



Alaska Department of Transportation and Public Facilities Transportation Carbon Reduction Strategy

A Five-Year Comprehensive Plan: 2024-2028

11/15/2023

Prepared for: Federal Highway Administration



THE STATE
of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

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November 15, 2023

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Re: Announcing DOT&PF's Transportation Carbon Reduction Strategy

Dear Ms. Garcia-Aline,

I am writing to announce a significant milestone in Alaska's journey towards environmental stewardship and sustainability: the launch of our state's inaugural Transportation Carbon Reduction Strategy (CRS). This strategy is a response to the mandates of the 2021 Bipartisan Infrastructure Law and the Carbon Reduction Program, tailored to address the unique transportation landscape of Alaska—a landscape characterized by vast expanses, a sparse population, and a heavy reliance on non-highway travel modes, especially aviation.

The CRS is a comprehensive approach that aligns with federal directives, requiring states to develop and update a carbon reduction strategy every four years. In Alaska's case, this involves a nuanced understanding of our state's geographical challenges and transportation needs. The strategy is sensitive to community sizes across Alaska, ensuring that funding and resources are allocated efficiently, with a focus on projects that mitigate on-road carbon emissions.

Alaska's transportation setting, with its vast and unique geographical challenges, requires a diverse mix of transportation modes. This diversity makes the reduction of transportation-related emissions a complex but crucial task. In terms of emissions profile, despite ranking 39th nationwide in CO₂ emissions, Alaska leads in per capita total energy consumption. The transportation sector, being the second-highest emitting sector in the state, necessitates focused reduction strategies.

The CRS also highlights the state's energy production profile, which currently relies on a blend of fossil fuel and renewable energy sources. A significant emphasis is placed on diversifying and optimizing energy usage. This includes the initiation of carbon management initiatives such as the Carbon Offset Credit Program, which emphasizes sequestration and management of carbon through nature-centric projects and renewable energy advancements.

"Keep Alaska Moving through service and infrastructure."



To achieve these objectives, the strategy introduces the Sustainable Transportation and Energy Program (STEP), which outlines various projects promoting a sustainable transportation system focusing on reduced GHG emissions, energy independence, and environmental health. The Carbon Reduction Implementation Plan provides a detailed roadmap for reducing transportation carbon emissions, detailing specific projects, funding, and strategic focus areas.

A comprehensive plan for Electric Vehicle (EV) infrastructure implementation is also a cornerstone of the CRS. This plan aims to increase EV adoption in Alaska, complemented by strategies for emissions reductions, promoting alternative transportation, congestion management, energy optimization, sustainable construction, and infrastructure development.

However, challenges abound. Alaska's vast and remote landscapes present unique challenges for transportation and energy infrastructure. Our heavy reliance on aviation and marine transport, combined with limited road networks, requires innovative solutions for reducing emissions. But these challenges also present opportunities for pioneering sustainable transportation solutions.

The DOT&PF's first Carbon Reduction Strategy is more than a plan; it is a commitment to reduce Alaska's carbon footprint while catering to its diverse transportation needs. By leveraging modern technologies, promoting alternative fuels, and focusing on sustainable practices, we are paving the way for a greener future.

Your support and collaboration are essential in this endeavor. Together, we can lead Alaska toward a more sustainable and environmentally responsible future.

Sincerely,

Ryan Anderson, P.E.
Commissioner



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ACRONYMS

ACC	Alaska Administrative Code
ADA	Americans with Disabilities Act
ADEC	Alaska Department of Environmental Conservation
AMHS	Alaska Marine Highway System
AMTS	Anchorage Metropolitan Area Transportation Solutions
ARRC	Alaska Railroad Corporation
BIL	Bipartisan Infrastructure Law
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
CO ₂ e	CO ₂ equivalent
CMAQ	Congestion Mitigation and Air Quality Improvement
CRP	Carbon Reduction Program
CRS	Carbon Reduction Strategy
DOT&PF	Alaska Department of Transportation and Public Facilities
EIA	Energy Information Administration
EPA	United States Environmental Protection Agency
EV	Electric Vehicle
FAST	Fairbanks Area Surface Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
HOV	High-Occupancy Vehicle
LBS	Pounds
LRTP	Long Range Transportation Plan
MACS	Metropolitan Area Commuter System
Mat-Su	Matanuska-Susitna
MSB	Mat-Su Borough
MVP	Mat-Su Valley Planning
MMT	Million Metric Tons
MPO	Metropolitan Planning Organization
MWh	Megawatt Hour(s)
NASA	National Aeronautics and Space Administration
NEVI	National Electric Vehicle Infrastructure Formula Program
PROTEC	Promoting Resilient Operations for Transformative, Efficient & Cost-Saving Transportation
SaaS	Software as a Service
SIP	Strategic Investment Plan
STEP	Sustainable Transportation Program
STIP	Statewide Transportation Implementation Plan
TIP	Transportation Implementation Plan
UAF	University of Alaska Fairbanks
U.S.C.	United States Code



Alaska Department of Transportation & Public Facilities Carbon Reduction Strategy

FOREWORD

In 2021, the Bipartisan Infrastructure Law heralded the Carbon Reduction Program, a federal initiative exclusively dedicated to supporting projects that aim to curtail transportation emissions. This program zeroes in on the reduction of carbon dioxide emissions from on-road highway sources within the transportation sector.

To be eligible for the program's funding, each state, in tandem with its metropolitan planning organizations, is mandated to craft a carbon reduction strategy within two years of the legislation's enactment, with subsequent updates every four years.

Alaska's inaugural Carbon Reduction Strategy for the transportation sector presents recommendations tailored to mitigate on-road carbon dioxide emissions, in alignment with the program's directives. Alaska's unique transportation landscape, characterized by its vast expanse yet sparse population density (1.3 individuals per square mile), poses distinct challenges. Many Alaskan communities remain disconnected from the National Highway System, leading to limited road-based travel. Moreover, with 86% of communities dependent on non-highway travel modes, aviation emerges as a primary mode of transportation¹. However, this strategy remains focused on on-road emissions, as mandated by the program.

Alaska's transportation energy infrastructure is diverse, with regions relying on varied energy sources, from coal and diesel to hydropower and natural gas. This diversity necessitates region-specific carbon reduction strategies. For instance, an electric vehicle powered by hydropower offers a more sustainable solution than one dependent on coal.

A comprehensive approach to carbon emissions in transportation considers both upstream (related to the production and transport of materials) and downstream (pertaining to the usage or disposal of materials) emissions². Given Alaska's reliance on diverse transportation modes for goods shipment, upstream emissions are particularly significant³. While this strategy emphasizes potential carbon dioxide reductions from various transportation projects, a thorough evaluation of Alaska's upstream and downstream emissions within the sector remains a future objective.

The strategies outlined herein require regional assessments due to Alaska's varied energy profiles in transportation. For a detailed understanding, refer to Appendix: Emissions Calculations and 8.0 Measuring Progress: Emissions Calculations which provide example project calculations based on proposed changes in Alaskan transportation infrastructure.

The Carbon Reduction Program allocates funds to entities like the Alaska Department of Transportation and Public Facilities and Metropolitan Planning Organizations, based on

¹ [Decarbonizing the critical sectors of aviation, shipping, road freight and industry to limit warming to 1.5–2°C](#)

² [Moving Low-Carbon Transportation in Xinjiang: Evidence from STIRPAT and Rigid Regression Models](#)

³ [Future Power Train Solutions for Long-Haul Trucks](#) ↵ ↵²



community size⁴. These entities are tasked with directing funds to transportation projects that mitigate on-road carbon dioxide emissions. However, this strategy does not impose any mandates on the public to participate in carbon reduction efforts.

Beyond its primary goal, this strategy envisions broader benefits for Alaska's transportation sector. It advocates for enhancements such as congestion relief, trail development for alternative transportation, traffic safety measures, advanced mass transit systems, and improved road visibility during winters⁵. Moreover, the strategy's emphasis on energy efficiency can significantly reduce transportation-related energy expenses, especially in regions with high energy costs⁶. While the primary objective remains carbon dioxide reduction, the ancillary benefits, such as safer transportation routes and reduced energy costs, might resonate more deeply with the Alaskan populace.

1.0 INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) proudly presents this Carbon Reduction Strategy (CRS), crafted in alignment with the directives of the Bipartisan Infrastructure Law (BIL) and the Infrastructure Investment and Jobs Act (IIJA) of 2021, as detailed in 23 U.S. Code (U.S.C.) 175. This strategy is further shaped by the guidelines of the Carbon Reduction Program (CRP).

The Alaska Transportation CRS delineates a roadmap to curtail transportation-related carbon dioxide (CO₂) emissions from on-road sources. It also highlights a suite of projects and strategies tailored for Alaska's unique transportation landscape. Key federal mandates that have informed this strategy include:

- Formulating the CRS within two years post the BIL's enactment.
- Periodic updates to the CRS at least every four years.
- Pinpointing and championing projects aimed at emission reduction.
- At the discretion of the State, quantify the total carbon emissions from production, transportation, and utilization of construction materials for transportation facilities.
- The CRS shall be appropriate to the population density and context of the state, including any designated Metropolitan Planning Organization (MPO).

The CRP's overarching objective is to channel funds towards projects that are at the forefront of reducing CO₂ emissions from on-road transportation avenues. With an allocation of an estimated \$81.6 million over the next five years under the CRP, Alaska is poised to make significant strides in this direction. In the Alaskan context, "on-road source" is an inclusive term that covers our terrestrial highways and our vital ferry routes via the Alaska Marine Highway System (AMHS).

CO₂, a predominant greenhouse gas (GHG), has been identified as a major contributor to the global climate change crisis⁷. Its ability to trap solar radiation within the Earth's atmosphere has led to a cascading effect of global warming. This warming manifests in various forms, including rising sea levels, altered precipitation patterns, heightened drought and flood risks, and threats to biodiversity⁸. CO₂ is predominantly released from burning fossil fuels, solid waste, and biological

⁴ [A Study on the Ship Energy Efficiency & GHG Emission Control in China](#) ←

⁵ [Future Power Train Solutions for Long-Haul Trucks](#)

⁶ [Moving Low-Carbon Transportation in Xinjiang: Evidence from STIRPAT and Rigid Regression Models](#)

⁷ [Can the bullet train speed up climate change mitigation in China](#)

⁸ [Transportation and Greenhouse Gas Emissions Trading. Final Technical Report](#)



materials. The planet's average surface temperature has surged by approximately two degrees Fahrenheit since the late 19th century, with increased CO₂ emissions being a significant contributor⁹

This CRS encapsulates DOT&PF's commitment to curbing CO₂ emissions through a blend of innovative projects, forward-thinking policies, incentives, and planning. The DOT&PF's ethos, "Keep Alaska Moving," resonates with the strategies detailed herein. Enhancing road networks, fostering active transportation connectivity, and other strategies underscore the synergy between Alaska's mobility and carbon reduction initiatives¹⁰.

Implementation responsibilities are distributed across various entities:

- State and local governments oversee maintenance for their respective roads.
- Mass transit options are the responsibility of local governments.
- Procurement processes, encompassing construction contractors or equipment and materials, are managed by state and local governments.

The CRP appropriates funds for States and MPOs. The strategies outlined here are holistic, catering to any entity across Alaska that benefits from this funding. It's worth noting that while the Alaska Railroad Corporation (ARRC) operates outside the DOT&PF's domain and isn't a direct funding recipient, the CRP provides for flexing funds from Federal Highway Administration (FHWA) to Federal Transit Administration (FTA) to accommodate ARRC projects that could reduce CO₂ emissions from railroad transportation, including transportation of passengers and freight¹¹

1.1 Carbon Reduction Strategy Alignment and Funding

Alaska, with its unique geographical and climatic conditions, faces distinct challenges and opportunities in the realm of sustainable development and environmental conservation. The vast landscapes, sparse population distribution, and reliance on various modes of transportation necessitate a comprehensive approach to carbon reduction, especially in the transportation and waste management sectors¹².

Transportation Sector. Alaska's transportation system is characterized by its diverse and extensive network, which is vital to the state's connectivity and economy. This system encompasses terrestrial highways, a robust maritime industry including the Alaska Marine Highway System (AMHS) and the newly designated M-11 Marine Highway routes by the USDOT Maritime Administration (MARAD), alongside a critical aviation sector. The integration of these maritime routes, crucial for both commercial and personal transit, highlights the significance of comprehensive carbon reduction strategies in this sector. Moreover, the rise in motorized vehicles and the heavy reliance on aviation further emphasize the need for effective environmental measures. In Alaska, a region noted for its ecological sensitivity, the impact of GHG emissions, mainly CO₂, CH₄, and N₂O, from the transportation sector is particularly consequential.

Solid Waste Sector. Given Alaska's remote communities and logistical challenges, solid waste management becomes a critical concern. Efficient waste management practices can significantly

⁹ [Can the bullet train speed up climate change mitigation in China](#)

¹⁰ [Effect of Community Road Infrastructure, Socio-Demographic and Street Pattern in Promoting Walking as Sustainable Transportation Mode](#)

¹¹ [A Holistic Approach for Estimating Carbon Emissions of Road and Rail Transport Systems](#)

¹² [Greenhouse Gas Emission Reduction Strategies in the Transportation and Solid Waste Sector](#)



reduce GHG emissions, especially methane, produced during the decomposition of organic waste in landfills.

Mitigation Strategies. For Alaska to address these challenges, a multi-faceted approach is essential. Adopting methods that inventory and project GHG emission loads can provide a clear roadmap for the future. Furthermore, leveraging tools like SWOT and QSPM analysis can help Alaska determine the most effective reduction strategies tailored to its unique conditions. For instance, promoting green open spaces and non-motorized pathways in urban areas like Anchorage or Juneau can reduce the carbon footprint. In remote communities, strategies could focus on efficient waste management practices and alternative energy sources for transportation.

1.1.1 DOT&PF's Sustainable Transportation and Energy Program

The Department of Transportation and Public Facilities (DOT&PF) has initiated the Sustainable Transportation and Energy Program (STEP) to bolster the Carbon Reduction Strategy (CRS). STEP outlines a series of projects and programs that embody Alaska's commitment to a multi-modal and sustainable transportation system. The objective of STEP is to enable communities to thrive through transportation investments that promote reduced GHG emissions, energy independence, efficiency, low-cost transportation, and a healthy environment.

Funding for STEP is sourced from various programs, including the Carbon Reduction Program (CRP), National Electric Vehicle Infrastructure (NEVI) Formula Program, the Low-No Emissions Vehicle Program, and the Congestion Mitigation and Air Quality Improvement (CMAQ). Additionally, discretionary grant programs are tapped into as they become available. While each of these programs has its unique requirements and focus, they collectively converge to fulfill the overarching objectives of STEP.

1.1.2 Sustainable Transportation and Energy Program (STEP) Funding Programs Outside of the Carbon Reduction Program

National Electric Vehicle Infrastructure Formula Program (NEVI). The NEVI program is established under the BIL and provides funding for strategic deployment of electric vehicle charging infrastructure to incentivize adoption and use of zero-emission vehicles. The program is formula-funded through FHWA. NEVI also provides funding to establish an interconnected network to facilitate data collection, access, and reliability in transportation systems¹³. Further detail on the NEVI program in Alaska is provided in 6.2 Electric Vehicles in Alaska.

Low-No Emission Vehicle Program. The Low-No Emissions Vehicle Program provides funding to state and local government transportation agencies for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. The Low- No Emission Vehicle Program is an FTA grant award program.

Congestion Mitigation and Air Quality Improvement (CMAQ). CMAQ is an ongoing FHWA program that provides funding for transportation projects and programs that help meet the requirements of the Clean Air Act and its amendments. Unlike the CRP, which targets reduction of GHG emissions (specifically CO₂), CMAQ targets reduction in criteria air pollutants, which are different environmental considerations than GHG₅. While GHG and criteria air pollutants considerations are not the same, often a reduction of one will result in a beneficial reduction of

¹³ To find out more, please read the Alaska Energy Authority's Alaska Electric Vehicle Infrastructure Deployment Plan found at: [https://www.akenergyauthority.org/Portals/0/Electric%20Vehicles/2022.07.29%20State%20of%20Alaska%20NEVI%20Plan%20\(Final\).pdf?ver=2022-06-29-152835-320](https://www.akenergyauthority.org/Portals/0/Electric%20Vehicles/2022.07.29%20State%20of%20Alaska%20NEVI%20Plan%20(Final).pdf?ver=2022-06-29-152835-320)



the other (e.g., a reduction in transportation emissions reduces both GHG CO₂ and criteria air pollutant carbon monoxide). Eligible projects under CMAQ include electric vehicles and charging stations, diesel engine replacements and retrofits, transit improvements, pedestrian and bicycle facilities, and shared micro-mobility projects (e.g., shared electric scooter systems). CMAQ projects provide a dual benefit by both reducing congestion related emissions and improving equitable access, safety, and use of new and emerging technology.

1.2 Integration of the Carbon Reduction Strategy with DOT&PF's Comprehensive Planning Framework

The Carbon Reduction Strategy (CRS) seamlessly integrates into the DOT&PF's holistic planning framework, often referred to as the "Family of Plans." This framework comprises a series of transportation blueprints that direct the State's endeavors in formulating policies, initiating programs, and launching projects. The aim is to perpetually enhance Alaska's transportation infrastructure. The "Family of Plans" is structured into three distinct tiers.

Tier I: Statewide Long-Range Transportation Plan (LRTP). The prevailing LRTP, titled "Let's Keep Moving 2036," sets the strategic direction for the state's transportation future. A subsequent draft, "Alaska Moves 2050," is currently under development by DOT&PF. The LRTP serves as the foundational plan, detailing the goals, policies, and actions aligned with federal and state regulations, including the 23 Code of Federal Regulations Section 450.216 and Title 17 of the Alaska Administrative Code, Section 05.120.

Tier II: Strategic Investment Plan (SIP). Operating in synergy with the LRTP, the SIP's primary function is to spotlight pivotal transportation system enhancements. It empowers DOT&PF to allocate funds for projects through the Statewide Transportation Improvement Program (STIP).

Tier III: Modal and System Plans. These plans delve into specific transportation systems, focusing on distinct modes or subjects, such as carbon reduction. The CRS is categorized under this tier, offering a strategic roadmap to achieve the overarching goal of diminishing carbon emissions.

Tier III: Collaborative Transportation Plans. This subset encompasses plans crafted through collaborative efforts between DOT&PF, governmental bodies, local communities, and tribal entities. Examples include city government LRTPs, community blueprints, and tribal transportation strategies.

Every plan within the "Family of Plans," irrespective of its tier, should resonate with the objectives, policies, and actions articulated in the statewide LRTP (Tier I). Specifically for the CRS, the draft "Sustainability in Alaska Moves 2050" advocates for a dedicated action to "analyze emission hotspots statewide, discern root causes, and identify impactful countermeasures to curtail carbon emissions." The CRS embodies the initial step in realizing this action, propelling Alaska towards a transportation future that is sustainable, environmentally conscious, and equitable.

1.3 Carbon Reduction Program-Eligible Projects

Eligible projects for funding under the Carbon Reduction Program (CRP) are delineated in 23 U.S.C. Part 175. These projects also encompass those described in established programs like CMAQ (Section 149(b)(4), Sections 142, 101(a)(29), 503(c)(4E)).



Table 1: FHWA Carbon Reduction Program Eligible Projects

Congestion Mitigation and Air Quality Improvement	As described in section 149(b)(4).
Public Transportation	Projects eligible for assistance under Section 142.
Pedestrian and Bicyclist Infrastructure	Projects detailed in Section 101(a)(29) which include construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized transportation modes.
Advanced Transportation Technologies	Projects as per Section 503(c)(4)(E) focusing on advanced transportation and congestion management technologies.
Intelligent Transportation Systems	<ul style="list-style-type: none"> • Deployment of infrastructure-based intelligent transportation systems capital improvements. • Installation of vehicle-to-infrastructure communications equipment, including retrofitting DSRC technology deployed in existing pilot programs to C-V2X technology.
Energy Efficiency	Replacement of street lighting and traffic control devices with energy-efficient alternatives.
Carbon Reduction Strategy Development	Development in accordance with subsection (d).
Demand Management	Projects or strategies supporting congestion pricing, shifting transportation demand to nonpeak hours, increasing vehicle occupancy rates, or reducing road demand, including electronic toll collection and travel demand management strategies.
Freight Movement	Efforts to minimize environmental and community impacts.
Alternative-Fuel Vehicles	<ul style="list-style-type: none"> • Support for deployment, including acquisition, installation, or operation of publicly accessible electric vehicle charging infrastructure or hydrogen, natural gas, or propane fueling infrastructure. • Purchase or lease of zero-emission construction equipment and vehicles, including supporting facilities.
Diesel Engine Retrofit	As described in section 149(b)(8).
Emission Reduction	Projects as per section 149(b)(5) that don't involve new capacity construction.
Port Facilities	Projects reducing transportation emissions, including advancement of port electrification.

1.4 Funding Apportionment

The FHWA provides a consolidated sum to each state, which is then distributed among various programs. The allocation for the CRP is determined by the percentages outlined in 23 U.S.C. 175(e)(1)(A) and 23 U.S.C. 175(e)(1)(B). DOT&PF is mandated to distribute 65 percent of these funds to urbanized regions based on their population density. Of the total \$81.6 million designated for Alaska, about 35 percent is allocated to MPOs. MPOs cater to urban areas with populations exceeding 50,000. In contrast, regions with populations under 50,000 are allotted roughly 30 percent of the urbanized area funds, with the exact amount based on population



density (as depicted in Figure 3). DOT&PF retains the discretion to distribute the residual 35 percent of funds across the state. Transferring funds to FTA projects is permissible and at the state's discretion. States are advised to commit CRP funds, either independently or combined with other eligible U.S. Department of Transportation funds, to projects that align with the strategies of this CRS. Additionally, a state can reallocate up to 50% of its annual funds between its various allocations, including programs like NHPP, STBG, HSIP, CMAQ, NHFP, and the PROTECT Formula Program.

Table 2. Carbon Reduction Program Summary of Available Funds for Alaska Fiscal Years (FY) 2022 to 2026

Urbanized Areas	Population Range	FY 2022-2026 ¹⁴
Metropolitan Planning Organizations (Anchorage Metropolitan Area Transportation Solutions and Fairbanks Area Surface Transportation)	Greater than 50,000	\$29.0 million
Small Urban and Rural Areas	Less than 50,000	\$24.0 million
Statewide	Any	\$28.6 million
Total	Statewide	\$81.6 million ¹⁵

2.0 CARBON REDUCTION STRATEGY DEVELOPMENT

The formulation of a Carbon Reduction Strategy (CRS) in the transportation sector is a pivotal step towards achieving sustainable and low-carbon transportation systems. As observed in various global industries, the proactive involvement of specific sectors in crafting and executing carbon reduction policies can lead to substantial emission reductions. In the transportation domain, a well-structured CRS can harness the potential of digital technologies, government policies, and industry innovations to foster green practices and reduce carbon footprints¹⁶. This section delves into the requirements, goals, and collaborative efforts essential for crafting a robust CRS that aligns with global sustainability objectives.

2.1 Requirements and Objectives of the Carbon Reduction Strategy

Pursuant to the Bipartisan Infrastructure Law (BIL), every state, in collaboration with designated Metropolitan Planning Organizations (MPOs), is mandated to formulate a Carbon Reduction Strategy (CRS) within two years following the enactment of 23 U.S.C. 175 on November 15, 2021. Subsequent updates to this strategy are expected every four years, with MPOs playing a consultative role. A comprehensive list of CRS prerequisites, as detailed in the Carbon Reduction Program (CRP), along with the specific measures taken to fulfill each requirement, is available in Appendix C. The CRS, as delineated in 23 U.S.C. 175(d), sets forth the primary objectives and requirements of such a strategy.

¹⁴ All dollar amounts are estimates and are subject to change.

¹⁵ Local match is required. Federal aid requirements for project delivery apply.

¹⁶ [Government Low-Carbon Policies Optimization for Smart Transportation Enterprises](#)



2.2 Engaging with Metropolitan Planning Organizations

The project team engaged in consultations with Alaska's two primary MPOs: Fairbanks Area Surface Transportation (FAST) Planning and Anchorage Metropolitan Area Transportation Solutions (AMATS). Additionally, discussions were held with a prospective MPO: Matanuska-Susitna (Mat-Su) Valley Planning (MVP).

Engagements with FAST Planning included sessions with the Staff and Technical Advisory Committee on May 3, 2023, and the Policy Board on May 17, 2023. Post these consultations, FAST Planning proposed actionable on-road CO₂ emission reduction initiatives and offered recommendations for their integration into the CRS. Some of these suggestions encompassed:

- Incorporation of alternative vehicle charging stations.
- Signal interconnect projects to enhance traffic flow.
- Promotion of transit usage and accessibility.
- Development of quantifiable metrics to evaluate air quality enhancements.
- Integration of roundabouts.
- Strategies to minimize traffic start and stop.

Conversations with AMATS spanned multiple committees throughout July and August 2023. While AMATS couldn't provide formal recommendations within the stipulated timeframe, they expressed their intent to do so before the CRS undergoes review and approval by the FHWA. The discussions revolved around carbon emission mitigation strategies, emphasizing reduced congestion, promotion of transit and active transportation, curbing individual vehicle miles, and encouraging the adoption of zero-emission vehicles. AMATS highlighted the success of their vanpooling initiative in curbing single-occupancy vehicle trips. Detailed meeting materials and summaries are archived in Appendix: Public Engagement

The draft CRS was shared with both FAST and AMATS on September 5, 2023, for their review and feedback. All received comments and suggestions were integrated into the final CRS, with formal feedback documented in Appendix: Public Engagement.

2.3 Stakeholder Engagement in CRS Development

The development of the Carbon Reduction Strategy (CRS) places a significant emphasis on inclusive stakeholder engagement. Recognizing the importance of public participation, DOT&PF launched an interactive StoryMap on its official website. This digital tool provides a comprehensive overview of the CRS's background, contextualizes its relevance to Alaska, and offers a platform for stakeholders to share their perspectives on carbon reduction measures through an online survey and the Smart Comment portal.

Our collaboration with Metropolitan Planning Organizations (MPOs) has been instrumental in broadening the outreach of the StoryMap. By sharing it with their networks, MPOs have encouraged a diverse range of stakeholders to provide feedback. All insights and suggestions gathered from these MPO sessions were meticulously assessed to ascertain their suitability for incorporation into the CRS. A comprehensive record of these engagements, including the feedback received, is documented in Appendix: Public Engagement.

Even after the plan is approved, the public will have consistent opportunities to engage in discussions on future carbon reduction initiatives, as highlighted in the Statewide Transportation Improvement Program (STIP), MPO Transportation Improvement Programs (TIPs), and other forthcoming planning endeavors. It's essential to highlight that the CRS is not a static document; it will undergo periodic reviews and updates, at least every four years, to ensure it remains aligned with evolving needs and best practices.



3.0 ALASKA’S TRANSPORTATION SETTING

Alaska, with its vast landscapes and unique geographical challenges, has a transportation system that is distinct from most other regions. The state's expansive area, combined with its remote and often inaccessible communities, necessitates a diverse mix of transportation modes. A significant portion, about 86%, of Alaskan communities are isolated, with no direct road access. The state's transportation matrix comprises roads and highways, which transform into winter trails and ice roads during colder months, ports and waterways, aviation, rail, and other innovative modes (Figure 6). The available infrastructure largely dictates transportation choices within each region.

Roads and highways, while essential, cover only a fraction of Alaska's vast expanse. DOT&PF oversees thousands of lane miles, but many communities remain unconnected by road. Instead, they rely on alternative modes of transportation, such as aviation and marine routes. Alaska boasts an extensive aviation system, with hundreds of registered airports, heliports, and seaplane bases. Given that over 80% of Alaskan communities are not connected by roads, air travel is not just a convenience but a necessity for many residents.

The Alaska Marine Highway System (AMHS) is another critical component of the state's transportation network, connecting numerous coastal communities. Only a handful of these communities are accessible by Alaska's road system, underscoring the importance of marine transportation.

Rail transportation, primarily through the Alaska Railroad, offers both passenger and freight services, connecting key regions from Fairbanks to Seward. Active transportation, such as walking and cycling, is also gaining traction, especially in urban areas. However, in many rural communities, these modes have always been essential.

Considering carbon emissions, the diverse transportation modes present both challenges and opportunities. The reliance on aviation and marine transport, while essential for connectivity, can contribute significantly to the state's carbon footprint. However, the increasing interest in active transportation and the potential for innovations in sustainable aviation and marine technologies offer pathways to reduce emissions.

Incorporating sustainability practices into Alaska's transportation system is crucial. As the global community moves towards more eco-friendly practices, understanding and optimizing the carbon emissions from Alaska's transportation sector will be pivotal. This will not only help in reducing the state's carbon footprint but also in ensuring that its unique transportation needs are met in the most sustainable way possible.

Table 3: Transportation Summary by Mode

Roads and Highways	DOT&PF manages 11,843 lane miles throughout Alaska. Road networks span from Unalaska Island in the southwest to Utqiagvik in the north, including paved and gravel roads, elevated boardwalks, and winter trails. The interstate highway system, while extensive, often consists of two-lane non-divided highways. Major urban networks are in Anchorage, Matanuska-Susitna Borough, Fairbanks North Star Borough, Kenai Peninsula Borough, and Juneau City and Borough.
Active Transportation	Active transportation, encompassing walking and cycling, is gaining traction in Alaska. While facilities for pedestrians and cyclists often coexist with the road network, there's a growing emphasis on integrating sidewalks, multi-use pathways, and bike lanes into new roadway projects, especially in urban areas. Both urban and rural communities in Alaska are witnessing a surge in interest in active transportation.



Aviation	Alaska boasts an extensive aviation network, arguably the largest in North America, with 765 registered facilities in 2021. DOT&PF has jurisdiction over 235 state airports, including two international airports in Anchorage and Fairbanks. Given that over 80% of Alaskan communities lack road connectivity, aviation plays a pivotal role, akin to roads in other states, ensuring the movement of goods and people.
Alaska Marine Highway System (AMHS)	The AMHS, covering 3,500 miles of coastline, connects 33 Alaskan communities and extends to Prince Rupert, British Columbia, and Bellingham, Washington. Only a handful of these communities have road access. The system operates with nine active ferries.
Rail	The Alaska Railroad mirrors the interstate highway system in its trajectory, spanning 482 miles from Fairbanks to Seward. It offers year-round passenger services and freight services, linking major port facilities and transportation hubs.
Transit	Public transit is not ubiquitous in Alaska. Where available, local governments manage it. Funding remains a challenge, with few transit systems having a dedicated source.
Ports and Waterways	Ports and waterways are vital for freight, passenger movement, and tourism. They also serve as lifelines for many remote Alaskan communities. While deepwater coastal ports handle the bulk of waterborne freight, inland waterways, facilitated by ports on rivers like the Yukon, Kuskokwim, and Tanana, are essential for smaller communities.
Other Modes	Alaska employs a variety of transportation modes, including ice roads in winter, board roads in remote communities, an extensive trail network, and winter trails connecting distant communities.
Other Facilities	DOT&PF's jurisdiction extends beyond transportation, overseeing 80 maintenance stations, 16 harbors, 851 bridges, a fleet of 7,366 state equipment and vehicles, 827 public facilities, nine weigh stations, and three tunnels, including the Anton Anderson Memorial Tunnel, North America's longest highway tunnel.

4.0 EMISSIONS IN ALASKA

Alaska's emissions profile is shaped by its unique geography, climate, and economic activities. The state's emissions are presented in millions of metric tons of CO₂ equivalency (MMT CO₂e), encompassing CO₂, CH₄, and other greenhouse gases.

4.1 CO₂ Emissions in Alaska

According to the U.S Energy Information Administration (EIA), as of 2021, Alaska ranked 39th nationwide in terms of CO₂ emissions. Despite this, Alaska stands out as the leading state in the U.S for per capita total energy consumption and expenditures. This high ranking can be attributed to Alaska's heavy reliance on air travel, its challenging climate, and the vast distances that need to be covered for transportation.

The primary sources for baseline CO₂ emissions data in Alaska are:



U.S Energy Information Administration (EIA): Provides up-to-date CO₂ emissions data as of 2021. The EIA database encompasses GHG emissions, with a specific focus on CO₂ emissions across all sectors.

Alaska Department of Environmental Conservation Report: Offers data on GHG emissions up to 2018, though not exclusively on CO₂ emissions. This report details transportation GHG emissions, differentiating between on-road and off-road sources in Alaska.

The Alaska Department of Environmental Conservation (ADEC), Division of Air Quality, has compiled the "Alaska Greenhouse Gas Emissions Inventory 1990-2020". This report indicates that CO₂ emissions in Alaska originate from various sectors, including electricity generation, residential and commercial activities, industry, transportation, waste decomposition, agriculture, and the disruption of emission sinks. Figure 1 includes the latest data from the Environmental Protection Agency (EPA) and depicts the percentage distribution of CO₂ emissions by sector. The industrial sector, which comprises oil and gas, mining, waste management, and agriculture, is the most significant contributor, accounting for 48.9% of emissions. Transportation follows closely, contributing to 33 percent of Alaska's CO₂ emissions, making it the second-highest emitting economic sector.

4.1.1 Alaska Emissions Compared to National Trends

Alaska's greenhouse gas (GHG) emissions profile is distinct due to its unique geographical, environmental, and economic conditions. According to the Energy Information Administration (EIA), based on total energy-related CO₂ emissions for 2020, Alaska was ranked 41st in emissions among states. In 2020, Alaska's total CO₂ emissions were reported at 33.4 million metric tons (MMT), an increase from previous years but still lower than the peak of 45.4 MMT in 2005. On a per capita basis, Alaska ranks fourth highest in the nation, and second for total energy expenditures¹. This ranking has remained consistent since 2015. The EIA attributes this to factors such as Alaska's Arctic environment, which results in long and harsh winters, and its economy's reliance on oil and natural gas extraction¹.

Furthermore, Alaska's total yearly CO₂ emissions rank 41st out of the fifty states and Puerto Rico, with 35.2 million tons recorded for 2019. In comparison, states with larger populations and economies, such as Texas and California, recorded emissions of 701.9 MMT and 363 MMT, respectively.

On a broader scale, Alaska's GHG emissions for 2020 constituted approximately 0.66% of the total nationwide GHG emissions. When considering global anthropogenic GHG emissions, which account for 36.44 billion tons per year (TPY), Alaska contributes a mere 0.000092672% of CO₂e to these global emissions.

Despite Alaska's relatively minor role in overall national and global greenhouse gas emissions, the state stands out for its high per capita emissions. This contrast is deeply rooted in Alaska's distinctive context. On one hand, its small population size typically leads to a lower total emissions output. However, Alaska's vast and rugged Arctic environment significantly elevates per capita energy and fuel needs, especially during prolonged, harsh winters. Furthermore, the state's prominent oil and natural gas industry, a major contributor to its economy, also adds substantially to its per capita emissions. Thus, Alaska's unique combination of a low population, an energy-intensive climate, and a major fossil fuel industry culminates in its high per capita emissions despite its smaller overall emissions contribution.

On a national scale, the U.S. transportation sector is the largest contributor to greenhouse gas emissions, primarily driven by road vehicles like cars and trucks. However, Alaska's transportation emissions profile is distinct due to its heavy reliance on aviation and marine transportation. While



road vehicles dominate the transportation emissions in the contiguous U.S., Alaska's vast landscapes and limited road networks necessitate a more diverse transportation mix. While Alaska's transportation emissions trends reflect its unique geographical and infrastructural challenges, its contribution to the nation's overall transportation emissions is relatively small.

4.1.2 Alaska Emissions by Sector

Alaska's emissions trajectory over the past thirty years presents a complex interplay of variables, influenced by infrastructure, technology, and resource utilization. The electrical generation sector reveals patterns of fuel combustion efficiency and technology adaptation, with coal combustion emissions indicating potential areas for technological intervention since 2013. The oil and gas sector's emissions data, juxtaposed with production metrics, offers insights into extraction and refining efficiencies. In transportation, the consistency of gasoline highway vehicle emissions, contrasted with the rise in diesel emissions, points to vehicular technology trends and fuel consumption patterns. The residential sector's data, particularly the spike in natural gas use, suggests infrastructural developments and shifts in energy consumption methodologies. Meanwhile, the agriculture and waste sectors underscore the engineering challenges and opportunities in waste management and sustainable farming practices. The role of emission sinks, from an engineering lens, emphasizes the importance of ecological infrastructure in carbon sequestration. Collectively, this analysis underscores the need for innovative engineering solutions to optimize resource utilization, enhance efficiency, and mitigate environmental impacts in Alaska's future.

Electrical Generation. In the realm of electrical generation, there has been a noticeable plateauing and slow decline in emissions from three of the four fuel combustion types since 1990. However, coal combustion emissions have seen an uptick since 2013. On the other hand, emissions from petroleum distillate (diesel) have slightly tapered off in the last two years of the reporting period, and natural gas emissions have consistently declined since their peak in 2012.

Oil and Gas. The oil and gas sector has witnessed a decrease in emissions between 1990 and 2020, primarily attributed to the decline in crude oil production and refining. Specifically, CH₄ emissions from oil production have declined by 0.325 MMT in the last five years. In contrast, natural gas production emissions saw a minor increase between 2017 and 2019 before decreasing by 0.134 MMT.

Transportation. Transportation emissions have shown varied trends. Gasoline highway vehicles' emissions have remained consistent over the past three decades, with a slight uptick to over two million TPY of CO₂e by 2018. Diesel highway vehicles have seen a steady increase in emissions since 1990, culminating just below 800,000 TPY of CO₂e by the end of the analysis period. Off-road vehicle emissions, which include aviation and marine sources, peaked in the mid to late 2000s but have experienced a slight decline in recent years. When examining on-road vehicle emissions trends from 1990 to 2018, emissions from gasoline highway vehicles have remained relatively consistent, with a slight increase to over two million tons per year (TPY) of CO₂e by 2018. Passenger vehicle emissions have also seen an increase, reaching over 1.33 million TPY since 1990.

Residential and Commercial. The residential sector has shown interesting trends. Statewide residential emissions have largely remained stable since 2013. However, there was a significant increase in residential natural gas use between 2019 and 2020, leading to a rise in emissions by 430,000 tons of CO₂e since 1990. This increase is noteworthy, especially considering the state's population grew by 181,000 during the same period.

Agriculture and Waste. Agriculture and waste sectors also contribute to the state's emissions. Agriculture produces GHGs through mechanisms like fertilizer converting to nitrous oxide and



decomposition from agricultural waste that produces methane. Waste decomposition, especially anaerobic decomposition of waste food, can release methane.

Emission Sinks. Lastly, emission sinks or reservoirs play a crucial role in the state's emissions profile. These are areas where carbon is removed from the atmosphere and sequestered. While wildfires produce CO₂, N₂O, and CH₄, the gases from wildfires are often absorbed by more productive recolonized vegetation.

Summary. Understanding Alaska's emissions trends over the past three decades is pivotal for shaping future policies and strategies. These trends reflect the state's evolving economic activities, technological advancements, and policy measures. While some sectors have seen increases in emissions, others have witnessed declines, emphasizing the need for a comprehensive approach to achieve broader environmental and sustainability goals.

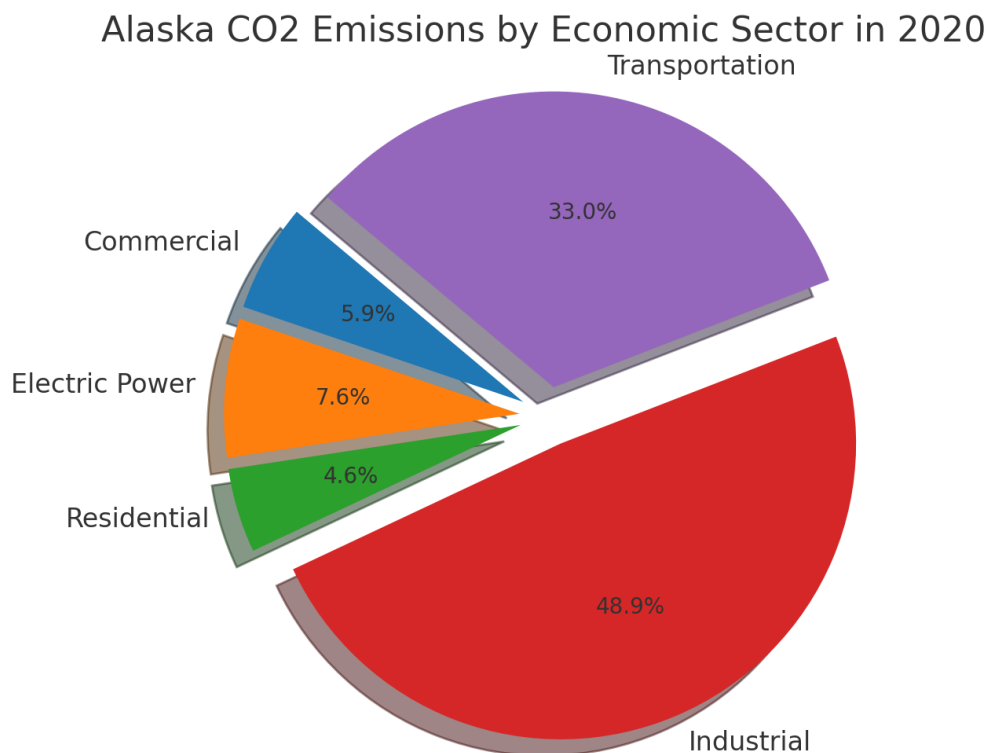


Figure 1: Alaska CO₂ Emissions by Economic Sector in 2020

4.2 Transportation GHG Emissions in Alaska

Alaska's unique geographical and climatic conditions have shaped its transportation infrastructure and, consequently, its greenhouse gas (GHG) emissions profile. The state's reliance on various modes of transportation, both on-road and off-road, has implications for its carbon footprint. The primary contributors to the state's transportation emissions are aviation, marine vessels, and on-road vehicle traffic.

4.3 Trends in Alaska Emissions

Electrical Generation: Emissions from electrical generation, especially from natural gas and coal, are significant. The shift in electrical generation methods (such as increased use of



renewable energy) could indirectly affect transportation emissions, particularly if electric vehicles become more prevalent.

Natural Gas and Coal Emissions: Trends in these sectors show fluctuations over the years. Reductions in natural gas emissions and increased coal usage in certain areas might impact transportation policies and fuel usage patterns in Alaska.

Petroleum Distillate (Diesel) Emissions: Diesel is a key fuel for transportation, and the document notes that diesel-fired electrical generation trends have remained stable. Rural Alaska, in particular, relies heavily on diesel due to logistical challenges, which could be indicative of diesel usage trends in transportation.

Oil and Gas Facilities: The emissions from these facilities can be a proxy for understanding the broader energy landscape in Alaska, which indirectly impacts transportation fuels availability and usage patterns.

Aviation Emissions. The aviation industry in Alaska is extensive, serving both large urban centers and smaller remote communities. Major air hubs are situated in Anchorage, Fairbanks, Juneau, and Ketchikan. Notably, the Ted Stevens-Anchorage International Airport has emerged as a significant cargo hub for trans-Pacific air freight, while Fairbanks stands as the primary cargo and passenger hub for Interior Alaska. Both these cities also accommodate active military air bases. Furthermore, the state's vast network of single and two-engine light aircraft highlights the importance of air travel in connecting its remote regions. Emissions from this sector peaked at nearly 14 MMT in the mid-2000s but saw a decline to less than eight MMT by 2018.

Maritime Emissions. Alaska boasts a robust marine industry, which plays a pivotal role in connecting its communities to trans-Pacific trade routes and markets in the contiguous United States. The state has also become a sought-after destination for the international cruise industry, especially during the warmer months. Additionally, Alaska's fishing industry, operating year-round across regions like the Gulf of Alaska, Bering Sea, and North Pacific Ocean, is a testament to its marine significance. However, it's crucial to note that international shipping routes traversing federal or state waters are not represented in the State GHG Inventory Tool (SIT) and, as such, are excluded from this document. Maritime emissions, which aren't differentiated by vessel type in the ADEC report, have remained relatively stable since 2009, fluctuating between 50,000 and 100,000 metric tons annually.

On-Road Emissions. On the road, Alaska's transportation is somewhat limited, with the primary activity centered on the Alaska Highway, linking the Kenai Peninsula, Fairbanks, and the Alcan Highway border crossing into the Yukon Territory. Many of Alaska's remote communities outside the 'Railbelt and Roadbelt' areas have sparse intercity road connections. As a result, residents in regions like Western and Northern Alaska often turn to off-road vehicles, complemented by personal marine and aviation traffic.

The ADEC report, which categorizes emissions by CO₂ equivalent (CO₂e), provides a detailed breakdown of on-road vehicle emissions up to 2018. This category encompasses passenger vehicles, light-duty trucks, and diesel highway emissions. The emissions from highway vehicles are calculated using Vehicle Miles Traveled (VMT) averages. This tool also factors in the average vehicle age to produce a comprehensive statewide emissions profile. Notably, despite Alaska's declining population, passenger vehicle emissions reached 1.4 MMT in 2018, the highest since 1990. This suggests a potential shift in vehicle usage patterns, or the types of vehicles being



used. Light-duty trucks, which include SUVs and personal pick-up trucks, contributed approximately 0.5 MMT in the same year. Diesel highway emissions, which have seen a steady increase since the 1990s, registered 0.8 MMT in 2018.

Rail. Lastly, when it comes to railroads, Alaska's network is relatively limited. The Alaska Railway (AKRR) connects Seward and Fairbanks, while the smaller White Pass and Yukon Railway (WPYRR) operates between Skagway and Carcross in the Yukon Territory. In essence, Alaska's diverse transportation sector, shaped by its geographical challenges and remote communities, underscores the importance of understanding its emissions profile to meet broader environmental objectives. Locomotive emissions, while minimal, range between 7,000 and 37,200 metric tons annually.

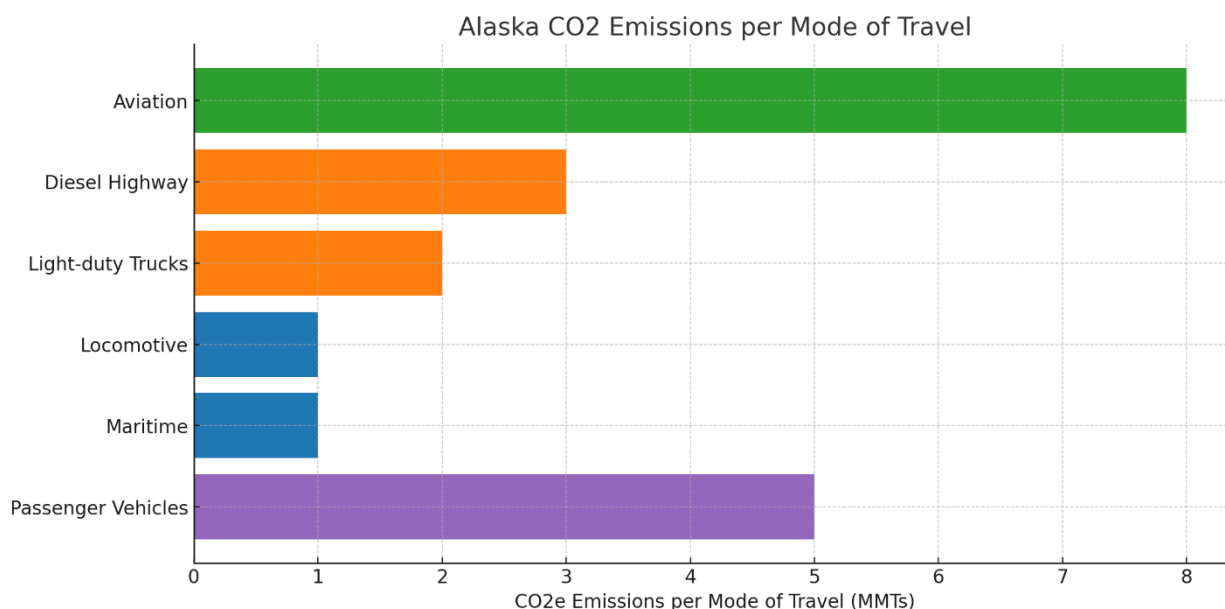


Figure 2: Alaska CO2e Emissions per Mode of Travel (MMTs)

Comparative Analysis and Insights. When juxtaposed, aviation's contribution to GHG emissions in Alaska is striking, with nearly 8 MMT, while all on-road sources combined account for less than 3 MMT. This highlights Alaska's unique transportation dynamics, where air travel often serves as the primary mode of inter-community connectivity due to its vast and challenging terrains. Alaska's transportation emissions profile underscores the need for targeted interventions and strategies. While the state's unique geographical and climatic conditions present challenges, they also offer opportunities for innovative solutions to reduce its carbon footprint.

5.0 ALASKA'S ENERGY PRODUCTION

Alaska's energy infrastructure, as depicted in Figure 3, is a complex amalgamation of diverse energy sources, including natural gas, coal, petroleum, hydroelectric, wind, solar, biomass, and battery storage. Energy Information Administration (EIA) data indicates that natural gas is the predominant energy source for electricity generation in Alaska, with a monthly consumption of 245,000 MWh. Hydroelectric follows at 87,000 MWh, petroleum at 85,000 MWh, coal at 59,000 MWh, and non-hydroelectric renewables at 17,000 MWh.

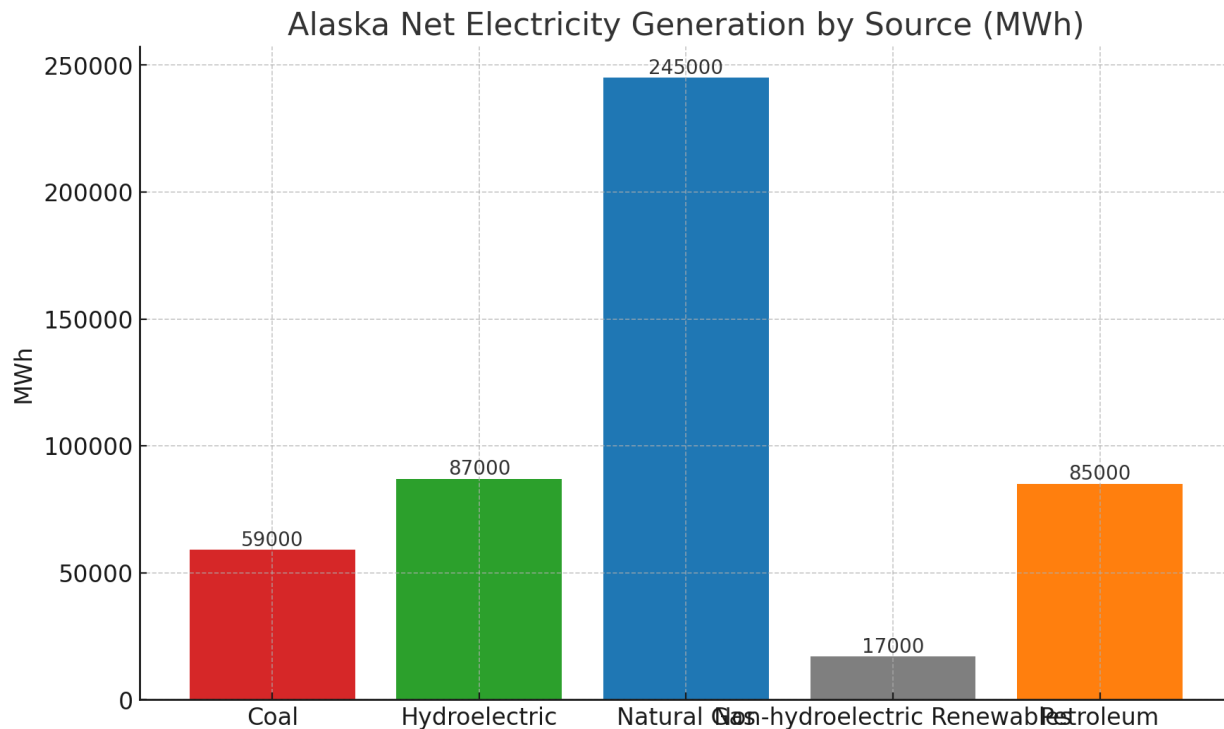


Figure 3: Alaska Net Electricity Generation by Source (MWh)

The state's energy grid is supported by 151 generation facilities. These facilities not only power residential and commercial establishments but also play a pivotal role in transportation infrastructure, such as lighting and charging stations. This interconnectedness implies that any shift in energy production directly impacts the transportation sector's CO2 emissions.

In rural Alaska, the energy matrix is predominantly petroleum-based. However, urban centers like Anchorage and the Kenai Peninsula predominantly utilize natural gas. Hydroelectricity complements natural gas in Southcentral Alaska and is the primary energy source in Southeast Alaska. The Interior Alaska region, on the other hand, relies on coal and petroleum. Non-hydroelectric renewables are interspersed across the state, indicating potential areas for expansion.

5.1 Fossil Fuel Energy Sources

In Alaska, natural gas is a dominant energy source for electricity generation, and the state boasts the third-largest natural gas reserves in the nation. Coal remains a significant energy contributor, though its emissions have increased since 2013. Meanwhile, despite a decline in crude oil production and refining leading to reduced emissions since 1990, rural Alaskan communities continue to depend heavily on petroleum-based energy.

Table 4: Alaska Fossil Fuel Energy Sources

Natural Gas	Natural gas stands out as a primary source of energy for electricity generation in Alaska. The Energy Information Administration (EIA) reports that natural gas consumption for electricity generation in the state is approximately 245,000 megawatt hours (MWh) monthly ¹⁷ . Alaska's proven natural gas reserves rank third among the states, showcasing its vast potential as a domestic energy
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¹⁷ [EIA](#)



	source ¹⁸ . The state is also in the process of developing an 800-mile pipeline to transport the North Slope's natural gas to international markets, with potential spur pipelines to supply natural gas energy to communities along its route.
Coal	Coal combustion has been a significant contributor to Alaska's energy production. There has been an uptick in coal combustion emissions since 2013.
Oil and Petroleum	The decline in crude oil production and refining has led to a decrease in emissions from the oil and gas sector between 1990 and 2020. However, rural Alaska primarily relies on petroleum-based energy sources.

5.2 Renewable Energy Sources

Alaska's strategic position as an energy-rich state is evident. Beyond the current infrastructure, the state is actively exploring innovative energy sources to enhance efficiency and reduce costs, especially for its remote communities. The state's vision is to provide affordable energy, targeting 10 cents power for all Alaskans by 2030. This vision is backed by initiatives in tidal energy, geothermal energy, nuclear microreactors, wind, solar, and natural gas.

Tidal energy, leveraging Alaska's extensive coastline, especially the kinetic energy from Cook Inlet's tides, offers a promising renewable energy source. Geothermal energy, tapping into Alaska's 97 thermal springs, provides a consistent energy source, unaffected by weather variations. The recent legislative update in 2022, facilitating the siting of nuclear microreactors, showcases the state's forward-thinking approach to harnessing nuclear energy. Wind and solar, though currently contributing a minor fraction to the state's energy grid, have vast potential, especially with the Alaska Energy Authority's (AEA) backing. Natural gas, with Alaska ranking third in proven reserves, remains a cornerstone of the state's energy strategy, with ambitious projects like the 800-mile pipeline underway.

Table 5: Alaska Renewable Energy Sources

Solar	Solar energy, although accounting for less than one percent of the state's electric grid, is gaining traction. The Alaska Energy Authority (AEA) has funded solar energy projects, leading to the establishment of new solar electric sources in various regions ¹⁹ .
Wind	Alaska's wind resources, especially in its western and coastal regions, are abundant ²⁰ . Wind power contributes to 2.4 percent of the energy for Alaska's electric grid. The AEA supports research and development efforts for rural and Arctic wind applications.
Tidal Energy	Alaska's extensive coastline offers potential for tidal energy production. Underwater turbines can harness the kinetic energy from tidal currents, especially in areas like Cook Inlet, which boasts one of the world's largest tidal ranges ²¹ .

¹⁸ [Alaska's Natural Gas Reserves](#)

¹⁹ [Golden Valley Electric Association](#)

²⁰ [Alaska Energy Authority](#)

²¹ [National Renewable Energy Lab](#)



Geothermal	With 97 known thermal springs spanning the state, geothermal energy presents a reliable and renewable energy source ²² . The Alaska Department of Natural Resources administers a program to lease lands with geothermal potential for development.
Nuclear Microreactors	In 2022, Alaska updated its statutes to streamline the permitting process for siting nuclear microreactors, which are prefabricated units transportable by truck or barge, capable of providing up to 20 megawatts of thermal energy ²³ .
Hydroelectric	Hydroelectric consumption for electricity generation is reported at 87,000 MWh, supplementing natural gas in Southcentral Alaska and serving as the predominant energy source for Southeast Alaska.

Incorporating energy-efficient transportation measures, such as LED lighting and vehicle electrification, can further optimize energy consumption. Emission sinks or reservoirs, areas where carbon is removed from the atmosphere and sequestered, play a pivotal role in Alaska's emissions profile. While wildfires produce greenhouse gases, the emissions are often absorbed by recolonized vegetation, aiding in carbon sequestration. These strategies, combined with the state's diverse energy initiatives, pave the way for a resilient, cost-effective, and sustainable energy future for Alaska.

6.0 ALASKA'S CARBON INITIATIVES

6.0 Carbon Management

Alaska is actively engaging in several initiatives to manage and reduce its carbon footprint. One of the prominent initiatives is the Carbon Offset Credit Program, spearheaded by the Department of Natural Resources (DNR). This program facilitates businesses or entities emitting CO₂ to counterbalance their emissions by investing in credits from nature-centric projects on State-owned land.

Moreover, the Alaska Energy Authority (AEA) champions renewable energy and energy efficiency programs. In the transportation sector, the emphasis is on electrification, with initiatives like the Alaska Electric Vehicle Working Group, the EV rapid charging infrastructure, and the execution of the National Electric Vehicle Infrastructure (NEVI) Formula Program.

6.1 Carbon Sequestration and Economic Diversification

Alaska, with its vast and diverse landscapes, is uniquely positioned to play a pivotal role in carbon sequestration, a crucial strategy in the global effort to mitigate carbon emissions. The state has recognized the potential of carbon offsets as a revenue source and has initiated the Senate Bill (SB) 48, laying the groundwork for a statewide carbon offset program within the Department of Natural Resources (DNR). This program emphasizes the importance of maintaining the accessibility of lands for Alaskans' recreational activities, ensuring no hindrance to natural resource development, and not imposing emission limits on businesses or individuals.

The program's primary focus is on carbon sequestration on state lands, particularly through forestry-driven carbon credit opportunities and other nature-based carbon offset avenues. The DNR has identified forests in the Matanuska-Susitna Borough, Tanana Valley, and near Haines as potential carbon offset sources. However, the recent spruce bark beetle infestation and the heightened potential for forest fires add complexities to these efforts. These challenges

²² [Alaska Department of Natural Resources](#)

²³ [Alaska Statute 18.45](#)



necessitate proactive management strategies, such as selective logging and controlled burns, to protect and maintain the forests' health and carbon-capturing capabilities.

Additionally, strategies like proactive wildfire management, tree replanting, and marine-based solutions such as kelp farming are being explored.

In addition to forest-based solutions, strategies like tree replanting, marine-based solutions such as kelp farming, and proactive wildfire management are being explored. Complementing these efforts, Alaska's boreal ecosystems and permafrost regions offer significant carbon sequestration potential. Research underscores the role of fire, forest succession, and permafrost in influencing carbon dynamics within these ecosystems. Inundated wetlands, characterized by slow decomposition and high primary productivity, have been highlighted as potential carbon sinks. Restoring these wetlands can serve as an effective negative emission technology. Furthermore, integrating vegetation in urban environments, as discussed in studies on carbon-positive buildings, can also contribute to carbon sequestration.

DNR is in the process of drafting regulations for the offset market and will collaborate with external auditors to validate potential offsets before listing them on registries. Governor Dunleavy's carbon offset program represents a forward-thinking economic strategy that leverages Alaska's natural resources to create a new revenue stream while simultaneously contributing to global carbon reduction efforts.

The program includes several key components:

1. **Innovative Economic Diversification:** As traditional oil revenues decline, Alaska must explore alternative revenue sources to support its economy. The carbon offset program presents an innovative way to monetize the state's vast forest resources without depleting them, ensuring long-term economic sustainability.
2. **Pragmatic Environmentalism:** Dunleavy's plan pragmatically uses market-based mechanisms to encourage environmental stewardship. By selling carbon credits, Alaska can help fund its budgetary needs while indirectly promoting global carbon emission reductions.
3. **Balanced Approach to Forestry Management:** The program maintains a balance by monetizing the carbon storage of standing forests while allowing for the responsible harvesting of timber.
4. **Market Responsiveness:** The voluntary international forestry carbon market provides immediate opportunities for revenue that Alaska can harness.
5. **Catalyst for Renewable Energy Investment:** By directing a portion of the carbon credit revenues to a renewable energy fund, Alaska is taking a step towards supporting cleaner energy sources.
6. **Engagement with Global Corporations:** Corporations worldwide are seeking to mitigate their carbon footprints, and Alaska's carbon offset program allows these entities to invest in the state's natural wealth.
7. **Meeting Demand for Carbon Offsets:** Alaska's strategy positions the state as a key player in meeting the growing demand for carbon offsets.
8. **Proactive Forest Management:** The preemptive approach to managing beetle infestations and fire-prone areas by selective logging could protect the forest's overall health and carbon capture capacity in the long run.



9. **Strategic Economic Leadership:** Governor Dunleavy's approach reflects strategic leadership. By capitalizing on the carbon offset market now, Alaska can gain a foothold in what is likely to become a more regulated and robust market in the future.

Governor Dunleavy's carbon offset program can be seen not just as a financial necessity, but as a transitional strategy that acknowledges the state's economic realities while also participating in the global effort to address climate change. It's a strategic pivot that shows foresight in economic planning and environmental responsibility, paving the way for a more sustainable and financially secure future for Alaska.

6.2 Electric Vehicles in Alaska

The "State of Alaska FY 24 Electric Vehicle Infrastructure Implementation Plan²⁴" provides a comprehensive look into the current state and future prospects of EV adoption in Alaska. It was developed by the Alaska Energy Authority (AEA), DOT&PF, and various stakeholders, including electric vehicle stakeholders, utilities, communities, and residents. The document is a draft plan that outlines the strategy for implementing electric vehicle (EV) infrastructure in Alaska using NEVI funds. AEA is the State Energy Office and the lead agency for statewide energy policy and program development. They have been designated, through an MOA with DOT&PF, as the state's lead agency for EV planning and implementation.

Phases of NEVI Implementation:

- **Phase 1:** Build Out Alaska's Alternative Fuel Corridor (2022-2024)
- **Phase 2:** Build Out Alaska's Highway and Marine Highway Systems (2024-2026)
- **Phase 3:** Install Charging Stations in Rural Hub Communities (2025-2026)
- **Phase 4:** Develop Charging Sites in Urban and "Destination" Locations (2026)

Present Day

As of May 2023, Alaska boasted 1,875 registered EVs, a commendable 50% surge from December 2021's 1,250 registrations. However, with an EV penetration rate of 0.36%, the state still trails the national average. Interestingly, Alaskans show a strong preference for Sport Utility Vehicles (SUVs) and pickup trucks, which make up 80% of the state's new vehicle purchases. Electric SUVs currently represent about 11% of the state's EVs, with electric pickup trucks just shy of 2%. Notably, while Tesla once dominated the Alaskan market with a 53% share in 2022, its dominance dwindled to 40% by 2023, with Chevrolet emerging as a strong competitor.

Through funding from the Volkswagen (VW) diesel emissions settlement²⁵, a corridor from Kenai Peninsula to Healy features 15 fast chargers and eight Level 2 chargers, strategically placed at nine charging stations, ensuring that each station is within a 100-mile radius of its neighbors. As of July 2023, eight of these sites, located in Anchorage, Chugiak, Healy, Homer, Cantwell, Seward, Soldotna, and Trapper Creek, are operational. The ninth station, situated at Cooper Landing, is under construction.

EV Projections

Alaska's EV growth projections are categorized into two scenarios. The "Continued Growth Scenario" foresees a steady growth rate of 42.05% from 2020 to 2021, translating to an average

²⁴<https://www.akenergyauthority.org/Portals/0/Electric%20Vehicles/2023.06.19%20Alaska%20FY24%20NEVI%20Plan%2065%20Percent%20Draft.pdf>

²⁵ <https://www.akenergyauthority.org/What-We-Do/Renewable-Energy-and-Energy-Efficiency-Programs/Electric-Vehicles/EV-Fast-Charging-Network>



of 1,200 EV sales annually. This would result in an addition of roughly 6,000 new EV registrations over a span of five years, pushing the penetration rate to 1.01% by 2026, a significant leap from 0.20% in 2021. On the other hand, the "Aggressive Growth Scenario" is more optimistic, predicting a 63% growth rate. This scenario anticipates the introduction of new battery electric pickup truck models and a broader range of SUV offerings. If this scenario plays out, Alaska could witness about 2,600 EV sales annually, adding a whopping 13,160 new EV registrations over five years, and potentially elevating the penetration rate to 2.02% by 2026.

Several factors are poised to influence Alaska's EV adoption rate. The state's inclination towards SUVs and pickup trucks suggests that the introduction of battery electric pickup trucks could significantly amplify the EV market share. However, external factors like supply chain disruptions and challenges in vehicle availability have temporarily hindered registration growth. On the infrastructural front, the Bipartisan Infrastructure Law (BIL) is set to bolster the development of a statewide EV fast charging network and community-based charging installations. The NEVI program, with its allocation of \$5 billion over five years, aims to establish EV service equipment charging stations along major highway corridors. Alaska stands to benefit significantly from this initiative, with a projected receipt of over \$50 million over the next five years.

Looking Ahead

While Alaska's present EV adoption rate might be modest compared to the national average, the state is on the cusp of a significant EV revolution. With infrastructural support, the introduction of EV models tailored to Alaskan preferences, and continued collaboration between the public and private sectors, Alaska's EV future is bright and promising.

The scarcity of EV charging facilities has been a notable barrier to EV adoption in Alaska. Consequently, the development of a fast-charging network is pivotal for the broader acceptance of EV technology. The transition to electric vehicles can be incentivized through various means. For instance, a study on the electrification of the transport sector highlighted that subsidies on EV purchases and the expansion of fast-charging infrastructure can significantly boost EV adoption²⁶. Such measures can have both immediate and long-term impacts on emissions reduction. Investing in charging infrastructure can lead to sustained reductions in emissions over several years.

The NEVI deployment plan identifies where and when EV charging infrastructure should be deployed, considering factors such as consumer adoption, installation costs, return on investment, utility availability, roadway traffic, weather, and site host availability. The deployment plan is expected to evolve over the five-year NEVI program, incorporating lessons learned, data collection, and continued stakeholder engagement.

Specific Infrastructure Recommendations to Improve EV Adoption

To improve the percentage of EVs in Alaska, the state needs to focus on a comprehensive deployment of EV charging infrastructure, considering both urban and rural areas, and ensuring that the infrastructure is user-friendly, efficient, and future-proofed. Specific suggestions include:

- Adequate lighting and restrooms at charging stations, ensuring ADA compliance.
- Clearly marked spaces designated for EVs only.
- Signs recommending charging up to 80% and directing users to the charging location.

²⁶ ["Policies for Electrification of the Car Fleet in the Short and Long Run - Subsidizing Electric Vehicles or Subsidizing Charging Stations?"](#)



- Futureproofing of sites by funding the installation of additional make-ready infrastructure at the same time as initial chargers are deployed.
- Publicly funded chargers should be capable of charging at a rate of 350kW.
- EV charging connectors should be SAE J1772 and SAE CCS connectors.
- Chargers must accept credit cards and other forms of payment.
- Consideration for adding Tesla charging adapters at each location.
- Work with the Department of Motor Vehicles (DMV) to efficiently designate and report on EVs.
- Funding to increase the capacity of existing power supplies and improve site access.
- After the EV infrastructure installation, there will be operational considerations, including electricity and maintenance costs and associated networking fees.

6.3 Carbon Reduction Emissions Milestones

In aiming to reduce its carbon footprint, the state is focusing on key sectors like transportation and industry that contribute significantly to emissions. Recognizing the complexities in managing emissions, the state proposes the following aspirations, which are indicative rather than time-bound goals.

Emissions reductions of 15%: This milestone reflects the potential impact of reducing GHG emissions from 2020 levels by 15%. This would entail targeting high-emission sectors with immediate measures to reduce emissions.

Emissions reductions of 30%: This milestone represents the challenging goal of cutting GHG emissions by 30% from 2020 levels. Achieving this would likely require a comprehensive transformation of the state's energy infrastructure, adopting sustainable practices across all sectors, and harnessing Alaska's natural resources for carbon sequestration.

Table 6: Alaska Carbon Emission Reduction Calculations

	Current Emissions (MMT/year)	Emissions After 15% Reduction (MMT/year)	Emissions After 30% Reduction (MMT/year)
Passenger vehicles	1.4	1.19	0.98
Diesel highways	0.8	0.68	0.56
Light-duty trucks	0.5	0.43	0.35
Maritime operations	0.1	0.085	0.07
Locomotives	0.03	0.025	0.02
Total	2.83	2.41	1.98
Reduction from Baseline	0	0.42	.085

While DOT&PF has strategies to achieve reductions, many factors that influence outcomes are beyond the Department's direct control. Therefore, while goal-oriented, it's essential to approach these milestones with an understanding of their aspirational nature in the context of broader environmental and economic factors.

7.0 THE MULTI-FACETED APPROACH TO SUSTAINABLE TRANSPORTATION IN ALASKA

The Alaska Transportation Carbon Reduction Strategy represents a comprehensive and forward-thinking plan designed to revolutionize the state's transportation sector. This approach encompasses seven distinct yet interrelated core themes, each targeting a specific aspect of transportation. Together, they form a cohesive strategy aimed at fostering a transportation network that is not only efficient and responsive to current needs but also sustainable, reducing



environmental impact and paving the way for a cleaner, greener future in Alaska. DOT&PF plays a pivotal role in promoting carbon-efficient decisions within the transportation sector. By focusing on the planning, design, and construction of sustainable infrastructure, DOT&PF not only enhances the transportation system but also sets a standard through its own carbon-conscious operations, fleet management, procurement decisions, and construction methodologies.

Alternative Fuel Production: Foster the development of alternative and renewable fuel manufacturing in the transportation sector. It emphasizes the creation and support of facilities for producing hydrogen, natural gas, propane, alcohols (e.g., ethanol, methanol, butanol), and oils derived from vegetables or waste. By investing in the manufacturing infrastructure for these fuels, the strategy aims to not only facilitate their integration into transportation systems but also to establish a sustainable and self-reliant fuel supply chain within the sector.

Advanced Carbon Management: Proactively manage carbon emissions by utilizing geological formations for carbon sequestration and Alaska's forests for carbon capture, while integrating sustainable energy into the transportation infrastructure.

Multimodal Alternative Fuel Supply Network: Foster the adoption of alternative fuels across different transportation modes by building infrastructure for electric and hybrid vehicles. The strategy also extends to marine transportation electrification and supports aviation and rail sector pilot projects.

Low Emission Vehicles and Energy-Efficient Infrastructure. Expand the use of electric, hybrid, and hydrogen vehicles, particularly in public and freight transport, alongside the transition of state-owned fleet vehicles to eco-friendly models. Implement energy-efficient lighting solutions, such as LED streetlights, to reduce overall energy consumption.

Active Transportation and Transit Enhancements: Encourage the use of Alaska Railroad for passenger services, enhance mass transit options, and develop infrastructure that supports pedestrian and cyclist mobility. This includes constructing sidewalks, bike lanes, and safe crosswalks, and promoting non-vehicular transportation modes.

Smart Traffic Solutions: Implement intelligent technology solutions for traffic management, such as interconnected traffic signals, advanced warning systems, and vehicle-to-infrastructure communications. Develop roundabouts and alternative routes to improve traffic flow and reduce congestion-related emissions.

Sustainable Construction Practices: Adopting construction methods that prioritize carbon reduction.

These strategies align with the Carbon Reduction Plan (CRP) objectives, such as minimizing single-occupancy vehicle trips, promoting low-emission transit options, and endorsing eco-friendly construction techniques.

To prioritize efforts, sources of on-road and off-road CO₂ emissions have been ranked based on their emission levels.



Transportation Carbon Reduction Strategies

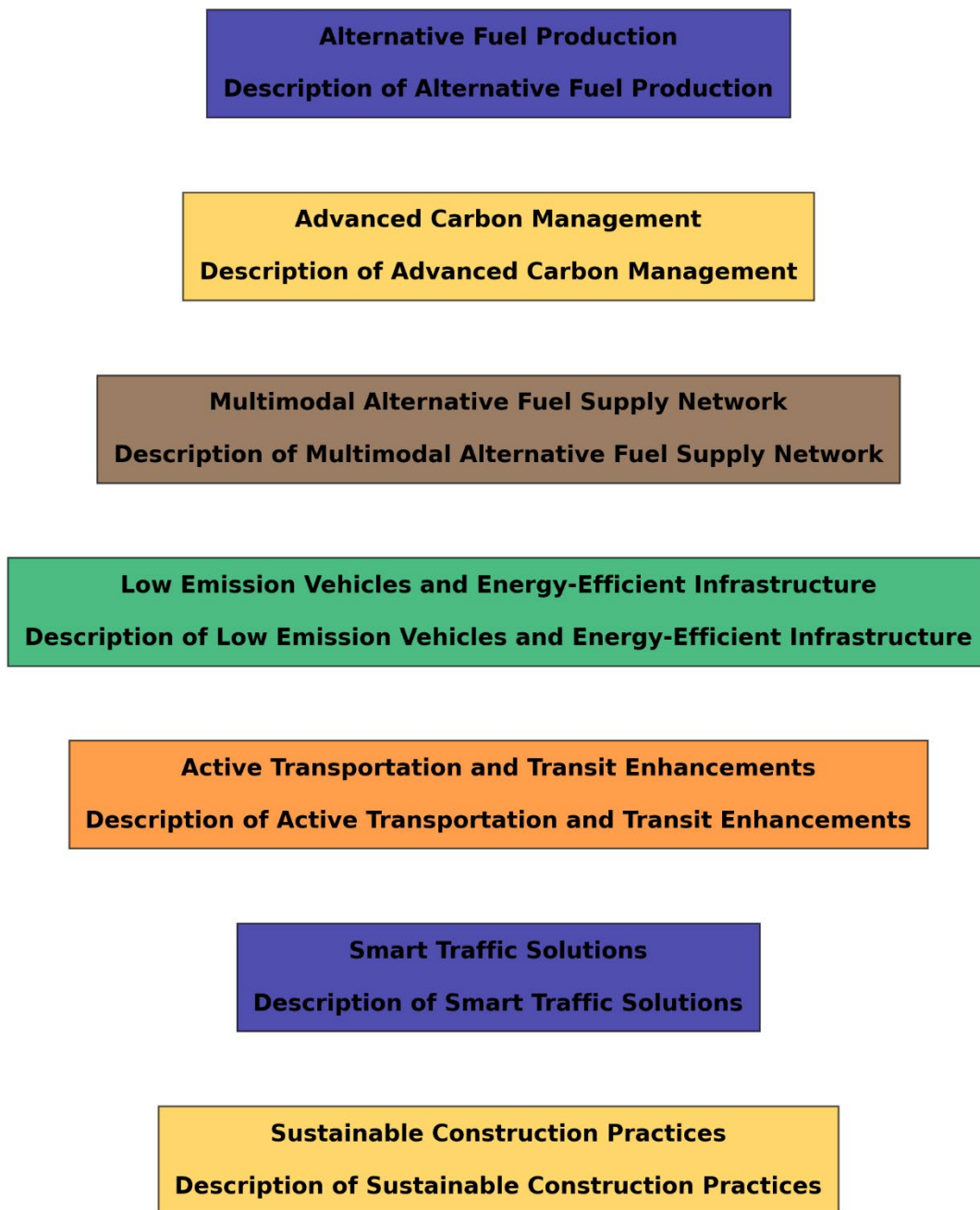


Figure 4: DOT&PF Transportation Carbon Reduction Strategies

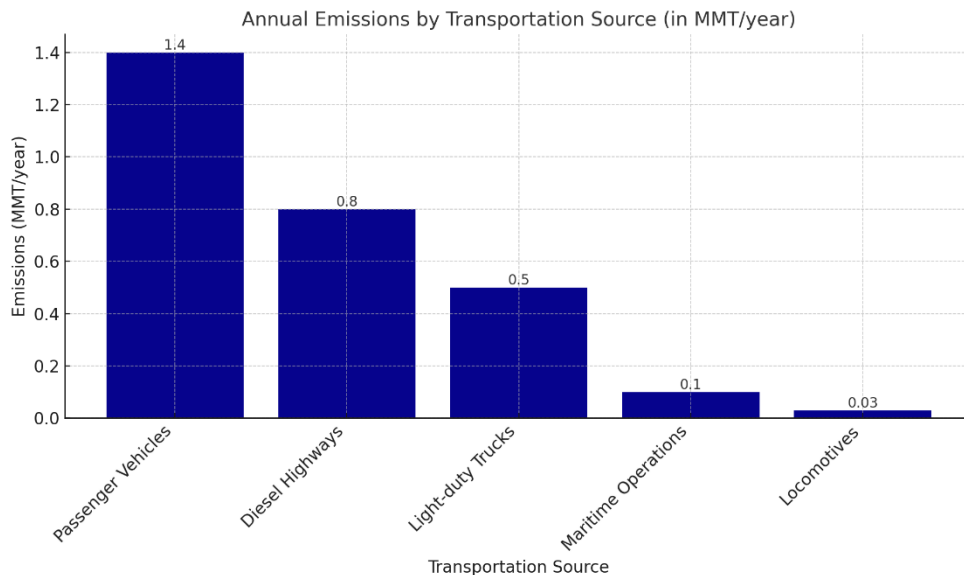


Figure 5: Carbon Emissions by Transportation Source

By targeting these significant emission sources, DOT&PF aims to make substantial strides in carbon reduction. For all efforts, implementation involves a collaborative effort between various agencies, including DOT&PF, AEA, Metropolitan Planning Organizations (MPOs), municipalities, boroughs, cities, local governments, and tribal entities overseeing transportation and transit services.

7.1 Alternative Fuel Infrastructure Development

Objective. This strategy aims to integrate alternative and renewable fuels into the transportation sector, thereby reducing reliance on traditional fossil fuels and to significantly lower greenhouse gas emissions and CO₂ from transportation. It emphasizes the adoption of hydrogen, natural gas, propane, alcohols (e.g., ethanol, methanol, butanol), and vegetable/waste-derived oils.

Strategic Focus. Developing a comprehensive transportation infrastructure that connects critical hydropower, geothermal, wind, solar, and carbon sequestration sites, which are currently hindered by limited road access. This includes conducting thorough assessments to identify hydropower, geothermal, wind, solar, and carbon sequestration areas lacking adequate road access, prioritizing based on potential energy output, environmental impact, and economic feasibility. The focus is on embracing domestically produced fuels, including renewable options, to reduce dependence on foreign oil. This strategy offers the dual benefits of cutting upstream greenhouse gas emissions linked to fuel production and reducing CO₂ emissions from vehicles. Key implementation measures include diesel engine retrofits, transitioning fleets to alternative fuel-powered vehicles, and establishing alternative fueling infrastructure to cater to a diverse range of vehicles, such as mass transit vehicles, private cars, marine vessels, and freighters.

Table 7: Alternative Fuel Infrastructure Development Surface Transportation Strategies

Renewable Diesel Refinery	Establishing refineries that convert organic materials like vegetable oils into diesel, which is chemically similar to petroleum diesel but with significantly lower greenhouse gas emissions. This initiative will promote cleaner fuels, reduce reliance on imported diesel, and align with sustainability goals by reducing the transportation sector's carbon footprint.
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Hydrogen Fuel Production	Supporting pilot projects for electrolytic hydrogen production, scaling to full production, and coordinating with the Port of Alaska on a hydrogen pilot project to demonstrate hydrogen fuel cell yard tractor performance.
Clean Ammonia Production	Collaborating with the Alaska Gasline Development Corporation (AGDC) and a Japanese-led team to produce carbon-free ammonia using gas from the Alaska LNG Project, involving carbon capture and sequestration in Cook Inlet. DOT&PF can play a role in supporting infrastructure development that aligns with this initiative, potentially aiding in the transportation and export of clean ammonia.
Enhanced Oil Recovery and Sequestration	A significant amount of carbon dioxide (approximately 202 million metric tons) is projected to be captured and either used for Enhanced Oil Recovery (EOR) or sequestered on the North Slope over the life of the Alaska LNG Project. DOT&PF can contribute to this by ensuring that the transportation infrastructure in and around these areas is optimized for supporting EOR activities and the secure transportation of captured carbon dioxide.
Road Development for Energy Sites	Build and improve roads to facilitate access to renewable energy sites, enhancing the state's ability to harness and utilize its natural energy resources. This project prioritizes the construction of roads to these vital energy resource locations.

Table 8: Alternative Fuel Infrastructure Development Aviation and Rail Transportation Strategies (Not-FHWA Eligible)

Sustainable Aviation Fuel (SAF) Refinery	Support the pilot project for sustainable aviation fuel production and scale up to full production.
Future Fuels Locomotive Pilot	Pilot project to evaluate the performance of hydrogen fuel-cell and renewable diesel locomotives and scale up successful technology.

7.2 Advanced Carbon Management

Objective: This strategy aims to leverage Alaska's natural and technological resources for effective carbon management and sustainable energy integration. The focus is on harnessing geological formations for carbon sequestration and utilizing the state's vast forested areas for carbon capture. Additionally, the strategy aims to integrate sustainable energy sources into transportation infrastructure, supporting Alaska's environmental goals and contributing to the nation's goal of net-zero greenhouse gas emissions by 2050²⁷.

Strategic Focus: The strategic focus combines geological carbon sequestration, sustainable forestry management, and green bank financing to reduce the transportation sector's carbon footprint through initiatives like electrifying public transport and enhancing energy-efficient infrastructure. It aligns with the Office of Energy Innovation's initiatives to leverage Alaska's potential in carbon storage and sequestration while investing in research for sustainable transportation technologies such as autonomous vehicles and electric marine vessels. The strategy includes monitoring and evaluating carbon emission performance, fostering sustainable practices through carbon credit programs and promoting renewable energy and electric vehicle infrastructure within DOT&PF's rights-of-way.

Table 9: Advance Carbon Management Strategies

Leveraging Alaska LNG Project's	The Alaska LNG Project is set to utilize a significant portion of the natural gas reserves in Prudhoe Bay and Point Thomson. It includes an Arctic
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²⁷ <https://www.nature.com/articles/s41467-022-31806-2.pdf>



Carbon Capture Capabilities	Carbon Capture (ACC) plant, which will remove carbon dioxide and hydrogen sulfide from the feed gas. By ensuring that this captured carbon dioxide is not vented, the project contributes significantly to carbon capture and sequestration. DOT&PF can support this initiative by integrating transportation projects that facilitate or complement the LNG project's infrastructure, thereby enhancing overall carbon capture efforts.
Lower Upstream Emissions (Alaska LNG Project)	Focused on reducing emissions associated with oil production in the North Slope, including carbon sequestration at the production point and a pipeline design with fewer compressor stations to reduce fugitive and combustion emissions.
Green Bank Financing for Transportation Projects	The establishment of a green bank, as proposed by Senate Bill 125 and House Bill 154, provides a unique opportunity for DOT&PF to access new financing mechanisms. This green bank could fund projects that reduce the carbon footprint of transportation infrastructure, such as electrifying public transportation, upgrading existing infrastructure to be more energy-efficient, and investing in renewable energy sources for DOT&PF facilities. This may include renewable energy generation, energy storage, energy efficiency improvements, and cleaner transportation methods, such as hydrogen, ammonia, and tidal energy sources.
Supporting the Office of Energy Innovation Initiatives	Governor Dunleavy created the Office of Energy Innovation to coordinate efforts in carbon capturing, storage, and utilization. DOT&PF can align its transportation development strategies with the initiatives of this office, particularly in areas that contribute to Alaska's significant potential for carbon storage and sequestration. By collaborating with this office, DOT&PF can ensure that its projects support the state's overall carbon market opportunity and leverage Alaska's vast carbon sequestration resources.
Sustainable Transportation Research	Delving into innovative methods and technologies to enhance transportation sustainability. Invest in research and innovation in transportation technology, such as autonomous vehicles, vehicle-to-grid integration, electric and hybrid-electric marine vessels, new mobility solutions, and behavioral science.
Sustainable Forestry Management	Silviculture, the art and science of managing forests, offers a holistic approach to forest management. Enhance forest health, productivity, and biodiversity through the application of scientific forestry principles, ensuring sustainable timber production while optimizing carbon sequestration and supporting diverse ecosystems. Restore areas affected by logging, wildfires, or other disturbances to their natural forested state.

7.3 Multimodal Alternative Fuel Supply Network

Objective. The objective of the Multimodal Alternative Fuel Supply Network strategy is to establish a comprehensive infrastructure supporting the widespread adoption of alternative fuels across various transportation modes in Alaska. This strategy aims to enhance access to and utilization of diverse energy resources, focusing on creating a robust network for electric vehicles (EVs), hybrids, and other alternative fuel vehicles, including in marine and aviation sectors.

Strategic Focus Areas: The focus is on developing and expanding infrastructure that facilitates the transition from fossil-fueled to electric and hybrid vehicles. This includes projects under the



National Electric Vehicle Infrastructure (NEVI) initiative and Charging and Fueling Infrastructure (CFI) to equip Alaska's transportation corridors and communities with adequate electric vehicle supply equipment (EVSE). Additionally, the strategy encompasses electrification and alternative fuel conversion in marine transportation and supports pilot projects in aviation and rail sectors.

Table 10: Multimodal Alternative Fuel Supply Network Surface Transportation Strategies

National Electric Vehicle Infrastructure (NEVI)	Install public Electric Vehicle Supply Equipment (EVSE) along Alaska's Alternative Fuel Corridor and statewide communities.
Charging and Fueling Infrastructure	Install public EVSE in later phase NEVI communities, rural communities, and at ports serving ground vehicles and vessels.
International Airport Electric Vehicle Charging Stations	Implement Direct Current Fast Charging (DCFC) and Levels 1 and 2 charging at airports for travelers, fleet vehicles, taxis and ride-share vehicles.
Green Corridor Development	Revise rules to encourage renewable energy, battery energy storage systems, and EV charging equipment to be located within the DOT&PF rights-of-way ²⁸ on road systems and at airports.
Ride-Hailing Electrification	Promote electrification in ride-hailing services and establish a rental program for electric bikes/scooters.
Reduced Idling	Develop infrastructure for plug-in heating and block heater programs
Vehicle-to-Grid (V2G)	Implement a Vehicle-to-Grid incentive program

Table 11: Multimodal Alternative Fuel Supply Network Marine Transportation Sector Strategies

Lo-No Emission and Hybrid Electric Ferries	Construct hybrid and battery electric ferries for various routes. Convert hybrid ferries to hydrogen fuel cell or ammonia-fueled hybrid electric systems.
Port Electrification	Ports, given their heavy machinery, ships, and cruise liners powered by fossil fuels, stand as significant contributors to greenhouse gas emissions. Transitioning to electric cranes, forklifts, and other equipment, coupled with enabling both ships and cruise liners to tap into the electrical grid through shore power while docked, can markedly reduce these emissions. The establishment of charging stations and electrical substations on port facilities amplifies this shift, steering ports towards a greener and more sustainable operation.
Cruise Ship and Cargo Vessel Future Fuels Preparation	Prepare infrastructure for future fuels like hydrogen fuel cells and ammonia for cruise ships and freight operators.
Hybrid Electric Fishing Vessel Pilot	Demonstrate and support the adoption of hybrid electric fishing vessels and port equipment.
Port Service Equipment	Demonstrate and compare the performance of battery electric and hydrogen fuel-cell port service equipment.

²⁸ [State DOTs Leveraging Alternative Uses of the Highway Right-of-Way Guidance](#)



Table 12: Multimodal Alternative Fuel Supply Network Aviation and Rail Transportation Sector Strategies (Not FHWA Eligible)

Hybrid and Hydrogen Fuel-Cell Aircraft	Conduct pilot projects for hybrid electric and hydrogen fuel-cell aircraft for short and long-haul flights.
Airport Ground Service Equipment	Demonstrate and compare the performance of electric and hydrogen fuel-cell ground service equipment. Coordinate with operators at Ted Stevens International Airport for hydrogen fuel cell ground service vehicles and aircraft
Alaska Railroad (ARR) Freight Connection	Establish a connection from Alaska Railroad (ARR) to the Lower 48 states for freight service.

7.4 Low Emission Vehicles and Energy-Efficient Infrastructure

Objective: This strategy is dedicated to implementing energy-efficient measures across Alaska's transportation sectors. The primary goal is to significantly reduce energy consumption and greenhouse gas emissions, particularly in regions dependent on conventional energy sources like coal and natural gas.

Strategic Focus: The focus is on integrating sustainable solutions such as LED lighting for streets and facilities and expanding the adoption of electric vehicles (EVs), hybrids, and hydrogen-powered trucks, especially in freight transportation. As of May 2023, with EV adoption in Alaska at a mere 0.36%, there is considerable potential for growth in this area. This strategy also includes the electrification of state-owned light-duty fleet vehicles and the promotion of alternative fuel vehicles. Additionally, the development of a comprehensive EV charging network, as outlined in the National Electric Vehicle Infrastructure Plan, is a key component, aimed at enhancing the appeal and practicality of EVs for various purposes, including work, leisure, and tourism.

Table 13: Low Emission Vehicles and Energy-Efficient Infrastructure Strategies

Light up the Highways	Replace street lighting and traffic control devices with energy-efficient LED solutions, significantly reducing energy consumption and enhancing sustainability in street and facility lighting
Energy-Efficient Urban Infrastructure	Retrofit urban areas with LED street lighting and traffic control devices. This initiative will reduce energy consumption, improve safety, and contribute to a greener urban environment. Energy Efficiency
Statewide Equipment Fleet Modernization	Transition state-owned light-duty fleet vehicles to electric models, setting an example for eco-friendly practices and reducing the carbon footprint of government operations.
Rural Micro Mobility	Pilot and demonstrate the performance of battery electric All-Terrain Vehicles (ATVs), side-by-sides, and snowmobiles, focusing on rural areas to assess their efficiency and adaptability to Alaska's unique conditions.
Fuel Additives	Piloting fuel additives to verify their performance and facilitate their adoption in Alaska.

7.5 Active Transportation and Transit Enhancements

Objective: This strategy is centered on diversifying transportation modes to create more inclusive streets for all users. It aims to reduce CO2 emissions by minimizing reliance on fossil fuels and promoting safer, alternative transportation options.



Strategic Focus: This strategy will focus on enhancing public transit and active transportation. It aims to shift reliance from single-occupancy vehicles to mass transit options like buses, trains, and shuttles, while improving pedestrian and cyclist infrastructure through the construction of sidewalks, bike lanes, and safe crosswalks. This strategy also includes incentivizing the use of the Alaska Railroad for passenger services and developing sustainable transit initiatives, such as dedicated bus lanes and smart transportation technologies. The overarching goal is to reduce carbon footprints, increase the use of non-motorized transport modes, and ensure accessible, safe transportation options for all residents, contributing to a healthier, more sustainable community environment.

Table 14: Active Transportation and Transit Enhancement Strategies

Alaska Railroad (ARR) Service Incentivization	Focusing on incentivizing the use of Alaska Railroad (ARR) for passenger services. This strategy intends to increase the utilization of ARR for commuting and leisure travel, thereby reducing the carbon footprint associated with personal vehicle use.
Mass Transit Enhancement	Encouraging a shift from single-occupancy vehicle trips to mass transit options such as shuttles, buses, and trains. This involves enhancing the efficiency, accessibility, and appeal of public transportation systems.
Pedestrian and Cyclist Infrastructure	Developing infrastructure that facilitates safe and convenient mobility for pedestrians and cyclists. This includes constructing sidewalks, bike lanes, safe crosswalks, median islands, and installing accessible pedestrian signals. By improving these facilities, we aim to motivate a higher uptake of non-vehicular transportation modes.
Sustainable Transit	Creating and promoting transit options to reduce both the number of single-occupancy vehicle trips and the total vehicle miles traveled. Enhancements may include dedicated bus lanes, upgraded public transportation stops, and integration of smart transportation technologies.
Active Transportation	This includes the construction of safe sidewalks, bike lanes, crosswalks, and median islands. These projects not only reduce carbon footprints but also ensure that transportation is accessible to all.

7.6 Smart Traffic Solutions

Objective: In Alaska, where congestion is less prevalent but still impactful in key areas, the objective of this strategy is to intelligently manage traffic flow and reduce emissions in targeted locations. The focus is on applying advanced technology solutions in strategic areas to optimize traffic movement, reduce idling, and minimize environmental impacts, particularly greenhouse gas emissions, in the unique Alaskan context.

Strategic Focus: The strategic focus centers on implementing efficient congestion management solutions and technological advancements. This includes the deployment of intelligent technology solutions to interlink traffic signals and centralized control systems for real-time traffic flow optimization, thus reducing stops and starts. Advanced warning systems will provide timely alerts about traffic conditions, enabling real-time travel decisions that ease congestion. The strategy also encompasses demand management for sustainable commuting, such as implementing congestion pricing and encouraging off-peak travel. The development of roundabouts and redundant routes, particularly in areas with limited alternative paths, will further aid in reducing congestion and its associated emissions.



Table 15: Smart Traffic Strategies

Operational Efficiency Through Improved Weather Observations	Support state-funded remote weather observation stations to enhance transportation operational efficiency, particularly in challenging Alaskan weather conditions.
Intelligent Technology Solutions	Optimize traffic flow by interlinking traffic signals and implementing vehicle-to-infrastructure communications, including retrofitting existing DSRC technology to C-V2X technology for more efficient traffic management.
Advanced Warning Systems	Install systems for crash and closure warnings, providing crucial real-time information to travelers, especially crucial in Alaska where many routes are singular. Prompt information about obstructions or closures enables travelers to make informed decisions, either delaying their journey or seeking alternative routes, thus minimizing idling and associated emissions.
Roundabouts	Construct roundabouts to facilitate smoother traffic flow and create redundant routes to reduce congestion during peak hours. Beyond their role in traffic calming and enhancing neighborhood safety, roundabouts are effective in mitigating congestion. They facilitate a smoother flow of traffic, reducing the need for vehicles to stop and start, which in turn minimizes emissions.
Redundant Routes	Creating alternative routes for major commuting corridors, especially in areas where only one primary route exists, enhances transportation system resilience. In Alaska, certain routes lack alternatives, leading to extensive queues during peak hours if there's a closure or crash. Offering redundant routes can significantly reduce such delays and the associated emissions from idling.

7.7 Sustainable Construction Practices

Objective: The objective of this strategy is to prioritize the use of eco-efficient construction equipment and methods that substantially minimize carbon emissions. This involves a comprehensive approach to sustainable construction practices in the transportation sector, emphasizing the reduction of environmental impact at every stage, from material procurement to equipment operation.

Strategic Focus: The strategic focus is on transitioning to construction equipment powered by electricity or alternative fuels and adopting environmentally friendly material procurement methods. Emphasis is placed on encouraging contractors to use low-emission or zero-emission machinery, incentivizing the adoption of green construction practices. The strategy also includes the utilization of solid waste and local manufacturing resources for material sourcing, reducing the dependency on virgin materials and minimizing the carbon footprint of transportation construction projects.

Table 16: Sustainable Construction Strategies

Solid Waste Utilization	Implement practices to reduce the use of virgin materials in transportation construction by leveraging solid waste materials, promoting recycling and reusing practices.
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Transition to EV or Hybrid Equipment	Encourage the adoption of construction machinery running on electric or alternative fuels to reduce emissions and enhance efficiency.
Contractor Eco-Incentives	Refine procurement guidelines and contractor selection criteria to incentivize the use of eco-friendly construction equipment. Offer incentives for sourcing materials using green or low-emission transportation methods.
Local Manufacturing Sourcing Software-3D Printing	Provide access to software and services for sourcing locally manufactured spare parts on demand, reducing transportation emissions associated with material delivery.
Advanced Pavement Management System	Adopt a pavement management system that selects maintenance and rehabilitation projects based on their life-cycle GHG performance. These technologies, which reduce embodied carbon during the manufacturing and construction of highway projects, align well with the goal of selecting maintenance and rehabilitation projects based on their life-cycle GHG performance. Utilizing a lifecycle assessment (LCA), specifically tools like the LCA Pave Tool, can help in assessing and demonstrating substantial reductions in CO2 emissions compared to typical pavement-related practices.
Eco-Friendly Material Procurement	Establish guidelines for the procurement of construction materials that prioritize eco-friendly production and transportation methods.
Green Construction Training and Certification	Develop training programs and certification for contractors and workers in sustainable construction practices, ensuring a skilled workforce capable of implementing these strategies effectively.

8.0 MEASURING PROGRESS: EMISSIONS CALCULATIONS

The DOT&PF Carbon Reduction Strategy serves as a roadmap for project selection and implementation.

8.1 CO2 Emission Reduction Calculations

Quantifying the CO2 reduction associated with each mitigation strategy involves analysis of several key variables. These include, but are not limited to, reductions in vehicular operational durations, diminishment in fossil fuel utilization, and declines in single-occupancy vehicle usage. The impact of these variables is often localized and subject to variation even within the same geographic area, dependent on the nature of the intervention (for example, the implementation of Bus Route A may result in a 15% increase in ridership, whereas Bus Route B may yield a 35% increase). The diverse range of variables complicates the process of conducting straightforward comparative assessments of strategy effectiveness. Nonetheless, after consultation with Metropolitan Planning Organizations (MPOs), a representative selection of projects aligned with each strategy was identified. The CO2 reduction metrics for these projects were then calculated. Table 3 presents a subset of these projects, aligns them with their respective strategies, and details the annual CO2 reductions in pounds. The impact of these projects on CO2 emissions varies significantly, from 1.9 million lbs/year to 15,000 lbs/year.



To provide a reference point, the total annual CO₂ emissions from on-road sources in 2018 amounted to approximately 6.1 billion lbs. Therefore, a 1% decrease in this value represents a reduction of about 61 million lbs/year.

Table 17: Example Carbon Emission Assessments

Project Name	Strategy	Project Location	CO ₂ Emission Reductions / lbs per year
MACS Transit SaaS	Mass Transit	Fairbanks	1,940,101
Airport Way Fairbanks Signal Interconnect	Intelligent Technology Solutions	Fairbanks	503,570
Shore Power at Sitka Ferry Terminal	Electrification	Sitka	138,230
MSB Shaw Elementary School Roundabout	Roundabout	MSB	134,050

8.2 Carbon Emission Assessment for Transportation Projects

DOT&PF will implement a CO₂ emissions reduction evaluation for projects, using a framework aligned with the Carbon Reduction Program (CRP) objectives and Federal Highway Administration (FHWA) goals. A detailed matrix, provided in Appendix: Emissions Calculations, outlines the proposed evaluation metrics. This matrix delineates the rationale for each criterion and proposes quantitative benchmarks. It is recommended that recipients of CRP funding utilize this matrix to assess projects, ensuring alignment with the CRP's strategic goals, federal mandates, and principles of transportation excellence, which include safety and cost-efficiency considerations.

The FHWA's Congestion Mitigation and Air Quality (CMAQ) Emissions Calculator is the preferred tool for this analysis. Augmented by data from sources such as the Environmental Protection Agency's (EPA) Emissions and Generation Resource Integrated Database (eGRID) and the EPA Motor Vehicle Emission Simulator (MOVES) program, it facilitates comprehensive emission assessments. The CMAQ tool, recognized by the FHWA for its applicability to CMAQ projects, excels in project-specific emission computations. It integrates data from various sources, including EPA MOVES, and incorporates default values for scenarios with limited data, such as average lengths of transit journeys.

For an in-depth comparison of CO₂ emissions and operational costs between light-duty electric vehicles and traditional combustion engine vehicles, the Alaska Center for Energy and Power's Alaska Electric Vehicle Calculator is advised. This tool is especially proficient in adjusting for efficiency variations in cold climates, offering more accurate assessments than many standard national tools.

Other Analysis Models

TRIMMS™ (Trip Reduction Impacts of Mobility Management Strategies) Model: This model conducts a comprehensive analysis of various emission pollutants and assesses the influence of



land use strategies on transit ridership. It employs the emission data from the Environmental Protection Agency's Motor Vehicle Emission Simulator (MOVES2010a), which is suitable for state-level implementation of air quality plans (SIP) and regional emission analysis in accordance with transportation conformity requirements.²⁹

Comparative Analysis of Washington Ferries and Road Transport: This research compares the carbon emissions of Washington's ferry services with road transportation, using methodologies developed by Trozzi and Vaccaro and the Greatest Integer functions. The findings indicate that maritime transport, in terms of CO₂ emissions per ton-mile, is more eco-friendly compared to road transportation³⁰.

Forest Carbon Sequestration in China: This analysis highlights the critical role of China's state-operated forest farms in carbon sequestration. The study advocates for reforms in forest management strategies and operational adjustments tailored to local ecological conditions, promoting sustainable forest management practices. The recommendation is to adapt cultivation strategies to enhance the effectiveness of these forests in carbon capture and storage.³¹

9.0 CARBON REDUCTION IMPLEMENTATION

An agile and comprehensive Carbon Reduction Strategy implementation plan will lay the groundwork by determining the initial carbon emissions, develop metrics to quantify the carbon emission reductions, and periodically update the carbon reduction strategy. These efforts ensure that transportation initiatives are in line with environmental conservation goals and are constantly evolving to incorporate the latest sustainable technologies and practices. The implementation plan will have an emphasis on consistent planning, performance metrics, and iterative refinement of strategies using the latest data. It will also prioritize regular monitoring and updating of strategies based on tangible outcomes.

Key Implementation Strategies:

1. **Periodic Update of Carbon Reduction Strategy:** Mandated by 23 USC 175, this strategy involves the creation and regular update (at least every four years) of the carbon reduction strategy. Each update will factor in the evolving knowledge of CO₂ reduction technologies and adapt to the changing transportation landscape in Alaska.
2. **Establishing Carbon Emission Baselines:** Laying the groundwork by determining the initial carbon emissions, which will serve as a reference for future performance evaluations. The subsequent section of this CRS delves deeper into the methodology for calculating baseline carbon emissions.
3. **Monitoring & Evaluating Carbon Emission Performance:** Developing metrics to quantify the carbon emission reductions achieved through CRP projects. This facilitates transparent reporting on the efficacy of the carbon reduction initiatives and allows for strategy adjustments in subsequent CRS updates to align with CRP objectives.
4. **Collaborate with state and federal agencies:** Work Alaska Department of Environmental Conservation and Alaska Energy Authority on monitoring and reporting.

²⁹ https://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1123&context=cutr_nctr

³⁰ <https://link.springer.com/content/pdf/10.1007/s11356-023-28281-7.pdf>

³¹ <https://www.mdpi.com/1999-4907/13/5/778/pdf?version=1652925620>



9.1 DOT&PF Draft 2024-2027 Statewide Transportation Improvement Program (STIP) Project List

The Alaska Department of Transportation & Public Facilities (DOT&PF) Statewide Transportation Improvement Program (STIP) is a vital framework that directly impacts the transportation infrastructure of our state. Serving as a crucial planning tool for the DOT&PF, the STIP guides efforts to maintain, enhance, and expand Alaska's transportation system. It is a comprehensive document that outlines transportation programs and projects scheduled for implementation over a four-year period. These initiatives encompass a wide range of activities, including highway improvements, bridge repairs, waterways projects, public transportation enhancements, and more.

As Alaskans, we recognize that our transportation system is the backbone connecting our communities, businesses, and industries. The STIP plays a pivotal role in increasing the safety of our transportation system, ensuring its proper maintenance, promoting statewide economic growth, and enhancing resilience and sustainability in our systems and communities. Through the STIP, we can strategically plan and prioritize transportation investments to address the evolving needs and challenges of our state. The STIP provides a transparent and accountable process for allocating resources and managing transportation projects. It aligns our objectives with the State's priorities as outlined in the Capital Budget approved by the legislature and signed into law by the Governor, as well as federal requirements to maintain eligibility for federal funding opportunities. This systematic and fully aligned approach enables us to effectively leverage both state and federal resources, maximizing the impact on our transportation infrastructure.

Beyond its significance for the DOT&PF, the STIP is a valuable tool for the general public. It offers a clear and concise overview of planned transportation projects, providing visibility and transparency to the residents of Alaska. By understanding the projects outlined in the STIP, individuals can stay informed about upcoming improvements in their communities, make necessary arrangements, and even provide valuable feedback on proposed initiatives. This transparency is also important for our contracting and consulting partners across the state, allowing their businesses to thrive with confidence in the expected work opportunities in the coming years.

The projects included in the Statewide Transportation Improvement Program (STIP) are in alignment with and implement the policies set forth in the Long-Range Transportation Plan (LRTP). Serving as a strategic alignment and investment tool, the STIP ensures consistency with the Family of Plans and the LRTP. The LRTP establishes investment areas for the State, encompassing:

1. Safety
2. State of Good Repair
3. Economic Vitality
4. Resiliency
5. Sustainable Transportation

Table 18 outlines the projects and programs under development by DOT&PF towards sustainable transportation.



Table 18: DOT&PF STIP Programs and Projects 2024-2027

STIP ID	Draft 2024-2027 STIP Programs and Projects	2024	2025	2026	2027
34197	Data Modernization and Innovation	\$10,839,809	\$10,919,116	\$13,697,790	\$10,800,001
9299	Congestion Mitigation Air Quality Improvements (CM)	\$2,486,632	\$2,553,772	\$2,622,723	\$2,622,723
34196	International Airport Charging Stations	\$3,000,000	\$3,000,000	0	0
34195	Southeast Alaska Port Electrification	\$3,500,000	\$1,400,000	\$1,400,000	\$1,400,000
26161	Air Quality Planning Project: Fairbanks	\$80,000	\$80,000	\$80,000	\$80,000
26168	Air Quality Mobile Source Modeling	\$200,000	\$200,000	\$200,000	\$200,000
17663	CMAQ: non-AMATS MPOs	\$1,600,000	\$1,600,000	\$1,600,000	\$1,600,000
34200	Transportation Workforce Development and Training	\$6,665,883	\$7,450,000	\$5,602,559	\$5,100,000
33861	Carbon Reduction Program: Rural	\$4,300,000	\$4,428,839	\$4,450,000	\$4,522,090
33862	Carbon Reduction Program: AMATS	\$3,804,540	\$3,907,263	\$4,012,759	\$4,012,759
33865	National Electric Vehicle Infrastructure Program	\$12,456,478	\$12,643,325	\$12,832,975	\$13,025,470
18791	Congestion Mitigation and Air Quality Improvements	\$4,961,031	\$3,402,210	\$4,561,768	\$4,811,768
33863	Carbon Reduction Program: non-AMATS MPOs	\$944,267	\$944,267	\$944,267	\$944,267
34198	Light up the Highways	\$5,000,000	\$5,000,000	\$0	\$5,000,000
	<i>Egan Drive Lighting Improvements</i>	<i>\$2,400,000</i>	<i>\$0</i>		
	<i>Anchorage Pedestrian Lighting Improvements</i>	<i>\$1,000,000</i>	<i>\$0</i>		
	<i>Glenn Highway Lighting Improvements</i>	<i>\$0</i>	<i>\$2,500,000</i>		
	<i>Light Up the Highways Placeholder</i>	<i>\$1,000,000</i>	<i>\$2,500,000</i>		
34199	Sustainable Transportation and Energy Program	\$4,389,559	\$8,390,321	\$13,843,900	\$12,454,924
	<i>Charging and Fueling Infrastructure</i>	<i>\$300,000</i>	<i>\$3,000,000</i>		
	<i>Fuel Additives and Future Fuel Development</i>	<i>\$750,000</i>	<i>\$700,000</i>		
	<i>Renewable Diesel Implementation Study</i>	<i>\$300,000</i>	<i>\$500,000</i>		
	<i>Advanced Pavement Management System</i>	<i>\$85,000</i>	<i>\$150,000</i>		
	<i>Construction Material Waste</i>	<i>\$85,000</i>	<i>\$150,000</i>		
	<i>Sustainable Transportation Data Collection & Management</i>	<i>\$250,000</i>	<i>\$128,174</i>		
	<i>Rural Dust Mitigation Program</i>	<i>\$1,100,000</i>	<i>\$1,200,000</i>		
	<i>DOT&PF Fleet Conversion</i>	<i>\$75,000</i>	<i>\$300,000</i>		
	<i>Low-emission Construction Equipment</i>	<i>\$85,000</i>	<i>\$500,000</i>		
	<i>Micro-Mobility for Rural Alaska</i>	<i>\$500,000</i>	<i>\$1,100,000</i>		
	<i>MatSu to Eagle River Bike Lane</i>	<i>\$200,000</i>	<i>\$400,000</i>		



APPENDIX: EMISSIONS CALCULATIONS



Table 1
Project GHG Emission Reductions
MACS Transit SaaS
Fairbanks, AK

Input		
Description	Input	Reference
Project Name¹	MACS Transit SaaS	
Project Description¹	The scope includes evaluating, selecting, and purchasing a subscription(s) to a suite of SaaS technologies with the following goals via public-facing apps: Trip planning, route tracking (real-time bus locations, estimated time of arrival, text notifications), purchasing electronic tickets, and booking on-demand transportation rides	Public Information on FAST website ¹
Evaluation Year	2021	Provided by FAST
Number of days the bus operates annually	312	Provided by FAST
Transit Bus annual mileage (bus miles/year)	54,794	Provided by FAST
Transit Bus annual ridership (boardings/year)	161,102	Provided by FAST
Reduction in Annual Vehicle Trips across the population due to SaaS²	5-8%	Provided by FAST
Average trip length (mile)³	4.52	CMAQ Toolkit Default
Analysis and Output		
Analysis Method	The analysis estimates annual project CO ₂ emission reductions based on the transit ridership increase before and after project implementation. Based on the Project design, the SaaS will allow transit planning and bus route tracking to support to encourage the use of transportation alternatives in place of single occupancy vehicles. The App will connect to on-demand transportation rides that can effectively expand the transit access to more destinations. Based on literature review and project-specific evaluations, it is estimated that these features of the SaaS can together reduce driving by approximately 5%-8%. These data were applied in the CMAQ Toolkit ⁴ to estimate CO ₂ emissions. As a conservative estimate, this analysis uses the lower bound of 5% and further assumes that 50% of these transit trips still need first/last mile travel by vehicle, which leads to a overall equivalent driving trip reduction of 2.5%. The level of reduction calculated is consistent with literature. ⁵	
Total Daily CO₂ Reductions (kg/day)	2,411	
Total Annual CO₂ Reductions (lbs/year)	1,940,101	

Notes:

- ¹ The Project information is available at: https://fastplanning.us/wp-content/uploads/2023/02/25_FAST_MACS_SaaS_Apps_Technology.pdf
- ² The estimated project impact of 5%-8% is an engineering judgement considering multiple effects of the SaaS based on literature and the local condition, and is consistent with the project planning document at https://fastplanning.us/wp-content/uploads/2023/02/25_FAST_MACS_SaaS_Apps_Technology.pdf
- ³ Due to limited data, the analysis used CMAQ national default for average transit trip length
- ⁴ The CMAQ Toolkit from FHWA, available at: https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/
- ⁵ According to a GHG analysis guideline document in California (Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities), providing community-based trip planning can result in a trip and GHG reduction of up to 2.3%, available at: https://www.caleemod.com/documents/handbook/full_handbook.pdf

**Table 2
Project GHG Emission Reductions
Airport Way Fairbanks Signal Interconnect
Fairbanks, AK**

Input		
Description	Input	Reference
Project Name	Airport Way Fairbanks Signal Interconnect	Provided by DOWL
Project Description	AK DOT will replace existing highway lights in the Kenai Spur Hwy with LED lights that are less energy intensive and reduce electricity consumption	Provided by DOWL
Evaluation Year	2027	Confirmed by DOWL
Area Type	Urban	Confirmed by DOWL
Corridor Length (miles)	3.14	Provided by DOWL
Number of Signalized Intersections in the corridor	11	Provided by DOWL
Average Number of Lanes (one direction)	2	Provided by DOWL
Average Posted Speed Limit	45	Confirmed by DOWL
Average Cycle Length (second)	90	Provided by DOWL
Truck Percentage in the corridor	4%	Provided by DOWL
Annual Average Daily Traffic (AADT) (both directions)¹	12,900	Provided by DOWL
Peak-hour Traffic Volume (sum of both directions)²	1,410	Provided by DOWL
Existing Corridor Travel Time (minutes)³	8	Provided by DOWL
Total peak hours per day (AM+PM)⁴	4.5	Confirmed by DOWL
Analysis and Output		
Analysis Method	The method calculates emission reductions from signal synchronization based on the calculation of time savings for travel along the project corridor by reducing delay at each intersection. The improved travel speed improves speed-specific emission factors as well as reduce emissions from idling. With the application of the CMAQ toolkit ⁵ , this analysis estimates the time savings based on the volume to capacity ratio at intersections based on the 2010 Highway Capacity Manual ⁶ , and the resulting emission savings.	
Total Daily CO₂ Reductions (kg/day)	626	
Total Annual CO₂ Reductions (lbs/year)	503,570	

Notes:

- ¹ The AADT of the corridor is estimated based on the average of AADTs in the 3 signalized intersections within the project.
- ² The peak hour traffic volume is estimated based on the average of volumes in the 3 signalized intersections within the project.
- ³ Total time in minutes that it takes for a vehicle to travel the length of the entire corridor
- ⁴ Peak hours are assumed to be 7:00-8:00, 11:00-13:00, and 16:15-17:45
- ⁵ The CMAQ Toolkit from FHWA, available at: https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/
- ⁶ Highway Capacity Manual. (2010). Washington, D.C. :Transportation Research Board

**Table 3
Project GHG Emission Reductions
Shore Power at Sitka Ferry Terminal
Sitka, AK**

Input		
Description	Input	Reference
Project Name	Shore Power at Sitka Ferry Terminal	
Project Description	The scope involves providing shore power to the ferries visiting the Sitka Terminal in the Alaska Marine Highway System.	
Vessel Name	Columbia	AMHS ¹
Average Time at berth (hrs/week)	2.5	AMHS ¹
Visits per week	1	AMHS ¹
Engine Model Year	2018+	AMHS
Engine Type	Auxilliary	AMHS
Vessel Engine Power Range (kW)	600 - 1000 kW	AMHS
Power demand at berth (kW)	710	EPA ²
Analysis and Output		
Analysis Method	The electricity supplied at the Sitka ferry terminal is primarily low emission hydropower; therefore, the calculation of potential emission reductions is based on the emissions that would occur if berthing activities were carried out without utilizing shore power. This is assumed to represent total potential emission reductions from installing shore power at the ports and retrofitting the ferries for shore power. Vessel berthing activity for the Sitka port ferry (Columbia) was estimated using the ferry schedules from AMHS. It was assumed that the vessel schedule obtained for July 2023 is valid for the entire year. Emissions factors for the Columbia ferry at the Sitka port were sourced from EPA's Port Emissions Inventory Guidance, and averaged based on model year, rated power range, and engine type. The total CO ₂ emissions are estimated using Load (kW), Berthing Time (hrs/year) and Emission Factor (g/kWh).	
Total Berthing Time (hrs/year)	130	
Ferry Auxiliary Engine Emission Factor for Columbia (g/kWh)³	679.5	
Total Annual CO2 Reductions (lbs/year)		138,229.8

Notes:

It was assumed that there is no large cargo handling equipment due to the small size of the freight transported on the ferry

¹ Ferry Schedule at the Sitka Port obtained from AMHS website:

https://dot.alaska.gov/oars/reservations/CalendarFM.amhsf?_gl=1*2opib2*_ga*MTY2NjM4ODU2My4xNjg5NzA1OTI0*_ga_42D0W9NC07*MTY4OTk1ODg1NS40LjAuMTY4OTk1ODg1NS42MC4wLjA

² EPA assumes that larger (M/V Columbia) RORO ferries use 710 kW power while at berth. Source : EPA's Port Emissions Inventory Guidance. Available at : <https://www.epa.gov/state-and-local-transportation/port-emissions-inventory-guidance>

³ Due to the Unavailability of exact vessel model information, EPA emission factors were averaged based on model year, rated power range, and engine type.

**Table 4
Project GHG Emission Reductions
MSB Shaw Elementary School Roundabout
Mat-Su Valley, AK**

Input					
Description	Input				Reference
Project Name	MSB Shaw Elementary School Roundabout				Provided by DOWL
Project Description	Construction of a Roundabout at Paradise Lane and Wasilla-Fishhook Drive intersection				Provided by DOWL
Evaluation Year	2025				Confirmed by DOWL
Area Type	Urban				Confirmed by DOWL
Business District	No				Confirmed by DOWL
Total peak hours per day (AM+PM)¹	1				Confirmed by DOWL
Existing intersection is	Un-signalized				Confirmed by DOWL
Number of Circulating Roundabout Lanes	1				Confirmed by DOWL
	Approach 1 (WB)	Approach 2 (SB)	Approach 3 (EB)	Approach 4 (NB)	
Peak Hour Traffic volume	352	418	34	392	Confirmed by DOWL
Existing Delay per Vehicle (sec/veh, refer to table on right)	381	9	21	8	Confirmed by DOWL
K Factor²	13.3%				Confirmed by DOWL
Analysis and Output					
Analysis Method	The method calculates emission reductions from roundabout project based on the calculation of time savings for travel along the project intersection with and without the roundabout. The improved travel speed improves speed-specific emission factor at the intersection. With the application of the CMAQ toolkit, this analysis estimates the delays and delay controls based on the volume to capacity ratio and maximum lane capacities based on the 2010 Highway Capacity Manual ³ , and the resulting emission savings.				
	Approach 1 (WB)	Approach 2 (SB)	Approach 3 (EB)	Approach 4 (NB)	
Average Annual Daily Traffic volume (AADT)⁴	5900	4900	400	6800	Calculated based on peak hour volume and K Factor
Existing Intersection % Left Turns⁵	69%	31%	10%	6%	Calculated based on 2025 peak hour volume provided by Client
Existing Intersection % Right Turns⁵	30%	1%	83%	38%	Calculated based on 2025 peak hour volume provided by Client
Total Daily CO₂ Reductions (kg/day)	167				
Total Annual CO₂ Reductions (lbs/year)	134,050				

- Notes:**
- ¹ The morning peak hour occurs from 8:30 to 9:30 AM, and the evening peak hour occurs from 3:45 to 4:45 PM, based on the MSB Shaw Elementary School Traffic Impact Analysis Draft Report
 - ² K factor is the percentage of the Average Annual Daily Traffic (AADT) in both directions during the peak hour.
 - ³ Highway Capacity Manual. (2010). Washington, D.C. :Transportation Research Board
 - ⁴ AADT is calculated based on peak hour traffic and K factor.
 - ⁵ Percentage of vehicles turning left or right. The remainder would be going straight. Calculated based on the MSB Shaw Elementary School Traffic Impact Analysis Draft Report, Figure 8A: 2025 Opening Year AM and PM Peak totals

**Table 5
Project GHG Emission Reductions
UAF EV Shuttle Buses Replacement
Fairbanks, AK**

Input		
Description	Input	Reference
Project Name¹	UAF EV Shuttle Buses and EV Bus Charging Station Infrastructure	
Project Description¹	This scope includes 1. Conversion of the UAF Shuttle Bus fleet from diesel to electric by purchase of up to 5 buses over a period of time, and 2. Construction of a electric bus fueling station on the UAF campus to support the conversion of the shuttle bus fleet from diesel to electric.	Public Information
Evaluation Year	2027	Confirmed by FAST
Type of vehicles replacing	Shuttle Bus	Provided by FAST
Model year of existing buses	2001 FORD BUS MINI 14 PASS GIRARDIN DIESEL (5000 miles/yr), 1992 THOMAS BUS 31 PASS TRANSIT LINER (7500 miles/yr), (3x) 2006 INTERNATIONAL 21 PERSON BUS, VT365, ALLISON (10000 miles/year each)	Provided by FAST
Fuel type of existing bus	Diesel	Confirmed by FAST
Model year of new alternative fuel bus²	2027	Confirmed by FAST
Fuel type of new bus	Battery Electric	Provided by FAST
Number of buses	5	Confirmed by FAST
Annual vehicle mileage³	2001 FORD BUS MINI 14 PASS GIRARDIN DIESEL (5000 miles/yr), 1992 THOMAS BUS 31 PASS TRANSIT LINER (7500 miles/yr), (3x) 2006 INTERNATIONAL 21 PERSON BUS, VT365, ALLISON (10000 miles/year each)	Provided by FAST
Will the fueling stations used for other alternative fuel vehicles?⁴	No	Confirmed by FAST
Will the fueling distance increase or decrease with the new infrastructure?⁵	N/A	Confirmed by FAST
One-way fueling distance increase/decrease (miles)	No change	Confirmed by FAST
Analysis and Output		
Analysis Method	Replacing diesel shuttle buses to electric bus can eliminate all tailpipe CO ₂ emissions during bus operation. Therefore, annual emission reductions are calculated based on the emission rate of existing diesel vehicles and the fleet activities. In the CMAQ toolkit, the emission reductions in this analysis are first estimated separately based on the vehicle model year and the corresponding annual VMT of the 3 existing vehicle types, and then added together as the total Project emission reductions. Because of the diesel bus emission factors from the CMAQ toolkit ⁶ and the EPA MOVES model data are only available since 1997, this analysis used the emission factor of the Model Year 1997 school bus as a conservative estimate for replacement of the Model Year 1992 Thomas Bus.	
CO₂ reductions from 2001 FORD BUS (kg/day)	33	
CO₂ reductions from 1992 THOMAS BUS (kg/day)	10	
CO₂ reductions from one 2006 INTERNATIONAL 21 PERSON BUS (kg/day)	34	
Total Daily CO₂ Reductions (kg/day)	145	
Total Annual CO₂ Reductions (lbs/year)	116,615	

Notes:

- ¹ The Project is an alternative to the UAF CNG Bus. The base project information is available at: https://fastplanning.us/wp-content/uploads/2023/02/06_UAF_CNG_Shuttle_Buses.pdf, https://fastplanning.us/wp-content/uploads/2023/02/07_UAF_CNG_Bus_Fueling_Station_Infrastructure.pdf
- ² The project will purchase the latest model years EV buses with zero tailpipe CO₂ emissions when the project starts.
- ³ The vehicle mileage data corresponds to the vehicle types provided above. It's assumed that the vehicle replacement will not change the mileage.
- ⁴ According to the CMAQ/CRP nomination form for fueling station infrastructure, the scope of the new EV stations is to fuel the new EV shuttles only.
- ⁵ This question is to evaluate whether charging distance will increase or decrease compared to the existing fueling station(s).
- ⁶ The CMAQ Toolkit from FHWA, available at: https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/

Table 6
Project GHG Emission Reductions
LED Street Lighting Replacement
Kenai, AK

Input		
Description	Input	Reference
Project Name	LED Street Lighting Replacement	
Project Description	AK DOT will replace existing highway lights in the Kenai Spur Hwy with LED lights that are less energy intensive and reduce electricity consumption	Provided by AKDOT
Evaluation Year	2027	Provided by AKDOT
Length of Project (mile)	3.2	Provided by AKDOT
Are streetlights installed on both sides?	Yes	Confirmed by AKDOT
Number of existing streetlights to be replaced¹	140	Provided by AKDOT
Power rate of existing streetlights (Watt)	250	Provided by AKDOT
Streetlight Daily Operation Hours (hr/day)	10	Provided by AKDOT
Number of LED streetlights to be installed²	140	Provided by AKDOT
Power rate of proposed LED streetlights (Watt)	120	Provided by AKDOT
Local Grid Carbon Intensity (lb CO₂/MWh)³	1,068	EPA eGRID based on Project location
Analysis and Output		
Analysis Method	The CO ₂ emission reduction from this Project is from electricity savings. Electricity saving is calculated based on the difference of existing and new streetlight power ratings, the number of streetlights and the local streetlight operational patterns as shown above. CO ₂ emission reductions are then estimated based on electricity savings and local grid carbon intensity from the EPA eGRID. This analysis used carbon intensity of AKGD, which serves Central and Southeast Alaska, including the Project area.	
Total Daily CO₂ Reductions (kg/day)	88	
Total Annual CO₂ Reductions (lbs/year)	70,927	

Notes:

- ¹. The value is based on number counts from aerial photo.
- ². Assuming replacing fixtures only, so the number of streetlight remain unchanged
- ³. The local grid carbon intensity is used to estimate the grid CO₂ emission reductions due to the power saving from LED streetlights. The data source is EPA eGRID: <https://www.epa.gov/egrid/power-profiler#/AKGD>. The carbon intensity used in the analysis is the ASCC Alaska Grid that serves Central and Southeast Alaska.

Table 7
Project GHG Emission Reductions
Chena Lake Recreation Area Bike & Pedestrian Infrastructure
Fairbanks, AK

Input		
Description	Input	Reference
Project Name	Chena Lake Recreation Area Bike & Pedestrian Infrastructure	
Project Description	This project includes the construction of a bike/pedestrian pathway separated from the unpaved section of the road roughly a ½ mile long on Plack Road, connecting recreation users to Chena Lake Recreation Area (CLRA) with a small off-street parking area. Also included in this project is the construction/rehabilitation of roughly 910 feet of trail for nonmotorized use. The Project will allow visitors access to the park from a new entrance through the bike/pedestrian pathway at the intersection of Plack Road.	Provided by client
Evaluation Year	2028	Confirmed by client
New Bikeway Length (mile)¹	0.67	Confirmed by client
Existing Daily Vehicle trips to CLRA²	822	Provided by client
Vehicles will use New Entrance (vehicles / day)	20-30	Provided by client
New Entrance One-way Driving Trip Length Savings (miles)	6	Provided by client
Average Bike Trip Length (mile)³	2	CMAQ Toolkit Default
Total existing bikeway length in the Project Area (miles)⁴	2	Measured through Google Maps
Analysis and Output		
Analysis Method	The method calculates emission reductions from bike and pedestrian infrastructure based on the calculation of vehicle trips and VMT savings associated with the project. Based on the project description, this consists of two parts: (1) vehicle detour related to the access to the new entrance, and (2) bike trip increase due to the lane expansion. We estimated the VMT decrease related to detour based on the Project design and estimated per trip VMT savings. For VMT reductions related to the bike trip increase, we used input data, available bike mode share data, and elasticity from a multivariate analysis that evaluates the impacts of bike lanes on cycling levels in the 100 largest U.S. cities, which found that a 0.25 percent increase in cycling occurs for every 1 percent increase in bike lane distance. ⁵ With the application of the CMAQ toolkit ⁶ , this analysis estimates the emission savings from vehicle trip and VMT reductions.	
Daily VMT Reductions (miles/day)⁷	306	
Total Daily CO₂ Reductions (kg/day)	51	
Total Annual CO₂ Reductions (lbs/year)	41,103	

Notes:

- ¹ The project includes 0.5 miles of bike/pedestrian lane, plus a 910 ft. non-motorized access trail.
- ² It is estimated that CLRA has about 300,000 visitors per year.
- ³ Due to lack of local data, this analysis used a one-way bike trip length of 2 miles, which is the default national average from the CMAQ toolkit.
- ⁴ Measured through Google Maps with self-identified Project boundary, as the local communities all have a separated path on Plack rd up until the Project site.
- ⁵ Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity, Available at : https://www.caleemod.com/documents/handbook/full_handbook.pdf
- ⁶ The CMAQ Toolkit from FHWA, available at: https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/
- ⁷ The VMT reductions are estimated based on the combined effect of vehicle detour and bike trip increase as discussed in the method row.

**Table 2
Project GHG Emission Reductions
UAF CNG Shuttle Buses Replacement
Fairbanks, AK**

Input		
Description	Input	Reference
Project Name¹	UAF CNG Shuttle Buses and CNG Bus Fueling Station Infrastructure	Public Information ¹
Project Description¹	This scope includes 1. Conversion of the UAF Shuttle Bus fleet from Diesel to CNG by purchase of up to 5 buses over a period of time, and 2. Construction of a compressed natural gas (CNG) fueling station on the UAF campus to support the conversion of the shuttle bus fleet from Diesel to CNG.	Public Information ¹
Evaluation Year	2027	Confirmed by FAST
Type of vehicles replacing	Shuttle Bus	Provided by FAST
Model year of existing buses	2001 FORD BUS MINI 14 PASS GIRARDIN DIESEL, 1992 THOMAS BUS 31 PASS TRANSIT LINER , (3x) 2006 INTERNATIONAL 21 PERSON BUS, VT365, ALLISON (10000 miles/year each)	Provided by FAST
Fuel type of existing bus	Diesel	Confirmed by FAST
Model year of new alternative fuel bus²	2027	Confirmed by FAST
Fuel type of new bus	Compressed Natural Gas (CNG)	Confirmed by FAST
Number of buses	5	Confirmed by FAST
Annual vehicle mileage³	2001 FORD BUS MINI 14 PASS GIRARDIN DIESEL (5000 miles/yr), 1992 THOMAS BUS 31 PASS TRANSIT LINER (7500 miles/yr), (3x) 2006 INTERNATIONAL 21 PERSON BUS, VT365, ALLISON (10000 miles/year each)	Provided by FAST
Will the fueling stations used for other alternative fuel vehicles?⁴	No	Confirmed by FAST
Will the fueling distance increase or decrease with the new infrastructure?⁵	N/A	Confirmed by FAST
One-way fueling distance increase/decrease (miles)	No change	Confirmed by FAST
Analysis and Output		
Analysis Method	Annual emission reductions for the total number of conventional fuel vehicles being replaced by alternative fuel vehicles are calculated based on the difference of the emission rate between existing conventional fuel (e.g., diesel) vehicles and the target renewable fuel vehicles and the fleet activity. By applying the CMAQ toolkit ⁶ , the emission reductions in this analysis are first estimated separately based on the vehicle model year and the corresponding annual VMT of the 3 existing vehicle types, and then added together as the total Project emission reductions. Note that because the diesel bus emission factors from the CMAQ tool and the EPA MOVES model data are only available since 1997, this analysis used the emission factor of the Model Year 1997 school bus as a conservative estimate for replacement of the Model Year 1992 Thomas Bus.	
CO₂ reductions from 2001 FORD BUS (kg/day)	2.285	
CO₂ reductions from 1992 THOMAS BUS (kg/day)	3.17	
CO₂ reductions from 2006 INTERNATIONAL 21 PERSON BUS (kg/day)	4.408	
Total Daily CO₂ Reductions (kg/day)	18.677	
Total Annual CO₂ Reductions (lbs/year)	15,029	

Notes:

- ¹ The Project information is available at: https://fastplanning.us/wp-content/uploads/2023/02/06_UAF_CNG_Shuttle_Buses.pdf, https://fastplanning.us/wp-content/uploads/2023/02/07_UAF_CNG_Bus_Fueling_Station_Infrastructure.pdf
- ² The project will purchase the latest model years CNG buses when the project starts
- ³ The vehicle mileage data corresponds to the vehicle types provided above. It s assumed that the vehicle replacement will not change the mileage
- ⁴ According to the CMAQ/CRP nomination form for fueling station infrastructure, the scope of the new fueling stations is to fuel the new CNG shuttles only.
- ⁵ This question is to evaluate whether fueling distance will increase or decrease compared to the existing fueling station(s).
- ⁶ The CMAQ Toolkit from FHWA, available at: https://www.fhwa.dot.gov/environment/air_quality/cmaq/toolkit/



APPENDIX: PUBLIC ENGAGEMENT





Carbon Reduction Strategy FAST Planning Staff & Technical Committee Update

Date/Location: Wednesday, May 3, 2023, 12:00 – 2:00 p.m.
Zoom

Staff Present: DOT&PF: Judy Chapman
DOWL: Theresa Dutchuk, Adam Morrill, and Morgan McCammon

Summary

The Fairbanks Area Surface Transportation (FAST) Planning Committee discussed their project nominations for consideration and funding strategy. The specific topics included congestion mitigation, air quality, and a carbon reduction program as Fairbanks is considered a serious non-attainment area due to wintertime air quality issues. This list of projects will be shared with the project team.

Theresa Dutchuk and Adam Morrill presented the Carbon Reduction Strategy. The presentation included the project overview, background, schedule, and input needs.

Discussion and Comments

Committee member Danny Wallace, City of North Pole, asked for clarification on how the State's Carbon Reduction Strategy would coordinate with the FAST Planning carbon reduction efforts. The project team shared that funding allocation is based on population. This would be a competitive process that incorporates a benefit analysis and would award project funding for those that sync with the State's plan. Jackson Fox, FAST Planning Executive Director, shared that FAST Planning has developed a list of projects ahead of State's planning process. FAST Planning can provide strategies applicable to the State's cold-weather climates.

A committee member commented on \$29 million allocated for the Municipal Planning Organization (MPOs) and separate State-wide funding, asking if the MPO could apply for those State-wide funds in addition. Judy Chapman, Department of Transportation and Public Facilities (DOT&PF) Planning, responded that this would be possible and depends on how DOT&PF manages funds.

Committee member Kevin McKinley, Fairbanks North Star Borough (FNSB) Planning Commission, requested clarification on the federal administration goals included in the presentation, specifically about safety and complete streets, equity, and urban versus rural considerations. The project team shared that the Bipartisan Infrastructure Law (BIL) outlined funding would be disbursed based on population centers and densities, focusing on populations over 250,000.

A committee member requested additional information on carbon existing conditions in Alaska and the contributions presented. The project team shared that Alaska is different from other states, with approximately 33% of carbon emissions related to transportation and 49% is related to industrial sources. Examples of industrial carbon sources include many of Alaska's economic sectors, like oil and gas operations on North Slope and use of natural gas to regulate the systems.



Carbon Reduction Strategy FAST Planning Staff & Technical Committee Update

A committee member stated that the Fairbanks area had CO issues 20 years ago, but they have been addressed. The main challenge the area is facing today is particulate matter (PM), requested clarification on how this Carbon Reduction Strategy coordinate with PM_{2.5}. The project team shared details on National Ambient Air Quality Standards (NAAQS) and greenhouse gases (GHG) being separate issues. Nick Czarnecki, Department of Environmental Conservation (ADEC) Air Quality Division, further shared that NAAQS are separate from GHG when looking at emissions reductions. Nick Czarnecki shared that lowering GHG emissions will have a beneficial impact on other air quality standards. The CRP is looking to lowering fuel combustion and lower all emissions.

Robert Pristash, City of Fairbanks Engineering Department, asked for clarity on how projects would be scored and weighted, as FAST Planning has developed a scoring system. The project team shared that they would like to work with FAST Planning to incorporate recommendations consistent with prior efforts.

Jackson Fox requested additional details on how emissions by transportation mode were calculated. The project team shared that a combination of methods was used, including fuel sales and vehicle miles traveled on road. Aviation and other transportation modes were determined from fuel sales.

Jackson Fox asked if this funding would be required to be used for on-road transportation and if aviation projects could be eligible. The project team shared that some aviation and marine projects could be included, however, because this is a national program, it is based on reducing carbon emissions by the most common source, nationally. Alaska is unique in that aviation is the highest carbon emission source versus on-road sources in lower 48.

Jackson Fox commented that FAST Planning has developed a competitive process, scoring projects to improve air quality in the area.

Jackson Fox offered to share the reduce carbon projects list and supporting documents developed by FAST Planning.

Recommendations

- Include alternative vehicle charging stations
- Signal interconnect projects to improve traffic flow
- Increase transit usage and access to transit
- Develop a quantifiable method to show air quality improvements to score projects
- Include roundabouts
- Develop methods to reduce traffic start and stop

The project team thanked the FAST Planning Committee and staff for their time and committed to updating the Committee following the release of the draft Carbon Reduction Strategy Plan in July 2023.



Carbon Reduction Strategy FAST Planning Policy Board Update

Date/Location: Wednesday, May 17, 2023, 12:00 – 2:00 p.m.
Zoom

Staff Present: DOT&PF: Randi Bailey
DOWL: Adam Morrill and Morgan McCammon

Summary

The Fairbanks Area Surface Transportation (FAST) Planning staff recently met with Anchorage Metropolitan Area Transportation Solutions (AMATS) and the new Mat-Su Valley Planning (MVP) Metropolitan Planning Organizations (MPOs). As a group, they would like to eliminate DOT&PF discretionary funding set-aside from the statewide budget to fund MVP with two full time staff members.

The FAST Planning Policy Board discussed their project nominations for consideration and funding strategy. The specific topics included congestion mitigation, air quality, and a carbon reduction program.

Adam Morrill presented the Carbon Reduction Strategy. The presentation included the project overview, background, schedule, and input needs. Additionally, Adam shared the list of recommendations from the Staff and Technical Committee:

- Include alternative vehicle charging stations
- Signal interconnect projects to improve traffic flow
- Increase transit usage and access to transit
- Develop a quantifiable method to show air quality improvements to score projects
- Include roundabouts
- Develop methods to reduce traffic start and stop

Discussion and Comments

A board member requested the emissions break down on type of aviation (commercial vs public)? Adam shared that Green House Gas Inventory reports this information and committed to sharing an answer. **A board member** requested also checking on military aviation emissions.

A board member asked if speed limits based on vehicle mileage on interstates would be considered. Adam shared that carbon emissions are highest between 0-10 mph, then decline until a certain speed before increasing again. This concept could be included in the Carbon Reduction Strategy.

Recommendations and Follow Up

- Determine the source of aviation carbon emissions
- Consider adjusting speed limits to minimize carbon emissions



Carbon Reduction Strategy FAST Planning Policy Board Update

The project team thanked the FAST Planning Board and staff for their time and committed to updating the Board following the release of the draft Carbon Reduction Strategy Plan in July 2023.



Carbon Reduction Strategy AMATS Technical Advisory Committee Update

Date/Location: Thursday, July 13, 2023, 2:30 – 4:30 p.m.
Teams

Project Team Present: DOWL: Theresa Dutchuk, Adam Morrill, and Morgan McCammon

Summary

Jon Cecil, Municipality of Anchorage (MOA), Transportation Planner, introduced the project and the consultant team members, Theresa Dutchuk and Adam Morrill, to the Anchorage Metropolitan Area Transportation Solutions (AMATS) Technical Advisory Committee (TAC).

Theresa and Adam presented an introduction to the Carbon Reduction Strategy (CRS), which included the project overview, background, schedule, and input needs.

Committee Discussion and Comments

Committee Member Yemi Alimi shared that he invited his colleague with the Department of Environmental Control (DEC), who is an expert on Green House Gas (GHG) emissions.

Committee Member Alimi further commented on ways to reduce carbon emissions: reduce congestion, increase use of transportation modes such as transit and walking, reduce individual vehicle miles traveled, and incentivize zero emission vehicle use.

A **Committee Member** mentioned the Vanpool Program (Rideshare). A subsidy could expand this program to offer the service more broadly to Matanuska-Susitna Valley and Girdwood areas. Strategies should include ways to make transit more competitive with personal vehicles.

A **Committee Member** mentioned AMATS has programmed Carbon Reduction Plan (CRP) funding and asked how the CRS would coordinate with already programmed projects. Theresa responded that coordinating with Metropolitan Planning Organizations (MPOs) is an important part of this process.

Committee Member Melinda Kolhass requested examples of emissions sources in the industrial category, as it accounts for a substantial percentage of the state's emissions.

Paul Goodfellow, DEC, shared that the state's GHG Inventory is available online for review. Industrial emissions are mostly from oil and gas drilling and refining. He further shared in the meeting chat: *I would encourage everyone to review the state's GHG Inventory, as it has technical details which may answer some questions posed here:*

<https://dec.alaska.gov/air/anpms/projects-reports/greenhouse-gas-inventory>.

Committee Member Kolhass shared an about idea fast food drive throughs to incentivize, minimize, or eliminate idling while at drive throughs.

Committee Member Kolhass requested clarification on why emissions testing is no longer required and commented that it could be worth explaining to public.



Carbon Reduction Strategy AMATS Technical Advisory Committee Update

Committee Member Brad Coy requested clarification on how aviation emissions were calculated. Adam shared that the largest source of aviation carbon emissions is international freight, and 5% came from transportation to remote communities. **Committee Member Coy** followed up by asking what ways this plan could minimize aviation emissions without jeopardizing jobs. Adam responded that the CRS plan focuses on on-road emissions. This is explicitly stated in the legislation because, in most states, the highest levels of carbon emissions come from on-road sources.

Committee Member Coy requested clarification on AMATS's flexibility for funding use. Adam responded that additional funding is available, and the funds shown in this presentation are DOT&PF projections. The CRS will be updated every four years and include allocations. This funding can be used for capital expenditures, maintenance projects, and non-motorized, if the use demonstrates reductions to on-road carbon emissions.

A **Committee Member** asked about cold engine starts contributing to carbon emissions. A **Committee Member** corrected that cold engine starts increase carbon monoxide (CO) rather than carbon dioxide (CO₂).

Public Comment

James Starzec, Department of Transportation and Public Facilities (DOT&PF) Transportation Planner, noted that this CRS is required to focus on on-road carbon emissions and requested clarification on the Alaska Marine Highway. Adam responded that for purposes of this plan, the Alaska Marine Highway system would be included.

James Starzec questioned if AMATS would be constrained by the CRS. Adam responded that the Federal Highway Administration (FHWA) would approve funding use if projects reduce carbon emissions, and that the CRS is being developed in coordination with MPOs to make it consistent with other state plans.

Adam Moser, DOT&PF Program Development Chief, shared in the meeting chat: *DOT&PF will not require AMATS to program its suballocation of CRP funding to conform to the plan, so long as the programming is an eligible activity for CRP. The plan is to provide options and inform the data driven investment of CRP funds.*

A member of the public mentioned that DOT&PF is evaluating electric vehicles (EVs), and if power comes from natural gas, no carbon emissions reduction benefit is realized.

A member of the public asked if the financial costs to Alaska residents have been considered for these strategies, and if this plan would have meaningful reductions compared to costs due to the low levels of on-road carbon emissions in the state.

Recommendations

The Committee stated that they could not provide recommendations before the Policy Committee meets in two weeks. A Committee Member made a motion, that passed, to request staff schedule a work session in the next month for the Committee to provide recommendations.



Carbon Reduction Strategy AMATS Technical Advisory Committee Update

The project team thanked the TAC for their time and committed to updating the Committee following the release of the draft Carbon Reduction Strategy Plan in September 2023.



Carbon Reduction Strategy AMATS Policy Committee Update

Date/Location: Thursday, July 27, 2023, 1:30 – 3:30 p.m.
Teams

Project Team Present: DOWL: Renee Whitesell, Theresa Dutchuk, Adam Morrill, and Morgan McCammon

Summary

Aaron Jongenelen, Municipality of Anchorage (MOA), Transportation Planner, introduced the project and the consultant team members, Renee Whitesell, Theresa Dutchuk, and Adam Morrill, to the Anchorage Metropolitan Area Transportation Solutions (AMATS) Policy Committee (PC).

Renee began the presentation by introducing the Carbon Reduction Strategy (CRS). Theresa and Adam continued by presenting background, schedule, and input needs.

Committee Discussion and Comments

Committee Member Daniel Volland mentioned that AMATS has strategies and projects in the Transportation Improvement Program (TIP). He asked how the state program intersects with TIP and whether the funding would be in addition to funding already programmed. Aaron responded that AMATS has programmed all CRP funding through 2026.

Adeyemi Alimi, Department of Environmental Conservation (DEC), recapped comments he shared from Technical Advisory Committee (TAC). He suggested strategies of reducing total particulate matter (PM) 10, reduction of the carbon footprint, increasing carpooling and van pooling programs, and increasing renewable energy for electric car charging.

Committee Member Volland mentioned the Complete Streets Program as a strategy to reduce carbon emissions, increase quality of life, and increase availability of transportation choices.

Adeyemi Alimi questioned the concept of reducing carbon emissions in aviation sector and combining those strategies with the on-road carbon emissions. The project team reiterated that the funding in this program is not available for strategies to reduce aviation sector carbon emissions.

Aaron Jongenelen added that a work session is being schedule for the PC and TAC members to make recommendations for the CRS.

Public Comment

A public participant mentioned they had difficulty hearing the presentation and PC conversation from the public seating area. The PC members said they would speak louder.

Some public participants expressed concern with the idea of reducing surface transportation carbon emissions and the cost to Alaska taxpayers for this program. Main concerns were that this strategy would reduce the options for personal vehicles, increase costs for residents now and in the future, and climate change science debate.



Carbon Reduction Strategy AMATS Policy Committee Update

A public participant was concerned with the focus of on-road transportation carbon emissions when 71% of transportation carbon emissions in Alaska come from aviation. He suggested focusing on the aviation sector as a primary way to reduce carbon emissions in the state.

A public participant commented that climate change is a problem, and this year has been the hottest July on record. He was glad to see carbon emission reduction projects in the draft 2024-2027 Statewide Transportation Improvement Program (STIP). He added that some communities in Alaska can use smaller personal electric or short-range vehicles that are obsolete in other larger communities.

One public participant urged AMATS to schedule a presentation by the CO₂ Coalition.

Additional Committee Discussion and Comments

Committee Member Volland mentioned that the presentation and eligible projects do not include suggestions to take personal property and seems to be about increasing transportation choices.

Adeyemi Alimi commented that the Anchorage emissions testing was discontinued. He reiterated the voluntary nature of programs such as the van pool program to decrease CO emissions.

A Committee Member raised concerns with renewable energy coming from imported materials from countries with slave labor equivalent, exploiting vulnerable populations, to increase electrification of transportation systems in Alaska.

Recommendations

AMATS staff will host a work session for PC and TAC members to make recommendations on the CRS early enough in August 2023 and to present strategies at the next PC meeting, in time for comment on the draft CRS.



Carbon Reduction Strategy AMATS Freight Advisory Committee Update

Date/Location: Wednesday, August 9, 2023, 3:00 – 4:30 p.m.
Teams

Project Team Present: DOWL: Theresa Dutchuk and Morgan McCammon

Summary

Jonathan Cecil, Municipality of Anchorage (MOA), introduced the project and consultant team member, Theresa Dutchuk, to the Anchorage Metropolitan Area Transportation Solutions (AMATS) Freight Advisory Committee (FAC). Theresa presented an introduction to the Carbon Reduction Strategy (CRS), background, schedule, and input needs.

Committee Discussion and Comments

Committee Chair Joe Michel asked for specific language in infrastructure bill discussing freight vehicles. Theresa will email this language to Joe. **Committee Chair Michel** requested examples of strategies applicable to freight movement. Theresa shared a few examples: transitioning freight vehicles to alternative fuels, developing infrastructure to support alternative fuel vehicles, and using alternative fuels for the Alaska Marine Highway System (AMHS) and facilities.

Committee Chair Michel asked about other non-freight specific recommendations, such as bike paths. Theresa shared that the project team is developing an example list of strategies to reduce on-road carbon emissions in the state. These include recommendations such as the Complete Streets program and others.

Recommendations

The FAC had no recommendations at this time.