



SAN DIEGO AND IMPERIAL COUNTIES SUSTAINABLE FREIGHT IMPLEMENTATION STRATEGY

FINAL EXISTING CONDITIONS AND SUSTAINABLE FREIGHT BEST PRACTICES

September 2022

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1. PURPOSE AND SCOPE

As part of the San Diego and Imperial Counties Sustainable Freight Implementation Strategy, this report focuses on the Existing Conditions Assessment that documents existing and upcoming sustainable trends, case studies, and pilots in the freight sector. This report includes a summary of relevant state, regional, and local plans, a review of best practices in sustainable freight, and a proposed screening framework for use in evaluating projects and policies for inclusion in the implementation strategy.

2. SUMMARY OF FINDINGS

An extensive literature review and analysis of best practices within the current realm of sustainable freight projects and policies was conducted, as part of the Task 3.1, Deliverables for the Existing Conditions Assessment, under Task 3. In this literature review, extensive documents, reports, and industry newsletters were screened and reviewed to identify existing and upcoming sustainable trends, case studies, and pilots in the freight sector. While focusing on best practices and examples relevant to the study area in the San Diego region and the state of California, the team also reviewed various reports from other jurisdictions within the United States and Europe. A full description of each of the documents is detailed in Section 1.

After conducting literature reviews on existing practices and conditions within the San Diego Association of Governments (SANDAG) and Imperial County Transportation Commission (ICTC) region and reviewing case studies and practices from other regions and countries, the team utilized the following process to screen for and determine best practices suitable for San Diego and Imperial Counties Freight Implementation Strategy, as shown in Figure 1. Based on more than 30 studies and reports, the team identified three key categories of sustainable freight best practices and 17 specific technologies/strategies. These best practices categories include:

- Technology Solutions
- Fleet Management and Operational Solutions
- Infrastructure Improvements

Figure 1: Task 3 Existing Conditions Assessment Process

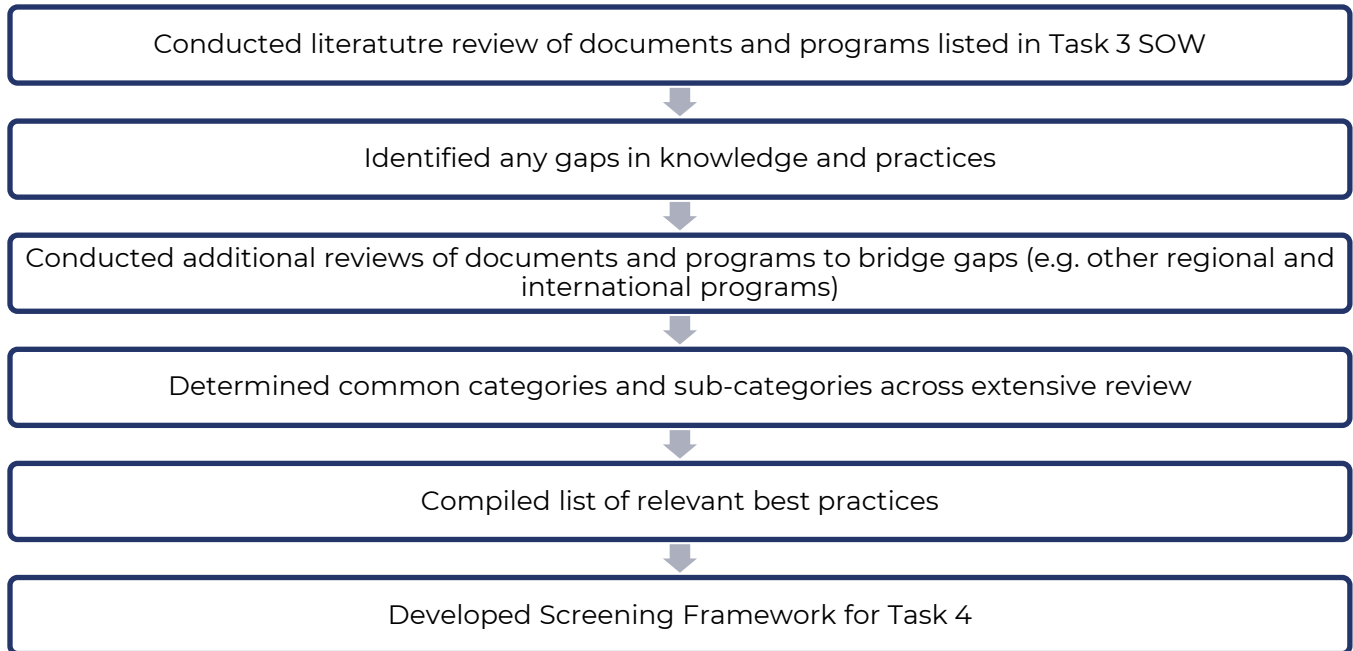
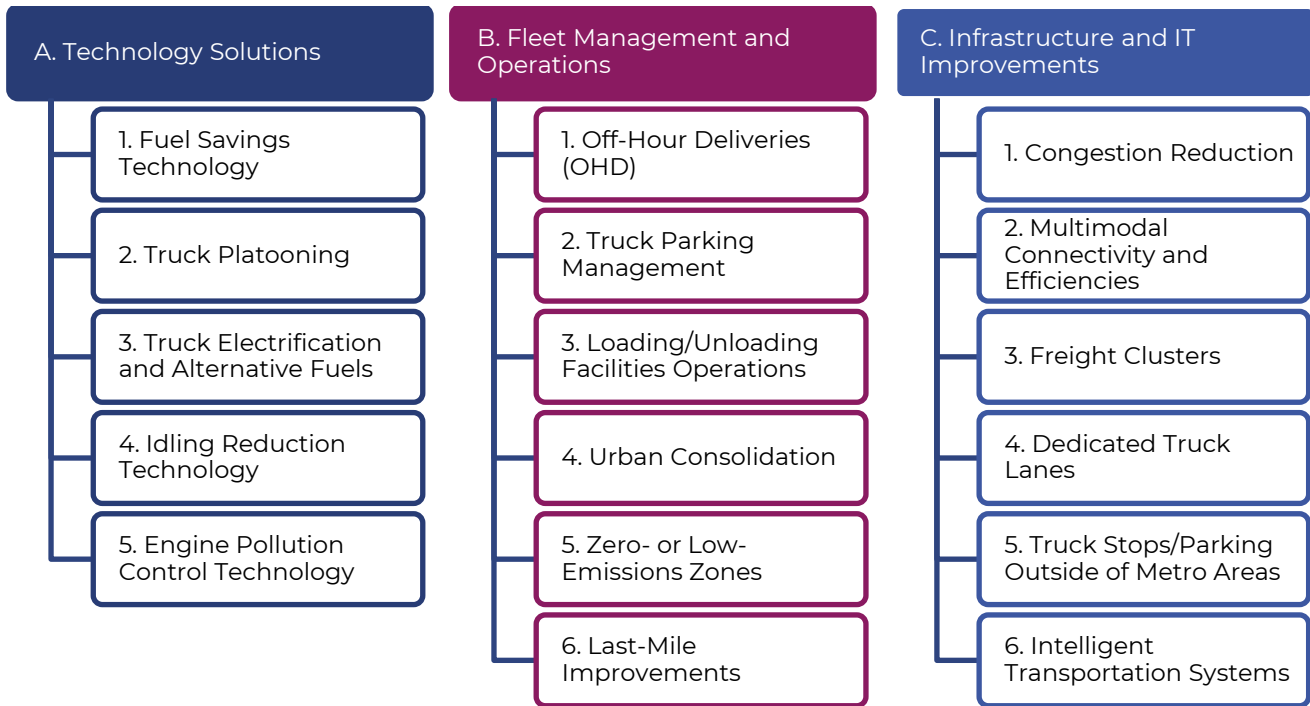


Figure 2 provides a graphic representation of all the categories and technologies/strategies. Section 3 provides a detailed explanation of the policies identified.

Figure 2: Sustainable Freight Best Practices – Categories and Technologies/ Strategies



After identifying a set of Best Practices, a proposed screening framework was developed to assess existing practices. This proposed screening framework will be refined by the project’s Technical Advisory Committee, and then used to determine which existing projects, programs, and policies are in alignment with the vision statement, and which projects, programs, and policies will meet the regional needs and priorities in future tasks. The draft screening framework can be found in Section 5 of this memorandum.

3. REVIEW OF EXISTING PLANS AND STUDIES

An extensive review of existing state, regional and local plans and studies was conducted as part of the Existing Conditions and Best Practices analysis. The following matrix summarizes the relevant documents reviewed.

Document Name	1. Freight Efficiency Strategies: A White Paper Series to Inform the California Sustainable Freight Action Plan (2016)
Summary	<p>A number of stakeholders met with the ultimate goal of identifying inefficiencies faced by the freight system and putting forward a set of strategies to achieve a more efficient freight system. In doing so, a key first step was to provide insight as to the possible root cause(s) of major inefficiencies affecting the system. In addition to assessing inefficiencies, this research describes some of the aspects and necessary conditions that need to be considered when defining or identifying remediating strategies. Moreover, the research discusses several efficiency improvement strategies. These include:</p> <ul style="list-style-type: none"> ▪ Voluntary Off-Hour Delivery Programs ▪ Receiver-led Consolidation ▪ Development of a Chassis Pool of Pools Fully Integrated System ▪ Improvement of Traffic Mitigation Fee Programs ▪ Implement Advanced Appointment/ Reservation Systems ▪ Developing an Integrated System for Dray Operations and Services ▪ Load Matching and Maximizing Capacity <p>In light of the then Governor Jerry Brown’s Executive Order B-32-15 (2015), it is imperative that the various public agencies in the state initiate, continue, or reinforce efforts to address some of these issues.</p>

Document Name **2. Methods for State DOTs to Reduce GHG Emissions from the Transportation Sector (2022)**

Summary As part of the National Cooperative Highway Research Program (NCHRP) objective to evaluate ways to reduce transportation greenhouse gas (GHG) emissions through state department of transportation (DOT) activities and decision-making, this guide document was developed to aid DOTs by breaking down technical and institutional related issues related to GHG estimation and reduction across the spectrum of an agency’s activities. The following table summarizes the key findings:

Observations	State DOT Recommendations
Most emissions reductions will come from clean vehicle and fuel technologies	Support electric and alternative fuel vehicle infrastructure for light and heavy vehicles, clean transit, and clean fleets
Demand reduction and systems efficiency strategies can reduce emissions by up to 5% to 20%	Implement intelligent transportation systems (ITS)/ efficient traffic operations. Invest in and support low-carbon travel alternatives and incentives to manage demand for vehicle travel
DOT construction materials, fuels/fleets, and buildings provide an additional reduction potential of 2% to 3% of total transportation system emissions	Use low-carbon, recycled/reused materials, where feasible. Switch to clean fuel light and heavy vehicles
GHG reduction targets of 75% to 80% or more by 2050 are challenging and will require widespread electrification and a clean grid	Collaborate with other state, regional, and local agencies

Document Name	3. Freight Industry Issues & Trends Memo: Mid-South Freight Flows & Industry Analysis - Memphis Issues and Trends Report (April 2022)
Summary	<p>To fully take advantage of these strengths and opportunities, and shore up weaknesses, the Memphis Urban Area Metropolitan Planning Organization (Memphis MPO) is developing a <i>Mid-South Region Freight Flows & Industry Analysis</i> to develop recommendations for facilitating the growth of freight and logistics industries in the region, including trucking, railroad, air cargo, waterways, pipeline, and warehousing. The <i>Issues and Trends Report</i>, identifies the main issues and trends faced by these freight sectors and assesses their likely impact on the region. This report is organized as follows:</p> <ul style="list-style-type: none"> ▪ Section 2 covers several trends and issues that are likely to affect all freight modes, including: e-commerce, the COVID-19 pandemic, and distributed manufacturing. ▪ Section 3 covers trends and issues in trucking, including: congestion bottlenecks, safety, pavements and structures, parking, electrification, emerging technologies, and driver shortage. ▪ Section 4 covers trends and issues in freight rail, including: network bottlenecks, precision scheduled railroading, intermodal network restructuring, rail technology, bridges and structures, at-grade crossings, and economic development. ▪ Section 5 covers trends and issues in water transportation, including: multimodal access, condition of facilities and assets, industrial land development, container-on-barge growth opportunities (empty and loaded), and industry growth opportunities. ▪ Section 6 covers trends and issues in air cargo, including: cargo trends, parcel industry developments, and accessibility. ▪ Section 7 covers trends and issues in warehousing and distribution, including recent growth, diversification, and use of automation and multi-story technologies. ▪ Section 8 covers trends and issues in pipelines.

Document Name	4. American Transportation Research Institute (ATRI) Trucking Research
Summary	<p>ATRI’s online compendium of <i>Sustainable Freight Practices for the Trucking Industry</i> describes sustainable practices from the trucking industry’s perspective and highlights the positive impacts of, and opportunities for, specific sustainability tools and programs. The various sections of the compendium describe the role truck drivers can play in advancing sustainability, including driving and vehicle operating techniques that can significantly decrease fuel consumption. Also in the compendium are vehicle practices that include a discussion of trends and impacts related to aerodynamics, tires, engines, alternative fuels, cargo management systems, and higher productivity vehicles. The compendium describes the role of the public sector in advancing sustainability in the trucking industry, including congestion mitigation, financial incentives, and government-funded research and development. The three-part series includes:</p> <ul style="list-style-type: none"> ▪ Part 1: The Role of Truck Drivers in Sustainability ▪ Part 2: Sustainable Vehicles Practices ▪ Part 3: Public-Sector Practices

Document Name	5. Sustainability Intervention Mechanisms for Managing Road Freight Transport Externalities: A Systemic Literature Review. (2018) Sustainable Freight Transport, MDPI (2021)
Summary	<p>With road freight transport continuing to dominate global freight transport operations, there is increasing pressure on the freight transport industry and its stakeholders to address concerns over its sustainability. This paper adopts a systematic review to examine the academic literature on road freight transport sustainability between 2001 and 2018. Using content and thematic analysis, this paper identifies and categorizes sustainability intervention mechanisms, providing useful insights on key research applications areas and continental distribution of sustainable road freight transport research. Six overarching sustainability intervention mechanism themes—decoupling, information and communications technology, modality, operations, policy, and other future research—can explore effectiveness of different interventions mechanisms to improve sustainable practices across different continents.</p>

Document Name	6. 2040 Portland Freight Plan – Freight Greenhouse Gas Reduction Best Practices (2022)
Summary	<p>The purpose of this white paper is to provide a concise summary of freight GHG reduction best practices. The urgency is in response to the Governor’s Executive Order 20-04 directing several state agencies to take immediate actions to address climate change, as well as the City of Portland’s climate change goals and commitments, including the recent Climate Emergency Declaration.</p> <p>TOP RECOMMENDATIONS</p> <p>The following is a summary of the top recommendations for reducing GHG emissions from freight. These recommendations are discussed in further detail throughout the report.</p> <p>Technologies</p> <ul style="list-style-type: none"> ▪ Promote the deployment of near-zero and zero-emission trucks—first for urban deliveries and port drayage trips (where operations are more favorable) and then for regional and long-haul trips. Near-zero emission trucks include plug-in hybrid electric vehicles, natural gas vehicles, and liquefied petroleum gas vehicles. The City of Portland can promote these technologies by leveraging funding sources for building charging/refueling infrastructure, working with the private sector to disseminate information technology best practices and experience, developing a pilot project to provide targeted financial assistance, and providing incentives and regulatory exceptions where feasible. Alternatively fueled trucks could serve as a pathway toward full electrification. The City of Portland should consider best practices from neighboring examples, including the Advanced Clean Trucks Program and the New York City Clean Truck Program. ▪ Incentivize use of fuel-saving technologies—such as aerodynamic deflectors and low-rolling resistance tires—through knowledge exchange, financial support, and regulations. ▪ Promote use of idling reduction technologies—such as Auxiliary Power Units (APUs) and electric and AC hookups—by tightening idling regulations, giving preferential treatment to trucks with these capabilities, and leveraging existing funding sources to expand hookup technology at truck parking facilities.

Management and Operations

- Promote off-peak delivery pilots in the central city with interested businesses that will help evaluate the benefits and build and disseminate knowledge about the right locations and conditions for successful implementation.
- Improve the ability of commercial vehicles to find parking, particularly in dense areas, as this avoids commercial vehicles circling/cruising around to find a spot, or parking in a travel lane and causing congestion/safety conflict. This could be achieved through a detailed commercial vehicle parking needs assessment that considers total delivery demand by location and compares it to available curbside delivery zones and off-street truck parking availability. The implementation of a real-time delivery zone reservation system may provide a long-term solution. Additional parking capacity dedicated for commercial vehicles, and the pricing of this capacity, could also help resolve parking availability challenges.
- Implement a Low-Emission Zone (LEZ) in the downtown urban core or pilot a Zero Emissions Delivery Zone,¹ similar to Santa Clara California. Make voluntary, initially, but provide incentives for sustainable technologies and practices. For example, provide priority curb access. Focus attention and investment in area to demonstrate benefits.
- Encourage delivery lockers (Parcel Port, Amazon Locker/Hub) and other consolidation solutions (such as micro hubs) through new residential/commercial building codes, and incentivize placement that is adjacent to high-volume pedestrian locations (such as transit stations).
- Address land use and regulatory impediments that impede the growth in urban consolidation centers that allow freight to be transferred onto vehicles that are better sized for urban delivery. Incentivize charging and refueling capabilities in urban consolidation centers to enable rapid deployment of near-zero and zero-emission trucks in the future.
- Incentivize and address regulatory barriers to the use of cargo bikes in denser urban areas for the first-/last-mile delivery, particularly in dense areas downtown and inner Eastside. Support cargo bike developments with expansion of bike-ped infrastructure.

¹ <https://lincubator.org/zedz/>. Pilot studies have started in several cities in the United States such as Santa Monica. Further information is available at <https://www.santamonica.gov/press/2021/02/25/laci-launches-first-in-nation-zero-emissions-delivery-zone-with-city-of-santa-monica-and-partners-including-nissan-ikea>.

Performance Measures / Monitoring & Evaluation

- Improve the existing GHG emissions inventory for the City of Portland to estimate emissions from different freight sources, ideally providing a breakdown by mode, type of vehicle (i.e., size, year and technology), and geography. This would facilitate the tracking of progress and identification of reduction opportunities.
- Adopt performance measures that are tied to a specific goal/target to measure and quantify the effectiveness of the various implementation measures. The metrics should be documented and shared with the public as a way of being transparent with the community being served. Several measures are proposed later in this report, depending on the types of strategies adopted.
- Quantifying the benefits can help justify the costs for implementing the GHG reduction strategies, and a robust monitoring and evaluation system can help achieve accountability.

Document Name	7. Guide to Deploying Clean Truck Freight Strategies (2017), National Cooperative Highway Research Program (NCHRP)
Relevant Sections	<p>Chapter 2, Clean Truck Strategies</p> <p>Chapter 3, Public-Sector Perspectives</p> <p>Chapter 4, Private-Sector Perspectives</p>
Summary	<p>The report serves as the compilation of the research on clean truck freight strategies, organized in the following categories:</p> <ul style="list-style-type: none"> ▪ Engine and after-treatment technologies – targeting criteria pollutants ▪ Engine and powertrain technologies – targeting fuel efficiency ▪ Alternative fuels ▪ Vehicle technologies – targeting fuel efficiency ▪ Operational strategies ▪ Clean truck corridor infrastructure <p>The researchers completed a literature review that considered more than 50 documents covering more than 45 strategies. For each strategy, the researchers assessed the following information:</p> <ul style="list-style-type: none"> ▪ Segments of the truck population to which the strategy is applicable ▪ Reported fuel and emissions impacts in terms of GHGs, particulate matter, NOx, and volatile organic compounds (VOCs) ▪ Cost (capital and operating) ▪ Current commercial availability or expected timeframe for availability ▪ Examples of deployment <p>Chapter 2 contains a summary of the literature review. Chapter 3 contains a synthesis of the research team’s interviews with public agencies. Chapter 4 shows a synthesis of interviews with the private sector. Chapter 5 shows a brief summary of the stakeholder workshop convened to discuss feedback. Chapter 6 lists case studies developed based on the user pilot testing. Chapter 7 contains a broad overview of the final guide and tool proposed.</p>

Document Name	8. Understanding the CO₂ Impacts of Zero-Emissions Trucks: A Comparative Life-Cycle Analysis of Battery Electric, Hydrogen Fuel Cell and Traditional Diesel Trucks (May 2022). American Transportation Research Institute
Summary	<p>The purpose of this report is to better understand the life-cycle CO₂ emissions of three Class 8 sleeper cab trucks. These trucks are referred to throughout the report as:</p> <ul style="list-style-type: none"> ▪ Internal combustion engine truck ▪ Battery electric vehicle truck ▪ Fuel cell electric vehicle truck <p>The life-cycle stages, described earlier, will be referred to as:</p> <ul style="list-style-type: none"> ▪ Vehicle Production ▪ Energy Production and Consumption ▪ Vehicle Disposal and Recycling <p>The research in this report sets a baseline life-cycle CO₂ calculation for each stage of the internal combustion engine truck, and then compares that internal combustion engine baseline to the two other truck types. The report provides industry, government, and other stakeholders with a technical environmental impact assessment of switching to zero-emission vehicles (ZEVs), as well as a glimpse at the advancements that may be needed to further decrease industry emissions.</p>

Document Name	9. National Academies of Sciences, Engineering, and Medicine 2020. Reducing Fuel Consumption and Greenhouse Gas Emissions of Medium-and Heavy-Duty Vehicles, Phase Two: Final Report (2020)
Summary	<p>Recommendations include:</p> <ul style="list-style-type: none"> ▪ Vehicle Technology: establishing GHG and fuel consumption reduction targets and incentives with the U.S. Environmental Protection Agency ▪ Alternative Technology: waste-heat recovery used in Class 8 and over-the-road vehicles potentially offer significant cost-effective fuel savings ▪ Hybridization ▪ Fuel Consideration ▪ Improved Freight Movement Efficiency

Document Name	10. Deployment of Green Best Practices in Supply Chain Processes (2020)
Summary	<p>Developing practices, processes, and products that have minimal impact on the ecosystem has become a key driver for supply chain management professionals. “Going green” can both lower costs and provide a competitive advantage, yet a majority of firms remain underprepared. This study identified green “best practices” in the supply chain field and investigated the extent to which selected businesses in the northeastern Pennsylvania region are instituting them. Selected companies are pursuing several green best practices and are especially strong in manufacturing activities. However, most practices are, at best, only in the infancy or isolated stages. Opportunities for businesses to more fully integrate their green programs and expand their green projects are discussed.</p>

Document Name	11. State of Art and Practice of Urban Freight Management: Part I: Infrastructure, vehicle-related, and traffic operations (2018)
Summary	<p>The first in a series of two papers, this paper conducts a review of the public-sector initiatives that could be used to improve freight activity in metropolitan areas; collects data about initiatives that been implemented and their performance; and produces a ranking of suggested initiatives. The review of public-sector initiatives is based on a comprehensive analysis of their performance, which catalogued the initiatives into seven major groups, 15 subgroups, and 48 unique initiatives. The initiatives covered in this paper include:</p> <ul style="list-style-type: none"> ▪ Infrastructure management ▪ Parking/loading areas management ▪ Vehicle-related strategies ▪ Traffic management <p>The characterization of the state of the practice and the performance of the initiatives was based on a survey that collected data from 21 countries and 56 cities throughout the world. The third component of the work is a ranking of suggested initiatives based on the performance data collected by the survey. The paper ends with a discussion of chief findings.</p>

Document Name	12. State of the art and practice of urban freight management: Part II: Financial approaches, logistics, and demand management (2018)
Summary	<p>The second in a series of two, this paper conducts a review of the public-sector initiatives that could be used to improve freight activity in metropolitan areas, collects data about the initiatives that have been implemented and their performance, and produce a ranking of suggested initiatives. The review of public-sector initiatives is based on a comprehensive analysis of their performance, which cataloged the initiatives into seven major groups, 15 subgroups, and 48 unique initiatives. The initiatives covered in this paper include:</p> <ul style="list-style-type: none"> ▪ Financial approaches ▪ Logistical management ▪ Demand/land use management <p>The characterization of the state of the practice and the performance of the initiatives was based on a survey that collected data from 21 countries and 56 cities throughout the world. The third component of the work is a ranking of suggested initiatives based on the performance data collected by the survey. The paper ends with a discussion of chief findings.</p>

Document Name	13. City of Toronto Freight and Goods Movement Strategy Literature Review (2019)
Summary	<p>The purpose of the technical and policy document review is to ascertain a thorough understanding of the context and background of this project, to successfully conduct the study and provide a relevant policy document and implementation plan. The review will focus on key freight issues in Toronto, and what makes the city a unique location for freight activity.</p> <p>This paper provides an overview of the existing policy documents and technical reports that relate to and impact goods movement in Toronto. The documents are divided into two different categories:</p> <ol style="list-style-type: none"> 1. Technical documents are those that focus on specific improvements that impact goods movement, such as infrastructure recommendations and other reports commissioned to better understand goods movement in the city. 2. Policy documents are literature that focus on transportation planning and policy, setting up a regulatory environment and policy context for goods movement in the city. These include transportation reports, land use plans, regional freight studies, and international freight studies. A suite of local, regional/provincial, and international policies inform the way transportation has evolved in the city and province, and shape future initiatives and potential investment. This review reveals the emerging key freight issues to better inform the development of the freight and goods movement strategy.
Document Name	14. The Greening of Logistics: Cutting Pollution and Greenhouse Gas Emissions (Global Logistics and Supply Chain Management, 8th Edition (2021)
Summary	<ul style="list-style-type: none"> ▪ Section 1 introduces the framework of logistics and air pollution. ▪ Section 2 discusses specific types of emissions from the logistics sector. ▪ Section 3 discusses the managerial and analytical framework of the logistics sector. ▪ Section 4 addresses the need to repower logistics with cleaner, low-carbon energy. ▪ Section 5 discusses the role of energy efficiency in logistics operations. ▪ Section 6 discusses increasing the utilization of logistics assets. ▪ Section 7 discusses shifting freight to greener transport modes.

	<ul style="list-style-type: none"> Section 8 focuses on reducing the demand for freight movement.
Document Name	15. California Sustainable Freight Action Plan
Relevant Sections	<p>Chapter 1 – California's Freight Transportation System in 2030 and Beyond</p> <p>Chapter 2 – Investing in California's Freight Transport System</p> <p>Chapter 3 – State Agency Actions and Pilot Projects</p> <p>Exhibit D – Pilot Projects</p>
Summary of Relevant Sections	<p>As laid out in then Governor Brown's Executive Order B-32-15 in 2015, California is to transition to a more efficient, more economically competitive, and less polluting freight transport system. To help realize the vision stated in this Executive Order, the California Sustainable Freight Action Plan (CSFAP) is the beginning of a process, and signals state government's interest in collaborating with stakeholders on defining the actions necessary to make vision for a sustainable freight transport system a reality.</p> <p>In Chapter 1, the CSFAP describes current policy drivers in the state and lays out the vision and guiding principles for California's sustainable Freight System, while also providing the following key freight targets:</p> <ul style="list-style-type: none"> Achieve 25% freight system efficiency, relative to the carbon that it produces by 2030. Deploy over 100,000 freight vehicles and equipment capable of zero-emissions operation by 2030. Increase competitiveness and economic growth targets. <p>Chapter 2 discusses potential funding sources for freight and approaches to ongoing freight investments. Appendix G of the report describes in detail the programs under discussion of freight funding programs, including from the FAST Act.</p> <p>Chapter 3 explores in more detail the actions and efforts that can be taken by state agencies and details some pilot projects. The pilot projects are used to demonstrate on the ground progress toward sustainable freight and hope to serve as launching points for much broader application. Agencies including Caltrans, ARB, Energy Commission and the Governor's Office of Business and Economic Development are participants in these pilot projects. As summarized in Appendix D, the pilot projects include:</p> <ul style="list-style-type: none"> Dairy biomethane for freight vehicles (San Joaquin Valley)

- Advanced technology for truck corridor (Southern California, Interstates 710, 10, 15 and State Route 60)
- Advanced Technology Corridors at Border Ports of Entry (California-Mexico Border, Otay Mesa)

Furthermore, Appendix F of this document details the Freight Efficiency Working Group Papers, including abstract for the following papers:

- Topic #1: Funding for Freight Infrastructure and Clean Equipment
- Topic #2: Strategies to Maximize Asset Utilization in the California Freight System: Part 1 – Background and General Recommendations
- Topic #3: Strategies to Maximize Asset Utilization in the California Freight System: Part 1 – Strategies
- Topic #4: Planning and Policy
- Topic #5: Operational Modernization at Distribution Nodes
- Topic #6: Information Technology

Document Name	16. California Division of Research, Innovation and System Information (DRISI) Research Reports
Document Summary	DRISI manages a comprehensive research portfolio to address research and operational needs across Caltrans. Out of the series of white papers and reports, the following two white papers were reviewed based on their relevance to sustainable freight.
Relevant Sections	<ul style="list-style-type: none"> ▪ Freight Efficiency Strategies: A White Paper Series to Inform the California Sustainable Freight Action Plan (Giuliano et al., 2016) ▪ Solar Power Initiative Using Caltrans Right-of-Way Final Research Report (Kurtz et al., 2020)
Summary of Relevant Sections	<p>The Freight Efficiency Strategies white paper seeks to identify a set of potential strategies that could improve California’s freight system performance and efficiency. The white paper focuses on those strategies aimed at maximizing asset utilization by fostering collaborative logistics practices and/or freight demand management. Moreover, the research discusses a number of efficiency improvement strategies, including:</p> <ul style="list-style-type: none"> ▪ Voluntary off-hour delivery programs ▪ Receiver-led consolidation ▪ Development of a chassis pool of pools fully integrated system ▪ Improvement of traffic mitigation fee programs ▪ Implement advanced appointment/ reservation systems ▪ Developing an integrated system for dray operations and services ▪ Load matching and maximizing capacity <p>The Solar Power Initiative report provides guidance to Caltrans on the installation of utility-scale solar electrical generation facilities in its right-of-way. It explores the current rules, regulations, and policies from regulatory agencies external to Caltrans and California utilities that affect Caltrans’ ability to install solar within its right-of-way. The report determines best practices that other state DOTs have developed based on their experience with the deployment of solar generation facilities within their rights-of-way. The report outlines best practices of how to develop solar generation sites within Caltrans right-of-way and summarizes design-build-own strategies that Caltrans could use as part of a public-private-partnership (P3) to finance the installation and/or maintenance of solar sites within the Caltrans right-of-way.</p>

Document Name	17. SANDAG 2021 Regional Plan
Document Summary	<p>The 2021 Regional Plan builds upon the previous plan and provides new updates since the earlier iteration of the reports. The 2021 Regional Plan is a long-term blueprint for the San Diego region that seeks to meet regulatory requirements, address traffic congestion, and create equal access to jobs, education, healthcare, and other resources. The plan is the result of years of planning, data analysis, and community engagement in the San Diego region with a transformative transportation system, a sustainable pattern of growth, and innovative demand and management strategies.</p>
Relevant Sections	<p>Chapter 1 – A Bold New Vision for the 2021 Regional Plan lays out the current key challenges and opportunities.</p> <p>Chapter 2 – Sustainable Communities Strategy (SCS) describes the Regional Plan SCS – the package of projects, policies, land use strategies, and programs that will achieve the state Vision and Goals.</p> <p>Chapter 3 – Paying for the Regional Plan, Forming Partnerships and Taking Action, and Monitoring How the Plan Performs describes the planning, investments, actions and partnerships needed to implement the 2021 RP, and the metrics that will be used to monitor implementation and performance over time.</p> <p>Appendix A – Transportation Projects, Programs, and Phasing (i.e., Page A-72 “Unconstrained Goods Movement Projects; Page A-78 “Figure A.15: Unconstrained Goods Movement Network”)</p> <p>Appendix Y – Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study</p>
Summary of Relevant Sections	<p>Chapter 1 summarizes the key state goals, policies and Executive Orders considered in the 2021 Regional Plan:</p> <ul style="list-style-type: none"> ▪ SB 375 and SCS Program and Evaluation Guidelines (2019) ▪ California Assembly Bill 805 ▪ 2017 Regional Transportation Plan ▪ California Transportation Plan 2050 (2021) ▪ Climate Action Plan for Transportation Infrastructure (2021) ▪ California Assembly Bill 617 (2017); Community Air Protection Program ▪ California State Assembly Bill 32 (2016); Reduce GHG Emissions by 40% below 1990 levels by 2030

- Executive Order (EO) B-55-18; EO S-3-05; EO N-79-20; and EO N-82-20

Under Chapter 2, the 2021 Regional Plan describes the “5 Big Moves” for a reimaged transportation system, including:

1. Complete Corridors
2. Transit Leap
3. Mobility Hubs
4. Flexible Fleets
5. Next Operating System (Next OS)

These plans emphasize improving Goods Movement to support sustainable, innovative strategies that foster trade and reduce freight-related GHG emissions and air pollution. These include:

- **Improving roadways** that improve the region’s local, regional, interregional and international movement, such as through Managed Lanes, bottleneck improvements, priority signals for trucks, measuring border wait times, additional dynamic truck parking, near-zero/zero-emission infrastructure, and critical bridges.
- **Border system improvements** to existing regional land ports of entry and providing reliable crossing times to commercial and passenger vehicles through variable tolling.
- **Railroad improvement** through Transit Leap initiatives, including track reconfigurations, bridge replacements, grade separations, and rehabilitation projects. There is specific mention of completing the last double-tracking projects along the Los Angeles – San Diego – San Louis Obispo (LOSSAN) Rail Corridor, which will provide additional rail capacity for freight operators, potential shifting some interregional truck trips to rail moves.
- **Air Cargo System Improvements** – San Diego County Regional Airport Authority improvements to cargo storage and handling facilities will support the movement of high-value and time-sensitive goods.
- **Maritime System Improvements** that would optimize maritime operations, reducing emissions, and facilitate truck and rail access.
- **Next OS** digital network that will support drivers picking goods up and delivering goods to businesses and residents. Truck routing and permitting information, truck parking availability, and border wait time data will be some of the applications found within the Next OS.

Appendix Y lists several specific projects worthy of note:

- **SR 11/ Otay Mesa East Port of Entry (POE)** – This project involves development of a new multimodal land POE in close coordination with Mexico’s future Mesa de Otay II POE. Using variable tolls to manage traffic demand for commercial and passenger vehicles, the POE will provide a new relief valve, resulting in decreased congestion and wait times at the other San Diego land POEs.
- **Near-Zero/Zero-Emission Truck and Freight Signal Priority Pilot** – The San Diego Port Tenants Association, through a California Energy Commission grant, recently transition some of their fleet to near-zero/zero emissions vehicles and implemented a freight signal prioritization (FSP) pilot project along Harbor Drive. Note that as of 2022, the pilot is now complete and is undergoing evaluation to become a permanent fixture as part of Harbor Drive 2.0.
- **Harbor Drive 2.0 Project** – Port of San Diego, SANDAG, U.S. Navy, and Caltrans District 11 are working to expand the FSP pilot project into a larger intelligent transportation system project along Harbor Drive that will provide greater efficiency for trucks and other multimodal users of San Diego’s Working Waterfront. These partners are working with the AB 617 Portside Community Steering Committee to identify strategies to reduce truck-related impacts and improve air quality in the surrounding Portside Environmental Justice Neighborhoods.

For more information, refer to the 2021 San Diego and Imperial County Freight Gateway Update Study (Appendix Y2).

Document Name	18. Community Emission Reduction Plan – Portside Environmental Justice Neighborhoods
Document Summary	<p>In response to Assembly Bill 617 (AB 617) in 2017, the California Air Resources Board (CARB) established the Community Air Protection Program. Part of that program, the Community Emissions Reduction Plan details information and strategies intended to reduce both air pollution emissions and community exposure to air pollution in the Community of Portside Environmental Justice Neighborhoods.</p> <ul style="list-style-type: none"> ▪ Chapter 1 describes the community and context of this effort. ▪ Chapter 2 details the role community outreach and engagement plays in achieving the success of AB 617 initiatives. ▪ Chapter 3 reviews the existing pollutant data. ▪ Chapter 4 delves deeper into the monitoring mechanisms and efforts taken to date. ▪ Chapter 5 and 6 describe the enforcement of existing air quality laws and regulations. ▪ Chapter 7 focuses on the actions and strategies of the Community Emissions Reduction Plan.

Document Name	19. SCAG Curb Management Study
Document Summary	<p>The primary purpose of the Curb Space Management Study is to take a comprehensive and multimodal review of some of the most congested and complicated curb space locations within the SCAG region. Specifically, the Curb Space Management Study will work closely with the cities of Anaheim, Riverside, Santa Ana, and Santa Monica, as well as more broadly across the SCAG region through the identification of interest and willingness to develop curb-related elements. The study commenced in August 2021 and is expected to be completed by June 2022.</p>
Summary of Relevant Sections	<p>Core Objectives of the study include:</p> <ul style="list-style-type: none"> ▪ Provide various strategies and recommendations for multiple cities within the SCAG region. ▪ Develop a work plan for multiple pilot project concepts and/or analysis plans for pilot projects currently underway. <p>The Curb Space Management Study concurrently has the following goals and objectives for consideration:</p> <ul style="list-style-type: none"> ▪ Reduce vehicle-miles traveled (VMT)/vehicle-hours traveled (VHT) and GHG emissions. There are multiple opportunities to reduce VMT/VHT and GHG emissions at the first- and last-mile levels. ▪ Reduce congestion. By taking a comprehensive and multimodal approach within complicated curb space areas, the study will consider optimal strategies managing demand and reducing congestion. ▪ Promote a balanced transportation system by better understanding first- and last-mile relationships between transportation network companies (TNCs) and existing transit and active transportation systems. ▪ Establish key collaboration and partnerships with public agency and private-sector stakeholders. ▪ Improve quality of life.

Document Name	20. California Statewide Truck Parking Study
Document Summary	<p>The California Statewide Truck Parking Study (CSTPS) identified statewide unmet demand for truck parking and existing truck parking challenges and recommendations for mitigating challenges. As part of that effort, it identified truck parking design guidelines, considered the feasibility for zero emissions fueling at truck parking lots, and developed a public-private partnership action plan for identifying and funding facilities. It also developed an implementation plan, including funding strategies.</p> <p>The CSTPS generated the <i>Truck Parking Design Guidelines</i> report (<i>Guidelines</i>), which is focused on establishing criteria and guidance for the siting, planning, and design of truck parking areas for use by truck drivers wishing to park in a secure setting off public roads.</p> <p>It covered:</p> <ul style="list-style-type: none"> ▪ Design Goals ▪ Existing Standards ▪ Design Vehicles ▪ Parking Stall Dimensions ▪ Services and Service Facilities ▪ Logistics, Geography, and Access ▪ Site Layout Examples
Summary of Relevant Sections	<p>Truck Parking Feasibility Guide Supplement – District 11 Site Assessment: One element of the <i>Guidelines</i> involved testing of the site selection and design criteria on sites in Caltrans District 11. Examination of Caltrans and other publicly owned properties across District 11 identified seven sites that might be feasible, and which were used as examples in the <i>Guidelines</i>. In the <i>Guidelines</i>, the “Site Layout Examples” section established a possible parking layout for each Example Site. Because the purpose of that document was not to propose specific sites for development, locational details were not included in the <i>Guidelines</i>.</p>

4. SUMMARY OF BEST PRACTICES REVIEW

A review of state, national, and international best practices in sustainable freight was conducted. The results have been organized into 3 key categories and 17 technologies/strategies relevant to the study area that encompass the San Diego and Imperial Counties region. The matrix describes the relevant policies and provides examples, along with the relevant studies and reports from which they were derived.

Category	Policies/ Interventions	Examples and Past Experiences
<p>A. Technology Solutions:</p> <p>1. Fuel Savings Technologies</p>	<p>Several off-the-shelf technologies exist that trucks can implement to improve fuel economy and reduce greenhouse gas emissions.² These include:</p> <ul style="list-style-type: none"> ▪ Aerodynamic deflectors on the cab and trailer (including trailed side skirts and tail flaps) ▪ Low-rolling resistance tires ▪ Low-viscosity lubricants, and many more <p>Research has found that many of these technologies are cost effective and can pay for themselves in just a couple of years from reduced fuel consumption.^{3,4} Currently, the trucking sector underinvests in these technologies; however, several states and localities are introducing regulations mandating or incentivizing their adoption. Examples include regulations introduced by the CARB mandating the use of certain aerodynamic deflectors and tires, and the voluntary SmartWay Program of the U.S. Environmental Protection Agency (EPA), which certifies fleets that use these technologies. Opportunities exist for the study area/San Diego region to work with the private sector to disseminate</p>	<ul style="list-style-type: none"> ▪ California Tractor-Trailer GHG Regulation (2008) has been successfully implemented, reducing fuel consumption by 5% to 10%, generally leading to a positive return-on-investment for carriers.

² 2040 Portland Freight Plan – Freight Greenhouse Gas Reduction Best Practices (2022)

³ <https://www.sciencedirect.com/science/article/abs/pii/S1366554513001452>

⁴ National Cooperative Highway Research Program (NCHRP) Report 862 - Guide to Deploying Clean Truck Freight Strategies. Chapter 2 Clean Truck Strategies

	<p>information on urban freight technologies and benefits and establish a peer knowledge exchange similar to the EPA’s SmartWay program, develop pilot projects to provide financial assistance in the acquisition of fuel saving technologies that go beyond statewide mandates, and/or provide incentives or regulatory exceptions for trucks that include specific fuel saving technologies.</p>	
<p>A. Technology Solutions:</p> <p>2. Truck Platooning</p>	<p>Truck platooning uses driver assistive technologies to allow two or more trucks to wirelessly share data in order to closely follow a lead truck. These technologies allow the trucks to drive very close together, which significantly decreases aerodynamic drag and improves fuel efficiency. Several truck platooning feasibility studies have been completed over the past decades. Widespread implementation is still uncertain, however. Truck platooning pilots are best conducted for intercity travel, involving multiple agencies and jurisdictions.</p>	<ul style="list-style-type: none"> ▪ Auburn University and American Transportation Research Institute research found up to 10% fuel economy for the trailing truck and up to 5% improvement for the leading truck.⁵ ▪ By using methods such as truck platooning, lane capacity may be increased by 65% to 100%. ▪ A project at Aachen University in Germany successfully operated a platoon of four trucks spaced at 33-foot intervals and research at UC Berkely successfully operated several three-truck caravans at approximately 14-foot intervals.

⁵ American Transportation Research Institute, Part 3 – Public Sector Practices. <https://truckingresearch.org/sustainable-public-sector-practices/>

		<ul style="list-style-type: none"> Technology solutions such as TuSimple Autonomous Freight Network (AFN), truck fleets are able to maximize efficiency, reliability and sustainability. AFN is deployed across six major cities across Arizona and Texas.⁶
<p>A. Technology Solutions</p> <p>3. Truck Electrification and Alternative Fuels</p>	<p>Government agencies across the country are taking steps to accelerate the electrification of the truck fleet, and related cargo-handling equipment (such as forklifts and cranes). Some of the key initiatives in California⁷ include:</p> <p>California’s Advanced Clean Truck Regulation approved new rules in June 2020 that require a certain percentage of trucks sold each year to be of ZEVs, at an increasing percentage from 2024 to 2035, with the goal of reaching 75% of Class 4 through 8 straight trucks and 40% of tractor trailers. This regulation also requires large fleet owners to provide information about their operations to inform future rulemaking. This initiative taking place in California is expected to have a significant impact on the electric truck market nationwide, given the size of the California trucking market.</p> <ul style="list-style-type: none"> California Executive Order N-79-20 sets the goal that all drayage trucks shall be ZEVs by 2035, and all medium- and heavy-duty vehicles shall be ZEVs by 2045.) 	<ul style="list-style-type: none"> Significant investment, research, and testing are underway throughout the country, especially in California, to accelerate truck electrification. Approximately 100 electric trucks are being deployed/tested at the Ports of Long Beach and Los Angeles. This includes the construction of chargers. The New York Clean Trucks Program provides incentives for replacing diesel trucks with electric trucks, with a goal of reaching 4,000 electric trucks by 2025 from 2,100 in 2020.

⁶ TuSimple. <https://www.tusimple.com/>

⁷ SANDAG. Appendix Y – Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study

- California's Low-Carbon Fuel Standard generates millions in credits each year and reached over \$2 billion in transactions in 2019.

Agencies have also been exploring use of alternative fuels that are less GHG intensive. The Ports of Long Beach and Los Angeles have increased the use of cleaner diesel and natural gas trucks. The two ports have also advanced zero-emission truck technologies (electric and hydrogen fuel cell) through their Technology Advancement Program, which provides funding in partnership with CARB for pilot projects. In support of both natural gas and hydrogen fuel cell deployments, the ports have also been investing in the fueling infrastructure.

There are three critical factors for industry when deciding to invest in these new technologies: 1) cost, 2) reliability and travel range, and 3) fueling infrastructure.

The fueling and recharging network is a critical piece that public agencies can affect.

California's policies have helped advance charging infrastructure. For example, in California, major public utilities providers have been engaged in assessing future demand, identifying deficiencies in the electricity grid, and developing future improvements to meet anticipated demand. Several funding assistance programs have been developed in California to facilitate the acquisition of electric heavy- and medium-duty vehicles and development of electric-charging technology.

- In early 2019, Penske Truck Leasing opened the nation's first Direct Current (DC) fast-charging stations (14 total, with 6 more planned) at four locations in Southern California designed specifically for heavy-duty commercial electric vehicles. Utilizing 50kW to 150 kW chargers, the stations can fully charge an all-electric Class 8 tractor in less than half a shift (or 7 hours, assuming a maximum daily 14-hour shift).

A. Technology Solutions:

4. Idling Reduction Technologies

Trucks frequently idle for extensive periods of time, generating significant emissions of criteria pollutants and greenhouse gases. Phase 2 of the joint EPA and U.S. Department of Transportation (USDOT) National Highway Traffic Safety Administration developed the Heavy-Duty Greenhouse Gas rule for original equipment manufacturers with respect to idle reduction requirements. This rule requires idle reduction technology, such as Auxiliary Power Units (APUs) for model year 2021 new Class 7 and Class 8 trucks with sleeper cabs, among other improvements to truck fuel efficiency.⁸ The EPA's voluntary SmartWay program has been encouraging the use of anti-idling technologies for over a decade. There are two main types of APUs: diesel-powered and battery-electric. Therefore, to ensure the maximum GHG reduction benefits, battery-electric APUs should be encouraged. Parking spots can also be retrofitted with electrical hookups, including HVAC hookups that eliminate the need for idling.⁹

Entities within the region can work together and go beyond existing rules by:

- Leverage local, state, and federal funding to build-out anti-idling technologies such as electrical and air conditioning hookups, at new and existing parking facilities.

— Simulator (MOVES 3), the use of APUs for extended idling is projected to reach 40% by 2021, 50% by 2024, and 55% by 2030.

— The Utah Inland Port Authority recently applied for Congestion Mitigation and Air Quality (CMAQ) funding for a new (publicly owned and operated) plug-in, truck parking facility in the inland port. The facility would include charging infrastructure for trucks to plug-in, provide power, and help avoid overnight idling on neighboring streets by 2027.¹¹

⁸ <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100P7NL.PDF?Dockey=P100P7NL.PDF>

⁹ 2040 Portland Freight Plan – Freight Greenhouse Gas Reduction Best Practices (2022)

¹¹ <https://inlandportauthority.utah.gov/truck-parking-solutions/>

	<ul style="list-style-type: none"> ▪ Lobby state agencies to allow for reduced vehicle registration fees and operating licenses for trucks equipped with battery-electric APUs. ▪ Tighten anti-idling laws and enforcement in certain areas of the city, such as residential areas. ▪ San Diego local and regional authorities can work together to restrict truck access to public facilities, including parking lots, to vehicles equipped with APUs only. While potentially useful, this could have the unintended side effect of increase the frequency of undesignated parking and making it harder for trucks to abide by Hours of Service regulations. <p>CARB has developed idling regulation for locomotives and railyard emissions that are set to be introduced in 2023.¹⁰</p>	
<p>A. Technology Solutions:</p> <p>5. Engine Pollution Control Technologies</p>	<p>These strategies focus on reducing criteria pollutant emissions (primarily NO_x or particulate matter) from trucks. They include exhaust retrofit devices such as diesel oxidation catalyst (DOCs) and diesel particulate filters (DPFs). With the introduction of trucks that comply with the EPA model year (MY) 2007/2010 emission standards, exhaust retrofits are now appropriate only for older trucks. Some potential configurations¹² include:</p>	<ul style="list-style-type: none"> ▪ September 2020, CARB provided funding to replace older trucks with outdated emission control features for newer, cleaner models in the San Diego region¹³. This effort is part of CARB’s long-term efforts in the Truck and Bus Regulation program.¹⁴

¹⁰ “Evaluation and Potential Development of Regulations to Reduce Emissions from Locomotives,” CARB, March 2018, arb.ca.gov/resources/documents/evaluation-and-potential-development-regulations-reduce-emissions-locomotives.

¹² National Cooperative Highway Research Program (NCHRP) Report 862 - Guide to Deploying Clean Truck Freight Strategies. Chapter 2 Clean Truck Strategies

¹³ “Clean Air For All: Moyer/FARMER/CAPP Grants,” SDAPCD, August 19, 2021, sdapcd.org/content/sdc/apcd/en/grants-and-incentives/carl-moyer-program.html.

¹⁴ Bus and Regulation Program, CARB. <https://ww2.arb.ca.gov/our-work/programs/truck-and-bus-regulation>.

- A Diesel Oxidation Catalyst is an after-treatment device that reduces carbon monoxide, hydrocarbons, and the organic carbon component of particulate matter. Diesel Oxidation Catalysts have limited particulate matter benefits and do not reduce NO_x. They are only appropriate for older (pre-2007) trucks.
- A DPF is an after-treatment device that captures particulate matter from the exhaust gas flow. DPFs do not reduce NO_x. They are only appropriate for pre-2007 trucks.
- Replacing older diesel trucks with newer (2010+) diesel models can significantly reduce particulate matter and NO_x emissions. Incentives to replace older vehicles with cleaner alternatives can accelerate the retirement of trucks not meeting 2007/2010 emission standards.
- Ocean-Going Vessel Fuel Regulation was established in 2009 and requires the use of marine distillate grade fuel (marine gas oil or marine diesel oil) with a maximum sulfur level of 0.1% while operating auxiliary diesel and diesel-electric engines, main propulsion diesel engines, and auxiliary boilers on ocean-going vessels within Regulated California Waters (all waters within 24 nautical).¹⁵
- CARB has developed and implemented measures aimed at reducing locomotive and railyard emissions in California. These measures are focused on limiting idling of combustion-powered vehicles and mobile equipment and reducing emissions resulting from stationary locomotive operations. The implementation and impacts of these measures and regulations are anticipated to begin in 2023.¹⁶

¹⁵ SANDAG Appendix Y: Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study Update

¹⁶ SANDAG Appendix Y: Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study Update

		<ul style="list-style-type: none"> Port of San Diego has deployed a Bonet System that helps further reduce cargo vessel emissions on and around San Diego Bay, including a Marine Exhaust Treatment System that is certified by CARB.¹⁷
<p>B. Fleet Management and Operations:</p> <p>1. Off-Hour Deliveries (OHDs) – Freight Demand Management</p>	<p>Off-hour deliveries (OHDs) or off-peak deliveries (OPD), typically defined as being between 7:00 p.m. and 6:00 a.m., are an effective tool for managing freight demand. By improving traffic flow, OHD can reduce emissions and reduce conflict between commercial vehicles, general traffic, and vulnerable road users.</p> <p>OPDs encompass many strategies to shift truck trips to hours of the day when the city is less congested, better utilizing roadway and parking infrastructure. Often this involves shifting trucks to operate at night; however, it could also include operating between the peak times of the day. The ability for companies to partake in OPD depends on their specific circumstances. For some, the costs of having staff present after-hours, or the cost of installing surveillance equipment in lieu of staff, could greatly outweigh the benefit of faster and more reliable deliveries. Companies could also have specific operations that require deliveries at certain times of the day, such as bakeries. Another common</p>	<p>New York’s original Off-Hour Truck Delivery (OHD) Pilot¹⁸ program ran from 2009 to 2010, funded by USDOT, and led by Rensselaer Polytechnic Institute with a goal of demonstrating feasibility and benefits of OHDs while reducing truck traffic during periods of highest congestion. USDOT was the lead coordinating agency for the pilot and worked with trucking industry representatives, New York State Department of Transportation, Port Authority of New York and New Jersey, and New York Metropolitan Transportation Council to develop an approach and address concerns of carriers and receivers regarding the shift to OHD. The New York City OHD program was subsequently expanded by New York City Department of Transportation to include 400+ partnerships with</p>

¹⁷ Port of San Diego, *Port of San Diego to Deploy Bonnet System to Help Further Reduce Cargo Vessel Emissions on and around San Diego Bay*. May 19, 2022. [Port of San Diego to Deploy Bonnet System to Help Further Reduce Cargo Vessel Emissions on and around San Diego Bay | Port of San Diego](#)

¹⁸ Off-Hour Deliveries Program, New York City DOT. <https://ohdnyc.com/sites/default/files/business-admin-files/Home/ohd-final-report.pdf> and <https://ohdnyc.com/benefits>.

impediment are buildings that do not allow night-time deliveries or are configured in a way that make these deliveries difficult.

The type of OPD that works best in practice depends on the relationship between the carrier and the receiver, the type of goods involved, the size of the shipment, and the technology available. The economics of OPD largely favors establishments that attract significant amounts of freight, such as hospitals, malls, and universities. This way the fixed costs of receiving deliveries at night, from having staff present or installing a surveillance system, are diluted over more deliveries. Unassisted OPD is easier to implement when the carrier and the receiver work for the same company or there is a high degree of trust between them (Sanchez-Diaz et al. 2016).

commercial establishments in New York City to accept OHD without supervision.

- An OHD pilot was recently implemented in the Toronto area, finding that these programs have the ability to significantly reduce freight delay and GHG emissions.¹⁹
- Transport for London created an office for “Retiming of Deliveries” to foster receivers to accept OHD, or to stagger their deliveries and reduce freight traffic in the peak hours.²⁰

¹⁹ <https://journals.sagepub.com/doi/full/10.1177/03611981221089552>

²⁰ <https://www.sciencedirect.com/science/article/abs/pii/S0965856418301277>

B. Fleet Management and Operations:

2. Truck Parking Management

Improvements in the ability of commercial vehicles to find parking, particularly in dense areas, could potentially yield significant GHG reduction benefits. Increased availability of commercial vehicle parking where needed avoids commercial vehicles circling/cruising around to find a spot, or parking in a travel lane and causing congestion/safety conflicts. Setting up designated freight parking and loading zones is another solution. These programs focus on allocating curb space for parking and loading activities at a fee. Ideally, loading zones of at least 100 feet are located in the middle of the block on the shoulder lane to keep the traffic delay to a minimum.²¹ Increasing the capacity of parking and loading areas is an obvious and low-cost way to reduce congestion and improve traffic.²²

Several ways to managing loading/unloading facilities operations are being considered. They include:

- Use of pricing tools (e.g., dynamic pricing) to manage demand, as well as increase parking capacity dedicated for commercial vehicles and load/unload operations)
- Building/curbside level designs to ensure quick, efficient, limited impacts on traffic streams
- Potential consolidation of receiving areas (e.g., urban consolidation)
- Strict enforcement of illegal parking

- Initiative undertaken by the New York City Department of Transportation, which increased the parking allocation for commercial vehicles and installed parking meters (New York City Department of Transportation 2012, The City of New York 2012). The freight industry reacted very positively to the new policy. However, since the parking spaces are also available to other service vehicles, the carriers do not fully or exclusively benefit from the policy.
- The Washington, DC, curbside freight study recommends providing longer parking/loading spaces, multi-space meters, and the pricing of loading zones.²⁵
- A pilot was started recently in Washington, DC, that allows trucks to reserve curbside space for free in selected locations. Reducing the time

²¹ <https://trid.trb.org/view/1485324>

²² Nourinejad, M., Wenneman, A., Nurul Habib, K., Roorda, M. (2014). Truck parking in urban areas: application of choice modelling within traffic microsimulation. *Transportation Research Part A* 64, pp. 54–64.

²⁵ Jones E., Chatterjee, A., Marsili, R. (2009). A collaborative plan for curbside freight delivery in Washington D.C. *ITE J* 79(5), pp. 22–25.

Steps could also be taken at the building/curbside level to ensure that commercial parking operations are quick, efficient, and limit impact on the traffic stream. Most buildings and businesses accept deliveries daily. Although some businesses offer off-street loading bays, most depend on the provision of load/unload space at the curb to receive their goods. Parked and double-parked trucks are a major contributor to urban congestion and the obstruction of pedestrian infrastructure, along with truck and delivery vans idling and emitting pollutants and GHGs. NCHRP Report 844 recommends regulations forcing new developments to adequately consider truck parking needs.²³ This could include constructing enough loading bays to satisfy the existing and future needs of tenants, and even designating alleyways or flexible spaces that trucks can use during certain times of the day. Over time, this would reduce the need for commercial curbside parking, which would reduce conflicts with other modes, improve safety, and enhance the aesthetics of the city. The Institute of Transportation Engineers published a technical resource guide²⁴ that could also help efficiently manage the curb for loading/unloading operations. The guide considers regulatory, operations, and technology strategies to optimize curb access and usage, and features case studies for quick reference.

spent parking, through a graduated fee schedule for example, could also decrease parking needs.²⁶

- San Francisco and Calgary implemented dynamic truck parking pricing that varies throughout the day to maintain availability.
- Los Angeles “Tiger Teams” strict enforcement of truck parking regulations.²⁷
- On main boulevard in Barcelona, certain lanes were designed for residential parking at night, commercial delivery parking off-peak, and through traffic during the peak.

²³ <https://www.trb.org/Main/Blurbs/175482.aspx>

²⁴ <https://www.ite.org/technical-resources/topics/complete-streets/curbside-management-resources/>

²⁶ <https://trid.trb.org/view/1562320>

²⁷ <https://ops.fhwa.dot.gov/publications/fhwahop10020/tigerteams.htm>

B. Fleet Management and Operations:

3. Urban Consolidation and Mobility Hubs

The objective of urban consolidation is to decrease the number of trucks needed to serve an urban area by combining pickups and deliveries. Consolidation can also allow freight to be transloaded onto vehicles that are smaller, cleaner, and more appropriate for travel in dense downtown areas. The two predominant types of consolidation schemes are consolidation centers that serve a single, large freight generator, and consolidation centers that serve many establishments in a region. The former has been used to serve airports or other self-contained destinations with many retail establishments, while the latter have been used primarily in dense historic European cities to reduce the footprint of urban supply -chains. The consolidation centers can be operated publicly or privately, and they can receive different levels of financial support from the public sector.

The main benefits of consolidation centers have been described²⁸ as:

- Potentially reduce truck VMT by increasing payloads
- Reduce emissions by shifting cargo to cleaner trucks
- Facilitate night deliveries by centralizing staffing and surveillance
- Reduce parking requirements, particularly during peak hours of the day
- Allow deliveries in narrow historic districts
- Reduce number of distinct deliveries

- The most successful consolidation centers are those that are operated by an organization that can strongly influence carriers and receivers, which is often the case when there is one property owner or developer involved. This is the case with the Heathrow Airport Consolidation Center, which serves over 300 airport tenants (mandatory) and is operated by DHL.
- Consolidation centers are much more common in Europe, where certain types of commercial vehicles are prohibited from operating in historic areas.

²⁸ <https://www.sciendo.com/article/10.1515/ttj-2016-0021>

- Provide value added services, such as off-site stockholding, pre-retailing activities such as unpacking, ticketing, and handling returns; waste recycling, or customer collection services

While urban consolidation has been successful in some instances, it has failed in many others because:

- Increased handling costs can offset transportation costs
- Diffusion of responsibility and loss of control over delivery
- Increased risk of damage from added handling
- Difficulties in chasing lost deliveries
- High set up costs/fixed costs
- Could increase emissions if cargo is transferred from large trucks to many smaller ones that are not exceptionally cleaner

The strategies that agencies can implement to facilitate urban consolidation that is sustainable depend on the local context. In Europe, public agencies have been extensively involved in the development and operation of consolidation centers, primarily as a way of transferring freight onto vehicles that can better navigate dense historic neighborhoods and meet local regulations (such as low-emission zones). In the United States, with lower levels of government involvement and subsidy, these types of approaches are unworkable. Therefore, SANDAG and ICTC are best served by introducing incentives or tweaking regulations to facilitate the type of sustainable urban consolidation

- Border Mobility Hubs represent another opportunity to ensure that trucks and small package carriers are properly accommodated with parking, queueing, separate spaces for vans and larger trucks, or other types of hub accommodations (e.g., accommodations similar to those provided by Amazon hubs).

	<p>that will reduce emissions. This could include reviewing land use regulations and making it easier to locate consolidation facilities closer to customers. Additionally, incentives could be provided for new consolidation developments that facilitate green technologies, such as electric truck recharging. Consolidation might be required to meet California's truck electrification goals.</p>	
<p>B. Fleet Management and Operations:</p> <p>5. Zero or Low-Emission Zones</p>	<p>Zero- or Low-Emission Zones (ZEE/LEZ) are another proven tool available to agencies that could directly influence the vehicle fleet composition on public roadways. In London, for example, clean air was a top priority/agenda for the mayor and public, because of the growing body of evidence that linked poor air quality with negative health outcomes; especially for children. The LEZ concept puts immediate pressure on high polluting, heavy trucks to upgrade their fleets more quickly (in addition to passenger vehicles). However, it can also be a burden on the industry and result in negative economic impacts to certain geographic areas if it is not strategically implemented. In addition, caution must be taken when designing the cordon area (including its size) to avoid vehicles attempting to bypass the LEZ by cutting through neighborhoods or taking longer, alternative routes as that would increase VMT.</p> <p>The creation and adoption of zero-emission goals can be an effective instrument for setting an agenda and catalyzing clean mobility. Net-Zero Emission initiatives, and climate emergency declarations can be especially effective in combination with LEZ. Such declarations can have a resonating effect on the surrounding community and can also help move climate action goals to the top of the</p>	<ul style="list-style-type: none"> ▪ Around 200 LEZs are around the globe, mostly concentrated in Europe, with reported improvements in local air quality. For example, in London, between 2017 and 2020, roadside measurements within the LEZ showed an estimated reduction in NO₂ emissions of approximately 44%.

	<p>governing body’s agenda (i.e., funding). It can also notify key stakeholders and private companies doing business in the region that they must be held accountable for their carbon footprint.</p>	<ul style="list-style-type: none"> ▪ The City of Santa Monica, California recently became the first city in the United States to pilot a Zero Emissions Delivery Zone. Although it is only a voluntary program, it is a good example of how to successfully build sustainable partnerships between public, private, and community stakeholders. To support the pilot and encourage new participants, this pilot provides priority curb access for ZED in selected locations in the zone.²⁹
<p>B. Fleet Management and Operations:</p> <p>6. Cargo Bikes</p>	<p>Maneuvering and parking large trucks on congested, narrow city streets can be hazardous for drivers, cyclists, and pedestrians. Non-motorized or electric-assisted cargo bicycles have been gaining popularity in North American and European cities for last-mile deliveries. Small-sized goods are typically consolidated at an Urban Consolidation Center or vicinity loading zone and transported to the final market destination. Cargo-bike deliveries are more effective in neighborhoods with high urban density and suitable bicycle and pedestrian infrastructure. They are not viable in less dense areas where average trip distances increase substantially, or where bicycle and pedestrian facilities are not provided as</p>	<p>Research estimated that a single cargo bike can save 13 tons of CO₂ emissions per year.³⁰</p> <ul style="list-style-type: none"> ▪ In Portland, the B-Line provides cargo-bike delivery service out of their consolidation center called “at the Redd,” in order to reduce emissions and promote local development.

²⁹ <https://www.freightwaves.com/news/electric-cargo-bike-tackles-last-mile-delivery-in-california>

³⁰ https://www.dot.y.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-11-11%20Final%20Report_Oct%202014.pdf

mixing with vehicular traffic could put the safety of the cargo-bike rider at risk.

Cargo bikes offer the following advantages over small delivery vans and light trucks making short trips:

- Reduced emissions and noise levels, where they are permitted to operate on public roads.
- Increased route flexibility and door-to-door service, since they can utilize both vehicle and bicycle infrastructure -assuming the latter is permitted by the City for human-powered cargo bikes.
- Improved road safety due to greater compatibility with pedestrians and cyclists, assuming cargo bikes travel at appropriate speeds.
- For shorter trips, there is potential for faster delivery times than traditional trucks in congested city centers.

Agencies in the San Diego region could consider increasing the use of cargo bikes by:

- Working with the private sector to identify barriers to the wider adoption of cargo bikes and work to lower infrastructure or regulatory barriers.
- Working with the private sector to disseminate information on cargo bikes and establish peer knowledge exchanges.

- In Toronto, UPS started a cargo-bike pilot for downtown deliveries. Bikes are 2.8 meters long, 1.2 meters wide, and weigh 217 kg empty. UPS wanted to use electrically assisted bikes; however, provincial regulations did not allow them.
- Companies like DHL, UPS and FedEx are implementing delivery tricycles in North American and European cities. Places where traffic congestion in the urban core is prevalent—such as Seattle, Downtown Pittsburgh, Portland, and New York City—are allowing cargo bikes on roads, including even offering free parking as an incentive.

B. Fleet Management and Operations:

7. Delivery Lockers

These are lockers that can be used in different contexts to allow people access to their packages without requiring delivery to their homes. Delivery lockers could be located in public areas, residential or office buildings, high-traffic commercial establishments (such as grocery stores), or at the establishments of package integrators (such as UPS and FedEx). The advantage of these lockers is that they help eliminate trips to deliver or pick up packages at people's homes, which reduces truck travel and GHGs.

The main challenge implementing lockers is the high degree of private-sector coordination required and the costs of maintaining and operating the lockers. This can be a challenge because the lockers need to be located on third-party property. Other challenges have included the upfront fixed costs, developing streamlined information systems to track the deliveries and alert consumers, and the security of the packages. However, the savings of completing a delivery through locker are substantial. It was estimated by the Council of Supply Chain Management professionals that the hand-off of packages to consumers accounts for 28% of all transportation costs. Much of these costs would be saved through locker deliveries. Lockers can also facilitate ODP by allowing packages to be delivered/picked up at night, generating all of the benefits of ODP, from reducing congestion to improving curbside parking.

- Amazon Hub operates thousands of lockers in over 70 cities around the world (as of 2018). Amazon Hub, a locker system for residential buildings, has been installed widely across North America.
- In Germany, the Hermes Group operates a system of relay points where customers can pick up deliveries. In Germany, there is also Packstation network with automated lockers that is used by Deutsche Post and DHL.³¹
- In France, Kiala provides pickup and delivery services for local businesses using a variety of carriers.

³¹ Rhodes, S., Berndt, M., Bingham, P., Bryan, J., Cherrett, T., Plumeau, P. and Weisbrod, R. (2012), *Guidebook for Understanding Urban Goods Movement*. Final Draft for NCFRP Report 14, Washington, DC: Transportation Research Board.

B. Fleet Management and Operations:

8. Delivery Drones and Robots

Delivery robots and drones represent technologies that are currently being explored to streamline last-mile deliveries. Delivery robots are currently active in some controlled settings, such as at a few universities, making deliveries by using pedestrian infrastructure. These robots can be cost effective in some cases, as it eliminates the need for people to be involved in the delivery; however, the ultimate implications on GHG emissions and the sustainability of the system are unknown. If they replace employees using bikes, then the delivery robots could potentially increase emissions. If they replace trucks, then they would have the effect of decreasing emissions. Delivery drones are another technology that has been touted in recent years as being able to improve the efficiency of the last-mile. However, it is not likely that drones will be widely used in dense urban areas the near future because of logistical and technological reasons. Operating in an urban environment, including having safe landing locations, poses several challenges that remain unresolved. The impact of these technologies on greenhouse gas emissions are also uncertain as the energy requirements to operate a drone can be substantial, especially considering their low weight capacity.

- Robots are currently being tested and used throughout North America for performing certain types of deliveries, often on university campuses; however, there remain many challenges to the widespread adoption of this technology, including security, reliability, speed, and handoffs.
- Delivery drones are being tested in several applications; however, in the medium-term their usefulness beyond a few niche applications is unlikely.

- A pilot program involving the City of San Diego, the U.S. Department of Transportation, and the Federal Aviation Administration has explored the use of drones for delivery of food, beverages, medical specimens, and packages. The future of drones for deliveries and other uses depends on technological capabilities, as well as the development of regulatory frameworks at the federal, state, and local levels.³²

³² San Diego UAS Integration Pilot Program: Mid-Program Report. City of San Diego, 2019.

C. Infrastructure Improvements:

1. Sustainable Congestion Relief

Traffic congestion in metropolitan areas create major economic, environmental and health impacts, of which, the trucking sector is a significant contributor. Infrastructure projects to help reduce congestion can also yield impacts in reducing these impacts, including potential GHG impacts from trucking idling. Roadway congestion also makes it hard for trucking companies to set and meet delivery schedules. Missing a delivery appointment can lead to production disruptions, stock-outs at retail establishments, and delays that cascade throughout the supply chain. Addressing major truck bottlenecks will allow for the whole roadway system to operate more efficiently, improving the utilization of existing assets.

The solution that most effectively resolves truck bottlenecks depends on the causes of the bottleneck. In most cases, an engineering analysis is required to identify the capacity, geometric, or operational causes of the bottleneck, and to identify cost-effective solutions. The Federal Highway Administration provides general guidance on addressing bottlenecks, including cost-effective ways of increasing capacity, ramp metering, improved signal operations, and intelligent transportation systems (ITS), among others. Congestion Mitigation and Air Quality Improvement Program is a Federal Highway Administration administered program to provide flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce

- Projects that streamline the border and reduce truck delay will have a positive impact on emissions in the San Diego region.³³ This could include recommendations from the California Sustainable Freight Action Plan: Advanced Technology Corridors at Border Ports of Entry, such as installing equipment to measure southbound border wait times and displaying this information through an advanced traveler information system to better manage commercial and passenger vehicle traffic at the border.
- ITS solutions can also improve traffic operations at significantly lower cost than increasing roadway capacity. Example could include the Harbor Drive 2.0 Project in San Diego.³⁴

³³ https://www.sandag.org/uploads/publicationid/publicationid_4746_28762.pdf

³⁴ <https://www.portofsandiego.org/press-releases/general-press-releases/port-master-plan-update-leads-vision-cargo-haul-road-part>

	<p>congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter.</p>	
<p>C. Infrastructure and ITS Improvements:</p> <p>2. Multimodal Connectivity and Efficiencies</p>	<p>Shifting freight from a high emission mode, such as trucking, to a lower emission mode, such as rail and water, has the potential to reduce total emissions. The EPA estimated that aggregate trucks generate 13 times more emissions per ton-mile moved than water, and 3 times more emissions per ton-mile than rail. However, achieving these mode shifts is complex, and often very difficult. Truck, rail and water modes typically serve different markets because of their different operating characteristics and performance. A shipper that pays a premium for the speed and flexibility of trucking is unlikely to readily shift to using rail to reduce emissions, given that the shipment is likely to be much slower.</p> <p>Shifting long-distance shipments from truck to rail can be encouraged by promoting the competitiveness of rail infrastructure in the region. The San Diego region does not have a rail intermodal terminal. However, the region is connected to the rest of the nation through the BNSF railroad on the LOSSAN corridor, and other inactive railroads (e.g., the San Diego & Arizona Eastern Desert Line). This represents a key mode used to transport automobiles from the PASHA terminal at the port of San Diego. This includes autos imported by sea, from Asia, Europe, or Mexico, and autos trucked over the Mexican border from the Toyota plant in Tecate. Autos that are not moved by rail need to be trucked north to rail terminals in the Inland Empire. Maintaining and</p>	<p>Methods for State DOTs to Reduce Greenhouse Gas Emissions from the Transportation Sector (2022)</p>

expanding the capacity of this rail corridor is critical to avoid automobiles to be moved by truck inland, which would greatly increase emissions. SANDAG has plans underway to fully double-track the LOSSAN corridor and make several operational and safety improvements. A realignment of the route is studied near the Del Mar Bluffs. SANDAG stresses that any passenger rail improvements to the LOSSAN corridor line complement freight rail operations to avoid losing freight service.

Additionally, separating at-grade crossings can further improve operations and eliminate conflicts, making rail more competitive, while eliminating emissions from automobiles and trucks from frequent crossing closures.

C. Infrastructure and ITS Improvements:

3. Dedicated Truck Lanes (DTLs)

Dedicated truck lanes seek to improve the speed, reliability and operations of traffic by separate trucks from general-purpose traffic. These improvements in operations would reduce emissions for general-purpose traffic and trucks. However, constructing new dedicated truck lanes would be expensive, and would most likely require a tolling scheme; however, this is often opposed by trucking industry groups. On the other hand, repurposing general traffic lanes as dedicated truck lanes is often opposed by communities, making these types of projects challenging to implement.

Climbing and descending lanes are another example of an opportunity to keep trucks safely moving up or down steep grades and allow surrounding passenger vehicles to continue in other lanes unimpeded by the slower trucks.³⁵

Dynamic lane assignments on highways and arterials provide the opportunity to accommodate trucks during seasonal, event-driven, or daily peak truck traffic times, allowing trucks to travel without mixing—or with reduced mixing—with general-purpose traffic. Dynamic lane assignments with variable speed limits by lane also help reduce speed differentials and stop-and-go traffic conditions, thus reducing shifting and resulting in fewer emissions and better fuel economy. Combined with ITS technologies such as lane-keeping and in-vehicle notifications, these strategies can enhance truckers' communications with regulatory agencies and improve

- While the concept of dedicated truck lanes has been studied for almost 20 years, there is only one major example in the United States, operated by the New Jersey Turnpike Authority.³⁷ Significant study has been conducted on other corridors, including I-70 (Illinois, Missouri and Ohio)³⁸ and I-75 in Georgia.³⁹ The I-75 project is the most likely to be constructed; however, it was recently announced that it will be delayed by 3.5 years.⁴⁰
- SANDAG indicates that dedicated truck lanes are most likely to be beneficial on the SR 905/I-805 interchange and other parts of the network with significant truck volumes.

³⁵ SANDAG. Appendix Y – Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study

³⁷ <https://www.sciencedirect.com/science/article/abs/pii/S0965856418301265>

³⁸ <https://www.tredis.com/clients/43-x-case-studies/41-i-70-dedicated-truck-lanes>

³⁹ <https://0014203-gdot.hub.arcgis.com/>

⁴⁰ <https://www.monroecoga.org/2022/03/07/gdot-announces-delay-in-i-75-commercial-vehicle-lanes-project/>

	truck mobility and safety. ³⁶	
<p>C. Infrastructure and ITS Improvements:</p> <p>5. Expansion of Truck Parking Facilities</p>	<p>Most heavy trucks need to park for long-term periods, especially on long-haul trips, to rest and meet federal Hours of Service regulations. Recent studies such as The Oregon Commercial Truck Parking Study⁴¹ describe the difficulties that truck drivers have in finding parking in urban areas. This leads to parking in undesignated locations, or on public roadways/parking lots, where trucks need to keep their engines idling to maintain power in the cabin to keep the electrical system on, including heating. However, these idling activities contribute to increased air emissions, including GHGs. Emissions generated from trucks idling to heat and cool the trucks as drivers take federally mandated breaks can significantly contribute to poor air quality and GHGs in the region. Expanding the availability of truck parking spaces in and around urban areas is likely to reduce emissions and improve sustainability. When parking availability is limited, truck drivers have to incur additional VMT driving to find a space, which generates emissions and congestion on the roads.</p>	<p>Truck parking capacity is being expanded across the country, including in California. There exists significant interest in this area, to both improve the efficiency of trucking operations, but also to improve the quality of life on the road and increase driver retention.</p>
<p>C. Infrastructure and ITS Improvements:</p> <p>6. Intelligent Transportation Systems (ITS)</p>	<p>Different ITS technologies can be implemented to improve the efficiency of freight operations. These could include:</p> <ul style="list-style-type: none"> ▪ Freight signal priority ▪ Truck parking availability information ▪ Advanced travel information systems (such as FRATIS) 	<p>The San Diego Port Tenants Association, through a California Energy Commission grant, implemented a freight signal prioritization (FSP) pilot project along Harbor Drive in San Diego's Working Waterfront.⁴² The FSP pilot operated for a year and preliminary results were</p>

³⁶ SANDAG. Appendix Y – Goods Movement Planning and 2021 San Diego and Imperial Counties Freight Gateway Study

⁴¹ <https://www.oregon.gov/ODOT/Projects/Project%20Documents/OCTPS%20Methodology%20Assessment.pdf>

⁴² "Cleaning the Air: San Diego Port Tenants Association Zero-Emission Freight Project," San Diego Port Tenants Association YouTube Channel, November 16, 2020, [youtube.com/watch?v=RC0HGs86YHs](https://www.youtube.com/watch?v=RC0HGs86YHs).

- Real-time information systems and dynamic routing
- Border crossing management systems

Other ITS strategies—such as gate operating systems and truck reservation systems being studied as part of Harbor Drive 2.0 Project and the Harbor Drive 2.0 Concept of Operations—can also provide opportunities to improve operational efficiency for marine terminals.

released on February 2022. Summary results show improvements for travel times and reduction in idle times.⁴³

⁴³ Final Report: San Diego Port Intelligent Transportation System Freight Signal Priority. February 2022.

5. DRAFT SCREENING FRAMEWORK

The draft screening framework to assess existing practices was developed after conducting literature reviews and best practices analysis. The screening framework is intended to serve as a tool to help identify existing projects, programs, and policies in alignment with the project vision statement that can help meet regional needs and priorities.

5.1 Project Purpose and Need

The screening framework is guided by following the purpose and need of this project:

- Region critical to state, national and international economies
- Freight is economic engine but produces greenhouse gas emissions
- State prioritized transition of freight sector to sustainable technologies
- Lessen the disproportionate environmental health burdens on vulnerable communities and tribal governments
- State and regional plans have highlighted need for sustainable regional freight vision
- Implement actionable multimodal projects and policies

5.2 Draft Vision Statement

Based on the project purpose and need the following vision statement was developed:

Implement multimodal freight-related projects and policies that improve sustainability and lessen disproportionate environmental health burdens on vulnerable communities and tribal governments while supporting the region's economy and its role as a trade gateway.

5.3 Sustainability Implementation Steps

The successful implementation of freight sustainability projects and policies requires a life-cycle approach that centers around learning as much as possible about how the system operates, the constraints of stakeholders, the possibilities and limitations of technologies, and a ground-level understanding of community impacts. Figure 3 describes some of the steps that are helpful in developing this understanding and implementing projects or strategies that work in the real world and achieve sustainability objectives.

Figure 3: Sustainability Implementation Steps



Source: Adapted from [Euromonitor](#)

Within the overall sustainability approach presented in Figure 3, this sustainable freight implementation strategy would comprise the first three steps. Step 1 is to outreach with relevant stakeholders to initiate buy-in. Step 2 is to assess and prioritize the most effective policies and interventions based on inputs from the outreach in Step 1 and other analyses. Step 3 involves building partnerships with key stakeholders in order to obtain their commitment and collaboration. This memo is developing a prioritization framework as part of the second step. Once approved by the Freight Stakeholders Taskforce, the prioritization framework would then be used to prioritize projects and policies in later tasks.

5.4 Freight Sustainability Prioritization Framework

The objective of the scoring framework is to prioritize the actions that most efficiently achieve the freight sustainability goals of the relevant San Diego regional authorities, including SANDAG, ICTC, and SCAG. Actions can include a wide range of projects, strategies, and programs, requiring the prioritization framework to be flexible and able to be applied generally. To quantify expected benefits, points will be awarded to criteria in the three areas of environment, equity, and economy. See Table 1 for a description of how points will be awarded and weighted. The criteria selected to represent these three areas were chosen narrowly so that they can be evaluated concretely, focusing the attention of the prioritization process on what is most important to SANDAG and ICTC as set forth in the project purpose and need. Other criteria could be included; however, this should be done carefully as it would dilute the impact of other criteria. Criteria will be evaluated as quantitatively as possible, given data and information available. Varying degrees of professional judgment is expected to be required for scoring the criteria.

Two criteria were selected to capture environmental impacts: reduction of GHGs and reduction of criteria pollutant emissions. Both are weighed equally. Some projects might lead to the reduction of criteria pollutants but not GHGs, such as some of the engine technologies being considered. Other criteria were considered, such as noise pollution; however, it was determined that focusing this prioritization effort on air pollution was justified as this is the main way that freight transportation impacts the environment and that is the focus in the project purpose and need.

Equity was captured by the criteria shown in Table 1, aligning with how CalEnviroScreen

4.0⁴⁴ was used in the 2021 Regional Plan with the addition of AB 617 communities⁴⁵. Projects that benefit the most vulnerable communities (Top 25% of CalEnviroScreen 4.0 scores and/or AB 617) will be awarded more points than those that benefit vulnerable communities (Top 50% of CalEnviroScreen 4.0 scores, or Tribal Land). Some projects under consideration have not been planned for specific locations in the region when this assessment was developed. Many such projects will accrue benefits to vulnerable communities because impacts from freight disproportionately affect those communities. This assumption will be carried throughout the San Diego and Imperial Counties Sustainable Freight Implementation Strategy. For the screening, a non-location specific project will receive a score between 1 and 10.

The vital economic role that the freight transportation system plays needs to be considered when seeking to improve its sustainability. Two criteria were selected to succinctly capture this imperative, focusing on improvements to the efficiency and the capacity of the system. Efficiency relates to how well the system moves freight, in terms of speed, reliability, costs, etc. Improvements to freight efficiency benefits consumers and businesses in the San Diego and Imperial region, boosting economic activity and employment. Improvements to freight capacity often lead to improvements in efficiency, as a system that is less congestion will operate more efficiently. These improvements can also generate additional benefits such as improving the ability of the system to accommodate expected increases in freight and trade, catalyzing economic growth.

⁴⁴ <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>

⁴⁵ Under the 2017 Assembly Bill 617 (C. Garcia, Chapter 136, Statutes of 2017), CARB established the Community Air Protection Program (“Program”) to focus on reducing exposure in communities most impacted by air pollution. Starting in 2018, the Program has selected a number of communities every year using numerous data sources, tools, and approaches to guide the selection and prioritization of communities and the funding available to the program. For details about the communities selected each year and how they are selected, please see: <https://ww2.arb.ca.gov/our-work/programs/community-air-protection-program/community-identification/community-air>

Table 1: Scoring of Benefits

Areas	Criteria	Scoring	Weighting
Environment	Impact on reducing emissions of GHGs	1 - 10	35%
	Impact on reducing emissions of criteria pollutants (particulate matter, NO _x , VOC, etc.)	1 - 10	
Equity	Degree to which benefits accrue to most vulnerable communities (Top 25% of CalEnviroScreen 4.0 scores, or AB 617), and vulnerable communities (Top 50% of CalEnviroScreen 4.0 scores, or Tribal Land), including safety considerations	1 - 10	35%
Economy	Improves efficiency (speeds and reliability) of freight transportation system	1 - 10	30%
	Improves capacity of freight system to accommodate expected increases in freight	1 - 10	

To identify the freight projects that best achieve sustainability objectives, and are most likely to be effective, it is necessary to also consider their costs and potential impediments. Table 2 describes how these will be considered in the prioritization process. An approximate estimate of implementation costs will be weighed the most heavily. Other factors that could impede the implementation of the project will also be considered, such as lack of funding, need for support of numerous stakeholders, technological complexity, and lack of consideration in existing planning processes. Projects with high scores in terms of costs or impediments will rank lower in the prioritization framework. However, high cost or impediment scores can be counterbalanced if there are substantial benefits, as described in the next section.

Table 2: Scoring of Implementation Costs and Impediments

Areas	Criteria	Scoring	Weighting
Costs	Approximate implementation costs	1 - 10	35%
Funding	Lack of funding match	1 - 10	25%
Stakeholder Support	Does implementation require legislative changes and/or seeking support of many competing stakeholders?	1 - 10	15%
Technological Complexity	Does the technology still require further testing/development and is it not ready for application? Are there regulatory impediments to implementing this technology?	1 - 10	15%
Planning Continuity	Not considered in local or regional plans or programs and/or conflicts with other modes	1 - 10	10%

The key output of a benefit-cost analysis is the benefit-cost ratio, which identifies whether projects are expected to generate more benefits than costs. A similar logic will be adopted in the prioritization framework, by dividing the scoring of benefits by the scoring of costs and impediments, as shown below, to calculate the Freight Sustainability Implementation Score.

$$\text{Freight Sustainability Implementation Score} = \frac{\text{Scoring of Benefits}}{\text{Scoring of Costs and Impediments}}$$

After this prioritization framework is finalized by the Freight Stakeholder Taskforce, projects will then be ranked according to the Freight Sustainability Implementation Score in later tasks.

ADDENDUM TO SAN DIEGO AND IMPERIAL COUNTIES SUSTAINABLE FREIGHT IMPLEMENTATION STRATEGY: FINAL EXISTING CONDITIONS AND SUSTAINABLE FREIGHT BEST PRACTICES

This addendum reflects a modification to the Final Existing Conditions and Sustainable Freight Best Practices Memorandum. Table 1 and 2 criteria were originally proposed to be scored on a scale between 1 and 10. This approach was developed by the Project Development Team (PDT), presented to the Freight Stakeholders Taskforce, and included in the Final Existing Conditions and Sustainable Freight Best Practices Memorandum. While working through the process of assigning scores, the project development team noted that a smaller scale would be more appropriate, given the conceptual nature of projects, programs, and policies being evaluated. The updated range for scoring, as indicated below, is between 1 and 3. The weighting of areas are unchanged.

Modified text is shown as underlined.

Changes to p. 55

Table 1: Scoring of Benefits

Areas	Criteria	Scoring	Weighting
Environment	Impact on reducing emissions of GHGs	1 - <u>3</u>	35%
	Impact on reducing emissions of criteria pollutants (particulate matter, NO _x , VOC, etc.)	1 - <u>3</u>	
Equity	Degree to which benefits accrue to most vulnerable communities (Top 25% of CalEnviroScreen 4.0 scores, or AB 617), and vulnerable communities (Top 50% of CalEnviroScreen 4.0 scores, or Tribal Land), including safety considerations	1 - <u>3</u>	35%
Economy	Improves efficiency (speeds and reliability) of freight transportation system	1 - <u>3</u>	30%
	Improves capacity of freight system to accommodate expected increases in freight	1 - <u>3</u>	

Changes to p. 56

Table 2: Scoring of Implementation Costs and Impediments

Areas	Criteria	Scoring	Weighting
Costs	Approximate implementation costs	1 - 3	35%
Funding	Lack of funding match	1 - 3	25%
Stakeholder Support	Does implementation require legislative changes and/or seeking support of many competing stakeholders?	1 - 3	15%
Technological Complexity	Does the technology still require further testing/development and is it not ready for application? Are there regulatory impediments to implementing this technology?	1 - 3	15%
Planning Continuity	Not considered in local or regional plans or programs and/or conflicts with other modes	1 - 3	10%