2022 Delaware Freight
Emphasis Area Summary:
Freight Resilience and
Environmental Impacts

D.10 Freight Resilience and Environmental Impacts

DelDOT's Division of Transportation Resiliency and Sustainability leads a mission to provide the citizens of Delaware with the most resilient and sustainable transportation infrastructure through effective project planning, design, construction, and maintenance along with the incorporation of innovative solutions such as alternative energy and electrification of the state's infrastructure to address the challenges associated with climate change.²⁰ Key initiatives within the state include a focus on:

- Impacts of Climate Change and Sea Level Rise with initiatives pertaining to design, construction, and maintenance; drainage; and a flood matrix.
- Electrification of Infrastructure and Fleet with initiatives pertaining to EV charging and electric buses and fleet.
- Use of Alternative Energy with initiatives pertaining to solar energy, propane conversion, and exploring hydrogen.
- Quality of Life with initiatives pertaining to the Keep DE Litter Free program and pollinators.

Freight Resilience Planning in the Face of Climate-Related Disruption

As DelDOT and their MPO freight planning partners continue to advance their freight resilience planning efforts, the agencies will also review and potentially draw from current best practices related to this evolving topic. Among potential best practice resources, FHWA released a *State of the Practice Scan: Freight Resilience Planning in the Face of Climate-Related Disruption* (June 2022). This resource confirms that there are two major components in freight resilience planning, including (1) planning infrastructure investments to mitigate the effects of extreme weather and natural disasters, and (2) planning for emergency operations and responses needed to keep freight moving during extreme weather events or natural disasters. The resource summarizes gaps and potential improvement actions in freight resilience planning that generally relate to:



- Defining goals for freight network resilience outcomes.
- Collaborating with stakeholders within and beyond planning jurisdictions.
- Leveraging data and information related to planning breakdowns during disaster response.
- Operationalizing resilience concepts, including methods for identifying "freight resilience projects" and forecasting the anticipated benefits to the network.

As public sector freight planning continues to mature at the state and local levels, better and more wide spread resilience practices will help to improve the system. FHWA has clear opportunities to provide direct technical assistance, education, and tools to its partners to help advance the state of practice in freight resilience planning and contribute to this development over the next several years.

Source: FHWA, https://www.planning.dot.gov/documents/Freight Resiliency State of Practice Scan FINAL.pdf.

DelDOT, Division of Transportation Resiliency and Sustainability, https://deldot.gov/Programs/trs/.



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D.10.1 Climate Change and Sea Level Rise

Sea-Level Rise (SLR) is one of the most significant consequences of climate change. Delaware is especially vulnerable to the effects of SLR due to its flat topography, low mean elevation, and significant community development and infrastructure investments along the coast. Rates of relative SLR measured at tide gauges in and around Delaware are approximately twice the rate of global mean SLR²¹ experiencing already over a one foot on SLR since 1900²². Due to the low-lying topography of the state (lowest state in the nation), creating resilient infrastructure in the face of roadway flooding becomes a challenge. DelDOT has been and continues to be challenged by the effects of SLR and frequently flooded roadways because of severe weather events.





While sea level rise may be a significant concern for Delaware, it fortunately appears to be of limited relevance to the state's first/final mile freight network. Assessments show that less than 1 percent of the identified first/final mile network mileage was likely to be inundated with up to 3' of SLR (Exhibit D-23). The at-risk connections were primarily concentrated in coastal New Castle County, and a relatively small portion of the network is at risk of temporary or permanent closure due to near-term SLR. While the total miles remain somewhat limited, they still carry with them an economic impact. Reviewing the most recent model Traffic Analysis Zone (TAZ) data, nearly 7,000 jobs (4,900 in Freight Intensive Sector industries) would be impacted by a 3' SLR scenario.

Delaware's Climate Action Plan, https://documents.dnrec.delaware.gov/energy/Documents/Climate/Plan/Delaware-Climate-Action-Plan-2021.pdf



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²¹ The Delaware Geological Survey, University of Delaware, https://www.dgs.udel.edu/projects/determination-future-sea-level-rise-planning-scenarios-delaware.

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Exhibit D-23: Freight Network and Sea Level Rise Comparison 23

Impact	1' SLR	2' SLR	3' SLR
First Final Mile Impacts (miles)	4.8 miles	9.6 miles	12.0 miles
First Final Mile Impacts (%)	0.01%	0.02%	0.03%

Determination of Future Sea-Level Rise Planning Scenarios for Delaware

The State of Delaware has had future SLR scenarios (projecting SLR out to year 2100) in place since 2009 to use in long-term planning activities. Those scenarios were integrated into many town and county plans and formed the basis of the Delaware Sea-Level Rise Vulnerability Assessment and Adaptation reports, the Delaware Climate Impact Assessment, and Executive Order 41: Preparing Delaware for Emerging Climate Impacts and Seizing Economic Opportunities from Reducing Emissions, which specifically mentions the periodic update of the SLR planning scenarios.

The new SLR planning scenarios recommended in the report correspond to increases of mean sea level in Delaware by the year 2100 of 1.53 m / 5.02 ft (High scenarios), 0.99 m / 3.25 ft (Intermediate scenario), and 0.52 m / 1.71 ft (Low scenario.)

As the project is still active and study information continues to evolve, updates may be reviewed at https://www.dgs.udel.edu/projects/determination-future-sea-level-rise-planning-scenarios-delaware.

²³ CPCS analysis of WILMAPCO data.



D.10.2 Electric Vehicle Technology

Delaware is one of several states referred to as a "Section 177 state," meaning that it is adopting California's Zero Emission Vehicle (ZEV) regulations in some form. This includes a dedicated ZEV program to provide more options for electric vehicle (EV) purchases, reported in a recent Delaware.gov news article as follows:

Managed by the Delaware Department of Natural Resources and Environmental Control (DNREC), the ZEV program is designed to accelerate the commercialization of battery-electric, plug-in hybrid and fuel cell electric vehicles. The regulations mandate that a certain percentage of the vehicles delivered for sale in a state are ZEV vehicles. Manufacturers receive credits for each delivered vehicle based on the type of vehicle, range and other factors. Each year, manufacturers must meet a ZEV credit amount that is based on average annual sales. In states already in the program, the automobile industry has successfully met the required percentage.²⁴

While the ZEV program essentially focuses on passenger vehicles, it provides opportunities and the potential for expanded EV infrastructure that may also lead to shared interests or opportunities in expanding or explore future freight-relevant EV technologies. As EV conditions evolve, broader ongoing freight planning efforts should also explore freight-relevant EV technologies that may be tested, added, or expanded within the state (e.g., truck stop electrification, EV truck technologies, EV equipment applications within port/airport operations, etc.). As noted in Chapter 5.3.2 of this freight plan and in the details of Appendix J, formula funding and competitive grant opportunities under the IIJA resources may be available to support advancements of EV technology.

Delaware News, https://news.delaware.gov/2022/03/03/delaware-to-adopt-zero-emission-vehicle-regulation/.



D.10.3 Energy Usage

Energy usage and related Freight Intensive Sector industries tend to directly affect the freight transportation system and/or freight industry needs. Key factors may include truck, rail, seaport, barge, or pipeline delivery of energy-related raw materials and resources; heavy construction and equipment needs related to energy production sources and utilities; or, in the case of alternative energy source, specialty cargo handling needs for components such as wind turbine blades, solar panels, and large generators. Because the energy sector can also be significantly affected by external forces related to raw materials, environmental policies, global supply chains, and other driving forces, it may be important to have a broader understanding of the state's overall energy usage trends and related details to provide a frame of reference for broader ongoing freight planning discussions. To that end, details in the exhibits below attempt to provide a snapshot of Delaware's current energy consumption profile (Exhibit D-24), energy sources (Exhibit D-25), and net electricity generation by source (Exhibit D-26).

Exhibit D-24: Delaware Energy Consumption Profile 25

Energy Production and Consumption	Delaware produces less energy than any other state, and although it is the nation's third-lowest energy consumer, in 2019 Delaware used almost 75 times more energy than it produced.
Net Electricity Generation	In 2020, natural gas fueled 92% of Delaware's in-state utility-scale electricity generation, up from 51% in 2010, while the state's coal-fired generation fell from 46% to 2% during the same period.
Household Energy Consumption	About 42% of Delaware households rely on natural gas for home heating, 35% use electricity, about 10% use fuel oil or kerosene, and 10% use propane.
Renewable Energy	Delaware's renewable portfolio standard requires that renewable energy sources generate 40% of electricity retail sales in the state by 2035, with at least 10% coming from solar energy.
Industrial Energy Consumption	In 2019 and 2020, Delaware's industrial sector was the state's largest natural gasconsuming sector, surpassing the electric power sector, which had been the largest for most of the past decade.

²⁵ EIA, Delaware Profile Analysis, https://www.eia.gov/state/analysis.php?sid=DE



Exhibit D-25: Delaware Energy Sources 26

Energy Source	Active Production?	Profile
Petroleum	No	The Port of Wilmington contains a bulk storage terminal for petroleum, which handles diesel fuel, heating oil, and other forms of oil. Petroleum provides the largest share of the energy consumed in Delaware, accounting for about two-fifths of the state's total energy use. The transportation sector is the state's largest petroleum consumer and accounts for 70% of the petroleum used in Delaware, and half of that is used as motor gasoline.
Natural Gas	No	All of Delaware's natural gas supplies arrive by interstate pipeline from Pennsylvania. In 2019, natural gas use in the industrial sector surpassed the amount used by the electric power sector for the first time since 2010. In 2020, the industrial sector, which includes chemical manufacturing and food processing, accounted for nearly two-fifths of the state's natural gas consumption.
Electricity	Yes	Natural gas fuels most of Delaware's generation of electricity. The use of natural gas-fired power plants to Delaware's utility-scale (1 megawatt or larger) electricity (natural gas to electricity conversion) net generation increased dramatically from 50% in 2010 to more than 90% in 2020. In-state generation typically supplies much less electricity than is used by Delaware consumers.
Renewable Energy (Solar, Biomass, and Wind)	Yes	Solar energy and biomass generate most of the renewable electricity in Delaware. Together, they contributed more than 2% of the state's net generation from utility-scale facilities in 2020. The state has almost a dozen utility-scale solar facilities that use solar photovoltaic (PV) technologies, the largest of which has a generating capacity of 12 megawatts. These utility-scale solar facilities are found throughout the state. Delaware has low onshore wind energy potential; therefore, it is limited to offshore. The one onshore windmill is in Lewes.
Coal	No	The small amount that is consumed arrives by rail from Pennsylvania and then is delivered to the electric power sector. In 2020, the state's one remaining coalfired power plant, the Indian River Generating Station, consumed all the coal used for electricity generation in Delaware. The plant is infrequently used and scheduled to close in 2022.

²⁶ Ibid.



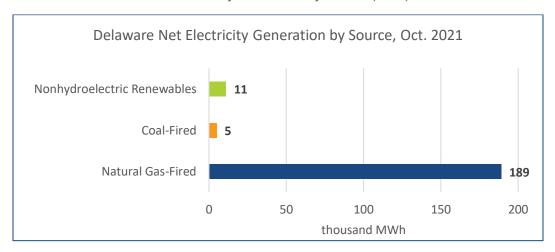


Exhibit D-26: Delaware Net Electricity Generation by Source (2021) 27

As noted at the beginning of this section, the use of alternative energy and initiatives pertaining to solar energy, propane conversion, and exploring hydrogen are included among efforts within DelDOT's Division of Transportation Resiliency and Sustainability. Additionally, the Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Climate, Coastal and Energy, uses an integrated approach of applied science, education, policy development, and incentives to address Delaware's climate, energy, and coastal challenges. Ongoing coordination between DelDOT, DNREC, the state's freight planning efforts via the Delmarva Freight Working Group, and key public/private partners involved with the energy sector, to include the Port of Wilmington, rail operators, and energy related FIS industry sector representatives should occur as needed to stay abreast of evolving energy trends, needs, and opportunities, and their influence on freight transportation system planning.

D.10.4 Equity and Quality of Life

Equity and Quality of Life issues related to freight transportation system planning often relate to freight's general impact on communities, including historically disadvantaged communities. These impacts may relate to noise, emissions, truck traffic, and other factors that are often more prevalent along first/final mile freight routes. As noted in Chapter 3.2.2 of this freight plan, many such issues were assessed in detail as part of Delaware's First/Final Mile Freight Network study in 2021, including focus areas related to land use, mobility, infrastructure conditions, institutional challenges, and safety. Subsequently, many of the freight goals, values, and strategies summarized in Chapter 6 of the freight plan look to balancing freight needs while protecting Delaware's communities.

At a broader level and in conjunction with many of the latest federal planning policies and funding resources expanded under the IIJA, notable efforts are being made to lessen the negative impacts of transportation, climate change, and other factors on historically disadvantaged, or environmental justice (EJ), communities. Such efforts are directly reflected in the recent Justice40 initiative (see callout box on the following page).

²⁷ EIA, State Energy Data System.



Jusitce40 Initiative

Executive Order (EO) 14008, Tackling the Climate Crisis at Home and Abroad, created the government-wide Justice40 initiative on January 27, 2021. This initiative aims to deliver 40% of the overall benefits of federal investments in climate and clean energy, including sustainable transportation, to disadvantaged communities.

As of May 2022, efforts under this initiative have included the development and beta-testing of a Climate and Economic Justice Screening Tool (CEJST) by the White Council on Environmental Quality (ECQ), development of an interim definition to identify disadvantaged communities for Justice40-covered programs, and a list of funding opportunities that are actively using this definition.

As Justice40 and its implementation continue to evolve, updates may be reviewed at https://www.transportation.gov/equity-Justice40.

With the Justice40 initiative and other EJ concerns in mind, direct consideration of EJ community impacts was accounted for in the freight plan's efforts related to freight candidate project screening. Specifically, these efforts account for areas of minority/low-income populations, and (from an air quality perspective) the presence of particulate matter for diesel emissions, including approach details as listed below.

Demographic Index: To assess project sites or impact areas in relation to the Delaware's minority/low-income populations, EPA's EJSCREEN tool was used. EJSCREEN is an environmental justice mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators.²⁸ Demographic Index is a combination of two factors, which are low-income and people of color.

- The low-income demographic indicator is described as the percent of a block group's population in households where the household income is less than or equal to twice the federal "poverty level."
- The "people of color" demographic indicator is described as the percent of individuals in a block group who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino. That is, all people other than non-Hispanic white-alone individuals. The word "alone" in this case indicates that the person is of a single race, not multiracial.

More details on demographic indicators can be found at: https://www.epa.gov/ejscreen/overview-demographic-indicators-ejscreen. The top percentiles of demographic index from the entirety of Delaware are used to track areas effected in the minority/low-income populations (Exhibit D-27).

Diesel Particulate Matter: Using the EJSCREEN data sources, areas within the state that score in the highest percentile of emissions for diesel particulate matter were mapped (Exhibit D-28). The bulk of the higher concentrations fall along the I-95 corridor and around the City of Dover. Delaware produces higher than average emissions, especially from Particulate Matter from diesel emissions.

Additional details for how these factors were applied to the candidate freight project screening efforts are included in Chapter 5.2 and Appendix I of this freight plan.

²⁸ EPA, https://www.epa.gov/ejscreen



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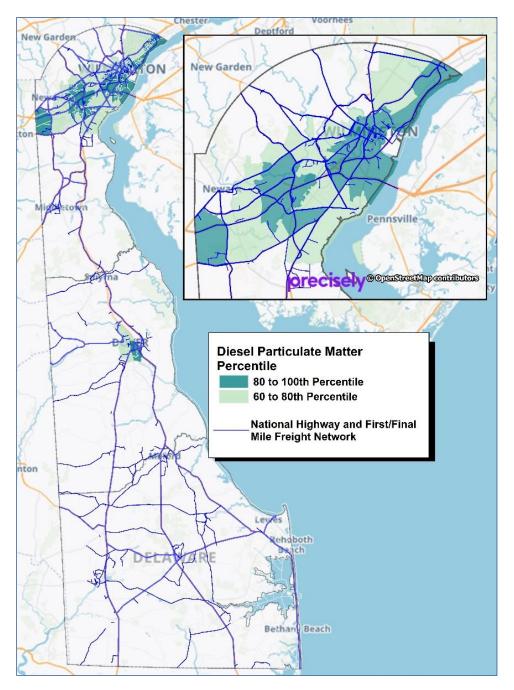
New Garder New Garden Pennsville orecisely @ Construction on the little of th **Demographic Index Percentile** (Minority + Low Income) 80 to 100th Percentile 60 to 80th Percentile National Highway and First/Final Mile Freight Network ton ehoboth Bethan Beach

Exhibit D-27: Demographic Index Percentile of Delaware

Source: WILMAPCO analysis and mapping of EPA EJSCREEN data.



Exhibit D-28: Diesel Particulate Matter Percentile



Source: WILMAPCO analysis and mapping of EPA EJSCREEN data.



D.10.5 Wildlife Habitat Protection

Relative to wildlife habitat protection, the natural environment is an important part of Delaware. Multiple laws and regulations require that actions with a Federal nexus (i.e., funds or permits) consider the level of impact projects have on the natural environment. These laws include the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), the Endangered Species Act (ESA), and the Fish and Wildlife Coordination Act (FWCA), as well specific freight planning requirements under 49 U.S.C. §70202(b) to minimize the impacts of freight movement on wildlife habitat loss.

DelDOT Environmental Stewardship Section

The Environmental Stewardship Section at DelDOT works to achieve the Department's goal of minimizing the environmental impacts on the state's transportation system. The section ensures that DelDOT projects and maintenance activities account for and take actions that protect, restore, and enhance the natural and cultural environment. Major areas of responsibility include:

- Project reviews for compliance with the National Environmental Policy Act (NEPA)
- Environmental Assessment (EA) and Environmental Impact Statement (EIS) level project support
- Programmatic Agreement support for Categorical Exclusion (CE) determinations
- Archaeology and historic preservation support
- Natural environment protection and mitigation
- Pollinator programs

Additional details and specific programs/focus areas may be reviewed at: https://deldot.gov/environmental/index.shtml.

DelDOT works to avoid and minimize impacts to wetlands and waters of the United States, state-regulated tidal wetlands, rare, threatened and endangered species, trees, and Essential Fish Habitat – among other things. DelDOT's Environmental Stewardship Section coordinates with project managers during project development to ensure a balance between natural resource and transportation needs. When balancing is not feasible due to safety, cost, constructability, or other factors, mitigation to offset impacts is necessary.

DelDOT is also committed to performing work where feasible within the state system to benefit pollinators. DelDOT's Maintenance & Operations department oversees the Enhancing Delaware Highways program, which has piloted several adaptive management strategies. One example includes the creation of Dove's Nest as Delaware's first-ever pollinator mitigation site. The meadow was part of required mitigation for the US 301 project in New Castle County and was planted with native wildflowers that bloom across the growing season to ensure that pollinators have a food source all year long, as well as Milkweed to provide breeding habitat for the monarch butterfly.



Source: DelDOT, https://deldot.gov/environmental/pollinators/index.shtml

