



Freight & Logistics

NCDOT is a part of your supply chain.

Cost of Congestion & Key Freight Bottlenecks — March & April 2022 Recap

Delay and congestion cost commercial industry millions of dollars each year. This cost eventually becomes a burden on the sustainability of the freight transportation sector, and the cost of goods and services for the end-consumer. This can be as straightforward as friction between volume and capacity, but freight congestion can also represent the challenge of reconciling network functionality with economic behavior.

Performance Measure	Q1				Q2	
	Mar-22	% CHANGE	Quarterly Summary (Q1)	Quarterly % CHANGE	Apr-22	% CHANGE
NCPFN System Total Commercial Cost of Delay (NPMRDS)	\$ 138,059,958	13.4%	\$ 128,307,659	-4.3%	\$ 136,275,953	-1.4%
NCPFN System Commercial Average Daily Cost per VMT (NPMRDS)	\$ 0.30	7.1%	\$ 0.28	-2.3%	\$ 0.31	3.7%
Commercial VMT on the NCPFN System	466,971,474	6.0%	1,377,883,943	-4.3%	445,170,405	-4.6%
NCPFN System Com. Vehicle-hours of Delay (NPMRDS) (#Hours)	1,373,868	13.4%	1,276,820	-4.3%	1,356,115	-1.4%
Top 10 Bottlenecks Total Cost of Delay	\$ 5,329,428	28.7%	\$ 3,866,385	-1.6%	\$ 5,400,178	3.3%
Top 10 Bottlenecks % of Total Cost	3.86%	13.5%	3.01%	-19.7%	3.96%	6.0%
Top 10 Bottlenecks Average Daily Total Cost of Delay	\$ 171,917	16.3%	\$ 129,492	-20.1%	\$ 180,006	11.8%
Commercial VMT on Top 10 Bottlenecks NCPFN System	\$ 9,163,331	-7.2%	23,220,306		7,605,291	-37.2%
Top 10 Bottlenecks Cost per VMT	\$ 0.58	38.1%	\$ 0.50		\$ 0.71	25.5%

Rank	Previous Rank	March 2022 Bottleneck Locations	Average Daily Delay*	Events or Incidents	Division
1	26	I-26 West at NC-146 Exit 37 south of Asheville	2 h 33 m	74	13
2	3	I-77 North at Tyvola Road Exit 5 in Charlotte	3 h 23 m	8	10
3	1	US-264-ALT West at NC-11/NC-43/NC-903 in Greenville	6 h 17 m	0	2
4	9	I-77 South at Remount Road in Charlotte	3 h 42 m	44	10
5	5	I-40 East at US-70 Exit 306 between Garner and Clayton	2 h 8 m	16	5
6	354	I-95 South at US-421 Exit 73 between Benson and Dunn	2 h 48 m	24	5
7	6	US-264-ALT East at NC-33 E 10th Street in Greenville	12 h 14 m	0	2
8	4	US-17 South at Gordon Road in Wilmington	8 h 57 m	6	3
9	36	I-40 West at Governor Road Exit 7 near Waynesville	3 h 18 m	10	13
10	10	US-74 East at US-601 Pageland Hwy. east of Charlotte	14 h 31 m	0	10

Rank	Previous Rank	April 2022 Bottleneck Locations	Average Daily Delay*	Events or Incidents	Division
1	9	I-40 West at Governor Road Exit 7 near Waynesville	5 h 23 m	8	13
2	5	I-40 East at US-70 Exit 306 between Garner and Clayton	2 h 43 m	16	5
3	11	I-85 South at NC-273 Exit 27 between Charlotte and Belmont	2 h 47 m	11	10
4	2	I-77 North at Tyvola Road Exit 5 in Charlotte	3 h 16 m	7	10
5	3	US-264-ALT West at NC-11/NC-43/NC-903 in Greenville	7 h	0	2
6	1	I-26 West at NC-146 Exit 37 south of Asheville	2 h 10 m	61	13
7	7	US-264-ALT East at NC-33 E 10th Street in Greenville	12 h 24 m	0	2
8	8	US-17 South at Gordon Road in Wilmington	10 h 49 m	2	3
9	30	I-26 West @ US-25 Asheville Hwy Exit 44 south of Asheville	1 h 6 m	24	13
10	10	US-74 East at US-601 Pageland Hwy. east of Charlotte	13 h 47 m	0	10

* hours per day in which congestion was present

March of 2022 witnessed a return of congestion across the Statewide Priority Highway Freight Network including a double-digit increase (13.4%) in congestion costs and hourly delays over February. This happened in tandem with a 6% increase in overall vehicle miles travelled on the freight network in March. Bottlenecks increased in relative impact to congestion costs, up nearly 30% over February with several high-volume roadways finding their way onto the statewide top 10 bottleneck list. Events and incidents (182 total) were a contributing factor in these March bottlenecks.

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NCDOT RAIL DIVISION FREIGHT & LOGISTICS PROGRAM

The key NCDOT resource for supply chain, freight, and logistics-related issues, analysis, subject-matter expertise, related projects, and relevant initiatives.

MULTIMODAL FOCUS

- Rail
- Highways/ Trucking
- Aviation
- Maritime/ Ports
- Bike/ Pedestrian
- Ferry
- Pipelines
- Information/ Data

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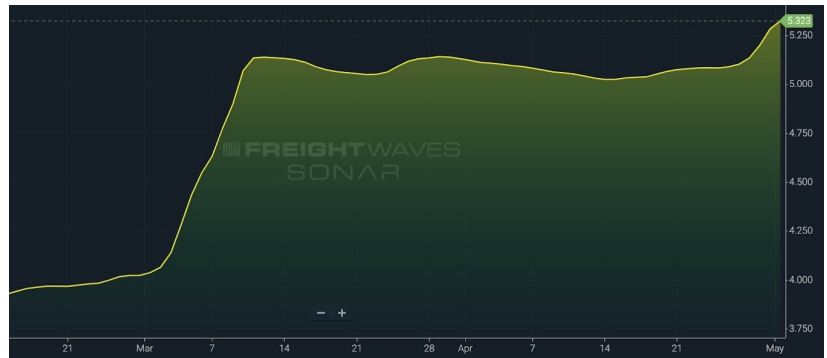
Cost of Congestion & Key Freight Bottlenecks — March & April 2022 Recap (continued)

Despite a challenging March, the 1st quarter of 2022 proved to be an improvement over 4Q2021 across all tracked metrics. This improvement included a 4.3% reduction in total congestion costs on the network, reduced relative importance for key bottlenecks, and lower VMT on the network quarter-over-quarter. As Q2 began commercial congestion costs on the freight network continued to decline with a 1.4% improvement in April in line with an overall reduction of VMT for the month versus March. All but two of April's bottlenecks carried over from the March 2022 top-10 list, however the relative impact of these sites improved over March figures. Events and incidents remain an issue despite a nearly 30% reduction in the number of incidents and events in April. Most of the pain points from March and April are concentrated in urban or suburban areas although April's top bottleneck interestingly runs north of Waynesville through the Pisgah National Forest to the border of Tennessee.

Key Supply Chain Issues facing North Carolina

- **Diesel fuel price increase straining the marketplace**

An overwhelming majority of trucks and trains in the US use diesel fuel and with increasing prices at the pump, freight movements that keep the nation's supply chains fluid are facing steep cost increases. According to AAA the national average for a gallon of unleaded fuel is \$4.41 while diesel averages \$5.55 a gallon nationally. Both averages represent record-setting levels for fuel prices in the US. Diesel prices show an increase of 53 cents in the last month alone with a YOY increase of \$2.42 a gallon. For railroads, rising diesel fuel costs are a significant issue. In 2021, CSX expenses increased more than \$700M YOY with more than half that increase spent on fuel. For freight railroads, already struggling with levels of service, higher diesel prices will compound issues. Signs of recovery are few with freight market analysts highlighting the International Energy Agency's [May 2022 Oil Market Report](#) which does not anticipate significant relief in the tight global oil market. The economic impact will eventually be felt by consumers or manufacturers with higher prices or reduced availability for products and components. Agriculture and Construction also rely heavily on diesel fuel putting these sectors at significant risk and placing further inflationary pressure on the US economy.



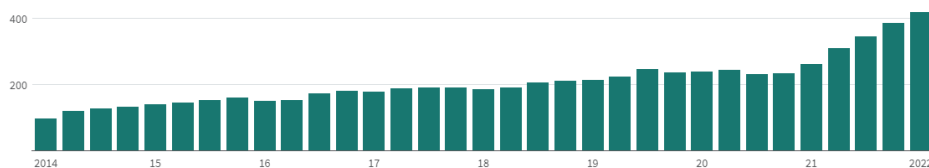
Diesel Truck Stop Actual Price per Gallon (USA) - SONAR

- **The US Environmental Protection Agency (EPA) is proposing the first [new rules for heavy-truck Nitrogen Oxide \(NOx\) emissions](#) in more than 20 years.** The response from the engine manufacturing sector is skeptical, expressing concern that the proposed new goals for NOx reduction will be too difficult to achieve. The EPA is considering two proposals, the first of which mandates a 0.035g NOx per BHP-hour for model years 2027-30 with further reduction to .02g thereafter, a 90% reduction over current standards. This mirrors California's emissions requirements for this period. Option 2 features a 0.05g limit by 2027. The agency also seeks to extend warranty periods for trucks currently set at 100K miles or 5 years to as many as 450K miles to further manage and maintain emissions compliance. ATA and NACFE, both trucking-related industry organizations, have expressed serious concerns about the proposed regulations being unachievable, a concern shared by engine manufacturers like Cummins. Some critics of the proposed rules say the increase in the cost of compliance for diesel vehicles will slow the progression of the industry to alternative or zero-carbon technologies.

- **Strong consumer spending and a major shift in inventory management practices from just-in-time to just-in-case spurs strong demand growth for logistics and warehouse real estate.** Higher inventory levels force companies to seek space in a very tight commercial and industrial warehouse sector. In their [May 2022 report](#), real estate research firm Prologis says that "at the current rate, available logistics space in the U.S. would dry up in 16 months." Analysts anticipate constrained warehouse capacity to

continue well into 2022 and with it, an estimated 22% increase in rent for the domestic marketplace. Delays in construction, material shortages, and strained builders' supply chains have slowed capacity expansion to 375M sq. ft. this year, 25M sq. ft. less than forecast. Within the broader industrial real estate warehousing sector, refrigerated

Exhibit 5
UNDER CONSTRUCTION, U.S. INDUSTRIAL
MSF



Source: Prologis Research.



Key Supply Chain Issues facing NC (*continued*)

or temperature-controlled warehouse space is at an all time premium and represents a significant growth opportunity within the supply chain. A recent example is the announcement by Bain Capital and Dallas, Texas-based Barber Partners highlight their \$500M joint venture to develop as many as 15 Class-A cold storage, temperature-controlled warehouses across the country. According to the most recent USDA survey, gross refrigerated storage capacity in the United States totaled 3.73B cu. ft. with 904 warehouses in Q4 2021. California leads all states with 396M cu. ft., Washington (294M), Wisconsin (285M) round out the top-three. North Carolina has 14 active warehouses representing 62.5M cu. ft. ranking the Old North State 20th in both categories nationally. Recent investments in cold chain infrastructure and services by NC Ports are well-timed and position the port with a competitive advantage to attract new shippers. At the NC Ports' 2022 Cold Chain Summit in April, participants announced the construction of five new facilities and 1.7M sq. ft near the port underway or slated for near-term construction that will undoubtedly expand the state's refrigerated warehouse capacity.

Initiatives, Projects & Research Updates

Updates

- *Economic Impact of North Carolina's Railroads study (2022-19)* now underway led by NC State ITRE and supported by the NCDOT Rail Division, Freight & Logistics Program. Progress is going well on this research. In addition to in-depth economic contribution analysis, the ITRE team has developed an online, GIS-based resource to identify rail related and rail-relevant businesses in North Carolina. The platform, currently in development, was demonstrated to the research advisory committee in early May. Further development and research continues on this project with completion anticipated on-schedule at the end of 4Q2022.
- *Offshore Wind Power:* On May 11, the federal Bureau of Ocean Management (BOEM) held a lease auction for the two offshore wind-power areas off the coast of North Carolina, the Carolina Long Bay wind area. Located 20 NM south of Bald Head Island the two sites include about 55K acres each where offshore wind power turbines may be installed. The winners of the auction were Duke Energy Renewables Wind, a Duke Energy subsidiary with a bid of \$155M for one lease, and TotalEnergies Renewables, a French energy developer, winning the other for \$160M. For the first time in a BOEM auction, winning bids required the companies to contribute \$42M to workforce training and supply chain development. A key objective for the NC TOWERS committee is to ensure that as much of that \$42M is spent in developing workforce, supply chain and economic development in North Carolina as possible. Potential productivity of the two sites, fully constructed, is estimated to be 1.3 gigawatts which will help achieve Gov. Cooper's state goal of 2.8 gigawatts of offshore wind energy by 2030 and 8 gigawatts by 2040. The economic development opportunities surrounding the offshore wind power sector are immense and North Carolina is well-positioned to compete nationally and internationally. (NCDOT is involved on the Infrastructure, EJ, and Inclusion subcommittee (Dana Magliola, liaison), as well as the Outreach & Engagement subcommittee (Susi Hamilton, co-chair). Susi Hamilton is NCDOT's representative on the full NC TOWERS committee.)

Ongoing (*no update*)

- Research activities continue for the R&D study *Economic Contribution of NC's Supply Chain (2023-16)* sponsored by NCDOT Freight & Logistics and NCDOT R&D. The project is led by NC State University's ITRE group with support from the NC State Supply Chain Resources Cooperative. This will be the second ever comprehensive study on the economic impact of the supply chain in North Carolina. NC Chamber of Commerce has also recently shown interest in this research from an economic competitiveness perspective. They are represented on the research project's advisory committee.
- *Geo-FRIT: Geospatial Analytics Tool for Quantifying Freight Risk and Resilience in Transportation (R&D Project 2022-18):* The Geo-FRIT research project sponsored by Freight & Logistics and led by UNC-Charlotte includes study of risk and resiliency profiles for NC primary and secondary freight routes is currently on track. The Geo-FRIT platform under development provide a web-based geospatial analytics tool for quantifying freight risk and resilience in transportation and allow for data collection and sharing among DOT divisions, as well as advanced modeling of disaster data for risk-based freight routing through spatial simulation-driven scenario analysis.
- *Integrating Supply Chain with Transportation Infrastructure Data for Enhanced Planning Capabilities (R&D 2020-10):* The purpose of this research is to integrate Department of Defense supply chain data managed by NC State Industrial Extension with existing geospatial transportation infrastructure data managed by the NCDOT on the NC OneMap platform. This project is currently active under an extended deadline provided by NCDOT Research & Development.