MANAGING MEMBERS
STAFF BRIEFING

Item No. 10A

Date of Meeting July 2, 2024

DATE: June 24, 2024

TO: Managing Members

FROM: John Wolfe, CEO

Sponsor: Jason Jordan, Director, Environmental & Planning Services

Project Manager: Rose Arsers, Air Quality & Sustainable Practices

SUBJECT: 2021 Puget Sound Maritime Air Emissions Inventory Results

A. SYNOPSIS

The Puget Sound Maritime Air Emissions Inventory (PSEI) is a collaborative effort to assess emissions from port and maritime activities in the Puget Sound Region and has been a foundational element of the Northwest Ports Clean Air Strategy (NWPCAS) since its inception. The initial 2005 PSEI established a baseline emission inventory for the Puget Sound ports and maritime industry and has been updated about every five years to track progress and inform new emission reduction programs. The PSEI is funded and managed by a diverse group of industry, port, and government stakeholders, who have collaborated to establish the PSEI methodology and perform updated inventories. The 2021 PSEI was completed in the spring of 2024 and publicly released on June 6.

Regional Results:

The key takeaways from the regional results (i.e. including all ports and maritime sources of emissions) are as follows.

1. The maritime industry and ports have made considerable progress in reducing diesel pollution in the region since the first inventory in 2005. Diesel Particulate Matter (DPM) emissions decreased by 82% between 2005 and the 2021 inventory, including a decrease of 30% between 2016 and 2021. A significant driver of the progress between 2016 and 2021 was the NWSA's Clean Truck Program, which includes a requirement that drayage trucks serving international terminals must be 2007 model year or newer; this rule went into effect in January 2019.

2. GHG emissions were reduced by 10% between 2005 and 2021; a positive result, but not on pace to reach full decarbonization by 2050. There are significant opportunities to increase the pace of emission reductions in the coming years, given the increase in state and federal funding opportunities.

3. Accelerating GHG emission reductions will be a high-priority focus of the updates to the NWSA, Port of Seattle, and Port of Tacoma NWPCAS implementation plans, which will begin in early 2025.

4. Regional emissions from vessels at anchor and at berth were significantly higher than in prior inventories as a result of supply chain disruptions associated with the COVID-19 pandemic. This was a result of vessels sitting at anchor in Puget Sound waiting to go to their berths and an increase in vessel at-berth time. While the supply chain disruptions contributed to regional air pollution and GHG emissions in 2021, this was an exceptional event that is not expected to recur in future years.

NWSA Results:

The key takeaways for the NWSA mirror the regional results and are as follows.

1. Between 2005 and 2021, DPM emissions from NWSA activities have decreased by 89% and between 2016 and 2021 decreased by 41%. The NWSA's Clean Truck Program was a significant driver of the reductions that occurred between 2016 and 2021; truck DPM emissions decreased by 87% between 2016 and 2021 and are down 93% since 2005. Other major drivers of emission reductions between 2005 and 2021 are the North American Emissions Control Area (ECA), which requires ships to use lower sulfur fuels while operating within 200 miles of shore, EPA new engine standards for onroad and nonroad engines, coupled with fleet turnover, and cleaner vessel standards as required by the IMO.

2. GHG emissions decreased by 20% between 2005 and 2021. The biggest driver of GHG emission reductions was vessel efficiency, resulting primarily from the shift to larger vessels and fewer vessel calls, but also shore power at TOTE terminal.

3. There were an unprecedented number of vessels at anchor across the Puget Sound in 2021, which impacted regional emissions. Based on the PSEI methodology established jointly by the partners in 2005, vessel at anchor emissions are not attributed to ports (though they are captured in the regional inventory). Adding regional container vessel at anchor emissions to the NWSA's emissions in 2021 dampens the reductions of DPM and GHGs to 87% and 9%, respectively. Given the exceptional nature of this disruption, staff expect vessel at anchor emissions to return to past levels in future inventories.

NWSA North Harbor Results:

The key takeaways for the NWSA North Harbor port emission results, which include only emissions at or near the terminals, are as follows:

1. Between 2005 and 2021, DPM emissions decreased by 76% and increased between 2016 and 2021 by 6%.

2. GHG emissions decreased by 5% between 2005 and 2021 and increased by 44% between 2021 and 2016.
3. Both the DPM and GHG emissions in 2021 were impacted by an increase in vessel at-berth time and an increase in CHE, truck, and locomotive switcher activity. The North Harbor experienced a 22% increase in TEU throughput in 2021 compared to 2016, which was a driver in the emissions increase, coupled with supply chain congestion.

NWSA South Harbor Results:

The key takeaways for the NWSA South Harbor port emission results, which include only emissions at or near the terminals, are as follows:

1. Between 2005 and 2021, DPM emissions decreased by 72% and decreased between 2016 and 2021 by 31%.
2. GHG emissions increased by 3% between 2005 and 2021 and decreased by 8% between 2016 and 2021. GHG emissions trends in 2021 were driven by a 34% increase in the average containership at-berth time and an increase in truck on-terminal idling time, which can be attributed to supply chain congestion.

B. BACKGROUND

The Puget Sound Maritime Air Emissions Inventory (PSEI) is a modeling study that estimates emissions from port and other maritime activities in the Puget Sound Airshed. It is a foundational element of the ports' clean air and climate action programs, providing critical data for tracking air pollutant and greenhouse gas (GHG) emission trends over time and understanding the distribution of emissions across the different "sectors" of port operations. The PSEI is a key input to GHG inventories performed separately by the NWSA, PoS, and PoT to construct the comprehensive carbon footprint for each of the port entities.

Performing a PSEI every five years has been a commitment under the Northwest Ports Clean Air Strategy (NWPCAS) since its inception in 2008. The first PSEI (also called the "baseline" inventory) was completed in 2007 for 2005 activities and was the basis for the development and focus of the first NWPCAS. Additional PSEI studies have been performed for 2011 and 2016 activities (published in 2012 and 2018 respectively), keeping our commitment to tracking emissions regularly and informing subsequent updates to the NWPCAS in 2013 and 2020. The 2021 PSEI was the fourth emissions inventory performed by the group. The 2021 PSEI geographical scope, emissions sources, and methodology were consistent with previous emissions inventories.

Funding Committee:

The 2021 PSEI Funding Agreement and Project were authorized by the Managing Members on June 7, 2022. The total authorized budget for the project was $560,000.

The NWSA contributed $345,000 ($110,000 in staff time and $235,000 toward the consulting contract); Port of Seattle contributed $50,000; Port of Tacoma contributed $20,000: other Forum members contributed the remaining $245,000. Because it is a comprehensive study of all maritime related emissions throughout the Puget Sound Airshed and not strictly limited to NWSA, PoS, and PoT, the PSEI is funded and administered by a "funding committee" of regional stakeholders under the Puget Sound Maritime Air Forum[1].

C. NEXT STEPS

To follow up on the public release of the 2021 PSEI on June 6, the NWSA and the ports of Seattle and Tacoma are exploring demand for organizing a public webinar to share results and garner feedback more broadly.

The 2021 PSEI shows both substantial progress and the need to redouble and accelerate our efforts to reduce and eliminate (by 2050 or sooner) the air and climate pollution associated with seaport activities. In particular, our GHG emissions reduction trajectory is not on a path to meet our goal of a 50% by 2030.

The ports already are taking action to address this challenge. Examples include:

- Installing shore power: Shore power has been installed and is in operation at T-5, which is delivering emission reductions that are not yet captured in our inventory. In addition, shore power will be installed at Husky Terminal by the end of 2024, is in design at Terminal 18, and is being planned at Washington United Terminal and Pierce County Terminal.
- Facilitating the transition to zero-emission cargo-handling equipment (CHE): Building on the successful demonstration of six electric yard tractors at the South Intermodal Yard in Tacoma, the NWSA is launching a ZE CHE Incentive Program by the end of the 2024. This program will encourage operating partners to transition to zero-emission technologies as equipment is being replaced.
- Facilitating the transition to zero-emission drayage: The NWSA also plans to launch a ZE Drayage Incentive Program by the end of 2024. This will incentivize the deployment of zero-emission drayage trucks in the NWSA gateway. To date, the NWSA has been awarded nearly $50 million in state and federal funding for this program, enough to incentivize the deployment of an estimated 100-150 ZE trucks.
- State and federal funding: Staff are aggressively pursuing additional state and federal grant opportunities that will help significantly accelerate our emission reduction efforts. For example, the recently submitted EPA Climate Pollution Reduction Grant proposal includes $52 million to expand the two incentive programs described above.

[1] Puget Sound Maritime Air Forum – Committed to reducing air emissions associated with the maritime transportation of freight and passengers

- In addition, the NWSA and the ports of Seattle and Tacoma joined forces to submit a $500 million proposal under the EPA Clean Ports Program. If successful, this grant would fund several shore power installations and the deployment of an additional 100 ZE drayage trucks and nearly 300 pieces of ZE CHE.

Looking forward, we will be exploring: 1) the increase of renewable fuels (such as renewable diesel) as a “bridge strategy” for significantly and cost-effectively reducing emissions in the near-term while zero-emission technologies are becoming more feasible, available, and affordable; and 2) strategies for encouraging vessel speed reduction and continued ship efficiency gains.

In addition, the NWSA and the Port of Seattle and Port of Tacoma will be updating their NW Ports Clean Air Strategy implementation plans beginning in early 2025. Through those updates, which will be guided by significant stakeholder input, staff will develop additional emission reduction strategies and actions aimed at accelerating our progress and meeting our goals.

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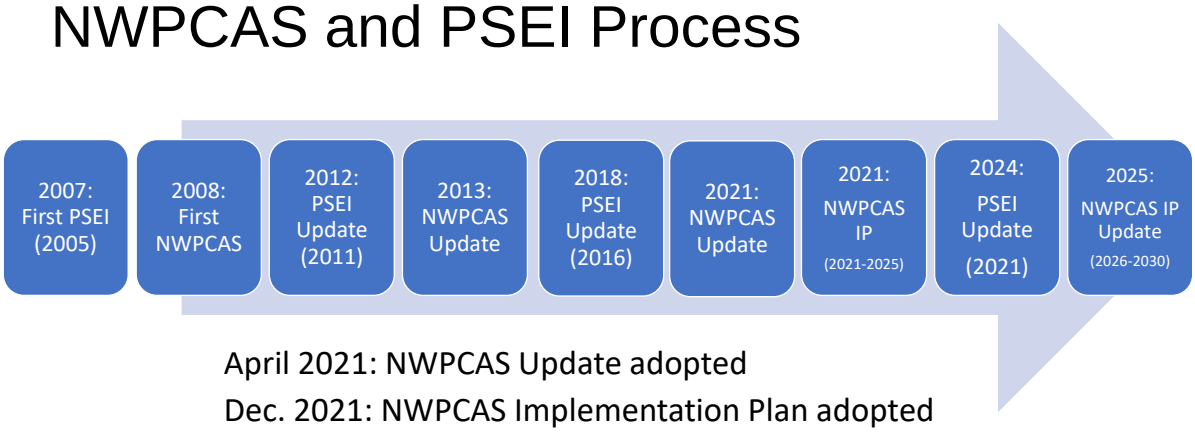
2021 Puget Sound Maritime Air Emissions

THE NORTHWEST SEAPORT ALLIANCE
SEATTLE + TACOMA

Presenter: Rose Arsers, Project Manager, AQSP Environmental

1

NWPCAS and PSEI Process



April 2021: NWPCAS Update adopted
Dec. 2021: NWPCAS Implementation Plan adopted
Dec. 2021: PSEI Funding Committee kickoff
June 2022: PSEI MM authorization
October 2022: Procurement complete, PSEI work began
April 2024: PSEI final report complete
June 6: PSEI public release

2

2

PSEI Scope

- **Modeling study based on operational data that we do every 5 years in collaboration with regional partners to assess maritime and port emission reduction progress in Puget Sound region.**

Partners

- The Northwest Seaport Alliance
- Port of Seattle
- Port of Tacoma
- Port of Everett
- Port of Anacortes
- Port of Olympia
- Pacific Merchant Shipping Association
- Western States Petroleum Association
- Cruise Lines International Association
- Northwest Clean Air Agency
- Puget Sound Clean Air Agency
- Washington State Ferries
- Washington State Department of Ecology

Ocean-Going Vessels (OGV)

- ***Cargo ships calling ports***
- Cruise
- Liquid bulk to/from regional petroleum facilities

Harbor Vessels

- ***Tugs***
- Ferries
- Work boats
- Commercial fishing
- Government vessels
- Barges
- Recreation vessels (separate category)

Cargo Handling Equipment

- ***Port related only***

Locomotives

- ***For port related cargo only***

Heavy Duty Vehicles

- ***Drayage trucks***
- Cruise passenger busses

Fleet Vehicles

- ***Other vehicles owned by ports and tenants***

(bold/italics=sources included in NWSA's emissions)

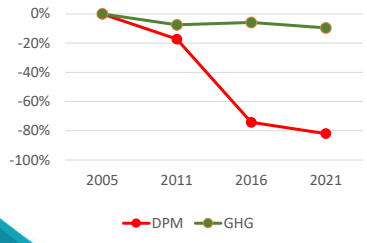
3

3

PSEI-Wide (Regional) Results

1. Significant reduction in DPM emissions from maritime/port sources across the region.
2. Continuous GHG emission reductions
3. COVID supply chain disruptions led to significantly more regional emissions at anchor than prior PSEIs

   - Based on exceptional nature of the disruptions, should be 1-time occurrence

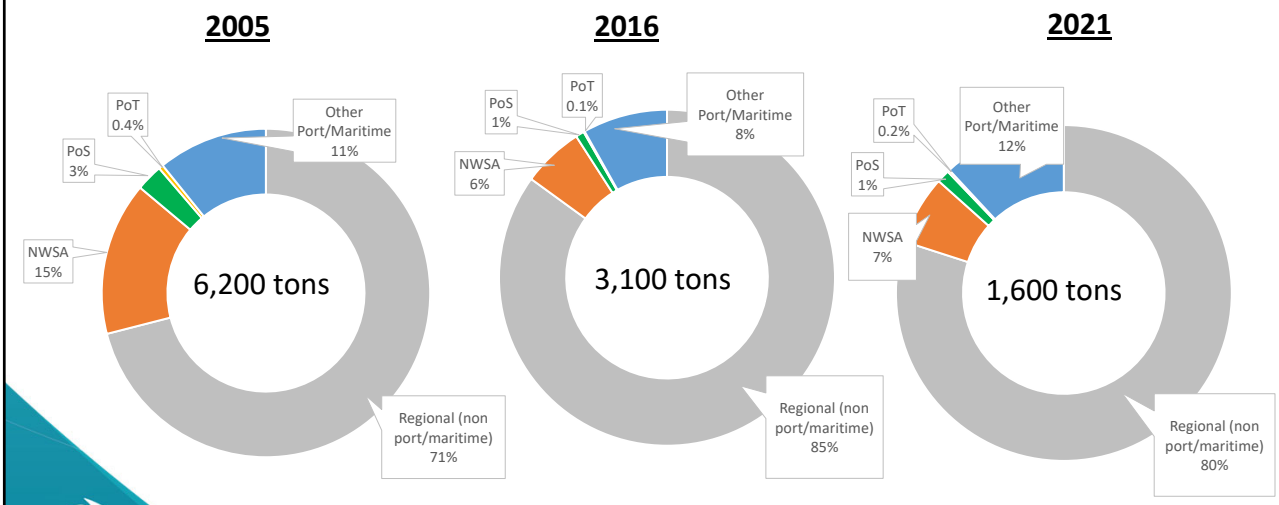


	DPM		GHG	
	2005-2021	2016-2021	2005-2021	2016-2021
Total	**-82%**	**-30%**	**-10%**	**-4%**

4

4

Contribution to Regional DPM Emissions



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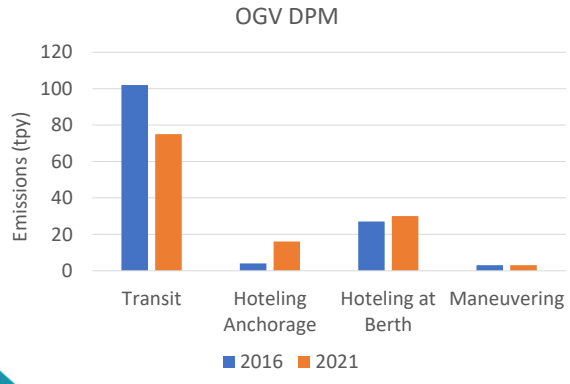
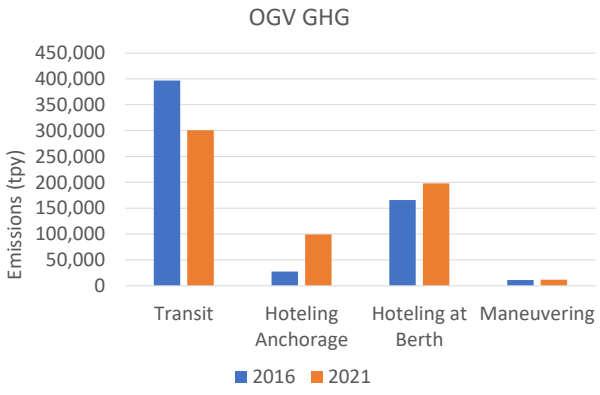
5

Regional OGV Emissions – COVID Supply Chain Disruptions

	DPM		GHG	
	2005-2021	2016-2021	2005-2021	2016-2021
OGV	-91%	-9%	-25%	1%



Transit	-26%
Hoteling Anchorage	300%
Hoteling at Berth	11%



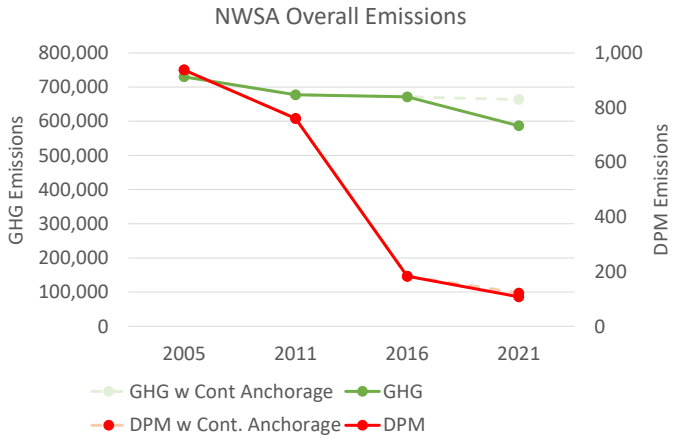
Transit	-24%
Hoteling Anchorage	261%
Hoteling at Berth	19%

At anchor emissions are NOT attributed to ports in the PSEI, based on established methodology; impacts are captured regionally but not as part of our emissions profile.

6

6

NWSA Results – Overall within the Airshed



Main Drivers of Emission Reductions:

2016 - 2021
- Clean Truck Program (DPM)
- EPA new engine emission standards + natural attrition (DPM)

2005 - 2021
- North American Emissions Control Area (DPM)
- Vessel efficiency & larger vessels (GHG + DPM)
- TOTE shore power (GHG + DPM)

DPM Emission Reductions

2005-2021	-89%	[-87%]
2016-2021	-41%	[-33%]

GHG Emission Reductions

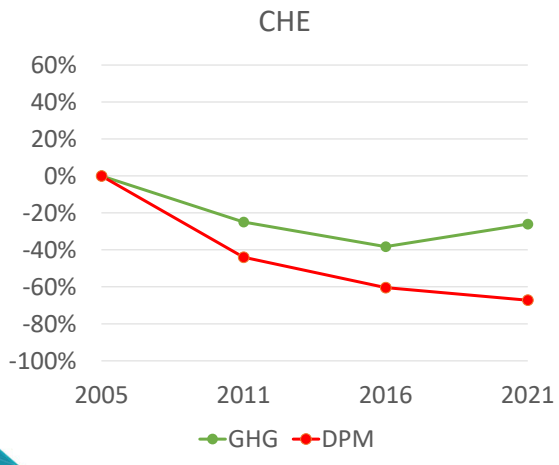
2005-2021	-20%	[-9%]
2016-2021	-13%	[-1%]

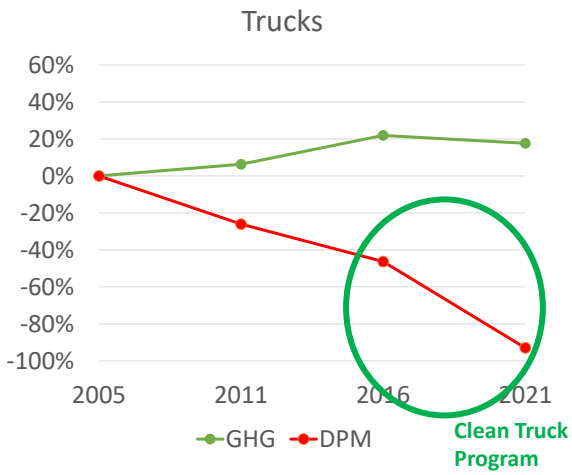
*[with regional container anchorage emissions added]

7

7

Trucks and CHE





DPM	2005-2021	-67%
	2016-2021	-17%
GHG	2005-2021	-26%
	2016-2021	20%

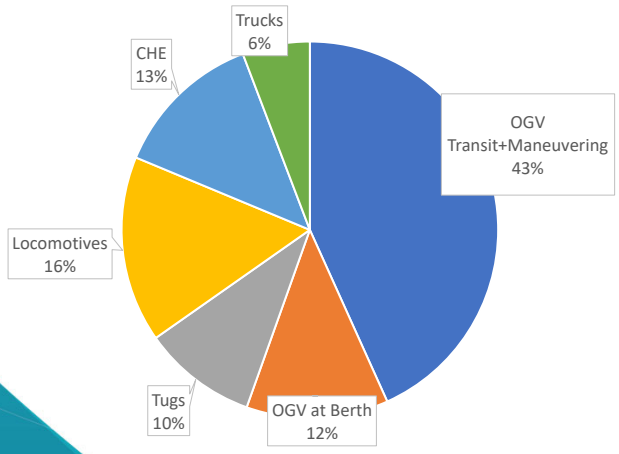
DPM	2005-2021	-93%
	2016-2021	-87%
GHG	2005-2021	18%
	2016-2021	-4%

8

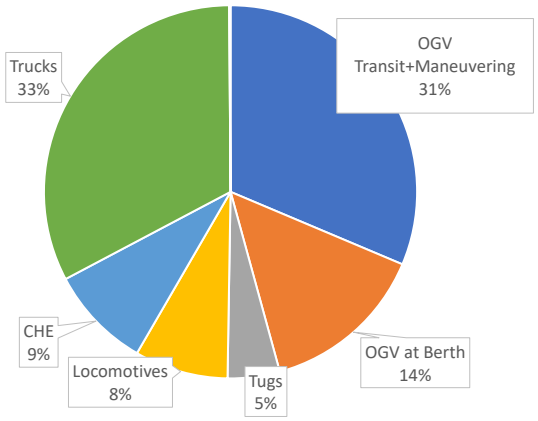
8

NWSA 2021 Emissions Distribution

DPM



GHG



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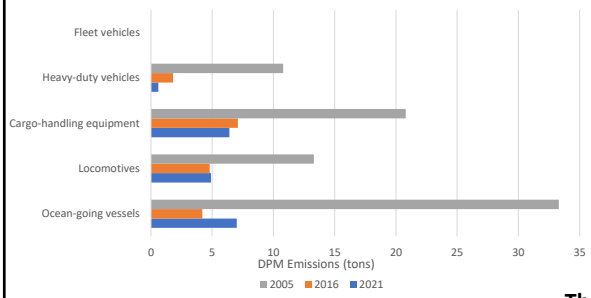
9

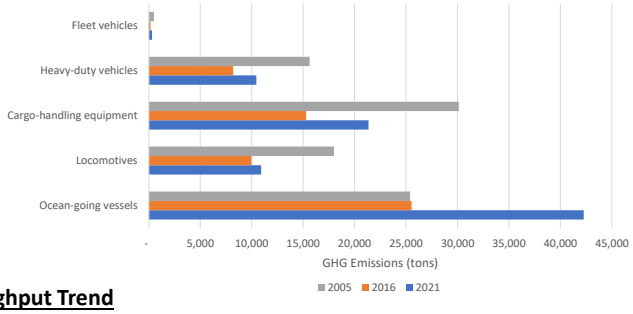
9

NWSA North Harbor Port Emissions Comparison

DPM Emissions



GHG Emissions



DPM Emission Trend

2005-2021	-76%
2016-2021	6%

Throughput Trend

Year	TEU	Cargo(MT)	Total Vessel Movements
2021	1,697,832	11,562,206	881
2016	1,394,343	11,276,112	928
2005	2,087,929	15,515,753	1,701
2016-2021	**22%**	**3%**	**-5%**
2005-2021	**-19%**	**-25%**	**-48%**

GHG Emission Trend

2005-2021	-5%
2016-2021	44%

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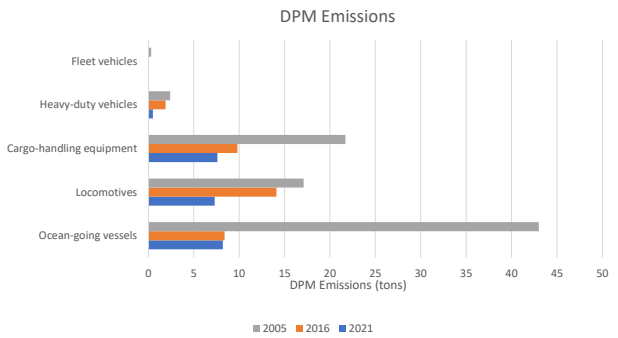
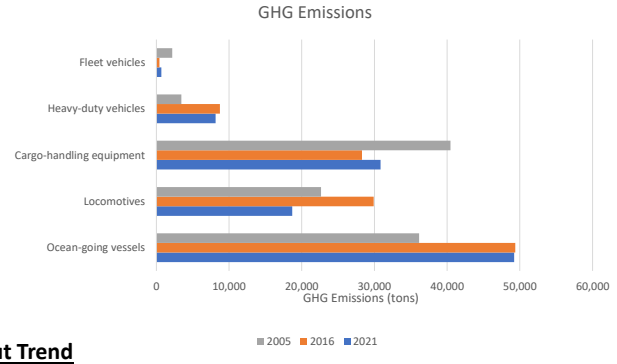
10

10

NWSA South Harbor Port Emissions Comparison





DPM Emission Trend

2005-2021	-72%
2016-2021	-31%

Throughput Trend

Year	TEU	Cargo(MT)	Total Vessel Movements
2021	2,038,374	14,615,733	1,526
2016	2,221,410	16,750,757	1,882
2005	2,070,000	13,431,333	1,835
2016-2021	**-8%**	**-13%**	**-19%**
2005-2021	**-2%**	**9%**	**-17%**

GHG Emission Trend

2005-2021	3%
2016-2021	-8%

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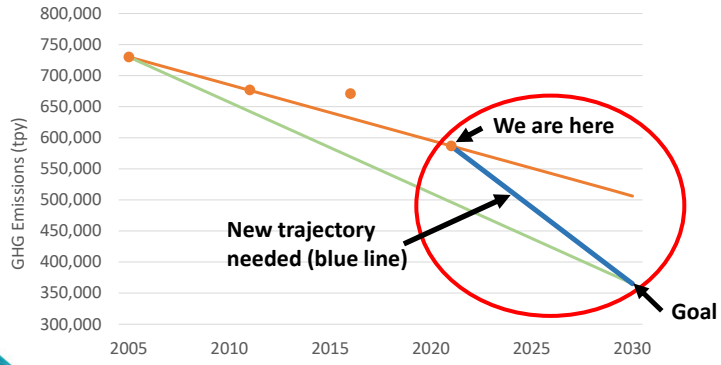
11

11

2030 Emissions Target Progress

- 2017 GHG Resolution set target to reduce GHG emissions
  - **50%** by 2030 relative to 2005 (Paris accord aligned)
  - **100%** by 2050



Next Steps:

- 2026-2030 Implementation Plan update – assess new trajectory needed
- Big funding opportunities to increase pace
  - Shore power implementation
  - ZE truck incentive program
  - ZE CHE incentive program and terminal deployments
- Explore renewable fuels as a bridge strategy
- Vessel speed reduction and continued ship efficiency gains
- Considering a community webinar to share PSEI results and generate feedback

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12

12