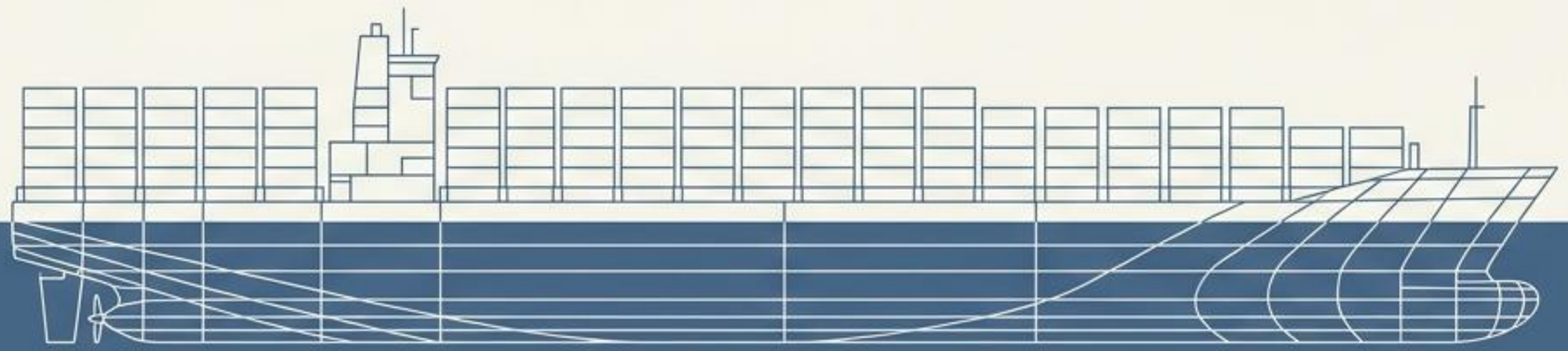
Responsible Shipping: Protecting the Health of Virginians, our Seafood Economy, and our Waters



The Hidden Threat to our Air and Waters

Presentation by Dr. Robert Hodson, Executive Director, Protect Virginia

WHY CHANGE COURSE
(4 Solid Reasons)

PROTECT PUBLIC HEALTH

PROTECT OUR SEAFOOD ECONOMY

PROTECT THE BAY AND OTHER VIRGINIA WATERWAYS

PROTECT THE PURSE - REDUCED COST TO VIRGINIANS

THE PORT OF VIRGINIA: LARGE VESSEL COMMERCIAL SHIPPING INDUSTRY

SHIP ANNUAL VOYAGES

APPROXIMATELY
2,000+
ANNUAL VESSEL CALLS
(Total Port System)



VESSEL TYPES:
Container, Bulk,
Break-bulk, Ro-Ro



ECONOMIC VOLUME

CARGO TONNAGE:
~65.6 MILLION TONS
ANNUALLY



TOTAL ECONOMIC IMPACT:
~$124.1 BILLION

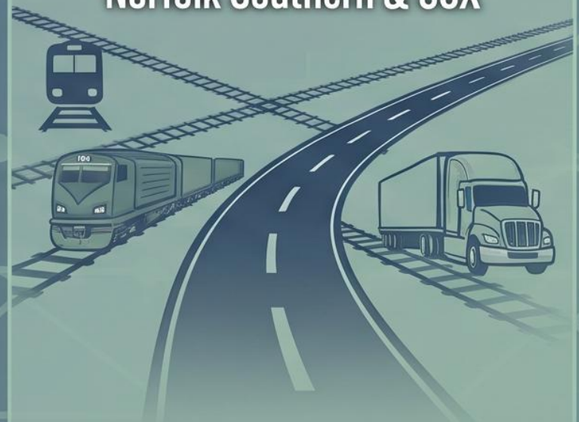


SUPPORTS:
565,000+ JOBS
VIRGINIA JOBS
(11% OF VA EMPLOYMENT)



ACCESS TO RAIL & TRUCK

ON-DOCK RAIL:
Norfolk Southern & CSX



INTERSTATE ACCESS:
Direct to I-64, I-266, I-664



INLAND REACH:
Extensive network
across Eastern U.S.



NIT PORT BENEFITS
(Norfolk International Terminals)

LARGEST TERMINAL
in The Port of Virginia



NIT CAPACITY:
~3.6 MILLION TEUs



DEEP CHANNELS:
55-foot depth (authorized)

ON-DOCK RAIL:
Expanded Central Rail Yard



SOURCE: The College of William & Mary Fiscal Yeaf The Virginia Maritime Industry Report and The Port of Virginia website. Data is illustrative of scale.

THE PORT OF VIRGINIA: LAND-BASED SUSTAINABILITY INITIATIVES

Focus on terminal operations, not direct emissions from ships at berth or sea.

CLEAN ENERGY & ELECTRIFICATION



POWERED BY 100% CLEAN ELECTRICITY (All Terminals)



RENEWABLE SOURCING (Solar & Wind Integration)

GOAL: NET-ZERO CARBON EMISSIONS BY 2040 (Scope 1 & 2)

MODERN EQUIPMENT & EFFICIENCY



INVESTMENT IN HYBRID & ELECTRIC CARGO HANDLING EQUIPMENT

REPLACING DIESEL-POWERED ASSETS

SIGNIFICANT REDUCTION IN PORT-WIDE FUEL USAGE

ENVIRONMENTAL STEWARDSHIP & CERTIFICATION



ISO 14001 CERTIFIED ENVIRONMENTAL MANAGEMENT SYSTEM





STORMWATER MANAGEMENT & WATER QUALITY PROTECTION

HABITAT RESTORATION & COMMUNITY PARTNERSHIPS (e.g., oyster reefs)

DATA IS ILLUSTRATIVE. SOURCE: THE PORT OF VIRGINIA SUSTAINABILITY DASHBOARD & REPORTS.

THE PORT OF VIRGINIA: LAND-BASED SUSTAINABILITY INITIATIVES

Focus on terminal operations, not direct emissions from ships at berth or sea.

CLEAN ENERGY & ELECTRIFICATION



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(Solar & W

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SIGNIFICANT REDUCTION IN PORT-WIDE FUEL USAGE

ENVIRONMENTAL STEWARDSHIP & CERTIFICATION



14001 CERTIFIED
RONMENTAL
AGEMENT SYSTEM



MANAGEMENT &
TY PROTECTION

HABITAT RESTORATION & COMMUNITY PARTNERSHIPS (e.g., oyster reefs)

PORT SUSTAINABILITY INITIATIVES ARE SIGNIFICANT BUT HAVE NOT FOCUSED ON DIRECT SHIP POLLUTION

THERE IS MORE WORK TO BE DONE

DATA IS ILLUSTRATIVE. SOURCE: THE PORT OF VIRGINIA SUSTAINABILITY DASHBOARD & REPORTS.

THE IMMENSE SCALE WARRANTS PROACTIVE MANAGEMENT



SINGLE LARGE CONTAINER SHIP

EMISSIONS EQUIVALENT TO

~ 1.5 MILLION CARS





A SINGLE SHIP CAN POLLUTE AS MUCH AS ALL THE TRAFFIC TRAVELING THROUGH HAMPTON ROADS BRIDGE TUNNEL (HRBT) IN 15 DAYS

WHAT CAN BE DONE ABOUT THE SHIP-BASED POLLUTION?



Source: www.youtube.com/@Quirksea/shorts



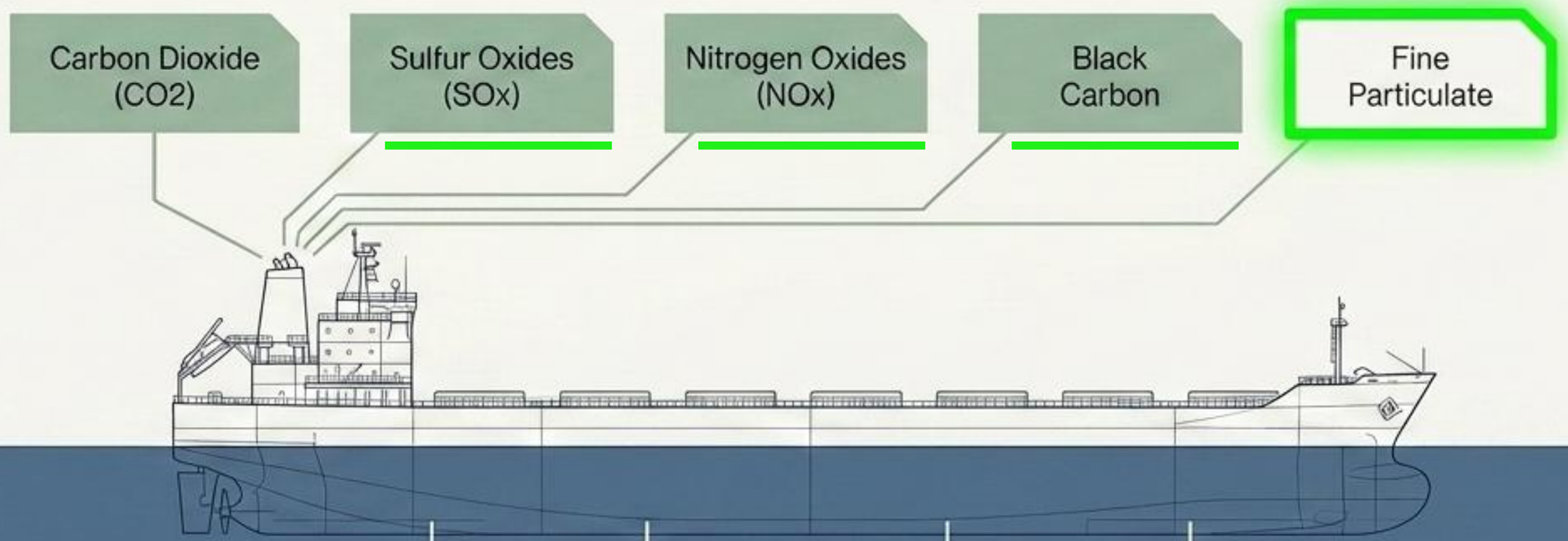
SWITCH TO CLEANER FUELS



Or other low-sulfur alternatives (e.g. LNG)

SHIPS BURNING DIRTY FUELS CAN SWITCH TO CLEANER **LOW-SULFUR** FUELS

The Anatomy of Commercial Vessel Pollution



Scrubber Washwater
(Highly acidic, toxic byproduct)

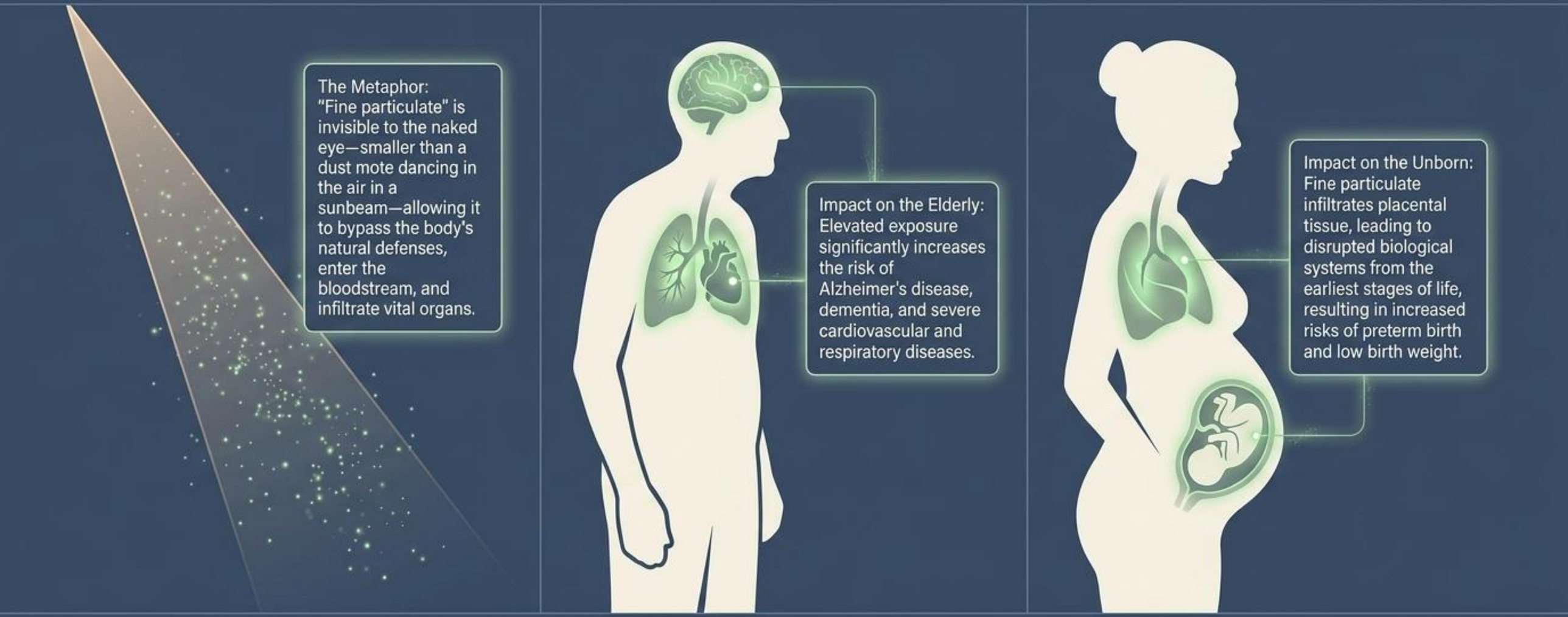
Grey Water
(Accommodations/Galley)

Black Water
(Sewage)

Bilge Water
(Oily mechanical runoff)

A THREAT TO PUBLIC HEALTH

Fine particulate ($PM_{2.5}$, $PM_{0.1}$) a byproduct of ships burning dirty residual fuels



The most damaging ultrafine particles ($PM_{0.1}$) are not even regulated.

Protect Virginia

Disproportionate Burden on Port Workers, Deckhands, and Adjacent Communities



Marginalized communities near ports face significantly higher exposure to these pollutants, leading to elevated rates of asthma, respiratory illness, and cancer.



Fence-line Communities Bear the Brunt

Higher asthma rates and health risks are concentrated in these neighborhoods, which are often predominantly low-income and communities of color. The impact is not distributed equally.

Protect Virginia

Disproportionate Impacts: Why Women & Children Face Greater Risks from Air Pollution

Children & Developing Life

Developing Lungs:
Children breathe more air per pound, pulling tiny particles deep into growing lungs.

Risks Before Birth:
Ultrafine soot passes from the mother to the unborn child, linked to lower birth weights.

Respiratory Burden:
Significantly higher risk of developing childhood asthma and severe attacks.



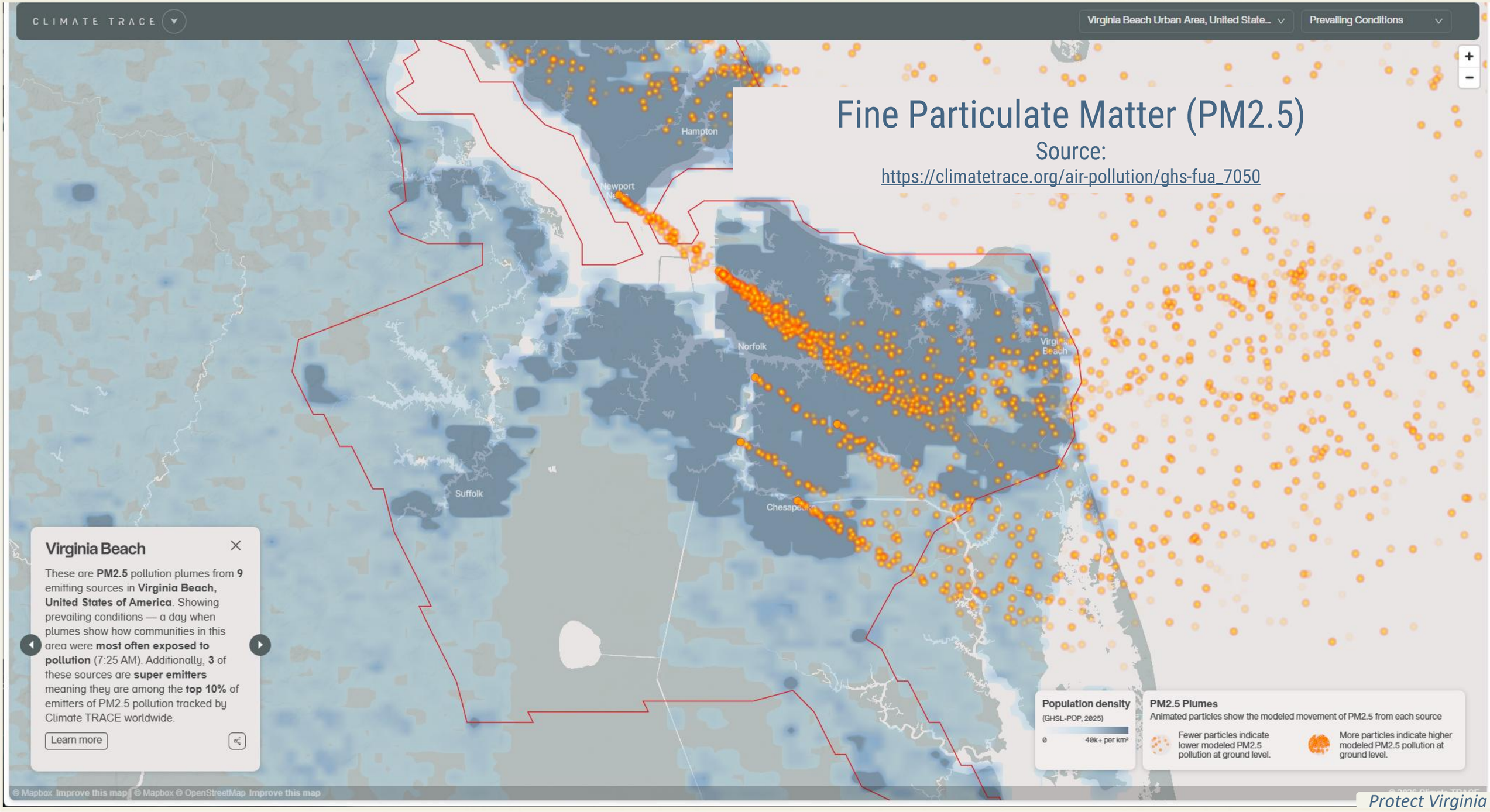


Women & Brain Health

Memory & Brain Health:
Long-term particulate exposure is strongly linked to accelerated memory loss.

Elevated Dementia Risk:
Inhaled micro-particles increase risks of cognitive decline and Alzheimer's disease.

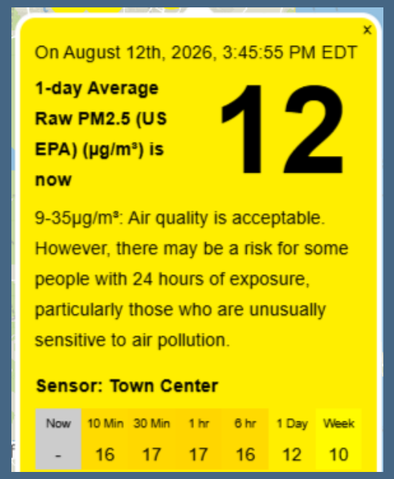
Genetic Vulnerability:
Natural genetic factors make older women especially sensitive to neurotoxic pollution.


CLIMATE TRACE
Virginia Beach Urban Area, United State...
Prevailing Conditions
Fine Particulate Matter (PM2.5)
Source:
https://climatetrace.org/air-pollution/ghs-fua_7050
Hampton
Newport
Norfolk
Virginia Beach
Suffolk
Chesapeake
Virginia Beach
These are PM2.5 pollution plumes from 9 emitting sources in Virginia Beach, United States of America. Showing prevailing conditions — a day when plumes show how communities in this area were most often exposed to pollution (7:25 AM). Additionally, 3 of these sources are super emitters meaning they are among the top 10% of emitters of PM2.5 pollution tracked by Climate TRACE worldwide.
Learn more
Population density
(GHSL-POP, 2025)
0
40k+ per km²
PM2.5 Plumes
Animated particles show the modeled movement of PM2.5 from each source
Fewer particles indicate lower modeled PM2.5 pollution at ground level.
More particles indicate higher modeled PM2.5 pollution at ground level.
© Mapbox Improve this map © Mapbox © OpenStreetMap Improve this map



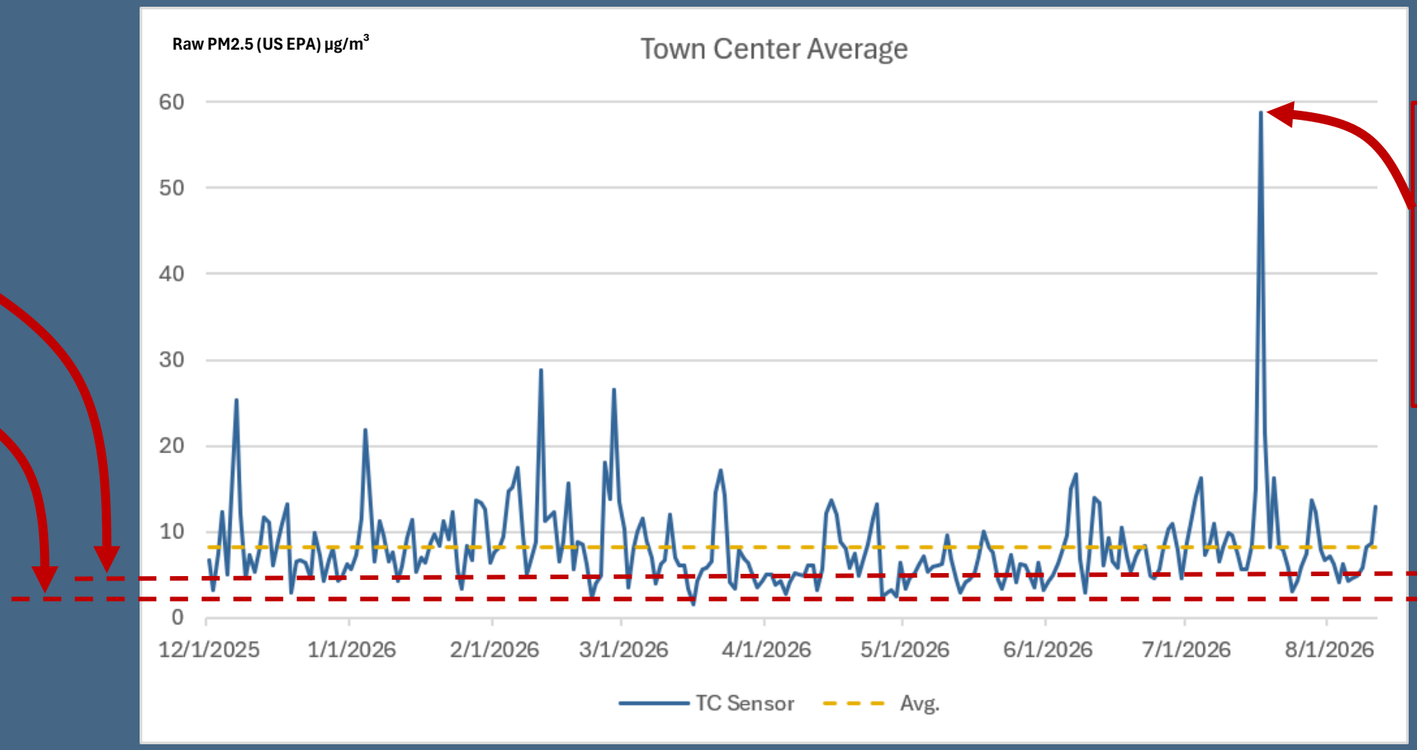
Norfolk $PM_{2.5}$ Quick Look – Could be many sources, but shipping is a contributor

($PM_{0.1}$ data not available)

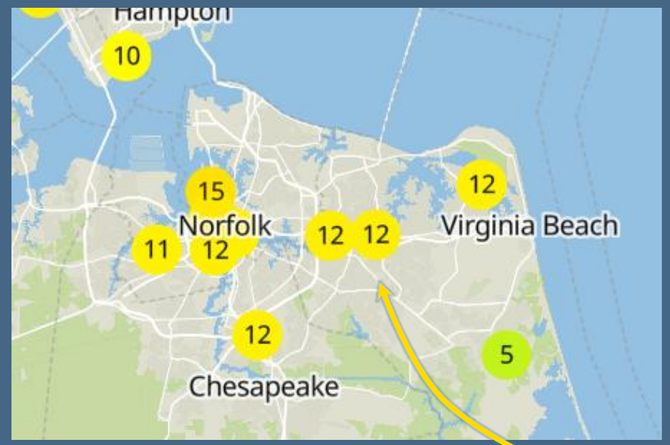


World Health Organization Annual Limit 5 ug/m^3

Onset of Increased Mortality 2.5 ug/m^3



Wildfire
These events will be more frequent with climate change.



Sensor Locations

My son and daughters-in-law's home

This data is a daily average from PurpleAir.com.

Highly daily averages are important because they can trigger asthma attacks leading to hospital visits.

Asthmatics are nearly 6 times more likely to frequent emergency departments overall.

Community Health Needs Assessment

City of Norfolk

A data and community-driven look at health and quality of life in Norfolk.

October 2024

"… the fossil fuel component of PM2.5 contributes a large global mortality burden"

JOURNAL OF ENVIRONMENTAL RESEARCH

4 OF THE 5 LEADING CAUSES ARE LINKED TO PM2.5

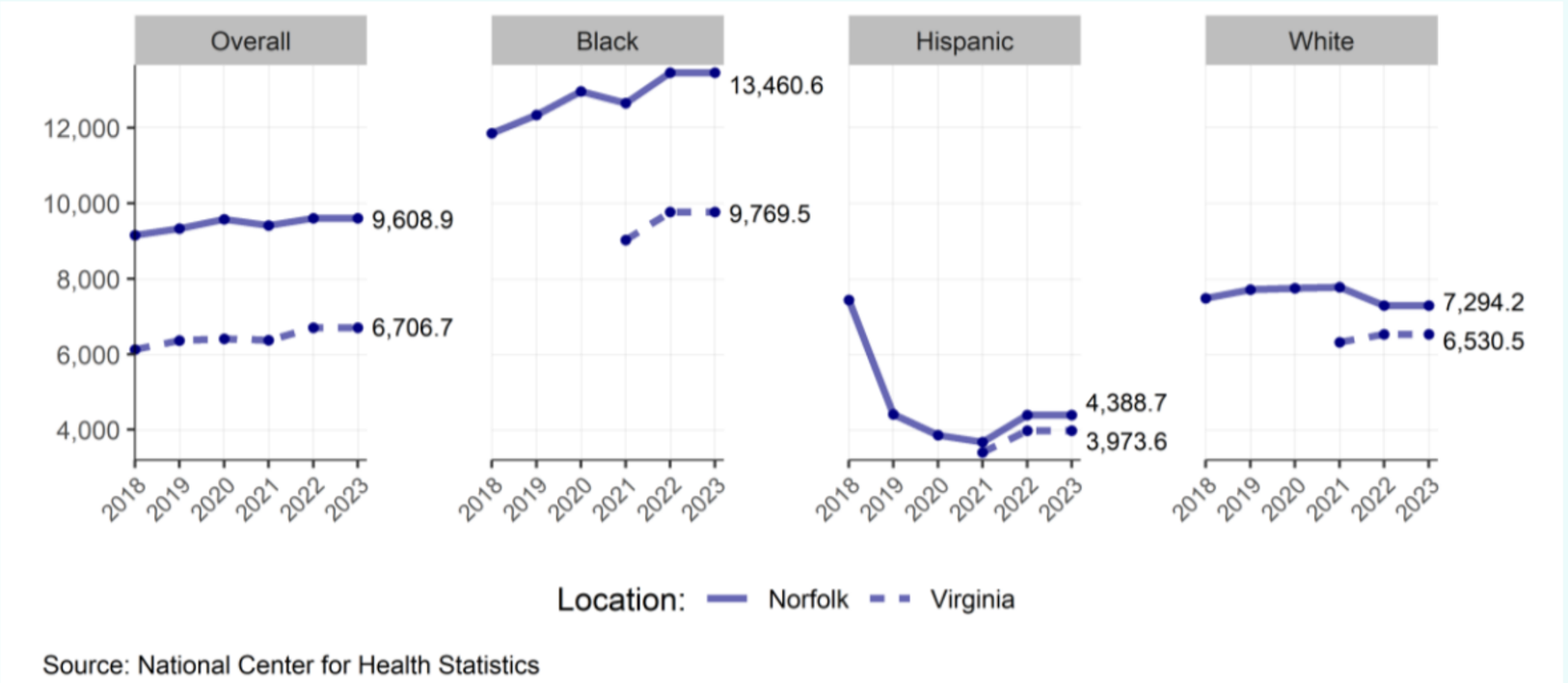
LARGE COMMERCIAL VESSELS ARE PM2.5 CONTRIBUTORS

Multiple factors may influence mortality, ship pollution may only be one factor.

3.2 Premature Mortality

Premature mortality refers to early deaths, or deaths that happen before the average age of death – around 75 years in the United States. Figure 12 shows premature mortality rate by race. The five leading causes of premature death include: cancer, unintentional injuries (e.g., drug overdose or vehicle crashes), heart disease, stroke, and chronic lower respiratory disease.[4]

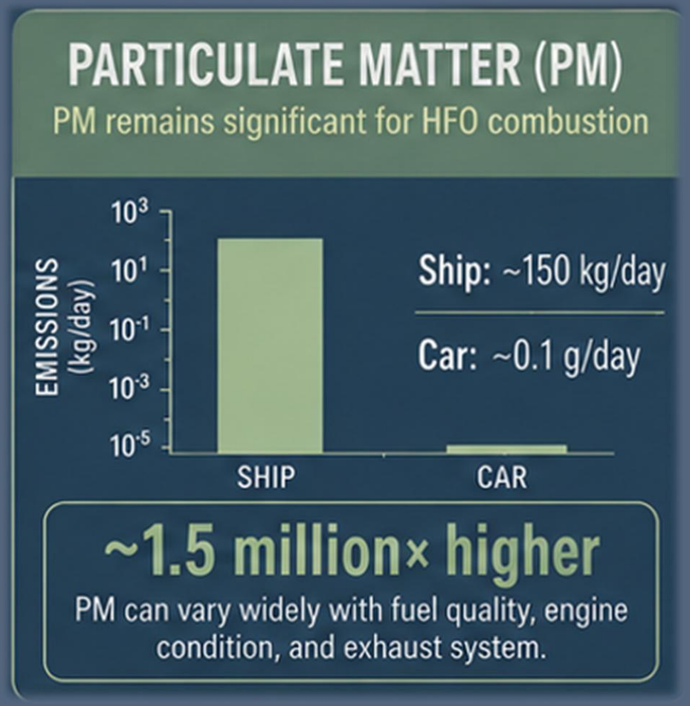
Figure 12. Premature mortality rate by race/ethnicity (2018 to 2022).

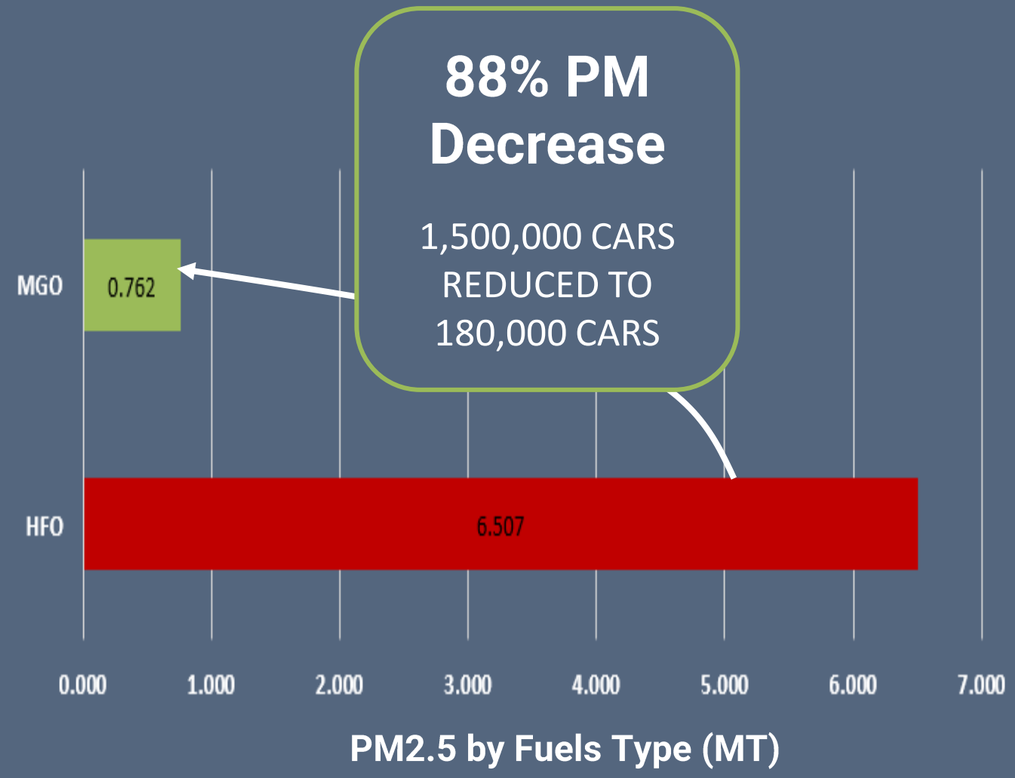


Source: National Center for Health Statistics

A SHIP CAN PRODUCE MORE PARTICULATE THAN A MILLION CARS

Switching fuels greatly reduces it.





Switching fuels significantly reduces particulate matter and associated health impacts.

A Threat to our Seafood Industry & Marine Ecosystems

The Virginia seafood industry is one of the oldest in the United States and the third largest producer of marine products in the nation, contributing over $1.27 billion in total economic output annually. In addition, the Virginia seafood and recreational fishing industries generate significant tax revenue.

Supports more than 10,000 full and part-time jobs across the Commonwealth, from watermen to local processors.

~ 125 Hampton Roads business are directly involved in harvesting, processing, wholesaling and distribution.



Provides **over 123 million meals** annually from 50 commercially valuable species.

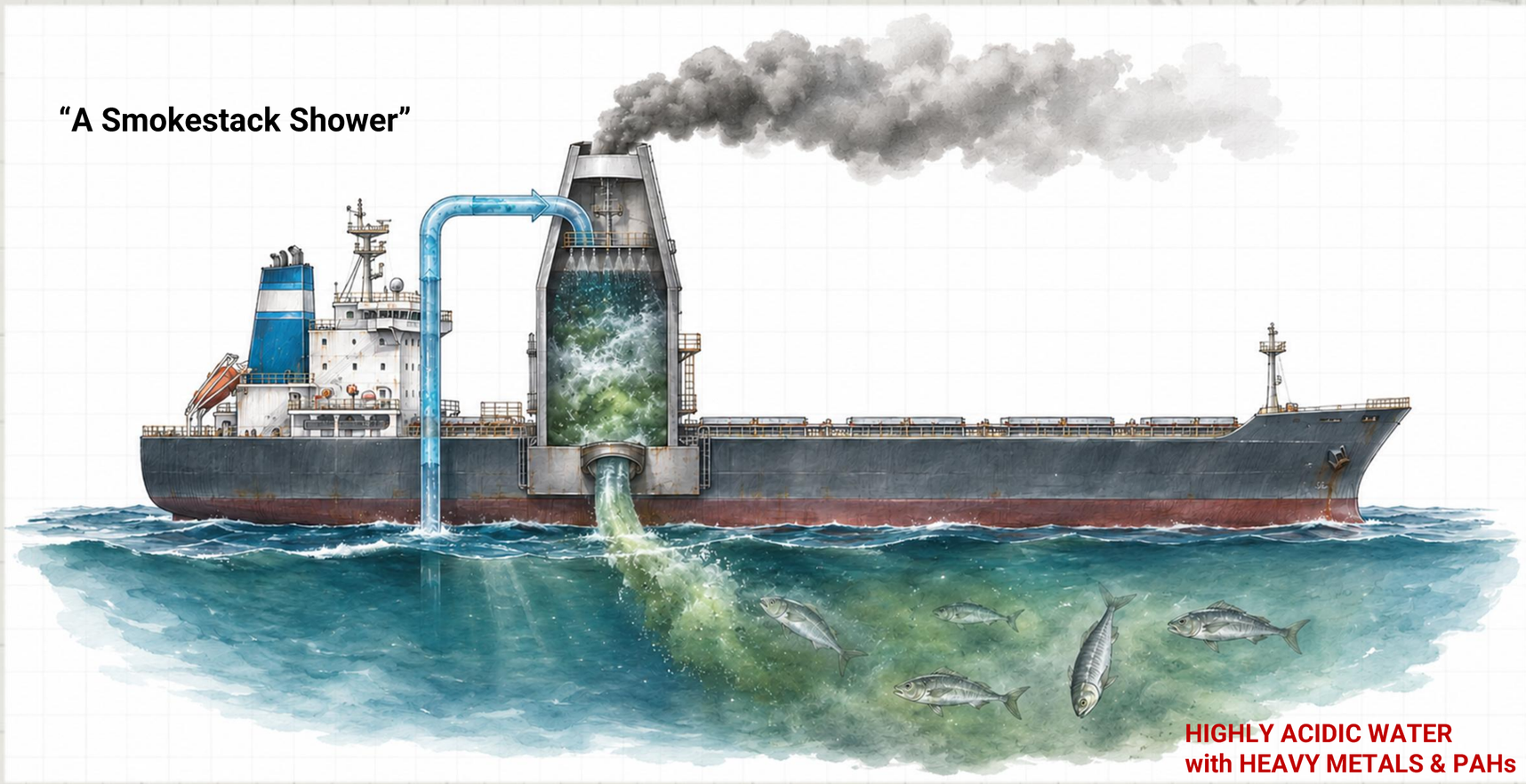
Leads the nation in hard clam aquaculture and ranks **first** on the East Coast for Eastern Oyster production

Protect Virginia

THE SCRUBBER LOOPHOLE
AIR POLLUTION CONVERTED TO WATER POLLUTION

(And yet it does not remove the most dangerous pollutants)

Heavy metals and cancer-causing PAHs have been found in Crabs, Oysters and Clams from the Chesapeake Bay.



Not all ships run open-loop scrubbers, but about 85% of ships that scrub exhaust run open-loop.

WHY? It slightly increases industry profits.

Quantity of scrubber washwater discharge.

Daily discharge volume can reach millions of gallons.

Millions of gallons per day



Daily washwater volume = 100+ Olympic Pools

Severe Acidity: Up to 100,000 times more acidic than surrounding seawater (pH 3-4).

Heavy Metals: High concentrations of neurotoxic Vanadium, Nickel, Copper, Mercury, and Lead.

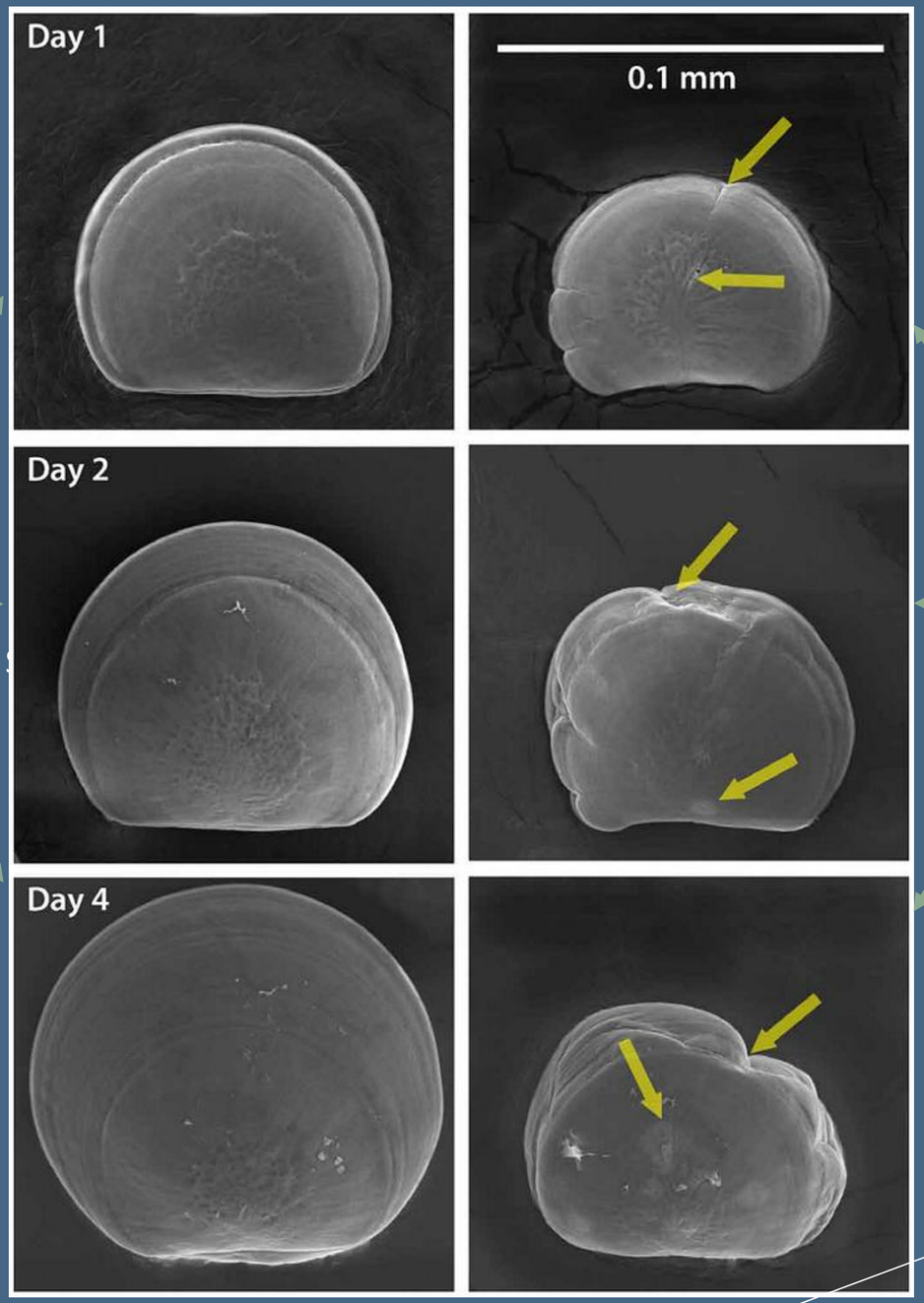
PAHs: Cancer-causing Polycyclic Aromatic Hydrocarbons derived from burning heavy fuel oil.

Actual amounts depend on ship speed, power generation, hoteling, and other factors

NEARLY $110M LOST

Due acidification causing larval production losses of 70% to 80% from acidic up-welling

NORMAL OYSTER DEVELOPMENT



EXPOSED TO ACIDIC WATERS

SCRUBBER WASHWATER
has a pH in the 3 to 4 RANGE
(much more acidic)

Barton, A., G.G. Waldbusser, R.A. Feely, S.B. Weisberg, J.A. Newton, B. Hales, S. Cudd, B. Eudeline, C.J. Langdon, I. Jefferds, T. King, A. Suhrbier, and K. McLaughlin. 2015. Impacts of coastal acidification on the Pacific Northwest shellfish industry and adaptation strategies implemented in response. Oceanography 28(2):146–159.

LIVELIHOODS DEPEND ON CLEAN WATERS

A 7th Generation Waterwoman's Request to Stop Ship Pollution

I am reaching out to you today not just as a friend, but **as a 7th-generation Virginia waterwoman and the owner of Barretts Neck Seafood** LLC based right here in Suffolk. Our family has worked these waters for centuries, and today, the future of our business and our community depends entirely on the health of the Chesapeake Bay.

Right now, our harvest is under direct threat from foreign container ships and tankers dumping toxic, highly acidic "scrubber" wastewater straight into our backyard waters. These vessels burn dirty Heavy Fuel Oil (HFO) to pad their corporate profits, leaving us to inherit the environmental and economic costs.

At Barretts Neck Seafood LLC, we grow oysters for sustainability, but our true mission is restoring local lives. Through our Parity Apprenticeship Program, we provide local jobs specifically for individuals re-entering our community. Our mission is built on the truth of Proverbs 24:16: "For a righteous man may fall seven times and rise again." We step in to teach people how to fish so they can eat for a lifetime, giving them the second chance society often denies them.

We are doing the hard work of building up our ecosystem and our people, but we cannot out-filter the massive volume of acidic toxins being flushed into the Bay.

I urge you to support Virginia legislation that requires these massive cargo vessels to use cleaner fuels and completely bans toxic scrubber wastewater discharges.

Please protect our local harvest, our jobs, and the people striving for a second chance.

Sincerely,
Mary Hill
Owner, Barretts Neck Seafood LLC

Mary was recently elected to the Suffolk City Council
maryhillandthepeople.com

TOXINS TRAVEL UP THE FOOD CHAIN TO OUR DINNER PLATES

ACCUMLATING MORE HEAVY METALS AND PAHs AT EACH LEVEL



INCREASING TOXICITY

IMPACTS TO MARINE LFE

Fish, Crabs, Clams, etc. Accumulate the Toxics

Respiratory



Striped Bass (Rockfish)



Post from August 2026

Neurological

Reproductive/Developmental



Atlantic Menhaden (Bunker)

IMPACTS ARE MINIMAL (INCONSEQUENTAL)
(Even if 100% of the cost is passed through to the consumer)



WHY ARE COST IMPACTS SO SMALL?

The higher cost of fuel is only required in Virginia waters less than 1% if a typical voyage from Europe.

The Maritime Double Standard and Flags of Convenience





The Double Standard: If a land-based factory dumped millions of gallons of untreated, highly acidic, heavy-metal-laced wastewater directly into the Chesapeake Bay, it would be immediately shut down by regulators.

Yet, ships are legally permitted to do this daily via the scrubber loophole.



Flags of Convenience: The shipping industry evades accountability by registering vessels in nations with lax regulations. Ships flying the flags of Panama, the Marshall Islands, and Liberia account for nearly 40% of all global scrubber wastewater discharges.

Protect Virginia

WHAT IS THE COST OF INACTION?

This an be a challenge to fully quantify – what we know…

- Scrubber washwater is highly acidic, and can impair development clams, oysters and crabs, and is lethal to zooplankton
- Heavy metals and PAHs are absorbed into species in the Chesapeake Bay
  - This is linked to harmful effects on marine life health and reproduction
  - This has the potential in impact human health and the Viginia Seafood brand
- There are serious public health implications associated with air pollution. Ship particulate pollution is especially harmful.

"Seven studies included costs of illness approaches for respiratory, CVD and stroke hospital admissions, ER visits, lung cancer and CVD cases, respiratory symptoms and medication use, bronchitis, asthma, RADs (Restricted Activity Days), WLDs (Work Days Lost), neonatal care costs, and DALY (Disability Adjusted Life-Year) costs"

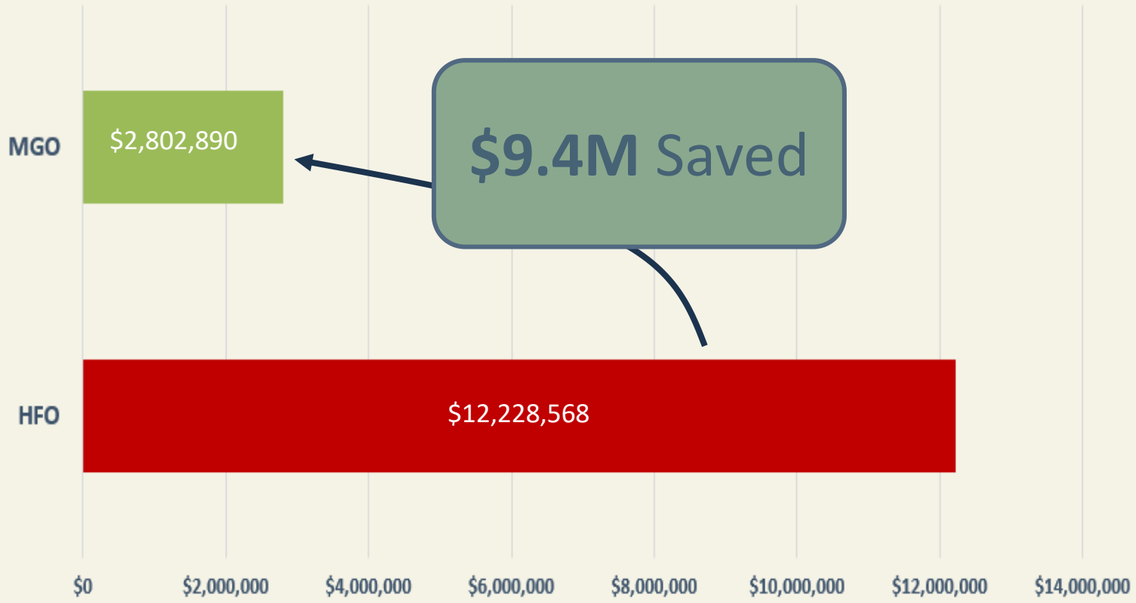
Quote Source: Health impact assessments of shipping and port-sourced air pollution on a global scale: A scoping literature review, Natalie Mueller et. al.

COST IMPACTS TO VIRGINIAN ARE SIGNIFICANT
$9.4M Savings from a Single Ship Switching Fuels for a Season

ESTIMATE BASED ON US GOV'T SOURCES

A medium-sized cruise ship switching from Heavy Fuel Oil to Marine Gas Oil.

Estimate made with the EPA shore power emission calculator and DOT emission cost tables.



Externalized Costs by Fuels Type

Thousands of large ships use Virginia waters

THE COST TO VIGINIANS IS SIGNIFCANT

HEALTHCARE IS COSTLY

Over 1 Million People live in Va Beach, Norfolk, Hampton, and Newport News

HEALTH OUTCOME	TYPICAL COST BENCHMARK	PATHWAY / EFFECT
ASTHMA	**~$3.3K / yr** ~$5.6K median hospitalization	Airway inflammation and attacks
COPD	**~$4.3K / yr** ~$18.8K hospitalization	Worsening airflow and lung function
HEART ATTACK	**~$23.6K** mean initial hospitalization	Inflammation, plaque instability and clotting
STROKE	**~$28.7K** mean hospitalization; ~$45K–$61K first-year total	Vascular injury and blood clots
DEMENTIA	**~$46.1K / yr** healthcare + long-term care	Potential neuroinflammatory effects
PRETERM BIRTH / NICU	**~$29K median** ~$95K mean NICU hospitalization	Possible placental and fetal impacts

Typical U.S. medical cost benchmarks; severe cases can cost more. Economic valuation of premature mortality is excluded here.

Sources: NIH/PMC, CDC, Alzheimer's Association; figures are rounded U.S. benchmarks used to contextualize health burden.

A GLOBAL TREND: We are lagging behind



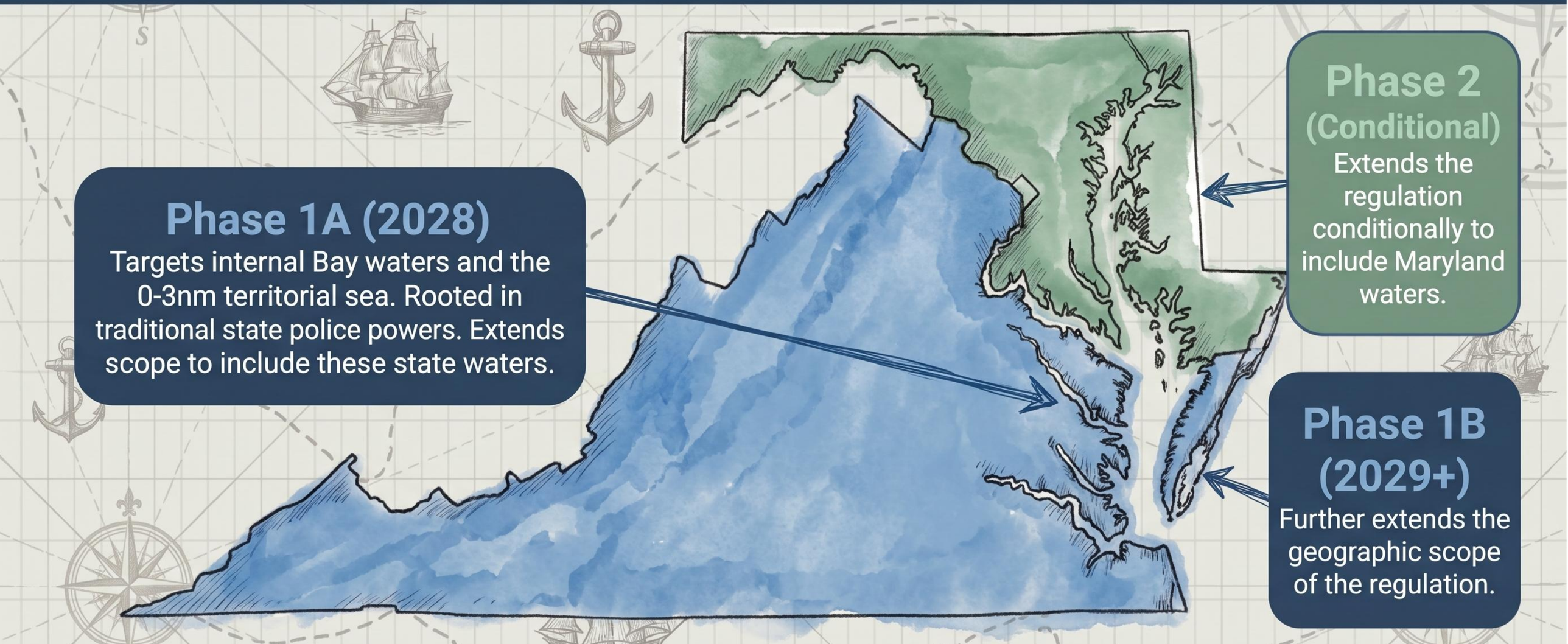
93 regulatory measures across 45 countries including two US states
(SOURCE: International Council on Clean Transportation 2021)

Four states in addition to Virginia are working on new regulations

Virginia and the United States are falling behind on a proven, implementable solution.

THE PHASED STRATEGY

A Strategy of Incremental Legal Armor: The General Assembly is proceeding incrementally, anchoring each geographic expansion to unshakeable legal precedent.



Phase 1A (2028)

Targets internal Bay waters and the 0-3nm territorial sea. Rooted in traditional state police powers. Extends scope to include these state waters.

Phase 2 (Conditional)

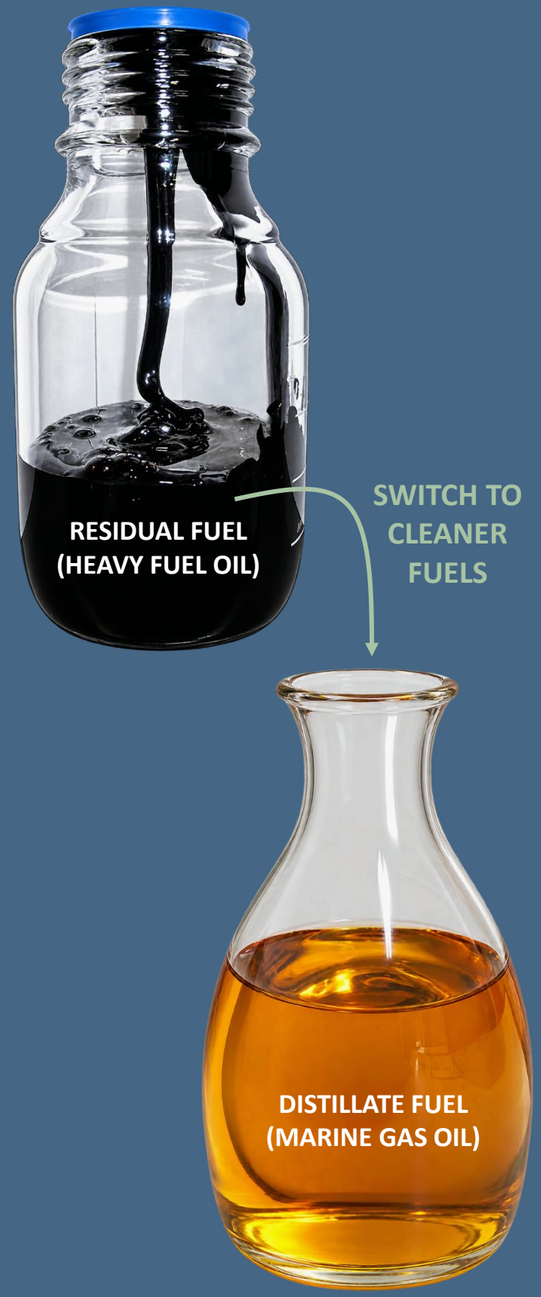
Extends the regulation conditionally to include Maryland waters.

Phase 1B (2029+)

Further extends the geographic scope of the regulation.

SUMMARY

- Some (not all) commercial vessels burn the dirty fuel because it is inexpensive.
- To meet air sulfur regulations, ships scrub the exhaust. These ships draw in water, spray their exhaust with the water, and rinse the now toxic water back into the sea/bay/river.
- The remaining exhaust is still loaded with toxic particles and gases that lead to serious health issues.
- The air and water pollution impact public health, the marine ecosystem, and the seafood it produces.
- There is a straightforward fix that minimizes industry impact – have commercial vessels burn low-sulfur in Virginia waters.



BRINGING BALANCE BACK



Low Sulfur Fuels in Virginia Waters

ACT NOW

SIGN THE
“FRIEND OF EARTH”
PETITION

CONTACT YOUR
STATE DELEGATES &
SENATORS



This presentation was produced by Protect Virginia in-part with Gemini, ChatGPT, and NotebookLM™ utilizing over 85 publicly available sources, including peer reviewed research, government reports, journalistic articles, and select web resources.

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Grounded in global scientific and economic research.

Virginia Seafood Agricultural Research and Extension Center (Economic Contributions of the Virgina Seafood Industry)

International Council on Clean Transportation (Global Scrubber Washwater Discharges)

The Women's Health Initiative Memory Study (Air Pollution, Alzheimer's, and Fine Particulate)

The United Nations Convention on the Law of the Sea / IMO MEPC Reports

Science of the Total Environment & Environmental Science & Technology (Health Impacts of Shipping Emissions)

Over 85 publicly available sources, including peer reviewed research, government reports, journalistic articles, and select web resources