EPA's National Clean Diesel Campaign and the North American ECA

AAPA-ESPO Meeting March 23, 2011

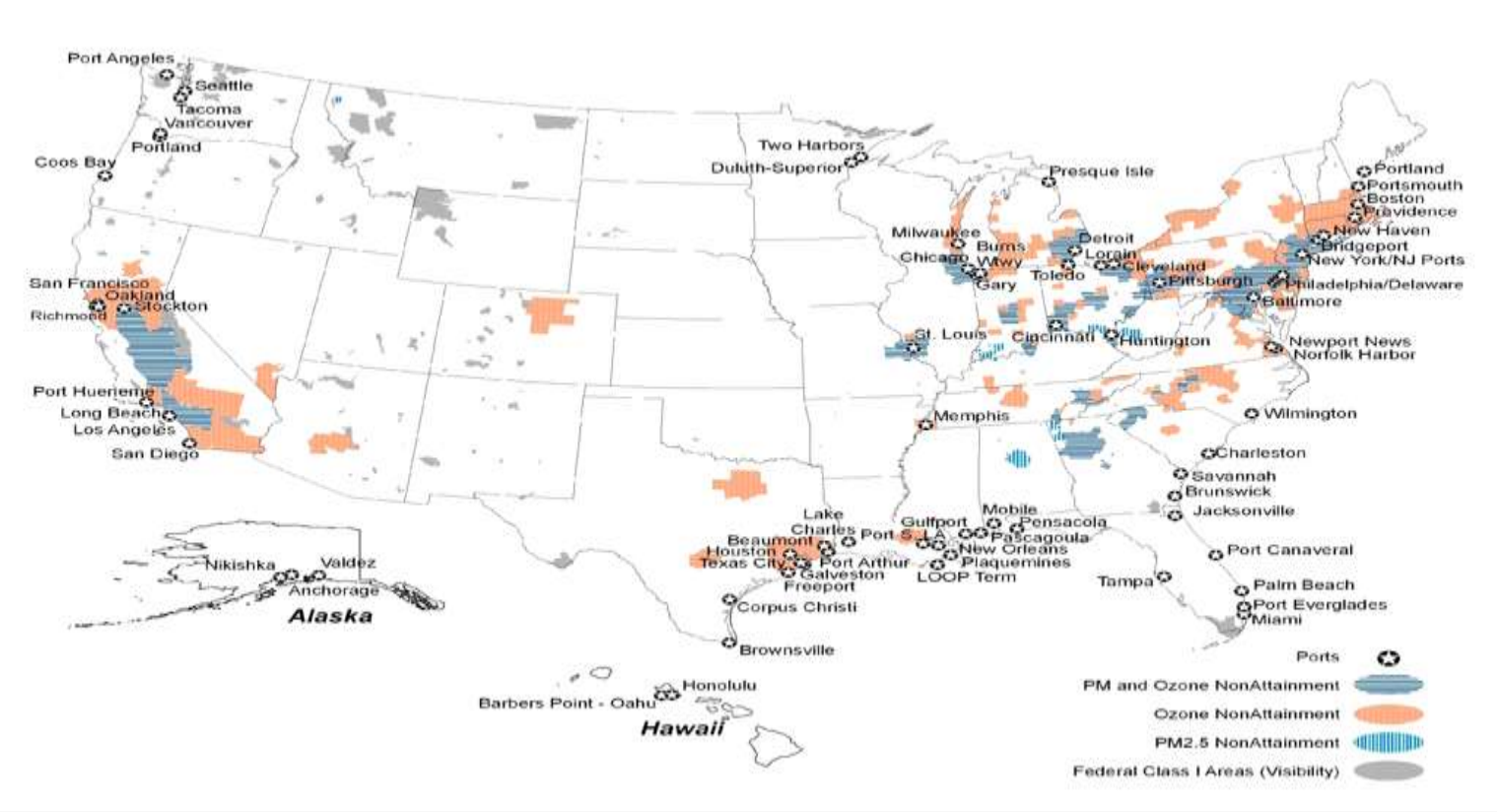
Office of Transportation & Air Quality
Jim Blubaugh

Overview

- Reducing diesel engine emissions
- Innovative and Regulatory programs
- North American ECA

U.S. Ports and Nonattainment Areas

- More than 40 major ports are located in $PM_{2.5}$ or ozone nonattainment areas
- About 88 million people live in 39 areas that do not meet the $PM_{2.5}$ NAAQS or that contribute to violations in other counties



EPA's National Clean Diesel Campaign Regulatory Roadmap

Tier 2 Light-Duty

final rule 1999

fully phased in 2009

Diesels held to same stringent standards as gasoline vehicles

These standard-setting rulemakings are key enablers for collaborative partnerships with industry and state & local governments

Heavy-Duty Highway

sales 800,000 / yr

40B gallons / yr

final rule 2000

fully phased in 2010

Nonroad Diesel

sales over 650,000 / yr

12B gallons / yr

final rule 2004

fully phased in 2015

Locomotive/Marine

sales 40,000 marine engines, 1,000 locomotives / yr

6B gallons / yr

final rule 2008

fully phased in 2017

Ocean Going Vessels

CAA Rule Dec 2009

IMO MARPOL Annex VI

ECA Controls

- Fuel Based 2015
- SCR Catalyst Based 2016

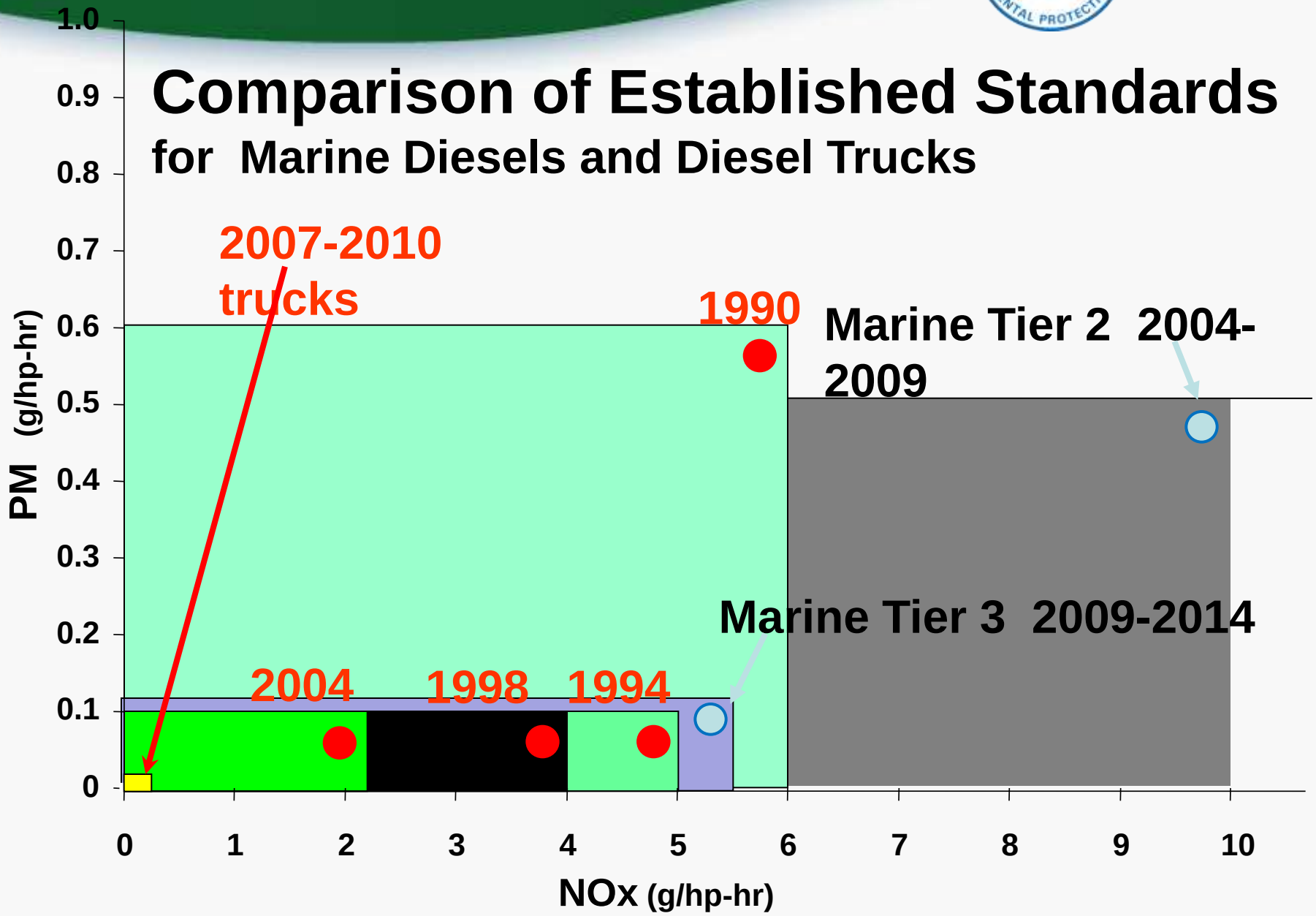
Note: sales and diesel fuel usage vary year-to-year; these figures are for comparison purposes only

Marine and Locomotive Engines

- **Locomotive and Marine C1 and C2**
  - March 2008 EPA adopted more stringent PM and NOx exhaust emission standards for locomotives and marine diesel engines.
  - EPA's three-part program:
    - (1) Tightening emission standards for existing marine engines when they are remanufactured;
    - (2) Setting near-term engine-out emission standards (Tier 3), for newly-built locomotives and marine diesel engines; and
    - (3) Setting longer-term standards (Tier 4), for newly-built locomotives and marine diesel engines that reflect the application of high-efficiency aftertreatment technology.

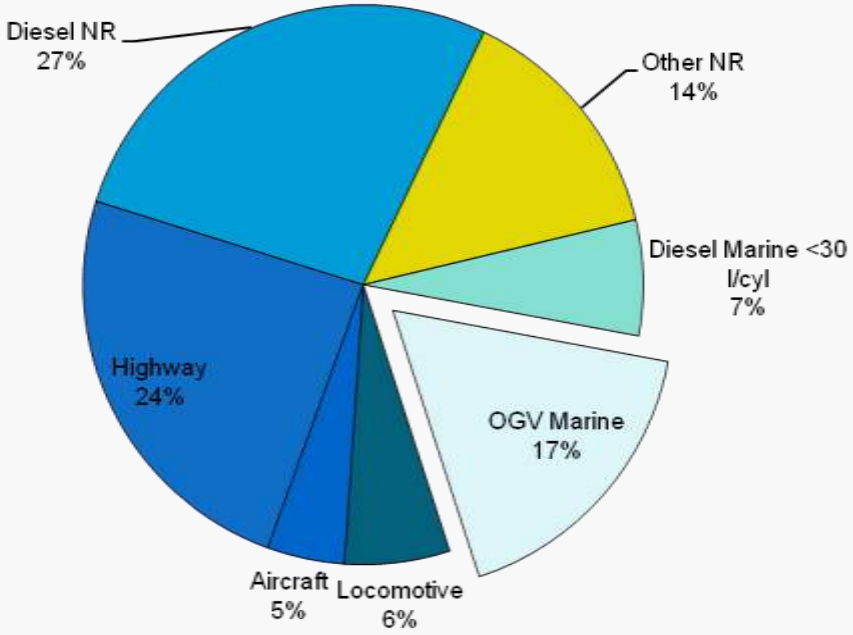
Comparison of Established Standards

for Marine Diesels and Diesel Trucks

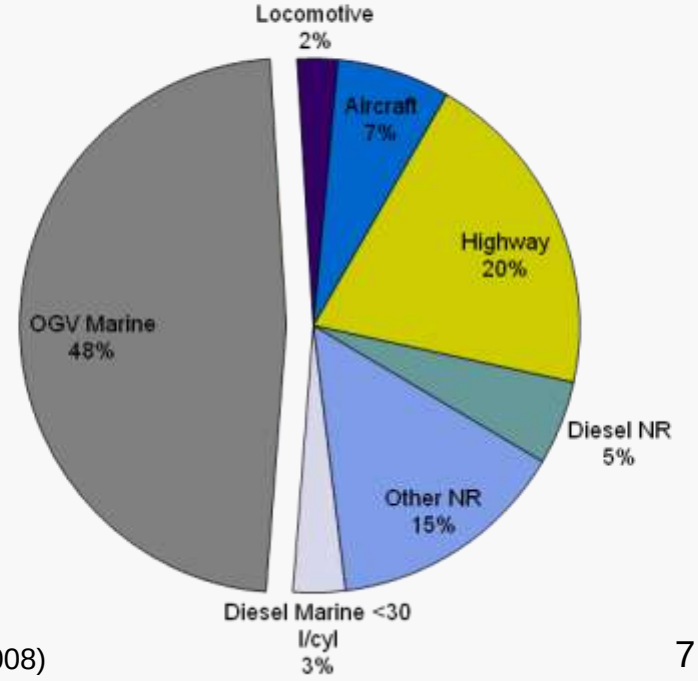


Ship Contribution to U.S. PM Inventory

2009 Mobile Source PM2.5 Inventory



2030 Mobile Source PM2.5 Inventory



Source of inventory estimates: C3 Marine NPRM (July, 2009)
Does not reflect IMO MARPOL Annex VI Amendments (October 2008)

- Clean Ports USA Program
  - Working with port authorities, terminal operators, shipping, truck and rail companies
  - Promote cleaner diesel technologies and strategies through education, incentives, and financial assistance for diesel emissions reductions at ports
  - Voluntary Diesel Retrofit Verification program
  - SmartWay Transport Partnership program
    - Tools, information, and recognition to reduce carbon footprint

- **Technology Strategies**
  - Refuel
  - Retrofit
  - Repair/Rebuild
  - Repower
  - Replace
- **Operational Strategies**
  - Improved Port Efficiency
  - Using On-shore Power
  - Considering Air Quality Impacts of Security Changes

ARRA Funding for Clean Diesel at Marine Ports

- **Over $60 million in awards to marine port-related projects, putting Americans back to work to clean the air**

Georgia Ports Authority
Port of Houston Authority
Port of Long Beach
Port of Los Angeles
Maryland Port Administration
Port of New York and New Jersey
Port of Oakland
South Carolina State Ports Authority
Tacoma Port Authority
Port of Virginia
Mississippi River Corridor
Great Lakes Commission

Cost-effective Marine Repowers

Northeast States for Coordinated Air Use Management

- EPA awarded $4.45 M to NESCAUM for upgrades of 13 harbor craft vessels with some built as early as 1929, 1946, 1970, etc.
  - Estimated Annual Reductions
    - 113.4 NOx tons per year
    - 9 PM tons per year
    - 603.4 CO tons per year
    - Fuel savings: 53,000 gals per year

  - Representative Tug Cost-effectiveness of EPA funds
    - $2,200 per lifetime ton NOx
    - $38,500 per lifetime ton PM

Great Lakes: Repowering gen sets

- EPA awarded $1.21 M ARRA grant to Great Lakes Commission
  - $403K match from American Steamship Company
- Repowering 1976 and 1979 service generator sets on 2 bulk carriers during winter off-season
- Improves air quality for 8 states
  - Estimated Annual Reductions
    - 36.4 NOx tons per year (40% reduction)
    - 0.4 PM tons per year (49% reduction)
    - Fuel savings: 8,500 gals per year

The H. Lee White *is one of two repowered bulk carriers on the Great Lakes.*

Emerging Technologies: Marine

- **Repowering the *Champion Coal*, a Pittsburgh- based towboat**

EPA awarded $1.5M to Pennsylvania Dept. of Environmental Protection for a marine engine overhaul known as Caterpillar's Emission Upgrade kit. The towboat's two Caterpillar 3500 series Tier 1 engines were rebuilt/upgraded to Tier 2 standards.

  - Estimated Emissions Reductions
    - NOx by 25%
    - PM by 33%
    - HC by 4%

ARRA Projects: Port of Los Angeles

$2M to replace, repower, and retrofit a total of 24 pieces of equipment (27 engines), including harbor craft

ARRA Project: Mississippi River Corridor – Ingram Barge

- 13 Kits on 6 Vessels
- Emerging Technology: ESW's DOC (below) and Crankcase Ventilation System

PEMS emissions testing by Emisstar

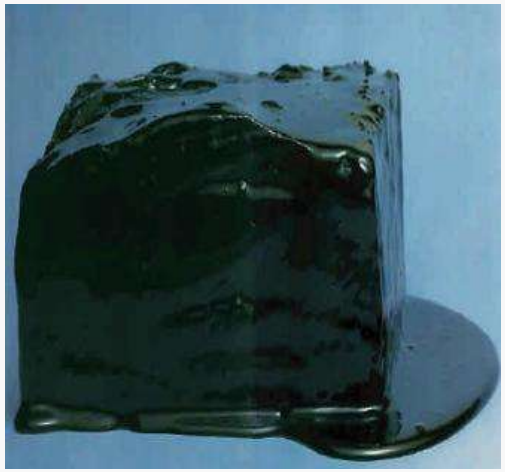
SmartWay Transport Partnership
U.S. Environmental Protection Agency

- SmartWay brand identifies shippers and carriers that reduce transportation-related emissions.
- SmartWay helps fleets address domestic goods-movement footprint for fuel efficiency and GHGs
  - Road, Rail
  - Drayage, Borders and Truck-stops
- This program leverages shipper influence with cargo ships/trucking/rail to promote a improved environmental footprint

Emission Control Area

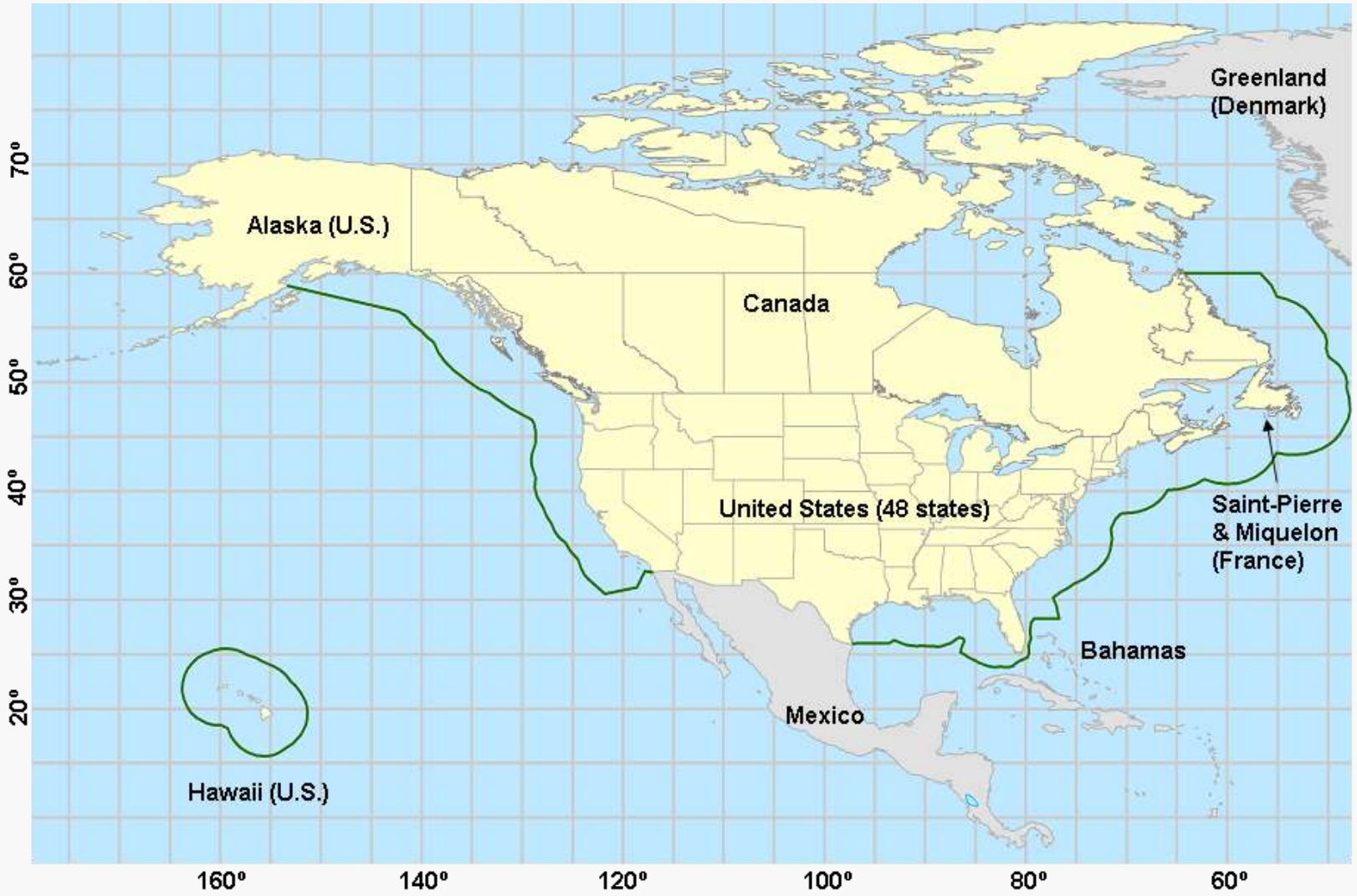
- ECA NOx Controls
  - Tier 3 NOx 80% reduction new vessels (2016)

- ECA PM and SOx Controls
  - 1.00% Fuel Sulfur effective August 2012
  - 0.10% Fuel Sulfur 2015+
    - Up to 96% reduction in SOx
    - ~85% reduction in PM

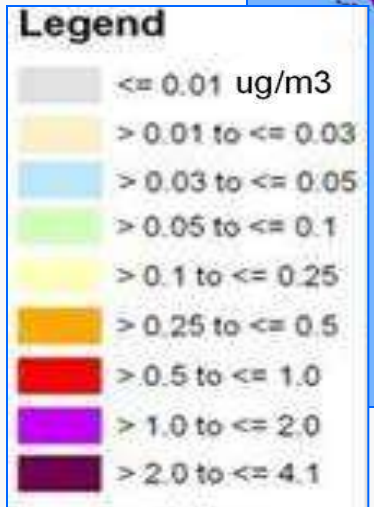


An Emission Control Area should be considered for adoption by the Organization if supported by a demonstrated need to prevent, reduce, and control emissions of NOx or SOx and particulate matter or all three types of emissions … from ships. (Appendix III, para 1.3)

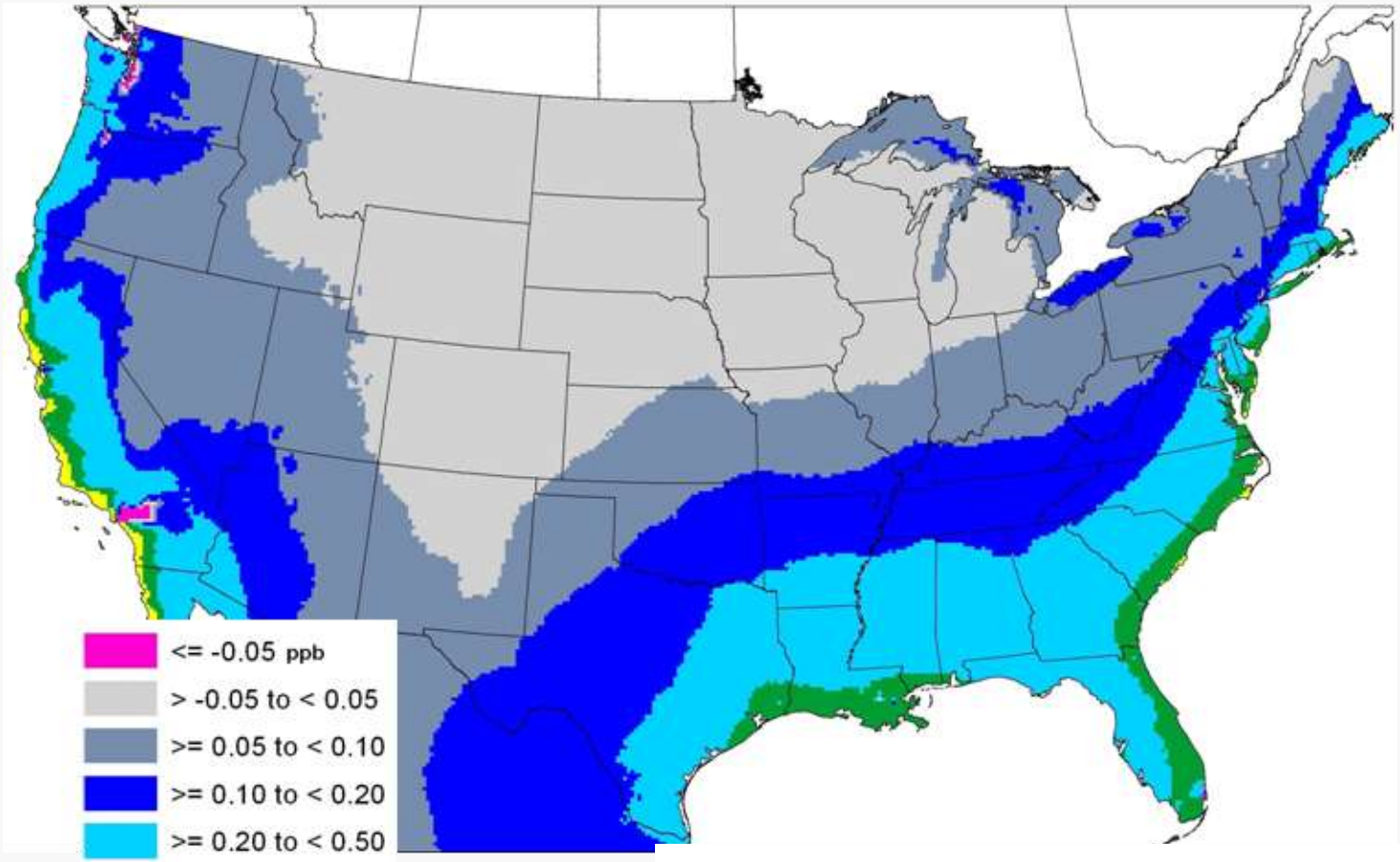
North American ECA



2020 Potential ECA $PM_{2.5}$ Reductions



2020 Potential ECA Ozone Reductions

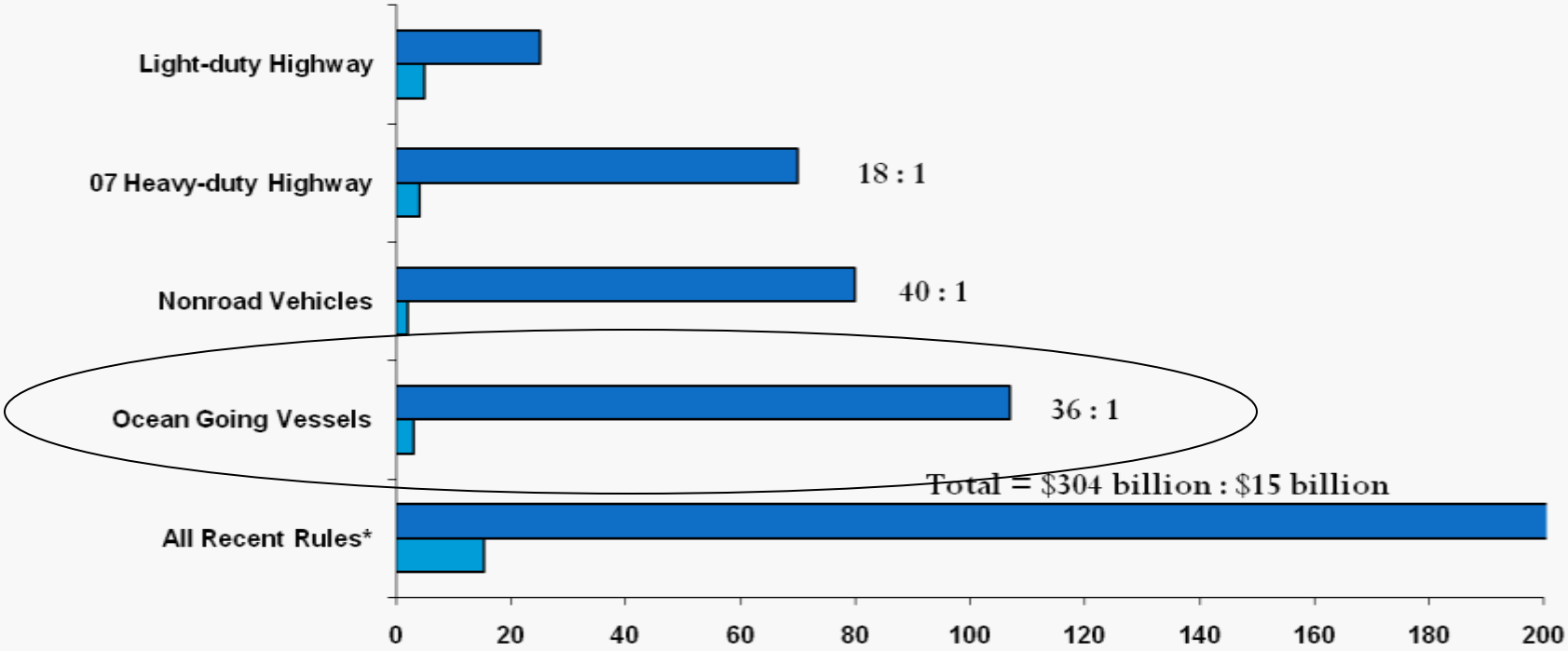


Ozone (Smog) reductions from the proposed ECA reach well into the U.S. interior

Benefits and Costs of the Coordinated Strategy

By 2030, the emission reductions associated with the coordinated strategy for OGV will annually prevent:

- Between 12,000 and 30,000 PM-related premature deaths
- Between 210 and 920 ozone-related premature deaths
- About 1,400,000 work days lost



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