Macro Port Assessment Overview

Briefing for MSTRS

December 3, 2015

Discussion Document: Work in Progress

Overview

- Purpose and Background of Macro Port Assessment
- Draft Emission Reduction Scenario Results
- Next Steps

MSTRS Consultation to Date

- We are nearing the end of this important OTAQ effort
- We have appreciated MSTRS' input over the past year and a half through:
  - Progress updates for the full MSTRS; and
  - Multiple webinars and discussions with the MSTRS Ports Workgroup about the Macro methodology and modeled strategies
- We will continue to update MSTRS, and consult on the final release of the Macro Final Report

Purpose of Macro Port Assessment

- Update our understanding of future national port-related emissions for criteria, air toxics, and climate pollutants

- Assess the effectiveness of technological and operational emission reduction strategies across ports with different emissions profiles

- Inform national policy discussion for port initiatives

Macro Design

- Estimate 2011 baseline emissions for $PM_{2.5}$, NOx, VOC, SO_2, CO_2, BC, and air toxics
- Estimate business-as-usual (BAU) inventories for 2020, 2030, and 2050 (CO_2 only)
- Subtract emission reductions from BAU inventories under 2 scenarios:
  - Scenario A: Enhanced fleet turnover with existing technologies and best operational strategies
  - Scenario B: More aggressive suite of strategies than Scenario A

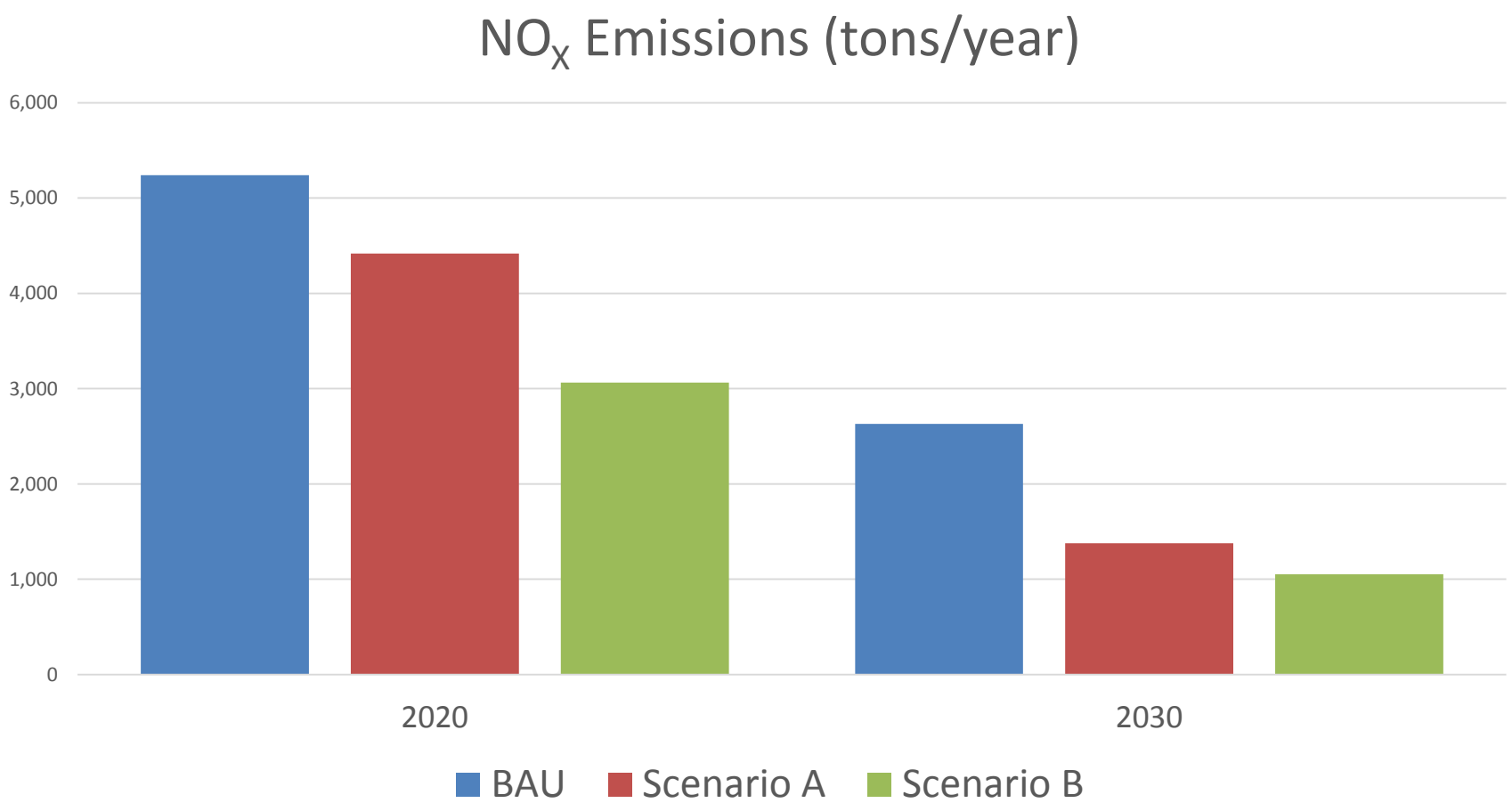
Key Methodology Assumptions

- Study incorporates the significant reductions from EPA's existing regulations, such as the ECA and locomotive regulations
- Relies primarily on existing EPA data and models
- Designed to provide national picture of port-related emissions trends and reduction strategy potential
  - Does not provide specific data for local decision-making at individual ports or specific neighborhood impacts
  - Growth scenarios are not based on port-specific assumptions
  - Age distributions for equipment are approximations based on national defaults from EPA models (MOVES and NONROAD) or EPA regulations
- Draft macro results are currently being revised and it is possible that results may change before the national study is finalized

Non-OGV Strategies Modeled

Sector	Strategy	Specific Equipment
Drayage Trucks	Enhanced Fleet Turnover	On-road Trucks
	Operational Improvements	
Rail	Enhanced Fleet Turnover	Line Haulers, Switchers
	Operational Improvements	Line Haulers
Cargo Handling Equipment	Enhanced Fleet Turnover	Yard Trucks, RTG Cranes, Container Handlers
Harbor Craft	Enhanced Fleet Turnover	Tugs, Ferries

Drayage Strategy Results



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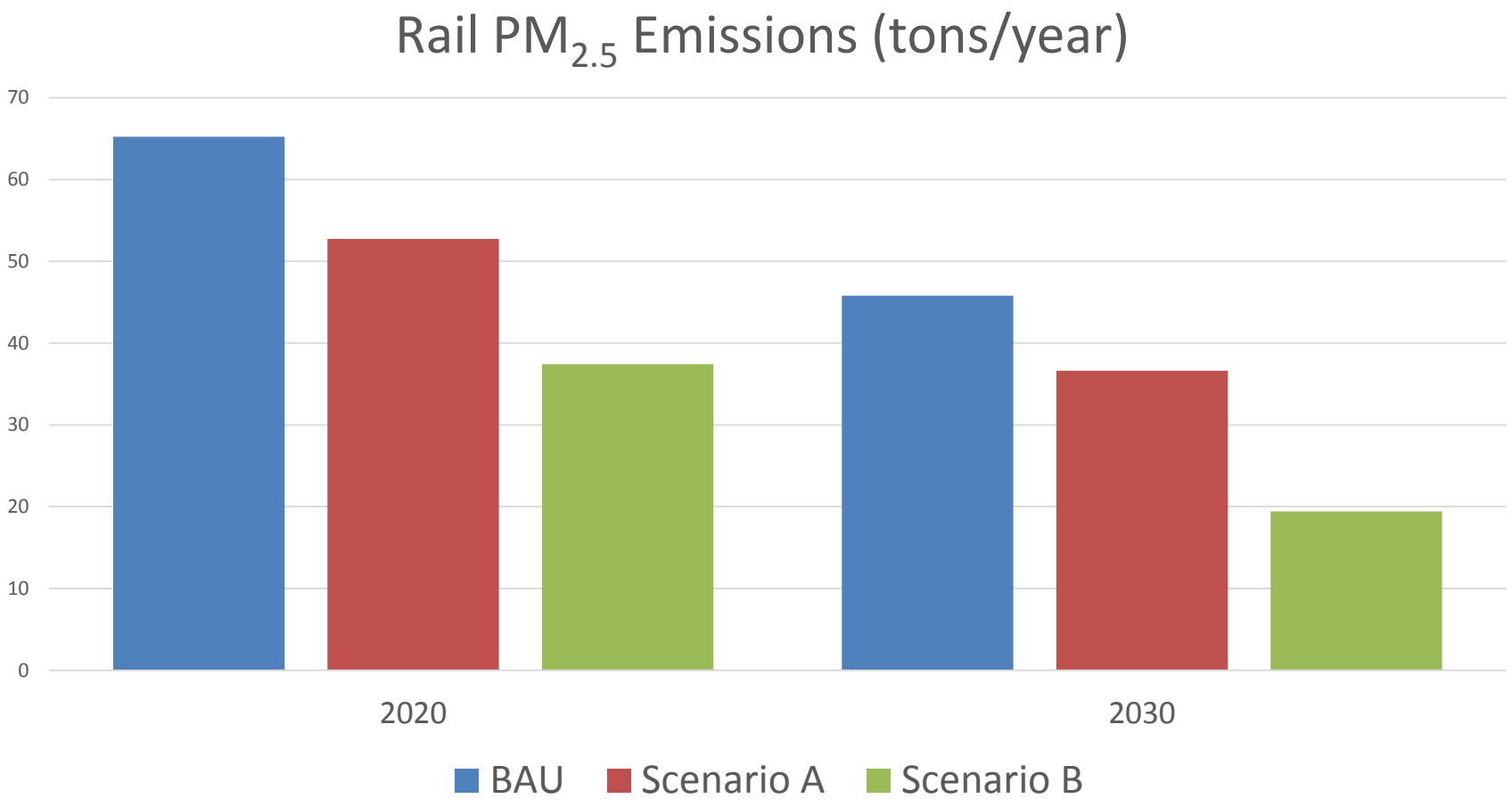
Drayage Observations

- Enhanced fleet turnover to newer truck technologies resulted in significant NOx and $PM_{2.5}$ reductions
  - For example, in 2020:
    - NOx reductions of 16-41%, and
    - $PM_{2.5}$ reductions of 38-58%
- Shift to electric vehicle truck technologies in future also resulted in significant reductions for CO_2, e.g.:
  - In 2050, CO_2 reductions of 6-12%

Rail Strategy Results



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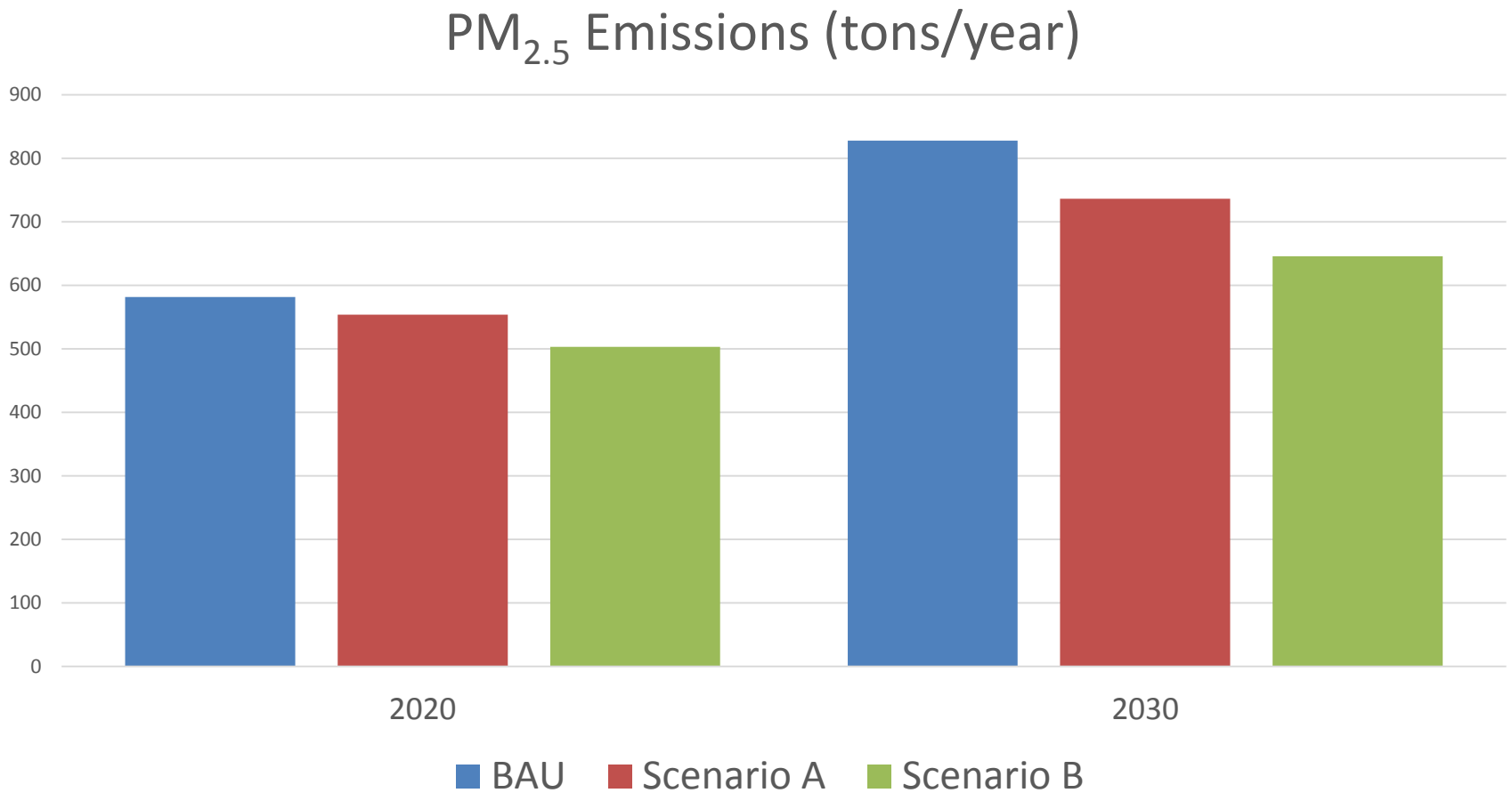
Rail Observations

- Enhanced fleet turnover resulted in significant $PM_{2.5}$ and NOx reductions, e.g.:
  - In 2030, $PM_{2.5}$ reductions of 5-28% for line-haul, and 15-29% for switchers
  - In 2020, NOx reductions of 4-14% for line-haul, and 8-17% for switchers
- Line-haul operational strategies reduced CO_2 emissions as well

OGV Strategies

Sector	Strategy	Specifics
OGV	Fuel Changes (lower sulfur levels, LNG)	Propulsion & Auxiliary Engines
	Shore Power	Frequent Callers Only (>5 calls for passenger, >6 calls for container & reefer)
	Stack Bonnets	Non-frequent Callers Only (container & tanker)
	Reduced Hotelling	Container

OGV Combined Strategy Results



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OGV Observations

- EPA's ECA regulations have resulted in significant $PM_{2.5}$ and NOx reductions between 2011 and 2020/2030
- Macro fuel scenario results vary for different engine and fuel types, e.g.:
  - Lower sulfur fuels (500 and 200 ppm S) produced 0.2-2% reductions in 2020-2030 for $PM_{2.5}$ from propulsion engines
  - ULSD reduced $PM_{2.5}$ for auxiliary engines by 2-11%
- Shore power and stack bonnet technology reductions are dependent upon the amount of OGV emissions covered by technology

Next Steps

- Complete Macro strategy analysis
- Coordinate with MSTRS Ports Workgroup and others on roll-out and outreach
- Finalize Macro Port Assessment and documentation