

# Faster Freight Clean Air

## A Summit on North American Goods Movement & Air Quality



Emissions Inventory 101  
February 25, 2008  
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## Overview

The Emissions Inventory is the Foundation by which Sound  
Actions, Policy, & Decisions are Based





## What are Marine Related EIs Used For? (Cont'd)

- ✓ Public Relations/Press Statements/Education
- ✓ Grant Funding Applications
- ✓ Demonstrating Redevelopment/Modernization Emission Reductions
- ✓ Assess Past and Future Trends
- ✓ Tool to report progress against set goals



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## Emissions Inventory Approaches

- “Top Down” EIs or Non-coordinated EIs
  - ✓ Traditionally Used for Nonroad & Area Source EIs
  - ✓ Uses Regional/National/International Data Sources & Assumptions to Develop Broad Estimates
  - ✓ State/National/International Estimating Methods



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## Emissions Inventory Approaches

- “Activity-Based” EIs or Coordinated EIs
  - ✓ Varying Levels of Detail Depending on EI Function and availability of data
  - ✓ Uses Actual Location Specific Information to Develop Estimates
  - ✓ Takes Into Account Local Geography & Conditions
  - ✓ Leverages Local Knowledge & Partnering Arrangements to Develop Activity Characteristics
  - ✓ Provides Greater Understanding & Resolution of Activity
  - ✓ Local/State/National Estimating Methods
  - ✓ Improves Accuracy of EI
  - ✓ Can Help Establish Working Relationships
  - ✓ Can Help Verify Top Down Based EI



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## Approach Based Examples

- California’s Latest Green House Gas Inventories are based on Top Down Approach
- Criteria and Toxics Pollutants Inventories are activity based inventories



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## Examples of EI Improvements based on Activity Based Approach

- OGV boiler emissions – 2001 versus 2005 EIs
- Load Factors used to calculate CHE emissions



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## Basic Equation

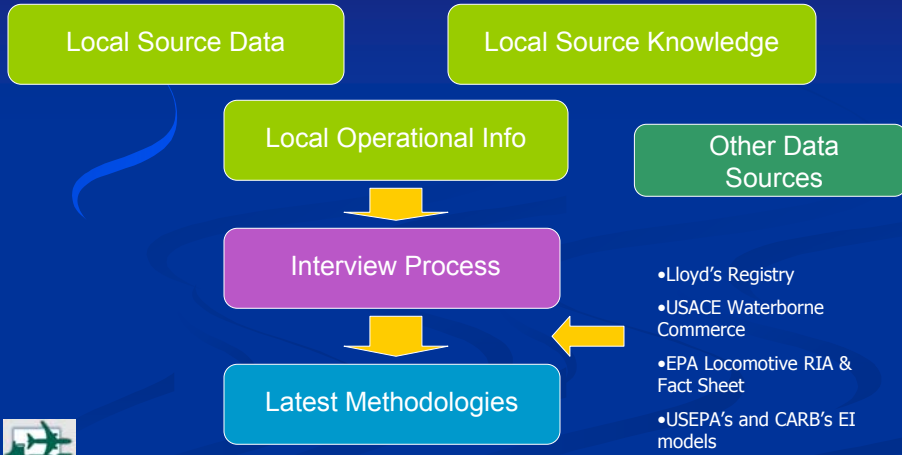
- Emissions = Emissions/Unit x Activity x Population x Activity x Correction Factors
- Emission (gm/mi or gm/hr or gm/bhp)  
HC/CO/NOx/DPM/PM2.5/SOx/CO2
- Activity
  - (annual hours/miles/speed)
- Population
  - by class/fuel/age/technology
- Correction Factors
  - Load/Speed/Fuel



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# Emissions Inventory Approach

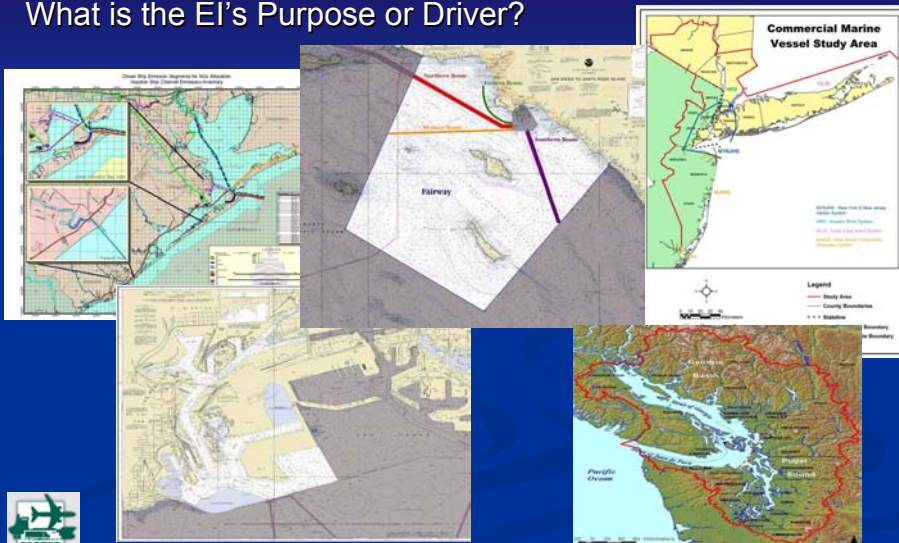
## ➤ Activity-Based Inventory Approach



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# Geographical Extent

What is the EI's Purpose or Driver?



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## Overview of Recent Activity-Based EIs

- Which Ports Are Doing Detailed Activity-based EIs?
  - ✓ More & more ports that are having to address air quality issues
- What Sources are they Looking At & Extent?

Ports	Marine	CHE	Rail	Trucks
POLA	✓R	✓PB	✓NA	✓NA
POLB	✓R	✓PB	✓NA	✓NA
POSD	✓NA	✓PB	✓NA	✓NA
PHA	✓NA	✓PB	✓NA	✓NA
PANYNJ	✓NA	✓PB	✓PB	✓PB
PSEI	✓R	✓PB	✓R (W Cascades)	✓R (W Cascades)
Bmt/Port Arth	✓NA			
BCCS/EC	✓R			



NA-Nonattainment Area; PB-Port Boundary; R-Regional

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## Activity-Based Elements

- Planning is the Key
  - ✓ Take into Account what you want the EI to be used for Upfront
  - ✓ Sources to Include & Not Include
  - ✓ Pollutants to be Considered
  - ✓ Geographical Extent
  - ✓ Level of Detail
  - ✓ Consideration that the Science is Evolving
  - ✓ Review Prior Studies that have been Completed for your Area
  - ✓ Coordinate EI w/Local, State, National Regulators
  - ✓ Frequency of Updates
  - ✓ Spatial Allocation Needs
  - ✓ Develop Working Groups



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## Challenges with Emissions Inventory Updates

- Change in methodology – how emissions are calculated  
– DR methodology
- Change in input factors – Additional emissions data, activity data
- How to compare and ensure trend analysis is realistic
- Future emissions versus growth in activity/throughput



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## Source Categories

- Five Source Categories
  - ✓ Each Source Category has Sub-Classes
  - ✓ Each Source Category/Sub-Class Can Have Different Operating Modes
  - ✓ Each Source Category/Sub-Class Can Have Different Emission Estimating Methods
- Ocean-Going Vessels (OGVs)
  - ✓ Tankers
  - ✓ Container Ships
  - ✓ General Cargo Vessels
  - ✓ Bulk Vessels
  - ✓ Liquid Petroleum Gas Carriers
  - ✓ Cruise Ships
  - ✓ Auto Carriers
  - ✓ Roll On/Roll Off
  - ✓ Military
  - ✓ Ocean-Going Tugs
  - ✓ Other OGVs



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## Source Categories

### ➤ Harbor Vessels

- ✓ Assist Tugs
- ✓ Dredges
- ✓ Ferries
- ✓ Government
- ✓ Excursion Vessels
- ✓ Recreational
- ✓ Fishing
- ✓ Etc.



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## Source Categories – Land Based

- Cargo Handling Equipment (Nonroad)
  - ✓ Yard Hustlers/Hostlers/UTRs, Rubber Tired Gantries, Top Picks, Side Handlers, Forklifts, Loaders, etc.
- Rail/Locomotive
  - ✓ Line Haul
  - ✓ Switching
- Heavy Duty Vehicles (Trucks)
  - ✓ Queuing
  - ✓ On Terminal
  - ✓ Port Boundary
  - ✓ Regional



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## Benefits of Activity-Based EIs

- More Accurately Estimates Emissions
- Establishes Consistency when Addressing Emissions Levels, Sources, & Effects
- Provides a Science-Based Foundation by Which Policy can be Developed & Commented On
- Identifies “Low Hanging Fruit”
- Allows for Quantification of Efficiency Improvements
- Future Forecasting & What if Scenarios
- Potential to Establish New Relations w/ Regulators, Ports, Industry, & Owner/Operators
- Evaluating Modal Shifts in Transportation Systems
- Improves Spatial Allocation of Emissions
- Many more...



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