Port Truck Air Emissions Inventories

And their Relevance to Regional Transportation

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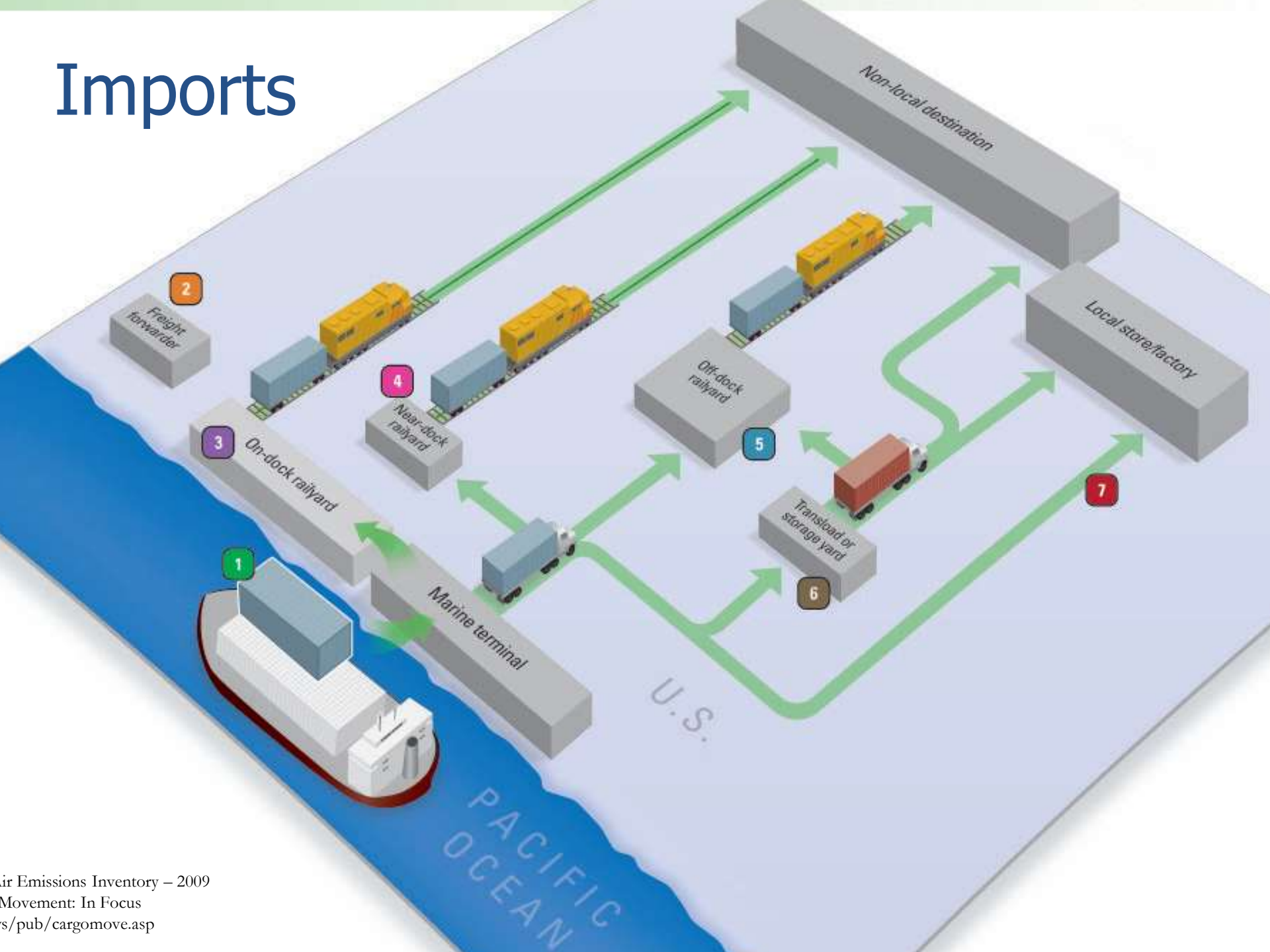
Port Truck Air Emissions Inventories

- Typical Port Truck Operations
- Port Truck Emission Estimates
- Port Trucks - Context

Typical Port Truck Operations

- Imports
  - Off-Loaded from Ship
  - On-Terminal Handling by Non-Road Equipment
  - Transportation from Port to First Destination ("First Point of Rest")
    - From Dock Directly to Rail
    - By Truck to Rail Yard
    - By Truck to Transloading Center
    - By Truck to Local Destination

Imports

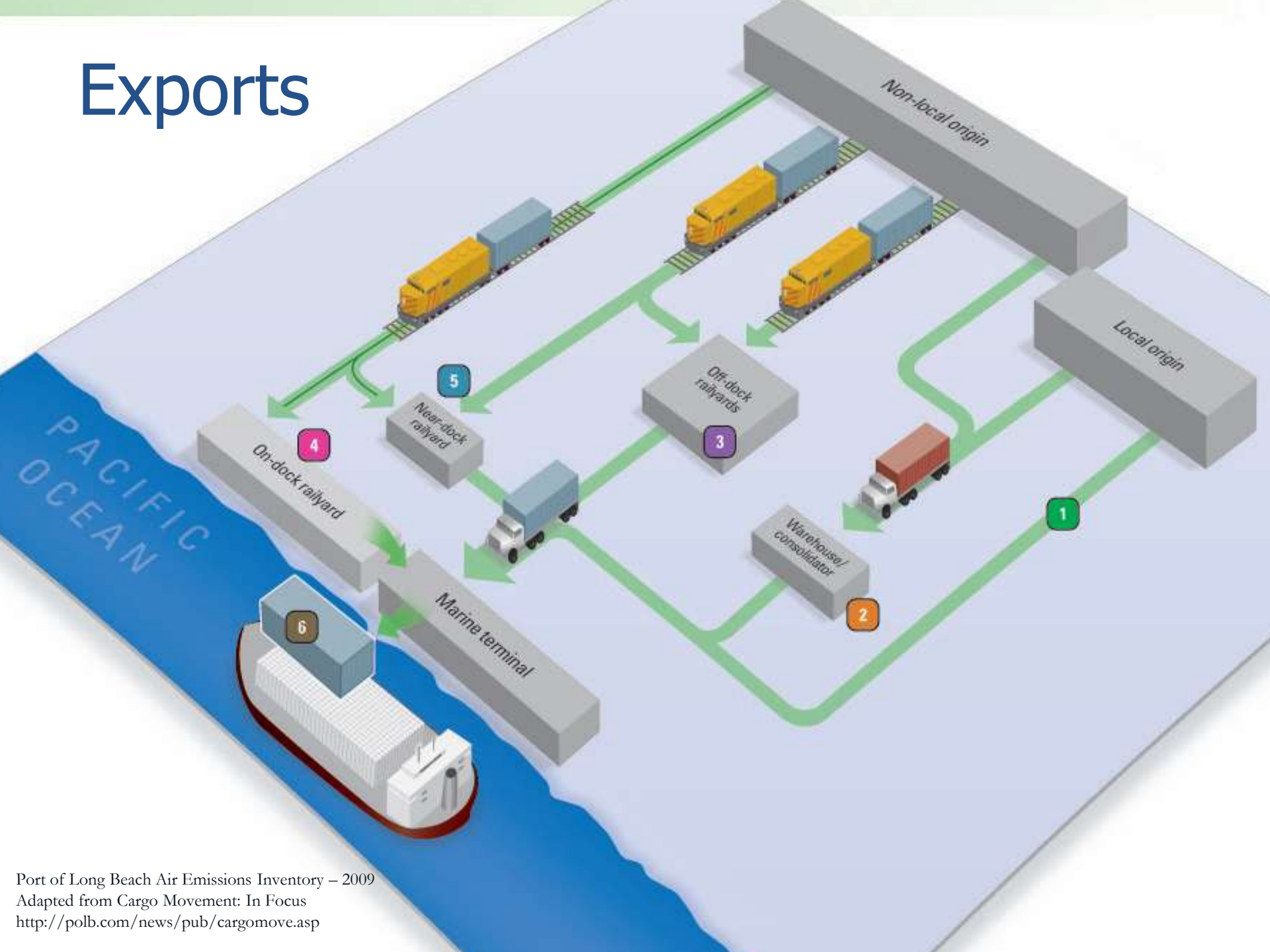


ir Emissions Inventory – 2009
Movement: In Focus
s/pub/cargomove.asp

Typical Port Truck Operations

- Exports
  - Brought to Port
    - By Rail Directly to Port or Terminal
    - By Rail to Local Rail Yard, then Trucked to Port
    - By Truck to Warehouse/Consolidator, then Trucked to Port
    - By Truck from Local Origin
  - On-Port Handling by Non-Road Equipment
  - Loaded onto Ship for Export

Exports



Port of Long Beach Air Emissions Inventory – 2009
Adapted from Cargo Movement: In Focus
http://polb.com/news/pub/cargomove.asp

Typical Port Truck Operations

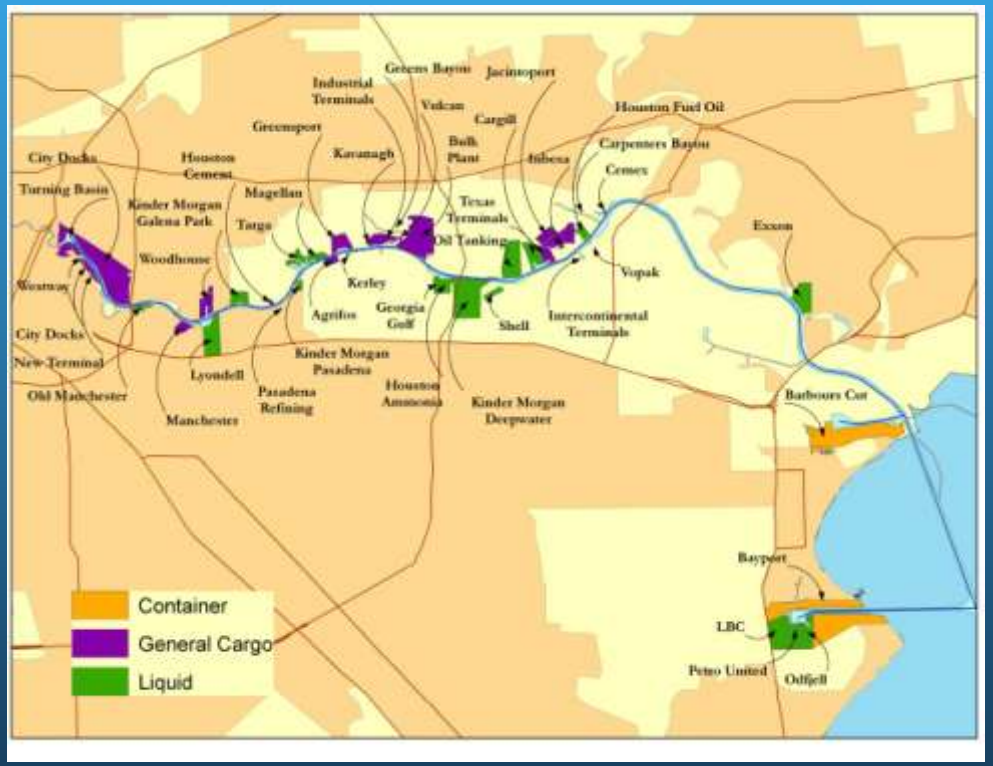
- Port Truck Operations are Part of a Much Larger Goods Movement System
- This Goods Movement System Includes Concentrations of Domestic Truck Activity at Off-Port Locations
- Imported Cargo is usually Moved by Trucks other than "Port Trucks" beyond the "First Point of Rest"
- Cargo to be Exported is often Moved by other Trucks before being Moved by "Port Trucks"
- Port Truck Activity is Most Concentrated in the Immediate Port Area but they and Other Trucks Operate away from Ports

Geography

- Some Ports are Geographically Dispersed
  - Port of New York and New Jersey
  - Port of Houston
- Some Ports have Developed within a Limited Area
  - Port of Long Beach
  - Port of Los Angeles

Some Ports are Geographically Dispersed while Others are More Compact

Port of Houston



Ports of Long Beach and Los Angeles

(Maps approximately to same scale)

POLA 2010 Annual Air Emissions Inventory

PHA 2007 Goods Movement Emissions Inventory

Geographically Dispersed Port

Port of New York and New Jersey

PANYNJ – 2006 Multi-Facility Baseline Emissions Inventory

Port Truck Emission Estimates

- Emission Factors from EPA or CA Models
  - MOBILE6.2
  - MOVES (new)
  - EMFAC 2011
  - g/mile, g/hour
- Based on Vehicle Miles Traveled (VMT) and On-Port Idling Time (hours)
- Two Areas of Operation
  - On-Terminal / On-Port
  - On-Road (Mixed with General Traffic Flow)

Port Truck Emission Estimates

- On-Port Information from Operators
  - How Many Truck Visits during the Year?
  - How Far (on Average) does each Truck Travel while on Port?
  - What is the Average Speed?
  - What is the Average Turn Time?
  - How Much Time spent Idling?
    - At Gate
    - Within Terminal

Port Truck Emission Estimates

- Model Year Distribution
- Emission Factors from Emission Models
  - Model year distribution used to develop composite EF reflecting fleet makeup
- Emissions =
  - Miles driven x g/mile emission factors
  - Hours idling x g/hour emission factors
  - Idling calc'd for on-port, built into on-road emission factors

Port Truck Emission Estimates

- Uncertainties =
  - On-Port or On-Terminal
    - Operating characteristics are estimates of averages, may be high or low
  - Total miles driven - estimates may be high or low
  - Speeds vary, emission factors vary somewhat with speeds
  - Model Year Distribution
  - Truck Model Year vs Engine Model Year
  - Change in EPA Model, MOBILE to MOVES

Port Trucks - Context

- Marine terminals act as "funnel" that may concentrate truck activity in the port vicinity
- Off-port distribution centers act as "funnel" that combines port and non-port truck traffic
- Local/regional goods movement activity patterns affect the mix – port trucks plus other goods movement on the same roads
- Focusing on "port trucks" can improve immediate port area but effect is diluted by non-port activity
- And… may affect trucking activity in other areas within the same airshed

Port Trucks - Context

Figure E.S.1:
Distribution of NO_x Emissions by Source Category, tpy, and percent

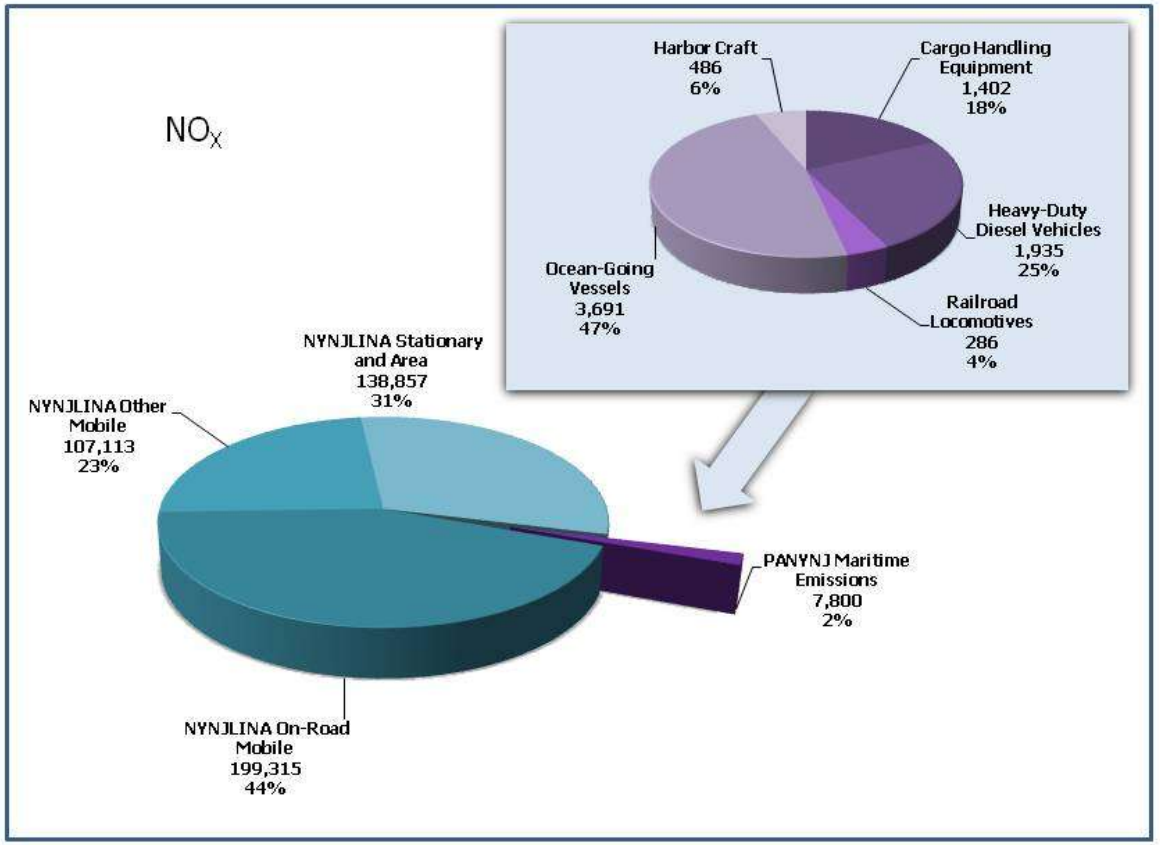


Figure from: PANYNJ – 2006 Multi-Facility Emissions Inventory

Port Trucks - Context

Table 2.3: 2007 PHA Associated Maritime-Related Sources Compared to 2005 HGB Nonattainment Area NOx Emissions

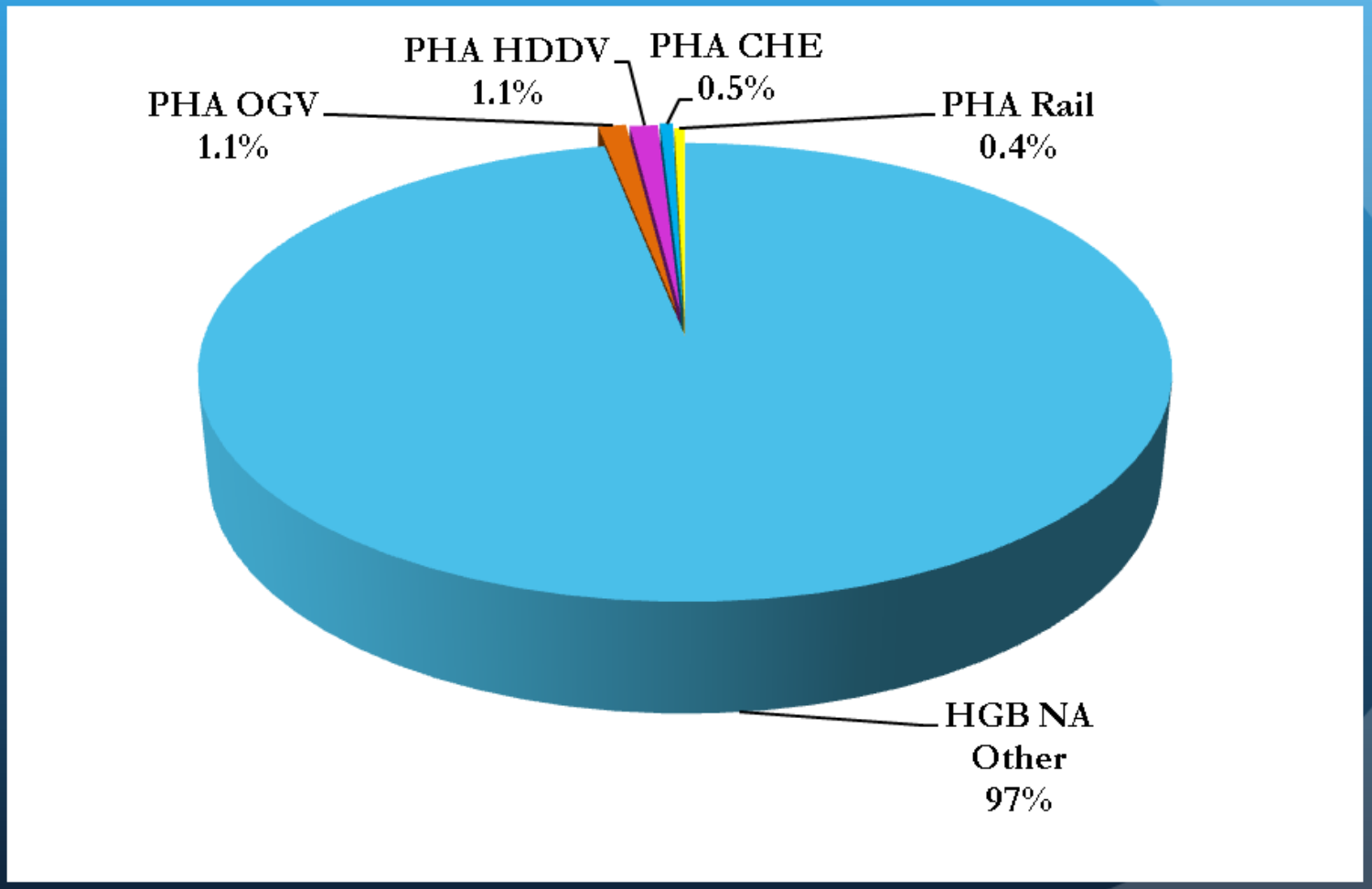


Figure from: PHA - 2007 Goods Movement Emission Inventory

Port Trucks - Context

Figure ES.8: 2010 NOx Emissions in the South Coast Air Basin, %

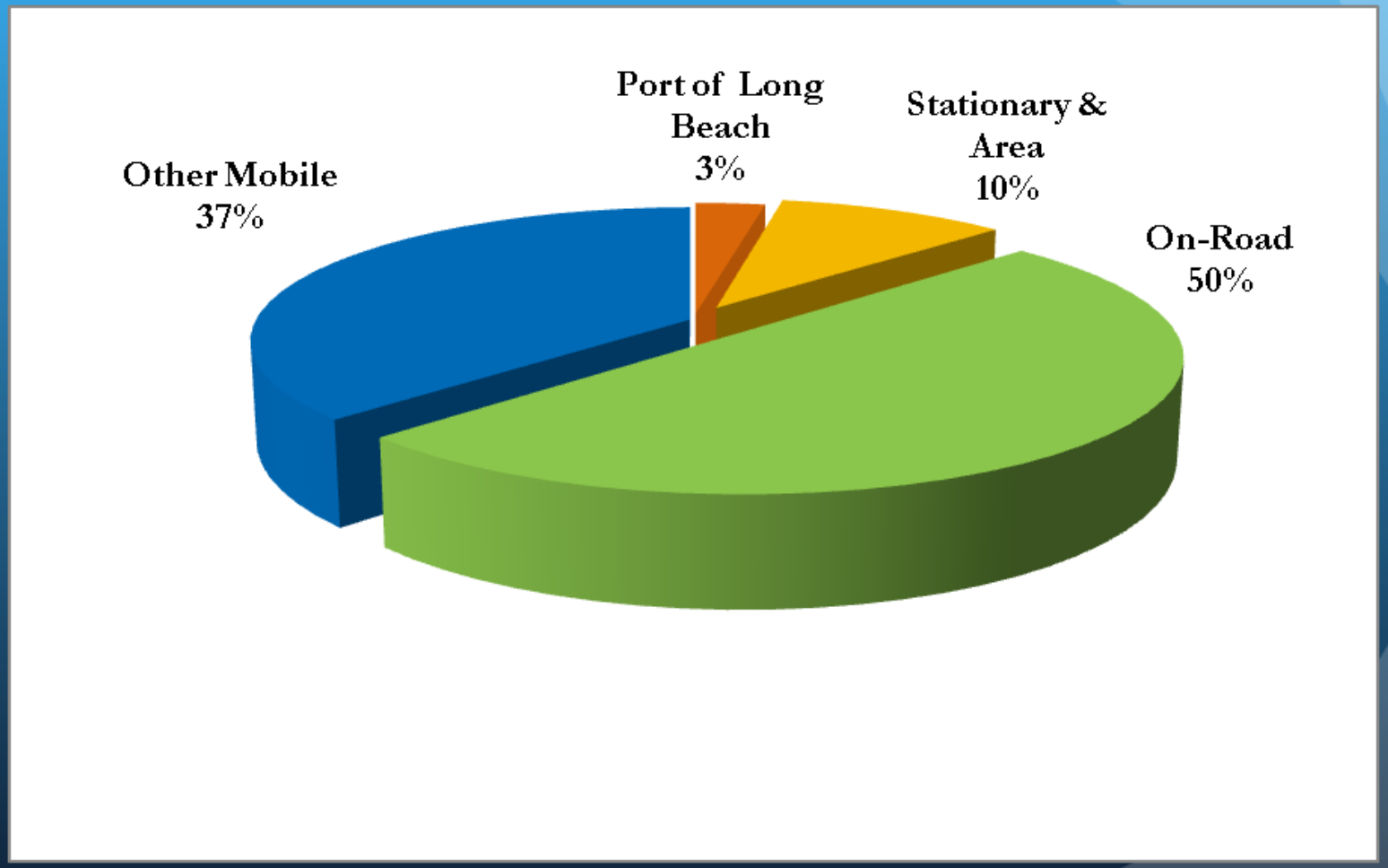
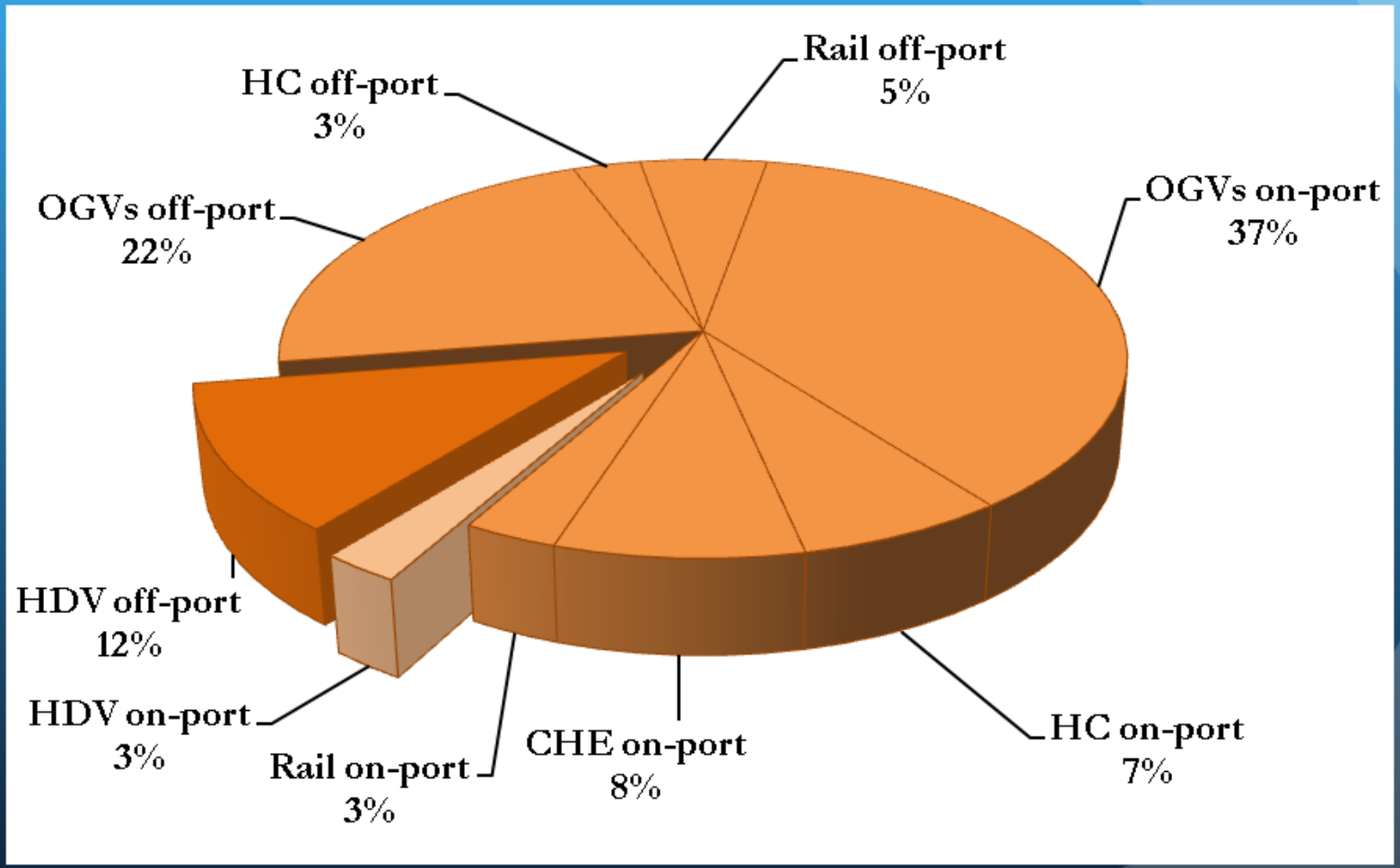


Figure from: POLB - 2010 Air Emissions Inventory

Port Trucks - Context

2010 On-port/Off-port NOx Emissions in the SoCAB, %



Data from: POLB - 2010 Air Emissions Inventory

Port Trucks - Summary

- Critical Data:
  - How many truck trips?
  - Where do they come from/depart to? (O/D info)
  - What is model year distribution?
- Benefits, detriments to focusing on port trucks:
  - Can have beneficial effect close to port
  - Effects are diluted further from port where trucks are intermingled with other diesel traffic
  - Can have detrimental effects at off-port distribution centers
  - May cause change in truck usage patterns within the airshed

Thank You!

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