



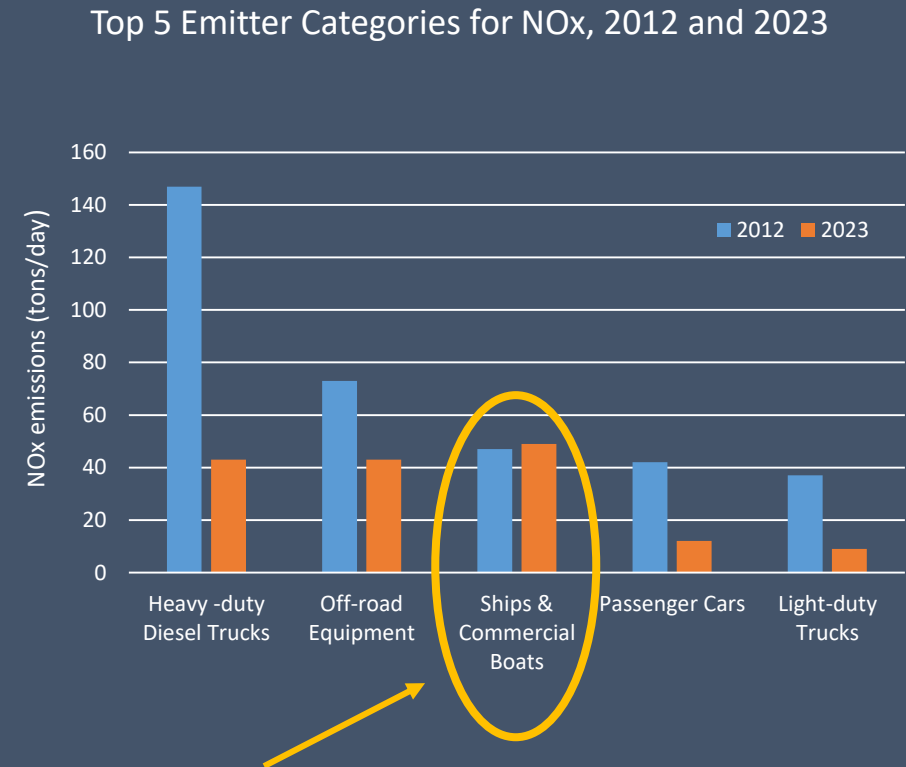
Potential International Partnerships with Ports for Emission Reductions

SCAQMD Governing Board Retreat

May 2018

Importance of Ship Emissions

- Ships and commercial boats were the 3rd largest contributor to NOx in 2012, and will be the top contributor in 2023
- Over 50% of NOx emissions from the ports are from ocean going vessels



Shipping is the only category with a projected increase in NOx emissions

Challenge #1

Limited
Regulatory
Authority

Most mobile sources are subject to CARB and EPA regulatory authority

Emissions from shipping are also subject to international regulatory authority

Challenge #2

Current
international
regulations not
sufficient

Require cleaner vessels (Tier 3 engines) in Emission Control Areas (ECAs) for vessels built after 2016

There is a glut of pre-2016 keels; new vessels are being built on pre-2016 keels and so don't require Tier 3 engines

International Maritime Organization (IMO)



- An agency of the UN based in London
 - Charged with developing a comprehensive regulatory framework for the shipping industry
 - Marine Environment Protection Committee (MEPC) addresses environmental regulations
 - MARPOL Annex VI governs air pollution from ships
 - Established regulations on SO_x and NO_x emissions; recently established GHG emission reduction goals
- IMO regulations are developed and implemented at a slow pace
- U.S. participates in IMO through the Federal government (Dept. of State, Coast Guard, sometimes EPA)

Current IMO Regulations for NOx

- Established classification of engines required for vessels based on year built

| Year Built | Engine Tier | NOx Emissions |
|------------|-------------|-------------------------|
| Pre-2000 | Tier 0 | uncontrolled |
| 2000 | Tier 1 | 9.8-17 g/Kwh |
| 2011 | Tier 2 | 15% cleaner than Tier 1 |
| 2016 | Tier 3 | 75% cleaner than Tier 2 |

Emission Control Area (ECA) only

Current Emission Control Areas

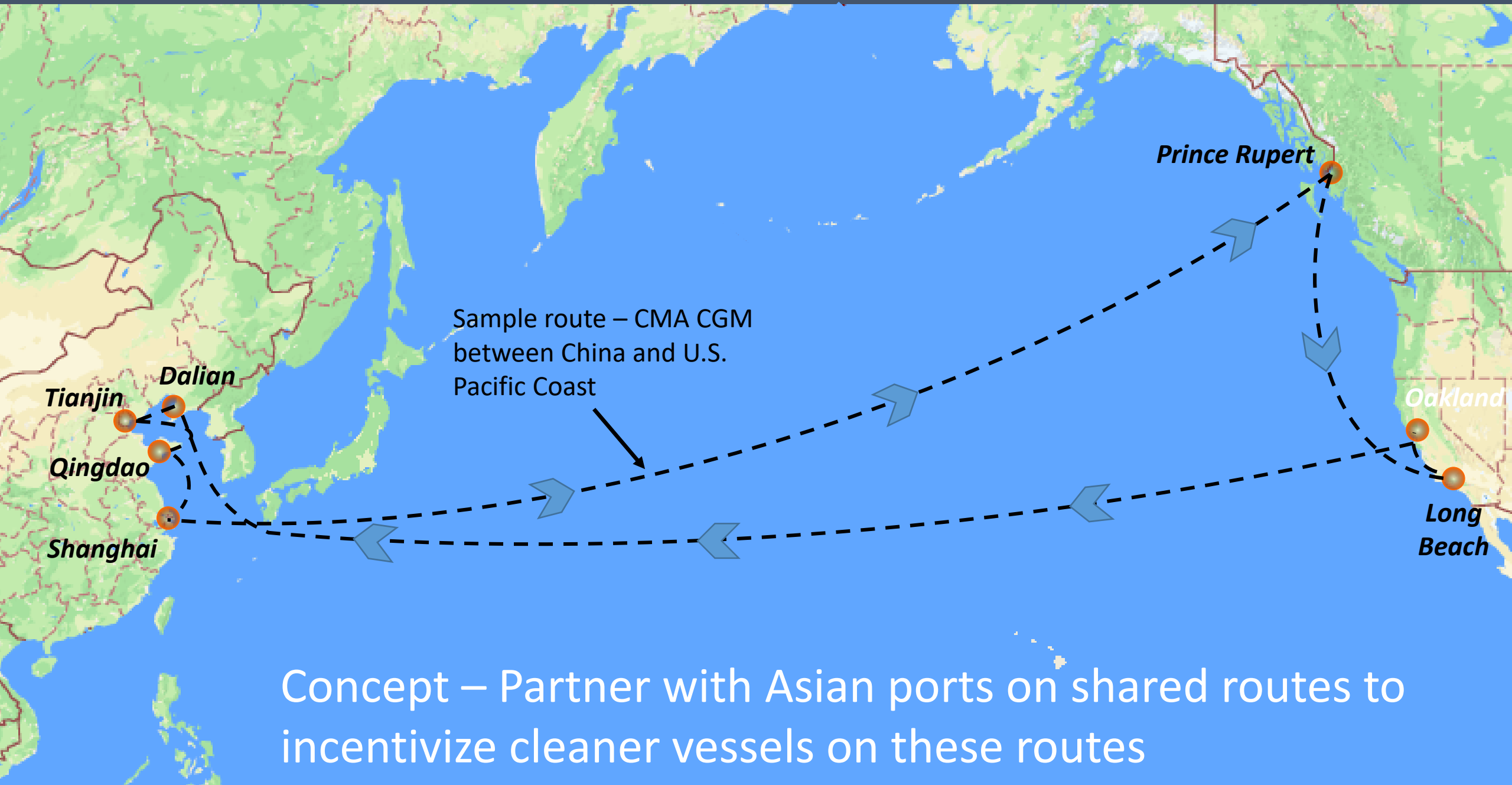


China has established their own “emission control zones” for SOx

- Imposes requirements within 200 nautical miles of an ECA
 - SOx: requires low sulfur fuel
 - NOx: requires vessels built after 2016 to meet Tier 3 engine standards
- North Sea and Baltic ECA will add NOx requirements in 2021

Issue: Few Tier 3 Vessels are Being Built

- Tier 0-2 vessels are not restricted from entering ECAs
- There is a surplus of pre-2016 keels; new vessels are being constructed on these keels
- Both San Pedro ports have incentive programs in place to attract Tier 3 vessels
 - Has not resulted in calls by Tier 3 vessels
 - In 2016, 79% of vessel calls were Tier 0 or Tier 1



Concept – Partner with Asian ports on shared routes to incentivize cleaner vessels on these routes

Partner with Asian Ports & Other Entities to Leverage Incentives

- Identify top ports in Asia that are on the same routes as Ports of LA/LB
- Collaborate with regional authorities/ports/shipping lines to develop a program where each participating port provides an incentive for a call by a cleaner vessel
- Each port's individual incentive is then leveraged to encourage changes in shipping behavior
 - Re-routing of existing Tier 3 vessels
 - Encourage construction of Tier 3 vessels on pre-2016 keels
 - Encourage retrofits of existing vessels cleaner than Tier 2

2016 Frequent Vessel Calls at Ports of LA/LB and Asian Ports



Motivation for China to Participate

- There are goals for both NOx emission reductions and emissions from the maritime sector in the national plan (5 year plan)
 - 20% reduction in NOx emissions from shipping by 2020 from 2015 levels
- Currently focused on PM, but NOx also contributes to PM issues
 - China has their own version of ECAs for SOx; could extend to NOx and move much faster than IMO
- Already starting to investigate incentive programs
- Interested in stepping up enforcement activities – lessons learned from SCAQMD

Challenges

- Behavioral
 - Need to better understand current shipping behavior and business models
 - Tailor incentives so that they are sufficient to change behavior
- Technology
 - Identify feasible retrofit technologies and costs
 - Technology demonstration projects
- Emission trade-offs
 - Avoid GHG disbenefit associated with some retrofit technologies

Next Steps

- Continue research & gathering information
 - Analyze satellite tracking data to confirm vessel routes
 - Collect information on feasible technologies & costs
 - Identify and work with key industry partners
- Build relationships with key Chinese partners
 - Meet with ports/regional authorities Summer 2018
 - Convene technology forum for retrofits Fall 2018
 - Continue meeting/information exchange through 2018-2019
 - Agreement on a joint incentive program Spring 2019

Working together we can reduce shipping emissions

Questions?

