



LNG & the Future of the U.S. Domestic Maritime Industry

Ben Christian

Project Manager, TOTE Shipholdings



LNG Conversion of Two Orca Class Vessels in Alaska Trade



Two new 3100 TEU LNG-Powered containerships for the Puerto Rico Trade

The North American Emission Control Area – Challenge and Opportunity



Possible Solutions

- **Do nothing:** Cost of 1% compliant IFO 380 is 30-40% higher with further increases expected in 2015
- **Install exhaust gas cleaning system:** Scrubbers use existing fuel with added costs
- **Convert to Natural Gas:** Meet all current and future emissions requirements, cleanest of all options

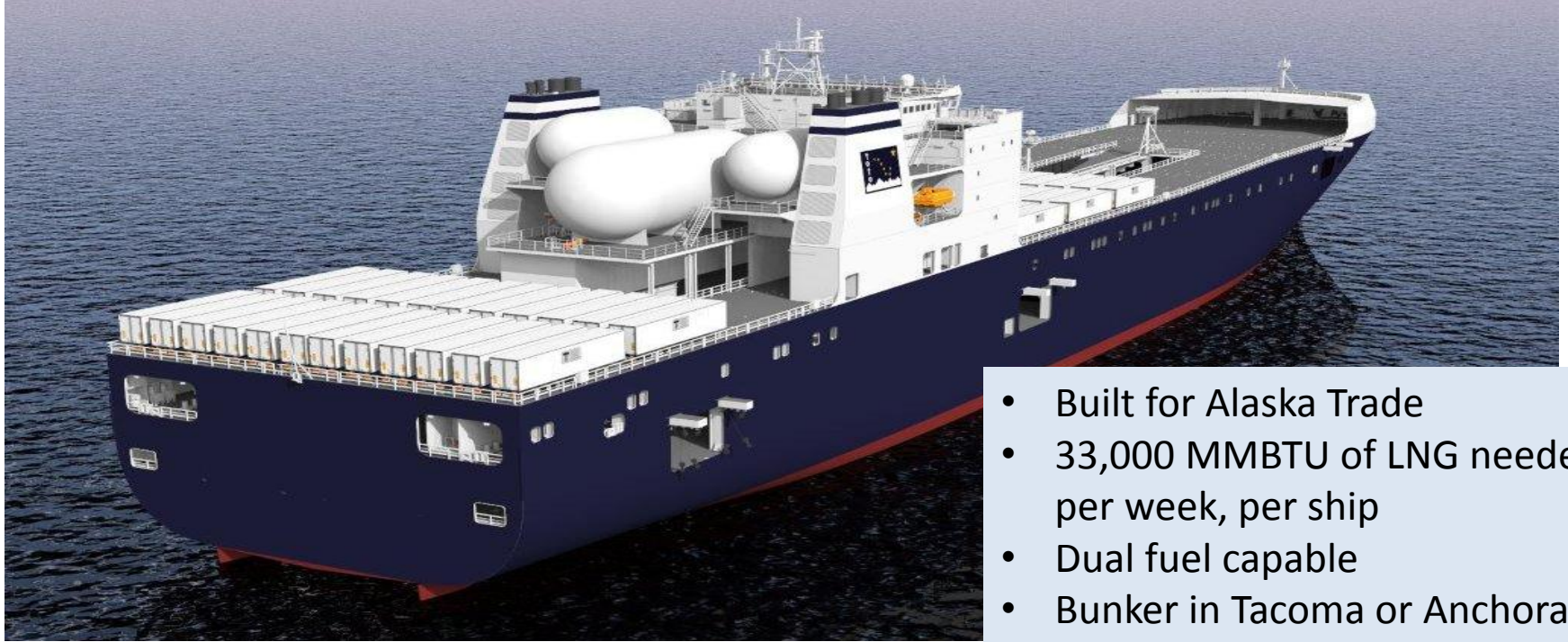


Clean & Safe Fuel

- Conversion to natural gas will reduce ship emissions 95% below even the most world's most stringent air quality standards that are outlined in the North American Emissions Control Areas
- LNG will virtually eliminate Sulfur Dioxide (SO_x), Particulate Matter (PM), Carbon Dioxide (CO₂) and Nitrous Oxide (NO₂) and far exceeds any other fuel source for environmental safety



Orca Conversion



- Built for Alaska Trade
- 33,000 MMBTU of LNG needed per week, per ship
- Dual fuel capable
- Bunker in Tacoma or Anchorage
- Minimal out of service time during conversion

New LNG Ships



- Puerto Rico service
- 3100 TEU
- First LNG container ships in the world
- Dual fuel capable
- Bunker in Jacksonville or San Juan
- First delivery in late 2015

Jones Act Playing a Significant Role in U.S. Maritime Innovation

Advantages

- Dedicated trade lanes
- Long-term capital investments
- Consistent weekly bunkering requirements



Now is the Time

- Clear window of opportunity to develop LNG supply infrastructure for maritime industry
- For vessels spending a third of their time or more in the ECA, LNG is a viable alternative
- We predict a boom in the construction of dual fuel, LNG powered vessels

