

# LNG as Marine Fuel Industry Update

*AAPA Energy and Environment Seminar*

Vancouver, BC

Wednesday, September 14, 2016

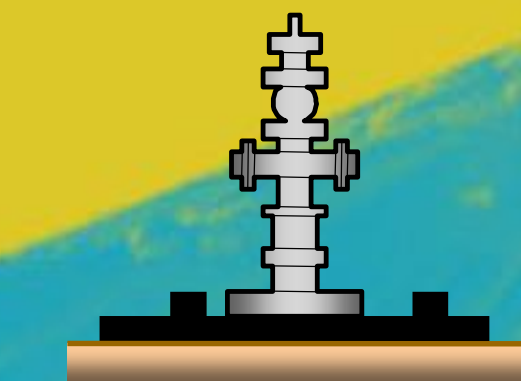
Margaret Kaigh Doyle, Senior Manager, BD - Marine

# Agenda

- **Changing LNG Value Chain?**
- **2013 versus 2016 Snapshot**
- **LNG/DF Vessels in North America (current and planned)**
- **Are the drivers towards LNG as Marine Fuel the same?**
- **Have the Drivers and Barriers to adoption changed?**
- **Eagle LNG solutions in Jax and beyond...**



# “Old School” LNG Value Chain



## SUPPLY

- Exploration
- Development
- Production
- Gathering
- Dehydrating



## LIQUEFACTION

- Treating
- Stripping
- Liquefaction
- Storage
- Loading



## TRANSPORTATION

- Shipping



## REGASIFICATION

- Receiving
- Storage
- Vaporization
- Transmission to market
- Integration with Power?



## MARKET

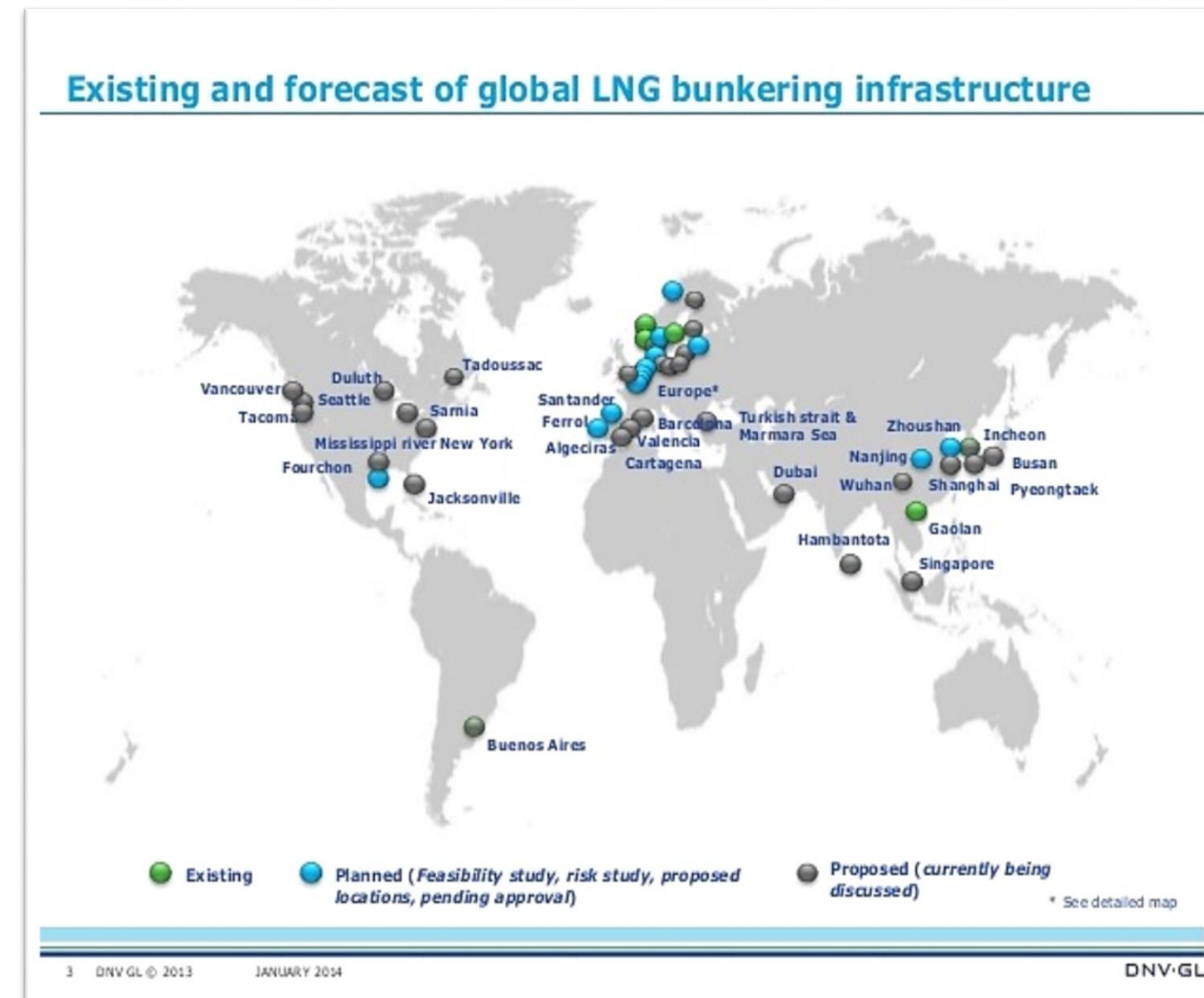
- Entry Charge
- Receipt (Dispatching)

Increasing Value

# Small Scale LNG Value Chain

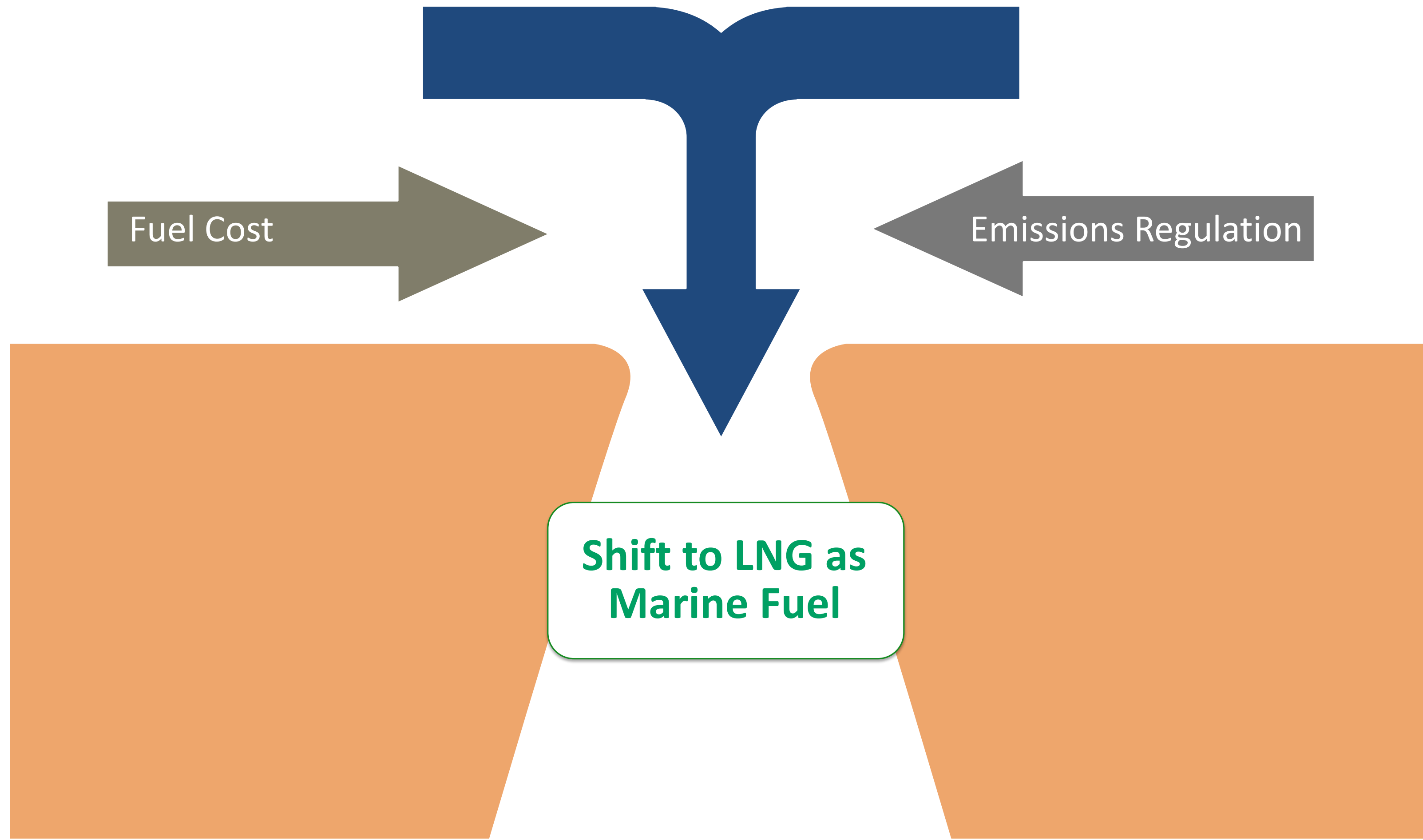


# The 2013 LNG as Fuel “Snapshot”



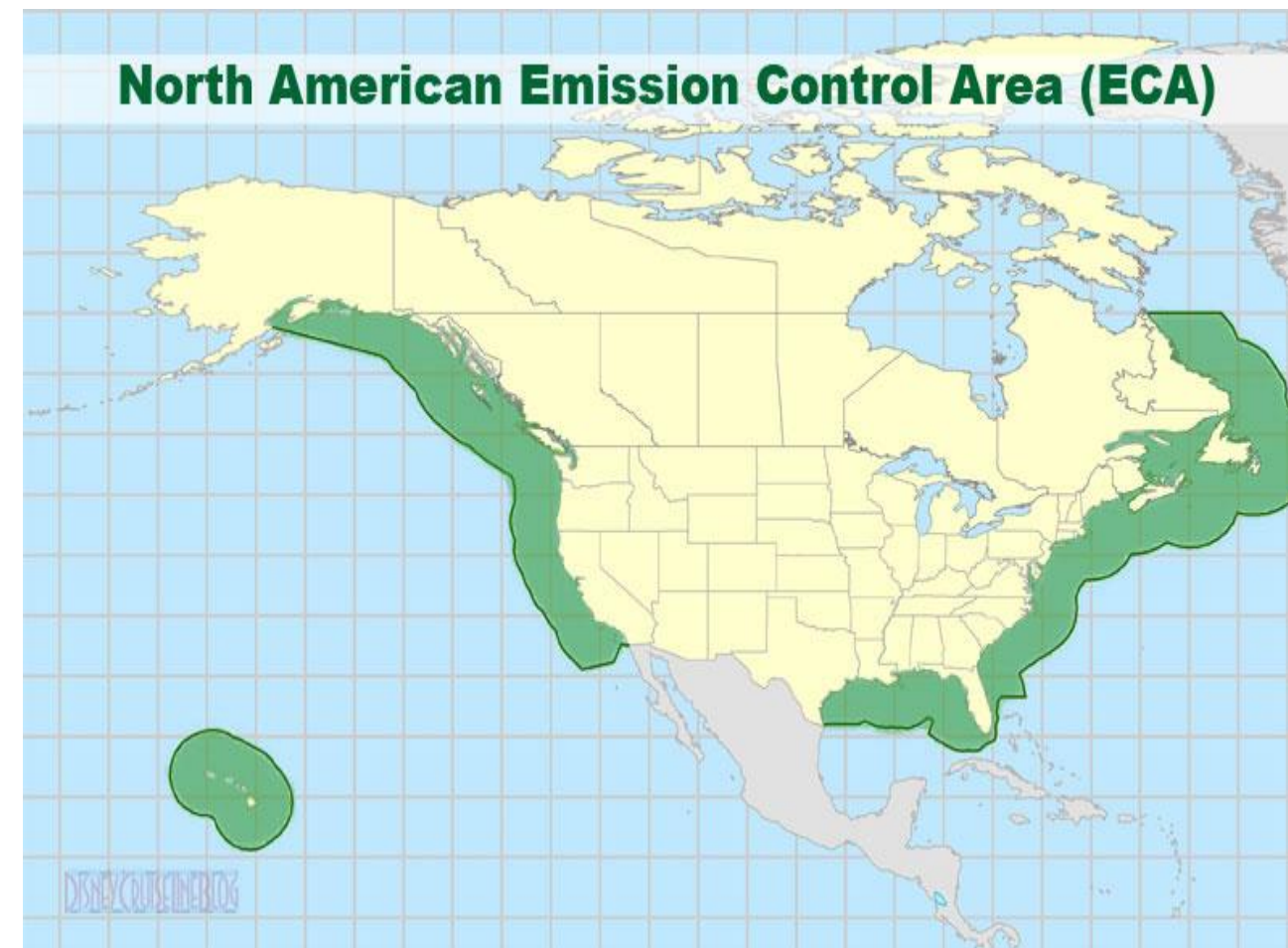
- Potential huge fuel savings compared with diesel
- Future of fuel prices will spark LNG demand
- USA shale investments create huge NG surpluses

In 2016 are the economic and regulatory forces that justify LNG as fuel the same?

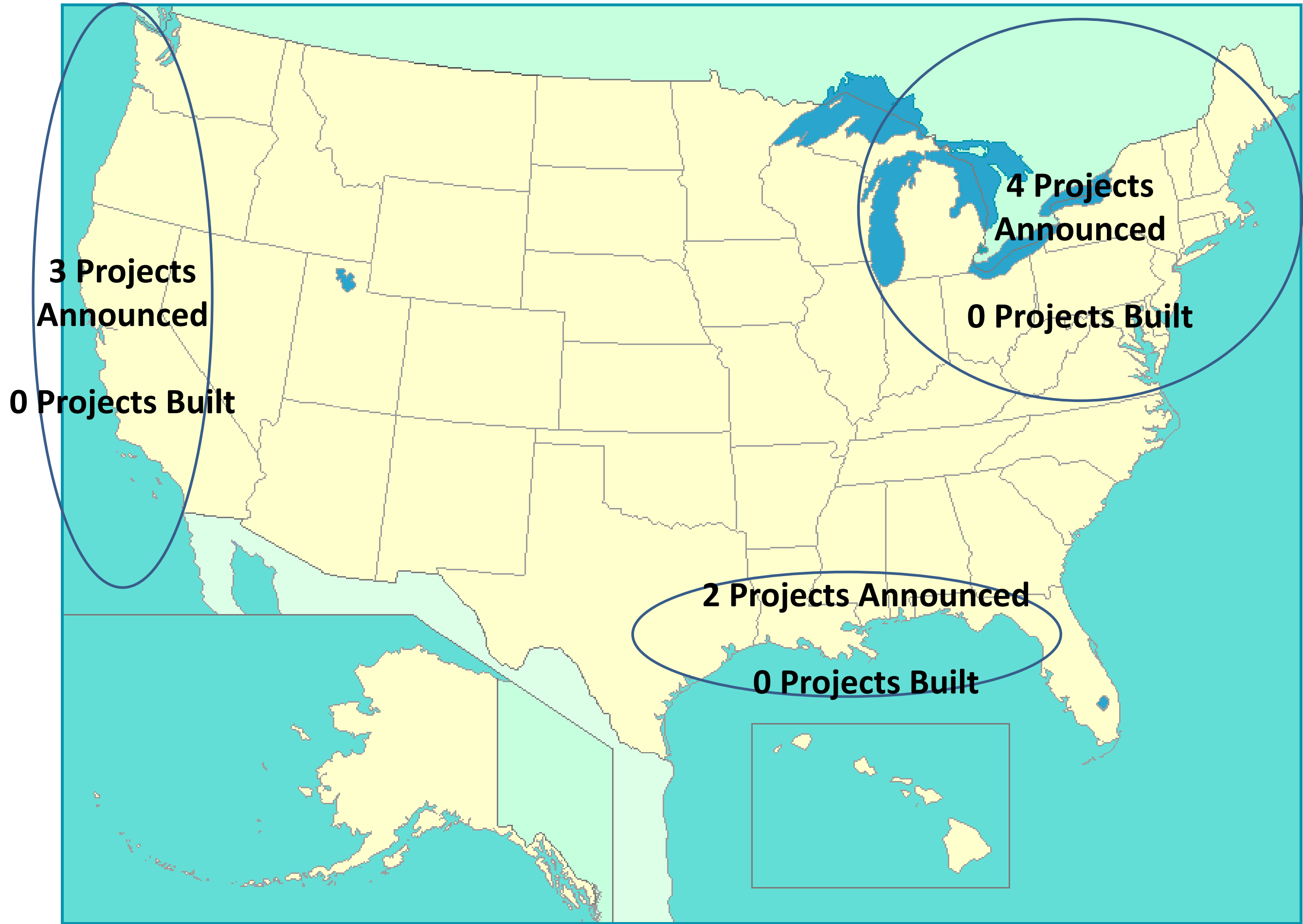


# Will the Strict ECA Regime Remain?

- As of 1 January 2015 ships trading in designated emission control areas have to use on board fuel oil with a sulfur content of no more than 0.10%
- The emission control areas established under MARPOL Annex VI for SO<sub>x</sub> are: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off the United States and Canada); and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands).
- Outside the emission control areas, the current limit for sulfur content of fuel oil is 3.50%, falling to 0.50% on and after 1 January 2020. **The 2020 date is subject to a review, to be completed by 2018, as to the availability of the required fuel oil. Depending on the outcome of the review, this date could be deferred to 1 January 2025.**



# 2106 Project Uncertainty Remains



# 2016 LNG Fueled Vessels

## “North American Snapshot”

- Harvey Gulf International – Currently operating DF offshore vessels
- Tote Maritime – Currently operating DF Containerships
- BC Ferries – Currently operating DF Ferries
- Transport Desgagne – Awaiting Delivery of DF Product Tanker
- Crowley Maritime - Awaiting Delivery of DF ConRo vessels
- Carnival Cruise Lines – Committed to DF Passenger Ships
- Matson – Committed to DF Containerships for Jones Act Fleet



# Who's Bullish on LNG as a Marine Fuel?

- Lloyd's Register, predicts there will be 653 LNG-powered ships of all types by 2025, including 25 cruise ships. Reporting the result of a study, it predicted that LNG will account for 11% of cruise ships built during the period, the highest adoption rate of any type of vessel.
- “DNV GL’s assessment of the existing rules, standards and guidelines shows that from a legal point of view, there are no remaining major showstoppers for the use of LNG as fuel - both for seagoing vessels and inland waterway vessels – nor for the deployment of LNG bunker facilities,” Martin Layfield, global segment leader of the Gas Value Chain, DNV GL – Oil & Gas.

## **A Need for Harmony in North America**

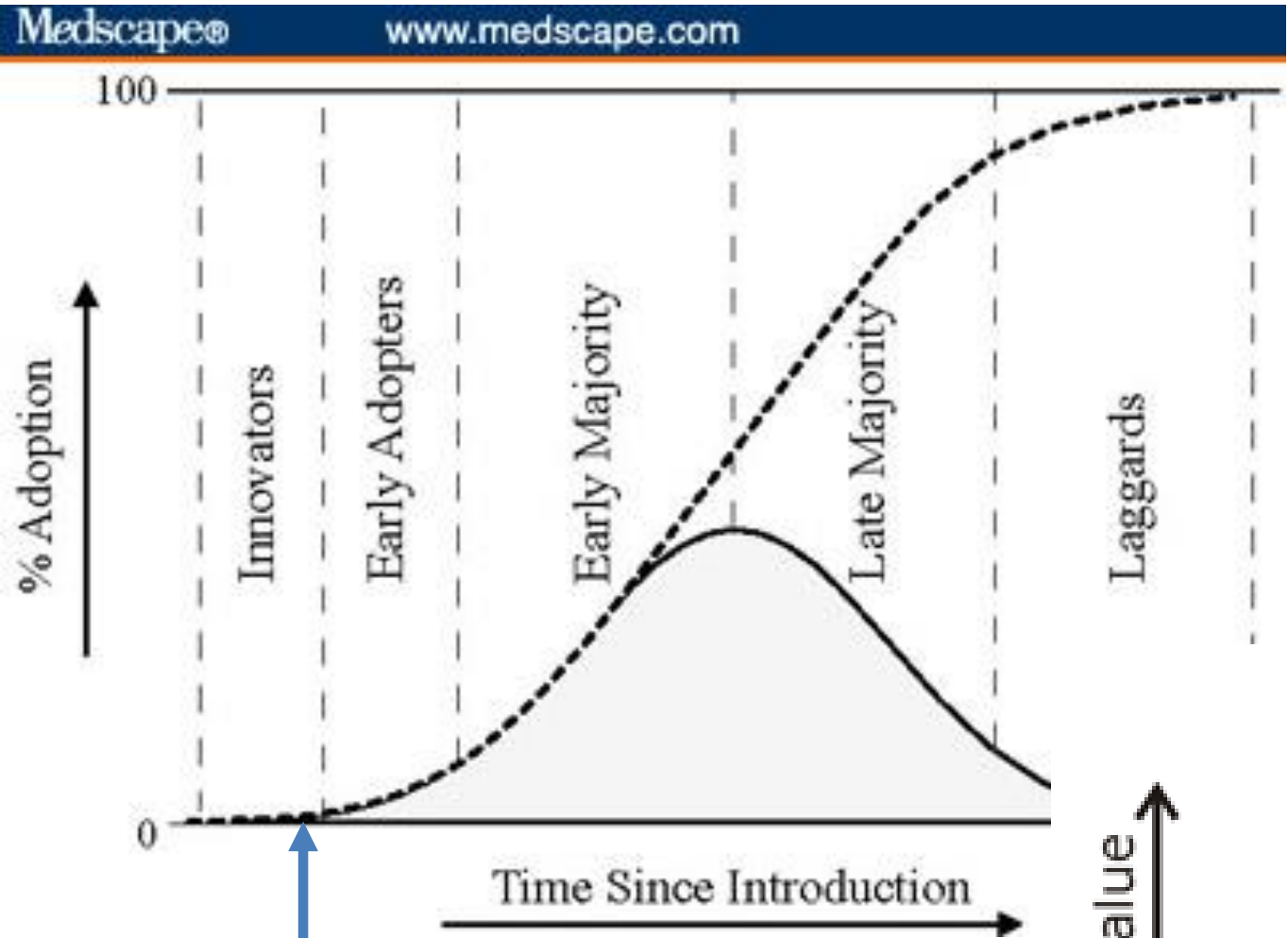
- **International Maritime Organization – IGF Code takes effect 1/1/17**
- **USCG issues Policy Letters 1-15 and 2-15**
- **33 CFR 127 Alternative**
- **USCG NVIC 01-11 Alternative**
- **USCG LNG NCOE Outreach and Guidance**
- **Updated NFPA 59A**
- **Local and State Stakeholders Input**
- **Various ASTM working groups have been formed and standards are being developed**



The background of the slide features three bald eagles in flight against a clear blue sky. One eagle is in the upper right, another in the lower left, and a third is partially visible in the center. The eagles are depicted with detailed feathers and sharp beaks, conveying a sense of power and freedom.

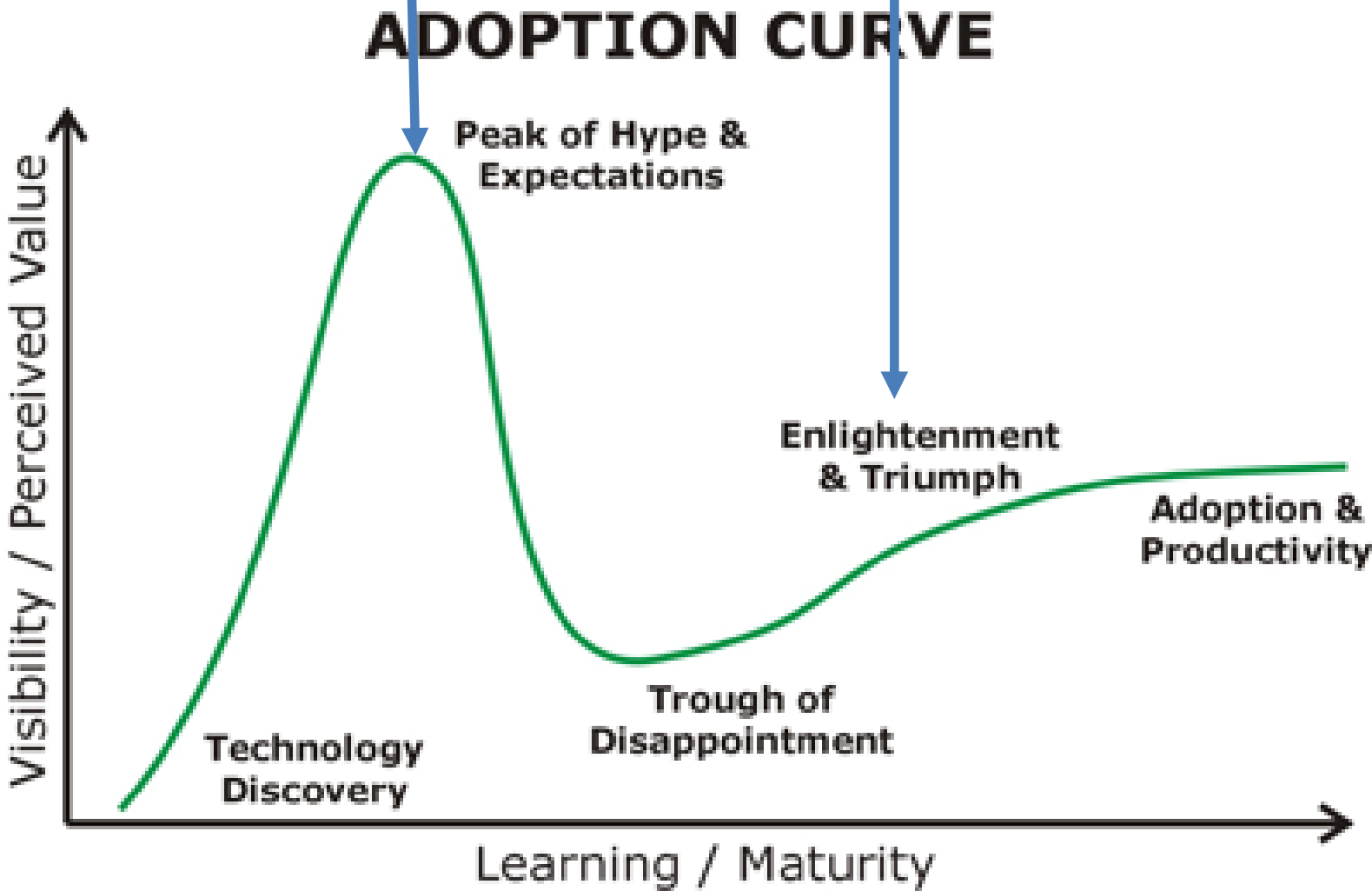
# **Have the Drivers and Barriers to Adoption Changed?**

# LNG Domestic Adoption



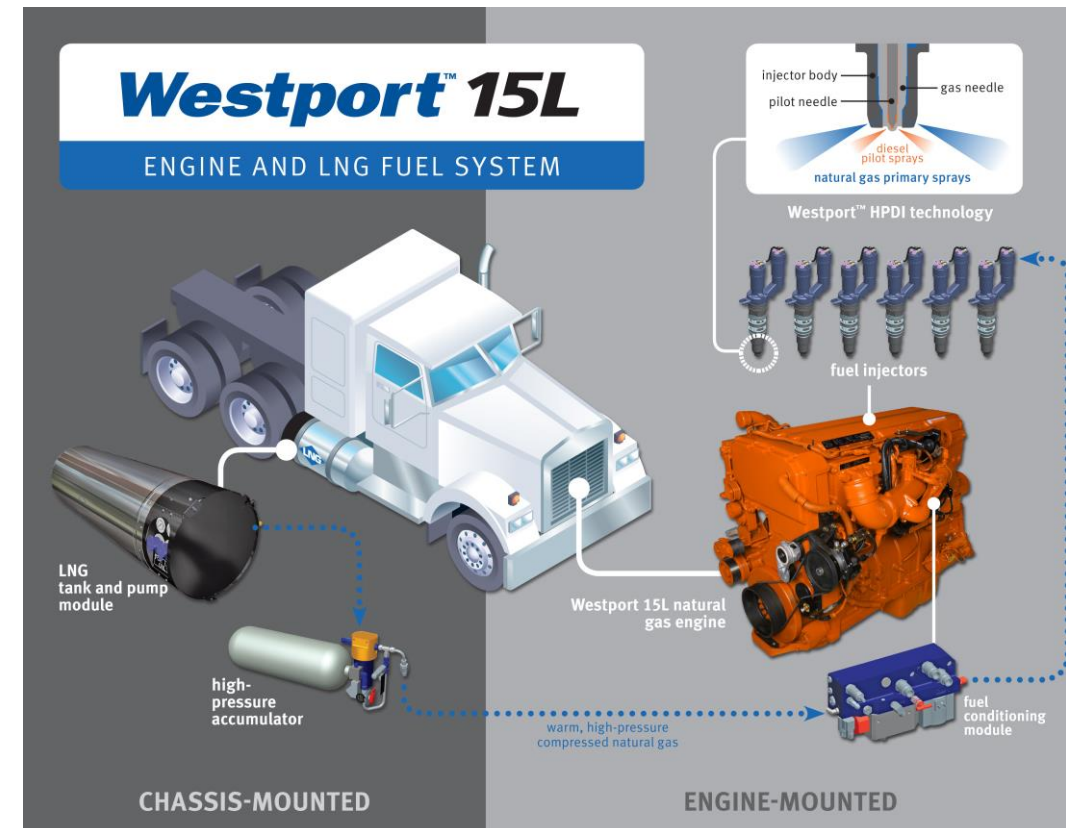
Early Days  
(still)

LNG (2014) LNG Today?



# Barriers to Adoption

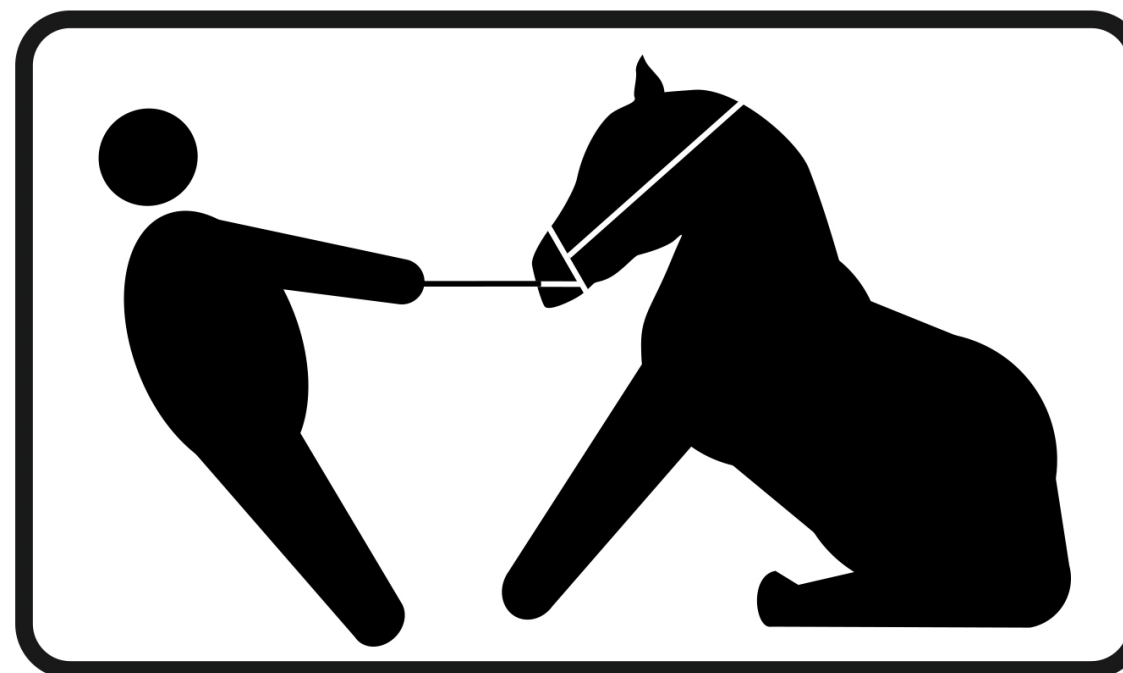
## Technology



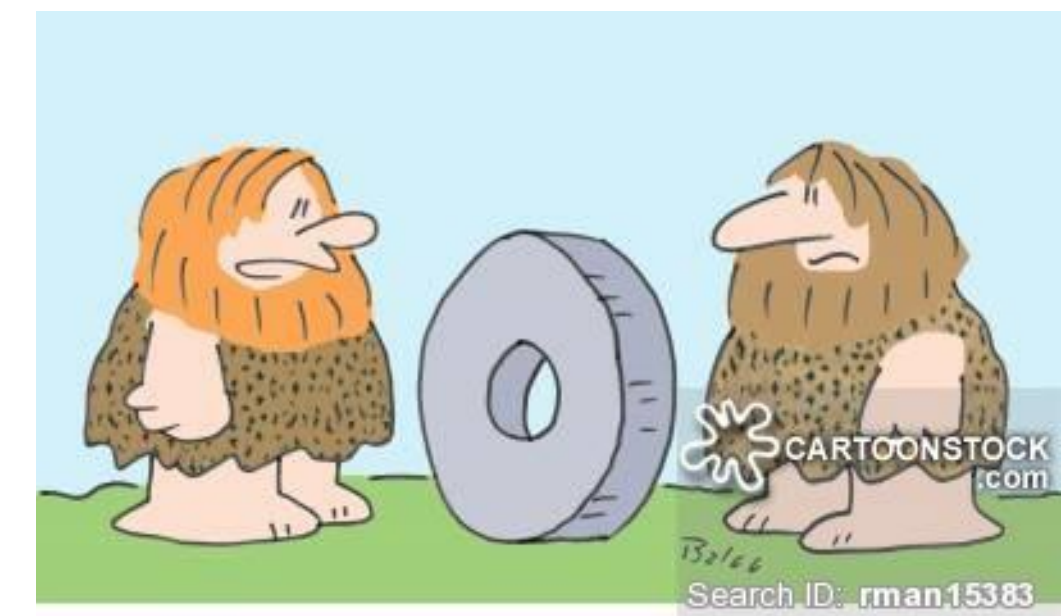
## Lack of Infrastructure



## Inertia



## Regulations

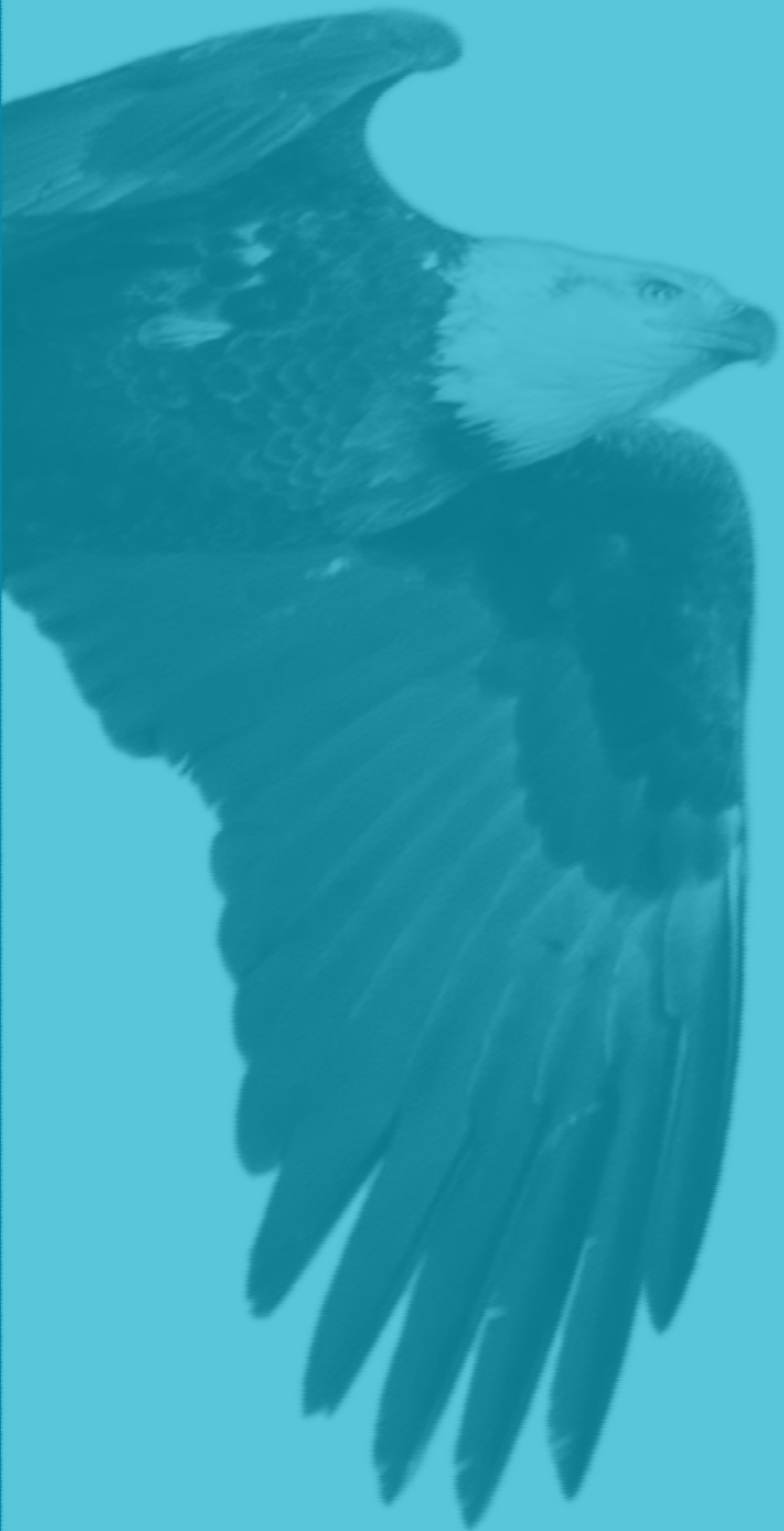


"Sure, it's a great invention, but does it comply with all government guidelines?"

# Infrastructure, Infrastructure, Infrastructure

*The biggest challenge for the growth of LNG-powered cruising is the rudimentary infrastructure for distributing it at ports. “We have to build it,” Tom Strang, Senior Vice President for Maritime Affairs at Carnival said of an LNG delivery infrastructure. “*

Travel Weekly, 9/11/16





- EMG is a private investment firm with \$13.5. billion under management.
- EMG targets equity investments of \$150 million to \$1 billion in the energy and minerals sectors focused on hard assets that are integral to existing and growing markets.



- Eagle LNG Partners is wholly owned by Ferus Natural Gas Fuels, a portfolio company of the Energy Minerals Group (EMG).



- Eagle LNG is developing end-to-end LNG solutions for small-scale export and domestic consumption.

# Eagle Jacksonville Terminal

VESSEL LOADING DOCK

STORAGE TANK

TANKER & ISO LOADING

1<sup>st</sup> of 3 "TRAINS"

105

Zoo Pkwy

105

Zoo Pkwy

105

# Eagle Maxville Facility



# Eagle Talleyrand Terminal



Two bald eagles are shown in flight against a clear blue sky. One eagle is in the foreground, flying towards the right, with its wings spread wide. The other eagle is in the background, also flying towards the right, slightly higher and further away. Both eagles have white heads and necks, and dark brown bodies and wings. The text "Thank you!" is centered in the middle of the image.

Thank you!

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