

# LNG Producer-Consumer Conference 2014

## Session 4: LNG Technology Developments



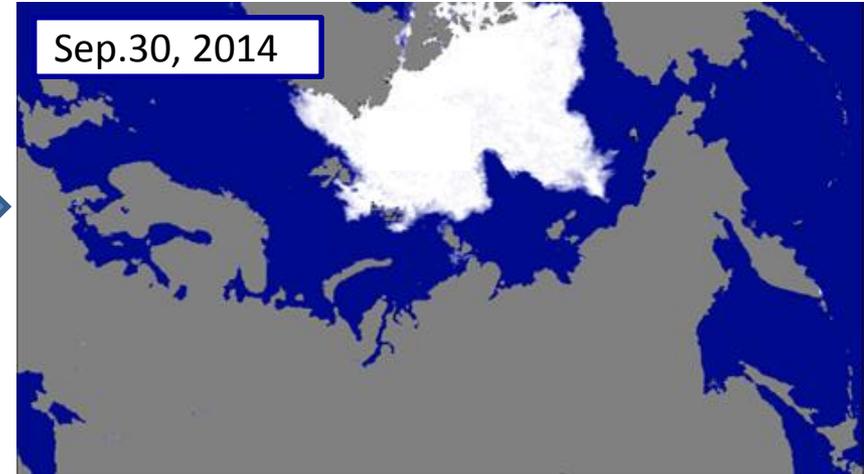
# LNG Trade through Northern Sea Route

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# Navigation through Northern Sea Route

- Northern Sea Route was opened by receding Ice



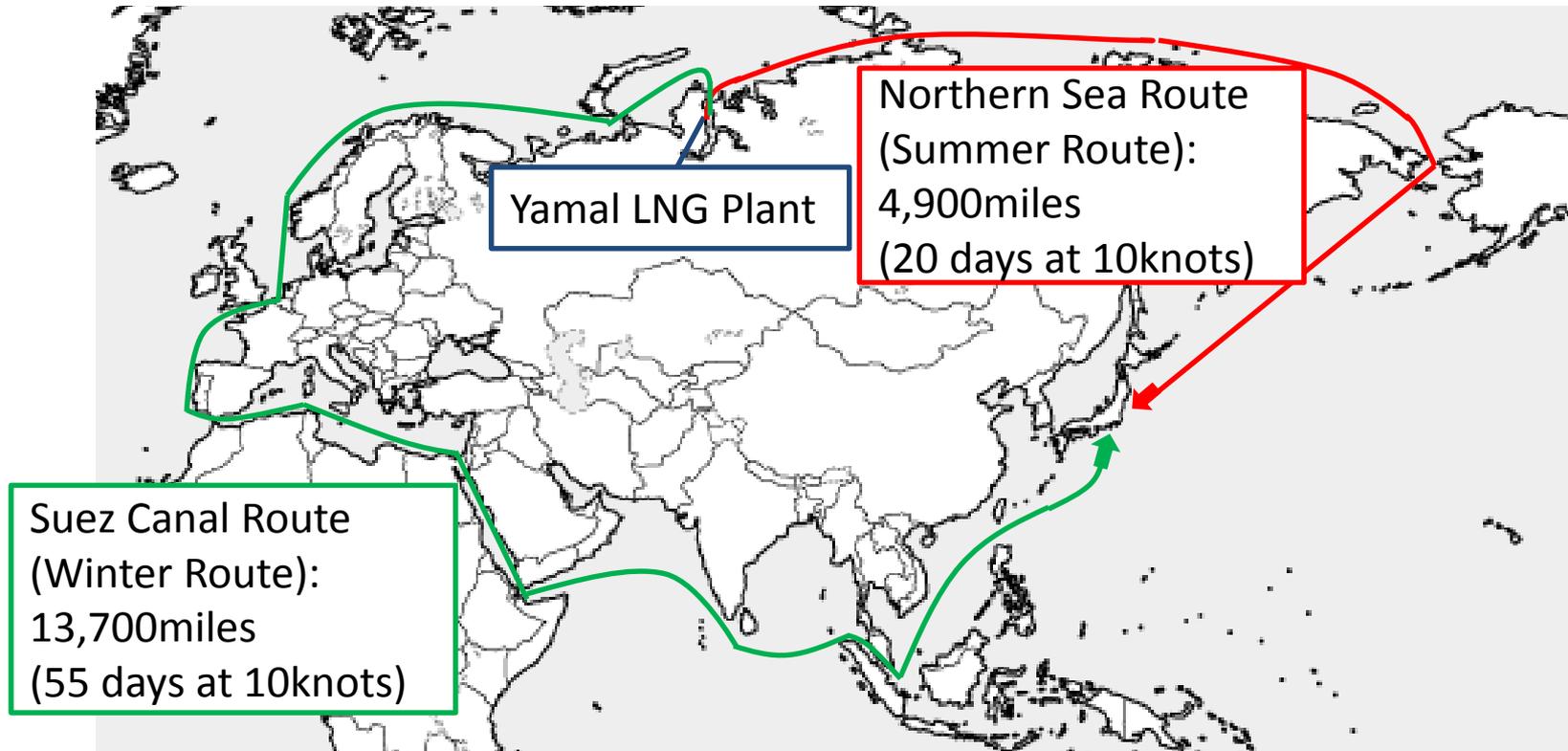
(Source: IARC-JAXA)

- 46 voyages (2 voyages for LNG) in 2012
- 71 voyages (2 voyages for LNG) in 2013
- Navigation through Northern Sea Route is allowed
  - generally in summer (from July to November)
  - generally with support by icebreakers
  - with permission by Northern Sea Route Administration, Russia



(Icebreaker "Yamal",  
Rosatomflot)

# LNG Trade through Northern Sea Route



**Icebreaking LNG Carriers for Yamal LNG Project**  
- capabilities of sailing in icy seas with maximum 2.1m ice thickness without assistance by icebreakers

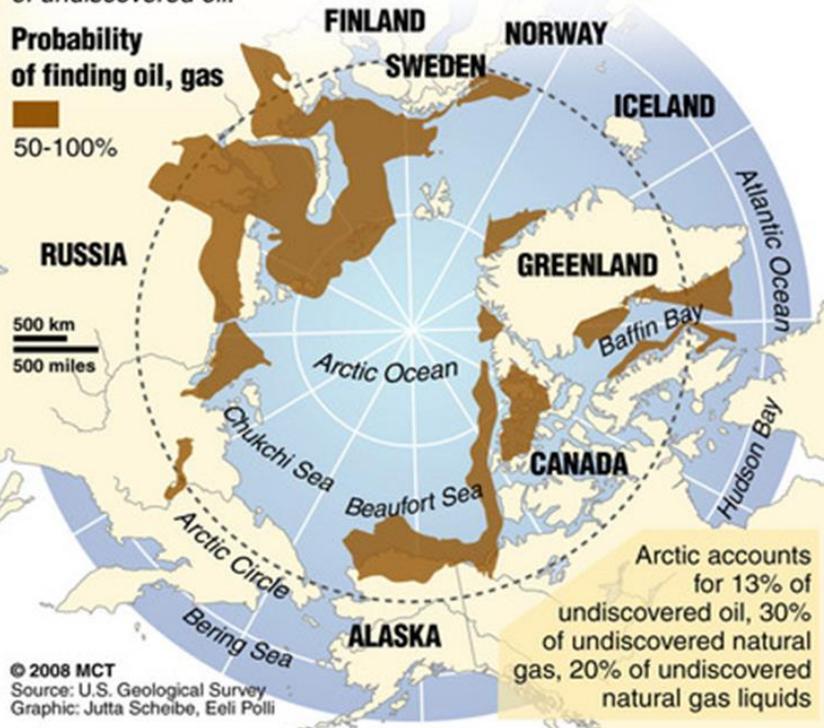
# Merit of Northern Sea Route

## Oil and gas in the Arctic

Area north of the Arctic Circle has an estimated 90 billion barrels of undiscovered oil.

Probability of finding oil, gas

50-100%



Arctic accounts for 13% of undiscovered oil, 30% of undiscovered natural gas, 20% of undiscovered natural gas liquids

## ➤ Enable to Access Energy Resources in the Arctic

( according to U.S. Geological Survey, 17% of discovered natural gas 30% of undiscovered natural Gas in the Arctic )

## ➤ Reinforce Energy Security for LNG Importers

(by bypassing Suez canal, Somalian coast, Malacca straits)

## ➤ Transportation Cost Reduction

# The Way Forward:

## to Enhance Utilization of Northern Sea Route



### **Increase in Number of Icebreakers/Icebreaking LNG Carriers**

- 5 existing nuclear-powered icebreakers in operation by Rosatomflot, Russia
- 3 new nuclear-powered icebreakers to be built in Russia
- 15 icebreaking LNG carriers for Yamal LNG project to be built in Korea



### **Safe Operation of Vessels in the Arctic**

- Development of international safety regulations for operation in the Arctic
- Increase in number of experienced/trained crew



### **Infrastructure Development**

- Development of service facilities along Northern Sea Route
- More accurate navigation charts required (insufficient depth measurement)
- Development of ice forecasting technologies (ice thickness measurement)