



MARAD ARCTIC TRANSPORTATION CONFERENCE

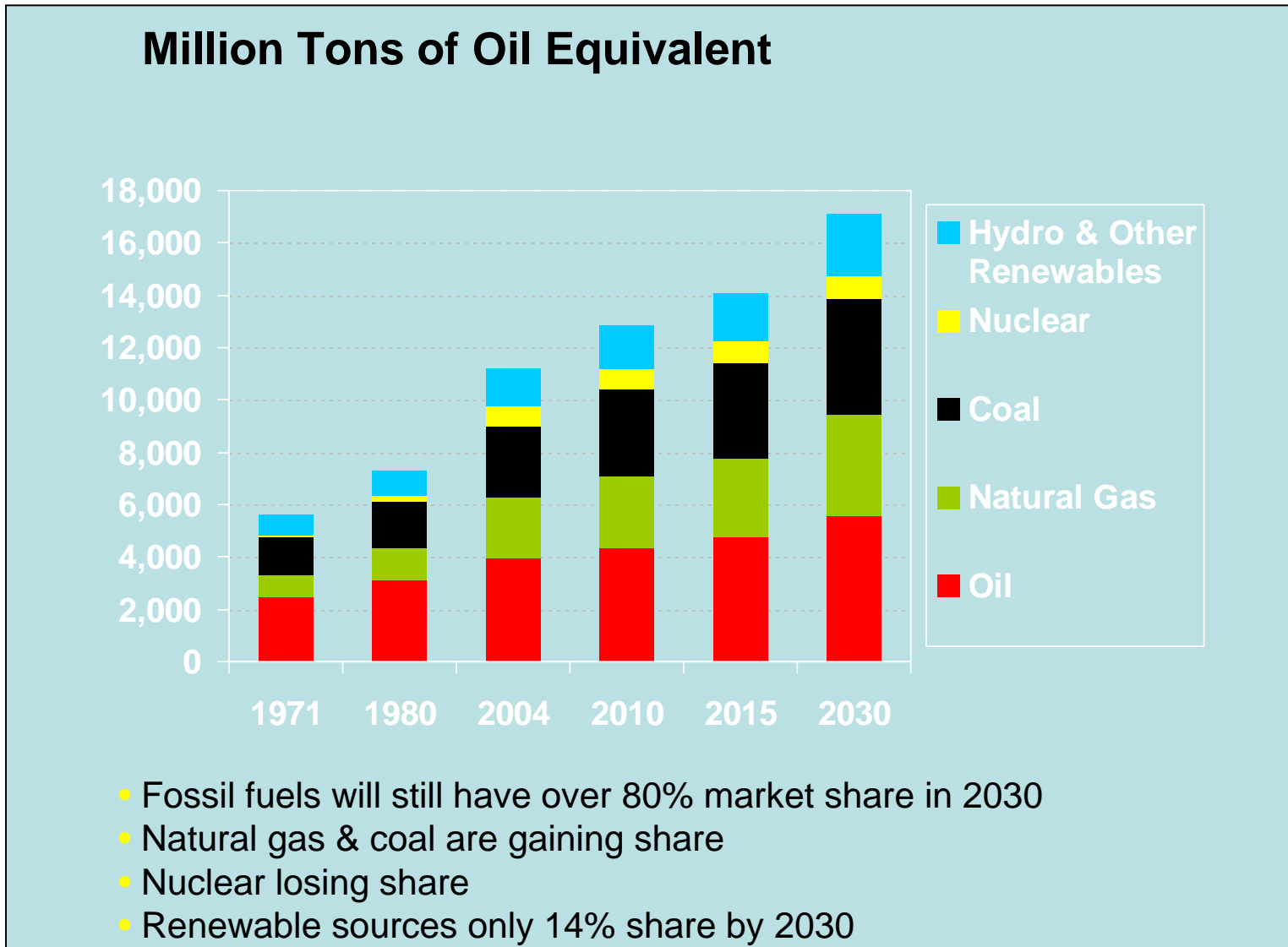
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# Circum-Polar Developments in Oil and Gas

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# World Energy Demand Outlook



Source: International Energy Agency, "2006 World Energy Outlook"

ConocoPhillips

# Resource extraction is more of a driver than climate change



- Historically the Arctic Regions of our planet have attracted human activity in relation to resource development
  - Fishing and Whaling, Greenland, Canada, Alaska, Russia
  - Coal, Svalbard
  - Lead-Zinc, Greenland Canada and Alaska
  - Nickel, Russia and Canada
  - Iron Ore, Canada
  - Oil and Gas, Russia, Alaska, Canada, Norway

# Arctic Shipping is Not New

- Svalbard Coal
  - Exporting to Europe for almost 100 years ~2 million tons/yr
- Zinc/Lead
  - Red Dog, Alaska – Largest Zinc Mine in the world close to 1 million tons/yr
  - Other Lead/Zinc Mines at Polaris, Little Cornwallis Island, Canada; Black Angel, Greenland, and Nanisivik, Baffin Island
  - Voisey Bay, Nickel Mine, Labrador, Canada
  - Norilsk Nickel, Russia
  - Etc
- North Slope Oil
  - since mid 1970s – peaked at 2 million bbls/day in 1988, still producing ~850,000 bbl/day
- Russian Arctic Oil and Gas
  - Marine exports with ice-breaking tankers in early stages
- Resupply and logistics for these developments and for Arctic Communities

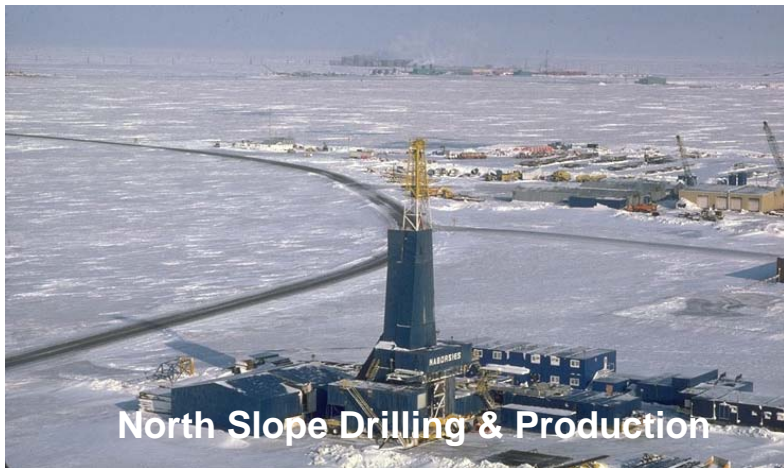
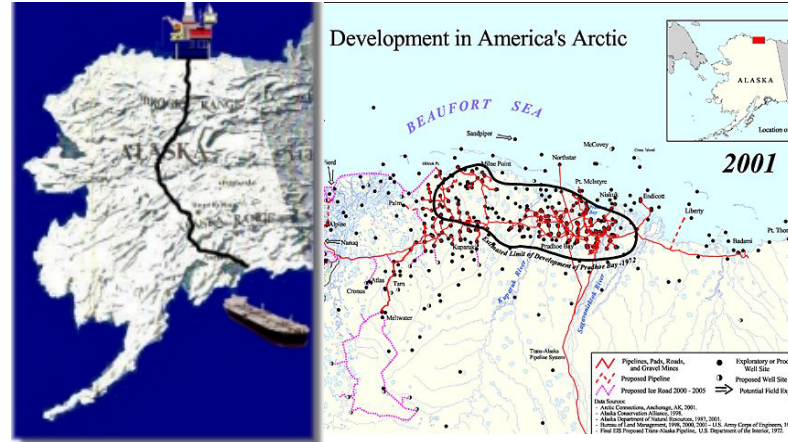
# Arctic Oil & Gas Developments

- Starting in the 1960's there have been some ongoing developments in the Alaskan and Canadian Arctic
  - The North Slope Alaska
    - Tanker *Manhattan* N.W Passage voyages
    - Prudhoe Bay Oil Developments
    - TAPS – trans-Alaska pipeline system
  - Canadian Beaufort Sea
    - Dome Petroleum and Gulf Canada exploration
  - Canadian Arctic Islands
    - Oil and gas exploration
    - Arctic Pilot Project – LNG to eastern seaboard
    - Small scale pilot oil export – Bent Horn

# Alaska North Slope Oil



Icebreaking tanker Manhattan



North Slope Drilling & Production



Polar Tankers shipping south from Valdez

# Beaufort Sea Drilling Units

## 1970s-1980s



Drillships – McKinley Bay



Molikpaq Drilling Caisson



Kulluk Circular Drillship



SDC Drilling Unit

# Canadian Beaufort Sea Support Icebreakers- 1970s-1980s



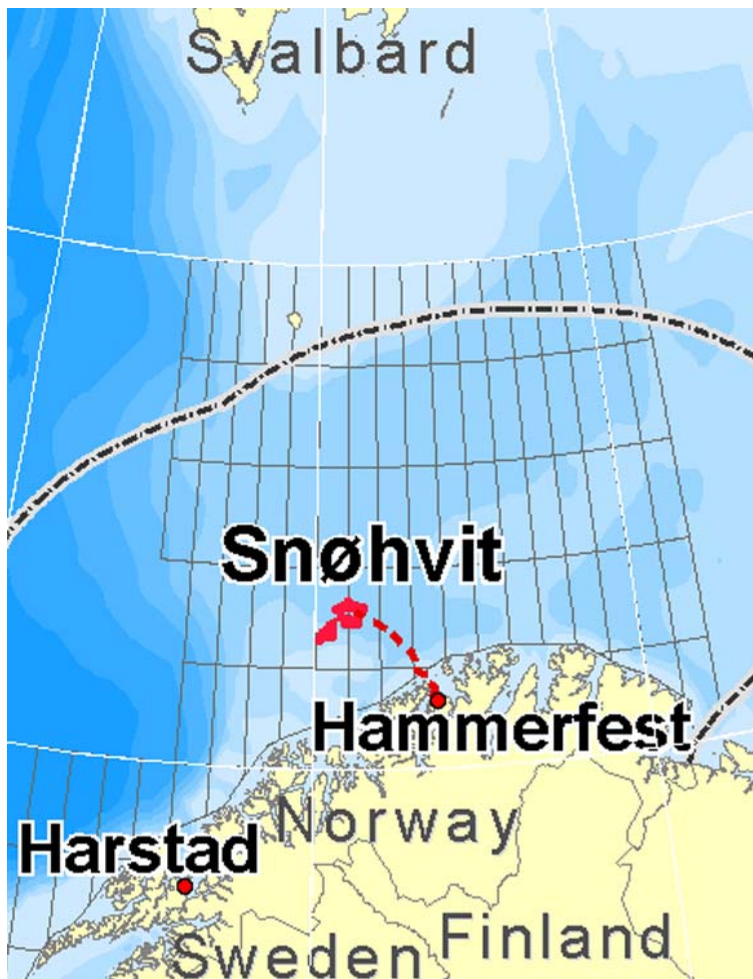


# Current & Future Arctic Oil & Gas Developments

- US Beaufort Sea
- Norwegian and Russian Barents Sea
- Russian Timan-Pechora Sea
- Canadian Beaufort Sea
- Canadian Arctic Islands
- US Chukchi Sea
- Russian Kara Sea

# BARENTS SEA

# Snøhvit LNG – Hammerfest Norway

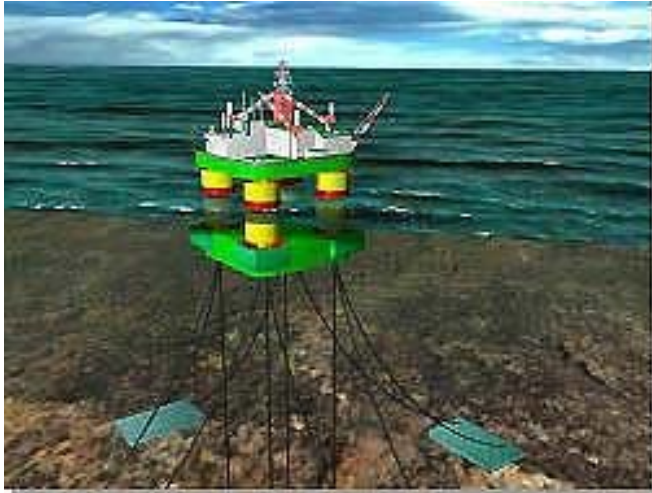


# Shtokman Gas Development Project



- The Shtokman field is one of the world's largest natural gas fields
- The field lies in the central part of Russian sector of the Barents Sea, 600 kilometers north of Kola Peninsula.
- Its reserves are estimated at 3.8 trillion cubic meter of natural gas and more than 37 million tons of gas condensate.
- Natural gas reserves were discovered in 1988, but the field is only now being developed owing to extreme Arctic conditions.

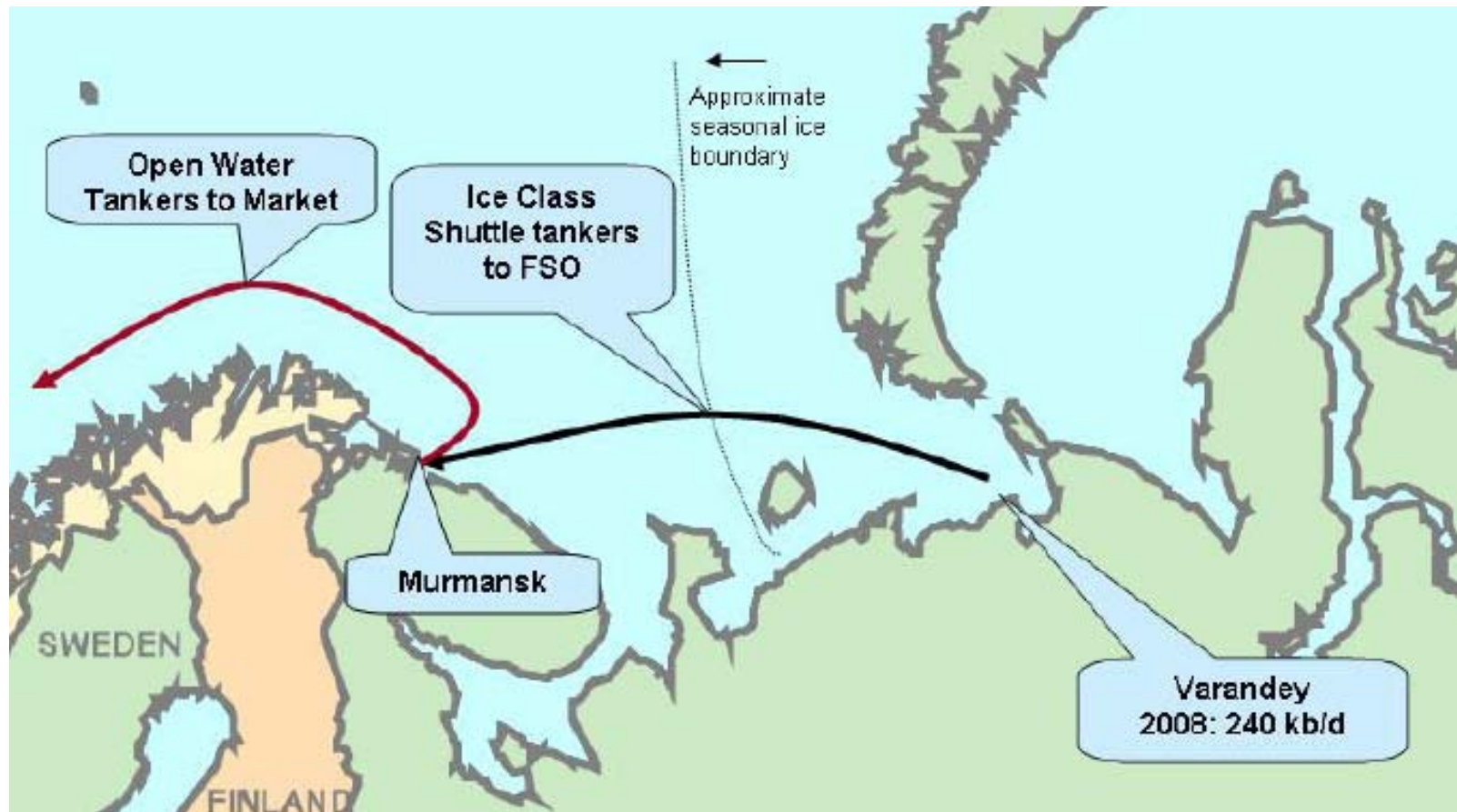
# Some Unique Elements for Shtokman Development



- Gazprom, StatoilHydro and Total, partners in the Shtokman gas field development are planning to use a number of ice-resistant, disconnectable Tension Leg Platforms as well-head platforms.
- In addition the plan is to provide power for the whole development using a barge-mounted nuclear power plant

# TIMAN-PECHORA SEA ConocoPhillips-Lukoil Developments

# Varandey Oil Export Project



# FOIROT with Loading Arm Installed

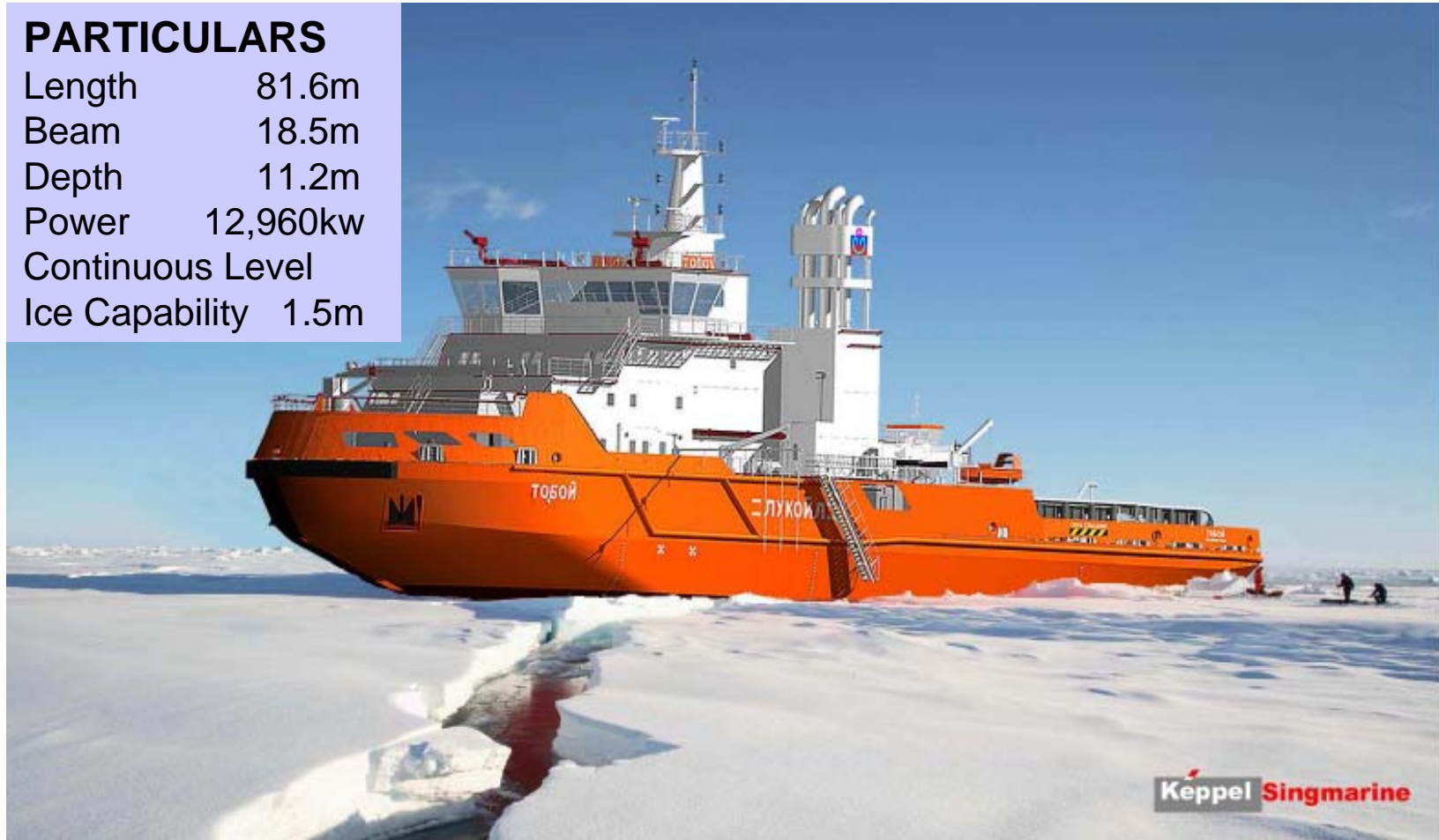




# MULTIPURPOSE ICEBREAKING SUPPLY VESSEL

## PARTICULARS

Length	81.6m
Beam	18.5m
Depth	11.2m
Power	12,960kw
Continuous Level	
Ice Capability	1.5m



# MULTIPUROSE AUXILLIARY ICEBRREAKER



## PARTICULARS

Length	100.0m
Beam	21.7m
Depth	13.5m
Power	23040kw
Continuous Level	
Ice Capability	1.7m

**ConocoPhillips**

# Varandey Project Icebreaking Tankers

- Three (3) icebreaking tankers
  - 70,000 tdwt capacity
  - Under construction in Samsung HI, Koje shipyard
  - Break 1.7m ice continuously
  - 2 x 10MW Tractor Pod propulsion
  - Medium speed diesel prime movers



# Vasily Dinkov at Honningsvaag, Norway

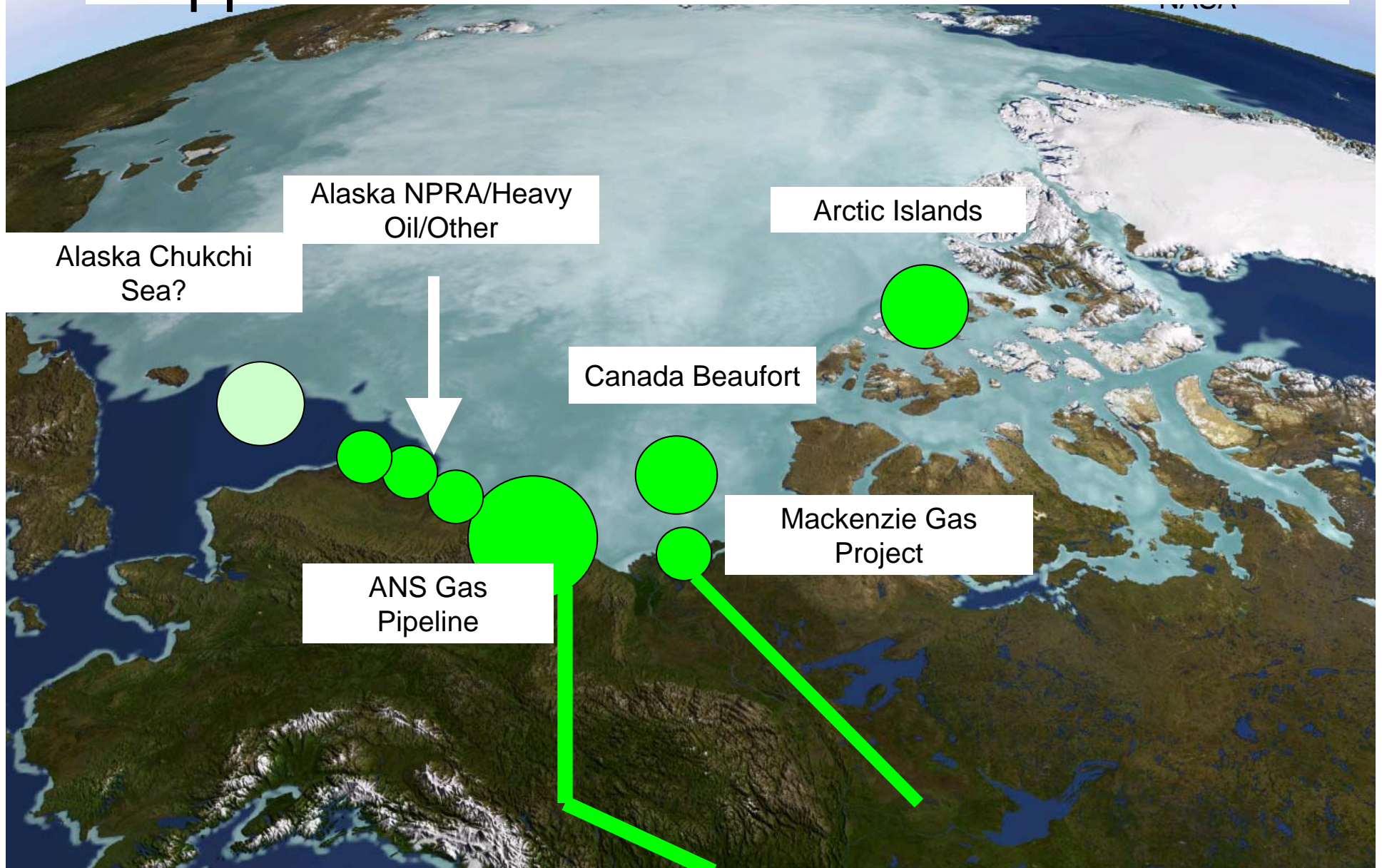


# Vasily Dinkov Icebreaking Bow



# BEAUFORT & CHUKCHI SEAS and CANADIAN ARCTIC ISLANDS

# Major Exploration & Development Opportunities in US and Canadian Arctic



An aerial, high-angle photograph of the deck of a large ship, likely a cargo vessel, viewed from the bow. The deck is a complex network of metal structures, including railings, ladders, and various pieces of equipment. A prominent vertical mast or antenna structure runs down the center of the deck. The ship's hull is visible on the left and right sides, and the ocean extends to the horizon under a clear blue sky. The word "QUESTIONS?" is superimposed in large, white, bold, sans-serif capital letters across the middle of the image.

**QUESTIONS?**