

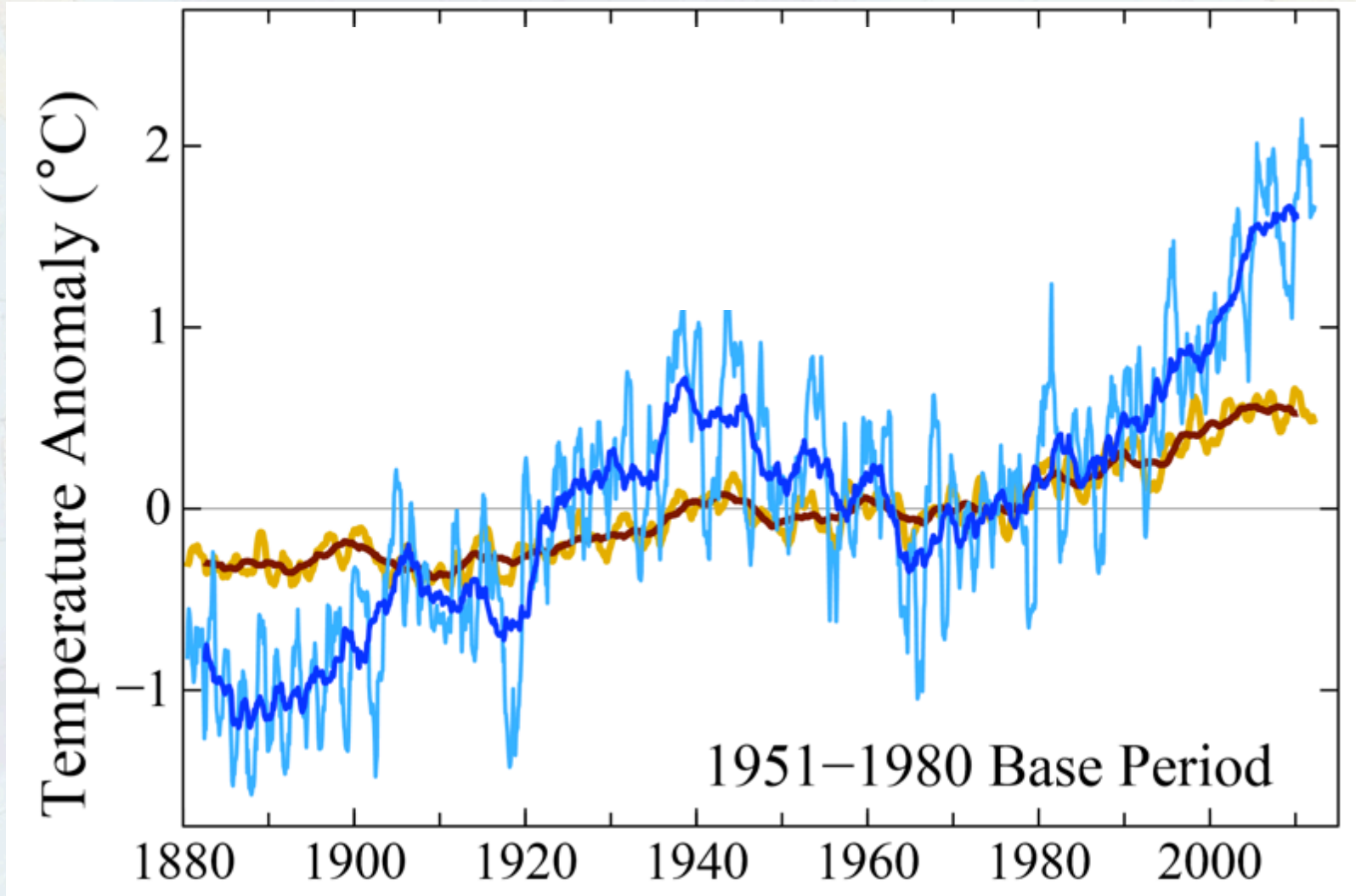
Socio-Economic Drivers of Change in the Arctic

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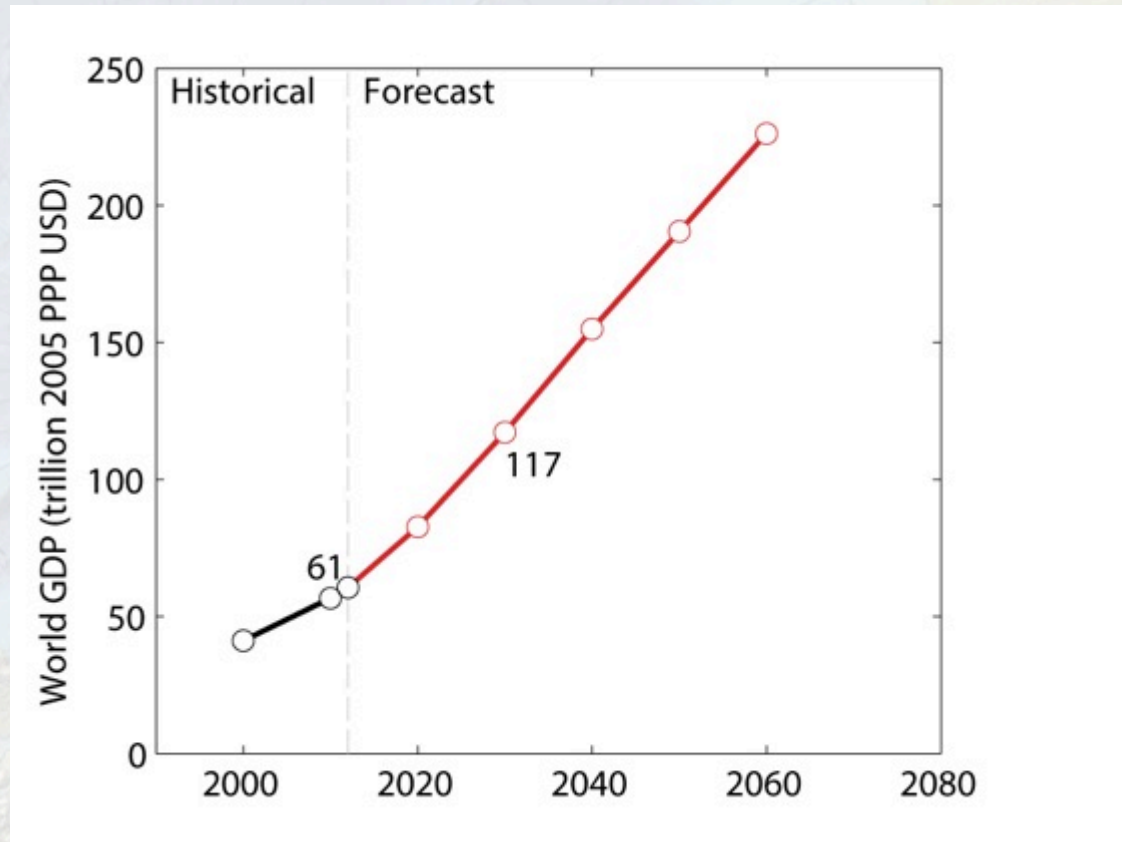
Context



Source: Columbia University, from NASA data

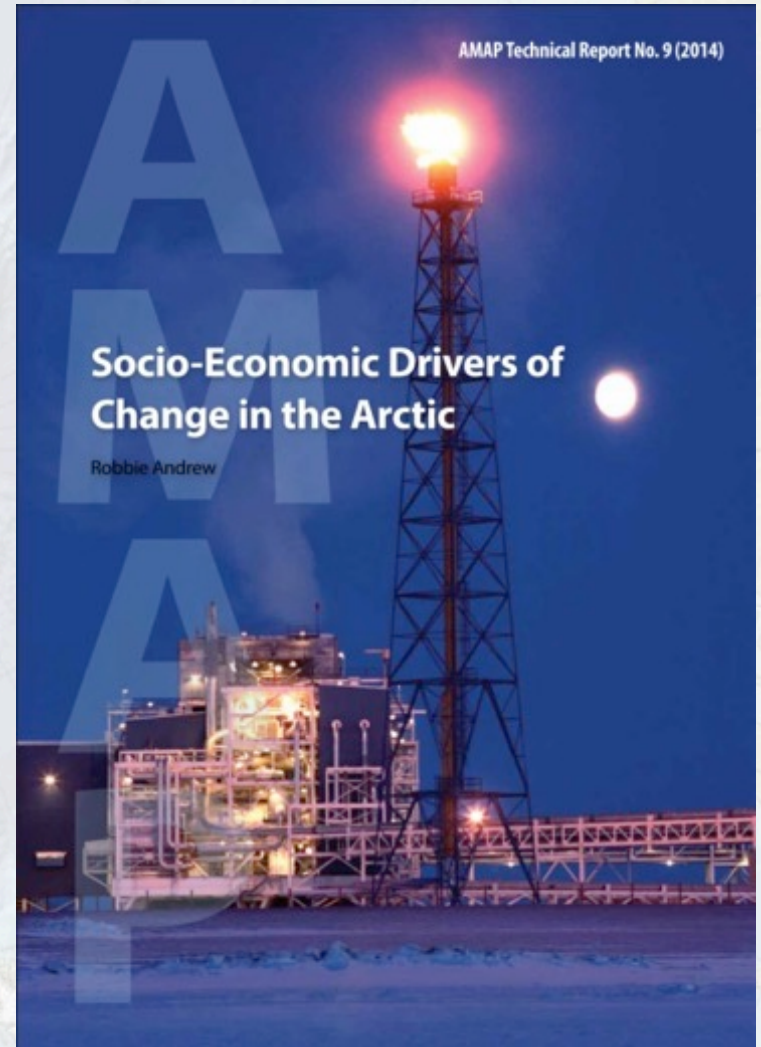
Context

- OECD projections
- GDP to double by 2030
- Enormous growth
- Enormous consequences



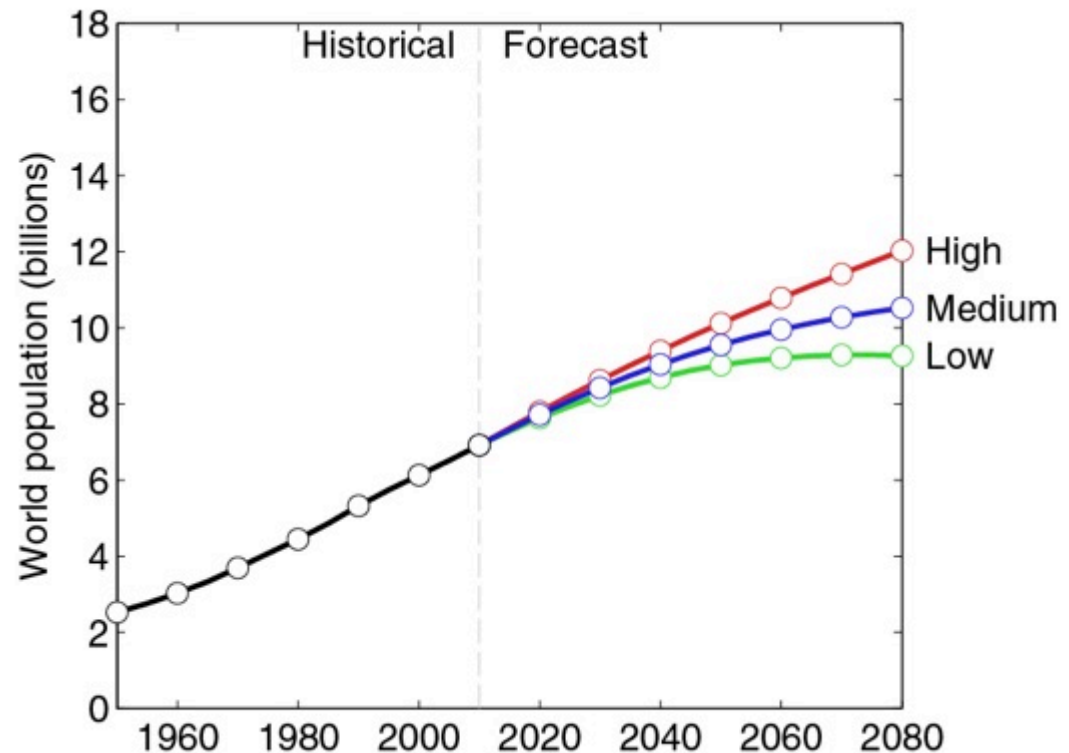
Content

- Population
- Oil and Gas
- Mining
- Shipping
- Tourism



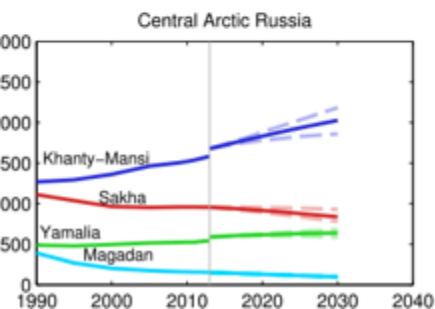
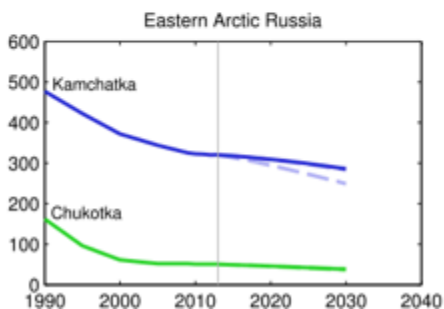
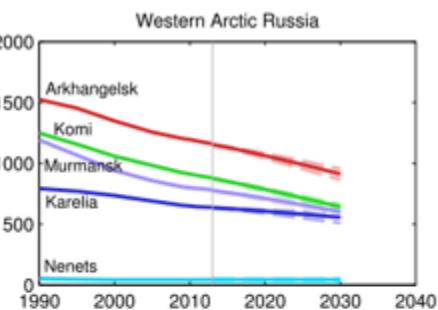
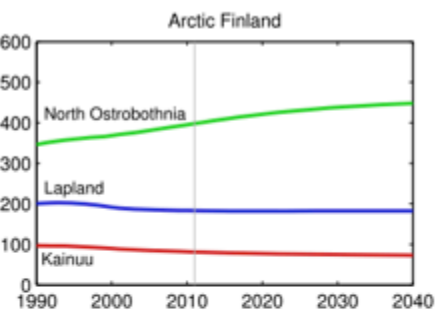
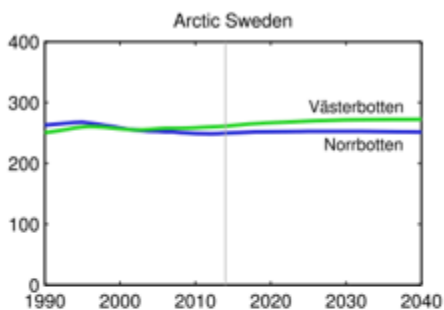
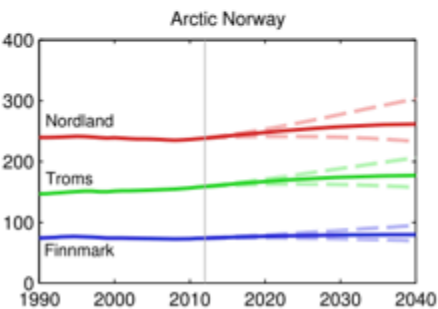
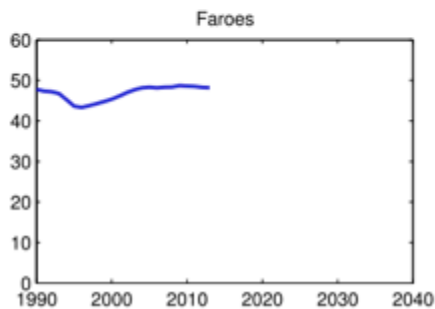
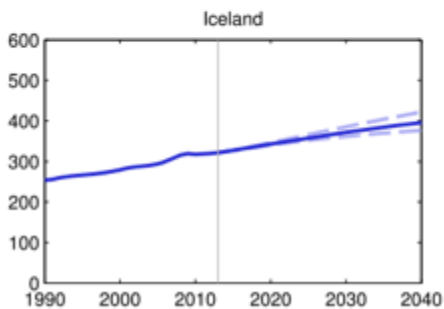
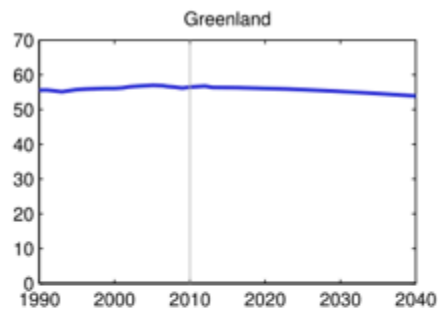
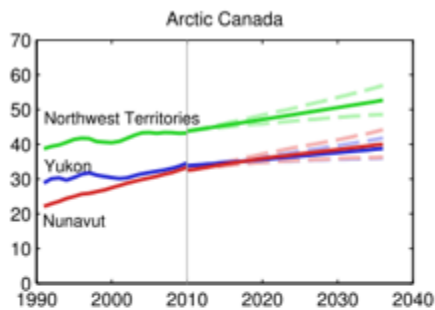
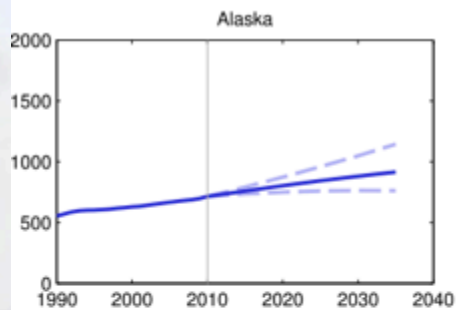
Population

- UN projections
- Still growing in 2080 in Medium projection

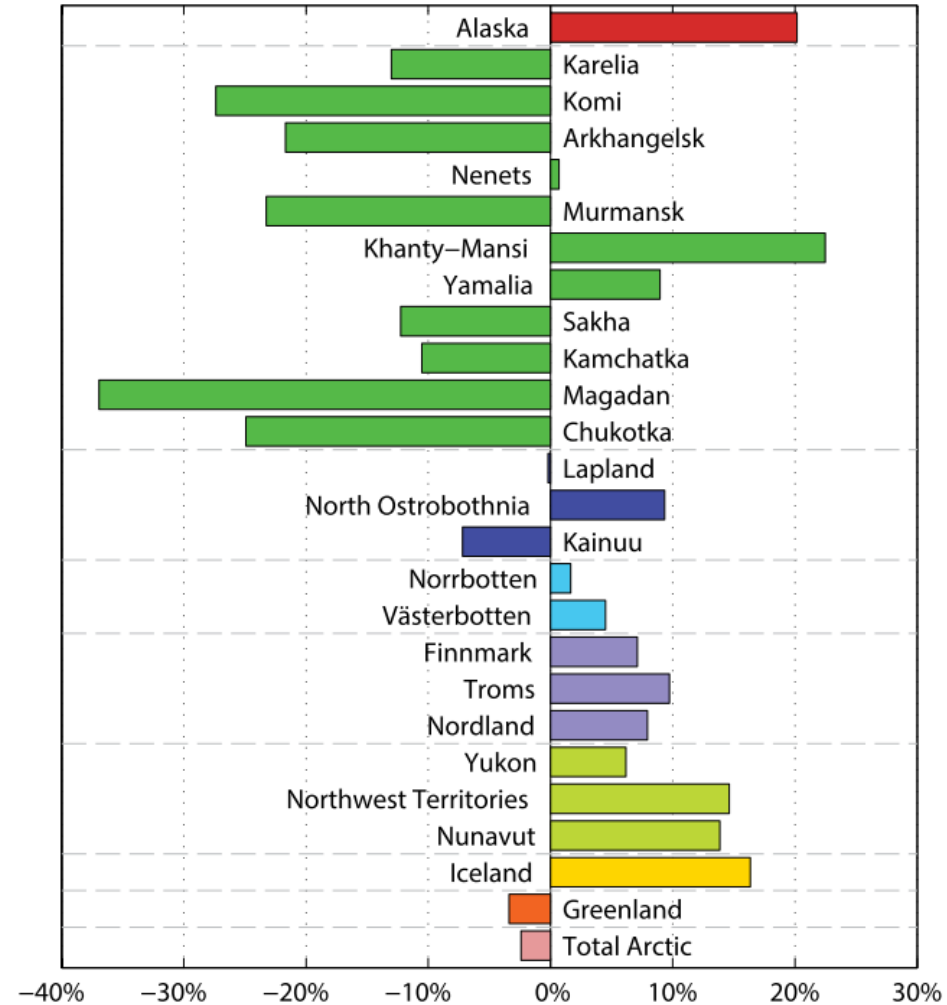


Arctic Population

- Between 4 and 10 million
- Significant out-migration from Arctic Russia following dissolution of USSR
- Urbanisation
- Out-migration of youth
- In-migration of those seeking work
- Boom/bust migration: Alaska, Iceland

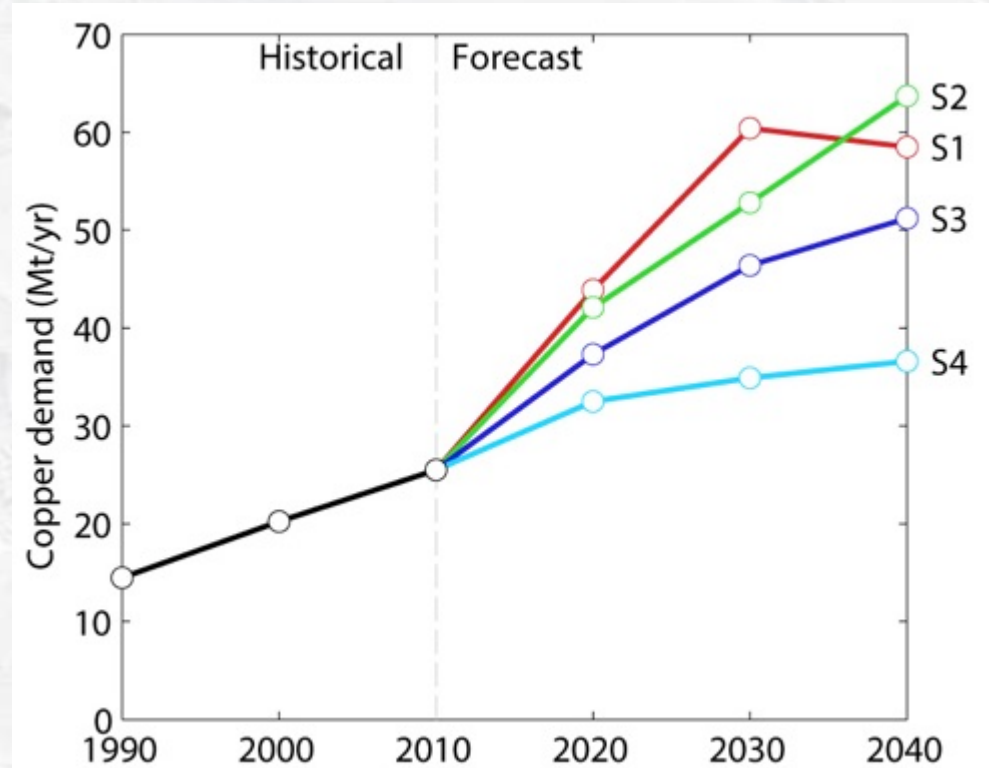


Population: to 2030



Global Demand for Mineral Resources

- POLINARES projections
- Four scenarios
- Two key resources: Steel and Copper



Mining in the Arctic

- Mining occurs in most Arctic countries
- Small operations are uncommon
- Arctic is a significant producer
 - 40% of world's palladium
 - 25% of diamonds
 - 15% of platinum
 - >10% of apatite and tungsten

Mining: Drivers

- Unexploited region
- Reduction in sea ice
- Changing sovereignty
- Securing supply chains
- Strong institutions
- High commodity prices



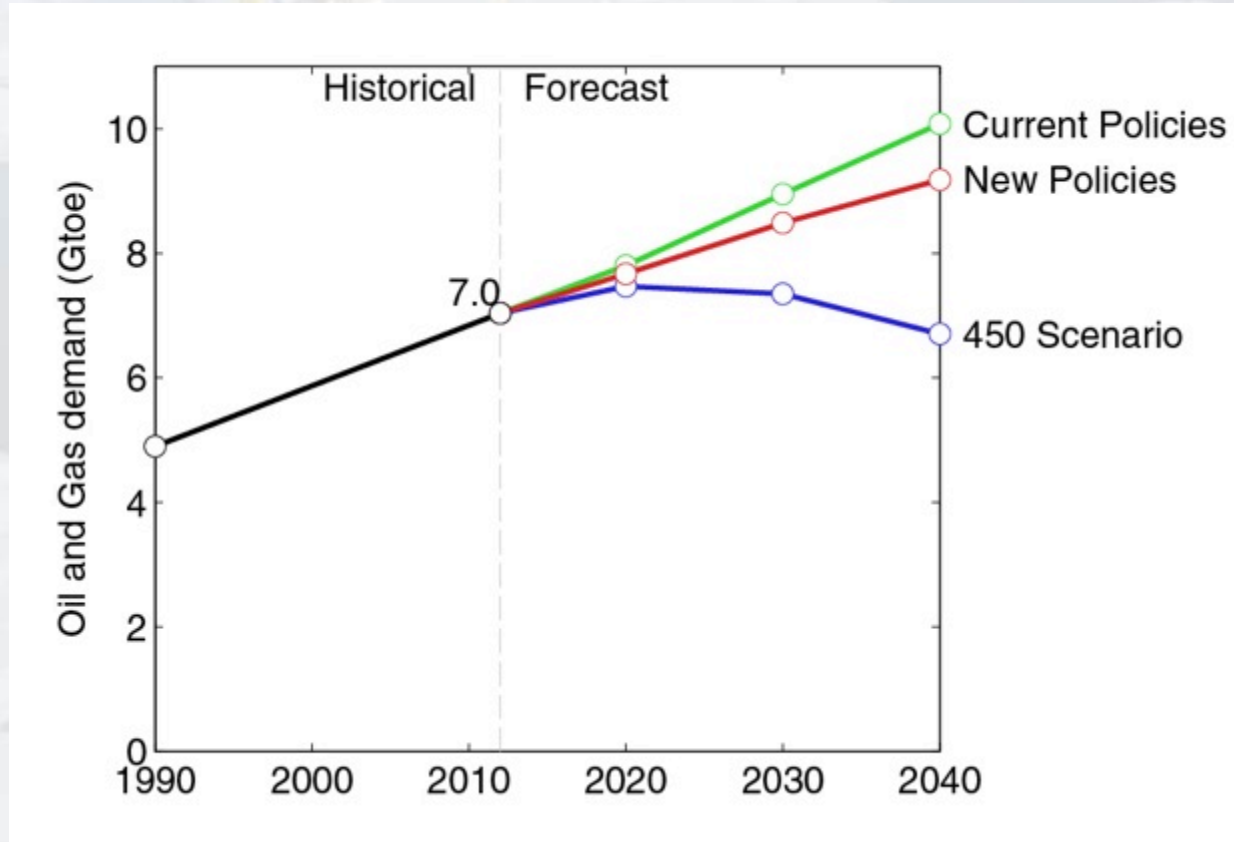
Baffinland's Milne Inlet camp

Mining: Outlook

- Constraints
 - Marine access still difficult; land access becoming more difficult in some areas
 - High costs of establishment, production, and transport require high commodity prices
- Becoming easier (cheaper), but the case for each mine must be treated independently

World Oil & Gas Demand

- IEA projections
- Arctic shares
 - 25% world's gas
 - 10% world's oil
 - Of which 97% Russia & Alaska

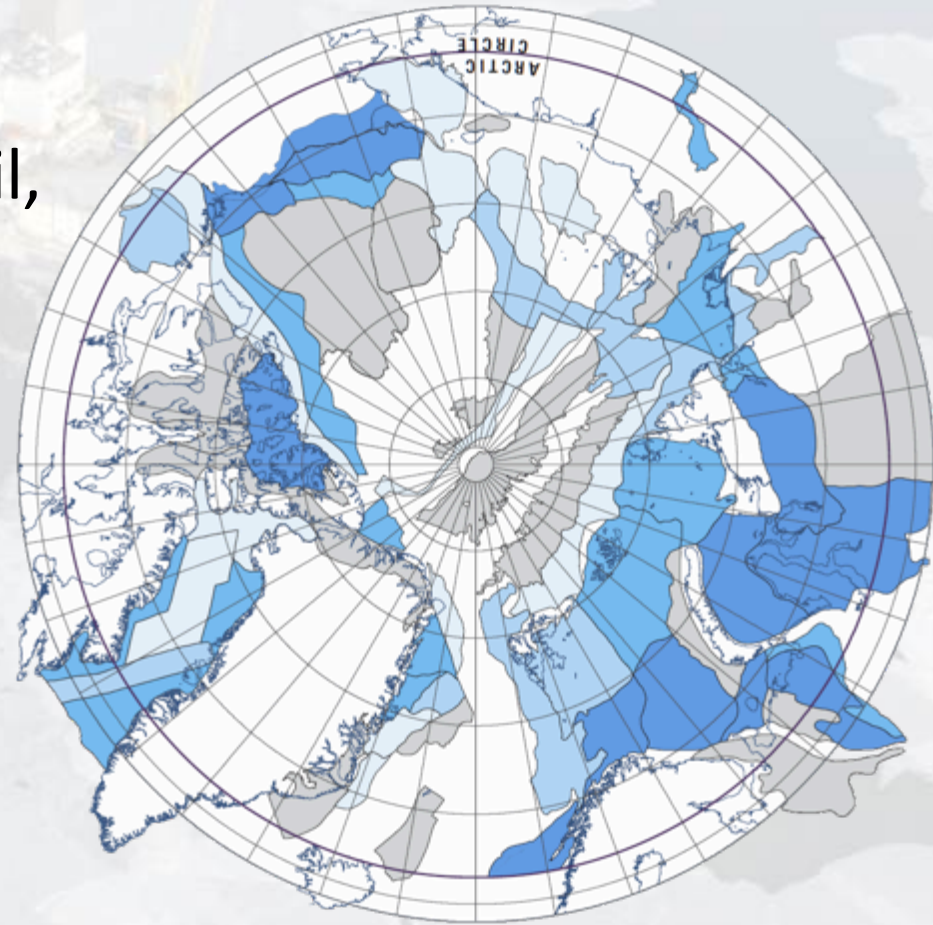


Oil and Gas: Drivers

- Accessibility: sea ice
- Improved technology
- Change in sovereignty: Greenland
- Government income
- Reduced dependence on energy imports
- Maritime boundaries: Barents Sea
- High petroleum prices ...

Oil and Gas: Drivers

- USGS assessment
 - 30% of undiscovered oil, 13% gas
 - Only 4% of remaining global conventional oil resources
 - 90%–95% within existing territorial boundaries

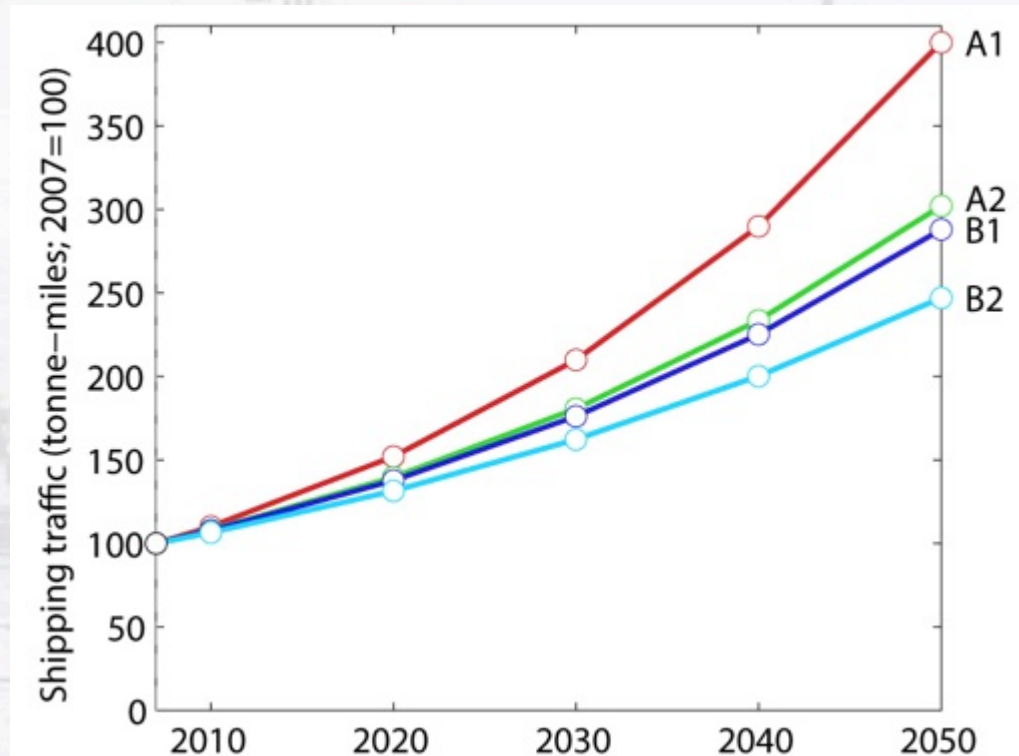


Oil and Gas: Outlook

- Costly, unsuccessful offshore exploration
 - Shell \$6 billion Alaska
 - Cairn \$2 billion Greenland
- Oil price slump: shale oil, recessions
- Environmental concerns
 - Oil spills do occur, and will occur in the Arctic
 - Preparedness for Arctic spills is very low
- Russian projects hindered by sanctions

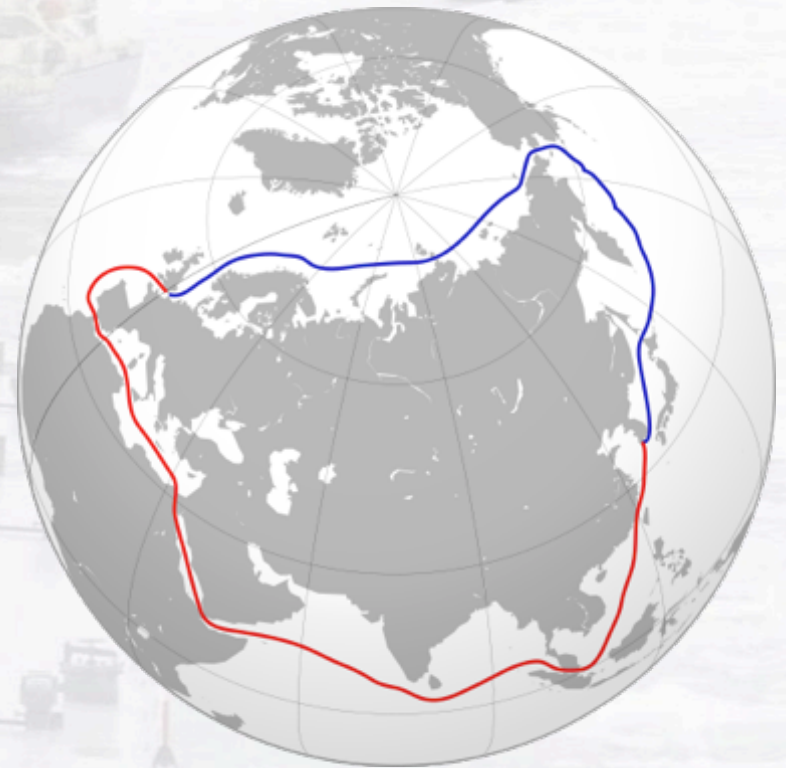
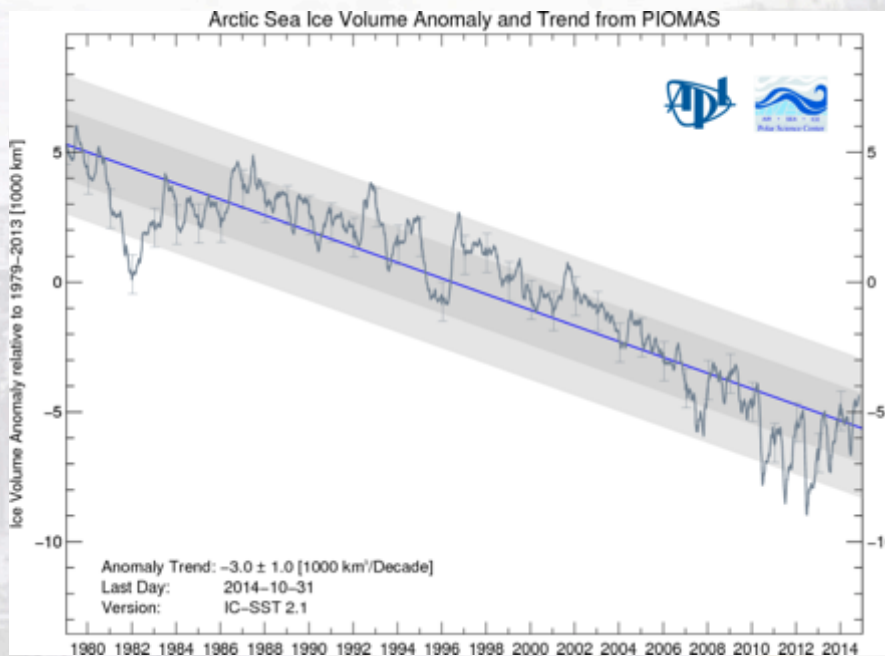
Global Freight Shipping

- Buhaug et al.
- Substantial growth in freight shipping is projected



Arctic Shipping

- “Arctic shipping is set for a record year”
- “First container ship on Northern Sea Route”



Shipping: Drivers

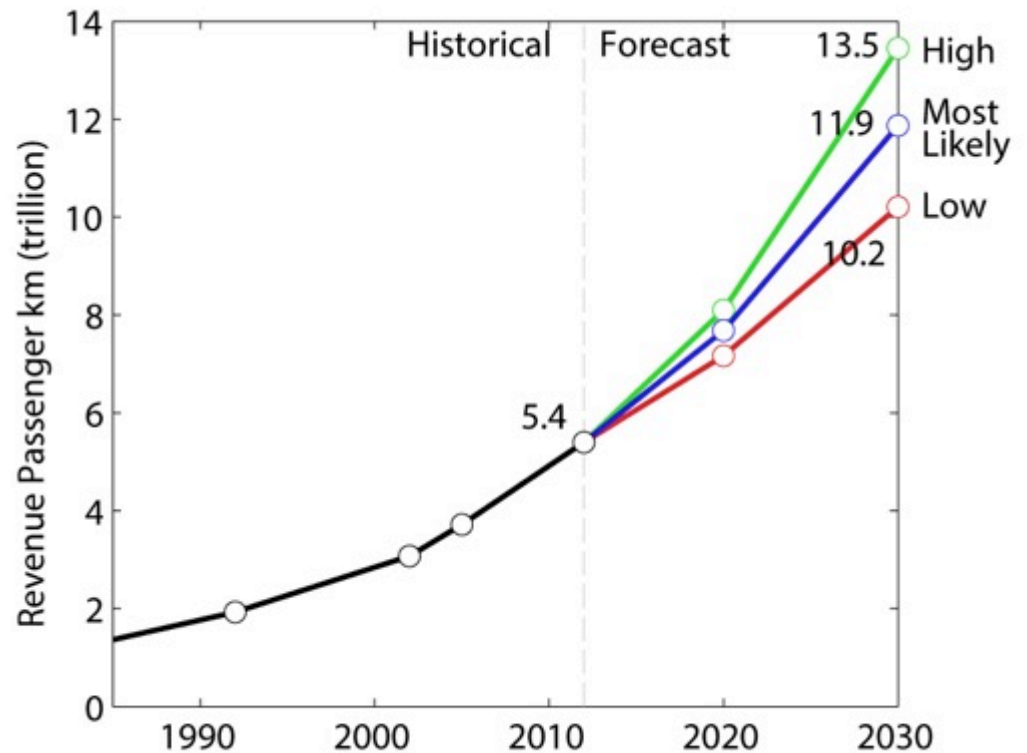
- Reduction in sea ice
- Reduced distance = reduced time/costs?
- Increased Arctic resource extraction
- Legitimisation of sovereignty: “Use it or lose it”
- Lower climate impacts?
- Safer passage (lack of piracy)

Shipping: Outlook

- There has been growth on the NSR
 - 71 ships in 2013, of which 30 cargo transits
 - But 32000 through Suez and Panama combined
- Survey of intentions
 - Container shipping companies are not interested
- Efforts to improve search and rescue facilities and oceanographic information
- Ballast: invasive species?

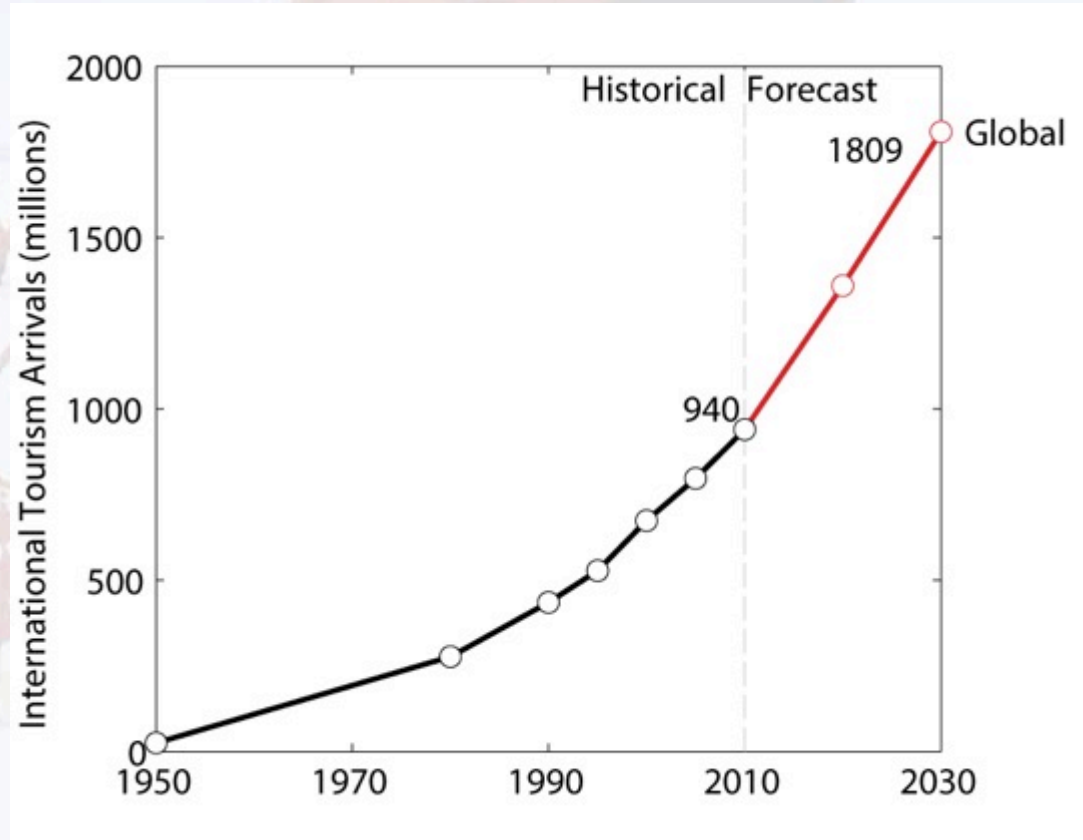
Global Air Passenger Travel

- ICAO projections
- Double over 20 years



Global tourism

- UN projections
- Double over 20 years



Arctic Tourism

- Long history, but little activity until recently
- Svalbard: regular flights and cruise ships
- ‘Arctic Russia’ national park
- North Pole trips on nuclear icebreakers



Arctic Tourism: Drivers

- Exotic
 - Polar bears, ice, midnight sun, vulnerable, heroic history, indigenous peoples, remote, etc.
- Feeling of exclusivity
- ‘Last-chance’ tourism
 - Last frontier, and last opportunity
- Reduced barriers to entry
 - More accessible, improved infrastructure, etc.

Arctic Tourism: Outlook

- Barriers to entry will continue to reduce
- Largely on cruise ships
 - Self-sufficient, and the ship is itself considered a tourist destination
- Revenues to communities likely to be negligible compared with resource extraction
- Environmental impacts could be substantial
 - Svalbard has banned heavy fuel oil in sensitive areas
- Tourists can be positive: advocacy for the Arctic

Summary

- Population likely to increase in some areas and decline in others
- Resource extraction likely to increase, but highly uncertain how much
- Potential for Arctic shipping overstated, but likely to increase
- Tourism likely to increase
- Other drivers: Fishing, Land transportation, Indigenous peoples

Thank you



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