1st APEC
Oil and Gas Security Network Forum
Melting of the Arctic Sea Ice: Significance for the APEC Economies' Energy Security

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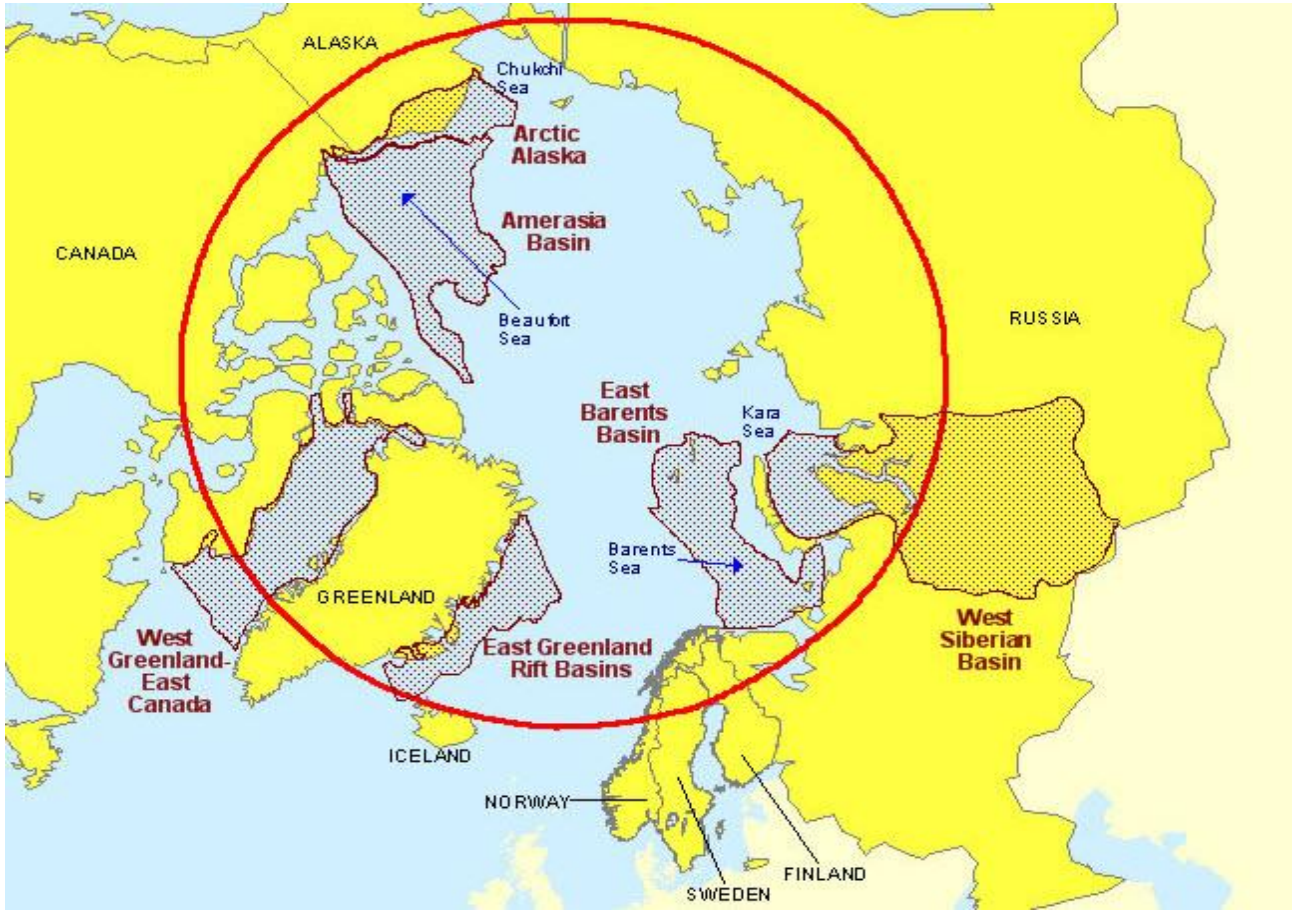
Asia-Pacific
Economic Cooperation

The Arctic Region

Resource Basins in the Arctic Circle Region

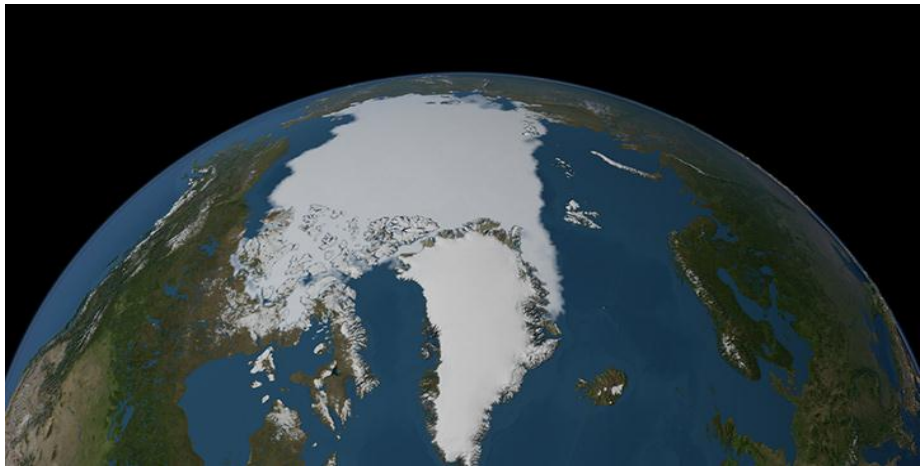


Source: US Geology Survey reprinted in: U.S Energy Information Administration (EIA).Arctic Oil and Natural Gas Resources.20 January 2012. http://www.eia.gov/todayinenergy/detail.cfm?id=4650

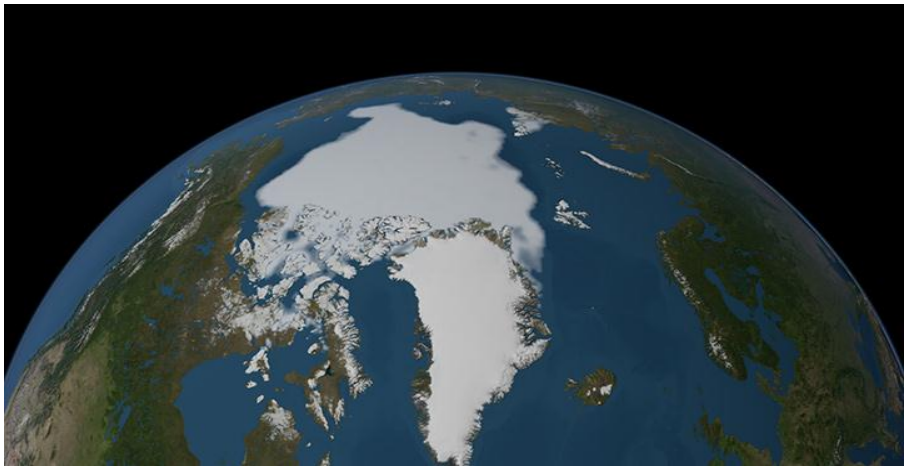
I-Melting of the Arctic Sea Ice

The Arctic sea ice has been melting because of global warming caused by greenhouse gases, particularly CO_2, whose main source of emission has been heavy consumption of oil, gas and coal for over two centuries.

Arctic Sea Ice 1979



Arctic Sea Ice 2013



Year	Arctic Ice September Average Extent (millions of square kilometers)
1979–2000 mean	7.0
2013/2014	5.4

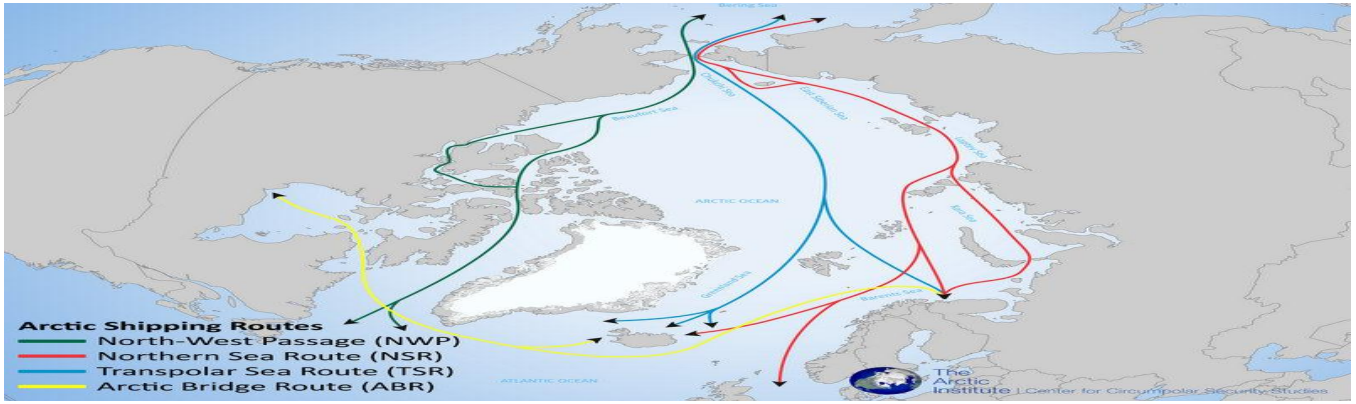
Source: 1979 and 2013 images. In õTime Series: 1979-2013 - Arctic Sea Ice Minimum.ò *NASA – Global Climate Change*, 2015. http://climate.nasa.gov/vital-signs/arctic-sea-ice/; 1979 and 2013 images. In õTime Series: 1979-2013 - Arctic Sea Ice Minimum.ò *NASA – Global Climate Change*, 2015. http://climate.nasa.gov/vital-signs/arctic-sea-ice/

II-Implications/Significance of the Arctic Sea Ice's Melting

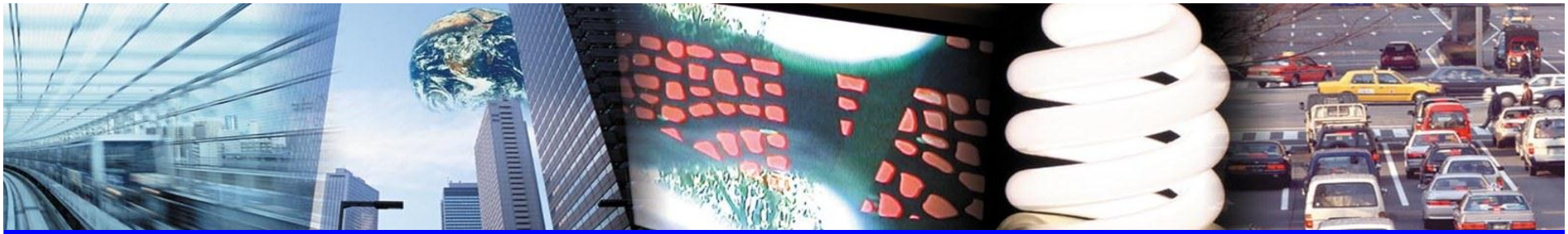
A-Environmental implications, including, rising sea levels to threaten the APEC economiesô oil/LNG terminals located at coastal areas.

B-Economic/trade implications, including **four sea routes** (**short-cuts**) available a few weeks a year in summer time to become longer gradually over decades should the current melting continue.

- **Two of them are more suitable for a varying amount of large-scale intercontinental shipping, including oil/LNG tankers:**
  - **The Northern Sea Route** through Russiaôs Arctic region
  - **The Northwest Passage** via Canadaôs Arctic region



Source: Humpert, Malte/The Arctic Institute. 2015. http://www.thearcticinstitute.org/2012/10/the-future-of-arctic-shipping.html



Implications/Significance

C-Energy implications: The melting of the Arctic ice may well unlock the vast regional **undiscovered oil/gas resources**, which are **mainly offshore (84%)** scattered unevenly among the Arctic economies.

- **Estimated undiscovered oil/gas resources: 90 bb** of oil, **48.11 tcm** of gas and **44 bb** of natural gas liquids equal to about **413 btoe in total**, according to the **2008 US Geological Survey**.

The bulk of the oil and gas resources are in Russia (**41%; 70%)** followed by the USA (**28%; 14%),** Greenland (**18%; 8%**), Canada (**9%; 4%**) and Norway (**4%; 4%**).

D-Significance: The significance of these resources for the global and APEC energy markets depends on their **actual size (proven resources)** and the volume of their **recoverable** for which explorations are required.

III-Opportunities

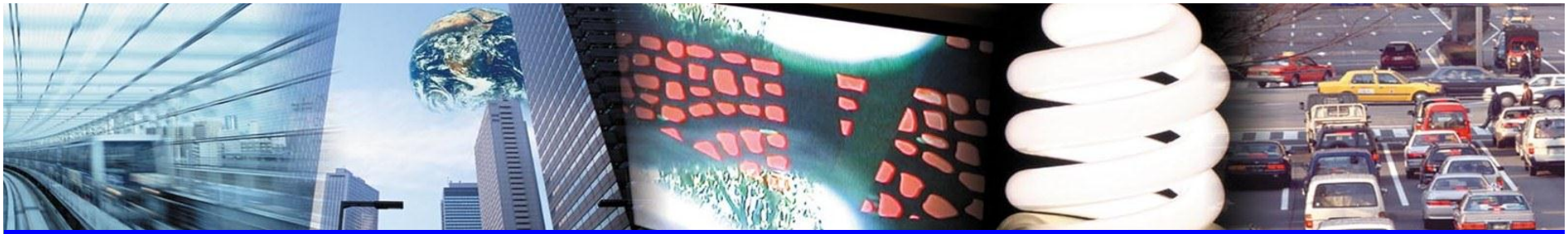
The Arctic undiscovered oil/gas resources could contribute to the APEC economiesô energy security in certain areas provided the sustainability of their large-scale production and exports at competitive prices:

- **Supply availability:** Increasing the available petroleum supplies to the APEC economies depending on oil/gas (LNG) imports.

- **Supplier diversification:** Increasing the number of the APEC economiesô suppliers and decreasing to some extent their reliance on their largest supplier, the conflict-prone Middle East.

- **Supply-route diversification:** Suppling the APEC economies through shorter routes or those routes not passing through the potentially dangerous waters due to **piracy** (Gulf of Eden & Strait of Malacca) and **possible expansion of civil war to the sea routes** (Yemenôs civil war affecting Gulf of Eden & Bab-al-Mandeb).

- **Price sustainability:** Potentially helping sustain oil and gas (LNG) prices by preventing drastic price hikes due to shortages.



IV-Challenges

Certain challenges to large-scale oil/gas production/exports in the Arctic region could prevent/retard these objectives:

1-Technical challenges: Inadequate infrastructure, scarcity of ice-class equipment/vessels, long-process of drilling, harsh working condition, technologically difficult and costly environmental requirements and high cost of production.

2-Environmental challenges: Extensive oil/gas extraction will speed up the Arctic sea ice's melting.

3-Economic challenges: Necessity of a sustainable strong and growing demand for oil/gas at high prices to sustain costly petroleum operations in the Arctic and make its oil/gas prices competitive.

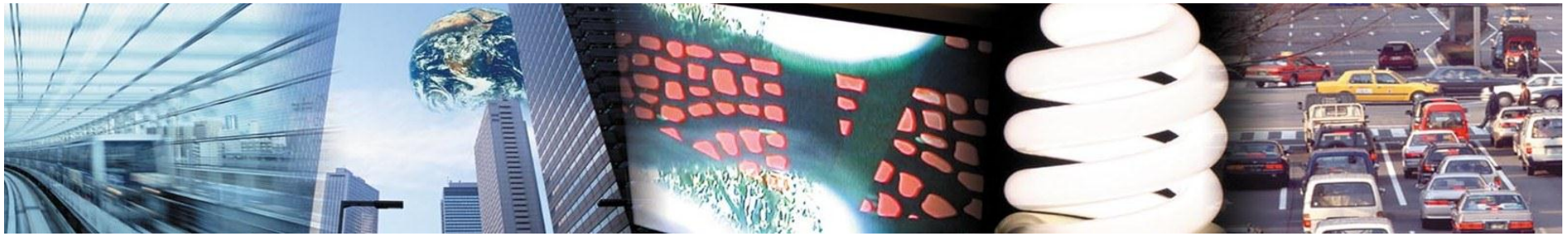
4-Political challenges: Various political factors, particularly potential disputes among the Arctic economies over oil and gas-rich areas beyond their exclusive economic zones.

V-Possible Scenarios for Oil/Gas Development in the Arctic Region

1-Delayed development scenario: Various internal/external factors, including the mentioned challenges, will delay for a significant period of time the large-scale development of the Arctic undiscovered petroleum reserves to leave their bulk intact, **the likely case in this decade**.

2-Limited/Restricted development scenario: Development of the Arctic undiscovered petroleum reserves will be limited (geographically/scale), mainly to **the extent justified to fill the gap caused by depleting the regional economies' non-Arctic reserves, a possibility in the ongoing decade and the first half of the following one.**

3-Extensive development scenario: Extensive development of the Arctic undiscovered petroleum reserves will take place due to certain global/regional developments (e.g., significant increases in the global oil/gas demand to require Arctic petroleum/sustainable high prices), **an unlikely scenario in the foreseeable future due to the mentioned challenges**.



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