National Petroleum Council

Arctic Potential

Realizing the Promise of U.S. Arctic Oil and Gas Resources

April 7-9, 2015

National Petroleum Council (NPC)

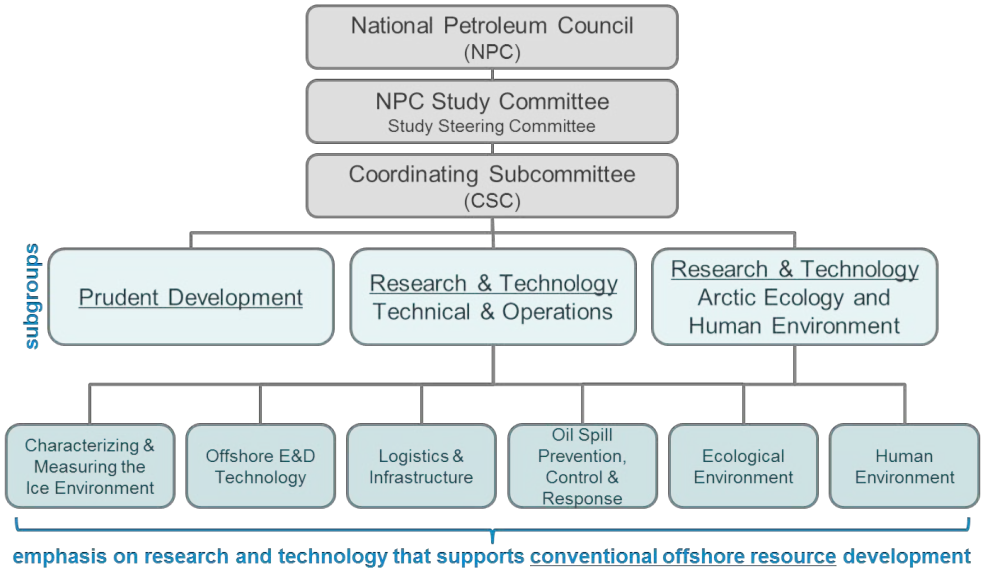
Origins	Continuation of WWII government / industry cooperation
Purpose	Sole purpose of NPC is to advise U.S. Secretary of Energy and Executive Branch by conducting studies at their request
Organization	A Federally chartered, self-funded Advisory Committee; not an advocacy group, does not lobby
Membership	Broad and balanced. Approximately 200 members from all segments of the oil and gas industries and many outside interests
Study Participants	Diverse interests and expertise relating to the topic being addressed
Study Reports	All NPC advice is provided in reports approved by its members and is available to the public. Reports can be viewed and downloaded at no cost from the NPC website – www.npc.org

Study Request and Organization

In October 2013, the Secretary of Energy requested the NPC to conduct a study

- "What research should the Department of Energy pursue and what technology constraints must be addressed to ensure prudent development of Arctic oil and gas resources while advancing U.S. energy and economic security and ensuring environmental stewardship?"
- The Secretary also noted that the Council's perspective would be helpful input to the U.S. chairmanship of the Arctic Council, the Quadrennial Energy Review and implementing the U.S. National Strategy for the Arctic Region

The NPC approved the report on March 27, 2015



Diverse Team:
266 participants from 105 organizations

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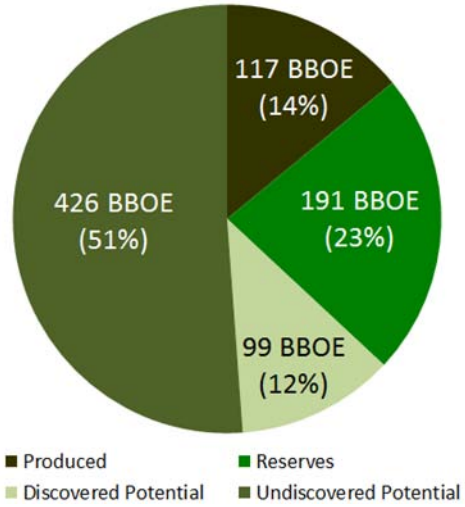
Executive Summary - Key Findings

1. Arctic Oil and Gas Resources are Large and Can Contribute Significantly to Meeting Future U.S. and Global Energy Needs
2. The Arctic Environment Poses Some Different Challenges Relative to Other Oil and Gas Production Areas, But is Generally Well Understood
3. The Oil and Gas Industry Has a Long History of Successful Operations in Arctic Conditions Enabled by Continuing Technology and Operational Advances
4. Most of the U.S. Arctic Offshore Conventional Oil & Gas Potential Can Be Developed Using Existing Field-Proven Technology
5. The Economic Viability of U.S. Arctic Development is Challenged by Operating Conditions and the Need for Updated Regulations that Reflect Arctic Conditions
6. Realizing the Promise of Arctic Oil and Gas Requires Securing Public Confidence
7. There Have Been Substantial Recent Technology and Regulatory Advancements to Reduce the Potential for and Consequences of a Spill

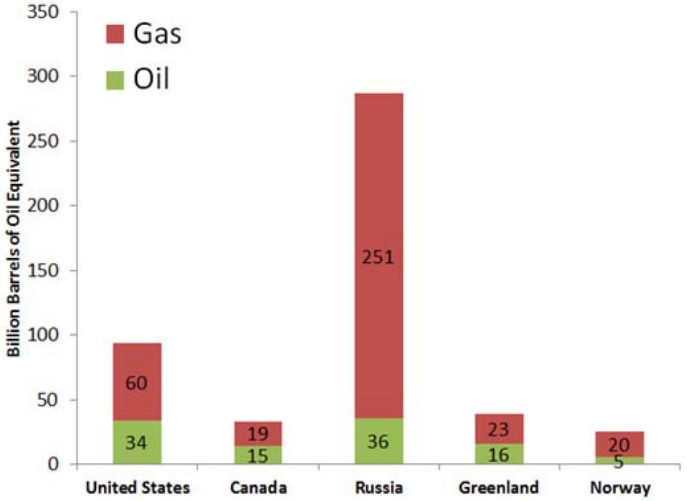
Large Arctic Oil and Gas Potential

Arctic Oil and Gas Resources are Large and Can Contribute Significantly to Meeting Future U.S. and Global Energy Needs

- The global Arctic contains about 25% of remaining undiscovered global conventional resources (USGS), and the U.S. has a large portion of oil potential
- If exploration starts now, offshore Alaskan development could coincide with the expected decline in the lower 48 fields
- National security and economic benefits associated with increased U.S. activity



Global Conventional Arctic Endowment



Global Arctic Conventional Oil and Gas[1] Resource Potential by Country

[1] Natural gas liquids not shown

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Most U.S. Arctic Offshore is Developable Today

Most of U.S. Arctic Offshore Conventional Oil and Gas Resources Can Be Developed Using Existing Field-Proven Technology

Increasing Complexity to Explore & Develop

Physical Ice Environment and Water Depth		Technology to Explore & Develop
Description	**Examples**	
Typically ice free, any water depth - *Minor first year ice intrusions, icebergs possible*	- South Barents Sea - Newfoundland	**Exploration & development proven** (Various drilling rigs, floating solutions, GBS, subsea tieback) Snøhvit Subsea  Hibernia GBS 
Any ice conditions, near shore & shallow water - *~<15m water*	- Globally, near shore (including US Beaufort and Chukchi Seas)	**Exploration & development proven** (Ice & gravel islands, concrete & steel structures, extended reach drilling from onshore) Spray Ice Island  Northstar 
Open water > ~2 months, any water depth - *Mainly first year ice, potential for combination of multi-year ice, icebergs and ice islands* - *Water depth determines development concept (greater or less than ~100m is key)*	- Sea of Okhotsk - Pechora Sea - Labrador Sea - US Chukchi & Beaufort Seas - South Kara Sea	**Exploration proven; development proven mainly in ~<100m water** Ice management required ~<100m development by GBS ~>100m development by floating drilling & subsea tieback Canmar Drillship  Sakhalin-2 GBS 
Open water <~2 months, any water depth - *Likely to encounter multi-year ice and/or icebergs, and in some locations ice islands* - *Water depth determines development concept, (greater or less than ~100m is key)*	- Deepwater Beaufort Sea - Deepwater Northern Russian Arctic Seas	**Exploration & development possible with technology improvements** Increased ice management capability and possible new technology
Limited to no open water - *Frequent multi-year ice with embedded icebergs, and ice islands*	- North East Greenland - Deepwater Northern Russian Arctic Seas	**Technology extensions or new technology required** Floating, robust ice managed solutions GBS / Subsea technology extensions or new technologies Difficult to mobilize equipment without open water season

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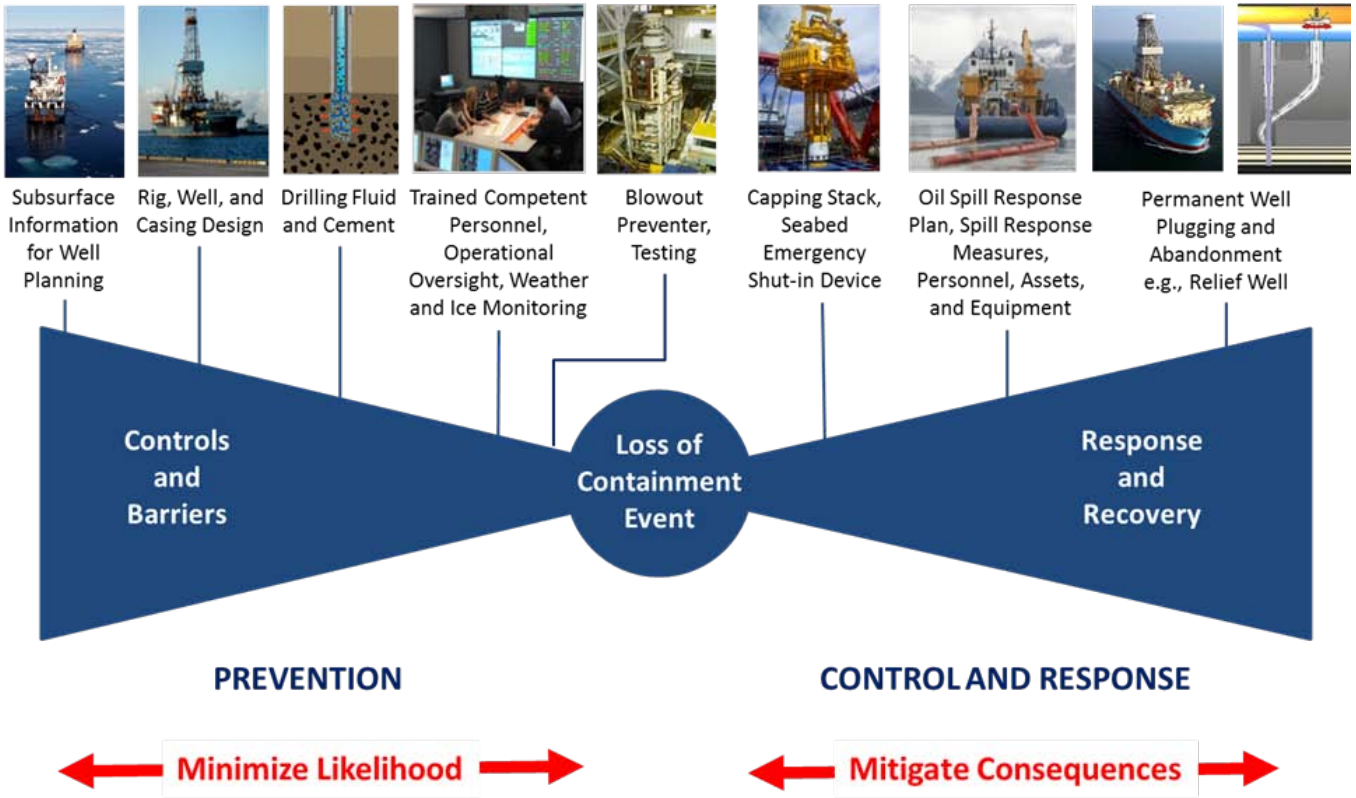
Well Control Technology Improvements

There Have Been Substantial Recent Technology and Regulatory Advancements to Reduce the Risk and Consequences of a Spill

- The greatest reduction of environmental risk comes from preventing a spill
- Recently developed control and mitigation technologies should be assessed



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Recommendations

Although the technology exists today to explore and develop the majority of U.S. offshore oil and gas potential, additional research opportunities are recommended to:

- Validate recently developed technology for use in the U.S. offshore, or
- Pursue technology extensions that could lead to improved safety, environmental or cost performance

Policy and regulatory recommendations are also included where they enable the application of technology and best practices from other jurisdictions, that could improve safety, environmental or cost performance

32 Recommendations in the Executive Summary

- 13 research, 3 regulatory, 16 leadership/policy
- Additional 60 research recommendations in the report

Recommendations grouped into themes: Environmental Stewardship; Economic Viability; Government Leadership and Policy Coordination

Environmental Stewardship

The NPC recommends:

- Industry and regulators should work together to perform the analysis, investigations and any necessary demonstrations to validate technologies for improved well control
- Government agencies should participate in ongoing and future industry collaborative research programs for oil spill response in ice, such as the Arctic Response Technology Joint Industry Programme that has been underway since 2012
- Regulators should continue to evaluate oil spill response technologies in Arctic conditions, and all spill response technologies should be pre-approved to enable selection of the appropriate response technology to achieve the greatest reduction in adverse environmental impacts
- Long term population estimates and understanding of the interactions of key species with oil and gas activities should be improved, to improve efficiency of exploration and environmental stewardship
- Collaboration and coordination of ecological and human environment research should be improved

Subsea Isolation Device

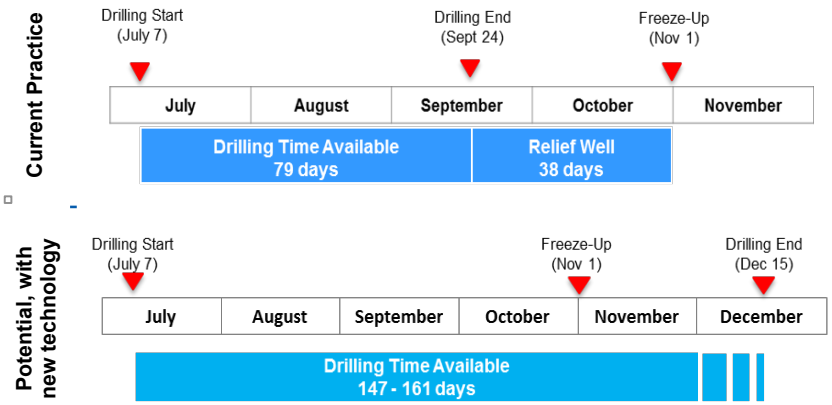
Capping Stack

Economic Viability

The NPC recommends:

- Industry, government, regulators should perform the analysis, investigations and necessary demonstrations to validate technologies / capabilities to safely extend the drilling season
- The Department of Energy and the Department of the Interior should assess the timelines to progress an offshore exploration and development program, compared with current U.S. lease durations and practices in other jurisdictions
- Policies, regulations and implementation practice should encourage innovation and enable use of technology advances

Drilling Season Length



Lease Length

Country	License / Lease System	Typical Well Count to Retain License / Lease	License / Lease Duration
Canada	Exploration Based	1 - 2	9 years
Greenland	Exploration Based	1 - 2	Up to 16 years
Norway	Exploration Based	1 - 2	Up to 30 years
Russia	Exploration Based	1 - 2	10 years
USA	Development Based	6 - 7	10 years

Government Leadership and Policy Coordination

Considering domestic leadership and policy coordination, the NPC recommends:

- The Arctic Executive Steering Committee should reaffirm U.S. commitment to prudent Arctic oil and gas development, assess alignment across federal agencies, and clarify the process by which it will collaborate with Alaskans
- The Arctic Executive Steering Committee as part of its mandated gap analysis should request regulators to compile a comprehensive and integrated inventory of regulatory requirements, and assess the interagency working group for lessons learned and improvement opportunities
- The Department of Energy should designate a senior advisor to support DOE's representative on the Arctic Executive Steering Committee and be a focal point for Arctic policy

Considering the Arctic Council, the NPC recommends:

- As Arctic Council members implement the two international agreements on search and rescue (2011) and on oil pollution preparedness and response (2013), the U.S. government should engage with the energy industry on response exercises
- The U.S. government should strengthen the Arctic Economic Council's interaction and engagement with the Arctic Council

Forward Plans

Digital Publications and Communications

- Approved by the Council March 27, 2015
- Report available for download
  - Video – 5 minutes
  - Executive Summary
  - Full Report
  - Topic Papers
  - Council Webcast

Printed Report Publication

- Executive Summary volume available mid April
- Full report available end May
- eBook available early June

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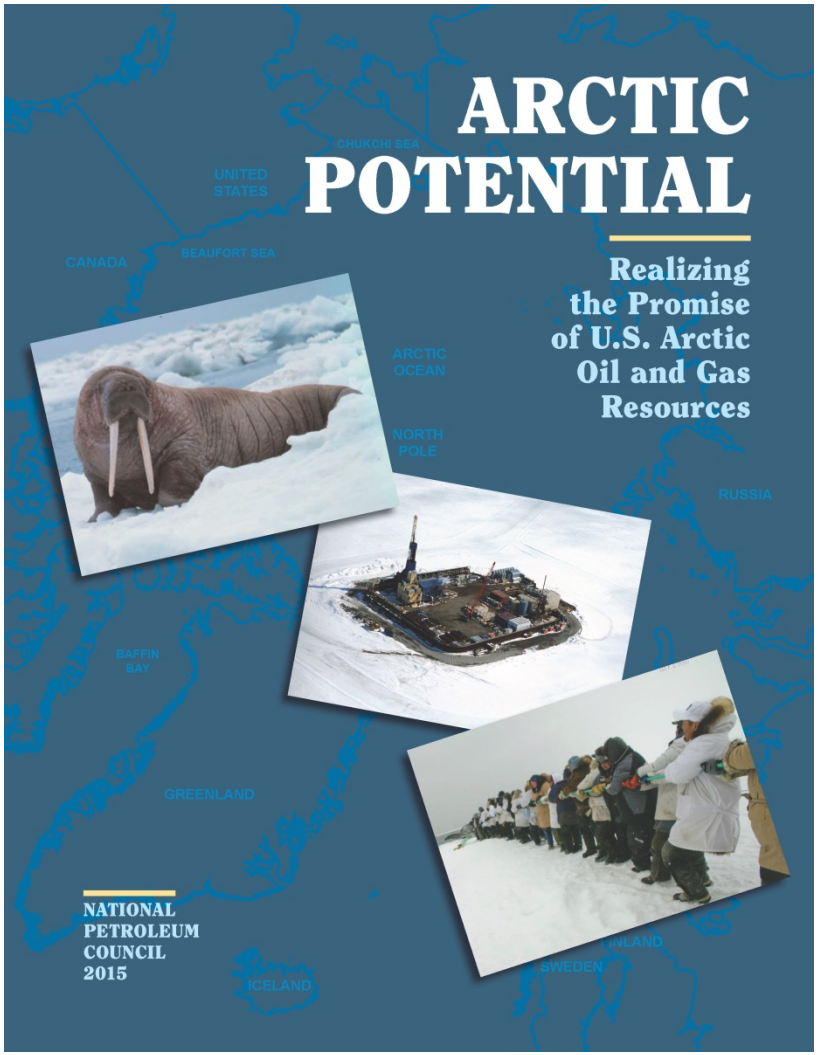

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