New Nexus of Climate and Energy Security for the Sustainable Arctic Future: The Arctic Perspectives on Global Oil and Gas Market

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Introduction: Overall Status of Sustainable Development in the Arctic Countries

The Arctic is a prism to display history of the earth, interaction of global economy, and integration of cross-cutting issues in sustainability. In a broad context of social policy, the nexus of climate and energy security is critical to develop policy mix for the transition to the green economy and sustainable development. The social dimensions of green economy require changes in patterns of investment, technology, production associated with sustainable development.

Figure 1 displays comparison of social indices among Arctic Council member countries, when we set the case of US equals 1. Compared to US, Russia spends more on military expenditure and less on health care. Canada and Norway outperform US, in terms of mitigation policy and economic growth, respectively. However, an economic slowdown is remarkable, especially in Nordic countries and Russia due to the low price of oil and global recession.

West Texas Intermediate (source: OPEC, IEA) fell from $73 per barrel in the fourth quarter of 2014 to $49 per barrel in the first quarter of 2015 and accordingly, consumer energy prices fell early in the year. CBO (2015) expects that global economy is still in the midst of a recovery and oil prices begin to rise by the end of 2015, largely in response to rising global demand for oil, which will lead to gradual increases in consumer energy prices.

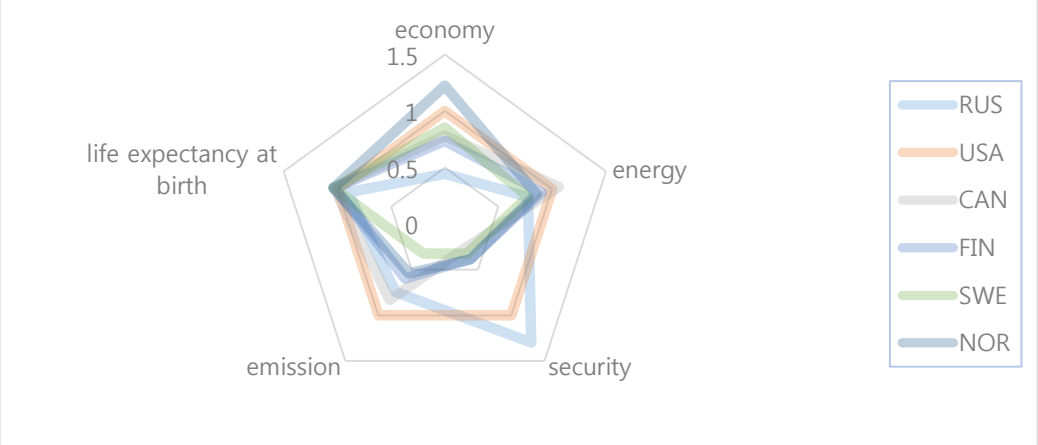

Figure 1: Sustainability Indices of Arctic Council members (US=1.00). Economy index indicates GDP per capita based on purchasing power parity (PPP). Energy index refers to use of primary energy (kg oil equivalent per capita) before transformation to other end-use. Emission indicates carbon dioxide emissions (metric tons per capita) stemming from burning of fossil fuels and manufacturing. Security index and life expectancy at birth explain military expenditures (% of GDP) and the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life, respectively. (Based on World Development Indicators 2011)

The Arctic becomes global and more complicated, since dramatic changes, such as sea ice loss, are projected to occur in Arctic ecosystems and influence the rest of the world with extreme weather events and unpredictable consequences. Arctic sea ice has decreased 14% between 2010 and 2012 since the 1970s (Tilling et al. (2015)).

The changes in the Arctic Ocean are so profound and climate change is faster and more severe in the Arctic than in most of the rest of the world. The Arctic is warming at a rate of almost twice the global average. That's why sound adaptation strategy against climate change in the Arctic is needed for the global community as well as for the Arctic region.

Climate change triggers irreversible changes. 95 percent of the change in the climate is caused by CO_2. And CO_2 emissions come from energy use, mostly fossil fuel. The Arctic has huge potential to supply oil and gas, although challenges to the Arctic resource recovery have two sides of the same coin. Balancing opportunities and obstacles is a key to develop the Arctic oil and gas. Although the external cost in present value seems to be high in case of Arctic oil drilling, the timing of the Arctic oil recovery depends on two markets: global oil market and carbon market.

The Arctic council members are exporters of oil and gas. And its CO_2 emissions on a per capita basis are above the world average. However, most of the countries (except Russia) in the Arctic are experiencing a decrease in the CO_2 emissions on a per capita basis, since 2005 (Figure 2). This is largely due to ambitious emission reduction targets[1] and successful renewable policies in Nordic countries. In case of US, shale gas has contributed to mitigation progress in industrial sector.

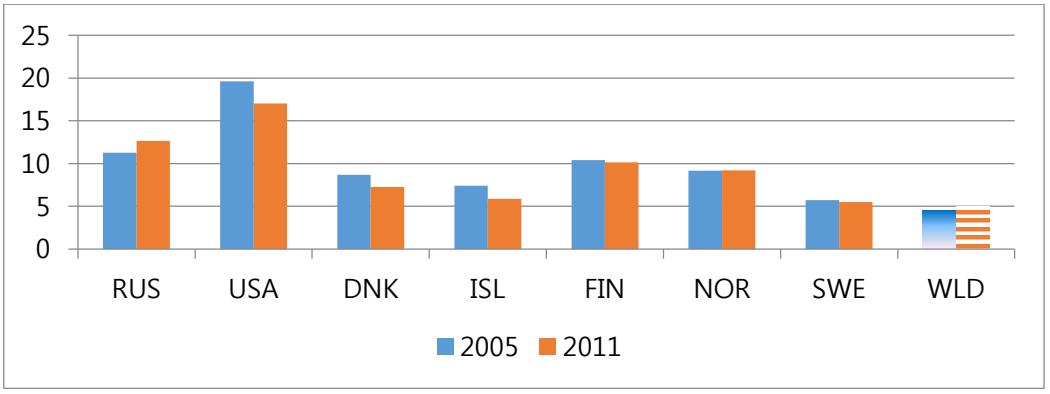

Figure 2: CO_2 Emissions (metric tons per capita) based on World Development Indicators.

The Nordic countries have pioneered energy and carbon taxes, which provide incentives for energy-saving and fuel switching to lower carbon energy. Figure 3 illustrates renewable energy share in total energy supply and net removals of CO_2 from LULUCF[2] in Nordic countries. Iceland has high portion of renewables in total energy supply. And carbon sequestration such as LULUCF results in decrease of net carbon emissions, by 25% lower than in 1990.

[1] The national targets for emission reductions for 2020 (compared to 1990 benchmark figures) in Nordic countries are as follows: Denmark (40%), Iceland (15%), Norway (30%), and Sweden (40%). Finland participates in the European Union Emissions Trading (EU-ETS). The national target outside ETS is 16% below 2015 level.

[2] LULUCF = Land use, land use change and forestry

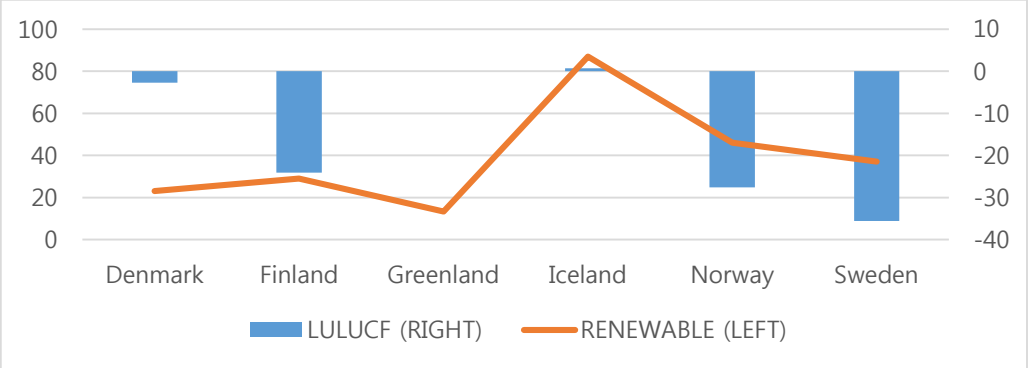

Figure 3: Renewable Energy as % of Total Energy Supply (2012) and Net Removals (MT CO_2) from LULUCF (2011)

Climate change is not a regional issue, but a global agenda. Without support from developing countries, the synergy effects of national policy in leading countries will be limited. In this regard, carbon financing can be a catalyst to promote investments towards a low-carbon economy.

The European Union Emissions Trading Scheme (EU-ETS) has served climate policy as one of market instruments, providing price signal for abatement technology since 2005. It allows firms to choose abatement technology base on market price of CO_2 permits, so that market price reflects information regarding demand and supply for the carbon permits. Therefore, market efficiency is a key element to provide right price signal to market participants as well as to potential investors for technology development.

The investors have been skeptical about market efficiency of the EU-ETS, because carbon market is considered as a relatively thin market, compared to stock market. Few transactions take place, so that the carbon market has been often volatile and less liquid, reflecting policy risks and uncertainty about allocation plan from phase I to phase III. However, regardless of criticism, EU-ETS has offered opportunities for the firms under CO_2 regulation to reduce abatement costs. In particular, EU-ETS allows market players to trade the permits within the same commitment period and this flexibility provides less incentive to switch between spot and futures. Kim and Lee. (2015) and Lean et al. (2010) pointed out, in a short period, there may exist arbitrage opportunities in the EU-ETS, but arbitrage opportunities in the EU-ETS will disappear in a long-term commitment period, as long as market is efficient.

Korea has launched emissions trading scheme in 2015, which is a significant milestone in cutting greenhouse gas emissions and bolstering its clean technology. California and Quebec have linked their cap-and-trade systems. China plans to implement a national emissions trading system as early as 2016. According to the expression of the World Bank, carbon pricing is expanding. Carbon pricing is an essential element of the policy mix towards sustainable development and green economy, not only for the Arctic community, but also for our future of global community.

The outcome of the 21st COP of UNFCCC will provide a momentum to open new paradigm for global commitments towards green economy. We are confronting challenges for the new nexus of energy and climate security. Since the Arctic is vulnerable to climate change and energy security, we should try our best efforts to initiate constructive dialogues, to promote public-private partnerships and to enhance interdisciplinary collaboration on the Arctic research and policy development.

Challenges in the Arctic Region: Concerns, Threats and Potential Challenges

the Arctic region is currently facing various challenges such as safety, environment, and cost increases. The concerns are presented in general prospect regardless of the type of primary targets2 of their impacts. It is strongly expected to raise public awareness regarding existing and potential issues, leading to better cooperation between nations to address them. These threats involve environmental, ecological and Arctic vegetation related issues that need to be addressed by the world community to overcome the potential upcoming disasters due to resultant changes in the Arctic environment.

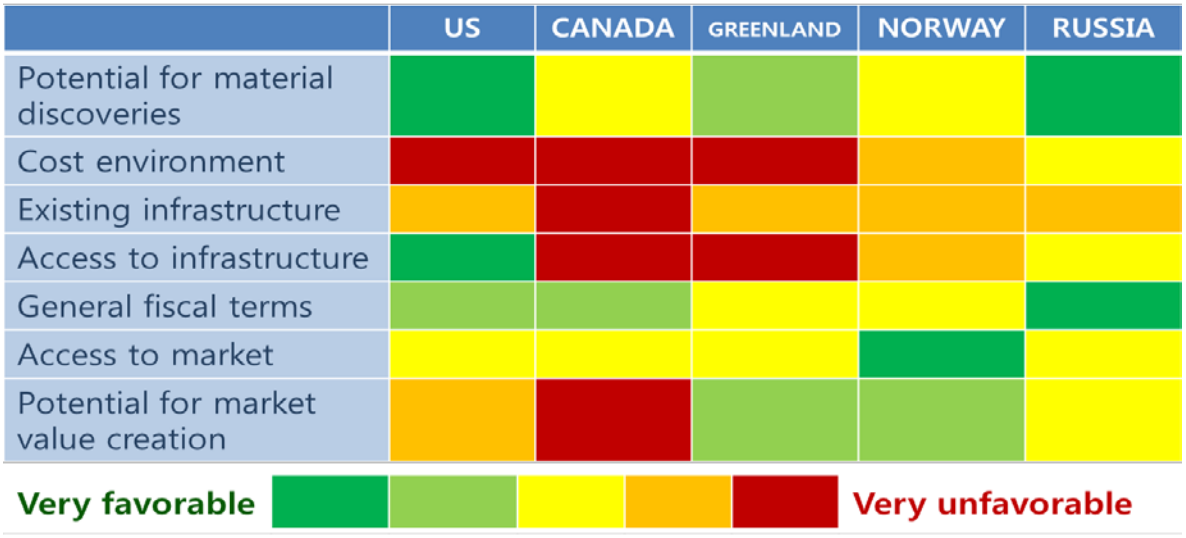

Figure 4. Summary attractiveness of Arctic opportunities by country

The Arctic is experiencing some of the most rapid transformations on the planet. Arctic regions maintain unique organic communities, arctic ecosystems are sensitive to environmental change and slow to recover, arctic regions have a significant effect on the global climate, global changes are first observed in arctic regions.

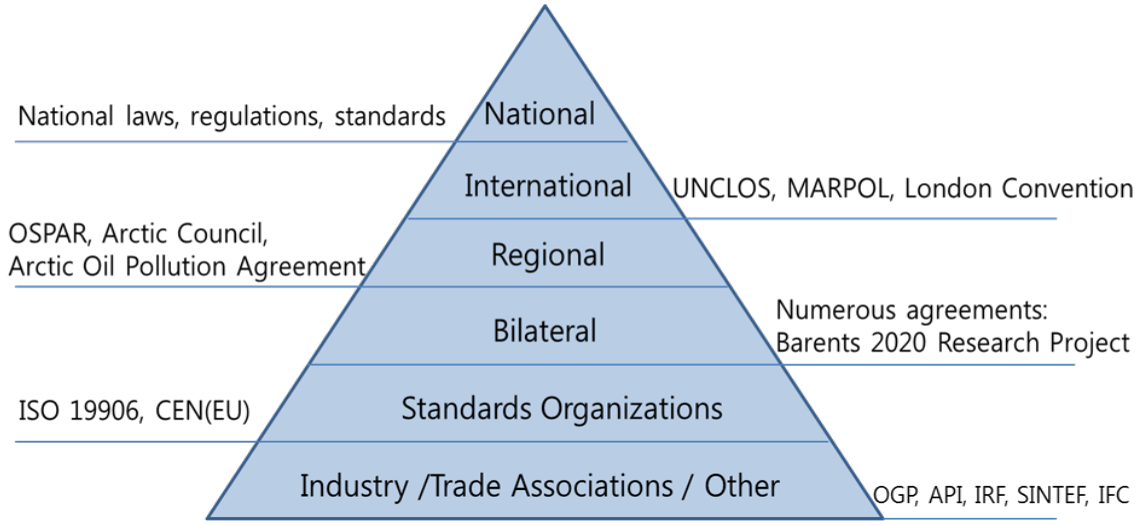

Figure 5. Current governance Framework for Offshore Oil and Gas Activities in the Arctic

Alongside all the impacts resulting from climate change, ongoing concerns resulting from human activities are not to be omitted. Nevertheless, since every element involved is connected, there are always bridges linking one to another. The scale is too enormous in terms of both space and time to be completely confident to what extent and/or in what aspect they are connected. In other words, the situation is not clear enough to reach a conclusion about whether or not climate change is the only cause for all of the changes taking place in the Arctic region.

Opportunities and Risks

Arctic oil and gas resources are large and can contribute significantly to meeting future global energy needs. The global arctic contains about 25% of remaining undiscovered global conventional resources(USGS) and the share of US is increasing. 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 US activity.

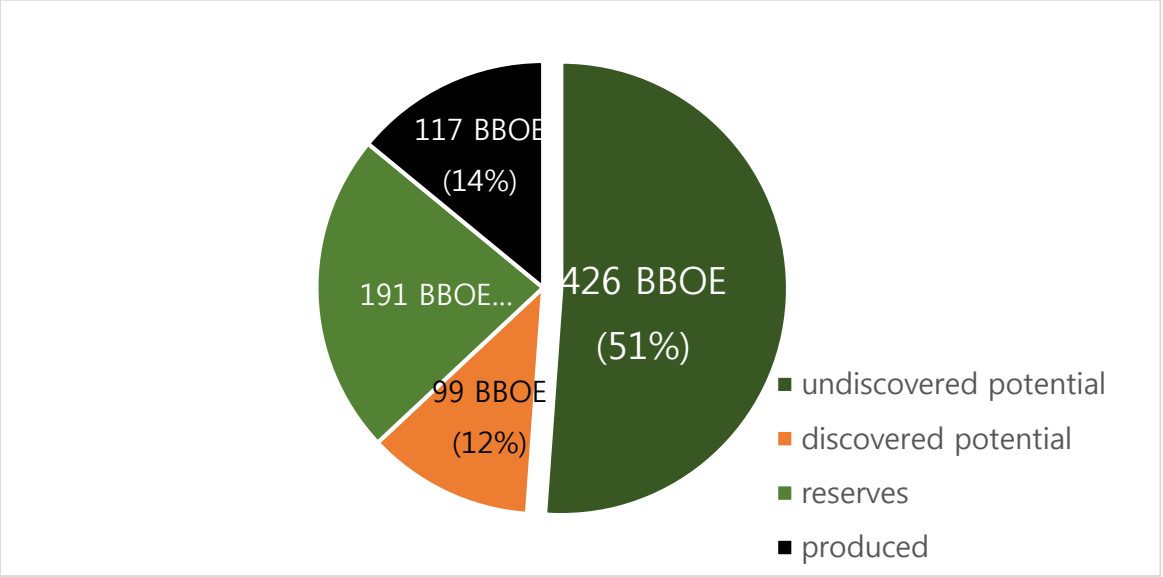

Figure 6 Global Arctic Conventional Endowment

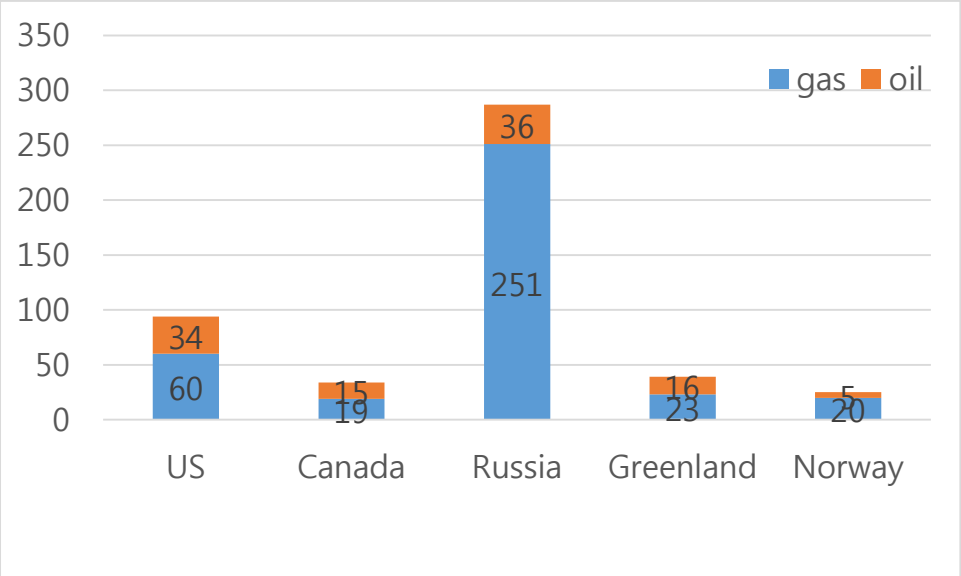

Figure 7 Global Arctic Conventional Oil and Gas Resource Potential by Country

Novatek plans to start its own liquefied natural gas production next year at its plant in Russia's Yamal peninsula, which it is building with France Total and China's CNPC and Silk Road Fund. Novatek, whose $27 billion LNG plant will be the second in Russia after the Gazprom-controlled Sakhalin-2 LNG project on the Russian Pacific Ocean coast, declined to comment. Despite Western sanctions imposed on Novatek and its major shareholder Gennady Timchenko, a close ally of Russian President Vladimir Putin, over Moscow's role in the Ukraine crisis, the company secured $12 billion in loans for Yamal LNG in April.

The economic viability is challenged by operating conditions and the need for regulations reflecting Arctic conditions. Arctic exploration and development is more costly than in other regions due to remoteness,

challenging climate, and limited operating seasons due to lack of infrastructure.

Shipping is critical in the Arctic. Therefore, R&D and new technology implementation is needed to ensure further Arctic shipping. Cargo flow transited along NSR, mostly hydrocarbons are carried by relatively large tankers, i.e. icebreaker. Korea is under consideration of having new icebreaker other than Araon, with Polar-20 capacity, which allows accessibility to participate in global arctic science collaboration with the Arctic community.

Conclusions

The Arctic environment poses some different challenges relative to other oil and gas production areas. The oil and gas industry has a long history of successful operations in Arctic conditions enabled by continuing technology and operational advances. In terms of new nexus of climate and energy security, Arctic oil and gas will provide sound supply for our next generation. In order to share the mutual benefits from Arctic oil and gas, international Arctic co-operation should be strengthened. Korea is ready to be a partner toward sustainable development of the Arctic oil and gas.

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