Briefing Note

The New Nexus of Climate & Energy Security for the Sustainable Arctic Future

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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 a comparison between 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 USD per barrel in the fourth quarter of 2014 to $49 USD per barrel in the first quarter of 2015 and accordingly, consumer energy prices fell early in the year. CBO (2015) expects that the 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.

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

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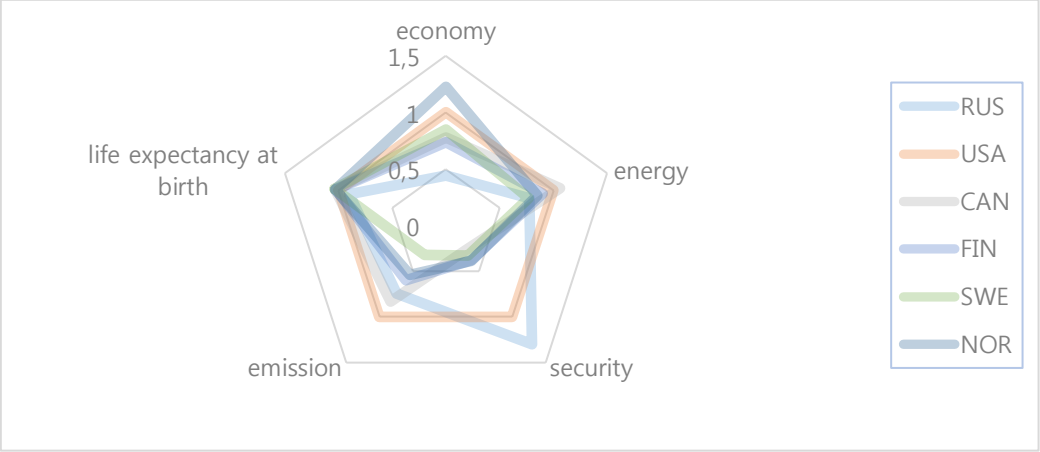
warming at a rate of almost twice the global average. That's why sound adaptation strategy against climate change in the Arctic is needed for the global community as well as for the Arctic region.

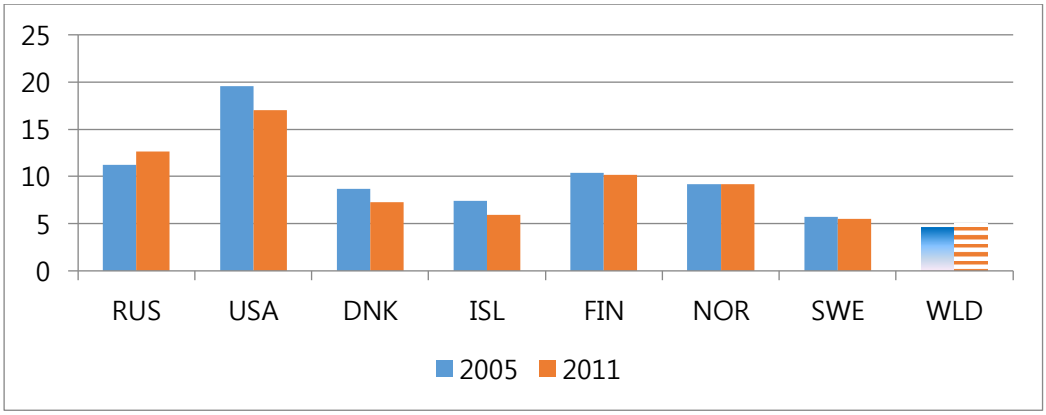
Figure 1: Sustainability Indices of Arctic Council members (US=1.00). Economy index indicates GDP per capita based on purchasing power parity (PPP). Energy index refers to use of primary energy (kg oil equivalent per capita) before transformation to other end-use. Emission indicates carbon dioxide emissions (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 time of birth were to stay the same throughout its life, respectively (based on World Development Indicators 2011).



Climate change triggers irreversible changes. 95% 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 Arctic resource recovery comprise two sides of the same coin. Balancing opportunities and obstacles is key in developing Arctic oil and gas. Although the external cost in present value seems to be high in the case of Arctic oil drilling, the timing of Arctic oil recovery depends on two markets: the global oil market and the carbon market.

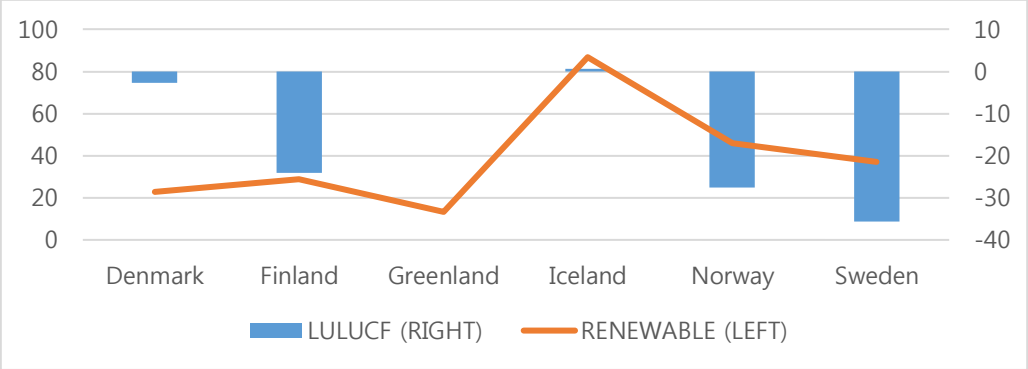
Several of the Arctic Council members are exporters of oil and gas. And their CO_2 emissions on a per capita basis are above the world average. However, most of the countries (except Russia) in the Arctic are experiencing a decrease in the CO_2 emissions on a per capita basis, since 2005 (Figure 2). This is largely due to ambitious emission reduction targets[1] and successful renewable policies in the Nordic countries. In the case of the United States, shale gas has contributed to mitigation progress in the 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 a high proportion of renewables in their total energy supply. And carbon sequestration such as LULUCF has resulted in a decrease of net carbon emissions, by 25% lower than in 1990.

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 rather part of a global agenda. Without support from developing countries, the synergy effects of national policies 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 using market instruments, providing price signals for abatement technology since 2005. It allows firms to choose abatement technologies based on market price of CO_2 permits, so that market price reflects information regarding demand and supply for the carbon permits. As such, market efficiency is a key element to providing right price signals to market participants as well as to potential investors for technology development.

Investors have been skeptical about market efficiency of the EU-ETS, because the carbon market is considered as a relatively thin market, compared to the stock market. Few transactions take place, so that the carbon market has often been volatile and less liquid, reflecting policy risks and uncertainty about allocation plans from phase I to phase III. However, regardless of the 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) point out, in a short period, how 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 the market is efficient.

Korea launched an emissions trading scheme in 2015, which is a significant milestone in cutting greenhouse gas emissions and bolstering its clean technology. California and Québec have linked their cap-and-trade systems. China plans to implement a national emissions trading system as early as 2016. As articulated by the World Bank, carbon pricing is expanding. Carbon pricing is an essential element of the policy mix towards sustainable development and a green economy, not

only for the Arctic community, but also for our future of global community.

The 21st COP of UNFCCC is expected to provide momentum to open a new paradigm for global commitments towards green economy. We are confronting challenges at 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 Arctic research and policy development.

Notes

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

References

Congressional Budget Office. (2015) An Update to the Budget and Economic Outlook: 2015 to 2025.

Kim, Hyo-Sun and Lee, Sungro. (2015) Testing Market Efficiency of Spot and Futures Prices in European Carbon Market*, Asian Pacific Journal of EU Studies*. 13(1): 109 – 119.

Lean, H.H., M. McAleer, and W-K Wong. (2010). Market Efficiency of Oil Spot and Futures: A Mean-Variance and Stochastic Dominance Approach, *Energy Economics*. 32(5): 979 -986.

Nordic Council of Ministers, Nordic Action on Climate Change, 2014.

Shevchuk, Igor (2014) Commentary Regional International Cooperation in the Arctic & Subarctic Zone: A View from Karelia. *Arctic Yearbook 2014*. Northern Research Forum: Akureyri, Iceland: 469 – 472.

Tilling, R.L., A. Ridout, A. Shepherd, and D. Wingham. (2015). Increased Arctic Sea Ice Volume after Anomalously Low Melting in 2013, *Nature Geoscience*: 643 – 648.

World Bank and Ecofys. (2015). Carbon Pricing Watch 2015.