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Study on different additional usage of new icebreakers to assess potential for minimizing overall costs of icebreaking

as a part of

WINMOS Activity 2 Concept study on next generation icebreakers

Sub-activities

2:4 Desktop study on different ownership, chartering and operating arrangements and

2:5 A study of different financing options for new icebreaker

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1. Background of the study

This study addresses the WINMOS project activity 2, sub-activities 2:4 and 2:5, studying different icebreaker concepts. The goal of the WINMOS project is to develop maritime winter navigation system and safeguard required icebreaking resources. This study on cost efficiency of icebreaking with relevant aspects related thereto, covered in this report, brings the result closer to the goal of WINMOS. A cost efficient and reliable icebreaking service is crucial in EU's northernmost waters, since they are yearly covered by ice causing obstacles to merchant vessel traffic.

In the study, different additional usages of new icebreakers and their commercial and operational consequences have been considered to assess potential for minimising overall costs of icebreaking. Focus of the study is on assessing options and extent for potential additional income and associated long term total costs and risks with impact on financial and operational efficiency for the winter navigation system.

2. Preparation of the study

The study has been made between October and December 2015. The primary way of preparing the study has been interviews with industrial companies, the authorities, icebreaking service providers, port operator and banks. The purpose of the interviews was to gain an understanding on (i) importance of icebreaking in logistic chains of industrial companies, (ii) existing set up of icebreaking in Finland and in Sweden, (iii) existing operations of the icebreakers, and (iv) the approach of the banks for financing icebreakers, project finance in general and relevance of ownership in credit analysis.

3. Summary of the need for icebreaking of the industrial companies

Industrial companies were interviewed on monetary and reputational consequences for delayed performance, ability to have warehousing as a buffer in tough ice conditions and their view on developing icebreaking. Two forest industry companies,

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Metsä Group and UPM, stainless steel producer Outokumpu and Neot (North European Oil Trade), which specialises in oil and bio-products wholesale, were interviewed. All companies have operations in the Gulf of Bothnia.

Forest industry logistics is complex to manage because of the raw material flows. Some mills are located close to raw materials and some close to ports. It is important for the forest industry companies that the number of ports is sufficient to keep exports on going at all times.

Paper production has been reduced following shut downs of paper mills. For instance paperboard is vital raw material to various industries and is further processed in industrial operations. Thus, the product needs to be delivered on time. This enables the companies to remain competitive. It is vital that logistics work as planned as competition is tough. Keeping a warehouse as a buffer is not a realistic option. As an example, Metsä Group's Simpele mill has 3500 products. Maritime transport is becoming even more critical as the products are shipped outside Europe.

Of transports of UPM, 80-85% is made by the sea. The company aims at optimisation of all logistics, icebreaking is not separately addressed. However, the required ice class is part of the analysis. UPM has an agreement with Foreca on provision of weather information all year round. UPM suggests considering an overall optimisation of Finnish ports. This could be connected to service level in winter and thus implement prioritisation of winter operations. Vessels with better ice-going characteristics should be prioritised.

Neot's regular traffic ports are Oulu and Luleå and shipments are made from Göteborg and Fredericia. In Vaasa port the fairway depth is only 9 meters, but in Oulu 10 meters. Neot's vessels need at least 9 meters, and sometimes ice conditions may affect the draft port and thus cause challenges. If changes are to be made to the routing, decision must be made three days before. Location of icebreakers is irrelevant for the decision. Back-up plan is made if the ice situation seems bad. There is some flexibility to arrange transportation by trucks from one terminal to another, however this is limited. Continuous shipping operation is a must, as terminals run out of products in a matter of days. Oil terminals are located in Oulu, Vaasa, Pori, Hamina and Inkoo. Ice maps are used in planning.

Maritime transport represents 70-80% of all Outokumpu's transportation. Icebreaking is vital in order to ensure that the service level remains at desired level. As the company's largest mill is located in Tornio, in the most northern part of Bay of Bothnia,

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there are no ships, which can operate without the assistance of the icebreakers. Outokumpu has five time charter vessels, which are 1 A ice class vessels. Eight to ten vessels are required in Tornio every week. Ice situation does not impact planning of transportation, neither what the storage level is. Overseas shipments will be made from Hamburg three to four times a week.

According to Outokumpu, it would be good to have some tailored information on how the ice is anticipated to develop as consequences would be easier to manage. For instance there are 200 men in shift waiting to unload the vessel in Central Europe. Lately, the winds have become stronger, this has and impact on ice dynamics and formation as it may happen faster.

Conditions at port of Oulu are not particularly bad as it is located at Oulu river delta and condensing water from nearby Stora Enso mill have a mitigating effect on the ice conditions. However, at the fairway and at sea outside the fairway, the ice conditions are often very difficult. The port has no direct operational role in icebreaking. Oulu port is developing as it is important for the nearby Stora Enso mill, sawn timber volumes have lately been growing, and mining industry is also growing in the Northern Finland.

Many companies operating in Oulu port don’t have any warehousing possibilities, some have some buffer. Big companies are striving to make the operations as cost efficient as practically possible. The transports from Oulu are part of larger transportation chain, as for instance lots of traffic from Oulu is to Hamburg and Lübeck and further from there. Worst situations are the ones, where there has not been any advance information. In this respect, traffic authority should act as coordinator.

4. Current set up for icebreaking

4.1 Finland

The Finnish Transport Agency (FTA) is responsible for the procurement of assistance of winter navigation, national coordination, development and guidance thereof. FTA makes decisions concerning the assistance period for winter navigation, exemptions and traffic restrictions. The objective is to guarantee that Finnish merchant shipping runs safely and smoothly in ice conditions cost-effectively. Icebreaking services include the assistance of vessels in ice and related towing.

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In practice all ports in Finland are affected by ice. Even in mild winters, icebreakers are needed in the eastern part of the Gulf of Finland and especially in the Bay of Bothnia where the ice is considerably thicker. Because of the cold temperature, there is a need for continuous assistance as the fairways and broken tracks freeze rapidly after been broken up. The period for the need of the icebreakers is longest in the Bay of Bothnia, often lasting six months. In the Sea of Bothnia during normal winter, the period for the need of an icebreaker is between the beginning of February and end of April and during a hard winter the conditions for icebreaking are very challenging.

As the ice situation becomes more difficult, FTA imposes traffic restrictions for the winter ports, i.e. ports which have at least 8 meters fairway depth and 24/7/365 navigable classed fairway. Icebreaker assistance is given to vessels which meet the traffic restrictions.

FTA does to own any ice breakers, but is responsible for arranging by procurement, the nationwide icebreaking services. The Government of Finland owns 100% of Arctia Oy,a limited liability company for profit established in 2010. Arctia is a company set up to manage the operations of the former State Shipping Enterprise FInnstaship. Arctia provides icebreaking services and is specialized is multipurpose vessel services, along with the management and chartering of icebreakers to Finland and abroad. Arctia owns seven icebreakers in total and one (Polaris) is under construction. FTA procures icebreaking services from the Swedish state, Arctia Icebreaking Oy, Alfons Håkans Oy and other private towing companies.

4.2 Sweden

Icebreaking service is managed in Sweden by the Swedish Maritime Administration (SMA).

Sweden has five icebreakers, which are all owned by the SMA. SMA procures management services for the icebreakers from private operating companies with a seven year agreement for the time being. In addition, guaranteed extra resources and framework agreement for icebreaking is procured from private suppliers.

Traffic restrictions are, as in Finland, imposed to improve the efficiency of vessel traffic. Icebreaker assistance is only given to vessels, which meet the requirements set out in the traffic restrictions. FTA and SMA have developed the Finnish – Swedish ice class rules in co-operation with classification societies.

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Sweden and Finland have performed co-operation in icebreaking for many years based on state-agreements signed 1962 and 2013. An elemental part of the co-operation is that icebreakers are used as a joint resource in the Gulf of Bothnia.

Sweden, Finland and Estonia signed a Memorandum of Understanding in December 2015 to jointly explore possibilities to expand co-operation among the countries for the purposes of carrying out cost effective winter navigation. Among other things, an analysis will be made on long term views on service level and icebreaking capacity for future need. Possibilities for synergies in development, procurement, ownership and management of icebreakers will also be investigated as well as related technical financial and legal matters. Target is to determine an optimal service level and capacity for future needs, with an aim of achieving joint secure, well-functioning and cost effective service for winter navigation in the Northern Baltic Sea.

5. Existing icebreakers and their use outside regular icebreaking

Arctia Offshore Oy has been providing ice-management operations in the Arctic supporting oil & gas exploration and production activities from ice-management to oil recovery services with multipurpose icebreakers Fennica and Nordica.

In November 2011, Royal Dutch Shell (Shell) signed a three-year contract with Arctia Offshore Oy and chartered Fennica and Nordica to serve as primary ice management vessels in the Chukchi Sea during the summer seasons. The primary purpose of Fennica was to protect the drillship Noble Discoverer by steering large ice floes so that they don't endanger the drilling operation. At the time contract with Shell was made, The multipurpose icebreakers were deemed competitive in areas where high ice class (Polar 10), sufficient lifting capacity and dynamic positioning are necessary.

The vessels may not be permanently located in the Arctic as they are needed in regular icebreaking. It takes 50 days to transfer to Alaska through the Panama Canal and 10 days to Greenland and Russia.

Examples of offshore duties performed by multipurpose Icebreakers:

- Laying flexible pipes and cables
- Cable repair work
- Anchor handling and suit casing anchors of moored offshore units
- Ploughing

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- Towing of barges, semi-submersibles and other offshore units
- Carrying deck cargo max 2500 t
- Maneuvering and mooring at side of fixed platforms, semisubmersibles, jack-ups, drilling fenders, barges etc.
- Arctic offshore support

Icebreaker Otso has also been converted and strengthened to ice class PC4 and used to support seismic surveys. In practice, such assistance involves icebreaking to break a channel for a research vessel conducting measurements.

Contrary to Finland, Sweden has chosen another policy. It is important for the Swedish state that the government retains direct control of the icebreaking operations and the icebreakers. Icebreaking is considered an integral part of the basic infrastructure and thus it is to be managed and controlled by governmental authority. Focus of the ice breaking operations is to make sure industrial companies are properly served in all circumstances. There are large forest industry and iron ore producers In Northern Sweden.

It is important for SMA to have transparent cost control on icebreaking operations. This is achieved through public tendering processes for management services for the five icebreakers owned by SMA (one being high polar ice-class ODEN) and supplementary icebreaking resources provided by private companies.

There is a joint political and ethical understanding that Swedish icebreakers are not leased out to oil companies. Sweden does not in any way want to be connected to such activity if an accident would occur. However, icebreakers have been leased out for scientific research outside the period where icebreaker is not reserved for icebreaking operations, i.e. from 15 April to September.

Even though the political decision prevents Sweden for taking part in oil & gas operations, the vessels could be used for other operations, such as oil combatting and marine surveillance.

Preference of the SMA is to equip the icebreakers and to operate them in the Baltic Sea, rather than invest in the multipurpose icebreakers, whose other business would primarily be in the Arctic.

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6. Potential Additional use of icebreakers

6.1 Arctic offshore market

Arctic offshore market in this study is defined as businesses conducting or supporting arctic offshore oil & gas exploration and related activity at sea. The size of the market is estimated to be large because of the oil & gas resources. A 2008 United States Geological Survey estimates that areas north of the Arctic Circle have 90 billion barrels of undiscovered, technically recoverable oil and 44 billion barrels of natural gas liquids in 25 geologically defined areas thought to have potential for petroleum. This represents 13% of the undiscovered oil in the world.

The market is still in an early phase as it mostly comprise of test drillings. However, bringing the region's resources to production has historically been a real challenge. According to Infield Systems' data, just 33 of the 174 discovered fields have been successfully developed, representing just a tiny fraction of the region's resource potential.

The high cost associated with drilling development has limited more extensive technology development in Arctic oil and gas production. Additional operating and maintenance costs as well as contracts with operating vessels will significantly increase overall expenses associated with drilling in the Arctic.

6.1.1 Status of the market and recent developments

Access to information on Arctic offshore market is not straightforward as the exchange of information is to a large extent made bilaterally based on personal relationships. Composition of freights is not standard. Freights and fees are based on contractual framework, but are agreed separately case by case. Amendments made to the vessels may be covered by separate mobility payment, but may be compensated by of other fees. Overall pricing is what matters, but as the payments are not standard, the comparability of the freights is not easy.

Typically long term charters (5-10 years) have more fixed pricing, thereby making calculation of time charter equivalent (TCE) possible and profitability assessments more reliable. In shorter term "spot charters" (few days to few years), a single day income may be high, but depending on freight structure and long term utilisation rate the TCE may be low.

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It is evident that the current market conditions have been affected by the low oil price. Chevron, Shell and Statoil have ceased their operations in the Arctic for the time being. Russia has invested in gaining internal expertise and accumulating resources for operating in the Arctic. This means that there are limited possibilities for foreign companies in Russia. However, continuation of low oil & gas prices is expected to reduce activities in Russia as well.

The Arctic offshore market has changed to considerably worse as the oil companies are pulling out. In autumn, 2011 Russian state-controlled Rosneft and ExxonMobil signed a strategic cooperation agreement for joint development of the three East Prinovozemelsky blocks in the Kara Sea following a major oil and gas discovery. Rosneft announced in January 2015, that it will not be able to resume drilling in the Kara Sea after Western sanctions halted its cooperation with ExxonMobil

Shell has continuously operated in Alaska from the mid-1960s until 1998, and drilled many exploratory wells in the Beaufort and Chukchi seas in the 1980s and 1990s. In 2005, the company re-entered Alaska, acquiring leases in the Beaufort Sea. On September 28th 2015, the company announced that it will halt exploration in the U.S. Arctic after $7 billion of spending ended with a well off Alaska that failed to show any meaningful quantities of oil or natural gas.

It is generally expected that the Arctic Offshore market will not recover until the price of crude oil goes up considerably and remains high for some time. Price of oil has fallen in 2015 and latest estimates for oil price in 2016 have been revised downwards. For instance World Bank Revised down Forecasts for oil prices in 2015 and in 2016. According to international energy association market equilibrium may not be attained until the 2020s. This estimate does not in itself assure that the Arctic offshore market would pick up.

According to Clarkson's database, in current market the freight levels likely to be obtained are not sufficient for a profitable business. Freights are not likely to increase in the near future, as the oil price has dropped and activity in the Arctic is considerably lower.

In addition, companies operating in the arctic offshore market ordered ships in anticipation of the market growing, which did not materialize. Current market conditions for offshore fleet in general are extremely weak.

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6.1.2 Risks and constraints

There are several risks associated with Arctic offshore operations. The main risks are of commercial, technical, weather-related, operational, environmental and reputational nature.

Main risks are listed here:

1) Estimate of the oil resources is not accurate.
2) Protective legislation
3) Sustainability of competitiveness in the Arctic offshore market
4) Maps and geographical data are not accurate
5) Environmental regulation is strict and legal liability may be larger than anticipated.
6) Late arrival to a) performing operations b) coming back due to getting stuck at arctic sea routes due to weather and ice conditions

When considering Arctic oil resources, reference is typically made to US Geological Institute's survey. No major oil discovery has been made in Alaska so far. There have been test drillings also in Greenland, but no oil, which may be commercially utilized was found. These estimates, while indicating substantial resources, should be treated with caution. Geological resource estimates do not specify what can be commercially recoverable. That is largely determined by market conditions, mainly the price of oil. There could be a lot of oil in the ground under the ice cap that may be 'technically recoverable', but we do not know how much of it can be recovered in a cost-effective manner.

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There is strict protective legislation for instance in maritime transportation in the United States, commonly known as the Jones Act. Generally, the Jones Act prohibits any foreign built or foreign flagged vessel from engaging in coastwise trade within the United States. The federal courts have given a very wide interpretation of the term. Essentially the term applies to a voyage that beginning at any point within the United States and delivering a type of commercial cargo to any other point within the United States. In Greenland there is a special tax imposed on all, who operate in Greenland for more than 30 days

As the market is not expected to develop in the near future, it is uncertain what types of services and thus vessel characteristics would be needed to meet the demand. In fact, given today's oil prices and increasing competition from more accessible sources, large-scale extraction of oil and gas in the Arctic could be decades away.

As an example of the inaccuracy of the maps and geographical data, a hole of unknown origin was discovered in Fennica in Alaska in July 2015. Later it was found that there was a previously uncharted shoal where the depth was shallower than what was indicated in the nautical charts.

The general principle in liability allocation is that the party that owns and controls the project, the operator, bears the risk of activities. Recently operators have attempted to shift more liability to contractors in the event of a catastrophic accident. There is also an attempt by the regulators to change the position of liability being exclusive preserve of the operator.

The root of these changes is the Macondo oil spill in the Gulf of Mexico in 2010. It is clear that impacts of the Macando oil spill are being felt in the liability allocation and regulatory enforcement across the industry generally, but it is not clear where the liability allocation and enforcement lines will finally end up.

There is no international legal framework in place to deal with the question of liability arising from pollution in the event of pollution following a blowout. Studies of international law that address environmental pollution are usually concerned with oil pollution from tankers. It is therefore left to national laws to deal with this matter. Such laws vary enormously both in the way that the law itself deals with it and with the way contractual indemnities are interpreted and enforced, or not as the case may be.

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6.2 Other possibilities for additional income for icebreakers

Icebreaker Otso provided assistance to seismic research operations in Arctic waters in the summer of 2015. In practice, such assistance involved icebreaking to break a channel for a research vessel conducting seismic measurements.

According to the interviews, there are some opportunities to use icebreakers in the Baltic Sea, for instance an emergency towing service could be established. Oil combatting and scientific work are potential other businesses as well. Due to the cost structure of the vessels, the multipurpose icebreakers are not competitive in other open water oil production areas.

For arrangements of Baltic icebreaking and availability for other duties it might be worthwhile to investigate if the icebreakers could be located in various locations, instead of existing centralized location. This might contribute to the efficient icebreaking and enhance security of supply. Oil combatting operations might also be an option for an additional use of the icebreakers

7. Financing

In order to study potential for building of a new ice breaker and its financing, the new ice breaker should be considered a commercial project, which would be financed by utilizing cash flow generated by (i) the fees from authorities for icebreaking in the Baltic Sea and (ii) other business. Banks were interviewed on approach for financing icebreakers and project finance in general and relevance of ownership in their credit analysis. The assumption was that as customary in project finance, a separate project company would carry out the project.

7.1 Market and aftermarket value for icebreakers

Icebreaking is different from conventional ship financing. There is an active market for commercial vessels, unlike for icebreakers, as they are tailor made to icebreaking in the Baltic Sea or Arctic, possibly including offshore duties. This means that the banks may not rely on asset values as a way of getting repayment. In conventional maritime financing, the vessel is used as security for the loan. If a loan is not repaid, the lender enforces the security interest by selling the vessel.

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7.2 Necessary agreements

Revenue stream of the project will be analyzed. The customerauthority must enter into a long term agreement for icebreaking to provide a secure long-term cash flow. Before the start of the building of the icebreaker, all relevant commercial agreements (provision of icebreaking and other services) for the should be in place, The agreements should be “take-or-pay”, which means that the contracting party must pay agreed price for the service even in case it would not use them.

Cash flow should be secured for at least 10 years. For Arctic offshore operations, a framework agreement should be made with a reputable oil company for at least 10 years with a minimum freight commitment. The bank would not take residual asset risk, which means that the loan should be fully repaid during the term of the loan. This means that a freight contract of 10-15 years would be required. The more binding agreements are, the less ownership has impact.

If cash flow of existing vessels is included, which means that an existing company would carry out the project, it would have positive impact on credit assessment.

Some banks have as policy to finance operating companies instead of projects. This is because of difficult experience in the 1990’s. Banks need to think about capital allocation, as Basel III rules affect credit assessment. According to the Basel III rules, the Banks have to effectively triple the size of the capital reserves they need to hold against losses. Therefore capital allocation has become major part of the lending process.

Both EIB and NIB emphasized that they will not accept market risk. This means that revenue from commercial agreements must be sufficient for the repayment of the loan. Any shortfalls must be covered by equity. EIB is conservative towards credit risk and particularly on reputational risk. EIB as well as other banks will assess environmental risks thoroughly. If primary activity of the icebreaker is outside EU, it might make it more difficult for EIB to fund the project.

On balance, the project must be strong on its own, ownership is secondary and may not compensate shortfalls in business case.

7.3 Credit process

Credit assessment process begins with analysing the underlying business. A feasibility study would be necessary on market; in particular how the Arctic offshore or other special market differs from commercial shipping. Banks will not take technical risk.

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Therefore proven technology must be used. In case the investment is expected to be carried out by a Special Purpose Entity (SPV), it is important to understand what technical risk there may be associated with the construction and what kind of support is available against delays. It will also be analyzed, how operational issues are managed.

Environmental matters are key, in due diligence process also contracting partners will be analyzed. Environmental due diligence process must be thorough.

7.4 Ownership

Equity investors have an impact on credit assessment. Fundamentally, project owners must be solid. Governmental ownership generally reduces risk, but impact of the ownership is analyzed case by case. If the ownership is of strategic importance to the government, i.e. the more the business is an elemental function of the society, the better the credit enhancement is. If the business is a monopoly and the ownership of government is 100%, it gets the highest credit enhancement. In order to achieve credit enhancement, the companies must commit to change of control clause, which means that loan becomes due and payable in case the company ceases to be majority owned by the government.

Banks need to consider what would happen if the loan is in default and what the likelihood is that the actions of the owners would be supportive towards the project company. It would also be good to have institutional companies (pension insurance companies) as investors.

All banks emphasized that the planned business is assessed separately and is the basis for credit decision. Ownership may not compensate any weaknesses in the business plan.

8. Conclusions

Industrial companies' logistic chains have become complex and tolerance for delays is, based on the interviews, even less than before. This means that efficient icebreaking remains a key component for efficient logistics as practically all ports in Finland and northern ports in Sweden are affected by ice, but especially for the companies operating in the Gulf of Bothnia.

Financial model for winter navigation should be utilized to assure that icebreaking is developed systematically and in a most cost efficient manner. The financial model should be used for investment calculations, but it also should regularly be updated for

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industrial development and foreseeable changes thereto. An analysis of expected lifetime of the vessel, level of operational costs and resale value should be considered.

For instance, before starting to plan to invest in new icebreaking capacity, a technical assessment would need to be carried out of condition of the existing fleet. According to the interviews, Fennica (1993) and Nordica (1994) are in good technical condition. Icebreakers Sisu (1975) and Urho (1974), although more than 40 years old, still have solid hull. Before making an investment in a new icebreaker, a technical analysis should be carried out on if there are possibilities to extend economic life of the existing icebreakers, as the hull is most expensive part of the vessel.

Additional business opportunities comprise in addition to Arctic offshore operations, for instance emergency towing service, oil protection and scientific work. It may be inferred from the interviews that co-operation between Finland, Sweden and Estonia is appreciated. The co-operation is likely to bring further opportunities.

An analysis of additional business should anyhow be part of an investment decision. A cost-benefit analysis and risk assessment on financial and operational consequences of additional business needs to be made.

Ownership of the icebreakers may be different from operating and management as the case is in Sweden. It would need to be further assessed if for instance institutional investors would be interested in investing in icebreakers.

Current status of the Arctic offshore market does not support doing business there, but the market is expected to recover if the oil price goes substantially and permanently up. However, market mechanisms will ultimately determine the future of Arctic energy. For instance in the United States, oil companies have set their eyes on Arctic for nearly a century, but the emergence of cheaper and more easily accessible alternatives, have been more lucrative. In addition, new technologies allowing for the extraction of shale oil and gas provide the alternative business.

The authorities must pay attention that there are adequate income assuring stand-by agreements with authorities, otherwise there is less interest in investing in icebreaking. Long term agreement with the authorities and fees thereunder is a must for getting financing for the investments.

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