



OFFSHORE ONSHORE

APPENDIX 1

INTERVIEW

SELECTION OF AREAS FOR
OFFSHORE-RELATED ONSHORE
ACTIVITIES IN QAASUITSUP
MUNICIPALITY



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INTRODUCTION

In the spring of 2011, Qaasuitsup Municipality decided to initiate a preliminary study and selection of suitable areas for ports and other offshore-related trades and industries in the entire municipality.

It is necessary to carry out a preliminary study due to the increasing oil exploration activity in the water west of Qaasuitsup Municipality, and the expectation that in the near future, oil and gas exploration will be a large and potentially space-consuming activity in Greenland and not least in Qaasuitsup Municipality.

Qaasuitsup Municipality has already gained its first experience of oil and gas activities from test drillings in 2010, and in 2011 the municipality has been approached about the possibilities of using areas in Aasiaat for offshore purposes. This situation means that the municipality needs to carry out a preliminary study, which can form the basis for future arrangements with respect to planning and designation of areas for offshore-related business.

Scenarios

The first part of the preliminary study is an assessment of the most likely onshore activities in connection with the expected exploration and production facilities in the area west of Qaasuitsup Municipality.

Through key interviews with central players - licensees as well as public authorities, local representatives and others related to the offshore industry - likely scenarios are identified regarding future offshore activities that may be expected to be located on areas in the municipality in the exploration, the construction and the production phases. The purpose is to uncover whether Qaasuitsup Municipality is to provide land for actual terminal and petrochemical plants, including all related environmental and land impacts, or whether the demands will rather concern supplies, repairs, personnel exchange and related activities such as administration, contingency arrangements and health services.

Interviews

The interviewees were chosen in cooperation with Qaasuitsup Municipality, and focus was on interviewing the licensees in Disko West and Baffin Bay. It was, however, not possible to interview all licensees, among other things since a number of licensees did not believe that they could contribute satisfactorily to the preliminary study as they were at an early stage in their planning activities. Ahead of the interviews, an interview guide was sent out. This guide can be found at the end of this appendix.

From May to June 2011, about 30 interviews were carried out, either as personal interviews or as telephone interviews. The list of interviewees can be seen at the end of this appendix.

The interviews form an essential part of the background for setting realistic future scenarios for the design of a support structure for the offshore industry in Northwest Greenland. The statements of the interviewees have not been repeated word for word. Their statements have been gathered under three main headings:

- Exploration phase
- Expansion phase
- Production phase.

Several parties have pointed out the positive fact that the municipality aims at being abreast of the development by identifying possible onshore areas for offshore activities in the municipality. At the same time, the companies mentioned that the final decision of where to locate their buildings/activities will be made by them. The municipality can act as an active and positive co-player. In this respect, it is important that the municipality gives unambiguous and reliable statements about what it wants and what it can assist the companies in.

Available and relevant reports and analyses about ports and oil exploration in Greenland have been reviewed before the interviews. In addition, data has been collected from the Internet. Reports and analyses used as background information can be seen from the bibliography in chapter 11.

Little specific experience

In the summer of 2011, Cairn Energy¹ as the only company undertook exploration activities in Disko West and off Nuuk. In 2010, the company made two drillings in the Disko Bay. The other licensees have not yet started drilling, and the licensees with whom it has been possible to make an interview are discreet about stating their specific wishes and needs. Consequently, the statements from Cairn Energy, their cooperating partners and a few other operators constitute a comparatively large part of the basis of the preliminary study.

Input from the interviews has been compiled in this report, which will form the basis for the further work with selecting areas for offshore purposes in Qaasuitsup Municipality.

The companies most advanced in planning of their future exploration activities have been able to provide the project with the most satisfactory knowledge about needs and wishes for location, area needs and supplementary functions. The local actors have been able to give detailed information about local supply conditions as well as water supply and navigation.

¹ Cairn Energy is the leading player in a consortium called Capricorn, which formally manages the activities.

EXPLORATION PHASE

2011 has seen extensive exploration activities in the fields in Disko West and off Nuuk. The activities take place in the summer period from about May/June to October. The exploration phase is characterized by being temporary and being geographically linked to the designated exploration fields. As long there has not been found sufficient oil deposits to allow for oil extraction, the licensees' investments are tied to the exploration fields and not to onshore plants and facilities. Therefore, the locations being assessed by the companies are the present towns and settlements. The existing infrastructure is being assessed on the basis of the following order of priority:

- Basic access to good infrastructure by way of airport and heliport.
- A port with a good water depth.
- Good, large and easily accessible surrounding areas for storing equipment.
- Normal supply structure in other respects.

Considerations about location and facilities

During the exploration phase, the offshore industry needs a supply base located comparatively close to the exploration fields. From here it shall be possible to sail equipment and samples to and from the exploration rig as well as to fly crews to and from the exploration area. These functions do not have to be placed at the same location, but the actors interviewed prefer a "one shop – one stop" solution.

High priority is given to access to an airport with landing facilities for fixed-wing aircrafts as well as a heliport featuring hangar facilities. If possible, the parties involved want an airport capable of receiving large passenger aircrafts, rendering it unnecessary to touch down in Kangerlussuaq on the way. Transport time is an important parameter that, however, is counterbalanced by the possibilities of efficient infrastructure and supply capacity in the surrounding area. The companies interviewed point out that a base port should be placed in the vicinity of an existing urban infrastructure with a number of facilities at hand, such as airfield, heliport, hospital and oil emergency measures. Furthermore, proximity to a local community is very important. This offers the possibility of building local qualifications.

By way of comparison, many of the interviewees mentioned the town of Stavanger. This town was chosen already in 1969 as base port for oil exploration off the west coast of Norway before any oil finds had been made.

The existing conditions could be used and it was possible to expand both the port and the areas on land as the exploration activities were intensified and oil and gas were discovered. The port facilities required for an exploration phase are areas that provide

great port conditions like a draught of minimum 9 m and a good quay allowing two ships at a length of 90 m each to berth, storage areas of minimum 25,000 m² as well as access to hall/facilities so that supplies can be stored in a covered and dry place.

Crew changes mean that a supply base must be able to provide accommodation and transport of a considerable number of people, which will vary according to operator. Preferably, crews may be accommodated in hotel rooms or in apartments.

Especially the onshore crews in the exploration season want to stay in apartments rather than in hotel rooms. The interviewees also pointed out that access to hospitals and health facilities would be an important parameter.

During an exploration phase, it will be expedient with access to water, but not a requirement if water can be fetched. Alternatively, water will be produced on ships using osmosis systems. Several indicate that the companies would like to be located in the same towns and areas. This facilitates cooperation, for instance about emergency response measures with respect to accidents.

Temporary experience from the exploration phase

During the exploration activities in Disko West, Aasiaat has been used as base port in the exploration season 2010 and again in 2011, because the town is close to the license areas and, as the only one of the towns in Qaasuitsup Municipality, has sufficient port conditions. In addition to this, the town has an airport for fixed-wing aircrafts allowing for air transport of crews.

As exploration primarily takes place in the summer season, i.e. from June to October, when the ports in Qaasuitsup Municipality are ice-free, ice is not considered a major problem in this respect. The companies chiefly lease the equipment used for exploration activities so they need not store equipment from one year to the next. Consequently, their need for storage space is primarily related to the exploration season.

Several of the interviewees mention that if more companies start their exploration activities at the same time, Greenland as a whole will run out of capacity. Consequently, there is a need for planning solutions on a national basis and in a wider perspective.

In the exploration season of 2010, Aasiaat was chosen as base port. In the season from June to October, about 150 ships called at the port in connection with the exploration activities. The length of the quay areas allows a maximum of two ships to berth at a time. This involved considerable capacity problems in the season, as Aasiaat is North Greenland's transit port and is therefore called by many passenger ships, RAL's supply ships and trawlers.

An area of about 3,000 m² was laid out for offshore activities at the port of Aasiaat plus 1,000 m² in a quarry behind the town. This was not quite enough and caused some logistic challenges with containers standing in layers and equipment being hard to access. Another challenge was the fact that the areas could not be fenced in. There is a strong wish for enclosing the areas, partly for safety reasons in terms of the local population, partly to prevent thefts.

Multiple operators involve increased pressure on areas and facilities in the municipality. In the interviews several interviewees pointed out that the optimum solution would be a combined port and storage area. As a minimum, each company will need 10,000-20,000 m². In an exploration phase, the optimum would be access to a storage area of 200,000 m² in total. As the operators share a good deal of equipment, for instance for emergency response measures, an extra operator in the area will not necessarily double the area needed.

Aasiaat was also used a hub for change of crews on the ships and the drilling rig. In the season of 2010, crews were changed three times a week, and this is also expected to be the case in the exploration season of 2011. Crews were flown in by chartered aircrafts from Aberdeen to Kangerlussuaq and from there on chartered aircrafts to Aasiaat. The airport is designed and equipped to handle ordinary passenger flights by scheduled airliners and not frequent changes of 60-70 people from drilling rigs, while also handling ordinary scheduled passengers. Therefore the local school was used as arrival and departure hall for the passengers.

The physical conditions around the airport in Aasiaat are also very limited. There is hardly room for more aircrafts in the airport, and there are no covered facilities for helicopters. The helicopters employed are so high-tech that they must be placed in a hangar when not in operation. In winter, this problem will intensify as the equipment cannot withstand the cold. Therefore, Aasiaat is used as base for transport of crews, whereas the chartered helicopters and the personnel are based in Ilulissat where the necessary overnight accommodation and hangars are available.

Accommodation of crews has been a challenge in Aasiaat, as the town does not have the required capacity. For this reason, supply ships with overnight accommodation capacity were used to a wide extent. It is a wish to assemble all activities in one place. This means storage, crew air transport, procurement of other supply equipment and onshore accommodation of crews. This is, however, not necessarily a deal breaker.

In Aasiaat, the water capacity is about 1,000,000 m³, half of which the town uses annually. In addition, it is possible to collect water in Lake 20, which has an estimated capacity of about 210,000 m³ and is assumed to have spring water. In Upernavik, water is collected from Akia Island. Here is a capacity of about 50,000 m³, which is not sufficient

to supply the town. Water can be fetched in the nearby settlement Apillatoq.

As far as supplies are concerned, one actor in 2010 consumed about 3,000-4,000 m³ water in the season and very little power, because ships etc. produce their own power. Another operator has estimated water consumption to be a little lower than that mentioned above.

Proposed suitable locations

As the fields are located very far from each other, supply bases will be needed in several places. The interviewees pointed out that a main supply base located in Aasiaat would be optimal. Several indicated that Upernavik is a fine location with respect to the northern fields in Baffin Bay. Upernavik has a relatively good port and an airport and it is possible to establish storage areas. However, the town lacks overnight accommodation and an efficient water supply.

Others highlighted Qaarsut as an option. North of the airport is a large, flat area towards the sea, which is suitable as storage area. There are also plans to extend the port, which will have a depth allowing supply ships to call at the port.

In Aasiaat, Tupilak Island was specifically pointed out. The island has very large areas suitable for storage, and a new port can also be established. In this connection, Nukissiorfiit has stated that it will be relatively uncomplicated to run water to the island. If the island is to be connected with the remaining town, a small bridge will have to be built.

CONSTRUCTION PHASE

The companies interviewed pointed out that activities in a construction phase will very much depend on the discoveries made and not least where they are made.

It is hard for the interviewees to indicate where the large construction of a proper supply port will take place in Greenland, or whether it is even realistic. If the first discoveries are made around Nuuk or in South Greenland, a supply base might be constructed there. In that case, supply bases in North Greenland will have a more local character. Whatever happens, it is estimated that the northern parts will see activity if oil is found - considering the transport distance to the fields.

Several actors refer to the experience from Norway and Stavanger, which was originally chosen as supply base in connection with exploration activities. Here, a gradual expansion of the town took place as oil was discovered, because Stavanger had expansion potential. It is therefore important that the location/town chosen as supply base has the potential to be expanded in the long run. In this way, the qualifications achieved during the exploration phase can be further enhanced locally.

PRODUCTION PHASE

Production

The interviewees are all very non-committal when giving their specific opinion about a production phase - a phase that may be 10-20 years in the future.

Onshore-based activities in Qaasuitsup Municipality in a production phase will depend on the discoveries and where these are made.

Focus areas

Under the present circumstances, the most likely scenario as judged by the interviewees is that the activities to take place in Greenland will be support functions for the offshore industry like storage, crews change and emergency response measures.

None of the interviewees expected actual oil production to take place in Greenland when oil is found. Establishment of refineries requires many fields, and it is not considered realistic that that amount of fields will be discovered in Greenland to enable establishment of refineries. At the same time, given its modest size, Greenland will never be a big purchasing country of oil and gas. Typically, processing of oil and gas will take place close to where the products are sold. Also, the total workforce in Greenland is very small, meaning that a production will require import of work force to operate the production plants.

Oil discoveries will be the most easily accessible and financially most advantageous. Gas discoveries will be far more difficult to handle with respect to both production and financially. Gas production is regarded profitable only in case of very large discoveries, and if world prices justify extraction. If gas is found along with the oil strikes, and these are not extracted, the gas will be returned to the underground. As a rule of thumb, extraction of oil will have to pay for a possible extraction of gas, and the price of extraction of gas will be double.

Expectations regarding equipment and methods

Based on today's knowledge, oil production is expected to take place as FPSO (floating production, storage and offloading), i.e. a floating vessel where hydrocarbons are processed and where the oil is stored until it can be transhipped to another ship, be transported to shore or be transported by pipeline. A FPSO vessel is designed to receive hydrocarbons produced on nearby platforms or in subsea installations, process them and store oil. FPSOs are preferred in offshore areas where it is hard to work, for instance in the Arctic regions, as they are easily installed and do not require a local pipeline infrastructure for oil exports. FPSOs can be reconstructed oil tankers or vessels built specifically for the exploration phase. A vessel used for oil storage only (without processing) is called a floating storage and offloading vessel (FSO).

The alternative is a pure subsea installation (a so-called subsea plant), which has no surface activity, and where oil and gas in unchanged form is brought ashore to a terminal in which the above separation into water, oil and gas is made. The stabilized crude oil is pumped to the nearest port where it is kept in tanks and from here shipped for further processing in refineries. When gas discoveries are exploited, the gas is conveyed either immediately to gas mains on the sea floor or to an LNG plant, before shipment.

At present, production is not expected to be effected as subsea solutions, as this type of solution does not work well in icy areas.

Attention was drawn to the fact that if drillings are to take place all year, they must be take place by means of a bottom founded drilling rig (fixed well), not a floating rig. This has been done in New Foundland where fixed installations are established in big concrete structures, which can withstand pressure from icebergs of up to 1,000 tonnes.

All companies interviewed also indicated that the offshore industry as a whole is very innovative. If large oil or gas finds cannot be exploited by means of the existing methods, the methods required will be developed.

Considerations regarding location and facilities

In a production phase, the distance from the supply port to the fields will still be of essential importance due to the same reasons as stated in the exploration phase, namely safety, time and money.

Several of the interviewees indicated that in the long term, the decisive factors regarding locations will not be the municipality earmarking areas for oil and gas activities, rather a number of surrounding facilities and other factors will make the port/the area the natural choice.

Important factors

- Basic, good infrastructure in the form of an airport that can accommodate Atlantic aircrafts
- A port with a good water depth
- Normal supply structure in all other respects.

But it is equally important:

- That the oil companies know that the town/the port is “where things happen”, i.e. there is a cluster formation - a concentration of institutions and subsuppliers, which offer practical and knowledge/knowhow synergies.
- That there is access to qualified companies and labour in the fields of supply, handling of goods etc.
- That a common location is found for environmental emergency measures, storage facilities etc.
- That there is a clear, long-term plan for development of areas, and that this plan is communicated and supported by the practical solutions of the municipality.

An important factor is good access to power for the onshore plants. It will also be necessary to expand infrastructure and develop homes for the employees wanting to move to the place to become part of the service industry that will support the activities of the oil companies.

At present, the most probable scenario is that the supply base port will be of the same

nature as, for instance, Esbjerg. It will therefore be important that the supply port can be expanded. Esbjerg has laid out approximately 200,000 m² for offshore activities and currently an expansion of 50,000 m² has been planned.

In Dusavik in Stavanger, 300,000 m² have been laid out for offshore activities. This port works as base port for the three companies Statoil, Exxon Mobil and Total.

It was also indicated that Greenland in general, i.e. the municipalities and the Government of Greenland have to cooperate about education/training and competence development in consortia or joint ventures. Today, the individual Greenland companies are too small on their own. Finally, Greenland must consider itself as part of a global oil industry operating across countries and continents.

Regarding the future effects of oil and gas activities on jobs and industry, several of the interviewees mention that it is difficult to assess the long-term effect. Decisive factors will be:

- Where discoveries are made
- Which technology is chosen for production (floating platforms (FPSO) or subsea technology)
- Whether other finds are made in Greenland at the same time.

Access to a qualified manpower will be one of the factors determining whether the number of local jobs will increase, and it is important whether local companies early on can handle subsupplies and thus create a basis for an increasing demand for local service activities.

It will take many years to build a local competence cluster. The experience from Denmark and Norway among other countries is that there will be a dependency on foreign competencies and suppliers for the first 20 years as a minimum, and only then will it be possible to build local competencies. Offshore Center Danmark estimates that the link between persons employed directly in the oil and gas industry and persons employed indirectly is a ratio of about 1:3 – but this is a very rough estimate.

INTERVIEW GUIDE

Subject	Question
Type and scope of activities in the municipality	<p data-bbox="432 589 895 618">Introduction, subjects of the interview</p> <p data-bbox="432 663 1310 692">What overall offshore activities does the actor expect to affect the municipality</p> <ul data-bbox="480 725 804 887" style="list-style-type: none"><li data-bbox="480 725 804 754">– In an exploration phase?<li data-bbox="480 788 804 817">– In an expansion phase?<li data-bbox="480 851 804 880">– In a production phase? <p data-bbox="432 920 1461 983">How may the activity be expected to vary in the long term, depending on whether oil or gas is found, find size etc.?</p>

Specific activities	<p>Exploration phase</p> <p>Wishes and needs regarding facilities</p> <p>Will the actors request particular facilities (storage areas, building, public emergency response measures etc.)?</p> <p>Will the actors request local power and water supplies on land in the exploration phase?</p> <p>How big ships may be expected to call at the mainland?</p> <p>How many ships may be expected to call per year, per season?</p> <p>Wishes and needs regarding location</p> <p>Which issues are considered the most important when choosing an area for the base port?</p> <ul style="list-style-type: none"> – Distance to license areas? – Regularity – no ice problems etc.? – Seasonal length regarding navigation without ice problems? – Need for co-localization of functions - can simple, but space-consuming storage areas be placed at other locations? – Access to airport, overnight accommodation etc.? – How important is proximity to a town for the base port in the exploration phase - including proximity to supplies, service/repairs etc.? <p>Crews and manning</p> <p>How many employees may the companies be expected to have in exploration seasons?</p> <p>Will the employees require their own homes, hotels or the like?</p> <p>To what extent would you integrate with the rest of the population? Do special policies exist about this?</p> <p>Does the company have a policy in this area - can it be influenced?</p> <p>Concluding questions</p> <p>In this phase, what is the expected total area need of the actors?</p> <p>In this phase, what are the expected total port requirements (quay length etc.) of the actors?</p> <p>Are onshore facilities to meet any other requirements/demands?</p>
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	<p>Expansion phase</p> <p>How is an expansion phase expected to differ from the exploration phase?</p> <p>What scenarios can be described:</p> <ul style="list-style-type: none"> – Depending on the size of the finds? – Depending on the nature of the finds (oil/gas and combinations)? – For how many years is the expansion phase expected to last?
	<p>Production phase</p> <p>How is a production phase expected to differ from the other phases?</p> <p>Which scenarios can be described?</p> <ul style="list-style-type: none"> – Depending on the size of the finds? – Depending on the nature of the finds (oil/gas and combinations)?
Organization	<p>Company structure</p> <p>What type of organization will be seen in the individual onshore companies/operators in the various phases?</p> <p>Will the operators bring along their entire organization (all services and all employees)?</p> <p>To what extent will local subsuppliers (if they exist) be used for repair works/service, supplies etc.?</p> <p>Will there be changes to how this type of project is traditionally manned (new tendencies, new work methods, new technology)?</p>
Public service	<p>Who will be responsible for functions like environmental emergency precautions, HSE, hospital/disaster preparedness?</p> <p>Management of waste and other induced effects?</p>
	<p>Concluding:</p> <p>Can large terminal facilities, refinery etc. be ruled out in Greenland?</p> <p>How certain/uncertain is this?</p> <p>What can influence this, if anything?</p>

INTERVIEWEES

Oil and gas actors as well as subsuppliers and authorities:

Nunaoil

Mærsk Oil

Arctic Base Supply

Cairn Energy

ExxonMobil

Bureau of Mineral and Petroleum

Esvagt

KPMG

Port and transport experts

Port of Esbjerg

RAL Aalborg

RAL Aasiaat

RAL Upernavik

Greenland Airport Authority

Cougar Helicopters

Ministry of Housing, Infrastructure and Traffic

Spangenberg og Madsen, (consulting engineer)

Supplies etc.

Nukissiorfit - Nuuk

Nukissiorfit - Aasiaat

Nukissiorfit - Upernavik

Polar Oil

Local stakeholders

Aasiaat Transport

EMJ Grønland

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