WHERE CAN DEVELOPMENT COME FROM?
POTENTIALS AND PITFALLS IN GREENLAND’S ECONOMIC SECTORS TOWARDS 2025
Where can development come from?
Potentials and pitfalls in Greenland’s economic sectors towards 2025

This analysis has been carried out by Ramboll Management Consulting in the period September 2013 to February 2014.

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1. **SUMMARY**

In these times the development of Greenland’s society and economy stands at a crossroads. On the one hand, the country is facing significant challenges, if the current level of social welfare is to be sustained in the future. On the other, it has been established that the country has vast economic potentials, which may greatly influence its future incomes, business life, and the sustainable development of society as well as environment.

The current socioeconomic situation calls for focusing on business development that both helps bring about a long-term transformation of the economy and creates development and jobs in the here and now.

The Government will be facing a growing gap between revenue and expenditure of public finances towards 2025. This deficit will have to be plugged either by reducing public expenditure or by increasing incomes to Greenland’s society and public sector by means of greater private sector activity and consequent tax revenues.

**Figure 1: Development in Government revenue and expenditure in millions of DKK, 2010 prices**

![Graph showing development in Government revenue and expenditure](image)


This report sets out to explore the economic potentials of Greenland’s existing sectors, e.g. fisheries, mining and tourism, as well as new sectors, such as energy-intensive production (e.g. aluminium smelters), utilisation of mineral deposits, and others.

Rambøll Management Consulting (henceforth 'Rambøll') has analysed which sectors will be able to address the current and future social and economic needs in Greenland, and what will be the consequences for the economy, society and environment.

Our aspiration with this report is to shine the spotlight on sectors which are creating permanent and locally-based jobs in Greenland, and which may to various degrees, within a relatively short time span, contribute to the economy.

We have chosen not to include offshore extraction of oil and gas in the analysis. It is well-known that this activity could potentially become a ‘game changer’ for Greenland. It has been subject to scrutiny in recent years, thoroughly mapping out both the possible socioeconomic gains and the societal, economic and not least environmental risks involved.²

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¹ For more details, see the Economic Council’s report 2010.
² See for examples Report on socio-economic aspects of hydrocarbon exploration and exploitation in Greenland, the Greenland Taxation and Social Welfare Commissions’s report Vores velstand og velfærd – kræver handling nu [Our prosperity and welfare demand
It is our starting point that economically, socially and environmentally sustainable development of society should be promoted through broad-based economic development which helps create a wide set of domestic capacities, jobs and lasting turnover. It is important that the society of Greenland increase private sector incomes as rapidly as possible in order to confront the current economic imbalance.

Although the emerging sector of raw materials will be able to create growth and employment, it is unrealistic to expect this to underpin development in all parts of the country. Other economic sectors in Greenland, however, also hold considerable unexploited scope for growth.

The country’s large and well-established fisheries sector, the existing tourism industry, hunting, agriculture and other activities offer opportunities for further development in coming years. They may thus contribute to meeting the socioeconomic needs of Greenland in the future.

Fisheries is the second-largest sector in Greenland with an estimated turnover of DKK 3.7 billion. Commerce is the largest sector with a volume of trade of about DKK 4.7 billion. Turnover in tourism has been calculated at DKK 334 million, while raw material extraction amounts to DKK 522 million in 2010. The fishing industry is by far the most important economic sector in Greenland today, accounting for about 60% of all exports, which totalled DKK 4.2 billion in 2011. Unlike other sectors, turnover in fisheries is not generated by means of public funding, and the sector delivers a significant proportion of Greenland’s total income.

**Figure 2: Turnover by sector in millions of DKK, 2010**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Turnover (in millions DKK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handel</td>
<td>4,725</td>
</tr>
<tr>
<td>Fiskeri**</td>
<td>3,700</td>
</tr>
<tr>
<td>Transport</td>
<td>2,858</td>
</tr>
<tr>
<td>Bygge og anlæg</td>
<td>2,146</td>
</tr>
<tr>
<td>Fest ejendom mv.</td>
<td>1,023</td>
</tr>
<tr>
<td>Industri</td>
<td>687</td>
</tr>
<tr>
<td>Råstof-udvinding**</td>
<td>522</td>
</tr>
<tr>
<td>Hotel og restaurant</td>
<td>372</td>
</tr>
<tr>
<td>Finans og forsikring</td>
<td>336</td>
</tr>
<tr>
<td>Turisme</td>
<td>334</td>
</tr>
</tbody>
</table>

* Turnover of fisheries is based on figures from 2011. ** Raw material extraction encompasses the mining sector, but not oil and gas. Source: Statistics Greenland, own calculations.

Based on a structured analysis of economic sectors that may possibly contribute to meeting the socioeconomic needs of Greenland in the future, Rambøll judges that the following sectors in particular may help foment economic growth: tourism, fisheries, mining, agriculture and seal products.

In Rambøll’s assessment, based on decisions and initiatives that have already been taken, the aforementioned sectors will be able to grow by an average of 0.6% annually until 2025 (total growth of 9%). This is equivalent to a total increase in the businesses’ annual turnover of about DKK 428 million in 2025.

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If a major mining project is carried out during the period (e.g. the Isukasia mine), it can potentially increase annual Government revenue by some DKK 1-2 billion, in addition to the income coming from the other sectors.

In the report’s chapters on each sector, we have made an assessment of the possible size of the respective sectors by 2025, being under the impression that further initiatives will be set in train that will promote growth and progress.

Given such initiatives, Rambøll considers that the sectors of tourism, fisheries, mining, agriculture and seal products may potentially grow by 3.8% annually towards 2025 (total growth of 56%). This is equivalent to a total added turnover of DKK 2.9 billion on top of the growth already described. This will be a strong factor in plugging the current gap between costs and incomes, and at the same time underpin economic development in all parts of the country, creating lasting, locally-based jobs.

**Figure 3: Turnover by sector in millions of DKK, 2011 and 2025, in 2011 prices**

![Figure 3: Turnover by sector in millions of DKK, 2011 and 2025, in 2011 prices](image)

Source: a series of sources and own calculations in accordance with chapters on individual sectors.

The report sets out general catalogues of ideas for possible initiatives that may promote growth in each sector. The chapters on individual sectors examine the particular initiatives and means that may be brought to bear in order to enhance growth in the sectors included. Table 1 below presents a synthesis of the chapters covering individual sectors.

Before each of the initiatives might be launched, it will be necessary to carry out more in-depth feasibility studies, as well as to define time horizons and preconditions.

Summing up, Rambøll sees a need for a structured political approach to the development of Greenland’s business life, focusing on the development of specific areas and competencies in light of systematic assessments of local strengths and skills. This will serve to ensure authentic capacity building in prioritised sectors.

It should be noted that the report has not assessed the public sector’s capacity to carry out the required changes. Simultaneously with the business sector development, it will be crucial to focus on sustaining and advancing the necessary public sector capacity to continue to underpin and catalyse the development, as well as to ensure the necessary permits, regulation and supervision. Otherwise, the development may have adverse effects on the sustainability of society and environment, in addition to hampering the pace of progress.
<table>
<thead>
<tr>
<th>Sector</th>
<th>Expected Volume</th>
<th>Current Volume</th>
<th>Expected until 2025</th>
<th>Land to Realize the Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining and Industry</td>
<td>$6.2 billion</td>
<td>$0.5 million</td>
<td>$950 million</td>
<td>1.1 million</td>
</tr>
<tr>
<td>Agriculture</td>
<td>$1 million</td>
<td>$0.2 million</td>
<td>$600 million</td>
<td>$0.4 million</td>
</tr>
<tr>
<td>Tourism</td>
<td>$0.7 billion</td>
<td>$0.5 billion</td>
<td>$500 million</td>
<td>$0.2 billion</td>
</tr>
<tr>
<td>Fisheries</td>
<td>$0.9 million</td>
<td>$0.4 million</td>
<td>$300 million</td>
<td>$0.5 million</td>
</tr>
</tbody>
</table>

**Figure 4: Summary of the sector analyses**

- **Mining and Industry**: Focus on extraction and coordination to realize the potential.
- **Agriculture**: Targeted at enhancing crop diversity and expanding crop yield.
- **Tourism**: Emphasizes on sustainable tourism practices.
- **Fisheries**: Key focus on conservation and sustainable fishing practices.

**Strategic Considerations**

- **Mining and Industry**: Need for advanced technology and sustainable practices.
- **Agriculture**: Importance of local employment and reducing food prices.
- **Tourism**: Expansion in the sector with opportunities for local economic development.
- **Fisheries**: Conservation measures and sustainable fishing practices.

**Environmental Impact**

- **Mining and Industry**: Significant environmental impact due to waste disposal and air pollution.
- **Agriculture**: Positive impact on land productivity and soil health.
- **Tourism**: Positively impacts local culture and promotes cultural awareness.
- **Fisheries**: Important for maintaining marine biodiversity and supporting local livelihoods.

**Employment Impacts**

- **Mining and Industry**: Potential for providing 3,000 new jobs.
- **Agriculture**: Potential for providing 3,300 new jobs.
- **Tourism**: Potential for providing 3,700 new jobs.
- **Fisheries**: Potential for providing 3,900 new jobs.

**Investment Requirements**

- **Mining and Industry**: $7 billion investment needed.
- **Agriculture**: $6 billion investment needed.
- **Tourism**: $6 billion investment needed.
- **Fisheries**: $6 billion investment needed.
2. INTRODUCTION

In these times, the development of Greenland’s society and economy stands at a crossroads. On the one hand, the country is facing significant challenges, if the current level of social welfare is to be sustained in the future. On the other, it has been established that the country has vast economic potential, which may greatly affect its future incomes, business life, and the sustainable development of society as well as environment.

The potentials have primarily been identified in the area of raw materials and minerals, and both political and business circles focus strongly on the concomitant opportunities for development.

Although the sector of raw materials will be able to create growth and employment, it is unrealistic to expect this to underpin development in all parts of the country. New jobs will be located in particular extraction zones, which will be naturally and directly advantaged in terms of local employment as well as turnover in other sectors benefitting from derived demand.

Other economic sectors in Greenland, however, also hold unexploited scope for growth. The country’s large and well-established fishing sector, the current tourist industry, agriculture, hunting, etc. offer an array of opportunities for continued development in years to come, which may also contribute to Greenland’s future.

At the same time, it must be kept in mind that, notwithstanding the vast economic potentials of the raw materials sector, these will presumably take some 5-10 more years to become substantial. Greenland’s current socioeconomic situation calls for focusing on sectors capable of creating development and jobs in the shorter term as well.

The development of sectors other than raw materials and minerals is also important if Greenland wishes to continue to chart a course of sustainable and inclusive development for society as a whole. It is necessary to establish permanent jobs, which, based on the skills of the population, serve to underpin the progress ahead.

An analysis by Rambøll of development in six Arctic towns (Nuuk, Narvik, Tromsø, Gällivare, Luleå and Oulu) document, for instance, that those societies that manage to create a broad-based economic structure with a well-educated labour force are also more resilient to economic downturns, and better at maintaining sustainable demographic, social and environmental development.

It is important to understand the implications of societal development for climate, environment and nature, since Arctic areas are highly vulnerable and unique as regards flora and fauna. Initiatives and measures to counter potential risks of specific activities should be an integral part of decisions concerning the future development and character of the sectors.

2.1 Focus of this report

This report is based on the premise that the society of Greenland must find a series of durable solutions for the future which ensure sustainability economically, socially as well as environmentally. This is not an easy task.

The Greenland Taxation and Social Welfare Commission sums up the scenario with the following quote: “The status quo is not an option.” This view has, in recent years, been expressed again and again by politicians, the business community and other actors in the country’s society.

This gives rise to a series of problematic issues which may be framed in the following questions:

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• Which sectors will be capable of addressing current and future social and economic needs in the country?

• How large a share can each of the various sectors contribute towards addressing the needs? And how will the sectors impact on the economy, society and environment?

• What national and international factors will influence the future role of the sectors?

This report addresses the above questions. By way of introduction, we go about this by identifying and analysing a number of select sectors, which may help Greenland to chart the desired course.

It is our point of departure that economically, socially and environmentally sustainable development of society is favoured through broad-based economic and social development which contributes to building a wide array of domestic competencies.

We have chosen not to include offshore extraction of oil and gas in the analysis. It is well-known that this activity could potentially become a ‘game changer’ for Greenland. It has been subject to intense scrutiny in recent years, thoroughly mapping out both the possible socioeconomic gains and the societal, economic and not least environmental risks involved.5

Our aspiration with this report is to shine the spotlight on sectors which are creating permanent and locally based jobs in Greenland, and which may to various degrees, within a relatively short time span, contribute to the economy.

To this effect it will obviously be crucial that – simultaneously with the business sector development – attention be paid to sustaining and advancing the public sector capacity required to continue to underpin and promote the development as much as possible, as well as to ensure necessary permits, regulation and supervision. Otherwise, the development may have adverse effects on the sustainability of society and environment, while also hampering the pace of progress.

The report highlights the opportunities both in (1) existing sectors, such as fishing, mining and tourism and (2) new sectors, such as energy-intensive industry (e.g. aluminium smelters), utilisation of raw material deposits, etc.

In the following chapters, we establish the current scenario with a series of key figures regarding the sectors which we have selected. Various social dimensions are included in this, e.g. socioeconomic weight, number of employees, contribution to public finances, planned investments, environmental implications, geopolitical vulnerability and other aspects.

Subsequently, we analyse the future potential, demands and investments of each sector. This analysis is divided into two parts: (1) Mapping out development measures already decided upon; and (2) innovative ideas and suggestions for further development of economic sectors, including those presented by private actors or think tanks.

The analysis will result in an assessment of the development potential in each sector, including of its possible socioeconomic weight by 2025. Moreover, when addressing each sector, we shall present a catalogue of ideas. This will indicate a series of initiatives that can be carried out in order to promote development in the sector concerned.

In the following Chapter 3, we look at Greenland’s current economic situation and challenges. In Chapter 4, we examine the country’s existing economic sectors and their relative size and development potentials. Furthermore, more profound analysis is presented of those sectors that,
given the right circumstances, might in Rambøll’s assessment take up a larger share of the economy than what is currently the case. In **Chapter 5**, a number of additional sectors are included, although these are not discussed in detail in the report.
3. GREENLAND’S ECONOMIC CHALLENGES

Greenland's economy is typical of Arctic regions and should, for the purposes of business
development, be viewed in light of the concrete circumstances of geography and climate
pertaining to an Arctic nation.

Firstly, the economy is based on exploitation of natural resources (hunting and fishing) and (thus
far) characterised by the absence of an industrial sector as such.⁶ Accordingly, the extraction of
raw materials and minerals plays only a limited role in Greenland's economy today. In December
2013, the country’s last productive mine in Nalunaq was closed down. Nevertheless, looking
ahead, the raw material potential is substantial, and a long list of companies have begun to
survey the underground in order to explore commercial opportunities for extraction.

Secondly, Greenland has a large public sector, which in many ways dominates the economy.⁷ The
country’s society is based on the Nordic social welfare model, offering a range of services to the
population. Going forward, not least the current costs of maintaining a high level of welfare are
bound to put pressure on the Government’s efforts to balance the books.

Thirdly, Greenland has a fragmented and small labour market spread over a vast geographical
area, although there is arguably a relative concentration in the larger towns. The working
population totalled 28,387 in 2010.

Greenland has 56,370 inhabitants (January 2013) spread across a vast surface area (2,166,086
km²). Greenland’s gross national product in 2011 was DKK 13.1 billion and has, in the period
2003-2011, had an annual growth of about 4% (in current nominal prices). According to
Statistics Greenland, the gross national product per capita was DKK 231,000 in 2011.

Figure 4: Greenland’s gross national product (GNP) in millions of DKK, 2003-2011, current
nominal prices

Greenland’s GNP per capita is low compared to the Nordic countries. In comparison, the average
GNP per capita in Denmark was DKK 322,000 in 2011, according to statistics Denmark. In the
period 2003-2011, Greenland’s GNP per capita is some 60-70% of Denmark’s.

Even when adjusting the figure to take account of the subsidy (bloktiškud) from Denmark and
Greenland’s income from the fisheries agreement with the EU, totalling about DKK 3.9 billion,
Greenland’s GNP per capita remains about 10% lower than Denmark’s.

⁶ Torben M. Andersen: “Grønlands økonomi” [Greenland’s Economy], p. 100.
3.1 Composition of public finances

In 2011, the Government of Greenland incurred expenditure of DKK 6.522 billion and collected income of DKK 6.391 billion. The subsidy from Denmark and the partnership agreement with the EU brought in about DKK 3.864 billion, thus accounting for 60% of total income. Direct taxes, i.e. income tax and corporate tax, made up DKK 1.135 billion, while indirect taxes, including import tariffs, amounted to DKK 800 million. Accordingly, altogether about 30% of Government revenue came from direct and indirect taxation.

Thus, Greenland’s economy remains highly dependent on the subsidy from Denmark, which must be expected in coming years to continue to play a crucial role in the development of society’s ability to consume and maintain a level of social welfare.

3.2 Public finances in the red

A series of actors forecast that the current financial situation is set to worsen in coming years due to a variety of structural circumstances.

In connection with the Autonomous Government Agreement with Denmark, the Economic Council of Greenland was designated in 2009. The Council’s mission is: "to assess the economic cycles and the viability of economic policy, just as the Council should examine the financing of social welfare payments." 8

The first report from the Economic Council was published in 2010, making a series of projections for Greenland’s economy in the following years.

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8 From the introduction to the Economic Council’s first report from 2010.
In its report, the Council thus presented an economic model and extrapolated from the current economic situation. This led the Council to identify a deficit between income and expenditure in public finances towards 2030.\footnote{For more detail, see the report of the Economic Council, Ch. 3.}

The Council estimates that this gap will be DKK 629 million by 2025, while the deficit will grow to DKK 950 million in 2030 (in 2010 prices). Expenditure significantly outgrows income, which increases the gap year by year. Various causes account for the negative trend in the extrapolation carried out by the Economic Council of Greenland. Part of the explanation naturally springs from the gradual withdrawal of the Danish subsidy, but the following sections will highlight some of the most important additional reasons.

**Figure 7: Development in Government revenue and expenditure in millions of DKK, 2010 prices**

![Graph showing development in Government revenue and expenditure](source)


Looking ahead, there will be fewer people in the economically active age and more elderly people to support. This will increase public expenditure on, among other items, elderly care and healthcare. As can be seen from the figure below, the so-called dependency ratio was 0.51 in 2012, which means there were 0.51 dependents (children, elderly, unemployed) per economically active breadwinner. The ratio is expected to increase to 0.56 in 2025. The cost of health and pensions will therefore rise in the years towards 2025. The falling birth rate will lessen expenditure in areas such as family, children and education, but this will not suffice to offset the cost increases.

**Figure 8: Development of dependency ratio, 2000-2025**

![Graph showing development of dependency ratio](source)

Note: Calculation of dependency ratio: Number of breadwinners (18-64 years) / number of dependents (0-17 years, 64-99 years). Source: Statistics Greenland.
In recent years, Greenland has experienced a downward demographic trend due to emigration and deaths exceeding immigration and births. This is not a major problem in itself, provided that the remaining population maintains the same or achieves a lower dependency ratio. However, this does not seem to be the case, since a significant share of the emigration is of young people who enrol for higher education outside Greenland, subsequently staying abroad in order to work.\textsuperscript{10}

These demographic trends are expected to continue in years to come. For 2025, Statistics Greenland forecasts a population of 55,730 compared to 56,452 in 2010. Moreover, a marked increase is anticipated in the number of citizens aged 65-99 years and a decrease in the age group of 18-64-year-olds.

\textbf{Figure 9: Development in Greenland’s population, number of persons}

![Graph showing population development in Greenland](image)

Source: Statistics Greenland.

Average life expectancy in the country has been rising over the past decades. In 1980 it was 64 years, while in 2012 it was 70.5 years. As in other Western countries, life expectancy is projected to grow in future by about one year for every five-year period, which, in view of a virtually unchanged population size until 2025, implies an upward shift in the age distribution.

\textbf{Figure 10: Development in life expectancy, age in years}

![Graph showing life expectancy development](image)

Source: Statistics Greenland.

\textsuperscript{10} Torben M. Andersen: “Grønlands økonomi” [Greenland's Economy], p. 107.
4. STATUS AND POTENTIAL OF ECONOMIC SECTORS

Greenland’s business structure is characterised by many small enterprises with few employees, supplemented by a handful of large companies accounting for a major overall share of employment. The vast majority of the large companies are owned in part or in full by the Government. This is the case of, for instance, Royal Greenland, Air Greenland, Tele Post, KNI, Royal Arctic Line, Nukissiorfiit, among others. The ownership modality can be either share-holding or full government ownership with semi-autonomous management (nettostyret).

The public sector is by far the largest employer, occupying 39% of the labour force (equivalent to 11,500 employees). The second-largest sector in terms of employment is that of commerce and repair activity, with about 12%, while the fishing industry provides for about 12% of the labour force. Potential growth sectors, such as tourism (including hotels) and raw material extraction account for, respectively, about 4% and 1% of all jobs.

Accordingly, employment in Greenland is relatively vulnerable, as it depends on public sector consumption and on the activities of a few, frequently government-owned, enterprises.\(^\text{11}\)

Figure 11: Number of employees by sector*

Note: The number of employees counts all hired personnel in Greenland. *Number of persons with this as their principal occupation on average per month. ** The term 'other sectors' includes: education, healthcare, social institutions, waste collection, organisations, culture as well as where no data is provided.


The above economic sectors had a combined turnover of about DKK 16.7 billion in 2010.\(^\text{12}\) The fishing industry is the second-largest sector in Greenland with an estimated turnover of DKK 3.7 billion (23%). Commerce is the largest sector with a volume of trade of about DKK 4.7 billion. Turnover in tourism has been calculated at DKK 334 million, while raw material extraction amounts to DKK 522 million in 2010. Fisheries is by far the most important economic sector in Greenland today, accounting for about 90% of exports. Unlike other sectors, turnover in fisheries is not generated by means of public funding, and the sector delivers a significant proportion of Greenland’s total income.

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\(^{11}\) See the chapter on Greenland’s business structure in the background report of the Greenland Taxation and Social Welfare Commission entitled Hvordan sikres vækst og velfærd i Grønland? [How to secure growth and welfare in Greenland].

\(^{12}\) Statistics Greenland does not provide a combined overview for 2011.
The following sections focus on those sectors that attract foreign capital and, in Rambøll’s assessment, hold growth potential going forward. The analysis concentrates on sectors that are driven by market conditions and are only to a limited extent supported by public subsidies. Rambøll has thus analysed a series of economic sectors capable of contributing to meeting the socioeconomic needs of Greenland in the future. Through this exercise, we have concluded that the following sectors may provide such contributions:

- Tourism
- Fisheries
- Mining
- Agriculture
- Seal products
- Other prospects

Each sector will be examined in the sections below. All sections are introduced with a factual description, after which the development prospects and opportunities are discussed. Against this background, Rambøll offers an assessment of the sector’s potential size in 2025. Attached to each sector will be a catalogue of initiatives that might be taken to promote development as much as possible.

It should be stressed that it will be important – along with the development of individual sectors – to maintain and advance the public sector’s capacities and competencies. This applies not only to the central Government of Greenland, but also to municipalities and other public institutions.

For the purposes of establishing and developing the mining sector, it will be necessary to undertake a series of tasks regarding licenses, permits, environmental supervision etc. In light of Greenland’s enormous geography and the relatively limited size of its public sector, the regulation of development will demand vast resources and competencies, which might not always exist today to the extent required.

Focusing on these matters will be necessary to ensure that Greenland stays on course for economically, socially and environmentally sustainable development of its businesses and society, and that this proceeds at the desired pace of progress.
4.1 Fisheries
Fishing is today a crucial sector in Greenland. Towards 2025, the sector is estimated to hold significant growth potential. At the same time, however, the country’s marked dependence on income from fisheries, in particular from the export of shrimp and Greenlandic halibut, makes the economy highly vulnerable to slumps in international demand, falling world market prices and not least a reduction in quotas. The sustainability of fish stocks should be the primary concern of sector stakeholders in order to safeguard long-term productivity. Accordingly, current recommendations regarding lower quotas of particular species should be taken seriously and complied with.

Fishing production has been calculated at DKK 3.7 billion in 2011, which makes it the most dominant of Greenland’s private business sectors. In terms of exports, fishing is also by far the most important sector.

There are two large fishing companies, namely Royal Greenland and Polar Seafood, along with numerous smaller enterprises, of whom some are partly or wholly owned by the two large companies. Royal Greenland is 100% owned by the Government, while Polar Seafood is privately owned. The sector operates on commercial terms, but is, as in other countries, subject to regulation, as fish resources are allocated through licenses. At present there is also a duty on shrimp and Greenlandic halibut, and recently a mackerel duty was introduced from 2014 onwards.13

Altogether, fishing in recent years has been moderately growing as regards both production volumes and income. In general, however, there is pressure for political reform of an activity characterised by overcapacity, low productivity in some parts of the sector, and a strong need to modernise the fishing fleet, which is today typically composed of older and relatively small vessels.14

This requires the will to bring about long-term, stable and attractive framework conditions for fishing enterprises. License distribution is at the core of the fishing business. Accordingly, just as in the case of abiotic (non-living) raw materials, the focus should be on creating a taxation structure that provides a stable income to the economy and treasury, and at the same time enables the sector to continue to develop.

4.1.1 Facts about fishing in Greenland
Fishing production has been calculated at DKK 3.7 billion in 2011. Of the total production, DKK 2.4 billion is exported (65%), DKK 0.9 billion (24%) is sold to domestic businesses with a view to processing and resale, while DKK 0.4 billion (11%) is sold for domestic consumption. Thus, altogether, 35% of total production is utilised in Greenland.15

A certain amount of fish is used for own consumption, given to families and friends, or is sold at the ‘Kalaaliraq’, which is a physical marketplace in Greenlandic towns and villages.16 The value of sales at the Kalaaliraq has not been included in the figures below. Production along the whole value chain of fisheries has not been calculated for years other than 2011 and is difficult to estimate based on existing data.17

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13 See, for instance, the discussion in Sermitsiaq newspaper on 15 November 2013 about a mackerel duty in the proposal for National Budget 2014.
14 See the report of the Greenland Fisheries Commission (2009).
15 See Fiskeriets økonomiske fodaftryk i Grønland [Economic footprints of fishing in Greenland].
16 Fishermen typically pay a duty to Kalaaliraq to have their goods sold. Here buyers are typically locals, and no taxes are paid on income from sales at the Kalaaliraq, except in Nuuk, where sold goods are taxed.
17 In the data of Statistics Greenland, the value chain of fishing is distributed across several sectors, including fisheries, industry and wholesale. Accordingly, officially available data do not make it possible to isolate fisheries as a sector. Statistics Greenland is currently working on a project aimed at strengthening data collection regarding fisheries.
In terms of exports, fisheries is the main sector in Greenland, and the exports of DKK 2.4 billion in 2011 make up 57% of total Greenlandic exports of DKK 4.2 billion. Looking exclusively at the export of goods, it is about 90% of exports that come from fishing. Accordingly, fisheries is by far the most important export sector in Greenland’s economy.

Total employment has been calculated at the equivalent of about 3,500 year-round full-time positions, which amounts to about 12% of the total labour force. There has been a massive decline in the number of employees in fishing. According to the Greenland Fisheries Commission’s report from 2009, the total number of fishing jobs was estimated to be 5,500 in 2004. This implies an annual fall in employment of some 6%. The trend is to some extent expected to continue due to greater overall productivity per unit through new technology and general consolidation in the sector, which will entail economies of scale and fewer operators.

Despite the pronounced drop in number of jobs, the fishing factories often struggle to find stable and competent labour in the high season. Fishing is partly seasonal, being most intensive in the summer.

The two large companies, Royal Greenland and Polar Seafood, operate primarily offshore with seagoing vessels, while most local fishermen work mainly near the coastline. In 2011 the two large companies accounted for 77% of the total fishing production. Royal Greenland represented 46% and Polar Seafood 31%.

The value chain of fisheries can be divided into four parts, as shown in the figure below.

Figure 13: Value chain of fisheries and role of selected actors

<table>
<thead>
<tr>
<th>Activities</th>
<th>Processing</th>
<th>Packing and distribution</th>
<th>Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Coastal fishing (shore)</td>
<td>• On board on trawlers (sorting and freezing of shrimp, cleaning and freezing of fish)</td>
<td>• The packaging often happens on the processing factories, but can also happen on the trawlers</td>
<td>• Sales offices around the world</td>
</tr>
<tr>
<td>• Coastal fishing (offshore)</td>
<td>• In processing factories (for factories along side Greenland’s west coast)</td>
<td>• Distribution of the fish primarily happens from the processing factories, where the fish also gets packed</td>
<td>• Kalaallituk ‘Brattab’ in Greenland</td>
</tr>
<tr>
<td>• Local fishing (primary shore)</td>
<td>• Royal Greenland</td>
<td>• Royal Greenland</td>
<td>• Royal Greenland</td>
</tr>
<tr>
<td>• Vessels (primarily offshore)</td>
<td>• Polar Seafood</td>
<td>• Polar Seafood</td>
<td>• Polar Seafood</td>
</tr>
<tr>
<td>Source: Greenland Fisheries Commission (2009), Fiskeriets økonomiske fodaftryk i Grønland [Economic footprints of fishing in Greenland].</td>
<td></td>
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</tbody>
</table>

4.1.1.1 Fisheries

The fishing fleet in Greenland was, towards the end of 2011, made up of about 525 vessels. To this should be added between 1,500 and 2,000 small boats, of which some are used for fishing and hunting, while others belong to larger fishing vessels using trap nets.

Fishing in Greenland is divided into near-shore (or inshore) and offshore (or seagoing).

Near-shore fishing (in sheltered waters)

Near-shore fishing is characterised by being labour-intensive and by relatively low productivity, where there is little to gain from economies of scale. Near-shore fishing is primarily carried out...
by small and medium-sized vessels, often up to 80 GRT dedicated to local and regional inshore fishing.\textsuperscript{20}

\textit{Offshore fishing (in open waters)}

Offshore fishing is, as opposed to near-shore fishing, characterised by being capital intensive and at the same time highly productive, taking great advantage of economies of scale. In 2010, there were 30 owners with 53 ships. The ships are primarily trawlers over 80 GRT, and often concentrate on shrimping, for which they are able to process their catch onboard. By law, trawlers must land at least 25\% of their catch for further processing on land.\textsuperscript{21}

4.1.1.2 Processing

Royal Greenland and Polar Seafood are together owners or co-owners of the lion’s share of fish processing plants in Greenland. Processing may take place either on the ship or in factories on land.

When processing takes place on ships, so-called trawlers are used, which function as floating factories. Trawlers are equipped both for fishing and processing. For instance, shrimp can be boiled and frozen on board, fish can be filleted and frozen, or the fish can be cleaned for further processing on land.\textsuperscript{22}

Processing on land takes place in one of the 31 processing factories in Greenland. All these plants are situated along Greenland’s west coast and receive their fish directly from the country’s fishermen, though Greenlandic fish is also delivered to a number of factories outside of Greenland, including Denmark, England and Poland.\textsuperscript{23} The factories fulfil various functions and offer the same processing services as on the ships, though they also have other processing equipment, such as large smoking chambers. Some factories are exclusively dedicated to shrimp production, while others work with a variety of fish species.

4.1.1.3 Packaging and distribution

Packaging and distribution often take place in the processing factories. As previously mentioned, these are not just located in Greenland, but also in Denmark, England and Poland, among other countries. In the factories, the fish is packaged and made ready for further distribution. However, fish can also be packaged onboard the trawlers.

The distribution of packaged fish from the factories is today mainly undertaken by the two large companies, Royal Greenland and Polar Seafoods, whose large size enable them to handle and invest in advanced distribution channels.\textsuperscript{24}

4.1.1.4 Sales

Greenlandic fish is typically sold through sales offices around the world. This function is not only undertaken by Royal Greenland and Polar Seafoods, but also by local firms in the foreign markets where Greenlandic fish is sold.

\textbf{Sustainable regulation of biotic resources}

The fishing industry in Greenland is regulated by the fishing legislation, which is based on a general principle of sustainability and long-term safeguarding of biotic (living) resources. To ensure sustainable fisheries development, each year the Naalakkersuisut (Government) determines the ceiling for the Total Allowable Catch (TAC).

The TAC is determined against the background of advice from ICES (International Council for Exploration of the Sea), NAFO (Northwest Atlantic Fisheries Organization) and the Greenland

\begin{flushright}
\textsuperscript{20} \url{www.NANOQ.gl} – about offshore and near-shore fishing.
\textsuperscript{21} \url{www.NANOQ.gl} – about offshore and near-shore fishing.
\textsuperscript{22} \url{www.royalgreenland.gl}
\textsuperscript{23} Some of the factory facilities owned by Greenlandic businesses process fish that does not come from the North Atlantic.
\textsuperscript{24} \textit{Se Fiskeriets økonomiske fodatryk i Grønland} [Economic footprints of fishing in Greenland].
\end{flushright}
Institute of Natural Resources. For all relevant fish species, it is determined how many tonnes can be caught, and in which areas fishing may take place.

GFLK (Greenland Fisheries License Control Authority) ensures that fishing quotas are observed. In 2013 West Greenland’s shrimp fishing was, as the first subsector in Greenland, awarded MSC certification, which serves as an international guarantee that current conditions of production are sustainable.

In view of the quotas, licences are issued to fishing stakeholders. As regards offshore fishing, a license is required for shrimp, Greenlandic halibut, crab, cod, redfish, Atlantic halibut, capelin and roundnose grenadier. As for near-shore fishing, a license is obligatory for shrimp, Greenlandic halibut, crab, cod, salmon, lumpfish (lumpsucker) and scallops. The total amount of fish taken by Greenlandic vessels, measured in thousands of tonnes, has risen from 196 in 2005 to 248 in 2011, equivalent to a total increase of about 26%.

Figure 14: Total catch in the fisheries sector (Greenlandic vessels), thousands of tonnes

Fishing in Greenland today concentrates mainly on shrimp, Greenlandic halibut and cod. The shrimp catch has been relatively stable in recent years, reaching 115 thousand tonnes in 2011, equivalent to nearly half the total volume of fishing. In 2011, 35 thousand tonnes of Greenlandic halibut was caught, which is at the level of recent years and about 14% of the total sea catch in that year. The catch of cod, however, has risen from 11 thousand tonnes in 2005 to 20 thousand tonnes in 2011, which is almost a doubling and equivalent to 8% of the total volume of catch throughout the period. Put together, these three species account for almost 70% of the total catch in 2011. The large increase in 2011 stems primarily from a very high catch of capelin, which grew from 90 tonnes to 48 thousand tonnes.

25 Before the Naalakkersuisut can determine the final TAC, the Fisheries Council (Fiskerirådet) must be consulted. The Fisheries Council is composed of representatives of the Employers' Association of Greenland (GA), the Organisation of Fishermen and Hunters in Greenland (KNAPK) and some appointed organisations (SIK, NUSUKA, KANUKOKA, Ministry of Fishing, Hunting and Agriculture, the Greenland Institute of Natural Resources, Greenland Fisheries License Control Authority (GFLK), Ministry of Industry and Mineral Resources, and Ministry of Finance and Domestic Affairs).

26 MSC = Marine Stewardship Council. It is an environmental fishing certification scheme and the best guarantee of sustainability at sea. WWF helped set up the scheme in 1997, and it is based on the sustainability of stocks, fishing to preserve marine ecosystems, and complying with local, national and international law. See WWF February 2013 – “Bæredygtige rejer er stor sejr” [Sustainable shrimp is a major victory].

27 Effekteregninger af fiskerireformer [Calculating the effects of fishing reforms].

28 Foreign quotas and catches are not dealt with in this report.
**Figure 15: Segmented distribution of catch of fish and shellfish (only Greenlandic vessels), thousands of tonnes**

Source: Statistics Greenland.

### Licenses and quotas

There are three types of licences:

1) Temporary licenses with a maximum allowable catch.
2) Temporary licenses without a maximum allowable catch
3) Permanent licenses with a maximum allowable catch, which are used for shrimping.

Licenses are issued to shipping firms or individuals who each year receive a certain share of their respective fleet segment’s annual quota. When the annual TAC is fixed, the Naalakkersuisut announces to shipping firms and individuals what quota their respective licenses correspond to. These quotas are tradable, and may thus be bought and sold between firms and individuals. However, there is still a ceiling on the share of quotas that a single shipping firm or individual is allowed to own.

In offshore shrimping, a firm or individual is not allowed to own more than 1/3 of the total quota for shrimp, while the maximum quota share for near-shore shrimping was raised from 10 to 15% in 2011.

### Trend in quotas

The trend in Total Allowable Catch (TAC) has been stable in the period from 2005 to 2012. In 2005, TAC was 253 thousand tonnes, while in 2012 it was 258 thousand tonnes. There is, however, considerable variation from one year to another with a difference of almost 100 thousand tonnes between the lowest level in 2006 of 197 thousand tonnes and the highest in 2011 of 294 thousand tonnes.
Utilisation of quotas
In 2011 the TAC was 294 thousand tonnes, while the actual catch was 248 thousand tonnes. Although the quota is close to being fully utilised, it is still possible to raise the catch by another 15%. In principle, there is thus scope for better utilisation of existing quotas. However, this assumes that the stocks underlying the quota determination really do exist in the waters and can be fished sustainably. For instance, the quota for shrimp was lowered in 2012 and 2013, which indicates that the optimal shrimp catch in 2011 was probably below the quota level.\textsuperscript{29}

There is potential for better quota utilisation in the fishing of Greenlandic halibut and redfish. Cod fishing in 2011 exceeded the allowed quota, but the quota for 2012 has been set at 20 thousand tonnes, which indicates that the quota level for 2011 was too low in view of the underlying stocks.

4.1.2 Environmental implication of fisheries
Fishing in Greenland raises a series of environmental issues, including CO\textsubscript{2} emissions and wastewater. In general, the fisheries sector is relatively energy-intensive, as particularly the

\textsuperscript{29} Grønlands økonomi 2013 [Greenland’s economy 2013].
operation of vessels and processing plants consumes vast quantities of energy. Furthermore, it is not uncommon for wastewater from processing and production to be directly discharged without treatment.

Stakeholders in the fisheries sector should strengthen their focus on establishing sustainable and environmentally-friendly production, which calls for constant attention to the following areas, among others:

- Reduction of water consumption and wastewater management
- Reduction of energy consumption (oil, gas, district heating, hydropower)
- Management of organic waste (conversion into animal feed)
- Reduction of paper, cardboard and plastic waste
- Reduction of chemical waste products

The section below sets out the environmental implications as regards CO₂ emissions and wastewater.

4.1.2.1 CO₂ emissions

Statistics Greenland has calculated the total volume of CO₂ emitted by the fisheries sector as 132,970 tonnes in 2012. This is a 19% increase from 108,094 tonnes in 2005. In 2012, the fisheries sector accounted for 72% of total energy consumption in productive sectors. In order to develop a sustainable fisheries sector, it is important to pursue the long-term perspective of reducing CO₂ emissions and pollution generally. A significant factor in this regard will be technological improvements that reduce energy consumption and enhance energy efficiency. Among the major measures to this effect are:

- Optimisation of trawls and otter boards that reduce oil consumption and increase the catch. Studies of trawling show that it is possible:
  - To save over 40% of energy consumption for the same volume of catch.
  - To catch 20% more fish per trawling hour.
- Among the initiatives to bring about this optimisation are:
  - Introduction of pelagic otter trawls that do not touch the seabed. Research has shown that this tool can reduce fuel consumption by 15%, which amounts to halving the otter trawl’s contribution to combined fuel consumption.
  - Introduction of slower trawling. For example, 10% slower trawling can result in 30% lower fuel consumption.
  - Using pelagic rather than bottom trawling, thus reducing energy consumption through less friction and at the same time lessening the direct harm caused to the seabed.

This type of initiatives to reduce energy consumption calls for strategic and long-term investments in new technologies on the vessels. The two large sector players, Royal Greenland and Polar Seafood, have to a certain extent adopted some of the aforementioned methods in order to achieve environmental improvements, and these initiatives should continue to be intensified in order to reduce CO₂ emissions and optimise energy consumption going forward.

4.1.2.2 Wastewater

Wastewater is one of the key areas in relation to processing of natural resources. In an examination of shrimp ing, total water consumption in a Greenlandic shrimp plant is measured as 40-70 m³ per tonne of raw material, while factories involved in processing of fresh ungraded

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30 The calculation includes fishing vessels, but not production plants.
31 Se GEMBA Seafood Consulting: “Demonstrationsfartøjer i Østersøfiskeriet med fokus på bedst kendte teknologier inden for energieffektivitet i fangstredskaber under hensyn til seletivitet og dokumentation” [Demonstration vessel in Baltic Sea fisheries focusing on best-known technologies for energy efficiency of catching tools considering selectivity and documentation], Dec. 2011. This study has been carried out for the Fishing Association of Bornholm and Christiansø as a survey of the effect of modern technology in trawling.
shrimp consume markedly more water than those involved in processing graded frozen shrimp, since it takes vast volumes of water to grade the shrimps.

Comparing Greenland’s 40-70 m³ of water per tonne of raw material to the international level of water consumption in factories using best available technology, the Greenlandic consumption is significantly higher, since the international level is 20-30 m³ per tonne of raw material.\(^\text{22}\)

In general, it is estimated that 40-70% of the natural resource, depending on fish species, turns into waste in factories through production or processing. Organic waste discharged from fish factories is typically heads, fins/tails, shells, skin, carcasses and scraps. The running water used while processing the fish is called process water and is typically discharged as wastewater.\(^\text{20}\)

In order to reduce wastewater, production plants should use the best available technology aimed at reducing emissions and resource consumption, including water consumption and wastewater discharges. Sustainable development should be underpinned by focused initiatives aimed at reducing the total volume of wastewater, but also to a high degree at recycling the organic waste for relevant products.

4.1.3 The Government’s fisheries policy

In recent years, reform efforts have been underway to modernise the fisheries sector. The work relies largely on a series of recommendations formulated in the Greenland Fisheries Commission’s report from 2009. Suggestions under the auspices of the Commission are based on the fundamental demand for sector development that is sustainable both as regards natural resources and in economic terms of achieving high productivity. In addition, the development should, to the extent possible, progress on commercial terms.

The recommendations of the Fisheries Commission generally points towards a series of structural changes aimed at streamlining a sector characterised by overcapacity, low productivity, many persons employed in fishing and hunting, and a strong need to modernise the fishing fleet, which is today composed of older and relatively small vessels.

The Government’s plan towards 2025 sets out the goal of these reforms: “The goal is to raise incomes for those involved in the sector and to ensure that the sector can contribute a fair share of its income in terms of a resource duty on all significant species in the fisheries.”\(^\text{34}\) Accordingly, the Commission’s work entails steps towards greater utilisation of economies of scale and hence rising productivity in the sector.

The Greenland Fisheries Commission’s proposal entails changing some of the small-scale fishermen and smaller fishing vessels into fewer, larger and more efficient production units. This also implies that, ceteris paribus, fewer people will be employed in the future fisheries sector.

As a contribution towards modernisation, the Government will focus on a number of areas where change is to be fleshed out in practice and integrated into fishing legislation in years to come. This refers, for instance, to reforms and improved framework conditions as regards:

- Restriction of ownership
- The obligation to land 25% of the catch
- Solution of the generational change issue

\(^{22}\) Environmental Protection Agency (under the Danish Ministry of the Environment), Brancheblad for Rejefabriker [Publication for shrimp factories], Oversigt over emissioner, bedste tilgængelige teknik (BAT) og nyttiggørelse af restprodukter [Overview of emissions, best available technology (BAT) and utilisation of waste products], September 2005

\(^{20}\) Environmental Protection Agency (under the Danish Ministry of the Environment), Organisk industriaflød i Grønland - Værktøjer til fremme af bedste tilgængelige teknik og nyttiggørelse af restprodukter [Organic industrial waste in Greenland – tools to promote best available technique and utilisation of waste products], June 2006

• Introduction of resource duty on all important fish species
• The distinction between near-shore and offshore fisheries
• Provisions regarding quota rights

The design of concrete initiatives springs from a wish for stable and long-term framework conditions that enable stakeholders in fisheries to carry out systematic investment in new technology as regards the fishing fleet and land-based installations. Furthermore, a special focus area is to make fishing licenses more strictly conditional on the use of local labour and local firms in order to maximise value for the society of Greenland. In this connection, Impact Benefit Agreements (IBAs) have been suggested as one of various relevant solution models. This is also being developed within the mineral sector.

It is crucial to address the fields outlined, as well as the need for reforms and structural adjustments as formulated by the Greenland Fisheries Commission, by carrying out concrete initiatives and amending fishing legislation accordingly. Determined political action in this area and willingness to invest long-term in fisheries are conditions for boosting the sector to become competitive internationally and for growing in the years ahead.

4.1.3.1 Expected impact of the initiatives

In most assessments of the potential of fisheries, there is a moderate belief that the required structural adjustments will be implemented to such a degree that the sector will be able to grow and form a larger share of Greenland’s economy than is the case today. The focus is first and foremost on all the challenges, which means – in the best-case scenario – that Greenland’s fishing industry will maintain its current level in the coming years.

A realistic assessment of the potential towards 2025, if these adjustments fail to be made, is an annual growth rate of 0-0.5%, which means that the turnover in 2025 will be at about DKK 3.7-4.0 billion.

If this is the scenario that plays out, fisheries will continue to be crucial in Greenland, but it will not be able to act as a sector capable of addressing the challenges ahead in terms of a systemic budget deficit and the need to move towards economic independence.

Figure 18: Projected turnover in the fisheries sector, billions of DKK


4.1.4 Potential of fisheries

Rambøll, however, sees significant opportunities to strengthen fisheries and create growth towards 2025, provided a broad-based and well-targeted effort is undertaken.

The possible levers to boost fisheries are already known and have been pointed out on several occasions. Accordingly, when structural adjustments and adaptation are mentioned, for instance in the Greenland Taxation and Social Welfare Commission’s report from 2010, these are indeed the initiatives that will lay the groundwork for growth in future fisheries. Thus, the sector’s potential must be realised by carrying out the initiatives and proposals which have already been presented in existing analyses.

Against this background, it is considered that a determined endeavour by political and business actors holds vast economic and business potential. Given the right measures, Rambøll estimates that the fisheries sector may reach a turnover of about DKK 5.1-6.6 billion by 2025, thus playing an even more decisive role in Greenland’s economy than today. This is equivalent to an annual growth rate between 2 and 4% in the sector.

**Figure 19: Potential turnover in the fisheries sector, in billions of DKK**

![Graph showing potential turnover in the fisheries sector](image)


The sector is estimated to be able to grow by 25-50% by means of systematic structural changes. This translates into a calculated effect of some DKK 1.0–1.9 billion a year by 2025 in additional turnover compared to the present level of DKK 3.7 billion. This would also bring opportunities in new areas of business, estimated to hold a potential of about DKK 0.5-1.0 billion.
Against the background of interviews with actors in fisheries and analysis of existing material, an overview is presented of possible initiatives/levers which may help develop the sector to become even stronger in the years to come. The point of departure for all measures is that they must be undertaken while paying attention to the environmental sustainability of biotic natural resources. All initiatives should be conceived as long-term areas of intervention aimed at bringing about a more efficient and productive fisheries sector. The levers and areas of action are described in more detail in the following sections.

**Figure 21: Overview of initiatives in the fisheries sector**

1. Systematic effort to encourage quota holders to utilise their licenses.
2. Introducing systems to ensure optimal utilisation of existing quotas.
3. Utilisation of newly accessible areas of Greenland’s waters, e.g., north of Greenland and currently under utilised parts of West Greenland.
4. Systematic prioritisation of experimental fisheries development by having marine biologists work for the Government, allocating experimental quotas, etc.
5. Exploring possibilities of fishing new species through experimental fisheries.
6. Experimenting with new fishing methods, e.g., pelagic fishing.
7. Analysing local conditions in order to prioritise between different localities regarding the relevance of the landing obligation.
8. Introducing individually tradable quotas for all species.
9. No mêléuring possibilities for committing quotas.
10. Establishing cooperation between public and private entities aimed at improving conditions for filling all positions in the sector with Greenland’s labour.
11. Establishing the right framework conditions for foreign investment.

Source: Greenland Fisheries Commission’s report (2009), Fiskeriets økonomiske fodaftryk i Grønland [Economic footprints of fishing in Greenland] 2013, interviews and research.
4.1.4.1 Utilising existing resources better

The following section examines three areas of intervention which can be pursued in order to get more out of existing resources.

Full utilisation of current quotas
At present, existing quotas are not fully utilised. As regards some significant fish species, it is possible to catch more without jeopardising stocks. It would be useful to undertake a systematic effort to encourage quota owners to use the volume of their licences and thus make the most of existing resources for the society of Greenland. It might become an obligation to secure optimal utilisation of the allotted volume. Alternatively, all quotas could be made tradable, as in the case of offshore shrimp quotas, thus allowing the market mechanism to ensure full utilisation of quotas.

Fishing in new geographical zones
Today’s fishing primarily takes place in certain areas off West Greenland. However, larger vessels and new technologies are expected to enable an expansion of fishing grounds. Among other locations, there seem to be great opportunities in East Greenland, whose present catch accounts for only a small share of the total volume. However, there are also vast areas with limited fishing in West Greenland today, which can be used more optimally. This even applies in parts of the zones where fishing is already at its most intense. A third opportunity springs from the ability of vessels to sail longer distances in order to get to the right areas. This requires large trawlers and longer expeditions out to sea.

Through a determined effort by the Ministry of Fisheries, Hunting and Agriculture, hiring more marine biologists, among other measures, it is possible to explore and assess new fishing grounds. This will enable new fishing grounds to be detected and licenses to be issued, initially on an experimental basis.

Experimenting with fishing of new species
Greenland’s fisheries have for many years focused mainly on shrimp and Greenlandic halibut. Other species have had a marginal significance. This concentration on a few species generally makes the sector vulnerable to a decrease in demand, falling world prices or diminishing stocks. In recent years, for instance, shrimp quotas have been reduced. On the other hand, world market prices for shrimp have generally been favourable. It is considered that there is substantial potential in expanding the present focus and experimenting with the fishing of new species.

Pelagic fishing offers a chance to establish a more diversified fishing portfolio, and this is already taking place to a certain extent with success. Mackerel, cod, capelin, blue whiting and other species can form part of such an expansion. This measure has already been undertaken through significant experimental fishing of mackerel, among other species.

It must be stressed that expansion of fisheries has to be environmentally sustainable regarding use of natural resources and be based on preceding fish stock assessments by relevant institutions. Moreover, it requires clarity as regards international rights, on which the allocation of national quotas is based, in order to ensure an optimal investment climate. Seen as a new business frontier, such activity will require investment in technology and capacity building. In this regard, it is important to take a professional and competitive approach to new business areas from the outset, viewing them from a long-term development perspective.

A systematic effort to fish other species offers an array of advantages. Generally speaking, it would establish a broader portfolio of Greenlandic fishery products. New competencies would be required in order to catch and process the new species. And the current risks of focusing on a few products would be spread, while the vulnerability to changes in stocks and international factors would be mitigated.
New markets
In connection with the expansion of Greenlandic fisheries towards a more diversified product portfolio, there is scope for finding new commercial outlets. In this regard, Asian markets could serve as a lever, and they already have a longstanding tradition of consuming many different types of fish. In addition, the Asian growth economies are expected to demand ever-increasing volumes of high-quality North Atlantic fish.

Large fishing companies are already purposefully engaged in various commercial marketing initiatives aimed at stimulating further expansion of the present outlets. To this effect, further focus on relevant certification regimes and standards may be a fruitful supplement to current efforts.

4.1.4.2 Optimisation of the sector
The section below suggests four structural measures with significant economic potential.

Gradual abolition of the landing obligation
The Greenland Fisheries Commission has previously indicated that the gain from fishing accruing to the country’s economy is reduced because of the obligation to land 25% of the catch. However, the provision is very important for local communities and job creation, and such considerations should be taken into account in any reduction of the landing obligation. Local investment in larger vessels, where production can take place on board, is one option to this effect. Phasing out the landing obligation should be seen in the context of creating alternative employment opportunities.36

Introduction of individually tradable quotas for all species
There is significant economic potential in introducing individually tradable quotas for all species. At present, these only exist for shrimp and Greenlandic halibut that are fished near-shore by vessels longer than 6 metres. Individual tradability of quotas across species would make it possible to consolidate quotas on fewer vessels, thus paving the way for greater economies of scale and capacity utilisation in the development of new business areas. Moreover, it would enable systematic investment in technology and capacity building regarding the handling of particular species. When consolidating quotas, it is important that the process benefits Greenlandic actors to the greatest extent possible.

Individually tradable quotas have pros and cons, but if the objective is to generate growth in the fishing industry, it is viewed as one of the measures that will foment further concentration in the sector, and hence enable units of high productivity.37

Raising the educational level
The Greenland Fisheries Commission points out that many well-paid jobs in the fishing industry are not given to Greenlanders. This is the case, for instance, of senior officers on seagoing trawlers. A determined educational endeavour should be undertaken to promote the appointment of Greenlanders to such positions in years to come. As proposed by the Fisheries Commission, such capacity building should be carried out based on wide-ranging cooperation between relevant public and private actors.38

Stimulating foreign investment
Long-term development of fisheries will require substantial investment in new vessels and technology. The present structure in the sector means that it is mainly the large Greenlandic companies that are able to make such investment. It is considered that a significant opportunity

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36 The Greenland Fisheries Commission’s report describes the complexity of the landing obligation, see p. 153-154.
37 The Greenland Fisheries Commission’s report lists the various arguments in favour of and against individually tradable quotas, p. 119-120.
38 The Greenland Fisheries Commission’s report, p. 155.
to supplement further development of the fishing industry consists in attracting foreign capital. This requires appropriate framework conditions and a change in current legislation, to make it attractive and possible to invest in fisheries, just as foreign investment is being welcomed in the field of minerals.

4.2 **Mining and energy-intensive industry**

The mining sector (and energy-intensive industry) has, until a few years ago, played a rather limited role in Greenland’s economy and society. Nevertheless, it has today become one of the most promising business sectors in Greenland. In 2011, it employed an estimated 500 Greenlanders measured in year-round full-time positions (though the actual number of employees varies from month to month) and in 2012 its investment level amounted to DKK 520 million.²⁸

The mining opportunities spring from a vast raw material potential with known deposits of many different minerals, including lead, zinc, iron, gold, rare earths, uranium, and others. Nowadays great attention is being paid to the continued development of this sector.

The objective is to bring about sustainable development that benefits Greenland’s society, creates permanent jobs, economic growth and greater prosperity in the long run. This makes it important that the population take part as much as possible to prevent them from becoming mere spectators of the development in their own country. Moreover, the development has to take account of the environment, nature and wildlife in these vulnerable Arctic areas.

Historically, the mining sector in Greenland has been active since 1854, engaging in the extraction of cryolite, zinc and lead, among other minerals. Today the sector is composed of a series of exploration projects undertaken by junior mining companies.²⁹ The last active mine was the goldmine in Nalunaq run by Angel Mining (Gold) A/S. However, the mine closed in late 2013, among other reasons because international gold prices have been falling, making the mine unprofitable. When the Nulanaq mine began operations in 2004, it was the first time in 30 years that a new mine was opened. Indeed vulnerability to fluctuations in world market commodity prices is among the major challenges faced by the mining sector in Greenland.

The Government also faces a series of challenges in establishing a mining industry. One of the most important ones is to strike a balance between maximising Government revenue through duties, royalties and taxes, creating an attractive investment climate for the mining corporations, and laying the groundwork for environmentally and socially sustainable development. This involves determining formal framework conditions in order to substantiate calculations of the financial implications of projects.

It is hard to estimate the potential Government revenue from mining in the coming years. This is primarily because the sector is still embryonic, and thus subject to many unknown factors. Which projects will come to fruition? When can production begin? How will they develop in practice?

Nevertheless, the Bureau of Minerals and Petroleum (BMP) and the mining companies have estimated that the most promising projects hold a potential total of about 4,500 jobs in the construction phase and 3,000 in the operational phase. Development of mining will have a spill-over effect on other complementary sectors, such as transport, hotels and restaurants.

4.2.1 **Facts about the mining sector**

The interest in raw materials in Greenland has been on the rise in recent years. From 2000 to 2006, some 20-30 exploration licences were issued. This number rose to 63 in 2007 and then

²⁸ The figure is estimated in a debating contribution on Greenlandic-Danish cooperation.
²⁹ Among the active junior mining companies are London Mining, True North Gems, Platina Resources, Hudson Resources, Rimbal Pty Ltd. and NunaMinerals, of which the latter is 33+% owned by the Government of Greenland.
culminated with 80 licenses issued in 2013, equivalent to an increase of 176% over seven years. A total area of 37,730 km$^2$ has been designated for exploration. In the first years of the 2000s, the interest in exploring Greenland’s minerals was driven by generally high and increasing world market commodity prices, as well as the prospect of longer periods of ice-free Arctic waters. Despite falling prices of many raw materials in recent years, the number of exploration licenses continues to be high, although the actual prospecting activity was less in 2012 and 2013 than in 2011.

In addition to the exploration licenses, five exploitation licenses were issued in 2013. Of these, the most promising is London Mining’s project to establish the Isukasia mine from November 2013, while the others relate to projects that are currently inactive or are being phased out.

**Figure 22: Number of (exclusive) exploration and exploitation licenses issued for mining**

![Graph showing the number of exploration and exploitation licenses issued for mining from 2000 to 2013.]


Note: This overview includes all exclusive mineral exploration licenses in Greenland. In addition, there are a series of non-exclusive permits and minor exploration and exploitation licenses. For an in-depth overview, see the source document.

Spending on exploration has generally been rising markedly in recent years, and amounted to DKK 520 million in 2012, according to Statistics Greenland. The investment level took a plunge in 2009, and then reached a record high of DKK 711 million in 2011. From 2006 to 2012, the investment level has almost quadrupled, and in the years 2007-2012 it has been at about DKK 500 million a year, with 2009 and 2011 as exceptions from the rule.

**Figure 23: Exploration costs in the mining sector, millions of DKK**

![Graph showing exploration costs in the mining sector from 2000 to 2012.]

Source: Statistics Greenland.
4.2.2 Market structure

The market structure of mining remains only weakly developed in Greenland. If the sector takes root in coming years, with activities in all phases from exploration to shutdown, it will change considerably compared to its current structure. The most prominent firms are London Mining, True North Gems, Platina Resources, Hudson Resources, Rimbal Pty and NunaMinerals. These are so-called junior companies that typically bring mining projects to fruition. Alcoa is the only very large mining corporation, which is currently engaged in discussions with the Government about the option of opening an aluminium smelter in Manitsaq. This project is not concerned with raw material extraction, but solely with setting up an aluminium smelter, for which the raw material will be shipped in from overseas.

There are about 40 companies engaged in exploratory activities, of which about half are Australian and Canadian. There are also some Greenlandic companies, of which NunaMinerals is the largest. Junior companies will typically try to bring projects to maturity, and then attract venture capital from partners, who will be interested in investing in mining construction and operation.

In addition to the mining companies, there are a series of smaller Greenlandic firms supporting exploration activities. These businesses typically have few employees, who are skilled in the operation of drilling camps, technical prospecting, transport of personnel and drilling equipment, catering etc. There is also economic activity associated with the legal and financial aspects of exploration and business start-ups in Greenland.

The map below shows that, while mining projects are located throughout Greenland, most are concentrated in the south-western part of the country. Potentially, more mines can be located in the northern part of the country, but may be hard to access due to difficult weather conditions, including extremely low temperatures.

It is very hard to determine when exploration projects enter into the construction phase. Even when an exploitation licence is issued, a project may still lack funding and be postponed or abandoned.

A highly significant factor in the whole field of raw materials is that individual projects are exposed to price fluctuations in the world market. Since the financial crisis of 2007-08, the mining sector at the global level has been characterised by overcapacity and a general decline in commodity prices.

Construction and extraction costs are high in Greenland due to the country’s geography, limited infrastructure and high wages.

This means that deposits must be high quality to be able to compete with many other countries.

On the other hand, Greenland is politically more stable than many of the areas and countries with which Greenland is competing to attract investment.

Status of mining projects in Greenland

There is wide variation in ongoing mining projects in Greenland as regards their scale, activity and potential value for the country’s society. The bulk of current projects remain at the early exploratory stage, where prospective areas are located using geophysical and spectral data, among other methods.
Several projects, however, are more advanced, and in some cases exploitation licenses have been issued, making it possible to start an actual construction phase given the right financing.

The projects can be categorised according to their maturity, i.e. the development phase in which they find themselves. A mining project can be divided into four overall phases: exploration, construction, operation and shutdown. In general terms, the mining sector in Greenland is at a low maturity level, and most of the projects (about 80) are engaged in exploration. Of these, some 3-5 projects are estimated to be ready to enter into the construction phase within 1-5 years. Two projects are really in the construction phase (Isukasia and Maarmorilik), even though the last part of financing has yet to be fully in place for both projects. One project is in the operational phase, albeit not active for the time being, and two are into the shutdown phase.

In the figure below, projects have been categorised according to their current phase.

**Figure 25: Overview of phases in a mining project, selected activities and maturity of projects**

Source: Mineral resources activities in Greenland, BMP: List of mineral and petroleum licenses in Greenland, Minedrift og miljø i Grønland [Mining and environment in Greenland] and company websites.

* The project is inactive. ** Isukasia has not been included pending final environmental approval.

In an assessment of the future potential of mining, it is natural to focus on the exploration and the construction phase. In the coming years, the main part of mining project activity will take place in exploration, while some of the more promising projects enter into the construction phase.

Looking at the five exploitation licences issued, it is currently only really the Isukasia mine that has significant potential in socioeconomic terms. The Isukasia iron mine north of Nuuk received its exploitation license in October 2013, but has yet to get its Impact Benefit Agreement, financing and employment conditions in order. Accordingly, the start-up of construction work and of actual operations remains somewhat into the future. However, if the financing issue is solved, a construction phase will be ready to commence.

The lead and zinc mine in Maarmorilik may potentially be reopened, and must then have its installations and infrastructure rebuilt. However, no specific plans have been announced, and some years are likely to pass before such plans can be carried out.

The goldmine in Nalunaq closed in December 2013, while the Olivin mine in Seque is being phased out. The molybdenum project at Malmberget has been postponed indefinitely, but in case it is started up, it is estimated to be able to create 600 jobs in the construction phase and 500 jobs in the operational phase.
The most advanced projects in the exploration phase, which will be described in more detail, are indicated in the overview below. All these projects are expected to be able to enter into the operational phase within the next 1-5 years. The Isukasia mine has been included in this table, since it has only just received its exploitation license and hence has yet to begin the construction phase.

**Figure 26: Overview of exploration projects and potential mines in 2013**

<table>
<thead>
<tr>
<th>Location</th>
<th>Minerals</th>
<th>License owner</th>
<th>Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citaten Point, Northern Greenland</td>
<td>Lead and zinc</td>
<td>Ironbank Zinc Ltd.</td>
<td>Application for exploitation is in hearing and is expected to be finished in 2014</td>
</tr>
<tr>
<td>Neqokesi (Tasi) Western Greenland</td>
<td>Iron</td>
<td>London Mining Greenland A/S</td>
<td>Exploitation permission granted October 2013</td>
</tr>
<tr>
<td>Kollisional, Southern Greenland</td>
<td>Rock electrolyte metals</td>
<td>Rumblay Pty Ltd. (Transbrass Mining Greenland A/S)</td>
<td>Exploitation permission granted (early 2014) under the condition of the right agreement between The Self-Rule Government and Transbrass tails into place and further studies are done</td>
</tr>
<tr>
<td>Tassersund, Qeqertarsuatsiaq</td>
<td>Rubies and sapphires</td>
<td>True North Gems</td>
<td>Application for exploitation license is in hearing and is expected to be finished in 2014</td>
</tr>
<tr>
<td>Kuanersuiit (Kvæne mountains), Narsaq</td>
<td>Rare earth metals, uranium and zinc</td>
<td>Greenland Minerals and Energy (Trading) A/S</td>
<td>Expected feasibility study in 2013 - 2014. Uranium exploitation awaits approval from the Self rule government (October 2012)</td>
</tr>
</tbody>
</table>


4.2.4 Energy-intensive industry – the aluminium smelter project

In connection with the description of mining in Greenland, energy-intensive industries should also be highlighted. Greenland has significant potential to develop this sector, which has much in common with the mining sector.

Greenland’s many glacial lakes can potentially be used to produce vast quantities of inexpensive and renewable energy. Today glacial lakes are already used to produce energy by means of hydropower plants in a number of towns. These plants deliver electricity to cover a great deal of Greenland’s energy consumption, and about 67% of the production of the country’s electricity utility Nukissiorfiit comes from renewable sources.\(^{41}\) There is thus relatively easy access to inexpensive and renewable energy in Greenland, which makes it possible for energy-intensive industries to establish facilities and utilise local resources.

Thus far, however, there is only one current development project in the energy-intensive sector, as the Government is negotiating with the US corporation Alcoa about the construction of an aluminium smelter near Maniitsqoq in West Greenland. The production takes place by processing the raw material aluminium oxide (alumina), which will be shipped in from mines overseas. Then the aluminium will be extracted in electrolytic pots using energy from two hydropower plants.\(^{42}\) Alcoa has estimated that the investment in a smelter will total around DKK 20 billion.

One of the major environmental challenges is that aluminium smelting produces fluoride waste. It is crucial that this be managed according to the best international standards to avoid pollution of the surrounding environment. Furthermore, aluminium production will contribute to significant CO\(_2\) emissions. The Government has previously calculated that an aluminium smelter would double the country’s combined CO\(_2\) emissions.

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\(^{41}\) nukissiorfiit.gl.

\(^{42}\) alcoa.com.
4.2.5 Environmental conditions and the need for sustainability

In connection with mining, it is important to have clear guidelines for the management of environmental impact. Greenland’s Arctic ecosystem is fragile and would suffer greatly from inappropriate treatment of the environment. Deposits of raw materials tend to be relatively far away from existing towns and villages. This requires infrastructure to be built in order to service mining operations. Accordingly, mining projects are bound, to some degree, to interfere with nature as regards local flora and fauna. Consequently, it may be convenient to prioritise projects where infrastructure is already in place.

Mining projects entail environmental impacts throughout all phases of their life cycle. The extent and character of the effects will depend on each project, being greatly dependent upon the type of raw material and the mode of extraction. Thus, there is a great difference between an open-pit iron mine and an underground ruby mine. As of today, all phases in the life cycle of a mine (regardless of its type) are subject to a number of environmental management requirements, which must be observed in order to obtain environmental approval of ongoing and new projects. In light of the sector’s expected progress in coming years, it will be important for the development to be based on the best international standards. If the right precautions are taken, the environmental impact of most mining projects can be kept to a limited level.

In view of legislation and permits, it is incumbent on mining companies to take account of environmental concerns in their activities and to take the right precautions to safeguard the surroundings. Responsible environmental protection revolves around thorough environmental assessments, which provide knowledge of the location’s natural conditions, map out the environmental effects of planned activities, and ensure careful and continuous environmental monitoring.

The greatest potential environmental impact takes place during the operational phase in connection with the extraction and processing of ore. However, environmental effects will be present as early as in the exploration phase as a result of geological surveys and test drilling. During the construction phase, the environmental impact is comparable to other construction projects for roads, buildings and other infrastructure.

Below is an overview of environmental aspects of each phase in a mining project.

**Figure 27: Overview of phases in a mining project, including environmental aspects**

<table>
<thead>
<tr>
<th>Exploration</th>
<th>Installation phase</th>
<th>Operational phase</th>
<th>Shutdown phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophysical mapping and collection of tests</td>
<td>Construction of mining plants</td>
<td>Quarrying and processing of ore</td>
<td>Removal of plants</td>
</tr>
<tr>
<td>Core drilling to estimate the occurrences</td>
<td>Construction of supportive infrastructure, e.g. harbor and hydroelectric</td>
<td></td>
<td>Restoration of terrain</td>
</tr>
<tr>
<td>Trial production</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental aspects:
- Environmental recognition for all activities have to be submitted in order to reduce the effects on plants and animals.
- Background studies and identification of polluted substances
- Environmental assessment
- Environmental approval
- In regards to the environmental approval
- Environmental studies
- Monitoring of polluted substances and possible effects on plants and animals
- Monitoring of polluted substances and possible effects on plants and animals
- Final environmental assessment
- Final environmental assessment

Source: Minedrift og miljø i Grønland [Mining and environment in Greenland].

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43 See Minedrift og miljø i Grønland [Mining and environment in Greenland]. The National Environmental Research Institute of Denmark, DMU, has since been closed down and has become a part of Danish Centre for Environment and Energy, DCE.
The direct environmental impact of mining throughout all phases can be divided into two categories:

1) Effects of pollutants
2) Disturbance of flora and fauna

4.2.5.1 Effects of pollutants

The most important environmental impact from mining comes from mining waste. Typical waste products include tailings, waste rock, lead, zinc, dust and discharge water. In all cases, mining waste must be handled responsibly and stored according to the rules in force for the waste product concerned.

Some examples of responsible waste management are:

- To deposit tailings or waste rock in the mine itself so that it does not harm the surroundings. This removes the need to leave waste rock in spoil tips in the mountains or fjords, where there is a high risk of, for instance, zinc and lead leaking into the surroundings due to rainwater or melt water.

- To limit the spread of metalliferous dust in the surroundings. Thus, activities associated with crushing, transportation, loading and unloading should be conducted so as to eliminate or minimise the spread of dust.

- To limit the spread of discharge water from production or actual mining, since it typically contains metalliferous particles which can pollute rivers and bays.

4.2.5.2 Disturbance of flora and fauna

Mining can disturb animal and plant life in several ways. In addition to the direct pollution, mining activity may interfere physically with the landscape and take over important habitats of local wildlife. This should obviously be avoided to the extent possible, taking appropriate measures so that infrastructure and other necessary installations are placed in areas with as little inconvenience as possible to local wildlife.

Furthermore, mining projects can disturb animals through increased noise. Mining creates noise which can scare animals away from their colonies as well as their moultng and breeding grounds and summering places. It is not irrelevant where and when the animals are disturbed. Animals’ reaction to noise is stronger at the time of the year when they are more sensitive, e.g. when geese are moultng or reindeer are calving. These disturbances can be avoided to a certain extent by limiting noise in particular areas and periods.

4.2.5.3 Environmental challenges associated with mining projects

Environmental challenges differ widely between the mining projects mentioned. Specific challenges are first and foremost closely linked to the type of mining, the character and quality of the deposit, and the management of environmental issues generally. Due to the special
conditions of Arctic nature, mining projects in Greenland should pay particular attention to limiting the environmental impact from wastewater and other emissions.

All mining projects in Greenland should be developed with a major focus on environmental sustainability. It is crucial to take the right precautions, project by project, in order to limit the impact on the surroundings as much as possible. All forms of mining imply interference with the environment. It is against this background that correct measures in all phases of the mining projects should be of central concern. They must meet the highest international standards, which should act as guidelines for activities in Greenland, not least when the environmental challenge is advanced and calls for very particular precautions, e.g. in connection with the extraction of uranium or other radioactive substances. Specific environmental challenges in the projects need to be addressed individually and in dialogue with the best international expertise from similar projects.

4.2.6 Potential jobs and Government revenue

The potential of ongoing projects for the economy and for society varies widely. Alcoa’s smelter and the Isukasia iron mine are vast projects, and may come to influence Greenland’s economy, business sector and independence significantly, if they go ahead. By comparison, the other projects are rather small. They may contribute favourably to new development in Greenland, but cannot in their own right lay the groundwork for radical change as regards the current situation of society.

In connection with the planning and procuring of permits, the most mature projects have appraised the potential social impact of foreseen activities. Thus, the operators have drawn up estimates of the number of jobs and expected income to Greenland which will be created by individual projects during, respectively, the construction and the operational phase.34

4.2.6.1 Direct and indirect job creation

Direct and indirect job creation refers to the staff recruited by the projects and by subcontractors, either on the occasion of the construction work or during the subsequent operation.

In total for all projects, it is estimated, against the background of studies carried out already, that the construction phase will directly create between 5,300 and 6,700 jobs. In the operational phase, the total number of directly created jobs for all projects included is estimated at about 3,000.

*Figure 28: Estimated number of jobs per project*

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34 The years for construction and production phases, as well as the number of jobs, are based on estimates from the Bureau of Minerals and Petroleum and information from licence holders. Accordingly, the figures are subject to significant uncertainty, since the final project design has, in many cases, yet to be determined.
The estimated share of positions to be taken up by local staff has only been calculated to a limited extent. In general terms, it can be said that smaller projects typically foresee hiring a relatively large proportion of local personnel, whereas larger projects will tend to recruit a smaller proportion of local labour. This will also hinge on the Impact Benefit Agreements (IBAs) entered into between the Government of Greenland and the mining companies.

Thus, it is to be expected that, during the construction phase, there will be relatively few locals recruited in larger projects and relatively more in smaller projects. In the operational phase, the share of local labour is expected to be higher in all projects. Furthermore, as skills are built locally over time, it will also be increasingly possible for positions to be taken up by locals.

One example of distribution between local and foreign labour springs from estimates regarding the Isukasia project, where 7-10% of all employees recruited during the construction phase are expected to be locals, while this proportion rises to 20-55% during the operational phase. Altogether, the projects indicated here are estimated to create about 500-1,100 local jobs during the construction phase, which is equivalent to 8-17% of the total number of jobs created. During the operational phase, 600-1,500 local jobs are forecast, which is equivalent to 20-50% of the total number of jobs created.

Each phase has its own distinct needs for labour and skills. Filling potential positions in the construction and operational phases requires the Greenlandic labour market to have the right competencies related to mining, which calls for general skills upgrading in wide array of fields.

4.2.6.2 A socially and economically sustainable mining sector

To set up an economically and socially sustainable mining sector in Greenland it is crucial that as many of the aforementioned projects as possible are carried out.

If the mining sector is to be consolidated in the long run and feature prominently in Greenland’s business life, it will be necessary to bring about a broad-based competence development covering the entire value chain from managers and mining engineers to operators and technicians. To this effect, the large projects will obviously matter more than the small ones, since they offer significantly greater opportunities to integrate a large cross-section of the Greenlandic labour force into the development, thus building the competencies and qualifications required in the sector.

In this connection it should be noted that Greenland Contractors, who are in charge of civilian functions at the Thule Airbase, one of Greenland’s largest traineeship providers, find it difficult to attract the necessary qualified local labour. For this reason, a large share of its employees are still Danish. To some degree, Thule Airbase employs the same type of skilled workers which the mines will potentially need in the future.

In conclusion and against this background, the persons presently outside the labour market either do not wish to or are not qualified to take up mining jobs. If the mines are opened, this will translate into fierce competition for qualified labour. Attempts should be made to control this in order to optimise sustainability in the development of society.

4.2.6.3 Derived job creation

The new jobs in the mining sector will increase demand in Greenland’s society generally, thus creating a series of new jobs in, for example, retailing, hotels, restaurants, etc. These jobs should be included in the assessment of the social impact of establishing a new sector.
A report on the effects of the Maniitsoq project calculates derived jobs as 10% of the total number of new directly and indirectly created jobs during the construction phase. In the operational phase, derived jobs are calculated at about 10-20%. On the basis of these percentages, the number of derived jobs per project can be estimated.

Figure 29: Estimated number of jobs per project, including from derived demand

Source: Bureau of Minerals and Petroleum, profitability studies (assessment of social sustainability) and Niras Greenland: *Aluminiumsprojektets økonomiske betydning* [Economic impact of the aluminium project].

4.2.6.4 Taxes and duties

An important part of the mining projects’ contribution to Greenland’s society will be the revenue for the Government through corporate tax, income tax, duties and the like. A full account of the projects’ economic impact should, however, also include the investment and hence expenditure incurred by the country’s society if, for example, many citizens move to a particular new area to work on a mining project. This may be expenditure on housing, schools and other welfare services, which are expected to be delivered to all citizens and to other residents with work permits in Greenland. It is complicated to calculate the net effect of new projects, and it will vary widely depending on the location of each project. The net effect is obviously expected to be positive for all projects, but its size is highly uncertain and will only be possible to calculate in connection with the realisation of individual projects.

For some of the projects, it has been estimated how much income tax on average per year is expected during the project’s lifetime. Corporate tax has only been estimated for a few projects, and will depend on many factors, including world market prices for particular commodities, internal corporate trade and firms’ ability to turn a profit. Potential duties and royalties have been impossible to calculate in the context of this study. The figures below indicate officially available estimates for each project.

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4.2.7 Sustainability is the key to strong development

The raw material potential of Greenland is vast, including known deposits of a host of minerals, such as lead, zinc, iron, gold, rare earths, uranium and others. What matters is to bring about sustainable development that benefits the society of Greenland, creates permanent jobs, economic growth and greater prosperity in the long term.

It is hard to gauge the size of the turnover in the mining sector and energy-intensive industries towards 2025. All signs are that the current level of exploration will continue in the coming years, with a trend towards a small increase. The current level of DKK 520 million will probably rise, although there has been a fall since the level in 2011. A future annual growth rate of 2% is considered to be realistic given the present intense focus on the sector.

Whether or not the described projects or other projects reach the construction and operational phase is highly uncertain, but it must be expected that one or several mines proceed from the exploration phase to the next phases. If, for instance, the Isukasia mine and the ruby mine in Queqertasutsiaat (Fiskønesset), both of which are rather promising projects, reach the production phase in 2025, the Government stands to gain a significant financial return. Thus, the Bureau of Minerals and Petroleum has estimated the corporate tax revenue from the Isukasia project at DKK 1.9 billion and the attendant income tax revenue at DKK 253 million.

Taking account of risks and all the provisos, an estimate of possible Government revenue in 2025 lies in the region of DKK 1-2 billion. This figure, however, is subject to great uncertainty. Estimating how much the turnover in the sector will be is beyond the scope of this study.

The figure below illustrates the potential of exploratory activities.
In a report from 2012, the Employers’ Association of Greenland (GA) states that the key to sustainable development in the raw material sector is to take conscious and well-founded decisions.

The Government can benefit from managing the ongoing development in pursuit of the objective of "creating permanently higher economic growth and prosperity". Accordingly, achieving healthy development requires the right choices to be made and carried out systematically.

Against the background of interviews with mining operators and research of existing material, an overview has been drawn up listing possible initiatives and levers capable of helping to develop the sector in years to come. For all initiatives, the starting point is that they should be undertaken focusing on environmental sustainability. The levers and areas of initiative are described in more detail in the following sections.

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**Figure 31: Potential turnover in the mining sector and energy-intensive industries, millions of DKK**

Source: Bureau of Minerals and Petroleum, profitability studies (assessment of social sustainability) and own calculations.

**Figure 32: Overview of levers of importance to setting up sustainable mining projects**

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48 Råstoffer og bæredygtig økonomisk vækst [Raw materials and sustainable economic growth], p. 6.
4.2.7.1 Developing the right framework conditions for sustainability

The following section examines two areas of intervention to develop the right agreements with the companies so as to make them contribute as much as possible to the society of Greenland.

4.2.7.2 Establishing clear and long-term Impact Benefit Agreements (IBAs)

One of the keys to maximising the positive effects for Greenland’s society and economy is to prioritise the preparation of clear and long-term Impact Benefit Agreements (IBAs) with the mining companies. The Government is already paying attention to this area.

An IBA enables the authorities to draw up binding agreements obliging the mining companies to make their projects benefit the society of Greenland as much as possible. An IBA describes the expected economic impact as well as all the positive effects of a given project for, for instance, the use of local labour, including the type and number of jobs created and in which phases. Moreover, an IBA can set out the expected number of apprenticeships in particular trades, education, training and competence development of local personnel, cooperation with educational institutions to build the skills of locals, measures to use local firms and suppliers in the projects, and agreements on how data and research may benefit society generally (e.g. geological survey results).

In this regard, at the same time it is important to develop transparent follow-up procedures and key performance indicators (KPIs) that make it possible to regularly monitor compliance with what has been agreed. Such procedures call for a systematic approach, which will become increasingly complex as the number and scale of projects rise.

An effective use of IBAs also involves an enforcement system which enables intervention at various levels in case of failure to fulfil agreements.

4.2.7.3 Maximising the direct economic impact

When calculating the financial compensation to the society of Greenland in terms of Government revenue, it is important to set a level of duties and royalties that provide both for competitiveness and for maximisation of direct income.

With the present share of 37% in government take, Greenland is at a good competitive level with countries like Chile and Ghana, whereas direct Arctic competitors, such as Canada, have a government take of 50% or more. Accordingly, Greenland is attractive as regards taxation, and could indeed increase its demands to operators and remain competitive.

Another possibility for maximising the direct financial benefit is to introduce a raw material duty per tonne of mined ore. Put briefly, such a measure aims to ensure that mining firms cannot avoid taxation by means of artificial transfer pricing and complex ownership structures. It guarantees the Government revenue in direct proportion to actual extraction. However, it makes it necessary to be able to control how much ore is shipped, and to continuously know the raw material price. This, we have been informed, is the model used by the Government in connection with the Isukasia project.

An important initiative to ensure financing for environmental restoration is the introduction of an environmental duty per tonne of mined ore. This money can be spent on repairing damage done to nature around the mine, regardless of the company’s finances and condition.

49 Overall, the whole field is regulated by the Greenland Raw Materials Act, while the requirements to be met by mining companies are described in Guidelines for Social Impact Assessments for mining projects in Greenland, Bureau of Minerals and Petroleum, Greenland, 2009.

50 See Råstoffer og bæredygtig økonomisk vækst [Raw materials and sustainable economic growth], Ch. 4.

51 See the report of the Greenland Taxation and Society Welfare Commission, Ch. 10.
4.2.7.4 Development of mining and adjacent sectors

This section looks at two areas of intervention aimed at developing mining and adjacent sectors in the society of Greenland.

4.2.7.5 Maximising direct local employment

A host of actors point to the need for collecting and systematising current knowledge of the mining sector in Greenland. One suggestion could be to make the existing knowledge available in a knowledge centre, establishing a corresponding web portal with an overview of competencies, capacities and services. The centre could also provide other types of resources, including teaching and other measures to upgrade qualifications. Moreover, the centre could serve as a go-between engaged in matchmaking of consortia and partnerships between Greenlandic and international firms.

An obvious idea for systematic cooperation consists of training locals through apprenticeships and other measures to upgrade qualifications. Mining companies are typically used to doing so as an integral part of their activities, and they will be best at developing specialised competencies within a given field.

The general assessment is that Greenlandic firms need to upgrade their qualifications in a host of areas in order to take on contracts in the raw material sector. What matters is to define the actual needs and competence level demanded by foreign companies, and at the same time to have a business culture that meets and handles cooperation with these actors in a professional and flexible manner.

It will also fall to the state to develop degree and in-service courses aimed at giving the local labour force the skills required to take on future mining jobs. The raw material school in Sisimiut is an important step in the right direction. If there is broad-based development of the mining sector in Greenland, however, there will be a need for much more specialised services in all links of the mining value chain, if these jobs are to be taken up by local staff in the long term.

One last point to help bring about a general and broad-based professionalisation of mining in Greenland could be the establishment of local scholarships for education within the sector.

4.2.7.6 Maximising local employment in other sectors

An important opportunity to maximise the value of the mining projects for the society of Greenland springs from ensuring that locals take up positions created in other sectors through derived demand from the mining sector. This is to a great extent about distributing relevant information on the opportunities to the right people, e.g. through a knowledge centre or similar entity. This may also give rise to a need for capacity development, though this will depend on the demand concerned.

4.2.7.7 Integrating the mining sector into future infrastructure

Mining projects will call for the building of infrastructure such as, for instance, ports and airports. For Greenland to make the most of these installations, it is important that the infrastructure measures, to the extent possible, are used to develop society generally. Such opportunities should be thought through from the outset, probably already in the early planning stage, in order to ensure a wide range of uses. For example, new ports and airports might be used in order to expand tourism.

Below is an overview of the projected installations in the most mature mining projects.
4.3 Tourism

Tourism is a promising sector which contains considerable potential for further development towards 2025. The turnover and number of employees in the sector have been rising slowly in recent years in parallel with an increase in the number of guests.

In 2012, Greenland was visited from abroad by 37,000 people staying overnight, of whom 50% came from Denmark. In addition, about 30,000 tourists disembarked from cruise ships. Thus, despite the country’s unique nature, culture and geography, relatively few tourists visit Greenland by international standards. Iceland, for instance, receives 1.6 million visitors a year.

With a turnover of DKK 334 million, the tourist sector is rather small and will have to grow considerably to play a significant socioeconomic role going forward. However, the direct turnover is complemented by sales in other sectors, such as transport and retailing.

Notwithstanding its modest size, tourism is an important sector, as it is based on turnover directly generated by the consumption of tourists. Thus, the tourism sector brings capital to Greenland from abroad.

Jobs in the sector are locally based. Moreover, tourism contributes to the country’s treasury, especially through taxes on air and cruise traffic.

Tourism in Greenland faces several challenges. Among those of a structural nature is a relatively short ‘tourist season’ (spring and summer), difficulties regarding the development of new infrastructure and limited capacity. The tourist sector has also been criticised for delivering an insufficient service level compared to international standards, and for fragmentary delivery of the various services that make up the tourist experience. In general, the sector has been seen by several parties as lacking in maturity.

Various measures are already underway to strengthen tourism in Greenland. For instance, the Government has drawn up a National Tourism Strategy 2012-2015, while Visit Greenland has

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The number of visitors is based on data from Air Greenland and the travellers using this airline’s planes. In addition, other visitors use the planes of Air Iceland and have not been counted here.
prepared an action plan with specific areas of intervention. Nevertheless, it is an open question whether the initiatives described in that publication, and the consequent investment, are sufficient to improve tourism in Greenland and thus give it a more prominent role in the country’s economy and business life.

4.3.1 Facts about tourism in Greenland

Statistics Greenland has calculated the income from tourism in the period from 2003 to 2011. It paints a picture of a slowly increasing, yet highly fluctuating, turnover from 2004 to 2010. Annual growth averaged about 3.6% in the period 2003-2010. A few years witnessed a marked increase and other years a sharp decline in turnover.\(^\text{13}\)

**Figure 34: Annual turnover, millions of DKK**

![Graph showing annual turnover from 2003 to 2010.](image)


The number of tourist sector employees is not tallied separately by Statistics Greenland, but it is estimated to lie between 400 and 500 full-time employees. There are enormous seasonal variations in tourism, and for many it is a sideline occupation during short periods in spring and summer, as the high season may employ up to three times more people than the low season.

In general, the tourism sector in Greenland is composed of a few major players, such as Air Greenland and Arctic Umiaq Line, both of which are part-owned by the Government, and a host of small local businesses running hotels, restaurants and other tourism activities. However, the market structure varies widely between, say, air transport, where Air Greenland is dominant, and hotels and restaurants, where most actors are private and less dominant.\(^\text{14}\)

The accommodation market is characterised by competition, since a range of hotels are on offer in many towns. With eight different accommodation facilities, there is particularly intense competition in Greenland’s third-largest town, Illulissat, which is home to Illusissat Icefjord inscribed on the UNESCO World Heritage List.


\(^{14}\) In this regard, Hotel Arctic en Illulissat is an exception, as it is owned by Air Greenland.
The market for air transport has been deregulated, and anyone capable of meeting the technical requirements of the Traffic Directorate can, in principle, fly in Greenlandic airspace. Air Greenland and Air Iceland are the two largest actors, complemented by a few package tour operators.

Air Greenland’s public service contract concerning flying a number of unprofitable routes was extended in 2012 until 2017, and greater competition is expected in the coming years from Air Iceland and other smaller package tour operators. The airports are run by Mittarfeqarfiit (Greenland Airports), which is a semi-autonomous firm (nettostyret) owned by the Government of Greenland, while several heliports and helistops are operated by Air Greenland A/S and Pilersuisoq A/S, respectively.

Transport of tourists by sea is also a market with many small operators and one large one. Arctic Umiaq Line A/S, owned by Air Greenland and Royal Arctic Line, ferries passengers along the coastline of West Greenland. Each year, Arctic Umiaq Line enters into a public service contract with the Government, which has historically ensured the firm’s survival. Within geographically limited areas, there is a long line of smaller actors who offer trips and sailing of shorter duration on normal market terms.

Overland transport in Greenland is solely local, since the infrastructure (roads and trails) is highly limited. This is primarily due to the Arctic weather conditions and the vast distances between towns. For the same reasons, the potential for developing public transport is minimal.

Tourists in Greenland primarily lodge along the west coast, and there are relatively few tourist activities on the east coast. In 2012, about 80% of all tourists spent the night on the west coast.

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53 The Transport Commission’s report. Note that, according to administrative practice, in addition to the technical requirements, a permit must be obtained from the Naalakkersuisut (Government) before flying in Greenlandic airspace.
54 Concerning the expectation of greater competition, see the annual report of Air Greenland (2012).
55 A semi-autonomously managed (nettostyret) firm is related to the central Government administration much as a Board in Danish state-owned companies. Accordingly, the Government representative for Health and Infrastructure is fully empowered to issue instructions to the Mittarfeqarfiit.
57 The Transport Commission’s report.
where the Municipality of Qaquitsup (Illulissat) accounted for the most tourists, namely 30%. There are no commercial tourist accommodation facilities in north-eastern Greenland.

**Figure 36: Number of guests by municipality in 2012, in thousands of visitors**

The current global spotlight on the Arctic and on Greenland should be able to foster a positive trend as regards the number of tourists in Greenland in the coming years, not least when compared to the current low number of guests from abroad staying overnight (37,160 in 2012).

By comparison, Iceland had 1.6 million visitors in the same year\(^1\), i.e. 44 times as many, even though Iceland’s number of inhabitants is only about 5.6 times higher and the country’s geography is significantly smaller.

Since 2003, annual growth in the number of visitors has averaged 2.6%. However, the number has fluctuated considerably from one year to the next, culminating in 2008 with 41,811 guests and then falling to 33,403 guests in 2010. The financial crisis of 2007-08 hit the tourism sector hard, but it has slowly begun to build up new momentum.\(^2\)

**Figure 37: Number of guests staying overnight in Greenland by nationality**

Source: Statistics Greenland.

In 2012, about 19,000 (51%) of guests staying overnight came from Denmark, while about 2,600 (7%) were from Germany, about 2,300 (6%) from USA and 1,800 (5%) from Sweden. The remaining approximately 30% are from a variety of other countries. A number of countries send about 1,000 tourists annually, including Iceland, England, Norway and France.

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\(^1\) Statistics Iceland, www.statice.is.

\(^2\) In this regard, it must be mentioned that some of the foreign visitors from various countries are business travellers and not actual tourists.
Thus, Denmark is by far the primary market for tourists and business travellers. However, many other nations with well-travelled populations, including the Nordic countries, make up a potentially highly significant market for tourism in Greenland in the future. In addition, there are many countries with travelling populations who only visit Greenland to a very limited extent.

Another important segment of tourists in Greenland visit on cruise ships. In 2010 they numbered about 30,300, which is a decent rise compared to the year before. Preliminary figures from Statistics Greenland indicate a possible decrease in numbers for 2011 and 2012. In general, however, the trend in cruise line tourism has been upward with an annual growth averaging 8.2% from 2006 to 2010.

There is widespread and growing international interest in the Arctic, including Greenland. Ongoing climate change has put the Arctic high on political agendas around the world. In addition, there is intense business interest in Greenland’s natural resources, which also generates
major attention and renewed interest in the country. This current spotlight on Greenland and the Arctic may pave the way for a positive trend in the number of tourists in coming years.

Furthermore, there are several signs that tourists, even in their current numbers, may increase consumption during their stay in Greenland. The Government’s tourism strategy points out, for instance, that the income per tourist is twice as high (DKK 13,054) in Iceland, which is in some regards comparable to Greenland as an Arctic tourism destination.62

Moreover, the Transport Commission’s report63 presents an overview of the average consumption of tourists visiting Greenland. Looking at holiday tourists, who should be seen as the main target group, they spend only four nights per stay on average. This appears low in view of the costs associated with travelling to and around the country. In other words, the tourists’ stay seems to be short considering Greenland’s geography, the quality of the country’s attractions and the costs of getting there.

Each visitor spends an average of about DKK 1,100 per day on accommodation, food, excursions, souvenirs and other minor shopping. This figure also seems low. Regarding these numbers, it should be added that Greenland is not normally seen as a cheap travelling destination, and indeed has rather high prices on most goods.

Altogether, the numbers point to significant potential for increasing the daily consumption of individual tourists.

**Figure 40: Average expenditure of tourists per stay in Greenland, in DKK.**

<table>
<thead>
<tr>
<th></th>
<th>Days pr. stay</th>
<th>Normal tourist costs</th>
<th>Flight transporta. costs</th>
<th>Fees</th>
<th>Total costs</th>
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</thead>
<tbody>
<tr>
<td>Holiday tourists</td>
<td>4</td>
<td>4,400</td>
<td>4.500</td>
<td>Min. 699</td>
<td>Min. 9,450</td>
</tr>
<tr>
<td>Business travelers</td>
<td>4</td>
<td>9,200</td>
<td>7.000</td>
<td>Min. 699</td>
<td>Min. 16,750</td>
</tr>
<tr>
<td>Visiting tourists</td>
<td>-</td>
<td>2,250</td>
<td>8.000</td>
<td>Min. 699</td>
<td>Min. 10,800</td>
</tr>
<tr>
<td>One-day tourists</td>
<td>-</td>
<td>200</td>
<td>-</td>
<td>699</td>
<td></td>
</tr>
<tr>
<td>Cruise tourists</td>
<td>-</td>
<td>2,250</td>
<td>-</td>
<td>699</td>
<td></td>
</tr>
</tbody>
</table>


4.3.2 Environmental impact

The environmental impact associated with tourism in Greenland is estimated to be limited. The main strain on the environment springs from transport of tourists to and around Greenland, primarily as regards CO₂ emissions from air traffic and pollution from cruise ships.

4.3.2.1 CO₂ emissions from air traffic

The strain from CO₂ emissions associated with air traffic is calculated as Air Greenland’s total emissions.64 In 2012, this was about 75 million kg for 390,000 passengers, which is about 192.5 kg per passenger flight.65 According, the CO₂ emission per foreign visitor will be 4-6 times higher, lying somewhere between 770 kg and 1,155 kg. CO₂ emissions from the approximately 37,000 visitors in 2012 totalled between 28.6 million kg and 42.9 million kg. Half of the visitors

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63 The Transport Commission’s report.
64 There is also cargo, which accounts for a share of CO₂ emissions, though this is presumed to be offset by 10% of the passenger market being in the hands of firms other than Air Greenland.
65 Air Greenland’s annual report (2012).
66 The passenger number adds together the route Copenhagen-Kangerlussuag and domestic flights in Greenland. To obtain an estimate of emissions per tourist it is assumed that each passenger flies return to Denmark/Iceland, boards at least two domestic flights (e.g. Kangerlussuag-Nuuk return) and at most four (e.g. roundtrip by air in Greenland).
come from countries other than Denmark/Iceland, thus causing further CO\textsubscript{2} emissions when including their travel to Denmark or Iceland.

According to its CSR policy, Air Greenland is committed to focusing on the environment, which is already reflected in a 7% reduction of CO\textsubscript{2} emissions from 2010 onwards. Among the contributing factors to this effect is the purchase of more environmentally-friendly planes with greater fuel efficiency, which is also financially advantageous for Air Greenland. Further CO\textsubscript{2} emission-cutting measures to mitigate the environmental impact are an important condition for sustaining an increase in the number of tourists, especially since Greenland’s nature is one of the tourism sector’s competition parameters.

4.3.2.2 Pollution from cruise ships
The principal sources of pollution from cruise ships are sewage, greywater (wastewater from wash hand basins, showers, baths etc.), oily bilge water, general waste and hazardous waste.\textsuperscript{67} The discharge of sewage and greywater may take place either directly into the sea or be delivered in the port zone, the latter being preferable to reduce environmental strain. The discharge of nitrogen dioxide (NO\textsubscript{2}) in port areas is estimated to be limited.\textsuperscript{68}

Greenlandic waters are risky to navigate due to flawed maps and icebergs. Given a rise in the number of cruise ships in recent years, this increases the risk of accidents. To some extent, the current legislative process in this field attempts to take this into account through concrete measures, such as sailing zones, ice class ship requirements for cruise liners with more than 250 passengers, and introduction of compulsory pilotage.\textsuperscript{69}

At the same time, the nature of Greenland makes the environment potentially more vulnerable to pollution than areas with a milder climate.\textsuperscript{70} More attention has been paid to the risk of accidents in Greenlandic waters resulting in environmental damage in 2013. This stems not only from accidents such as that of the cruise liner Costa Concordia in Italy, but also from greater focus and intensification of Danish efforts in this field.\textsuperscript{71} Nevertheless, this is something the Government of Greenland and of Denmark should join forces to prioritise even further. Hence, initiatives in this area are already underway in response to criticism levelled by the Danish Auditor General in 2013 to this effect.

4.3.3 Current development strategies and activities
Tourism is already under the microscope in Greenland, and several actors have a strategy for how to develop the sector in coming years. Two important public sector contributions are the Government’s “National Tourism Strategy 2012-2015” and Visit Greenland’s “Strategic Plan for Visit Greenland 2012-2015”.

The Government’s objective regarding tourism is: “To secure economically, socially and environmentally sustainable growth in the tourism and adventure sectors so that these account for an important share of Greenland’s export earnings by 2020.”\textsuperscript{72}

The growth strategy concentrates explicitly on initiatives that can be carried out by the end of 2015. It is mentioned that the strategy also sets its sights on a long-term endeavour, but no

\textsuperscript{67} United States Environmental Protection Agency (EPA), Cruise Ship Discharge Assessment Report 2008.
\textsuperscript{68} Luftforurening fra krydstogtskibe i havn [Air pollution from cruise ships at harbour], National Environmental Research Institute of Denmark, DMU.
\textsuperscript{69} Udkast til bekendtgørelser vedrørende sejlads sikkerhed og lodspligt [Draft government orders concerning navigation safety and compulsory pilotage], Danish Maritime Authority.
\textsuperscript{70} Visit Greenland.
\textsuperscript{71} Beretning til Statsrevisorerne om Danmarks indsats i Arktis [Report to the auditors of public accounts on Denmark’s work in the Arctic], Auditor General, September 2013.
\textsuperscript{72} National Tourism Strategy 2012-2015.
specific initiatives are outlined to this effect, although education and labour market measures are highlighted as possible levers.

The Government’s “National Tourism Strategy 2012-2015” has four objectives or growth targets:

1) To increase the number of cruise ship tourists by 5%.
2) To increase the number of land-based tourists by 10%.
3) To increase the number of employees in the tourism sector (measured in years of full-time work) by 5%.
4) To increase turnover in the sector by 5%.

The growth is intended to spring from the following initiatives in the strategy:

- Better marketing of Greenland
- Greater accessibility in terms of ports and aviation infrastructure
- Improved legislation
- Improved documentation of the adventure sectors and greater volumes of statistics/data.

The initiatives launched in the strategy are not fleshed out in detail, but are marked out as sighting points for tourism development.

Visit Greenland’s “Strategic plan for Visit Greenland 2012-2015” has been drawn up as the practical realisation of the main goals of the Government’s strategy. The major objectives of the strategic plan can be summed up as an expected 5% growth in employment (measured in years of full-time work) and turnover within the tourism industry in 2015.

Visit Greenland has published the following targets in its strategic plan towards 2015:

- A 15% increase in the number of land-based tourists compared to the present level of 33,400
- A 5% increase in the number of cruise ship tourists compared to the present level of about 30,000.
- An increase in turnover in the tourism sector from the present level of DKK 334 million to DKK 380 million.

These targets are to be met by means of the following five initiatives:

- Greater volumes of statistics and other documentation within the tourism sector in Greenland.
- Greater visibility of Greenland in the global tourism market.
- Improved accessibility/infrastructure for arrivals from other countries.
- Greater private sector investment through concessions and better taxation structures.
- Enhanced market development through branding and cooperation agreements with travel operators.

Municipal plans towards 2020 also express a wish to boost tourism, among other means by investing in local infrastructure, showcasing local cultural life, and upgrading local qualifications, so that the growth translates into more local jobs. Most initiatives concur with the national tourism strategy.

The municipalities are interested in issuing concessions in various fields and in creating facilities for recreational purposes (skiing installations and tourist cabins). For example, the Municipality of Qeqqata, home to Greenland’s second-largest town Sisimiut, wants to become more attractive to adventure tourists through the campaign “Destination Arctic Circle“ and to improve arrival facilities for cruise ships. However, the municipal initiatives have not been fleshed out in detail in the published plans.
4.3.4 Expected effect of the initiatives
In Visit Greenland’s strategy, the current ambitions aspire to an increase in tourism sector income from DKK 334 million in 2010 to DKK 380 million in 2015. This is equivalent to an annual growth of 2.6%.

Assuming that this estimated annual growth becomes possible with the right measures towards 2025, the turnover of the tourism sector will be about DKK 500 million in 2025.

Figure 41: Turnover in the tourism sector, millions of DKK


In conclusion, the major strategies pursued by the Government and Visit Greenland are specific until 2015, but lack further long-term objectives after that. A long-term strategy would serve to tailor major long-term investments, e.g. in infrastructure and recreational installations, to the development in other sectors in Greenland, thus enabling the achievement of a greater overall impact.

4.3.5 Tourism opportunities looking ahead
The initiatives already taken, as described above, are important to create growth in tourism towards 2015. However, they cannot be considered to harvest the full potential of the sector. Rambøll estimates that more systematic strategic interventions and investments will be able to tap into a great economic and business potential. One target for 2025 could be, for instance, to raise income per tourist to the same level as in Iceland (DKK 13,054).

Given the right measures, Ramboll believes that the tourist sector could reach a size of some DKK 600-800 million in 2025, thus featuring much more prominently in Greenland’s economy than what is currently the case. This is equivalent to an annual growth of between 4 and 6% in the sector.
At the same time, however, Ramboll considers that it will require a major effort by the private as well as the public sector to develop tourism. Against the background of interviews with tourism operators in Greenland and analysis of existing material, a list has been compiled below, indicating possible levers to help develop tourism into an even stronger sector in the coming years.

The following section examines the above areas of intervention/levers, which Greenland may pursue in order to increase the consumption and length of stay per tourist.

### 4.3.5.1 Professionalising the tourism sector

Tourism in Greenland can be further professionalised, and the current service level can be raised. In many cases, the work with tourists is fully up to international standards, whereas in other cases the standard of tourist experience is assessed to be poorer than in comparable countries.
Tourists arriving in Greenland must be expected to be experienced consumers of advanced travel destinations, and they are used to purchasing high-value professional tourist products with a high standard of service.

It is found that Greenland’s tourism sector holds scope for further development via professionalisation of goods and services throughout the value chain, benefiting from the design of more measures to give the overall tourism experience a lift, including, for example:

- Establishing a specific tourism degree course based on international service standards and knowledge of practice from similar tourist destinations (e.g. Alaska and Iceland), thus creating more employees with direct tourism education in all links of the value chain from transport to services.

  ➢ The current degree course as service economist specialised in tourism at the Greenland Business School (Niuernermik Ilinniarfik) is seen to play a key role in the ongoing professionalisation of the tourism sector. At the same time, it is considered that increasing its enrolment would be beneficial. The international dimension of the course is important to draw on the experiences of other countries regarding tourism, products and service level.

  ➢ The degree course as Arctic tourist guide, started in 2013 at the Greenland Business School, appears to be a sensible and important initiative. Over time, the international profile of the course must be expected to bring in experiences from other tourism destinations to Greenland.

- Hiring persons with experience, e.g. from Iceland, northern Norway or Alaska.

- Carrying out a systematic and evidence-based analysis of present service standards measured against countries that are comparable to Greenland (e.g. Iceland and Alaska). This will make it possible to concentrate interventions and initiatives on those areas where they add optimal value. Moreover, data should be collected on the global market potential for tourism in Greenland, so that potential tourists of the future can be addressed in a well-targeted manner.

4.3.5.2 Infrastructure improvements

According to the Transport Commission’s report and our own interviews with key players, the tourism sector can be expanded considerably by improving infrastructure. Today it is time-consuming and expensive to get around in Greenland, since most of the transport between towns takes place by air. Moreover, air traffic is, in some periods, characterised by delays and cancellations due to difficult weather conditions and flight safety concerns.

Initiatives in this field call for long-term investment in infrastructure, and the capacity will not only benefit tourism, but potentially many sectors of society in Greenland. Thus, investment should start from strategic cost-benefit analyses across sectors and interests. Investment in infrastructure will also create local jobs in, for instance, construction work. The Transport Commission recommends the following types of infrastructure investment:

- Lengthening runways to enable larger planes to land in Greenland.

- Expanding ports and quay facilities to enable more and bigger cruise ships to arrive. The potential for cruise ship tourism is considered to be extensive given the opportunities for unique experiences of nature.

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73 See the Transport Commission’s report.
• Expanding the road network, so that more tourist destinations can be accessed by land, e.g. a road between Sisimiut and Kangerlussuaq.  

4.3.5.3 Greater supply and higher quality of activities and tourist information

It is considered to be possible to increase the supply and quality of activities and information on offer for tourists in Greenland. Modern tourists are used to being offered wide-ranging and diverse high-quality options that are accessible and well-planned.

Greenland’s Arctic location makes it possible to design unique products and experiences, which few other countries can offer, such as ice safari, trophy hunting and wilderness hotels.

At the same time, information on the various excursions and experiences is expected to be available, both at local information offices and online. However, only to a limited extent has the information thus far been brought together in one place. Visit Greenland is working on a shared portal for the municipal tourist organisations, which could help meet a demand for being able to plan one’s trip in detail via the Internet.

Potential measures to expand the supply and quality of activities and tourist information include:

• Securing good commercial framework conditions for private operators to make it attractive to launch new excursions or other experiences. One way of doing this is by inviting tenders for concession agreements. For example, there is already trophy hunting in Nuup Kangerlua (also known as Godthaab fjord, next to the capital Nuuk) and around Kangerlussuaq. This type of initiatives should be stepped up.

• Identifying new potential tourism experiences via a market analysis of comparable countries, such as Canada and Iceland, which may help expand the variety of activities on offer to tourists.

• Organising package holidays for various types of tourists in order to link together a variety of experiences. For example, one package could be designed for those interested in culture, focusing on cultural history sites and talks by experts, while another could address extreme sports tourists, including excursions into the wilderness and heli-skiing.

• Setting up local tourist offices with trained personnel in order to help tourists identify relevant experiences.

• Integrating and creating synergy between marketing initiatives across municipal borders, e.g. through better documentation of opportunities to:
  
  i) Enhance online accessibility of information that provides an overview of Greenland experiences on offer, including prices and timetables of activities.

  ii) Enhance coordination, information and services for tourists wishing to consume local service products, such as sailing and guided tours.

• Displaying tourist maps in towns and villages, providing an overview of current experiences/offers and detailing relevant facts about the local area.

• Prolonging the tourist season with relevant activities for the right market segments. In particular the spring season seems to offer good opportunities in tourism terms.

74 See Vej mellem Sisimiut og Kangerlussuaq - Konsekvensanalyse af fordele og ulemper [Road between Sisimiut and Kangerlussuaq – impact assessment of pros and cons].
4.3.5.4 Attracting more tourists
The following section examines two areas of intervention capable of attracting more tourists to Greenland.

4.3.5.5 Greater marketing efforts to attract more tourists
One of the five areas of intervention in Greenland’s national tourism strategy for 2012-2015 is to increase the visibility of trips to Greenland, and to develop Greenland’s brand in the eyes of new potential tourists.

Thus, the idea of boosting marketing has been identified both by the Government and by Visit Greenland in their respective strategies. For example, Visit Greenland wishes to design subsites targeted at the relevant tourist segments and strengthen its PR work in selected markets. The segments to be primarily targeted by Visit Greenland are adventure tourism (75% of its work), cruise ship tourism (20%) and extreme adventure tourism (5%).

In addition, Visit Greenland has drawn up 11 tourist profiles (e.g. ‘sightseer’ and ‘authenticity-seeker’), at which the future marketing is to be targeted. The measures outlined look substantial and will, given systematic implementation, be able to produce a positive effect. However, it is also considered that further effort is necessary to realise the full marketing potential of the initiatives.

Potential measures to spread the awareness of Greenland as a tourist destination are:

- Active lobbying for programmes such as ‘Ice Cold Gold’ to be recorded in Greenland, thus enhancing awareness of the country as a tourist destination. In this regard, TV series and films could have a major effect.

- As an extension of Visit Greenland’s work in coming years, long-term marketing measures looking towards 2025 can be undertaken for a variety of tourist segments. This calls for determined investment and persistence, as it will take some years for the efforts to produce a direct yield. A specific long-term objective of the campaign could be to raise the level of knowledge about Greenland to that about Iceland.

- Setting up a knowledge-sharing network of local operators, so that experiences can be exchanged, thus enhancing the marketing of each other’s tourist services.

Visit Greenland’s work with tourism segments seems to be a springboard for more proactive and strategic marketing for particular target groups.

4.3.5.6 Entering into strategic cooperation agreements
Strategic cooperation agreements can help boost tourism between Greenland and other nations, thus increasing the number of tourists in Greenland. These can be agreements about greater exposition of what partner countries have to offer towards local tourists, both at fairs and online. At the same time, experiences can be shared between organisations, so that the marketing can be targeted at its respective segments through the optimal communication channel.

Some opportunities for entering into cooperation agreements could be:

- Expanding existing cooperation with current stakeholders, e.g. tourist organisations in Iceland, USA and Scandinavia. Increasing cooperation with Iceland in particular seems to offer great opportunities. Iceland attracts many tourists and has already successfully offered trips to Greenland as part of their product. Cooperation has thus already started and should be stimulated as much as possible in coming years.

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• Strengthening international organisational cooperation with other Arctic nations in order to attract more tourists to the Arctic.

  - In 2007, Greenland joined the newly established North Atlantic Tourism Association (NATA), which involves cooperation between the Faroe Islands, Iceland and Greenland with the aim of promoting tourism in the Arctic.

• Mapping out new potential tourist markets and entering into cooperation agreements with various national actors and similar organisations.

  - In August 2012, NATA commissioned an assessment of the potential of the German tourist market. The report concludes that Iceland today has a dominant position in the German market compared to Greenland and the Faroe Islands, but that the number of potential tourists is the same for all three countries.

4.4 Agriculture

Agriculture accounts for only a small part of Greenland’s economy today. It encompasses primarily livestock breeding of sheep, cattle and reindeer. In recent years, however, horticulture and crop cultivation has been on the increase. The primary agricultural export is lamb and reindeer meat. This is high quality and considered a luxury good. Agriculture is considered to have growth potential in coming years. At the same time, however, it is estimated that a major endeavour and significant investment are required if agriculture is to be expanded in earnest towards 2025.

4.4.1 Facts about agriculture

Figures from Statistics Greenland show that 50-100 persons have agriculture as their principal occupation in 2011. The sector’s turnover was DKK 31 million in 2012, and it accounts for about 0.1% of total export of goods. The Government subsidises agriculture, which serves particularly to sustain and develop production of lamb and other agricultural production. Lamb production is also protected through an import tariff on foreign sheep and lamb. Nevertheless, local production struggles to compete with imported lamb. In 2013, DKK 13 million was allocated to business-promoting subsidies in agriculture.

In recent years, the number of farm units in Greenland has been falling. At the end of 2011, there were 48 farms, representing a 20% decline over the past ten years. Over half of Greenlandic farms lie in the Narsaq district. Indeed farming generally takes place in South Greenland and is often run by families. The size of a typical farm in 2011 was 22.5 hectares, which is about three times less than its equivalent in Denmark.

Along with warmer weather conditions in Greenland, the area of cultivated land has grown significantly over the past ten years. In 2011 it was 1,081 hectares, while in 2001 it was 780 hectares. This does not include 242,000 hectares for mountain grazing. Only about 10 hectares were used in 2011 for production of potatoes and other vegetables, while 1,071 hectares were used for production of winter fodder in terms of wrapped hay bales.

4.4.2 Meat production

The agricultural sector in Greenland is primarily based on sheep-breeding, with 20,232 ewes in 2011, which is the equivalent of 87% of all agricultural production animals. There are also 3,000 domesticated reindeer, equivalent to 13% of agricultural production animals. In recent years, the Government has invested significantly in infrastructure in sheep-breeding districts by letting the firm KNI take over, build and run a modern slaughterhouse, which in addition to lamb is now also able to slaughter beef cattle, musk and reindeer. Until 2017 the slaughterhouse will be subsidised

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76 Grønlands Statistik: Landbruget i Grønland.
78 Statistics Greenland: Landbruget i Grønland [Agriculture in Greenland].
through a public service contract, which in 2013 amounted to DKK 7 million. Furthermore, modern production buildings have been erected, while the production of coarse feed has been increased to secure supplies during tough winters, for which it is still necessary, however, to import concentrated feed.

The general trend is towards fewer sheep-breeders, but with more ewes. In 2011 there was only one sheep-breeder with less than 100 ewes, and the number of sheep-breeders with 100-500 ewes has fallen from 42 in 2000 to 26 in 2011. Meanwhile the number of farms with over 500 ewes has risen from 9 in 200 to 18 in 2011, which is in line with the fact that a farm needs at least 400 sheep for the owner to be able to make a living from it.

In 2013, the Government’s direct subsidy to sheep-breeders was DKK 13.5 million, or about DKK 630 per lamb produced. Since 2004 the Government has also contributed to the running of the slaughterhouse. In a report from 2004 about the need for agricultural policy measures, it was estimated that slaughterhouses would reach profitability when slaughtering 25,000-26,000 lambs a year. In 2011, 21,370 lambs were slaughtered, producing about 325,000 kg of meat. The production of lamb for meat has been on the rise in recent years, but unstable weather, e.g. dry summers without much precipitation, has resulted in a reduction of the production of winter fodder, which resulted in lower weight of slaughtered animals in 2008, 2009 and 2011. According to the Committee for Economic and Labour Market Affairs of the Municipality of Kujalleq, if Greenland wants to become self-sufficient in lamb, the number must rise to 35,000 lambs.

An important challenge for the sector consists in lowering the price of locally produced lamb to compete with imported lamb. In this regard, the relatively small scale of production is a major barrier, since the present structure provides limited economies of scale and few opportunities for efficiency gains. One way of helping to hold down costs could be to use local hydropower to lower the price of electricity used in production.

4.4.3 Vegetables and potatoes
Vegetables and potatoes have for decades been grown in small quantities in South Greenland. The production has primarily consisted of potatoes, turnips and rhubarb. In recent years, new crops have been produced, such as iceberg lettuce, fresh strawberry and tomatoes. In 2010, the total potato production reached about 130 tonnes, which is almost half the annual potato consumption of Greenland.

Today it is typically sheep-breeders who grow potatoes as a sideline for sale in the domestic market. A few also grow other vegetables. In other words, there are still no farmers for whom vegetable and potato cultivation is their principal livelihood. There is a generally positive trend in this field in Greenland. For example, recently the potato production has been expanded through a new distribution warehouse in Qaqortoq, so people along the whole coast can share in potatoes from South Greenland.

In South Greenland lies the Upernaviarsuk Experimental Farm, which is dedicated to agricultural research and training in a sub-Arctic and low Arctic zone. The area is characterised by being surrounded by an ice-free fjord throughout the winter term. At the farm, experiments are conducted with grass species, e.g. to make hay, and various types of grain, mainly oat, rye and barley. Moreover, various types of cabbage and other vegetables are grown. The grain species still cannot be grown to full maturity due to the climate in South Greenland. It is therefore harvested before it is fully mature and used for animal feed.

Nearly all crops are sold in the domestic market, but it is far from sufficient to meet the demand. The remaining consumption is covered by means of imports, mainly from Denmark. The home

79 Statistics Greenland: Landbruget i Grønland [Agriculture in Greenland].
80 Grønland – nøglespiller i Arktis [Greenland – key player in the Arctic].
market in itself holds significant potential for Greenland’s own production of agricultural goods. However, crop cultivation is deemed to be poorly advanced in the country, and a wide range of initiatives are required to establish a competitive sector.

4.4.4 Ongoing initiatives
Despite the very modest size of the sector, agriculture features prominently in the Government’s strategy to become self-sufficient. The Government’s agricultural policy is entitled “Visions for Greenlandic Agriculture” and it presents a series of visions, objectives and strategies for agricultural development until 2015.81 The overall objective of the agricultural policy is the following:

“Consumers should be guaranteed a supply of locally sourced foodstuffs at reasonable prices and of high quality. Greenlandic agricultural producers should be able to achieve a reasonable income and enjoy development opportunities that secure a continuous supply of sustainably produced food in Greenland.”

In order to help the development gain momentum and overcome future challenges, the following four focus areas are listed:

- Improving the incentives structure for agricultural producers in order to enhance the resource and capacity utilisation of both public and private investment in the sector.
- Streamlining administration and simplifying rules, among other means by making the administration more flexible, using better IT solutions in administration and introducing more lenient rules for agriculture to the extent relevant.
- Taking systematic initiatives in favour of innovation and product development, including by improving the interaction between Savaatíllit Peqatigíit Suleqatigissut (SPS – the sheep-breeder’s association), other business-promoting actors and companies, as well as by continuing to upgrade the qualification of Consultancy Services for Agriculture.
- Ensuring professionalism in advisory services and administration, as well as strengthening capacity building through greater focus on education and in-service training of agricultural producers.

The challenges associated with the aforementioned focus areas must be confronted in close cooperation between the agricultural sector, SPS and the Agricultural Council (Landbrugsrådet).

Moreover, it is possible to use the business subsidy scheme, which enables farmers to apply for support for various business-related investments, such as buildings, power plants, machines, tools, etc.82

The good intentions of the agricultural policy have only been partially followed up and carried out in practice. Agriculture remains subject to a series of structural conditions which impinge upon and encumber growth and development of the sector. In the spring of 2014, a Government-appointed Agricultural Commission will publicise the result of a thorough analysis of the sector and its structural challenges, as well as a series of recommendations for its further development.

4.4.5 Future prospects of agriculture
In light of the political wish for independence, agriculture will play an interesting role going forward. It is not at present a major sector in Greenland, but climate change and the extension of the growth season will, ceteris paribus, make agriculture more attractive in the coming years, and perhaps stimulate some growth.

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82 Ministry of Fisheries, Hunting and Agriculture (NANOQ – the business subsidy scheme).
In the years ahead, agricultural development will depend on support from the Government or on private investment. The sector does not currently have the capital for the necessary investment in new technology and production facilities, such as greenhouses and plastic tunnels for pre-germination. Despite intense political focus on self-sufficiency in recent years, the Government has cut back the overall level of agricultural subsidies. This makes the prospects of a self-supporting and sustainable sector even more distant.

There are, however, several positive announcements and hopes regarding agricultural development. Indeed the Committee for Economic and Labour Market Affairs of the Municipality of Kujalleq, believes that Greenland, over 10-15 years, will be able to supply most of the country with meat, egg, vegetables and potatoes of high quality, thus becoming self-sufficient in a series of areas by 2025. The Consultancy Services for Agriculture sees it as realistic to be able to supply half of Greenland’s total demand for vegetables.

At the same time, however, there are seen to be a number of challenges, which need to be taken into account and make it doubtful whether significant growth can be realised in the coming years.

4.4.6 Future challenges of agriculture
One of the crucial challenges for agriculture is the lack of a well-developed infrastructure. The existing infrastructure is unable to underpin production optimally and efficiently. For example, it is often difficult for sheep-breeder in South Greenland to deliver their produce to the larger towns along the coast where they can be sold in grocery stores. This also applies to crops which need to get to consumers in a tolerably efficient manner.

Another challenge is that there is only a rather modest tradition of horticulture in Greenland. This gives rise to a need to develop capacity in effective and professional vegetable cultivation. The qualifications concerned span the entire value chain, including production, sales and management, all of which is needed to prepare the ground for producing and distributing competitive goods to Greenlandic consumers and possibly for export. In this regard, it is considered that initially focusing on a few select crops may be a viable strategy, so that robust productions are systematically built to achieve a critical output, broad professional experience and attendant investment, e.g. in greenhouses and irrigation systems. Investment in greenhouses is necessary in view of the short growth season, which constitutes a natural limitation in the sector and favours concentrating on the crops most suitable for the climate.

A final challenge is to bring about a general change of attitude among Greenlanders to make them more inclined to choose Greenlandic agricultural produce, even when this is more expensive than imports. Campaigns and information measures could be fruitful to this effect.

4.4.7 Environmental consequences
Agricultural production in Greenland is expected to have a highly limited environmental impact. This springs from extensive cultivation methods and, of course, from the fact that the sector is not foreseen to reach a substantial size for some years.

4.4.8 Expected turnover in agriculture towards 2025
In view of the challenges indicated, Rambøll does not forecast any growth in agriculture towards 2025. Nevertheless, the potential for a stronger agricultural sector does exist, and a higher turnover could become a reality with well-targeted initiatives. At present, however, the most realistic scenario towards 2025 seems to be maintaining the current level. Such a development has been illustrated in the figure below.

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84 Grønland – nøglespiller i Arktis [Greenland – key player in the Arctic].
4.5 Seal products
Hunting seals is an integral and central part of Greenlandic culture. The commercial side of seal hunting is run by the Government-owned Great Greenland, which each year is allotted several millions of DKK on the National Budget in order to buy sealskins from sealers. In addition, the company has for some years received an annual capital injection in order to function financially. Great Greenland runs Greenland’s only tanning firm and employs 40 people in Qaqortoq in South Greenland.

Sealing has been controversial in the past decades. This has made it difficult for Great Greenland to sell the skins at the desired price, leading to the accumulation of large stocks. The lumping together of normal sealing carried out with a rifle and clubbing of seal pups in Canada has caused organisations dedicated to animal protection to question hunting methods and sustainability. As a result, the EU has banned commercial trade in sealskin and seal meat.

The ban has severely affected those population groups to whom sealing is one of few opportunities to make their own living. Moreover, the EU measure has damaged the chances of developing the sealskin sector as an actual industry on a par with, for instance, the mink industry in Europe.

In principle, the so-called Inuit exception means that Greenland is not covered by the ban and may legally trade commercially in seal products. Nevertheless, the ban has reportedly dealt a severe blow to demand. Since, for example, Canadian sealskin cannot be imported to the EU, the WTO has investigated the case.

The WTO ruling from November 2013 concerning the EU ban on the import of seal products, including the Inuit exception from 2009 and the implementation regulation from 2010, states that the EU’s implementation of its legislation is in contravention of WTO rules.

Therefore, the EU must, according to the WTO ruling, adjust its Inuit exception so that it does not favour Greenlanders above, for instance, Canadian Inuit hunters. If the EU import ban is to be maintained, the WTO insists that the Inuit exception is either completely eliminated or enforced in an even-handed manner in the various countries.

A National Budget allocation in Greenland subsidises the purchase of sealskin. This measure was taken in the wake of a sharp price drop in the 1970s and early 1980s, which occurred in response
to intense campaigning against sealing. The subsidy amount has been decreasing since 2002 when it was DKK 36.7 million, falling to DKK 25.2 million in 2011.\textsuperscript{6}

The pronounced fluctuations in the number of purchased seal skins and the movements in export volumes indicate that sealing has commercial potential, provided efforts to make consumers more interested are successful, particularly in East Asia. This goal is pursued jointly by Great Greenland and the Government. The strong business focus on seal skins is considered to hold significant potential.

WWF has just published a report presenting the latest knowledge about seal stocks in Greenland and describing the Greenlanders’ sustainable sealing practices. The report issues a number of recommendations on how the EU can ensure that the Inuit exception works as intended\textsuperscript{8} and may thus lay the groundwork for Greenland augmenting its income in this field.

The harp seal and the ringed seal are the most numerous of Greenland’s seals, with populations of millions of individuals, while the total stock of hooded seal is more than half a million. In its report, WWF affirms that the status for all three species is ‘least concern/not endangered’.

Thus, the newly published WWF report declares its support for sustainable sealing in Greenland and encourages the EU to address the effects of the import ban by informing the public about the Inuit exception. Greenpeace has also announced its support for sealing in Greenland adhering to sustainable methods.

Today Greenpeace, just like WWF, calls for removing any limits on the Greenlandic hunters’ right to export seal products to the European market. According to both organisations, the EU should commit itself to spreading information among member countries and their populations about the Inuit exception, about the sustainability of Greenlandic sealing, and about its cultural, historical and economic significance for the Inuit in the Arctic.

Given support from the EU, it may thus be considered whether the existing certification scheme can be expanded to guarantee, for example, sustainable hunting, full utilisation of the prey and animal welfare in order to meet the rising demands of conscious consumers in the EU as well as in the rest of the world.

According to figures from Statistics Greenland, the number of seal skins purchased from sealers and exports of seal skin have fallen since 2006. In 2001, the number of purchased seal skin was 87,587. This rose to 112,346 in 2006, but fell to 34,627 in 2012.\textsuperscript{8} A corresponding trend is noticed in exports. In 2001, Greenland exported seal skin at about DKK 9.8 million. In 2006 this figure reached about DKK 36.9 million, while in 2011 it fell to about DKK 10.9 million, thus returning to the level of 2001. Nevertheless, seal skin exports have been rising since 2007, when they plummeted to DKK 4.0 million. However, the export has primarily been destined for the building of stocks in Denmark. Throughout the period, few of the seal skins purchased from sealers have been resold. At present, there are stocks of 150,000 unsold seal skins in Greenland. The turnover of seal skin products towards 2025 is foreseen to rise compared to the current level, especially in terms of exports, as new markets are expected to be able to buy a larger share than today. Sales in current markets are expected to increase slowly.

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\textsuperscript{6} Statistics Greenland: Sælskind, tilskud og indhandling [Seal skins, subsidy and purchase]
\textsuperscript{8} Statistics Greenland: Indhandling af sælskind efter tid og enhed [Purchase of seal skin by time and unit].
Figure 45: Estimated turnover of seal products 2013-2025, millions of DKK

Source: Statistics Greenland, interviews and own calculations.
5. OTHER SECTORS – POSSIBLE FUTURE PROSPECTS

In addition to the economic sectors examined and analysed above, it is possible to identify a number of other areas, which may, in the longer term, contribute to the development of society. However, Rambøll does not consider that these sectors will be able to play a significant role before 2025. This chapter describes the long-term prospects in fields such as server cooling, energy export and industrial processing of raw materials.

5.1 Server cooling

A still relatively unexplored business field for Greenland is the installation of server parks. Servers require cooling. Since companies invest vast sums in this, they have begun to seek out geographical areas with naturally cold weather conditions.89

The company Facebook, for instance, has begun to set up a large server park in Luleå in northern Sweden. One factor in this choice of location was the town’s cold climate, which means the servers can be cooled directly by nature, thus making major energy savings.90 It is not just good business for Facebook, but also for Luleå. The company is expected to invest SEK 3-4 billion in the project and to create 300 new jobs in the building sector, plus 50-60 permanent jobs in the server park.

Another example of a company which spends heavily on server cooling is Microsoft. In 2008, Microsoft built a new server park on the outskirts of Chicago at half a billion dollars. The energy consumption of the park is estimated to lie in the region of 200 MW, of which about half is for cooling. This requires three new power plants in the area to deliver enough energy to keep the server park going.91

Inspired by the growing Swedish success, the chances of installing server parks in Greenland have begun to be explored. Greenland’s climate has much in common with the Swedish, and may thus be seen as an attractive alternative to Sweden. Greenland can offer environmentally-friendly and sustainable hydropower and has already gained extensive experience from the running of existing hydroelectricity plants.

Although the design of concrete projects remains far off, these are nevertheless very likely to be feasible in Greenland.

5.2 Energy export

The growing global focus on environmentally-friendly energy and reduction of CO₂ emissions may in future lead to Greenland beginning to export green and sustainable energy. The energy can be produced in hydroelectric power plants and could over time become economically attractive for the nearest countries compared to energy from fossil fuels. Hydropower can potentially be exported as HVDC by submarine cable to Labrador in Canada, which already has hydropower plants transmitting energy to industrial cities in the USA.92

Such projects require vast sums of capital, but as global environmental requirements continue to rise, the World Bank has expressed that it may be willing to co-finance projects of this type. Greenland is already advanced as regards the development of renewable and sustainable energy. Inauguration of the latest hydroelectric power plant in Ilulissat means that 70% of the country’s public electricity and heating is now generated from renewable sources.93

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90 Sermitsiaq newspaper, December 2011: "Serverpark i Grønland" [Server park in Greenland].
91 Berlingske Business, September 2008: "Grønland vil sælge kulde til IT-branchen" [Greenland wants to sell cold to the IT business].
92 Grønlands teknologihistorie [Technological history of Greenland], p. 397.
93 Sermitsiaq newspaper, September 2013: "WWF: Grønland viser vejen" [WWF: Greenland shows the way].
Other countries also see potential in exporting their environmentally friendly energy. Experts believe that it is technically possible to export the inexpensive geothermic electricity produced in Iceland to the rest of Europe. Indeed, they even foresee that this can be profitable.⁹⁴ One challenge of such a project is the need for an electric cable to Scotland, which will be 3,000 km long and cost around DKK 11 billion. Even so, the future potential of exporting environmentally friendly energy to other countries is highlighted, which, other things being equal, could also be an opportunity for Greenland in the future.

5.3 Further industrial processing of raw materials

In the longer term, there is a chance that Greenland could build an actual industrial capacity to process the minerals found underground in the country. From an environmental perspective, this could be beneficial, since the raw materials would then be transported only in their processed state. In socioeconomic terms, industrial processing of raw materials would create more employment opportunities for Greenlanders, just as the economy would stand to gain.

It has been possible to build such derived industries in countries like Iceland. However, Rambøll considers that such industrial development in Greenland will only result from a well-consolidated mining industry, and that significant challenges will have to be confronted as regards geography, necessary infrastructure and labour market.

⁹⁴ Ingeniøren magazine, February 2013: "Iceland overvejer eksport af geotermisk energi til Europa" [Iceland ponders export of geothermic energy to Europe].
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