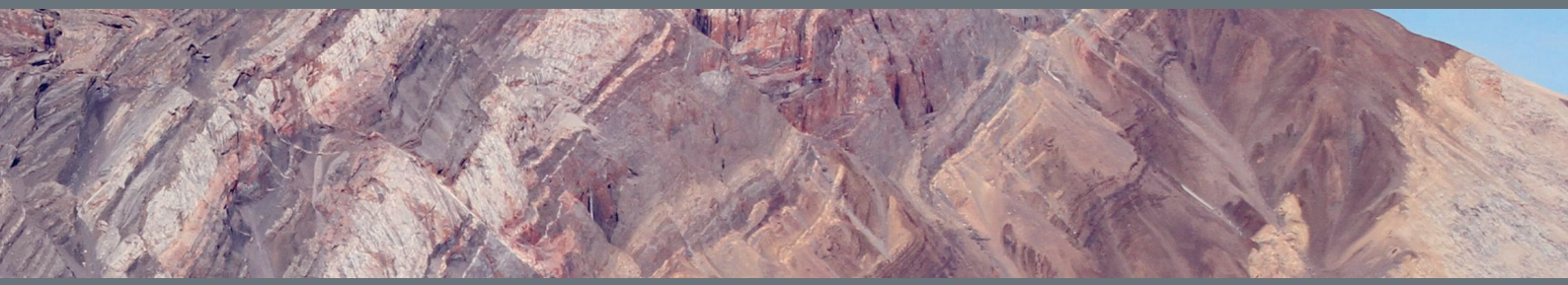
TO THE BENEFIT OF GREENLAND

The Committee for *Greenlandic Mineral Resources to the Benefit of Society*



ILISIMATUSARFIK
University of Greenland

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COPENHAGEN

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FOREWORD

"Throw the windows wide open and let clear vision and fresh air dispel the spectres that have fed on secrecy and unfounded rumours for too long."

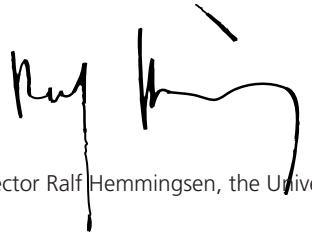
This was the challenge issued by Professor Minik Rosing and the then-Greenlandic premier, Kuupik Kleist, in a joint statement last year. Their task was to ensure more facts were included in the sometimes heated debate about the Kingdom of Denmark and its advantages and disadvantages for both Danes and Greenlanders. They also encouraged the university to devote its energy to this task. This makes sense; basing debates on facts is always better than relying on myths and hunches. And this is where the university's politically independent experts can play an important role by passing on information and studies that can lead to specific steps to resolve social challenges. Ilisimatusarfik (the University of Greenland) and the University of Copenhagen therefore decided it was time to set up a joint committee to focus on working on Greenland's natural resources, which were again in 2012 the subject of debate in both the Folketinget (the Danish parliament) and Inatsisartut (the Greenlandic parliament). The report does not take a stand on the issue of whether Greenland should be fully independent and therefore does not consider the future of the Kingdom of Denmark. Instead, it considers the challenges within the existing framework of the *Selvstyrelov* (Greenland Self-Rule Act) and the Kingdom of Denmark.

Considerable amounts of natural resources are expected to exist in Greenland. This has led to discussions on potential Greenlandic independence, the extent to which the natural resources involve a security policy aspect and whether Denmark should do more to "jump on the bandwagon". We were convinced that a university committee comprising a number of researchers with specific knowledge of natural resources and Greenlandic affairs was the best qualified team conceivable to task with providing an overview of Greenland's natural resources, their importance for the Kingdom of Denmark and not least how Greenland can make best use of the resources we know lie concealed in the ground in Greenland.

In their article, Rosing and Kleist wrote: "We must join forces to activate our knowledge. This will allow the cultural and human resources to have the greatest benefit for the Greenlandic population, and a wide spectrum of Greenland's natural resources can be used in a way that creates jobs and development. The aim of this would be to create a wider and more sustainable industrial base in both Greenland and Denmark, relieve the pressure on living resources and ensure the protection of Greenland's natural environment."

For almost a year now, the Committee has worked on this wide-ranging issue. The members have met with the stakeholders in the field of natural resources and have collected accessible information in areas as diverse as law, international experience, public participation, geology, economics, biology, Asia, political science and history. The outcome is a comprehensive survey of the challenges and opportunities natural resources present the people of Greenland. We hope that this report about the socially beneficial use of Greenland's natural resources will be a useful source of information for decision makers in Greenland and Denmark. In addition, we hope that it will contribute to broad, public discussion about a highly important issue affecting the future of Greenland and the Kingdom of Denmark.

Rector Tine Pars, Ilisimatusarfik



Rector Ralf Hemmingsen, the University of Copenhagen

STRUCTURE

This report is based on existing information and research about many subjects that are relevant when considering the use of natural resources, including geology, history and law. The aim has not been to create new research but to collect existing information in a range of fields in order to provide an overall view of the challenges related to this complicated issue, as well as potential solutions.

The report has been written by *the Committee for Greenlandic Mineral Resources to the Benefit of Society*. This Committee consists of 13 specialists in a range of fields and was set up in the spring of 2013 by the University of Copenhagen and Ilisimatusarfik[1]. The Committee's members have contributed to a number of background papers upon which this report is based[2]. When relevant, supplementary material has been included. The report comprises two main chapters: "Exploitation of Greenlandic natural resources for the benefit of society", which summarises the information collected in the background papers and "Focus areas", which lists a number of issues revealed by the Committee's work to be worthy of special attention as well as ideas generated by the Committee's work.

Exploitation of Greenlandic natural resources for the benefit of society

The conclusions of the Committee's work are summarised in this chapter, which describes the status, potentials, barriers and possible scenarios for Greenland in connection with a potential future that involves mining, quarrying and mineral extraction:

- The historical background for Greenland as we know it today
- The prognoses for Greenland's development, which has largely contributed to actualise the desire to extract the country's natural resources
- A description of the geological potential and the current status of mining and quarrying of natural resources in Greenland
- A description of the potentials and barriers for Greenland's use of natural resources
- Conclusions concerning the consequences of mining and quarrying natural resources in the area of security-policy and foreign affairs
- A review of five potential scenarios for Greenland's development
- A description of the commercial opportunities for the Kingdom of Denmark in connection with these scenarios

Focus areas

This chapter identifies a number of items that we believe deserve special attention. These items describe core areas that require a concerted political approach rather than comprising political recommendations. However, where possible we have indicated proposed solutions.

1. The University of Greenland.
2. See appendix 4 a-j for summaries of the most important points from the background papers and see appendix 3 a - c for more information on how the Committee has approached its task.

INTRODUCTION

In recent years, the debate in the Danish and Greenlandic media may have given the impression that the pursuit of Greenland's natural resources is currently developing along dramatic and rapid lines. It may have seemed that the discovery of minerals and oil in Greenland is a new phenomenon and that mining and quarrying can be a new sustainable industry that can secure more independence for Greenland. Never before has more column space, more air time, and more gigabytes been devoted to discussing how the assets buried in Greenland's underground should be managed.

In fact, mineral extraction has been conducted in Greenland since the 1840s, and drilling for oil began off the coast of Greenland in the 1970s. The concept of natural resources as the source of (greater) independence for Greenland was first conceived at about the time of the Second World War. In the 1960s, the legislation governing mining and the mining companies' scope for exemption from taxation and duties was the subject of discussion – and the companies' need for stable policies. In the 1970s, Greenland's underground resources have received renewed interest due to the energy crisis. For example, in 1975 the Danish newspaper Politiken wrote:

"The question of oil and mineral extraction will also be of interest during this coming parliamentary session. We will be treating the question of uranium extraction from Kvanefjeld, iron ore extraction in Godthaab Fjord and the drilling for and extraction of oil that is expected to be discovered off the shores of Western Greenland."

This excerpt could easily have been taken from a newspaper dated 2014. However, times have changed significantly since 1975. Greenland has had its first period of home rule followed by self-rule – and the administration of natural resources has been transferred from Copenhagen to Nuuk. That probably helps explain why the debate has recently heated up once more. If this results in a genuine natural-resource rush, it could change Greenlandic society. And then who wins? Who loses? And how will the natural resources be managed in the best possible way?

More factual debate

Although the subject of natural resources has been debated at length, confusion can still arise and more facts are required for informed debate. This report provides a factual overview and lists proposals for how the mineral natural resources can be used to benefit Greenland and Greenlanders as much as possible and thereby also benefit the Kingdom of Denmark as a whole.

The Committee also hopes the report will form the basis for a vital debate on what kind of society the population of Greenland desires in the coming decades within the frameworks specified by its natural resources, demography and global position. Although the natural mineral resources are expected to benefit society, and the environmental and social consequences of the mining operations and oil and gas production have been frequently debated, a serious discussion of the direction Greenland wishes to take in the future has not been given much free rein.

The report is intended to inspire broader debate. We would like to thank our many peer reviewers and all the stakeholders within the area of natural resources who met with us and helped to define the course of the Committee's work. The Committee has full responsibility for the scientific content of the report[3].

On behalf of the Committee

Minik Rosing

3. Gudmundur Alfredsson has wished to express a dissenting opinion, see appendix 4b.

The report seeks to shed light on how Greenland's natural resources can benefit the country's population (Photo: Minik Rosing)

EXPLOITATION OF GREENLANDIC NATURAL RESOURCES FOR THE BENEFIT OF SOCIETY

In this report we strive to explain and analyse a number of issues linked to natural-resource exploitation in Greenland. Our starting point is existing research, which is described in the report's background papers. The work is based on the existing framework conditions for exploitation of mineral resources in Greenland, as described in the Greenland Self-Rule Act. In this context, mineral resources include ores, oil and gas.

A historical journey towards self-rule

Greenland is a well regulated legal community closely related to the other Nordic countries. The Arctic region as a whole is well regulated with a high degree of transparency and agreement on the allocation of resources and responsibilities. All countries with territories in the region agree in the Ilulissat Declaration[4] to resolve disputes in accordance with international law.

Greenland is part of the Kingdom of Denmark, which includes Denmark, the Faroe Islands and Greenland. Greenland has been culturally, politically and economically linked to Denmark for 300 years. This relationship changed character when a decision by the International Court in The Hague in 1933 granted Denmark sovereignty over the entire island of Greenland, which, had seen the establishment of several Danish colonies, but also included uninhabited regions not formally affiliated with any country. This decision is the basis of the presence of a Greenlandic nation today. Greenland's colonial status was ended in 1953 by an amendment to the Danish Constitution. As Greenland became part of the Kingdom of Denmark with the status of a county, independent institutions were not established in Greenland. The UN General Assembly noted this change. It can be disputed whether this involved any real equality. Similarly, another subject discussed today is the amount of influence the inhabitants of Greenland themselves had on this decision. A long cherished desire in Greenland for greater political independence from Denmark was initiated with the introduction of Home Rule in 1979, and continued with the 2009 Greenland Self-Rule Act. The current political process in Greenland largely reflects implementation of the intentions behind the Act on Greenland Self-Rule Authority.

The 2009 Self-Rule Act granted Greenland the rights to manage all natural resources in Greenland and the economic zone off the coast of Greenland, including underground mineral resources. The people of Greenland are also recognised as a nation under international law and as a people have permanent sovereignty over the natural resources according to UN General Assembly Resolution 1803[5] . Greenland

4. Ilulissat Declaration: http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf.

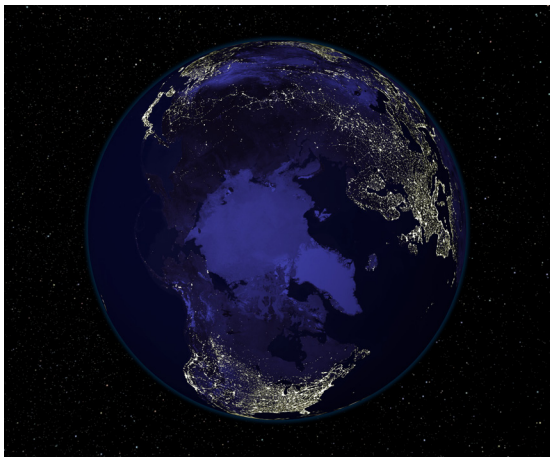
5. UN's audiovisual library of international law: http://legal.un.org/avl/ha/ga_1803/ga_1803.html. Downloaded in November 2013.

also has the right to self-determination, including the right to withdraw from the Kingdom if the Greenlandic population so desires as expressed in a referendum and subject to approval by Inatsisartut. This right is specified in the Greenland Self-Rule Act.

Resources are an opportunity for change – not for the status quo

Greenland's nature is not only beautiful, it provides a livelihood for a large part of the population. Human interaction with the sea and living resources is a core part of Greenlandic identity.

However, Greenlandic society is rapidly changing. Regardless of how the mineral resources are exploited, Greenland will experience major changes in the decades ahead. Some of these changes will occur as a result of internal developments such as political and cultural trends, migration and an increasing proportion of older people. Others will occur because the Arctic – and therefore Greenland – has higher priority on the global agenda, and because of the environmental impact of climate change.



Greenland is coming closer to centre of global politics (Photo: NASA)

The potential natural-resource projects require a delicate balancing act. Over the last century, Greenland has built up some experience in mining. If mineral resources are to become a key element of Greenland's economy, it will be on a completely different scale than anything previously seen. The transition to a mining economy will be as comprehensive as the change in Greenland during the transition from a hunting society to a fishing society in the middle of the last century.

Potential projects will all have both positive and negative effects on Greenland's nature and society.

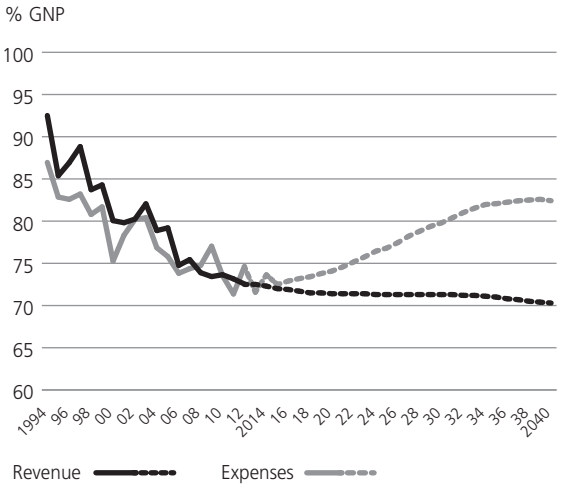


Figure 1: Forecast of the development in Greenland's economy. Source: Statistics Greenland and the Economic Council of Greenland

Regardless of how the projects are managed, and the level of income produced for the community, the increased mining activities will lead to major changes.

The main conclusion that can be drawn from the Committee's work is therefore that mineral resources provide an opportunity for change, not to preserve society as it is today. At the same time, the Committee's second major conclusion is that the development should not take place too rapidly. A large number of rapidly built mines will not necessarily benefit Greenland's economy in the long term.

Significant improvement in the government budget required

A balanced economy will require a significant improvement in the public sector budget, which will be an average of DKK 800 million over the next 25 years, or approximately 6% of Greenland's GDP. This improvement is needed to maintain the current level of public services.

Greenland therefore needs to determine the basic scope and speed of the conversion required, and then decide what kind of society should be established by exploiting mineral resources and the opportunities they can offer.

Economic decline ahead

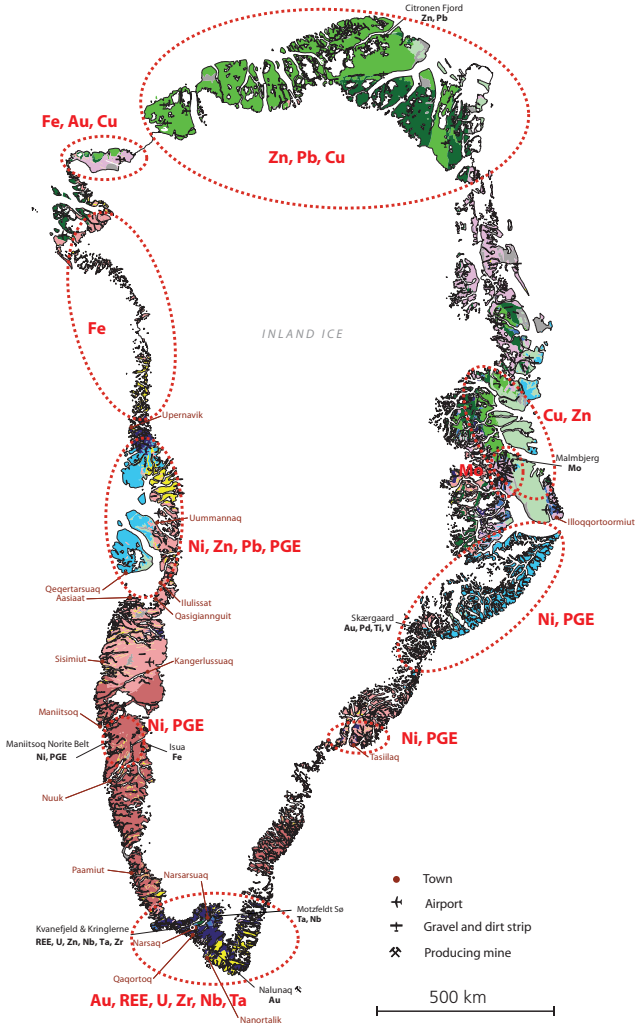
The government budget in Greenland is currently balanced. However, demographic changes that will see more elderly and fewer young people as well as

Cost of an independent economy: DKK 5 billion
An independent Greenlandic economy would, in addition to the DKK 800 million in increased annual costs in 2040, require DKK 3.6 billion a year to compensate for the block grant, DKK 800 million annually to fund public servies not yet transferred to Greenlandic responsibility, DKK 190 million annually to phase out subsidies from the EU and a further about DKK 456 million a year to carry out new tasks if Greenland decides to withdraw entirely from the Kingdom.

increased social spending, are expected to result in a large and growing deficit in the coming decades, as seen in the forecast shown in Figure 1.

According to the Economic Council of Greenland[6], fishing, which currently contributes approximately 90% of Greenland's exports[7], cannot be significantly increased.

6. The Economic Council of Greenland: Greenland's economy 2013, October 2013 http://naalakkersuisut.gl/~/media/Nanoq/Files/Attached%20Files/Finans/DK/Oekonomisk%20raad/Rapport%202013FINAL2%20GR%20ENG%203.pdf.
7. According to e.g. Copenhagen Economics' report on the economic footprint of fishing in Greenland (in Danish) October 2013. http://www.ga.gl/LinkClick.aspx?fileticket=HG%2F%2BIjJ2KKo%3D&tabid=36&language=da-DK.



Greenland – major deposits and prospective areas

- *Ilímaussaq intrusion Ta-Nb-Y-Zr-U-Th-REE deposits in South Greenland (alkaline complex)*
  - Kvanefjeld REE-U-Zn-F deposit: Greenland Minerals and Energy, Australia
  - Kringlerne REE-Zr-Nb-Ta: Tanbreez, Australia
- *Motzfeldt Nb-Ta deposit in South Greenland (alkaline ring complex)*
  - Ram Resources, Australia, Pre-resource stage
- *Citronen Fjord Zn-Pb deposit in North Greenland (SEDEX)*
  - Ironbark, Australia, Pre-feasibility stage
- *Skaergaard PGE-Au deposit in southern East Greenland (layered intrusion)*
  - Platina Resources Ltd., Australia, Pre-feasibility stage
- *Malmbjerg Mo deposit in central East Greenladn (porphyry intrusion)*
  - KGHM, Poland, Exploitation licence
- *ISUA Fe deposit in southern West Greenland (banded iron formation)*
  - London Mining, Exploitation licence.

Figure 2: The map shows the largest known mineral deposits in Greenland. As shown, Malmbjerg has an exploitation licence. London Mining has an exploitation licence for Isua. Kvanefjeld and Kringlerne are presumably in the process of being issued with a licence and Ironbark is expected to apply for a licence for Citronen Fjord in the near future. Source: GEUS

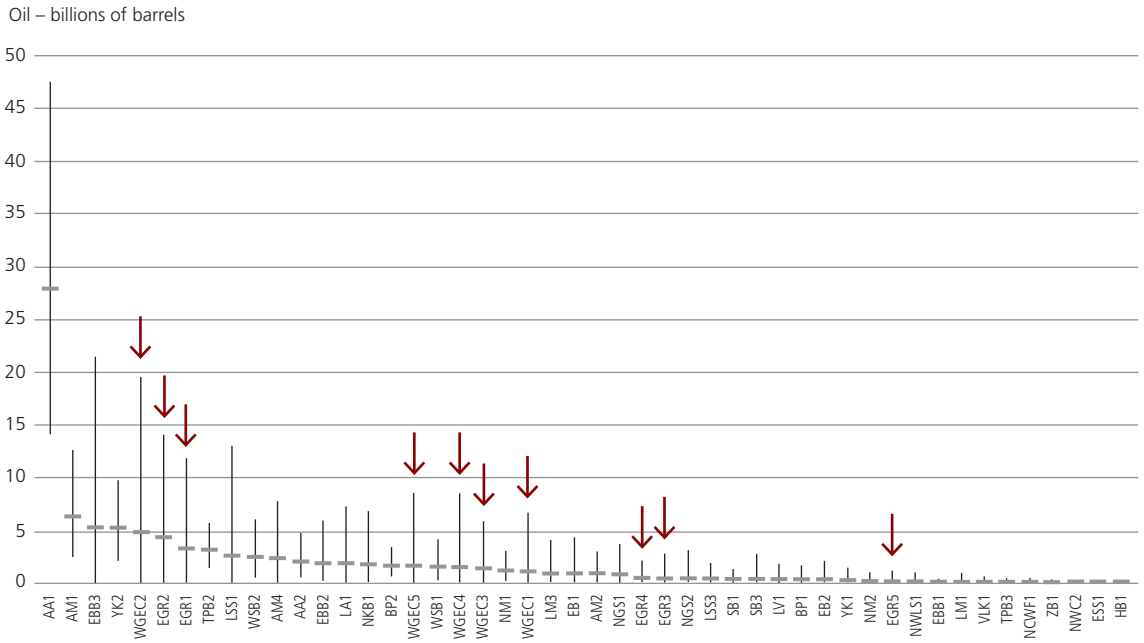


Figure 3: Source: Gautier et al. 2009. Estimated undiscovered oil resources in the Arctic region. The vertical lines show the span of estimated resources from a 5% to 95% level of probability. The vertical markers are average estimated oil resources for each individual region. The red arrows show the resources in West and East Greenland, respectively. WG = West Greenland, EG = East Greenland. Further documentation is available in the background paper "Den geologiske baggrund for Grønlands naturressourcer". The economical potential from oil is probably greater than from hard minerals, however uncertainty is rife concerning this and timeframes are lengthy.

The political agenda in Greenland has two economic signposts among its most important themes:

1) To ensure a balanced self-governed economy during the decades ahead and
2) To achieve a self-sufficient economy that is independent of subsidies from Denmark or other countries.

The need to increase Greenland's revenue and ensure continued welfare, as well as the political wish to create a self-sustaining economy, are drivers for Greenland's aspirations concerning the exploitation of mineral resources, including "hard minerals", or ores, and oil and gas.

A country with genuine potential

The Committee has established that Greenland has proven underground reserves of vast potential. Greenland contains a large number of known hard mineral deposits, and other potentially significant resources may also be present. The known deposits, described in Figure 2, are not yet being extracted or are on stand-by. Exploration activities themselves are currently a source of revenue for Greenlandic society.

We also note that even if estimates of the quantity and quality of ore in a geological deposit are well documented, it is difficult to translate this into economic potential and even more difficult to predict a specific revenue for Greenlandic society. This is due partly to the great uncertainty regarding natural-resource prices in the global market, the risk of changes in the global demand for natural resources, as well as the many unknown factors related to the practical difficulties associated with the extraction and transport of mineral resources.

If all goes well, the extraction of hard minerals could begin to contribute significantly to Greenland's economy within five to ten years.

It is estimated that Greenland's offshore oil and gas potential in West Greenland can be compared with the total Danish production and reserves from the North Sea, and the potential off the coast of East Greenland is somewhat larger. The total potential is significantly less than the potential of Alaska, Russia and Norway. There are major barriers such as the lack of technology for the production and distribution of oil and gas from potential fields in Greenland, and gas exploitation is not expected to be profitable for a very long time.

Potentially, production and export of oil could start within 20 to 50 years.

Figure 3 shows an assessment of the potential for oil discoveries in the Arctic. As shown, the level of uncertainty is very high. Though there is great potential, the actual amount of oil discovered could be non-existent.

A good basis for resource extraction

In recent decades, Greenland has built a government body to safeguard the Self-Rule Administration's mineral-resource interests, and to regulate the activities related to the exploration and exploitation of mineral resources in relation to the effects on society, impact on the environment and labour market conditions.

Similarly, Greenland's Directorate of Minerals and Petroleum/Bureau of Minerals and Petroleum (BMP), in collaboration with the Geological Survey of Denmark and Greenland (GEUS), has made great progress in attracting exploration and mining companies to Greenland.

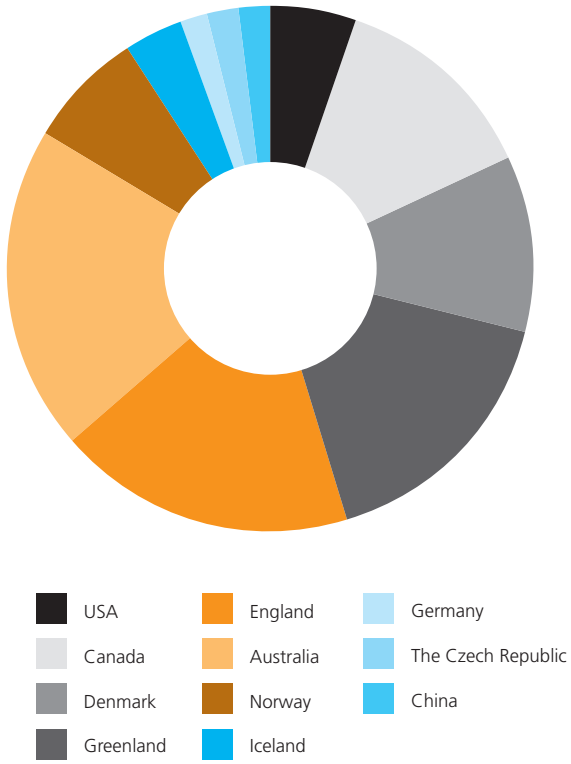


Figure 4: Distribution of exploration companies in Greenland 2013. Source: The Bureau of Minerals and Petroleum[8].

8. BMP, September 2013: http://www.bmp.gl/images/stories/minerals/adress_list/List_of_Licensees_and_Partners_as_of_September_1__2013.pdf. The companies' national affiliations are determined by where their offices are based.

Most companies conducting mineral exploration in Greenland are from Australia, Canada and Europe, each with roughly equal shares in the activities (Figure 4). Despite extensive publicity and news headlines proclaiming a "Chinese invasion", until 2013 no Asian companies held licences, and currently one Chinese company is carrying out mineral exploration.

Typically "junior companies" conduct initial mineral explorations. Any findings are then matured to actual mining by the junior companies themselves, or by larger operators who buy the projects. The nationality of the exploration companies reveals little about the ultimate source of the investment.

In most cases, the company that obtains a mining permit then has to raise significant capital to build and operate the mine. This occurs in the international capital markets where private, institutional and governmental investors can invest the necessary capital. In this way, state owned companies from other countries become principal stakeholders in mining projects in Greenland. It is therefore not possible at this time to definitively pinpoint the nationality of the economic interests in mineral exploration in Greenland.

Great potential with a range of challenges

The international mining industry considers Greenland to have a high potential in terms of both hard minerals and oil and gas, but also appreciates that there are major barriers preventing its potential from being fully unleashed.

Greenland is among the world's 15 most-attractive mining areas, according to the international mining industry. Greenland's size, geological structure and high level of basic geological and geophysical data are positive parameters, while the Arctic climate, lack of infrastructure and lack of local labour are considered negative factors.

The attraction value, compared with the global prices of natural resources, have seen major increases over the last decade, leading to more international interest in Greenland's mineral resources, expressed as a fourfold rise in the number of exploration licences from 2003 to 2013. Climate change, technological advances and geo-political factors have had a marginal impact on this increased interest.

Greenland's good track record in terms of government is also viewed as a benefit. The companies indicate that stability and predictability regarding the framework conditions for exploration and exploitation of mineral

From Fraser Institute's Survey of Mining Companies 2012/13. The proportion of the total of 742 mining companies that responded "encourages investment" or "not a deterrent to investment" to the questions below. Greenland is top on all parameters except infrastructure and supply of labour/skills.

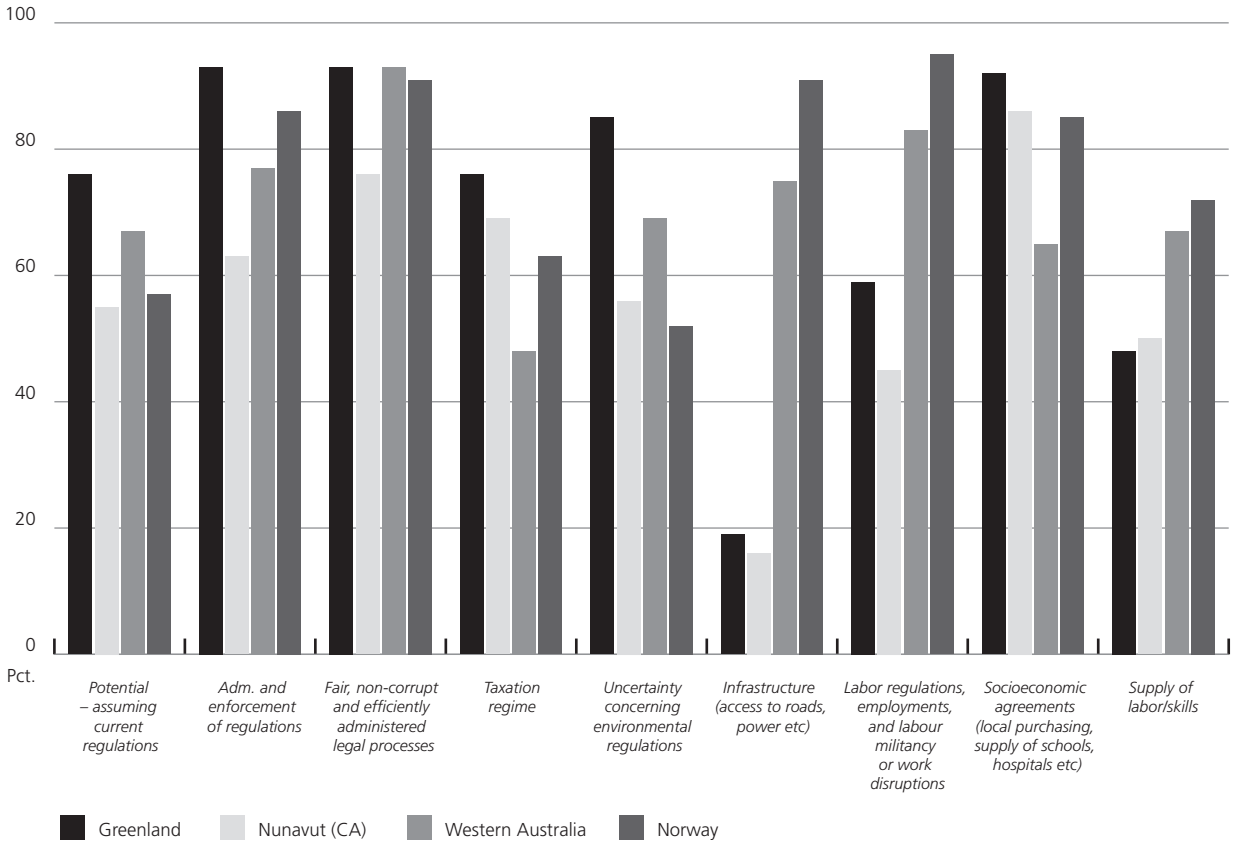


Figure 5: Excerpt from the Fraser Institute's annual survey of mining companies' assessments of the potential for natural resource extraction in a wide range of countries. The assessment of Nunavut (Canada), Australia and Norway's potentials are compared with Greenland using nine parameters. Greenland tops the list on all parameters except infrastructure and supply of labour/skills. Source: Fraser Institute 2012/13. The figure was prepared by the Committee.

Core samples taken near Isua (Photo: Minik Rosing)

resources are of great importance. After a period of great stability, the past year was marred by intense political debate on the framework for natural-resource extraction. The next Fraser survey is expected in spring 2014, so no studies are available showing how this situation has affected mining companies' assessment of the situation.

However, it may be noted that announcements about certain framework conditions have been delayed and that this has had consequences. For example, in 2012 it was announced that a special business zone north of 81° north latitude would be established. As of December 2013, the new terms had not yet been announced. This means that at the earliest, exploration activities are likely to resume in the summer of 2015, as the window for setting up logistics for the summer of 2014 is nearing its close. Conclusive negotiations over oil exploration licences in Northeast Greenland have also been postponed repeatedly.

The Fraser Institute's survey of mining companies' assessments of the potential for natural-resource extraction gives Greenland top marks for "Administration and enforcement of regulations" and "Fair, non-corrupt and efficiently administered legal processes" in the area of natural resources. Nevertheless, the Committee met frustration among exploration companies over long processing times and difficult communication between businesses and natural-resource authorities. These factors are not quantitatively documented, but have been a recurring theme.

It may be noted that a very large number of natural-resource management tasks is currently the responsibility of a relatively few employees in the Bureau of Minerals and Petroleum.

Transparency Greenland and other NGOs have criticised the lack of public participation. They are concerned that public hearings for specific projects are held too late in the process of issuing permits and that the public's access to information leading up the hearings is unsatisfactory.

FACTS about the Bureau of Minerals and Petroleum

On 1 January 2013, the Mineral Resource Authority was consists of the Bureau of Minerals and Petroleum (Råstofstyrelsen) and the Environment Agency for Mineral Resources Activities (Miljøstyrelsen for Råstofområdet). The BMP can draw on geological expertise and can order research services from the Geological Survey of Denmark and Greenland (GEUS). The BMP collaborates with the National Centre for Environment and Energy (DCE) and Greenland Institute of Natural Resources in order to ensure that the Mineral Resource Authority's assessment and findings concerning environmental factors and drafts are based on the decisions of one or more scientific and independent environmental institution[9]. The BMP is in responsible for natural resource management as well as for marketing Greenland's natural resources abroad. The BMP has a total of 27 employees divided among four departments and one secretariat.

Licences: Tasks such as administration of oil and mineral extraction permits in all project phases, contributions to marketing the mineral potential, planning of licence rounds and inspections of minor exploration activities and administration of small-scale permits.
Employees: 9 case officers

Engineering and Inspection: Tasks such as co-ordinating SIA and IBA processes and the economic supervision of oil and mineral activities, including control of royalties, quality, prices etc.
Employees: 4

Analysis and Control Functions: Tasks such as health, safety and environmental inspections and approval of staffing and organisation plans, secretariat for the Senior Civil Emergency Planning Committee (*beredskabskomitéen*)
Employees: 3

Geology: Tasks such as planning and approval of geological projects, geological interpretation of seismic data, contributions towards marketing mineral potential and supervision of exploration projects.
Employees: 6

Source: The Bureau of Minerals and Petroleum website[10], which contains a full list of tasks and staffing.

9. A description of the Environment Agency for Mineral Resources Activities is available here (downloaded in January 2014: http://naalakkersuisut.gl/en/Naalakkersuisut/Departments/Natur-og-Miljoe/Miljoestyrelsen-for-Raastofomraadet
10. Since the writing of this report, BMP has changed its name into The Mineral Licence and Safety Authority, MLSA. Organisational changes and changes in the number of people employed can have taken place as a consequence. In the report, the Committee refers to the structure of the BMP as it was up until the end of 2013.

The Committee's work has revealed that natural-resource and environmental legislation is well developed. However, there are currently no international comparative studies of the legislation.

Nevertheless, we can see that the management of natural resources and environmental legislation are not clearly and completely separate. This could mean that management of this area is not always transparent. At the same time, there are certain ambiguities regarding the interfaces of legal responsibilities between Denmark and Greenland. Similarly, we have found that the rules for environmental responsibility are not universally and entirely clear.

Security and foreign policy issues related to exploitation

Mineral resources are managed solely by the Self-Rule Authority. However, some issues relating to the extraction of mineral resources may still have foreign policy or security implications for the Kingdom, other members of the Kingdom or other countries. No clear line can be drawn between matters concerning purely Greenland's resources and matters that have such significant consequences for other parties that they should be involved in the decision-making processes involving extraction and exports.

A radioactive debate

The security and foreign policy implications of the extraction and export of uranium are a theme that has attracted particular attention in Denmark, Greenland and to some extent internationally. This is due to the lack of consensus about the extent of Greenland's self-determination rights when it comes to uranium extraction.

An important question relates to the division of competencies within the Kingdom if Greenland wishes to export uranium to other countries. The Kingdom, including Greenland, is bound by the Non Proliferation Treaty – NPT[11]), which is administered by the International Atomic Energy Agency (IAEA).

To the extent that the IAEA system implies that international, nuclear agreements must be concluded with the recipient country, this raises the question of Greenland's competence in the area of foreign policy.

Section 12 (1) of the Greenland Self-Rule Act states that on behalf of the Kingdom, Naalakkersuisut (Greenland's elected government) can negotiate and conclude international agreements that relate only to Greenland and fall within the areas overtaken by the Self-Rule Authority. Natural-resource administration is such a power. However, it follows from the Greenland Self-Rule Act section 12 (4), in conjunction with section 13, that agreements affecting defence and security policy are to be negotiated and concluded by the Danish government (with the involvement of Naalakkersuisut).

If agreements according to international law governing uranium exports are considered a security policy issue, it is a matter for the Kingdom, while it is purely a matter for Greenland if the uranium is treated as any other mineral natural resource that Greenland can extract in accordance with the Mineral Resources Act. Currently, as Greenland and Denmark have not reached reached a common understanding as to how this assessment should be made in general, the problem is resolved pragmatically on the basis of step-by-step agreements.

The actual uranium potential

While discussing the controversial uranium issue, it is also important to discuss the actual uranium potential in Greenland.

With the current plans for the extraction, the potential for uranium production from the Kvanefjeld deposit, which is the most advanced uranium project in Greenland, corresponds to less than 2% of the global annual uranium production. Despite the debate, there is therefore no immediate prospect that Greenland will become a significant uranium exporter for the foreseeable future. It is also worth noting that neither uranium nor rare earth metals – despite the name – are particularly rare resources. They are relatively common, and therefore the deposits in Greenland cannot be considered strategic resources for countries such as China or the United States, which have access to the resources they need. Therefore, any extraction activities would compete against many other deposits of these resources in the world.

Finally, it should be emphasised that the extraction of uranium, like the extraction of all other natural resources, has a number of environmental impacts. These consequences are not caused primarily by uranium being radioactive, but by the unavoidable impact of mining, as with the extraction of many other mineral resources.

Security involves more than uranium

Other issues with international implications could involve drilling for oil near Canada and possible

11. UNODA website: http://www.un.org/disarmament/WMD/Nuclear/NPT.shtml (downloaded in November 2013)

transport through Canadian waters or ice-breaking in the Arctic Ocean to deliver supplies to mining operations and export ore from North Greenland – all of which could have global environmental consequences.

Finally, it should be mentioned that China's possible interest in Greenland's resources has been debated in terms of whether it should be interpreted in a security policy perspective. However, the Committee's work revealed no indications that China's interests are of other than purely commercial (and research) nature.

Generally speaking, from a geo-political perspective, the information collected by the Committee shows that, in and of themselves, Greenland's natural resources are not a strategic concern.

SCENARIOS FOR GREENLAND'S FUTURE

Greenland must make a number of fundamental choices. These choices will shape Greenlandic society for years to come and will define it and the relationships Greenland has with the rest of the Kingdom. These choices must be made if Greenlandic society is to be sustainable in the long term.

Because these choices are so fundamental, they are political in the sense that they are based on economic interests, cultural norms, ideological attitudes, etc, and the choices that can and should be made may be perceived differently. However, it is far from obvious which choice is "right".

Greenland can choose from a range of different paths, and it is impossible to know exactly where these paths lead. Having said that, we can predict largely where Greenland's current course is likely to lead, and we can explain how this course can be adjusted in order to achieve the most beneficial impact for Greenlandic society.

Our mission is primarily to describe these choices and their consequences, and we have laid out five scenarios that describe them. In all these scenarios, we assumed that Greenland maintains its strong fishing industry, with a yield for society that is at least equivalent to the current yield.

In the first four models, it is assumed that the provisions of the Greenland Self-Rule Act concerning the size and regulation of the block grant are maintained. It is considered highly probable that Danish policy will support this in the scenario's lifecycle. It requires, of course, that Denmark and Greenland agree that the Kingdom should remain intact and based on mutual respect and mutual interest in further developing the Kingdom on the basis of the existing systems of self-rule. The fifth model features the more rapid phasing out of the block grant if a process is adopted that favours dissolving the Kingdom of Denmark.

The scenarios we have depicted are not forecasts of how Greenland's economy will develop in the future. They are intended to show the likely economic consequences of the different policy choices Greenland can make and which are essential for the country's future. The scenarios also touch on some of the many other important choices that will result from these decisions – such as choices regarding future economic frameworks, housing patterns, etc.

SCENARIO 1: STATUS QUO

This scenario is a projection of the current situation as it will evolve if no major mineral projects are started and no adjustments are made to the economic policy. Greenland will maintain its current commercial and settlement structure and adjust its expenditure to suit an unchanged basic income from fishing and other existing commercial activities.

As described in the section on the economy, by 2040 this will lead to a substantial increase in public spending and shrinking public revenues, due partly to a growing proportion of older people outside the labour market, and increased net migration (Figure 6).

A balanced economy will be difficult to achieve, and a combination of sharply increased taxes and cuts in public services will be necessary in any case.

Today, Greenland has a large public sector and consequently such a scenario will also result in increased unemployment. An even greater exodus could thus be caused by a status quo scenario. Even today, more than a fifth of all Greenlanders live outside Greenland. Four out of five Greenlanders in Denmark also manage well economically and socially, which could potentially help to reinforce the desire to live outside Greenland in a scenario with slow economic development and reduced welfare benefits.

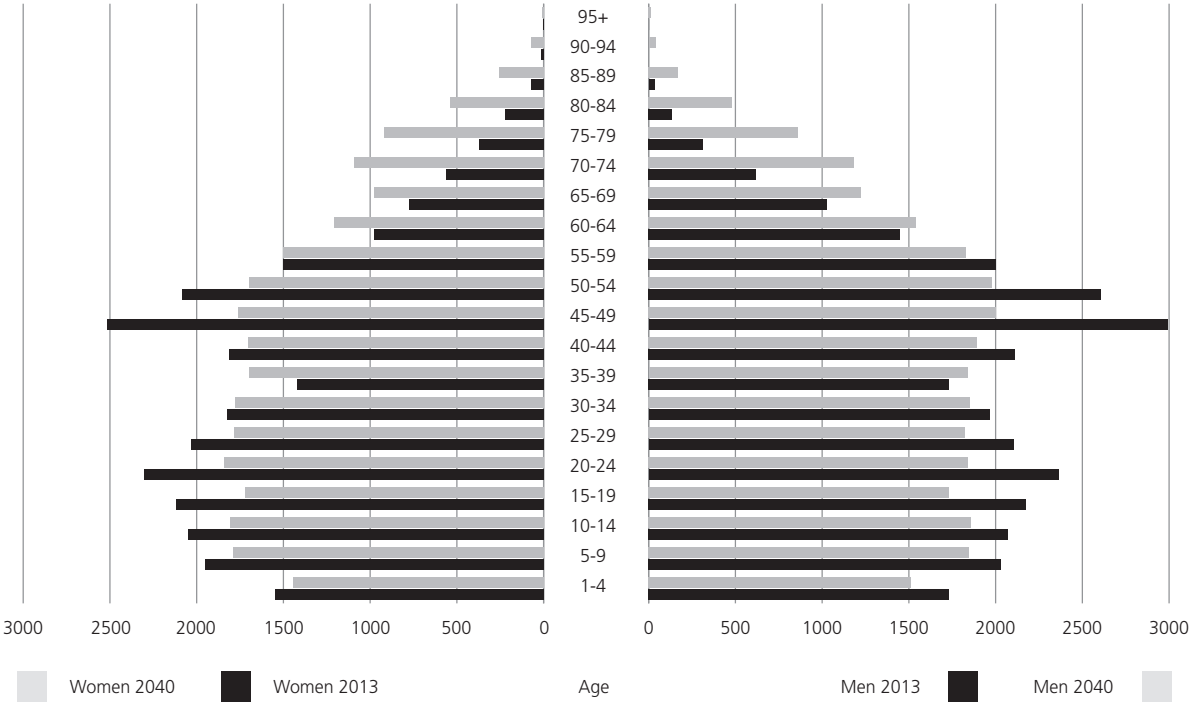


Figure 6: Prognosis for the development in the composition of the population of Greenland by 2040. Source: The Economic Council of Greenland.

SCENARIO 2: GREENLAND BECOMES A NATURAL-RESOURCE EXPORTER

Greenland chooses to base its future on economic growth from natural-resource extraction.

In such a scenario, Greenland will develop a mining industry to the scope allowed by its mineral deposits and at the pace permitted by the international market.

The revenue objective is to cover a projected deficit that will increase over time to DKK 1.5 billion annually in 2034, corresponding to an average of about DKK 800 million per year until 2040. This is the revenue required to close the gap that would otherwise exist between

The Greenland Self-Rule Act

Sec. 7. Revenue from mineral resource activities in Greenland shall accrue to the Self-Rule Authority. The revenue referred to in subsection (1) shall include the following revenue:

1) Revenue in accordance with specific licenses for prospecting for, exploration for, or the exploitation of mineral resources. This shall not, however, include amounts paid to cover expenditure under the auspices of the Bureau of Minerals and Petroleum.

2) Revenue from any taxation in Denmark and Greenland of licence holders with respect to the part of the business that relates to mineral resources in Greenland.

3) Revenue from Greenland and Danish public authorities' stakes in companies, etc. that operate in the mineral resource area in Greenland.

4) Revenue from withholding tax, etc. in Denmark and Greenland concerning shareholders in companies that are licence holders, or in companies that entirely own such companies directly or indirectly and can receive tax-free dividend from these.

Sec. 8. If revenue from mineral resource activities in Greenland accrues to the Self-Rule Authority, cf. section 7, the Government's subsidy to the Self-Rule Authority shall be reduced by an amount corresponding to half the revenue that, in the year concerned, exceeds DKK 75 million.

(2) With effect from 1 January the year after the commencement of the Act, the amount of DKK 75 million referred to in subsection (1) shall be adjusted annually in accordance with the increase in the general price and wage index of the Finance and Appropriation Act for the year concerned.

(3) Calculation pursuant to subsection (1) shall take place the subsequent year with a view to payment the following year.

Greenland's revenue, including the block grants from Denmark, and the costs incurred by Greenland to maintain Greenlandic society at the current level.

Based on the available information about the mineral deposits, initially the most realistic scenario would be to extract hard minerals, with projects such as Isua, Kvanefjeld and Kringlerne among the largest and most advanced[12].

Revenues from hard minerals would consist of taxes and duties on resource production and exports shared with Denmark and on personal taxes (which accrue only to Greenland) from the labour employed in the mining industry itself as well as taxes from secondary commercial sources involving subcontractors of goods and services for industry.

The proportion of revenue derived directly from resource production is divided between Denmark and Greenland after a deduction of DKK 75 million per year, which Greenland receives in full. However, a large proportion of Greenland's revenue would come from personal taxes in connection with the extraction and value creation in the businesses servicing the natural-resource exploitation. This would result in a modest reduction of Denmark's block grant to Greenland, even with multiple concurrent large-scale mining projects.

Definition of "large scale"
In the Greenlandic "Large Scale Act" large-scale projects are defined as projects with construction costs of more than DKK 5 billion. Currently, only the Isua and Kvanefjeld projects fall into this category.

We assume in this scenario that it will be possible to open a new large-scale project every other year, and that this can begin as soon as possible, i.e. starting in 2017[13].

We expect large-scale mines to have a typical lifecycle of 10 years and to typically provide revenue of DKK 700 million a year. Of these, DKK 300 million a year will be direct revenue from corporate taxes and royalties and DKK 400 million a year will be indirect revenues from income taxes. Half of the direct income (minus DKK 75 million in basic allowance) will go to Denmark. In other words, DKK 112.5 million from the first project will go

12. See list of potential large-scale projects and their estimated revenue for Greenlandic society in appendix 2.

13. Assuming the Isua projects receives funding in 2014 and the construction is completed in 3 years as scheduled.

On the assessment of socio-economical returns from mining projects
It is extremely difficult to accurately predict the return Greenlandic society will receive, even from specific and very advanced mining projects. We have therefore used generalised returns in our model scenarios. The finances of the modeled large-scale projects are assumed to consist of direct revenues of DKK 300 million a year from corporate taxes and royalties and DKK 400 million a year from income taxes from the mining activities and effects derived from services. The choice of model parameters is based on data from the companies that have very advanced projects and the general experience that indirect revenue exceeds the direct revenue from royalties and corporate taxes. The choice of these model parameters does not indicate that the Committee has assessed and validated this revenue, but they have been chosen to illustrate the consequences of different policy choices within a realistic framework.

As a general rule, it is estimated that a mining project should provide about 50% profit in relation to turnover. A mining project with an annual turnover of DKK 1.5 billion will therefore have operating costs of DKK 750 million and profit of DKK 750 million per year. The direct revenue from taxation of the profits will be 37% of DKK 750 million per year, i.e. DKK 277 million per year. Typically, the operating cost are divided up as 70% for consumer goods such as energy, chemical reagents, spare parts and transport and 30% for labour. It will therefore be possible to deduct personal taxes on income amounting to DKK 225 million, approximately DKK 100 million, per year. The provision of transport services, energy, catering, etc will to some extent provide revenue for the Greenlandic companies and their employees, thus giving secondary tax effects. In connection with the development of mines, there will be personal taxation in both the construction phase and winding up phase, just as prospecting and exploration also generate tax revenue for society. In the models, all these contributions are collected under the item 'tax revenue', which is set at DKK 400 million per year. This is a fair estimate, but does not mean the Committee believes the specific projects will produce this precise amount.

towards reducing the block grant and DKK 150 million from each subsequent project.

In this scenario, 24 concurrent large-scale mining projects would be required to zero out the block grant.

Mines: A quick fix but no long-term solution
The calculations for this scenario show that if everything goes according to plan, Greenland could cover the expected deficit in public finances solely via resource revenue from as early as 2017. However, as each mine has a limited lifecycle, the revenues from the mining industry will increase only until 2027. This will be followed by a constant annual income of about DKK 2.8 billion per year. This revenue will be maintained for a limited number of years only, for as long as major new deposits are found that can be developed into a large-scale mine every other year.

In this hypothetical example, we have assumed that this is possible for the entire period up to 2040, and we have assumed that no real economic reforms are implemented.

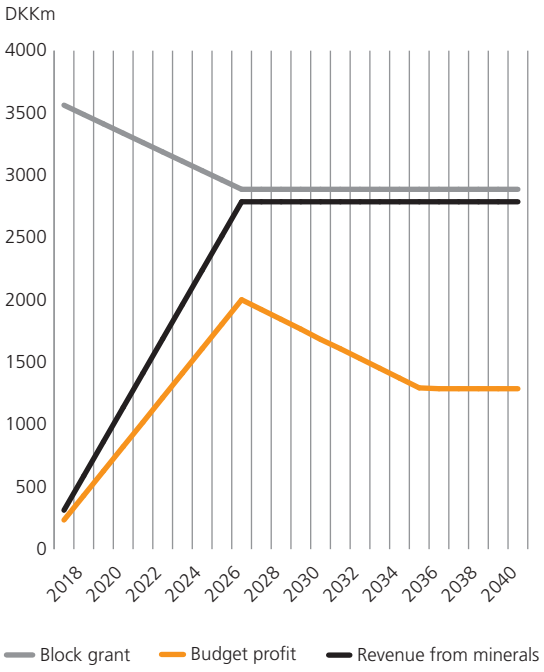


Figure 7: The development of revenue from mineral resources (black curve), profit from the public budget (orange curve) and block grant (grey curve), according to scenario 2. Economic development based on a new large-scale project being started every other year so that after ten years five projects would be running concurrently. Each project contributes DKK 700 million per year.

Unrealistically large number of deposits required
This scenario requires the construction of a very comprehensive mining industry.

A new large-scale project would have to be developed and launched every other year. This scenario cannot be implemented solely on the basis of known deposits. Since it takes a long time to find and develop new deposits, there is a great risk that revenues would vary significantly from year to year, and that they would not reach the level predicted by the model. There is a high risk that revenue will begin to decrease as the "low hanging fruit" is harvested.

With the scenario described, a balanced economy in Greenland could be achieved in the relatively short term. However, this resource-based economy is not sustainable. When a given mine is exhausted, Greenland will have lost a resource. This could be described as borrowing money from future generations, and Greenland will have lost some of its assets. When, after some years, the mining industry begins to decline the country will be left with the same budgetary challenges as before the mining industry developed, yet will have fewer resources.

As shown in Figure 7, the block grant is reduced to about DKK 2.8 billion per year through the distribution of revenue that is specified in the Self-Rule Act. If Greenland chooses to pursue a policy objective of eliminating subsidies and overtaking responsibility for more areas currently held by Denmark, the budget surplus could be invested in meeting this objective.

In this scenario, the block grant could be reduced to about DKK 1.6 billion per year if no new areas were taken over by the Self-Rule Authority, and to DKK 2.4 billion per year if all areas currently held by Denmark were taken over, but shared Kingdom functions were still be handled by the Kingdom.

Labour needs could lead to immigration surge
The labour required for building new mines and operating existing mines would increase from 3,000 in 2016 to a stable level in 2027, when five large-scale mines would be in operation concurrently, three would be under construction and three would be being phased out. With a stable demand for labour in the mines, which for the most part will be fly-in/fly-out jobs, lawmakers would need to decide whether it would be expedient to support adding a workforce of approximately 10,000 people and possibly their families to the resident population.

It should be decided whether these should be integrated into the existing cities, or whether a "Hong-Kong model" of economically, financially, culturally and politically isolated zones or fly-in/fly-out labour residents outside Greenland should be adopted. These decisions would have financial, cultural and demographic consequences that should be analysed in more detail as the basis for urgent political debate.

Consequences for Denmark

This scenario provides Denmark with direct savings of DKK 712 million through the reduction of the block grant pursuant to the Greenland Self-Rule Act. If Greenland's proceeds were used to further reduce the block grant and allow the Self-Rule Authority to take over responsibility for more areas of public administration, these savings could increase to about DKK 2 billion a year.

Greenland has legislation concerning a natural resource wealth fund (Råstoffond)

Greenland's Mineral Resources Act was passed in 2008. The Act will come into force on the day on which the Treasury receives revenue from natural resources of at least DKK 5 million in a single year. This has not yet been the case.

In 2013, an amendment was proposed that would permit the immediate use of a large part of the revenue from natural resources rather than saving it in a natural resources fund. Regarding the date on which it comes into effect, the proposal will mean that the natural resource wealth fund will come into force when revenue exceeds DKK 10 million for two consecutive years. The proposal is in consultation until January 2014.

SCENARIO 3: RESOURCE VALUE IS OPTIMISED THROUGH A WEALTH FUND

In this scenario, the conditions are the same as in the previous scenario. However, instead of immediately spending the revenues from resource extraction, the profit from both direct and indirect revenues is placed in a natural resource wealth fund after the deficit in public finances is covered.

This is justified by the fact that mineral resources are non-renewable resources, and that the sale of these constitutes a drain on Greenland's national wealth. If

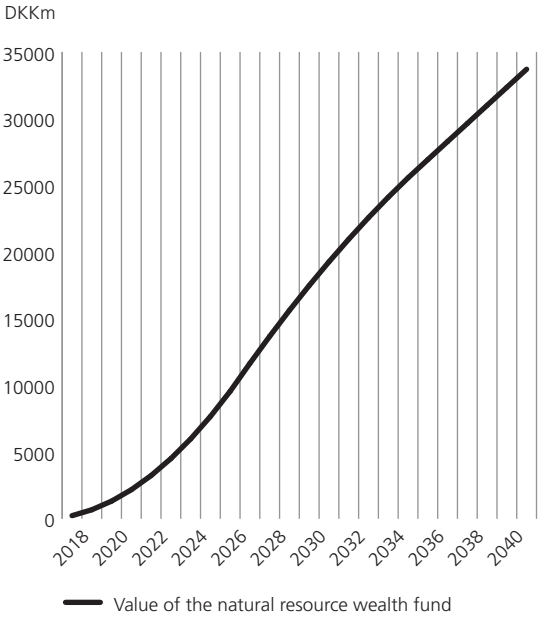


Figure 8: Development in the natural resource wealth fund with the launch of a new large-scale project every other year, so that after ten years there would be five concurrent projects. Each project would be contributing DKK 700 million per year. The defecit in the public budget would be covered, and the remainder placed in a natural resource wealth fund. The fund's yield would be paid into the fund on a continuous basis. By 2037, the budget deficit would be eliminated, and Greenland's economy would be stable.

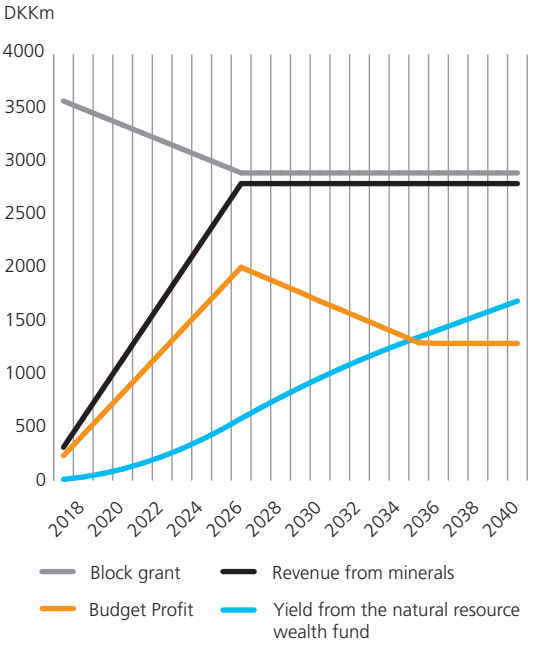


Figure 9: Economic development with the launch of a new large-scale project every other year, so that after ten years there would be five concurrent projects. Each project would be contributing DKK 700 million per year. The deficit in the public budget would be covered, and the remainder placed in a natural resources fund. From 2027, the block grant would stabilise at about DKK 2.8 billion per year. There is no economic scope for phasing out the block grant but it would be possible for the Self-Rule Authority to take over new areas.

the revenue is used to cover current expenditure, society will be removing value from future generations. The entire income from resources should be placed in the fund, but with this scenario, we assume that political leaders have deemed that economic reforms that limit expenditure cannot or should not be implemented and that it is not acceptable to build up debt in parallel with constructing the fund. The portion of income set aside in a fund should be preserved for future generations, and the yield on interest of about 5 % may be used every year into the future.

A natural resource wealth fund could be used to make long-term strategic investments in infrastructure, to diversify the economy and to raise the general educational level. This fund would also allow for direct Greenland co-ownership of oil production equivalent to Statoil's role in Norway today, provided this receives political backing.

If Greenland chooses to form a natural resource wealth fund, it must succeed in accumulating in the region of DKK 30 billion over the next two decades to balance the government budget, as projected in the forecast by the Economic Council of Greenland. The deficit in 2034 is projected to be DKK 1.5 billion, which the return on interest on the DKK 30 billion in the fund can cover at a real rate of return from the fund of 5%.

Society would probably have to pay increased costs due to natural-resource activities. These increased costs are not included in the calculations. Similarly, the scenario contains no real economic reforms.

This scenario provides the opportunity to bring lasting balance to Greenland's economy by 2037, but not for phasing out the block grant. It would also allow for balanced finances for the government of Greenland from 2017 and would ensure a stable, balanced economy that is independent of new mineral discoveries after 2037. However, the model assumes that an extensive mining industry is rapidly built up.

It is highly probable that the mining industry in Greenland cannot be developed as rapidly as the model requires. However, this strategy cannot be implemented solely with the known mineral deposits.

The demographic consequences would correspond to those described in scenario 2.

SCENARIO 4: MULTI-PRONGED STRATEGY

This scenario creates a stable economy and harmonious societal development without dramatic changes in the composition of the population. It includes a controlled structure for the mining industry, economic reforms and diversification of the economy with massive capacity-building and development of knowledge-intensive industries.

The controlled build-up of the mineral industry is intended to mean that to the extent possible, the industry is expanded as local competence for performing job functions in industry develop, preferably in functions that require high-level skills. Such a strategy would also help to prevent Greenland's economy from overheating. This scenario also requires the establishment of a natural resource wealth fund.

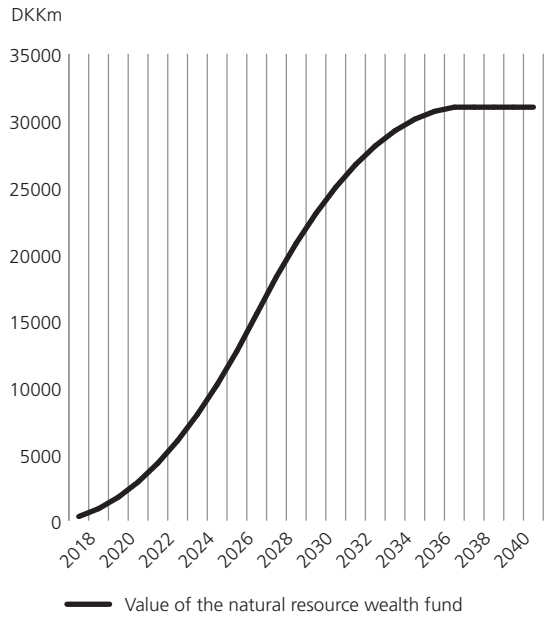


Figure 10: Development in fund capital if all the revenue from all five large-scale projects begun in the course of 20 years is placed in the fund. Each project would contribute DKK 700 million a year. The yield from the fund would be used to reduce the deficit in public finances.

Mining zones and limited number of projects

The scenario includes special zones where society actively wants to promote mineral-resources extraction with consideration for local businesses and regional development, and other zones where mineral projects are not desirable in order to protect the environment, social well-being, existing businesses, demographics, etc.

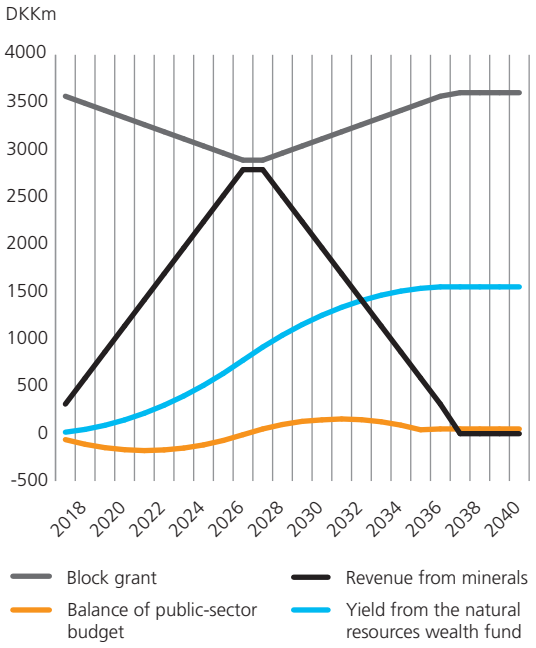


Figure 11: Economic development if all the revenue from all five large-scale projects implemented in the course of 20 years is placed in the fund. Each project would contribute DKK 700 million a year. The yield from the fund would be used to reduce the deficit in public finances. In the course of 10 years, the revenue and expenses would balance. Greenland could consider asking Denmark whether the payments to reduce the block grant could be postponed during this period and thereby avoid increasing the debt. This debt could be paid off using the profit from the finances after 2027.

The scenario involves focusing over time on setting up about five large resource projects. The projects would be located outside zones of special natural and cultural value, and all revenue from the natural resources industry would be placed in a natural resource wealth fund. Introducing special zones would also make it easier for Greenland to capitalise on its status as a pristine country of vast wilderness areas and thus attract other types of businesses and organisations that could provide the country with revenue.

Natural resource deposits in zones of special natural and cultural value would thus also constitute value if they remain unused. Greenland's untouched nature is a resource and global demand for nature conservation and ecosystem services is expected to grow. Greenland may seek to capitalise on these values through international agreements, EU agreements, the Kingdom of Denmark or private philanthropic organisations. This could be done by establishing geoparks, which are appointed by international panels as world heritage sites, and may be financed through international agreements that offset the revenue lost by society while preserving untouched nature. A focus on strict management of marine resources and the creation of protected areas could strengthen sustainable use of living resources in areas that are not designated as national parks.

Greenland seeks to attract international organisations and knowledge-intensive industries and uses its still

Dividing Greenland into zones could help it preserve its natural environment (Photo: Minik Rosing)

unspoiled nature, high level of public service and political and social stability as assets when seeking to attract highly skilled workers.

Mining is developed only where it can support the diversification of business opportunities for the resident Greenlandic population, and in areas where it is estimated in advance that the environmental and negative social impacts are clearly outweighed by the positive economic and social benefits.

This means that small and medium-scale projects are favoured in urban areas, and large-scale projects would be developed only in certain isolated areas where special natural values are not jeopardised and city or village communities are not negatively affected. A limited amount of large-scale mining projects are accepted. Small-scale projects, which can create jobs for the permanent residents of the existing cities, are encouraged.

In this scenario, the strategy in the natural-resource industry is based on a realistic assessment of the immediately available options, and is based on the assumption that mineral resources would be exploited for a limited period. The primary objective of the natural-resource projects is to extend the range of the Greenlandic business community and to establish a natural resource wealth fund.

Through the return it generates, the fund could compensate for the specific costs Greenland incurs as a result of the geographical situation by focusing on exploiting the deposits that have a high income and low social and environmental impacts. The private mineral exploration and mining industry would ensure fair terms through known and documented zone legislation, as well as through support for infrastructure construction.

If all revenues from five successful large-scale projects are placed in a natural resource wealth fund, the yield from the fund could be used to balance the Greenlandic economy starting in 2027 and provide opportunities for strategic investments to diversify the economy and strengthen capacity and infrastructure. By 2027, the annual budget deficit would remain below DKK 200 million. This deficit could be reduced through economic reforms or by establishing new industries or covered by loans that could be repaid through profits after 2027.

This could be achieved through an agreement with Denmark to postpone reducing the block grant until there is a surplus on public finances. It should be noted that this scenario requires that the first large-scale project is ready for production in 2017 and that it is possible to launch a total of five projects during a decade and that the economic conditions for all projects hold true. There is a real risk that the development of a mining industry would take longer than outlined in the model and that the return to Greenlandic society be less than modelled.

SCENARIO 5: INDEPENDENCE – THE GREENLANDIC DILEMMA

An independent self-sustaining Greenlandic economy based on mineral resources contains an intrinsic dilemma. Extracting sufficient mineral resources to Greenland's independence within 20 to 30 years would require such extensive foreign investment and massive inflow of foreign labour that there is a real risk that the current Greenlandic population would become a minority in Greenland.

If an extensive mining industry rapidly builds up in Greenland, the local capacity building will be unable to keep pace with the expanded industry. There is therefore a high risk that the current population will be kept in their current typically lower-paid jobs while a new class of better-paid foreign workers is established. This could lead to increased impoverishment of the present Greenlandic population. Similarly, mining of this magnitude would radically change the entire structure of Greenlandic society, contributing to impaired access to major wilderness areas and thus hindering the development of other industries. In certain areas, the basis for cultural activities deemed to be Greenland's core domestic values, such as hunting, fishing, berry picking and general outdoor activities, would also be impaired. On the positive side, there would be increased access to newly built infrastructure such as ports, airfields or hydropower plants that could improve other aspects of Greenlandic society.

Potentially, exploiting mineral resources could be an important aspect of building a nation with a self-sufficient economy in the geographical Greenland. However, this will not necessarily lead to greater independence for the Greenlandic population, as it is defined today.

The result could be the rapid decay of the Greenlandic culture, language and political control, as seen in other Inuit regions that have opened their doors to many newcomers and the rapid expansion of economies based on natural resources.

In a scenario involving independence, it may be necessary to take another approach rather than following scenarios based solely on the extraction of natural resources in order to generate sufficient economic but also demographic resources to achieve this. Based on the information currently available, a scenario of independence can very well lead to a massive decline in living standards in Greenland and requires extensive economic reforms with major consequences for the financial situation of the average resident.

NECESSARY CHOICES

As shown above, the effect of mining on Greenland's socio-economic situation will depend on some political choices that must be made in Greenland.

If the revenue from mining is used to fund spending on social services, mining will have a major impact in the short-term but in the long term will reduce Greenland's national wealth, shrink its industrial base and raise the deficit in public budgets when the most easily accessible mineral deposits have been exhausted.

If it is accepted that it is only economically sustainable to use interest return of about 5% of total revenue as direct input for the annual budget, the revenue from mineral resources could stabilise Greenland's economy in the long term, but is unlikely to support a sustainable economy within the next 25 years.

The aim of preserving the value of national resources means that the values created by the sustainable exploitation of living resources have about 20 times greater direct financial impact, given that all the revenue can be used in the year in which it was created. This is one of several arguments in favour of environmental regulation of natural-resource exploitation as a way to ensure that there is no long-term loss of living resource habitat, as a loss of renewable living resources can only rarely be compensated financially by mining revenue. Environmental regulation can be coupled with the introduction of zones to support this goal.

Greenland will be hard pressed to achieve financial balance solely with fishing at the current levels, the block grant and mineral extraction, and it must be considered highly unlikely that a sustainable economy can be created without the need for subsidies over the next 25 years.

None of the scenarios explained allow for significant reductions in the block grant, but economic stability will benefit substantially if the extraction of mineral resources and the establishment of a natural resource wealth fund are commenced quickly.

It is also clear that scenarios 2 and 3, in which Greenland relies on mining to create a stable economy, cannot be considered realistic, based on the number of known deposits. Even the more moderate development of a mining industry described in scenario 4 would require both a concerted effort and a combination of fortunate circumstances.

BUSINESS OPPORTUNITIES WITHIN THE KINGDOM

In a situation in which Greenland chooses to develop mining to a greater or lesser extent, the experience of other countries shows that particularly the operational phase includes occupational opportunities for local workers, for example.

This applies both to direct employment in the mining industry and jobs with subcontractors within service, logistics, catering etc. In connection with the IBA agreements, great efforts have been made to ensure that mining companies are aware of using local labour. Experience from Norway and elsewhere has also shown that unless the government requires it, there can be a detrimental impact on companies' willingness to safeguard local employment.

However, during the construction phase it appears that small subcontractors, which Greenlandic companies usually are, experience difficulty bidding for jobs. In this respect, it would be an advantage for the Greenlandic companies to establish partnerships with major foreign companies and possibly join clusters with other companies in Greenland.

Trade
Denmark is Greenland's main trading partner, with about 2/3 of both imports and exports. Japan and China are the second most important export markets, while the second largest import market is Sweden. Trade in services between Denmark and Greenland is also extensive. Net revenue for Denmark from this trade totals several hundred million Danish kroner a year.

Part of the Committee's task has been to assess the potential business opportunities for Denmark in connection with natural-resource projects. It is estimated that there will be a market for Danish companies in relation to constructing mines, ports and roads, as well as in capacity building and investment.

It is important to bear in mind that most of the potential mining activity involves general industry and is not specifically related to mines. Consequently, Danish companies will be very well placed to bid when the projects start. It is also important to remember that the opportunities for Danish companies (and others) cannot be seen in isolation from the Greenlandic companies,

Nanortalik (Photo: Minik Rosing)

as a presence in Greenland will require local alliance partners. Partnerships would therefore naturally be beneficial for both the companies from Greenland and elsewhere.

Creating clusters is a prime example of proactively preparing for potential opportunities for both Danish and Greenlandic companies to benefit from forming alliances.

Although Greenlandic companies in general will benefit significantly from entering into partnerships with foreign companies, it is natural to exploit the special advantage that the Danish and Greenlandic companies have laws, some cultural aspects and often language in common. All other things being equal, barriers to co-operation will therefore be less evident than when co-operating with companies outside the Kingdom.

It is also important to be aware of the business opportunities inherent in increased co-operation in the Kingdom related to processing natural resources extracted in Greenland which cannot be processed within the country[14].

14. According to the legislation, if a natural resource cannot be processed in Greenland, reasons must be specified.

In a scenario in which Greenland relies on a multi-pronged strategy, the Danish companies and especially Danish researchers would also have an interest in co-operating with Greenlandic companies and research institutions. In addition there are business opportunities in the tourism industry, where several Danish companies have already established activities.

Kingdom-wide responsibities
As part of its responsibilities within the Kingdom, Denmark contributes to a range of societal tasks, such as justice, foreign affairs, emergency services, fishery inspection and defence. Furthermore, Greenland receives financial support through an annual DKK 3.6 billion block grant, which currently comprises about 30% of its economy and about 60% of the Self-Rule Authority's budget.

GREENLAND CAN AVOID 'THE RESOURCE CURSE'

There are very few examples of countries successfully achieving greater prosperity and economic stability through the exploitation of mineral resources.

Helicopter on Storø Island (Photo: Rebekka Knudsen)

However, this does not mean that Greenland is heading towards a certain resource curse[15]. Greenland can benefit from a variety of special and favourable bounding conditions. The block grant from Denmark acts as a stabiliser for Greenland's economy, which reduces overheating in times of large natural-resource revenue, but compensates for periods of decline in this type of revenue. This reduces the so-called "boom and bust" scenario seen in Alaska and elsewhere.

In Alaska, the development has been strongly influenced by activities related to motorway grid construction, base construction, oil production and the construction of associated pipelines, as well as exploitation of mineral resources. Boom periods of intense activity attract a large workforce and the population therefore grows. When the resource is exhausted or production stops for other reasons – bust periods – a large exodus ensues.

Both aspects have drastic impacts on local communities demographically and economically. Both in Canada and Alaska it is evident how these changes leave the indigenous local people with problems because they have a direct connection to the land and depend more on local community networks and family relationships. During a "bust" period, they are left without jobs and are sometimes left living with the long-term pollution and environmental degradation caused by natural-resource exploitation. In the case of Greenland, the block grant acts as a buffer to prevent the fluctuations in the economy becoming too large. This can also help stabilise the community.

15. The correlation between the economy based on natural resources and inexpedient social and economic development.

Through its connection with Denmark, Greenland also has free, unrestricted and in some cases preferential access to education in all relevant subjects and at all levels. Greenland therefore has unrestricted access to developing the skills that are essential for creating lasting value for society on the basis of mineral resources.

The block grant is retained and reforms commence

In the most likely scenario, Greenland will need to retain almost the full block grant from Denmark, although slight reductions would result from the Self-Rule Act's provisions for the distribution of revenues from the extraction of mineral resources. Additional revenue is also likely to be required to maintain the current public budget. With an economy based on natural resources, the block grant could function as an economic stabiliser and less and less as subsidy.

Overall, the information we have gathered in a number of fields – law, economics, geology, geography, history, international experience, Asia, geo-politics, social effects and environmental effects – shows that Greenland has good prospects for obtaining real value from its natural resources that will benefit the country and its population. Thus we see no great danger that Greenland will suffer from the resource curse seen in a number of African countries and elsewhere.

On the other hand, we also conclude that Greenland must initiate a political discussion about the type of society that it wants in general as quickly as possible, and that the natural resource wealth fund and comprehensive structural reforms should be established and safeguarded.

FOCUS AREAS

This report identifies a number of scenarios that examine how Greenland can gain maximum value from its natural resources – while also showing the consequences of opting not to initiate any natural-resource projects.

These scenarios are used to indicate a number of points that we believe deserve special attention when discussing Greenland's opportunities in the future.

We have split these focus areas into two categories:

Focus areas requiring attention related to the extraction of raw materials, and focus areas related to some of the more general factors associated with the development of Greenland.

The focus areas are partly the outcome of the background papers, and partly prompted by ideas and realisations made in connection with the Committee's work.

OPTIMAL NATURAL-RESOURCE VALUE

FOCUS AREA: Consider a multi-strategy approach
Our calculations have shown that even with a large number of large-scale projects at the same time, revenues for the Treasury in connection with natural-resource extraction would be insufficient to replace the block grant. Similarly, revenues from these projects will not be able to stabilise the economy in the long term. A very large number of projects will also inevitably result in a social structure that differs significantly from the one Greenland is known for today.

In a discussion about a possible future as a natural-resource exporter, special attention must be paid to conserving living resources, as this is crucial for Greenland's future. This should not be compromised by mining. The social value of revenues from renewable living resources is considerably higher than the effect from non-renewable mineral resources. In very general terms, the value of revenue from sustainable use of living resources is 20 times greater than from the exploitation of mineral resources.

Sustainable fishing is a valuable resource (Photo: Minik Rosing)

Nevertheless, exploitation of mineral resources provides Greenland with much-needed balance and future stability for public finances.

One of several options that could be considered would be a 'harp strategy' – a strategy that features Greenland playing on several strings and complementing the work of developing any natural-resource projects with other forms of business development.

This strategy focuses on gradually setting up about five large natural-resource projects. The projects are located

outside the special natural and cultural value zones, and direct revenue for Greenland is put in a natural resource wealth fund. The introduction of special zones would also mean that Greenland can more easily capitalise on its status as a pristine country with areas of vast wilderness and thus attract other types of businesses and organisations that could provide income for the country. Natural-resource deposits in zones with special natural and cultural values would therefore also be of value if left underground because geoparks could possibly be identified in these zones, for example. These are identified internationally as world heritage sites and are therefore of international interest – not only from a tourism perspective.

Other strings of the harp strategy could be to:

- Develop a comprehensive national strategy for diversified business development that also focuses on co-operation with international companies, including the specific benefits Greenlandic businesses may gain from collaborating with Danish companies.
- Develop a comprehensive strategy to increase the capacity and add new skills within the central administration, business and education.
- Consider developing the practical content of the Kingdom by physically moving the administration of areas that are relevant across the Kingdom of Denmark from Copenhagen to Nuuk. This could involve work in the Arctic Council.

FOCUS AREA: Natural resource wealth fund

The Committee's work has shown that rapidly initiating the natural resource wealth fund and putting the largest possible proportion of any revenue from the natural-resource projects will be a key factor for the future stability of Greenland's economy. At the same time, a natural resource wealth fund will be crucial for the Self-Rule Authority's prospects of becoming an investor in natural-resource projects in the future if there is a political wish for this. Although the Self-Rule Authority is not included as direct investors in the projects, mining projects will require large public investments in infrastructure and education, for example.

It is therefore recommended that the advantages of such a fund are considered.

FOCUS AREA: Establishment of go/no-go zones

In connection with the decision on whether an attempt should be made to exploit an area of potential natural resources, the Committee recommends that consideration be given to classifying Greenland into zones through a process that investigates cumulative impacts, public consultation and resident participation.

A group of zones could then be identified. In some zones, the community could actively promote the extraction of mineral resources based on consideration of the structure of the local business community and regional development. Other zones would be identified as those where mineral activities were not desired in the interests of the environment, social well-being, existing business, demographics, etc.

Such zoning should be forward-looking and transparent for residents and companies. The would also be politically stable so the framework conditions for mineral extraction would be known for decades to come. It is also appropriate to distinguish between different categories of mineral extraction (for example, large-scale and small-scale).

The zoning concept already exists in the offshore area, where license areas are defined by conducting regional environmental assessments. In the current process, the emphasis is on the environmental impacts of exploration activities and possible future production. Resident involvement is limited and focused primarily on public access to documentation. Involving the community early when assessing local social consequences would be desirable.

In the field of onshore minerals, no corresponding regional planning process exists. However, areas in the National Park in North and Northeast Greenland are being demarcated via professional biological evaluation and designated as no-go zones and zones with stricter requirements. In 2011, new exploration activities based on granting exploration permits were suspended for Greenland north of 81° N by the BMP. The purpose is stated as the introduction of new and more attractive conditions in the field of industry. The new conditions have yet to been announced.

Zoning, with different terms for natural-resource exploration and extraction, should be extended to the whole of Greenland, so that community activities and interests other than the exploitation of mineral resources can be prioritised. During this process, early public participation following international standards and consultation with the minerals industry and other relevant industries are essential for identifying the zones. This can be achieved by strengthening e.g. NGO involvement in all phases of the process, which would contribute to a better understanding and involvement of the population and thereby provide greater

acceptance of and confidence in the development of a new mining industry.

A system of zones could benefit flora and fauna (Photo: Minik Rosing)

FOCUS AREA: Assessment of geologic potential
While assessing the revenue potential and possible effects of a potential natural-resource project, it is noteworthy that today the primary source of information is the exploration companies themselves in collaboration with the BMP. The Committee therefore recommends that this point deserves special attention.

A possible solution for this challenge could be to form an independent body to provide information about a given project's validity, to ensure that the project contributes to the development of society and ensure that this information is presented early enough to be applied in a timely manner during the public participation process.

A council could be established with representatives from the BMP, NGOs, community organisations and research institutions. This body could advise the Self-Rule Authority generally in terms of building a natural-resource industry and reducing the risk of inappropriate decisions and management procedures.

FOCUS AREA: Transparency in feasibility assessments for mining projects.
There should be protocols for how mining companies implement and document the feasibility studies that underlie their negotiations with authorities and investors and are included in public hearings. As it stands, proof is required from Canadian companies listed on the Toronto Stock Exchange (TSX). Companies that are not listed in Canada are not subject to requirements concerning the methods or quality of their feasibility studies.

This is problematic in relation to conducting accurate assessments of the societal benefits of a given project, and consequently investors wishing to invest in mining in Greenland are poorly protected. If a firm loses an investment based on exaggerated or false expectations for the finances in Greenlandic projects, that could undermine future investors' confidence in Greenland.

FOCUS AREA: Good governance
In Greenland today, many natural-resource projects are perceived to lack transparency in decision-making processes. This indicates, among other things, that it may be worth considering whether an independent authority for appeals is needed in cases where a decision is made by the The Environmental Agency for the Mineral Resources Area. Tightening the rules for eligibility is another option. A form of obligatory "label" could be considered for natural-resource organisations. Such a label would require lawmakers as well as directors of exploration companies, etc to relinquish their interests and relationships.

Finally, it should be considered whether 'watertight seals' should be introduced between corporate boards and lawmakers so that it would not be possible to go directly from a seat on the board of a mining company to a political post that may have an impact on the company's future, for example.

FOCUS AREA: Administration of revenue from natural-resource projects
The Committee's work has shown that it can be beneficial to approach the issue of customising the Greenlandic tax system so as to ensure a reasonable level of tax payments from the exploitation of Greenland's resources from several angles. Licence fees, resource withholding tax and royalties all play a role in addition to ordinary income tax.

FOCUS AREA: Upgrading the central administration or increased outsourcing
Through surveys, the mining companies generally express satisfaction with Greenlandic law and management. However, a common theme expressed by NGOs and companies is that the capacity of the central government should be increased in a number of areas. This applies to tax, the environment and preparing contracts, where it can be difficult to match the competence of large companies' departments in these

areas. However, it also applies to the assessment of the information provided by the companies themselves during the many processes before any licence for exploration or exploitation is issued.

A complementary supplement for upgrading the central administration could involve a higher degree of outsourcing of these issues – for example, to law firms in other countries with experience in mining, or tax experts inside or outside Greenland.

The two options should be weighed against each other and combined optimally as outsourcing could, for example, mean a loss of income tax revenue, while the benefit may be easier and more flexible administration. The two options could be combined so that while building up skills in key areas of Greenland, a network of international consultants could be put in place both to complement the skills and resources in Greenland and contribute to knowledge building.

FOCUS AREA: Labour management
A question that overshadows the debate on natural resources is how much emphasis should be placed on recruiting Greenlandic labour.

Greenland is not subject to EU regulations governing the freedom of movement and can thus – legally – prioritise Greenlandic labour. This issue is part of the discussion about the direction Greenlandic society should take, as a fundamental decision must be made about whether it is more important to maintain the Greenlandic population composition in towns and villages as we know it today, or remain open to a multicultural society and accept the obligations, opportunities and conflicts that may bring along with it. In this context, the issue of language should also be discussed.

FOCUS AREA: Competence building at all levels
The necessity of general competence building if labour is to be recruited mainly from Greenland is highlighted by all sources both inside and outside Greenland. In the case of natural resources, it is estimated that this is where revenue will largely be generated for many years to come through income tax from project employees. Capacity building is therefore vital.

International experience has been gained by sending people abroad to receive training to work in mines in order to ensure that there is Greenlandic labour ready to take jobs as soon as mines are operational. A large proportion of the Greenlandic workforce has no qualifications. However, this does not mean that they do not possess skills that are useful for developing a mining industry. Short-term training and accreditation schemes that build and document competencies in logistics, field work and other services in connection with prospecting, EIA and SIA studies will pave the way for a higher degree of local participation, creating value during the development of natural-resource projects right from the earliest stages of feasibility studies.

FOCUS AREA: Improved public participation
Insufficient, late and overly narrow public participation are major themes in the decision phase of natural-resource projects. Earlier involvement should be in focus. Similarly, information should be translated in good time. Alternatives to the current public participation process could include a broader and more systematic involvement of NGOs in connection with the visits already made by the BMP and interested companies to residential areas outside Nuuk, for example.

In order to ensure that civil society can obtain the necessary level of feedback from public hearings, it is necessary to strengthen NGOs and capacity building.

Information about Greenland's geological potential can be hard to obtain (Photo: Minik Rosing)

FOCUS AREA: Strategic and national use of IBAs
There is scope for more strategic use of Impact and Benefit Agreements. Currently, the agreements have a local focus and are negotiated individually from project to project. While it is important to use IBAs to ensure local communities benefit from the establishment of mining projects, there is a risk that the IBAs will exclusively prioritise short-term local requirements (support for sports clubs, etc) rather than focus on long-term development of Greenlandic society and investing in initiatives that truly make a difference. Perceptions of the purpose of IBAs should therefore be moved from ensuring local support and acceptance to giving local residents a say in how proceeds from the projects are invested. There is also an opportunity at the national level to build joint strategic initiatives through the IBAs to ensure that the agreements produce the greatest benefits.

Long-term strategic initiatives can target different priorities, including relevant Greenland-based research that could enhance the knowledge base for future agreements. In this context, it would be expedient to set up an independent panel, including the participation of scientists: Each time an IBA is compiled, money should be prioritised for research, and the panel could identify the strategic research required to ensure that Greenlandic research institutions were involved in order to strengthen the national research environment.

If a process is implemented reflecting the proposed zone model, particularly sensitive areas can be identified regionally. These could form the basis for joint efforts that are prioritised in the individual IBAs as a supplement for local and project-specific initiatives identified in the related SIA.

IBA agreements are a good tool that would be improved if made even more precise. For instance, there is a challenge in ensuring that the obligations in the IBA are sufficiently clear for breaches to be evident. Another challenge involves ensuring that lack of implementation or breach of the IBA may have consequences for the company.

FOCUS AREA: Improved emergency management
All scenarios for Greenland's future development gloss over the need for increased disaster preparedness. These include, for example, SAR, pollution accidents, shipwrecks and accidents resulting in many casualties.

In a scenario in which Greenland decides to transform into a natural-resource exporter – both large and small scale – an emergency response system would be sorely needed. Natural-resource companies operating in Greenland are required to build and maintain an appropriate incident response team, however, a larger range of public emergency services will also be required. In practice, the size, economy and labour shortages in Greenland mean it will be difficult to build a suitable response team of an appropriate size. However, alternatives exist, including the Icelandic model, which includes using an expanded corps of volunteers in order to build a less resource-intensive incident response team.

FOCUS AREA: A shared investment strategy
The economic projections for the Greenlandic economy clearly show that the Greenlandic economy is under pressure in a way that prevents the public sector from participating as full or even partial partners in mining projects.

However, there are other good reasons to recommend that the Self-Rule Authority should avoid investing in mineral extraction projects as far as possible, and instead leave this to privately owned companies. Consequently, the government of Greenland will continue to make an effort to find interested investors outside Greenland.

A proper investment strategy that actively defines which source of investment is most appealing may be useful. The results of the Committee's work indicate two aspects: partly, a positive outcome is uncertain as most investors are currently reluctant to invest in Greenland due to the infrastructure and the shortage of labour etc. Also, the investors, including potential Asian investors[16], are mainly interested in investing in projects in line with a partnership model with partners possessing greater local knowledge.

This reveals how Greenland can benefit from entering into a partnership with Denmark to attract investors. A partnership with Denmark could also involve investments in substandard parts of the infrastructure. Danish pension firms have been mentioned by some as potential investors. It is also recommended that the guidelines in the government's debt and investment strategy should be maintained, meaning that the government should not invest in infrastructure that is associated only with natural-resource projects.

16. In addition to the background paper about Asia, the Committee has been inspired by the project "Kinesiske råstofinvesteringer i Australien og Canada – erfaringer fra Danmark og Grønland". A survey project by Rasmus Abildgaard Kristensen financed by the Annemarie og Erling Kristiansen grant.

Finally, Greenland may also benefit from co-operating with Denmark on broader business development than activities linked specifically to the development of natural-resource projects.

FOCUS AREA: Post-closure strategy
The trend is for most mining projects to be characterised as fly-in-fly-out projects, in which employees stay in camps during the project yet maintain their permanent residence elsewhere.

The fact that natural resources in Greenland are usually located far from residential areas, coupled with the fact that most mines will have a lifecycle of 10 to 15 years, indicates that in most cases no attempt is likely to be made to establish actual mining communities. Instead makeshift camps are likely to be established around the mines.

Historical experience gained from Qullissat also argues against attempting to construct new cities. However, this situation does not make it any less important when establishing a project to consider what will happen when the mine closes, as this will create demand for jobs in other parts of the economy or preferably working on other projects. Therefore when one project begins, consideration should be given to whether other activities should also be initiated.

FOCUS AREA: Stronger environmental monitoring
Environmental monitoring of natural-resource projects is an important part of the regulation of natural-resource activities in Greenland. Checks are conducted to ensure that companies comply with requirements, and results from monitoring the environment are an important tool for assessing whether regulation is adequate or should be adjusted. In new large-scale projects, it is recommended that the focus remains on closely monitoring and controlling the activities to secure the correct culture of compliance with requirements and environmental concerns from the start. This can also create local jobs and strengthen research in this area.

Another recommendation is that during major projects, environmental monitoring is conducted at regional level. This monitoring should not only reveal individual environmental impacts from the natural-resource industry but also the total (cumulative) effects on the ecosystem of climate change, transboundary pollution, industry, fishing and hunting.

The monitoring should ensure that studies can be initiated to explain the causality behind the unexpected observations and, if necessary, prompt stricter requirements.

FOCUS AREA: An oil-for-oil agreement
An idea has been conceived as an indirect outcome of our work that may help to strengthen the unity of the Kingdom of Greenland and Denmark, if this is a common political goal.

Phasing out the oil industry in the Danish sector of the North Sea is expected to coincide with the earliest production from Greenland's economic zone. Denmark could invest a specified share of the oil production from the North Sea in return for a corresponding share of production from the Greenlandic fields. This would act as a buffer for both parties and provide greater economic stability in the near future while the mineral industry is not yet contributing significantly to Greenland's economy. At the same time, such an agreement will help to safeguard the future of Denmark's oil industry after its fields are exhausted.

FOCUS AREA: Uranium and other challenges
Uranium mining raises questions about Greenland's possible accession to a number of international conventions, including those relating to security and the handling of uranium, which do not currently apply to Greenland.

In addition, questions are being raised about Greenland's foreign policy competence in relation to the conclusion of international legislative agreements that may affect security issues. The speed at which the necessary regulatory framework can realistically be established should be assessed.

When an agreement is reached that could form the basis for the extraction of uranium, a knowledge-sharing agreement between Risø research lab (and others with experience in the field) and Nuuk would probably be beneficial for both Greenland and the Kingdom of Denmark.

OVER-ARCHING FACTORS

FOCUS AREA: A necessary debate about direction
All considerations regarding natural-resource projects and the future development of Greenland begin and end with the discussion of what kind of society is most desirable. Without such discussions, there is no background for making well-informed decisions about any project.

It is recommended that the Self-Rule Authority, in co-operation with Greenlandic NGOs, should embark on such an essential debate. In this context, past

experience and experience from other countries can be involved. Similarly, various possible scenarios for the future and the consequences of each scenario can be developed, including questions such as settlement patterns, mobility needs, desire for independence and willingness to accept foreign workers.

The basis of the Greenlandic societal model is another issue that could be addressed. During its work, the Committee has not encountered surveys looking at the advantages and disadvantages of using the Danish social structure as a model for Greenland. The Committee notes, however, that the Greenlandic structure is largely inspired by the Danish structure. Such an analysis of the advantages and disadvantages of the current structure of society could provide a basis for debate about the direction in which society is heading featuring a number of parameters other than natural resources.

FOCUS AREA: Need for economic reform
The scenarios for Greenland's future economy show that, regardless of which scenario is chosen, more initiatives will be required to ensure financial sustainability. These cover virtually all aspects of society, and involve such factors as strengthening capacity building and business development, as well as reducing public spending.

While there may be good grounds for maintaining the public sector in Greenland, the Committee's work reveals the need for a thorough review of the Greenlandic fiscal and tax system to identify possible sources of income. This could also illustrate the benefits of considering structural reforms, housing reforms and identifying possible savings in public budgets to reduce public spending in order to provide the scope for increased budgets in specific areas such as education and health.

Natural-resource activities and the derivative systems created cannot be considered independently of other activities and systems in society. It is therefore essential to create scenarios in which the various reforms are explicitly conceived together. Similarly, the economic viability of reforms entail that the cumulative effects of all Greenland's major business activities are addressed. Similarly, it will also be necessary to determine the impact that natural-resource activities and reforms will have on Greenland's economy.

FOCUS AREA: A master business strategy with a national focus
In order to make the most of the non-renewable resources, policy-makers should be aware of the business development and Greenlandic job creation, including assessment of mobility needs, identification of the specific Greenlandic subcontractors (including the potential for job creation in connection with environmental tasks) and promotion of co-operation with e.g. Danish and international partners to build capacity.

It could be advantageous to also focus on a recruitment strategy to encourage qualified Greenlanders living abroad to return and take jobs. This will also be relevant to counteract a situation in which a thriving mining industry could drain talent from other important parts of the economy. Special "key sectors" could be safeguarded against the loss of competent labour to potential natural-resource projects.

FOCUS AREA: Strengthening the Kingdom through geographical relocation of administration
Today, all Kingdom-wide functions are administered in Denmark. The administration of some public affairs could be moved from Copenhagen to Nuuk.

This would increase equality in the Kingdom and improve both the level of competence and tax revenues in Greenland. Lessons learned from Norway show that such a strategy can provide areas with a small population and industrial base with a higher degree of sustainability and increase their attractiveness as a place to live. Areas where this may be relevant could include the work of the Arctic Council, for example. In this context, we are talking about a matter of concern to the entire Kingdom, which is managed from offices in Copenhagen, but concerns Greenland to a large extent. Another area could be teamwork to capitalise natural assets in Greenland in relation to international interests in nature conservation or ecosystem services.

FOCUS AREA: Ratifying international conventions
Greenland is becoming an increasingly independent global player.

It could be considered whether the Self-Rule Authority could usefully review a number of international conventions that currently apply to other parts of the Kingdom with a view to deciding whether these can and should be enforced in Greenland. These include the

UN anti-corruption charter[17]. Ratification of a number of these conventions could help to strengthen the image of Greenland as a safe and reliable natural-resource extraction partner.

In such circumstances, the requirement for ensuring stable framework conditions for the exploitation of mineral resources advocates that any differences are identified and agreements are reached with the optimal consideration for all stakeholders before specific projects of this nature begin.

17. http://www.unodc.org/documents/treaties/UNCAC/Publications/Convention/08-50026_E.pdf.

If Greenland's mining industry is to take off, we must pay close attention to a number of important issues (Photo: Minik Rosing)

APPENDICES

1. IMPORTANT POINTS FROM THE BACKGROUND PAPERS

All background papers have been published on the University of Copenhagen website (http://news.ku.dk/greenland-natural-resources/). The background papers are summarised below.

A. GREENLAND'S GEOLOGICAL POTENTIAL

Language: Danish. This background paper explains the geological potential of Greenland's underground deposits and for the country's geological development. The paper is based mainly on comprehensive material from GEUS. The background paper is supplemented by two memos from GEUS about critical minerals and the development in the global market for natural resources.

The background paper reaches the following conclusions:

- The geology of Greenland is well described and the whole of Greenland is geologically mapped.

- Greenland contains a large number of identified mineral deposits.

  Nine have previously been mined and six deposits have documented amounts of ore and purity, and the environment and societal consequences of mining have been surveyed in sufficient detail to warrant the granting of mining licences. These would permit the mining to start if the necessary projects can be implemented. None of these deposits have active ore extraction at the present time.

- A warmer climate is expected to change logistics. No significant increase in ice-free landmass is expected during this century, but new mineral deposits may be revealed to a lesser extent.

- Some deposits have not yet been studied sufficiently to evaluate the profitability of mining and environmental and social impacts, and for other deposits extensive studies have predicted that mining is not financially viable with current natural-resource prices.

- In conclusion, Greenland's geology supports a large mineral-resource potential. However, this potential should not be construed as actual available capital, but rather as a basis for the long-term development of a mining industry.

- Mining of hard minerals is deemed to be able to contribute positively to diversifying the Greenlandic economy, but minerals are relatively unlikely to be able to support a self-sustaining Greenlandic economy with the current public service.

B. INCOME, TAX REVENUE AND FINANCING

Language: English. This background paper describes the exploitation of Greenland's natural resources from a financial perspective. The paper deals with the public sector's role relating to future natural resources in particular.

One of the most important points is that the public sector in Greenland is under considerable pressure. The fiscal policy is not sustainable.

By 2040, public expenditure will be unable to be covered by the block grant and expected tax revenues. This is due partly to excessive emigration and the existing high standard of public services and transfers. At the same time, Greenlandic society has significant social problems that require public-sector initiatives. This applies to social issues, abuse, inadequate education, lack of infrastructure, settlement etc.

Overall, this means that massive fiscal-policy adjustments of about DKK 800 million (or more pessimistic assumptions would predict as much as DKK 1 billion) a year will be required by 2040.

This adjustment can be achieved by cutting public spending, raising existing taxes/finding new taxes or

changing the national economic structure in order to save expenses and provide additional revenue. The three options can, of course, be combined. Regardless of the strategy, an overall budget increase of DKK 800 million annually would be required on average.

Given the current strained budget, the public sector should not expose itself to large expenditure and revenue fluctuations. Coupled with the fact that the potential mining activities are financially risky, this means that the public sector should refrain from investing in natural-resource projects, both alone and in partnership with private-sector investors. Even if the activities are left entirely to private investors, and even if the principles of the government's 'Debt and Investment Strategy' are met, public investment and running costs would be involved and would constitute a challenge, since the costs would come before any tax revenue from mining activities.

The role of the public sector in forthcoming natural-resource projects should primarily be regulatory, by, for example, preparing auctions, issuing licenses, regulating taxation, ensuring compliance with environmental, health and safety regulations etc. In the field of taxation, the paper advocates combining corporate taxation of natural-resource manufacturers with a resource rent tax and royalties.

Finally, the background paper describes another challenge: New mining activities will probably not resolve fiscal sustainability problems for three reasons:

1. The resource area is characterised by extensive uncertainty, i.e. the prices of individual natural resources, the size of reserves at individual locations, extraction costs and subsequent transportation, payments for labour and capital etc.
2. Although the mining activities are extensive, additional public investment and operating costs will inevitably be incurred, and collecting royalties and taxes to both compensate for this while contributing significantly to fill the gap between the expected future expenses and revenues could be difficult.
3. Extraction of raw materials erodes Greenland's national wealth. The mineral resources are non-renewable, and should therefore be set aside for future generations. This can take the form of a wealth fund (like the Norwegian oil wealth fund). The revenue for the state from the resource activities would therefore be limited to the extra taxes from mining activities and secondary activities minus the part that is set aside.

C. SECURITY AND FOREIGN POLICY

Language: English. The background paper deals with the possible consequences in terms of security policy resulting from exploiting Greenland's natural mineral resources while defining how geo-policy can be understood in a Greenlandic/Danish context.

The paper shows that Greenland's natural resources constitute both a symbolic and an economic bridge between Greenland's past and its future as an independent state. All discussions about the country's natural resources are therefore inherently (geo) political. This means that utilising the resources not only entails considering how any future economic benefits should be shared, but also the very definition of what constitutes Greenlandic society and what authority this community possesses.

The paper concludes that Greenland has a special geo-political situation because through its geographical location, the country is important for US security. This applies historically, for example, in connection with the Second World War. But even today, changes in Greenland's status and the use of the country's natural resources would have an impact on the US, which may still be interested in access to the country. The fact that Greenland is therefore part of the US sphere of interest is an important point to remember when Greenland is to take action – also in relation to Denmark.

Considering the basic security policy in essence, it is concluded that today Greenland is not, and does not appear to have the potential to become, a land of looming military conflicts. Therefore, and given the country's relatively small population, Greenland has few reasons and few opportunities to develop genuine Greenlandic military resources. Regardless of the legal status of the Greenlandic government, Greenland must therefore find alternative options when establishing a preparedness search and rescue system, but also related to oil spills and the like, for example. This paper concludes that the security guarantees from the US or through possible NATO membership could potentially be solutions. However, both of these options will be controversial and also require relatively large financial resources.

With regard to natural resources, the paper concludes that Greenland's mineral natural resources – including rare earth elements and uranium – have no intrinsic strategic value because the Western world can meet its current requirements for these raw materials through the existing market.

The paper therefore concludes that even if the uranium could potentially be used for nuclear weapons, the real cause of the conflict between Copenhagen and Nuuk concerning the cancellation of zero-tolerance is not found in the narrow scope of the defence policy.

D. ENVIRONMENTAL IMPACTS

Language: Danish. The paper concerns environmental impacts of natural resources in Greenland and experience of the need for regulating them.

The paper assumes that the exploration and extraction of mineral resources will inevitably affect the natural environment, and that these impacts can be prevented and reduced through regulation by the authorities.

The paper demonstrates that significant research and studies have been conducted to support the environmental regulation of natural-resource projects in Greenland, but that more information about the particular Arctic conditions and mining projects and their impacts is required. The lack of information leads to uncertainty in environmental consulting and thus the use of the precautionary principle. This uncertainty could be reduced through further knowledge building. Finally, it is important to appreciate the importance of ecosystems being subject to transboundary pollution even before any project begins, and that they are changing due to climate change.

The paper lists how natural-resource activities can be regulated to influence the natural environment as little as possible.

Regulation would permit the authorities to:

a) require that appropriate studies to illustrate environmental issues are conducted before projects are approved
b) specify the necessary environmental requirements for the activities
c) monitor the environmental impact of the activities
d) intervene with if the environmental impact deviates from the expected and approved impacts
e) demand environmentally justifiable clean up in connection with mines closing and monitoring of waste depots after mines close

The paper describes how in the past century, mines have caused unacceptable pollution (Maarmorilik and Mestersvig), while the more recent mining activities (Seqi and Nalunaq) were established in an environmentally sound manner and have not caused significant environmental impacts.

In the area of oil drilling, in recent years offshore exploration wells have been established and offshore seismic data collected. Exploration wells are generally established in an environmentally sound manner and with a comprehensive programme of environmental monitoring. Experience shows that comprehensive environmental control, environmental monitoring and follow-up are required to ensure that such complex activities are run along environmentally sound lines.

The seismic surveys are regulated primarily to protect marine mammals from disturbance and Greenlandic regulation is among the strictest in an international context. For example, there are large protection zones where intensive seismic activities are prohibited during sensitive periods and requirements that companies must prepare standard noise models. Nevertheless, there is considerable uncertainty about how seismic activities impact on the most noise-sensitive species, such as narwhal, because the knowledge base is inadequate. In the light of this, the Self-Rule Authority launched a large industry-funded research project to illustrate the possible effects on narwhals when a major seismic campaign was conducted in Baffin Bay in 2012.

Before Greenlandic waters are opened for oil exploration, a strategic environmental assessment (SEA/SEIA) must be conducted. SEAs summarise the current knowledge and environmental status of the areas (zero-solution) and describe how the areas could be affected if oil activities are introduced. The SEAs are submitted for a public hearing before the government reaches a decision regarding opening and defining supply areas. In the past decade, SEAs have been carried out for most offshore areas around Greenland, and key environmental risks and information gaps are described. All SEAs and related scientific studies have been prepared and all data organised in a data centre where the information associated with the individual region is stored for use on further administrative regulation and planning. Similarly, this data is available to the oil companies that will operate in these areas.

Similarly, relatively few strategic regional environmental assessments for land-based mining operations have so far been conducted. The environmental regulation of mining activities has been based largely on the specific projects' local studies conducted while preparing project-specific EIA investigations. However, as the mining project activity level, other industrial activities and other potential environmental impacts are increasing, significant demand for more detailed information is rising.

A large marine oil spill is the largest environmental risk related to oil activities and it is important to focus on how the environmental risk relating to a spill can be minimised. In Greenland, this is achieved in connection with exploration drilling using the Norwegian safety regulations (NORSOK), which are among the strictest in an international context. For example, two drilling rigs are available, which allows an auxiliary well to be established very quickly, and the drilling season is required to end so that an auxiliary well can be reached before it becomes icebound. As yet there are no documented effective methods for combating oil spills in ice and darkness. Such methods should be developed prior to exploration and production in icebound waters beginning.

In support of oil-spill preparedness, maps have been developed for identification of coastal areas where protection should be given priority in the event of oil spills (Coastal Zone Atlas). The paper also recommends continuing the work started on developing an intelligent response team that can use different methods to combat oil spills, including incineration at sea and dispersion. The methods should be used based on an analysis of what constitutes minimum damage to the environment overall (Net Environmental Benefit Analysis) and can be used more and more precisely as greater understanding is accumulated concerning the prevalence and vulnerability of animals in the water column and on the sea surface, and of the natural decomposition potential for oil in the various marine and coastal areas.

The paper contains a number of recommendations:

- a larger knowledge base in key areas would identify significant environmental issues with increased safety in the planning phase, providing a better basis for making demands on location, technology, emissions etc. Additional regional SEAs would be expedient on land, in freshwater areas and in adjacent fjords, as would an improved understanding of environmental toxicity and the degradation of chemicals and oil components in Arctic conditions.
- Environmental monitoring should be carried out at regional level for large projects. This monitoring should not only illuminate the environmental impact of an individual natural-resource industry, but the total (cumulative) impact on the ecosystem of climate change, transboundary pollution, industry and fishing and hunting. The monitoring should ensure that studies can be initiated that may explain the causality behind unexpected observations (for example, whether changes are caused by pollution or climate change) and, if necessary, stricter requirements for natural-resource activity should be introduced. Monitoring of selected indicators at ecosystem level would be an important part of management based more on the ecosystem that can address the challenges of management and adaptation in an environment evolving rapidly due to climate change, for example.
- to further improve oil spill preparedness, precise demands must be made on the industry and co-ordinated research, development and construction of emergency services in the Kingdom and internationally. Although responsibilities are formally clear, the Kingdom seems to need more synergy and a common focus on addressing this major task.

E. HISTORICAL EXPERIENCE

Language: Danish. The background paper describes the historical activities related to exploration and exploitation of natural resources and identifies a number of fields for attention that may be relevant for future projects. Throughout history, Greenland's geological resources have been of interest. The paper assumes that many lessons can be learned from the natural-resource activities that have already been carried out in Greenland, large and small. The paper also touches on the most important public debates related to specific activities and some of the reports that former commissions have prepared.

A large section of the background paper focuses on the larger projects, such as cryolite from Ivittuut, coal from Qullissat and lead and zinc from the Black Angel (Maarmorilik), as these have had the greatest impact on Greenlandic society. The development of political relations and institutions of importance for natural resources to mining activities are also presented. The reviews conclude with a series of focus fields of a specific and general nature that could be a starting point for "translating" historical experience into contemporary issues and expectations. One of the common denominators, for instance, is that there is relatively little experience recruiting Greenlandic labour for natural-resource projects.

Three projects are highlighted in particular as they represent different experiences with the employment of Greenlandic labour:

- The coal mine at Qullissat operated between 1924 and 1972. The workers were Greenlanders, but there

It is important to understand the impact natural-resource extraction has on society (Photo: Minik Rosing)

were some individual external specialists (technicians and engineers). The mining town was a functioning unit with a rich cultural life. When a decline in mining led to its closure in the late 1960s, it was seen as a traumatic experience for the residents, who felt the closure was decided without their involvement.

This experience contributed to the political trends that subsequently led to the introduction of home rule in Greenland. Experience gained from the project emphasises both the importance of public participation and, at an early stage, discussing how the future after a mining project should be planned. This experience also illustrates the importance of considering in advance whether the relationship between society and natural-resource activity is desirable in the short and long term (for example, a mining camp or an outright mining society).

- The cryolite mine at Ivittuut operated from the mid-1800s to the 1980s. The workers came from abroad – Greenlanders were only permitted to work there after the Second World War. During the war, cryolite exports provided Greenland's economic foundation while Denmark was occupied by Germany. This fact contributed to a shift in attitudes towards Greenland being able to support itself financially.

- The lead and zinc mine at Maarmorilik was operated by foreign companies, and only a minority of the workforce was Greenlandic. Despite the challenges facing these Greenlandic workers, including language, they were able to co-operate with foreign workers. However, interest in the media and political circles focused on the low proportion of Greenlandic labour in the mine.

The background paper also discusses the division of competence and the institutional framework between Denmark and Greenland. On this point, the historical review that overtaking responsibility for natural-resource management has major political importance in Greenland. However, control and administration of the area is still divided. For example, research institutions are located in Denmark, while natural-resource administration is in Nuuk.

F. COMMUNITY IMPACTS

Language : English. This background paper focuses on the societal implications and derivative effects of natural-resource projects. The paper focuses on the different phases of natural-resource projects and reviews the eligibility criteria and methods applied for evaluating the impact of natural resources on society in Greenland today: Social Impact Assessments (SIA) and Impact Benefit Agreements (IBA).

The paper describes how projects can be divided into several phases before, during and after the extraction of natural resources, including the initial decision phase. The decision phase precedes the granting of a licence to prospect for resources in a particular area that can lead to an actual project in the long term. As the effects of the project phases can vary a great deal and are interdependent, it is important to address the potential social effects and weigh the positive and negative consequences for the individual phases and identify the danger signals in the decision phase.

Establishment of new natural-resource projects will certainly result in social and societal change. The type and scope of societal impact depends on how the project is managed. SIAs are a project-related tool used when preparing natural-resource applications. The illustrate the possible consequences and ensure as much local benefit as possible. Companies are legally required to prepare an SIA in connection with applications for natural-resource projects in Greenland. It is emphasised that various projects can have very different effects, depending on whether they are offshore or onshore projects, urban or rural projects, small or large projects, for example. In conclusion, today SIA requirements and guidelines are at a high level, but should cater to these differences to a larger extent. Another conclusion is that evaluating the experience of the SIA, which is still a relatively new tool in Greenland, can improve the basis for management and SIA processes. It also stresses that SIAs should be developed early and not only by companies but also by public authorities – preferably integrated environmental and social assessments before licences are tendered or granted.

The paper concludes that it would be beneficial to use IBAs more strategically and long term than is currently the case. For example, there is a need to consider education and research and allocate funding for this in the IBA. This will ensure that society in the long term – and on a national, rather than the current very local, level – would benefit from the agreements entered into by natural-resource companies. It is argued that companies run the risk of investing in short-term benefits for local inhabitants, such as sports facilities, rather than longer-term community improvements.

To ensure the provision of longer-term goals, it is proposed that an independent panel be set up to help identify possible strategic objectives that can benefit society. This would also promote project stakeholders, including residents and relevant NGOs, being invited to participate in identifying these goals.

Overall, it is concluded that there is large need to strengthen civil society to engage in informed dialogue with companies and decision makers. Generally, the relationship between authorities and citizens is not strong enough. Similarly, the capacity of the central administration requires strengthening to deal with the complexity of natural-resource projects. Partly in order to give large companies the necessary service and feedback and partly to ensure transparent management.

The paper also noted that there are currently several organisations in Greenland that have voluntarily joined forces to stimulate debate and provide information about possible projects and their impacts, which they believe is missing in connection with the public involvement. This is seen as a strong indicator that the need for better information is genuine, and suggests a clearer focus is required on motivating increased production and distribution of knowledge on natural-resource projects based on local areas of interest.

Another important point in the paper is the need for a clearer focus on due diligence, meaning that public involvement should be introduced at the very early stages rather than much too late, as is currently the case. The early involvement should feature e.g. dialogue between the various stakeholders on their individual goals for public involvement to give the authorities a solid foundation that can be applied to set more specific standards for public involvement. Similarly, the dialogue should also address what direction we want for society in the long term and how the next few specific projects will contribute to or possibly hinder these goals being achieved. It is argued that this will increase the potential for more informed dialogue on the pros and cons of each project.

G. LAW

Language: English and Danish. This background paper begins by explaining the Greenlandic self-rule legislation, including the position of the natural resources in the Kingdom. It then reviews a number of legal respects that are relevant to the exploitation of natural resources.

The paper examines the licence system related to the exploration and extraction of minerals in Greenland. It finds that the frameworks for licensing are well described, and there is extensive regulation regarding the closure of projects to ensure that the licensee follows the project to completion. It is noted that the respective rules governing hydrocarbon licences and other mineral licenses differ from each other in several cases. Whereas the rules for hydrocarbon licences are very specific and intricate, regulations for other mineral licences are less detailed.

The background paper reviews a number of model standard licenses for exploitation, showing that the licenses all have similar and systematic structures. Different rules seek to ensure Greenlandic interests in the natural-resource extraction in different ways. Some confusion can arise concerning the question of applicable law. Danish law is applied to a large extent, but in certain contexts both Danish and Greenlandic law are referred to.

The paper points out that, according to the Mineral Resources Act, a licence for exploration and/or exploitation may be subject to the use of *Greenlandic workers and Greenlandic businesses*. The provision does not give rise to conflict with EU rules, as Greenland is not a member of the EU. The provision anchors the strategy for the contribution of the natural-resource industry to support the sustainable development of the Greenlandic society. The specific agreements are made through Impact Benefit Agreements (IBA). The paper also states that the obligations of the licensee seem vague, and it is doubtful how far they can be enforced. This also applies to the obligation to use Greenlandic labour. IBA agreements do not necessarily have built-in penalty clauses. It is worth considering whether the IBA model is of such importance to Greenland's yield from mineral deposits that parliament should legislate a more detailed framework for this. The background paper also deals with the management structure of the mineral resource area. Here it is noted that a new provision in the Mineral Resources Act section 3 (b) means that an appeal against a decision made by the BMP or the Environmental Protection Agency for Mineral Resources must be brought before the government. As a popularly elected political body, the government cannot be considered to be an independent appellate body.

The background paper also discusses liability for pollution damage and injuries related to the extraction of natural resources. The Mineral Resources Act contains detailed rules on operators as well as the licensees' liability for pollution damage. It is concluded that in general, strict liability applies, but that no clear picture exists of how far responsibility extends for the players and the licensee licensees, as some overlap seems to exist between two different sets of rules. There is also no legislation expressly addressing the importance of the Self-Rule Authority's representative NunaOil being permitted to act as a licensee. With regard to liability for oil pollution damage caused by ships, the principle of the Danish maritime law generally applies. Finally, liability for occupational injuries is mainly subject to Greenlandic law. To some extent, Danish tort law also applies. The question of the precise interaction between these two sets of rules has so far not been studied. The Greenlandic rules governing liability for occupational injuries apply to all workers in Greenland.

On the issue of extraction of mineral deposits containing uranium, the paper concludes that clarification is required concerning whether the extraction of uranium as a by-product for export purposes will be permitted. If uranium may not be produced as a by-product, it would be a waste product that should be handled with consideration for the environmental and health risks. To the extent that Greenland exports uranium, the specific regulations of the International Atomic Energy Agency (IAEA) and Greenland as well as the Kingdom's obligations should be addressed. The paper also notes that it has been estimated that in the given circumstances, up to 10 years are likely to pass before the necessary legal frameworks for any uranium exports are in place. Overall, the paper finds that the regulatory framework in Greenland is of good quality and fully on a par with similar legal regimes in other countries.

H. VALUE CREATION AND RIPPLE EFFECTS

Language: English. This background paper describes the factors influencing value creation in relation to natural-resource extraction projects.

The paper describes a series of regional "input factors" of importance to value creation, such as accessibility and competitiveness in relation to labour and subcontractors. It also describes the importance of developing concepts and technology in mining companies and exploration companies. The timelines for exploration and exploitation, composition of teams, employees' international competitiveness and the degree of processing of natural resources locally versus processing elsewhere are of particular significance to companies.

The paper also shows that producers in high-cost

countries such as Greenland typically attempt to reduce production costs through automation and limiting local processing, for example. Another way to cut costs may be the so-called "integrated operations" which involve running a project from another country from where subcontracting is also sourced.

On the input side, the value of natural-resource projects depends on factors such as available labour at production level in the area, administrative skills, quality of subcontractors, venture capital and the degree of entrepreneurial culture.

The paper concludes that although there are many positive initiatives in Greenland, the country also faces the great disadvantage that the resources available for most of the necessary input factors are limited. This means that the timing of new projects, contracts that give more rights to the producer, and partnerships with companies and governments in neighbouring countries will be key factors for successful projects.

An important point in the background paper is that although it is possible to run many projects in parallel during the exploration phase, it would be extremely risky to do the same during the exploitation phase. This is also linked to Greenland's dependence on the highly volatile market for both living and exhaustible natural resources. If Greenland decides to invest heavily in the development of natural-resource extraction, a global recession could have devastating effects on the country's economy. These risk factors also indicate that many of the exploration companies' forecasts for job creation and revenue for Greenlandic society may be overly optimistic. It would be more expedient to include independent analyses, which draw on the experience of other countries with high levels of costs, in the companies' rough calculations.

In the long term, Greenland has genuine potential as a producer of hard minerals and oil. However, the actual value creation is difficult to predict as it will depend on global market prices and the extraction in question. The paper concludes that the central administration of Greenland and other public institutions are well developed, but are experiencing problems because of their modest size. There is a distinct lack of private companies and venture capital, which increases the pressure on the Self-Rule Authority.

The potential for revenue from natural-resource projects is related to company tax, royalties, income tax and secondary effects of infrastructure investments. The paper describes the experience gained in Norway, which shows that the secondary effects of natural-resource projects in the short term are small, but accumulate over time. Additional value-adding effects could come through higher spending and tax from subcontractors. The effect will increase over time as the skills and number of subcontractors rise.

I. INTERNATIONAL EXPERIENCE

Language: Danish. This background paper describes experiences from six different natural resource and large-scale projects in Norway, Iceland, Canada and Alaska. All the examples describe the construction and production phases of the projects, and also deal with the impact of projects on the community, education, labour market, housing market etc. The examples describe projects in different phases of their life cycle and are specially selected because in different areas they can be compared with Greenland and the challenges facing the country in areas such as infrastructure, labour, education, and public participation.

Examples from Iceland are the aluminium production facilities ISAL and Fjardal.

ISAL has 450 employees: 70 people with higher education and 100 skilled employees. The remainder are unskilled labourers but have attended short courses. Some young students find employment there during the summer holiday. The company appears attractive with many employee benefits. On-going training and co-operation with trade unions offer loyalty and continuity. An informal agreement to employ mainly local workers has produced results. The company is also an example of a high degree of public involvement. Local residents have been asked and have voted against the expansion of ISAL. The company has therefore now decided to expand production within the existing framework.

Fjardal has 450 employees. During the construction phase, the company had considerably more employees – though few local hires. During the operational phase just under 80% of the employees are local hires, which is twice the number expected.

Experience gained in Iceland shows general satisfaction with the presence of the companies and their impact on the local economy. Whereas Greenland is struggling with unemployment and a generally low level of education, Iceland has faced low unemployment, which has created a shortage of labour. Attractive employment conditions and marketing of the region, however, has successfully attracted the necessary labour. The proportion of locals involved in the projects has exceeded expectations. The proportion of unskilled

workers and young people who find permanent or temporary work with the projects and are trained through short courses, has also proved high.

In the cases studied, the proportion of foreign workers in the construction phase has been relatively high, and expectations regarding the use of local suppliers during the construction phase have not been met. Lessons from Iceland also show that processes with a high degree of public participation are instrumental in creating mutually good relations between local people and the industry. Similarly, experience gained shows that involving environmental organisations can have a positive impact on the preparation of relevant environmental assessments etc.

The description of the experience gained in Norway is based on the SØRAL aluminium plant, which has 380 employees, and ÅRDAL, which for long periods had more than 1000 employees, and thus dominated developments in the local community of about 5,500 inhabitants. The plant is being shut down in phases, and the Norwegian government has injected funds for supporting the development of alternative activities to replace the many lost jobs.

The oil and gas industry in Norway is large, and naturally the background paper therefore deals with this. It draws mainly on Snøhvit gas field. Around 1,500 people were employed during the construction phase. Unlike previous large-scale projects, the Norwegian government has not demanded that local labour should be prioritised, which has had major consequences. There have been concerns about an influx of 1,500 people from outside the local area, but this has proceeded painlessly, and has simply led to higher turnover in the nearby town. A negative consequence has been rising house prices in the area. Experience from Norway shows that provisions concerning the use of local labour can make a difference to local communities. Norway has also worked with a district policy that has attempted to decentralise government activities in order to support the peripheral areas.

In Alaska, development companies receive compensation from oil companies, which is intended to ensure business development in the area – a practice that has produced mixed results. However, developing subcontractors for the oil companies, in the catering and construction sectors, for example, has been largely successful. Trade unions in the area are weak, however. Alaska has experienced major immigration, and indigenous peoples now constitute a minority.

The experiences of other countries can be useful (Photo: Rebekka Knudsen)

Early on, Alaska established a wealth fund to secure the state against an economic boom followed by great recession. Today, the fund contains $22 billion. Half has been invested and is being used for the for state expenses, whereas the other half is being paid out to state residents.

Although the oil industry employs between 7,000 and 8,000 people, the percentage of local employees is marginal. Most are skilled workers with previous experience in the oil industry, while a smaller proportion are administrative employees. Characteristically, the oil industry largely prefers experienced people who have been trained by the companies themselves. This makes it difficult for young people in small communities to find employment.

The vast majority choose not to relocate. This is possible because of the oil industry operates with a 2 weeks on-2 weeks off scheduling structure. Some people also choose to move to larger cities once they start earning more money. Natural-resource projects could therefore result in depopulation of smaller municipalities.

Overall, the experience from Alaska shows that establishing a wealth fund can make major difference. In contrast, the connection with local communities has almost exclusively been carried out through transfers from this fund, although there has been no development of the service sector as a result of the oil industry. Alaska has no specific experience to offer in terms of public involvement. And finally, a significant lesson learned is that local residents who lack skills may have difficultly finding employment.

Experience from oil and gas extraction in Canada shows that the projects generate significant local investment, and the need for labour has proved greater than first calculated. Unlike Alaska, trade unions are strong here, and strong emphasis is placed on hiring local – or at least Canadian – labour. Training courses have been established that qualify residents to work in the industry. Companies helping to finance training, just as they are instrumental in helping local businesses to get off the ground.

The projects are not thought to have had a major impact on population settlement patterns. A positive effect can be traced in terms of reduced emigration, and local economic projects have had an effect in terms of revenue for sub-contractors and service companies. Finally, efforts have been made to isolate the activities from the surrounding community by building camps in mining areas that have their own healthcare providers, for example. This has helped to reduce the pressure on the public health system.

J. ASIA

Language: English. This background paper focuses on describing China's, Japan's and South Korea's interests in Greenland's geological resources. The paper focuses on the fact that the large amount of publicity concerning China's potential forthcoming presence in Greenland in connection with natural-resource projects, entails several problems. Firstly, the debate on China helps depict its interests in a way that is unrealistic. Secondly, this has also overshadowed the focus on other Asian countries, which could be just as important in the Greenlandic context. The paper also reviews the market for natural resources in the Asian countries described.

The background paper's review shows that all the three Asian countries have an interest in the Arctic region. The countries' economic growth – together they contribute 75% of Asia's total GDP – and climate change has fuelled this interest. As it currently appears, the primary interest for the Asian countries concerns the possible future shipping lanes northeast of Greenland. In addition, research interest in the Arctic is increasing. The Chinese government has earmarked resources for Arctic research, including the establishment of the Polar Research Institute of China in Shanghai.

The Asian countries share a particular business structure, with several large state-owned enterprises and/or the government monitors corporate investments abroad. However, it is worth noting that this structure no longer means that commercial interests are being put on the back burner in favour of the government's potential strategic interests. The prerequisite for Asian investments in Greenlandic natural-resource projects is mainly that the projects are deemed economically viable.

All three countries depend heavily on oil from the Middle East and the countries' energy needs are increasing. The need for minerals is more complex. Both China and South Korea are clearly hoping to increase their uranium resources for energy production, while Japan's needs have currently stalled on account of the 2011 accident at the Fukushima plant. The Asian countries studied are all also increasing their foreign investments.

Chinese companies are currently active in the Arctic and have also invested in Canadian and Icelandic projects. In a Chinese context, it is also particularly worthwhile to look at the state-owned companies, which are by far the largest and have the best loan options relating to China's "Go Out" strategy, which involves investments abroad. Experts interpret China's investment strategies in different ways. However the main interest appears to be commercial and rooted partly in the desire to strengthen the Chinese companies' competitiveness against international companies.

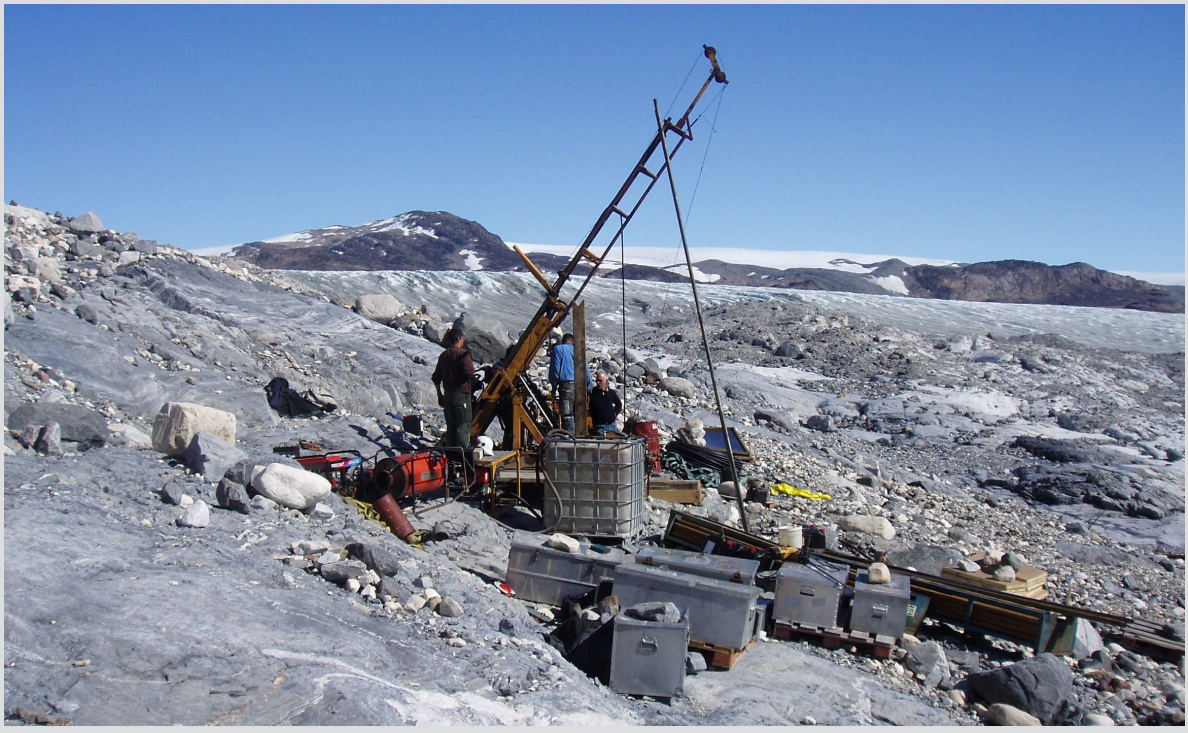
At the same time, China is experiencing a great need for natural resources, and although China remains self-sufficient in most areas, there is a clear interest in expanding access to strategic natural resources. While investing in foreign natural-resource extraction, China is prioritising engaging in collaborative projects with local or other external firms. It is also noted that the Chinese government has applied strict restrictions on how foreign companies can enter the Chinese natural-resource market. Basically, it is possible only in collaboration with a Chinese company.

Japan has maintained a presence in the Arctic for many years and the Japanese shipping industry began expressing an interest in the sailing route through the

Northeast Passage in the 1990s. As well as having clear research interests in the Arctic, Japan has strong relations with Greenland because of the trade in living resources, i.e. Royal Greenland currently dominates 25% of the Japanese prawn market. Finally, Japan participated in the Greenlandic KANUMAS project, which since 1989 has made a number of geological oil exploration studies in the waters around Greenland. However, the Japanese government has no definite Arctic strategy and is therefore not seen as a country with a distinct strategic interest in Greenland, although it clearly has commercial and research opportunities. The need for natural resources in Japan is currently balanced, however, the need to seek out more sources of natural resources in the future is recognised. Japanese companies have been investing more in foreign natural-resource projects, even in the wake of the financial crisis. Japanese companies are aware of Greenland's potential, but are concerned whether deposits will be economically profitable. The Japanese mining industry has asked the government for increased support, including amendment of the support system to entice the Japanese companies to engage in projects in developed countries.

South Korea's interest in Greenland has so far focused mainly on shipping lanes and trade in living resources, and has therefore reflected a financial bias. The country has not yet invested in Arctic natural-resource projects. However, the background paper estimates that South Korea's interest may become more strategic partly because the use of a shipping lane through the Arctic will provide an opportunity to continue its economic growth. This item ranks number 13 on a list of 140 goals for the government over the next five years. In 2013, the government launched a plan for South Korea's activities in the Arctic. The plan includes increasing Arctic research and contributions for the "Arctic business model". South Korea is therefore showing more political interest in Greenland, and has also sent several delegations to visit the country. The South Korean media are also helping to paint a positive picture of Greenland as an exotic destination and land of opportunity as far as natural resources go. The paper notes that South Korea has economic potential and great experience of participation in e.g. construction projects in other countries and under very difficult conditions. The country is therefore believed to be a potential partner for Greenland in terms of both mining and infrastructure projects. As for the Nordic countries, South Korea has a "green growth" focus.

Asia's – especially China's – interest in Greenland is making headlines. There are examples of Chinese economic activities abroad that have caused problems, with tension and conflicts in the relationships between the local population and the Chinese investors and their representatives. However, these difficulties do not essentially differ from conflicts between local populations and investors from other parts of the world.



Limiting the number of mining projects could be to Greenland's benefit (Photo: Minik Rosing)

2. THE LARGEST PROJECTS IN THE PIPELINE AND THEIR SOCIO-ECONOMIC IMPACT

It is extremely difficult to find valid figures illustrating how much revenue the companies expect to generate from natural-resource projects, and how much can be a resource for Greenland as a consequence.

The table below is based on assumed figures and estimates that were found on the companies' websites, in public presentations from the Bureau of Minerals and Petroleum, consultant reports etc. The table shows a few highlights for the largest of the projects that the Greenlandic Ministry of Mineral Resources and other sources considered front runners when the Committee was compiling this report.

Often large gaps exist between the estimated revenue and number of employees expected to be engaged in the projects. This indicates that it may be very difficult, also for the companies themselves, to predict how much labour a given project will need and how much revenue it will be possible to generate.

Finally, all the projects entail a number of risk factors are not always clear. These challenges can relate to climate, logistical problems or fluctuating prices on the global market. These factors can all help to delay, increase costs or simply make projects impossible

London Mining – Isua
The company aims to obtain financing in 2014. In the design phase, the proceeds for Greenland will be personal taxation of the labour force with tax losses deducted during the establishment phase.

Life cycle: 15 years
Production: The mine will – if financing is found in 2014 – be able to produce iron ore concentrates starting in 2017.
Revenue: London Mining expects to contribute DKK 32 billion to Greenlandic society over 15 years. The direct revenue from this totals about DKK 28.5 billion with indirect revenue of DKK 3.5 billion.
Employees: Up to 3,000 people during the construction phase. Between 600 and 800 people during the operational phase.

GME – Kvanefjeld

Life cycle: 30 years
Production: Production expected to begin in 2017. Construction phase expected to start in 2015.
Revenue: DKK 37 billion in direct revenue during the project life cycle and between DKK 1.5 billion and DKK 4 billion in indirect revenue. Revenue from income tax from subcontractors will add to this.

Employees: An estimated 380 people can be employed during the operational phase.

Ironbark – Citronen Fjord
The mine will be based in northeastern Greenland. The company states in its own material that the climate and lack of infrastructure may present considerable challenges.

Life cycle: 12-15 years
Production: Application expected in 2014.
Revenue: DKK 115 million annually in income taxes and DKK 152 million a year in corporate taxes. Income tax from subcontractors will add to this. Total annual revenue for Greenlandic society is DKK 267 million.
In all, the project is expected to generate DKK 2.2 billion in direct revenue and DKK 1.5 billion in indirect revenue during the mine's life cycle.
Employees: Around 450 people during the operational phase.

3. GREENLAND IN FIGURES

Greenland is the world's 12th largest country ...
An area of 2,166,086 square kilometres – 50 times larger than Denmark. The distance from north to south is the same as from Copenhagen to Istanbul.

...with a very small population
Just 56,370 people inhabit Greenland. About 16,500 of them live in Nuuk. About 48,000 live in towns, while 8,200 live in the settlements.

... which is becoming smaller and older
The total population is expected to fall over the next 20 years to 56,000 in 2020 and 55,000 in 2030. By 2040, around 2,500 fewer people will be living in Greenland than today.

Unemployment is high...
In August 2013, 2,850 people were looking for jobs compared with 2,607 people in the same month of the previous year. The workforce totals 26,791 people (2011). The average monthly unemployment rate is 9.4%.

...and few people have an education
Some 70% of people aged 15-64 have only a primary school education. In 2011, 1,474 people started an education programme. About 50% of them completed the programme: 406 skilled, 133 medium-term education, 46 long-term higher education.

A small economy...
The country's total GDP is DKK 13.1 billion, of which DKK 3.5 billion consists of the block grant from Denmark.

...with relatively few and small companies
In 2011, 3,860 companies were based in Greenland. Almost 75% of these were owner-operator firms with fishing by far the most common occupation. Some 93% of Greenland's exports of goods originate from fishing and the industry generated DKK 2.6 billion in foreign revenue in 2011.

4. ABOUT THE COMMITTEE

The Committee for Greenlandic Mineral Resources for the Benefit of Society was formally established on 1 March 2013, and the mandate for the work is as follows:

A. THE COMMITTEE'S MANDATE

"The Committee is to be composed of between three and five members appointed by Ilisimatusarfik and three and five members appointed by the University of Copenhagen. Members are appointed by the two universities' respective rectors and composed of candidates with specialist expertise in the relevant disciplines. The rectors of the two universities comprise the overall Steering Committee along with two professional representatives of the Committee, i.e. one appointed by each of the two institutions. The rectors jointly appoint a Chairman of the Committee.

The two universities are tasked with establishing a special secretariat to support the Committee, which can also draw on expertise from outside or from other parts of Ilisimatusarfik or University of Copenhagen, as agreed.

The Committee's duties are to examine what the parties in Greenland and Denmark can do together to ensure the socially beneficial exploitation of Greenland's natural resources and to formulate proposals for possible specific steps that could be taken by Greenlandic and Danish partners, individually and collectively. The Committee's proposals should aim towards actions that at the same time strengthen Greenlandic society's opportunity to benefit directly from the investment in exploitation of Greenland's natural resources, particularly in terms of job creation, while opening up for a more active role for the Danish business community and Danish investments.

The Committee will finalise and publish its report by the end of 2013 in a form that is also a suitable basis for public debate. The Committee has been tasked with analysing:

1. What practical potential exists in Greenland for the extraction of mineral resources, oil/gas, hydropower and fresh water and how does this potential relate to the scope of any potential extraction projects defined by investment requirements, labour requirements during the construction, mining and closure phases as well as the life cycle and environmental impacts. The Committee is not to carry out independent investigations but build on existing knowledge,

from e.g. GEUS, NunaOil, NunaMinerals, the BMP and universities.

2. Different models to provide the necessary financing, including the availability of Danish/Greenlandic capital, and international opportunities such as in the Nordic region and Europe/EU.

3. Experience with regulatory and contractual frameworks for foreign-funded and conducted mineral exploration in other highly developed countries, such as Norway, Canada and Australia.

4. International experience in the regulation of large-scale projects, so that undesirable demographic, political, including any security policy, and environmental impacts are avoided.

5. How different categories of exploitation of natural resources and their financing can create value in Greenland and Denmark, both in terms of business opportunities, education, research, tax revenue and building or supporting infrastructure.

6. In addition to the above factors, the Committee may also include other items that it considers essential to ensure the socially beneficial exploitation of natural resources in Greenland.

B. DISSENTING OPINION

Gudmundur Alfredsson wished to express the dissenting opinion as follows:

"Preparedness is good and that is true for the debate about the exploration and exploitation of natural resources in Greenland, and this report raises a number of issues worthy of careful consideration.

I do, however, object to the report's repeated references to and emphasis on the involvement and participation of Denmark (and the so-called Kingdom) in the exploitation of these resources.

This approach seems rooted in the colonial past and not as an earned or deserved privilege, especially as this is done without looking at whether this avenue of continued Danish involvement is in the best interest of Greenland and the people of Greenland, and without subjecting a possible Danish role to desirable competition from other countries if or when greater interest, more expertise or better conditions, prices and/or support would be available.

At the same time, maybe for related reasons of supposed Danish entitlement, the report tends to talk down to and is unnecessarily negative and pessimistic about the independence option and the ability of the Greenlanders to do things by themselves and for themselves. For example, it borders on the absurd to claim that independence would result in undermining traditional culture, such as hunting and fishing; this goes against history in Greenland and in other colonial situations.

Additionally, there is no mention of free association in relation to the existing terms of self-rule or as a future constitutional option, with an enhanced ability to engage in international relations and international co-operation."

C. WORK FORM

The Committee's work was carried out over the period March to December 2013. The Committee held eight meetings to discuss the theme of natural resources from different angles, including a four-day residential stay in Greenland, where Committee Members met individuals active in the raw-materials industry. The Committee Members have all contributed to one or several background papers, which can be found on the Committee's website (http://news.ku.dk/greenland-natural-resources/).

The background papers are based on existing research. Project co-ordinators have been personally responsible for gathering material and information from relevant people from both the inside and outside the Committee. All background papers are peer reviewed[18]. The background papers, supplemented by input from stakeholders in the natural-resources industry and the involvement of relevant supplementary material where necessary, form the substance of this report.

D. MEMBERS

The Committee Members were appointed by the Rector of the University of Copenhagen, Ralf Hemmingsen and the Rector of Ilisimatusarfik, Tine Pars. The two rectors have each appointed about half of the Committee Members. The Chairman of the Committee was also appointed jointly. Members conducted research in all the areas that the rectors have found relevant in relation to the exploitation of the Greenland's natural underground resources.

Professor Minik Rosing is Chairman of the Committee.

18. The background paper "Value creation and ripple effects" was not peer reviewed.

The Committee's work has been followed by a Steering Committee consisting of the Chairman and the two rectors.

The Committee is multidisciplinary and consists of 13 scientists from nine research institutions. Together the Committee Members cover a wide range of disciplines from law and economics to biology and geology.

Professor Minik Rosing (Chairman)
Natural History Museum of Denmark
Disciplines: Geology. Areas of specialisation include research into the geological exploration of Greenland with a focus on rock formation environment for the oldest sediments on Earth found in Isua at Nuuk
Appointed by: Ilisimatusarfik and the University of Copenhagen
Background paper: Responsible for the paper "Den geologiske baggrund for Grønlands naturressourcer". The paper was peer reviewed by Karen Hanghøj, GEUS and Flemming Christiansen, GEUS

Head of Research and Advisory, Senior Scientist PhD, Anders Mosbech
Department of Bioscience – Arctic Environment, Aarhus University and affiliated with DCE (Danish Centre for Environment and Energy), and Arctic Research Centre at Aarhus University
Disciplines: Biology and the environment. Specialities include research into Arctic marine mammals, seabirds and marine ecology, and how exploration and extraction of natural resources affects the environment
Appointed by: Ilisimatusarfik
Background paper: Responsible for the background paper "Miljøeffekter af råstofaktiviteter i Grønland". The paper was peer reviewed by Lars-Henrik Larsen, Head of Department at Akvaplan-Niva a/s Tromsø, and Søren Hald Møller, the Environmental Agency for the Mineral Resources Area, EAMRA, Greenlandic Self-Rule Authority

Associate Professor Anne Merrild Hansen
Department of Development and Planning, Aalborg University
Disciplines: M.Sc, planning. Specialities include research on strategic environmental assessments and Assessment of Social Impact (ASI) with a focus on assessing the risks and maximising the positive impacts, and reducing the negative impacts on local communities and mining companies in Greenland
Appointed by: Ilisimatusarfik
Background paper: Responsible for the background paper "Community impacts". The paper was peer reviewed by Peter Croal, P. Geol. International Environment and Development Advisor, Canada and Professor Frank Vanclay, Rijksuniversiteit, Groningen

Professor Bent Ole Gram Mortensen
Department of Law, University of Southern Denmark
Disciplines: Law. Specialities include research into legal issues in the energy sector, including oil and gas extraction, renewable energy and electricity supplies.
Appointed by: Ilisimatusarfik
Background paper: Jointly responsible for the background paper "Juridisk Baggrundspapir". The paper was peer reviewed by Thomas Trier Hansen, Nordic Law Group

Professor Vibe Garf Ulfbeck
Head of CEVIA
Disciplines: Law. Specialities include research into property, tort and contract forms between public and private players. Jointly responsible for the background paper "Juridisk baggrundspapiret"
Appointed by: University of Copenhagen
Background paper: Jointly responsible for the background paper "Juridisk baggrundspapir". The paper was peer reviewed by Thomas Trier Hansen, Nordic Law Group

Professor Gudmundur Alfredsson
Professor at Polar Law, University of Akureyri, Iceland and Ilisimatusarfik
Disciplines: Law. Mainly research into humanitarian law and human rights
Appointed by: Ilisimatusarfik
Background paper: Contributed to the background paper on legal aspects. The paper was peer reviewed by Thomas Trier Hansen, Nordic Law Group

Associate Professor Frank Sejersen
Associate Professor at the Department of Cross-Cultural and Regional Studies, University of Copenhagen
Disciplines: Anthropology. Specialities include research with a humanistic and anthropological approach to Greenland's efforts to strengthen self-determination and social development
Appointed by: University of Copenhagen
Background paper: Responsible for the background paper on historical experience. The paper was peer reviewed by Martin Ghisler, Adjunct Senior Researcher Geocenter Copenhagen, Karsten Secher, Adjunct Senior Geologist, GEUS, Jens Dahl, Adjunct Professor at the Department of Cross-Cultural and Regional Studies at the University of Copenhagen

Senior Researcher Geir Helgesen
Director of the Nordic Institute of Asian Studies, University of Copenhagen
Disciplines: Asian studies. Research on Asian aspects with a focus on culture, politics and community building
Appointed by: University of Copenhagen
Background paper: Responsible for the background paper on Asia. The paper was peer reviewed by Ras Tind Nielsen, MSc. Political Science, ReD Associates

Klaus Georg Hansen
Head of Institute, Ilisimatusarfik
Disciplines: Ethnography. Specialities include research on public participation and democracy aspects of policy-making processes and issues concerning demographics and urbanisation in Greenland.
Appointed by: Ilisimatusarfik
Background paper: Contributed to the background paper "Community effects". The paper was peer reviewed by Peter Croal, P. Geol. International Environment and Development Advisor, Canada and Professor Franc Vanclay, Rijksuniversiteit, Groningen

Professor Mikkel Vedby Rasmussen
Head of the Centre for Military Studies at the Department of Political Science, University of Copenhagen
Disciplines: Security and foreign policy. Specialities include research on Danish security and defence policy and the challenges for the Danish armed forces in the Arctic
Appointed by: University of Copenhagen
Background paper: Responsible for the background paper "Greenland Geopolitics: Globalisation and Geopolitics in the New North". The paper was peer reviewed by Ulrik Pram Gad, Center for Advanced Security Theory and Jon Rahbek-Clemmensen, Centre for Military Studies

Professor Odd Jarl Borch
University of Nordland, Norway
Disciplines: Economics. Specialities include research on business development and offshore projects in the Arctic. Focus on entrepreneurship, innovation and regional development
Appointed by: Ilisimatusarfik
Background paper: Responsible for the background paper "Value creation and ripple effects"

Senior Researcher Rasmus Ole Rasmussen
Senior Researcher, Nordreggio
Disciplines: Geography. Specialities include research on regional development and impact assessments through production changes in Arctic communities
Appointed by: Ilisimatusarfik
Background paper: Responsible for the background paper on international experience. The paper was peer reviewed by Professor Lawrence C. Hamilton, University of New Hampshire

Professor Søren Bo Nielsen
Professor of public economics, Department of Economics, Copenhagen Business School (CBS)
Disciplines: Economics. Specialities include research on public finance, especially tax policy. External expert for the Self-Government Commission 2004-08 and Chairman of the Economic Council in Greenland 2009-10
Appointed by: Ilisimatusarfik
Background paper: Responsible for the background paper on economics. The paper was peer reviewed by Søren Bjerregaard, Head of Division at the Ministry of Economic Affairs and the Interior, and Diderik Lund, Professor of Economics at the University of Oslo

For the benefit of Greenland
The Committee for Greenlandic Mineral Resources to the Benefit of Society
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