Crisis

The Embassy of Waste
MSc3 Research Report

North Sea: Landscapes of Coexistence
Transitional Territories Studio 2019-2020

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Architecture Track

I want to thank my tutors Taneha, Kaveh, Sjap and Francesca, for making me step out of my comfort zone and supporting me as I ventured into the unknown. Thank you for the challenges, but above all, for the encouragement.

Thanks to the long distance and unconditional support from my family and to the companionship and growth from the good friends I have made in Delft.

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The Embassy of Waste
Longyearbyen , Svalbard

Abstract

In the current geopolitical climate, where Arctic nations are at the brink of conflict in their pursuit for influence and resources, mining has acquired a political character, establishing a delicate equilibrium between resource claims and the protection of the territory. This equilibrium is manifested in the Svalbard Free Zone, where all nations are free to make use of its resources, yet the presence of Norwegian population, and mining as raison d'etre of inhabitation, has acted as the entity of governance and ambassador for the best interests of the region. Nonetheless, with the ongoing end of coal mining in Svalbard, and the demise of Norwegian presence in the archipelago, the 'free zone' will face a state of uncertainty, vulnerable to the interests and disputes amongst the Arctic nations (Pedersen, 2017).

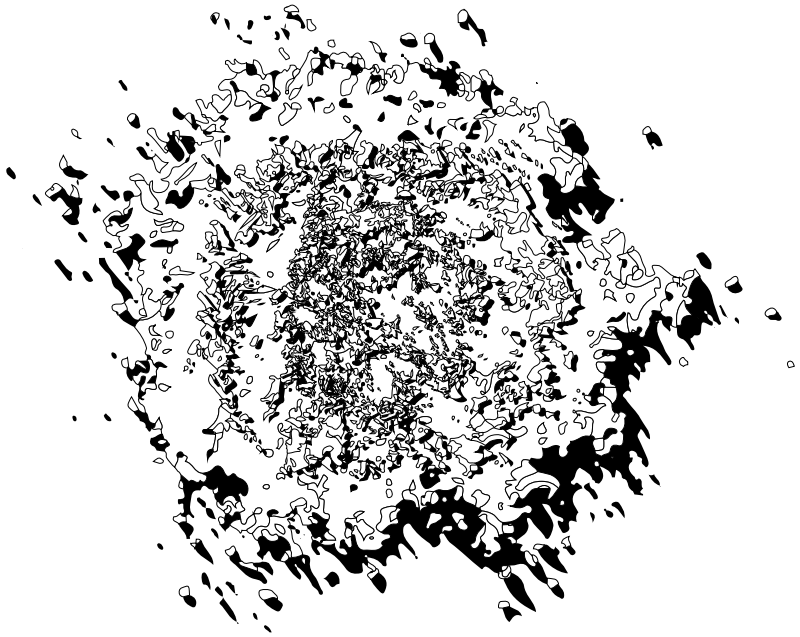
As the 'free zone's' uncertainty threatens the stability of the entire region, mining waste becomes a glimpse of hope towards a new form of political representation. While the Arctic communities face the havocs of such waste, its potential reuse makes it a novel resource and a chance for cooperation to counterbalance both its environmental effects and the political crisis that is about to unfold. Hence, the Embassy of Waste is a political manifesto that introduces the recollection and recycling of mining waste in the decaying mining community of Longyearbyen, Svalbard, in an attempt to become a novel tool towards the governance and self-sufficiency in the region.

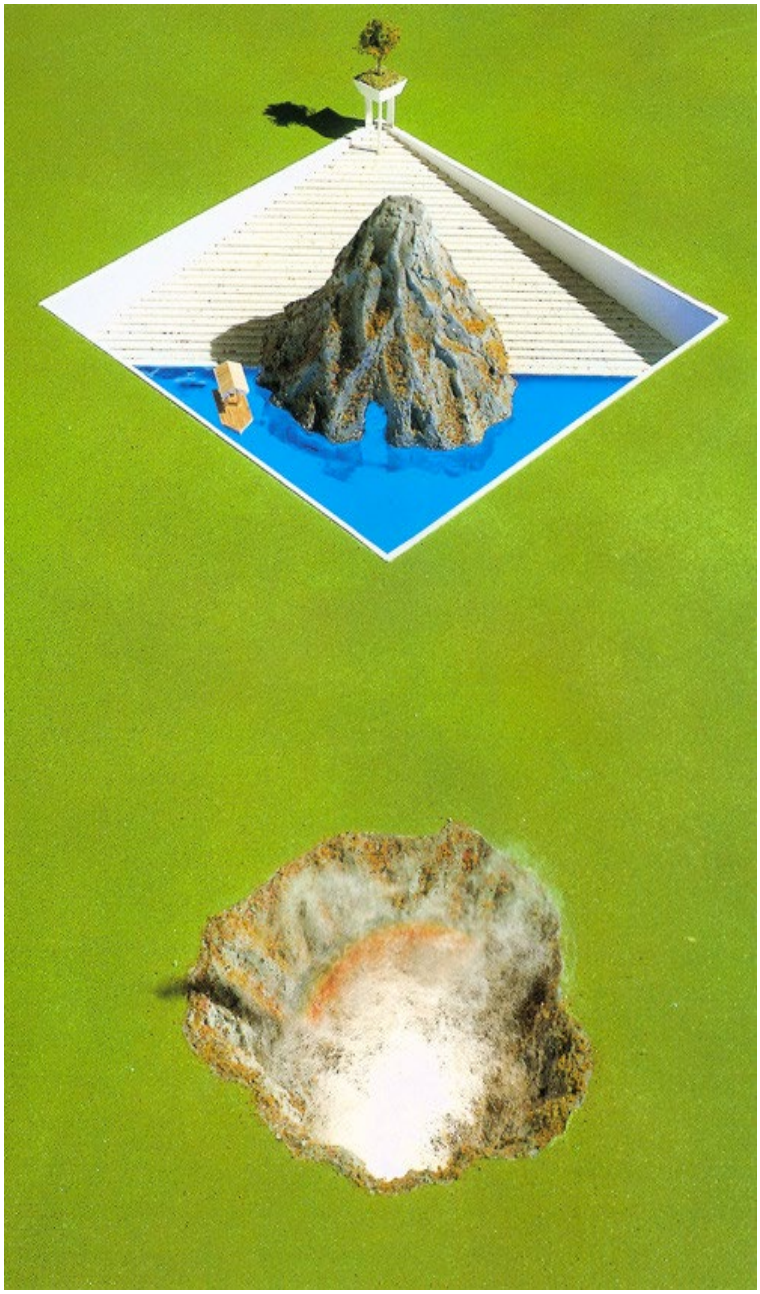
Lines of Inquiry
- Crisis of Representation
- Dual Nature of externalities

Pedersen, T. (2017). The Politics of Presence: The Longyearbyen Dilemma. Arctic Review on Law and Politics, 8(0), 95–108. https://doi.org/10.23865/arctic.v8.682

Mining Waste

- North Sea
- Arctic Resource Race
- Mining Paradox
- Mining Waste



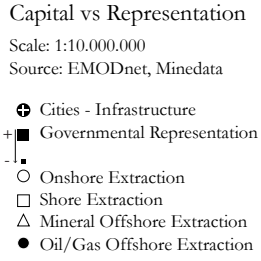


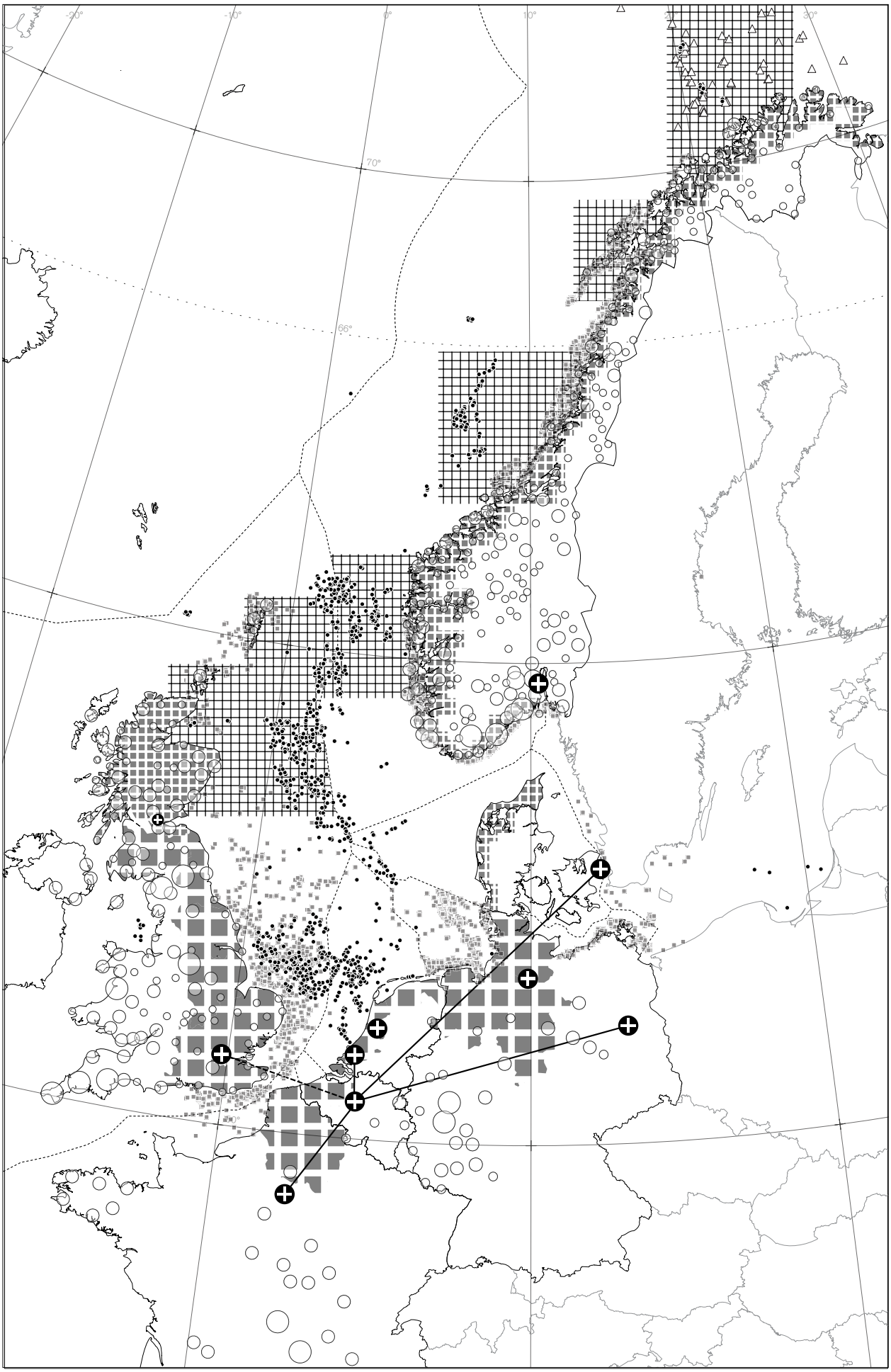
Emilio Ambasz, Emilio's Folly- Man is an Island

- North Sea
- Arctic Resource Race
- Mining Paradox
- Mining Waste

In the North Sea Atlas for the Transition Territories Studio, different lines of inquiry were analysed. The Crisis of Representation refers to the overlap between the different economic and extractivist complexities of the North Sea with the feeling of identity and representation of its people. When it comes to the resource extraction, there is an evident overlap and conflict between the major extraction fields both offshore and on shore, with the areas most isolated from the governmental representation centres. This is evident in the contrast between the highly industrialized south, which manages to have better coping mechanisms to deal with such infrastructure due to its highly urbanised context. Nevertheless, towards the north, Norway, Scotland and Denmark, the extractivist activities towards the sea overlap with very isolated territories, which often show a high sense of identity and belonging to their land, yet a low sense of governmental representation.

This overlap between representation and politics with the capital extractivism in the region is a key aspect of these research. This overlap becomes the base and departure point for the research below as it crosses the over extraction of resources with the social and political impact of these vulnerable territories.




-30°
-10°
0°
10°
30°
70°
66°

- North Sea
- Arctic Resource Race
- Mining Paradox
- Mining Waste

Mineral Extraction and Flows

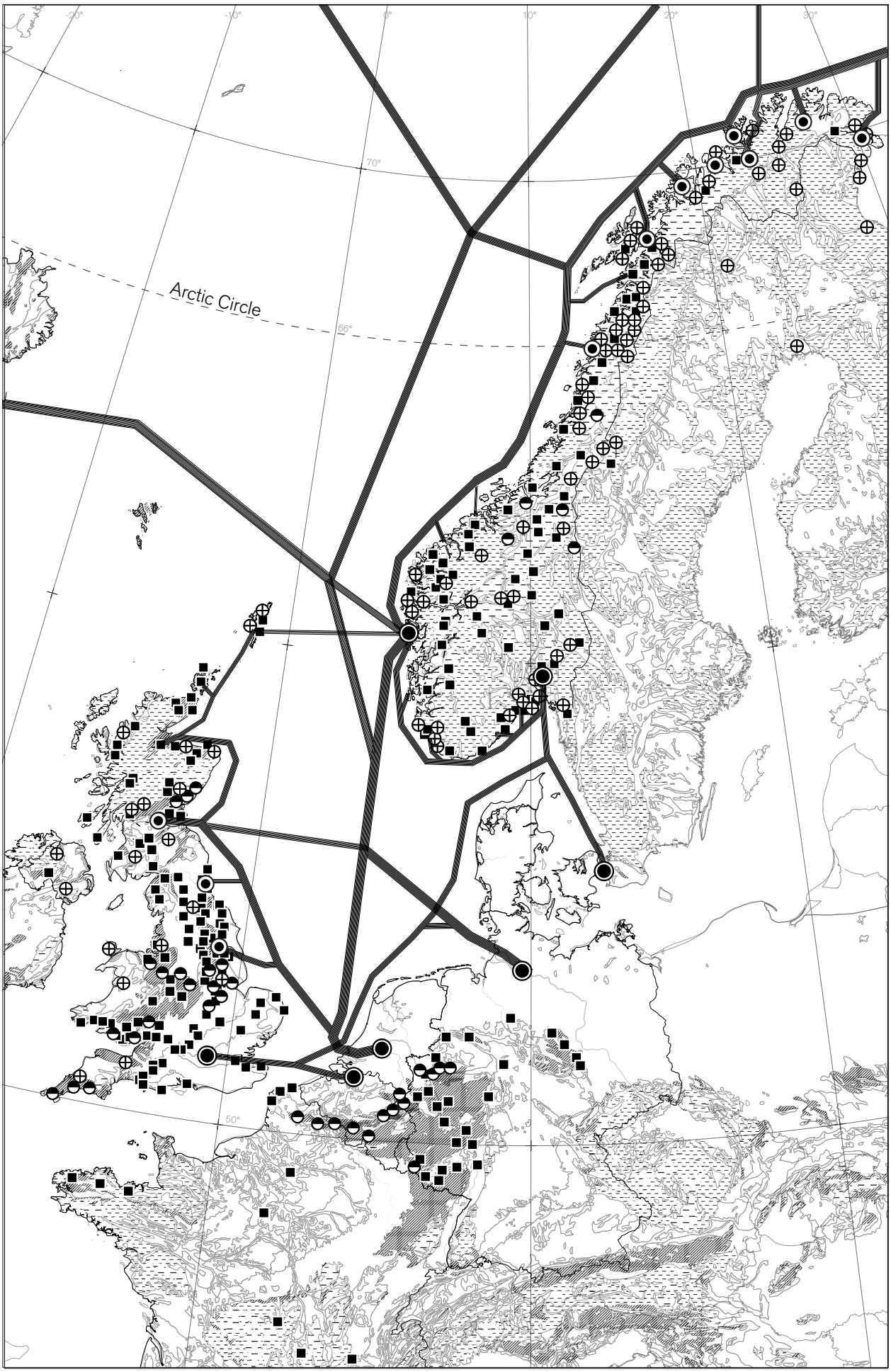
Unlike the oil and gas race which is rather current, the mineral resource extraction has been embedded in the dynamics of the region since the Vikings era. More recently, since the origin of the industrial revolution in the United Kingdom, to its further spread to the world, mineral extraction became an essential activity to literally boost the industrialized world. Due to its geological qualities and its traditional and ancient mining, both the United Kingdom and Norway have been the leading countries and main exporters of minerals like ore, stone and coal. The contrasting geological conditions between the ancient rock from Norway and the British isles and the sandy coast of mainland Europe created a dynamic of demand an offer. Norway and the UK provide, until this day, minerals to the rest of the continent. Hence, the transportation of earth (bulk carriers), is today one of the most intense flows between ports in the North Sea. Hence mining is intrinsically the consciousness between land and sea. The collection of earth from a territory transported and traded across the sea.

Today the North Sea region, particularly the United Kingdom and Norway, show a considerable amount of active mines through their territory. Above all, both nations are showing an increase in these activities, with a particular tendency to move toward the north. The new mining projects projected for the following years are mostly concentrated in the isolated and northernmost, parts of these nations.

Mineral Resource Extraction

Scale: 1:10.000.000
Source: USGS, Minedata

Coal Deposits
Industrial Mineral Deposits
Active Mines
Future Mines
Closed Mines
Bulk Carriers Flows


Arctic Circle
70°
66°
50°

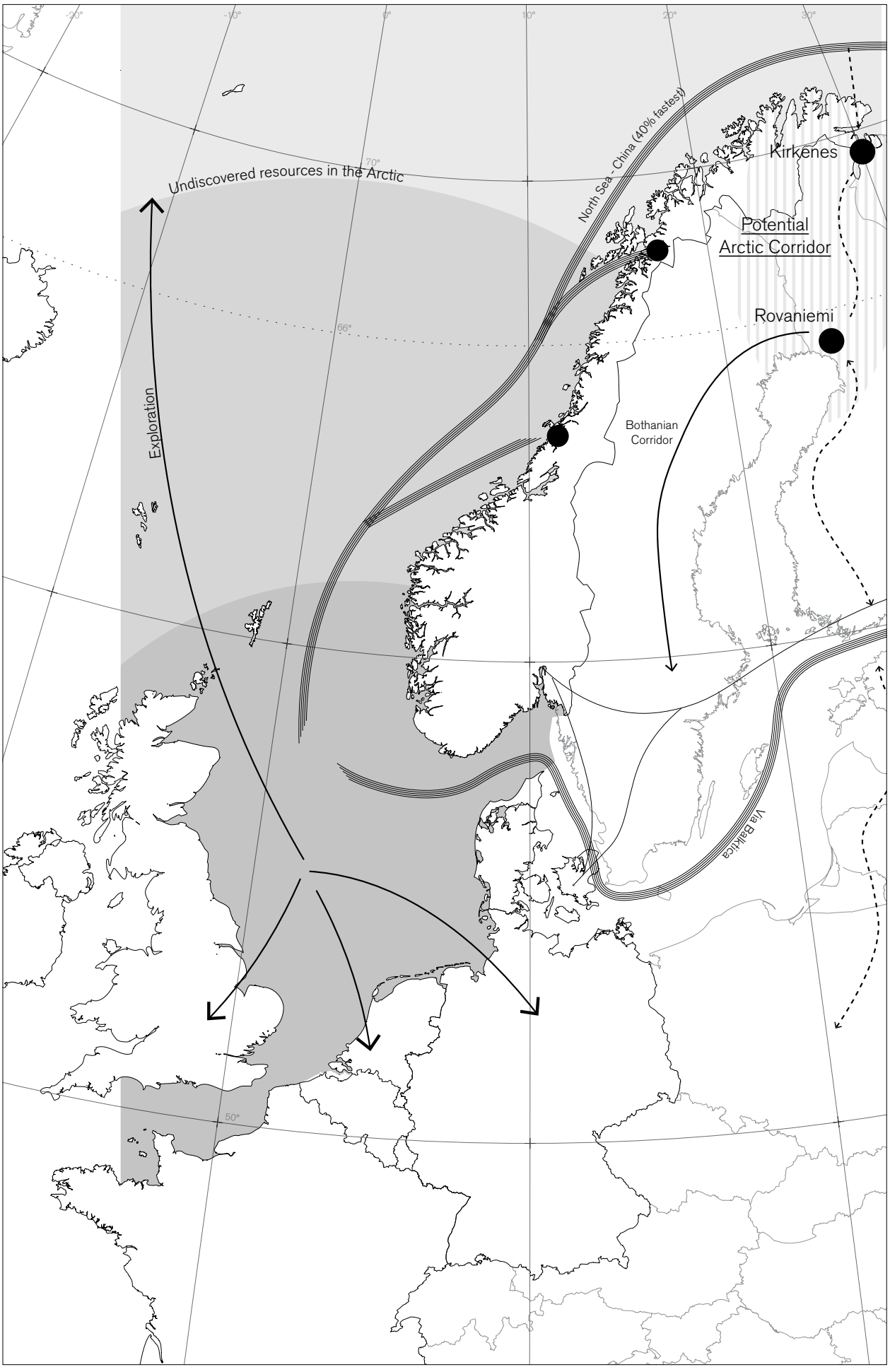
- North Sea
- Arctic Resource Race
- Mining Paradox
- Mining Waste

Northward Shift

The projection of new mines towards the north answers to a common pattern in the exploration of resources. Due to the over extraction of minerals, oil and gas, both in land and sea, the exploration has been moving upwards. The increasing accessibility in these isolated northern territories, the new infrastructure, new trading routes and recently discovered resource deposits is consolidating an evident shift in the exploration and extraction of resources. With the North Sea as epicentre of these activities, the shift is heading towards the Norwegian Sea, above the Arctic Circle. New infrastructure connections are allowing the North Sea to connect with the Baltic and Arctic Sea through Scandinavia. In the northward shift that the resource exploration is taking, Norway has a big role to play, as it stretches from the North Sea towards the Arctic Region, and is the epicentre of the rise in oil/gas, mineral extraction as well as transport and trading infrastructure.

Shift to the North

Scale: 1:10.000.000
Source: North Sea Atlas - Capital - Transitional Territories


Undiscovered resources in the Arctic
Exploration
North Sea - China (40% faster)
Kirkenes
Potential
Arctic Corridor
Rovaniemi
Bothanian
Corridor
Via Baltica
70°
66°
50°

The New Silk Route

The northwards shift towards the Arctic is a direct consequence of climate change and to the rapid transformation of the Arctic Territories. The accelerated melting of the icecaps is unveiling an incredible amount of resources that threatens to consolidate the Arctic as a new strategic territory for resource extraction. Additionally, the reduction of the sea ice extent has increased the accessibility to the region, not only making it easier to access to such resources, but consolidating new trading routes.

In the last years the Arctic region has been transformed into an important trading region. With the opening of two routes that connect the North Sea with China through both Russia and Canada, the Arctic has become the host of what is being considered the be the new "Polar Silk Road". As with the ancient road depicted by Marco Polo, the new Polar Silk Route connects two of the main cultural and economical centres in today epoch, through Arctic passages that beholds great riches in resources.

The fact that today it is possible to cross the Arctic Sea without much problem has shortened the trading routes between east and west considerable, revealing the potential of the Arctic region as a strategic region.

(Tillman, H., Jian, Y., & Nielsson, E. T., 20180

With the North Sea as economical and extraction center in today' trading context, the northward shift towards the Arctic is creating

Polar Silk Route

Scale: 1:10.000.000
Source: North Sea Atlas - Transitional Territories


China
USA
1970
1980
1990
2000
2007
2030
2050
2100
Canada
Greenland
(Denmark)
Russia
NORTHERN
Sea-Route
Iceland
Norway
NORTH SEA

Resource fields in the Arctic

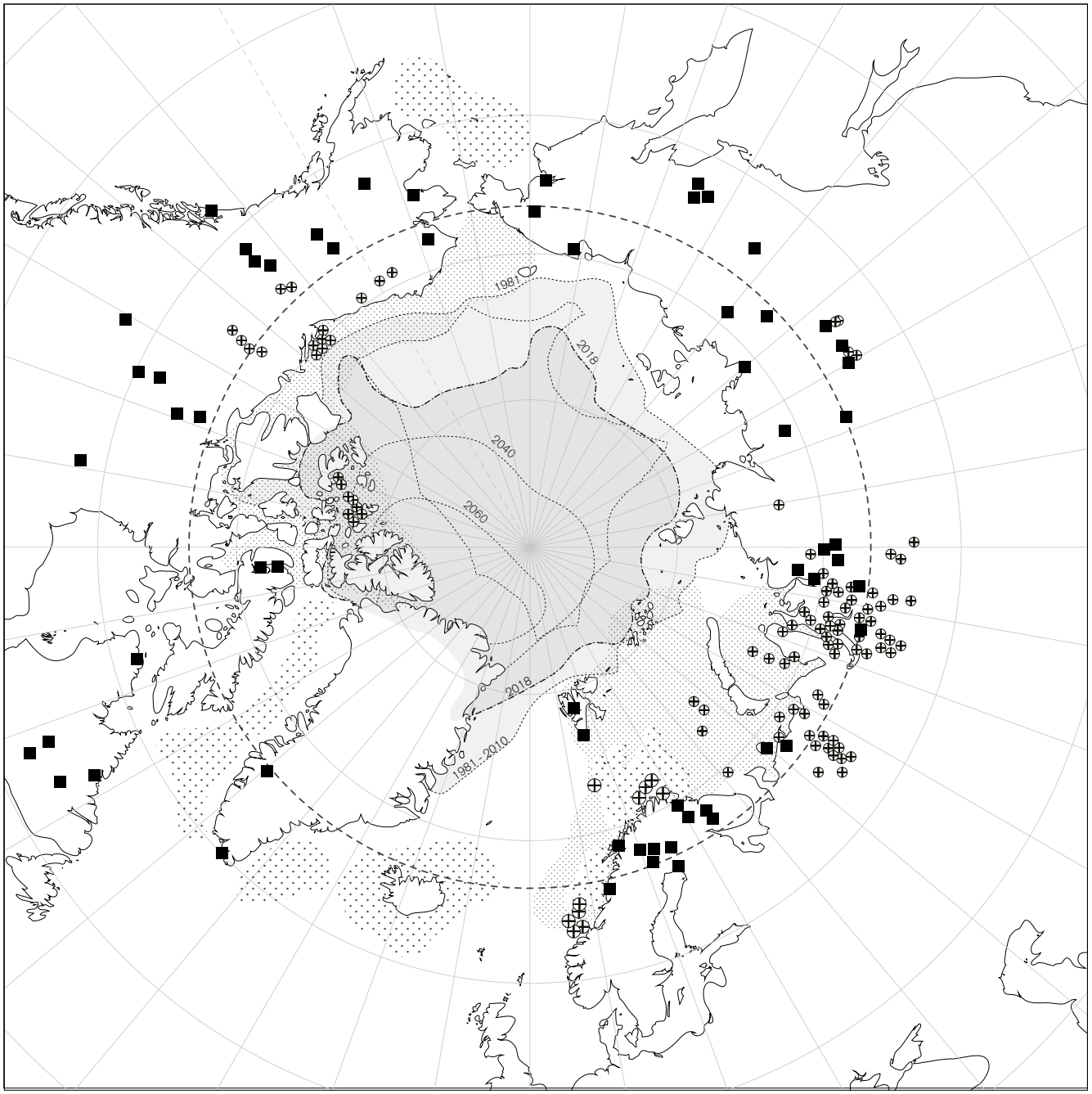
Within this new silk road crossing through the Arctic, the discovery of oil and mineral deposits has triggered a resource race amongst the Arctic nations (Russia, Canada, U.S, Norway and Greenland/Denmark). These nations have started exploring, and expanding their resource extraction fields all along the Region. As it is evident in the map, the reduction of the ice sea extent is revealing areas for new prospective onshore and offshore extraction. In these areas the increase in extraction fields is already evident specially in Russia and in the north of Norway.

This Arctic resource race is deeply linked with climate change, as the sea ice extent recedes,more resources are made available, easily accessible thus allowing the nations along the Arctic Sea to make profit and contribute towards the further territorialization of the sea.

Arctic Resource Exploration

Scale:
Source: EMODnet, Minedata, Environment & Society Portal

Prospective Offshore Extraction
Major Fishing Area
Mines
Extraction Fields
Current Ice Extent
Ice Extent Projection


1981
2018
2040
2060
2018
1981–2010

Flows and Port Expansions

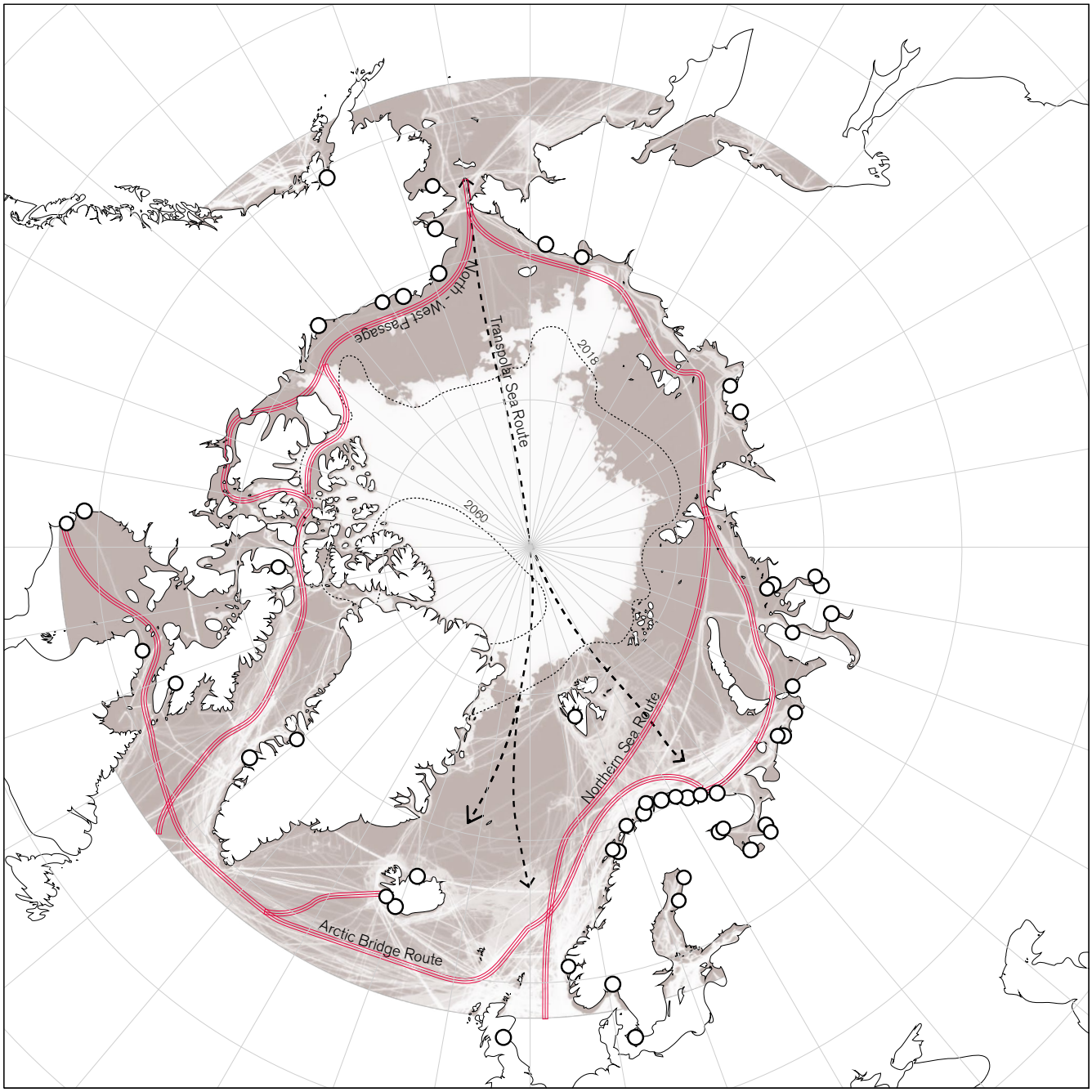
The territorialization of the Arctic Sea is defining a new territorial order. From a pristine landscape, inaccessible, with harsh environments and isolated communities, to a region of extreme riches, and development. Therefore, due to the increase in resource extraction, and trading routes, the Arctic cities are going through several transformations. The already in operation Northern Sea Route and North West - Passage, and the eventual opening of a "Transpolar Route" is requiring for the coastal cities above the Arctic circle to adequate their infrastructure to cope with the increasing trading and extraction activity.

In this transformation, and "development" Norway seems to be positioned in the most strategic location. With a considerable amount of port cities, high amount of extraction fields onshore and offshore, and as merging point between different shipping flows, Norway is the country that is undergoing the biggest transformation in its Arctic cities. What where small isolated communities a few years back, are being transformed into port cities, creating an imbalance between the community and infrastructure.

Flows, Trading Routes, Ports

Scale:
Source: National Geographic

○ Port Expansions


North - West Passage
Transpolar Sea Route
2016
2000
Northern Sea Route
Arctic Bridge Route

Mining and the Arctic Communities

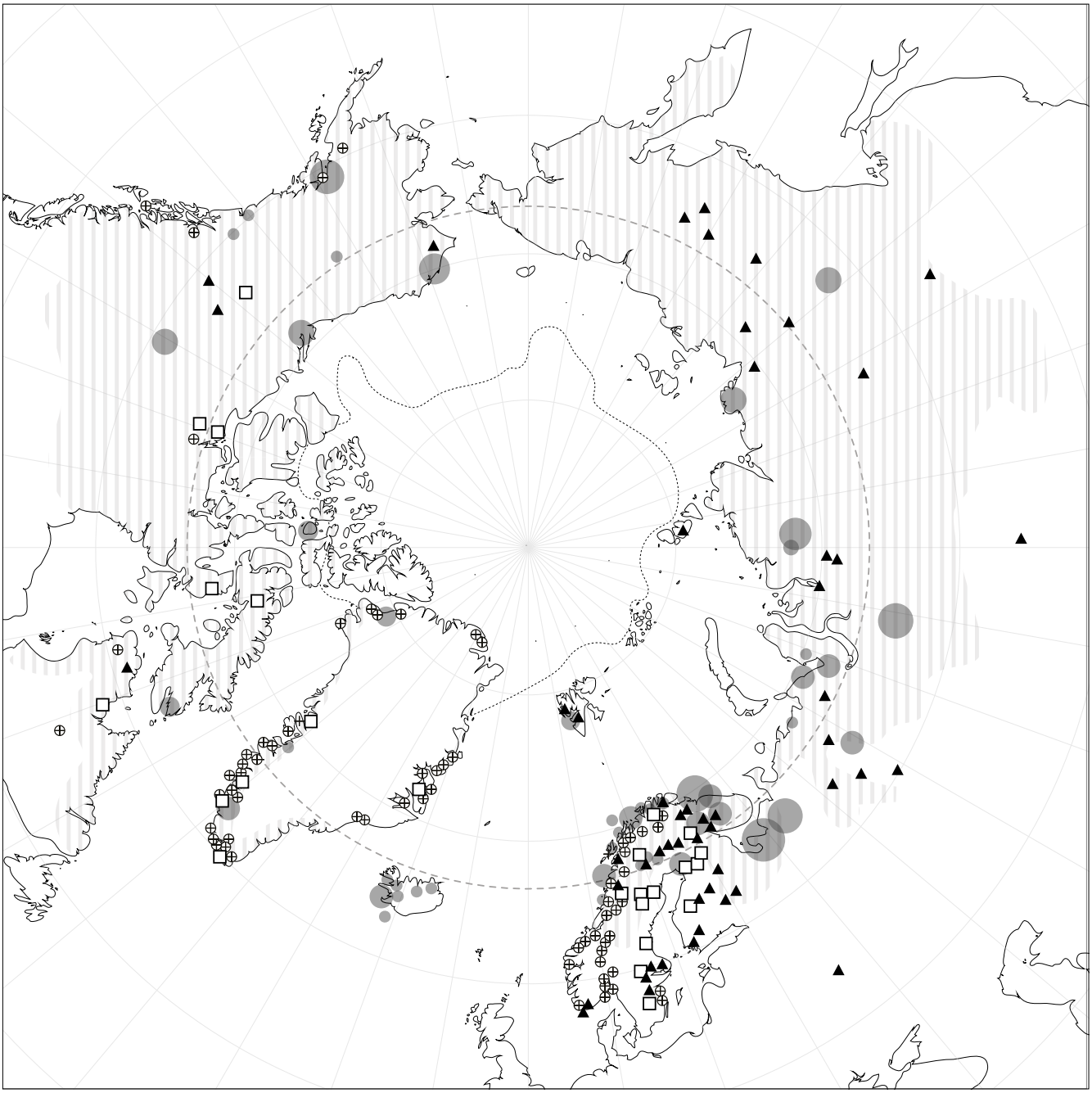
In the ongoing transformation of the Arctic region into a new trading and extraction ground there is an important overlap to consider. Particularly with the rise of mining activities in the region, and with the rapid development of ports and infrastructure, there is an evident conflict between highly isolated and local communities with the development brought by the Arctic resource race. As seen in the map, the Arctic region has a very strong presence of indigenous population. With the Sami People in Norway and Scandinavia and a great variation of tribes in Russia, Greenland, Canada and the U.S, the Arctic region has been isolated through history, developing a strong sense of belonging to the land. The increasing accessibility to resources in the region has had a direct impact on this communities, which for centuries have relied on the land. Today the overlap between highly traditional communities with mining activities and other sources of extraction is having a special impact in Norway, where the highest concentration of populated centres is.

The increase in activities conflicts with an isolated community that feels reluctant to change. Their remoteness has protected them from high industrial activity, and with time, has strengthen their sense of belonging to the land. Therefore, communities as the Saami, and the more of 4 million inhabitants of the Arctic regions, refuse to let mining change their way of life.

Arctic Mine Race

Scale:
Source: EMODnet, Minedata, Department of Geography, Université de Laval

- Populated Centres
- Area of Indigenous Population
- Mining - Development
- Mining - Extraction
- Mining - Exploration



Norwegian Arctic

Due to the evident overlap between communities and extraction activities, and to its connection between the North Sea and the Arctic Sea, the Norwegian Arctic is one of the fastest changing in the region. This due to the fact that is the most explored and resource rich areas which stretches from the North Sea, to the Arctic, with Norway as the confluence of both territories. Due to its strategic location between the remoteness of the Arctic and the infrastructure of the North Sea, is no surprise that most of the extraction fields in general, and mining sites in particular are projected in the Norwegian Arctic region. Hence, the increase in resource extraction activity in the Arctic is meant to increase offer and demand dynamic between the North Sea an the rest of the world.

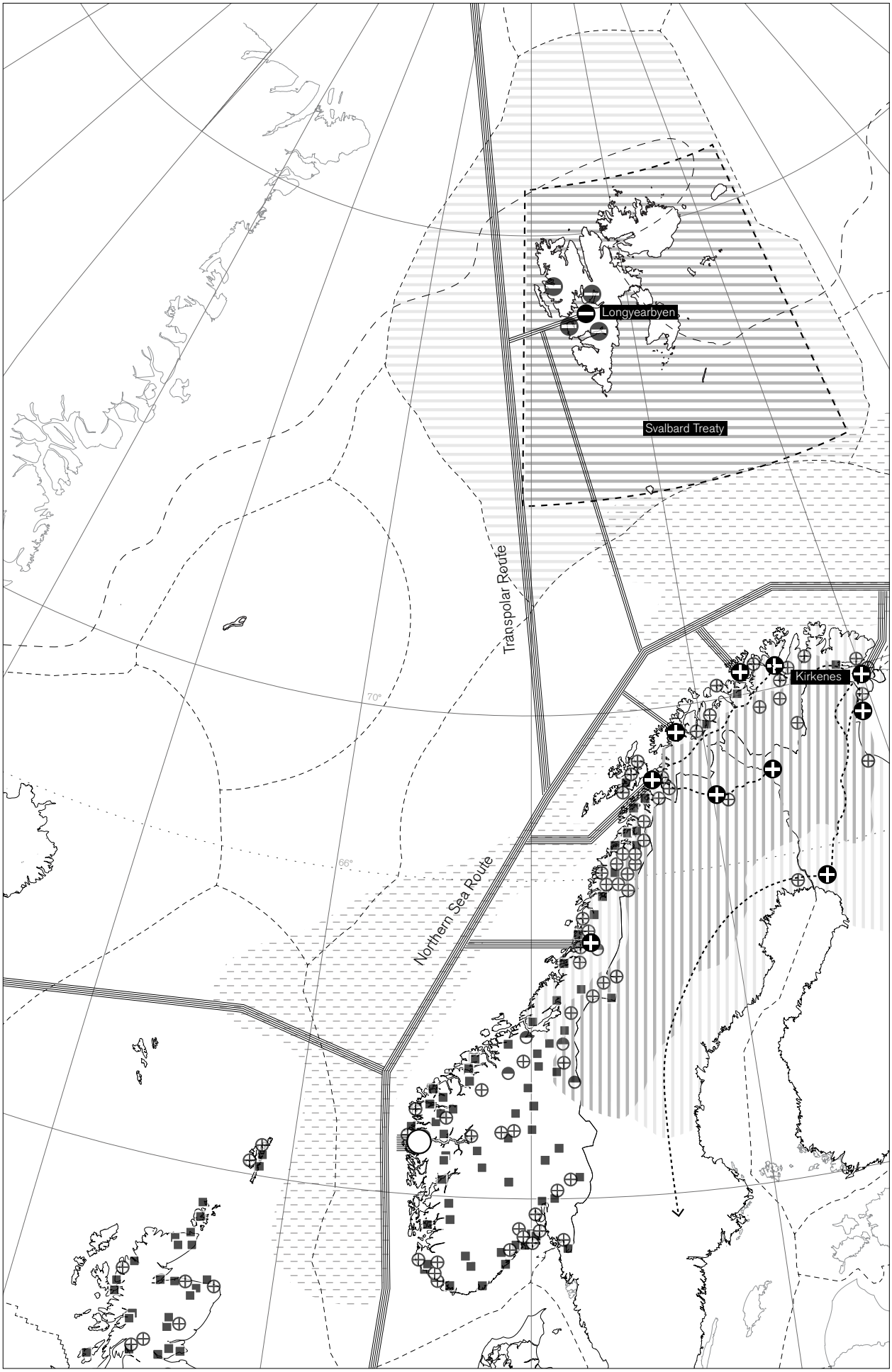
As it is evident, there are many different mining activities opening and projected for the following years. Nonetheless the aim of this map is to show the main mining sites where the effects of mining are higher and more evident. The map exposes how the Norwegian coastal cities like Kirkenes are being consolidated as major mining sites. Additionally, inland extraction fields in Sweden and Finland are feeding the infrastructure and logistic capacities of Norwegian cities and their access to the sea.

Nonetheless the most interesting aspect of this map is how the region not only is being affected by the opening of new and bigger mines, but how it is being also affected by the closing of some mines, particularly in the Norwegian Archipelago of Svalbard. The havocs that both the opening and closing of mining has on the territory and communities will be explained in detail further on.

Norwegian Sea

Scale: 1:10.000.000
Source: NORDREGIO, USGS, Norwegian Polar Institute

- Main Mning Sites: Opening
- Main Mining Sites: Closing
- Projected Routes: Bulk Carriers
- Indigenous Area
- Protected by International Law
- Prospective Extraction Areas and Reserves
- Active Mines
- Future Mines


Longyearbyen
Svalbard Treaty
Transpolar Route
Kirkenes
70°
66°
Northern Sea Route

Mining Paradox

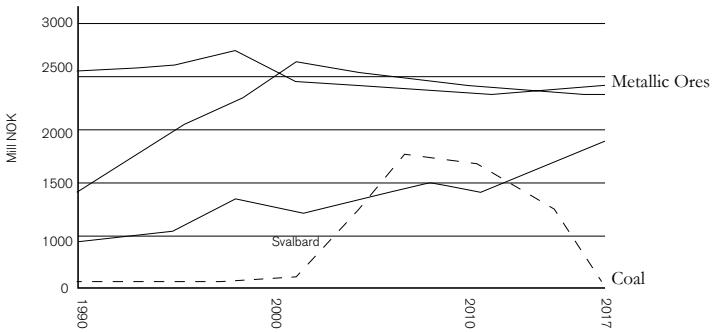
Currently, along the countries in the North Sea, England and Norway lead in mineral extraction. Both are examples of how both the closing and the opening of mines can be harmful for local communities. With the rise in demand of metallic ores, Norway is expecting to open several mines in the Arctic circle. This has devastating effects on the environment, the fishing areas of the locals and the Sami territory. On the other hand the decrease in demand of Coal in the 80's is of great relevance as it is evidence of the social and economical impacts that the sudden closing of mines caused to the mining communities in the UK. Thus, today the threat of closing of the last coal mines in Svalbard, Norway, suggest a similar devastating impact on this Arctic community.

The opposite yet relevant effects of both the opening and closing of mines answers to the "Mining Energy Paradox". This paradox refers to the shift towards renewable energies in which metals become a prime source to build solar panels, turbines etc.. (Gleeson, D 2019). Therefore mining is considered to be essential for the global sustainable development. (Dale 2018) Within this paradox, the global sustainable development has trigger both the rise in demand of certain minerals, and the demise of some more pollutant ones.

The aim towards sustainable renewable energies have risen the demand of steel, triggering the mining of iron and copper ore. Initially this has led to the thriving towns like Narvik (NO), Kiruna (SW) and Kirkenes (NO), increasing the environmental and social impacts on the territory. On the other hand, climate policy has plunged the demand of coal, and threatens to affect the mining community in Svalbard. (NO).

Gleeson, D. (2019, September 5). The mining and energy "paradox." Retrieved from https://www.mining-journal.com/humphreys/opinion/1315906/the-mining-and-energy-paradox

Coal Miners Strike 1984. United Kingdom (ref)



- North Sea
- Arctic Resource Race
- Mining Paradox
- Mining Waste

Process

In the Arctic the most relevant minerals to analyse are coal and ore. They both have different processes. On one hand the demand of coal for energy led to towns and settlements in the UK specially and in Norway in particular to base the whole economy in this activity. The constant demand and offer kept the cycle going and the economy of the local territory stable. Nonetheless the decrease of this activities due to climate policy threatens communities and their economy.

1. Demand - Work - Single Industry Settlements
2. Single Industry Settlement's proximity to mine
3. Extraction - Transportation
4. Processing - Trade

Repeat !

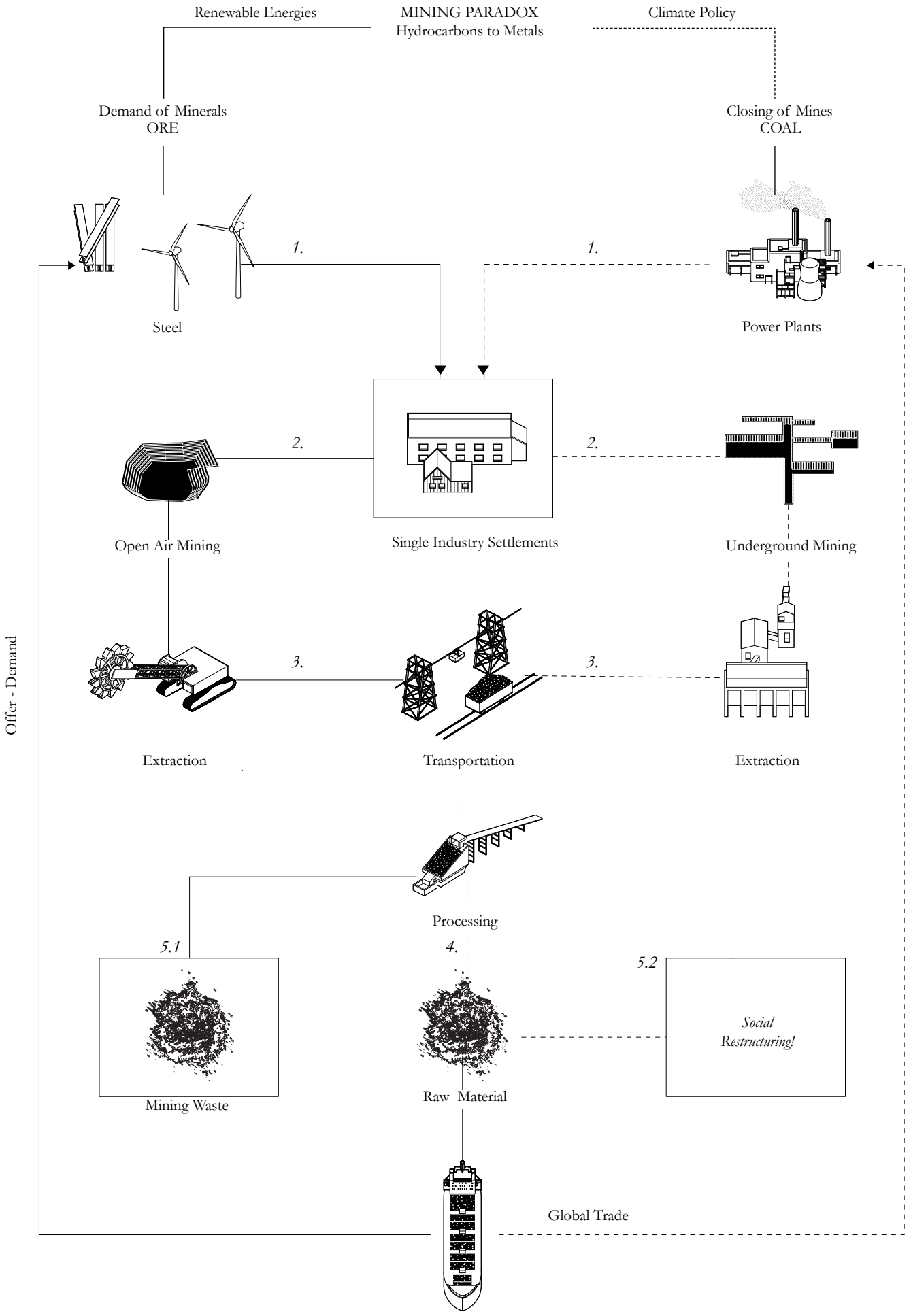
Result:

5.1. Mining Waste
5.2 Local Restructuring or former mining communities.

5.1. As a consequence of the increase in demand and production of metallic ores in Norway, comes the production of considerable amounts of waste that can be very harmful for the environment.

5.2 Mines have the devastating effect of turning towns in single industry centres. The mineral extraction arrives as a promise of development and opportunities. Initially this is true, as it increases the employment, wealth and local economy. In the case of some remote territories, mining becomes the sole reason of inhabitation of such places. This single industry settlements exist due to the ongoing cycle of demand and offer. Yet when such cycle breaks, the symbiotic relationship between mining and settlement exposes communities in urgent need of local restructuring. This term, coined Britt Dale refers to the institutional process of transition of single industry mining settlements towards new activities (Dale 2002).

Dale, Britt. (2002). An Institutionalist Approach to Local Restructuring. European Urban and Regional Studies, 9(1), 5–20. https://doi.org/10.1177/096977640200900101


Renewable Energies
MINING PARADOX
Hydrocarbons to Metals
Climate Policy
Demand of Minerals
ORE
Closing of Mines
COAL
1.
1.
Steel
Power Plants
2.
2.
Open Air Mining
Single Industry Settlements
Underground Mining
Offer - Demand
3.
3.
Offer - Demand
Extraction
Transportation
Extraction
Processing
5.1
4.
5.2
Social
Restructuring!
Mining Waste
Raw Material
Global Trade

Mining Waste

In the area studied, which stretches from Scotland to the Arctic, with Norway as main focus, the increase of mining activities is opening debates about the mining waste that is being produced.

When it comes to the extraction of metallic ores, there is a ratio to determine how much of the rock extracted is the mineral and how much is waste rock. When it comes to iron and copper, the extraction consists in obtaining the rock, and separating the metal, consequently, the rest is essentially just waste. The ratio for iron ore for example is 50/50, which means that approximately half of the material being extracted is considered waste. (SGU)

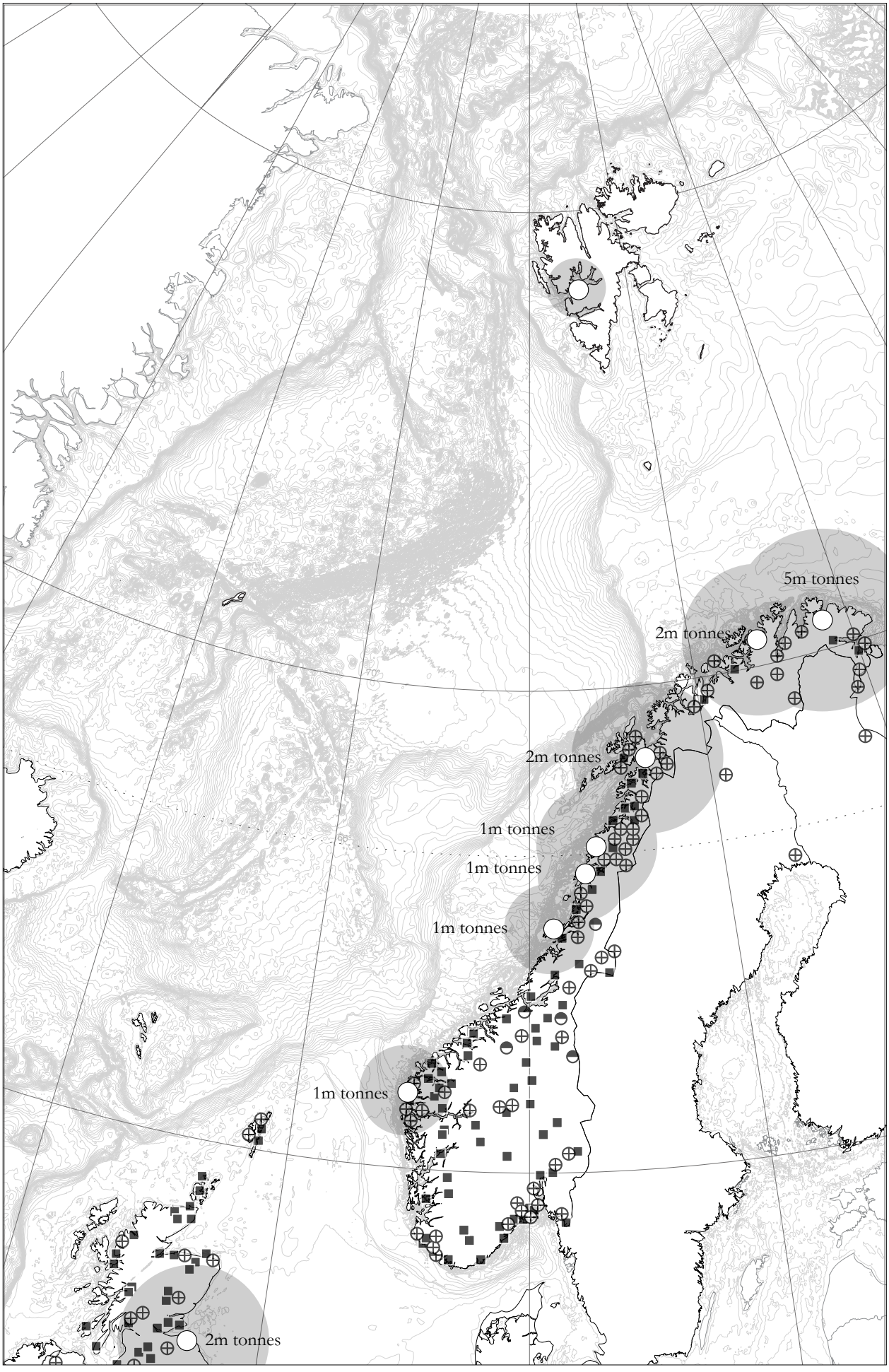
Understanding the dimensions of such waste is essential to give the importance that it deserves. Besides the evident effect of the mining fields in the territory, the disposal of such waste has great environmental impacts. As a matter of fact, most of this waste is disposed either by creating dams to contain them, of by discharging them in the sea. In the case of the North Sea, the most common practice is to dispose of it in the sea bed of which Norway is one of the leading countries in the world.

Today, Norway disposes approximately 10 million tones of mining waste per year in the fjords seabed. Deep sea mining waste disposal is very profitable for the mining companies due to its low costs and to the location of most of the mines alongside the coastline. (DOSI, 2020) It releases an uncountable amount of contaminants and metals into the sea and threatens to affect the economy of the local communities in the Arctic. With the projection in increase of mining operations, these numbers are expected to increase per year and with it, its impacts on local activities. This has triggered a political and moral dilemma between the local interests and claims on their land, and the global sustainable development and trade.

Deep-Sea Tailings Disposal (DSTD). (2020, February 23). Retrieved from https://www.dosi-project.org/topics/deep-sea-tailings-disposal-dstd/

Leading Countries in Deep Sea Mining Waste Disposal
https://www.grida.no/resources/11429

Marine Discharge of Mining Waste
Source: UN Enviroment Programme - GRID Arendal
DOSI Deep Ocean Stewardship Initiative


5m tonnes
2m tonnes
2m tonnes
1m tonnes
1m tonnes
1m tonnes
1m tonnes
2m tonnes

Deep Sea Mining Waste Disposal

This practice is considered to be one of the most environmentally friendly in comparison with other disposal practices.

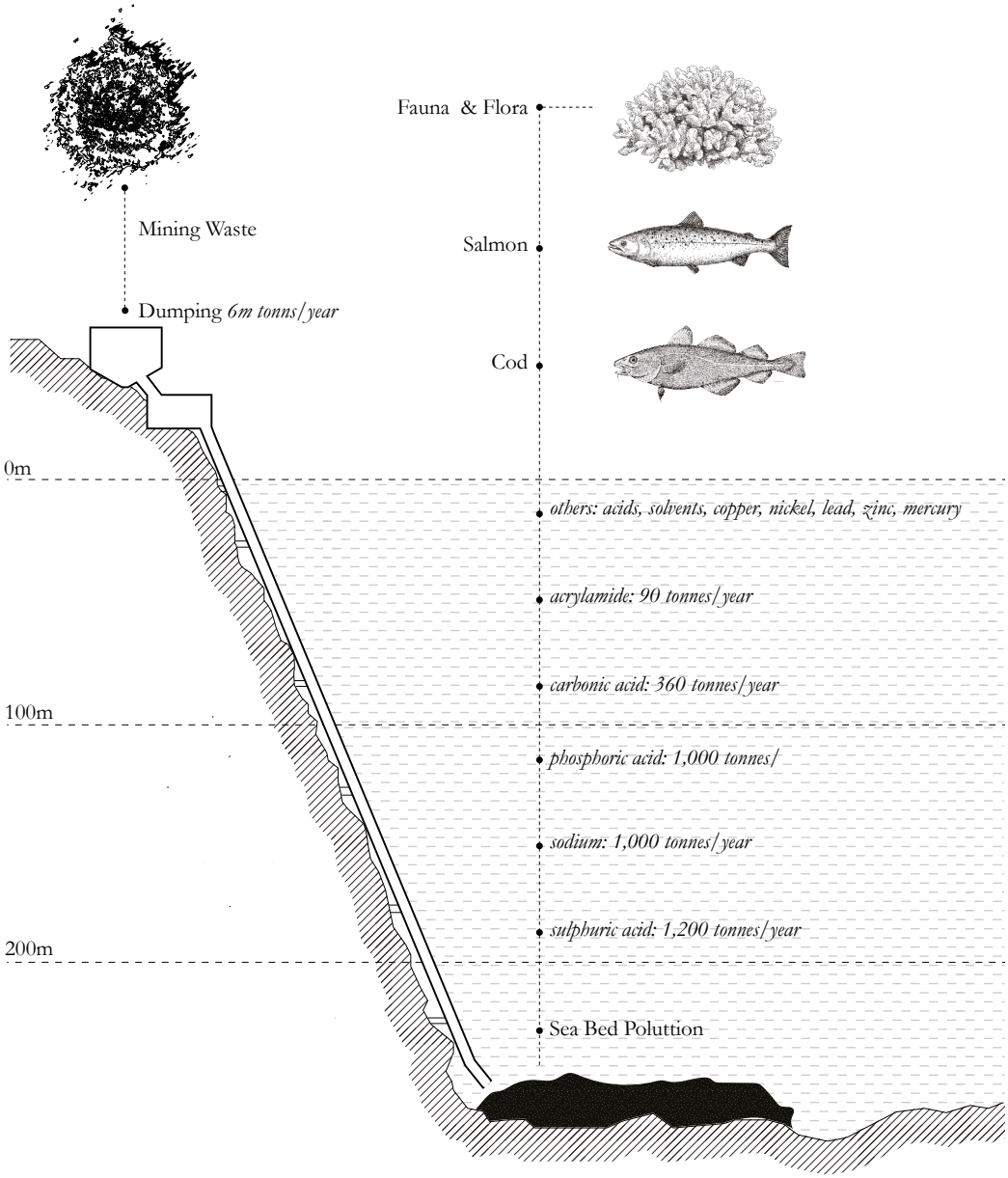
The discharge of mining waste in the seabed has become the most commonly used in Norway, given the proximity of the mines to the sea, and to the deep shore of the Norwegian fjords. Nonetheless, as explained earlier, mining is overlapping with highly the Sami territory, were highly traditional activities such as fishing and reindeer herding are soon to suffer the consequences of this practice.

The process consists on disvposal infrastructure located by the shore, in proximity to the mine. Before being dumped, the waste is mixed with sea water for it to go directly to the bottom of the sea bed once dumped. This way, the mining companies and Norwegian government argue that by avoiding the mining waste to disperse in the sea they are reducing the impacts on the ecosystem. With this argument the Nussir Copper mine was recently approved in Sami territory despite the controversy and opposition.

Nonetheless, environmentalists and Sami representatives argue that the disposal of rock containing heavy metals and chemicals will undoubtedly affect the fjord's ecosystem, which consequently will affect the traditional fishing economy of the local communities.

Marine Discharge of Mining Waste

Source: UN Enviroment Programme - GRID Arendal
DOSI Deep Ocean Stewardship Initiative



Deep Sea Tailing Disposal - Norwegian Fjords

Arctic Problematic

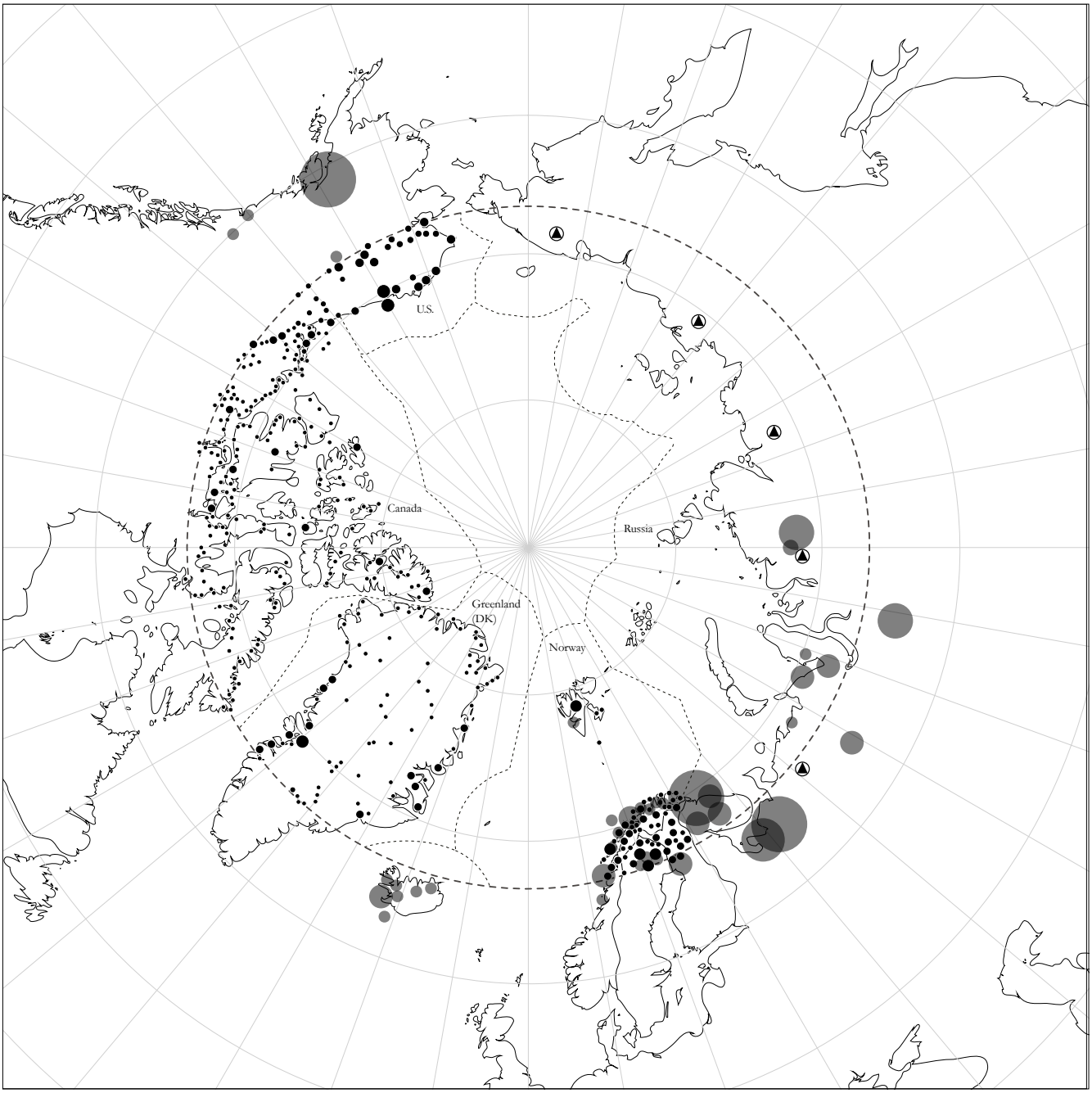
Besides the local concerns, the disposal of mining waste is undoubtedly a global problematic. In the Arctic context, mining activities in particular are affecting what once was a pristine and protected environment. All across the Arctic there is evidence of contaminated sites due to resource extraction. The disposal of heavy metals and chemicals has already shown its impacts in the territory by polluting the water streams, and increasing the toxicity of the soil. This maps shows all the confirmed contaminated sites above the Arctic circle. Besides Russia, the Arctic nations have confirmed more than 2000 contaminated sites which are evidence of waste a problematic on a territorial scale. In the local scale the effects of polluted sites are very sensitive as most of these communities, some of them indigenous, rely on the water and the soil that the mining industry is contaminating.

Hence, the disposal of mining waste becomes both a global and local problematic. And given that the mining paradox is meant to increase the mining activities, it is essential to address the geographies of waste; find alternatives for the sustainable management of such waste and reduce its environmental and social impact.

Norway: 524
Greenland: 468
U.S: 509
Canada: 662
Russia :No information

Contaminated Sites in the Arctic

Source: http://robindesbois.org/en/polar-star-n2-2750-sites-pollues-en-arctique/


U.S.
Canada
Greenland
(DK)
Norway
Russia

Waste as a Resource

Mining waste is one of the biggest waste concerns in the world, specially with the increase projection of mining activities as cause of the pursuit for a global sustainable development (Bian, 2012) Therefore within this "global sustainable development" it is key to address the sustainable disposal of such waste. For this it is important to understand waste as a resource, as an opportunity rather than a problem, so instead of discussing where and how this waste should be disposed, the discussion should be about why we should dispose of it, instead of reusing it.

Therefore, by addressing waste as a resource it is possible to understand that the geological conditions of such waste already have the potential to be reused for other purposes. Activities such as construction industry, craftmanship , interior design and energy could be highly benefited by the management of mining waste. Depending on the composition of the waste, which is directly related to the kind of mineral that is extracted, it could be used for different purposes. For example, mineral rich waste can potentially be used for industrial tools, crafts, and porcelain , rocks and sandy waste can be used for the construction industry and clay rich waste for tiles and bricks. (Lottermoser, 2011)

Within the construction industry it has been proven that not only can mining waste become a potential replacement for the aggregates used for the production of concrete, but it can even increase the thermal capacity of the material.

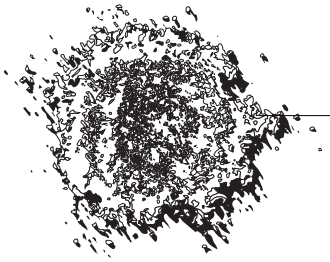
Therefore, the different properties of mining waste could potentially become a resource for the construction industry, where it-could be used to build everything from the structure to the facade and interior appliances.

"Cast in Carbon"
iaacblog

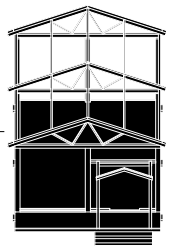
Lottermoser, B. G. (2011). Recycling, Reuse and Rehabilitation of Mine Wastes. Elements, 7(6), 405–410. https://doi.org/10.2113/gselements.7.6.405

Bian, Z., Miao, X., Lei, S., Chen, S. -e., Wang, W., & Struthers, S. (2012). The Challenges of Reusing Mining and Mineral-Processing Wastes. Science, 337(6095), 702–703. https://doi.org/10.1126/science.1224757

Mining Waste

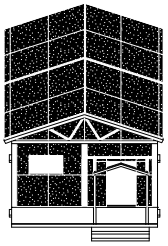


Sand, Clay, Rock. Mineral



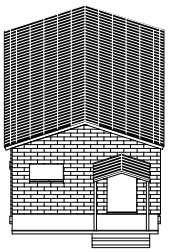
Concrete

Ultramafic, Coal Tailings



Insulation

Iron, Coal, Sand, Mineral, Clay



Tiles - Bricks

Clay, Mineral Rich, Iron Rich

Crafts and Appliances

Mining Waste Management and Reuse

The management of mining waste is a necessity in today's epoch of waste. The process of recycling follows almost all the same specificities of mining. The rock needs to be recollected, transported, stored, separated and eventually processed. The main difference lies in the result, becoming the raison d'etre of this research. While mining produces minerals, recycling produces product, not waste.

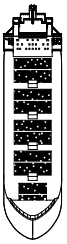
The similarities between the mining process and the management of waste is indeed a potential, as mining sites could try to manage as much of the waste on site. Nonetheless most of the mining companies don't do this because of efficiency and costs. Hence, the potential of introducing this active cycles of recycling into former mining communities, where the knowledge, logistics and infrastructure are wating to be reactivated.

Therefore, by introducing cycles of waste management into these communities it would be possible to address several of the issues specified above. On one hand, both the societal and environmental impacts of mining in the Arctic, on the other, the local restructuring and self sufficiency of Arctic communities.

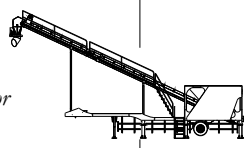
Arctic Nations

Mining Waste

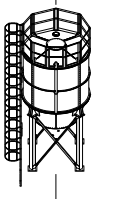
Recollection



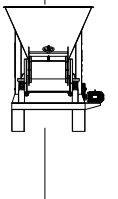
Conveyor



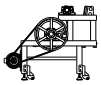
Silo



Feeder

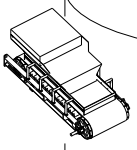


Crusher

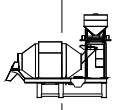


Crafts

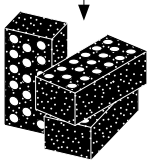
Landfill



Magnet



Casting



Product

Within the studio's framework, my research began with the North Sea as it gradually transitioned to the Arctic region. With the rapid melting of the ice caps, and the opening of new trading route across the North Pole, the Arctic is being consolidated as a strategic yet highly vulnerable region for the inevitable resource exploration coming from the North Sea. Within this resource race (ref) that is beginning to take place in the Arctic, mining activities withhold the most presence in the region, and it is fast increasing. Unlike oil and gas, nowadays mining is considered to be a 'necessity in the transition towards renewable energies' (Dale 2018).2

This paradox refers to the intrinsic relation between renewable energies and mining, which increases the demand of certain materials and with it, its impacts. Alongside the mining paradox comes the 'resource curse' which refers to the social, economical and territorial consequences of resource rich territories (Auty 1993)

This transition has triggered both the rise and demise of demand of certain minerals, having a special effect on Arctic communities. On one hand the increase in demand of certain minerals has made of the disposal of mining waste both a global issue and a local concern, on the other the closing of coal mines, specifically in the Archipelago of Svalbard has led to a mining community in an urgent need of local restructuring. Hence, my research led me to conclude that mining waste management and reuse could potentially become a new economy for the Arctic community of Svalbard, withholding the mining knowledge and addressing the global problematic of waste.

As the Mining paradox is here to stay, at least the recycle of its waste could reduce the environmental impacts and increase the self sufficiency of the communities.

"Woe to the thinker who is not the gardener but only the soil of the plants that grow in him!"
Nietzsche, Daybreak

1.4. Research Question

Can the sustainable management of mining waste reduce the environmental and social impacts and serve as base towards the local restructuring of former mining communities?

Territorial Scale

Local Scale

North Sea

Northward Shift

Arctic Nations

MINING PARADOX
Hydrocarbons to Metals

Renewable Energies

Demand of Minerals

ORE

WASTE

Reduce environmental impact

Increase Self Sufficiency

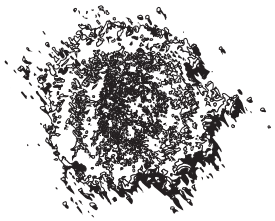
Climate Policy

Closing of Mines

COAL

Local Restructuring
Mining Communities

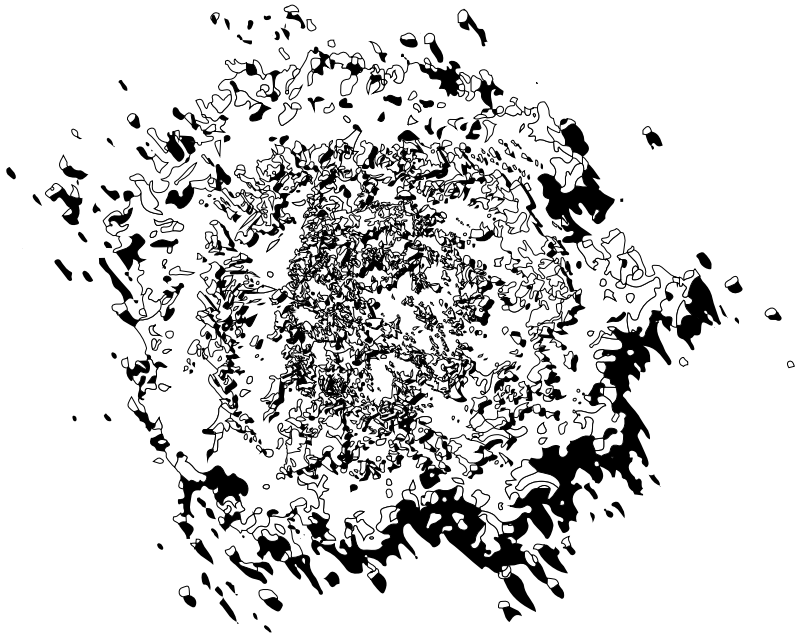
Mining Waste
Management



Where to manage such waste?

Svalbard

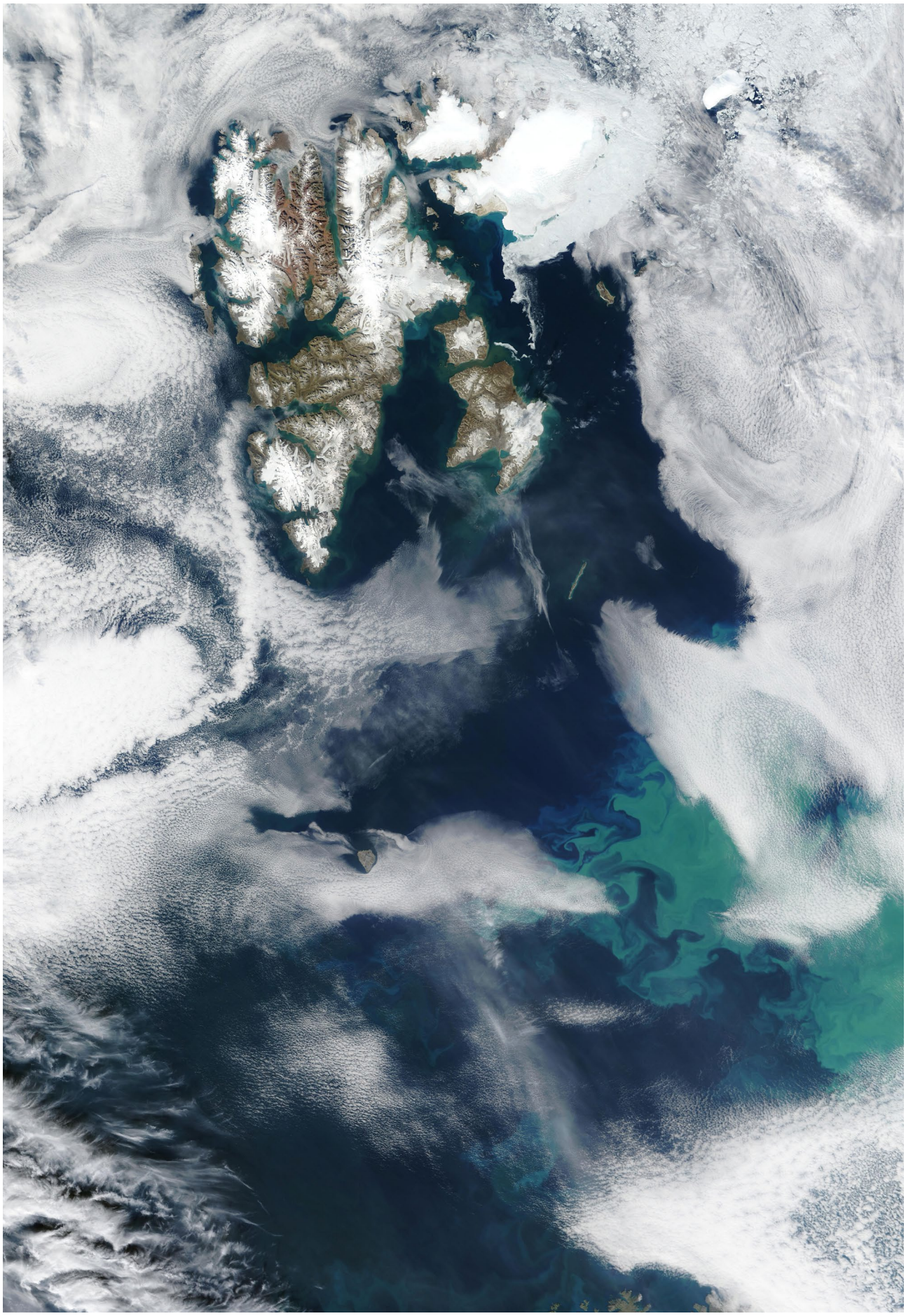
- Svalbard Archipelago
- Terra Nullius to Svalbard Treaty
- Mining as Governance
- Svalbard Free Zone



- Svalbard Archipelago
- Terra Nullius to Svalbard Treaty
- Mining as Governance
- Svalbard Free Zone

Svalbard and the Barents Sea

Source. NASA
Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC



Svalbard Archipelago

This archipelago is located in the intersection between the Barents Sea, Greenland Sea, Norwegian Sea and the Arctic Sea. It is composed of 12 different Islands of which the Island of Spitsbergen is the biggest and only habitable territory in the Archiepelgo. With just 3 consolidated settlements and two abandoned towns, it is considered to be the northernmost populated point in the world.

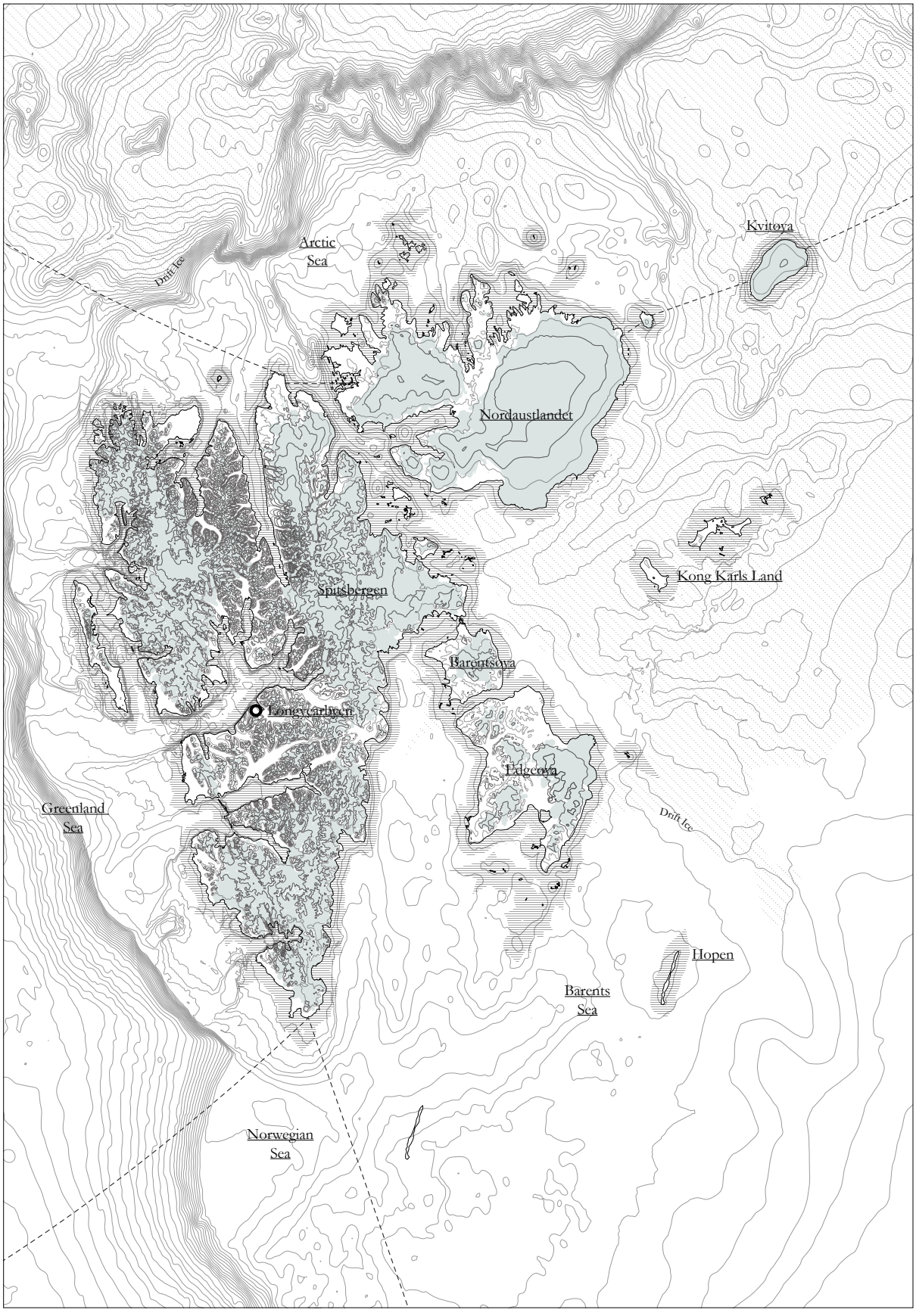
Location: 78°13'N 15°39'E
Area: 62,054^{2}km
Population: 2,667
Languages: Norwegian, Russian
Currency: Norwegian Krone, Rubles
Seat of Power: Longyearbyen

Free Economic Zone

De-militarized Zone

Svalbard and Barents Sea

Source. NASA
Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC


Arctic
Sea
Drift Ice
Kvitøya
Nordaustlandet
Kong Karls Land
Spitsbergen
Barentsøya
Longyearbyen
Edgeøya
Greenland
Sea
Drift Ice
Hopen
Barents
Sea
Norwegian
Sea
0 30 50 100km

78°13'N 15°39'E

Geographical Conditions

The geographical conditions of Svalbard are unique. With evidence of all the different geological era's, its geography is a layered catalogue of the geological history of the world. The archipelago counts with large areas from the Tertiary and Carboniferous period, going back more than 300 million years. Within the geological layers from this period is possible to find large amounts of coal deposits, of which Svalbard is famous for.

These geological condition have furthermore defined the extractivist history of the archipelago, consequently also its inhabitation.

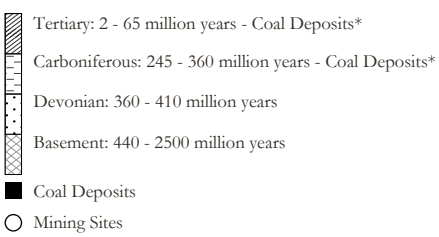
Its rough geography and its mineral richness has also consolidated Svalbard as the epicentre of geological research. Yet, most of its territory is covered in ice all year long, as approximately 60 % of its territory is covered in glaciers.

Topographical Conditions

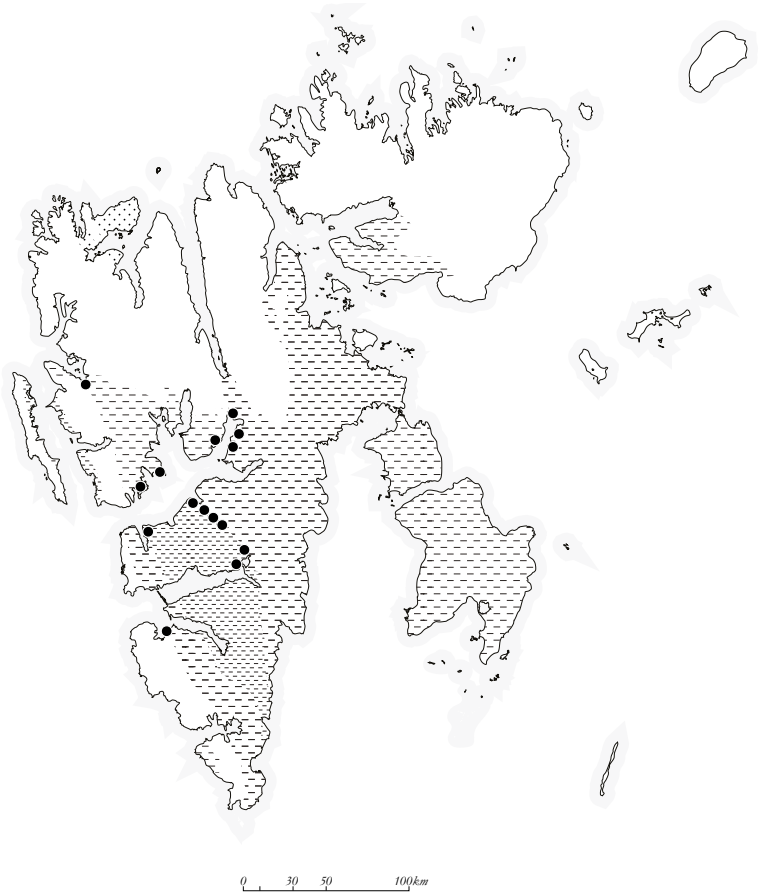
Source: Kartkatalog GEONORGE

Geological Conditions

Source: Norwegian Polar Institute




0 30 50 100km


0 30 50 100km

Extreme Arctic Conditions

Due to its location at the edge of the North Pole, Svalbard counts with extreme conditions.

Daylight:

Located above the 74° north latitude, the daylight in Svalbard is defined by extremes. During winter the darkness extends for more than 3 months while in summer it has 4 months of continuous daylight.

Within this conditions it is possible to experience the 28 days of Polar Night on which there is absolute darkness and the Midnight sun, on which the sun doesn't set.

Its extreme conditions and high latitute also allows for the Aurora Borealis to occur in the winter months.

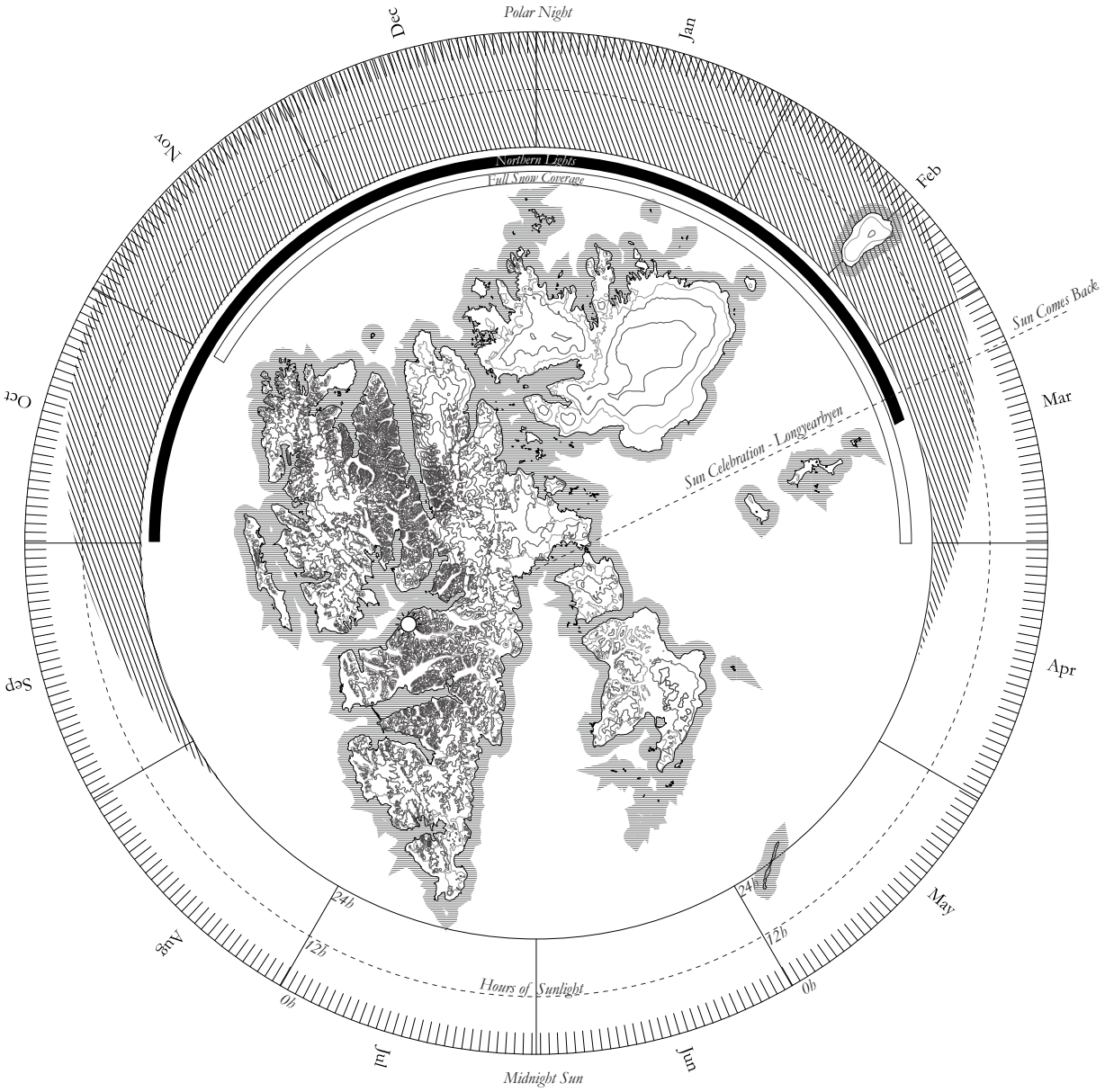
Temperatures:

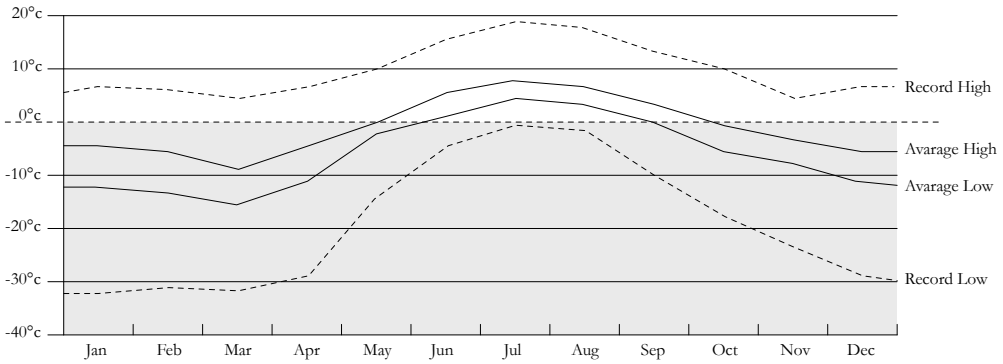
The Temperatures in Svalbard can go as low as -30°c with "feels like" temperatures below the -40°. In the summer months the tempertures usually dont go above the 5°c mean, which allows for the permafrost to remain frozen. Nonetheless with climate change, summers are now registering temperatures above the 15°c, which is a clear threat to the ecological stability of the region.

http://sharki.oslo.dnmi.no/portal/page?_pageid=73,39035,73_39049&_dad=portal&_schema=PORTAL

Norwegian Meteorological Institute

eKlima


Polar Night
Dec
Jan
Feb
Nov
Northern Lights
Full Snow Coverage
Sun Comes Back
Oct
Mar
Sun Celebration - Longyearbyen
Sep
Apr
24h
12h
0h
May
Aug
Hours of Sunlight
Jul
Jun
Midnight Sun


20°c
10°c
0°c
-10°c
-20°c
-30°c
-40°c
Record High
Avarage High
Avarage Low
Record Low
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

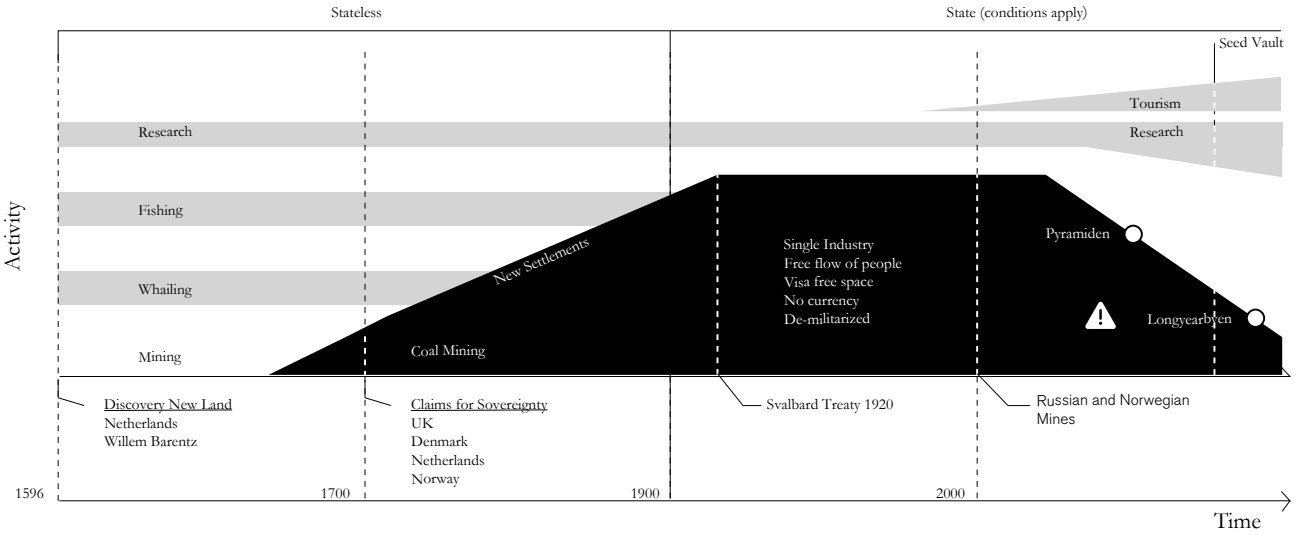
Historical Precedents

The Svalbard Archipelago remained until the 1600 an undiscovered territory. It was in exactly in 1596 when the Dutch explorer William Barents discovered what today is the Island of Spitsbergen. During his many voyages across the Arctic, Barents refereed to Svalbard as "the new land", of pointed mountains (*Spitse - bergen* in Dutch), hence the name.

After its discovery, this territory, with not indigenous inhabitation, was explored by different nations where but its permament inhabitation wasnt until the 1800 hundreds when the first deposits of coal were discovered giving a solid reasons for nations to establish perament communities on the archipelago.

Nonetheless, for 200 years the archipelago would acquire a unique character as the only territory free of the governance of a sovereign state.


FRETUM DAVIS
ESTOTILAND
GROENLAND
ISLAND
POLUS ARCTICUS.
Het nieuwe land
ESTRECHO DE ANIAN
Tartas
Capo de Tabin.
Mongul
Taingin.
Caracoram.
I. Tafata
Cavcona
Colmac
BAIDA
Molgomzaia
TARTARIÆ PARS.
Obdora
Samoieda
Condora
Ingora
SOMER ZEE
NOVA ZEM.
FINMARCHIA
NORVEGIA
SWEDIA
Oost Finland
SCOTIA
Circulus Arcticus


Stateless
State (conditions apply)
Seed Vault
Tourism
Research
Research
Fishing
Whailing
Mining
Activity
New Settlements
Coal Mining
Single Industry
Free flow of people
Visa free space
No currency
De-militarized
Pyramiden
Longyearbyen
Discovery New Land
Netherlands
Willem Barentz
Claims for Sovereignty
UK
Denmark
Netherlands
Norway
Svalbard Treaty 1920
Russian and Norwegian Mines
1596
1700
1900
2000
Time

Terra Nullius

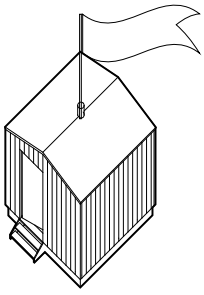
The Svalbard Archipelago was then known as "terra nullius", or *no mans land*. Here, different nations coming from the North Sea and the Arctic would establish provisional station for resource extraction.

Since the 1600 the main extraction was related to fishing and whaling, yet it also became an ideal location for scientific research and exploration of this new territory.

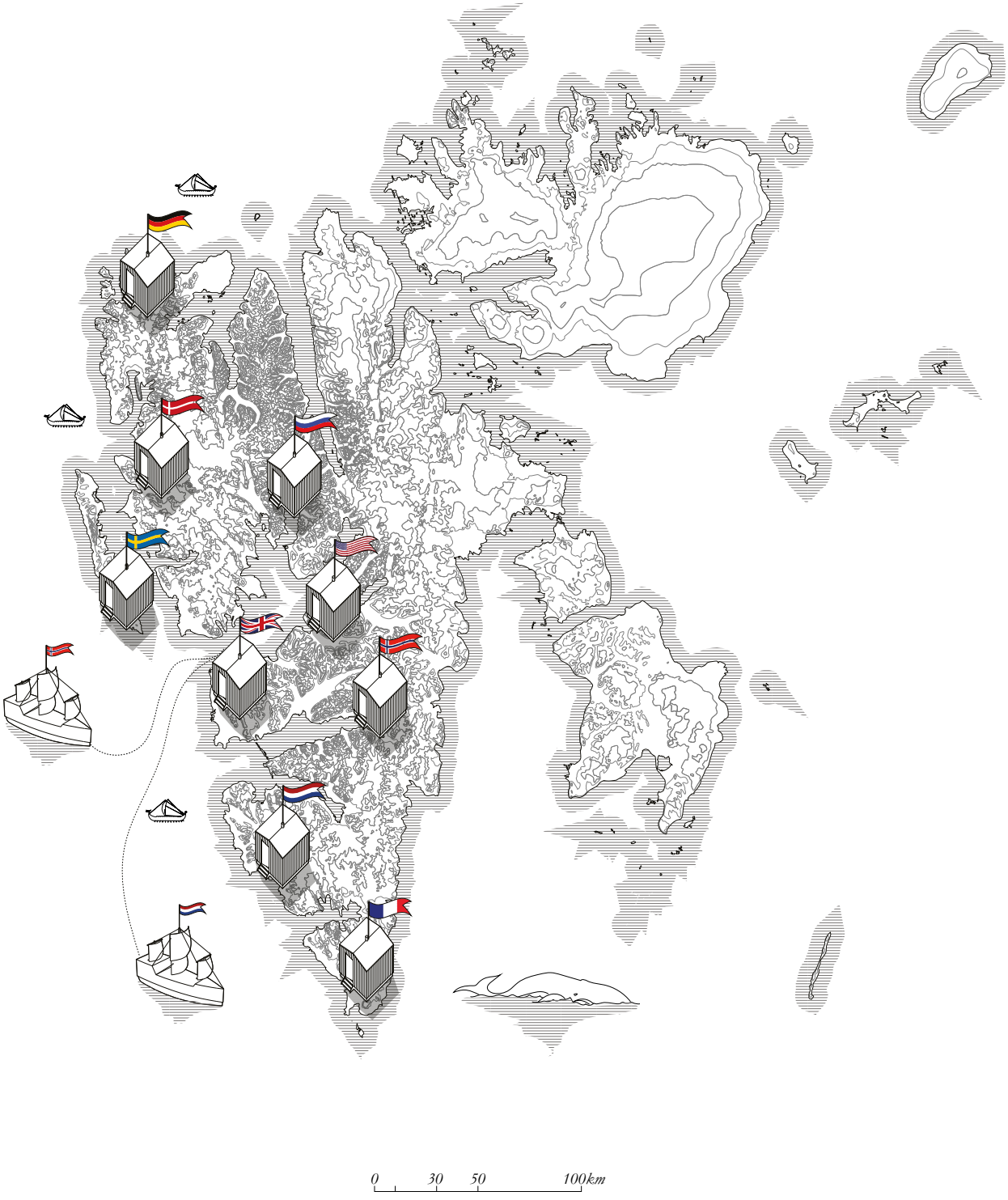
This provisional stations, either for extraction or research would start creating the first settlements, until then still ponly provisional. This settlement had a unique charactersitic of many flags waving in the same territory, in peace. Today this seems very unlikley, but back then the territoy was shared by the different nations that managed to reach the Archipelago.

This condition of *no man's land,* remained through time, giving it a unique example of cooperation and peace.

https://www.unis.no/the-avocado-of-the-ocean/whaling-gronfjorden-spitsbergen/



Provisional Stations
for Resource Extraction


0
30
50
100km

Coal Mining

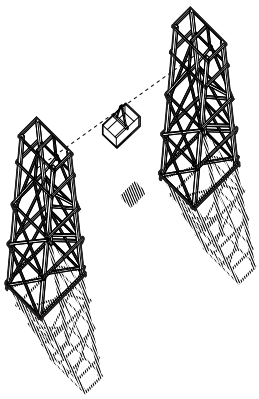
Nonetheless it wasn't until the discovery of the first coal deposits were the first claims of Sovereignty started. In the epoch of the industrial revolution, the control over the vast coal deposits on Svalbard triggered a sovereignty race amongst the nations that by the time had more presence in the territory.

Sweden, Norway, the United States and the Netherlands, which started extracting coal very early on, established workers and families, leading towards the beginning of the permanent inhabitation of the Archipelago. As the nationals of these countries increased, so did the claims, yet after World War I, the Versailles Treaty aimed towards and agreement.

Due to its proximity, nationals presence and coal mining companies already established, Norway was assign as the Sovereign of the Svalbard Archipelago, on what it would come to be known as The Svalbard Treaty.

As main concept of the treaty, the Archipelago acquires a sovereign yet it has to remain with its condition of cooperation and *terra nullius* .

https://www.unis.no/the-avocado-of-the-ocean/whaling-gronfjorden-spitsbergen/



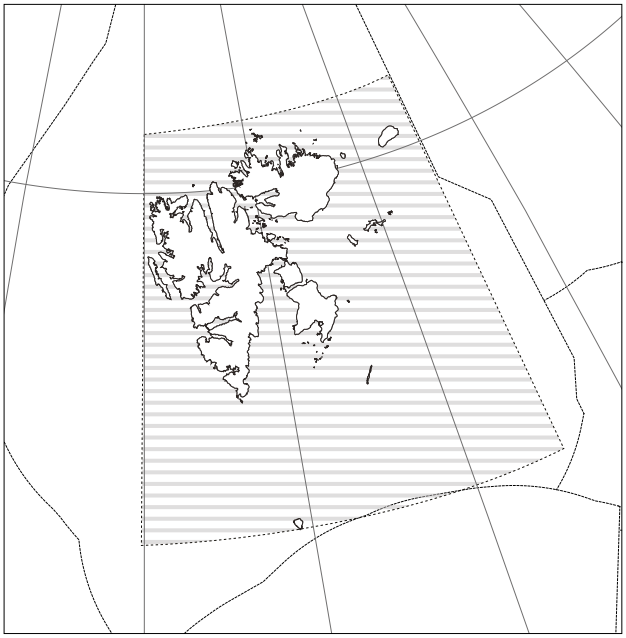
Coal Mining Infrastructure


Ny-Ålesund
Pyramiden
Longyearbyen
Barentsburg
Svea
0 30 50 100km

Svalbard Treaty

With Norway as sovereign, and intermediate between the signing parties of the treaty, the Nordic country acquires a condition similar to that of an ambassador. Hence, following the principle of an embassy; "the (...)responsible for the communications between two (or more) states would remain untouchable". (Ferrari 2011) Consequently, it is the condition of Norway as ambassador which makes of the Svalbard Free Zone, open for cooperation, yet immune to the political and economic influence of foreign nations at least for the time being.

The treaty states in its Articles several aspects towards the free and open Archipelago, of which Norway has to veil for its ratification. It Also



Svalbard Treaty: **Plenipotentiaries (ambassadors) state:**

Annex

Russian Mining Community
"Russian nationals and companies shall enjoy the same rights as nationals of the High Contracting Parties."

Article 2
Sovereignty: Norway as entity of control and local Governance

Article 3
Free Trading Zone
"Equal liberty of access and entry for any reason or object "

Article 4
"Absolute equality to communications Between all flags"

Article 9
Svalbard "may never be used for warlike purposes"

Ferrari, M. (2011). EMBASSIES: an Architecture of Exception. In San Rocoo Islands (1st ed., Vol. 1, pp. 155–162). Venezia, Italy: Publistampa Arti Grafiche.

The Svalbard Treaty , Paris, 9 February 1920, Versailles Treaty , available from http://library.arcticportal.org/1909/1/The_Svalbard_Treaty_9ssFy.pdf

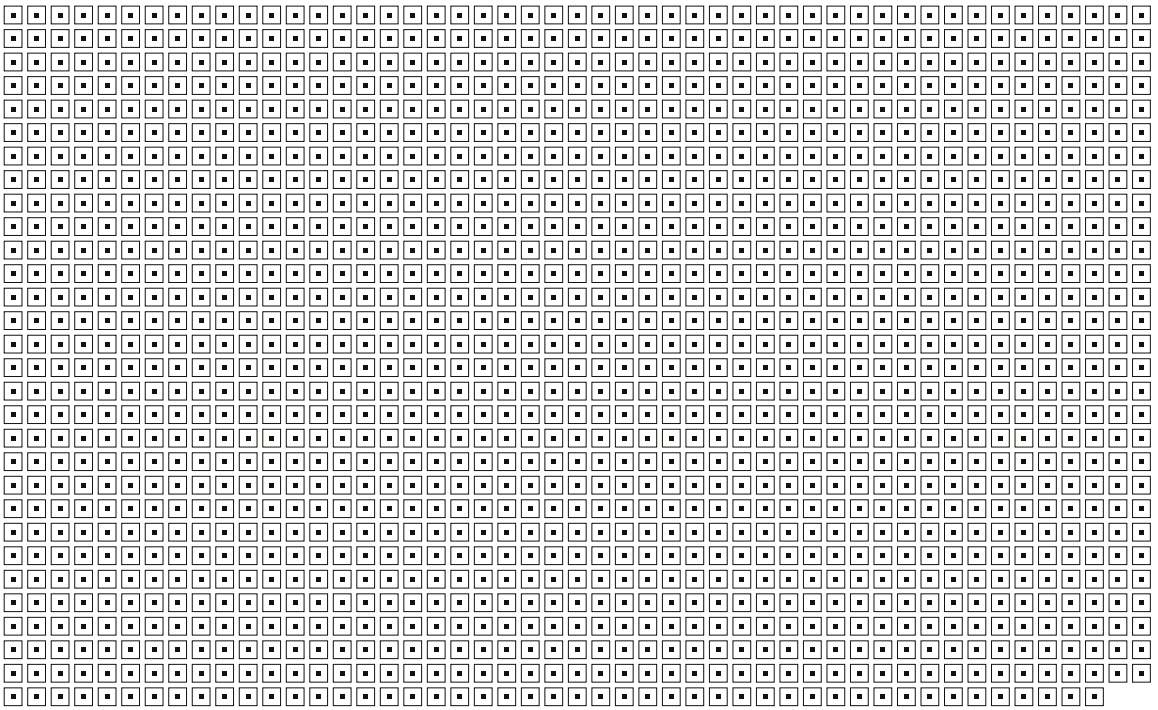
SVALBARD TREATY
1920
Spitsbergenverdrag

Sovereign *Plenipotentiaries - Ambassadors* *Rights*

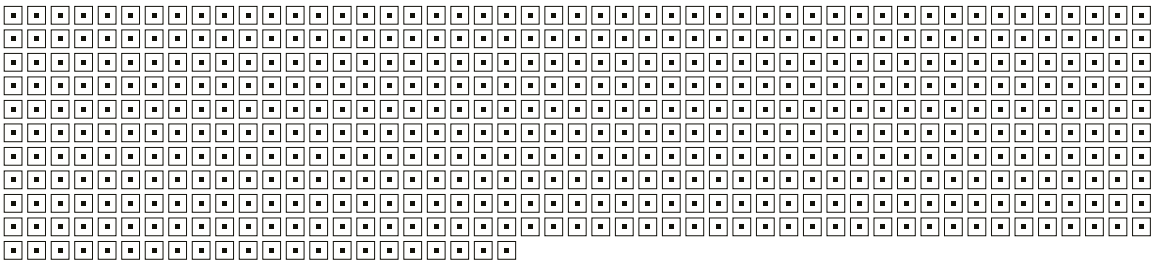
1. Norwegian Parade in Longyearbyen
2. Friendly football match - USSR vs Norway
Source: Svalbard Museum Photo Archive

Rightful Citizens - Free Flow of People

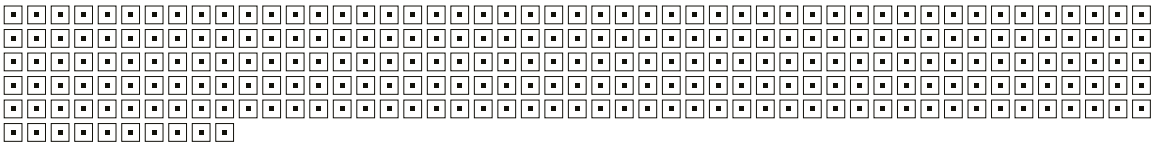
Norway (1498 - 58%)



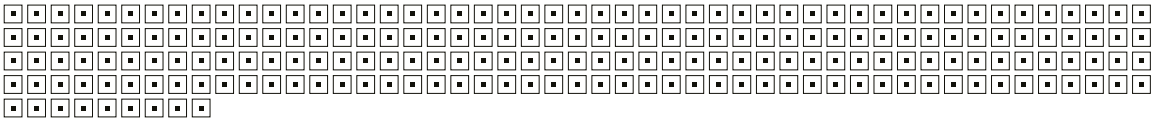
Russia - Ukraine (523 - 20%)



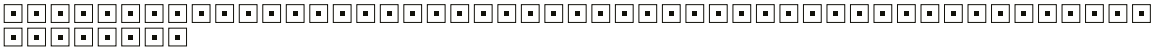
Europe (260 - 10%)



Asia (210 - 8%)



America & Oceania (58 - 2%)



Africa (7 - 0.3%)

Land Use

After the Svalbard Treaty, the territory was thoroughly understood and divided according to the land use. From its total extension approximately 60% is covered in Glaciers which meant that more than half of the archipelago was inhabitable and needed to be protected. Including the glaciers the natural areas protected by the Treaty also sum up around 60%. Between both condition, the habitable percentage of the island, and hence, available for resource extraction activities, is only about 10%.

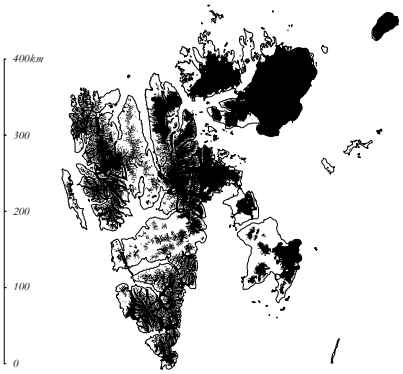
Understanding the Territory

Scale: 10.000.000
Source: Diva GIS

Svalbard
62,045 km2

Belgium - Netherlands
72,231 km2

Denmark
42,933 km2



Glaciers
43,683 km2

Protected Areas
43,902 km2

Mining Concessions
3,983 km2

Mining Concessions
3,983 km2

Randstad
1,500 km2

London
1,100 km2

Mining as Territorial Administration

The remoteness and isolation of the archipelago, in relation to the centres of governance of Oslo and Tromso in Norway became a hindrance for the Norwegian government to enforce the sovereignty that was granted by the treaty. To provide Svalbard of the same sovereignty and governmental representation as the other regions in Norway, councils, ministers, police, services and others would had to be shipped from the mainland, which was perhaps considered to be not excessive for such a small population. Nonetheless Norway had already a governmental presence at the time that didn't required additional bureaucracy and worked within the rules stated by the Svalbard Treaty: the mining companies.

Therefore, the small inhabitable percentage of inhabitable territory was given to state owned coal companies as a concession. This meant that the land was Norwegian * but it was operated and administered by both Russian and Norwegian companies which withheld the major extraction sites in the island.

Consequently, the maintenance, logistics, transport, well being and other services of the populated centres were continued to be provided by this companies. Revealing the symbiotic relationship between mining and the inhabitation, but above all, the importance of this activity in the governmental system of the archipelago.

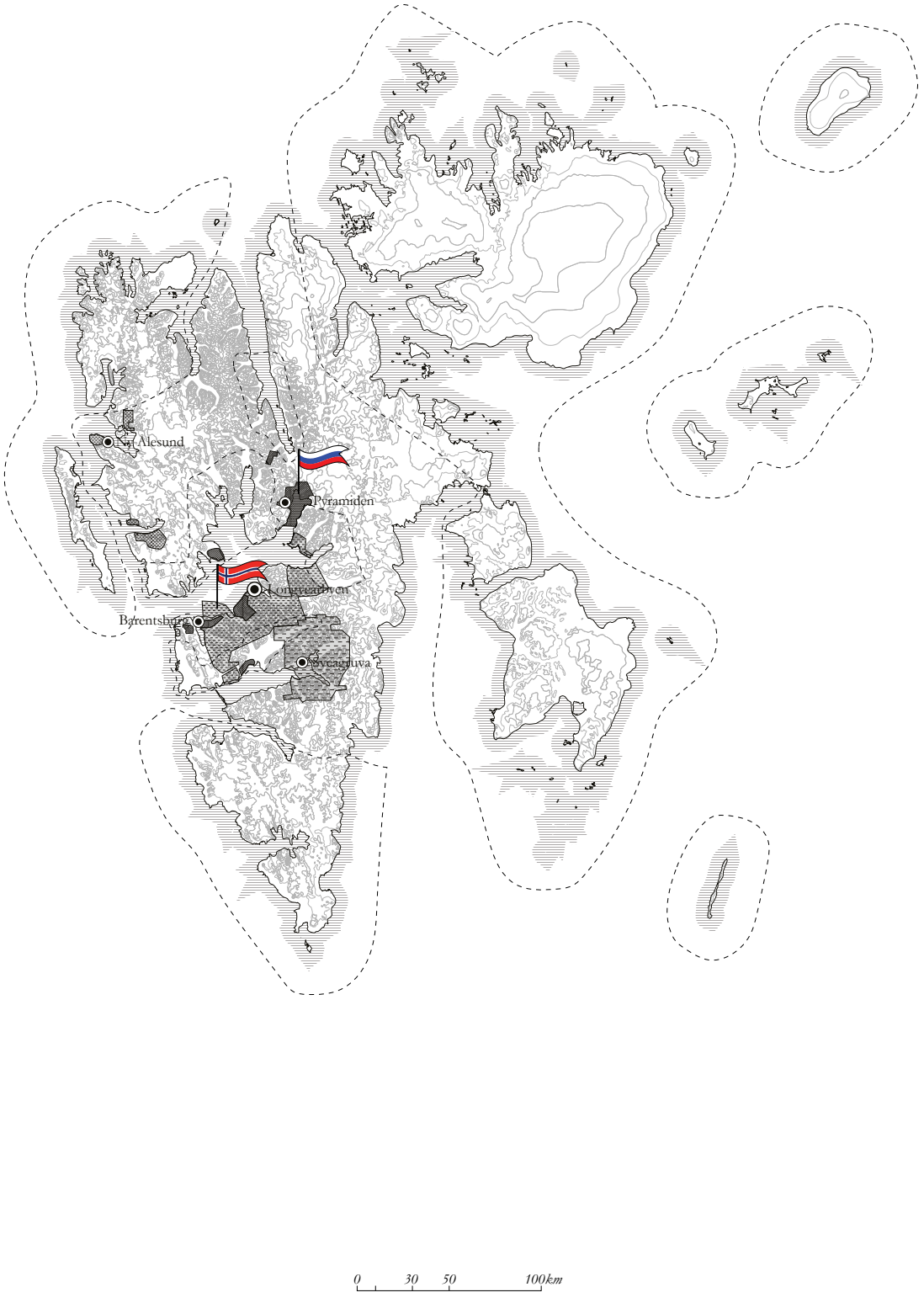
*Conditions may apply under Svalbard Treaty

Store Norske 2010 Annual Report – http://www.snsk.no/getfile.php/1669680.1589.qrrvvcscua/AR_2010.pdf
he University Centre in Svalbard – http://www.unis.no/

Mining Concessions

Scale: 10.000.000
Source: Diva GIS

Norwegian Mining Concession - Store Norske Spitsbergen AS
Norwegian Mining Concession - Store Norske Spitsbergen AS
Russian Mining Concession - Trust Arktikugol
Protected Areas


Ny Ålesund
Pyramiden
Longyearbyen
Barentsburg
Svea/Sveagruva
0
30
50
100km

Coal as Svalbard's *Raison d'etre*

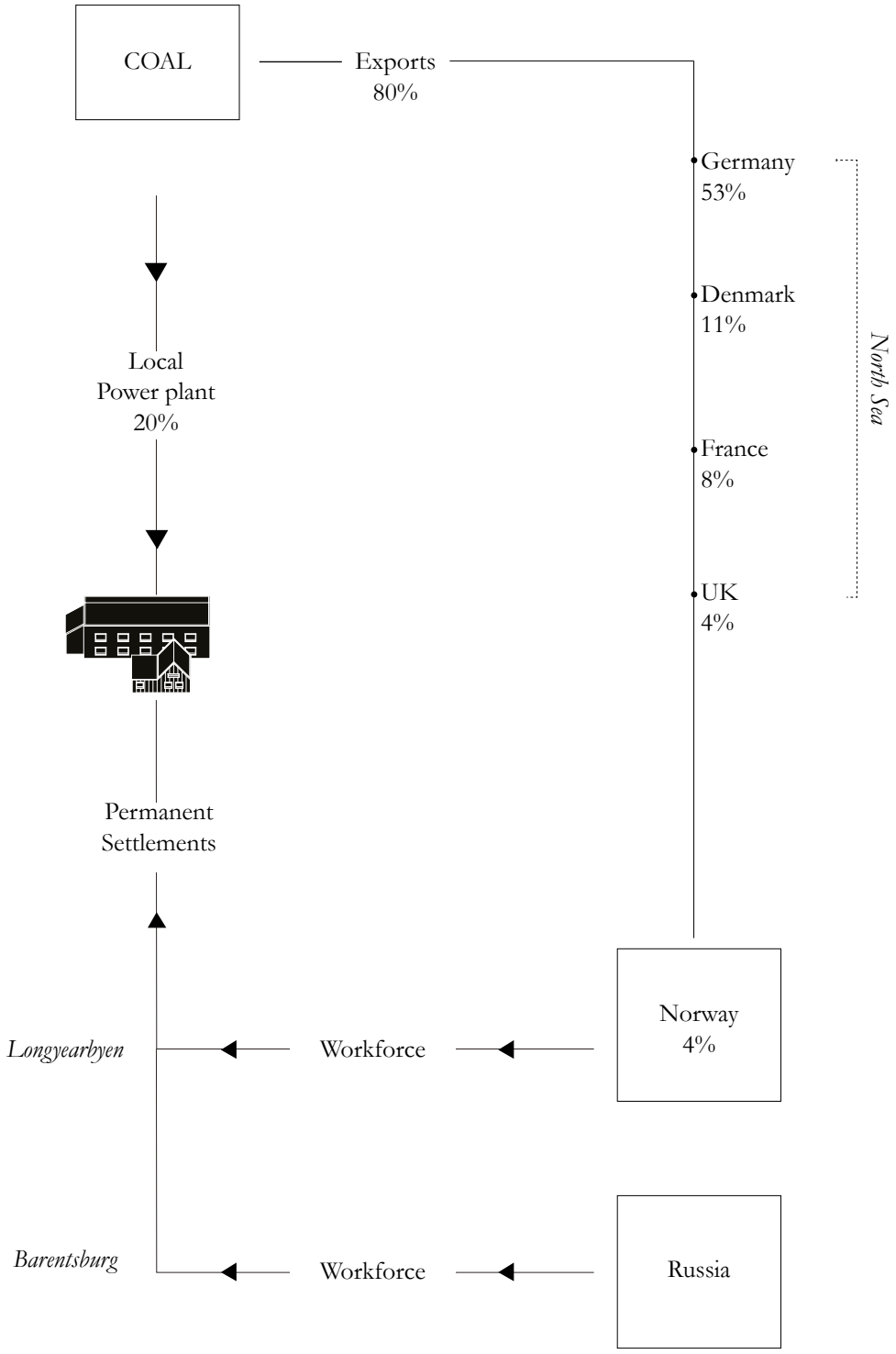
With the Svalbard treaty as evidence, it was coal mining what triggered the permanent inhabitation of the territory. Until then, its remoteness, harsh environment and lack of resources made it an unlikely place to establish a settlement. Reason why the provisional stations served as a seasonal settlement for fishing and whaling.

With the beginning of coal mining came the need to import workers and their families. With it the importance of public services, housing, energy and everything required for the well being of the workforce.

This created a symbiotic relationship between mining and the inhabitation of the island. Due to the its extreme weather and isolation, the only reason to live in the Island would be if you were a miner coming from the United States, Russia, Norway, or any other country with mines in the Archipelago.

Today that system remains. With only Russia and Norway with mines and established settlements, their future depends of coal mining. The export of coal became triggered a cycle where demand required workforce, such workforce would be imported from mainland together with the basic services.

Today as the Coal prices plunge, this cycle which is the raison d'etre on inhabitation is threatened. The intrinsic relationship between permanence and mining is so extreme, that for example Russia, has continued to invest in the coal mines in Barentsburg uniquely to keep its national in the island. For Russia, the permanence of its nationals is an investment for the future, reason why the mining community continues to extract coal without any apparent reason.


COAL
Exports
80%
Germany
53%
Denmark
11%
France
8%
UK
4%
North Sea
Local
Power plant
20%
Permanent
Settlements
Norway
4%
Longyearbyen
Workforce
Barentsburg
Workforce
Russia

1. Coal Miner Statue - Longyearbyen
2. Miner in Sveagruva
Source: Jonatan Fernström Photographer

Russian Miners in Barentsburg
Source: http://www.leodelafontaine.com/galeries/WORKS/arktikugol/arktikugol.html

Politics of Presence

As with Russia with the mining Settlement of Barentsburg, the Norwegians are also depending on coal to hold to the sovereignty acquired by the treaty.

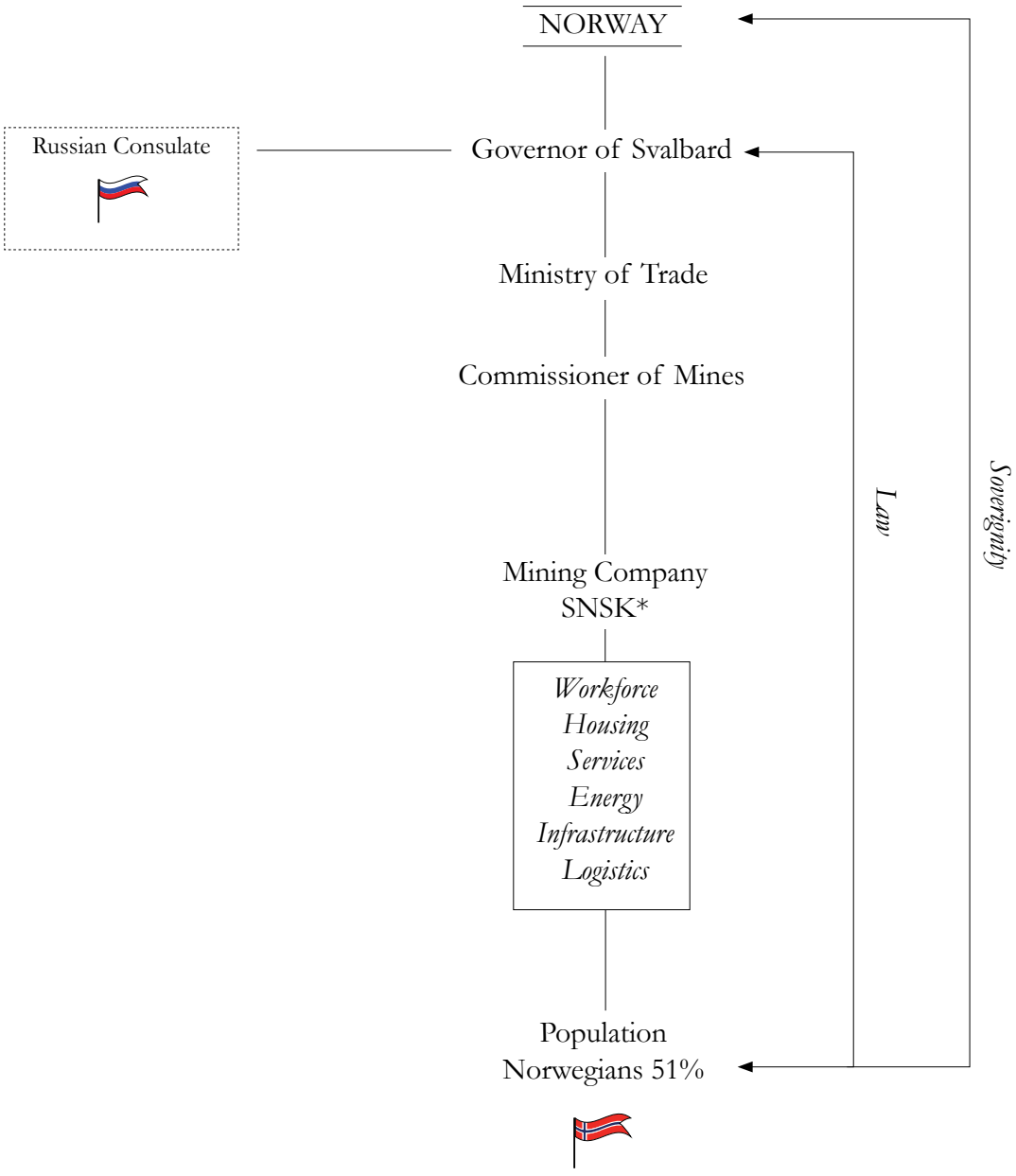
As raison d'etre of inhabitation, mining was what essentially gave Norway the right of sovereign, as the majority of the population at the time of the treaty was Norwegian.

Since then, Norway established a governmental system around mining, which remains up to this day. Due to the remoteness, it seemed difficult for Norway to transfer its entire regional governmental structure for such a small settlement. Therefore, given the influence and power of the state owned mining companies on the territory, Norway delegated the governmental responsibilities to these.

Therefore the mining company would then take care of the basic infrastructure, energy, services, work, welfare, logistics and even education, while Norway would import Law enforcement and healthcare. Hence as mining is the reason of the permanence of Norwegian citizens, it is essentially the base of the sovereignty claim of Norway.

"it is the Government's position that the assertion of Norwegian sovereignty is best served with a permanent presence of Norwegian citizens. Maintaining a Norwegian settlement in Svalbard has been, and continues to be, an objective for the Norwegian authorities".

The Politics of Presence: The Longyearbyen Dilemma
Torbjørn Pedersen



***Store Norske Spitsbergen Kulkompani**

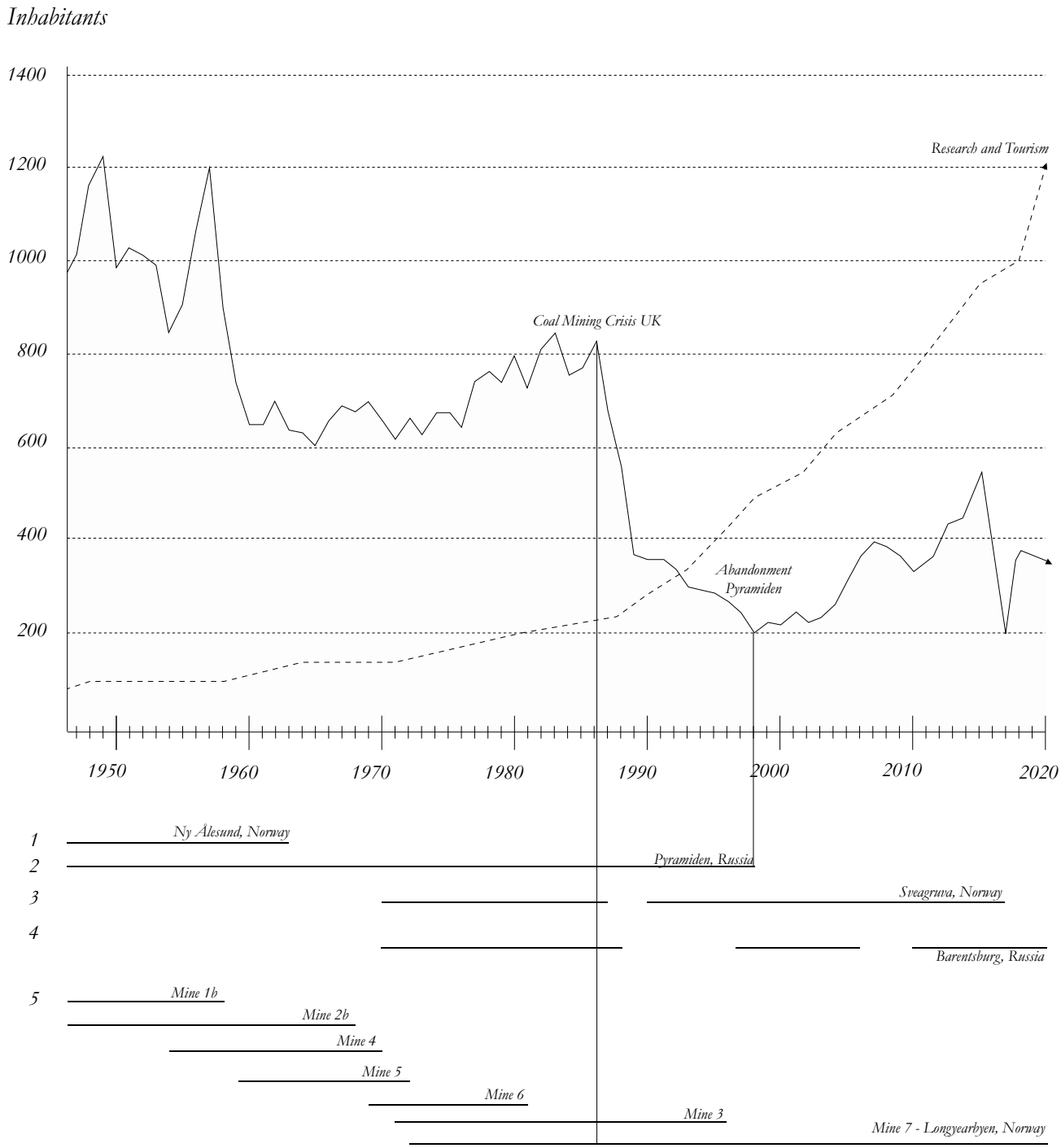
Mining Crisis

In today's epoch of the new climate policies and the shift towards renewable energies, coal has encountered several crises. Even from the 80's with the miners crisis in the United Kingdom, the demise of coal demand is threatening the livelihood of many mining communities and single industry settlements around the world.

In the case of Svalbard, the demise of coal is systemically reducing the permanent population in the Archipelago. With one abandoned town in 1998, and one soon to be totally disassembled, the coal crisis is an inhabitation crisis.

With the demise of the inhabitation, comes the uncertainty of Norway's sovereignty on the territory.

Coal Mining Employment
Source: Statistics Norway


Inhabitants
1400
1200
1000
800
600
400
200
Research and Tourism
Coal Mining Crisis UK
Abandonment
Pyramiden
1950
1960
1970
1980
1990
2000
2010
2020
1
2
3
4
5
Ny Ålesund, Norway
Pyramiden, Russia
Sveagruva, Norway
Barentsburg, Russia
Mine 1b
Mine 2b
Mine 4
Mine 5
Mine 6
Mine 3
Mine 7 - Longyearbyen, Norway

Miners in Barentsburg

Photo: Paul S. Amundsen

https://roadsandkingdoms.com/2014/a-russian-mining-town-in-norway-qa-with-paul-s-amundsen/

Mine 3 (Closed) Longyearbyen

Santiago Palacio Villa®

End of Mining

With the foreseeable end of mining, the local communities on Svalbard refuse to let it in the past. In former mining communities struggling to find alternatives to supply the void left by this activity, mining becomes part of the tradition and collective imagery, and an important pillar of the future of these communities. [1]

Hence within the social and political crisis soon to be caused by the end of mining, this activity is essentially the archipelagos heritage, and it should be the starting point towards transition.

1 Dale, B., Bay-Larsen, I., & Skorstad, B. (2017). The Will to Drill - Mining in Arctic Communites (Springer Polar Sciences) (1st ed. 2018 ed.). Cham, Switzerland: Springer.

Sixteen Tons

"Some people say a man is made outta mud
A poor man's made outta muscle and blood
Muscle and blood and skin and bones
A mind that's a-weak and a back that's strong

You load sixteen tons, what do you get?
Another day older and deeper in debt
Saint Peter don't you call me 'cause I can't go
I owe my soul to the company store"

Tennessee Ernie Ford

Miner's Choir - Longyearbyen

https://www.newsdeeply.com/arctic/articles/2016/03/03/when-coal-leaves-center-stage-in-longyearbyen

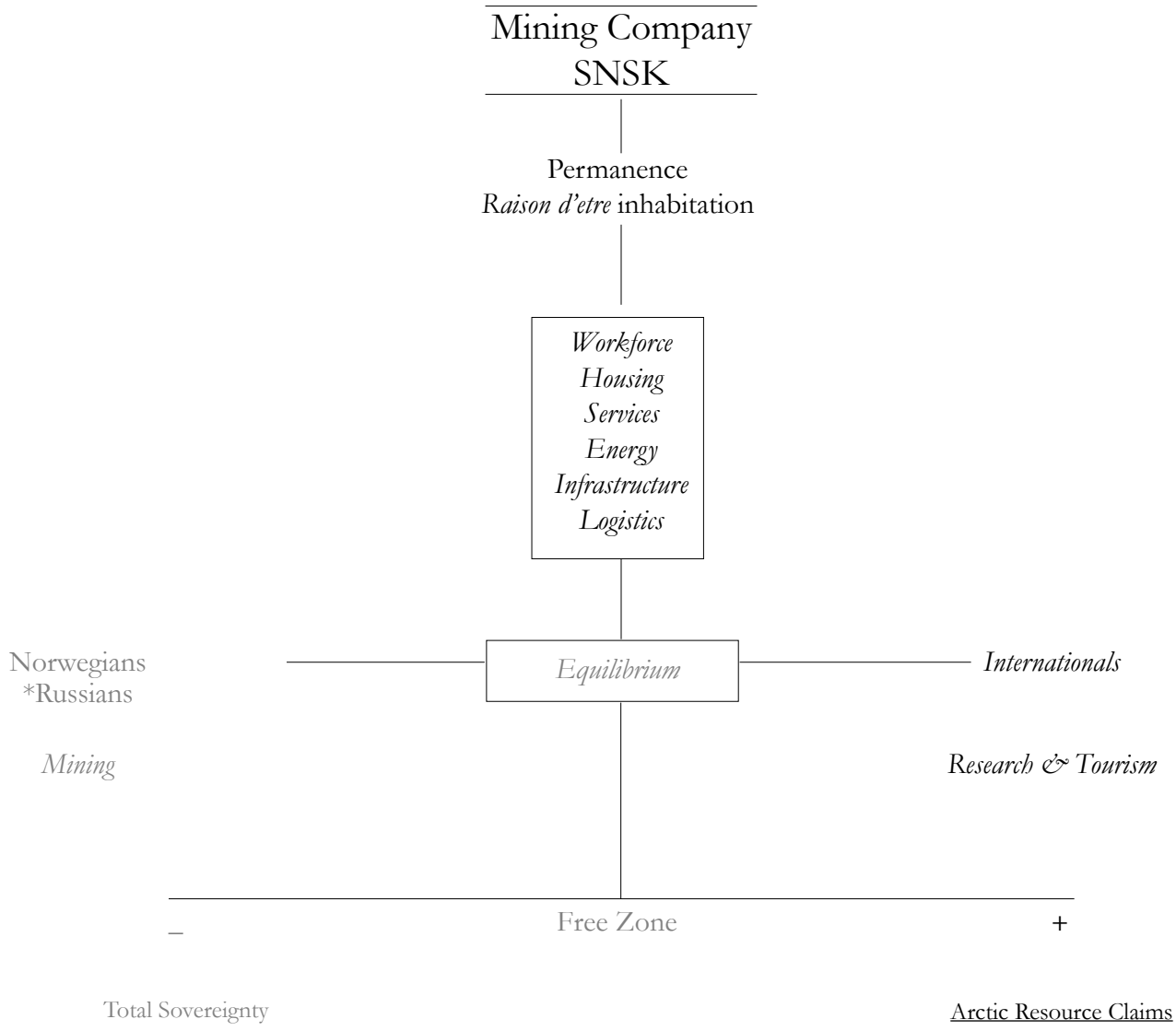
Mining Company Crisis

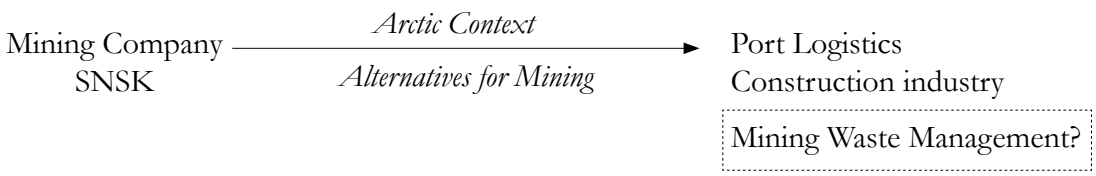
Politics of Presence is a term coined by Torbjørn Pedersen to explain the dilemma that faces the city of Lonyearbyen, the main mining settlement in the Svalbard Archipelago. As the coal crisis hits the state owned mining company SNSK, the permanence of the Norwegian citizens is hanging by a thread.

The mining company as entity of local governance and control has established an equilibrium between the Norwegian nationals and the internationals moving to the archipelago. As Svalbard transitions from Coal to other activities, the Norwegian population decrease considerably while the international community is growing by the minute.

The Svalbard treaty encourages the free movement of people, and welcomes all nationalities, yet, the presence of Norway through mining is what the base of its sovereignty claims over the territory. In the hypothetical case that Svalbard only had Norwegian nationals, its sovereignty would be absolute, and it could be hard for other nations to benefit from the treaty. Opposite to today's scenario, where the reduction of the population weakens Norway's claims, and suggest the interference of the political interests of the Arctic nations.

Pedersen, T. (2017). The Politics of Presence: The Longyearbyen Dilemma. Arctic Review on Law and Politics, 8(0), 95–108. https://doi.org/10.23865/arctic.v8.682


Mining Company
SNSK
Permanence
Raison d'etre inhabitation
Workforce
Housing
Services
Energy
Infrastructure
Logistics
Norwegians
*Russians
Equilibrium
Internationals
Mining
Research & Tourism
–
Free Zone
+
Total Sovereignty
Arctic Resource Claims

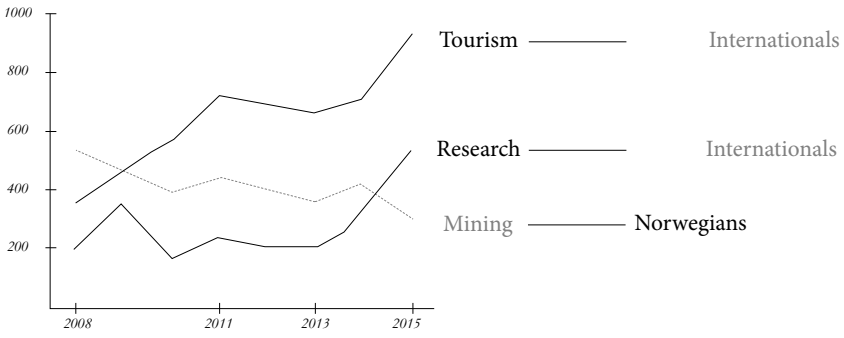

Mining Company
SNSK
Arctic Context
Alternatives for Mining
Port Logistics
Construction industry
Mining Waste Management?

Local Restructuring

As the Mining company SNSK struggles to look for alternatives to replace mining and maintain the Norwegian workforce in the archipelago, the transitioning Svalbard is already evident. Increasing activities such as tourism and research have been taking the lead in people employed, leaving mining behind.

Tourism has become an important part of the economy, an it has actually already transformed the city of Longyearbyen from a mining town to a tourist villa. On the other hand, Svalbard is a hotspot for geological, satellite, astronomical and climatic research The sprawl of these activities is not less dangerous than coal mining. Mass tourism and the increasing research infrastructure also threatens to affect the ecological balance of the archipelago.

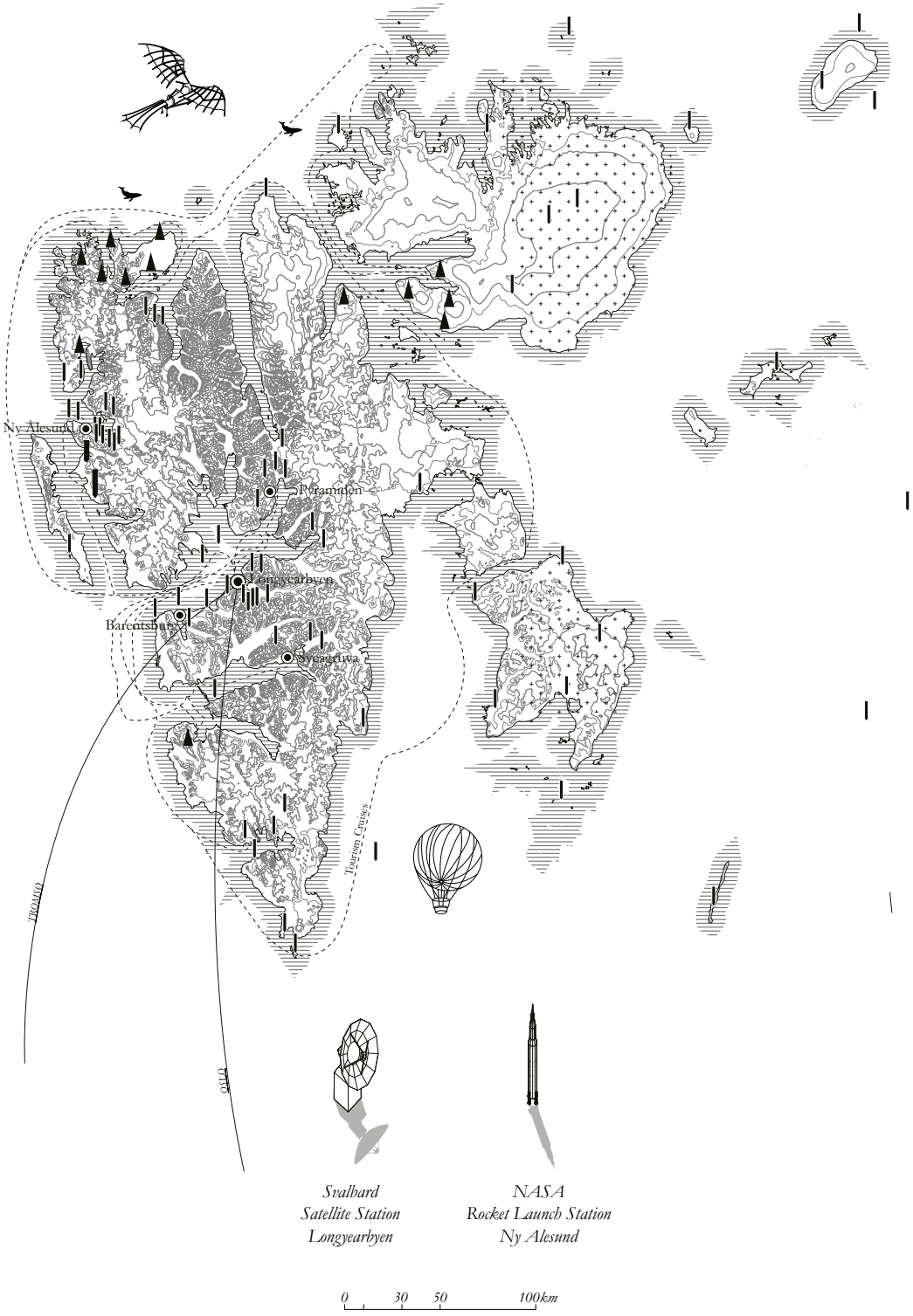
Nonetheless the main conflict is in the workforce of these activities. Both tourism and research suppose both a seasonal and part time employment, as well as a majority of international workforce. This means that not only is the Norwegian population being diluted , the work and inhabitation is becoming less permanent every time.



Research & Tourism

Scale: 10.000.000
Source: Hurtisgruten, Research in Svalbard Database

Research Centres
Research Areas
Flora, Fauna, Landscape Sightings
Tourist + Local Routes: Boat
Tourist + Local Routes: Snowmobile


Ny Alesund
Pyramiden
Longyearbyen
Barentsburg
Svea
Tourist Cruises
TROMSØ
OSLO
Svalbard
Satellite Station
Longyearbyen
NASA
Rocket Launch Station
Ny Alesund
0
30
50
100km

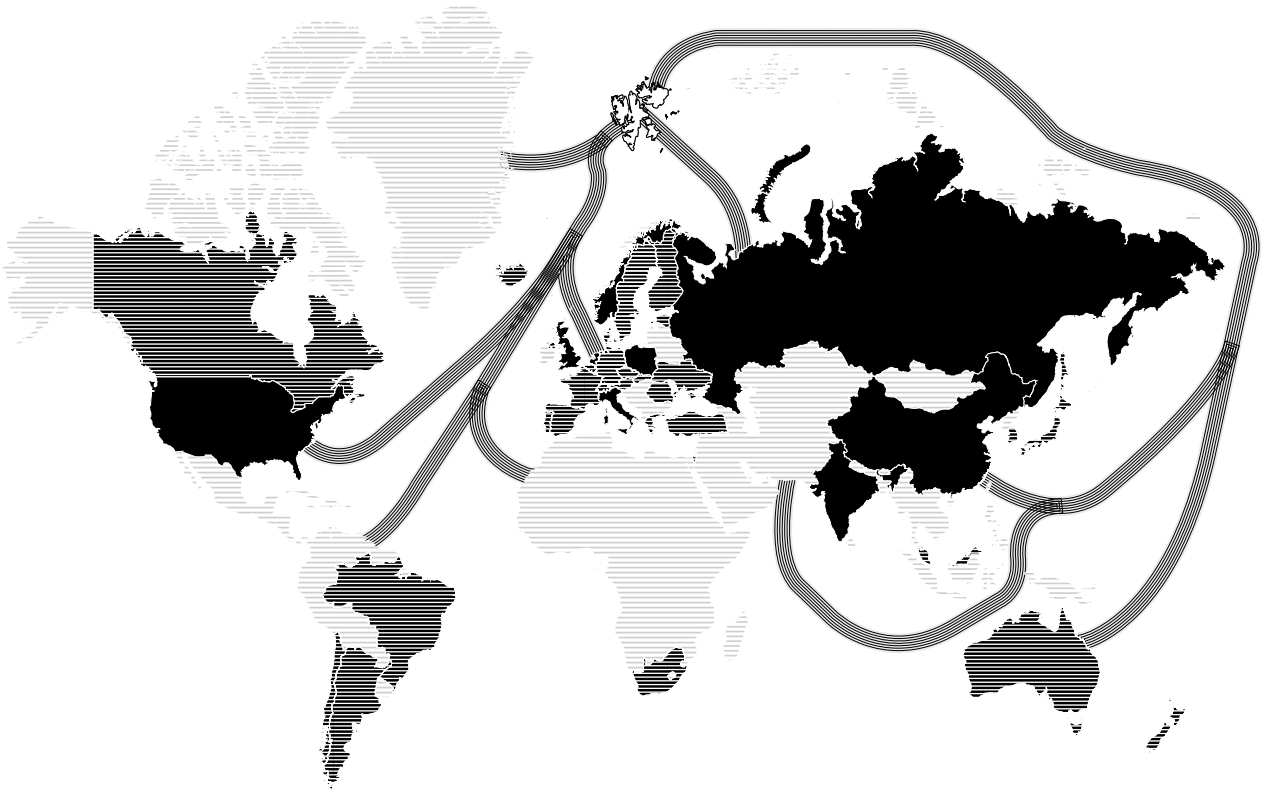
- Svalbard Archipelago
- Terra Nullius to Svalbard Treaty
- Mining as Governance
- Svalbard Free Zone

Dangerous Alternatives

With the potential of the free zone and the increasing accesibility of the archipelago, it seems like the transition towards new activities wont be traumatic. it is already happening, as Svalbard is being consolidated as a research and tourism hotspot, and mining is facing oblivion.

Nonetheless, as these activities bring international, they affect the balance established by the Norwegian presence as control and ambassador for the ratification of the treaty.

So, even if it might seem hopeful that these activities are positioning Svalbard as an international community, the geopolitical repercussions this might have in the future are varied.



RESEARCH CENTERS

International
- Global Seed Vault
- Arctic World Archive

Norway
- Svalbard University
- Svalbard Science Center
- Kjell Henriksen Observatory
- Andøya Space Center
- Ny Ålesund Station
- Zeppelin

Poland
- Stanisław Baranowski Spitsbergen Polar Station
- Polish Polar Station
- Nicolas Copernicus University Polar Station
- Adam Mickiewicz University Polar Station

United States
- NASA Launching Site
- Satelite Station Svalnet (US)

India
- Himadri
- IndARC

China
- Yellow River Station

Italy
- Dirigibile Italia Arctic Station

United Kingdom
- NERC Arctic RS

Netherlands
- Netherlands Arctic Station

Russia
- Russian Scientific Center Spitsbergen

TOURISM COMPANIES

Norway
- Hurtigruten Svalbard
- Basecamp Explorer
- Svalbard Adventure
- Better Moments AS
- SvalbardVilmarkssenter AS
- Svalbard Husky AS
- Svalbard Wildlife Expeditions

Delicate Equilibrium

The Svalbard Free Zone's condition has the potential to promote international cooperation among nations, (as with the research activity) yet is vulnerable to the resource claims taking place in the Arctic. As agreed in the Svalbard Treaty, its protected condition relies on the Norwegian presence as *Ambassador* for the territory's best interests. Mining as governance and reason of permanence of Norwegians on Svalbard has created a delicate equilibrium between the conditions of "free zone" and protection. Yet, today this balance is being disturbed by the end of mining as it threatens the permanence of Norwegian citizens, therefore its presence and sovereignty over the territory. Without Norway as a strong ambassador for the fulfilment of the treaty , the "free zone" becomes an open door for the extractivist interests of the Arctic Nations.

This delicate equilibrium is evidence of how a crisis in a small Arctic community can have important repercussions on the territorial and global scale.

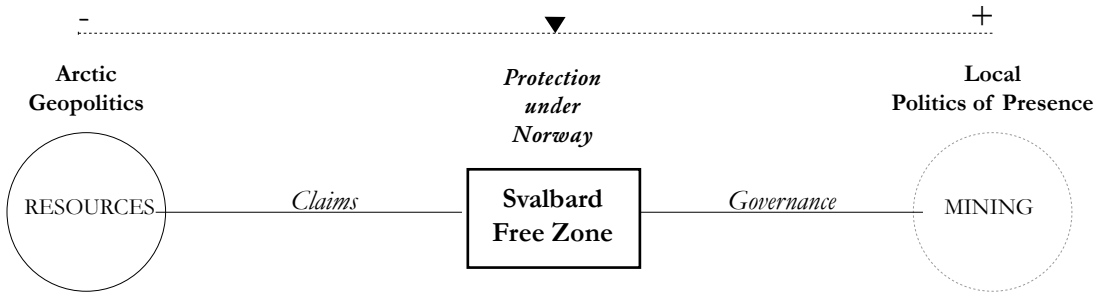
"Isolated, the declining trend in the share of Norwegians in Svalbard is likely to fuel misperceptions about its legal status. Misperceptions, which in turn, could tempt other governments to assert more political influence in Svalbard, which may ultimately affect peace and stability in the region."

The Politics of Presence:
The Longyearbyen Dilemma
Torbjørn Pedersen

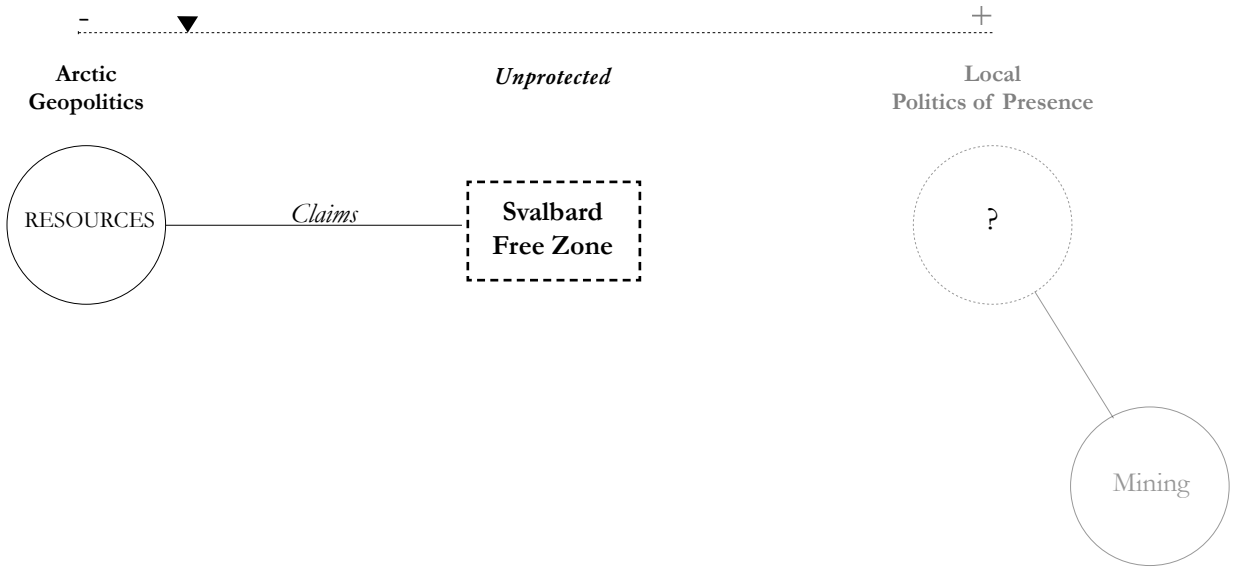
Territorial Scale
Arctic

Local Scale
Longyearbyen

Delicate Equilibrium



State of Uncertainty



The "Cold" Free Zone

Even though historically the Svalbard Free zone has been a safe haven for cooperation, today's epoch of over-extraction leaves the Free Zone as the centre of a geopolitical dispute.

The discovery of new resource deposits, new and shorter trading routes, developing cities and ports and a more favourable weather have triggered a resource race and the further claims of resources and territorial waters

Today the Arctic nations are presenting their continental shelf claims, looking to get the bigger piece of the split of the Arctic. Additionally there is a resource race and a military race taking place. Nations as Russia, The United States and Canada are already placing military bases in strategic places along the Arctic, as it becomes the new geopolitical chess.

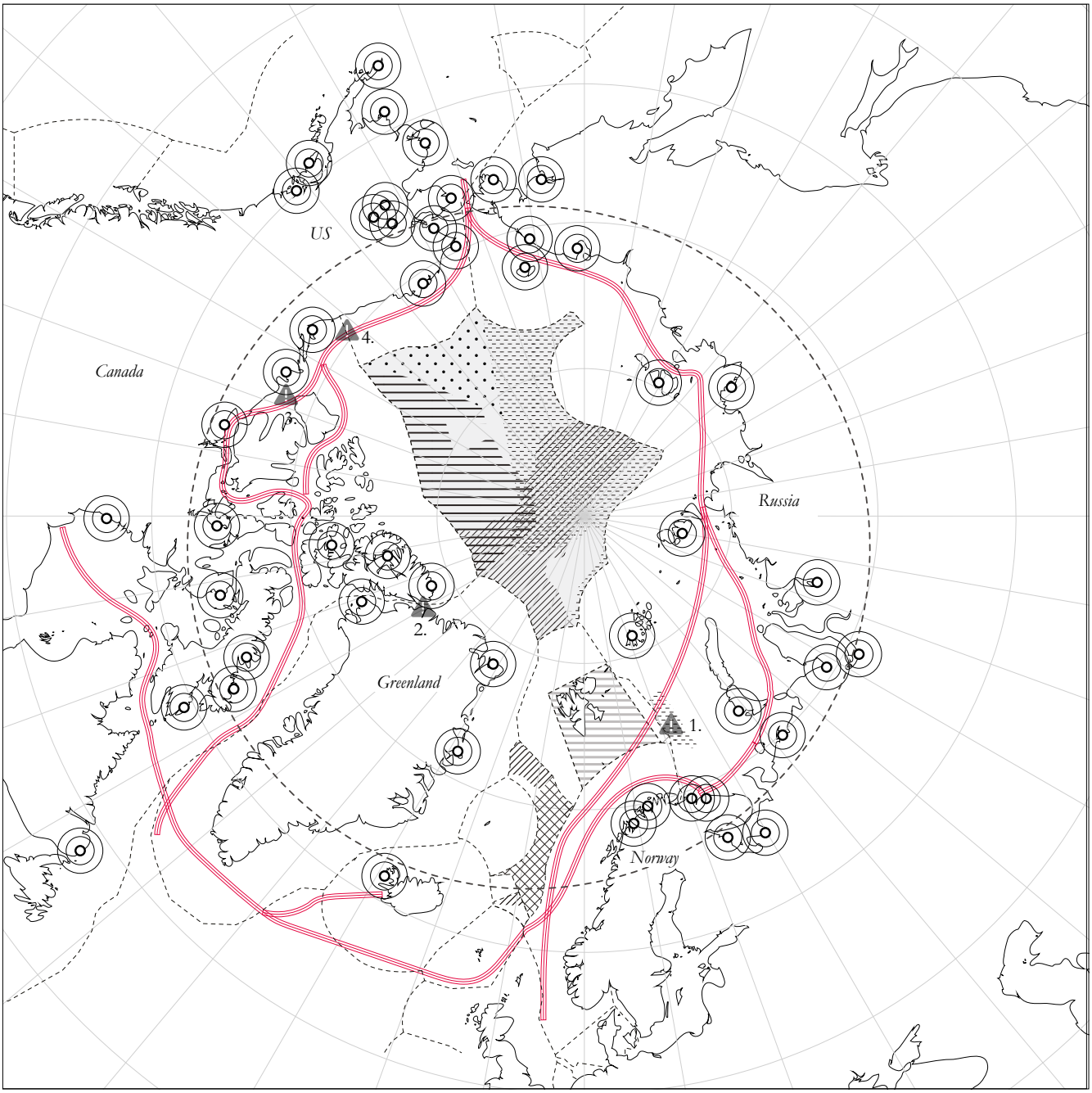
As the different claims overlap and military bases sprawl, conflicts arise between theatrics nations, which seem to be turning their eyes at Svalbard.

Under the treaty, the resources in Svalbard are meant to be shared, yet Norway has acted as control, to allow the free zone to have a balance between sharing and protection of the ecosystem. Yet as all military bases seem to silently face the archipelago, it has become the "cold" free zone; a state of uncertainty on the verge of collapse.

1. Conflict Maritime border Russia - Norway
2. Conflict maritime border Greenland (Denmark) - Canada
3. Trade Route Conflict U.S - Canada
4. Conflict Maritime Border U.S - Canada

Arctic Claims & Militarization

Scale: 10.000.000
Source: Karlin, A. K. (2010, November 21). Translation Canada Arctic Militarization. Retrieved May 27, 2020, from https://akarlin.com/2010/11/translation-canada-arctic-militarization/


US
Canada
Russia
Greenland
Norway
1.
2.
4.

Greetings from the Svalbard Free Zone

The future of the free zone depends entirely of Norway as ambassador of to the mining company a representation on the territory. If the crisis is not aborted, Svalbard will soon be facing the effects of over extraction, mass tourism and against the treaty's accordance, militarization.

Therefore what for now seems to be a pristine, protected territory could potentially become the next extraction ground of the Arctic nations.

Hence the responsibility of Norway towards the world and the Arctic. Its condition of ambassador positions it as the intermediary within this conflict, and urges it towards alternatives to mining to re-establish the equilibrium that has been disturbed.

1. Arctic Militarization

Source: Russian Military Base - Kotelny Island
https://business.financialpost.com/pmn/business-pmn/russia-stakes-its-hold-on-the-arctic-revamps-military-bases

2. Mineral Extraction

Source: Diamond Mine, Canadian Arctic
http://www.mining.com/diavik-diamond-mine/

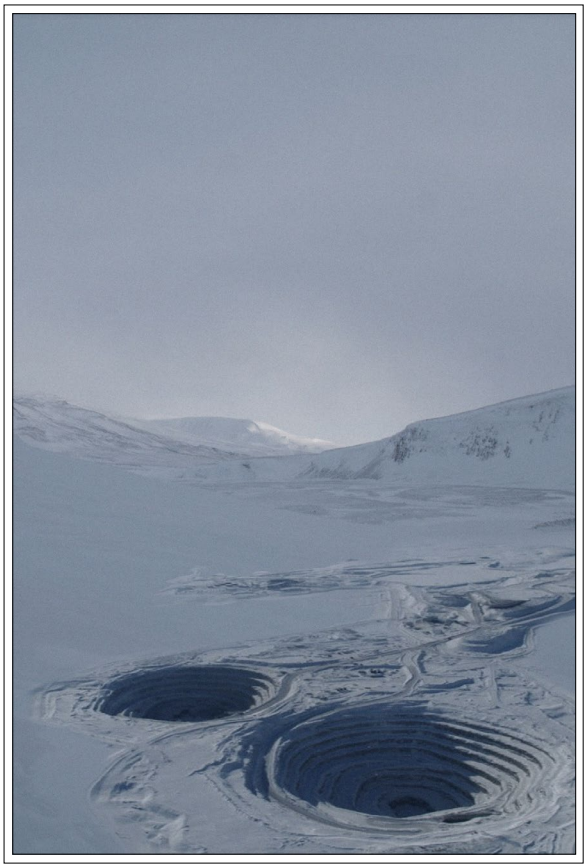
3. Oil/Gas Extraction

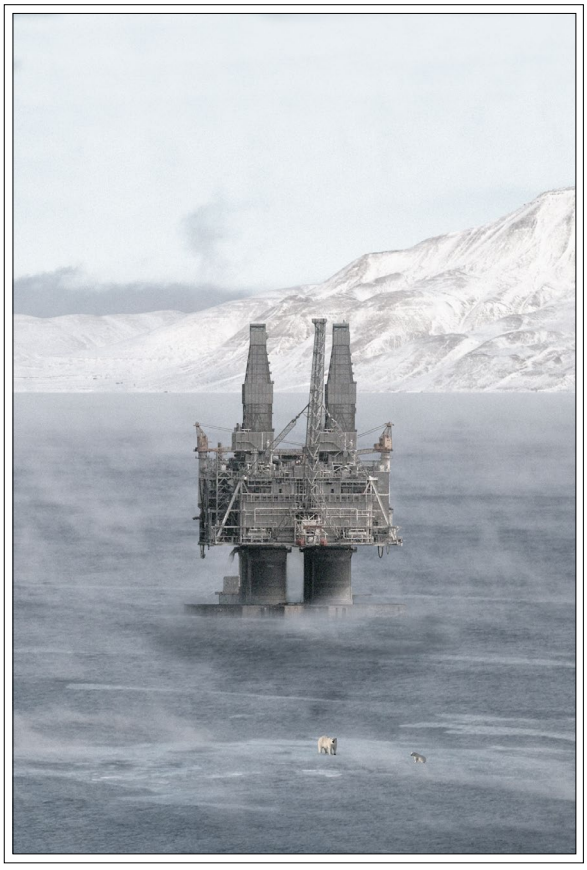
Source: Hibernia Oil Platform - Canada
https://www.cbc.ca/news/canada/newfoundland-labrador/hibernia-shut-

3. Mass Tourism

Source: Cruise - Pjotr Manhonin
https://upload.wikimedia.org/wikipedia/commons/6/64/Regal_Princess_Starboard_Side_Tallinn_1_July_2015.JPG

Background Images: Santiago Palacio Villa®





Greetings from
The Svalbard Free Zone

Research Question

How can the management of mining waste become a tool for governance and self sufficiency in the Arctic? Can mining waste re

As I focused on the specificities of the Arctic and on Svalbard as a territory currently transitioning from mining to other activities, I realized that my research was intrinsically political. Svalbard is an archipelago known for being 'no man's land'. Through history it had withhold its character of an unclaimed territory of which its in-habitation is solely because of the mining of coal. For this reason and due to its remoteness, and internationality, mining companies became the entity of control and governance in Svalbard, similar to the role of an ambassador sent by different nations to represent their interests in foreign land. Therefore, through my research I realized that mining in the Arctic is much more than just an environmental and social problematic, it is a geopolitical issue and the raison d'etre of Svalbard as a consolidated territory. Therefore, by understanding the political relevance of mining in this Arctic community,

I came to the realization that my project had to address the management of mining waste from a political point of view in order to successfully embed itself in the Arctic context. Reason why Svalbard's condition of "free zone' became an important topic as at it is meeting point between the two sides of my research. Addressing and maintaining that delicate balance that have been established between mining as governance and the resource claims and political influence in the Arctic. On one hand having the potential to recollect such mining waste due to its condition of exception (ref), and on the other addressing the political vulnerability of this territory within the resource claims in the Arctic.

Therefore, my research developed and transformed radically. Although always in the line of mining waste, it transitioned towards the politics of such waste. Therefore the name of my project as " The Embassy of Waste", tackles mining waste management and reuse as a political tool of local governance and Arctic cooperation and self sufficiency. By consolidating Svalbard through its condition of "free zone" as a sustainable wasteland, not only am I addressing the governance on the territory , but the cooperation among Arctic nations. Through its name of "Embassy" it acquires both a local and a regional political character, veiling for the protection of Svalbard while benefiting the Arctic nations by managing the waste produced and reusing it towards a new local material. Therefore becoming a project from the Arctic to the Arctic, with Svalbard as an ambassador and intermediate.

Territorial Scale

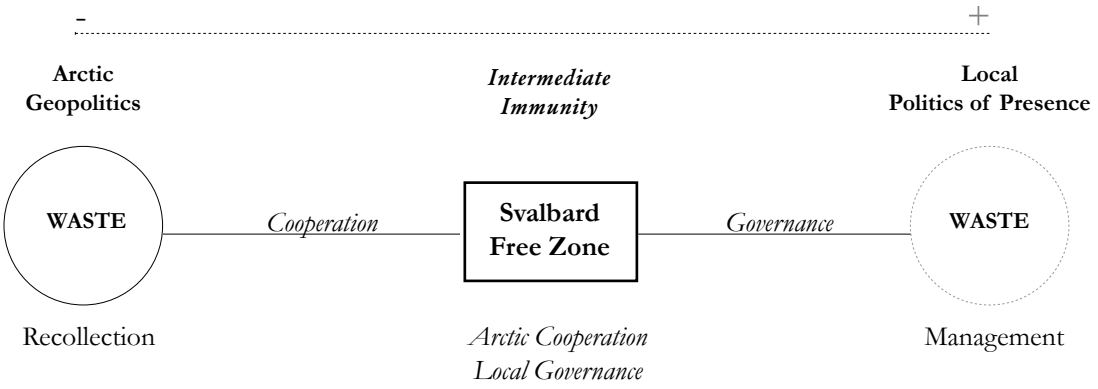
Arctic

Local Scale

Longyearbyen

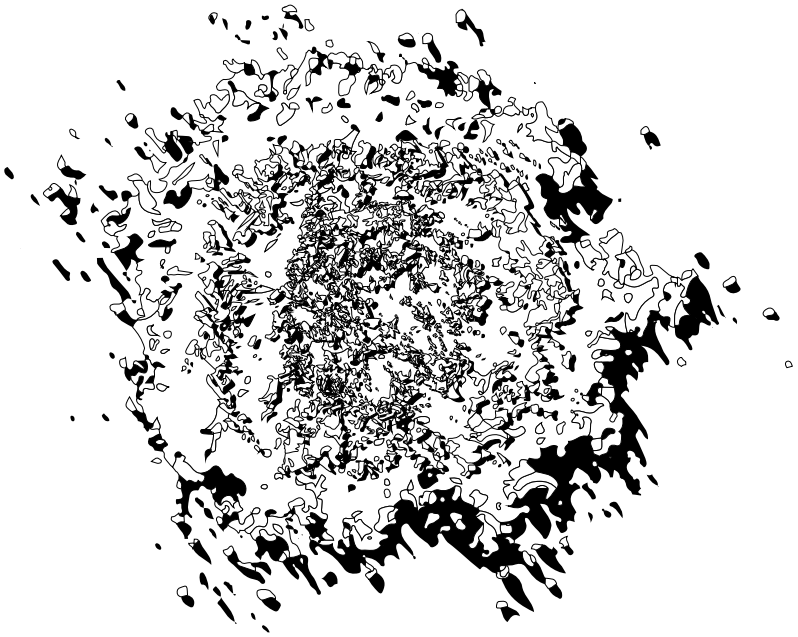
EMBASSY OF WASTE

An Architecture of Exception



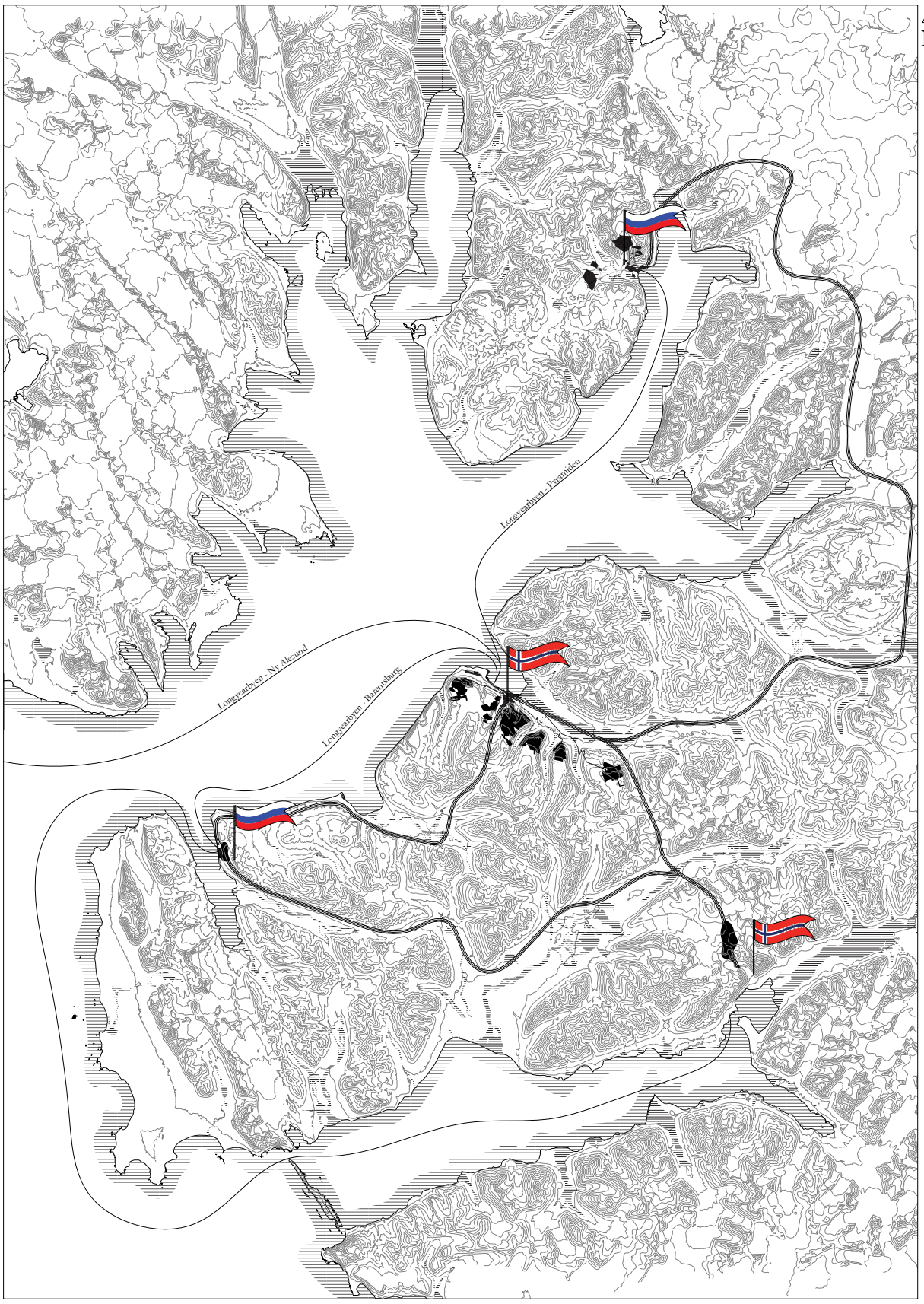
Embassy of Waste

- Longyearbyen, Svalbard
- Project Proposal
- Design Operations



Isfjord

Isfjord is the main fjord in the island of Spitsbergen. Three of the 5 historical mining settlements are located here. Towards the north-east there is the abandoned russian town of Pyrmiden and towards the west, the Russian mining town of Barentsbug. Right in the middle, the city of Longyearbyen is position strategically based on the coal deposits found there, yet also as transportation hub to the other settlements around it.



Isfjord, Svalbard

- Longyearbyen, Svalbard
- Project
- Design Operations

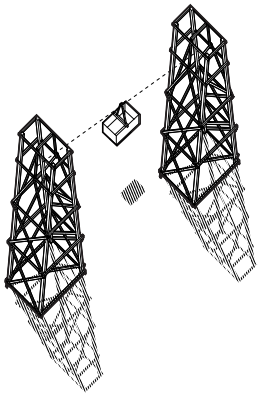
Adventvalley

Within the Isfjord, the Adventvalley is the river mouth of one of the many glaciers in Svalbard. The valley is characterized for its mudflats which in winter freeze, becoming a white desert plain.

Towards the east, the valley is privilege with the Coal necklace, a network of coal deposits spread linearly through the many peaks along the valley.

In the map it is possible to see the sprawl of the many different mines, and within it is possible to see the small town of Longyearbyen, as the epicentre of coal mining in Svalbard.

The town and surroundings are characterized by the extensive network of cable car towers for the transportation of coal.



Coal Mining Infrastructure

Caption or title of the image

Scale
Source

01 Legend
02 Legend
03 Legend
04 Legend
05 Legend etc.

Mine 1b
Mine 2a
Mine 2b
Mine 3
Mine 4
Mine 5
Mine 6
Mine 7

Longyearbyen

Longyerbyen, which translates Longyear city in Norwegian, was an North American mining settlement later purchased by Norway. it is the seat of government, and centre of Svalbard in every way. It is the only way of access to the archipelago both by air and sea, and it is the epicentre of the coal mining infrastructure. Today it is becoming a tourist villa, with a high international community.

Its population fluctuate between 2400 and 2600 inhabitants. Yet in summer it receives cruises with proximity 3000 people. The result is a small city with the infrastructure for mass tourism.


N
0
0,5
1
2km

Longyearbyen, Svalbard
March 2020
Santiago Palacio Villa ®

Coal Mining Transport Infrastructure
March 2020
Santiago Palacio Villa®

Mining Infrastructure

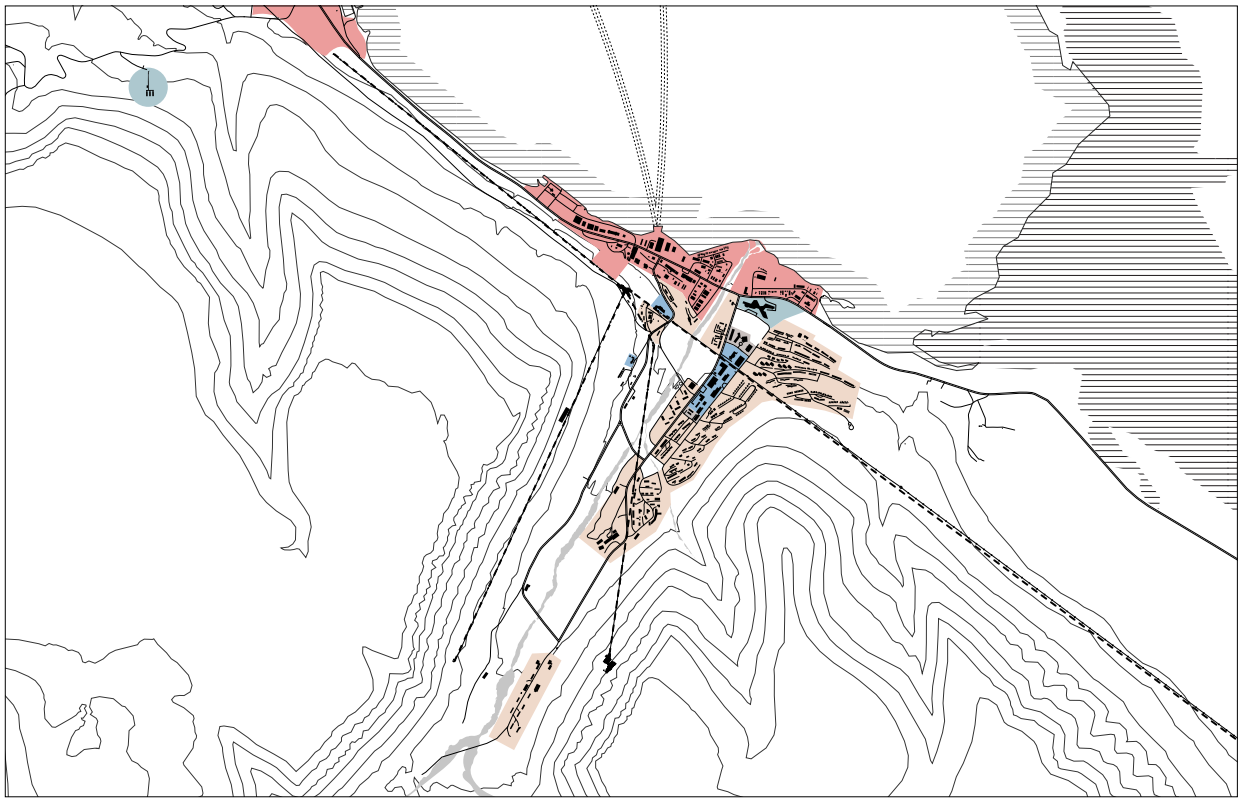
Scale
Source: DIVA GIS

Land Use

Scale
Source: LPO Arkitekter

Red:	Industrial
Yellow:	Housing
Blue	Cultural, Governamental


N



Externalities

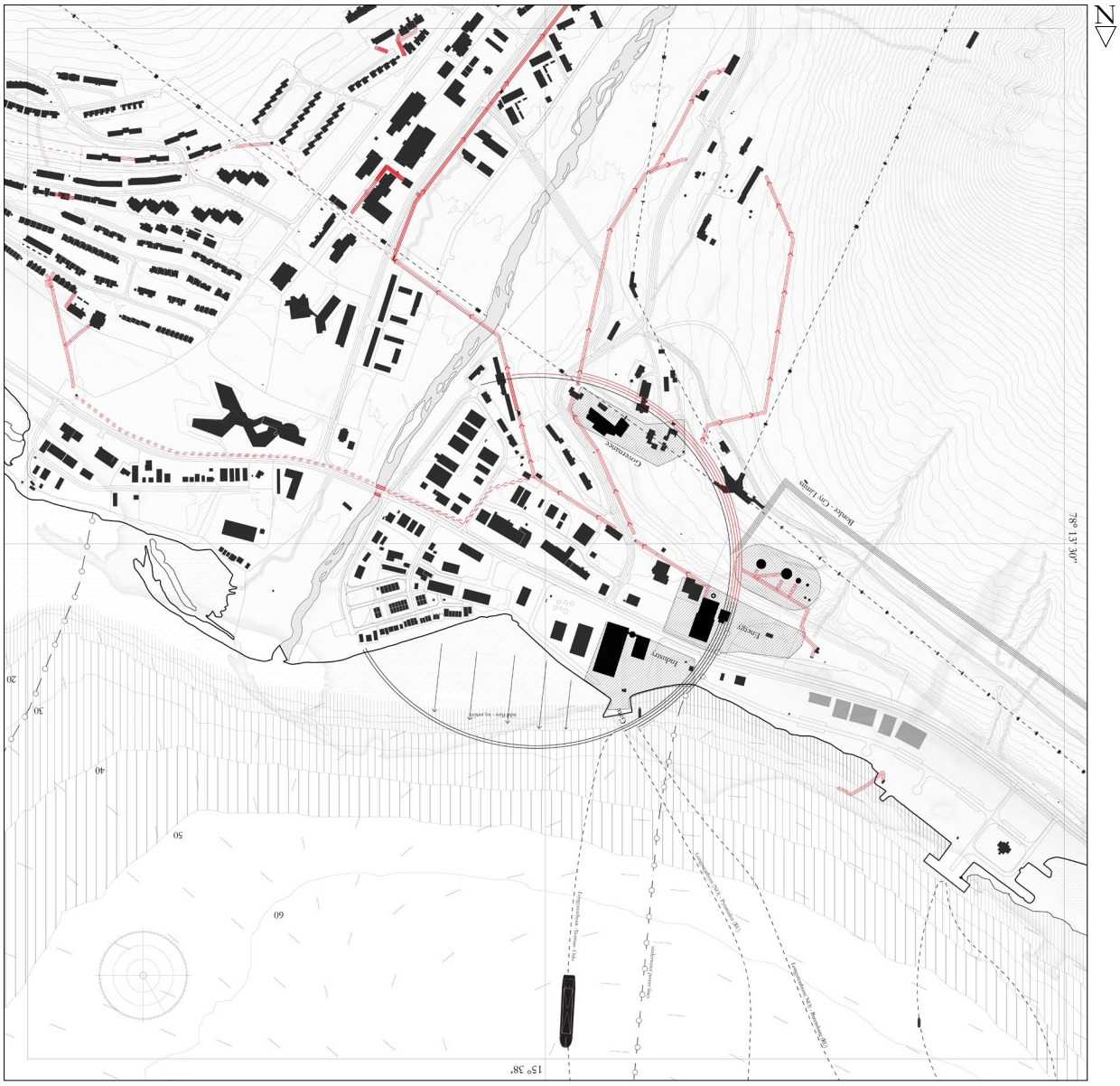
Even though mining faces oblivion, and the concept of a mining town is in the past, coal mining continues to be the beating heart of this community. Besides being the cultural heritage and part of the collective imagery of the community, it is interconnected with every single dynamic on the territory.

As the coal is burned locally to produce energy,. the heat produced in the mine is used as the local heating. The energy and logistical infrastructure are the core of this settlement, and its physical sprawl on the territory contrasts with the washed aesthetics of the Arctic.

Hence, in Longyearbyen, mining is much more than the extraction of coal, it is interconnected with all the different dynamics and processes in the territory. Energy, production, logistics and governance.

Scenario

Given the invisible yet important political value of mining , the Embassy domesticates its externalities on the territory, aiming to restore the energy, production and governmental processes that are soon to face total oblivion. Embedding itself within the existing mining and energy infrastructure of the city, the Embassy extends from the sea to the land introducing the linearity of mining waste management as an infrastructural, non human spine that articulates the project and stitches the territory. Furthermore becoming the border of the 'free zone" and the cardo and decumanus for the future growth of the city

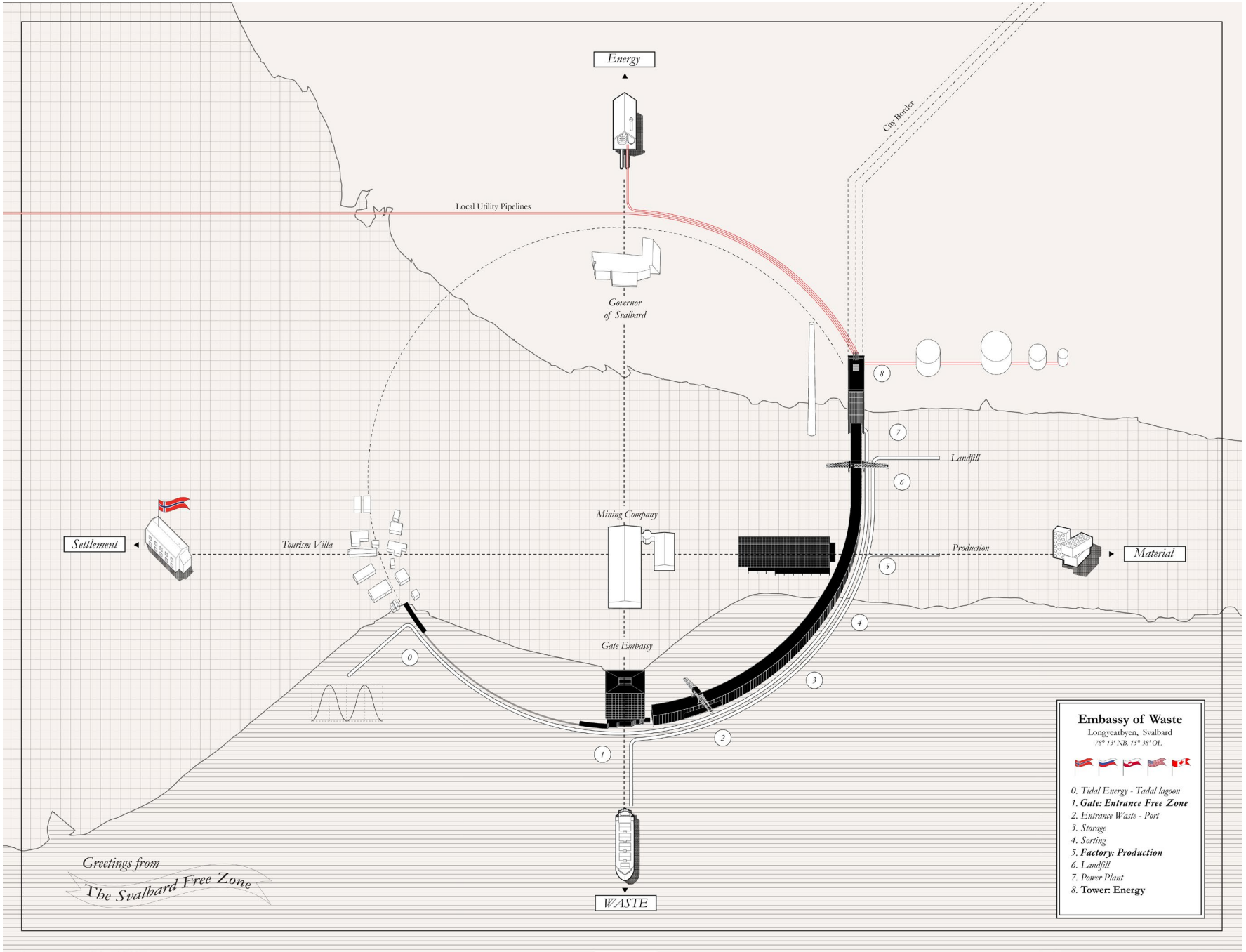


Domesticating Externalities

Project

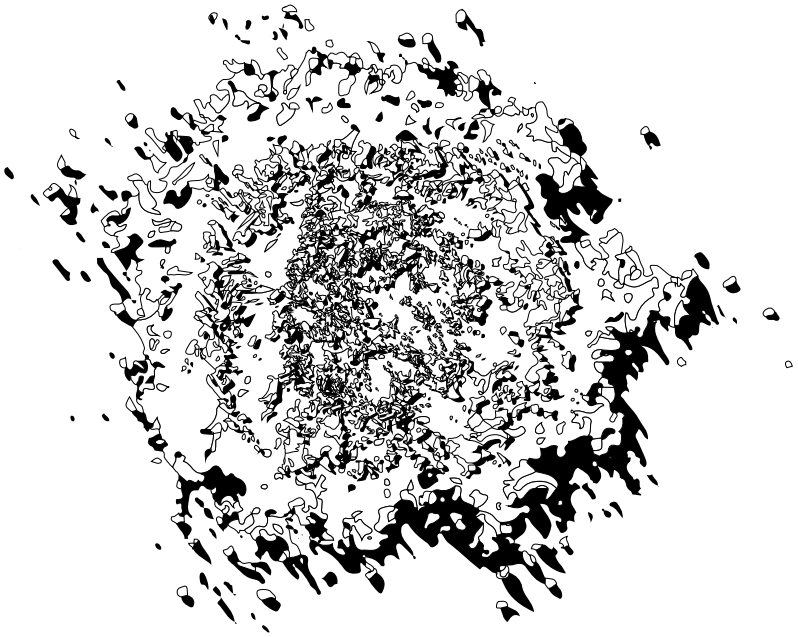
Given the invisible yet important political value of mining , the Embassy domesticates its externalities on the territory, aiming to restore the energy, production and governmental processes that are soon to face total oblivion. Embedding itself within the existing mining and energy infrastructure of the city, the Embassy extends from the sea to the land introducing the linearity of mining waste management as an infrastructural, non human spine that articulates the project and stitches the territory. Furthermore becoming the border of the 'free zone" and the cardo and decumanus for the future growth of the city

Along this border, embracing the urban mesh, three architectural buildings become the manifestation of the politics of waste by intertwining the non-human process with the public character of the Embassy. The Gate, The Factory and The Tower, represent the converging point between the different governmental scales and the industrial process. Thus, by bringing the public face to face to the management of mining waste, the project becomes a political act in itself as it blurs the existing threshold between the community and the industrial imagery, strengthening the notion of waste as a means for political representation.


Energy
City Border
Local Utility Pipelines
Governor
of Svalbard
8
7
Landfill
6
Mining Company
Settlement
Tourism Villa
Production
Material
5
4
Gate Embassy
0
3
2
1
WASTE
Greetings from
The Svalbard Free Zone
Embassy of Waste
Longyearbyen, Svalbard
78° 13' NB, 15° 38' OL
0. Tidal Energy - Tadal lagoon
1. Gate: Entrance Free Zone
2. Entrance Waste - Port
3. Storage
4. Sorting
5. Factory: Production
6. Landfill
7. Power Plant
8. Tower: Energy

Result

- Material Production
- EMBASSY
- Bordering the Arctic City
- Self Sufficiency in the Arctic



Politics of Waste : Border

Lorenzetti's mural, just as its name, depicts the *effects of good government in the city and the countryside*. In this allegory, a good government is achieved by the interconnection of the many different dynamics on the territory, both in and out the city. With a wall dividing the mural in city and country, it acts as filter between the many and threshold between this two symbiotic yet contrasting activities.

The Embassy of Waste aims towards a similar allegory. The bar as monument and border stitches the territory yet it structures the limit of the city and the country (industry). As the three buildings embrace the city, they act as the threshold between industry and public, waste and community. Therefore aiming towards waste as a tool for the good governance of the Arctic.

Effects of Good Governance in the City and in the Country
Ambrogio Lorenzetti
Santiago Palacio Villa ®

Politics of Waste

The project as the border of the Arctic city becomes a political act in itself.

With waste as a resource, the material produced in the project is the physical manifestation of the politics of waste, a result of Arctic cooperation and local governance. As a conscious understanding of the territory and its politics, the material becomes a local resource towards the circularity of the Arctic region. Therefore as the ice melts and the Arctic cities face their inevitable growth the Embassy transitions from border to centre the new centre of the city as it positions Svalbard as an ambassador not only for the stability but or the self-sufficiency of the Arctic territory.

Longyearbyen, Svalbard

Properties of Waste

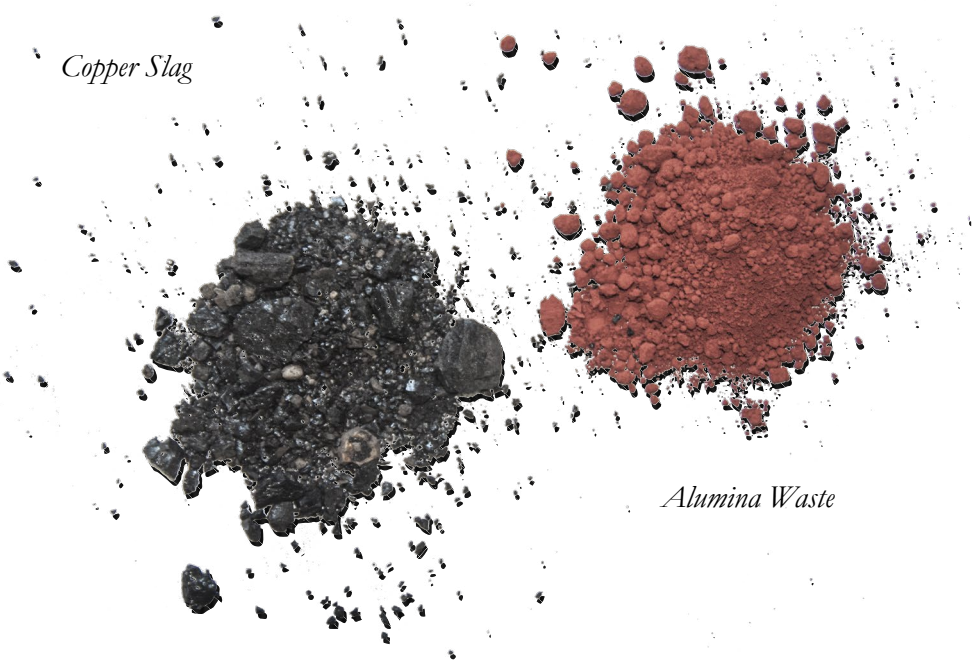
It is proven that the recycle of mining waste can result in the production of insulation, ceramic tiles, crafts, cement and even porcelain. The Properties of the waste depends on the type of waste, hence on the type of extraction. In the context of the Arctic it would be metalls including aluminium, Iron, Copper and others. Hence, as the Embassy of Waste, the project recollects mainly metallic ores which have specific properties towards reuse.

Slag: It is the wasteful result of the separation of metals from the rock extracted at the mine. The properties of Slag, mainly from Copper and Iron, are mainly towards the replacement of cement in the production of concrete. By replacing cement, it reduces co2 emission in 70% and it is proven to increase thermal capacity.

On the other hand, Bauxite Residue is the result from Alumina industry.. It is characterized by a reddish colour and it can be used in the production of ceramics.

Source: Glossary — studiothusthat. (2020). Retrieved from https://thusthat.com/Glossary

MINING WASTE



Pre Fabricated Elements

As a result, the project showcases the product material in its façades. The bar, showing the recycling of waste towards a local production of concrete, and the three satellite building becoming a catalogue of the colourful prefabricated elements that could potentially result from the mixing of certain kind of waste.

The Gate: Ornament

The Factory: Operable Tiles

The Tower: Functionality

Political Act

The project, just as mining in Svalbard, tackles many of the intertwined complexities and specificities of the Arctic context. By addressing both an infrastructural and industrial aspect such as mining waste management, and a political and social aspect such as governance, my research encountered a dilemma between the scales . Both the infrastructure and political topics suggest a monumentality and a big scale that contrasted with the small scale of the Arctic communities and the local approach that my project has intended. Yet, it was not until I widen my research and my view on the territory, that I understood my project as one piece within a wider pre existing network of externalities. Therefore by understanding my design as part of a territorial dynamic, rather than just an architectural project, I managed to provide my project of scale and context in order to overcome such dilemma in the design process.

Therefore my project embeds itself in a territorial loop of externalities (energy, infrastructure, governance) , in which it address the different dynamic while developing a specific architectural project. This leads me to a second dilemma regarding the design. The Embassy of Waste, as mentioned above, requires both an infrastructural and political character, yet by approaching them through an architectural programme they revealed a dichotomy between the building for non human and building for humans; between infrastructure and community. Therefore the project splits in 2 simple gestures; one central spine addressing the linearity of the infrastructure process, with three architectural elements which embrace the city and that brings the industrial process and the Arctic life together. This design gesture made me realize that my project is not a hybrid between politics and waste, instead, by bringing waste and people together, the projects becomes a political act in itself.

Moreover, by introducing active cycles of reuse and production of mining waste in such a vulnerable territory as Svalbard the project acquires an ethical character beyond architecture, but that of an ambassador, veiling for the best interests of the Arctic region; sustainability, political stability and self sufficiency. [9]

9. The Svalbard Treaty , Paris, 9 February 1920, Versailles Treaty , available from http://library.arcticportal.org/1909/1/The_Svalbard_Treaty_9ssFy.pdf

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Svalbard Museum Photo Archive

LPO Arkitekter

Embassy of Waste
Svalbard , Longyearbyen
78°13'N 15°38'E