GREEN MINERALS

Enabling the green shift

Investor presentation

November 2021

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Outline of the talk

- Deepsea Mining
- Market backdrop
- Green Minerals
- Summary
- Q&A

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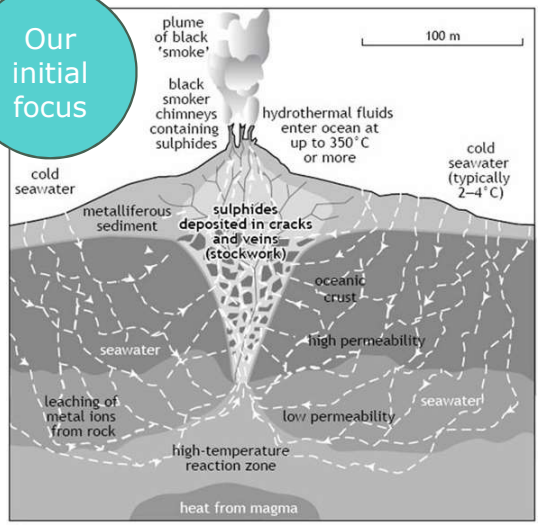
SOURCE: NTNU

Three main types of marine minerals occurrences

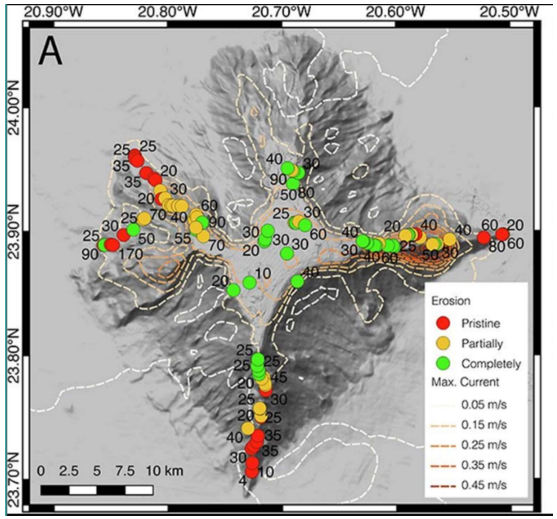
Seafloor massive sulphides (SMS)

Our initial focus



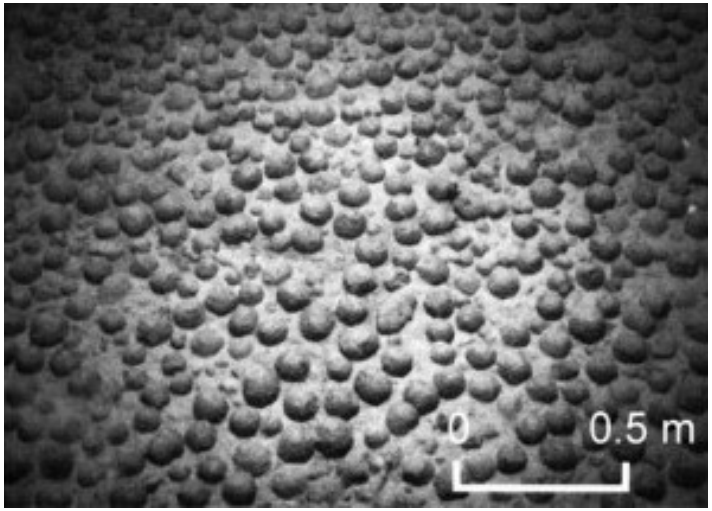
- Impacted area is very small (diameter in the 100's m range.)
- Production from SMS's will be performed through 'surgical interventions'.
- Non-unique ecosystems around inactive vents
- Probably relative low environmental impact.

Manganese crust



- Intermediate areas (50-100km^2)
- Steep slopes most likely favourable for development of crust on NCS.

Polymetallic nodules



- Large areas (>250k km^2)
- Substantial amounts of material (sediments)
- Environmental concern around risk of fragmenting ecosystems/breaking genetic links.

Closed loop production system reduce/remove sediment plume during extraction for all deposits.

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Seafloor massive sulphides (SMS)

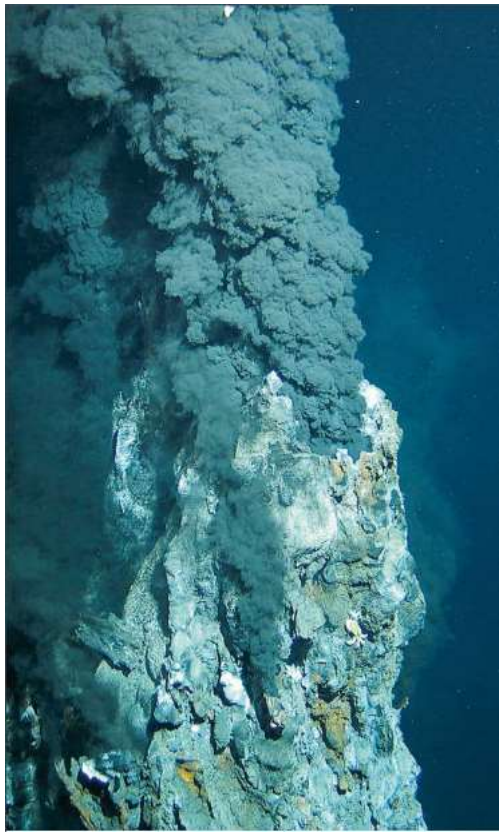
Characteristics

- Stay away from active vents:
  - Rich and unique ecosystems dominated by endemic species
- Targeting inactive and extinct:
  - When an active vent becomes inactive, the endemic species naturally dies.
  - Inactive and extinct vent locations are recolonized by 'background', normal deep sea bacterial communities.
- Production from SMS's will be performed through 'surgical interventions':
  - SMS deposits have very limited areal extent, 100's of meters in diameter.

=> Relative low environmental impact is expected.

This is how seafloor sulphides looks like

Collapsed chimney of an extinct SMS from the Norwegian Mid Ocean Ridge



Chimney of active hydrothermal vent. Also called Black Smoker. Image from the Mid Atlantic Ridge

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Source: NPD (link), GEOMAR

Deep sea mining is gaining momentum

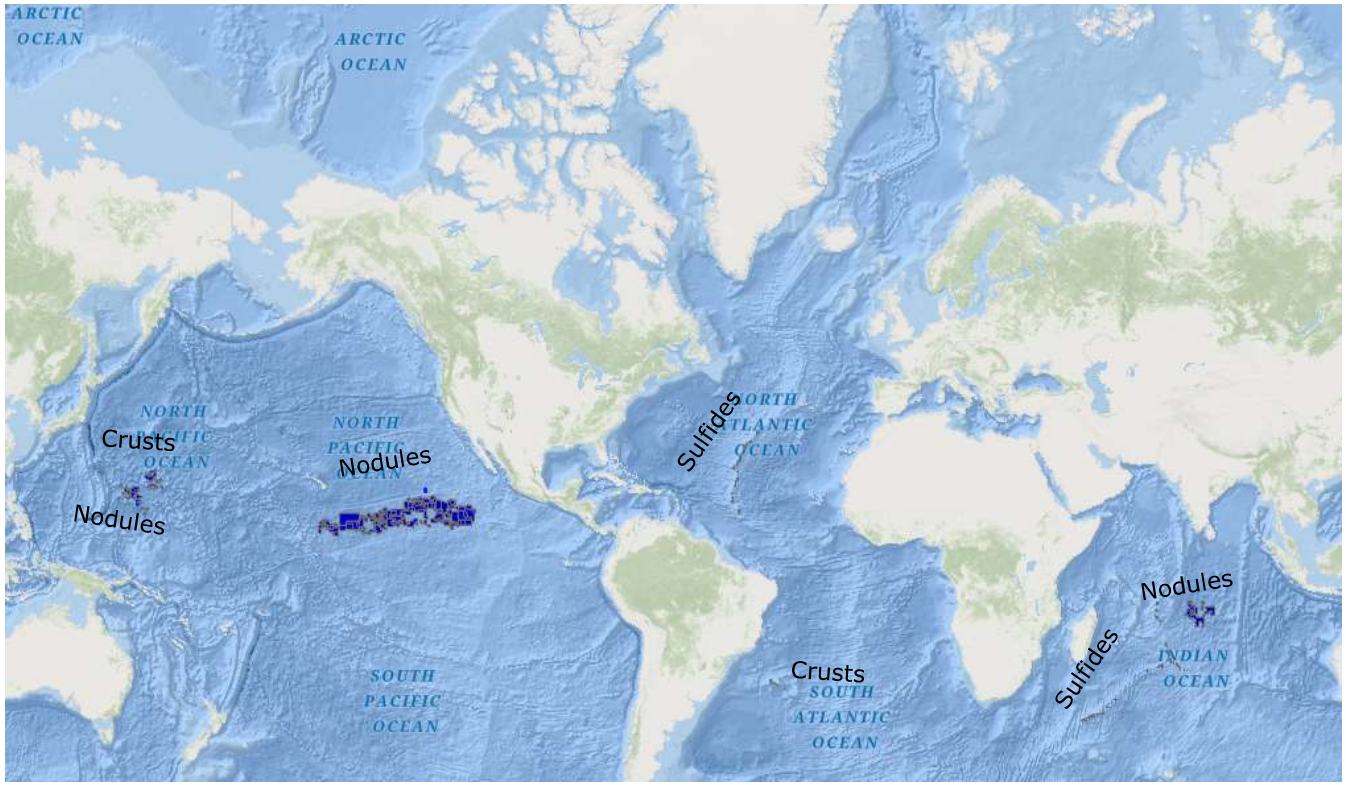
Comments:

- Internationally, 31 licenses has been awarded
  - 7 Massive Sulphides
  - 5 Manganese Crusts
  - 19 Nodules

- Norway
  - Will be one of the very first countries to open up for deep sea exploration on NCS.
  - World class offshore industry and deep sea technology established in country.
  - Close to market and onshore processing facilities.
    - Several large battery factories planned in Norway

  - Perfectly positioned to take a leading role in multi billion $ industry.

Overview of international seabed mining licenses



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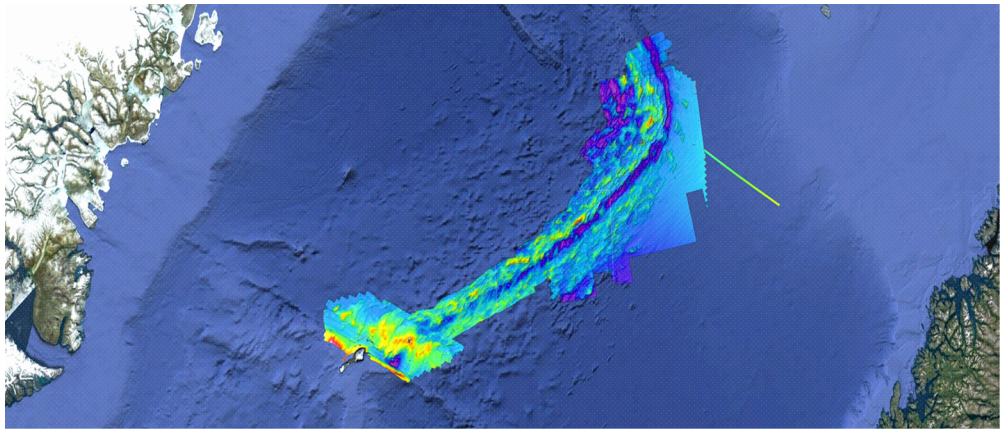
Source: International Seabed Authority

Norway is the most attractive area to kickstart the deepsea mining industry from

Commentary:

- Mineral exploration on the Norwegian continental shelf ("NCS") is attractive for several reasons:
  - Size and richness of reserves
  - One nation state with one regulatory authority
  - 60 years of successful O&G regulation
- There is a political drive for DSM in Norway. The new government wants to increase the mapping of critical minerals for the green shift. (ref Hurdalplattformen).
- Seafloor Massive Sulfides (SMS) and Crusts found in several locations in the Norwegian Sea already

The Mohns & Kniprovich ridges



Mean Resource estimate for key Metals in SMS deposits in Mohns & Knipovich ridges*

6.9Mt Copper	7.1Mt Zinc	1.5t Gold	10.5k Silver

Estimated value more than NOK 1,000bn (USD 120bn)**

Findings from SMS samples	Findings from crust samples
▪ **Copper:** up to 14 % (vs ~0.6 % for onshore mining) ▪ **Zinc:** up to 10 % ▪ **Cobalt:** up to 1 % (vs ~0.2 % for onshore mining)	▪ **Manganese-Cobalt play** ▪ **Scandium:** 4-7x Pacific Ocean ▪ **REE:** Up to 2x Pacific Ocean

*) Other metals and REEs not included in estimate;
**) 2019 metal prices used by Ellefmo et al and 9,25 nok/usd, Quantifying the Unknown

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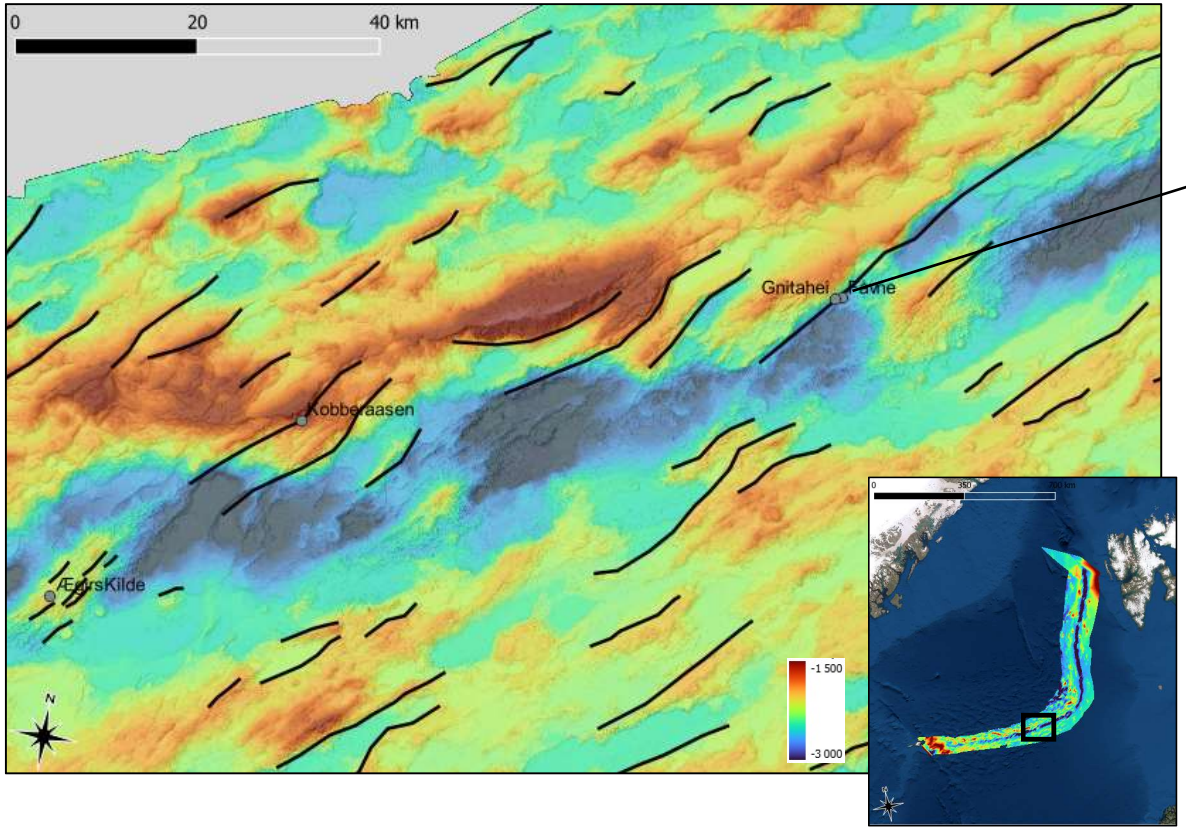
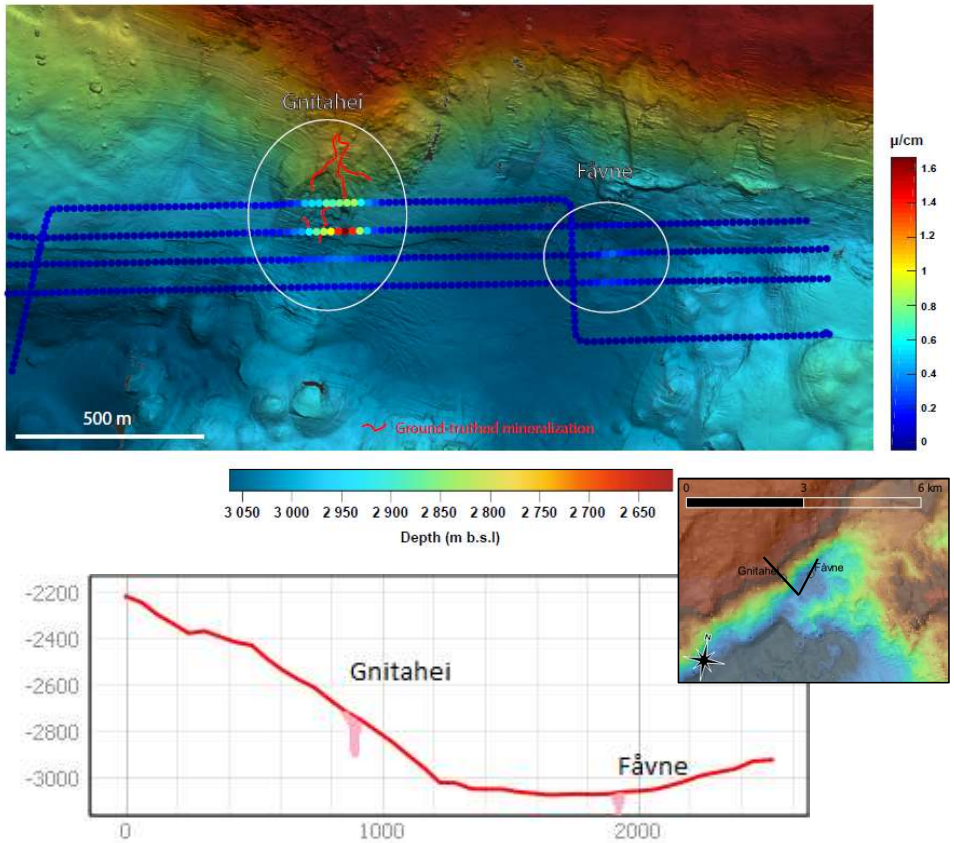
Mapping of potential SMS target areas on NCS ongoing





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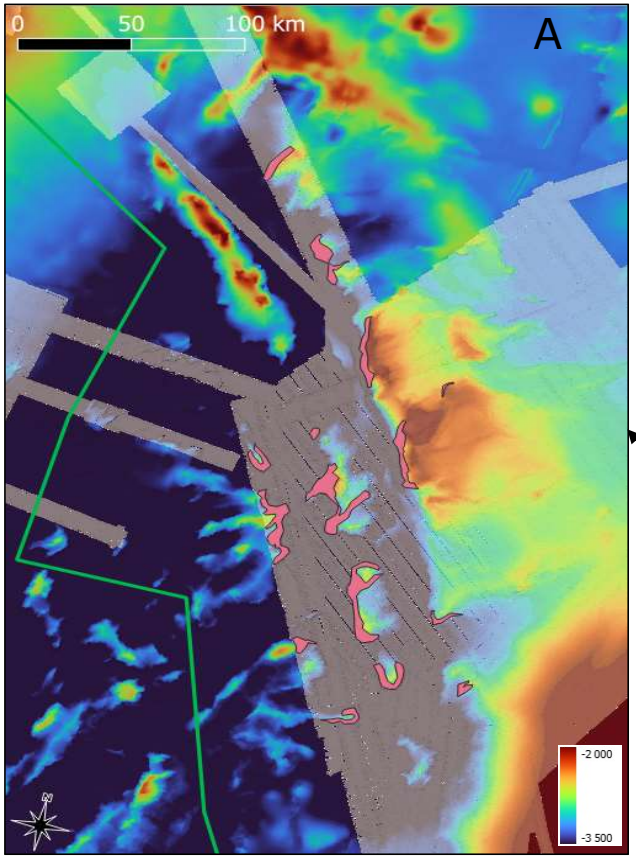
Source: Green Minerals and Onstad et al., 2021

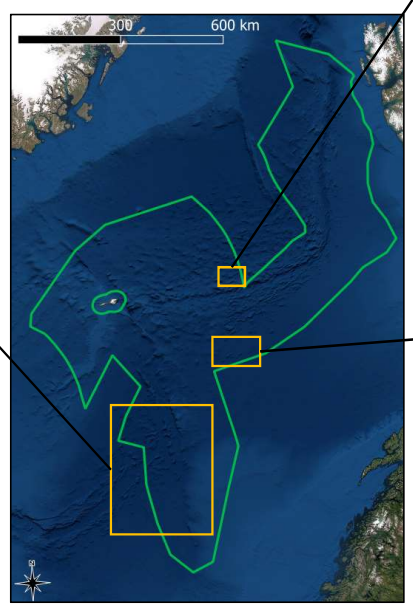
Crust opportunities on NCS

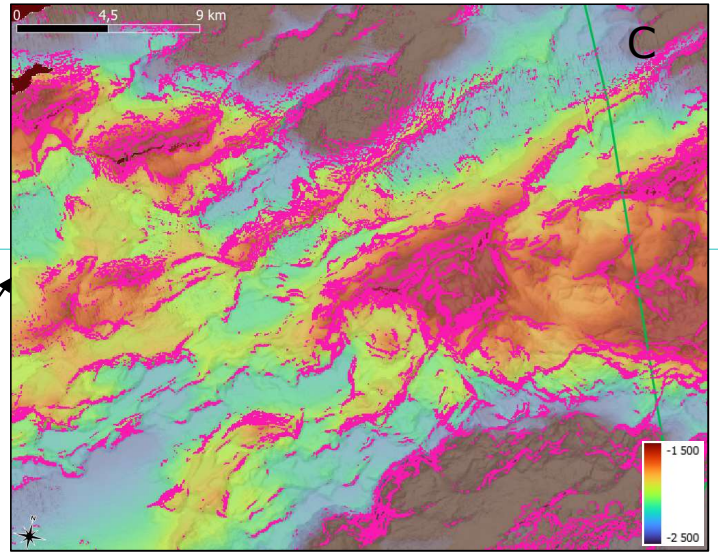


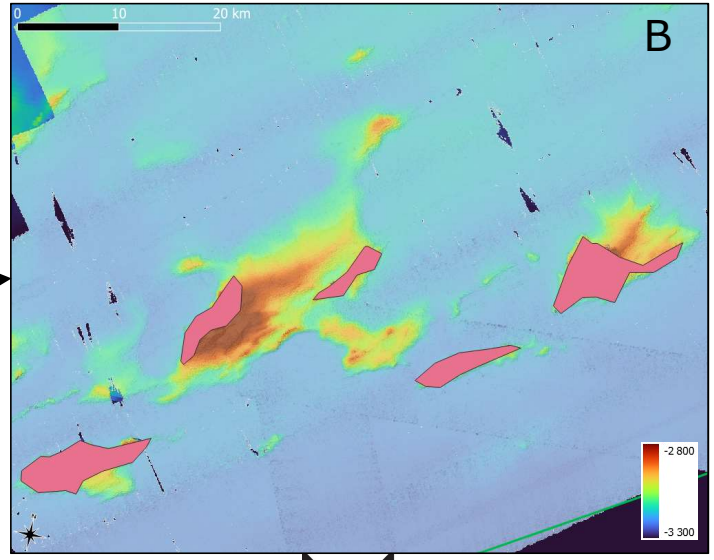
Largest areas ~100 km² (A)

Several small in close vicinity 15- 30 km² (B)

In the ridge area several with opportunities. Purple area slope between 20 and 40° (C)







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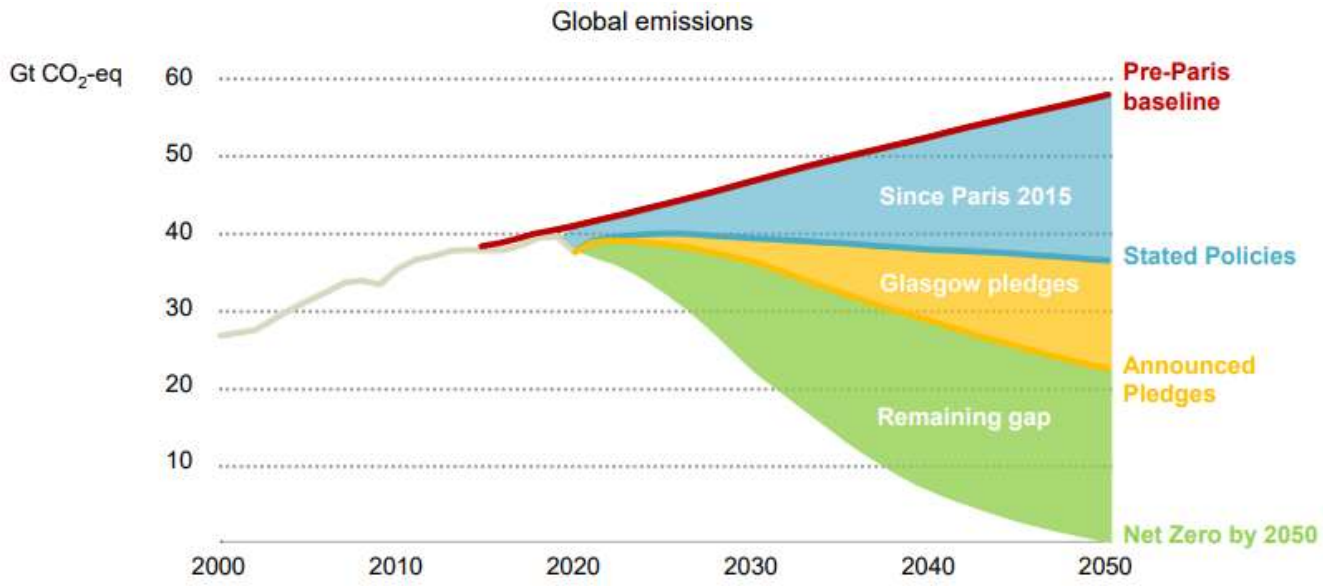
World's policy makers are coming together to discuss concrete action and credible plans to combat growing climate challenges



- Addressing climate change and its implications have never been higher on the agenda
- The Paris Agreement from 2015/2016 provided a legally binding international treaty on climate change
  - Goal was to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels
- A series of follow up summits have later been arranged, reinforcing and deepening the nations ambitions
- Current pledges could lead to peak oil this decade, while renewable power generation and electrification are booming

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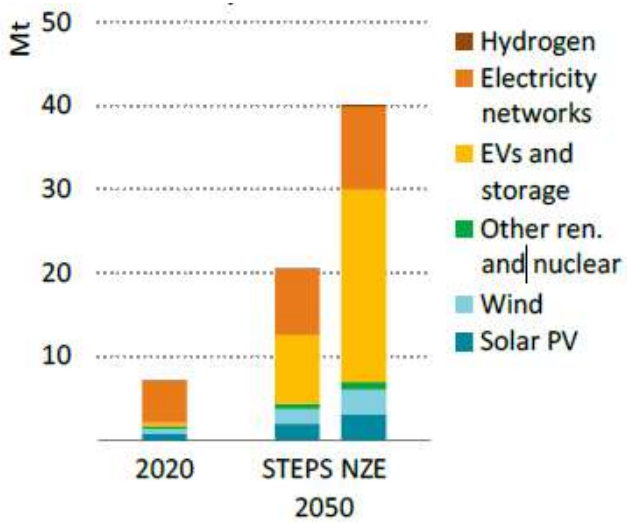
Source: IEA (2021), World Energy Outlook 2021, IEA, Paris (link)

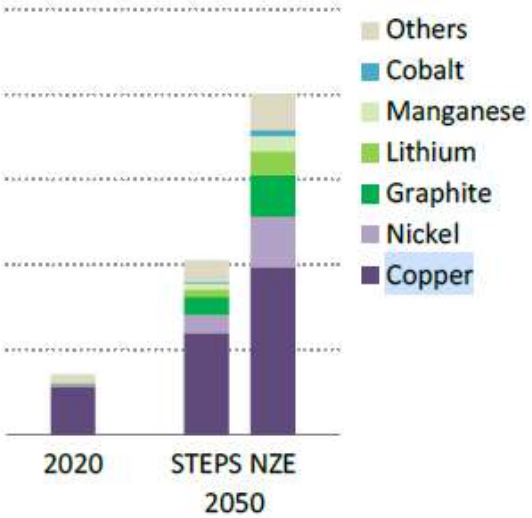
The green transformation is fuelling demand for minerals

Mineral requirments for clean technologies by sectors



- Low-carbon technologies are driving a steep demand growth for marine minerals
- The «Stated Policies Scenario» scenario is driving a close to tripling in demand for minerals in 2050…
- …while the ambitious «Net Zero Emissions" scenario demands more than six times the 2020 level by 2050.

Mineral requirments for clean technologies by sectors



- Copper demand is rising the most in absolute growth, with about 14 Mt by 2050 compared to 2020 in the NZE scenario
- Current supply is not adequate for this growth, and long lead-times for new capacity rises the risk of supply lagging demand

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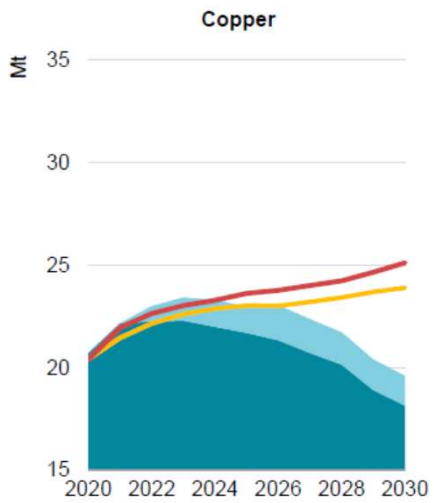
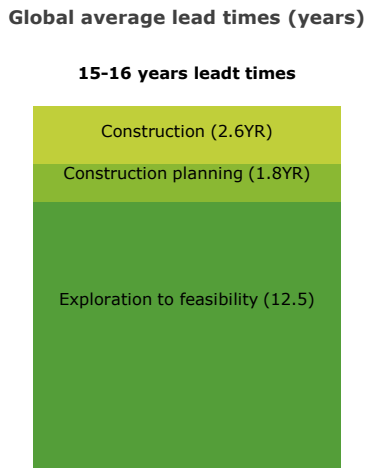
Source: IEA (2021), World Energy Outlook 2021, IEA, Paris (link)

Access to minerals to accelerate the energy transition could become a bottleneck





- Todays supply situation looks adequate, but long lead-times and strong demand growth could put a string on the supply chain
- There is a mismatch between the forecast demand development and the typical lead-time for new production facilities
- Lower ore grade (gehalt) increases environmental impact due to increased waste production and intensified energy use

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Source: IEA (2021), The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris (link)

The onshore grade is decreasing, leading to increased environmental impact, cost and energy intensity

- Similar to oil, the era for easy onshore copper is over
- The average ore grade is decreasing, resulting in:
  - Higher energy cost per unit produced
  - Growing waste production
- The 19 million tonnes of additional copper that need to be delivered for net-zero 2050 implies a new La Escondida (see photo) must be discovered and enter production every year for the next 20 years.

La Escondida Copper Mine, Chile. By far the largest copper mine in the world

Marine minerals could provide a sustainable source for critical minerals.

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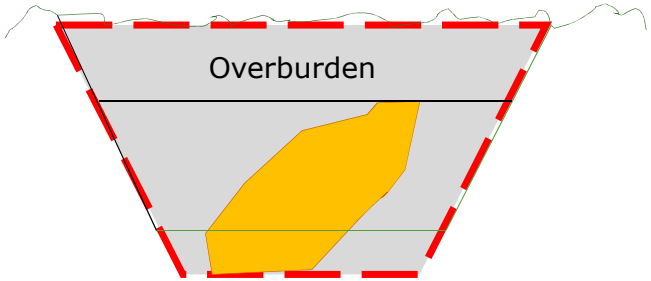
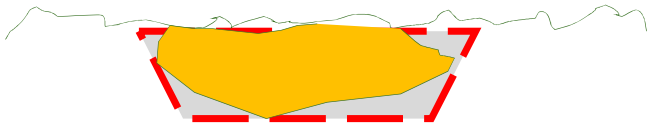
Source: Mining-technology, 2021

SMS deposits are changing the mining paradigm

Typical land deposit



Expected SMS deposit



Orebody

Pit limit – gray is waste rock

Deepsea SMS mining is expected to offer 5x higher ore grade (gehalt)

Waste reduction up to **75%**
Tailing reduction (solid waste) up to **86%**

SMS Waste can be separated on seabed:

- Minimizing surface waste handling and storage
- No risk to land water source
- Energy efficient – no lifting of unvaluable material
- Seawater can act as a buffer – AMD (Acid Mine Drainage) risk low

AMD

Photo source: USGS

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Deepsea mining versus traditional mining

		Onshore mining	Deepsea mining	Difference	Comments
Impact of minerals to 1bn electric cars	$C0_2$ equivalent emissions (Gt.)	1.5	0.4	-70%	
	Ore use (Gt.)	25	6	-75%	Higher ore grade in marine minerals
	Deforestation (Sqm)	66,000	5,200	-92%	
	Solid waste (Gt.)	64	0	-100%	100% reduction for nodules, solid waste reduction up to 86% for SMS
	Freshwater ecotoxicity (1.4 DCB equivalent Gt)	21	0.1	-99%	
	Megafauna wildlife at risk (trillion organisms)	47	3	-93%	

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Source: Paulikas et al. 2020

Supporting global sustainability

SUSTAINABLE DEVELOPMENT GOALS

Providing minerals for the green transition

Fighting child labor while creating sustainable jobs and economic growth

Creating sustainable Rare Earth Elements (REE) and base metals to used in new form of transportation

Reducing waste generation and enabling companies´ green transition

Enabling CO2 reduction being key elements in new technology

Reducing deforestation

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Asset light business model trough partners and affiliations

Exploration → Offshore production → Offshore logistics → Onshore processing facility

Exploration

- SeaBird Exploration
- National Oceanography Centre
- University of Southampton

Offshore production

- Oil States
- WEIR MINERALS
- SMD

Offshore logistics

- Stena

Onshore processing facility

To be named

Potential universal partners:

- The European Green Deal (von der Leyen Commission, #EUGreenDeal)
- NMM Norsk Forum for Marine Mineraler
- DSMA DeepSea Mining Alliance
- Battery producers
- Copper end-users

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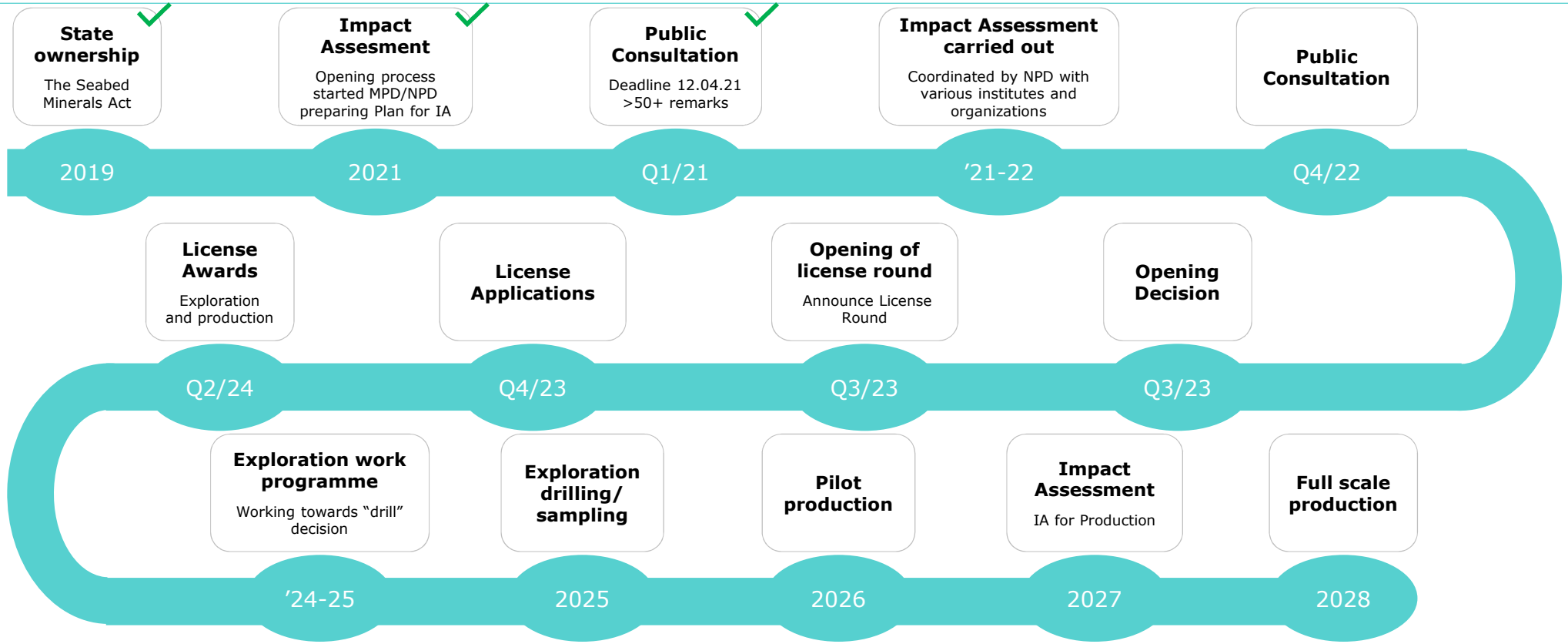
Roadmap towards exploration license in ’24 and production in ‘28



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Green Minerals aspirational targets

Exploration

- Two research cruises before NCS opening, including ecosystem impact evaluation
- To be awarded 3 exploration licenses by early 2024
- Prove up one extinct/inactive SMS of potential commerciality by year end 2025.
    - +6% average grade Cu (+ others Zn, Au, Ag, trace elements)
- Crust exploration strategy in progress

Development/Production

- Pilot system ready to operate in 2026
- Full scale production in 2028:
    - 5-8000 tonnes/day ore to surface
    - 200+ day/year operations
    - 1,5MT ore/year
- Processing performed in Norway/Scandinavia
- Immense focus on subsea ecosystem and biodiversity

Finished product/processing

- Annual revenue potential from one production system*:
- SMS:
    - $550m for Copper only
    - Potential of >$800m with 0.25% Cobalt and other metals (Zn, Au, Ag++)
- Crust:
    - $490m Manganese
    - $220m Cobalt
    - $75-100m est in other metals (Nickel, REE, Lithium++)

*(based on current metal prices and "ore to metal factor")

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Investment highlights (GEM NO)

A pioneer in offshore mining and the leader in Marine Minerals on the Norwegian Continental Shelf

1. Marine Minerals needed for the Green Shift
2. >NOK 1000bn opportunity on NCS
3. GEM with capital-light partnership strategy across the entire value chain
4. Well-defined roadmap towards opening decision in 2023 and pilot production in 2026
5. A real option with very low down payment against a >$350m annual EBITDA opportunity, i.e inherent flexibility and highly attractive risk-reward

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