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UNFC Case Studies

Finland/Estonia, Sweden and Norway
Nordkalk limestone & Forsand sand & gravel mines

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Application of UNFC to minerals and anthropogenic resources: Sustainable management of raw material resources, 26 August 2020

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- These case studies were prepared by the Geological Surveys of Norway and Sweden, Nordkalk, Forsand Sandkompani and Petronavit a.s
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- The report has been prepared in cooperation between the Geological Survey of Norway (NGU), the Geological Survey of Sweden (SGU), Nordkalk, Forsand Sandkompani and Petronavit a.s..
- The contributors were:
SGU: Erika Ingvald, Head of Division, Mineral information and Mining Industry
Nordkalk: Håkan Pihl, Director Sustainability
NGU: Annina Margreth, Researcher in the Natural Construction Materials team,
Forsand Sandkompani: Rune Haukalid, Managing Director
- Petronavit a.s.: Per Blystad, Consultant and Sigurd Heiberg, Chairperson
- The contributions were as follows:
Nordkalk: The Karinu Case.
SGU and Nordkalk: The Bunge Case.
NGU, Forsand Sandkompani and Petronavit a.s: The Forsand case.
Petronavit a.s: Coordination of the case studies.

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- Our aim was to test UNFC on
 - Industrial mineral resources
 - and how it can be useful for privately owned companies

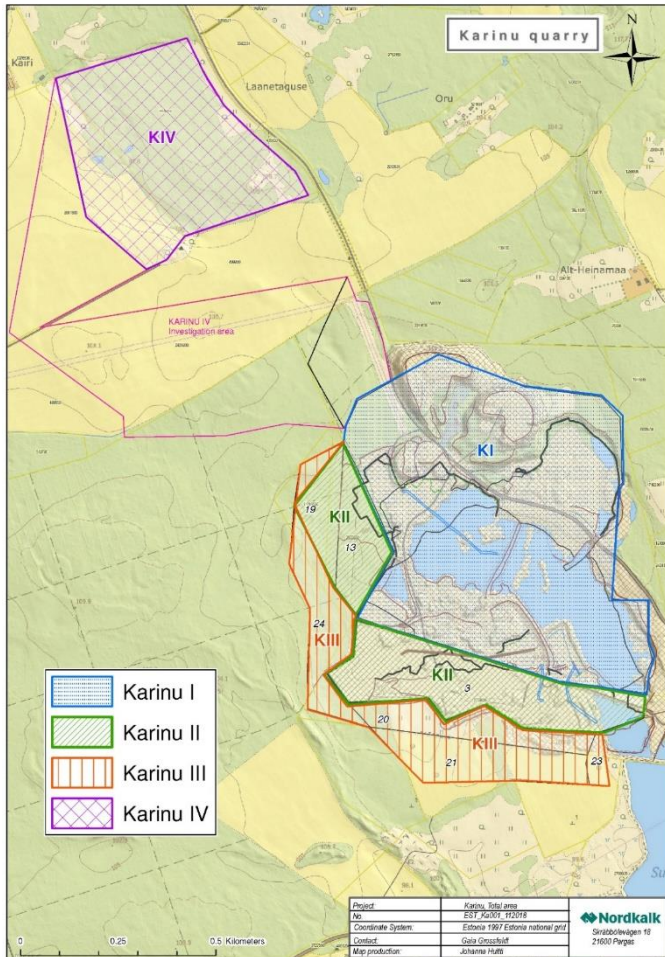
- In the Nordic context

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Domain	Quality and volume (kT)	UNFC code	Coming actions
Karinu I	Good 90	E1F2G1+G2	
	High MgO 420	E1F2G1+G2	
	Unsold not assessed	E3F4	Historical production of fine material.
Karinu II	Good 220	E1F1G1+G2	
	High MgO 80	E1F2G1+G2	Extraction is in progress.
Karinu III	Good 1400	E1F1G1+G2	
	High MgO 350	E1F2G1+G2	Prepared for starting extraction.
Karinu IV	Good 1900	E2F2G1+G2	Preparation of the EIA and a permit application.
	High MgO 310	E2F2G1+G2	Technical design plan. More investigation in order to add the confidence level.
Karinu total	Good 3700		
	High MgO 1200		

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Year	Court verdict	UNFC E Category
2008	1st instance, application turned down	E3
2009	2 nd instance, partial permit granted	E2
2010	Supreme Court, sent back the case to the 1st instance	E2
2011	1th instance, turned down the permit	E3
2012	2 nd instance, granted the permit	E1
2013	Supreme Court, granted partial appeal, due to Natura 2000 evaluation. Case sent back to the 1 st instance	E2
2014	1 st instance, granted the permit. Case appealed.	E1
2015	2 nd instance trial put on hold due to new Natura 2000 proposal.	E2
2015	Swedish Government, Decision on a new Natura 2000 area.	E2
2018	2 nd instance, taking on the trial which was on hold since 2015. Did not grant the permit.	E3
2018	Supreme Court turned down an appeal. The 2018 verdict came into legal force.	E3

The UNFC F and G Categories were at an early stage concluded to be F2 and G1

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The Forsand Project

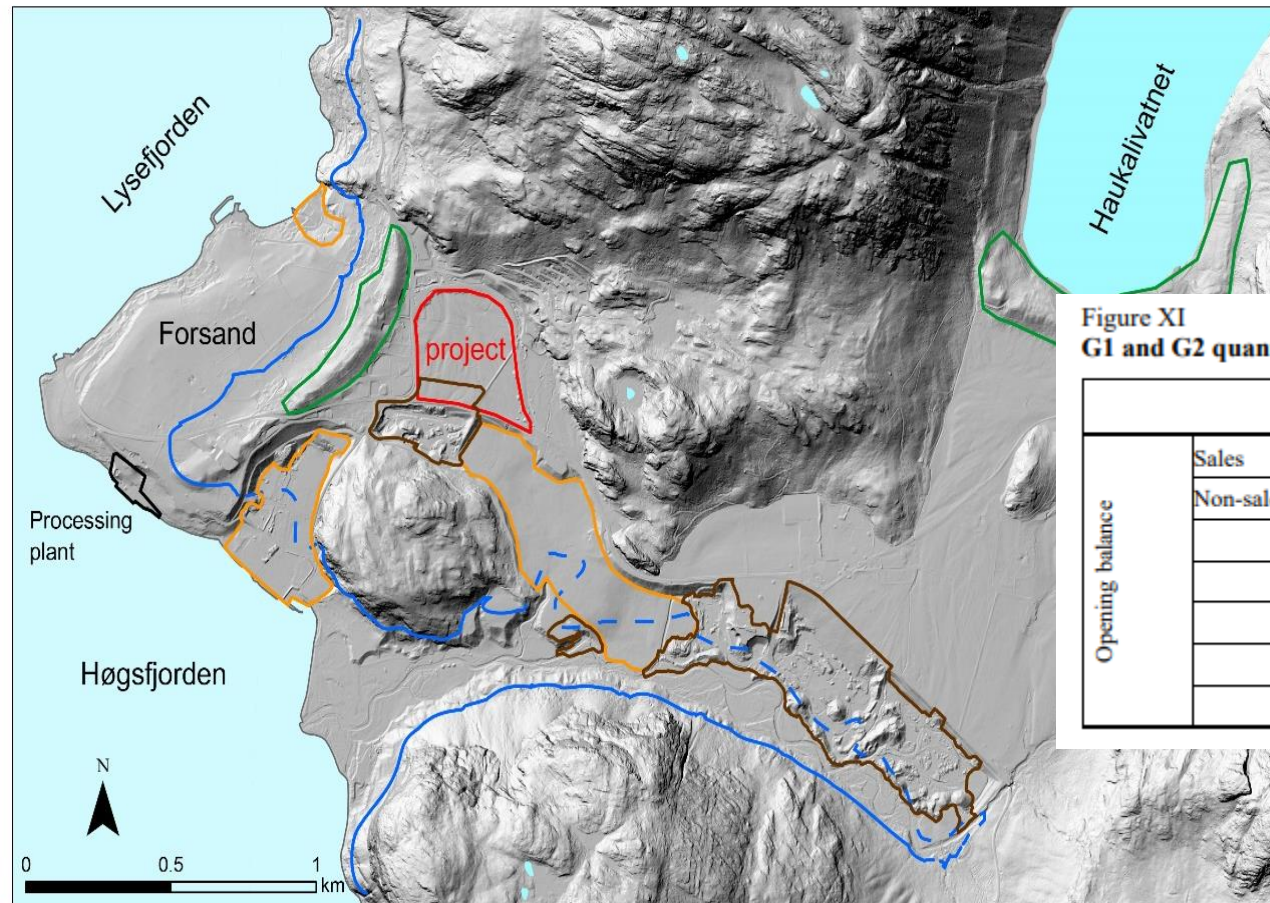


Figure XI
G1 and G2 quantities at the beginning of period 4 in million tons

			Fourth period 2020		G1	G2
Opening balance	Sales		0.29			
	Non-sales		0.03			
	E1.1F1.1	2G	1.92	1.54	0.38	
	E1.1F1.2	2G				
	E3.1F1.1	2G	0.09			
	E3.1F1.2	2G				
	E3.3F4	2G				

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CONCLUSIONS

UNFC works well in assessment of industrial mineral resources. The Environmental-socio-economic axis (E) is often the most important when developing a mineral source. It may concern the legal control of the land as well as the formal permit issues. This is very well reflected in the UNFC evaluation and demonstrated in the limestone mining cases.

For a UNFC study it may be natural to divide a mineral resource into different domains, defined per permit stages and technical development, depending on the local conditions. Variations in quality may control the commercial utilisation of the resource. UNFC allows case to case adjustments to cope with the quality parameter.

If not all of the extracted resource can be sold and utilised, the UNFC class E3.1 is useful for reporting resources for potential future utilisation. E3.1 can also be applied to rocks that are not the key resource and must be removed, but may become useful in the future.

Overburden removal is a routine in any open pit operation. In most cases it is not a commercial product, but will be used in the restoration phase. By keeping track of and giving such volumes a UNFC code it is possible to connect the requirements of the EU Extractive Waste Directive and the reporting of a waste handling plan. In fact, such overburden volumes may be assigned a future role in the restoration of the site.

Thank you

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