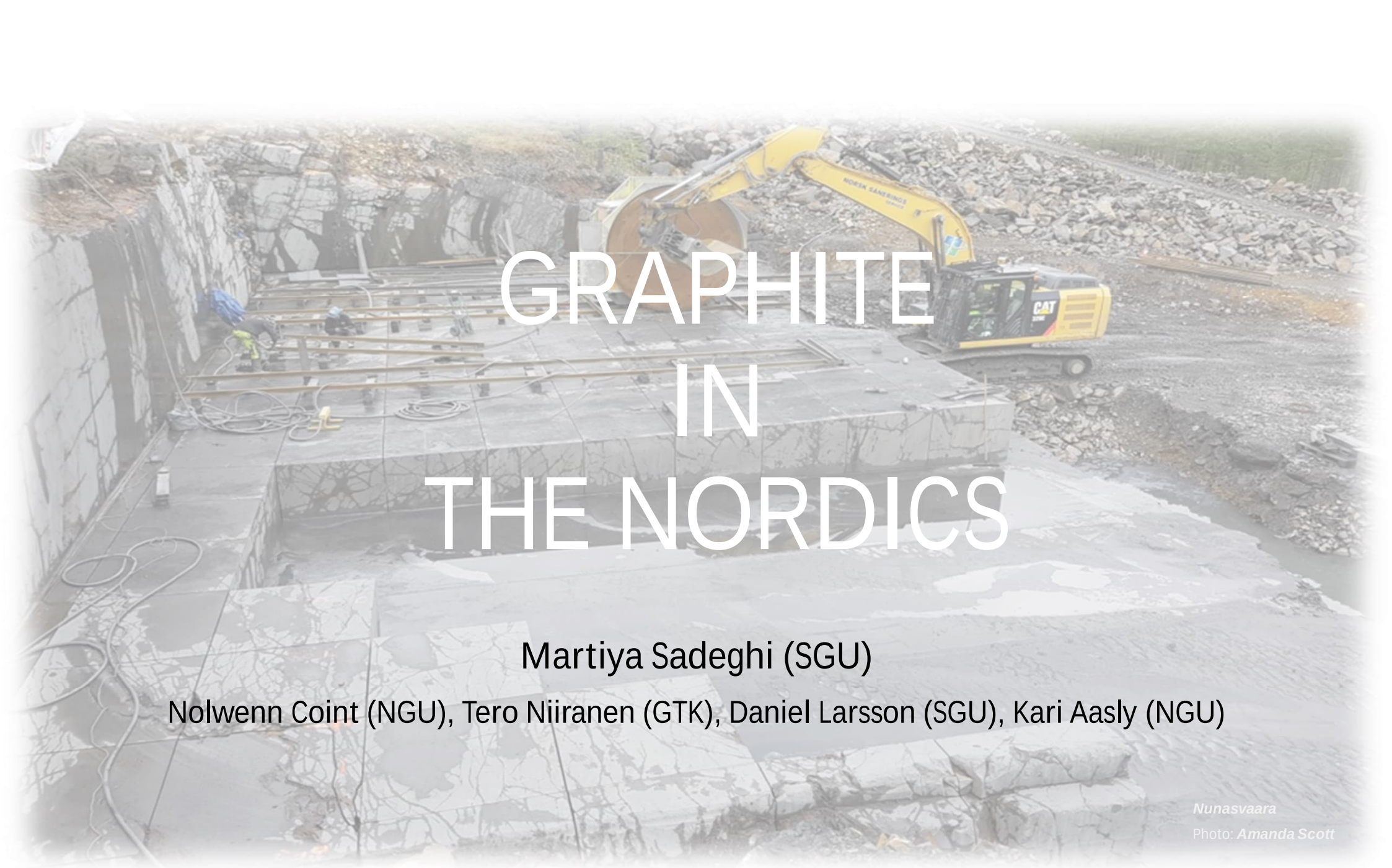


GRAPHITE IN THE NORDICS

Martiya Sadeghi (SGU)

Nolwenn Coint (NGU), Tero Niiranen (GTK), Daniel Larsson (SGU), Kari Aasly (NGU)

Nunasvaara

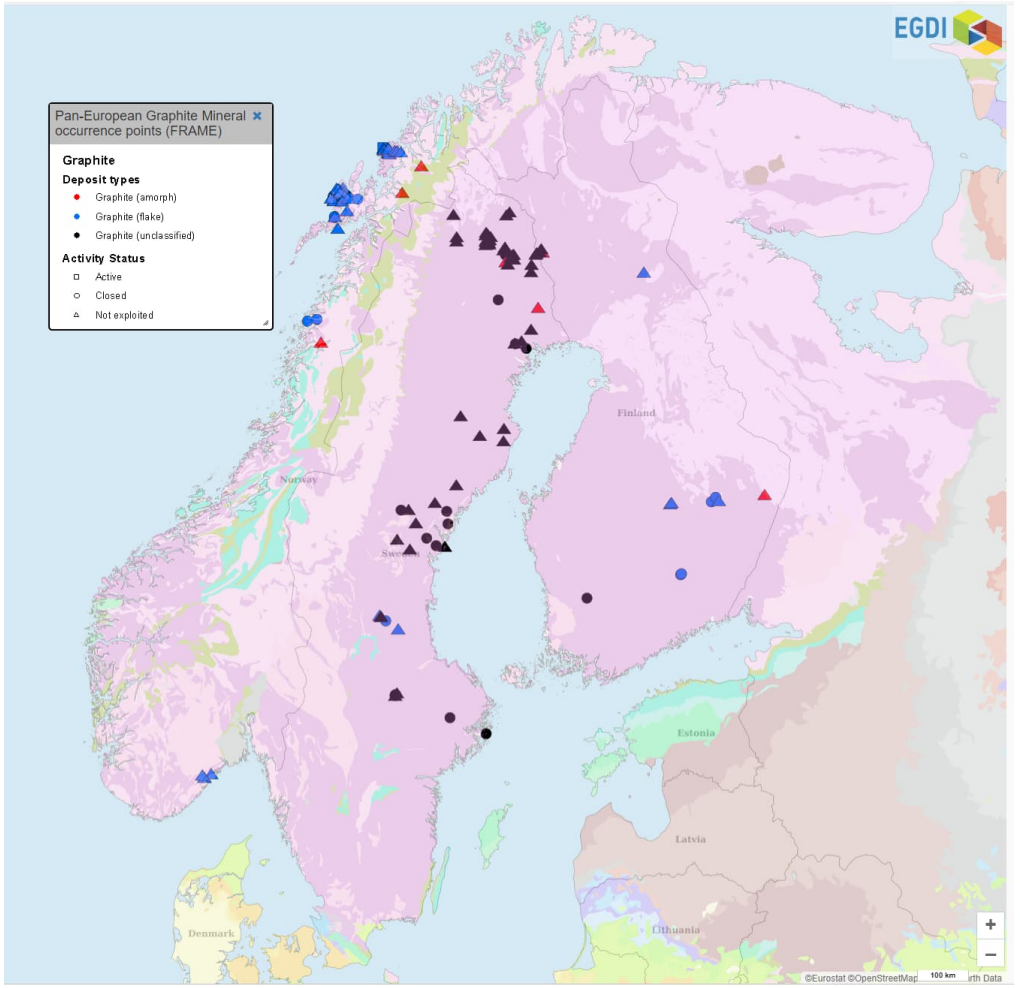
Photo: *Amanda Scott*

Fennoscandian graphite potential

- Proven potential for graphite mineralisations in Fennoscandian shield (Nordic countries)
- The most famous or largest deposits:
  - Skaland graphite deposits on Islands of Senja in Norway
  - Nunasvarra deposit of northern Sweden
  - Pipumäki occurrence of Central Finland
- Active exploration and mine development projects ongoing.
- Known resources: Finland 1,276,900 t, Norway 17,985,000 t, Sweden 10,500,766 t

Sources:

-(The Nordic supply potential of critical metals and minerals for a Green Energy Transition. Nordic Innovation Report)
-Graphite occurrences and deposits (Energy critical elements) FRAME project (EGDI – European Geological Data Infrastructure (europe-geology.eu)
-Based on Fennoscandian mineral deposit map
Fennoscandian Mineral Deposits (gtk.fi)

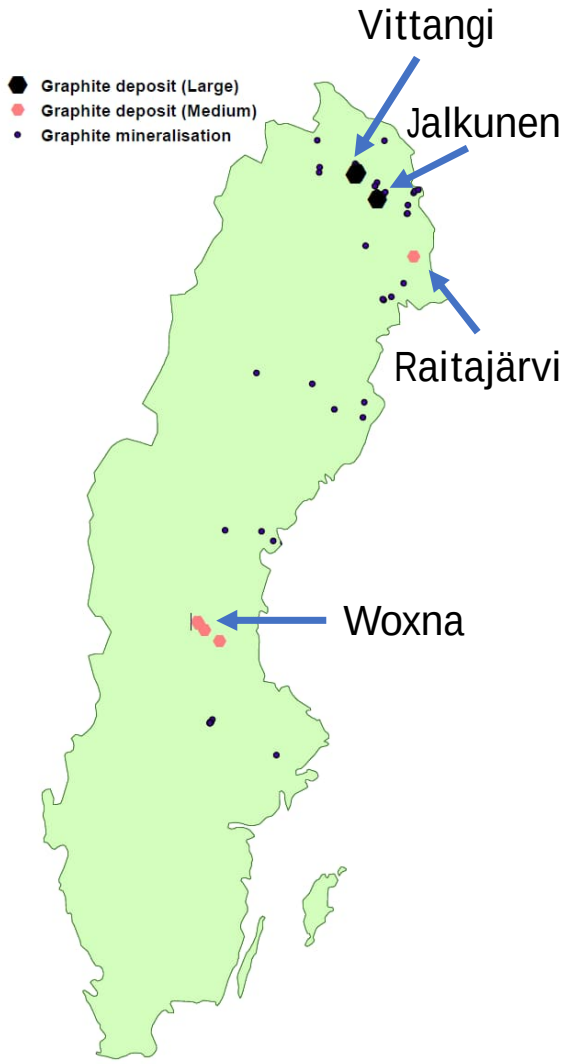


GEOLOGICAL SURVEY OF NORWAY - NGU -

SGU Geological Survey of Sweden

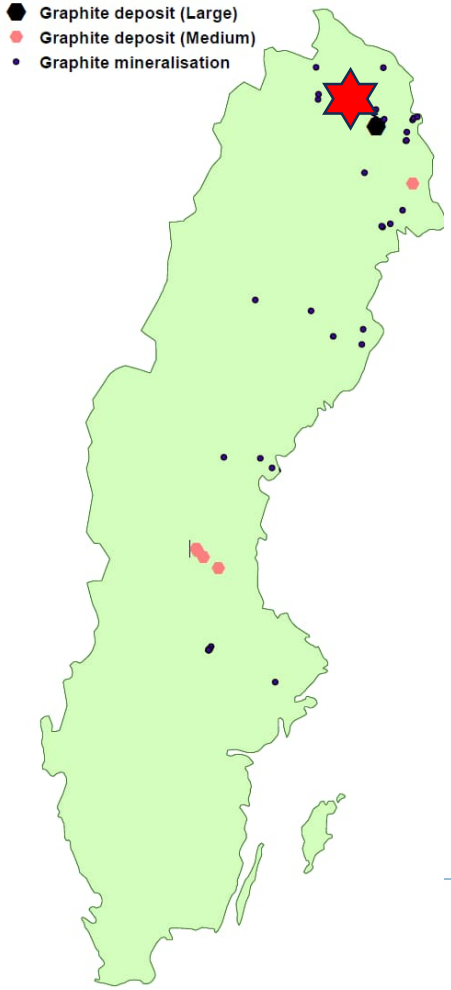
GTK

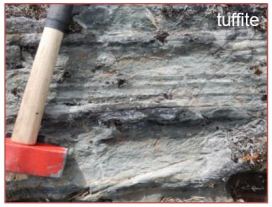
Sweden

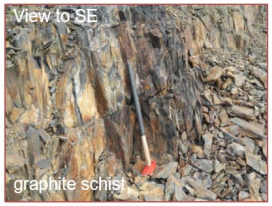


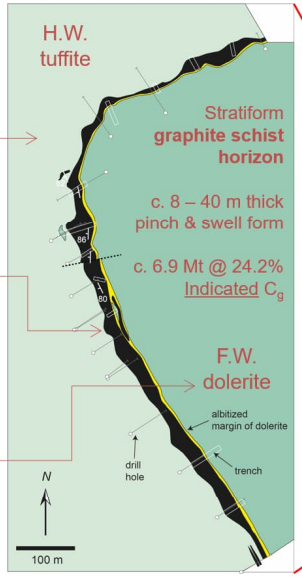
Mine/Project	Highlights	Company
Vittangi Graphite (Nunasvaara+Niska)	Talga annual report 2023 (JORC) Full mine-to-anode operation, First Coated anode plant in Europe. total indicated resource 27.8 Mt, with Cg grade 23.8% total inferred resource 9 Mt , with Cg grade 21.2% total mineral resources estimated 36.9 Mt , with Cg grade 23.1% and total graphite resource 8.5 Mt	Talga Group
Jalkunen Graphite	Talga annual report 2023 (JORC) total inferred resources estimated 31.5 Mt , with Cg grade 14.9 % and total graphite resource 4.7 Mt	Talga Group
Raitajärvi Graphite	Talga annual report 2023 (JORC) total indicated resource 3.4 Mt, with Cg grade 7.3% total inferred resource 0.9 Mt , with Cg grade 6.4% total mineral resources estimated 4.3 Mt , with Cg grade 7.1 % and total graphite resource 0.3 Mt	Talga Group
Woxna Graphite	NI43-101 Technical Report: Fully built mine, planned life of mine 15 years, 4 deposits. M&I resource: 10.8Mt at 7.72% TCG for 834.5Kt Inferred resource:2.5Mt at 8.16% TCG for 204.9Kt Total M&I+I resource: 13.3Mt at 7.83% TCG for 1,039.5Kt	LEADING EDGE MATERIALS

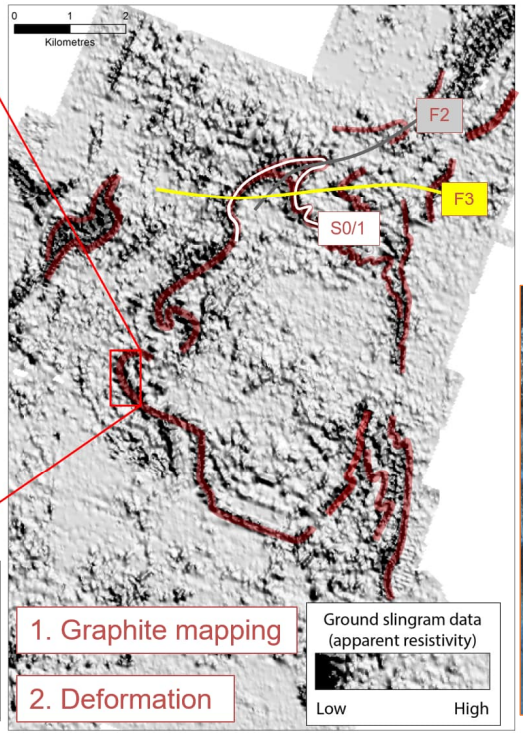
Vittangi project : Nunasvaara
Full mine-to-anode operation
Fist Coated anode plant in Europe

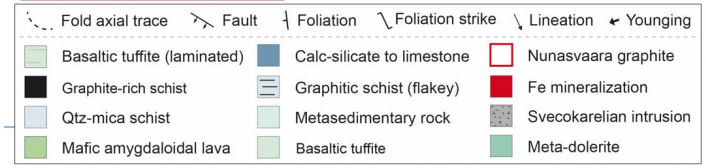




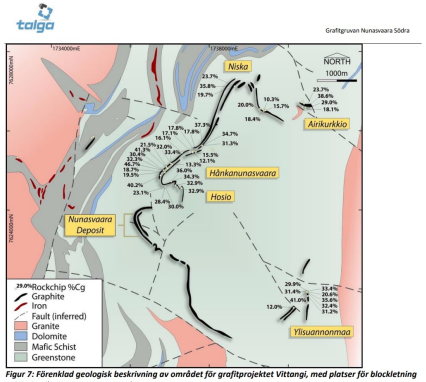






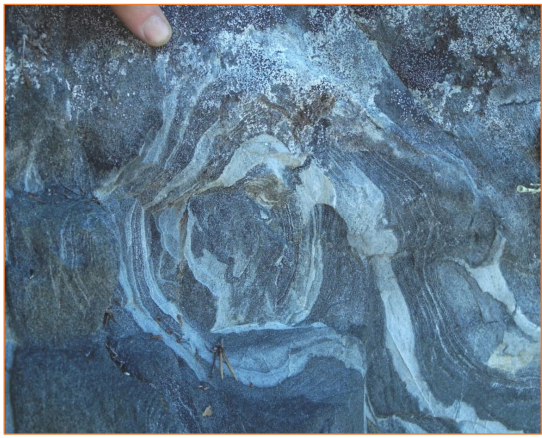


Lynch et al., SGU report 2014:04

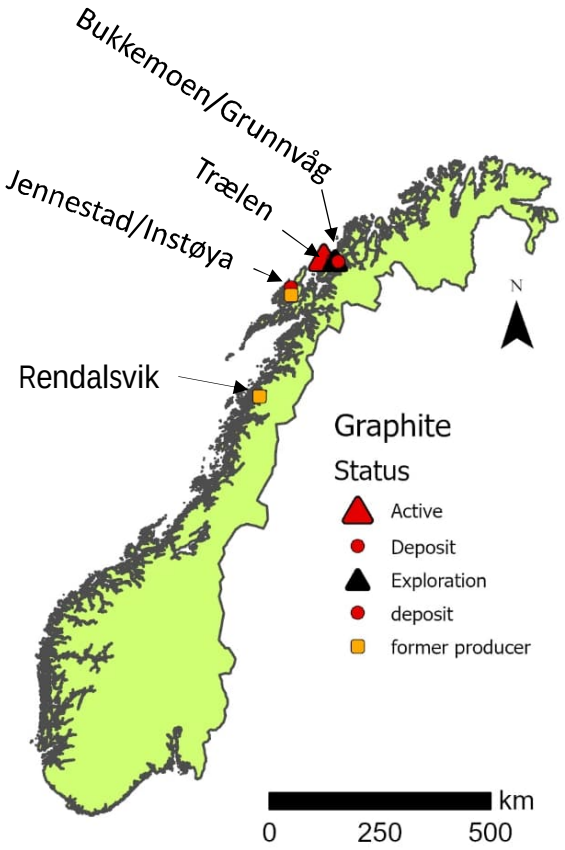


Figur 7: Förenklad geologisk beskrivning av området för grafitprojektet Vittangi, med platser för blockletning och halter (ASX: TLG 15 nov 2012).

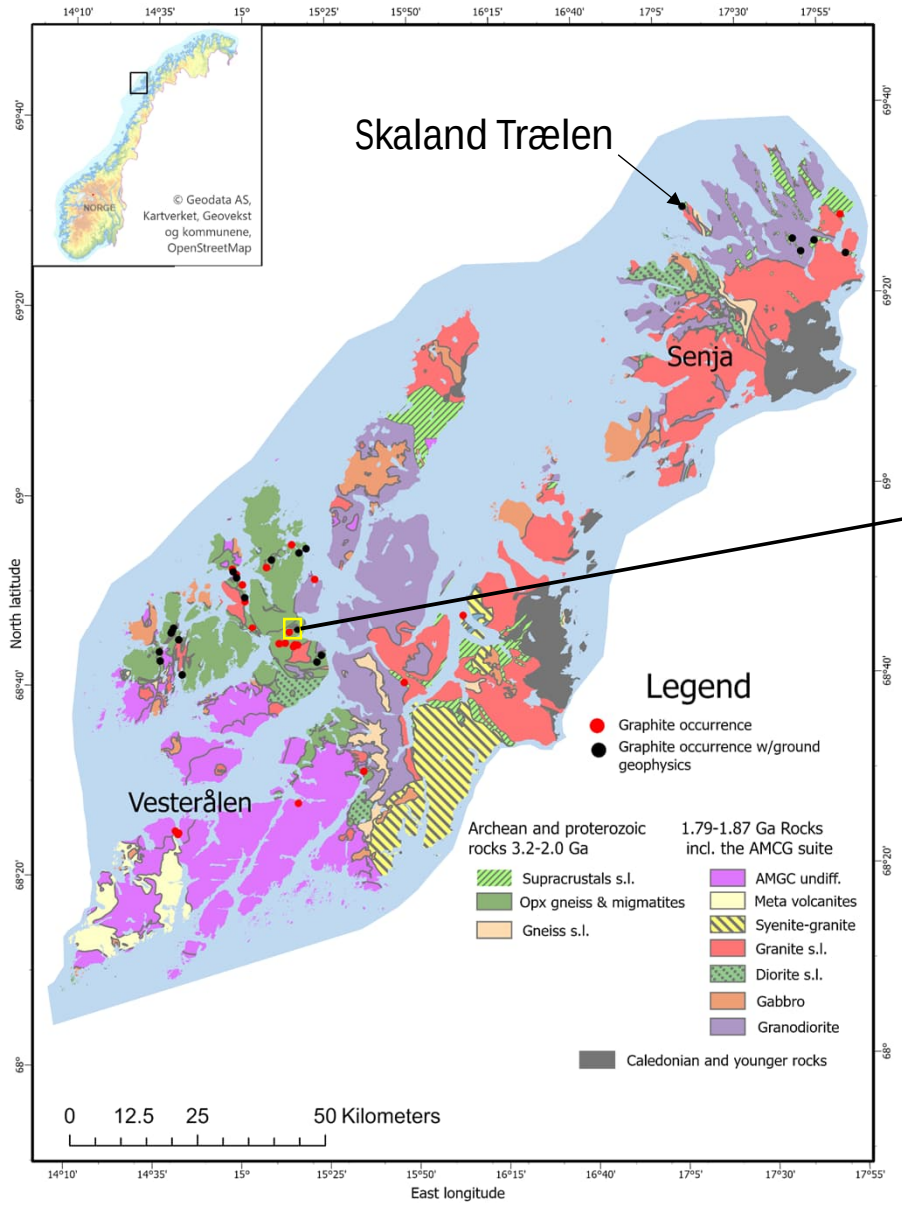
Bilaga-A.-Teknisk-beskrivning-Talga-Graphene-AB.pdf (talgagroup.eu-central-1.linodeobjects.com)



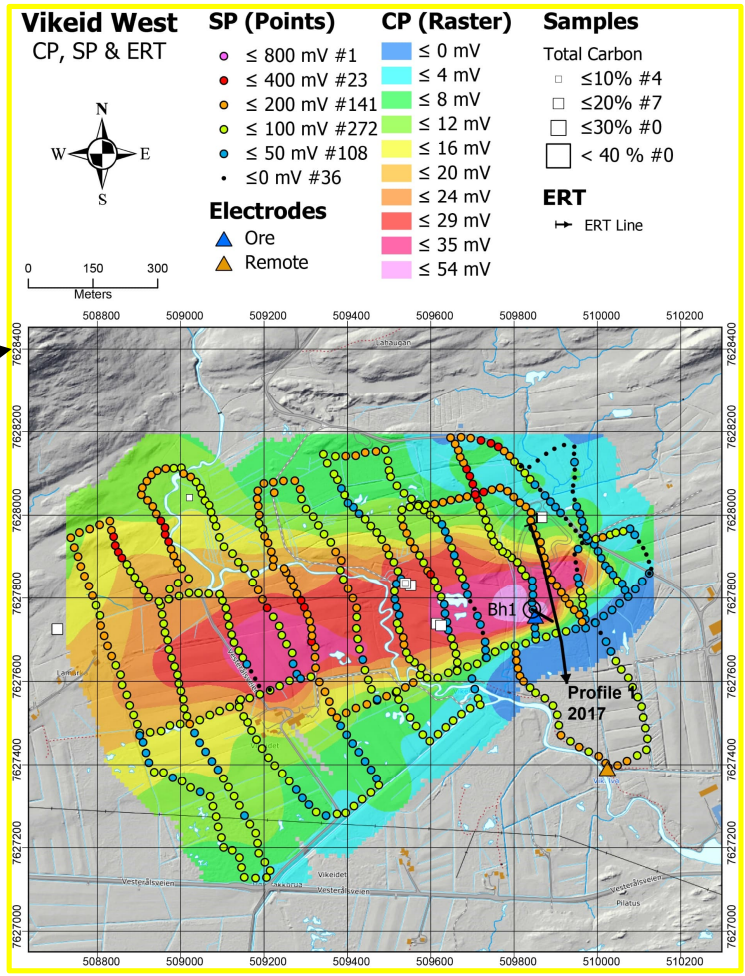
Norway



Project	Highlights	Company
Trælen	Skaland Graphite has been in operation since 1932. Present mining site has 1.844 Mt@ 23.6% TGC (JORC). Annual production about 10Kt of graphite concentrate.	MRC/Skaland Graphite
Bukkemoen	Largest known deposit in Scandinavia, 84 Mt @ 6.5% graphitic carbon (non-compliant resource). Extensive geophysical data available.	
Jennestad	Deposit under exploration, 29Mt @ 11% (non-compliant resource). Extensive geophysical data available. Drilling currently ongoing.	Artic Graphite AS
Grunnvåg	Easy accessible deposit close to Bukkemoen. 22 Mt @ 5.2% graphitic carbon (non-compliant resource).	
Instøya	Easy accessible deposit, massive graphite lenses > 5 meters thickness. 15Mt@ 9.3% graphitic carbon (non-compliant resource).	Artic Graphite AS
Vardfjellet	Well exposed deposits. 12.8 Mt @9.2 % graphitic carbon (non-compliant resource).	
Rendalsvik	Former producer, 1.9 Mt @ 11.1 % graphitic carbon (non-compliant resource).	



Jennestad graphite deposit



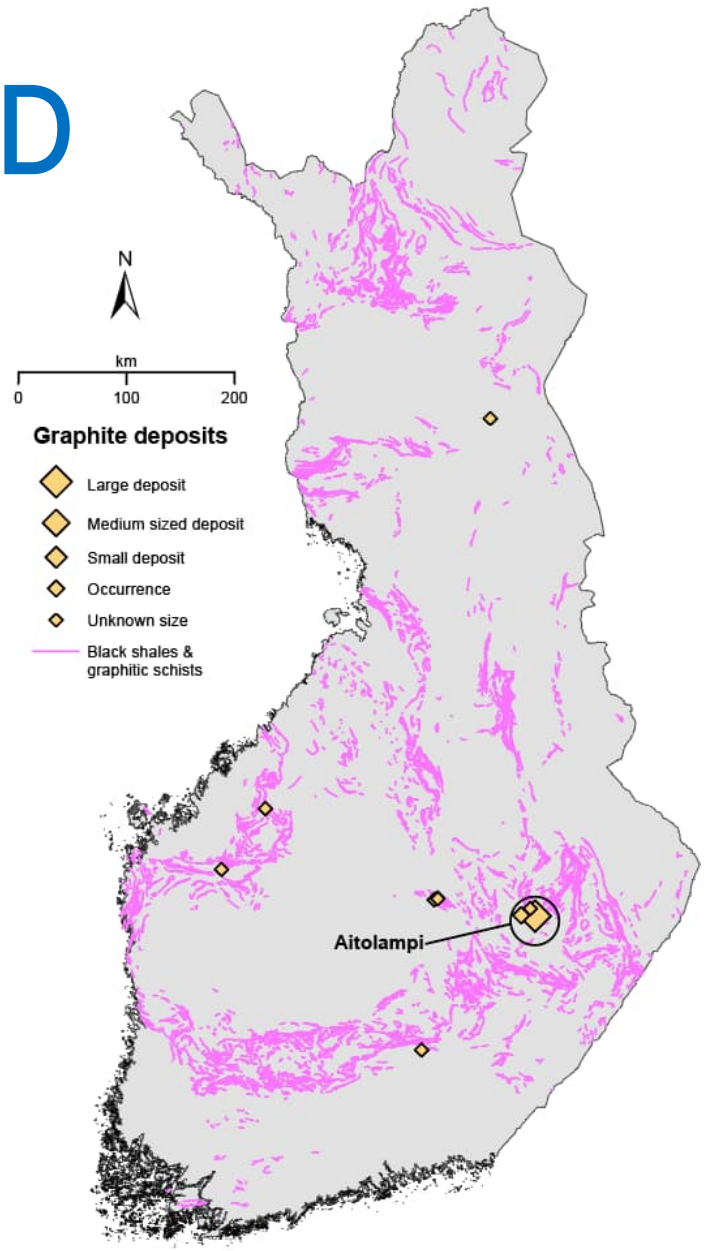
Gautneb et al., 2023

Example of self potential and charged potential geophysical survey, Jennestad

lyellcollection.org/doi/pdf/10.1144/SP526-2021-180

FINLAND

- Abundant graphite schist & gneiss areas throughout the country
- GTK has carried regional scale graphite related recon studies past 15 years esp. S-Finland
- Limited company activity, currently 2 companies have exploration permits or exploration permit applications in the country
- One advanced graphite exploration project (Aitolampi)



AITOLAMPI – GRAFINTEC OY

- Aitolampi graphite deposit was discovered by Beowolf mining in 2016
- Graphite schist within a high metamorphic quartz-feldspar-biotite gneiss
- Resource estimate 2019
- Scoping study and exploration ongoing

MRE for Aitolampi as at 28 August 2019

Classification	Mt	TGC %	S %	Density (t/m^3)	Contained graphite (kt)
Indicated	11.0	4.9	4.9	2.80	542
Inferred	15.7	4.7	4.6	2.81	733
Indicated + Inferred	**26.7**	**4.8**	**4.7**	**2.81**	**1,275**

Mineral Resource Estimate of Total Graphitic Carbon in accordance with the JORC Code, 2012 edition.
Source Grafintec Oy

Image by Beowulf Mining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