

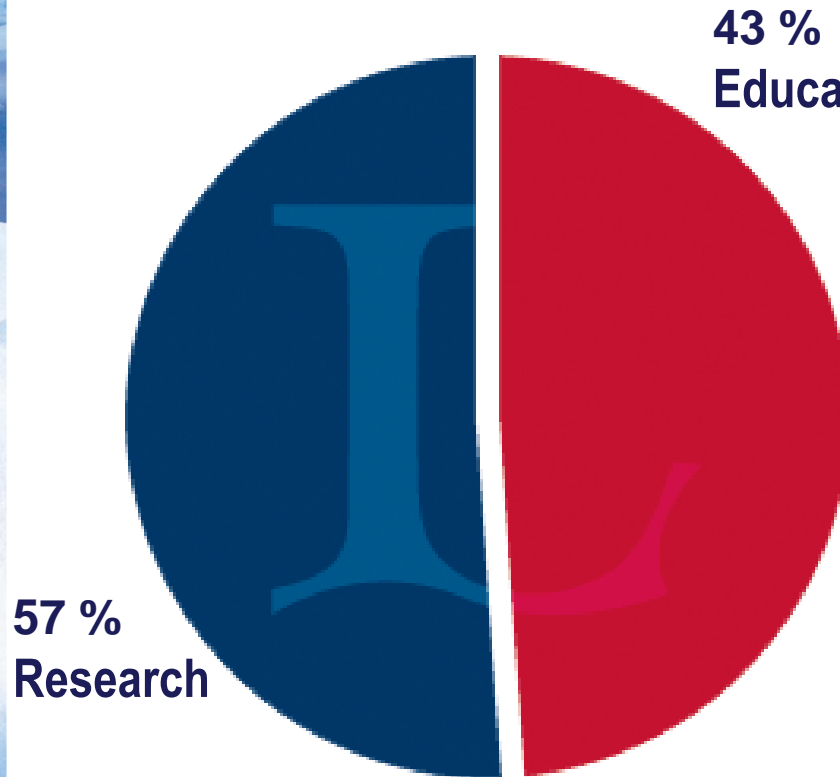


Björn Öhlander

Dean of the faculty of
engineering

Professor in Applied
Geology

Facts about Luleå University of Technology



43 %

Education ■ Founded 1971

■ Turnover EUR 160 million *

■ 16,000 students

■ 1,500 employees

161 professors
researchers 515 teachers &

570 doctoral students**

■ 70 research subjects

57 %
Research

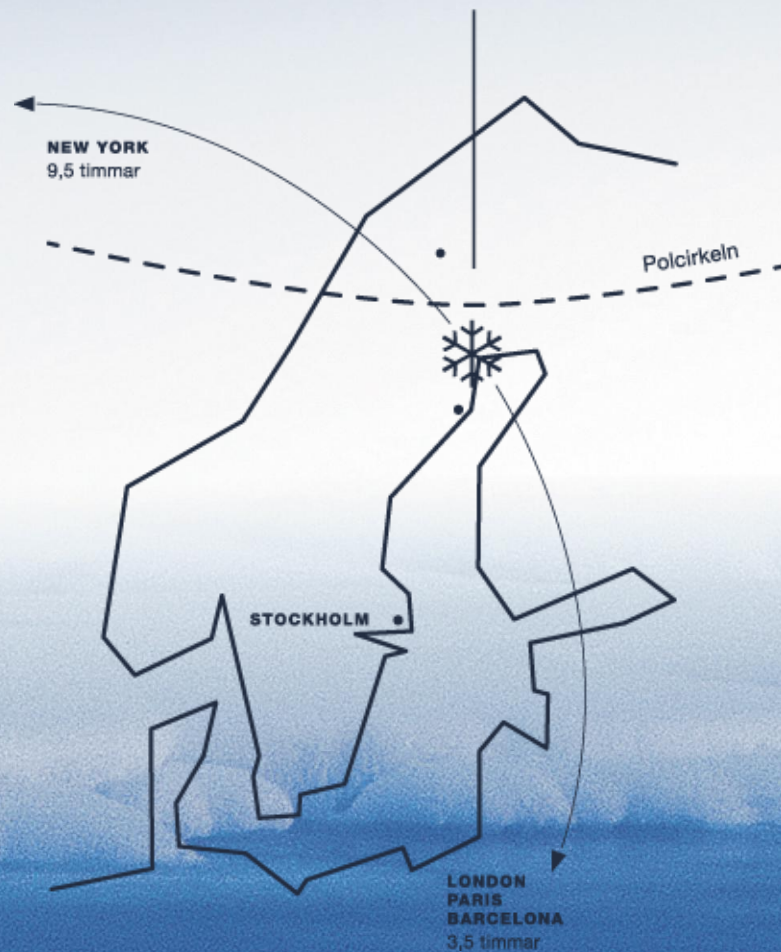


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Skandinaviens nordligaste tekniska universitet
Forskning & utbildning i världsklass

Luleå tekniska universitet



LULEÅ
TEKNISKA
UNIVERSITET



Vision 2020

Strong Research and Innovation Areas

- **Attractive Built Environment**
- **Effective Innovation and Organization**
- **Future Mining**
- **Renewable Energy**
- **Innovative Art and Technology**
- **Sustainable Transports**
- **Intelligent Industrial Processes**
- **Enabling ICT**
- **Smart Machines and Materials**





**Luleå University of Technology is the centre
of mining related research and education in
Sweden.**

This was further strengthened from 2010, when the Centre of Advanced Mining and Metallurgy (CAMM) was established, based on strategic funds from the Swedish government. The Swedish mining industry has long before that declared that Luleå university of technology is their strategic partner in research and education related to mining.



THE MINING AND MINERALS CHAIN AT LULEÅ UNIVERSITY OF TECHNOLOGY

Discovering, exploring
and verifying mineraliza-
tions and orebodies

Building, operating and
maintaining mining and
mineral-industry facilities

Concentrating ore,
processing minerals and
producing metals and
other products

Closure and remediation
of mines and other mineral-
industrial facilities

APPLIED GEOPHYSICS
ORE GEOLOGY

ROCK MECHANICS AND
ROCK ENGINEERING

MINERAL PROCESSING
PROCESS METALLURGY
CHEMICAL ENGINEERING

APPLIED GEOLOGY
SOIL MECHANICS AND
FOUNDATION ENGINEERING



OPERATION AND MAINTENANCE ENGINEERING
INDUSTRIAL PRODUCTION ENVIRONMENT
SOUND AND VIBRATIONS
FLUID MECHANICS
ECONOMICS (NATURAL RESOURCES)




The "Mining and Minerals chain" at LTU with core research areas in red.

The global demand for metals and minerals is rapidly growing, powered by the growth industries of Asia and China. Europe has a huge trade deficit for metallic minerals, and needs to utilize more of its own resources to decrease this dependence.



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Mining operations may have detrimental effects on soil, water and biota. The Swedish mining sector uses 1.7 % of the electric power in the country. In addition, a substantial amount of fossil fuel is used, and nitric gases are emitted from various processes. Leakage of the nutrient nitrogen from undetonated explosives and cyanide leaching for gold extraction occurs. Dust and noise problems are common at mine sites.

However, these effects occur only as long as a mine is active.

The major potential long-term environmental effect of mining is formation of acid mine drainage in sulphide-bearing mine wastes, which can last for hundreds or even thousands of years.

Waste management

Two main types of waste. Coarse waste rock, mined to get access to ores, and fine grained mill tailings.

Fe ores often have a Fe-grade of $> 50 \%$.

Cu-Zn-Pb-ores generally contain $< 5\%$ metals.

Large Cu-ores such as porphyry copper ores usually have a Cu-concentration $\ll 1 \%$, i.e. $> 99 \%$ is waste.

Gold ores generally have på 3-4 g Au per ton. Almost everything that is mined is waste,

Thus, a lot of waste is mined; in Sweden alone 100 Mton ton annually, globally 15 000 - 20 000 Mton annually.

WASTE MANAGEMENT IS IMPORTANT!!



- In Sweden, management of sulphide-bearing mine waste is directed towards prevention of formation of acid mine drainage, also on a very long time perspective (next glaciation perspective).
- After closure, it should be possible to leave the remediated waste without continued maintenance.
- Treatment methods such as liming for ever or at least for a very long time is not an option.



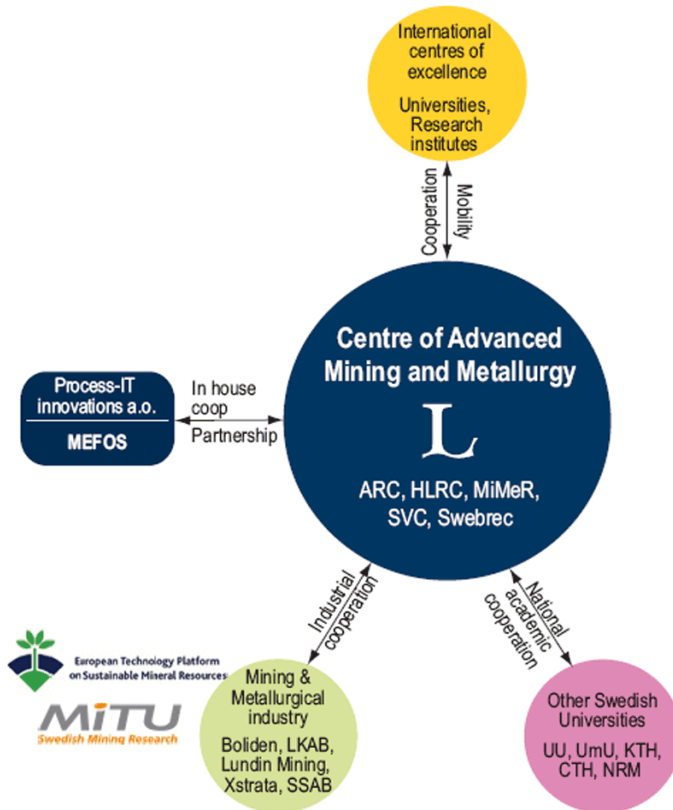
ImpactMin is important!

Welcome to Luleå and have a good meeting here.



CAMM

Centre of Advanced Mining and Metallurgy



- Geometallurgy and 4D geological modelling
- Deep mining
- Lean mining –production systems
- Particle technology
- **Green mining – reducing the environmental footprint (prof. Björn Öhlander)**
- Raw materials for future iron- and steelmaking

Coordinator: Prof. Pär Weihed





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