# Keliber

## Lithium Mining for Fast Growing Markets


**CEO Pertti Lamberg**

10th Lithium Supply & Markets Conference, Wednesday, June 27, 2018

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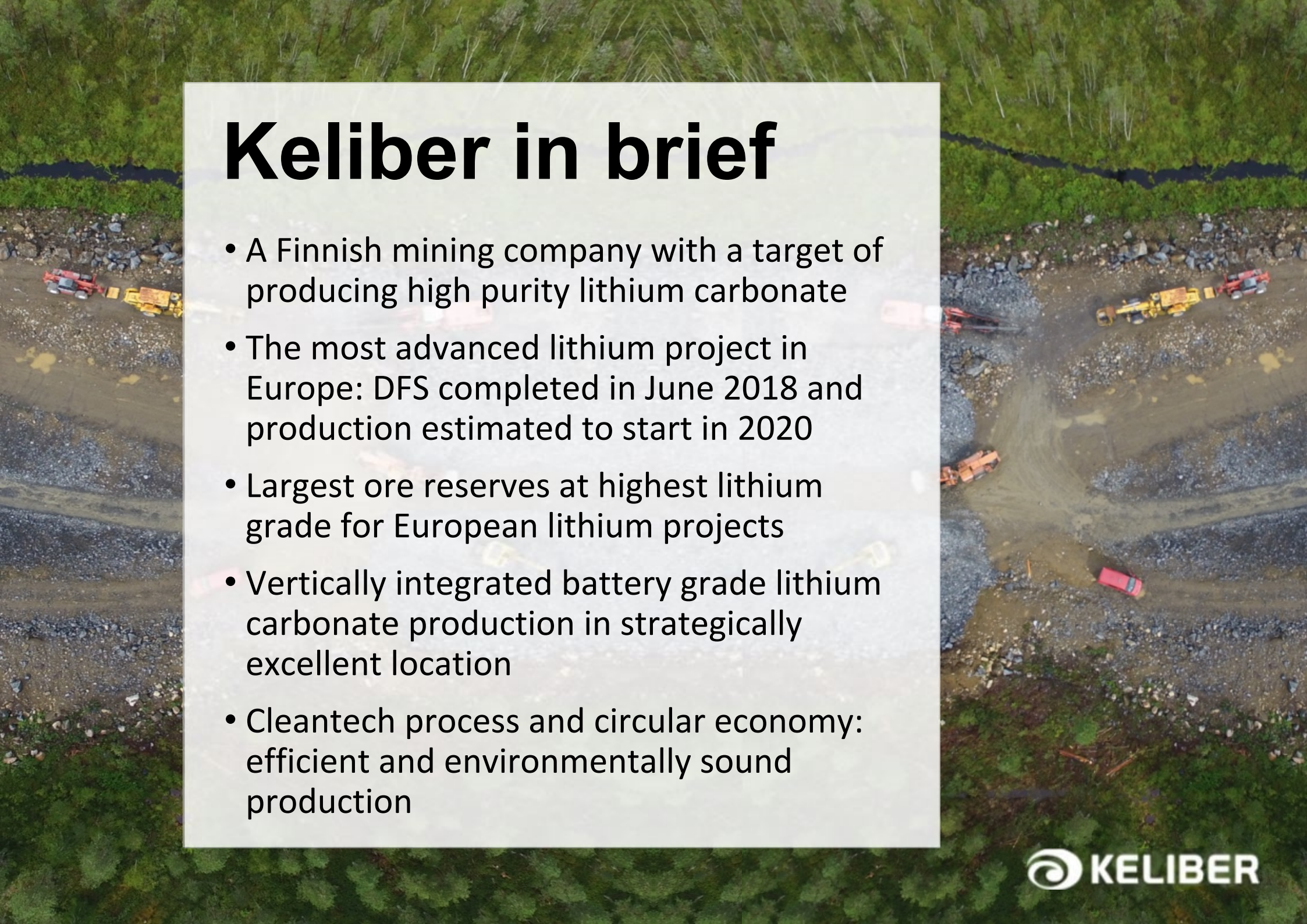

# Keliber in brief

- A Finnish mining company with a target of producing high purity lithium carbonate
- The most advanced lithium project in Europe: DFS completed in June 2018 and production estimated to start in 2020
- Largest ore reserves at highest lithium grade for European lithium projects
- Vertically integrated battery grade lithium carbonate production in strategically excellent location
- Cleantech process and circular economy: efficient and environmentally sound production

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# Litium Project highlights

| | | |
|---|---|---|
| **1** **Strong business case demonstrated by DFS** | • Only European lithium project in DFS stage<br>• Pre-tax IRR 24 %<br>• Pre-tax NPV (@8%) MEUR 295<br>• Pre-tax pay back period 5.5 years | page 5 |
| **2** **Growing resources** | • Mineral Resources (Measured and Indicated) 9.47 Mt 1.16 % $Li_2O$<br>• Ore Reserves 7.408 Mt @ 1.04 % $Li_2O$ | page 10 |
| **3** **Strong markets** | • Rechargeable battery sector forecasted 19.6 % pa growth through to 2032<br>• Driven by global electrification of transportation<br>• Upside potential through by-products and scalable operations | page 15 |
| **4** **Strategically attractive location** | • Located near to fast developing European markets<br>• Production within an already established infrastructure | page 19 |

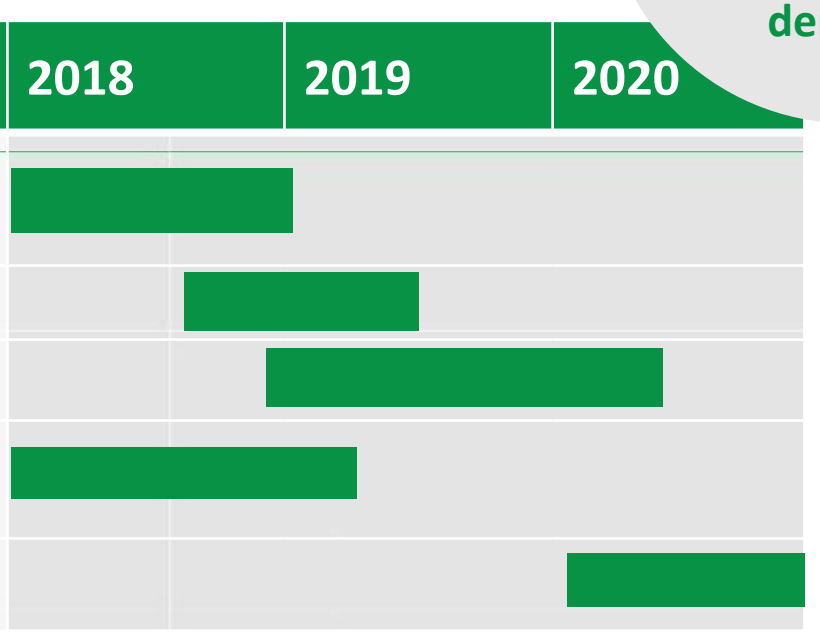
# Strong business case

# The most advanced lithium project in Europe

- **Only European lithium project in DFS stage**
- **Largest ore reserves at highest lithium grade for European lithium projects**
- First mining company in Finland accepted to the pre-consultation procedure for permitting

**Production estimated to start in 2020 to meet the brisk market demand**

| Tentative timeline for the next stages | 2018 | 2019 | 2020 |
|---|---|---|---|
| **Permitting** (environmental, mining and other)<br>• Completion of EIA processes during Q2-Q3/2018 | | | |
| **Detailed Engineering** | | | |
| **Construction** | | | |
| **Off-take negotiations and preparations for construction financing** (ongoing) | | | |
| **Commissioning and production ramp-up** | | | |



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# Key DFS project assumptions

The current life of mines is 13 years, but the project is extended to 20 years by purchasing spodumene concentrates from third parties

| | |
|---|---|
| Expected mine life (Expected Life of Operations) | 13 (20) years |
| Annual mine production | 570 ktpa average |
| Annual spodumene concentrate production | 112 ktpa average |
| Annual battery grade lithium carbonate sold | 10,745 tpa average |
| Battery grade lithium carbonate price between 2017–2032 (in real terms) | 10,320 US$/t - 13,931 US$/t |
| Exchange rate | EUR/US$ 1.00€ = 1.21 $ |

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# Attractive project economics

| | |
|---|---|
| Total Revenue (Expected Life of Operations), MEUR | 2,281 |
| Total EBITDA (Expected Life of Operations), MEUR | 1,213 |

**Pre-Tax**

Payback Period Years **5.5**

**Post-Tax**

Payback Period Years **5.7**

PRE-TAX NPV **295** MEUR @ 8%

POST-TAX NPV **225** MEUR

**Pre-Tax IRR % 24**

Post-Tax **IRR % 22**

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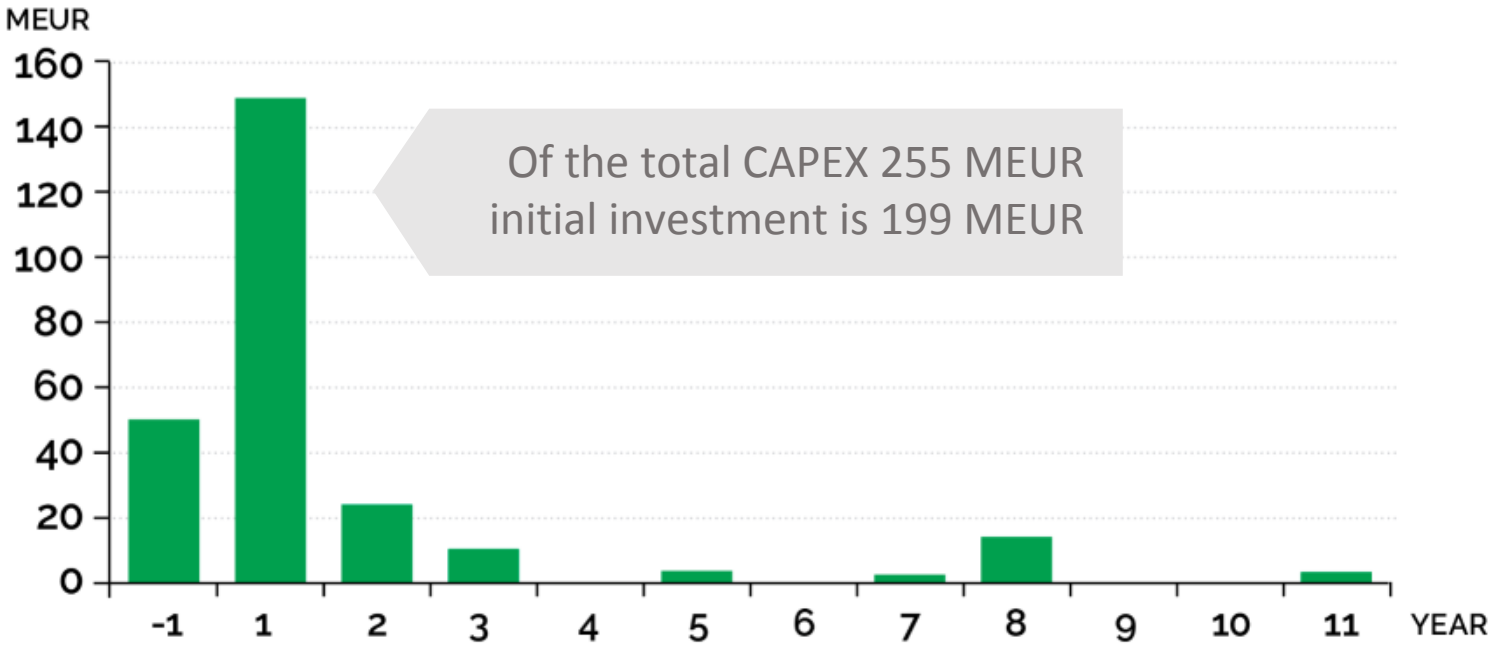
# Capital and operating expenditures




| CAPEX | MEUR |
|---|---|
| Direct | 205 |
| Indirect | 50 |
| **Total CAPEX** | **255** |

| | |
|---|---|
| **Unit Total OPEX**, EUR / t $Li_2CO_3$ (produced from Keliber's currently known ore reserves) | **4 427** |
| **Unit Total OPEX**, EUR / t $Li_2CO_3$ (incl. purchased spodumene concentrate) | **4 866** |

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# Resources and cleantech process

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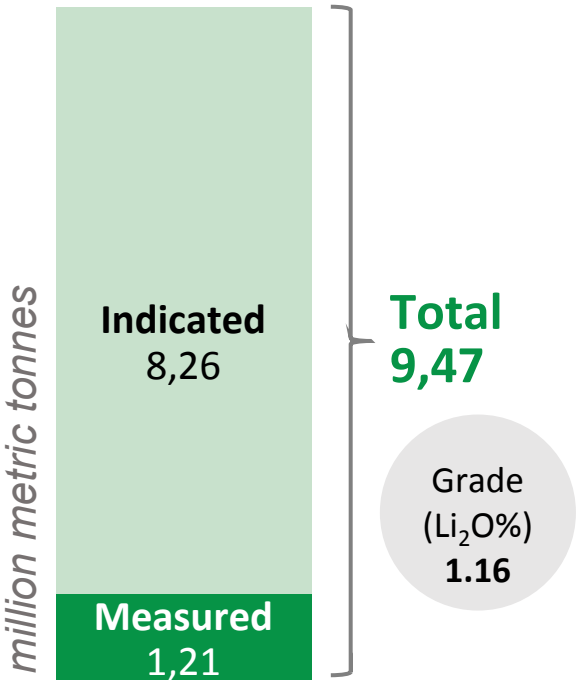
# Growing resources and reserves

Latest estimate of mineral resources and ore reserves (million metric tonnes)

## RESOURCES (May 2018)




## RESERVES (June 2018)

| | **Open pit** (kt) | **Underground** (kt) | **Total** (kt) |
|---|---|---|---|
| **Proven** | 898 | 247 | 1 145 |
| **Probable** | 3 739 | 2 524 | 6 263 |
| **Total** | **4 637** | **2 778** | **7 408** |
| Ore grade ($Li_2O$%) | 1.07 | 0.99 | 1.04 |

Ore reserves are included in the mineral resources
Estimates prepared by Competent Persons in accordance with 2012 JORC code

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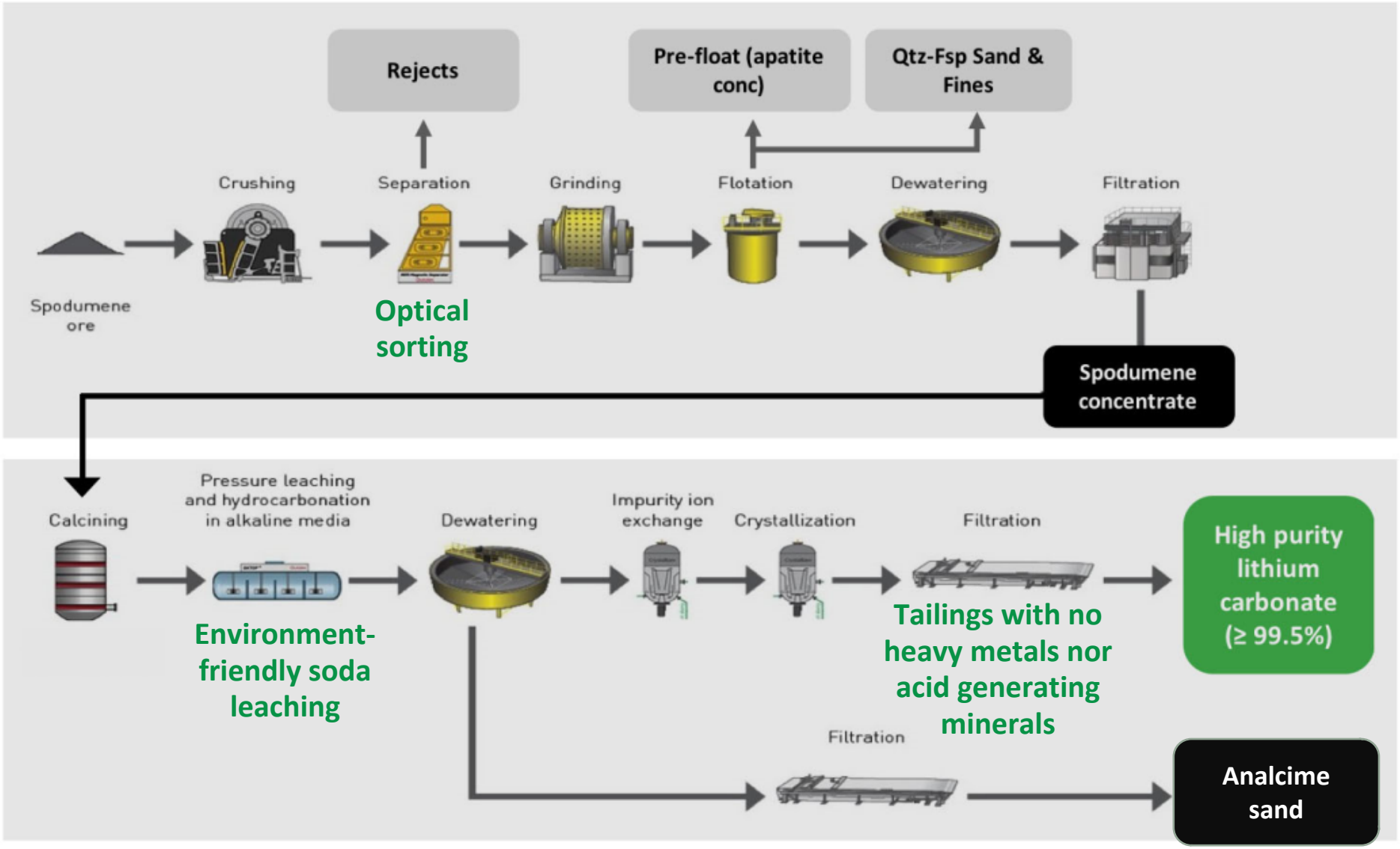
# Cleantech process

Efficient and environmentally sound production of high purity lithium carbonate

## Soda leaching process developed together with Outotec



# Strong commitment to sustainability

Sustainable production process and proactive environmental actions

- One of the shortest transportation distances in the world from mine to production of lithium chemicals
- Resource efficiency through optimized production chain
- Circular economy through number of potential by-products that can be used locally
- Proactive and transparent environmental and societal actions

# Project upside potential

- Significant lithium endowment – high exploration potential in the area
- Potential for valuable by-products: Analcime sand and quartz-feldspar sand suitable for circular economy
- Possibility for capacity growth due to excellent location
- Adopted production technology serves potential for diversifying product portfolio
- Chemical plant in harbor close to growing European end-product markets

# Fast developing markets for lithium

# Global megatrend

Towards a more mobile and sustainable world

**Global needs to reduce $CO_2$ emission and improve air quality in big cities**

**Changes in consumer behavior**

**Accelerated investment in the lithium value chain**

**Global electrification of transportation with continuing political and regulative support**

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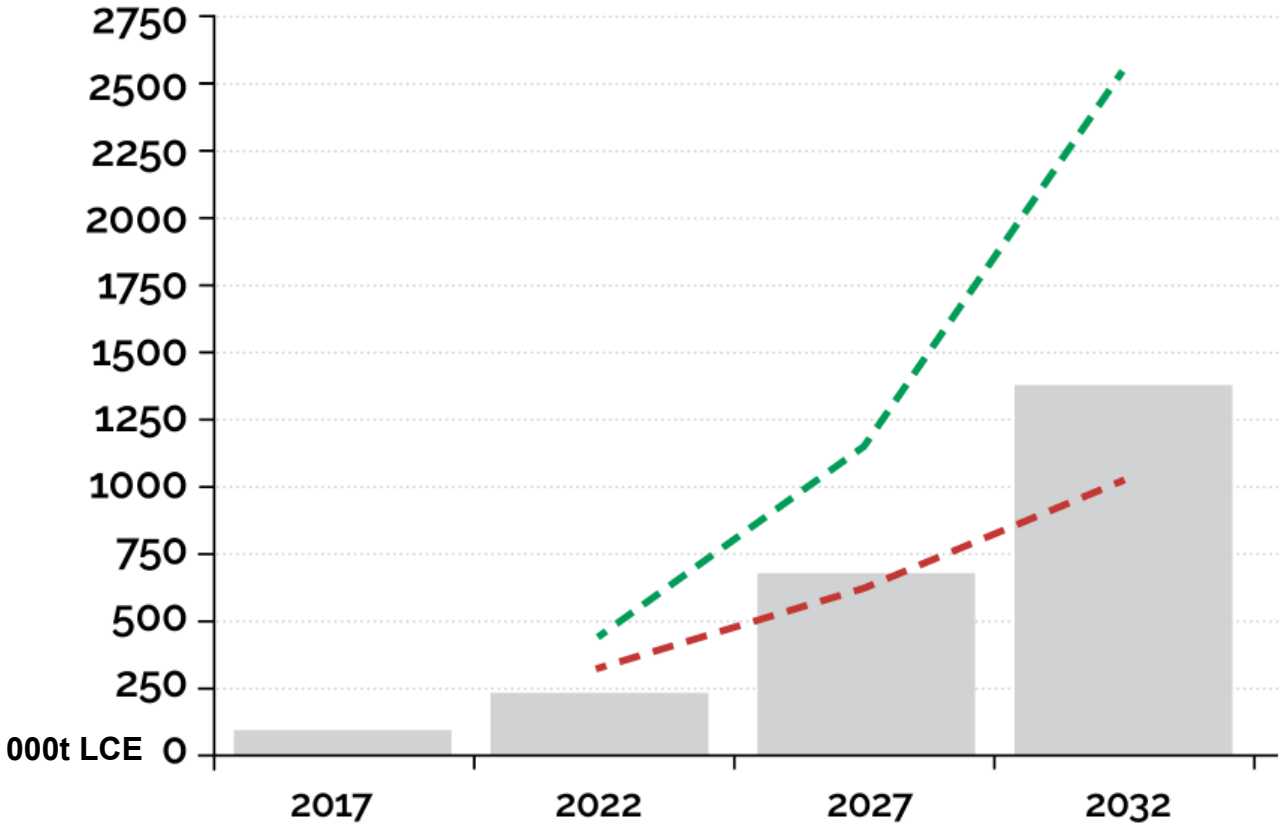
# Increase in demand for lithium

## Rechargeable battery sector driver for growth

Increasing global demand: 19.6% per annum increase in the rechargeable battery sector

Annual global demand growing: 0.21 Mt (2017) → 0.83 Mt (2027) → 1.56 Mt (2032)

Other markets also growing (ceramics and glass-ceramics, polymers, metallurgical powders)




**Forecasted consumption of lithium**

Rechargeable battery
High
Low

LCE = Lithium carbonate equivalent

*Source: Roskill Consulting Group Ltd, 2018*

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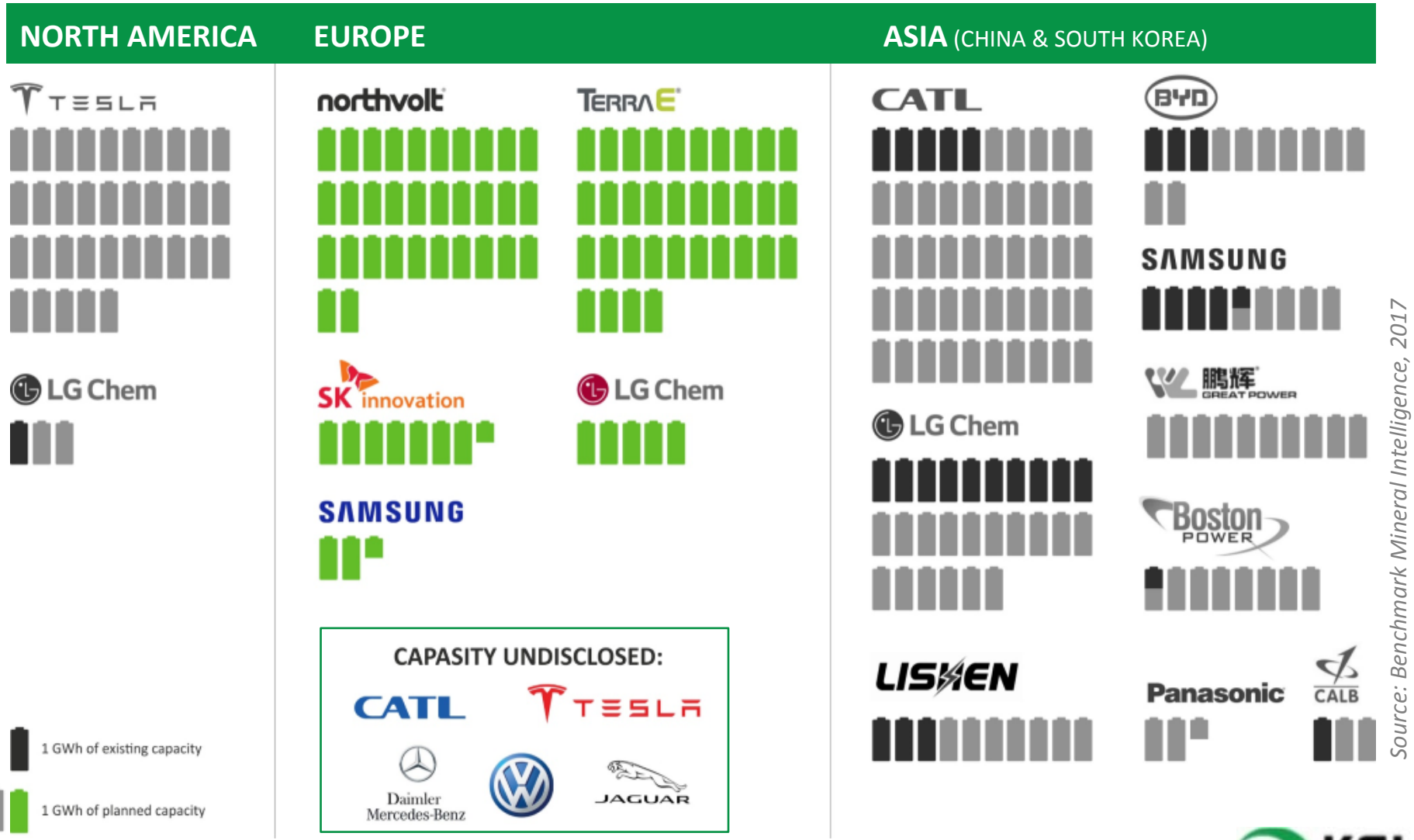
# Lithium-ion Megafactories - Europe enters the game




*Source: Benchmark Mineral Intelligence, 2017*

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Strategically attractive location
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# Finland well positioned for battery storage growth

**Raw materials**

**Li**

**Ni**

**Co**

**Graphite**

**From mines to chemicals**

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**Norilsk Nickel** worlds largest Ni producer (30 % of production refined in Finland)

**Freeport Cobalt** worlds largest producer of Co chemicals

**Terrafame** investing MUSD 200 in Ni and Co battery chemicals

**BASF** announced intention to invest MEUR 400 to battery cathode material production

**Strong political support**

**May 2018:** The Finnish government announced **significant support for the Finnish battery industry** by establishing a joint company ***Finnish Minerals Group*** to pool its ownership and accelerate growth in the industry.

Source: BUSINESS FINLAND, 2018

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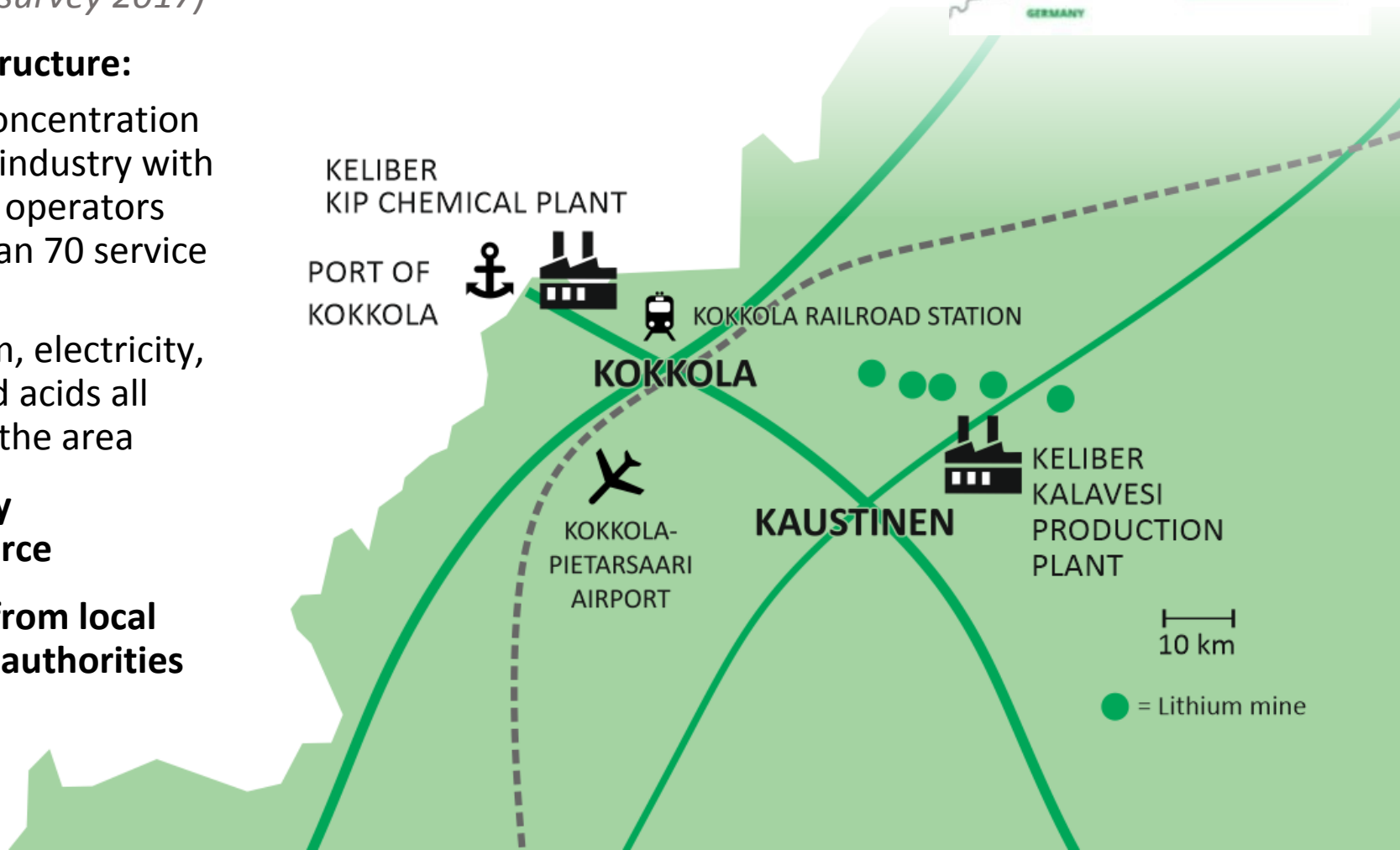
# Excellent location

## Established infrastructure

- **Finland the most attractive jurisdiction for mining investment** *(Fraser Institute survey 2017)*
- **Excellent infrastructure:**
  - Significant concentration of chemical industry with 15 industrial operators and more than 70 service companies
  - Water, steam, electricity, heat, gas and acids all produced in the area
- **Good availability of skilful workforce**
- **Strong support from local community and authorities**

# Concentrator plant in Kalavesi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# Chemical plant in Kokkola Industrial Park


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# Team and summary

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# Experienced management

## Pertti Lamberg

**CEO**

PhD, Geology

**Recent experience:**

- Outotec (Finland): Director of Plant Products 2015–2016
- Luleå University of Technology: Professor of Geometallurgy 2011–2016
- Outotec Research: Chief Technological Advisor, refinement of minerals 2007–2010

## Jaakko Vilponen

**CFO**

MSc. Economics

**Recent experience:**

- Boliden Stockholm (BA Smelters): Business Development Manager 2009–2015
- Boliden Stockholm and Kokkola (Smelters business segment): Chief Financial Officer 2006–2009

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# Management team

**Pertti Lamberg**
CEO

**Jaakko Vilponen**
CFO

**Kari Wiikinkoski**
Environmental Manager

**Jarmo Finnilä**
Communication and Administration Manager

**Manu Myllymäki**
Chief Production Officer

**Olle Sirén**
COO

**Pentti Grönholm**
Chief Geologist

Team with decades of experience in the mining and metals industry, business development and financing, stakeholder communications and environmental planning and preservation.

# Summary

- Strong business case with attractive financials
- The most advanced lithium project in Europe: production estimated to start in 2020
- Excellent location with established infrastructure
- Growing resources and potential for upside through by-products and scalable operations
- Cleantech process and circular economy: efficient and environmentally sound production of high purity lithium carbonate

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