

CASE: Well positioned for growth with hydrometallurgy

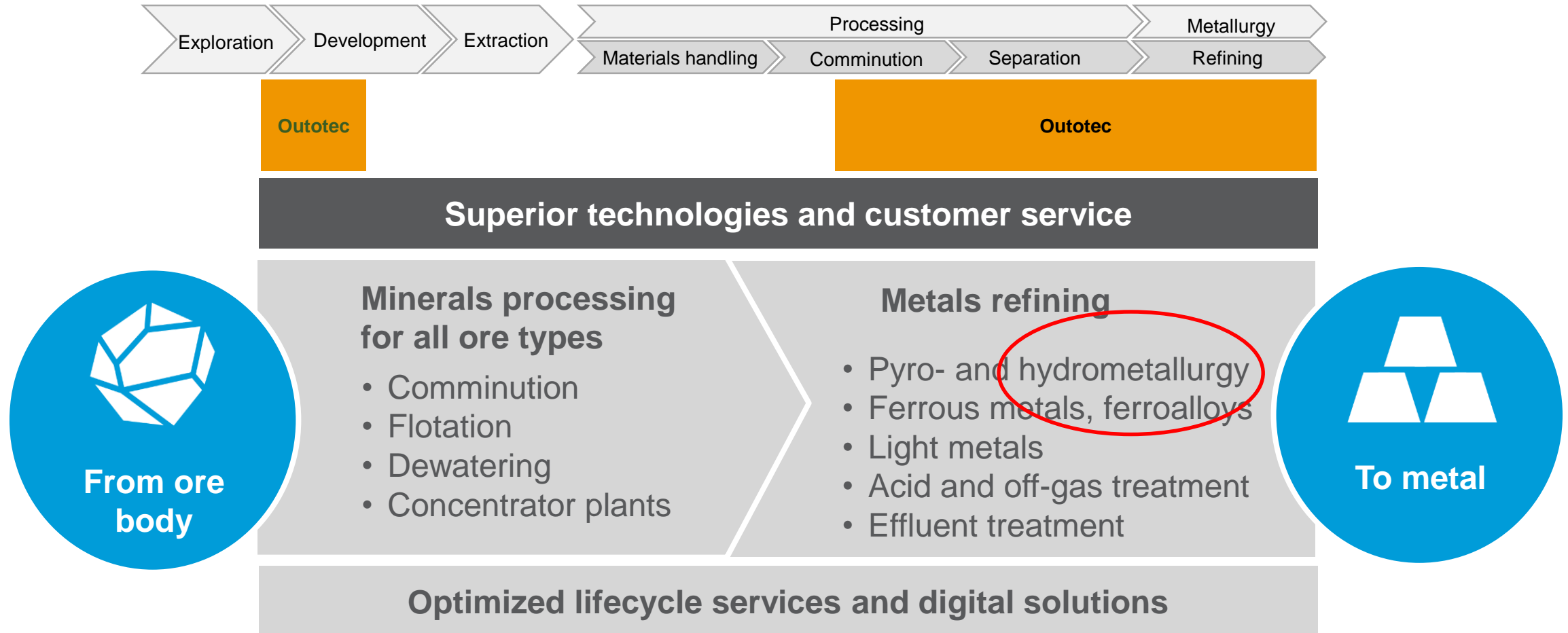
Outotec Capital Markets Day 2017

Kalle Härkki, President – Metals, Energy & Water

Outotec House – September 21



Our business on the value chain from ore to metal



We have several growth opportunities in hydrometallurgy

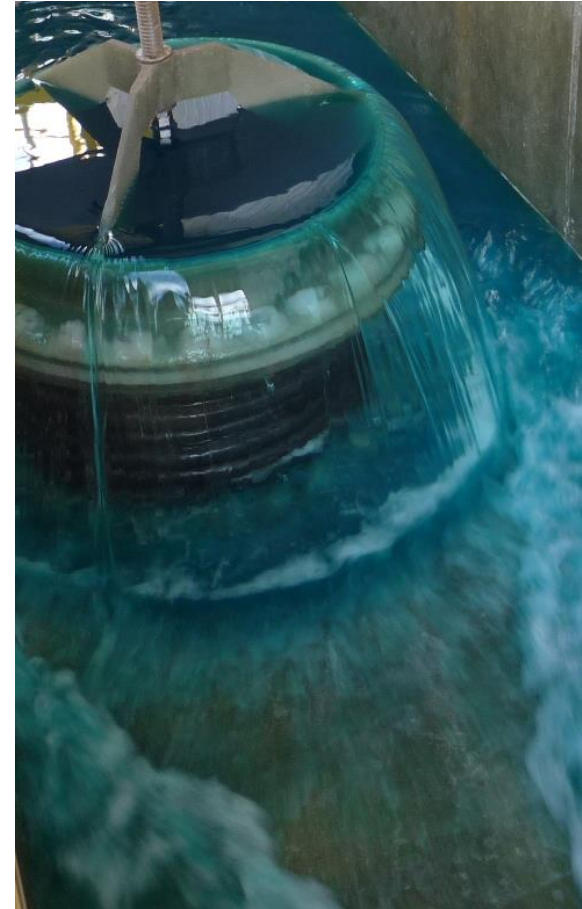
Improve recovery of valuable metals
– efficiency improvement

Our excellent testing and piloting facilities enable
– early involvement in customer projects

Close process water circuits
– understand process implications

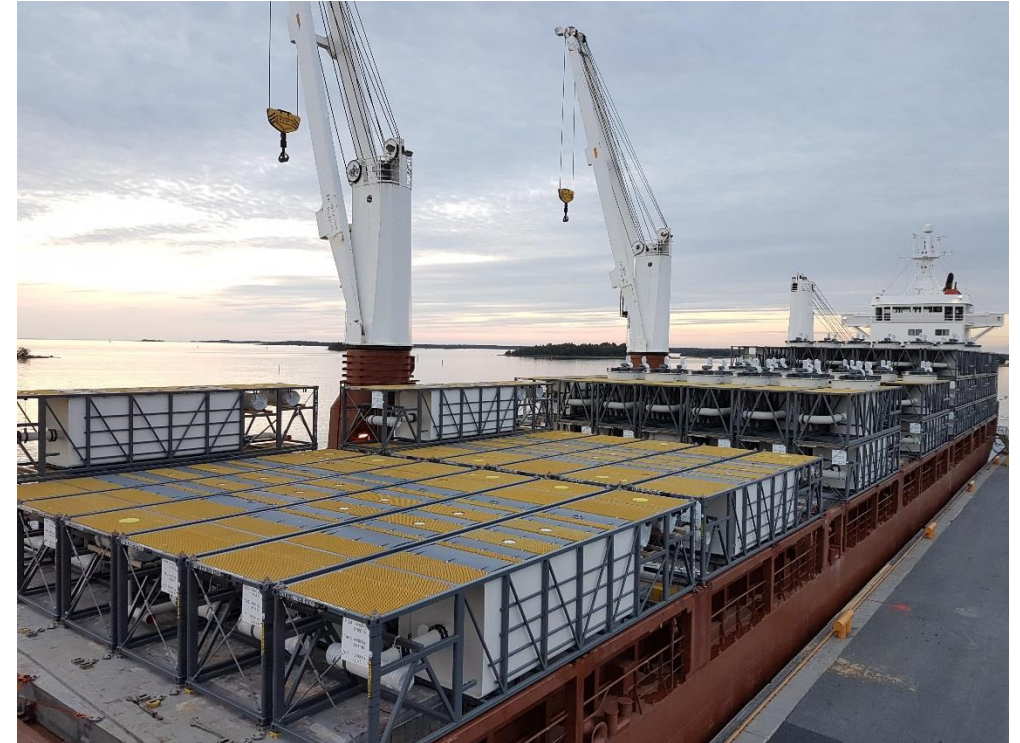
Treat low-grade ores and concentrates containing more impurities
– sustainable technologies

Provide sustainable solutions in China



Our leading position in hydrometallurgy is based on decades of technology development

- Novel technological solutions for hydrometallurgical extraction of base and precious metals including also lithium
- Systematically developed wide product portfolio enables entire plant deliveries and modular plant concepts
- Large number of proprietary equipment generates healthy service business



New VSFX technology on the way to the customer

Our laboratory testing and piloting facilities differentiate us from our competition



- Optimal process solution is largely dependent on customer's raw material composition (chemistry)
- Testing is the key to optimized and environmentally friendly processes
- Pori Research Center provides extensive testing and analyzing facilities, supporting process design and both equipment and plant deliveries

Pori research facilities

- 8 laboratories
- 2 laboratories for bench scale pilots
- Hydrometallurgical and pyrometallurgical pilot plants
- Industrial scale hydrometallurgical test plant
- Test partnerships

Concepts

- Raw material chemical and mineralogical composition
- Leaching, precipitation and solvent extraction yields
- Optimization of process parameters
- Solid-liquid separation parameters
- CEN tests to define residue EU waste classification
- Corrosion analyses (equipment)

We enabled significant improvement in silver recovery for Met Mex Peñoles in Mexico

Met Mex Peñoles zinc plant with silver production

- Peñoles is one of the biggest silver producer in the world
- A newly commercialized Pure Jarosite process will improve metals (Ag, Pb) recovery typically by 20%, silver being economically most important
- This project will be combined with the expansion project and delivered in 2017-2018



Direct Leaching expansion project

- Pure Jarosite process including
 - Process equipment (reactors, thickeners, filters, etc.)
 - Erection, commissioning and start-up support & site services
 - Comprehensive e-catalogue of spare parts
- Roaster feed pre-treatment system

Our solution provides huge savings to the customer with better zinc and lead recovery

Challenges

- In conventional jarosite process roughly 20% of silver lost to iron residue
- In addition, losses of lead and zinc
- Problem especially for zinc producers with high silver content concentrates

Solution

- Outotec's Pure Jarosite process avoids almost all losses of silver, lead and zinc

Benefits

- Increased overall silver zinc and lead recovery
- Value to customer: tens of millions USD annually with short payment time
- Relatively simple and cost-effective modifications at the plant