LCA of an innovative flotation technology to enhance metal fine particle recovery

FineFuture
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AWAR – Assessment on WAste and REsources

POLITECNICO MILANO 1863

MINEA

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INTRODUCTION

- The project: **FineFuture** - EU funded project June 2019 – May 2022
- The aim: developing groundbreaking **technologies** to **enhance** the fine particle **recovery** in the **flotation** process
- The **research question**: how to address these technologies with the Life Cycle Assessment tool

LINKS & CONTACTS
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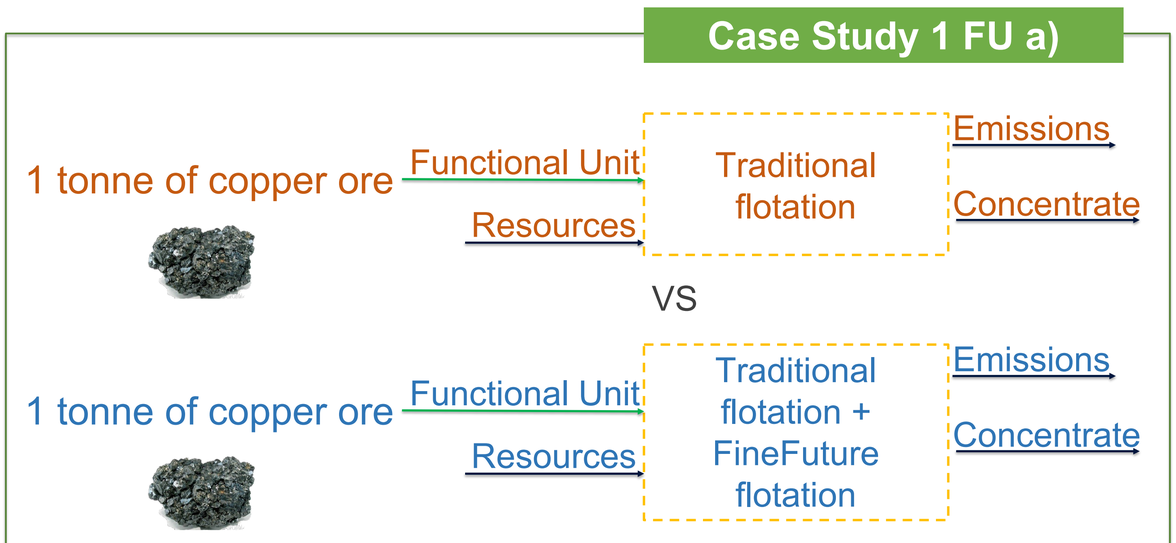
MATERIALS AND METHODS

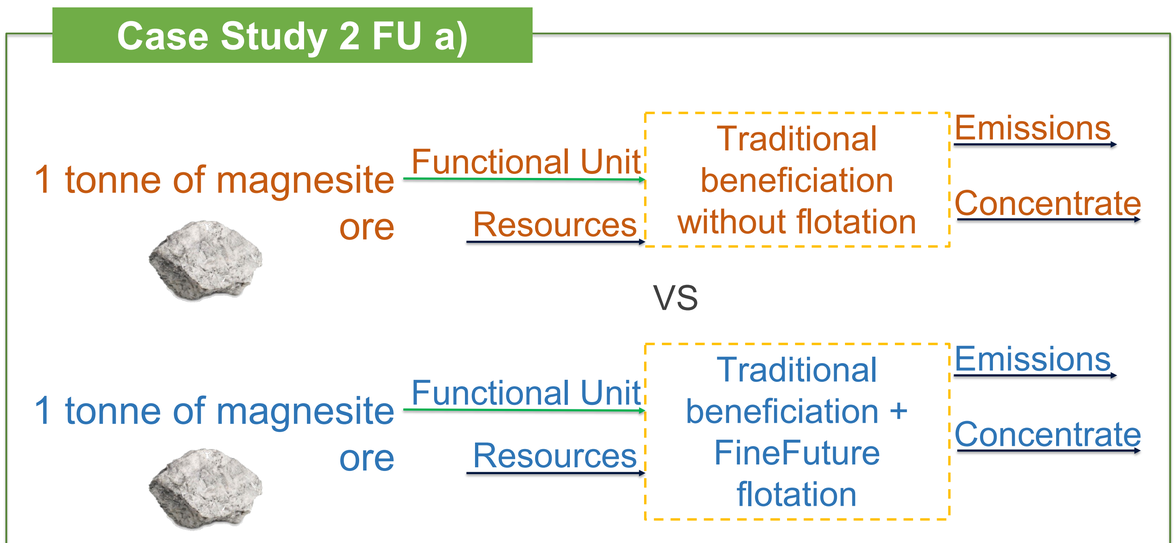
	CHALLENGES	POSSIBLE SOLUTIONS	OUR ANSWERS
SYSTEM DEFINITION	• One or more technologies will be developed • Technologies not yet defined • Application of the technology to a broad spectrum of sources, materials and beneficiation processes (processes that already include flotation either not) • To be applied to a site/material dependent process	a) Identification of an **average** case b) Selection of **representative** case studies	**Representative** case studies: 4 comparative LCAs of the system before and after the implementation of the technology/ies Exemplary materials and processes selected: 1. Copper ore extracted with flotation 2. Magnesite ore extracted without flotation 3. Manganese from dry tailings 4. Copper from wet tailings
FUNCTIONAL UNIT (FU)	Defining the functional unit of a system producing an intermediate product (the concentrate) whose characteristics might change after the implementation of the technology (first of all the concentration, but also granulometry, etc.)	a) Input based functional unit (the ore minerals/tailings rather than the concentrate) b) Including the downstream processes until the refined mineral/metal is obtained c) Commodity oriented Functional Unit (i.e. the valuable content in the concentrate)	**a) Input based functional unit** ✓ Effects downstream are not an issue ✗ It is not the function of the system ✗ It creates a multi-functionality in the system (the concentrate) **c) Commodity oriented functional unit** ✓ It represents the real function of the system ✗ It disregards the effects that other characteristics of the product might have downstream

RESULTS

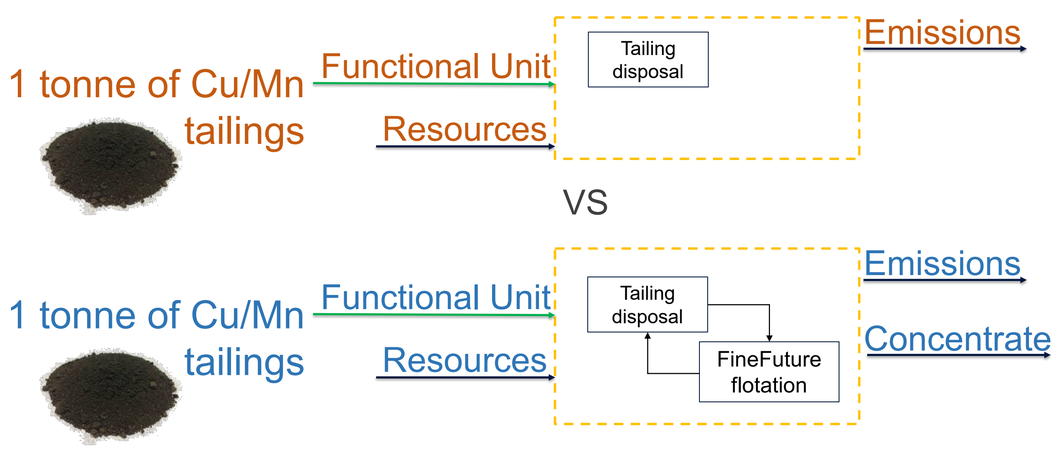
Case Study 1 FU a)



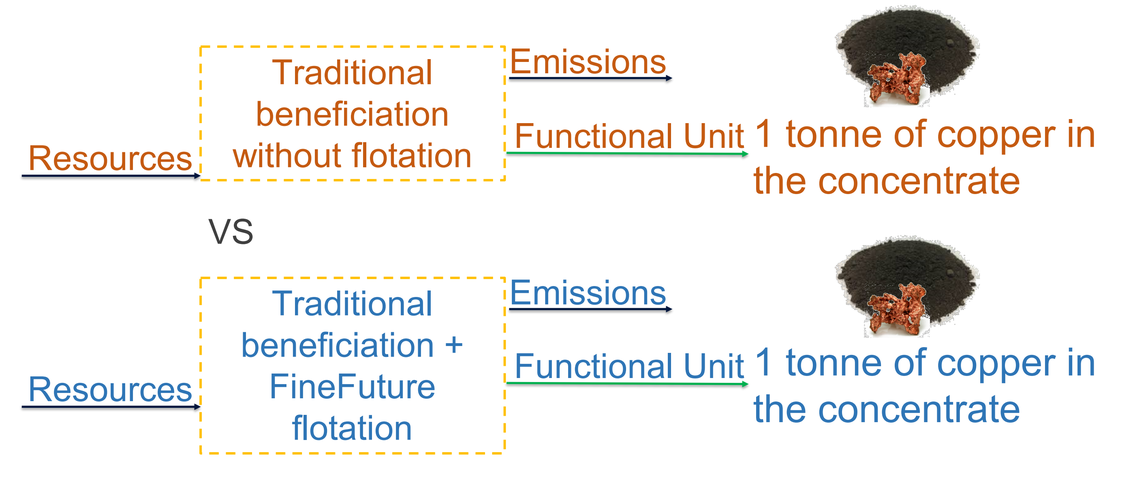
Case Study 2 FU a)



Case Studies 3 & 4 FU a)



Case Study 1 FU c)



OPEN ISSUES

- The **Input based functional unit creates** an inherent **multi-functionality** (the concentrate). Whether the system expansion is used, the **definition of the system avoided** remains an **issue**: firstly, its determining properties has to be defined; secondly, a system with such an output needs to be found.
- How the new technology will **affect the downstream (and upstream?) unit processes** and to which extent (e.g. different concentrate implies different tailings and different leachate)
- **Upscaling issue**: how to have a fair comparison notwithstanding data at plant scale for the traditional technologies vs. data at laboratory/ pilot scale?