



Challenge 3: Innovative approaches to limit the consequences of accidental water pollution events

Joint Expert Group on Water and Industrial Accidents

*Seminar on emerging risks in accidental water pollution:
focus on natural hazard-triggered accidents*
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ORE-SAND: A CIRCULAR ECONOMY SOLUTION TO THE MINE TAILINGS AND SAND SUSTAINABILITY CRISES

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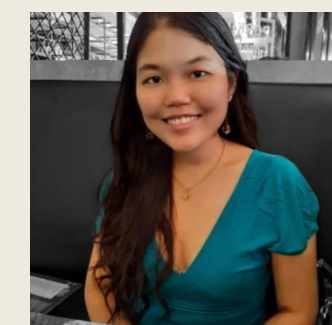
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Setting the scene



What is ore-sand?



Ore-sand



River sand



Manufactured sand

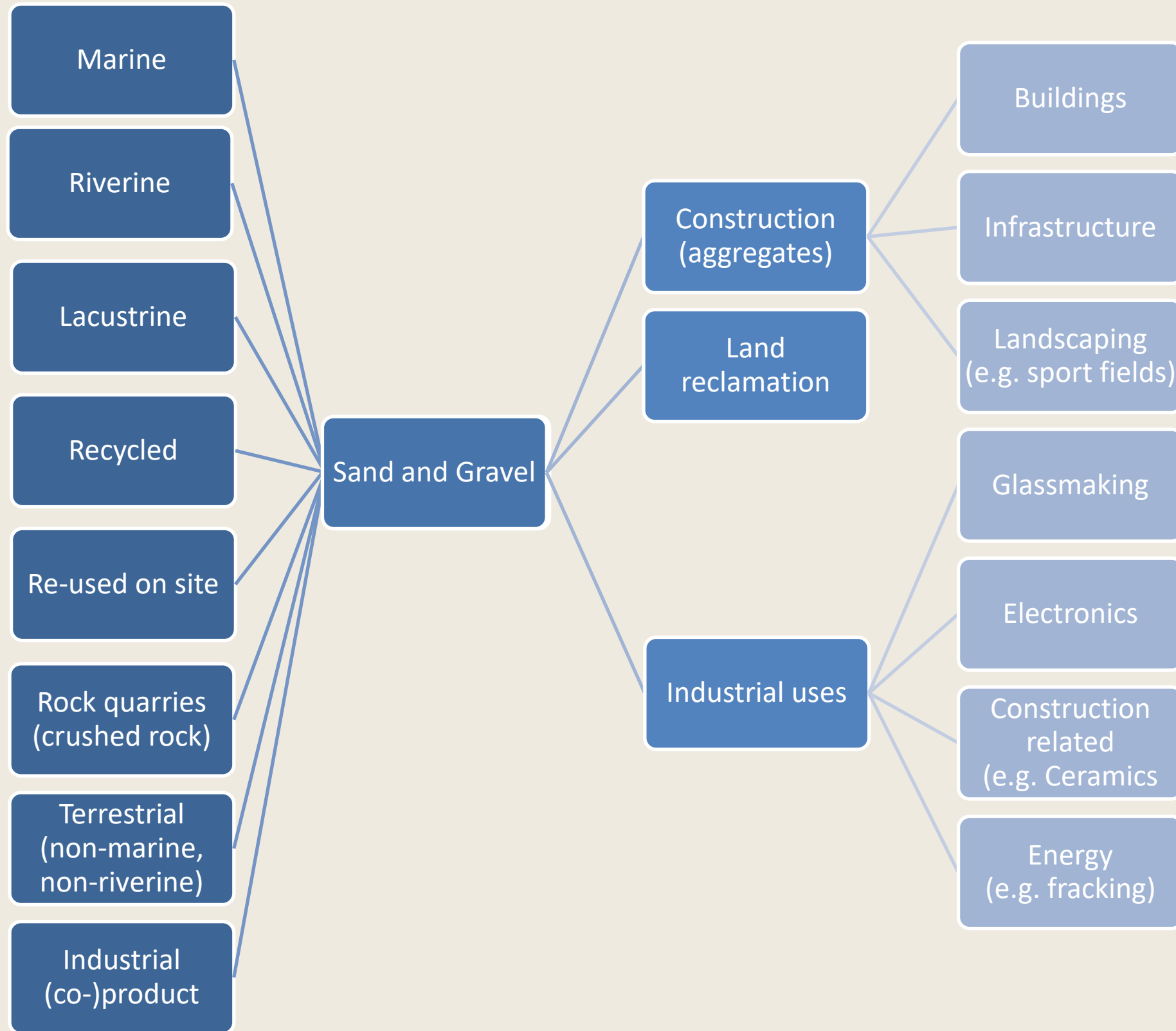
Ore-sand (o-sand) is a type of processed sand sourced as a co-product or by-product of mineral ores. Typically, it is a result of mechanical crushing and grinding, different physical and physicochemical beneficiation processes for mineral concentrates recovery, including optimization of these processes and additional processing stages to achieve the required properties of sand.

What are the markets for sand?

Source Material Sector Application

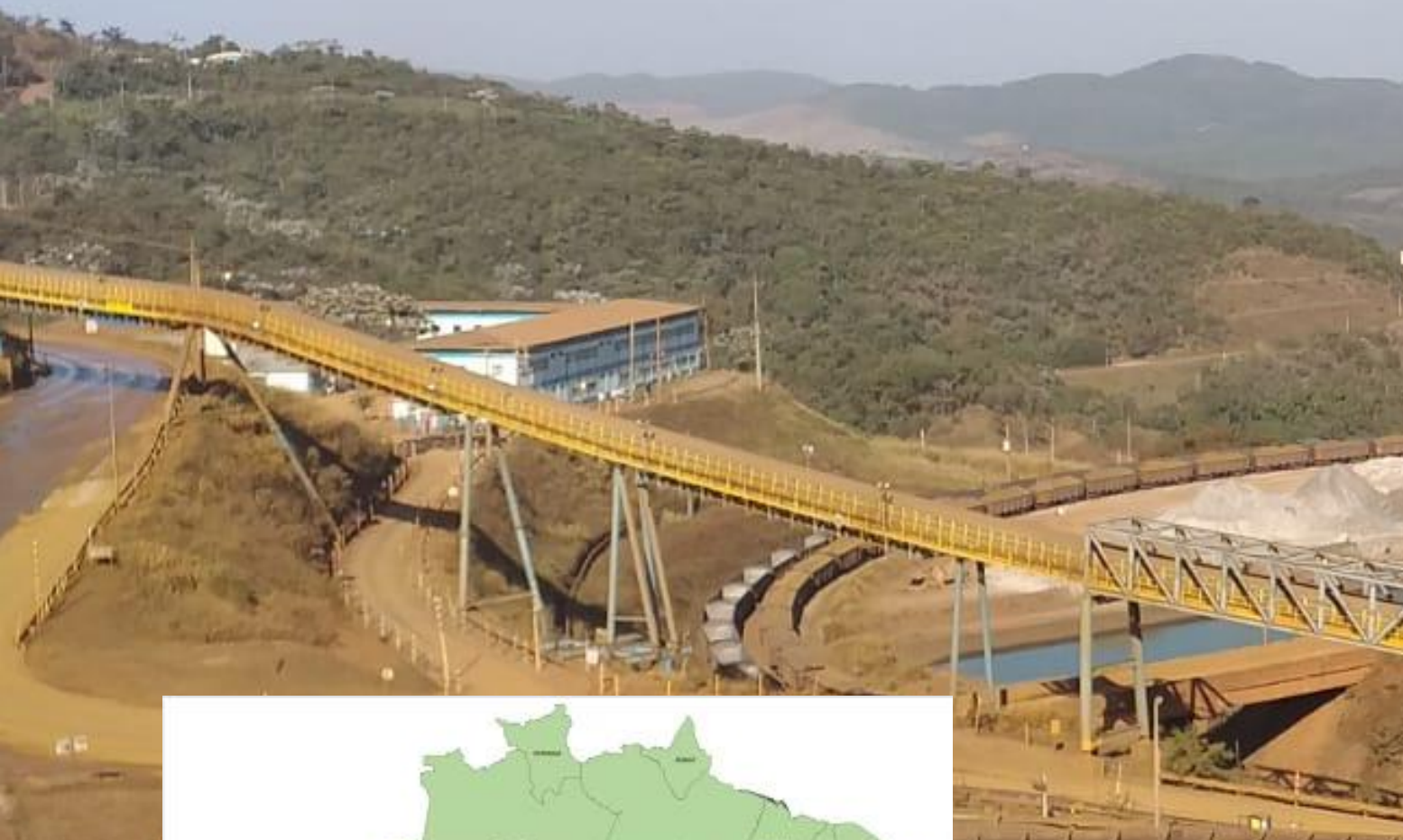
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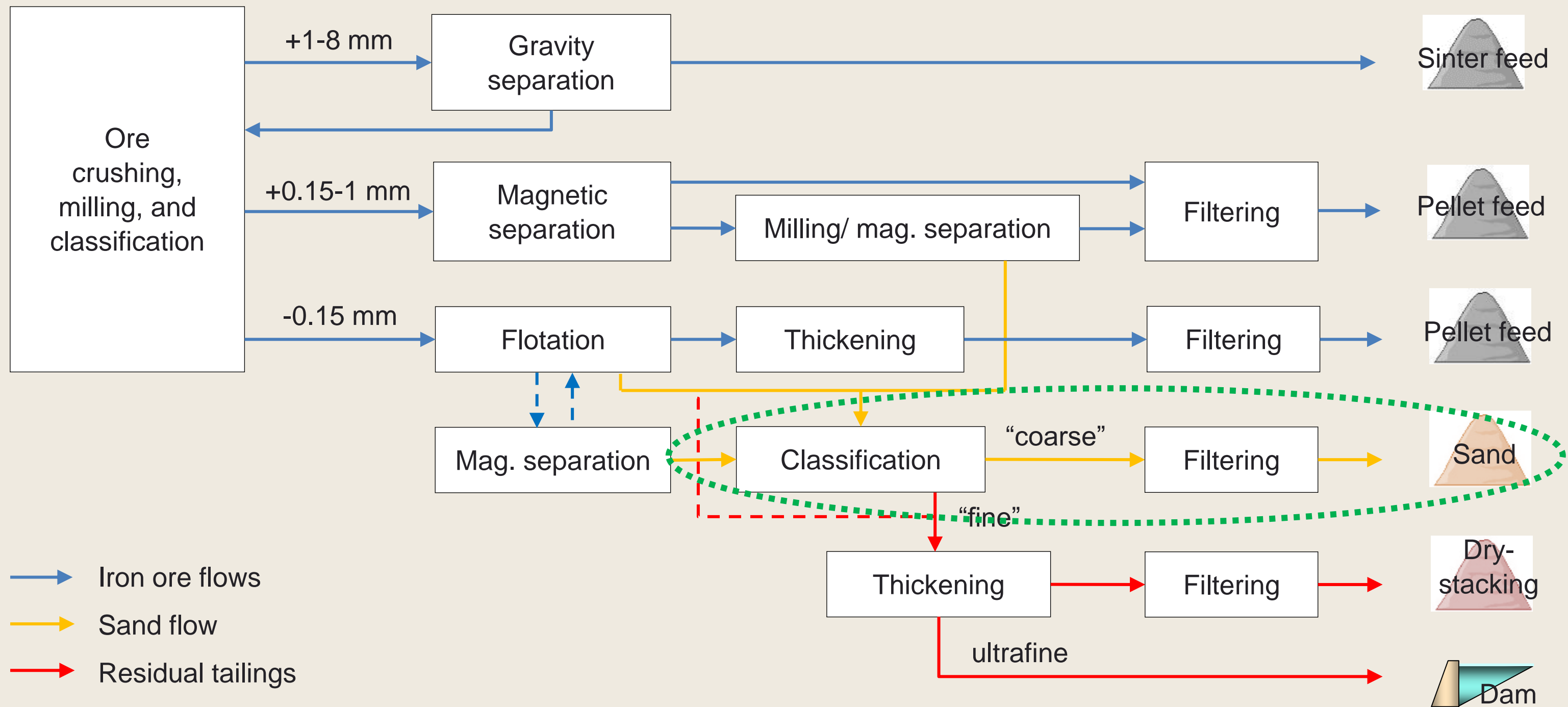


Source: Peduzzi ,
Unpublished, analysis
conducted with USGS
data in 2018

The Vale sand case-study

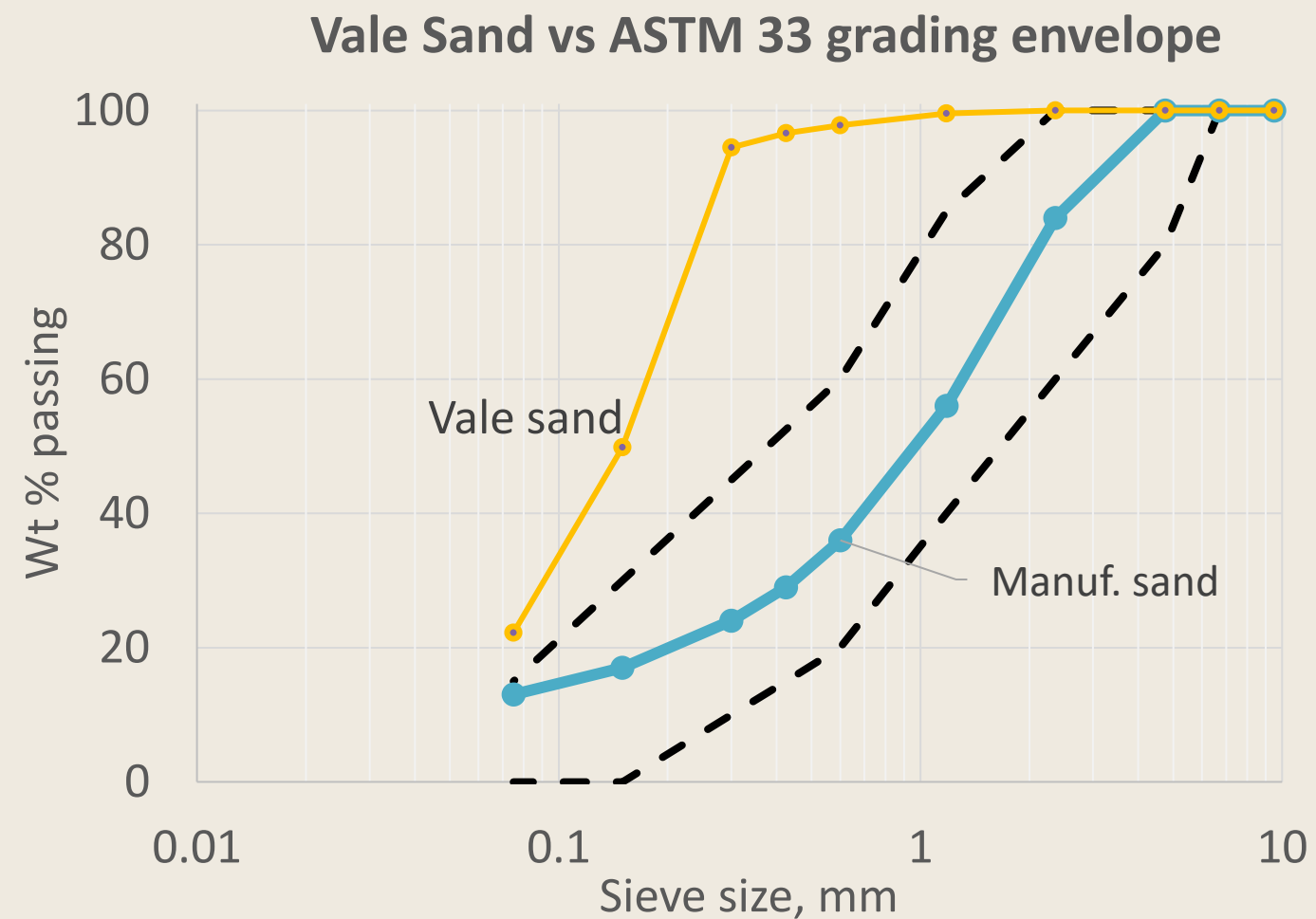


Iron ore and sand co-recovery



Vale Sand: standard and unique features

Very fine quartz-based sand



D_{v10} : 60 μ m; D_{v50} : 134 μ m; D_{v90} : 271 μ m

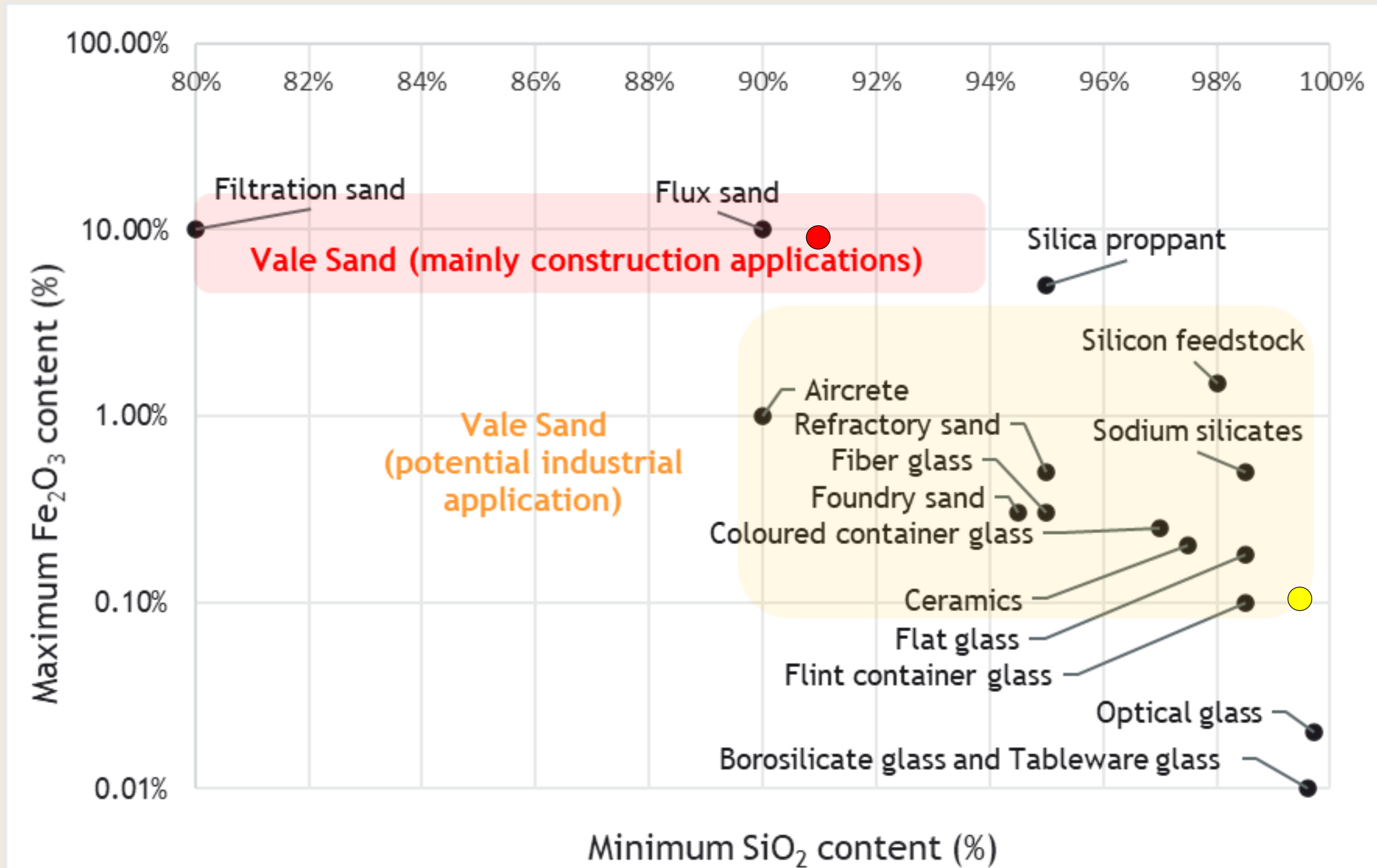
Residual iron oxides,
very low trace elements



Very angular shape



Vale Sand: current and potential applications



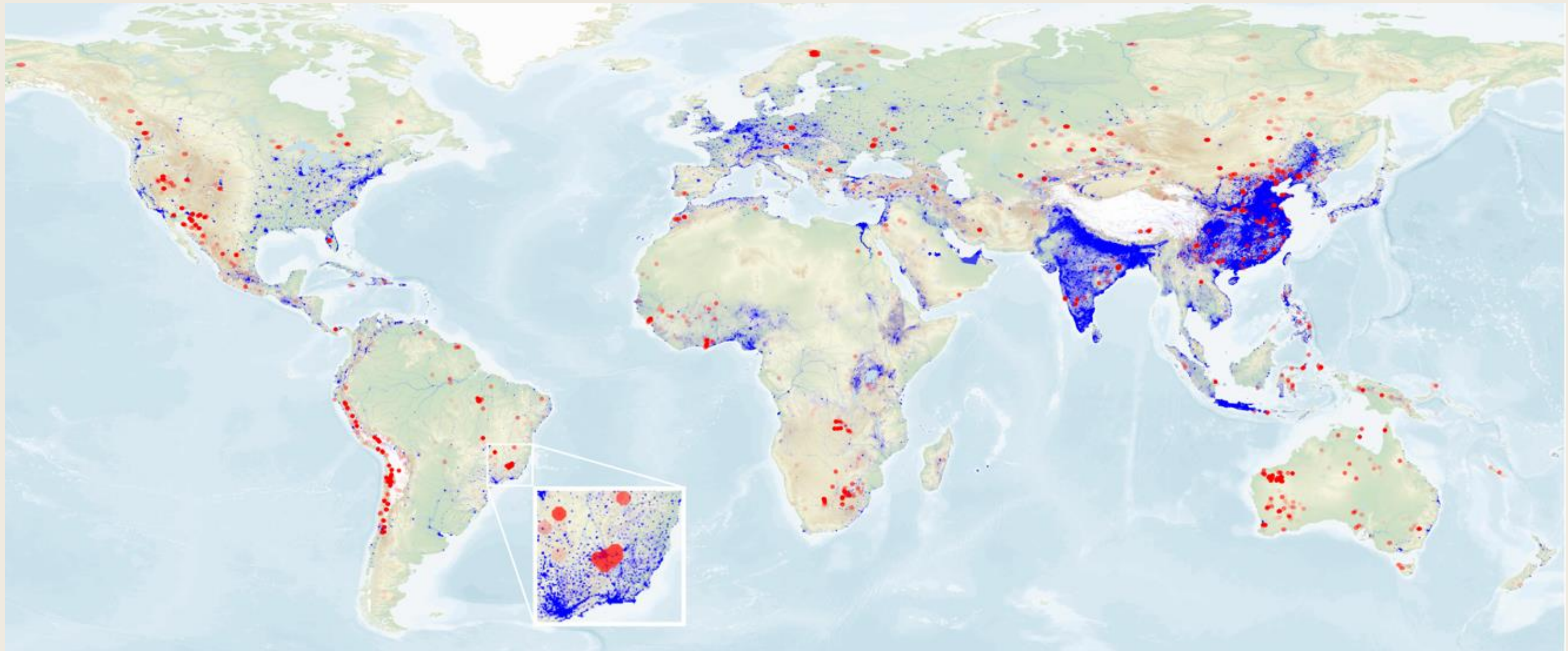
Increasing quality

Increasing quality



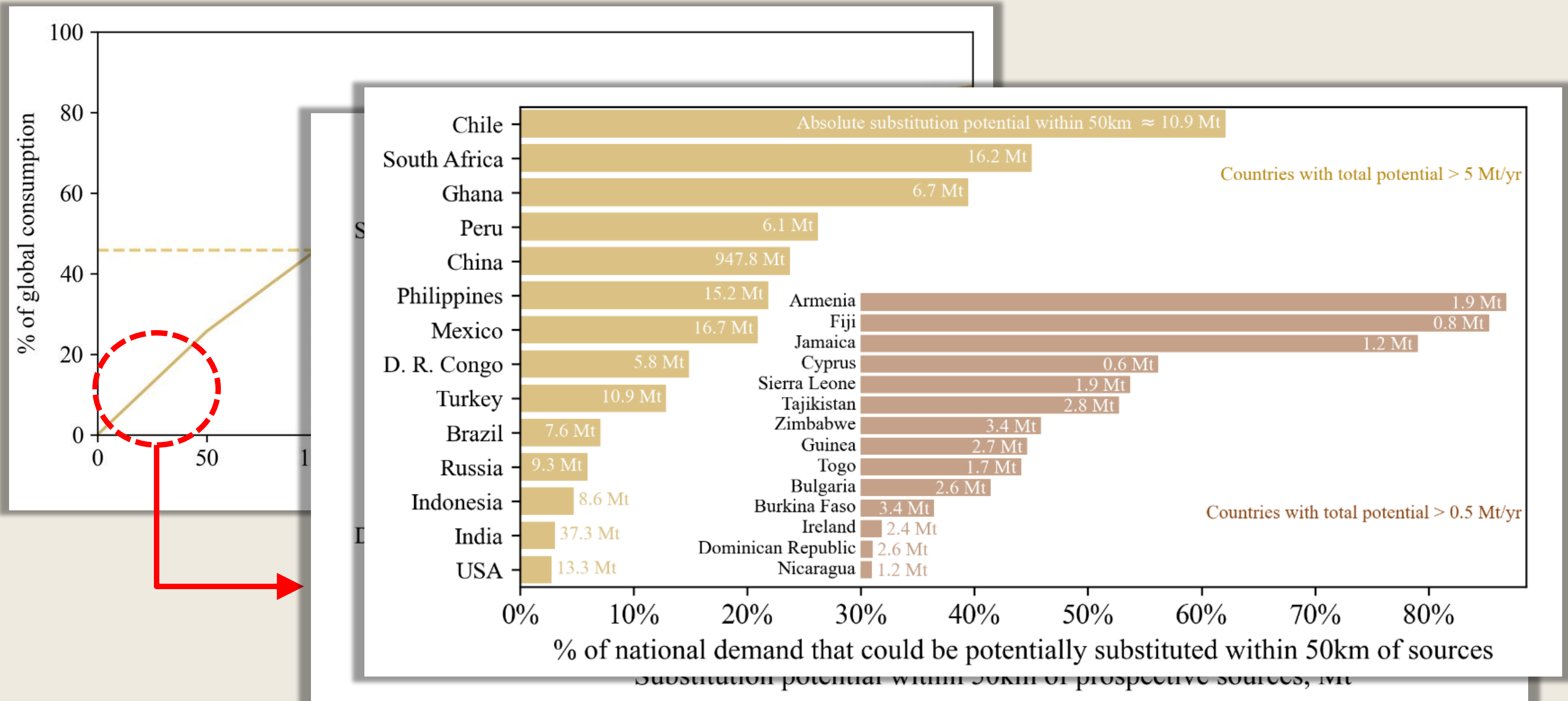
Note: based on min SiO₂ and max Fe₂O₃ content; compliance with other requirements may be also needed.

What is the potential to scale up ore-sands?



Note: The potential supply points of ore-sand (red) are shown as points with a radius of 50 km, a typical distance over which transporting sand is economic. The weight of the pixels is proportional to the estimated potential supply at that point, capped at 200 kt. The weight of the blue pixels is proportional to the estimated demand at each location, capped at the same value.

Where ore-sands could be close to markets?



Conclusions

- **Ore-sand is a product by design, not repurposed waste**
Adjustments in mineral processing can create a marketable sand product.
- **Current limitations and opportunities**
Full replacement currently limited by grain size. Coarser ore-sands possible e.g. via coarse particle flotation.
- **Sand markets align with tailings risks**
Sites close to urban centres present both a sand market and a rationale for tailings reduction.
- **Safeguarding sustainable and just transitions**
Wider adoption of ore-sands must address potential presence of contaminants, management of residual tailings, and broader effects on the market.
- **Future markets**
Almost a third of mine sites in the world can find at least some demand for ore-sand within a 50 km range, with at least 10% reduction in tailings. From a consumer point of view, about half of the global sand market is in the vicinity of a potential local source of ore-sand.



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