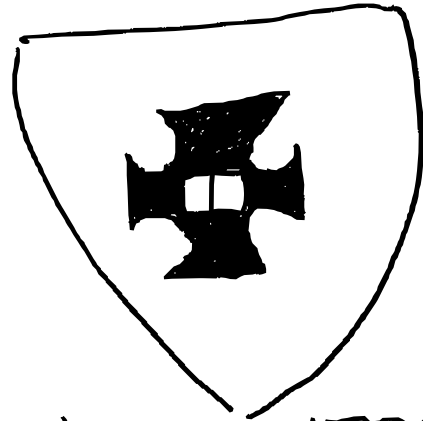


Ore Sand:

A circular economy  
approach to reduce  
tailings and responsibly  
supply sand

Professor Daniel Franks

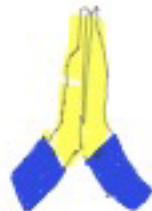


THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

MIT Global Summit on Mine Tailings

20 September 2024

# Acknowledgements



## Our work w/ Vale + University of Geneva

Artem Golev, Louise Gallagher, Annavet Van der Velpen,  
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Pasca Peduzzi, Juliana Santos, Lois Resende, Emile Schepers

## Our work w/ Newcrest, Newmont + Australian Economic Accelerator

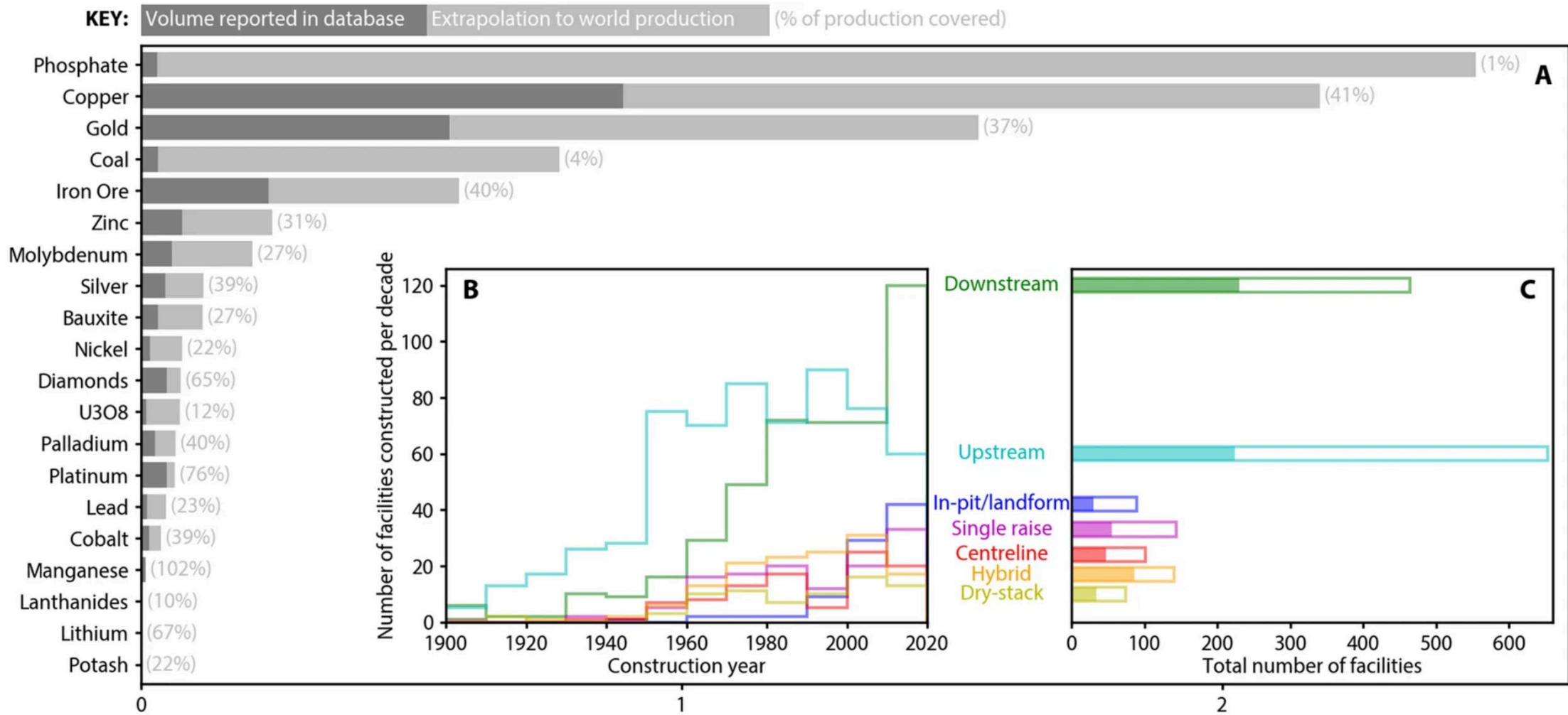
Juliana Segura Salazar, Lulit Habte, Bioambika, Christian  
Antonio, Vinh Dao, Mehdi Serati, Rebecca Gravina, Harry  
Asche, Luke Vollert, David Seaman

## Our work w/ Camborne School of Mines

Madhu Ardhahari, Kathryn Moore, Juan Soto, Juliana  
segura salazar, Louise Gallagher

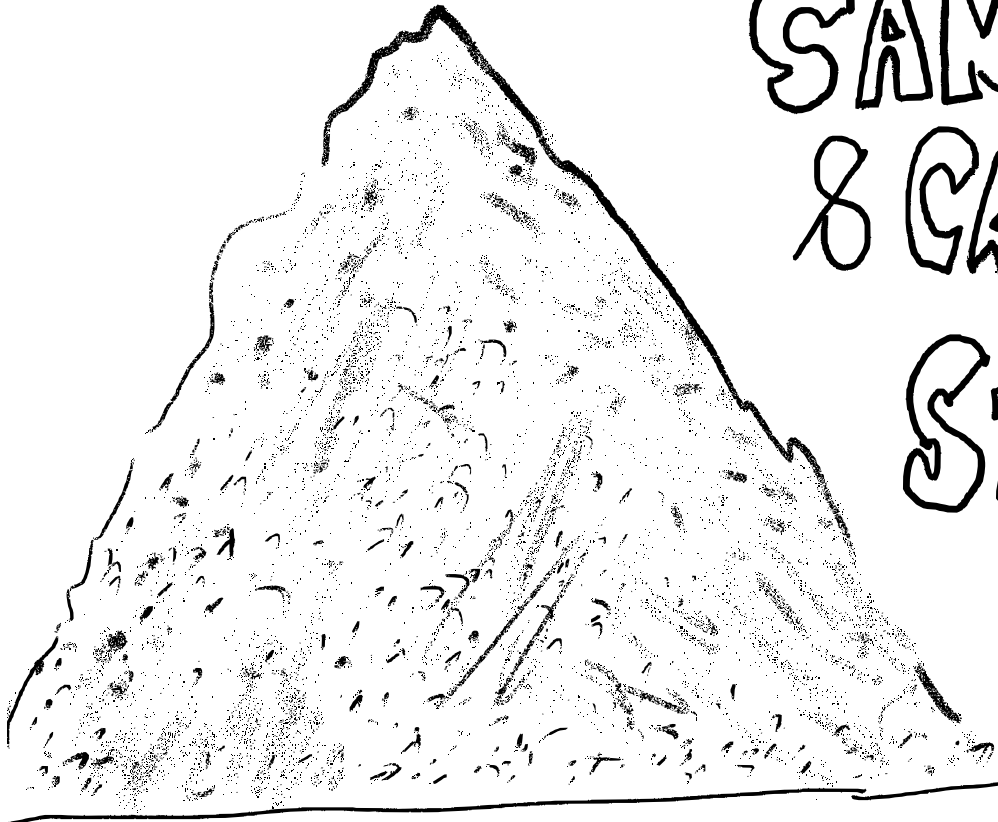
## Our work w/ Resources Technology and Critical Minerals, Trailblazer

Leigh Staines, Juliana Segura Salazar, Louise Gallagher



Worldwide annual increase in tailings storage ( $\text{km}^3$ ), extrapolated from reported planned storage and production data

(Franks et al.; <https://www.nature.com/articles/s41598-021-84897-0>)

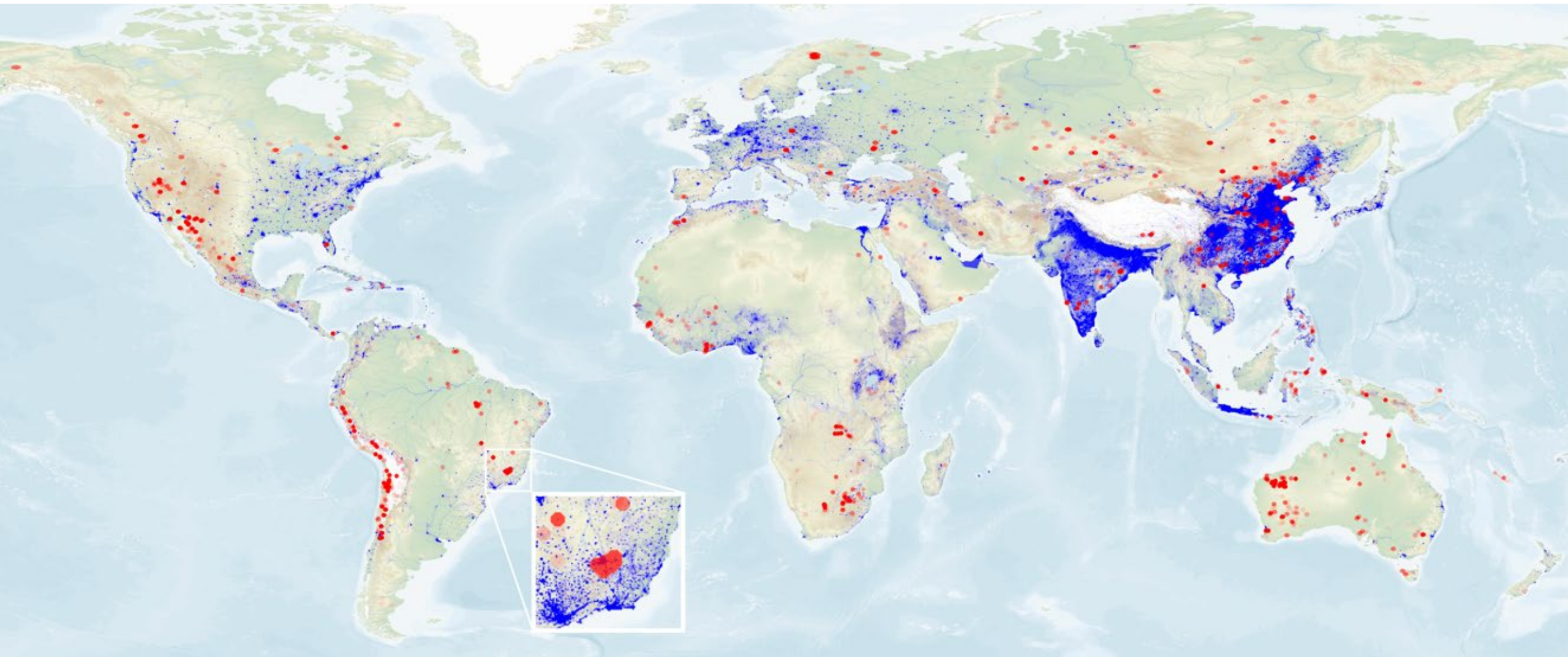


SAND, GRAVEL  
& CRUSHED  
STONE

≠

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14 Million Olympic Pools  
/YEAR



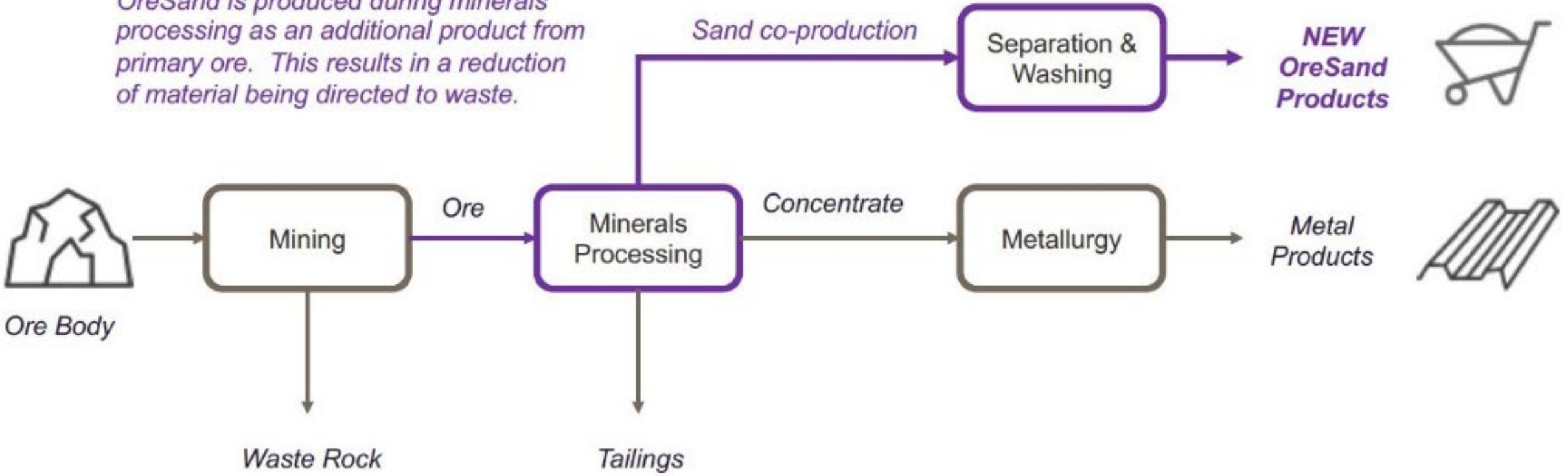
Google  
Scholar

"tailings" and  
"construction  
material"

7,830

- not produced for purpose  
end of pipe → lacks required  
characteristics
- public and governments wary about  
using the wastes of the mining industry

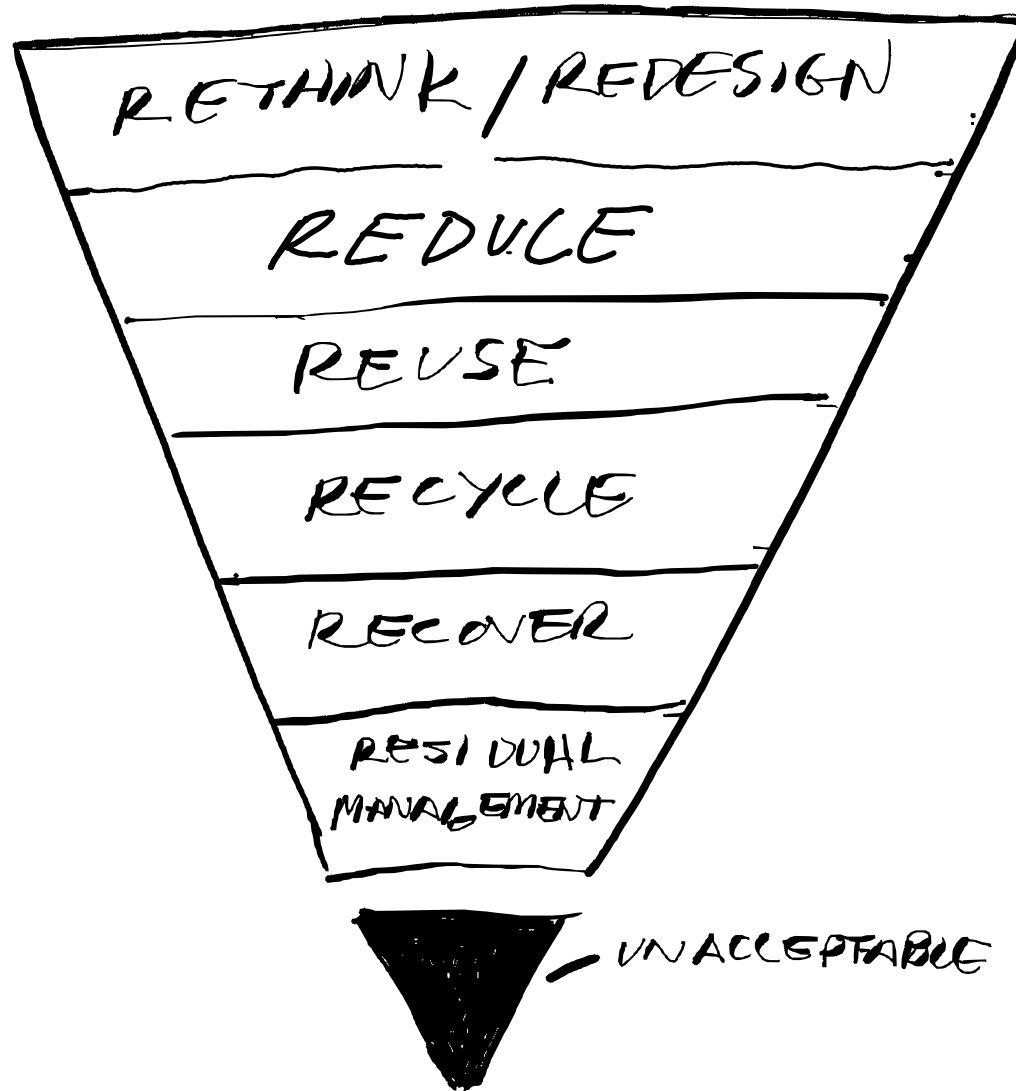
*OreSand is produced during minerals processing as an additional product from primary ore. This results in a reduction of material being directed to waste.*



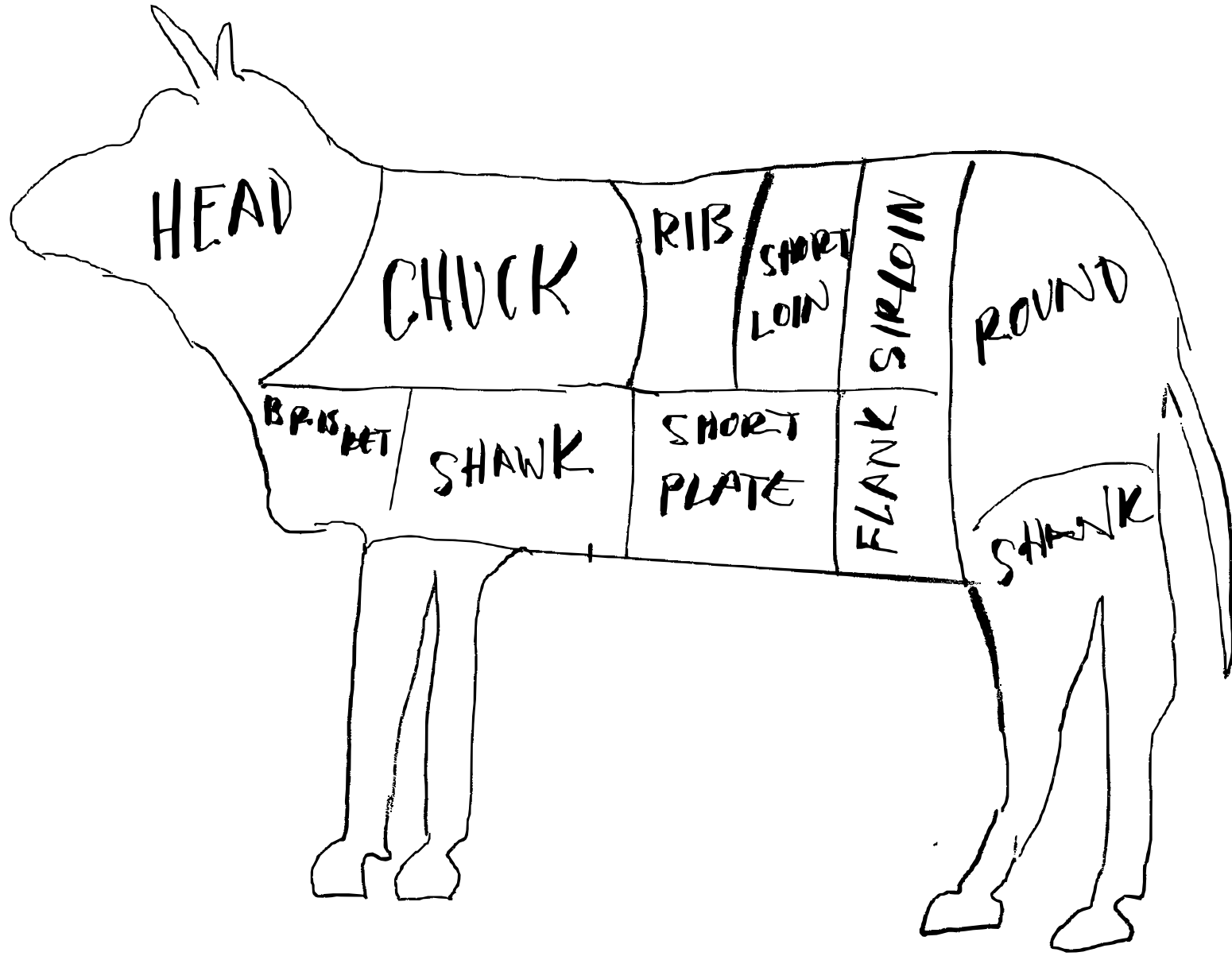
**AVOIDED**  
*Tailings volume reduction by up to 50%*

**IMPORTANT DISTINCTION:**  
*OreSand is NOT from Tailings*

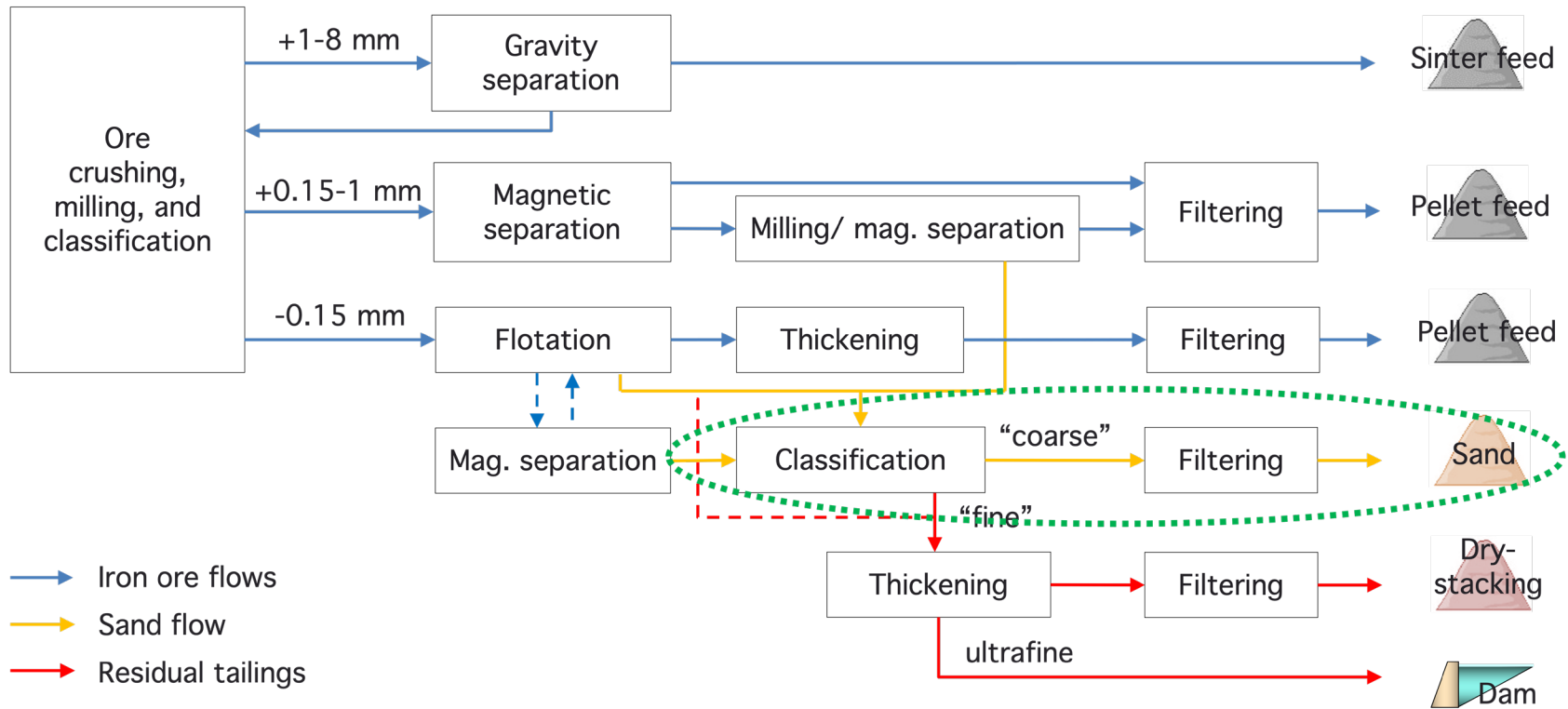
# THE ZERO WASTE HIERARCHY





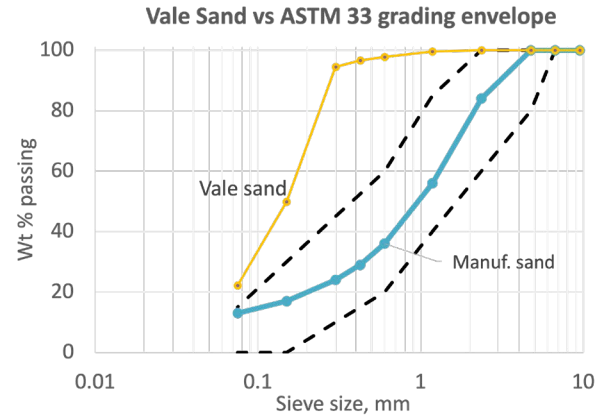


# Case 1. Vale Sand



# Case 1. Vale Sand

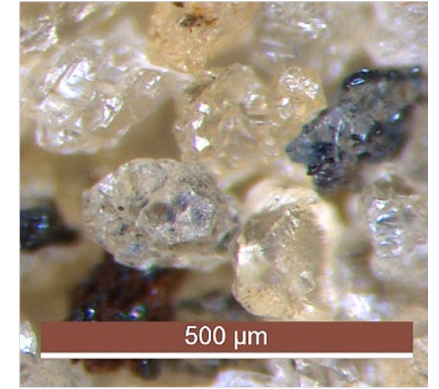
Very fine quartz-based sand



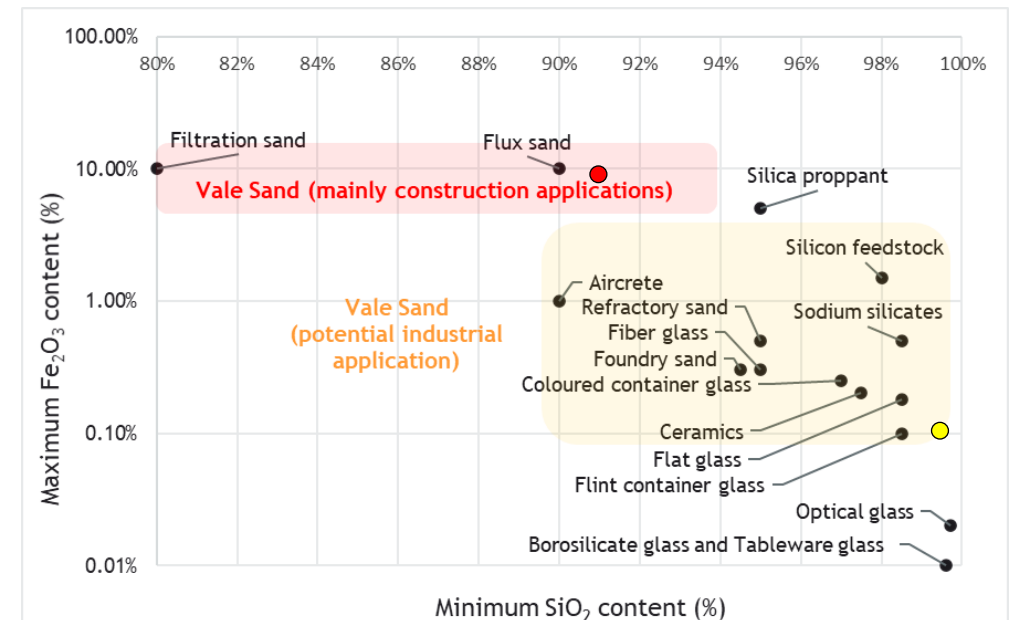
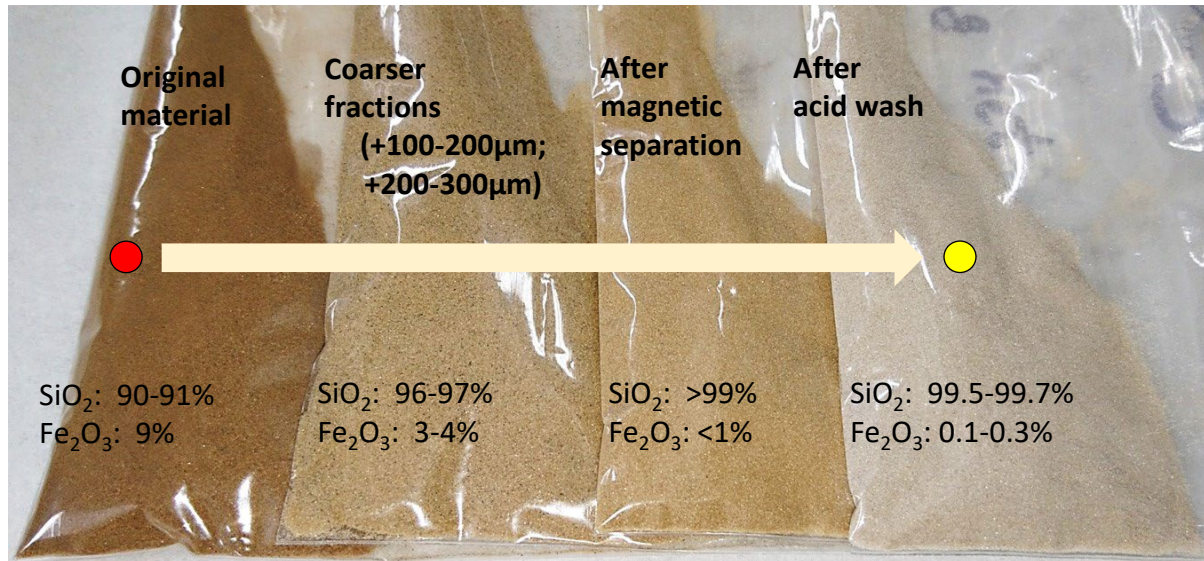
Residual iron oxides, very low trace elements



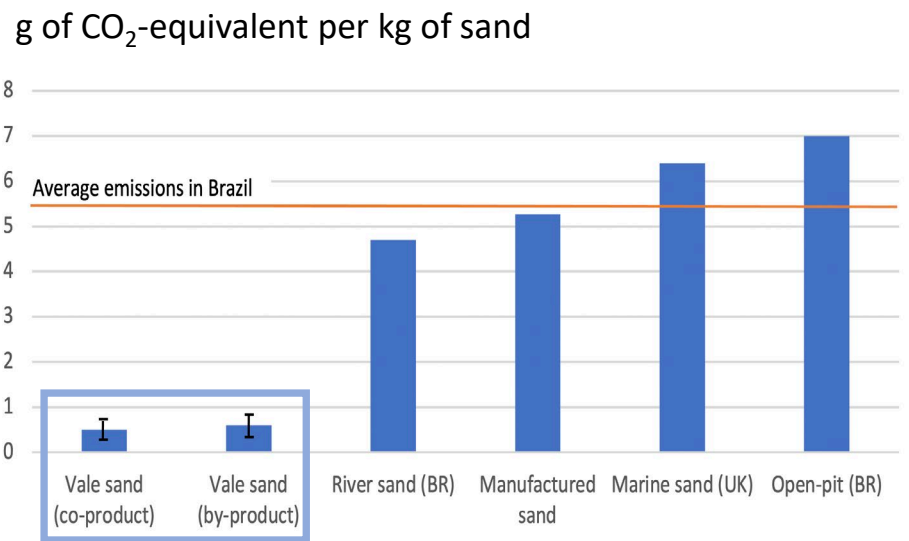
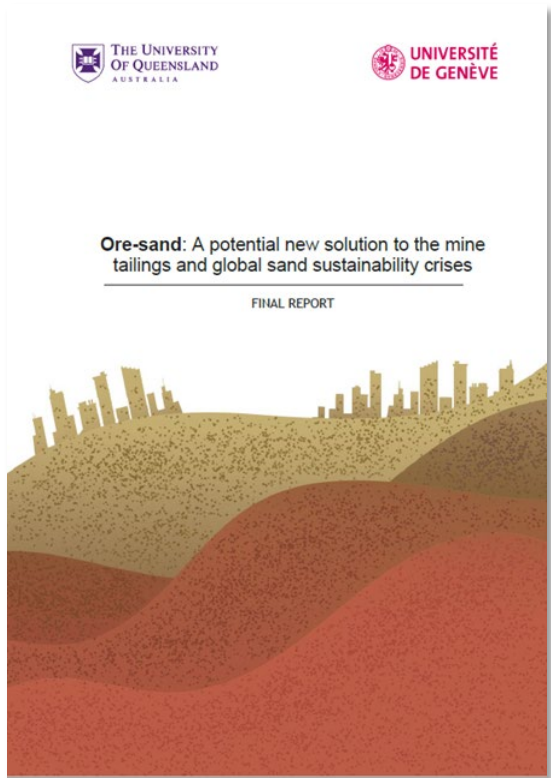
Very angular shape



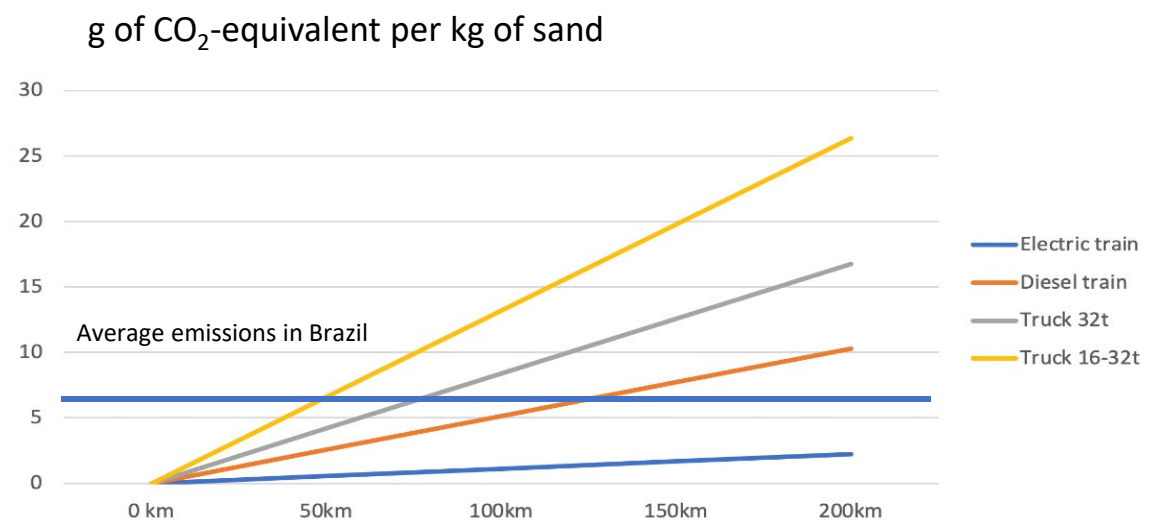
$D_{V10}$ : 60 $\mu$ m;  $D_{V50}$ : 134 $\mu$ m;  $D_{V90}$ : 271 $\mu$ m



# Case 1. Vale Sand



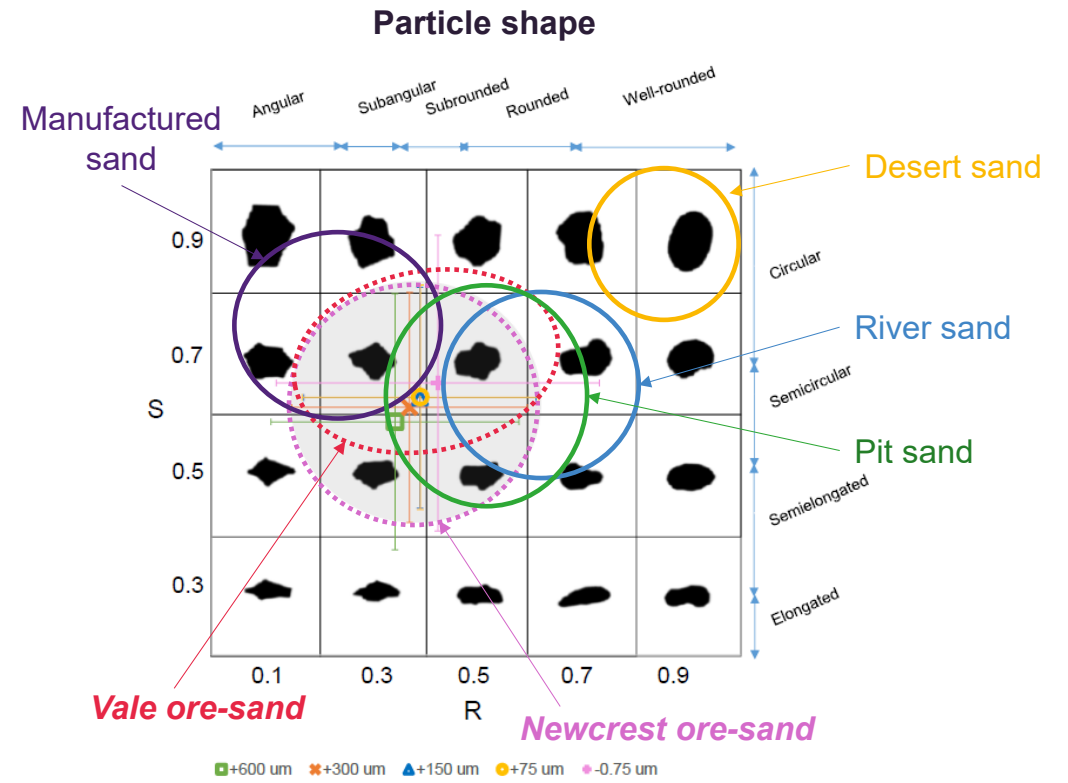
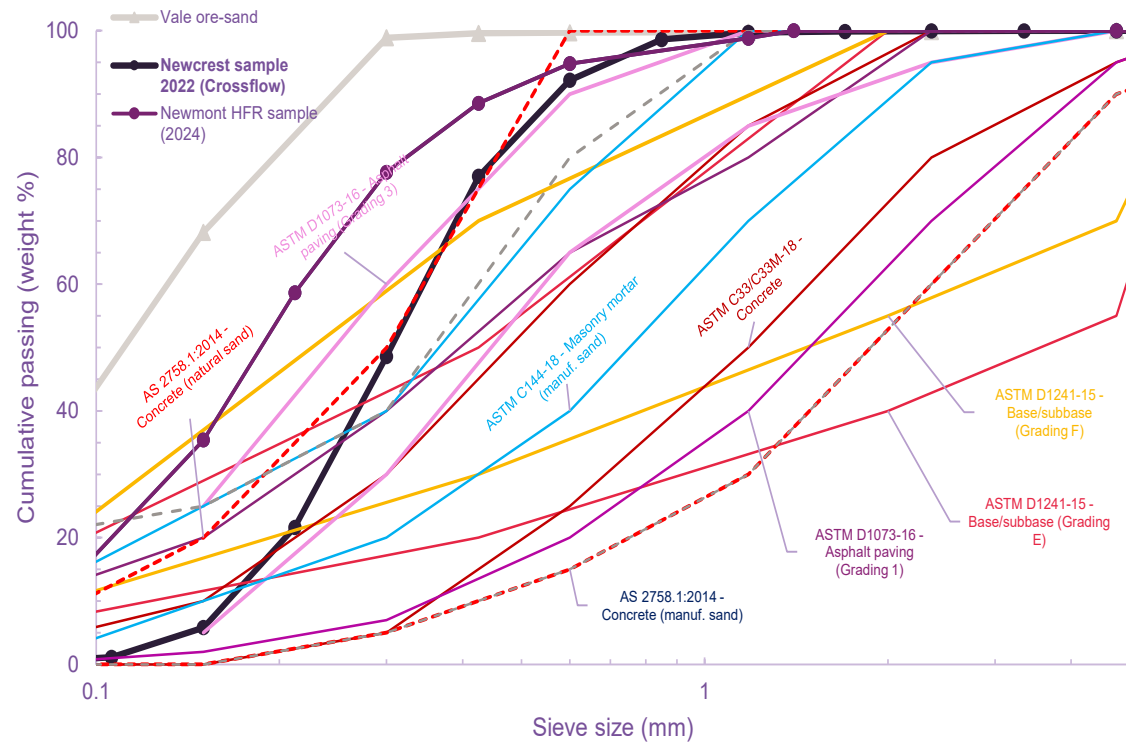
GHG emissions of production (without transportation)



GHG emissions of production and delivery

(Golev et al., 2022)  
[https://smi.uq.edu.au/files/83107/FinalReport\\_OreSand\\_v1.pdf](https://smi.uq.edu.au/files/83107/FinalReport_OreSand_v1.pdf)

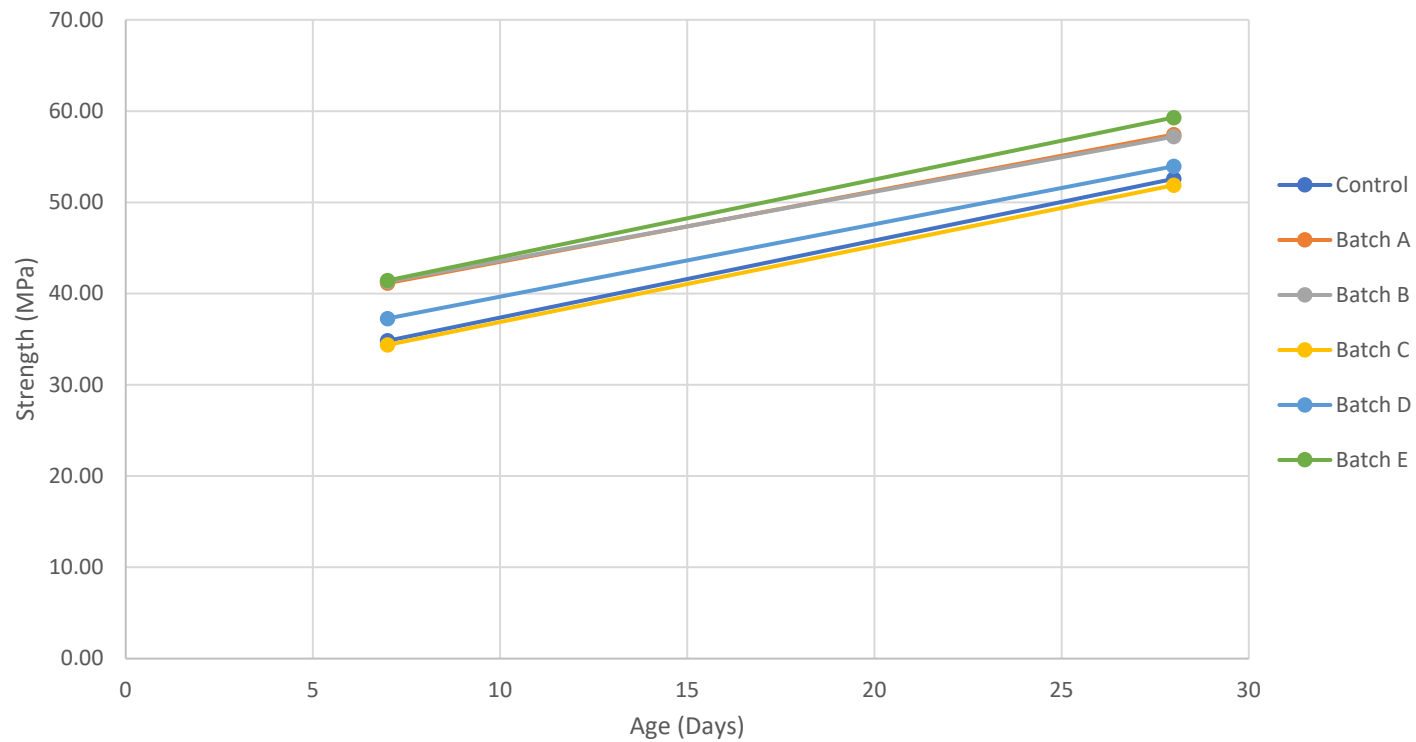
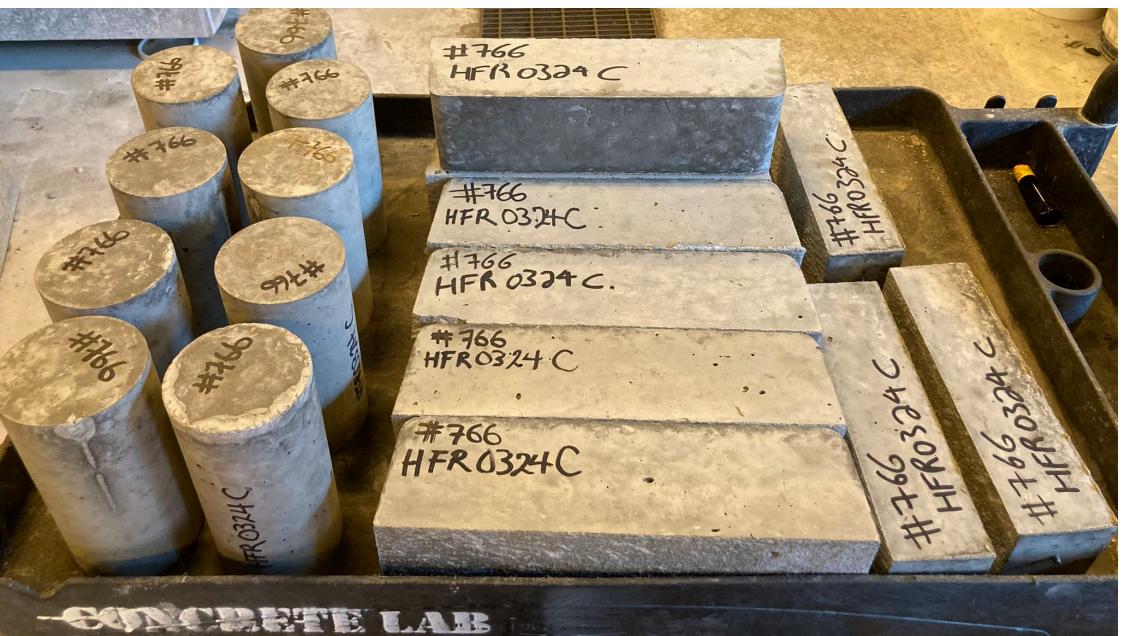
# Case 2. Newmont/ Newcrest



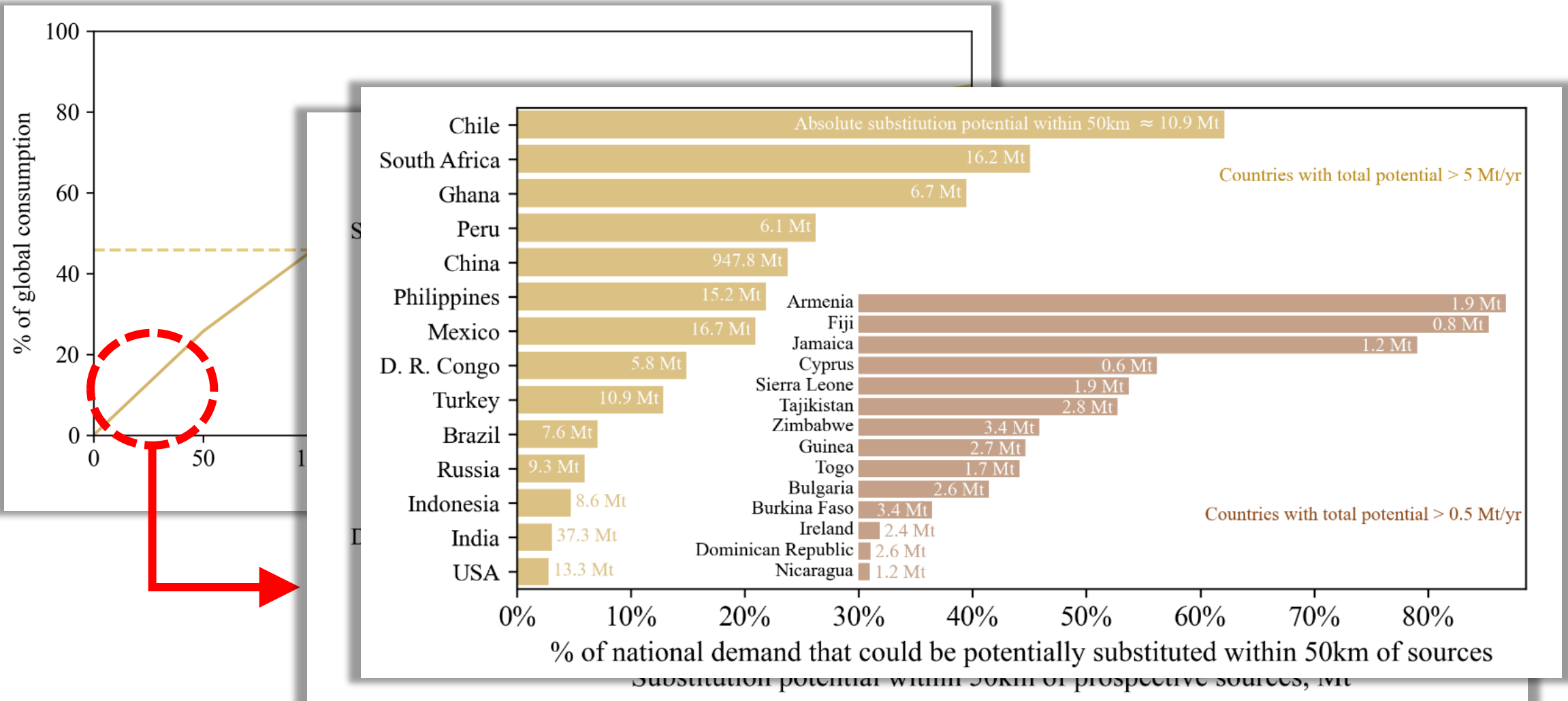
Modified after: Muszynski et al. (2012), Golev et al. (2022)



Case 2. Newmont/  
Newcrest.



# Ore Sand Demand

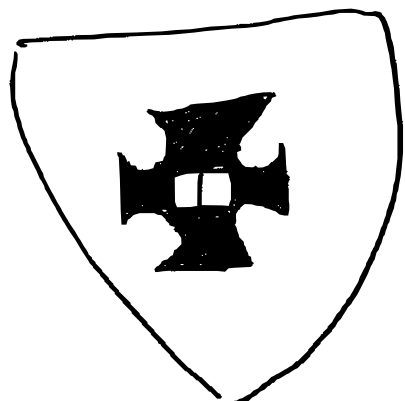


# What's Next?

- Decision Support Tools
- Business case and economic modeling
- Decision trees - what do we look for in ores?
- Modelling hotspots
- By-product services - pilot sites
- Registered products
- Ore Sand knowledge hub
- agglomeration of residual tails = coarse aggregates
- industrial sands - upgrading

Ore Sand  
Inc.





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Thank You

e: d.franks@uq.edu.au