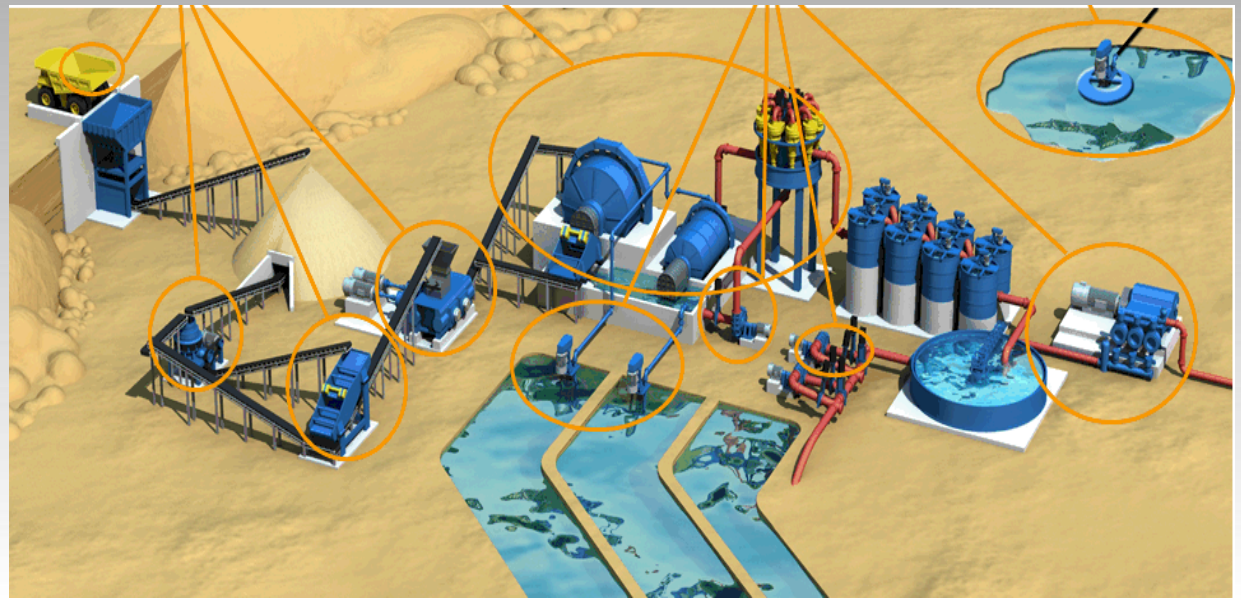
Energy Efficiency Best Practise in the Resources Sector

The Coalition for Energy Efficient Comminution

CEEC

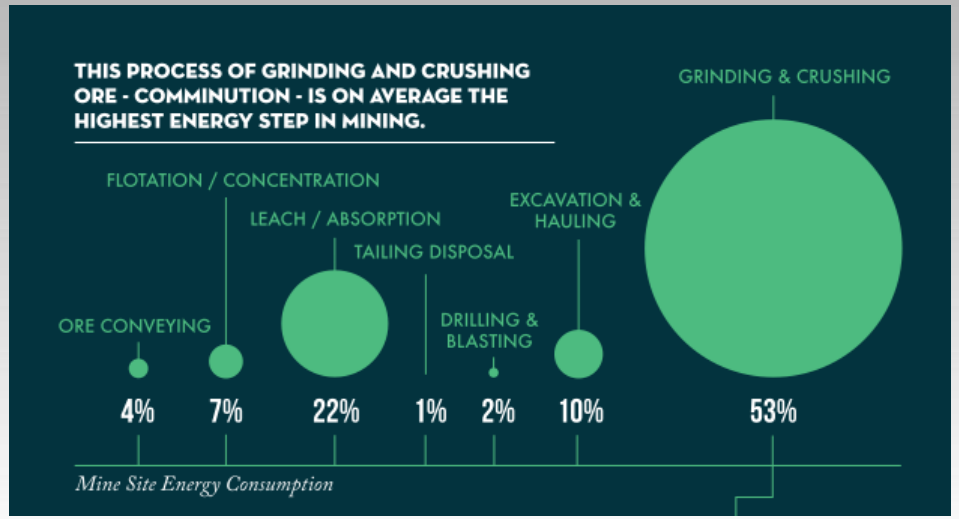
A not-for-profit company, supported by industry donations

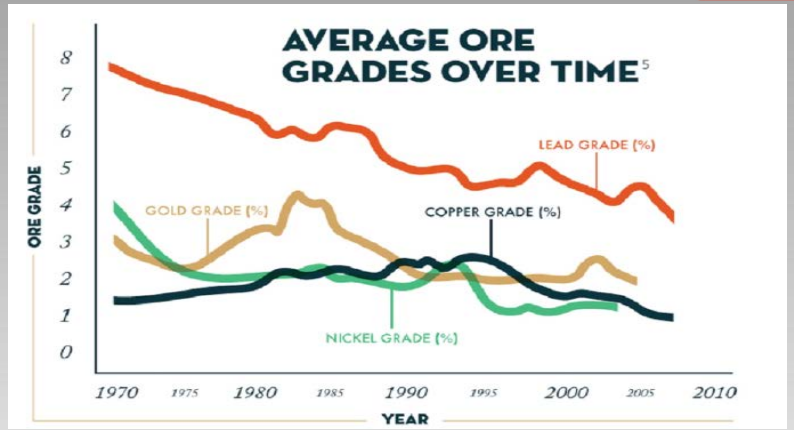
What is Comminution?

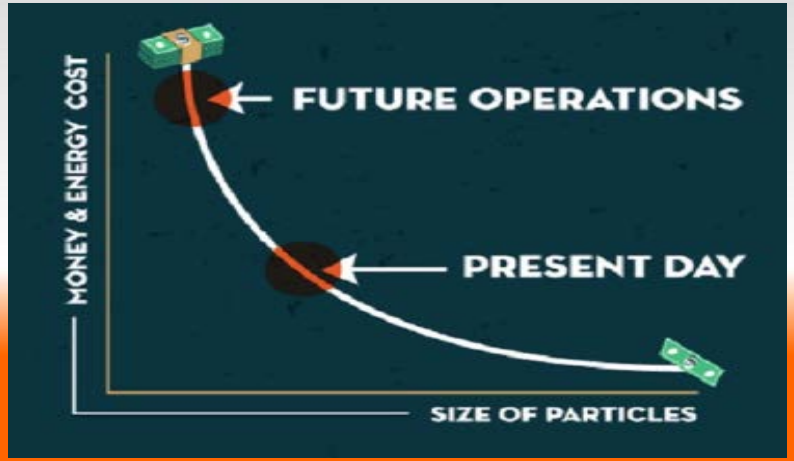


Size reduction of rocks to liberate minerals

Why Comminution?







CEEC's vision

To demonstrate and promote energy-efficient comminution strategies improve productivity, energy efficiency and shareholder value

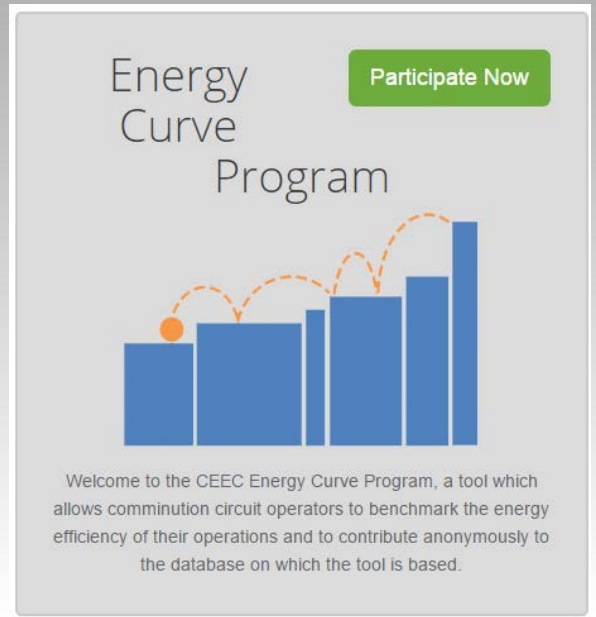
Major CEEC undertaking

Through a CEEC workshop Industry leaders gathered to address the challenge of improving comminution efficiency

CEEC workshop generated the CEEC roadmap

Key strategic outcomes of CEEC roadmap

- Measure performance and produce **benchmarks** that allow energy efficiency performance to be quantified and evaluated.
- Adopt best practice in technology.
- Identify and implement appropriate business drivers and KPIs.
- Communicate the benefits, motivate, engage and train.



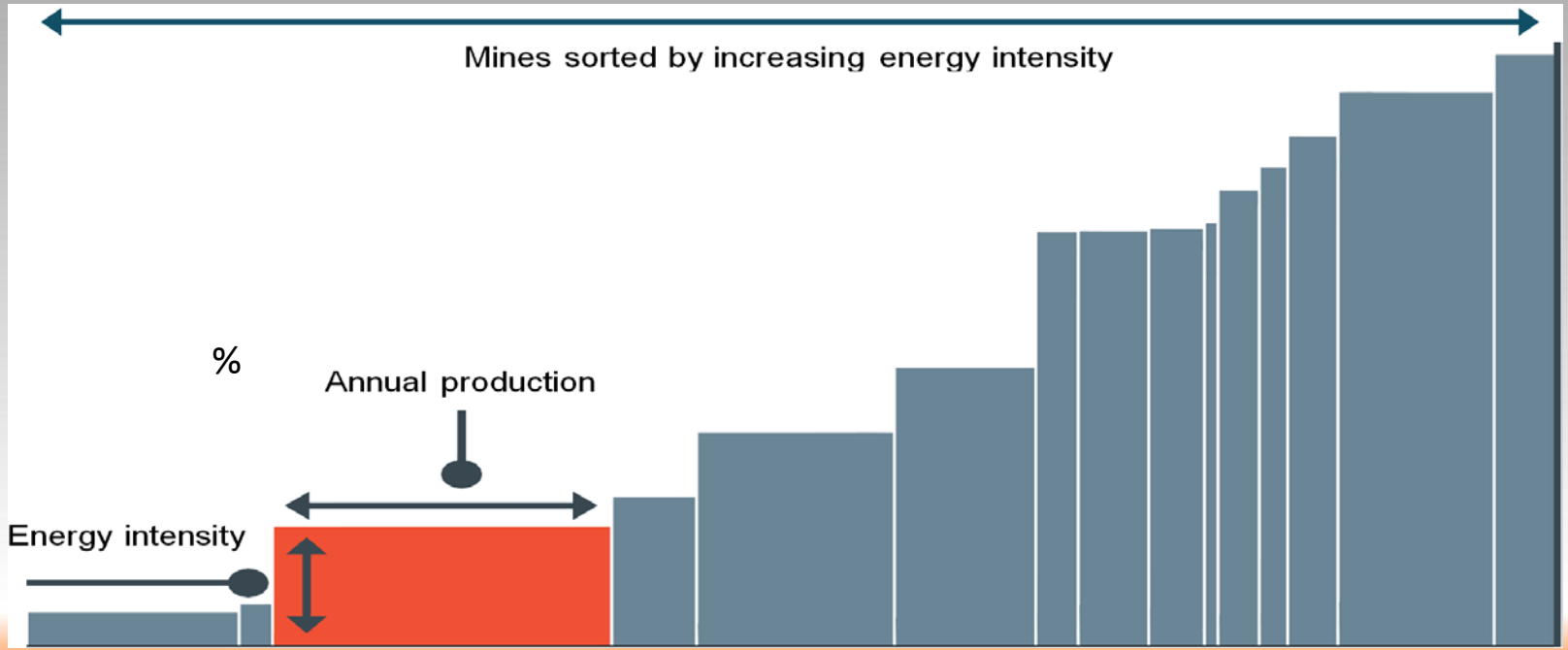
CEEC Energy Curve program

"The outcome of the 2014 CEEC Workshop was cross-industry agreement to:
Populate energy curves for gold, copper, platinum, nickel"

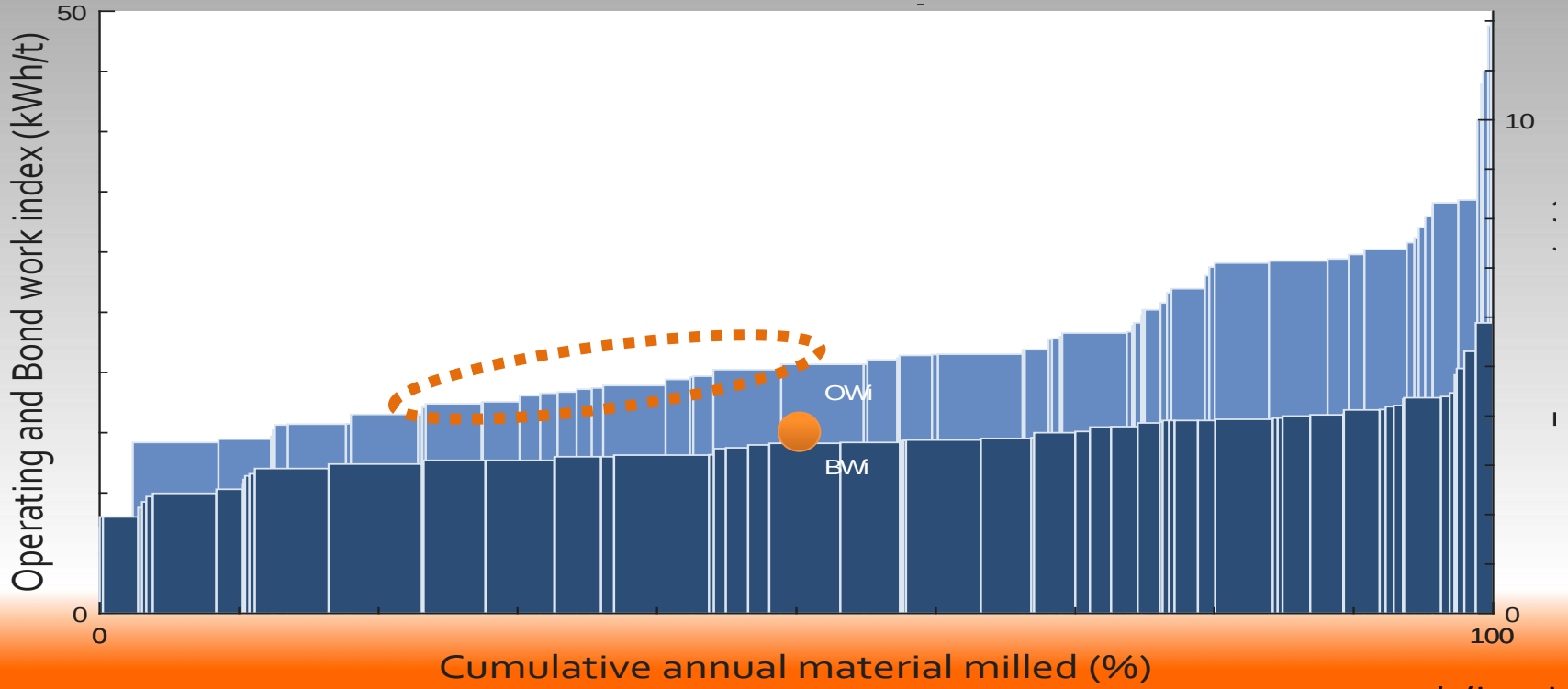
CEEC Energy Curve program

- Accessed via the CEEC website
- Collect, measure and benchmark comminution intensity
- Provide a simple, visual and universal benchmarking technique
- Motivate operations to improve comminution efficiency and therefore improve productivity to achieve best practice

CEEC Energy Curve methodology

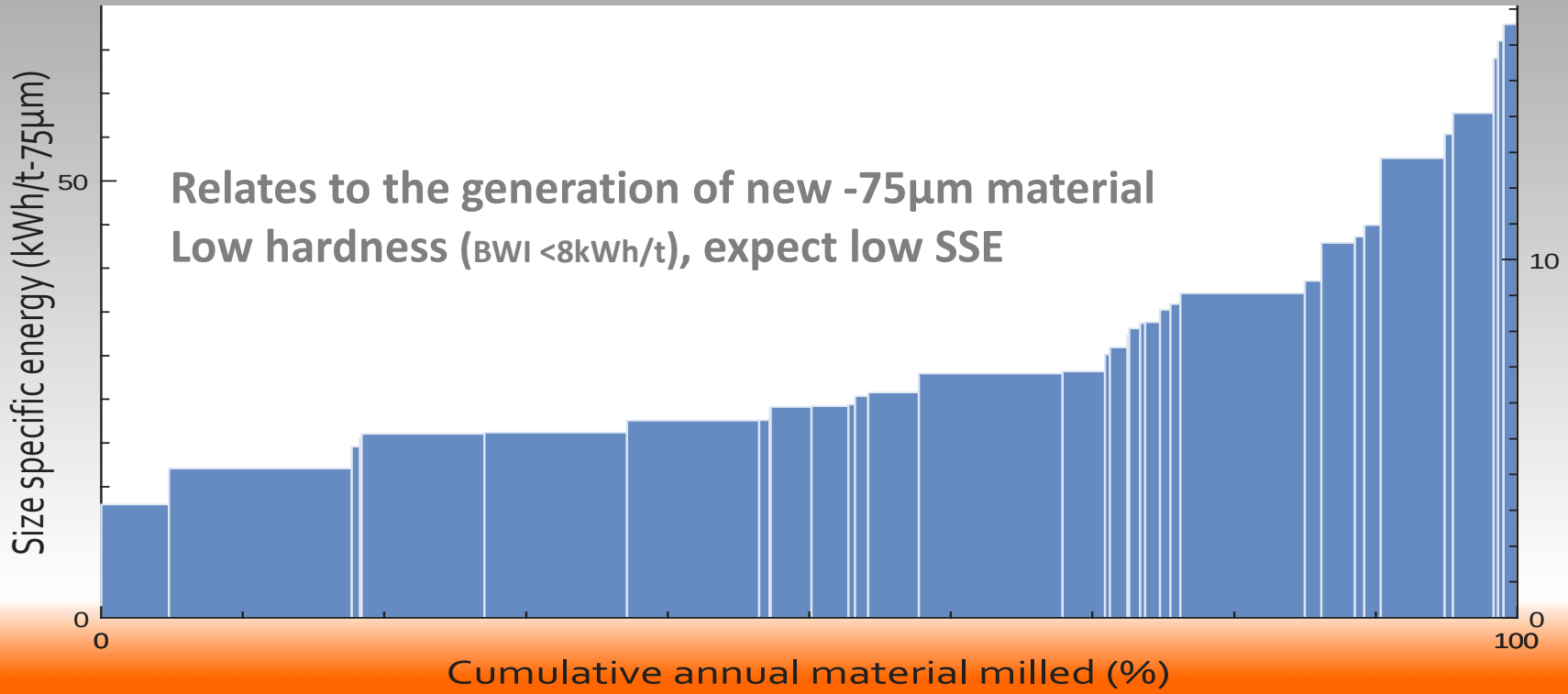


Bond Intensity (h)*



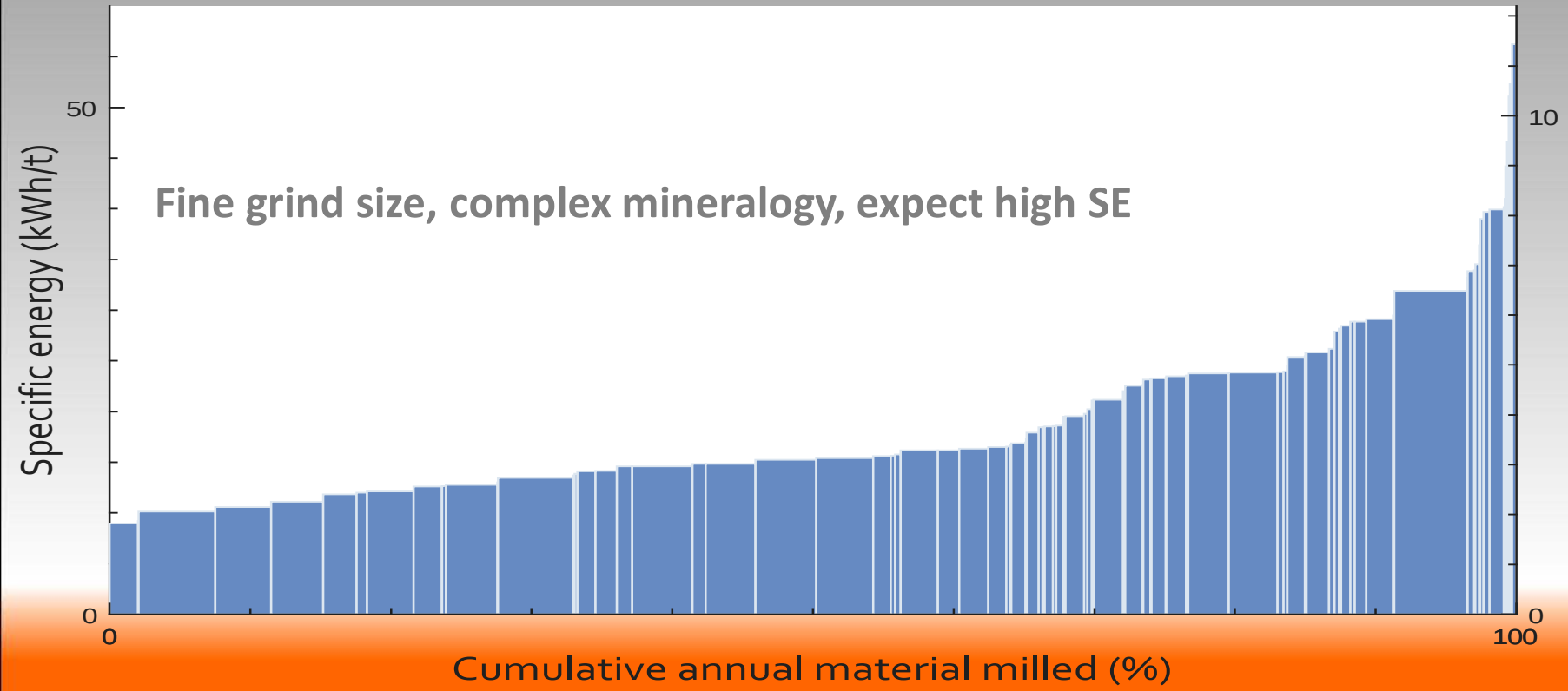
* (hardness)

SSE Intensity (h + c)*



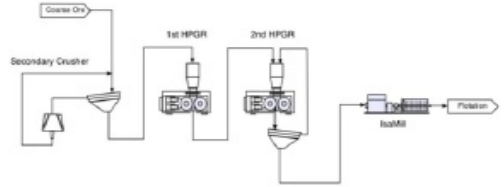
* (hardness + circuit efficiency)

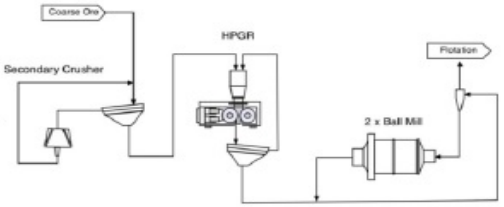
Tonne Intensity (h + c + s)*



* (hardness + circuit efficiency+ size)

SSE Intensity (h + c)





HPGR-Stirred Mill
75 µm

HPGR-Ball Mill
106 µm

Size specific energy (kWh/t-75µm)

50

0

0

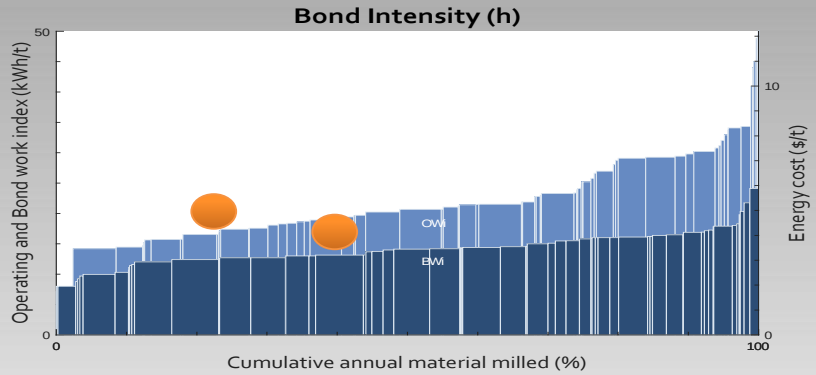
100

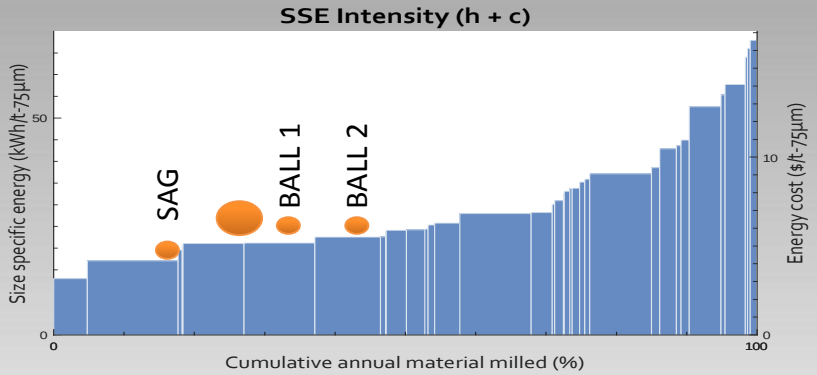
10

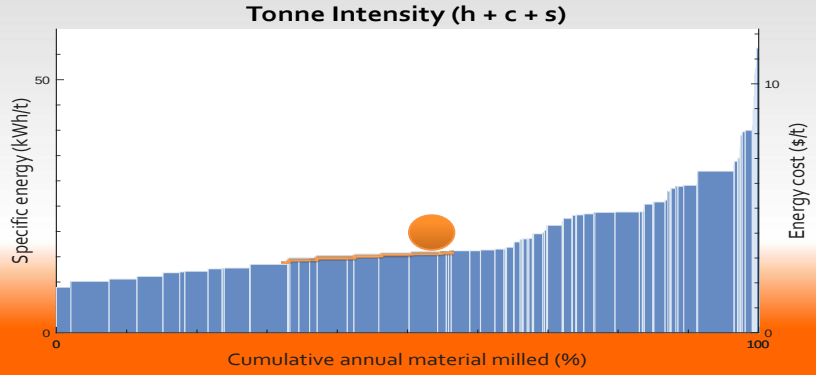
0

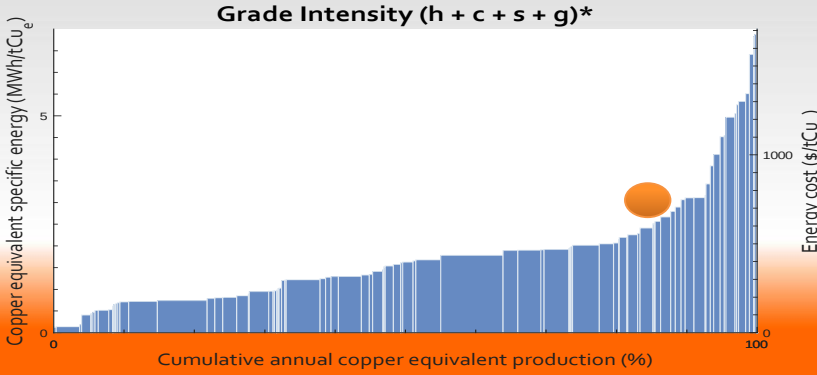
Cumulative annual material milled (%)

Standard Suite of CEEC Energy Curves





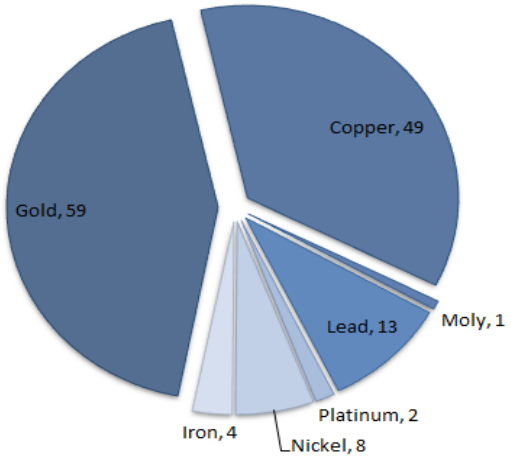


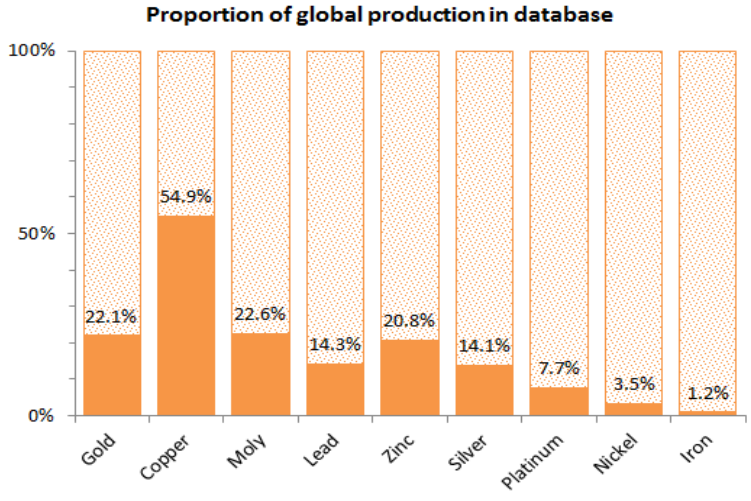


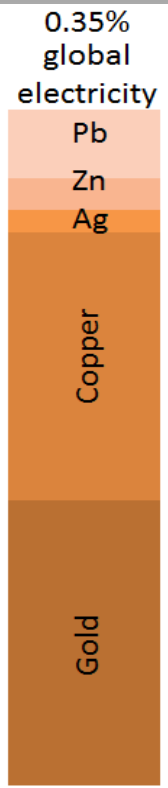
as at 27-Apr-2015

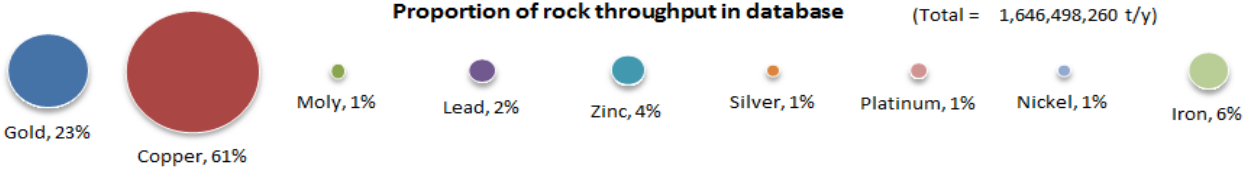
* (hardness + circuit + size + grade)

CEEC Energy Curve database



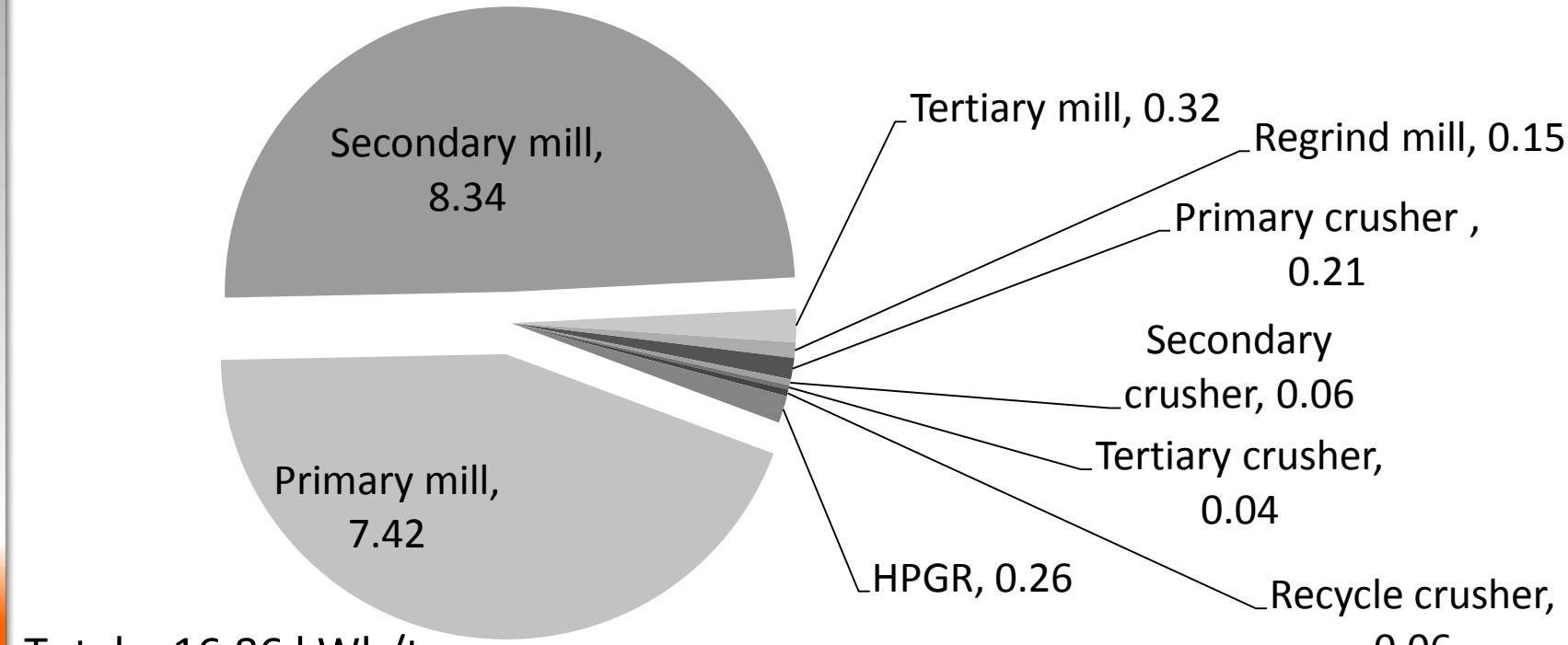






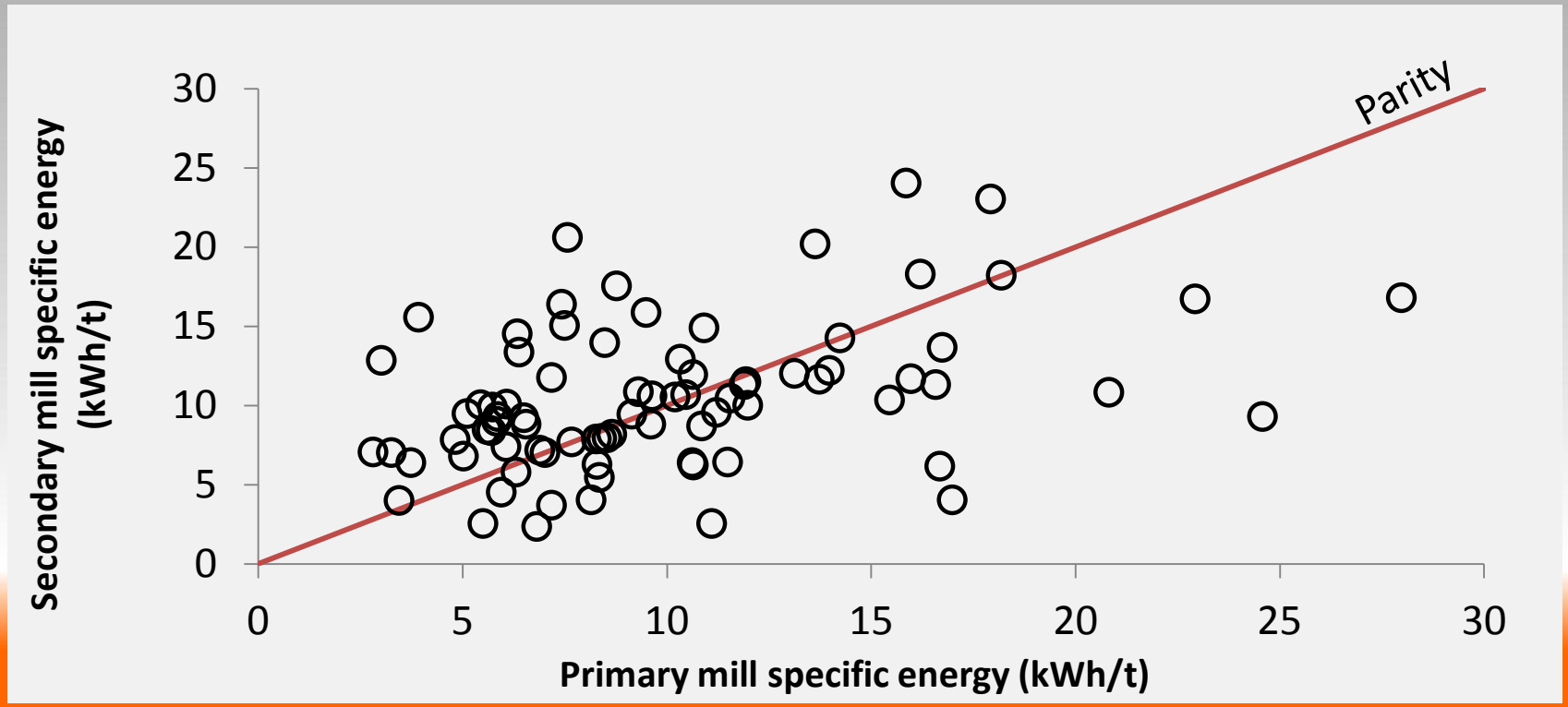
As at 13/10/2015

Equipment makeup (kWh/t by equipment type)

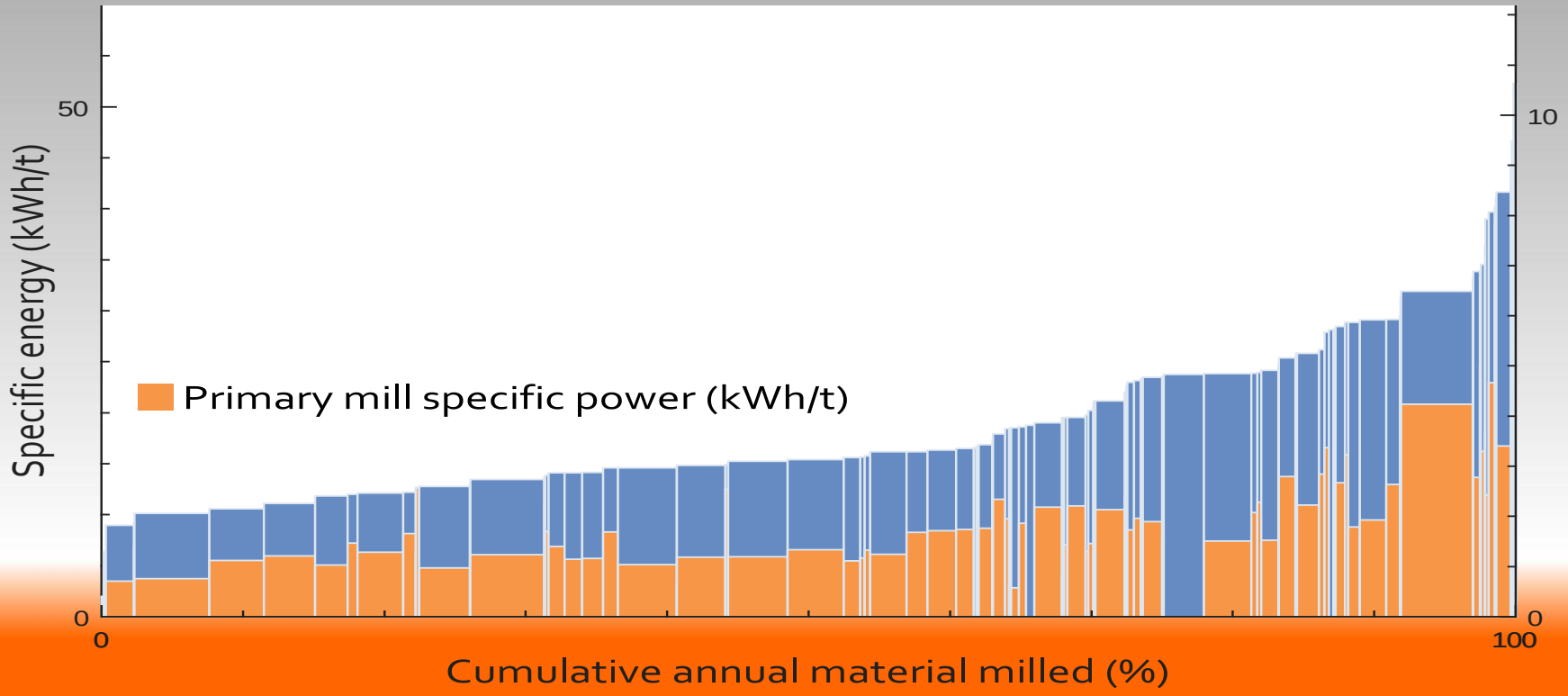


Total = 16.86 kWh/t

Energy split between primary and secondary milling



Energy split between primary and secondary milling



Conclusions

- Energy efficiency results in greater productivity and shareholder returns
- Improving energy efficiency and productivity starts with benchmarking
- CEEC Energy curves visually represent the comminution energy intensity
- The database that supports the CEEC energy curves is significant and growing

CEEC's Sponsors