

Swiss Energy Strategy 2050

A miner's perspective

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Bern, 17 January 2020

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1. Context and key observations
2. Glencore and the mining industry can be key enablers of the energy and mobility transition
3. Concluding remarks



Context & Key observations

The world's reliance on fossil fuels remains high⁽¹⁾

- More than 80% of global energy demand met by fossil fuels in 2018
- This is unlikely to change materially by 2040 under current and announced policy intentions

GHG emissions continue to increase⁽²⁾

- 2017: +1.5%, 2018: +2.1%, 2019F: +0.6%

Future emissions need to fall rapidly to meet Paris Agreement goals

Higher living standards, poverty reduction and urbanisation all require affordable and reliable energy (UN SDG 7)

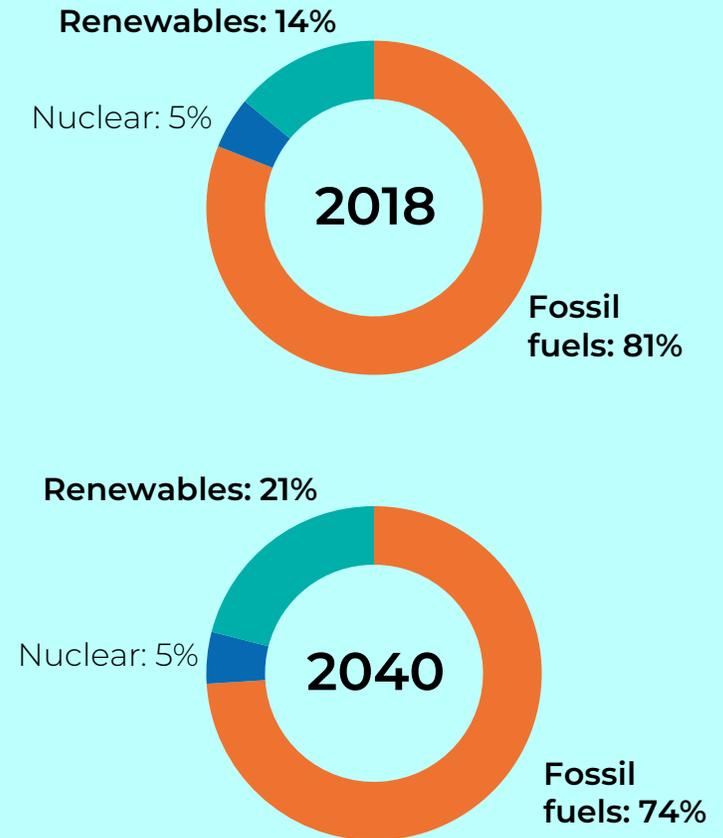
- Another 1.9bn people in the world by 2050 will add to the challenge⁽³⁾

The policy response needs to be global

- Unaligned national and or regional measures will be muted by emission developments elsewhere

Mining companies need to mobilise additional resources to enable the transition to renewables, energy storage systems and the transformation of global mobility systems

Global primary energy demand forecasts under current policy intentions⁽¹⁾





Mining has a key role to play in decarbonising tomorrow's world

Founded in Switzerland over 40 years ago, we are one of the world's largest globally diversified natural resource companies

At our Swiss headquarters in Baar, we employ more than 850 people, making us one of the major employers in Central Switzerland

Our Swiss location is the centre of our global business

- Key personnel are based here, including CEO, CFO and divisional heads
- With the exception of oil, all our commodity businesses are run from Baar with support of locally based management

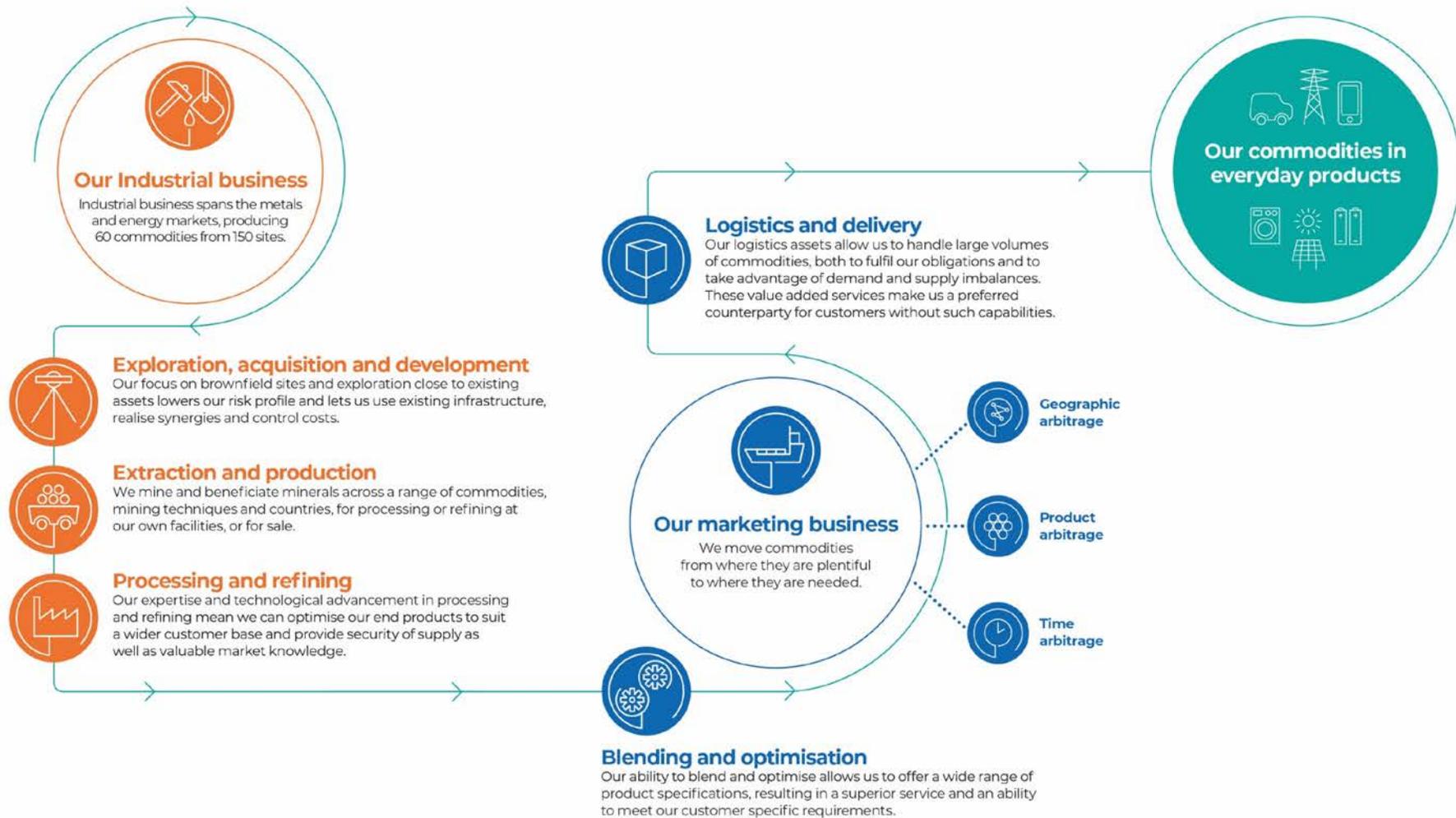
Glencore operations and offices



Our global footprint

Responsibly sourcing the commodities that advance everyday life

- We are present at every point in the value chain from where commodities are sourced to where they are consumed
- We employ 158,000 people globally and are invested and active in all major geographies, producing 60 commodities from 150 sites
- We live our core company values: Safety, Entrepreneurialism, Simplicity, Responsibility and Openness



Enabling the transition

Mining and commodities have shaped the modern world we live in today

The mining industry has underpinned the fundamental shift in global living standards since the Industrial Revolution

- The single greatest increase has emerged from China's urbanisation and industrialisation over the last 40 years with c.750 million people lifted out of extreme poverty since 1990

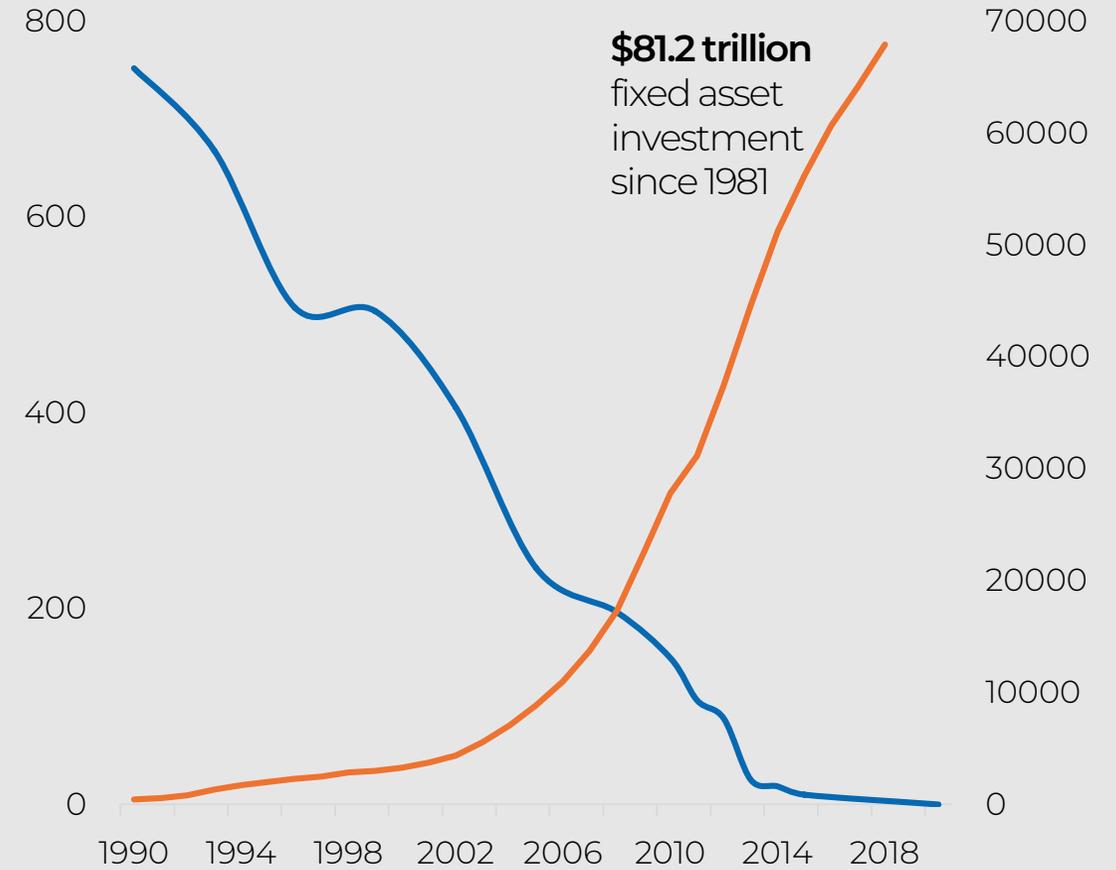
Mining and the commodities we produce are part of our everyday life

- **Steel** in construction, **copper** in power grids, **aluminium** in packaging, **coal** for cement production, power generation and steel making, **nickel** and **cobalt** in high performing alloys and battery packs and stainless steel for food contact materials and medical appliances

Mining is even more relevant today – the metals needed to decarbonise energy underpin:

- Battery backed energy storage
- Electrification of mobility
- 5G, artificial intelligence, big data and a more connected world

Chinese people living in poverty (LHS M)⁽¹⁾
vs Chinese fixed asset investment (RHS billion RMB)⁽²⁾



Commodities that Glencore produces

We are a major responsible supplier of many of the enabling commodities needed for the transition

	Cu Copper	Co Cobalt	Ni Nickel	Pb Lead	Zn Zinc	V Vanadium	Coal Thermal Coal
Application	Batteries Solar Power Wind Power Mobility Electronics Grid	Batteries Wind Power Mobility Electronics Grid	Batteries Solar Power Wind Power Mobility Electronics Grid	Batteries Solar Power Wind Power	Batteries Solar Power Wind Power	Batteries Solar Power Wind Power Electronics Grid	Low-cost baseload power Cement manufacture
Glencore production⁽¹⁾	1.45Mt	42kt	124kt	273kt	1.1Mt	9.1kt	118Mt
Global supply⁽²⁾	20.7Mt	124.5kt	2.4Mt	4.9Mt	12.9Mt	95kt	6 billion tonnes

Nickel supply and demand

A case study of nickel's key role in enabling the transition to a low/net-zero carbon future

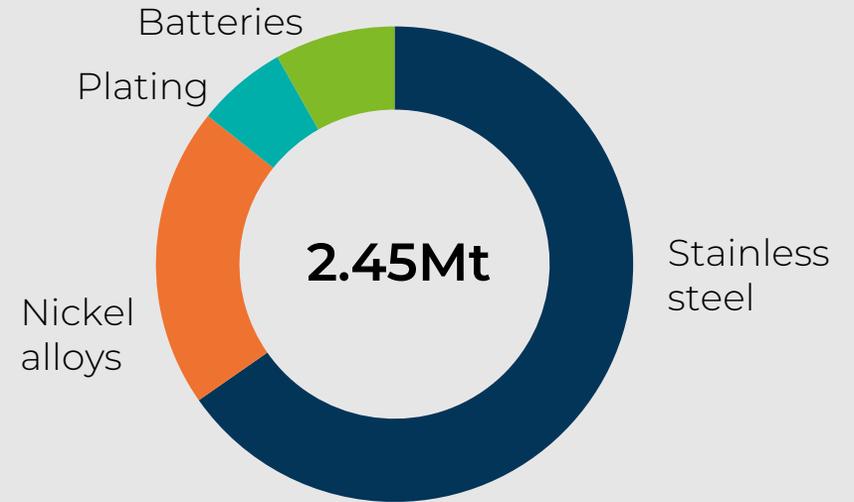
Nickel is a relatively small market at 2.45Mt

- Aluminium: 65Mt, copper: 23.5Mt

Stable demand growth underpinned by:

- Austenitic stainless steel: >65% of nickel demand and used in infrastructure, construction, architecture, food contact surfaces, automotive, aerospace, oil and gas and LNG
- >20% nickel containing alloys: high-end industrial use, particularly in LNG, wind farms, solar, aerospace, nuclear and medical
- Consumes more than 400kt of primary nickel annually with increasing demand as material performance requirements and safety factors increase

Current nickel market (Mt Ni)⁽¹⁾



Annual average demand growth

Last 30 years

5%

Last 10 years

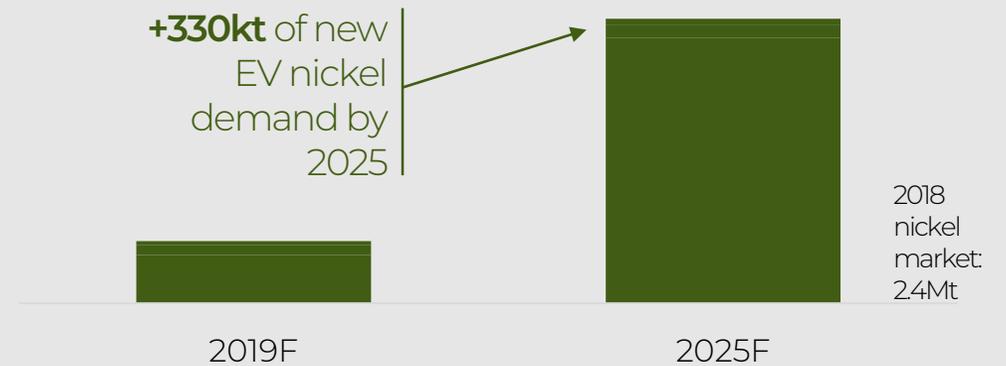
6%



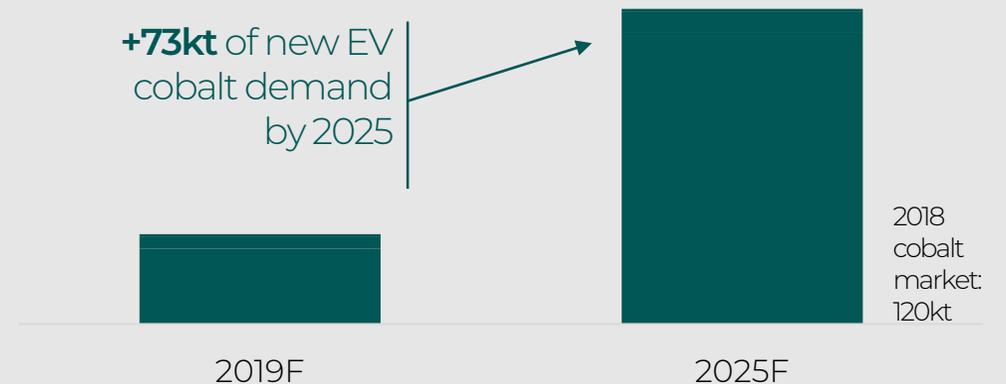
Electrification of Mobility

- Significant demand growth emerging as the world adopts new NMC and NCA battery chemistries**
 - Nickel battery demand: c.50kt in 2010, c.200kt in 2019F, >500kt in 2025F (inc 400kt Ni in EV)
 - Nickel in Electric Vehicles forecast at 800kt by 2030
 - Trend for higher EV penetration, larger battery size and higher nickel chemistries (811 vs 622) suggest even higher nickel demand than forecast
- Lifecycle of nickel and cobalt well understood and readily recyclable**
 - Majority of nickel containing steels/alloys are recycled
 - Glencore processed 35kt of recycled material to recover 5kt nickel and 3kt cobalt in 2019
- We are investing more than \$2bn developing the next generation of Canadian nickel sulphide mines while upgrading our metallurgical facilities to responsibly supply nickel from our global operations**

Nickel demand in electric vehicles (kt Ni)⁽³⁾



Cobalt demand in electric vehicles (kt Co)⁽³⁾



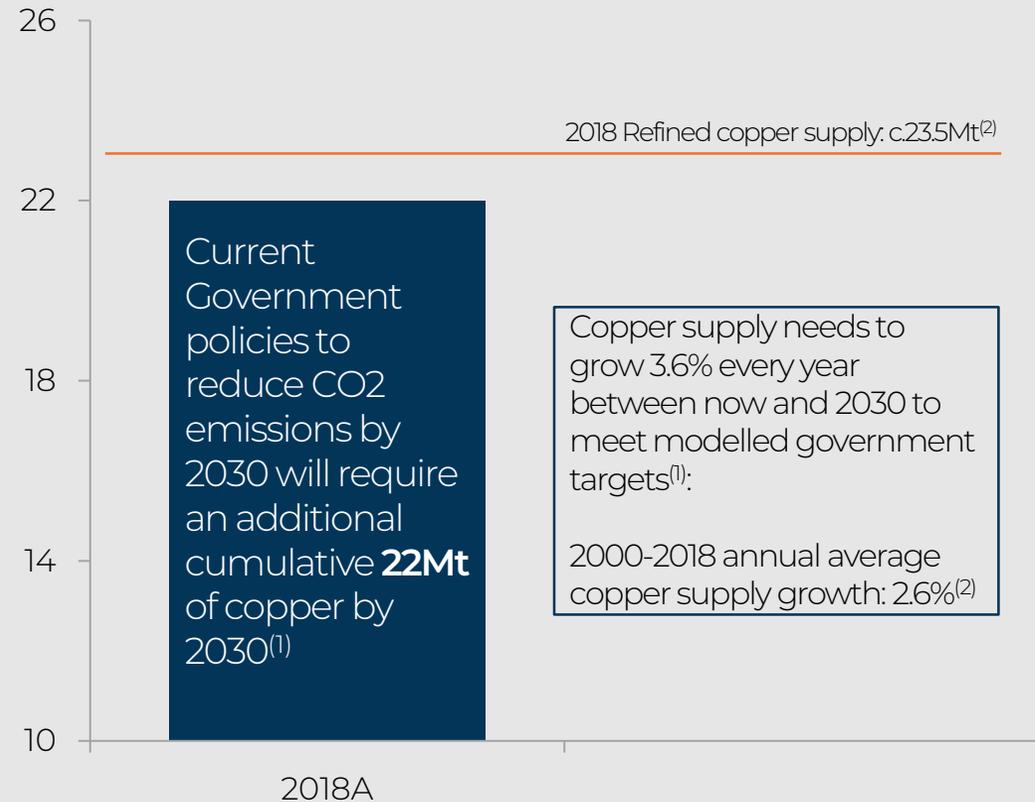


Decarbonisation of energy:

- **What holds for nickel and cobalt is equally true for copper**
 - Decarbonising energy primarily impacts electricity generation, industrial processes and mobility
 - Renewable energy sources are much more copper intensive than conventional energy generation – additional copper required in generators, transformers, inverters and extra copper cabling
 - Implementation of current CO2 emission policies is forecast to require an additional 22 million tonnes of copper by 2030.⁽¹⁾
- **Meeting this demand will require the mining industry to invest billions of dollars in capital each year to prolong the life of existing mines and develop new resources that are increasingly scarce**

Decarbonisation requires a lot of copper

Additional cumulative Cu demand needed (Mt Cu)⁽¹⁾



Seaborne coal demand expected to remain broadly stable over the next 5 years

- Robust demand growth from new Asian capacity expected to offset lower demand in Europe and the USA
- Asia’s share of global coal power generation up from c.20% in 1990 to almost 80% in 2019 – “coal’s fate is increasingly tied to decisions made in Asian capitals.”⁽²⁾

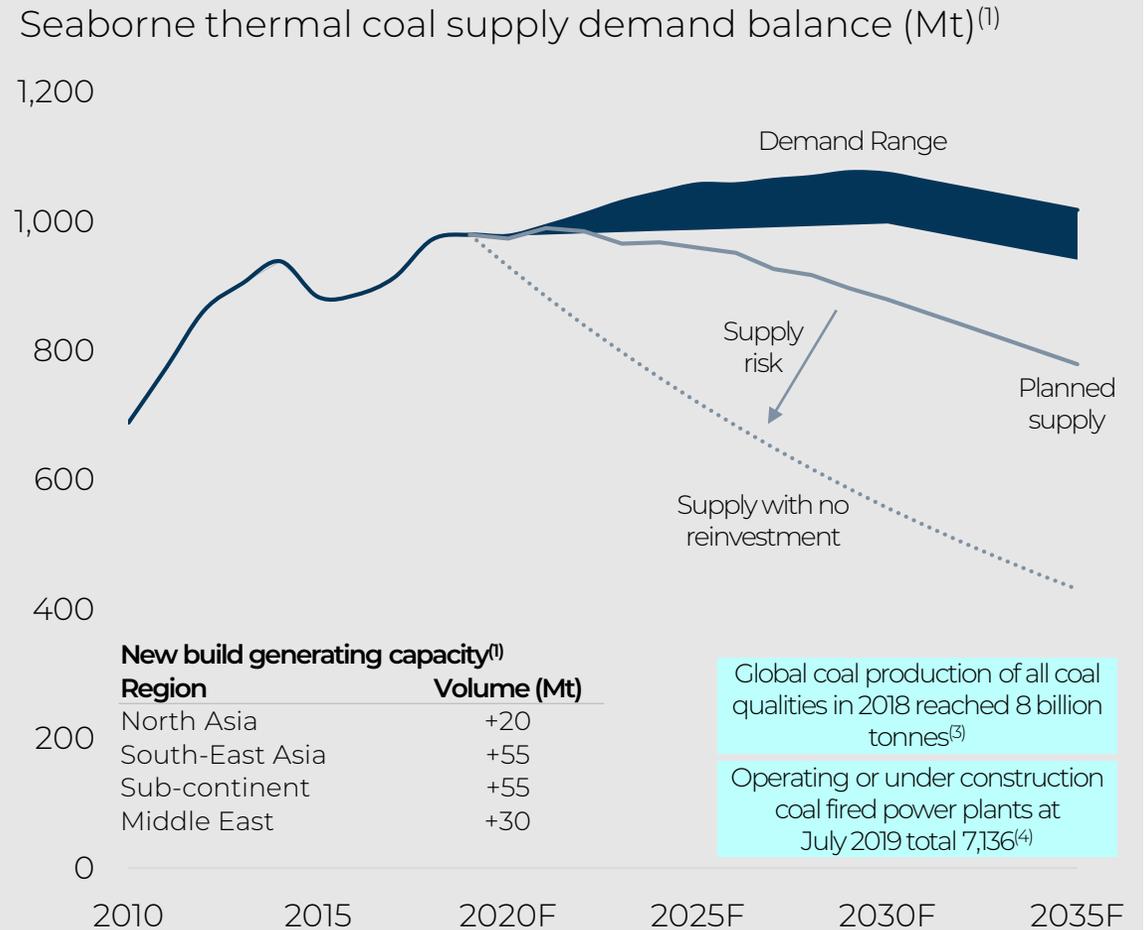
Supply increasingly at risk

- Accelerating depletion of the seaborne coal reserve base
- Our production capacity is capped at 150Mtpy and will decline as our existing portfolio depletes without reinvestment
- Development approval delays and shrinking financing options likely to limit planned future supply

Growing risk of failure to meet energy needs and compromised economic growth

- Balance required between the need for affordable/reliable energy and accelerating the shift to renewables
- High quality coal is part of the energy solution

Structural deficits emerging



Reducing our CO2 footprint

Emissions reduction initiatives

CCS	Electrification	Automation	Connected mines	Brownfield priority	Renewables roll out	Energy capture
<p>Carbon Capture and Storage (CCS) is a key enabler of decarbonisation⁽¹⁾</p> <p>Glencore's CTSCo project is designed to provide insight into development of CCS in an industrially scalable, safe and cost effective manner</p>	<p>Hybrid and fully electric mining equipment options now available</p> <p>Will be deployed at our new fully electric Onaping Depth mine project in Canada's Sudbury basin</p>	<p>Fully automated mine fleets are becoming a reality</p> <p>We plan to deploy autonomous equipment at Onaping Depth</p>	<p>Big data, data analytics, basic artificial intelligence are already enabling productivity gains through improved mine planning and fleet utilisation</p>	<p>Prioritising brownfield versus greenfield investments to drive higher returns and utilise existing mining and processing infrastructure</p>	<p>We have installed 2 x 3MW wind turbines, and associated energy storage systems at our Raglan Ni and Cu mine in Nunavik, Northern Quebec. These turbines generate c.15% of the power the isolated site requires, displacing over 4M litres of diesel annually</p>	<p>Furnace offgases are now being harvested at a number of sites to reduce primary energy needs</p> <p>Reduces overall primary energy intensity by over 20% versus traditional processes at our KNS operation in New Caledonia</p>



Renewable energy is key to achieving a low-carbon reality

- Getting there requires a fundamental shift in how we power the world

The metals and minerals responsibly produced by the mining industry will underpin this change

- The industry also needs to lead the development and adoption of new technologies and process innovation to both increase its own productivity and accelerate emission reductions

Glencore is well positioned to play a key role in enabling this transition

- We are a responsible supplier of the commodities that are critical for the shift to a low/net-zero carbon reality

We have set ambitious goals for ourselves, including the prioritisation of capital investment into commodities that support the transition and the development of long-term targets to reduce our emissions

Q&A

