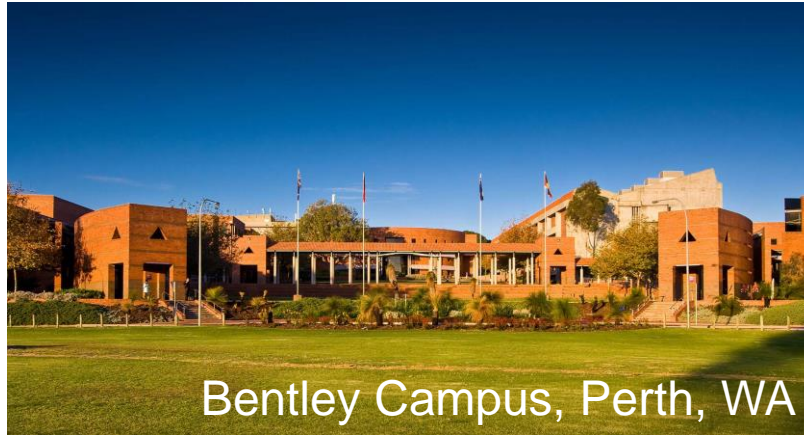# Sustainable Mining and the Role of the Mining Industry

Dr Hyongdoo Tom Jang

The 44th AKBC-KABC
September 2023

Curtin University

'Make Tomorrow Better'

Bentley Campus, Perth, WA

- The top one per cent of universities worldwide.
- Operating out of 5 countries with 9 unique campus locations
- Campuses in Australia, Malaysia, Singapore, Dubai, Mauritius
- 58,000+ students

# Western Australian School of Mines

'Da Dextram Comitibus'

- Erected for International mining and industrial exhibition in 1899 and founded in **1902** in Coolgardie. In 1969, becomes a branch of Curtin University

- Celebrate 120 years of WASM in August 2023

WASM, Curtin University has been ranked **the world's 2nd Mining school** since 2017. (Seven straight years)
QS World University Rankings by Subject of **Mineral & Mining Engineering**

Western Australia
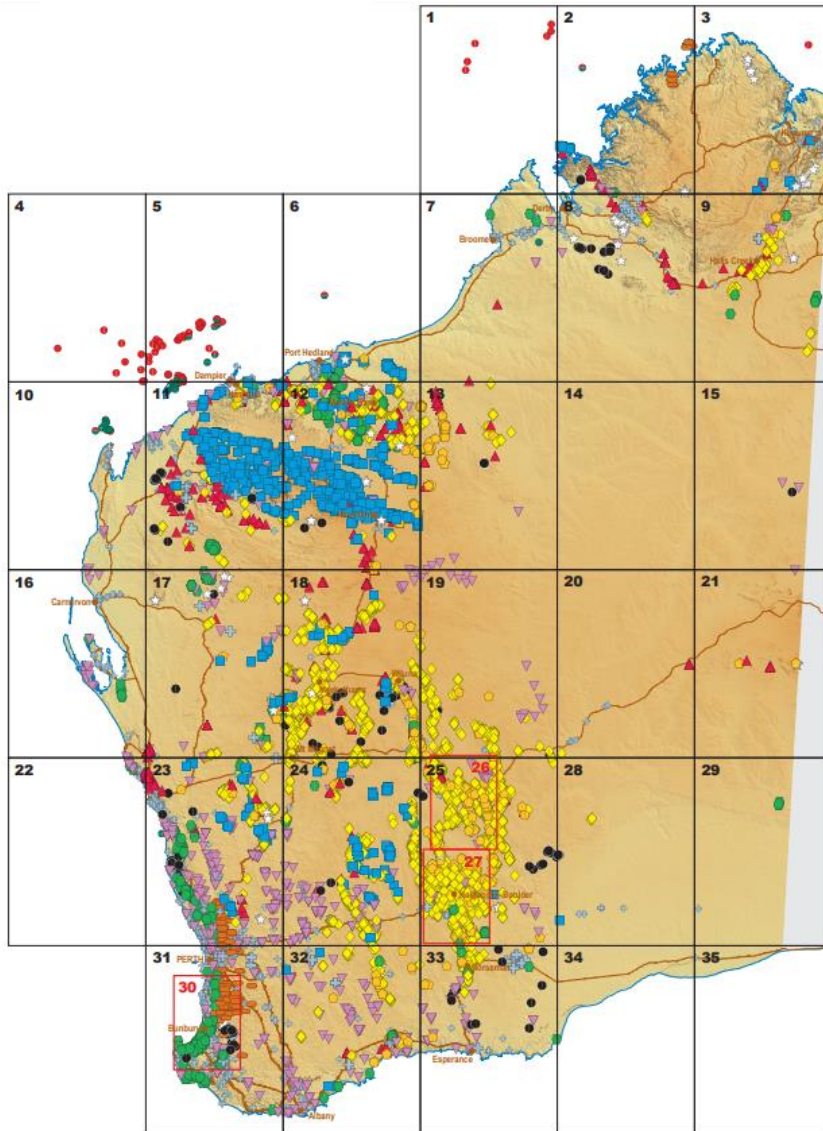
Abundant and diverse minerals
- 50+ different minerals
- 500+ commercial projects
- 1,000+ operating mine sites

Innovative technology
- A leader in autonomous mining
- Integrated mining systems

Environmental and ethical standards
- The leading edge of sustainable mining
- Environmental accountability
- Social responsibility

Battery Minerals
lithium, nickel, cobalt, manganese, aluminium, vanadium, rare earth metals, and reserves of untapped, high-quality graphite

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Sustainable Mining

Sustainable development means – "Meets the needs of the present without compromising the ability of future generations to meet their own needs".
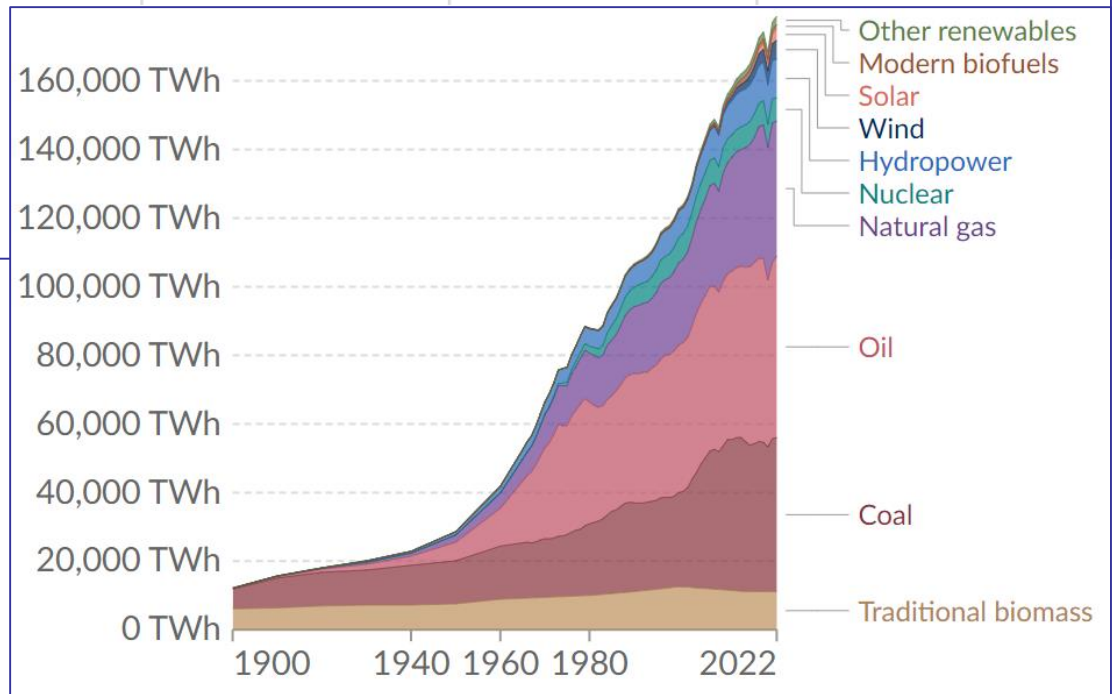
(Brundtland 1987)

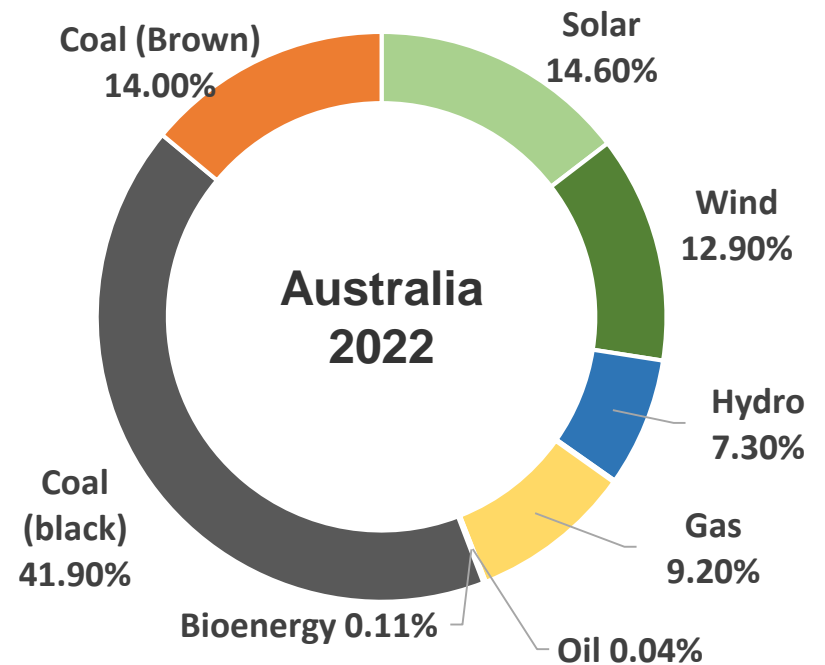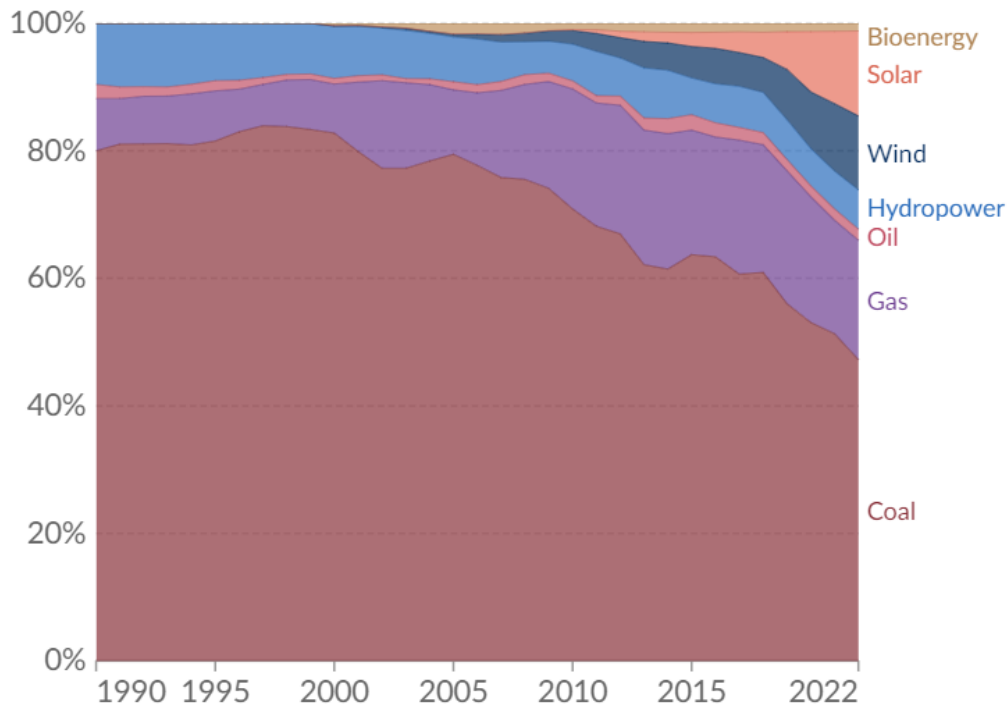Curtin University

Primary energy consumption trends
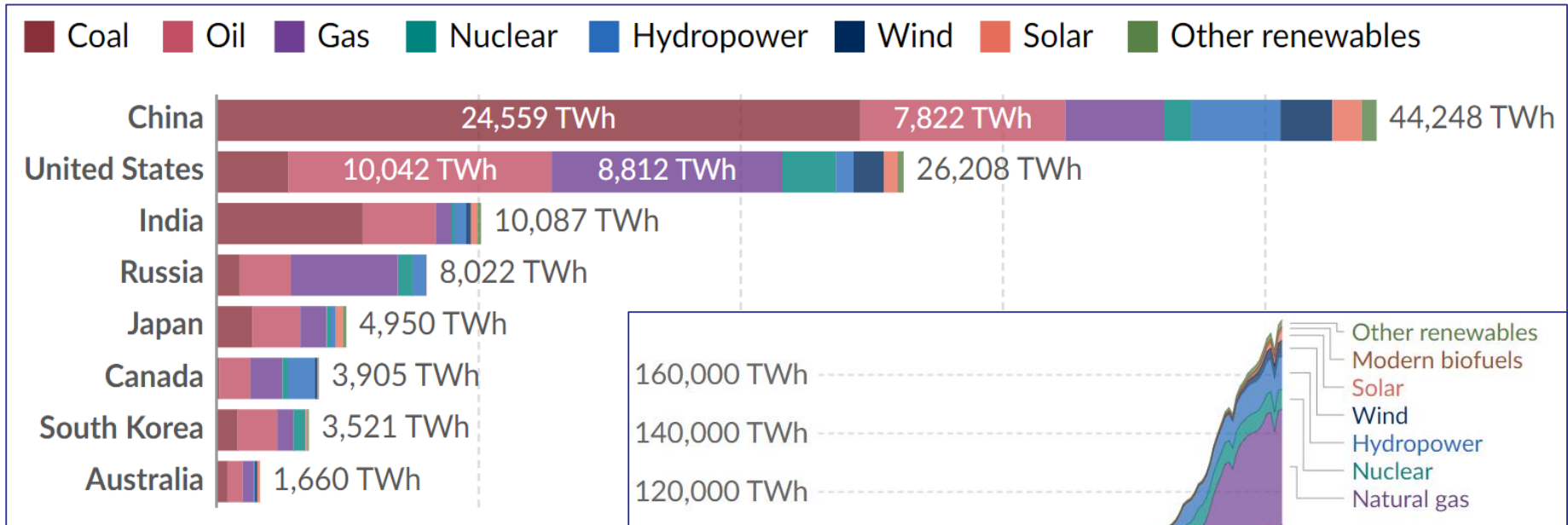
Global primary energy consumption by source – country in 2022

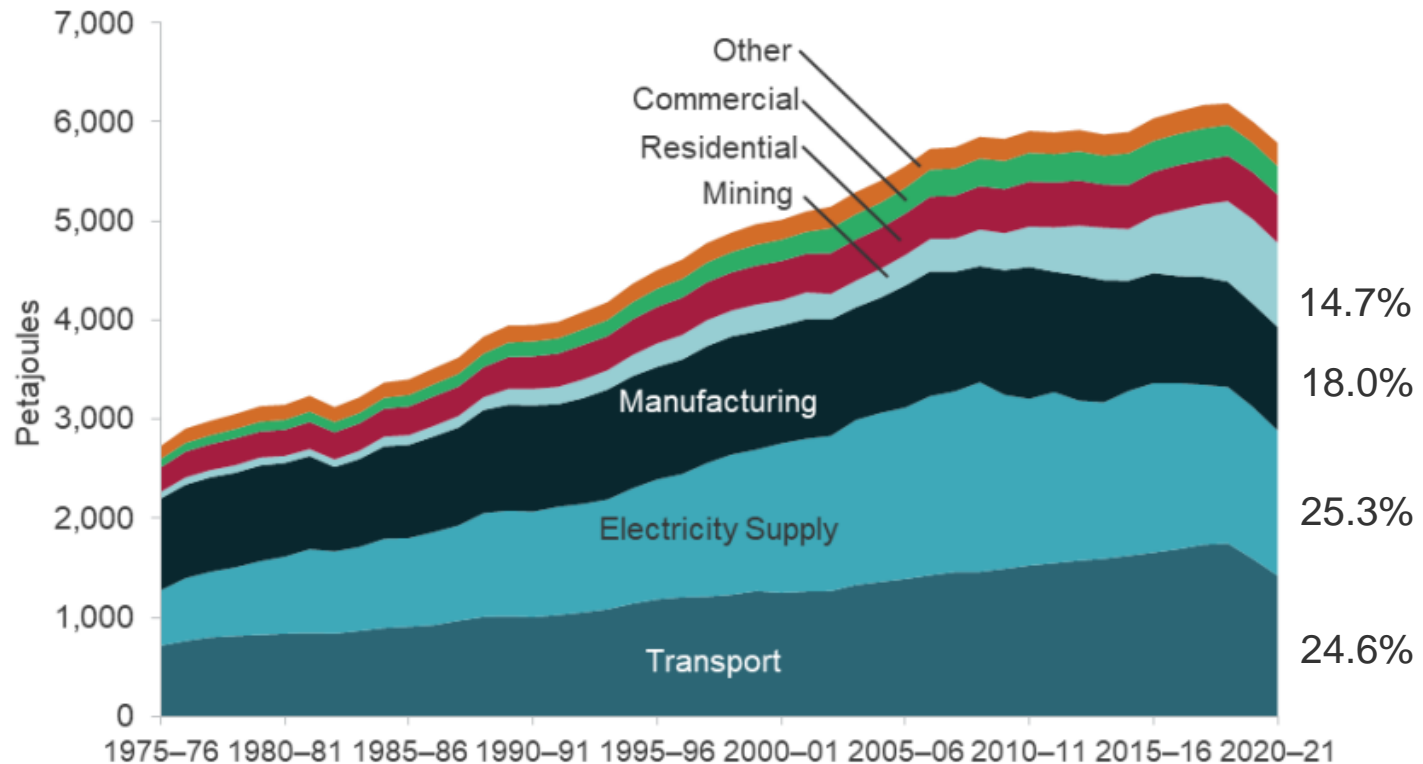Global primary energy consumption by source – years

Energy Consumption of Australia

Total energy consumption by fuel type

Energy Consumption of Australia

Total energy consumption by sector

- Mining energy use increased in 2019–20, supported by LNG and iron ore export growth

Source: Department of Industry, Science, Energy and Resources (2021) Australian Energy Statistics

CO2-e emissions in Australia

Reported scope 1 emissions by industry
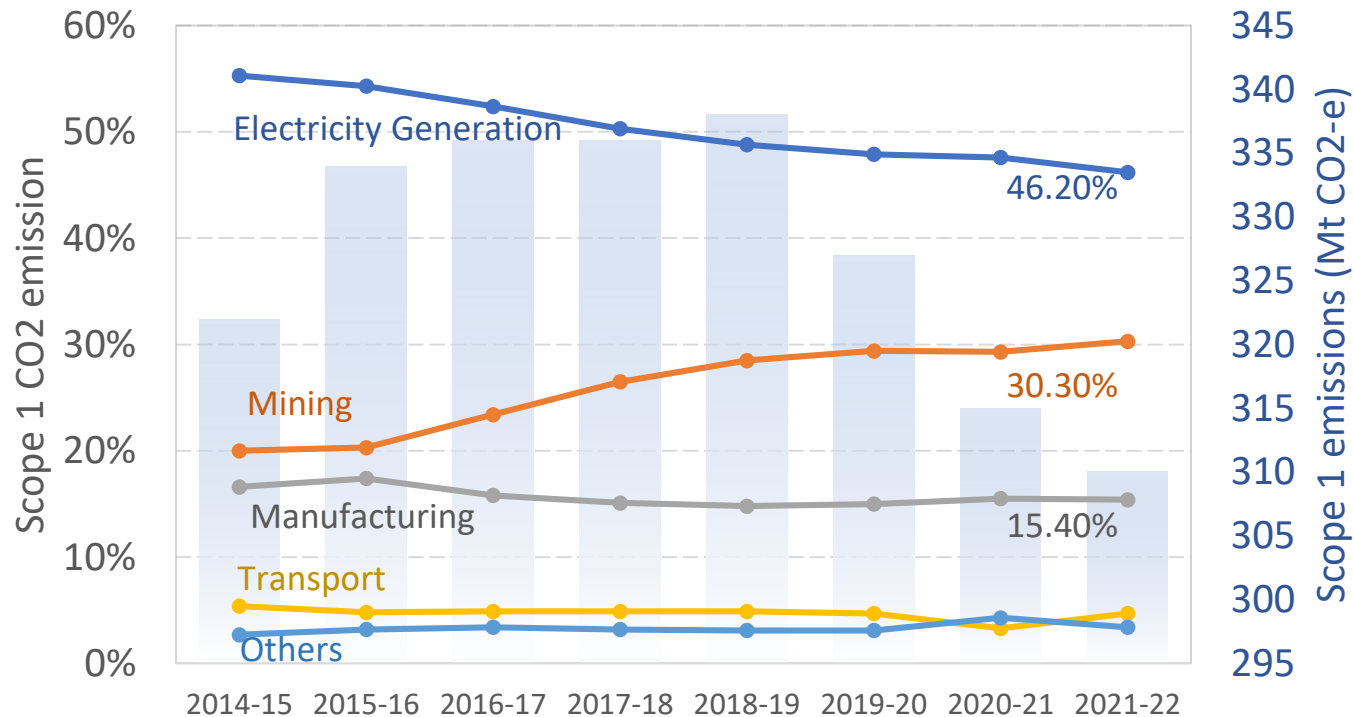
- SC1-CO2-e: 310 million tonnes - around 5% decrease since 2020-21
- Decrease the electricity sector. The mining sector still stays around 30%.

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Breakdown of current CO2-2 emissions in Mining

Example, %: Iron ore; open pit; Australia; Run of mine: 25 Mt per annum

Legend: ■ Diesel ■ Electricity ■ Other

Waterfall chart values:
- Drilling: 4
- Blasting: 2
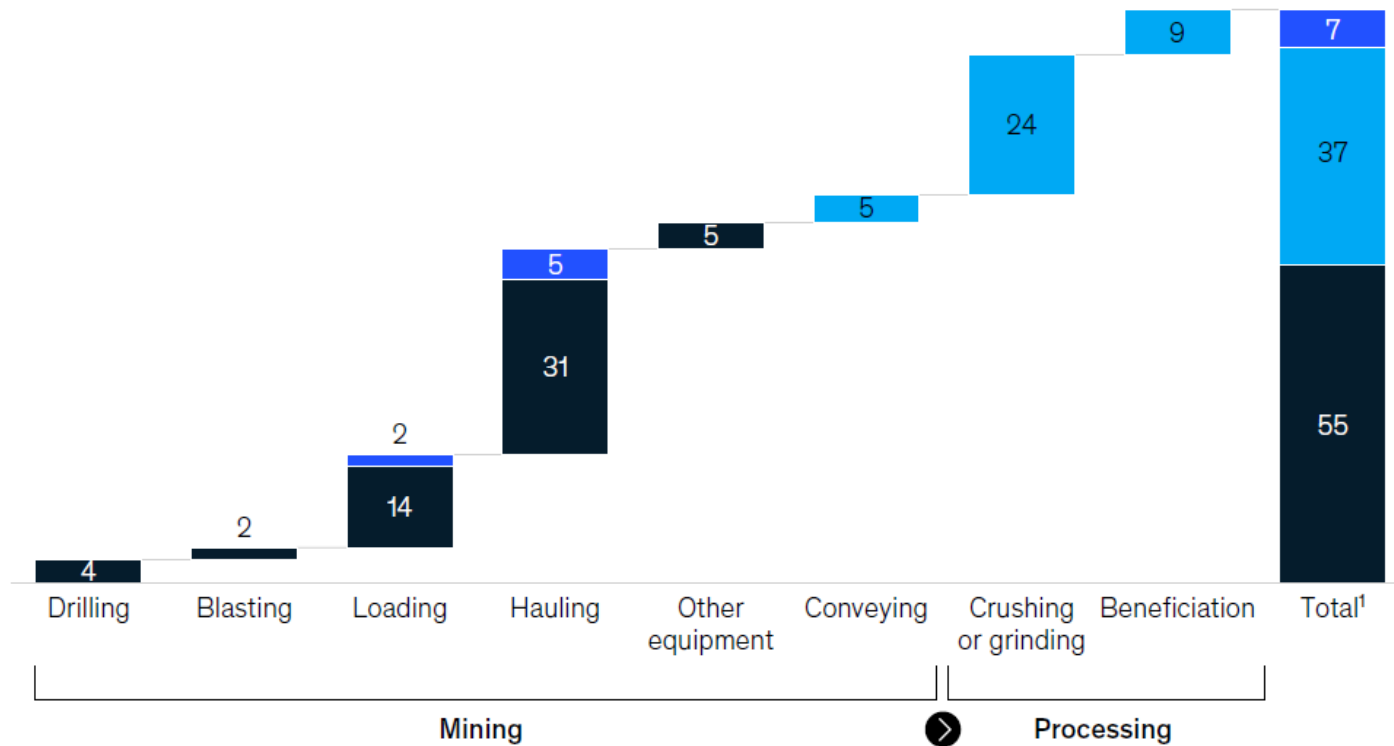- Loading: 14, 2
- Hauling: 31, 5
- Other equipment: 5
- Conveying: 5
- Crushing or grinding: 24
- Beneficiation: 9
- Total[1]: 55, 37, 7

Mining | Processing

- The mining industry contributes 2 to 3 per cent of global CO2 emissions.
- Scope 1 emissions from diesel: 40 to 50%
- Scope 2 emissions from electricity generation: 30 to 35%

Source: McKinsey Mine Decarbonization Model Addressing (Figures may not sum to 100%, because of rounding.)

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Supply demanded metals for Net-zero and Energy Transition

Global market value for coal vs. energy transition minerals
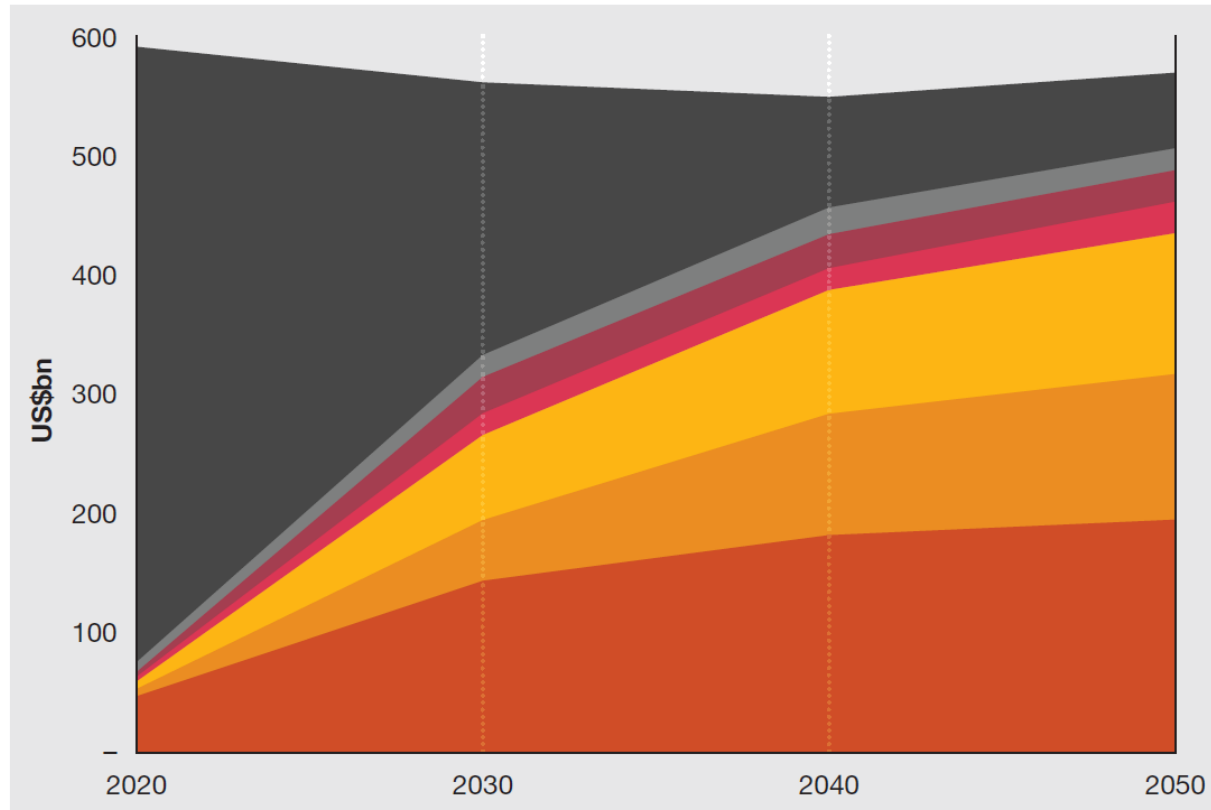
Legend: Thermal coal · Other critical minerals · Graphite · Cobalt · Nickel · Lithium · Copper
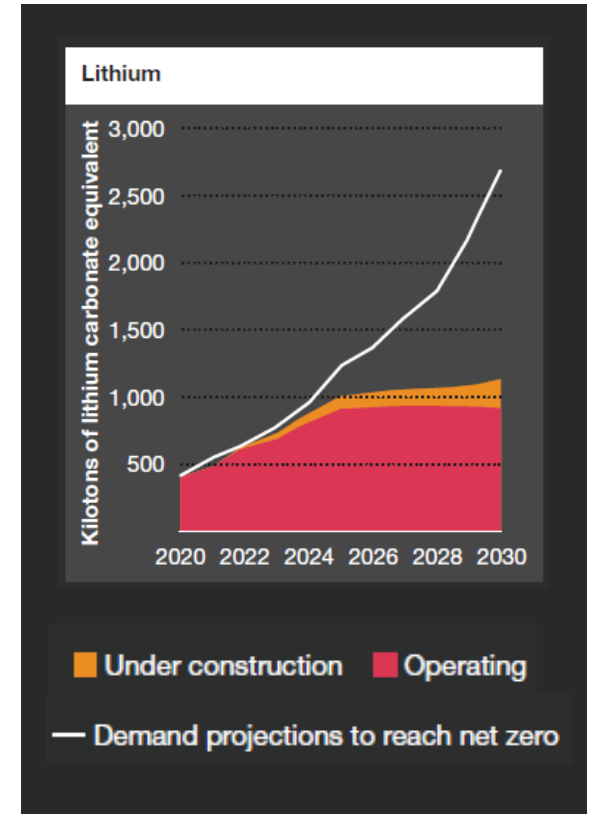
Roll of the mining industry in climate change

The world will be able to meet its net-zero targets **only if**

the mining industry can substantially ramp up production.

Carbone-zero mining

Direct reduction of CO2-e emissions	Climate change target	Met production targets of critical minerals

[1] The United Nations Framework Convention on Climate Change or Paris Agreement requires signatories to pursue efforts to limit the global average temperature increase to 1.5°C above preindustrial levels.

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Australia – Korea Smart Mining Education Consortium (AKMC)

To enhance the development of human resources in the field of mining and resources engineering in Korea, producing globally competitive experts who are in demand by industry, government, and academia in both Korea and Australia.

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Australia – Korea Smart Mining Education Consortium (AKMC)

Minerals production, 2021

5.5 Gt   1309 Gt

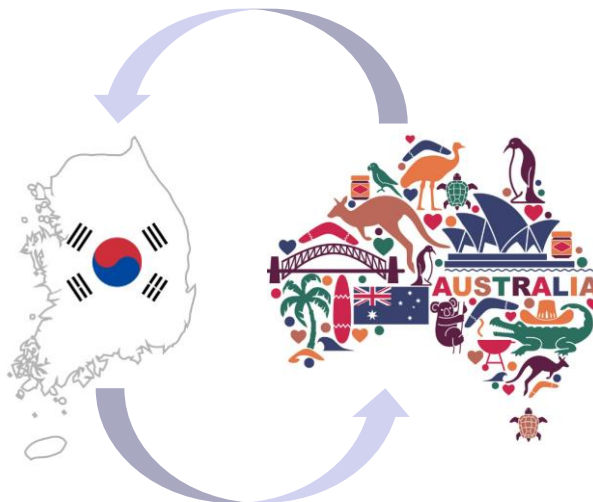KOREA   Energy consumption, 2022   AUSTRALIA

3521 TWh   1660TWh

- Educationally prepared students with degrees

- Lack of opportunity for work-integrated learning

- Lack of engineers

- Opportunities to work at the world-leading and innovative mining systems

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AKMC – Activities

Short-term internship program

Industry internship program
(vacation & graduate program)
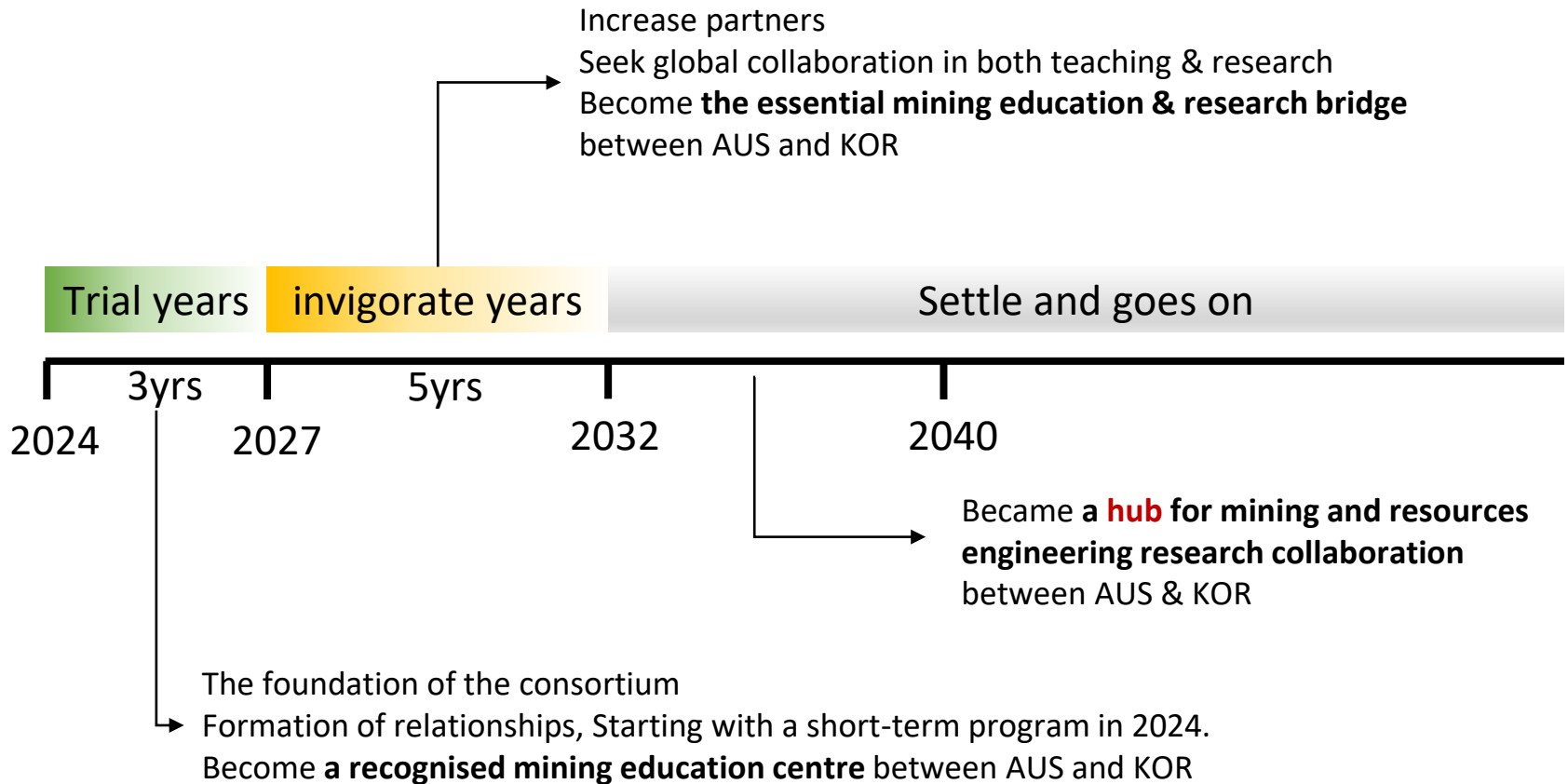

Dual degree and credit exchange
program

Promoting forum/conference

Promoting research collaboration
between Australia and Korea

Horizons of AKMC

Increase partners
Seek global collaboration in both teaching & research
Become **the essential mining education & research bridge**
between AUS and KOR

| Trial years | invigorate years | Settle and goes on |

3yrs   5yrs

2024   2027   2032   2040

Became **a hub for mining and resources
engineering research collaboration**
between AUS & KOR

The foundation of the consortium
Formation of relationships, Starting with a short-term program in 2024.
Become **a recognised mining education centre** between AUS and KOR

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AKMC - Collaborations

Collaboration with the major universities in Korea and industry partners.

Australia – Korea Smart
Mining Consortium

Primary partners

Cooperative partners

Thank you

Super-pit, KCGM, Kalgoorlie Australia