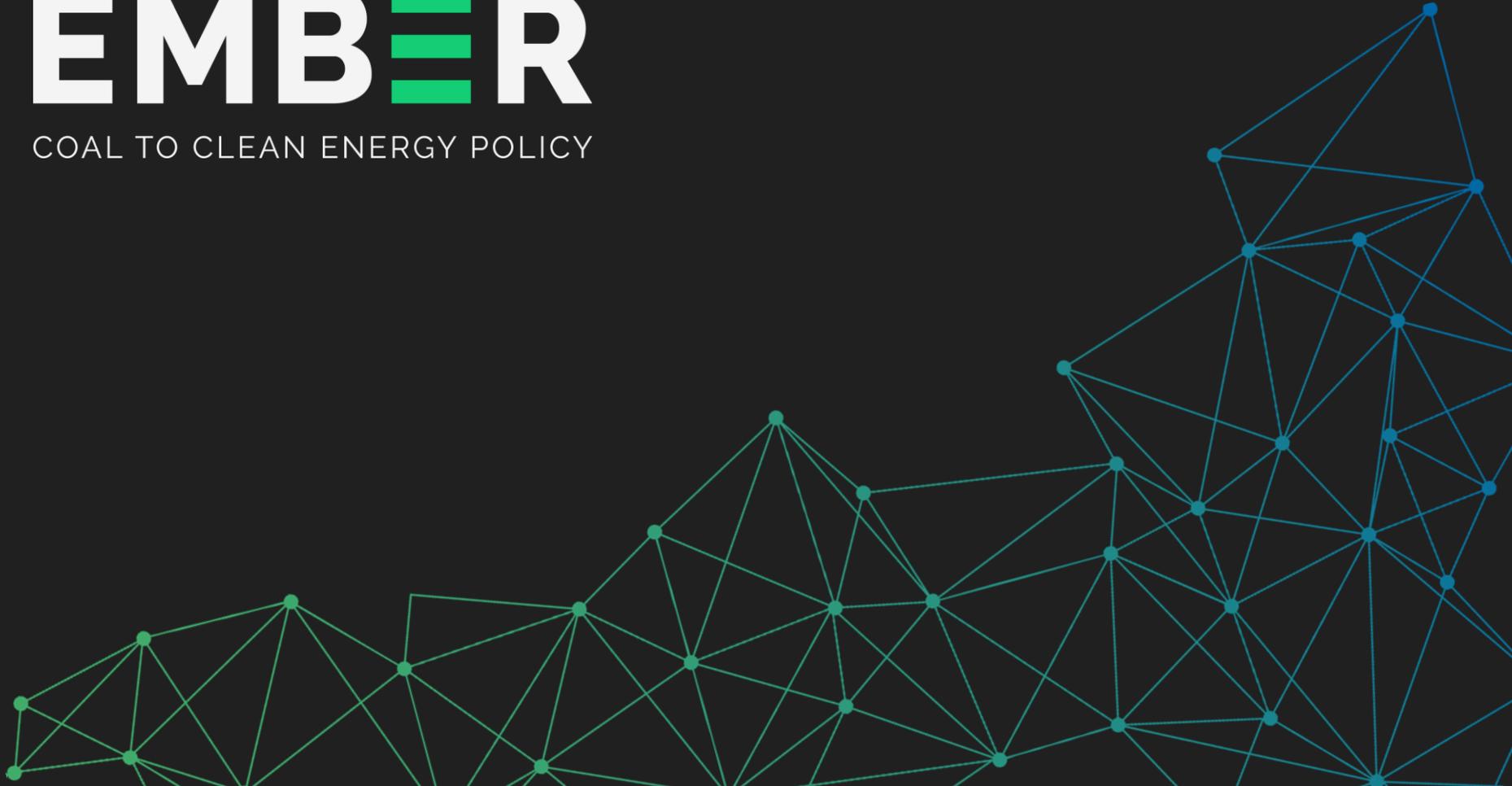


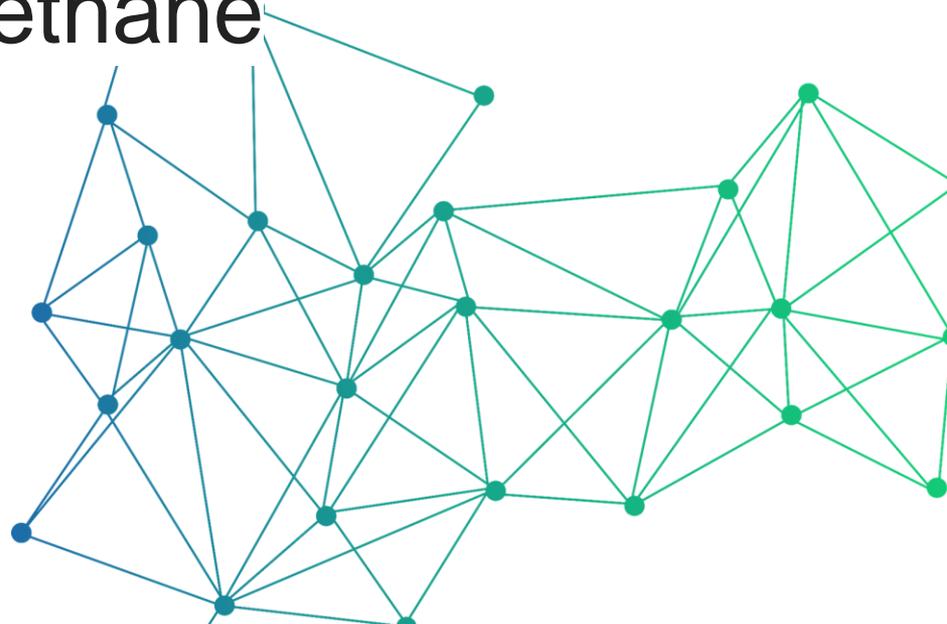
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COAL TO CLEAN ENERGY POLICY

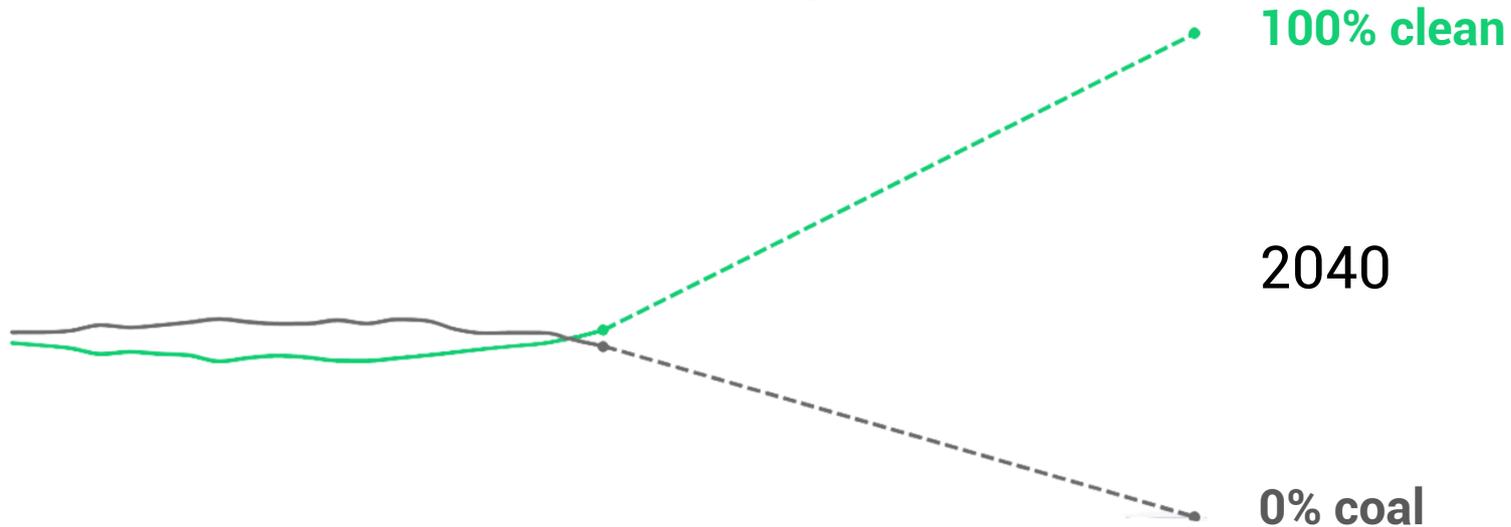


Why the steel industry needs to tackle coal mine methane

Conal Campbell
Methane Monday - 8th Meeting
23rd January 2023

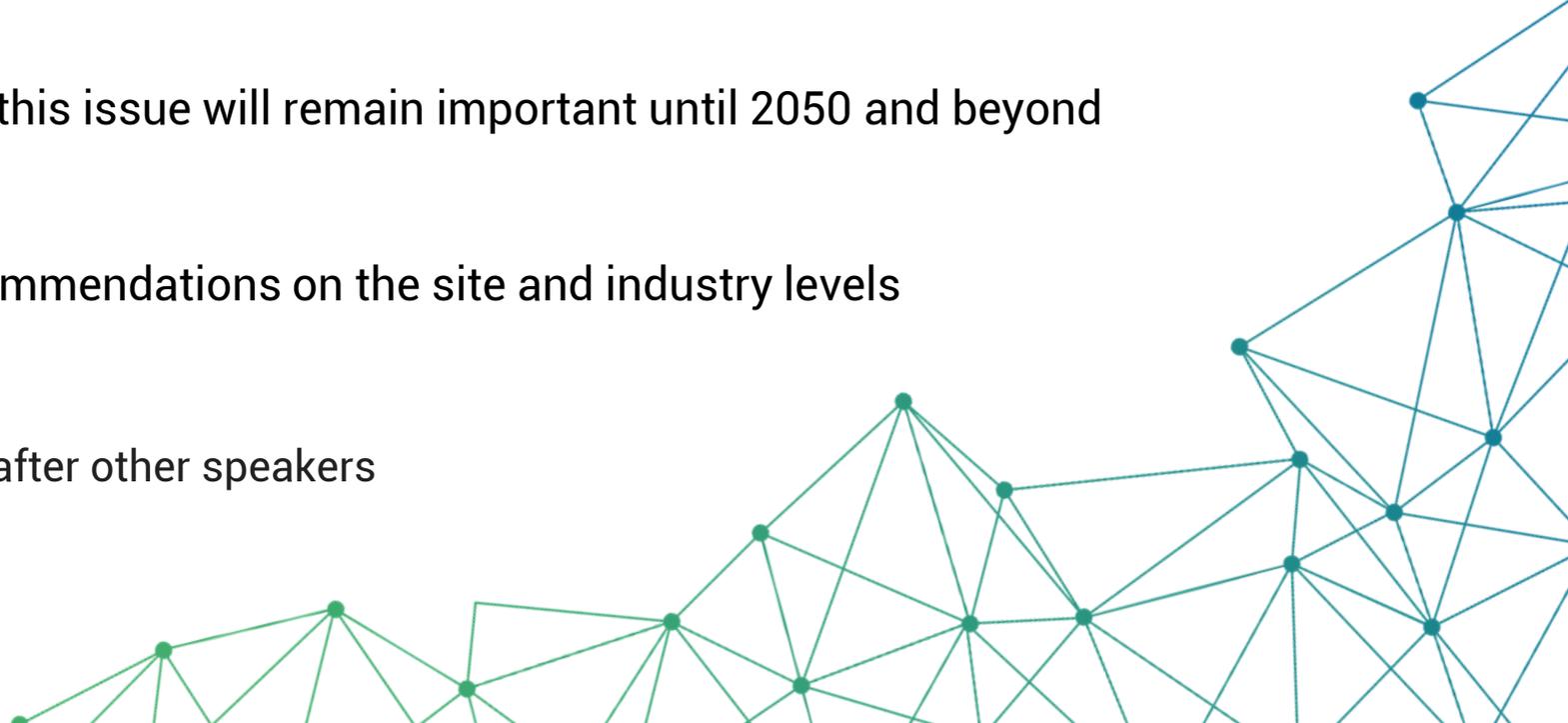


Ember is an energy think tank that uses data-driven insights to shift the world from coal to clean electricity.



Agenda

- 01** Quantifying global warming from steelmaking methane
- 02** Why this issue will remain important until 2050 and beyond
- 03** Recommendations on the site and industry levels
- 04** Q&A after other speakers

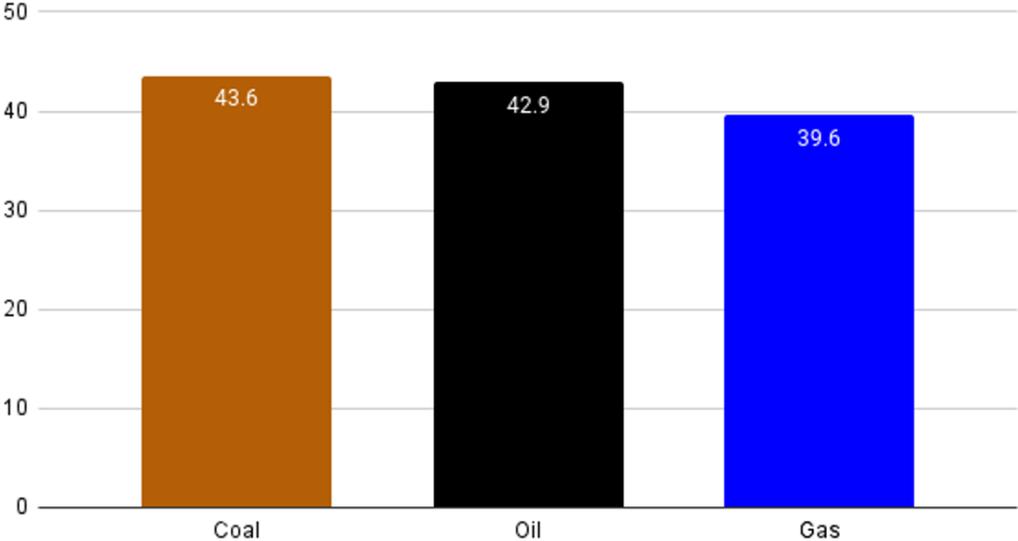


Quantifying global warming from steelmaking methane



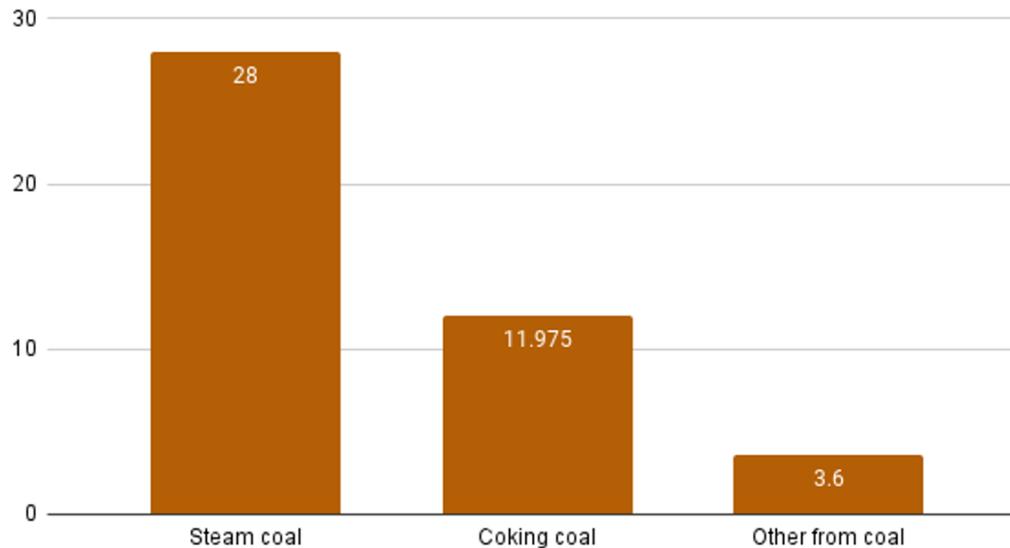
Coal mine methane exceeds other fossil fuels

Global energy sector methane emissions (Mt) (2021)



Of total CMM, metallurgical coal is $\geq 27\%$

Coal emissions (Mt) (2021)

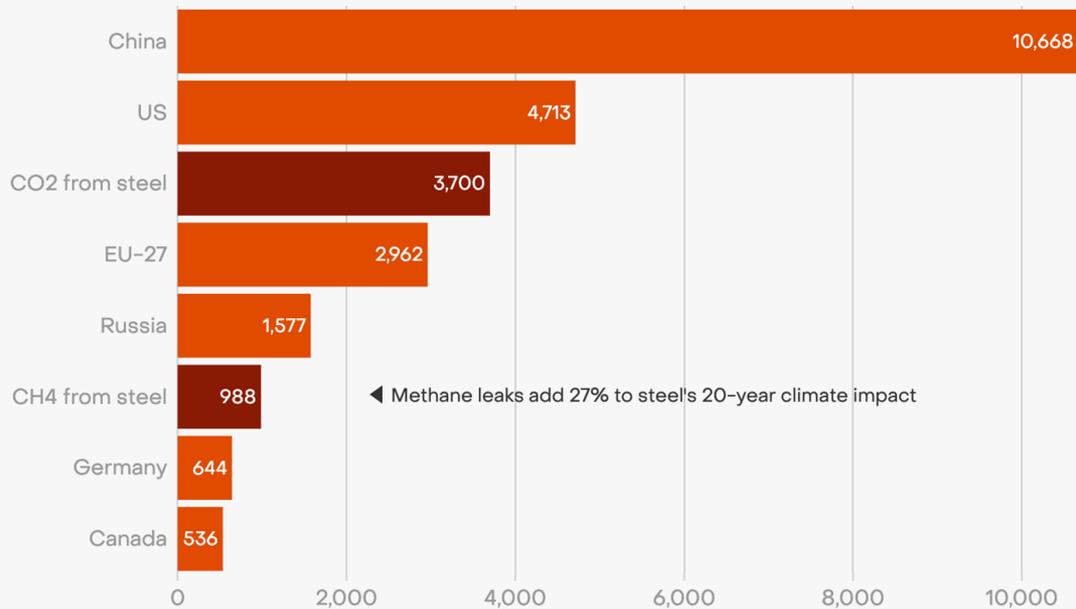


In order to compare coking CMM, we need to convert it into CO₂-eq

Coking coal CH ₄	11.975 MT
CH ₄ 20-year GWP	<u>82.5x</u>
Coking CMM in CO ₂ -e	988 MT

Coking coal mine methane warms the planet more than some large nations

National CO₂-only emissions (mt). Steelmaking CO₂ and CH₄ emissions in million tonnes CO₂e (GWP-20)



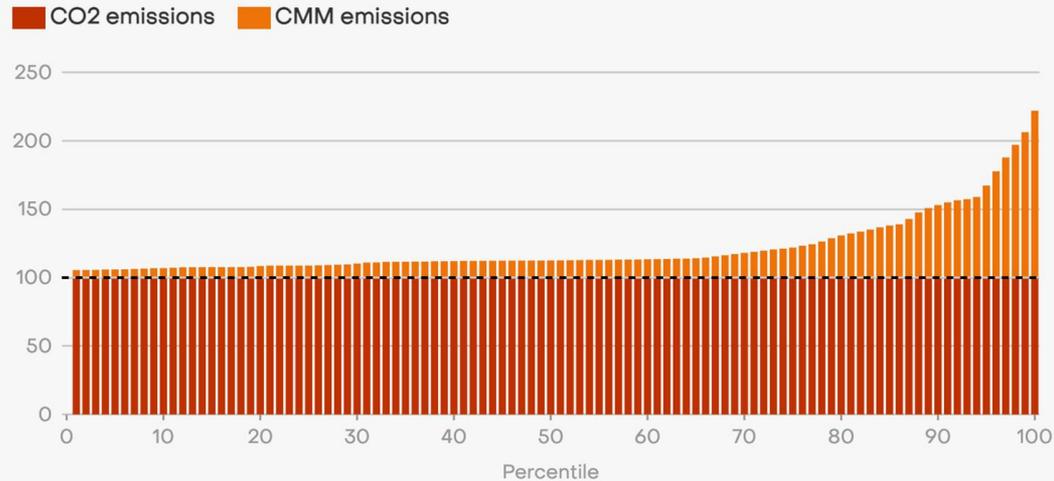
Source: Countries' CO₂-only emissions are from the Global Carbon Project

Not all steel has an equal climate impact

- Blast furnace (i.e. coking coal-powered) steelmaking accounts for 70% of global production
- Different coking coal causes different climate impacts

Steel's GHG footprint strongly dependent on methane content of the coal it uses

Index, 100= 1.94 tonnes of CO₂ (average direct and indirect emissions of 1 tonne of steel)



Source: IEA World Energy Outlook 2019 (Figure 5.15)

Note: World Energy Outlook covers thermal and metallurgical coalminers

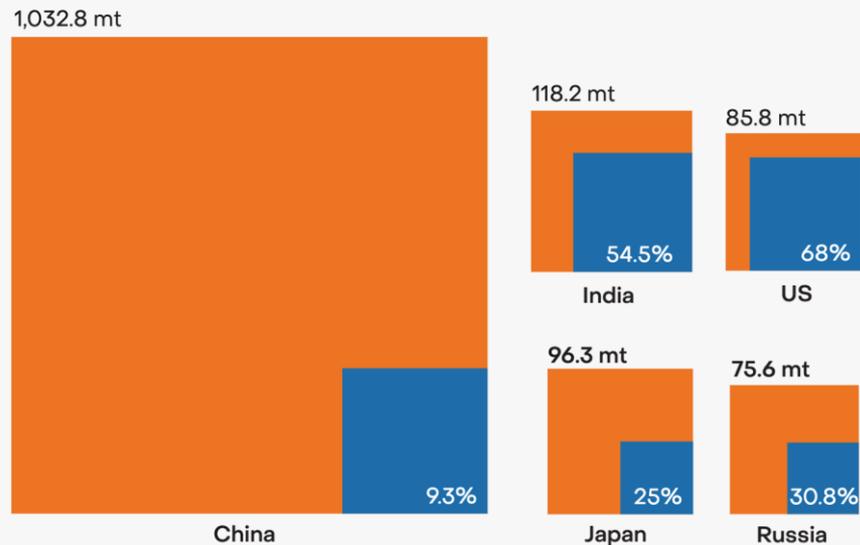
Not all steel has an equal climate impact

- Almost all non-blast furnace steel production uses electric arc furnaces, which use little or no coal
-but important to know whether the electricity is from green sources
- There are regional differences in EAF adoption:

China's low take up of electric arc furnace steelmaking is keeping coal mine methane emissions elevated

Top five steelmakers' outputs (mt) and EAF adoption (%)

- Total steel production (mt)
- Electric arc furnace adoption (%)



EAF steelmaking uses ~64x less coal than blast furnaces, thus sharply reducing methane leaks

Source: World Steel in Figures 2022 and World Steel Statistical Yearbook 2019

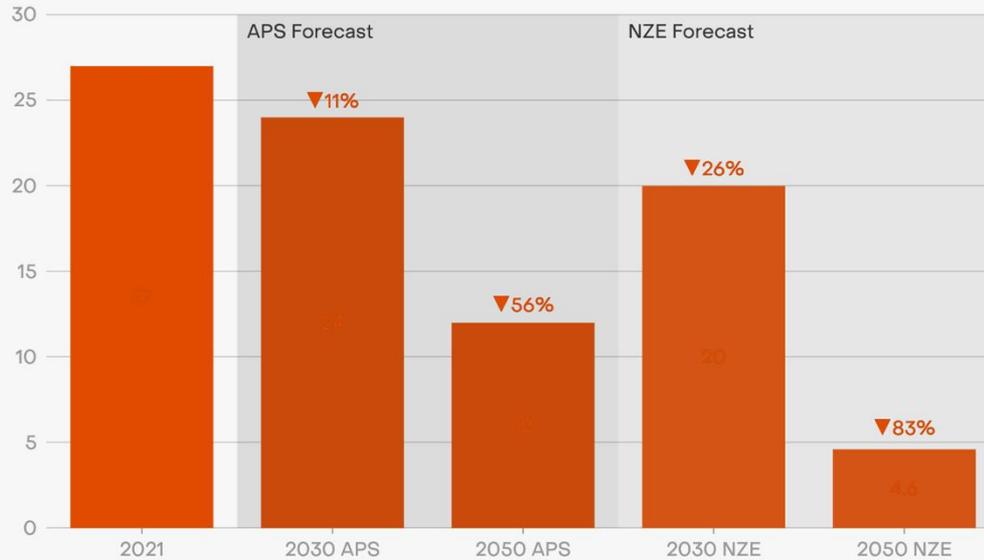
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Why this will be important until 2050 and beyond



Wide uncertainty about future coal use in steelmaking

Coking coal demand forecasts, exajoules



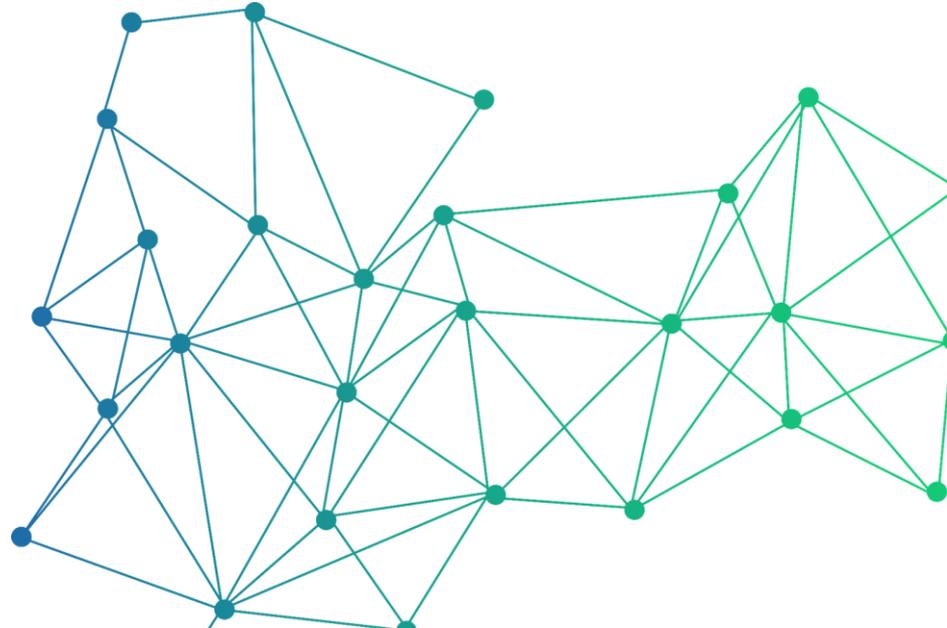
Source: Source: IEA "Coal in Net Zero Transitions" report 2022, figure 3.11

Worrying signs from India...

Indian steel production is expected to nearly triple between now and 2050, yet virtually all planned primary capacity additions are for conventional blast furnace-based production.

IEA Energy Technology Perspectives 2023

Recommendations



Coal mines: how much can CMM be reduced?

The UNEP Global Methane Assessment shows that readily available targeted measures could reduce CH₄ emissions from the coal sector by 12–25 Mt/yr (i.e. 27-57% of total).

From 55% to 98% of these measures could be implemented at negative or low cost.

How to achieve CMM reductions:

Most importantly: keep gassy coal in the ground

For mines which continue to operate:

Monitoring, reporting and verification

Effective flaring, not venting

Oxidation

Capture and utilization (heat and electricity)

Industry level: stakeholder steps to reduce CMM

Recognize full lifecycle emissions in assessments of the steel industry

- Include CMM in global assessments of all types of production

Emulate the Oil and Gas Methane Partnership 2nd Framework (OGMP 2.0) to collaboratively implement best practice MRV and allow coking coal miners to demonstrate performance improvements against agreed benchmarks.

- Steelmakers should only buy coal from producers that have a net zero-compatible plan.

Thank you!

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