



Near-Zero Emissions Materials Production and Trade

Energy Technology Perspectives 2024 Webinar

6th December 2024

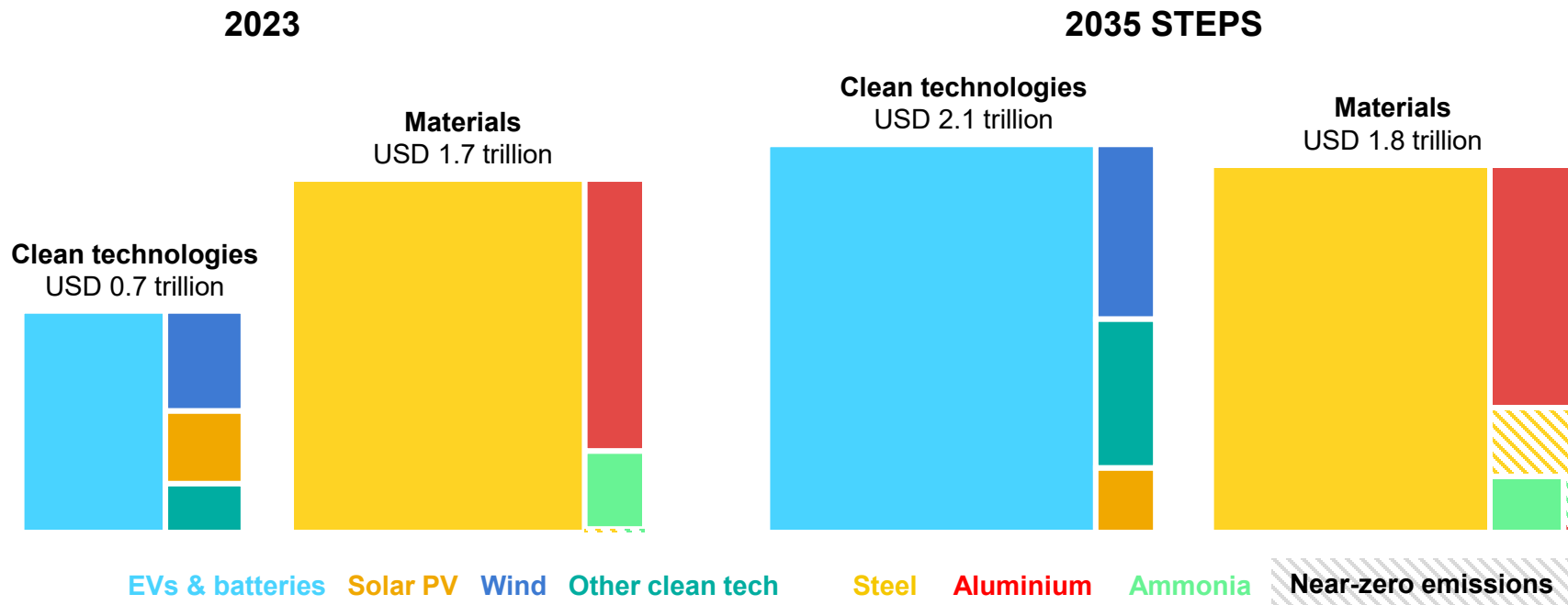
- **Clean technology manufacturing and trade**
26 November 2024, 12:00 – 13:15 (CET)
- **The future of shipping**
26 November 2024, 14:30 – 15:30 (CET)
- **Unlocking manufacturing opportunities in emerging markets**
3 December 2024, 12:30 – 13:45 (CET)
- **Near-zero emissions materials production and trade**
6 December 2024, 15:00 – 16:00 (CET)

- **15:00 IEA presentation**
 - Near-zero emissions materials in context (**Alexandre Gouy**)
 - Regional deep-dives (**Richard Simon**)
 - Opportunities for emerging economies (**Leonardo Collina**)
- **15:35 Reflections from industry**
 - worldsteel (**Andrew Purvis**)
 - International Aluminium Institute (**Marlen Bertram**)
- **15:45 Q&A**
- **16:00 Close**

Near-zero emissions materials in context

Markets for clean technologies and near-zero emissions materials

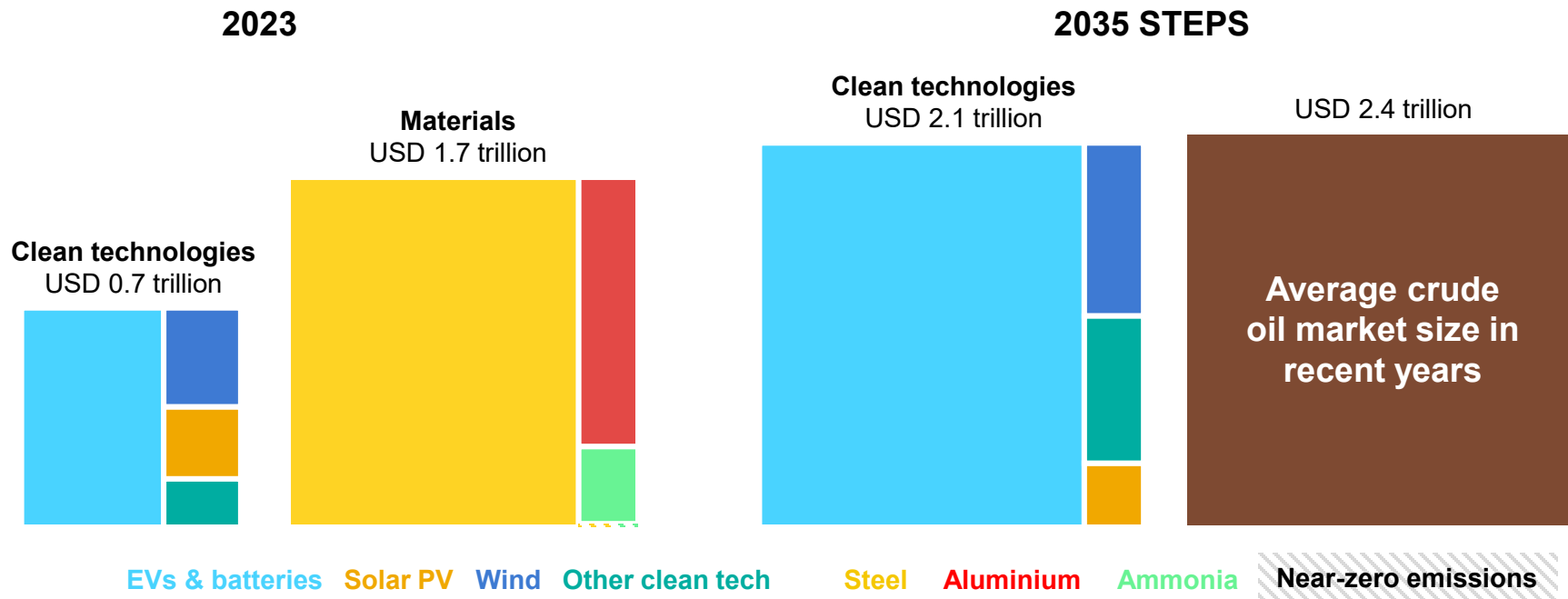
Market size of key clean technologies and materials by scenario



The market for key clean technologies is set to nearly triple by 2035 under current policy settings, whereas the market growth for near-zero emissions materials is much more dependent on the implementation of climate pledges.

Markets for clean technologies and near-zero emissions materials

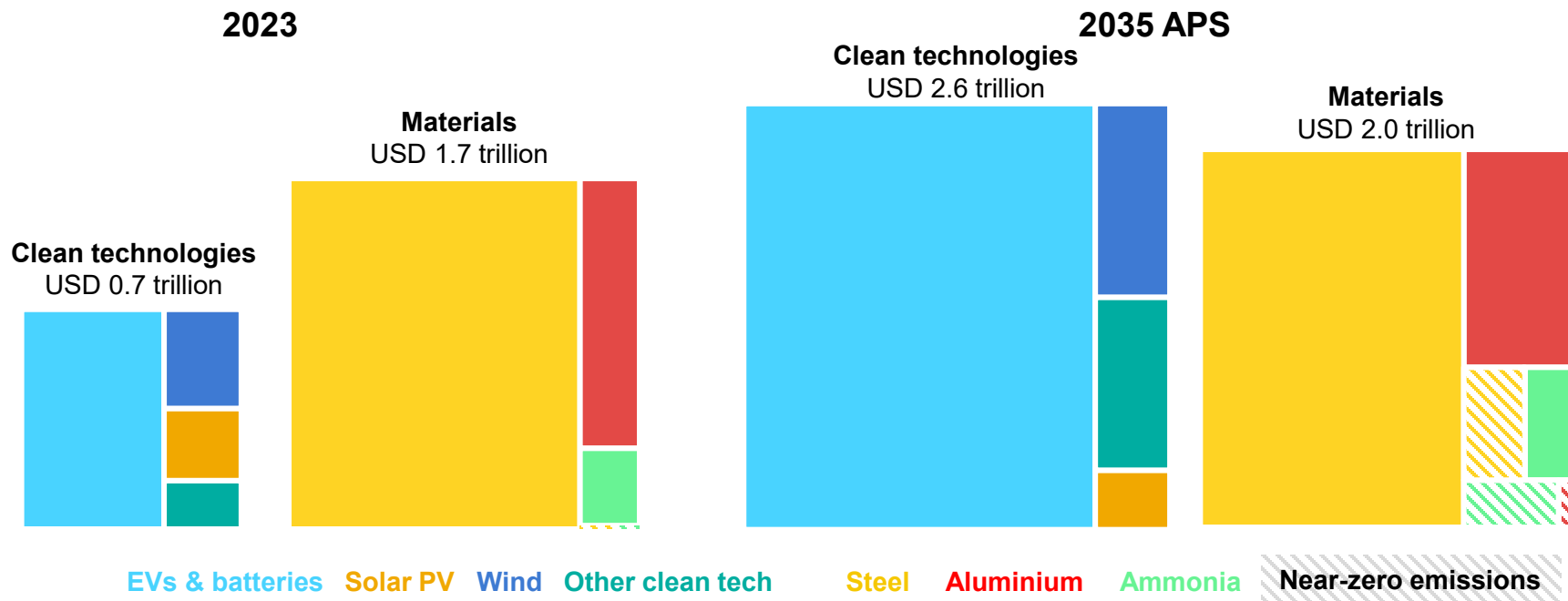
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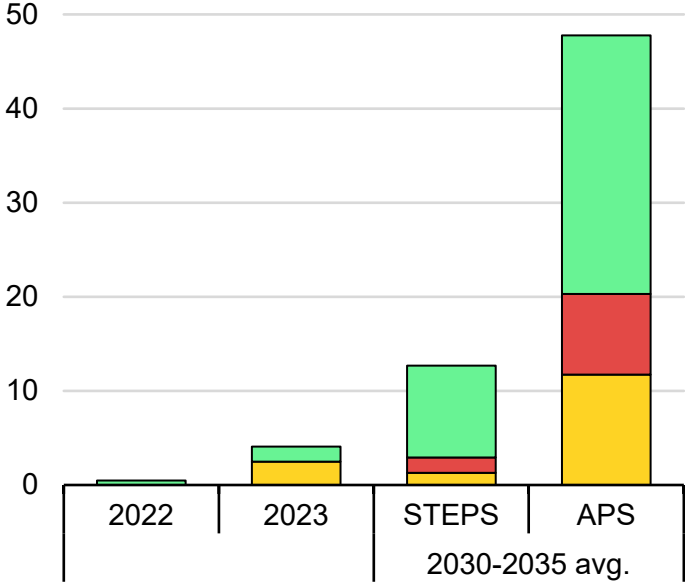
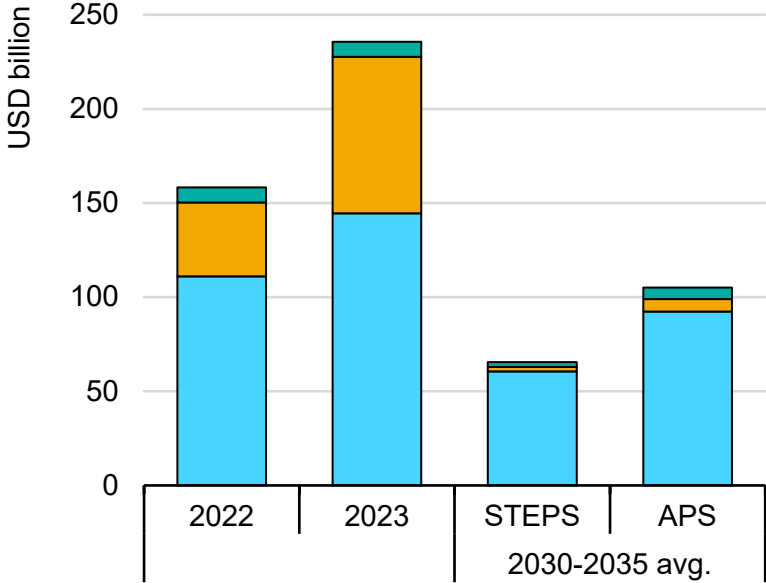
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Diverging investment trends

Investment in clean technology manufacturing (left) and near-zero emissions materials production (right)



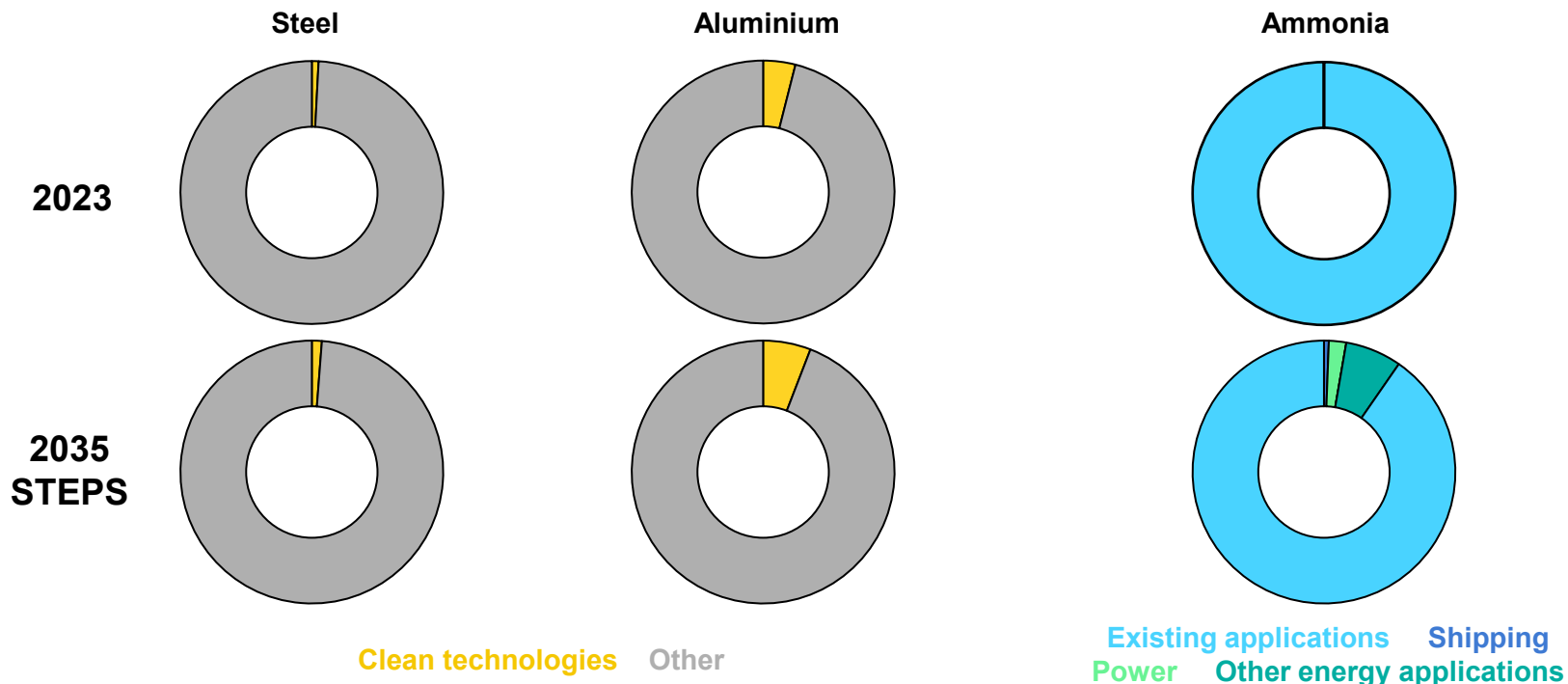
EVs & batteries Solar PV Other clean tech

Steel Aluminium Ammonia

Investment is booming for clean technologies but for near-zero emissions materials production it needs to accelerate dramatically for the world to get on-track with climate goals.

Clean technology supply chains need materials

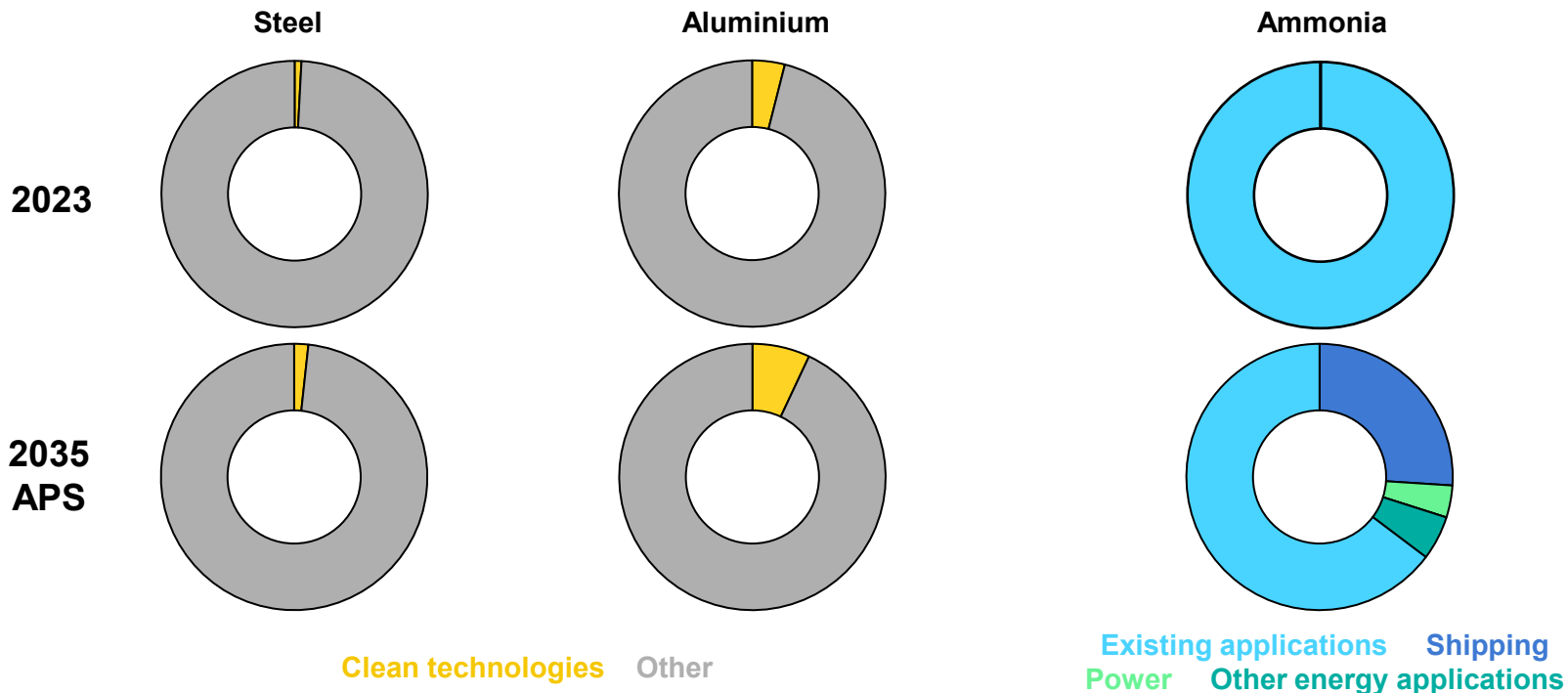
Share of materials used for clean energy applications



Clean technology manufacturing accounts for 1-4% of steel and aluminium demand today. Ammonia for new energy applications accounts for 35% of total ammonia demand by 2035 in the APS, up from virtually zero today.

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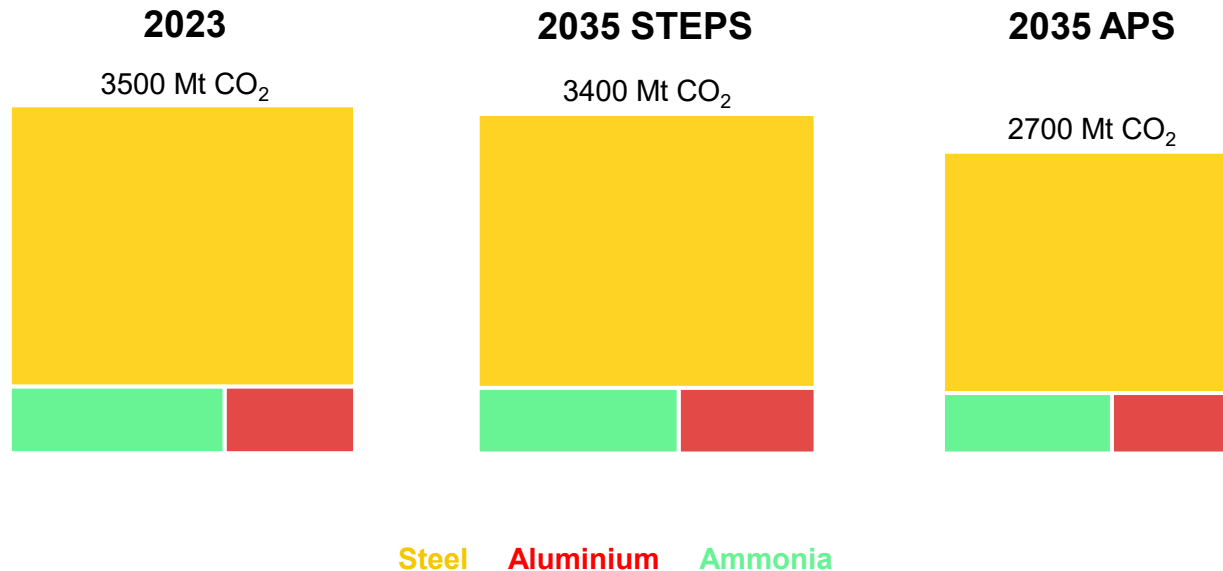
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Materials production is emissions-intensive today

Emissions from materials production

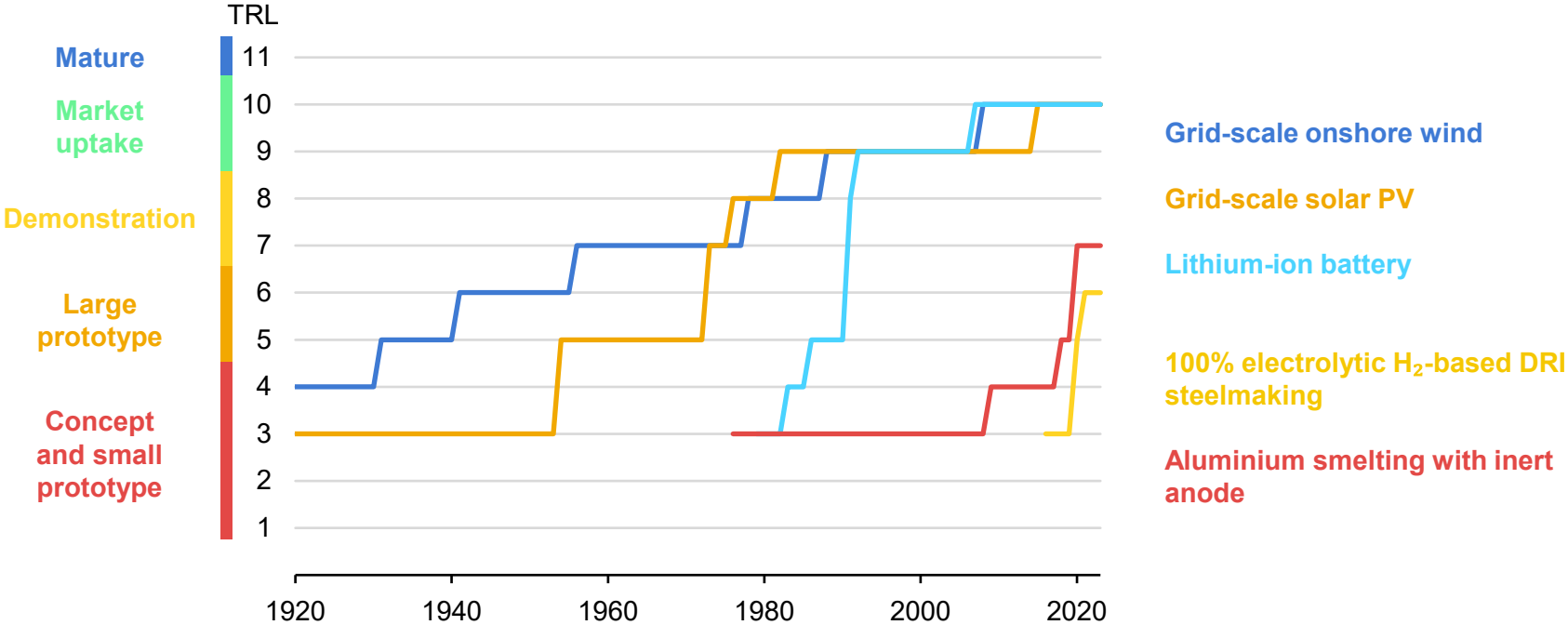


The combination of near-zero emissions technologies deployment, higher shares of scrap use and improved materials efficiency leads to a reduction of emissions from material production.

Key near-zero emissions technologies are still under development



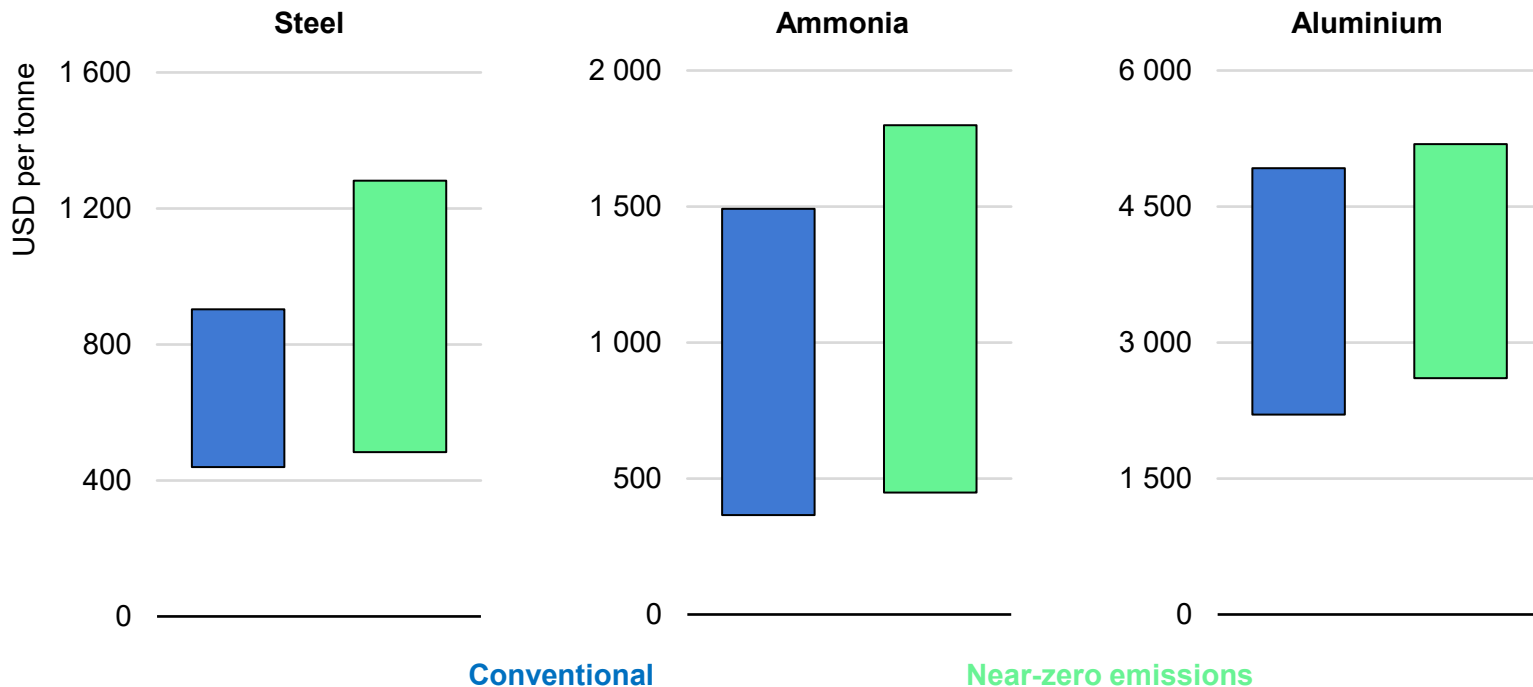
Historic evolution of the technology readiness level of selected clean energy technologies



Development of near-zero emissions materials production only started recently, but is progressing fast.

Near-zero emissions materials typically incur a premium

Indicative levelised cost of production for selected materials in the APS, 2035

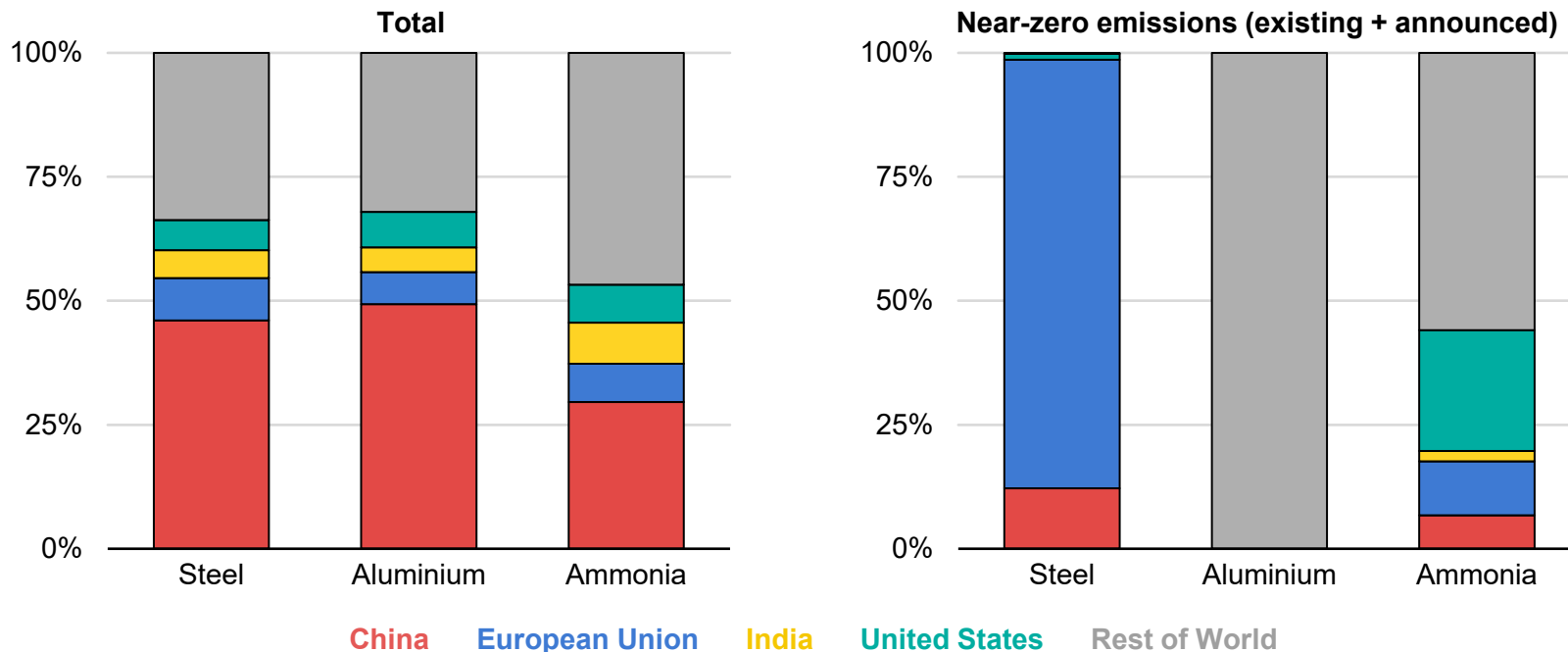


Near-zero emissions technologies usually have higher production costs than their conventional counterparts, mainly because of higher capital expenditure and energy costs.

Regional deep-dives

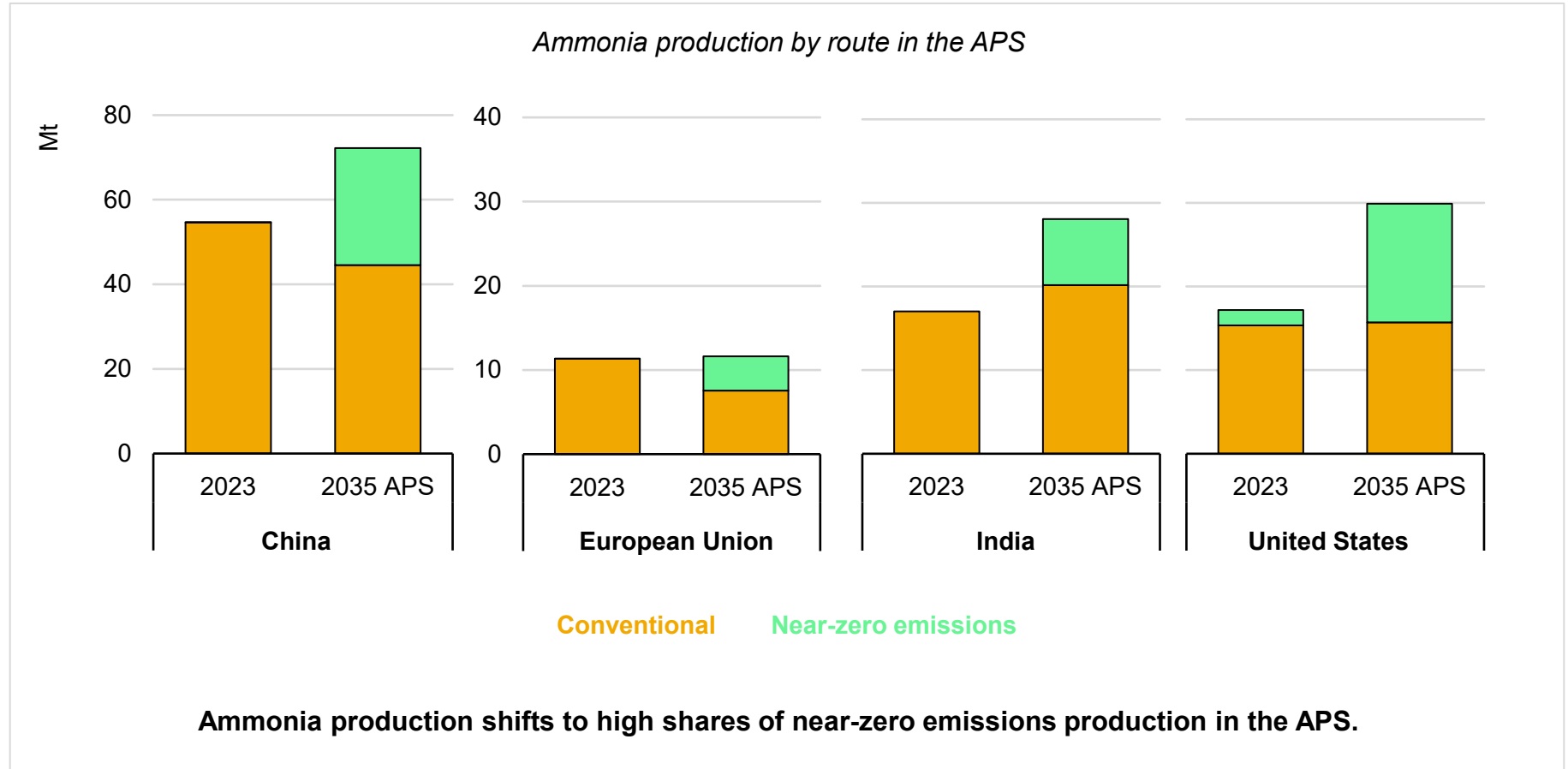
Geographic distribution of materials production capacity

Share of global manufacturing capacity by country/region, 2023

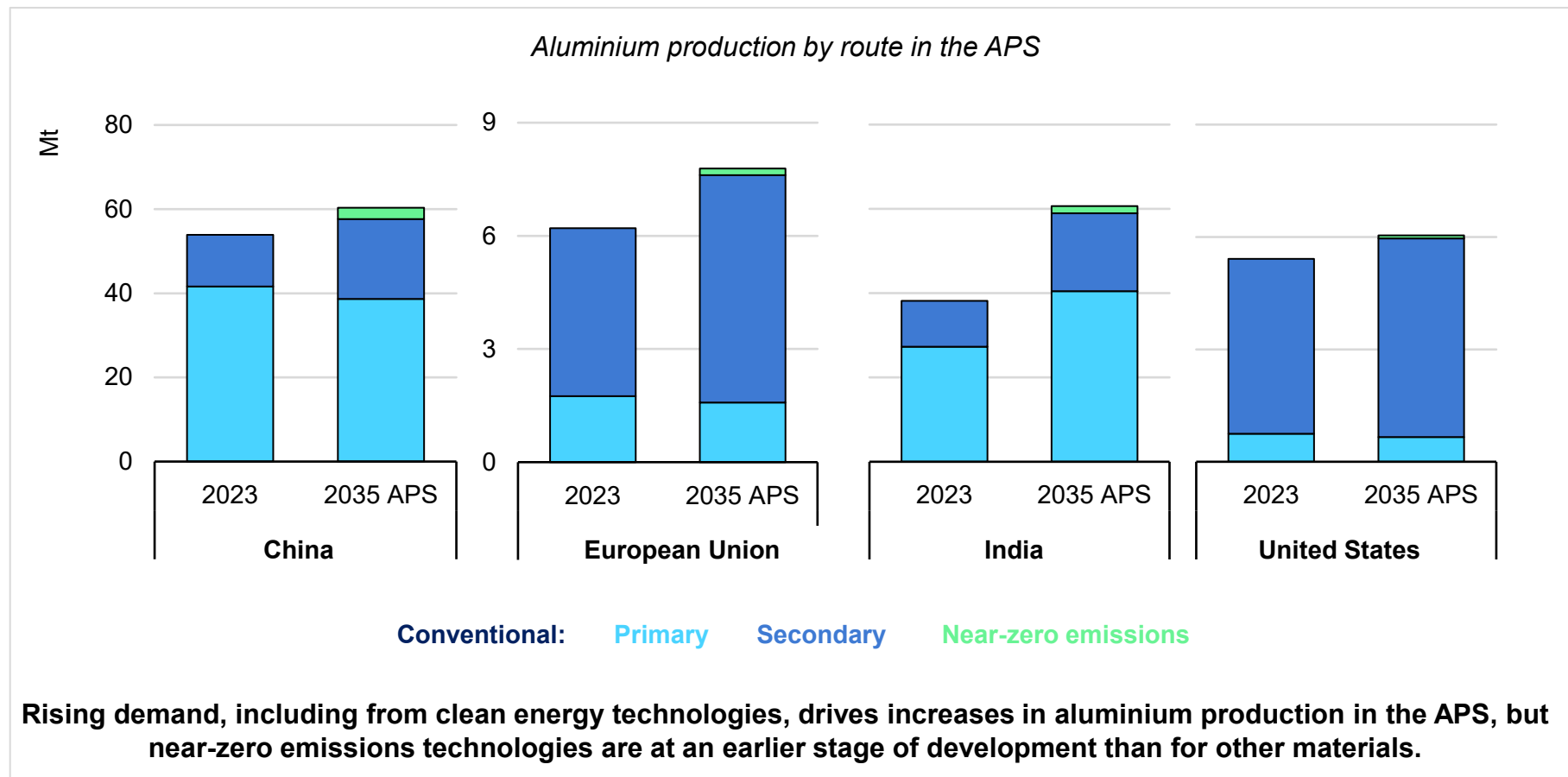


Manufacturing capacity for key materials is less geographically concentrated than for clean energy technologies, but announced projects for near-zero emissions production facilities are even more concentrated in some cases.

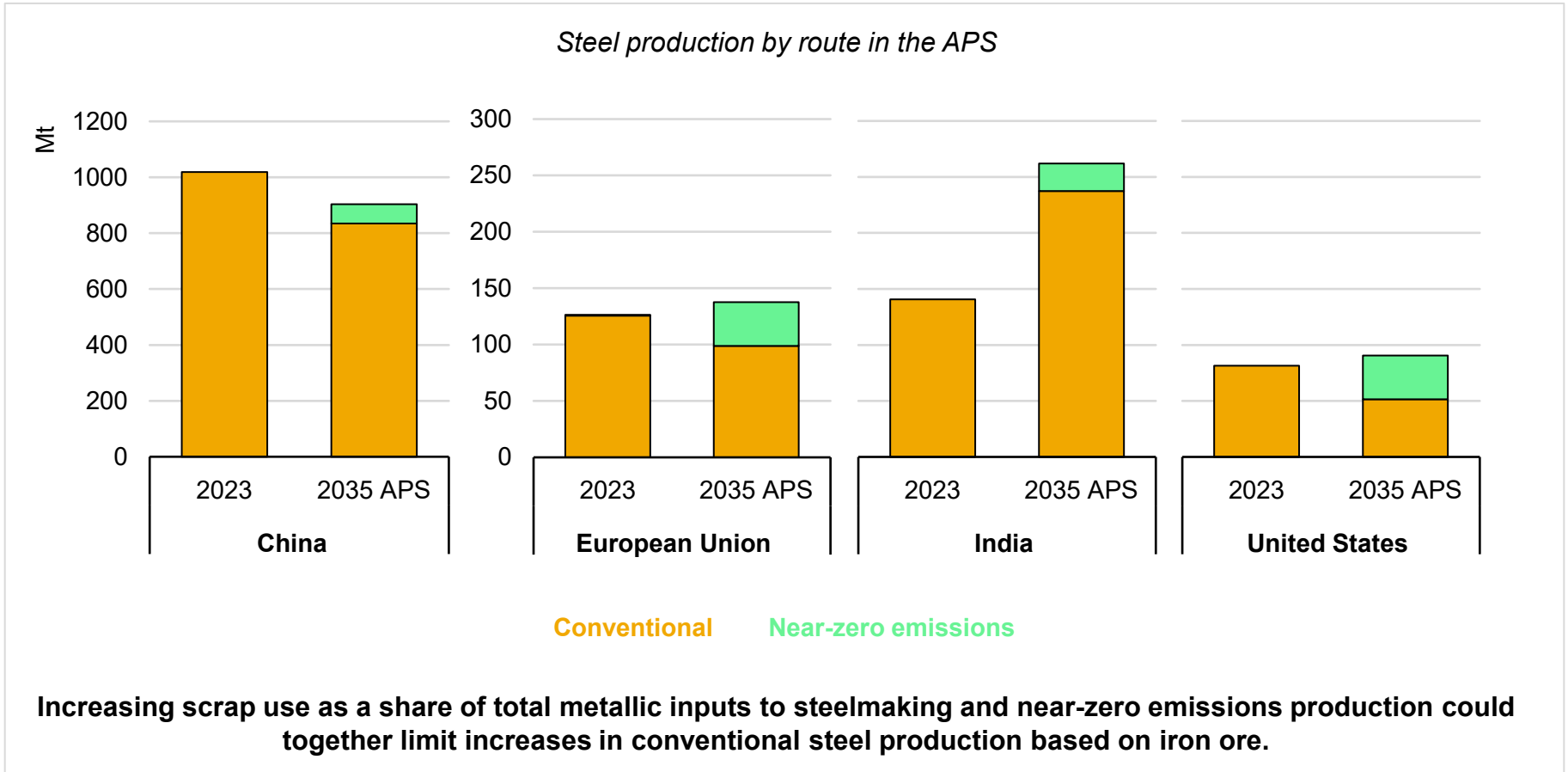
Shifting regional dynamics for production and trade



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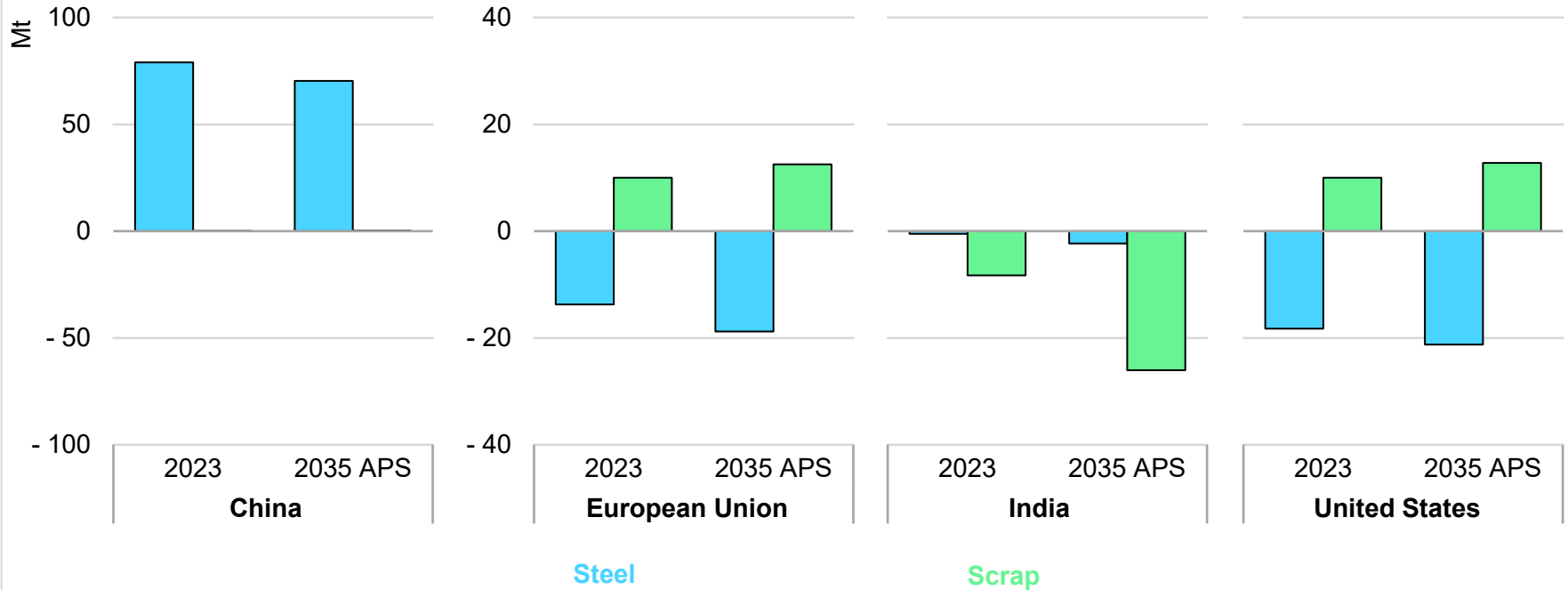


Shifting regional dynamics for production and trade



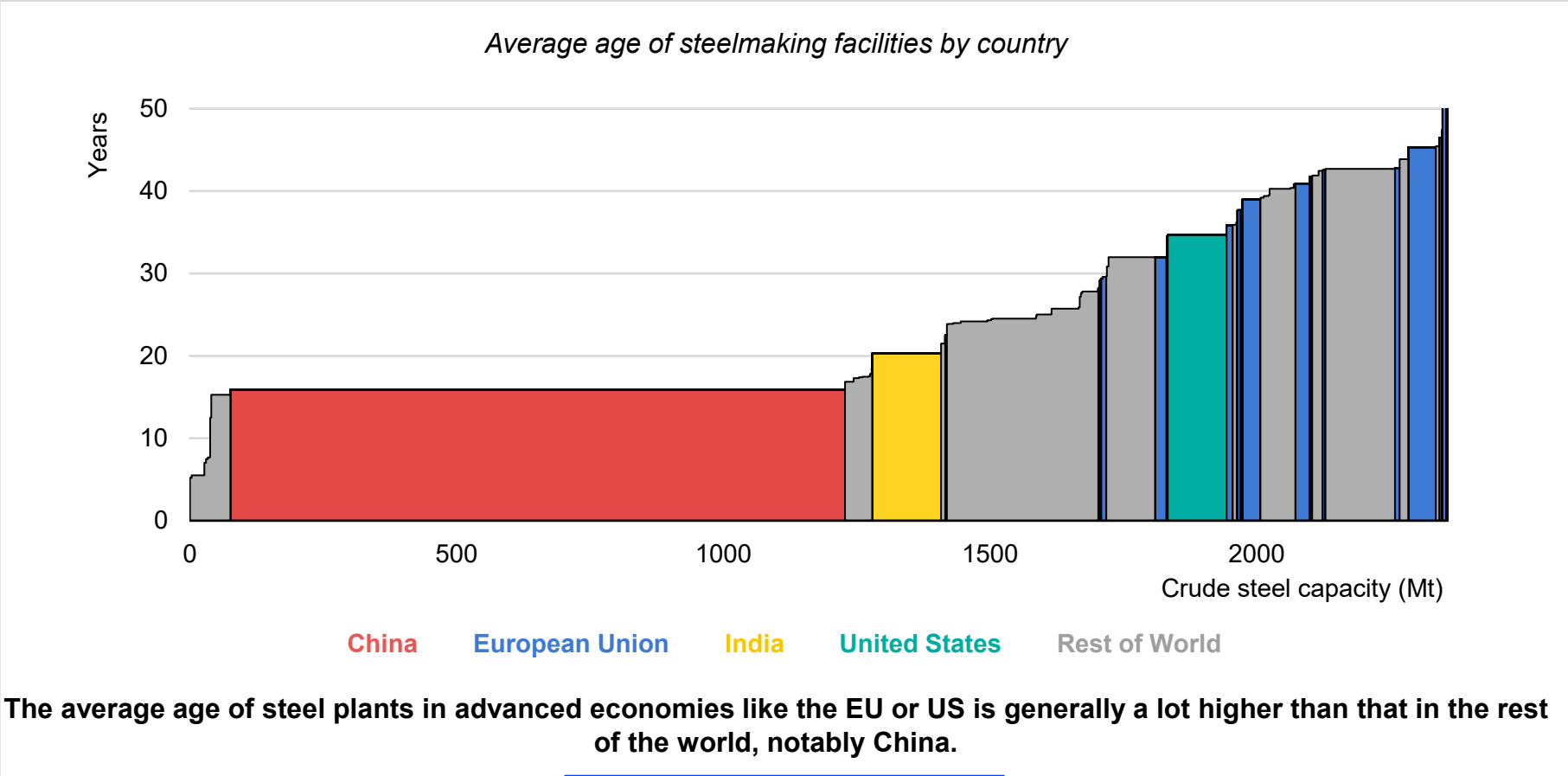
Shifting regional dynamics for production and trade

Net trade volumes of steel and steel scrap by region in the APS



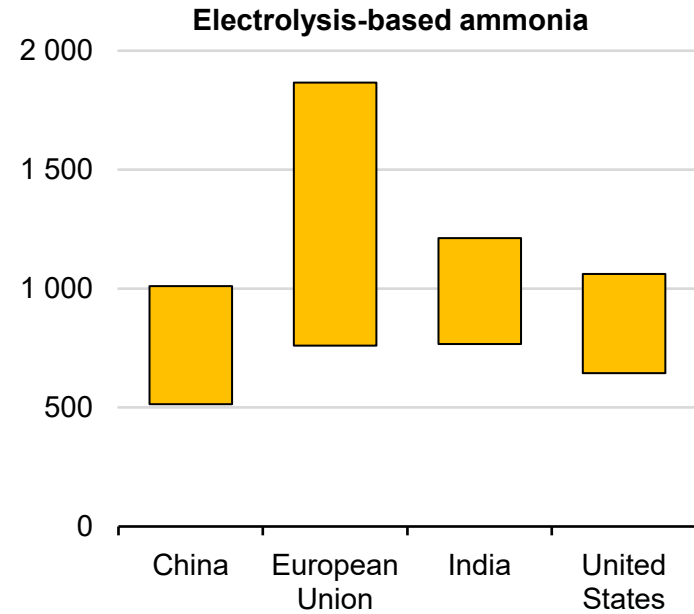
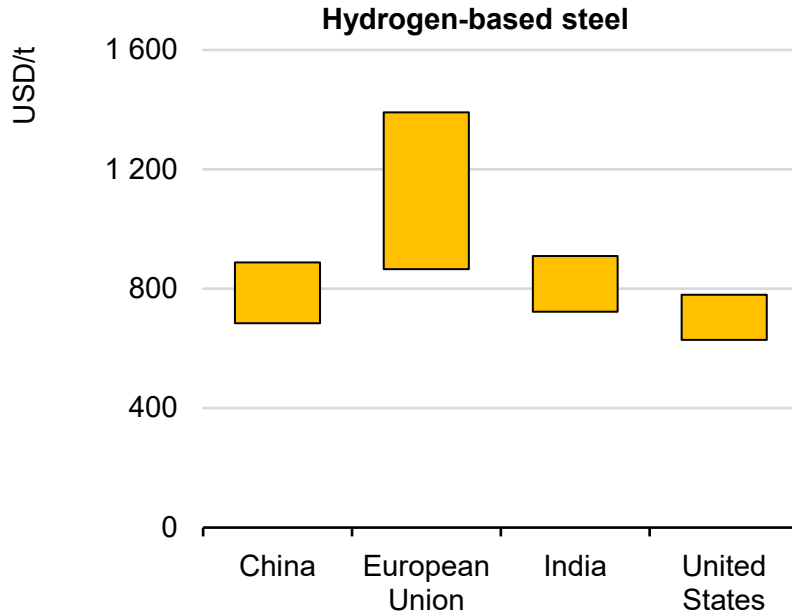
China remains a net exporter of steel in the APS. India could import scrap to help boost and decarbonise domestic steel production while demand is still growing rapidly.

Different regions have different starting points



Cost competitiveness is a key consideration for industrial strategies

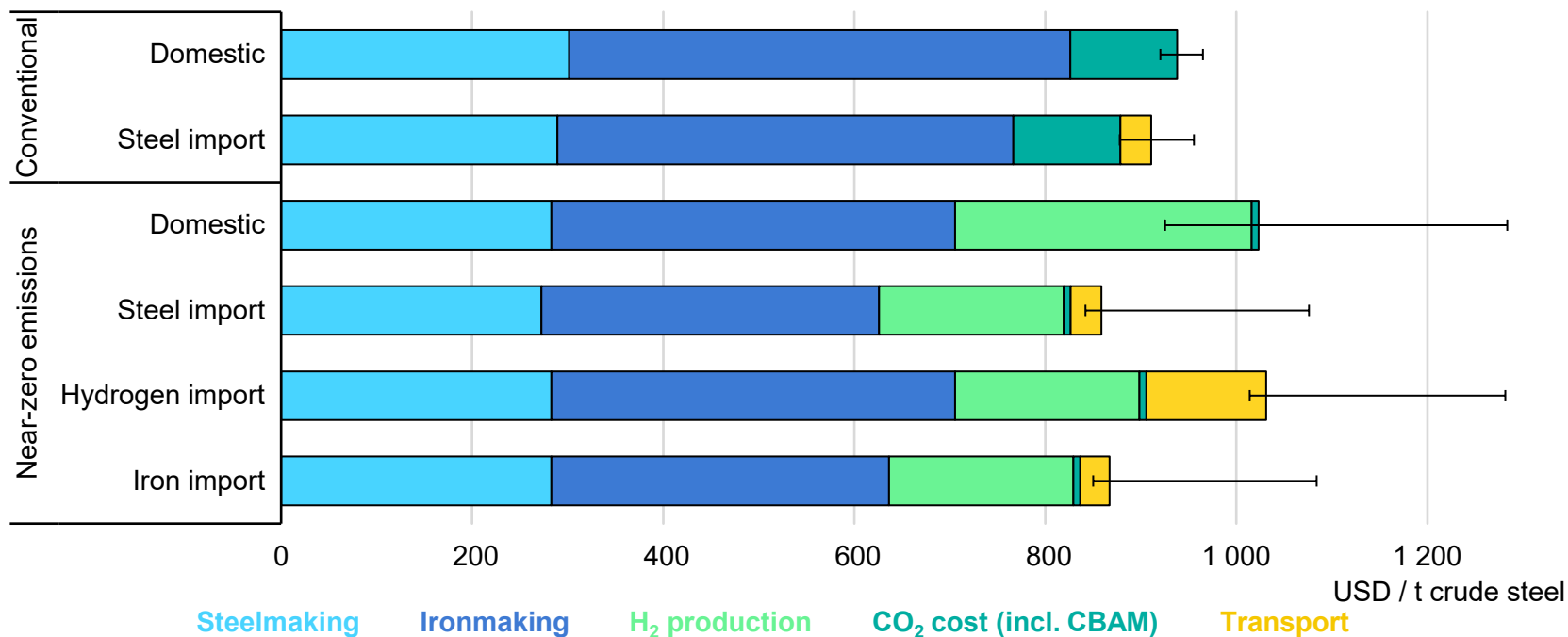
Production costs of materials using low-emissions hydrogen in the APS, 2035



Variation in energy, capital and labour costs between regions lead to significant differences in production cost, which persist in the APS, indicating a need for strategic partnerships and international collaboration.

Partnerships can lower the cost of energy-intensive inputs

Levelised cost of production of steel in the EU and cost of import from Brazil in the APS, 2035



Strategic partnerships with countries that can harness low-cost renewable resources to produce energy-intensive intermediates could help close the cost gap between near-zero emissions and conventional production.

Opportunities for emerging economies

Non-cost related factors play a decisive role in investment decisions

Enabling factors for establishing clean energy technology and material supply chains

Business environment

Ease of doing business

Finance costs

Industrial competitiveness

Resources and domestic markets

Workforce skills/human capital

Domestic demand

Resources and material inputs

Market size of related industries

Investment decision

Energy and transport infrastructure

Energy infrastructure

Reliability of electricity supply

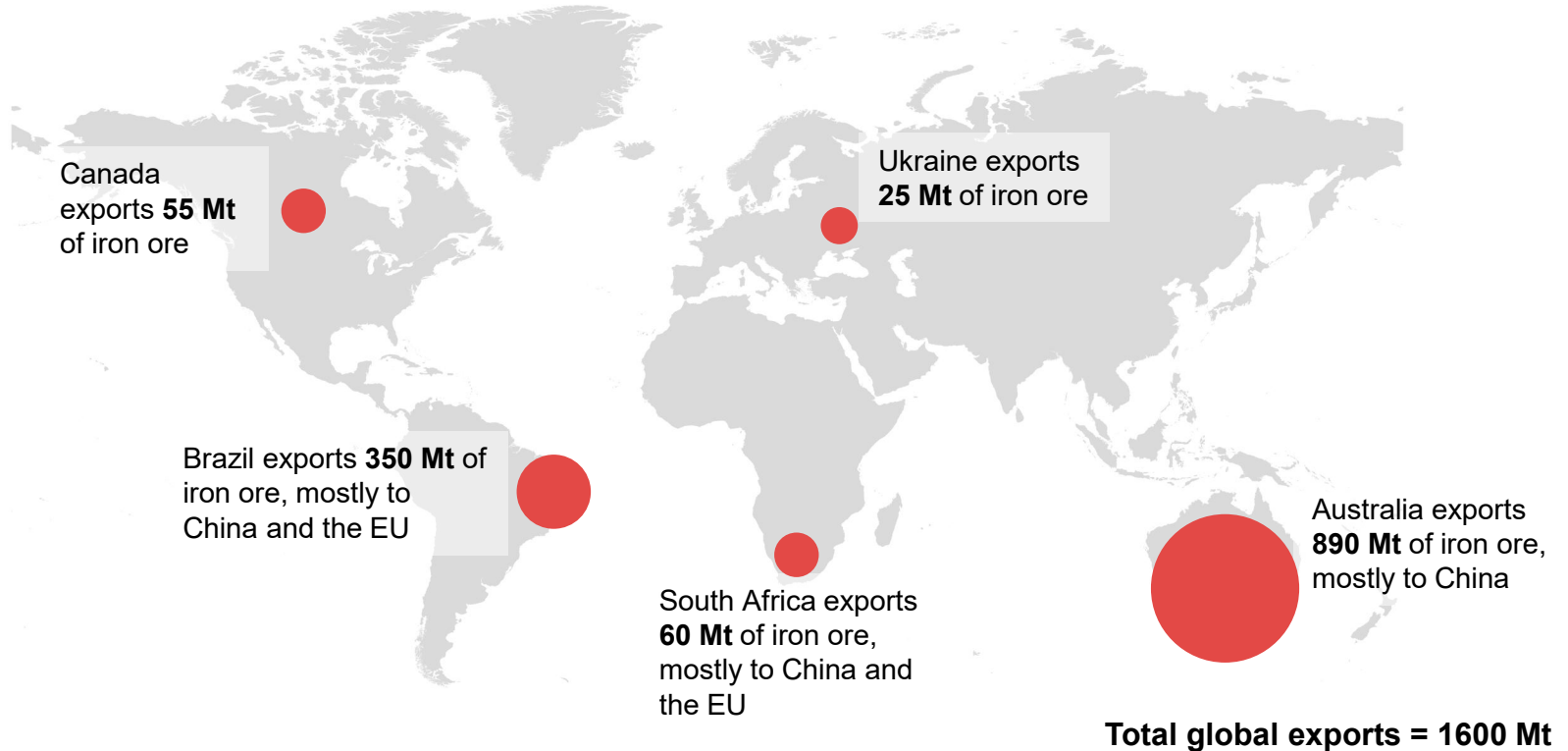
Access to low-emissions energy

Energy price

Transport infrastructure

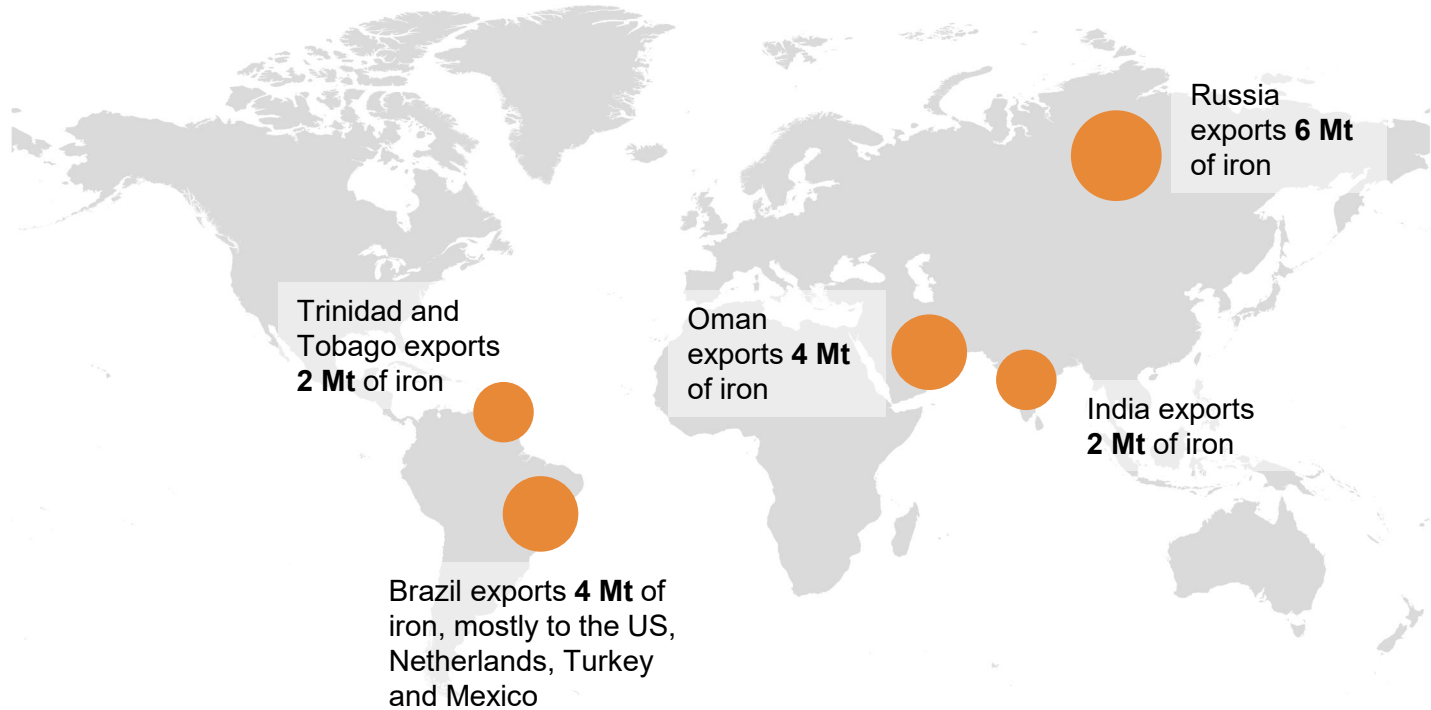
Supply chains for materials rely on global trade

Main exporters of iron ore, today



Supply chains for materials rely on global trade

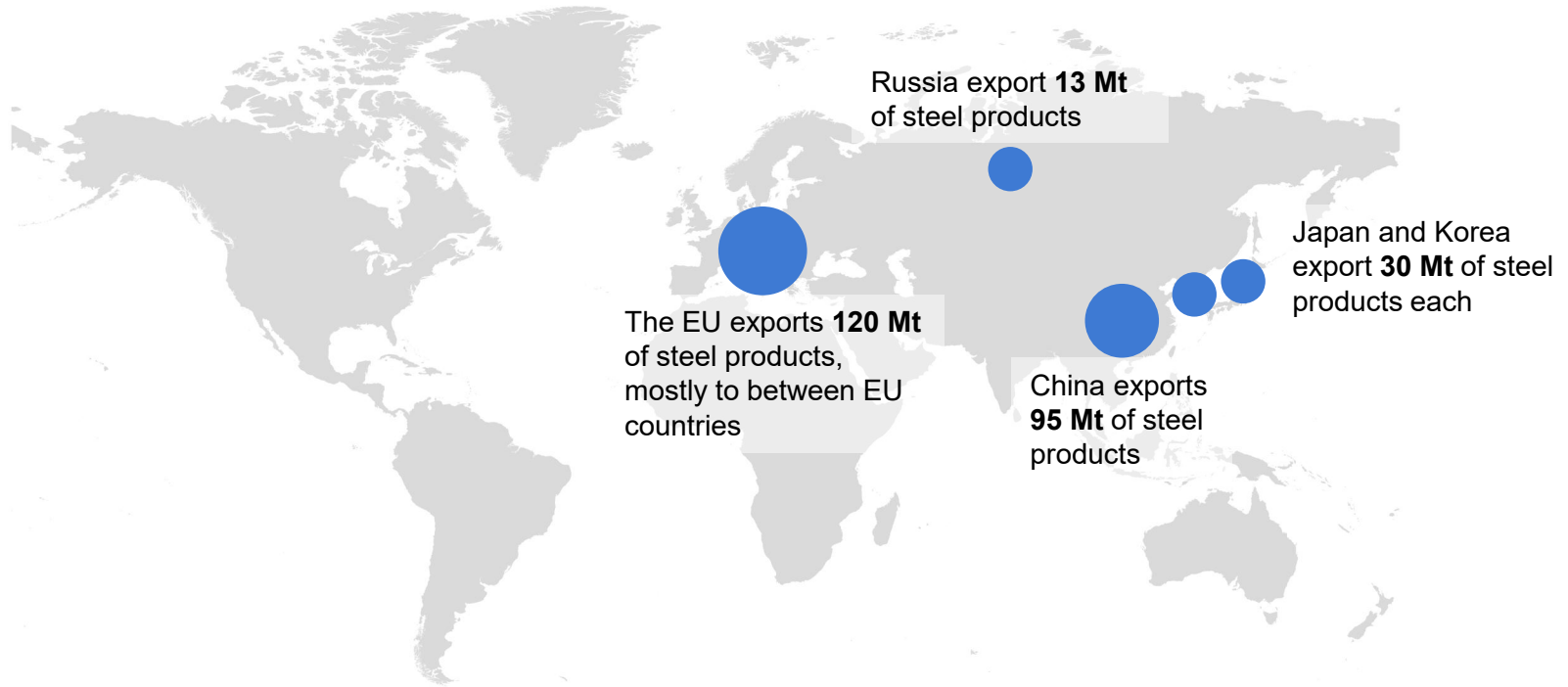
Main exporters of iron, today



Total global exports = 25 Mt

Supply chains for materials rely on global trade

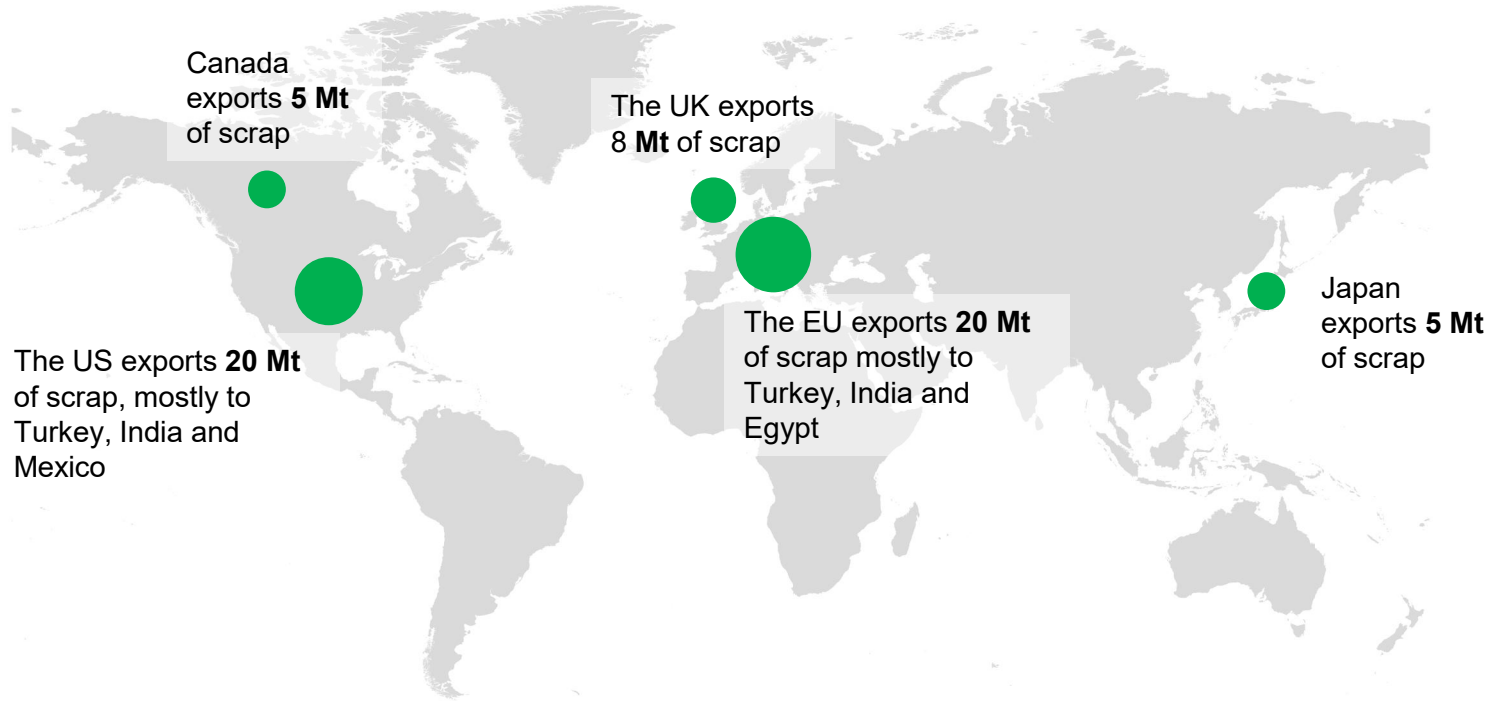
Main exporters of semi-finished and finished steel products, today



Total global exports = 435 Mt

Supply chains for materials rely on global trade

Main exporters of steel scrap, today



Total global exports = 100 Mt

- ✓ Good renewable resources
- ✓ Iron ore reserves
- ✓ Available energy infrastructure (North & South Africa)

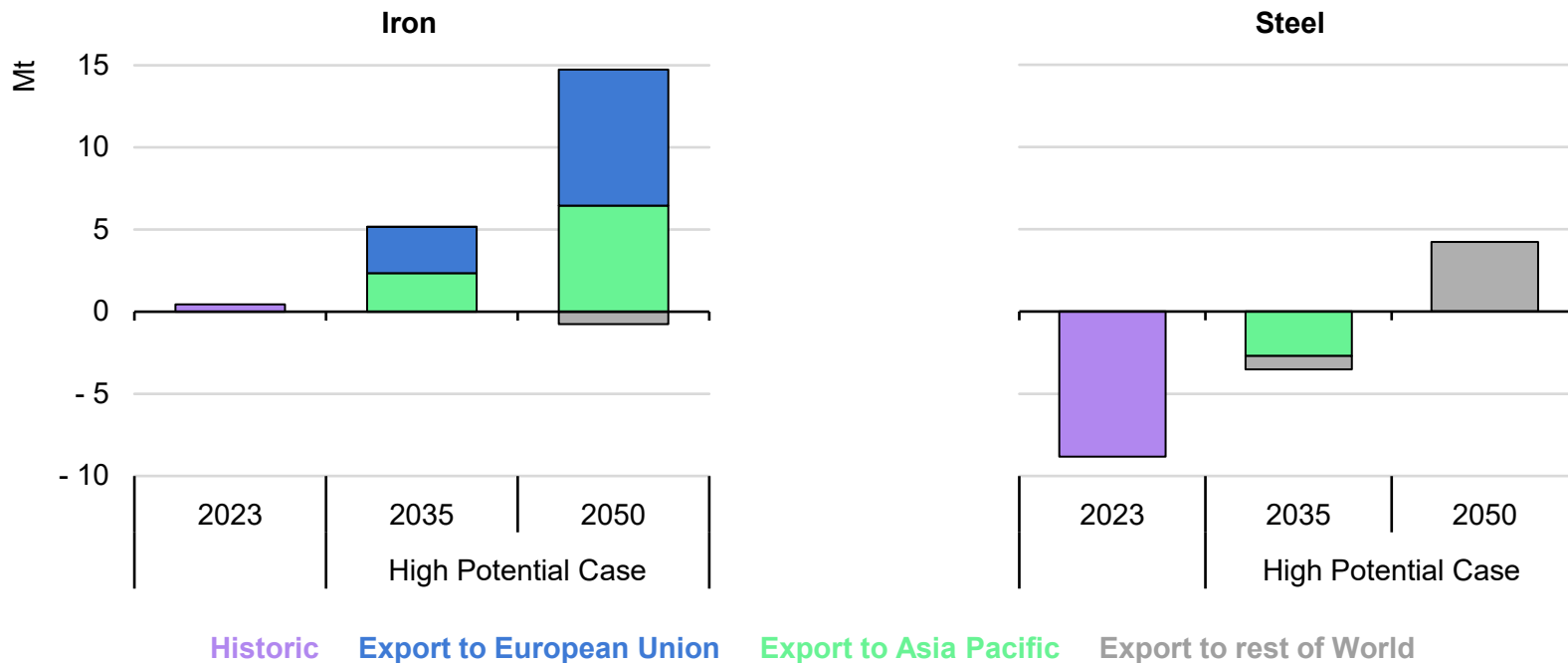


Africa becomes a key exporter of near-zero emissions iron

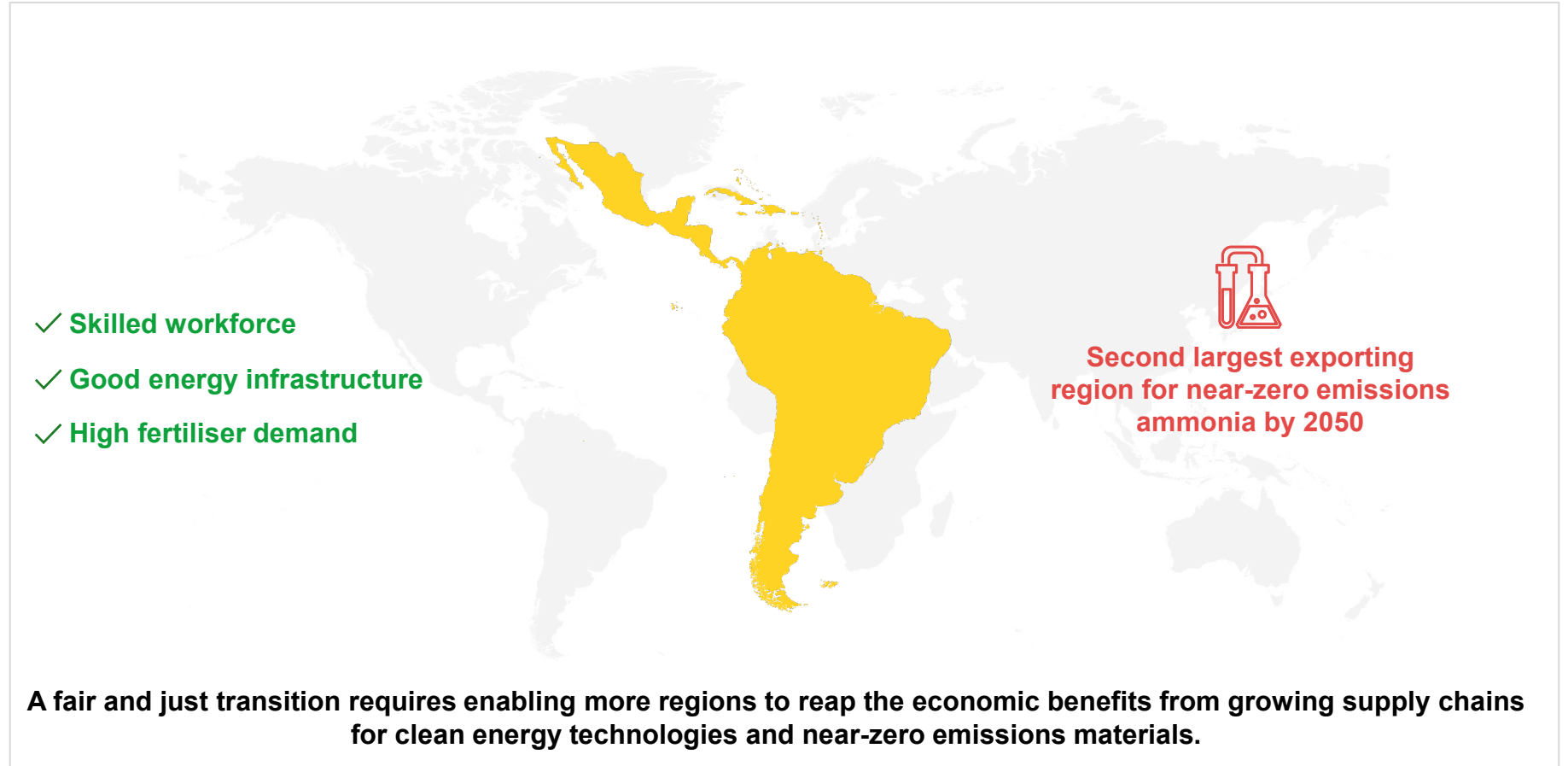
A fair and just transition requires enabling more regions to reap the economic benefits from growing supply chains for clean energy technologies and near-zero emissions materials.

Opportunities for emerging markets: Iron and steel in Africa

Net trade in iron and steel, Africa, High Potential Case

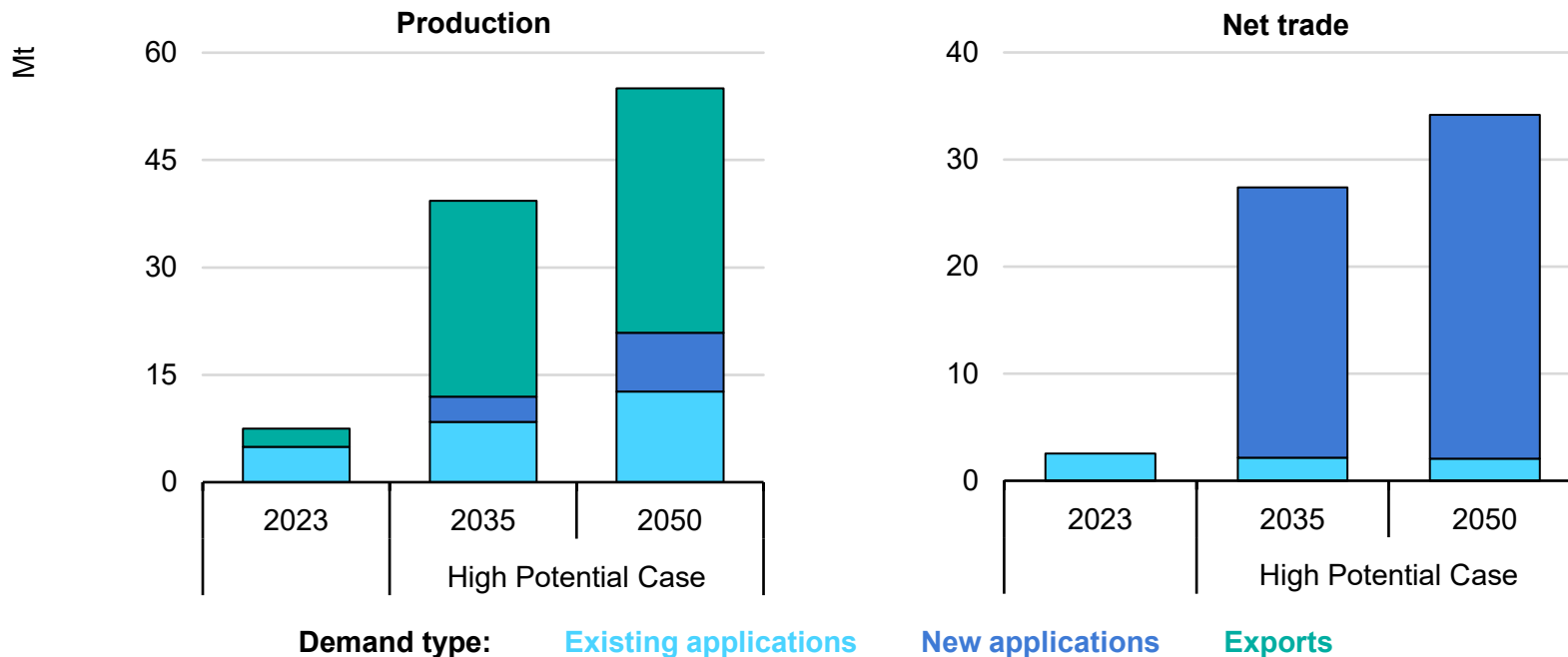


African countries could leverage their energy and materials resources to industrialise; near-zero emissions iron exports could be worth at least four times than the equivalent tonnage of iron ore.



Opportunities for emerging markets: Ammonia in Latin America

Ammonia production and net trade, Latin America, High Potential Case



Latin America could become a major exporter of near-zero emissions ammonia in the High Potential Case, meeting rising demand for new energy applications, including in the shipping and power sectors.

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