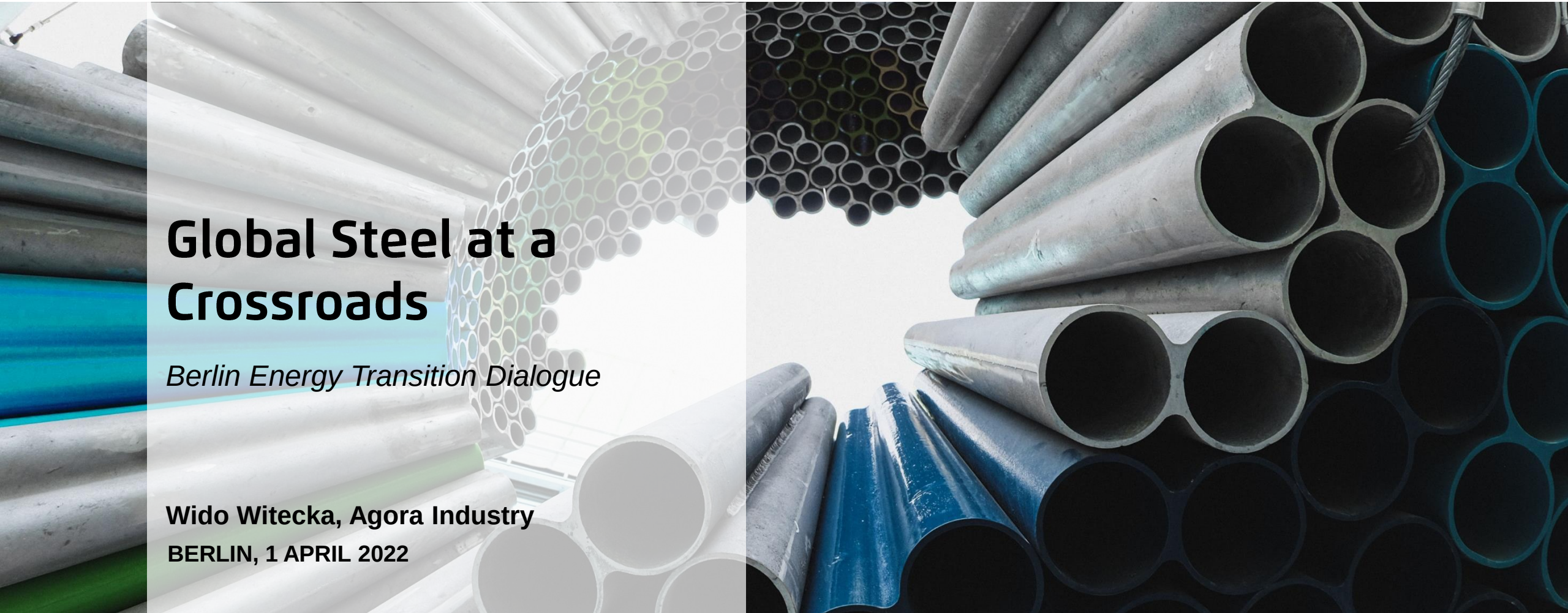


Global Steel at a Crossroads

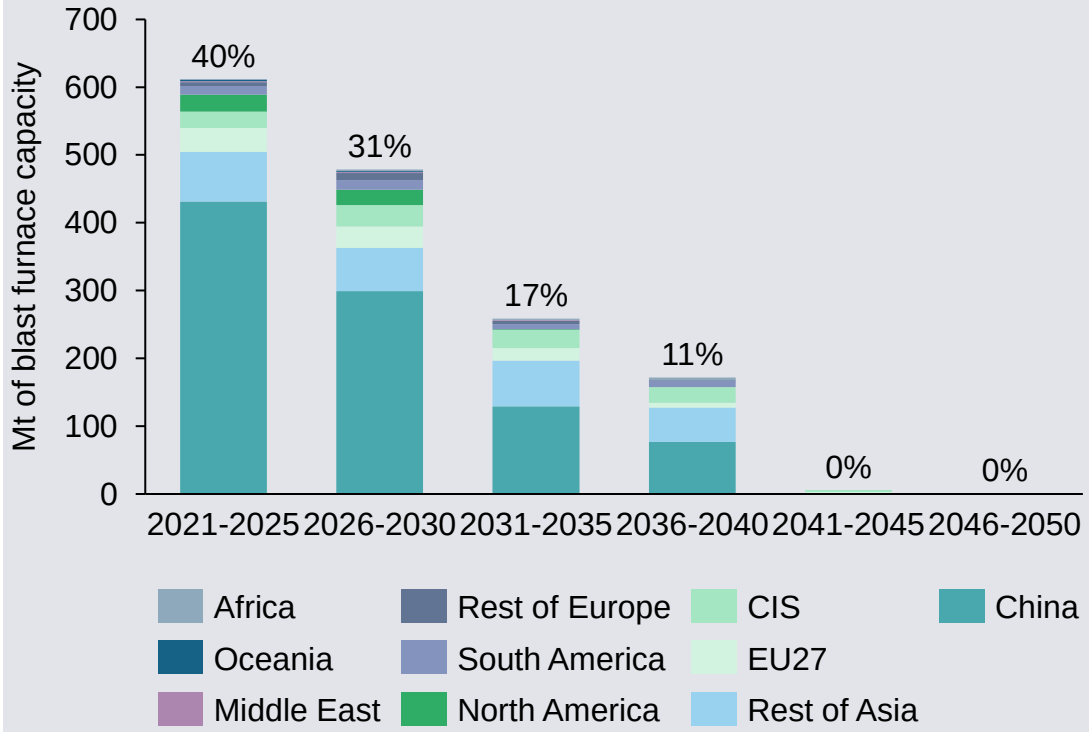
Berlin Energy Transition Dialogue

Wido Witecka, Agora Industry

BERLIN, 1 APRIL 2022

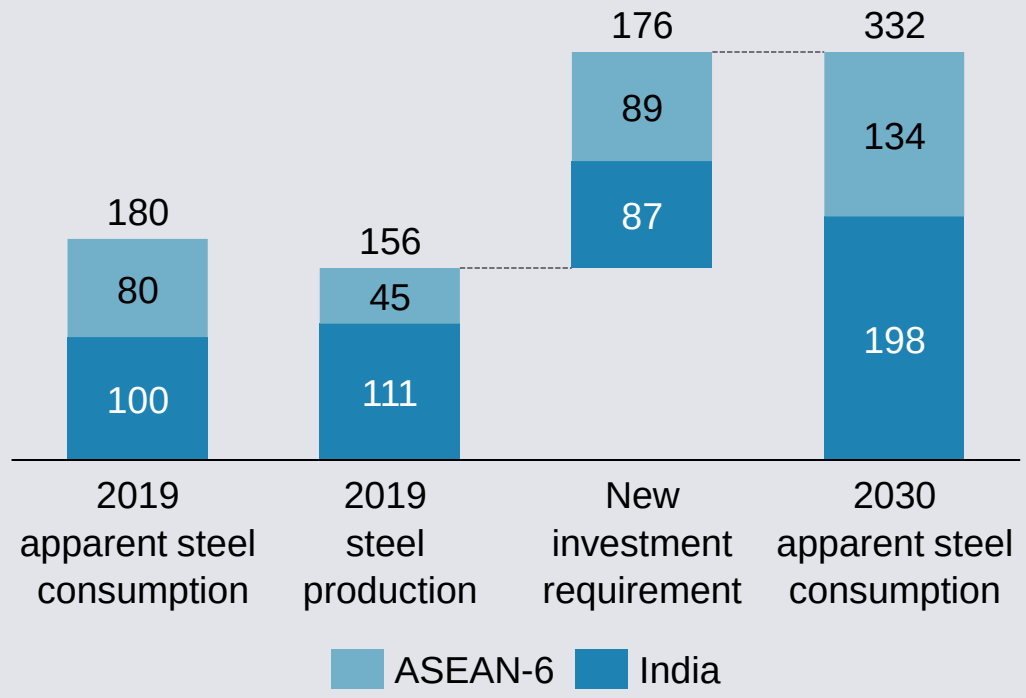
The global steel sector is at a crossroads: Before 2030, 71% of existing coal-based blast furnaces (1.090 Mt) will reach the end of their working life and require major reinvestments

Share of global blast furnace fleet requiring reinvestment



Agora Industry based on World Steel Dynamics, 2021; Agora Industry, Wuppertal Institute & Lund University for China, 2021

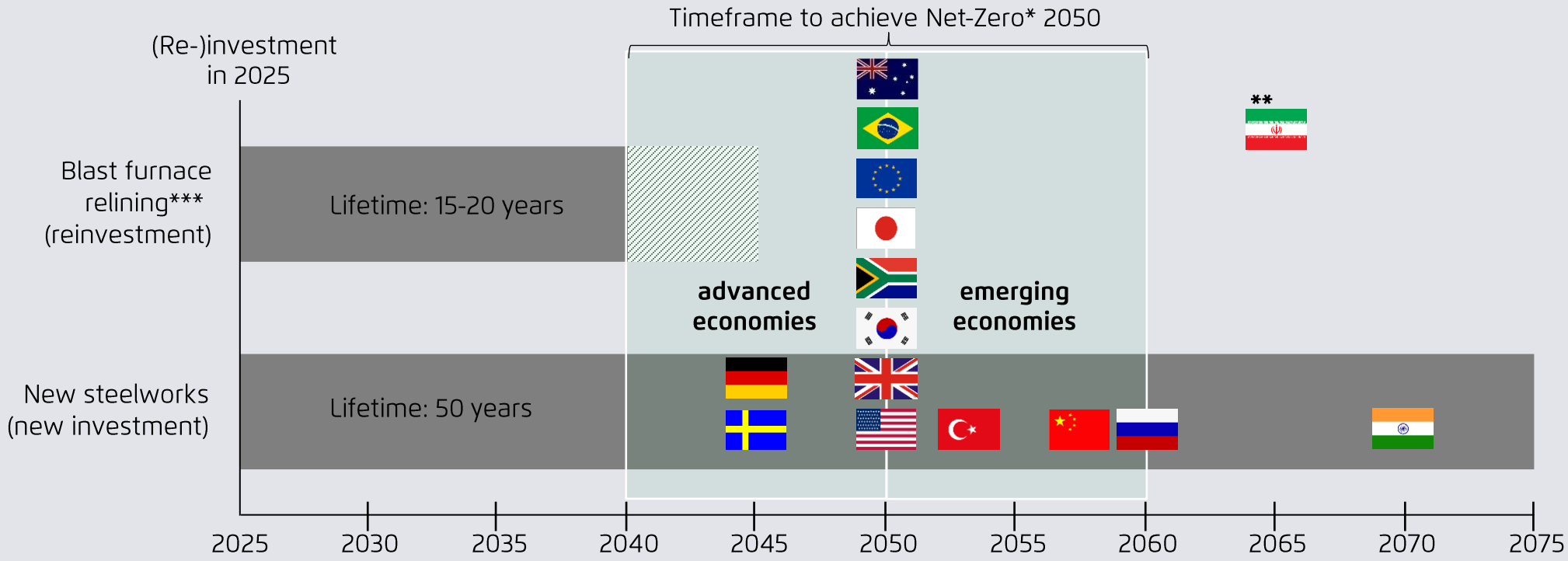
New investment requirement: projected new steelmaking additions



Agora Industry 2021, based on World Steel Dynamics, TERI 2020 and SEASI 2020

Due to the long lifetimes of steelmaking assets, the investment decisions in the 2020s will be crucial

Technical lifetime of coal-based primary steel production capacity and timeframe to achieve Net-Zero 2050

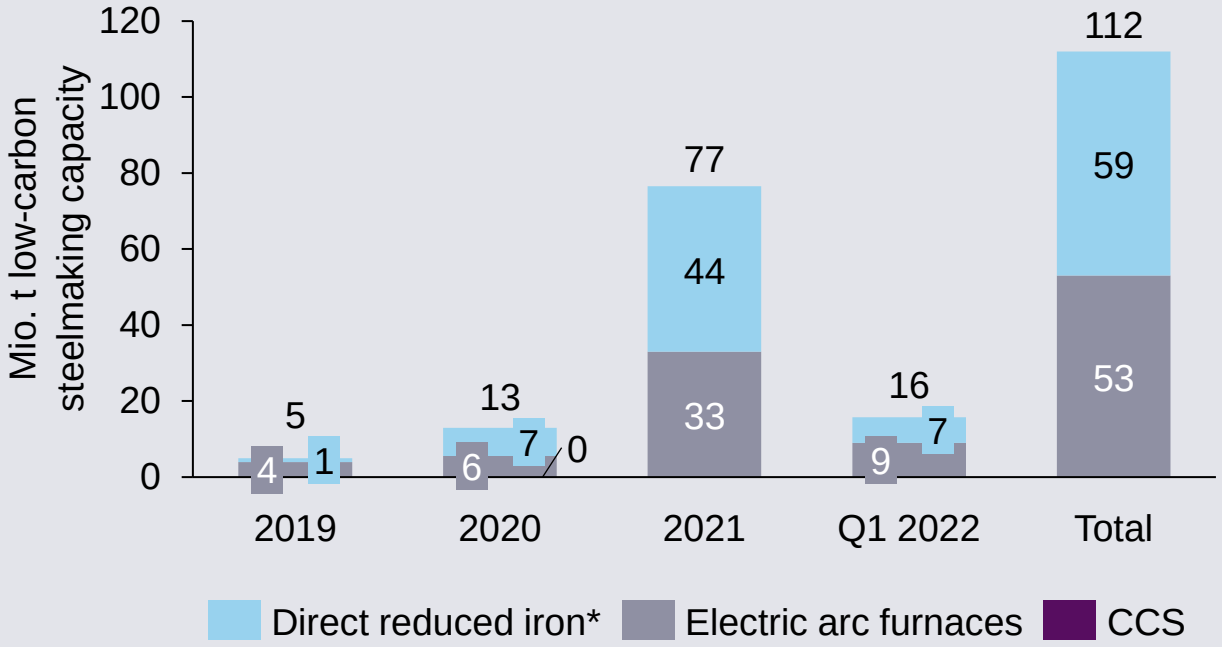


Agora Industry, 2021

* South Korea and South Africa have announced carbon neutrality targets. Russia's and Turkey's target are not official yet. All others have announced net zero targets. **n/a; no target *** 15 years lifetime in advanced economies; 20 years lifetime in emerging economies

Low-carbon steelmaking technologies are ready to be deployed now – and the project pipeline of announcements to build them before 2030 is growing rapidly

Global low-carbon steel announcements to be built before 2030 (left) and commercial-scale DRI announcements 2022-2026 (right)



Company, Country	DRI capacity	Year online
HBIS, CHN	1.2 Mt	2022
Metalloinvest, RUS	2 Mt	2024
ThyssenKrupp, GER	1.2 Mt	2025
Essar, KSA	5 Mt	2025
SSAB, SWE	2 Mt	2026

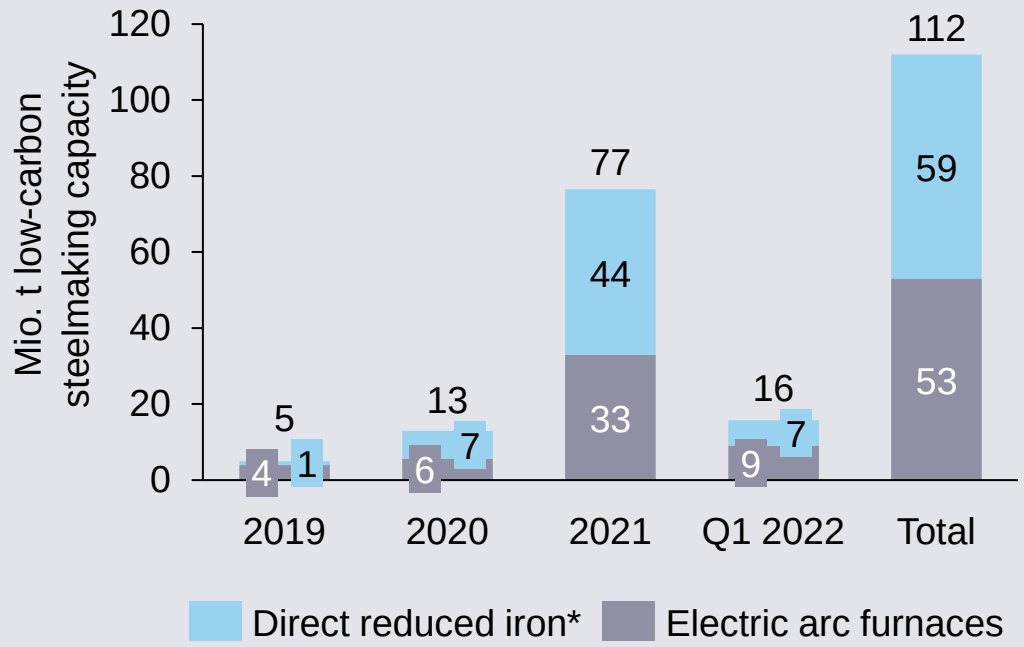
Another promising technology is molten oxide electrolysis. Boston Metal wants to build a commercial-scale plant by 2028.

Agora Industry based on Agora Industry Global Steel Transformation Tracker, 2022

*Steel produced by using direct iron reduction technology with hydrogen or natural gas.

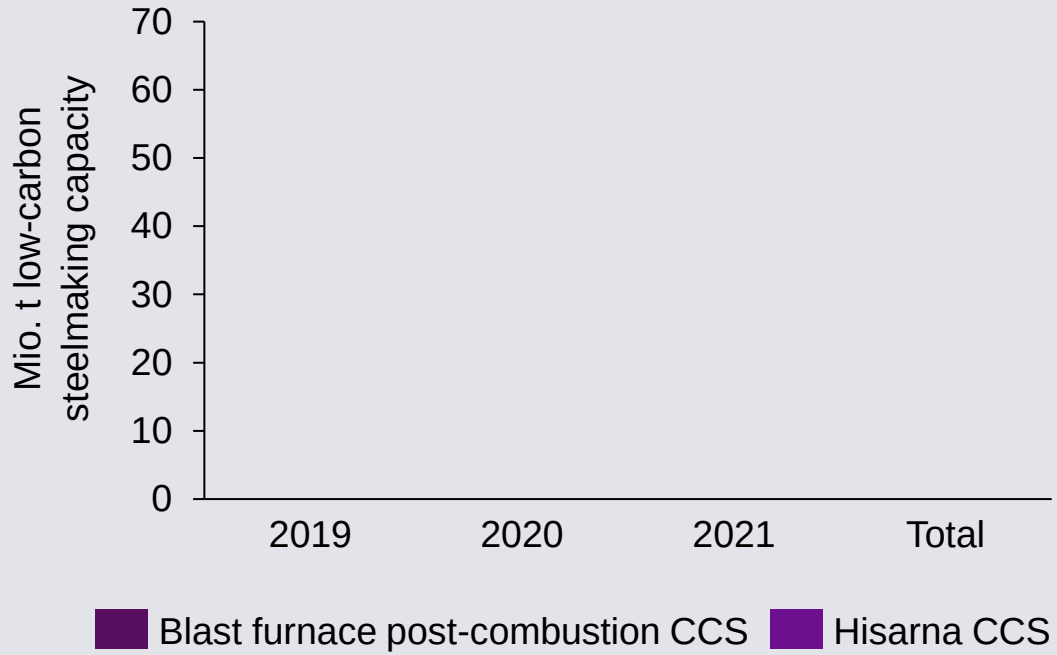
No steel company worldwide is working on the commercia-lization of CCS on coal-based blast furnaces. (Re-)investing into blast furnaces in the 2020s may be a dead-end road

2030 low-carbon steel announcements: DRI and secondary steel (EAF)



Agora Industry, 2021

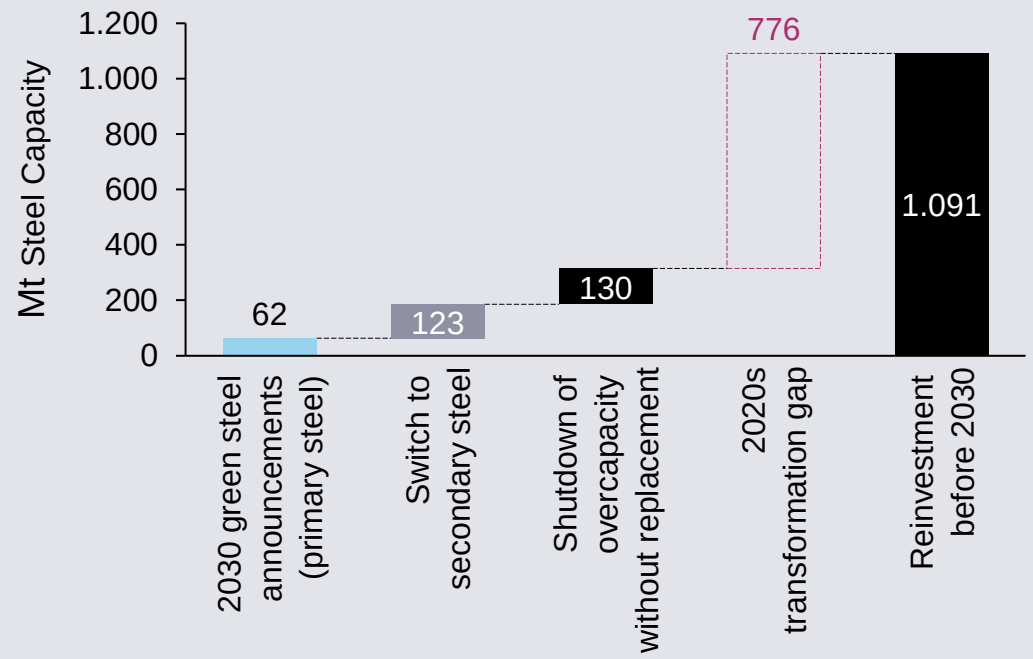
2030 low-carbon steel announcements: CCS in combination with coal-based steelmaking technologies



Agora Industry, 2021

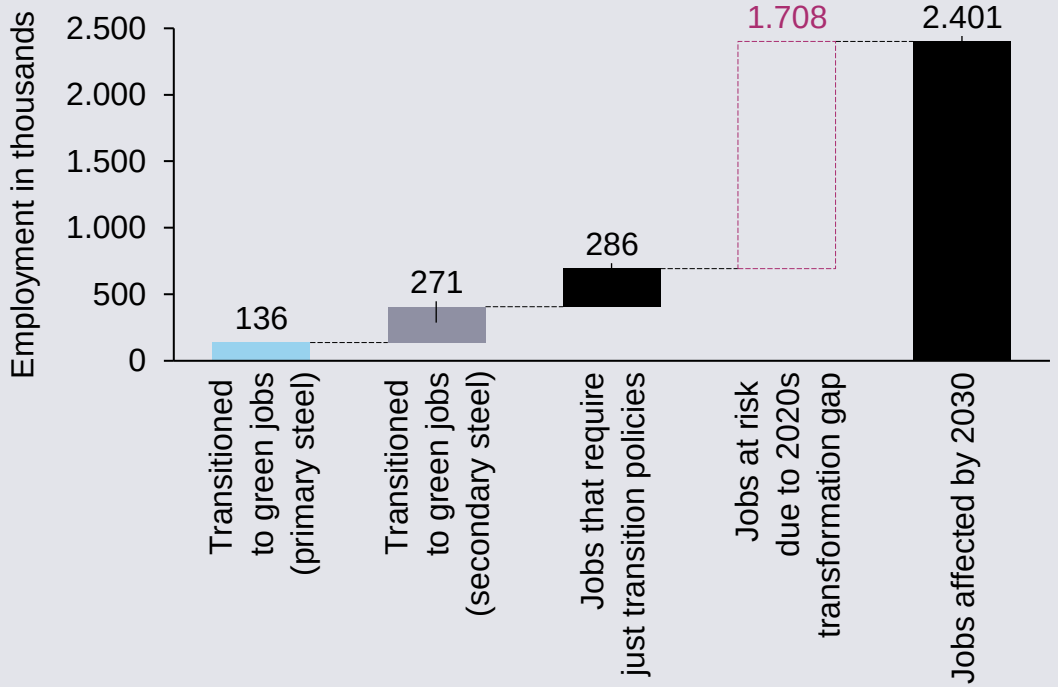
Global Steel: the asset transition task in the 2020s is enormous – but each low-carbon steel plant transitions more workers to clean and future-proof jobs

2020s transformation gap: Global production (status quo)



Agora Industry, 2021; switch to secondary steel based on World Steel Dynamics, 2021

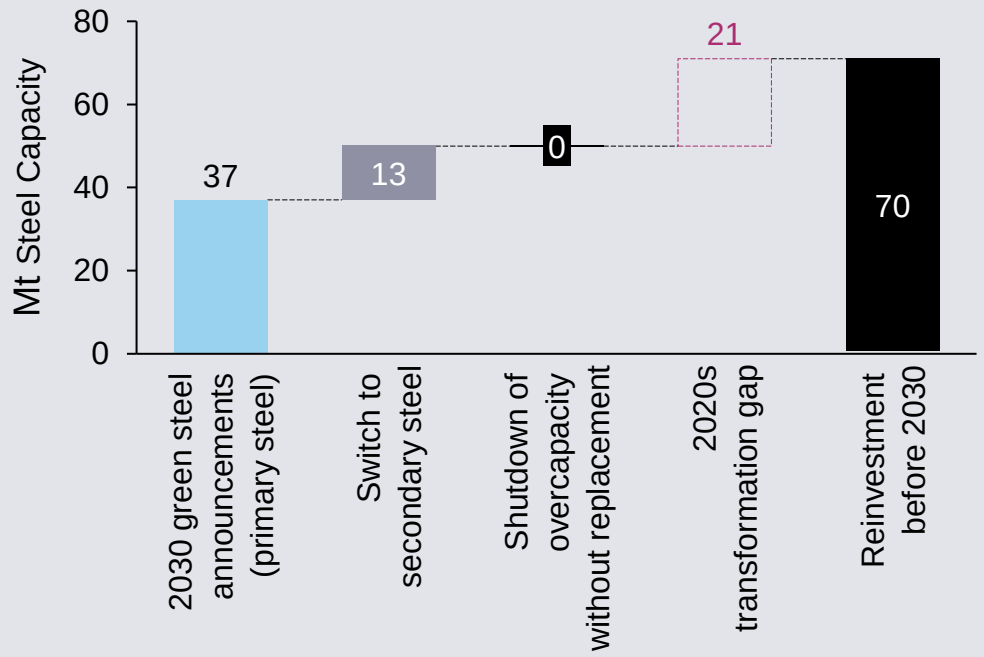
2020s transformation gap: Global employment (status quo)



Agora Industry, 2021

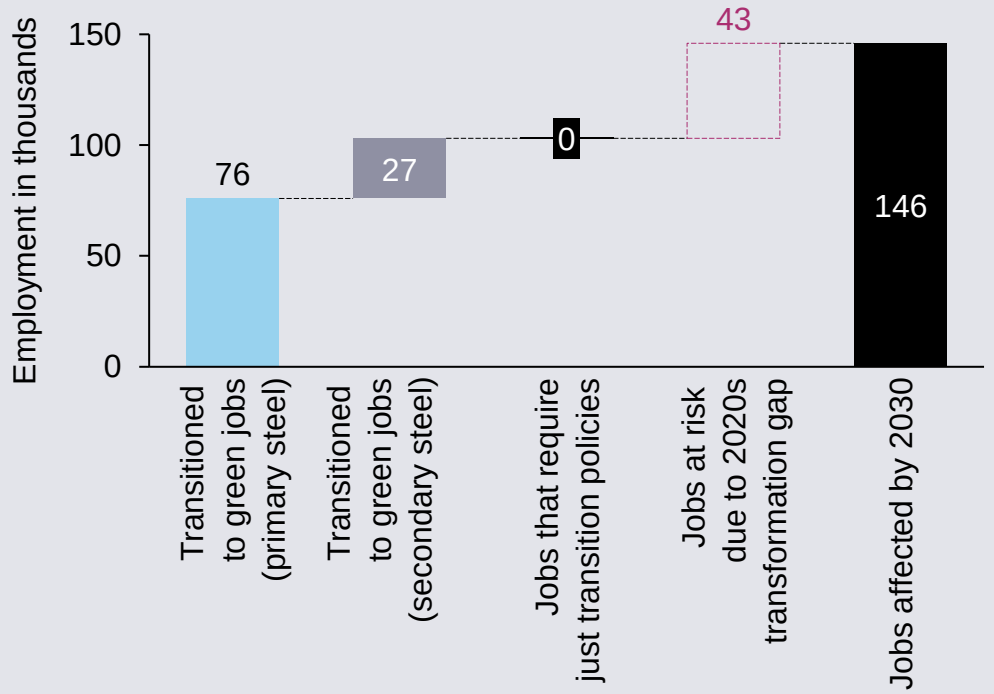
In the EU, most blast furnaces that reach the end of their campaign life by 2030 will be replaced with low-carbon technologies – policies that support final investment decisions are needed now

2020s transformation gap: EU27 production (status quo)



Agora Industry, 2021; switch to secondary steel based on World Steel Dynamics, 2021

2020s transformation gap: EU27 employment (status quo)

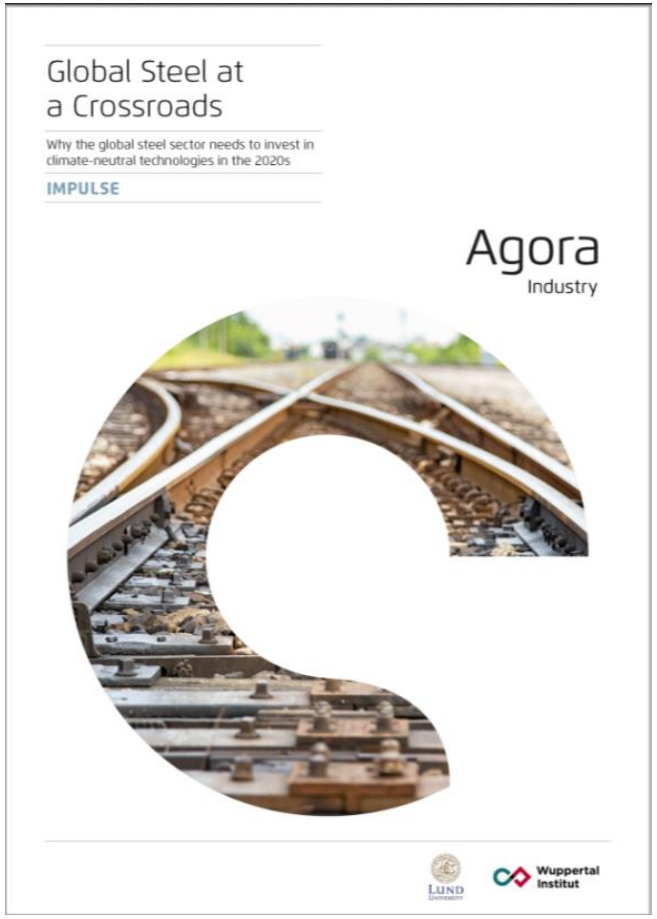


Agora Industry, 2021

Conclusions

- The global steel transformation needs to start in the 2020s. Key low-carbon technologies are ready and can be deployed now.
- As of now, DRI seems to be the only key low-carbon technology to decarbonize primary steelmaking that will be available in the 2020s. Challenges for its deployment include high grade iron ore qualities, clean hydrogen supply, an increase of DRI engineering capacity and policy instruments to bridge the cost gap.
- Aligning the steel sector with a 1.5°C compatible scenario needs to put the asset transition from coal to clean at its core. The best strategy is to avoid reinvestments into new blast furnaces by instead prolonging lifetimes of old assets by 2-5 years and after 2025, invest into DRI directly.
- For advanced economies this means that each blast furnace that reaches the end of its lifetime will be replaced with a technology that is compatible with climate neutrality. The EU and the US are planning to phase-out coal in the power sector by the early 2030s – by then blast furnaces would be highest emitters.
- A single-speed global steel transformation can bring enhanced international cooperation and a level playing field. The transformation will help to transition millions of workers to clean, future-proof jobs.

For more information: „Global Steel at a Crossroads“ Paper and the „Global Steel Transformation Tracker“



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Thank you for your attention!

Questions or comments? Feel free to contact me:

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