

Business Breakthrough Barometer 2024

Steel



World Business
Council
for Sustainable
Development

BAIN & COMPANY 

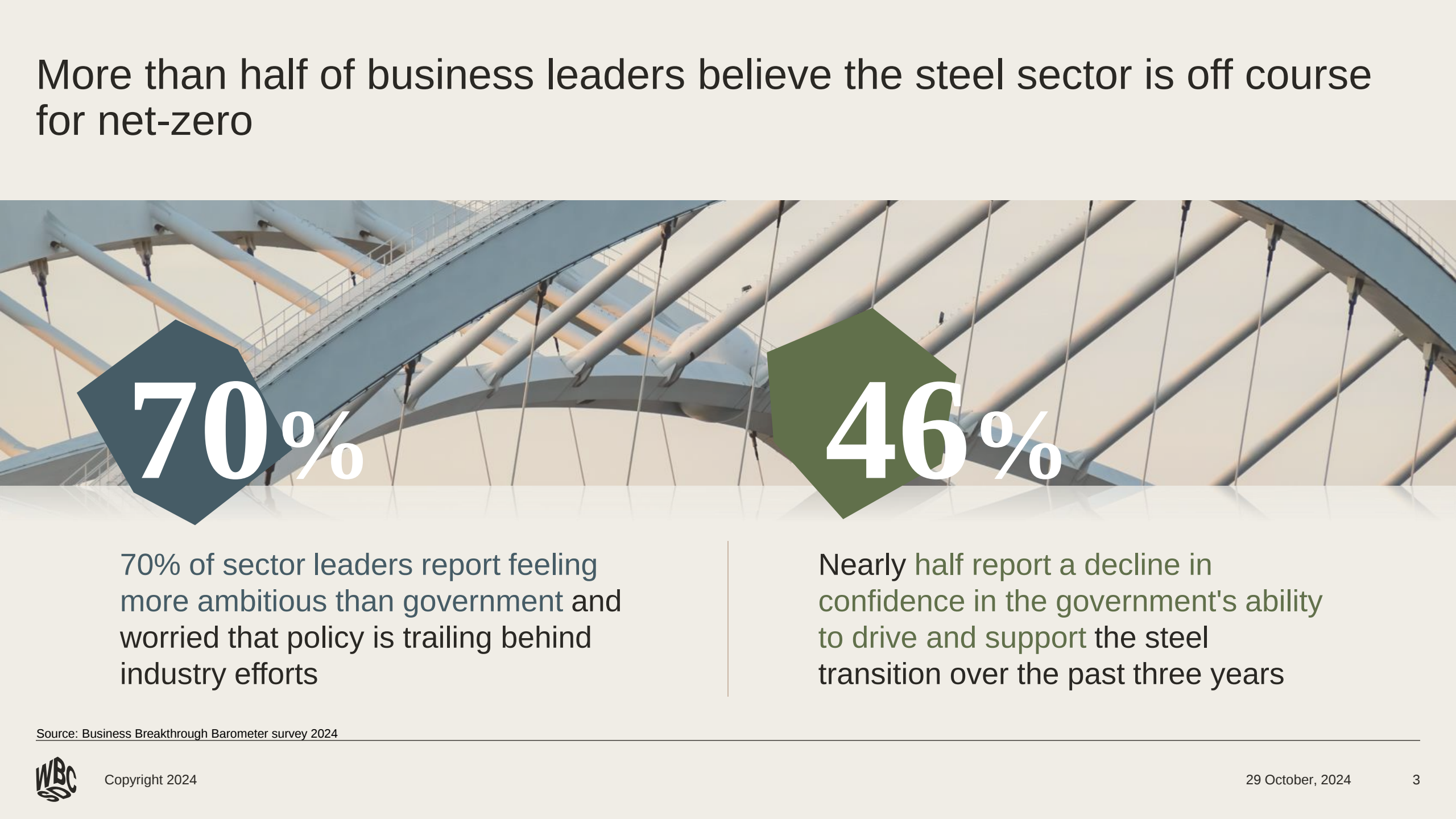
29 October, 2024



Key messages

- **More than half of business leaders believe the steel sector is off course for net-zero**
 - 70% of sector leaders report feeling more ambitious than government and worried that policy is trailing behind industry efforts
 - Nearly half report a decline in confidence in the government's ability to drive and support the steel transition over the past three years
- **Despite this, sector leaders report a surge in capital commitments to net-zero steel**
 - Announced DRI 2030 capacity jumping 150% in the last year
 - However, this falls short of the 120-150 Mtpa needed to hit the 2030 Breakthrough target and represents only 70-80% of the capacity required under the IEA's 2030 NZE scenario calling for 8% of iron production to be near zero
 - 31% of the 2030 pipeline envisages using green hydrogen; a further 46% will initially transition from natural gas to hydrogen, with pathway dependent on geographic fuel availability
- **But business leaders are also concerned that much of this planned capacity may never materialize**
 - Only 9% of leaders at frontier companies are very confident that recent project announcements will reach Final Investment Decision (FID).
 - And many earlier projects have been shelved or pushed back towards 2030
- **Hydrogen costs and availability are universally seen as the key factor in making the net-zero business case viable**
 - Business are preparing for production changes requiring a stable supply of green hydrogen as ETS and CBAM increasingly drives up the price of emissions intensive production
 - In addition to securing supply, steel players are watching the price of green hydrogen to make the business case, citing required prices ranging between \$1.5 - \$2 /kg for a viable business case
 - However, all agree that government intervention will be needed to guarantee the low-priced hydrogen required to get projects off the ground
- **On the revenue side, businesses are largely counting on early-stage voluntary demand from consumer-facing sectors like automotive to de-risk FID**
 - Early-stage voluntary at a premium up 20% is key for driving future FID on near zero steel projects
 - Businesses acknowledge that scale of voluntary demand willing to pay a premium is still limited
 - Despite early demand from consumer facing industries, steel sector worried that passing through higher costs will be challenging as customers are not ready to absorb price increase
- **At the same time, business leaders foresee significant supply chain disruption given the potential for falling input costs in some regions, intensifying regulatory pressures, and difficulty sourcing green H2**
 - Many steel executives are anticipating the decoupling of iron and steel production for primary steel
 - Several companies planning expansions of hydrogen DRI in the MENA and Australia, driven by growing and aggressive low cost electrolyzer production, abundant renewable energy, and cheap interim natural gas
 - Steel ranked as sector where international coordination was deemed most crucial, with 47% of executives rated it as very important, though most respondents judged current mechanisms as largely ineffective
- **While momentum for low-carbon steel is growing, businesses stressed that these efforts pale in comparison when set against the large, young, and expanding fleet of BF-BOF plants**
 - In China and India, where assets average 14 and 18 years with 40-year lifespans, there's hope, but scepticism, that limited local incentives and CBAM will drive sufficient change
 - Industry experts are positive when discussing move towards greener production methods for India, driven by recent announcement of the Indian carbon market
- **This makes CCUS a potentially critical part of the solution, but businesses are increasingly worried about limited progress**
 - Businesses are increasingly concerned policy support is not sufficient to secure ROI and bolster pipeline
 - Geologic carbon storage capacity varies greatly by region with promising subsurface reservoirs in e.g., Gulf of Mexico, North Sea, Indian subcontinent
 - Even if all current pipeline CCUS projects are realized, less than 1% of global steel production will be covered
 - A massive investment boost is needed to meet the IEA's 2030 target of 60 MtCO₂ captured annually
- **Majority of steel players cite investment case as well lack of mandates and standards as key barriers holding back near zero steel**
- **Sector sees key policy focus for next 12 months in strengthening carbon pricing and adjustment, introducing sector mandates, and aligning on international standards**

More than half of business leaders believe the steel sector is off course for net-zero



70%

70% of sector leaders report feeling more ambitious than government and worried that policy is trailing behind industry efforts

46%

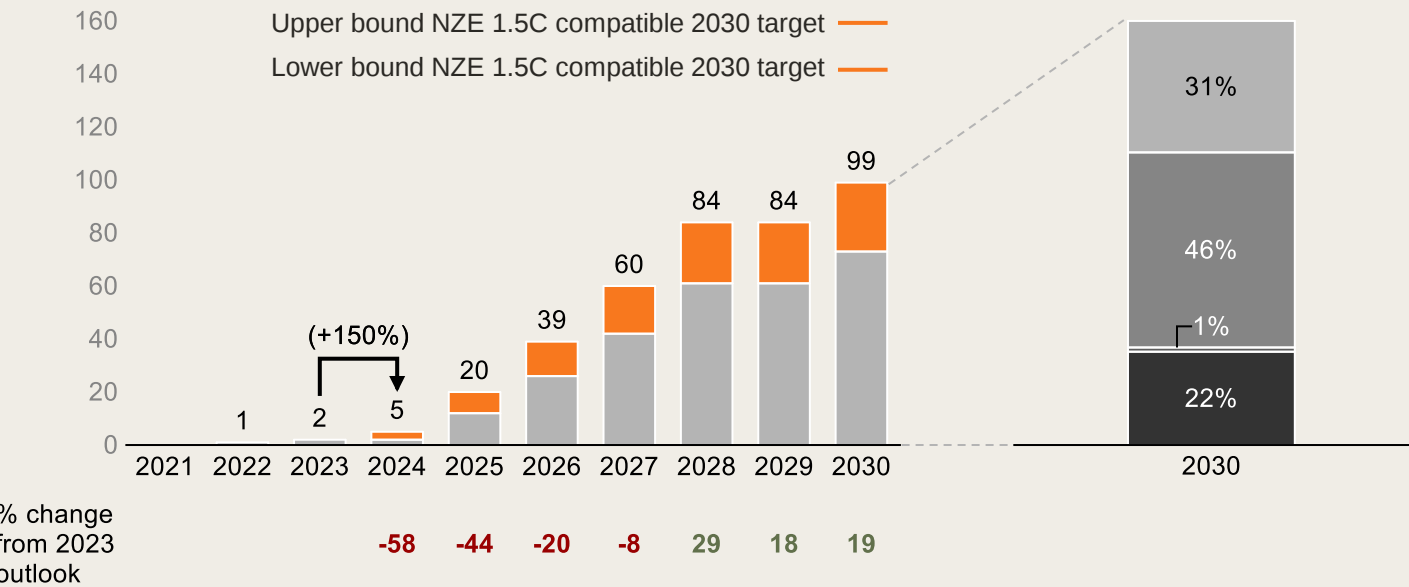
Nearly half report a decline in confidence in the government's ability to drive and support the steel transition over the past three years

Source: Business Breakthrough Barometer survey 2024

Despite this, sector leaders report a surge in capital commitments to net-zero steel

H2 ready DRI capacity (mtpa)

■ Announcements without FID ■ FID



Intended technology share in 2030 DRI pipeline (%)

■ H2-DRI ■ NG-DRI to H2-DRI
■ NG-DRI-CCUS ■ NG-DRI

- Announced DRI 2030 capacity jumped 150% in the last year
- 31% of the 2030 pipeline envisages using H2; a further 46% will initially run off NG
- However, this represents only 66 - 82% of DRI capacity required under the IEA's 2030 NZE 1.5 compatible scenario

"We have announced quite a lot of investment in DRI and EAF in Europe, and, in North America. But we haven't reached final investment decision yet on any of those in Europe."

VP, SUSTAINABILITY, STEEL MANUFACTURER

Note: Global production includes primary and secondary steel production volumes; The 2030 targets refer to the near-zero emissions primary steelmaking capacity that would be needed to be on a 1.5C compatible pathway based on IEA, IRENA, UN 2022, and Agora Industry scenarios; Source: World Steel Associated – World Steel in Figures Agora Industry (2024); Global Steel Transformation Tracker (2024)

But business leaders are also concerned that much of this planned capacity may never materialize



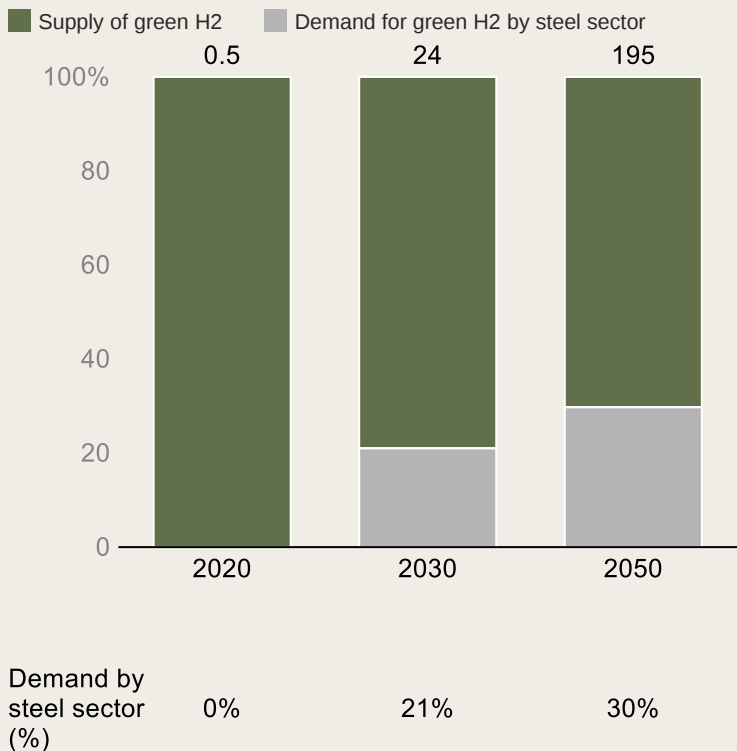
Only 9% of leaders at frontier companies report feeling “very confident” that recent project announcements will reach Final Investment Decision (FID)



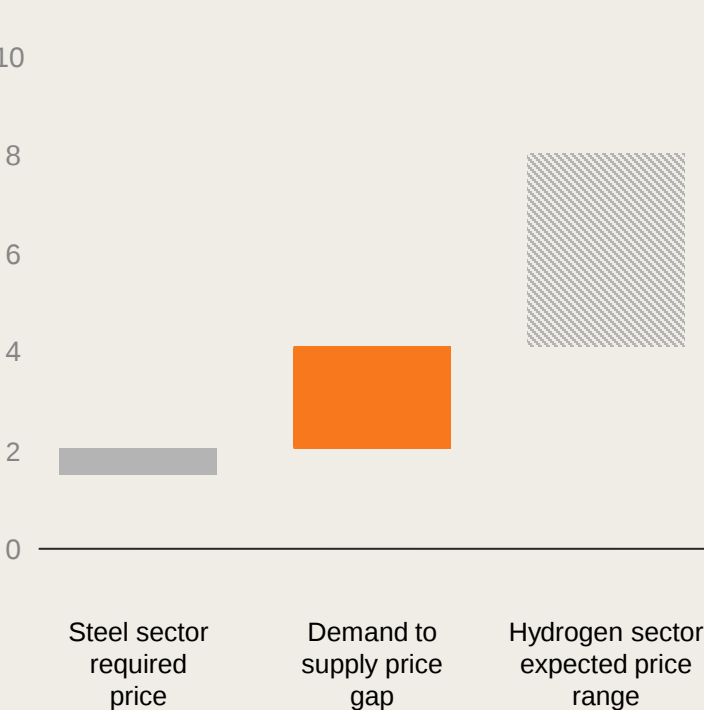
At the same time, many earlier projects have been shelved entirely or pushed back towards 2030

Hydrogen availability and cost are widely regarded as critical to making the net-zero business case viable

Projected green hydrogen capacity (mtpa)



Green hydrogen price (USD/kg)



- Project developers vary on the required price point, estimating between **\$1.5 – \$2/kg**
- This compares to hydrogen sector estimate of **\$4 – \$8/kg** by 2030
- All agree that government intervention will be needed to guarantee the **low-priced hydrogen** required to get projects off the ground

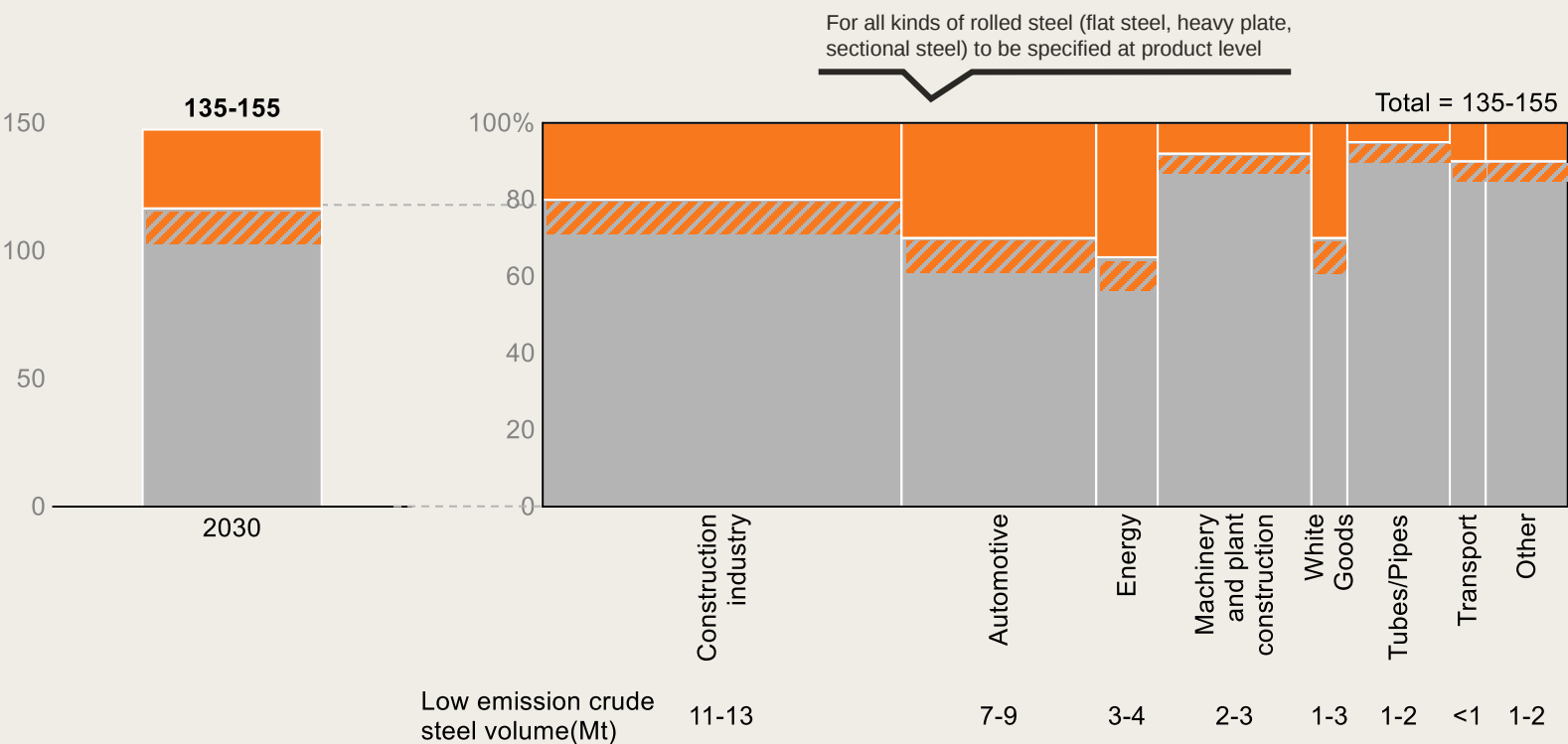
*“We want to be a green hydrogen off-taker and we want to sign today, but **they just can't offer the price or the quantity we need.**”*

VP, SUSTAINABILITY,
STEEL MANUFACTURER

Note: Green hydrogen supply figures based on consensus estimate from DNV, Goldman Sachs, Credit Suisse, IEA, and Ember; Supply figures exclude hydrogen produced as a process by-product, Demand figures for 2030 and 2050 based on 1.5C compatible steel decarbonization scenarios from Agora Industry and the IEA; Source: DNV Global, Goldman Sachs, Credit Suisse, IEA, Ember, Agora Industry – Global Green Iron Scenario

On the revenue side, businesses are largely counting on early-stage voluntary demand from consumer-facing sectors to de-risk FID

EU crude steel production and demand, 2030FC (mtpa)



- Voluntary demand is paying around a 20% **premium for near zero steel**
- Despite early **demand from consumer facing industries**, steel producers are concerned that there will be a limit to customers willingness to absorb price increase

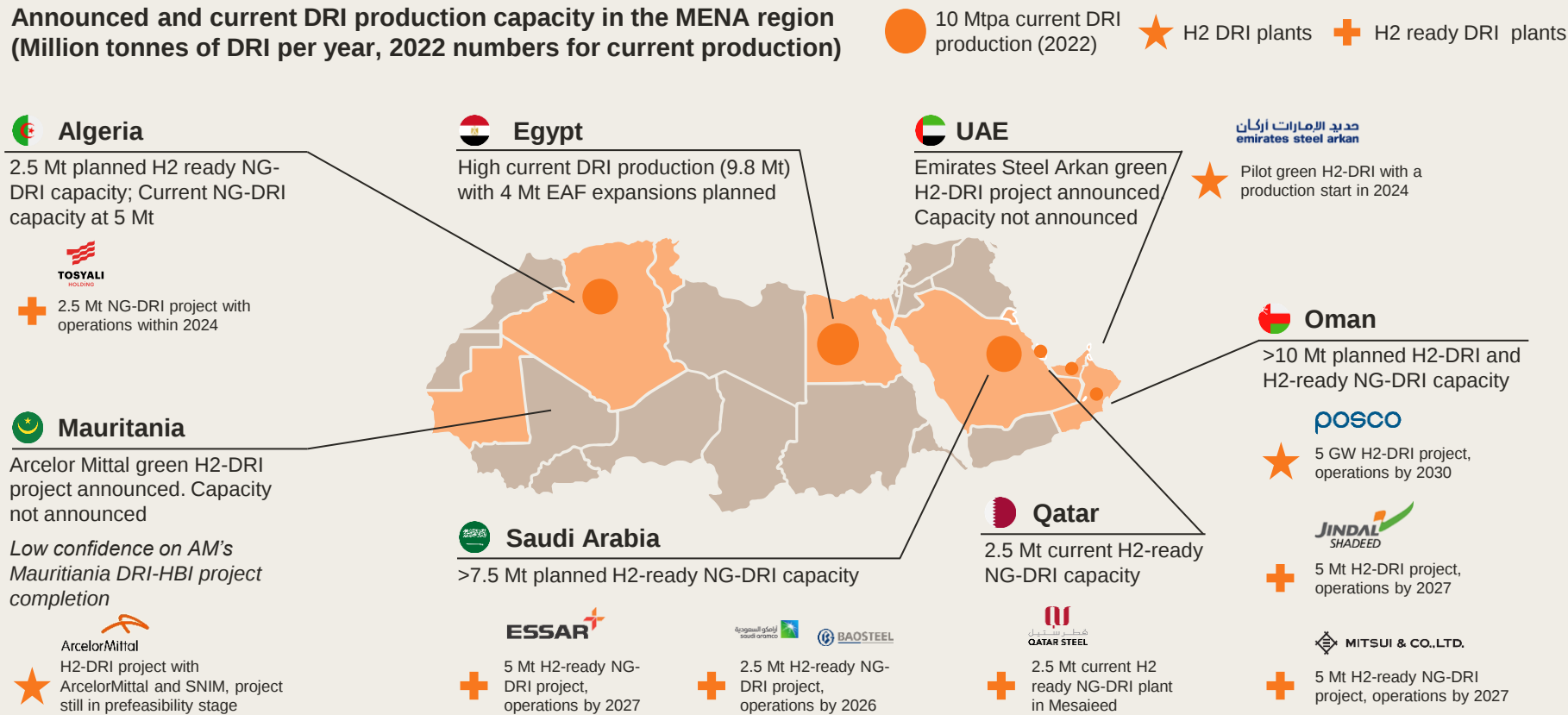
“Last year we **sold out the limited volume of emission free steel**. We expect to double our capacity, even if it’s from low numbers, and we still expect significant interest from our customers.”

CTO, STEEL PRODUCER

Note: near zero steel defined as processual decarbonized steel with significantly improved CO2 footprint (min. 60%) beyond current state
Source: Market participant interviews; EU Commission; EUROFER

Business foresee a significant reshaping of steel supply chains through the transition

Announced and current DRI production capacity in the MENA region (Million tonnes of DRI per year, 2022 numbers for current production)



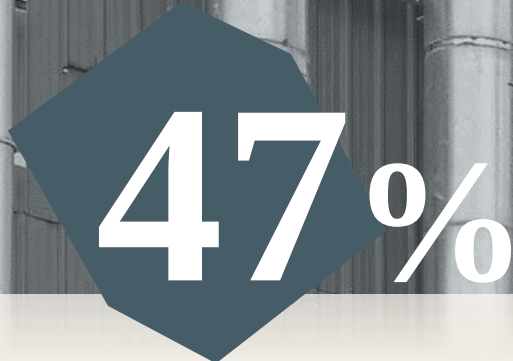
- Many steel executives are anticipating the **decoupling of iron and steel production** due to shifts in input costs and regulation
- Several companies **planning expansions of hydrogen DRI** in the MENA and Australia, driven by lower cost electrolyzer production, abundant renewable energy, and relatively cheap interim natural gas

"I think the HBI route will be key in **restructuring supply chains** – we certainly see a production shift towards the Middle East for DRI."

HEAD OF GOVT.
RELATIONS, STEEL
MANUFACTURER

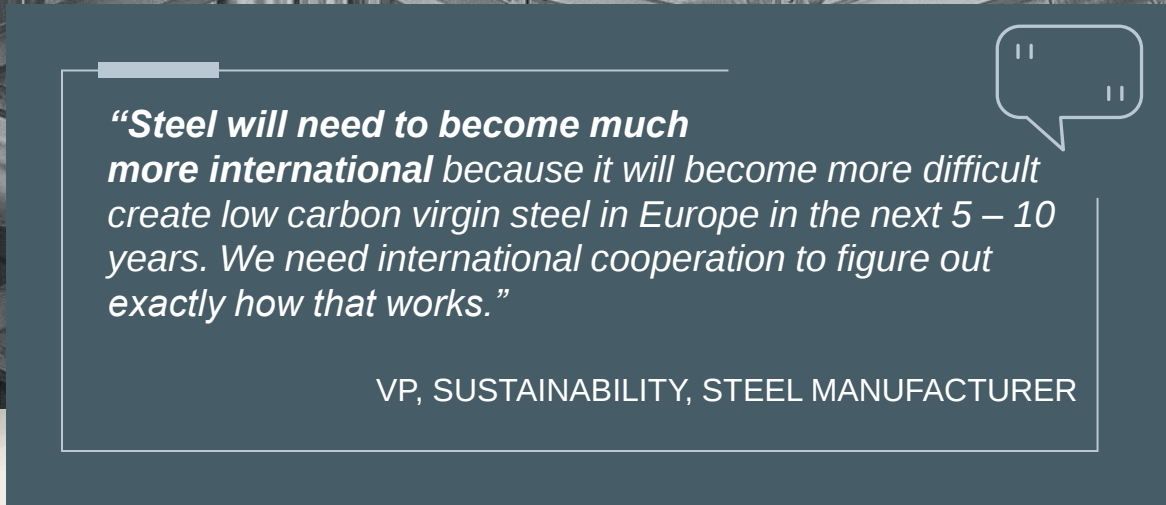
Source: Agora Steel Transformation Tracker; Global Energy Monitor; Green Steel Tracker; Lit. search; Bain analysis

Steel was the sector where international coordination was deemed most crucial



47%

47% of executives rated it as very important, though most respondents judged current mechanisms as largely ineffective



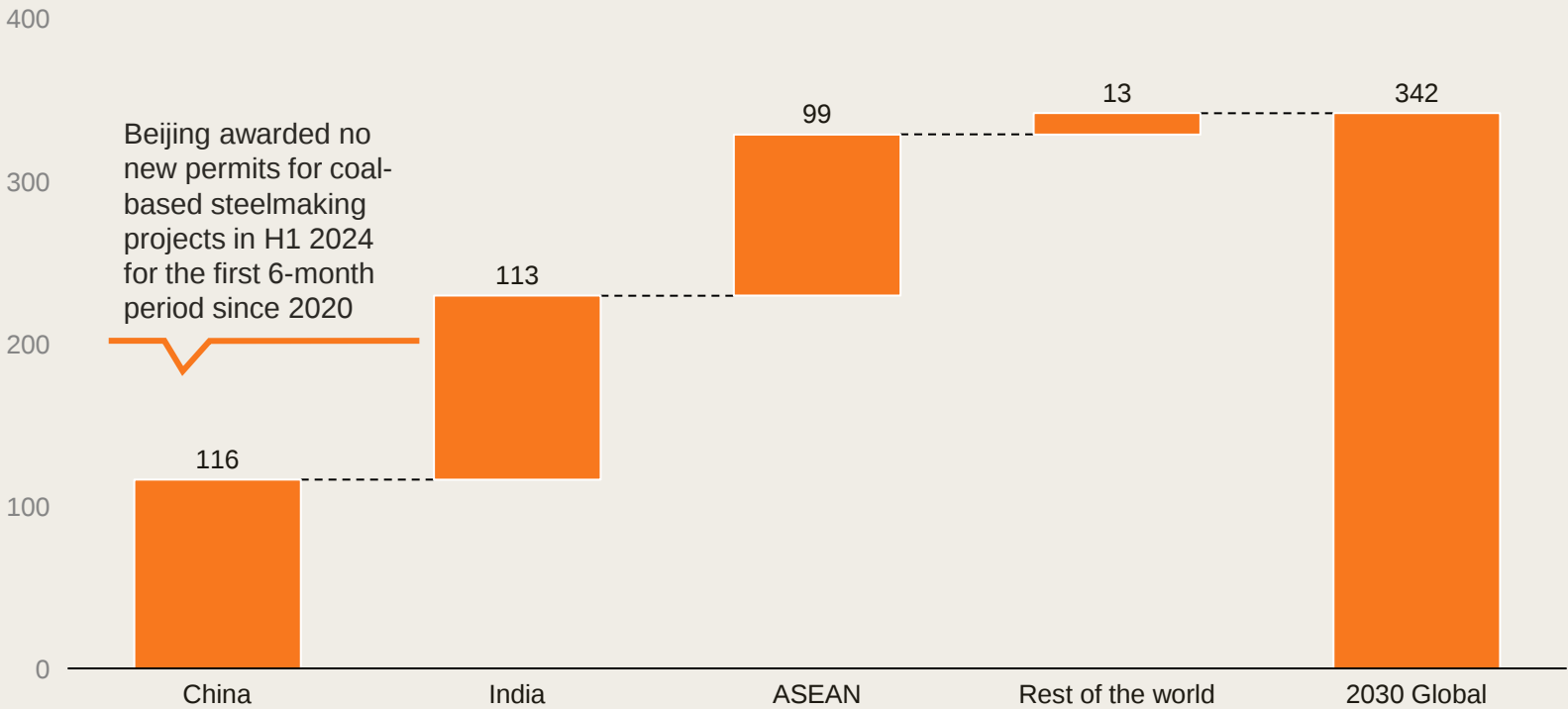
“Steel will need to become much more international because it will become more difficult create low carbon virgin steel in Europe in the next 5 – 10 years. We need international cooperation to figure out exactly how that works.”

VP, SUSTAINABILITY, STEEL MANUFACTURER

Source: Business Breakthrough Barometer survey 2024, interview sentiment

Momentum around low carbon steel grows, but businesses stress these efforts pale against the large, and growing fleet of BF-BOF

BF-BOF 2030 capacity addition (mtpa)



- Large and growing fleets of blast furnace capacity in China and India are young, with assets average 14 and 18 years old respectively
- Average lifespan of blast furnaces is approximately 40 years, leaving sizable portion of fleet with a considerable remaining operational lifespan
- Businesses express hope, with some scepticism, limited local incentives and CBAM will drive sufficient change

Note: BF-BOF: Blast Furnace - Basic Oxygen Furnace; EAF: Electric Arc Furnace; DRI: Direct Reduced Iron
Source: Agora Industry; Global steel transformation tracker, Energy and Clean Air, EIA

This makes CCUS a potentially critical part of the solution, but businesses remain concerned about the glacial progress

Actual and planned CCUS iron and steel capacity (MtCO2/yr)



Note: Capacity based on IEA estimate; pipeline estimates based on planned, and under construction projects with announced operation year and capacity
Source: IEA CCUS Projects Database 2024 – Iron and steel, IEA Steel and aluminium progress report, IEA 2030 NZE forecast

- Even if all **current pipeline CCUS projects are realized**, less than 1% of global steel production will be covered
- **Geologic carbon storage capacity** varies greatly by region
- A **massive investment boost** is needed to meet the IEA's 2030 target of 60 MtCO2 captured annually
- Businesses are **increasingly concerned** **policy support** is not sufficient to secure ROI and bolster pipeline

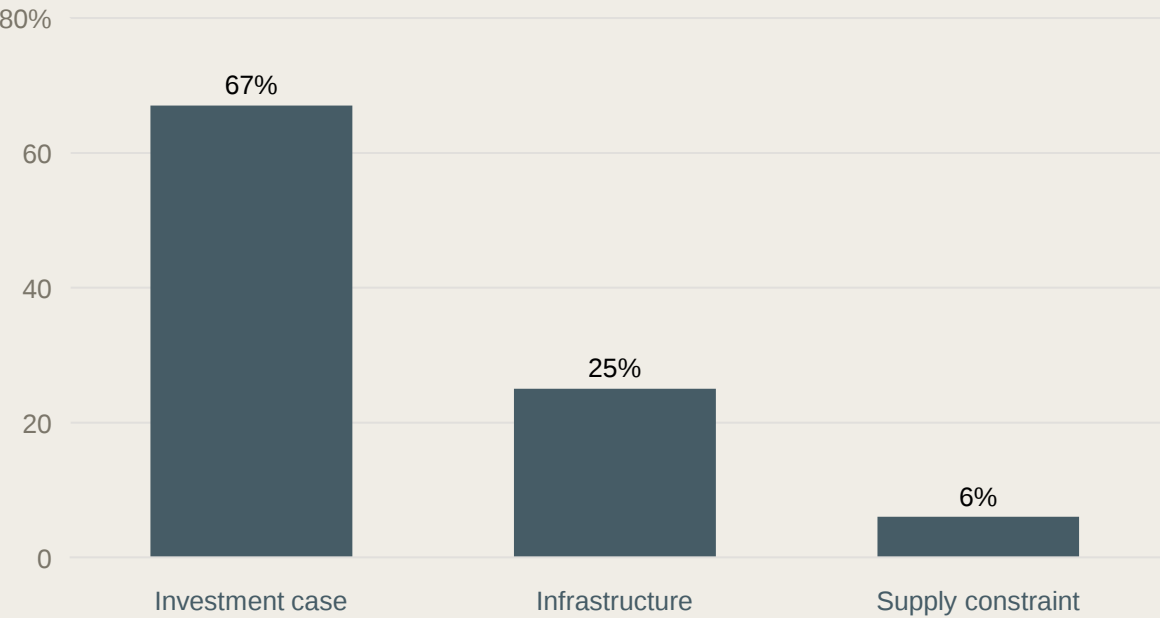
*“We believe in CCUS, and we are going to need every tool at our disposal. In practice, it will depend on where you’re producing and what the **local government is supporting**.”*

SUSTAINABILITY HEAD, STEEL AND MINING COMPANY

Majority of steel players cite investment case as well lack of mandates and standards as key barriers holding back near zero steel

Which of the following do you view as the steel sector's largest barriers towards accelerating and investing in the development and deployment of near zero steel technology?
Please select the top 3 most impactful barriers

Share of survey responding barrier in the top 3 (%)



Source: Business Breakthrough Barometer survey 2024



INVESTMENT CASE

- Companies cite limited voluntary demand at a premium for near zero steel as key barrier
- At the same time, high cost of capital and uncertain ROI for near zero steel is holding back sector from committing more projects to FID
- Operational costs also stand in the way, with businesses citing a hydrogen cost between \$1.5 - \$2 / kg required for a viable case



INFRASTRUCTURE

- The lack of common standards for near zero steel is slowing the formation of a tradeable market

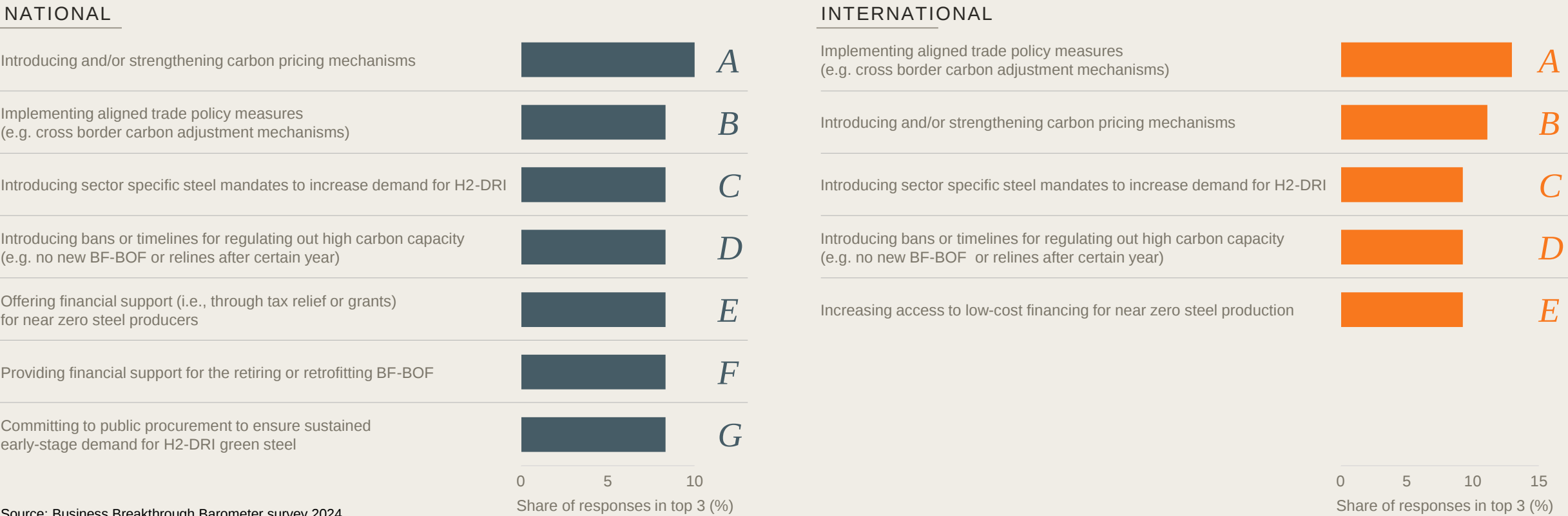


SUPPLY CONSTRAINT

- Companies point to availability of key inputs required for H2-DRI-EAF steel production as a significant barrier (e.g., green hydrogen, high grade iron ore, stable renewable energy)

Sector sees key policy focus for N12M in strengthening carbon pricing & adjustment, introducing sector mandates, and aligning on standards

WHAT ARE THE TOP THINGS REGULATORS SHOULD FOCUS ON IN THE NEXT 12 MONTHS TO ACCELERATE INVESTMENT IN THE DEVELOPMENT AND DEPLOYMENT OF KEY TECHNOLOGIES AND SOLUTIONS TO ENABLE THE NET ZERO TRANSITION WITHIN THE STEEL SECTOR?



Source: Business Breakthrough Barometer survey 2024



Businesses all agree on key policy interventions by governments within carbon pricing and border adjustment, mandates, and certifications



-  Business leaders agree that **simplified and internationally aligned certifications** for near zero steel will ease compliance for consumers
-  Further, global standards will be key to **facilitating a tradeable and investable market** for near zero steel producers



-  Industry pioneers note that **carbon pricing and border adjustments must work in tandem with standards and certifications** to avoid emissions leakage and to mitigate risk of deindustrialization
-  Steel producers agree that by implementing and strengthening carbon pricing and cross border adjustments, **policymakers can ease price differentials** and ensure fair competition for near-zero steel



-  Businesses agree that establishing clear mandates for usage of near zero steel in **public and private sector procurement** will secure key early-stage demand and enable safer investment from steel producers

Source: Business Breakthrough Barometer survey 2024, interview sentiment

Thank *You*



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