



ArcelorMittal



Pathway to low-carbon steel making
September 2020

Disclaimer

Forward-Looking Statements

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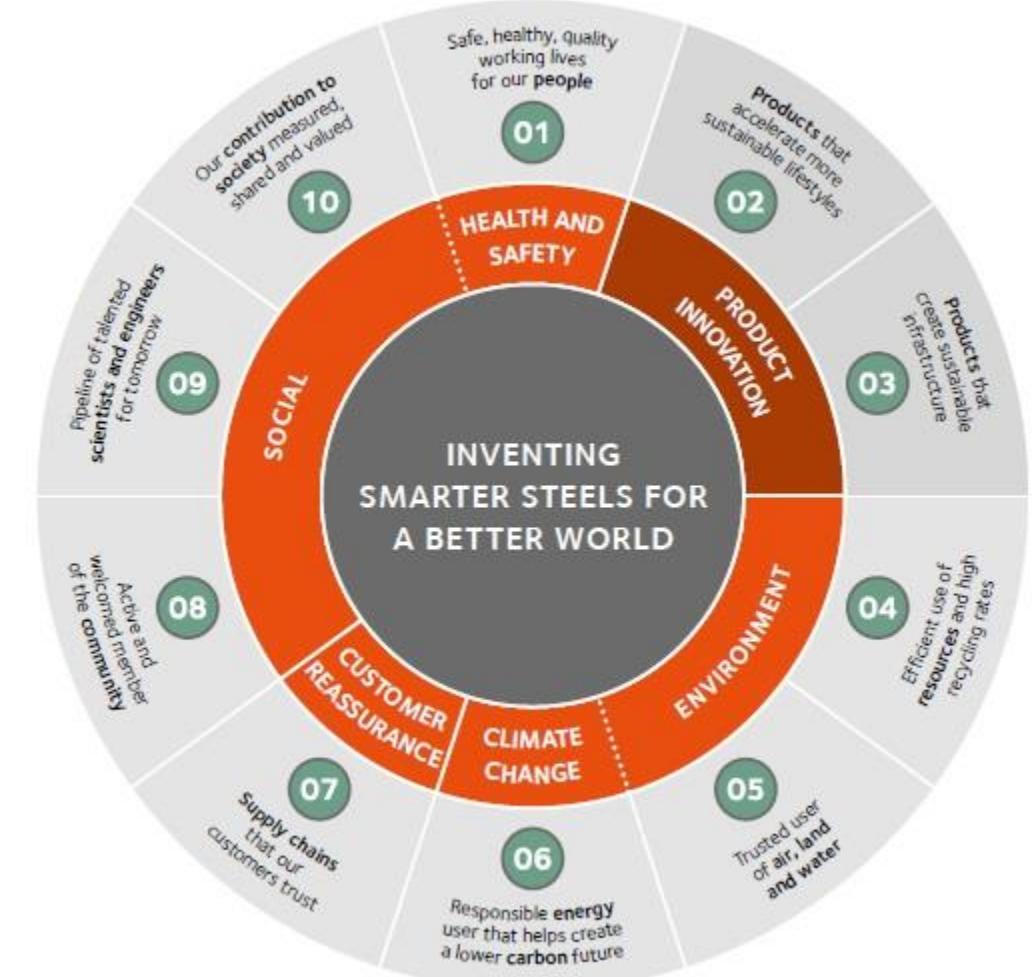
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Our approach to sustainable development

Sustainable development underpins the Company's purpose: Inventing smarter steels for a better world

- ArcelorMittal is committed to building solutions for the sustainable development of society
- Our 10 Sustainable Development (SD) outcomes provide a compass to describe the business we know we must become
- Board's Audit, Remuneration, Corporate Governance & Sustainability Committee oversees progress on SD
- Carbon on several focus points





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Steel in a Low Carbon and Circular Economy

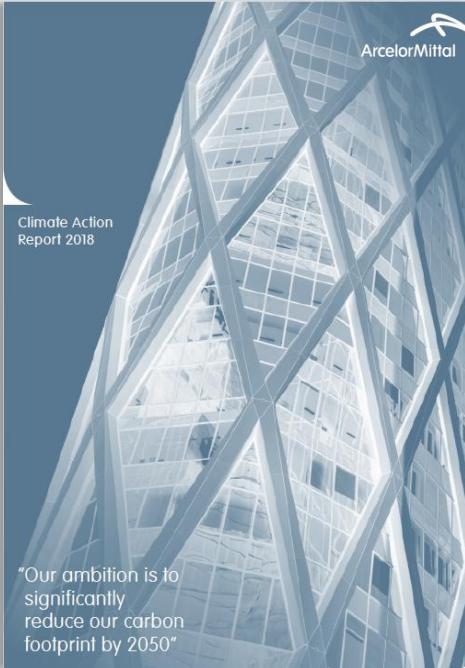
ArcelorMittal's disclosures on sustainability



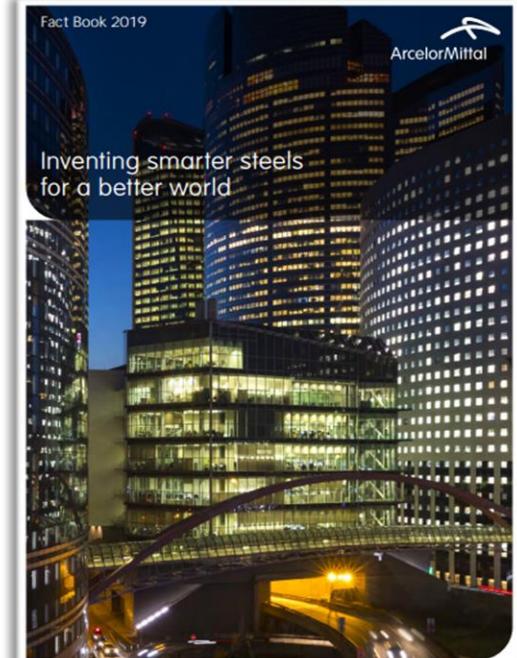
[European Climate Action Report](#)



[Integrated Annual Review](#)



[Climate Action Report](#)



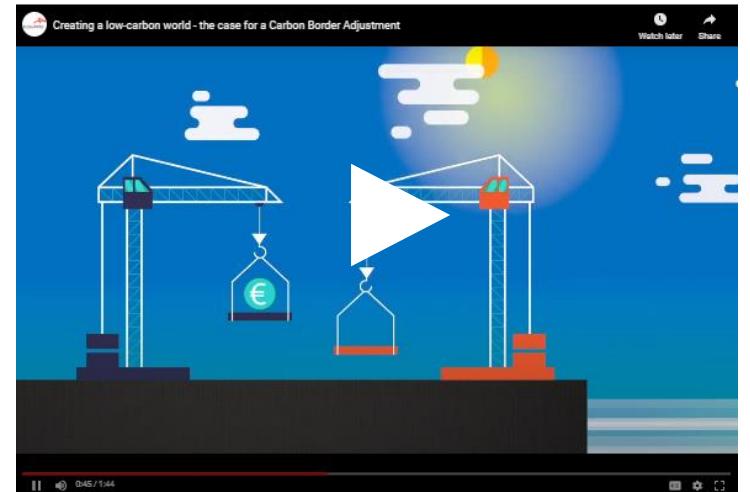
[Factbook](#)



TASK FORCE ON
CLIMATE-RELATED
FINANCIAL
DISCLOSURES

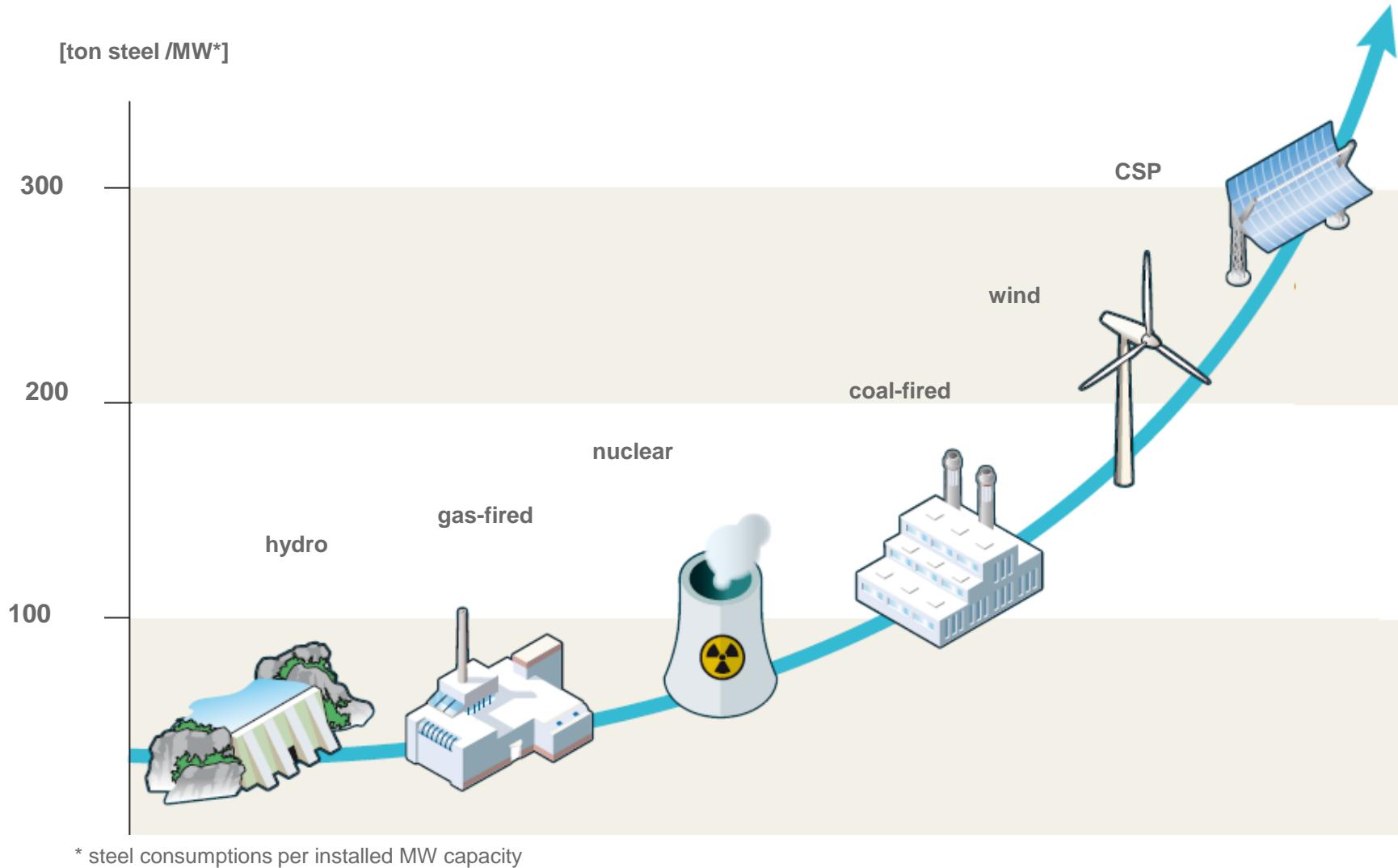
Commitments and targets

- Commitment to Paris Agreement, and recognition that we need to significantly reduce emissions across the group
- First ‘Climate Action in Europe’ report released June’20, laying out our roadmap to 2030, in line with the EU’s Green Deal:
 - 30% CO2 reduction target by 2030, and carbon neutrality by 2050
 - Pioneering breakthrough carbon-neutral routes for steelmaking
 - Smart Carbon, and an innovative DRI-based
 - New policy framework(s) required to ensure the transition to carbon neutrality is both competitive and possible
- “Creating a low carbon world, the case for a Carbon Border Adjustment” published in April 2020
- Global Climate Action Report 2 and new global target delayed by Covid-19 - expected by end of 2020



Steel is essential in the energy transition

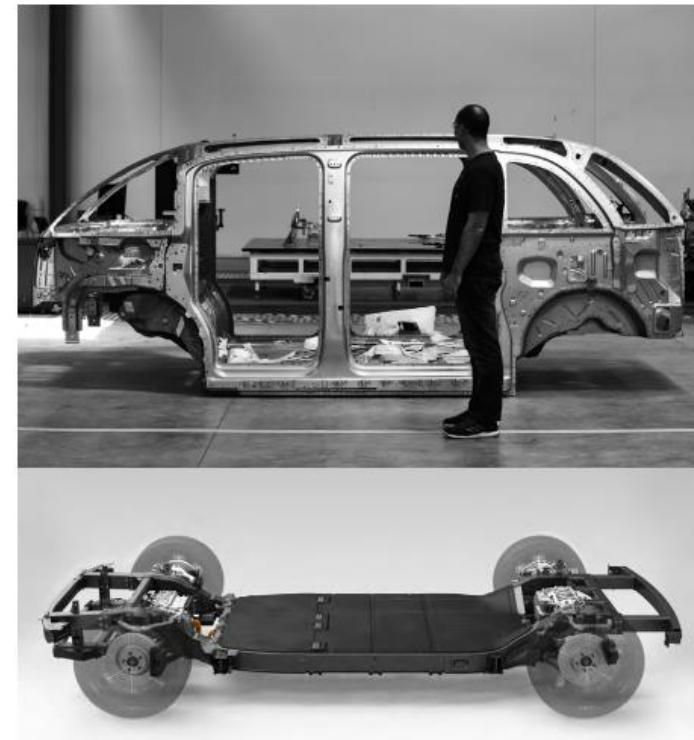
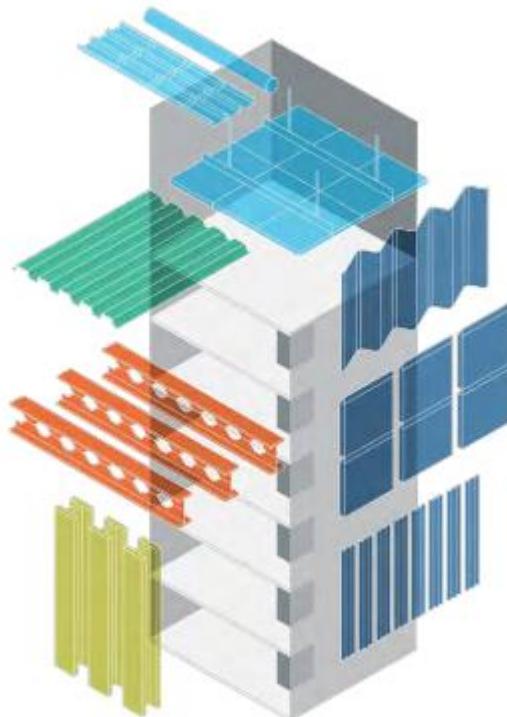
- Steel intensity in energy sector is increasing with the transition to low carbon sources of energy generation



Steel is essential for a low carbon and circular economy

... and our innovation offers our customers solutions to their carbon challenges

- **Stelligence** offers architects and engineers the possibility of doing more with less – designing building solutions that minimise material use and whilst maximising space, flexibility and end of life recyclability
- The emergence of **battery electric vehicles** /scooters etc is likely to see steel as the material of choice as safety and cost become the key drivers.



Stelligence key figures

11%

Cost savings
across facade,
stairs and core
elements



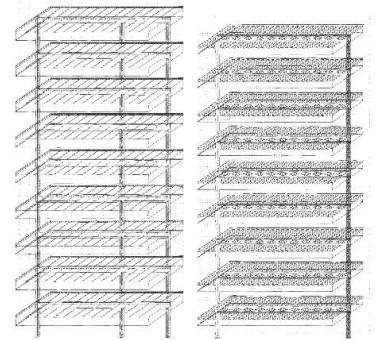
24%

Construction costs
saving from
construction times
**twice as fast as
concrete
equivalents**

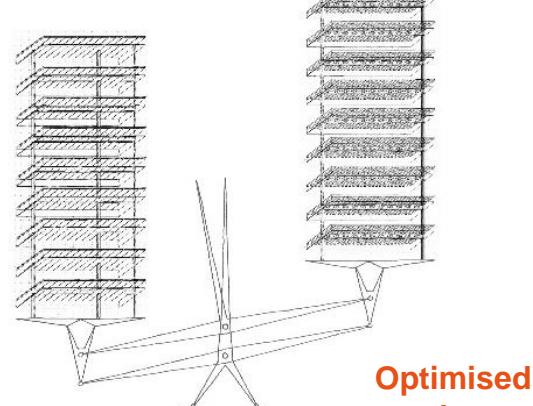


39%

Foundation cost
savings due to steel
foundation solutions,
less than half the
weight of equivalent
structures



Optimised
steel
scenario

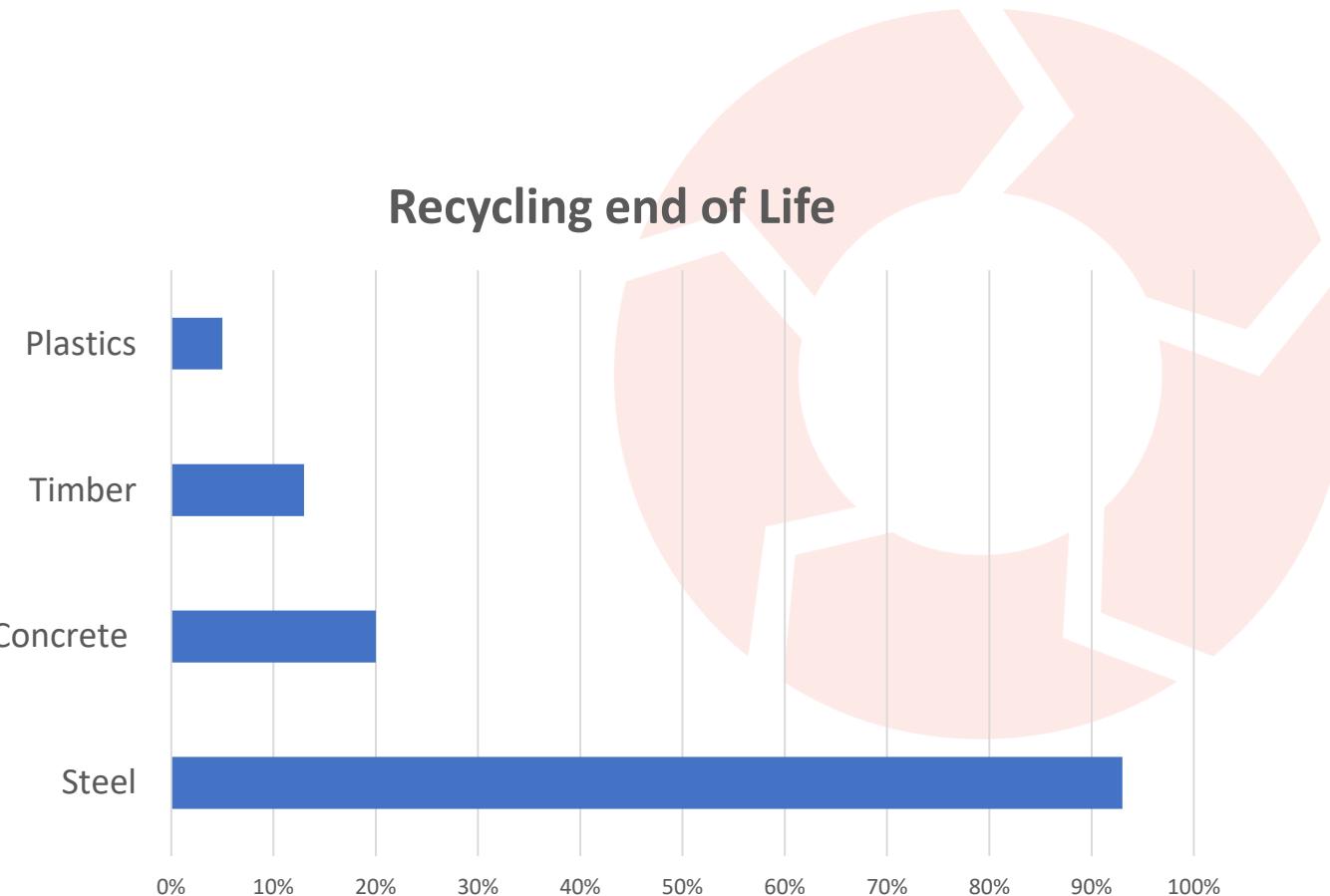


Baseline
scenario

Optimised
steel
scenario

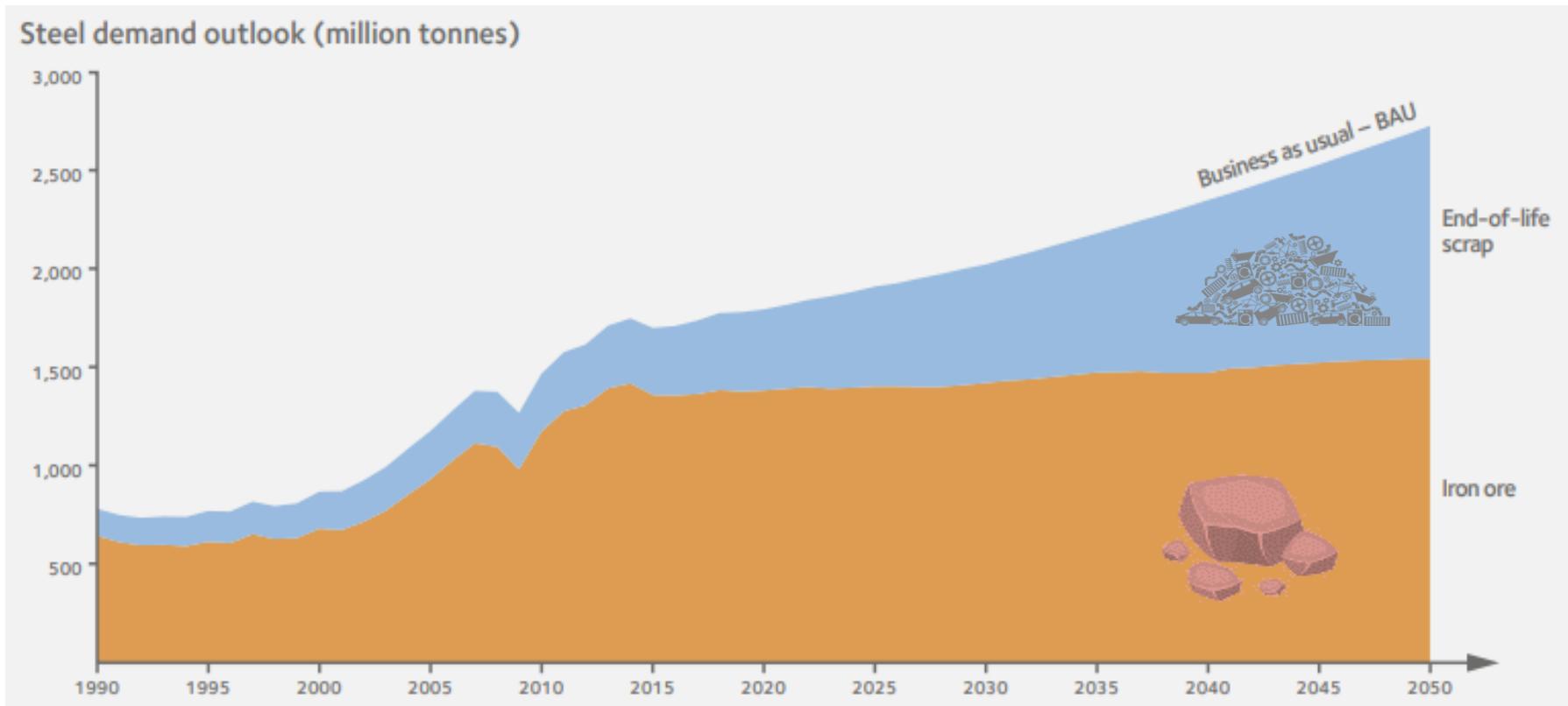
Steel: a permanent material, recycled again and again...

- Steel is very easy to recycle – our recycle rate outperforms the materials we compete with



Primary steel will continue to be needed to meet global demand until 2100

- Availability of scrap is limited due to its “finite” nature, dependent on disposal at end of life of products, equipment and buildings



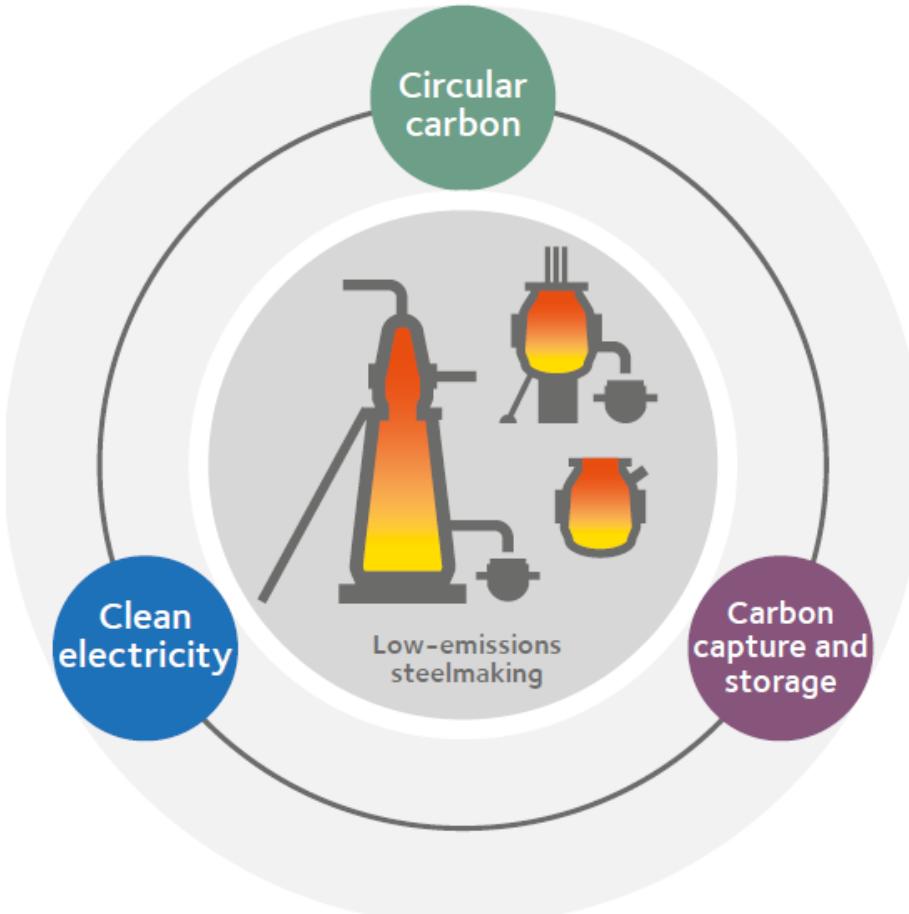
- Amount of secondary sources will increase over the coming decades; electricity will become green over this period
- Still, the world will continue to rely on primary sources to produce steel in 2050
- Today we use coal and natural gas as energy; steel industry will have to transition to clean energy sources



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Our climate strategy for
low-emissions
steelmaking

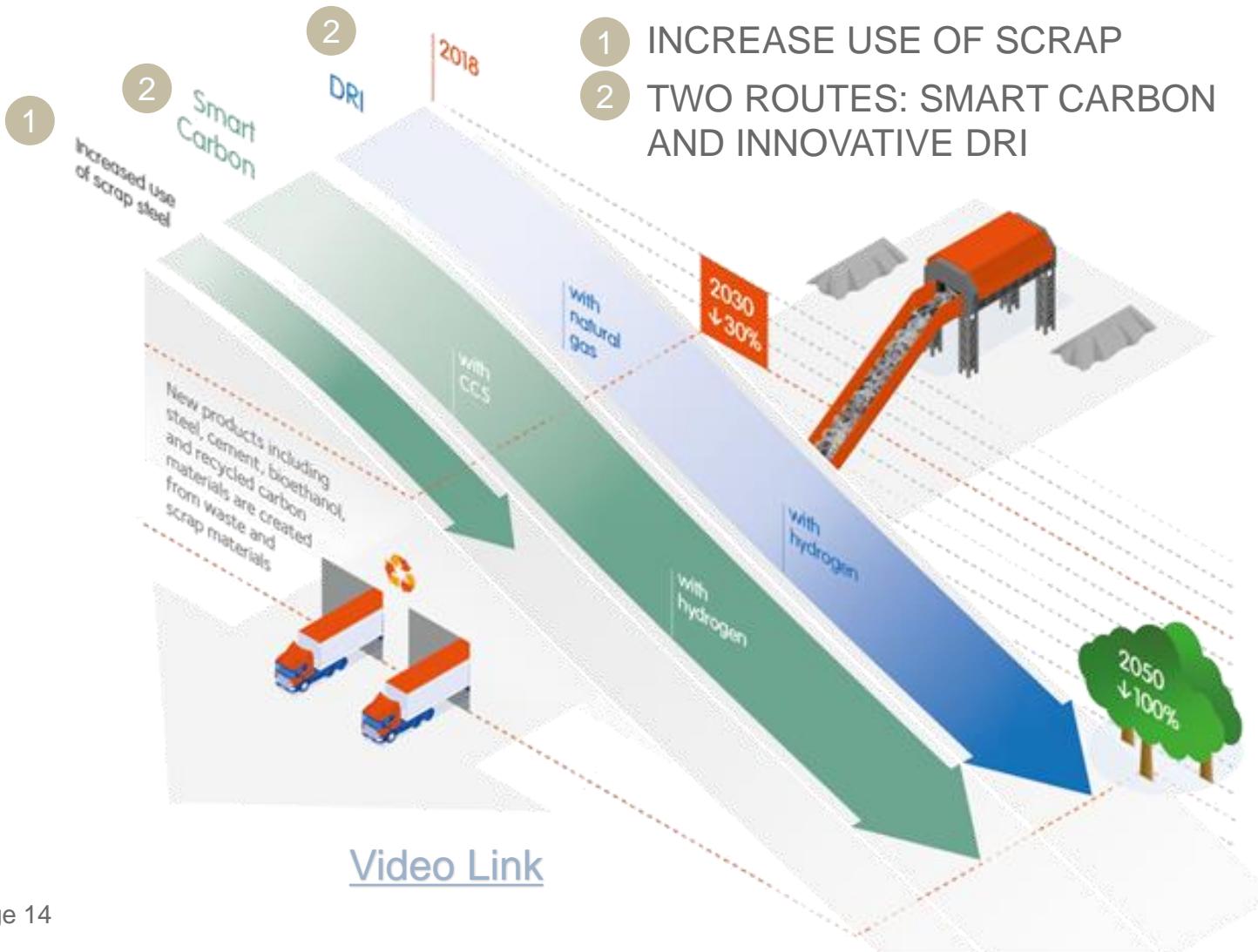
Three clean energy vectors to transition steel industry to net zero



→ two options for primary steelmaking:

- “Smart Carbon” route
- “Innovative DRI” route

ArcelorMittal roadmap to low-emissions steelmaking in Europe



- Smart Carbon includes:
 - Carbalyst
 - Torero
 - IGAR
 - 3D - carbon capture
- DRI includes:
 - ArcelorMittal Hamburg hydrogen project

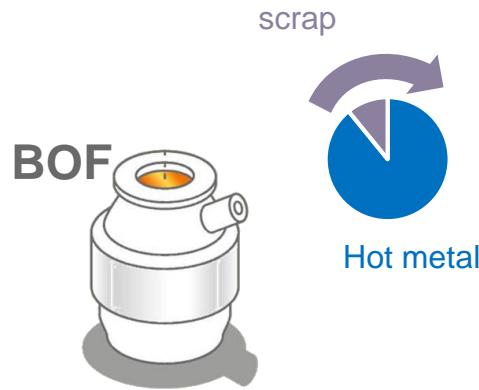
ArcelorMittal Europe Targets:

- 30% by 2030
- Net zero by 2050

Increased use of scrap

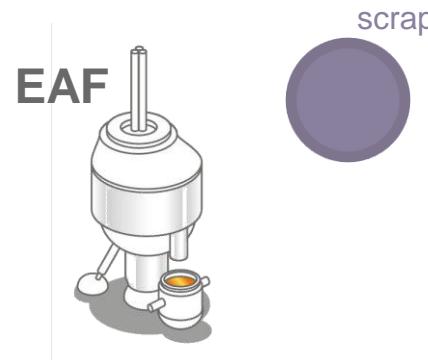
1

INCREASE USE OF SCRAP



Increase amount of scrap versus hot metal in BOF

- Operational improvement
- Pre-melting technology

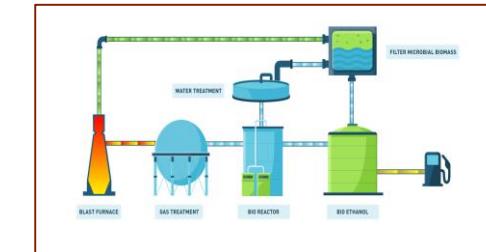


Invest in electric arc furnace technology to increase steel produced using scrap

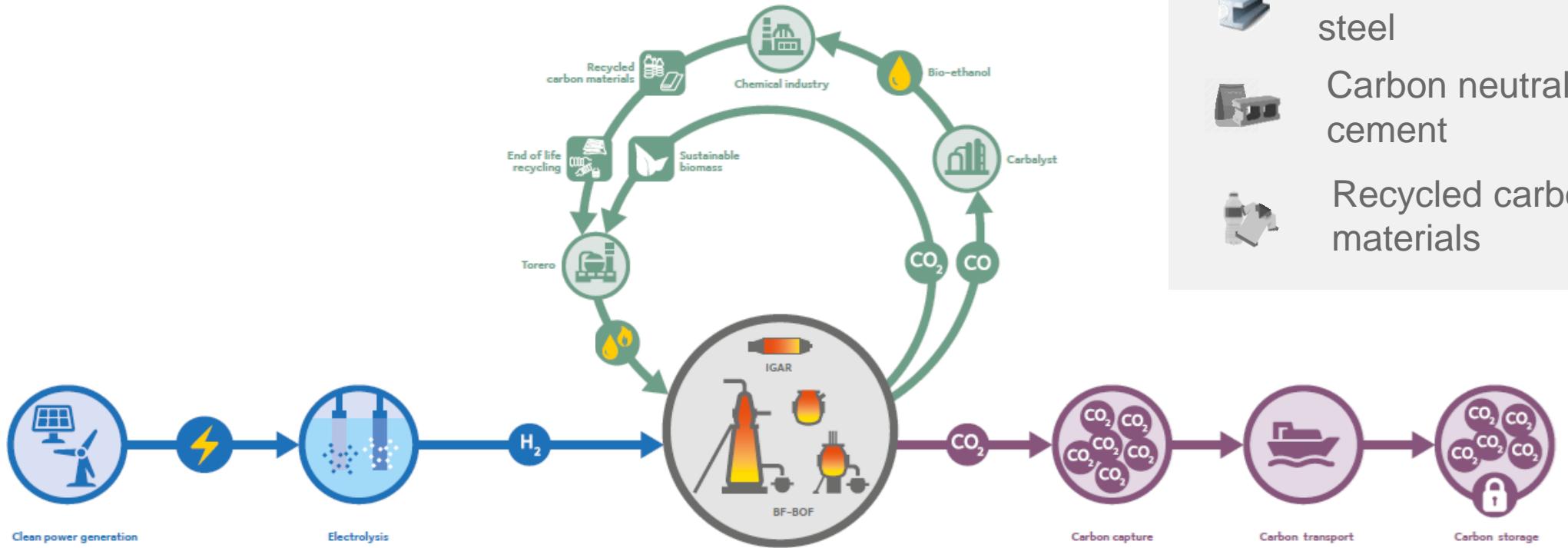
Disproportionate increase in scrap consumption in Europe would lead to shift in scrap trade flows, leading to increased iron ore based steel production in laxer CO₂ jurisdictions outside of Europe

Two routes: Smart carbon

- Replacing coal, with renewable / recycled carbon



Two routes to carbon neutral steel: 1) Smart carbon



Evolving existing Blast Furnace technology, with use of bioenergy and incorporating carbon capture, storage and use; longer term incorporating clean hydrogen as reductant

Smart carbon – our technologies

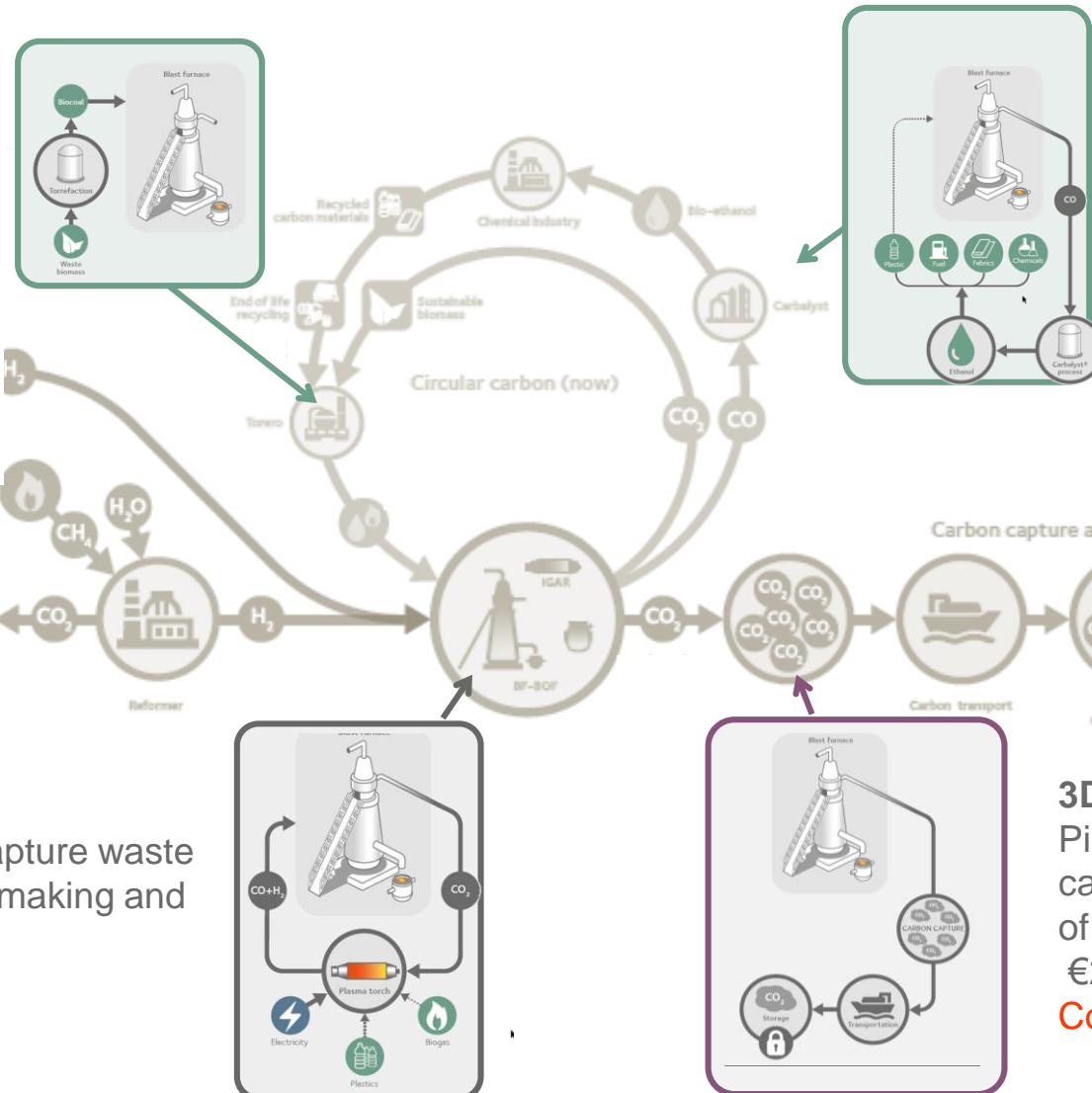
Torero

Industrial scale demo plant in Ghent, Belgium converting waste biomass into biocoal via two reactors, each producing 40kt bio-coal/yr.

€50m investment cost.

Status: under construction

Production expected to start via reactor #1 2022 and reactor #2 2024



IGAR

Pilot project in Dunkirk, France to capture waste CO₂ and waste hydrogen from steelmaking and convert into reductant gas.

€20m project budget

Completion expected 2022

Carbalyist (Steelanol)

Industrial scale demo plant in Ghent, Belgium capturing carbon off-gases and converting into 80m litres recycled carbon ethanol pa.

€165m investment cost

Status: under construction

Production expected to start 2022

3D

Pilot project in Dunkirk, France to capture CO₂ off-gases (0.5 metric tonnes of CO₂/hour) for transport/storage.

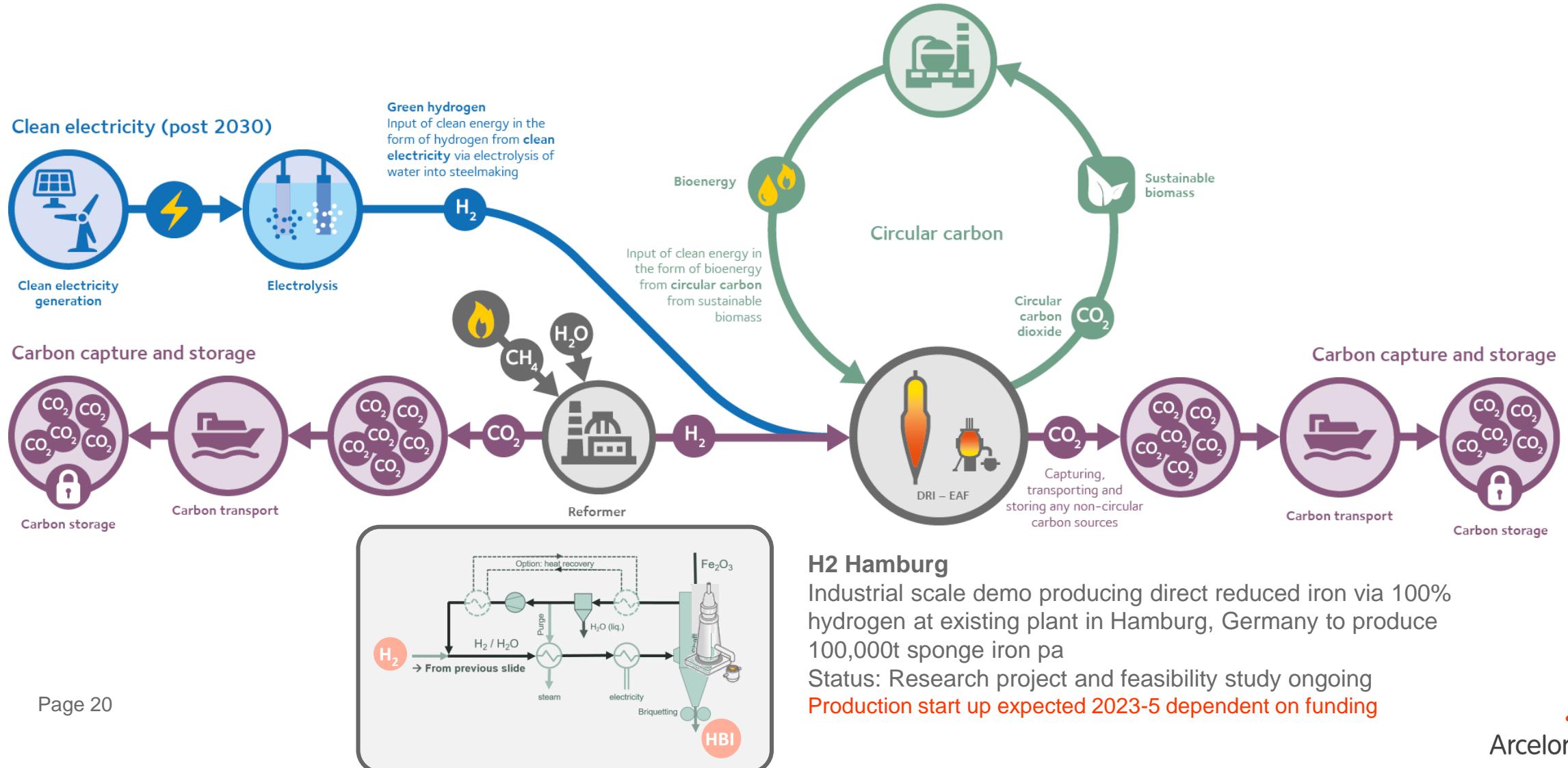
€20m project budget

Completion expected 2021

Carbalyst – site progress in Gent to start production in 2021



Two routes to carbon neutral steel: 2) Innovative DRI-based route



Costs - reaching carbon neutrality by 2050?

	Investment needed	Production cost increase	
	ArcelorMittal Europe steel footprint	Clean energy infrastructure	
Smart Carbon	€15-25 billion	€15-165 ¹ billion	+30-60% ¹
Innovative DRI route	€30-40 billion	€40-200 ² billion	+50%-80% ²

1. Lower end of range leveraging bioenergy and carbon capture storage (CCS) infrastructure; high end of range leveraging green hydrogen infrastructure
2. Lower end of range leveraging carbon capture storage (CCS) and blue hydrogen infrastructure; high end of range leveraging green hydrogen infrastructure

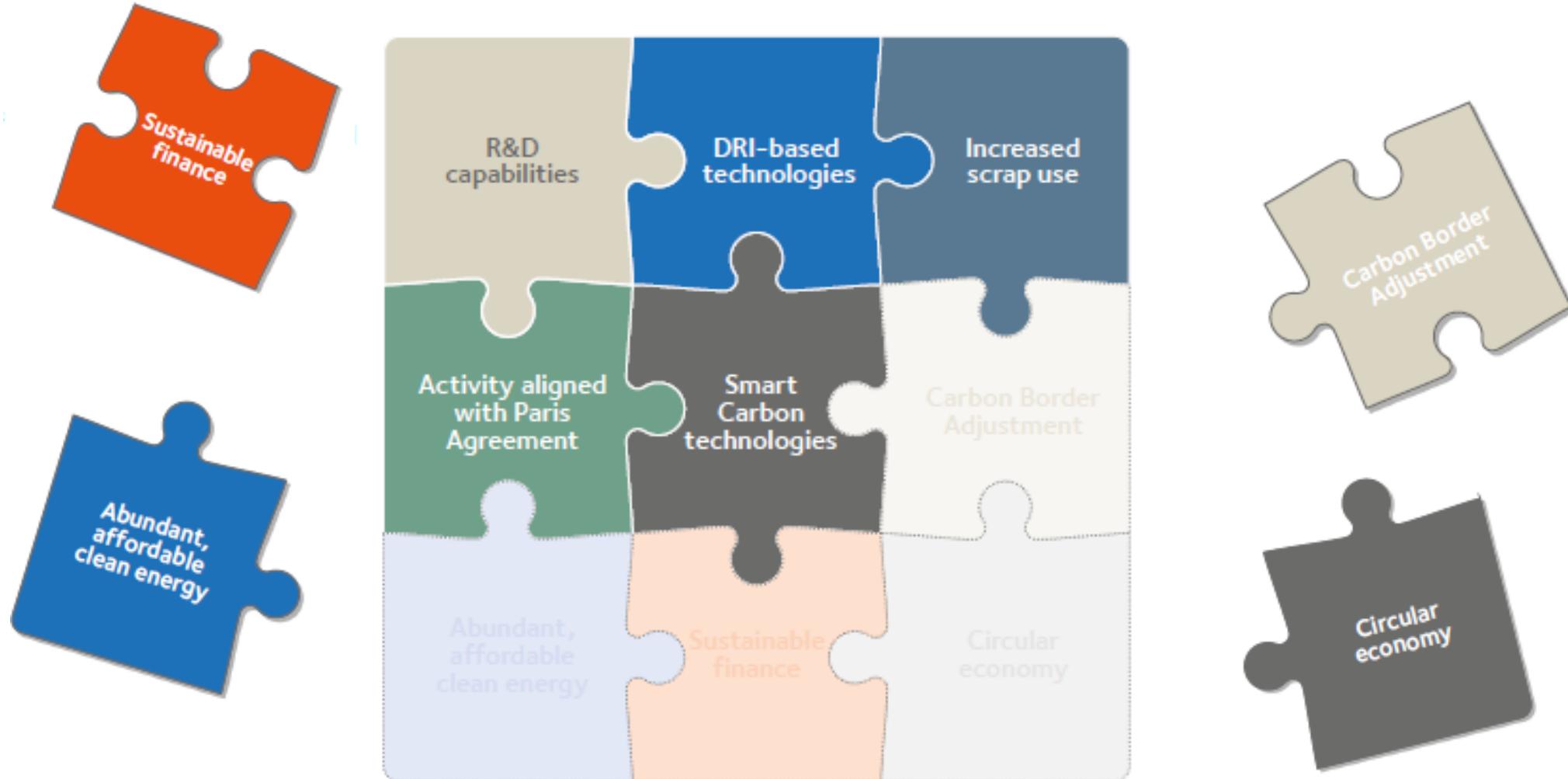


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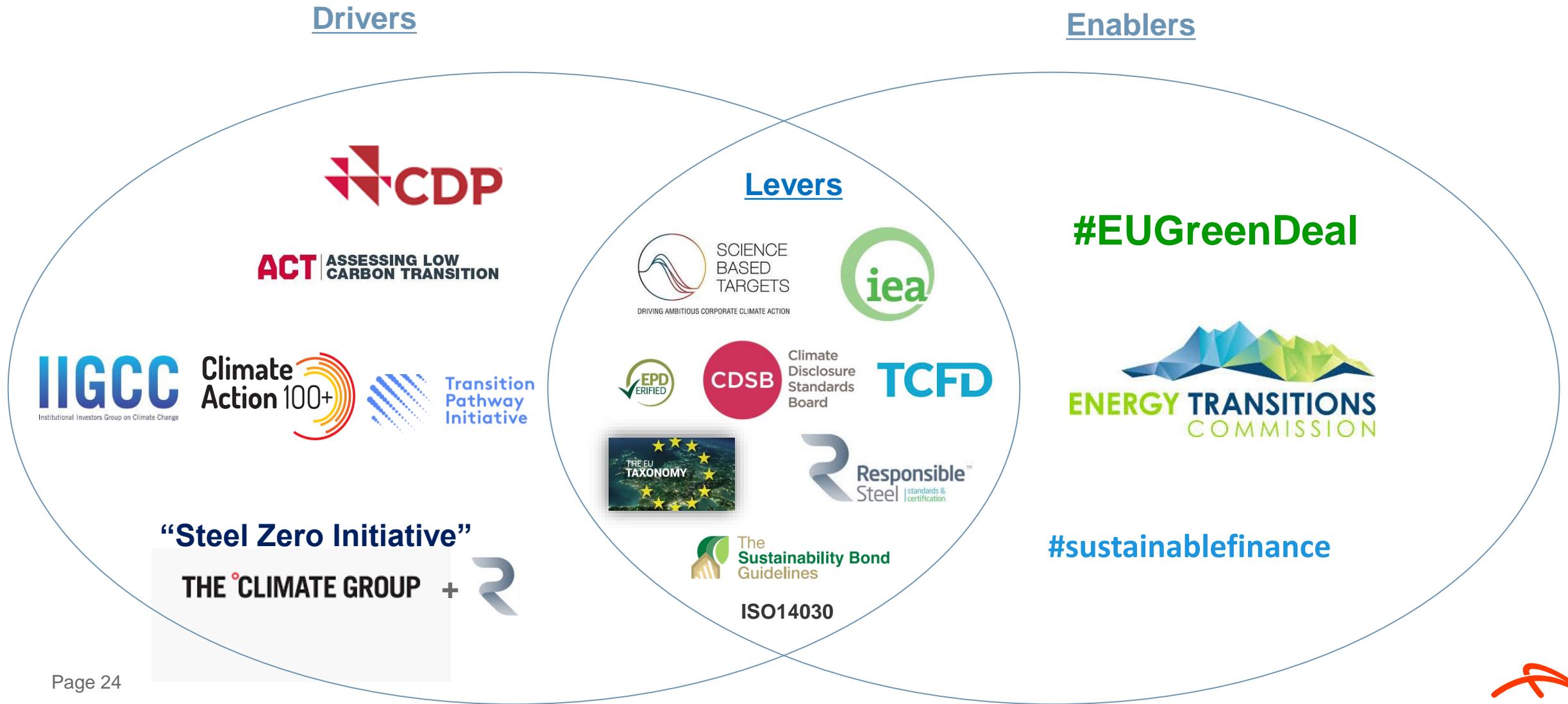
Policy enablers

Carbon neutral steel

We bring key pieces of the puzzle; but we need policymakers to complete the missing pieces



Range of stakeholder initiatives to align steel with the Paris agreement/net zero





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Green Deal

The European Green Deal as the EU's recovery strategy

Funding for low carbon transition:

- Innovation fund (€10bn for 7yrs)
- Existing initiatives – SPIRE (energy); Clean Steel Partnership / Horizon Europe (steel)
- IPCEI – additional funding for steel to overcome obstacles to roll out
- EU has identified Carbon Border Adjustment as source of budget funding
- Revision of State Aid guidelines under consideration to enable support mechanisms for industry transition e.g. Contracts for Difference



Focus on core steel markets:

- **Construction:** Renovation in buildings & infrastructure and a more circular economy
- **Renewable energy projects:** wind, solar, kick-starting clean hydrogen economy
- **Automotive industry:**
 - Purchasing facility for clean vehicles to reduce CO2 / pollutant emissions in line with EU standards
 - Clean automotive investment fund to accelerate investments in zero-emission drive trains
 - Doubling EU investment on electric car recharging infrastructure
- **Mobility:**
 - Rails investment (€40bn): Rolling stock/ development of corridors for passengers and freight
 - Urban mobility cycling, public and individual transport



Significant stimulus deployed

EU: Automotive stimulus package

France

- Increased subsidies: ex €7k for individual to buy EV and €5K for corporate; subsidies to change vehicles (ICE or EV);
- Relocalisation and support for local EV production → Target 1 Million EV/yr by 5 years



Germany

- €130bn for all economy
- €6K euro incentive for battery electric cars costing <€40K
- Passenger car incentives: lowering VAT to 16% from 19%
- Motor vehicle tax reform. From Jan'21, cars with an emission of >95 grams/CO2 per/km face staggered tax





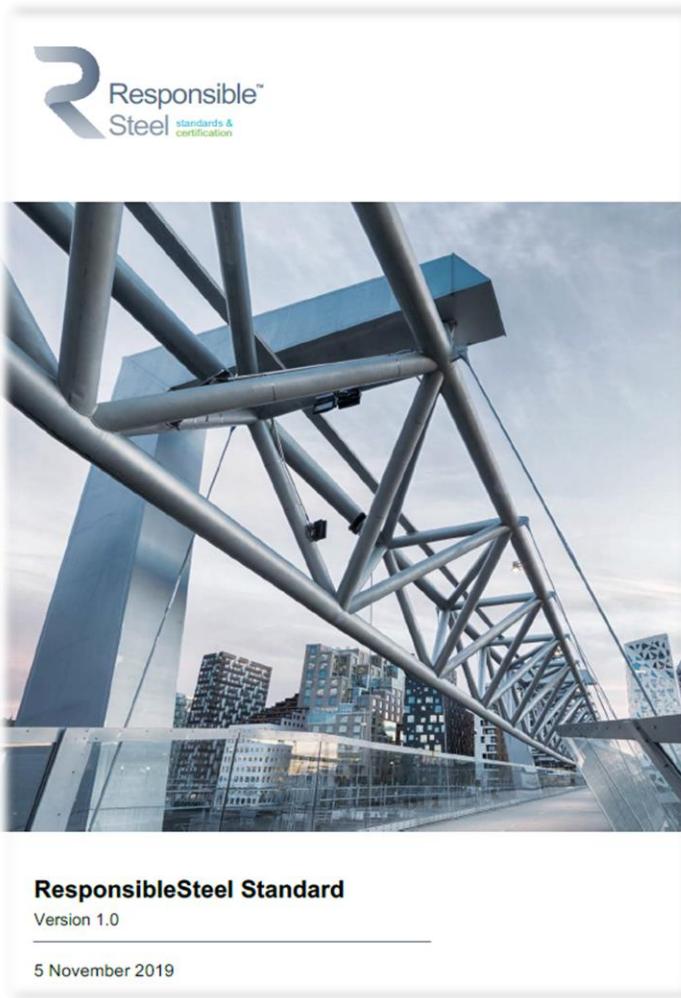
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ResponsibleSteel

A new global sustainability standard for the steel industry

- Providing a multi-stakeholder forum to build trust and achieve consensus;
- Developing standards, certification and related tools;
- Driving positive change through the recognition and use of responsible steel makers and products.



- Multi-stakeholder standard
- Independent assurance and oversight
- Intended to drive up standards over time
- Value to customer and steelmaker

ResponsibleSteel members

Business members

- Anglo-American
- Aperam
- ArcelorMittal
- Australian Steel Mill Services
- BlueScope
- BMW
- Carport Central
- CLN Group
- Daimler
- HARSCO
- HBM Group
- Heathrow
- HSBC
- Lendlease
- Outokumpu
- Teck
- VAMA
- Venlaw Park
- Voestalpine

Civil society members

- CDP
- Clean Air Task Force (CATF)
- Fauna & Flora International
- IndustriALL
- IUCN
- Mighty Earth
- The Climate Group
- We Mean Business

Associate members

- ACRS
- Afnor Group
- AURA Financial
- Australian Steel Institute
- Better Coal

CARES

- CARES
- Challenge Sustainability
- Climate Bond Initiative
- DNV GL
- EGGA
- Equitable Origin
- European Outdoor Group
- Exova – BM Trada
- Green Building Council of Australia (GBCA)
- GUTcert
- HERA
- International Manganese Institute (IMnI)
- International Zinc Association
- IRMA
- Levin Sources
- Lloyds Register Germany GmbH

MAC-TSM

- MAC-TSM
- MERG
- Mineria Responsable Consultores
- Pacific Institute
- RTQMS
- Russian Academy of Sciences – Institute of Geography
- Sourcemap
- Steel Research & Technology Mission of India
- Sustainability Assurance Services (SAS) Global
- Sustainable Steel Council
- Track Record Global
- United Certification Systems (UCS)
- University of Waterloo

Twelve principles

Governance Principles

1. Corporate Leadership
2. Social, Environmental, Governance Management Systems

Social Principles

3. Occupational Health and Safety
4. Labour Rights
5. Human Rights
6. Local Communities
7. Stakeholder Engagement and Communication

Environment Principles

8. Climate Change and Greenhouse Gas Emissions
9. Noise, Emissions, Effluents and Waste
10. Water Stewardship
11. Biodiversity

12. Decommissioning and Closure

ArcelorMittal commits to ResponsibleSteel Site Certification



November 2019

ArcelorMittal today announces a 12-month programme to secure ResponsibleSteel certification for all its Europe Flat sites.



"Responsible production techniques and standards have become increasingly important to our customers and consumers. It's at the heart of how we do business, giving our customers the reassurance that we meet their sustainability expectations."

**Geert Van Poelvoorde, CEO
ArcelorMittal Europe – Flat Products**



ResponsibleSteel will work with mining certification schemes



- ArcelorMittal Mining has committed to IRMA certification of all marketable sites within 5 years





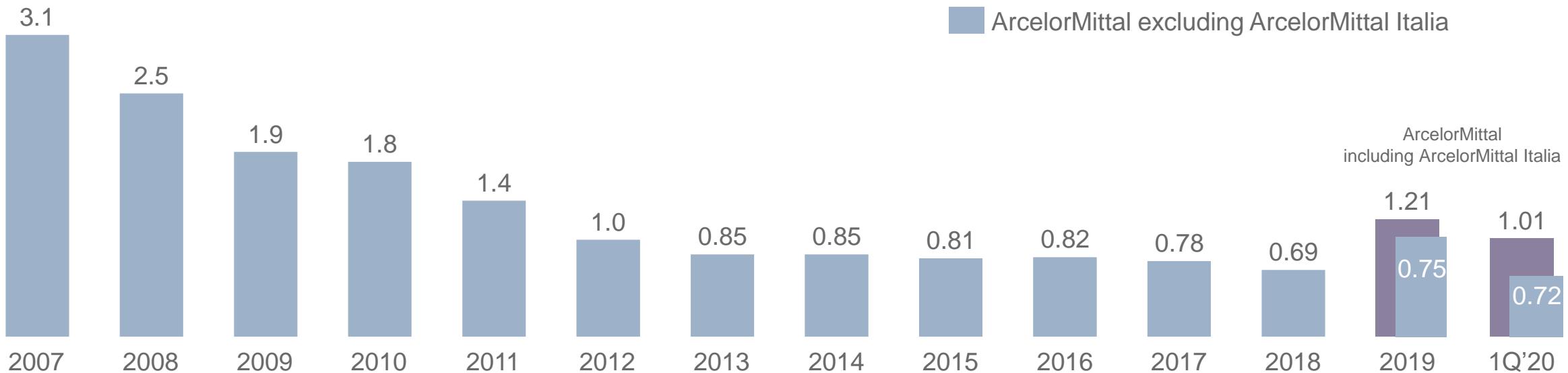
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Appendix

Safety is our priority: Remain committed to the journey towards zero harm

Health & Safety of the Company's workforce is of paramount importance

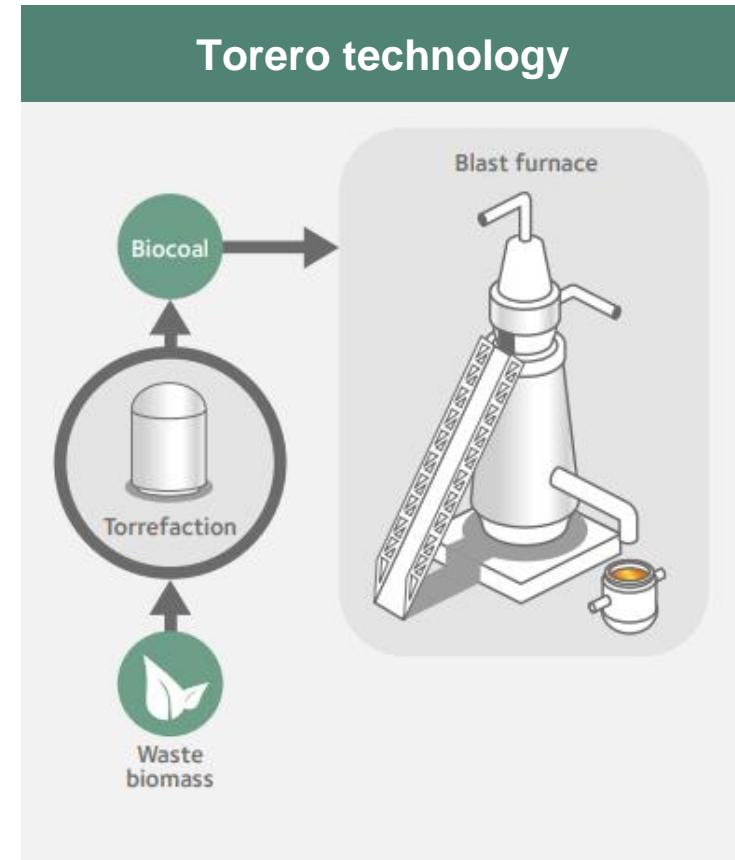
- Following the spread of COVID-19 pandemic, where possible, employees are working remotely and where assets continue to operate, we are following the recommendations of local governments as well as the World Health Organization
- We continue to ensure extensive monitoring, sanitation and social distancing measures applied at all operations, alongside provision of essential personal protective equipment
- Robust planning to ensure facilities can operate and protect health of our people
- The Company's efforts to improve the Group's Health and Safety record will continue to focus on further reducing the rate of severe injuries and fatality prevention with continued extensive training programmes, severe risk detection, analysis and shared learning.



Torero

Reducing iron ore with waste carbon

- Developing our first **industrial-scale Torero demonstration plant** in Ghent, Belgium, with two reactors
- Targets the **production of 'circular carbon' inputs**, such as bio-coal from waste wood to displace the fossil fuel coal currently injected into the blast furnace
- €50 million investment; aims to convert 120,000 tonnes of waste agricultural and forestry residues into bio-coal annually
- Production via first reactor expected 2022; and via second reactor 2024
- Future projects would see expansion of sources of circular carbon to other forms of bio- and plastic waste



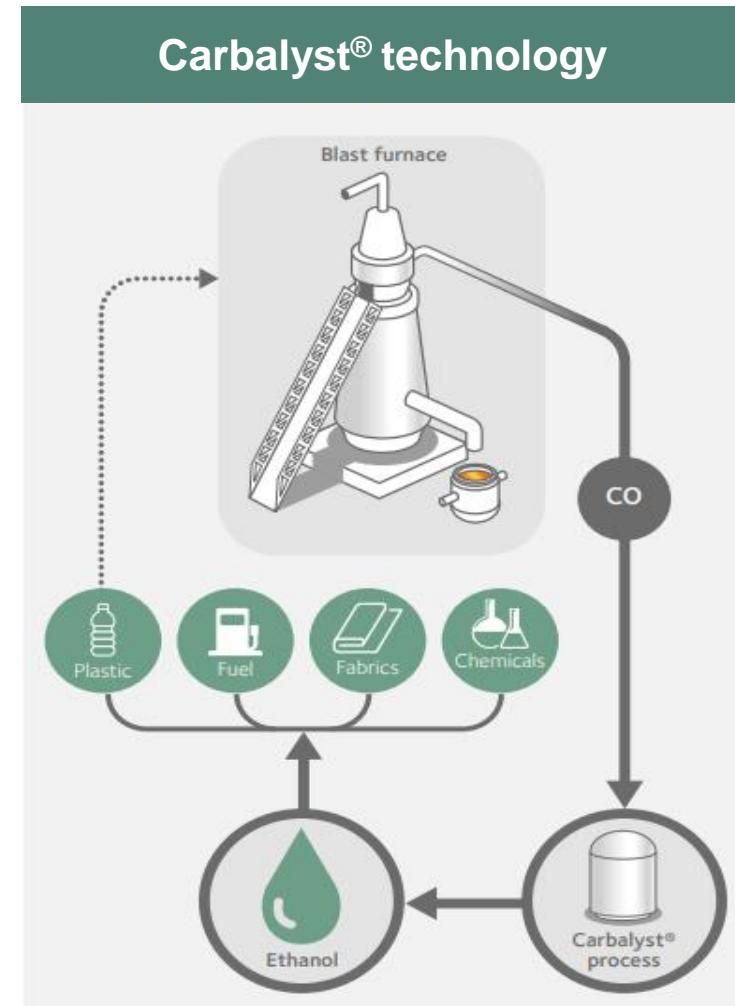
A 'smart carbon' technology

Carbalyst®

Capturing carbon gas and recycling into chemicals

- Working with LanzaTech in Ghent, Belgium, to build first **industrial-scale demonstration plant to capture carbon off-gases** from the blast furnace and convert into a range of **Carbalyst® recycled carbon products**
- Project started in 2018; €165m investment cost; completion expected 2022; will capture ~15% of available waste gases and convert into 80m litres of ethanol annually
- LCA studies predict a **CO₂ reduction of up to 87%** from Carbalyst® bio-ethanol **compared with fossil transport fuels**
- This alone has the **potential to reduce CO₂ emissions equivalent to 100,000 electrical vehicles** on the road or 600 transatlantic flights annually

A ‘smart carbon’ technology

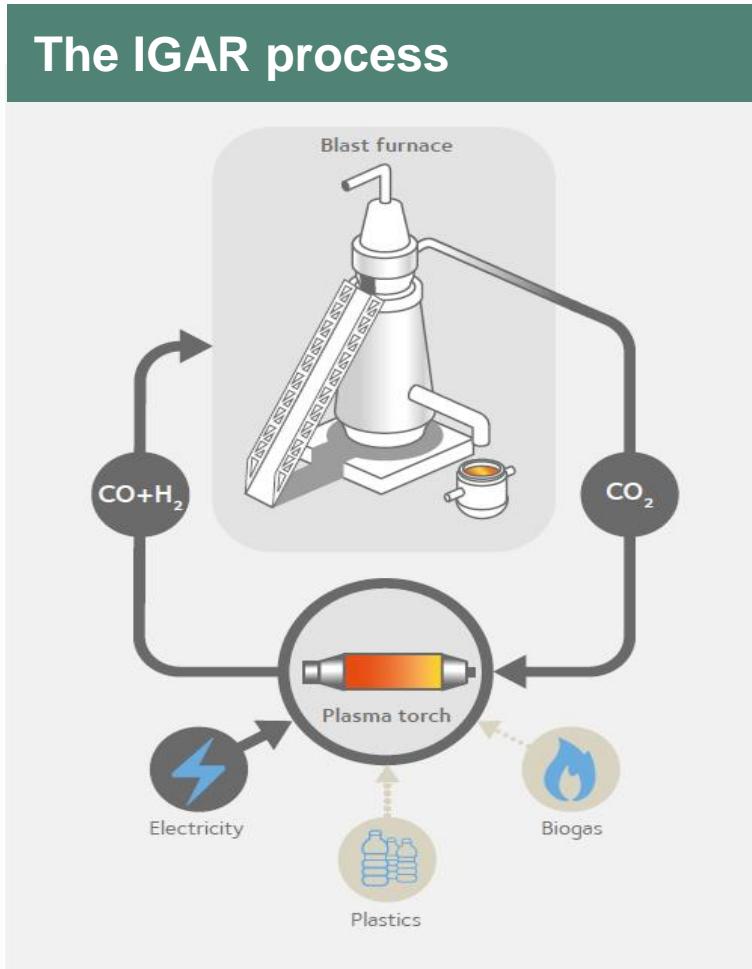


IGAR: reforming carbon to reduce iron ore

Reforming carbon from waste gases or plastics to reduce iron ore

- The IGAR pilot project aims to capture waste CO₂ from the blast furnace and convert it into a synthetic gas (syngas) that can be reinjected into the blast furnace in place of fossil coal.
- In Dunkirk, ArcelorMittal is running a €20 million project, supported by the French ADEME, to construct a form and test the syngas.
- Future plans to reform waste plastics

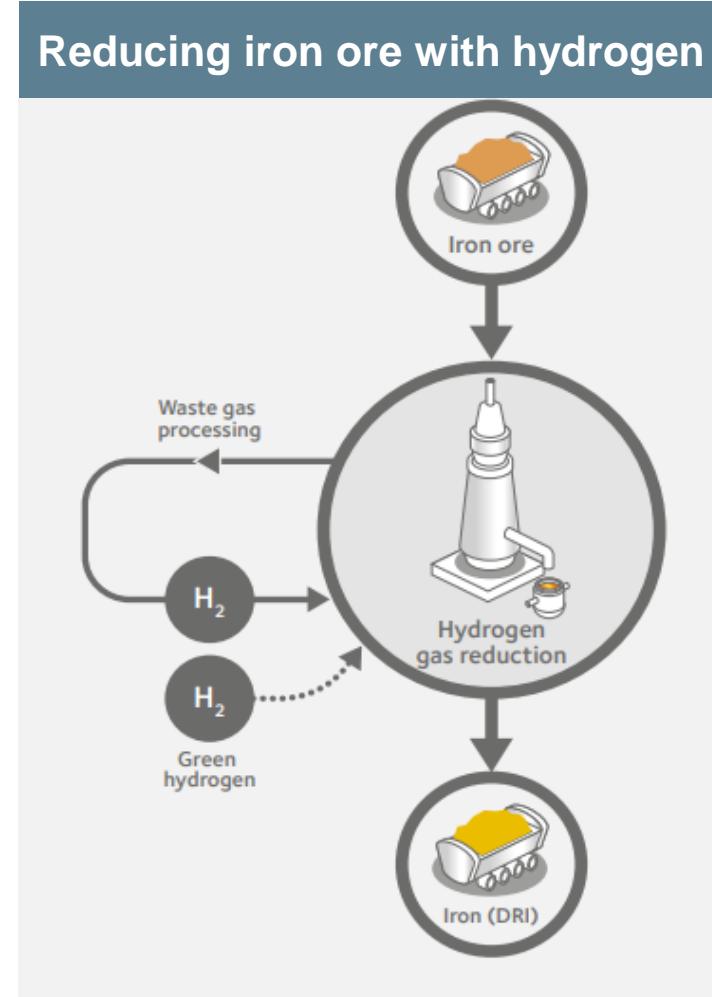
A 'smart carbon' technology



H₂ Hamburg

Reducing iron ore with hydrogen via the DRI

- Industrial scale demonstration project at our Hamburg site
- Innovative DRI installation on 100% pure hydrogen for the direct reduction of iron ore for the steel production process
- Installation will generate hydrogen from natural gas and/or from the waste gases at the existing plant and demonstrate the hydrogen technology with an annual production of 100,000 tonnes of iron per year
- In the future, the plant should also be able to run on green hydrogen (generated from renewable sources) when it is available in sufficient quantities at affordable prices.
- Production start up expected 2023-5 dependent on funding



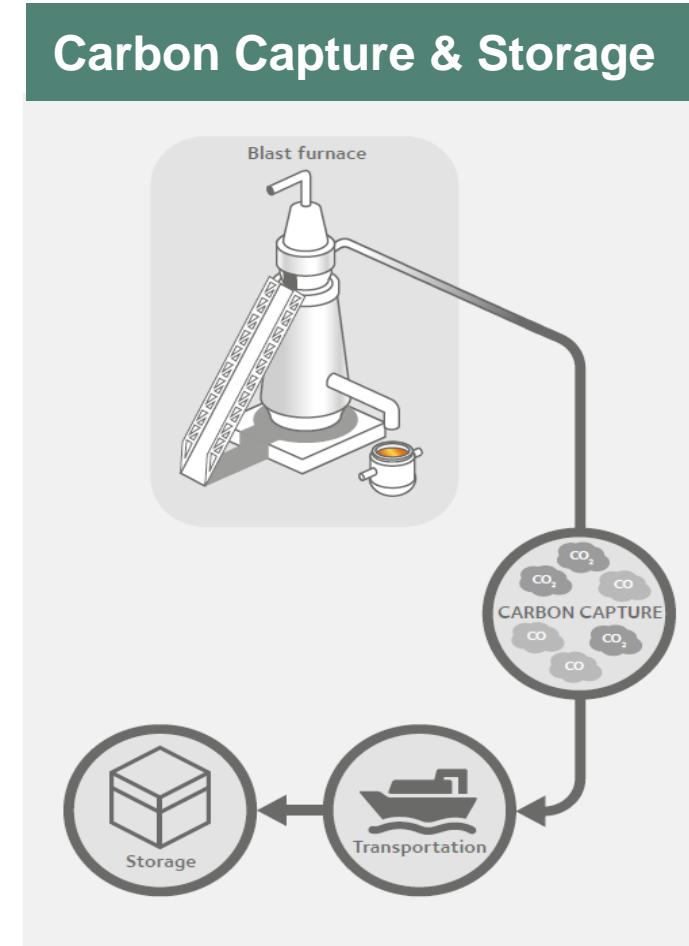
Carbon capture: capturing fossil fuel carbon for storage or reuse

“Carbon2Value”

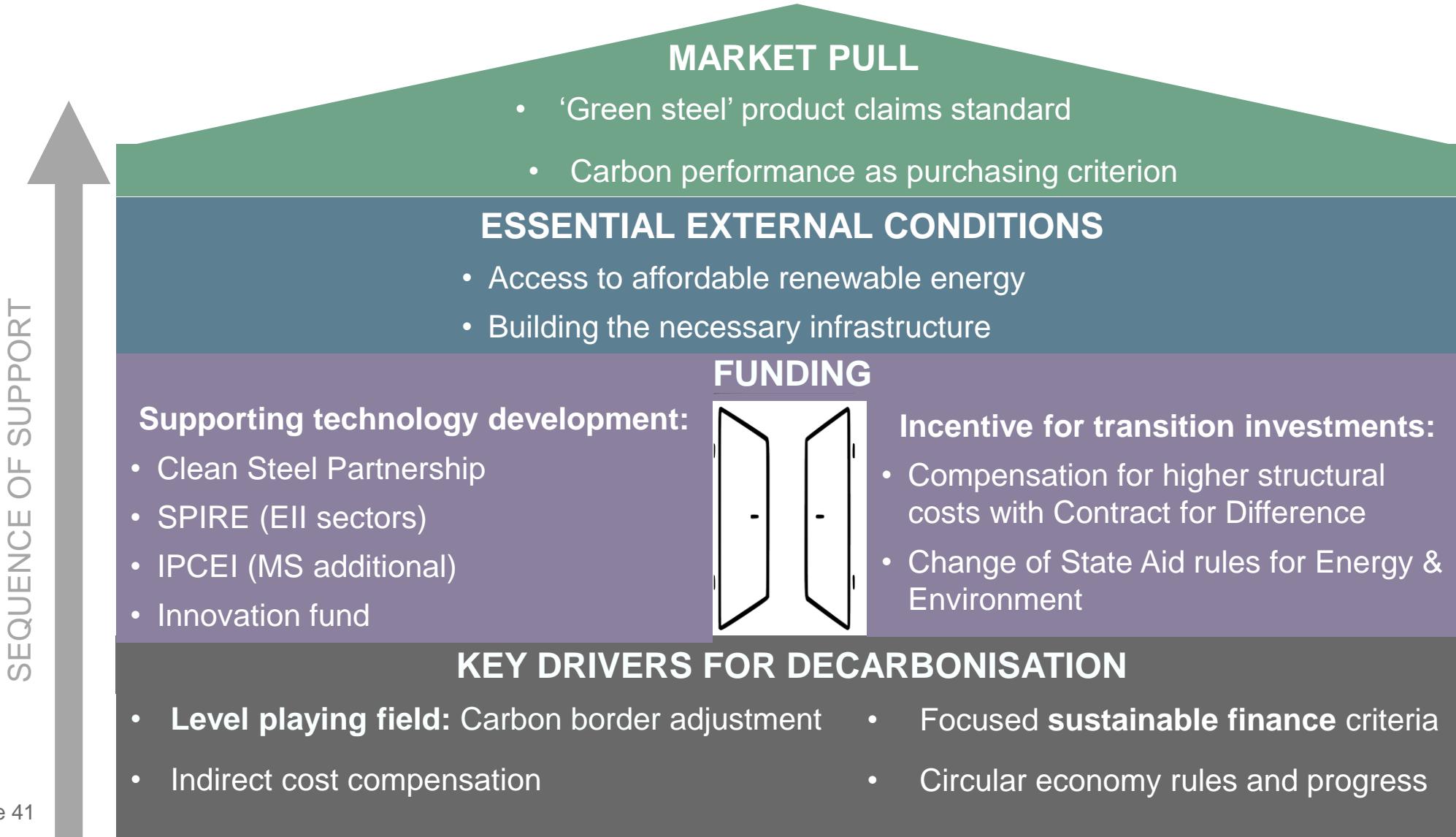
- Developing cost-effective technologies to capture and separate CO₂ from our waste gases, and liquefy it for subsequent transport and storage or reuse.
- Combining this with a circular carbon energy input would further reduce CO₂ emissions.
- A pilot plant to capture CO₂ has been built in Gent, together with DOW Chemicals as part of the Carbon2Value project.

“3D”

- €20m pilot project in Dunkirk, France to capture CO₂ (0.5 metric tonnes of CO₂/hour) for transport/storage using only low-temperature waste heat.
- Completion expected 2021



Building key policy enablers for low-emissions steelmaking (focus on EU)



Policy requirements – the ‘missing pieces’

The medium-term market conditions needed include:

- Creating an environment where carbon-neutral steel is more competitive than steel which is not carbon neutral
- A fair competitive landscape that accounts for the global nature of the steel market, addressing domestic, import and export steel dynamics, as well as the distinction between primary and secondary sources to make steel.
- Access to sustainable finance, to innovate and make long-term investments.
- Access to abundant, affordable clean energy: the scale of the steel industry’s energy needs are such that concerted cross-sector and government efforts will be required to develop the necessary clean energy infrastructure.
- Public instruments to accelerate innovative technology deployment to transition to carbon neutral steelmaking.

