Carbon contracts for difference

ERCST event

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Circular Economy (CE)

Carbon Direct Avoidance (CDA)
H_2-based metallurgy
Electricity-based metallurgy

Smart Carbon Usage (SCU)
Proces Integration
Carbon Valorisation/CCU

Carbon Capture and Storage CCS[2]
(not included in SCU, CDA or CE)

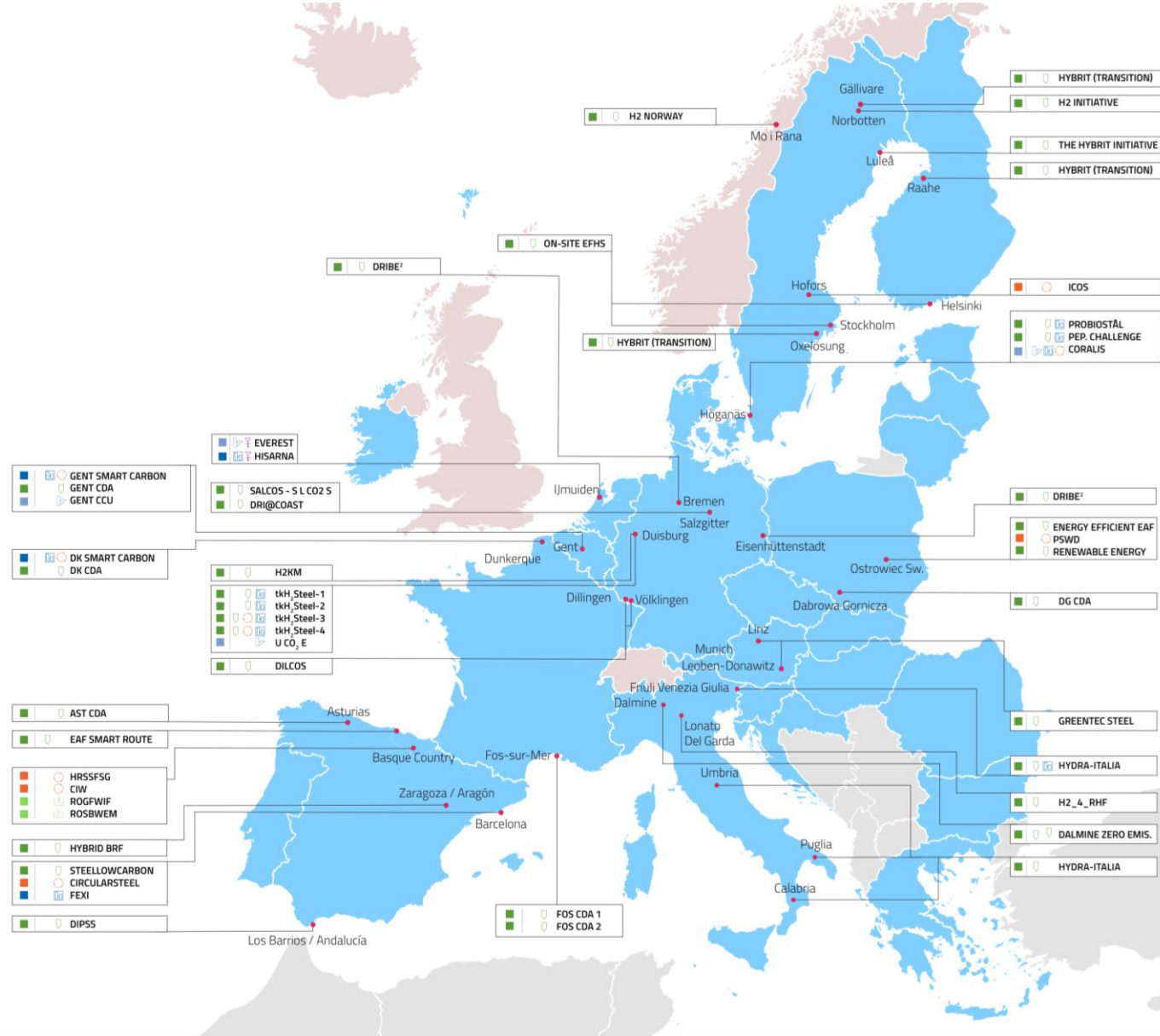**54 low-CO_2 projects**

At least at Technology Readiness Level (TRL) 7
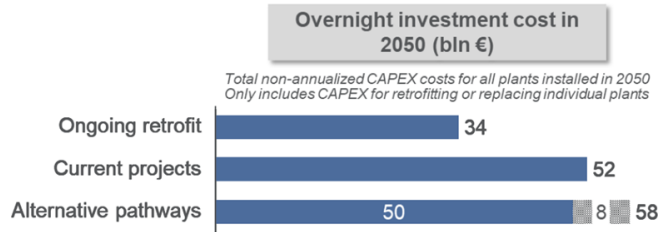
Starting year before 2030

Potential annual CO_2 abatement in 2030: 76 Mio tons CO_2/year

Capex needs: 25 billion EUR

Opex needs: 45 billion EUR

Source: IPCEI low carbon industry, July 2021

HYBRIT (TRANSITION)
H2 INITIATIVE
THE HYBRIT INITIATIVE
HYBRIT (TRANSITION)
H2 NORWAY
Gällivare
Norbotten
Mo i Rana
Luleå
Raahe
ON-SITE EFHS
DRIBE²
Hofors
ICOS
Helsinki
Stockholm
PROBIOSTÅL
PEP. CHALLENGE
CORALIS
HYBRIT (TRANSITION)
Oxelösung
Höganäs
EVEREST
HISARNA
GENT SMART CARBON
GENT CDA
GENT CCU
SALCOS - S L CO2 S
DRI@COAST
IJmuiden
Bremen
DRIBE²
Salzgitter
ENERGY EFFICIENT EAF
PSWD
RENEWABLE ENERGY
Duisburg
Gent
Eisenhüttenstadt
Dunkerque
Ostrowiec Sw.
DK SMART CARBON
DK CDA
H2KM
tkH₂Steel-1
tkH₂Steel-2
tkH₂Steel-3
tkH₂Steel-4
U CO₂ E
Dillingen
Völklingen
Dabrowa Gornicza
DG CDA
DILCOS
Linz
Munich
Leoben-Donawitz
Friuli Venezia Giulia
AST CDA
Asturias
Dalmine
Lonato
Del Garda
GREENTEC STEEL
EAF SMART ROUTE
Basque Country
Fos-sur-Mer
Umbria
HYDRA-ITALIA
HRSSFSG
CIW
ROGFWIF
ROSBWEM
Zaragoza / Aragón
H2_4_RHF
Barcelona
HYBRID BRF
DALMINE ZERO EMIS.
Puglia
STEELLOWCARBON
CIRCULARSTEEL
FEXI
HYDRA-ITALIA
Calabria
DIPSS
FOS CDA 1
FOS CDA 2
Los Barrios / Andalucía

Overnight investment cost in 2050 (bln €)

Total non-annualized CAPEX costs for all plants installed in 2050
Only includes CAPEX for retrofitting or replacing individual plants

Ongoing retrofit	34
Current projects	52
Alternative pathways	50 / 8 / 58

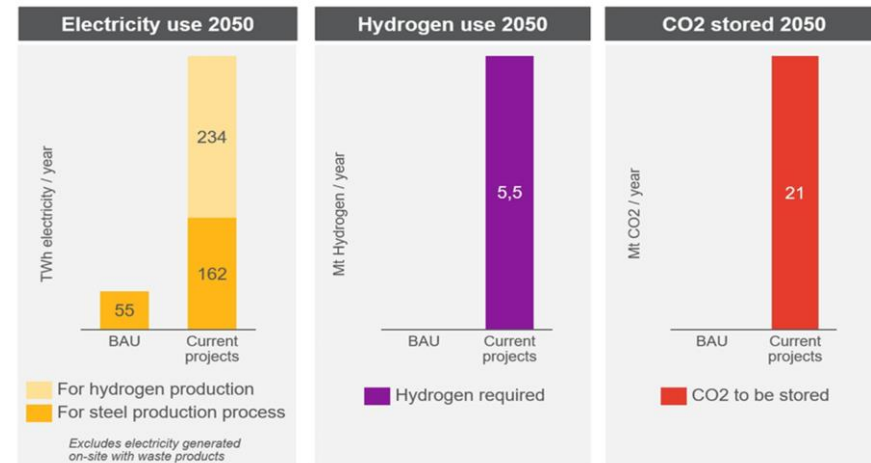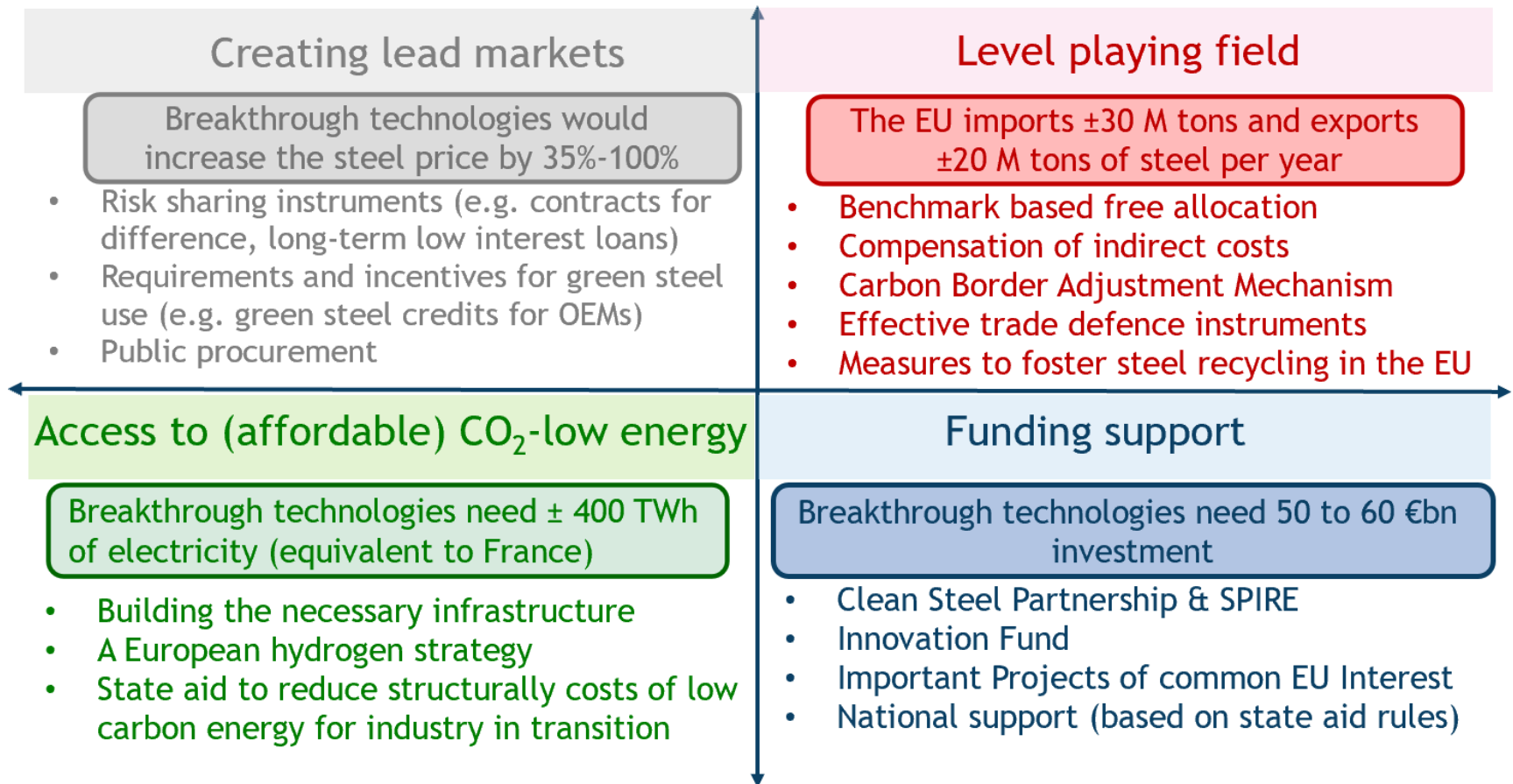Note: Cost projections are based on estimated full-size scale, material and energy consumption of commercial scale production installations.

Up to 70% increase of investment needs

Relative steel production cost (BF/BOF retrofit low range 2015 = 100%)

- BF/BOF Retrofit high range
- BF/BOF Retrofit low range
- Average primary routes high range
- Average primary routes low range
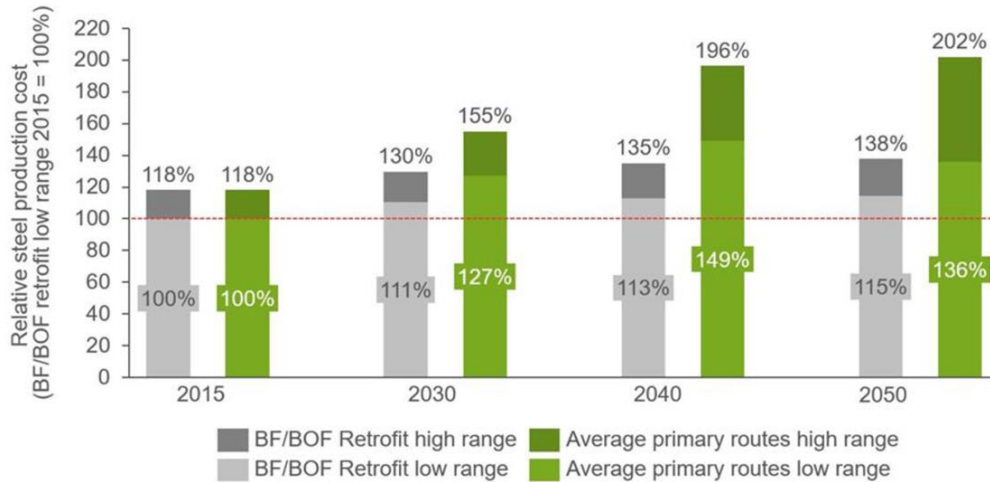
35%-100% increase of production costs in primary steel making

Up to 400TWh of CO2-free electricity (including for the production of yearly 5.5 Mt hydrogen), which is **7 times more** than what the sector purchases from the grid today

Electricity use 2050 — TWh electricity / year — BAU: 55 — Current projects: 162 (For steel production process), 234 (For hydrogen production)

- For hydrogen production
- For steel production process

Excludes electricity generated on-site with waste products

Hydrogen use 2050 — Mt Hydrogen / year — Current projects: 5,5

- Hydrogen required

CO2 stored 2050 — Mt CO2 / year — Current projects: 21

- CO2 to be stored

Source: EUROFER low-Carbon Roadmap, Nov 2019

Creating lead markets

Breakthrough technologies would increase the steel price by 35%-100%

- Risk sharing instruments (e.g. contracts for difference, long-term low interest loans)
- Requirements and incentives for green steel use (e.g. green steel credits for OEMs)
- Public procurement

Level playing field

The EU imports ±30 M tons and exports ±20 M tons of steel per year

- Benchmark based free allocation
- Compensation of indirect costs
- Carbon Border Adjustment Mechanism
- Effective trade defence instruments
- Measures to foster steel recycling in the EU

Access to (affordable) CO_2-low energy

Breakthrough technologies need ± 400 TWh of electricity (equivalent to France)

- Building the necessary infrastructure
- A European hydrogen strategy
- State aid to reduce structurally costs of low carbon energy for industry in transition

Funding support

Breakthrough technologies need 50 to 60 €bn investment

- Clean Steel Partnership & SPIRE
- Innovation Fund
- Important Projects of common EU Interest
- National support (based on state aid rules)

Thank you for your attention

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