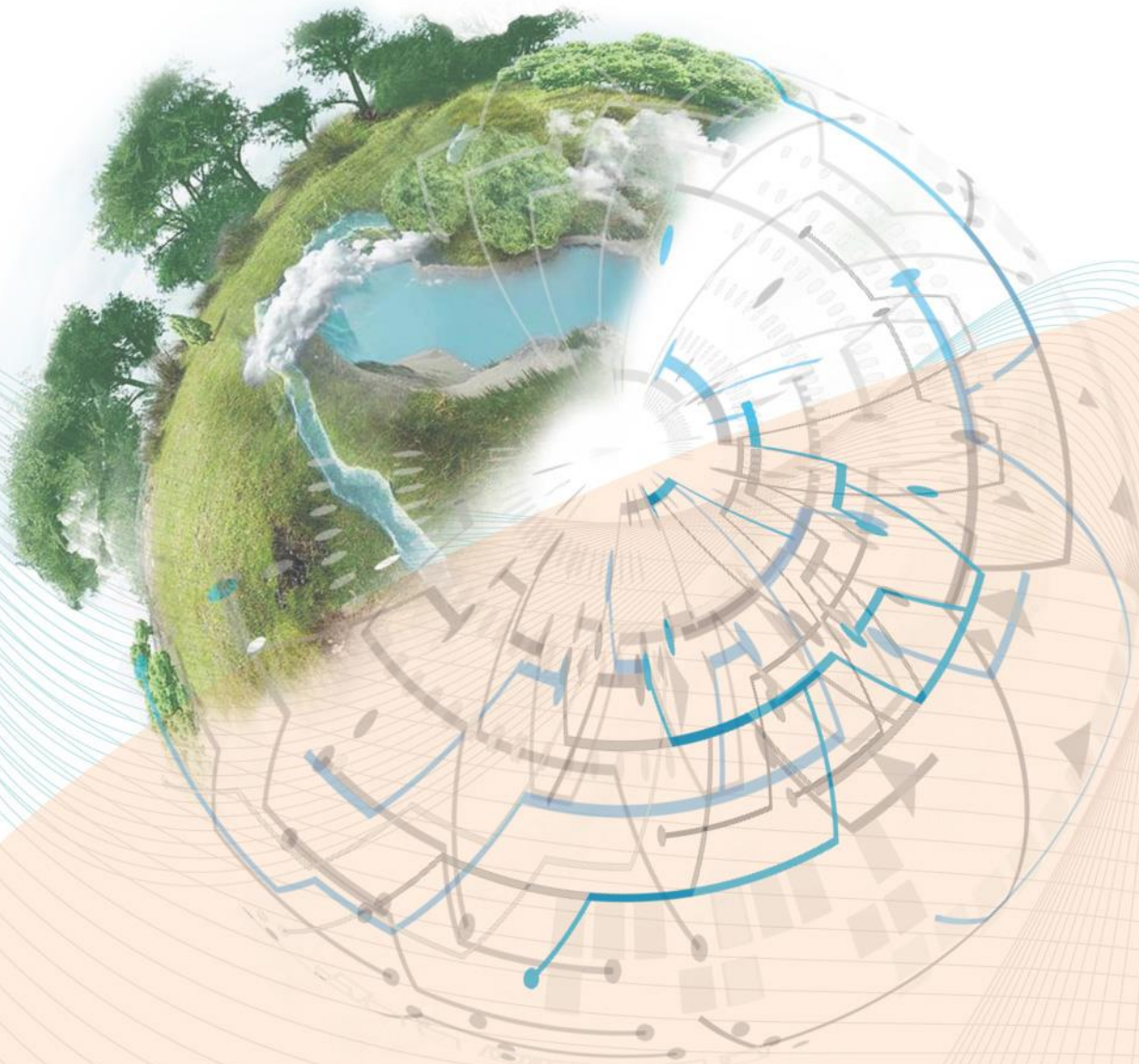

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LNEG – National Laboratory for Energy and Geology

GREEN TRANSITION

The challenges for moulds industry

Sofia G. Simões
Head of Resource Economics Unit LNEG

LNEG Resource Economics Unit

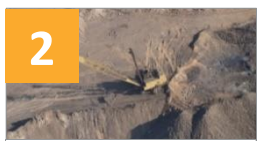
The unit is **crosscutting the Energy and Geology areas** of LNEG
Develops I&D&D activities and decision-support for both public policy-makers and the private sector on **energy and geology resource economics, towards carbon neutrality and sustainable resource exploitation and use**

The unit applies techno-economic & social analytical approaches in the following I&D fields:

1

Sustainable energy systems

2



Resource use for energy production and consumption

3

Classification of geological deposits in a global economy

4

Economic and social impact of the energy transition

5

Circular economy, including design of products, services, systems and business models

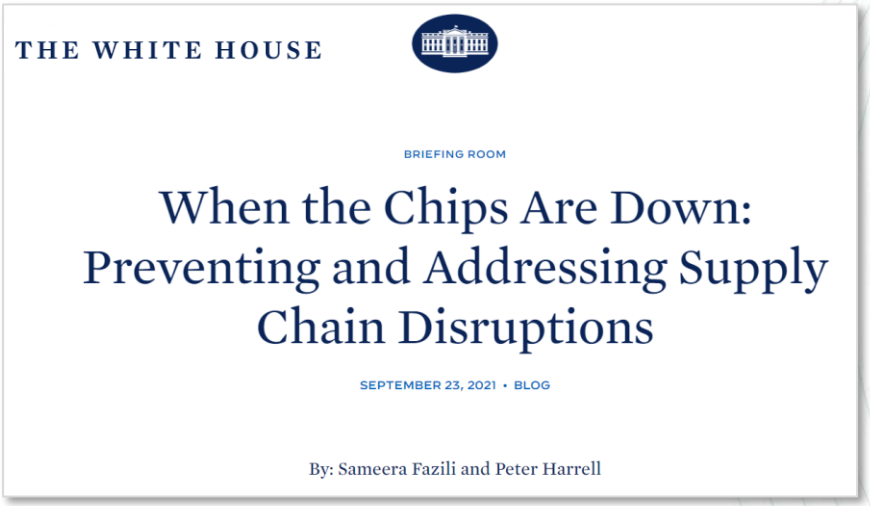
6

Sustainable public circular procurement

https://www.lneg.pt/en/unit/resource-economics-unit/

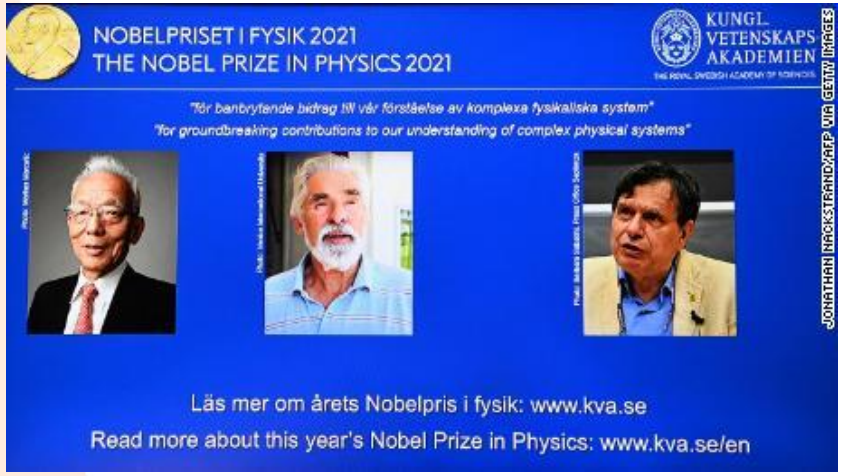
https://www.euronews.com/2021/10/28/why-europe-s-energy-prices-are-soaring-and-could-get-much-worse

Energy prices in European markets are reaching unprecedented high levels, which are leading several national and European decision-makers to rethink the design of energy markets.



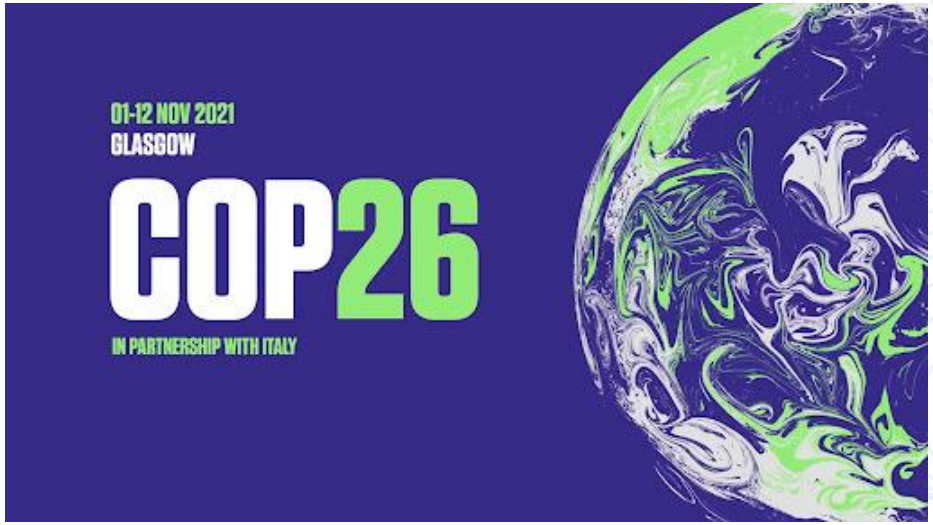
ttps://www.whitehouse.gov/briefing-room/blog/2021/09/23/when-the-chips-are-down-preventing-and-addressing-supply-chain-disruptions/

Disruption in the global supply chain for semiconductors and micro-chips, which could cause a drop of 1% USA GDP and led USA Government to take several actions



https://cdn.cnn.com/cnnnext/dam/assets/211005063600-01-nobel-physics-2021-large-169.jpg

2021 Nobel Prize in Physics for Syukuro Manabe and Klaus Hasselmann that "laid the foundation of our knowledge of the Earth's climate and how humanity influences it"



What do all the previous have in common?

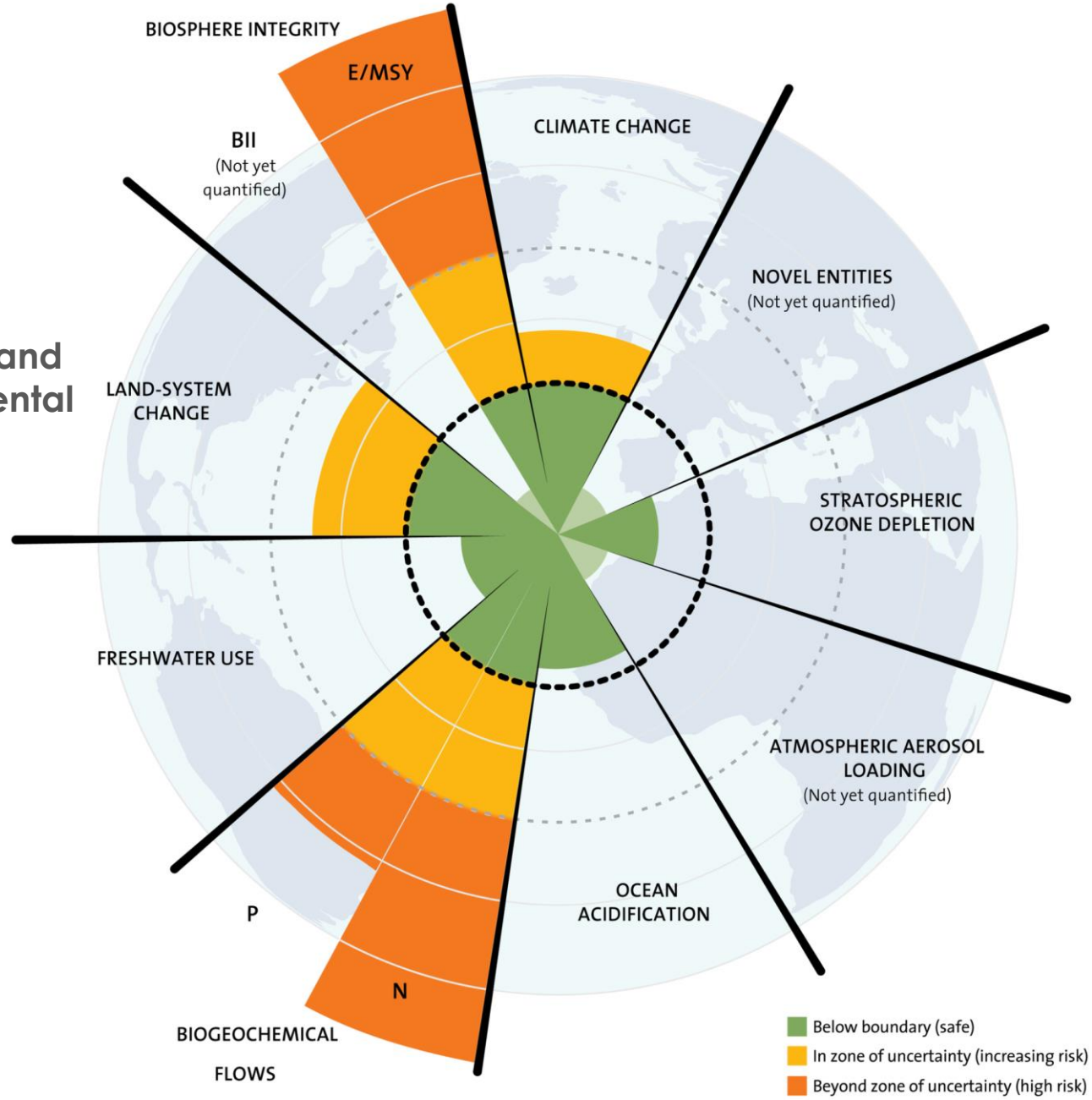
All respond to the fact that our economic system is dependent on natural resources whose availability is changing from what we have been used to

We depend on economic activities based, to a greater or lesser extent, on the biophysical processes and ecosystem services that our planet provides

9 Planetary boundaries

Distance between the degree of human disturbance and the planet's regenerative capacity for nine environmental disturbances:

1. stratospheric ozone depletion
2. chemical/as-yet-unknown entities pollution
3. freshwater use and global water cycle
4. ocean acidification
5. increased aerosols in the atmosphere
6. **loss of biosphere integrity (i.e., loss of biodiversity)**
7. **land use (land system) changes**
8. **biogeochemical (nutrient P and N) flows**
9. **climate change**

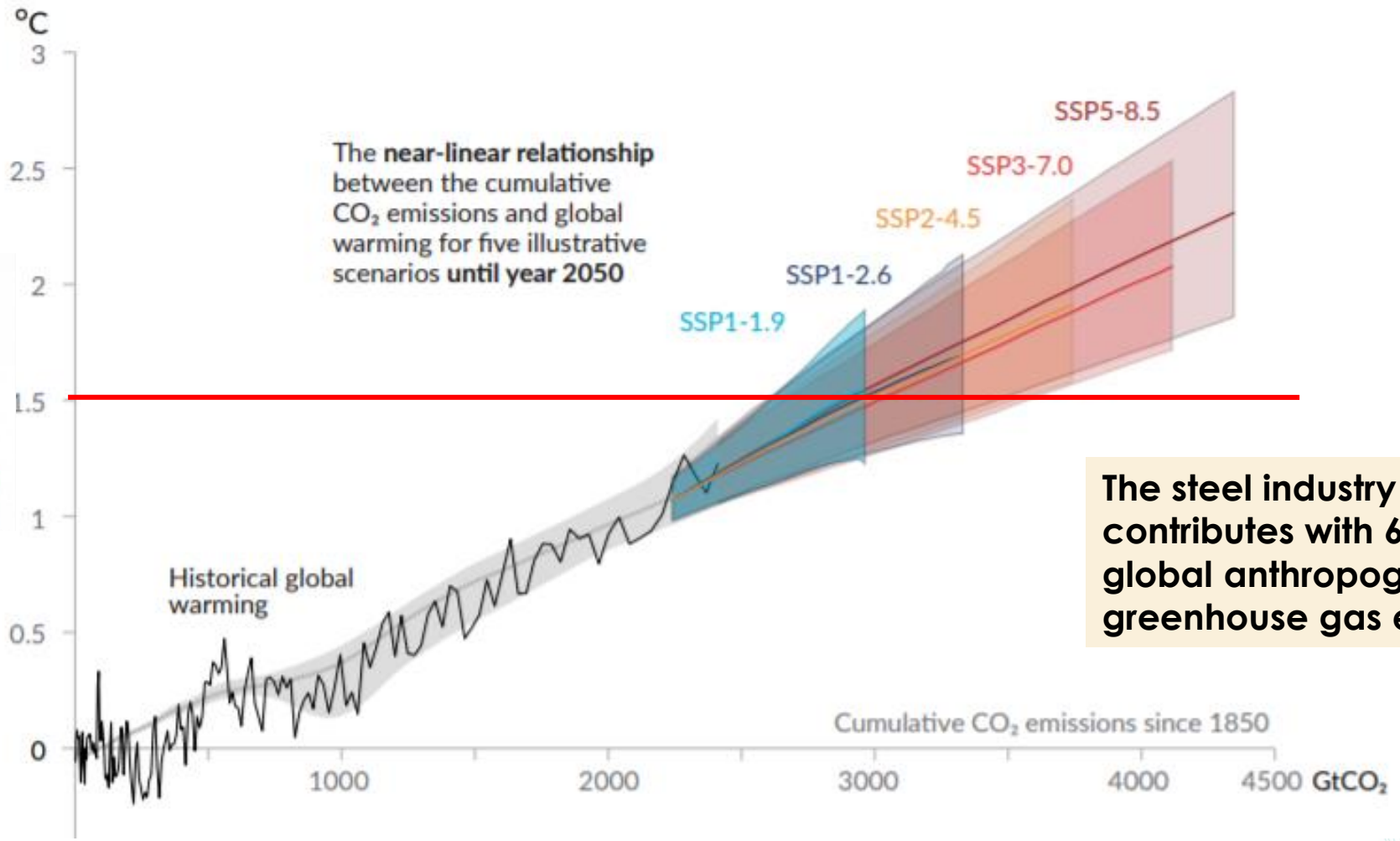


J. Lokrantz/Azote based on Steffen et al. 2015
https://www.stockholmresilience.org/research/planetary-boundaries.html

With the best scientific knowledge to date, it becomes evident that it is impossible to keep our economic system functioning in the long run without making drastic changes

Every tonne of CO_2 emissions adds to global warming

What will be the GHG emissions and temperature increase till 2050?



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

The steel industry contributes with 6-8% of global anthropogenic greenhouse gas emissions

ipcc
INTERGOVERNMENTAL PANEL ON climate change
Climate Change 2021
The Physical Science Basis
Summary for Policymakers

https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf

"Every ton of steel produced in 2018 emitted on average 1.85 tons of CO_2, equating to about 8% of global CO_2 emissions. Consequently, steel players across the globe, and especially in Europe, are increasingly facing a decarbonization challenge."

https://www.mckinsey.com/industries/metals-and-mining/our-insights/decarbonization-challenge-for-steel

CDP
DISCLOSURE INSIGHT ACTION

Nerves of steel: Who's ready to get tough on emissions?

2016

70%

of global steel production will face a price on carbon in 2017

Zero

The number of carbon capture and storage projects operational in the steel industry

15%

of the largest Chinese steelmakers publicly disclose their greenhouse gas emissions

- 14% of steel companies' potential value is at risk if they're unable to decrease their environmental impact
- investors are raising concerns that the steel industry needs to act now
- emissions associated with steel production tend to account for a significant proportion of an organisation's supply chain emissions

https://www.cdp.net/en/investor/sector-research/steel-report

"The direct CO_2 intensity of crude steel production has been relatively constant in the past few years.
In contrast, in the Net Zero Emissions by 2050 Scenario it falls an average 4% annually between 2020 and 2030. Achieving this reduction and maintaining it after 2030 will not be easy.
Potential for energy efficiency improvements will likely soon be exhausted. Thus, innovation in the upcoming decade will be crucial to commercialise new low-emissions processes, including those that integrate CCUS and hydrogen, to realise the long-term transformational change required."

The steel sector is still highly reliant on coal, which currently meets 75% of its energy demand (i.e., via the blast furnace or blast oxygen furnace process)

2018: 1.4 tCO_2 / t steel

2030: 0.9 tCO_2 / t steel

https://www.iea.org/reports/iron-and-steel

Decarbonise steel production

Short term

- energy efficiency improvements
- increased scrap collection to enable more scrap-based production

Long-term

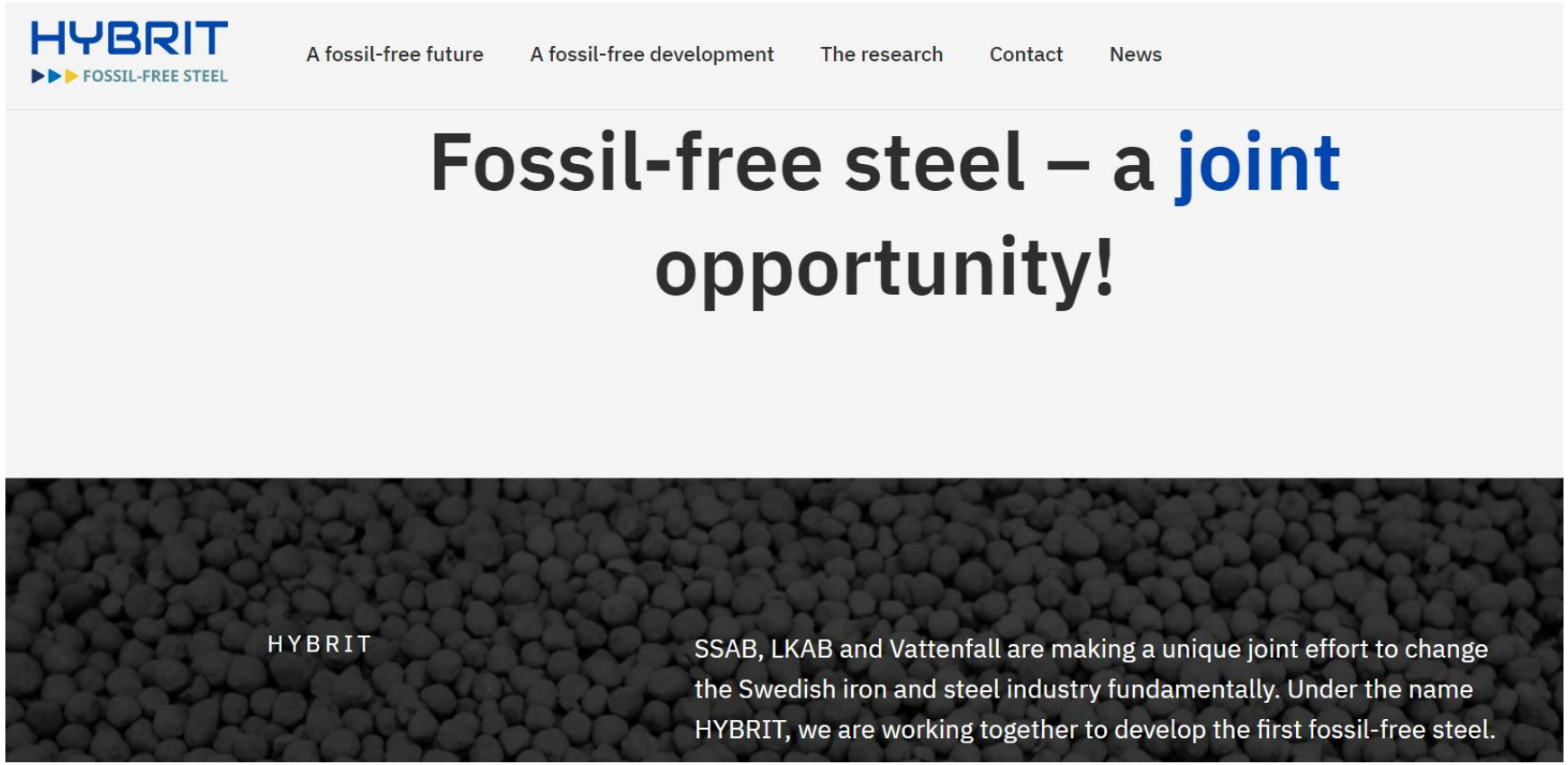
- new direct reduced iron (DRI) and smelting reduction technologies based on low-carbon electricity (via direct consumption or via hydrogen produced via electrolysis)
- CCUS carbon capture and usage/storage
- material efficiency strategies to optimise steel use

https://www.iea.org/reports/iron-and-steel

global initiative of leading organizations to speed up the transition to a net zero steel industry

- public commitment to procuring, specifying or stocking 100% net zero steel by 2050 and an interim commitment of 50% by 2030

https://www.theclimategroup.org/steelzero



use hydrogen instead of coal as the “reducing agent” to remove the oxygen from the iron ore

https://www.hybritdevelopment.se/en/

https://cicenergigune.com/media/uploads/rrss/estrategia-europea-hidrogeno.jpg

- What will these technology changes mean for the moulds industry?
- How will the price of steel change?
- To what extent can the moulds industry consider alternative low carbon raw materials?

Thank you!

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