International Energy Agency

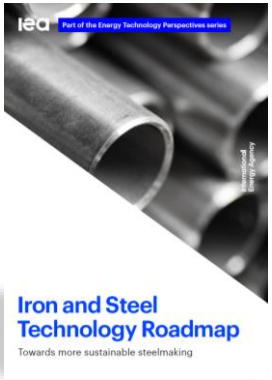
Iron and Steel Technology Roadmap

Towards more sustainable steelmaking

Launch webinar, 08 October 2020

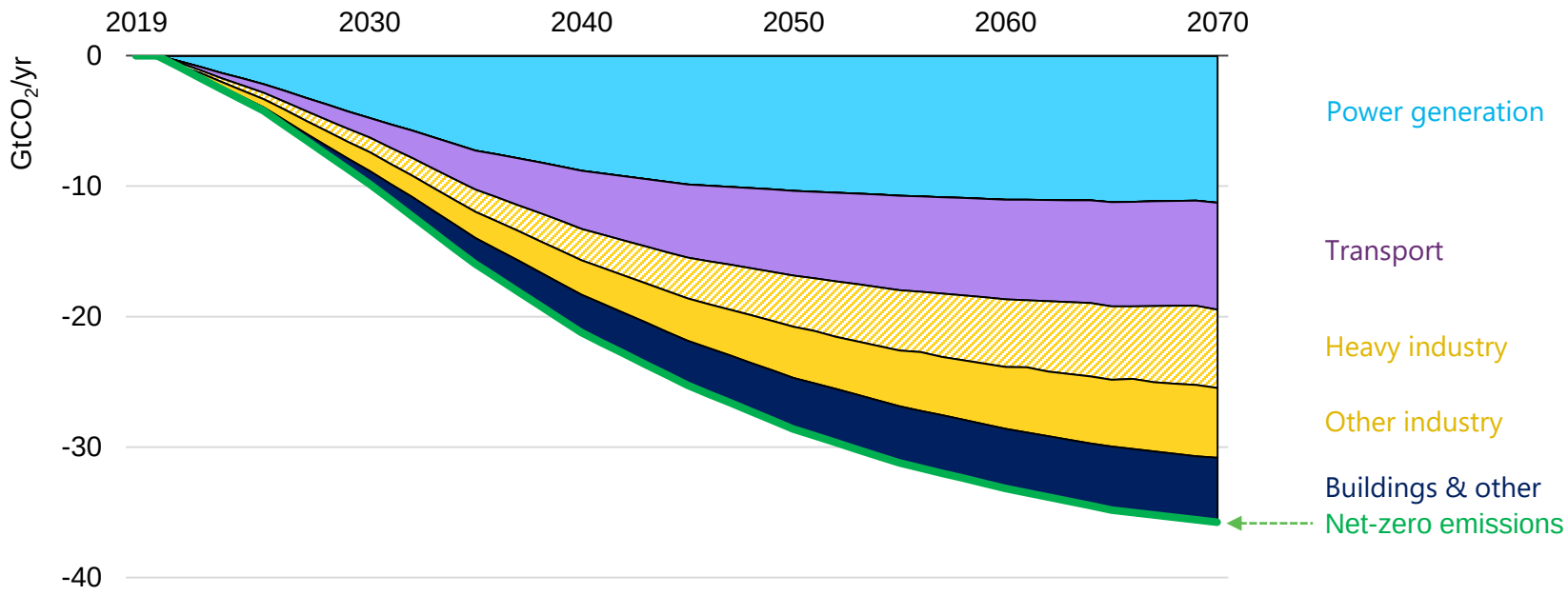
What do net-zero ambitions mean for energy technology?

- A growing number of governments and companies are making ambitious pledges to reach net-zero emissions in the coming decades.
- Major progress has been made: the rise of solar PV, wind and batteries has significantly reduced the costs of renewable electricity and electric cars.
- But an energy system transition to net-zero emissions requires broader technology efforts in three critical areas:
  - Existing assets in power generation and industry
  - Clean energy innovation
  - Infrastructure that enables rapid technology deployment



Focusing on the power sector is not enough to reach climate goals

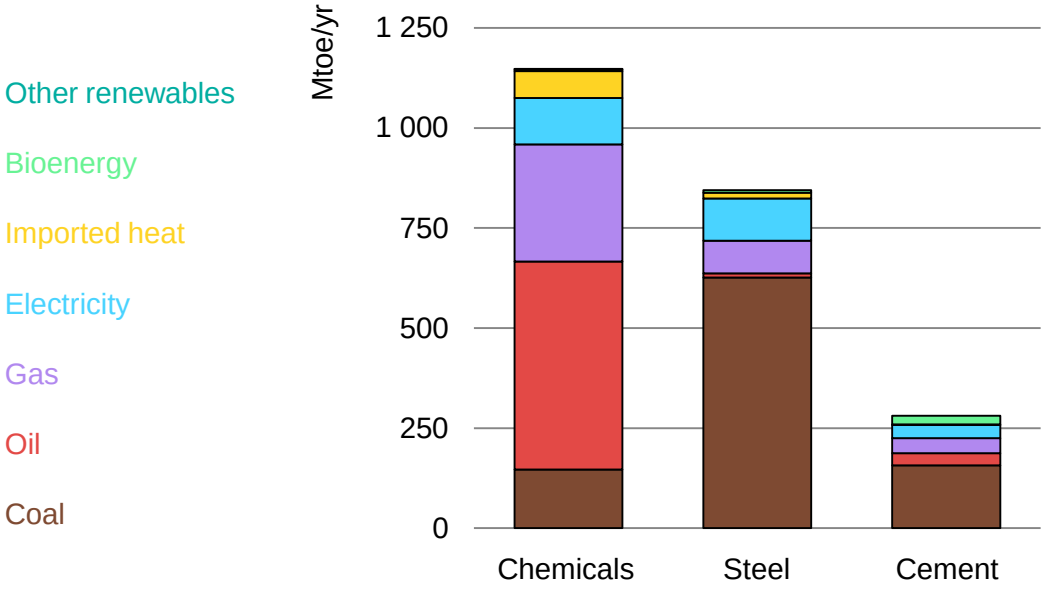
Global CO_2 emissions reductions in the Sustainable Development Scenario, relative to baseline trends



Clean energy technology progress in the power sector is encouraging, but alone not sufficient to reach energy and climate goals. About half of all CO_2 emissions today are from industry, transport and buildings.

Emissions from heavy industry sectors are ‘hard to abate’

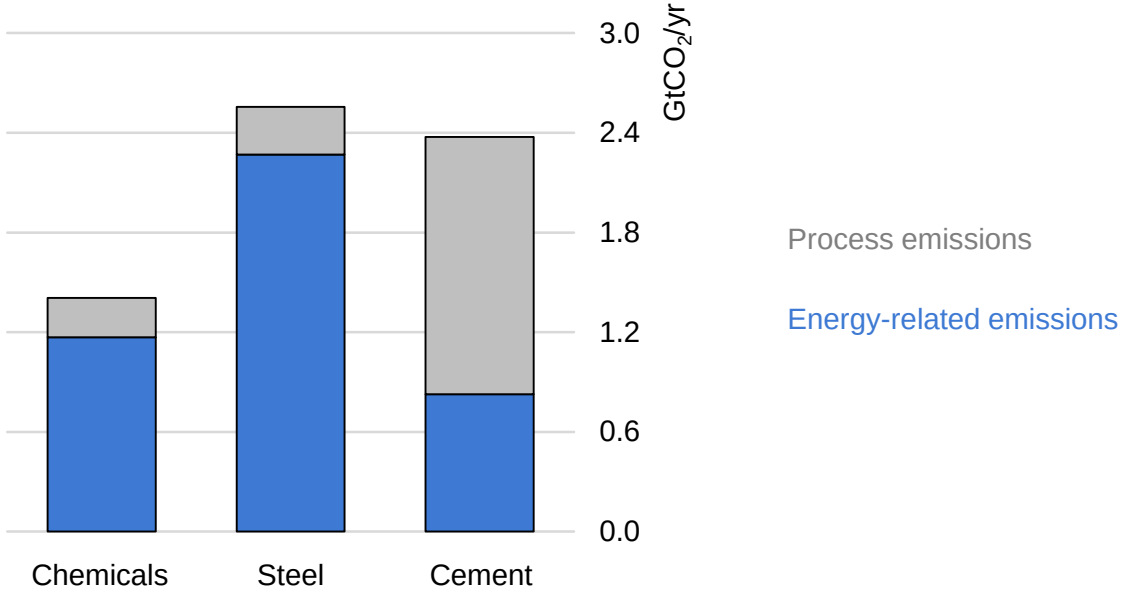
Heavy industry final energy demand and direct CO_2 emissions, 2019



Fossil fuels account for around 85% of the final energy used in heavy industries, which, combined, account for just under a fifth of total energy system CO_2 emissions.

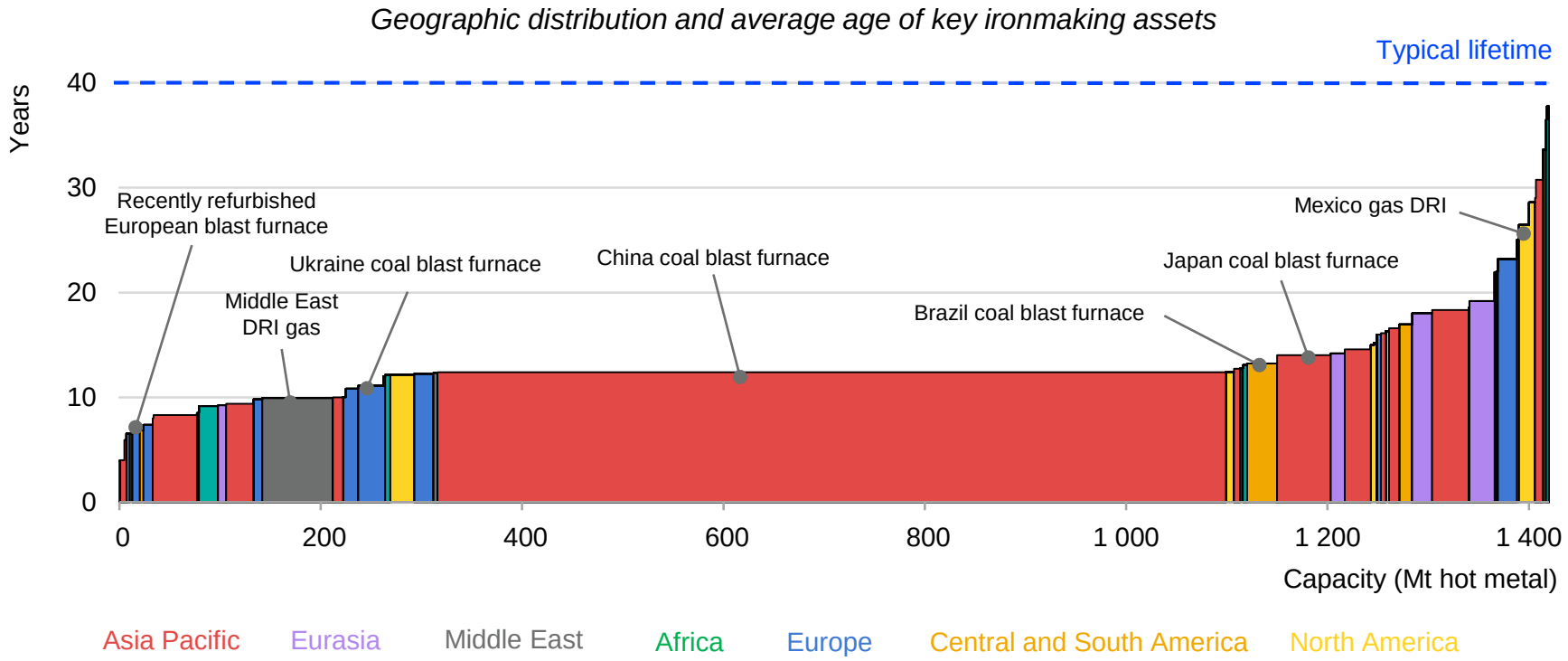
Emissions from heavy industry sectors are ‘hard to abate’

Heavy industry final energy demand and direct CO_2 emissions, 2019



Fossil fuels account for around 85% of the final energy used in heavy industries, which, combined, account for just under a fifth of total energy system CO_2 emissions.

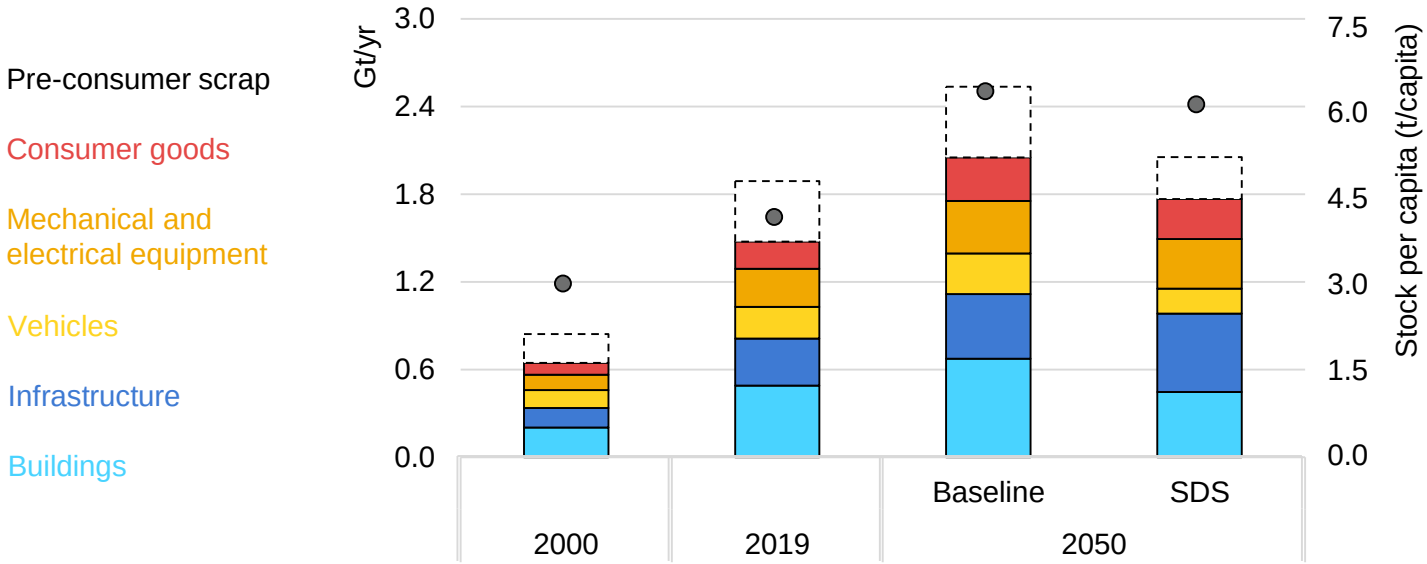
Existing capacity is the starting point for the transition



Around 50% of the existing stock of ironmaking equipment is based in China, with India contributing a further 5%. The current stock is quite young, with a global average age of 13 to 14 years for blast furnaces and DRI furnaces.

Steel continues to play a pivotal role across multiple end-use sectors

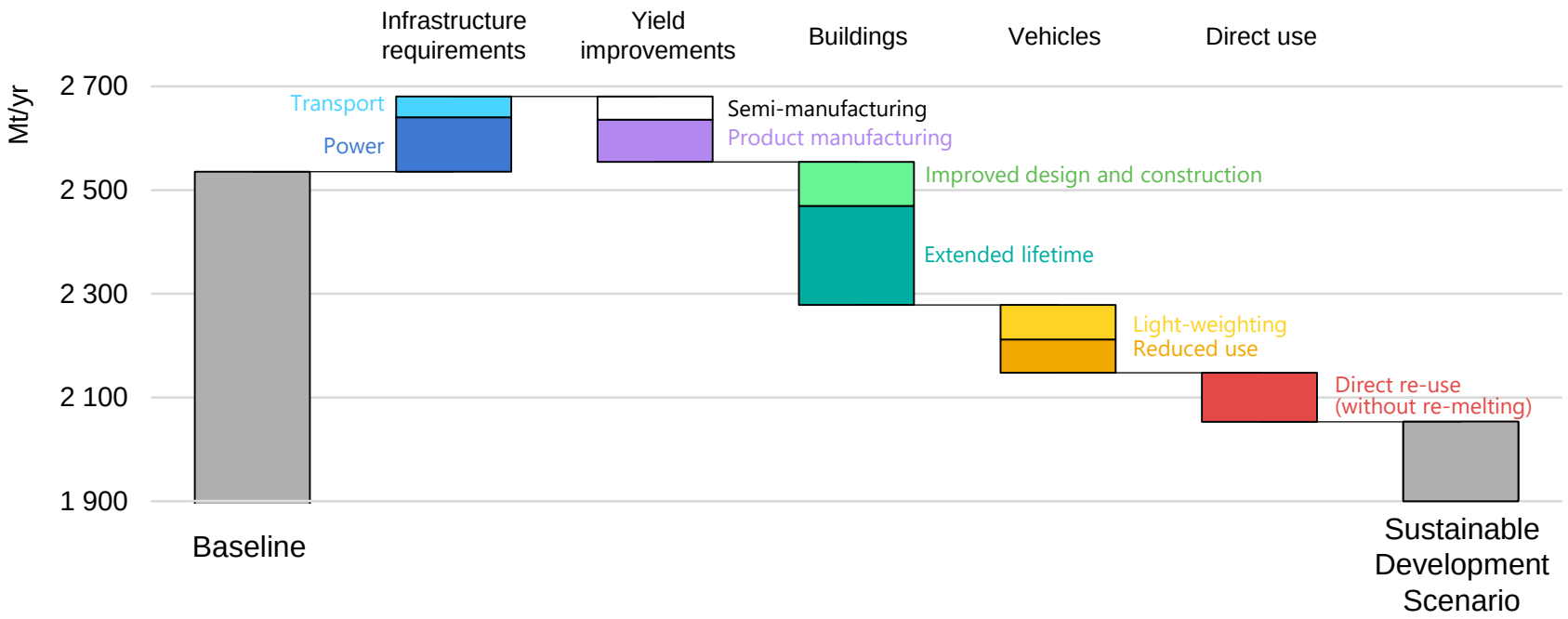
Global end-use steel demand and in-use steel stock by scenario



Global demand for steel is projected to increase by more than a third through to 2050 in our baseline projection. In the Sustainable Development Scenario, demand is reduced through material efficiency strategies.

There is great potential for a more efficient use of steel

Contributions to changes in global steel demand, 2050



Material efficiency strategies pursued across the supply chain deliver savings of around 20% in global steel production in the Sustainable Development Scenario, relative to our baseline projection.

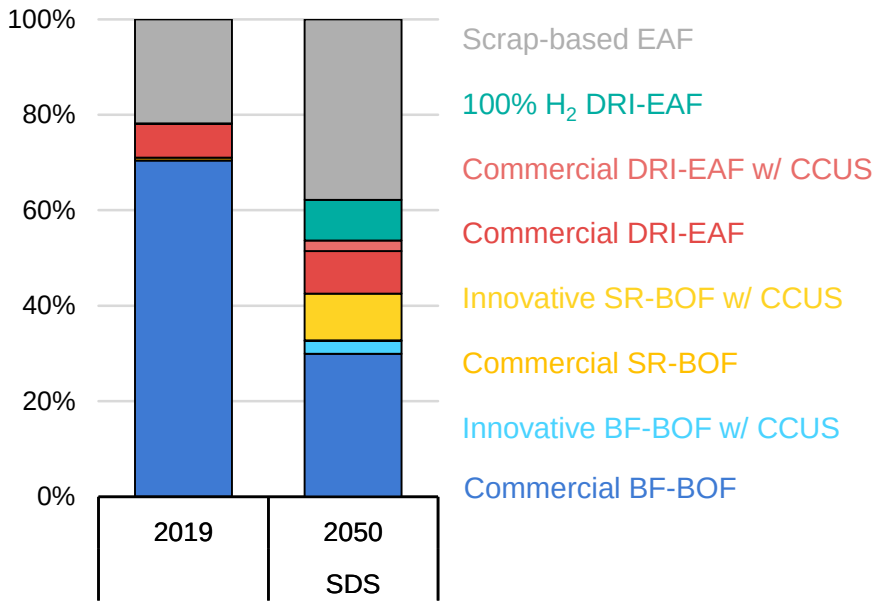
A portfolio of mitigation strategies is required

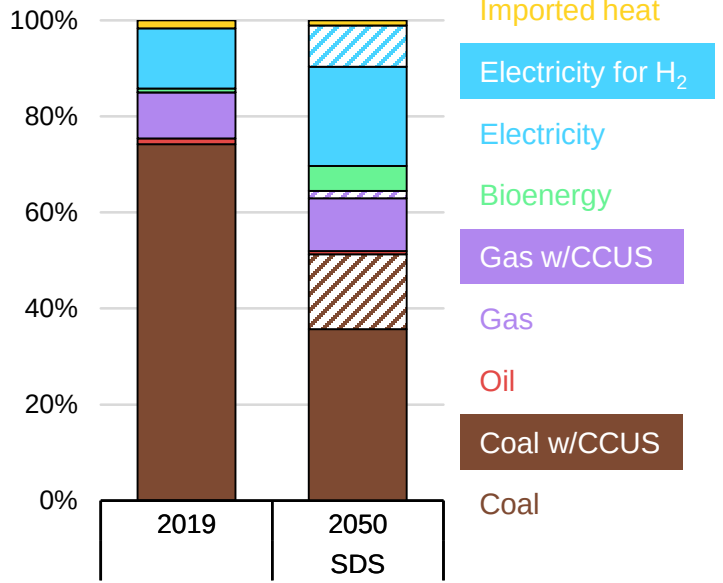
Cumulative direct CO_2 emission reductions in iron and steel, Sustainable Development Scenario relative to baseline

Technology performance improvements and material efficiency deliver 90% of annual emission reductions in 2030. In the longer term, innovative technologies such as CCUS-equipped and hydrogen-based production are required.

A diverse portfolio of energy carriers and processes

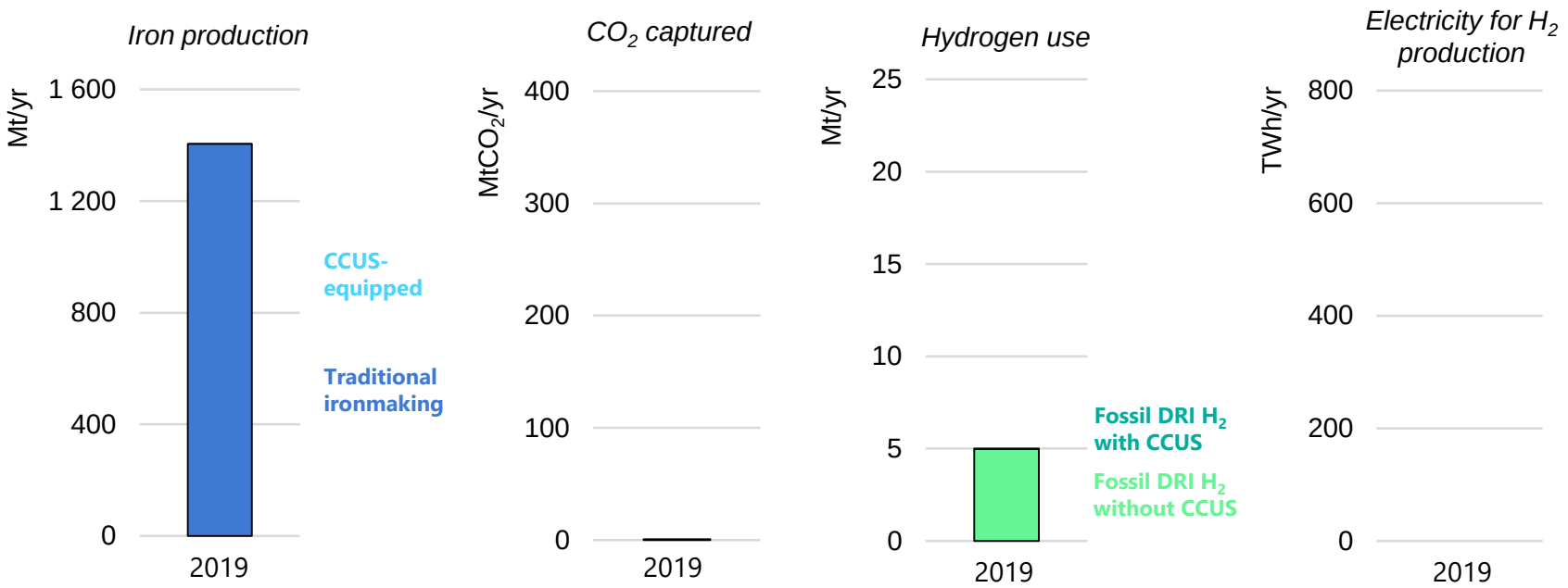
Shares of process technology (left) and final energy carriers (right) in the Sustainable Development Scenario





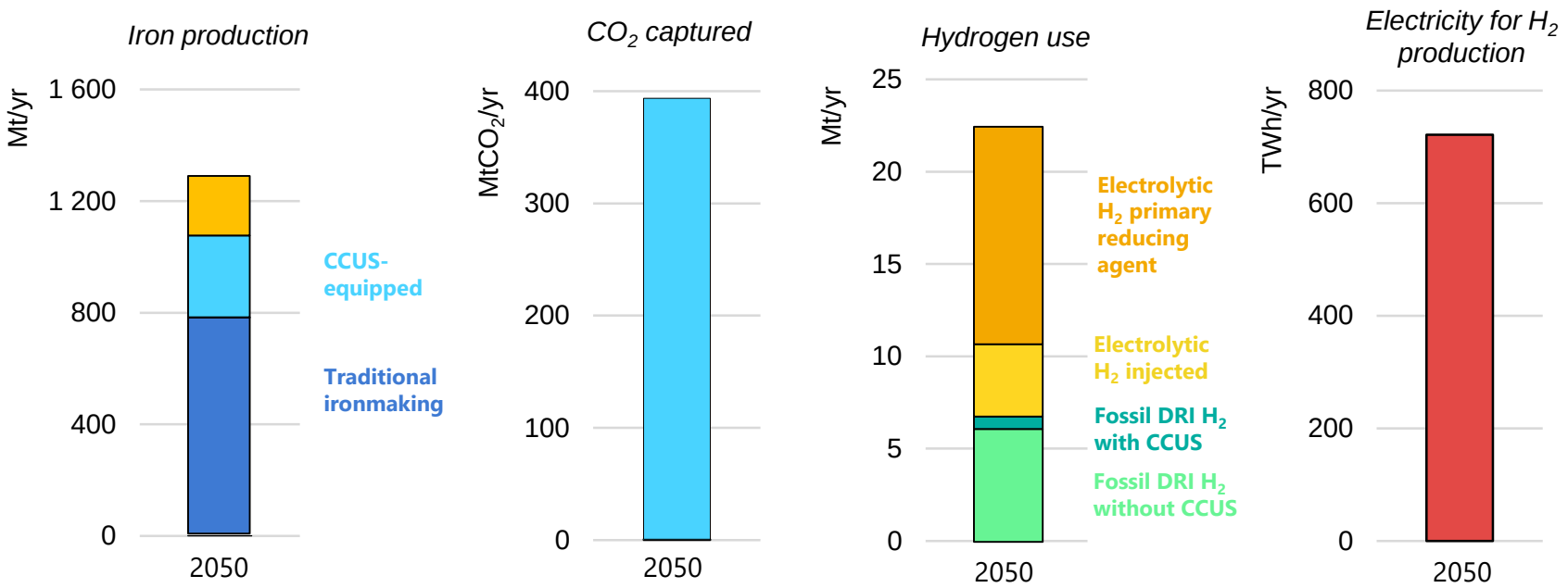
Unabated use of coal drops by more than 50% in the Sustainable Development Scenario by 2050, facilitated by widespread deployment of innovative technologies.

Sustainable steel requires a major push for clean energy infrastructure



The transformation for primary steel production in the Sustainable Development Scenario requires infrastructure developments for CO_2 transport and storage, hydrogen production, and renewable electricity generation.

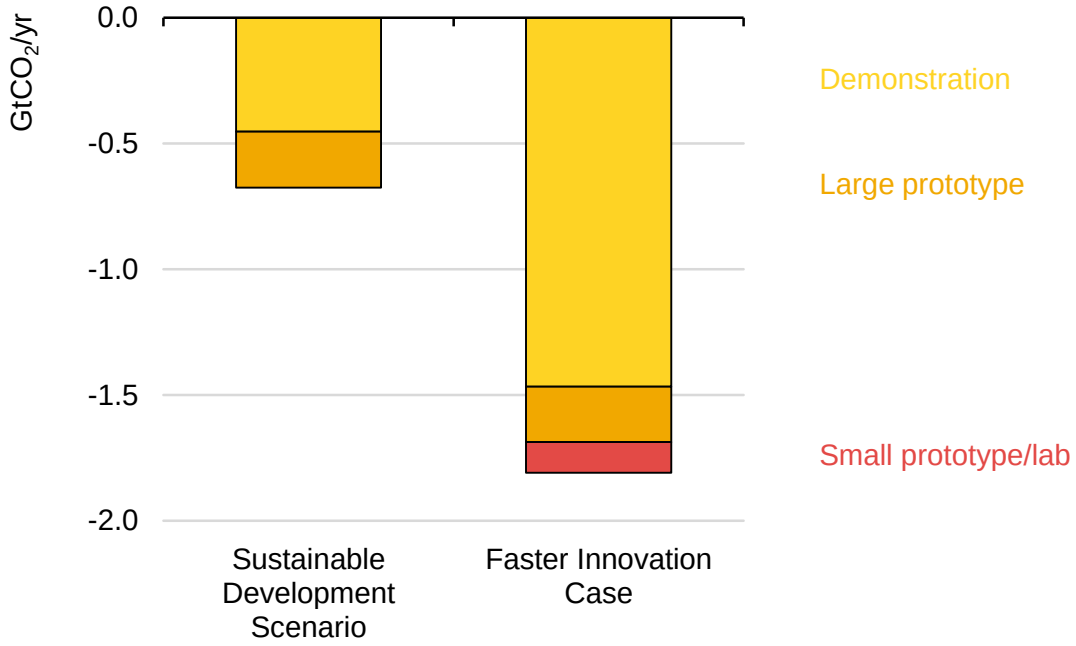
Sustainable steel requires a major push for clean energy infrastructure



The transformation for primary steel production in the Sustainable Development Scenario requires infrastructure developments for CO_2 transport and storage, hydrogen production, and renewable electricity generation.

Innovation is key to delivering deep emissions reductions

Emission reductions relative to baseline by currently pre-commercial technologies, 2050



In the Faster Innovation Case, demonstration and prototype stage technologies contribute nearly three times as much emissions reductions in 2050 as in the Sustainable Development Scenario.

Governments have a critical role to play in accelerating the transition