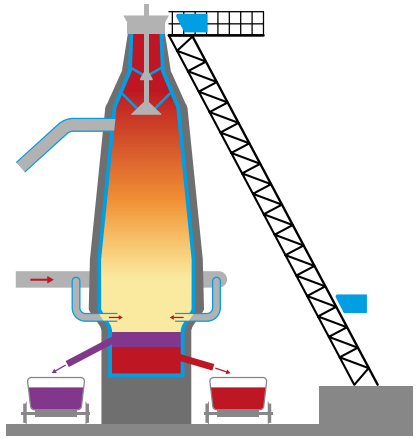
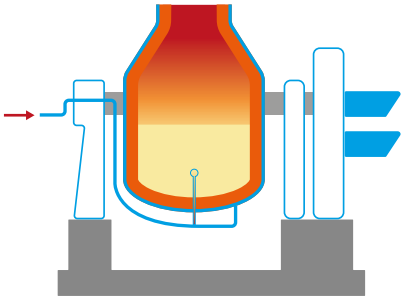
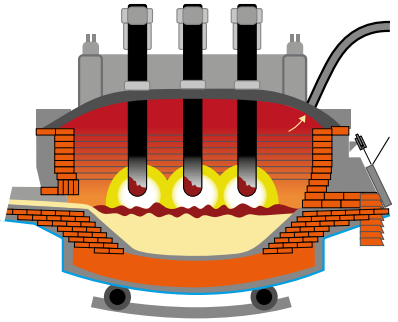
Green iron and steel – a diversity of routes to decarbonisation.



Blast Furnace



Basic oxygen furnace



Electric arc furnace

sbh4 consulting

Decarbonisation pathway	Application in iron and steel making	CO_2 emissions reduction route
Replacement of blast furnace with DRI using blue hydrogen	Iron making	CO_2 capture during hydrogen production
Replacement of blast furnace with DRI using green hydrogen	Iron making	Renewable or nuclear power for water electrolysis to hydrogen
Substitution of fossil coke / coal in the existing blast furnace with biocarbon	Iron making	Sustainable biogenic CO_2 emissions*
Increased use of electric arc furnaces	Steel making, scrap re-processing	Renewable or nuclear power for the electric arc furnace
Plasma decomposition of CO_2 to syngas	Iron and steel making	Renewable or nuclear power for the electrical plasma
Reheating using electricity, blue or green hydrogen	Steel processing	Displacement of fossil fuel in steel reheating furnace
Fermentation of BFG, BOFG to ethanol and then synthetic fuels production	Iron and steel making	Avoidance of CO_2 emissions from flue gas combustion*, substitution of fossil fuel by ethanol-derived fuels
BFG, BOFG combustion for heat and power	Iron and steel making	Avoidance of CO_2 emissions from fossil fuel combustion for heat and power*
BFG, BOFG conversion to hydrogen using Water Gas Shift	Iron and steel making	Avoidance of CO_2 emissions from fossil fuel use in hydrogen production*
Iron oxide chemical looping BFG, BOFG flue gas conversion to hydrogen	Iron and steel making	Avoidance of CO_2 emissions from fossil fuel use in hydrogen production*

*CO_2 emissions can further be reduced if CO_2 from these processes is captured