thyssenkrupp is embarking on two parallel and equally important technological paths in order to produce climate neutral steel by 2050: avoiding CO₂ through the use of hydrogen and utilizing CO₂ through Carbon2Chem® technology.

**Avoiding CO₂ (hydrogen method)**

Starting in 2019 
**The test**
thyssenkrupp will gradually replace pulverized coal in one blast furnace (BF) with hydrogen (H₂).

Starting in 2022 
**The introductory phase**
Step by step, all three blast furnaces (BF) will be transitioned to H₂ injection.

Starting in 2024 
**The milestone**
Using large-scale direct reduction plants (DR) which will be operated using green H₂, thyssenkrupp will produce sponge iron which will then proceed to the blast furnaces (BF) for processing, allowing a further reduction in emissions.

**Using CO₂ (Carbon2Chem®)**

Starting in 2020 
**Industrialization**
The pilot system at the Duisburg steel plant will use steel mill gases to produce base chemicals.

Starting in 2025 
**The breakthrough**
CO₂ will be used as a raw material in an industrial-scale plant. The Carbon2Chem® technology is also useful in other industries, for example the cement industry.

**2025 to 2050**
Transformation to climate neutral steel production
Using electric arc furnaces (EAF), thyssenkrupp will process sponge iron into climate neutral crude steel using electricity from renewable energy sources.

2018
**The world first**
The concept: CO₂ becomes raw materials. In September 2018, thyssenkrupp produced ammonia from steel mill gases for the first time at its Carbon2Chem® technical center in Duisburg.

2018
**The world first**
The world’s first time thyssenkrupp produced ammonia from CO₂ using Carbon2Chem® technology.