

CO₂ emission reduction: feasible under current economic conditions

Jaap Vente
Roadmap Manager CO₂ Neutral Industry
TNO – Energy Transition
Jaap.Vente@tno.nl

The iron and steel industry is responsible for advanced materials on which our modern economies, including renewable energy technologies, are built. At the same time, they are also responsible for about 7% of the worldwide CO₂ emissions. To put this in perspective, if all direct carbon emissions were to be converted to methanol, an amount of 30 times the current global methanol market size would be manufactured. To reduce the carbon footprint of the steel industry, the production of methanol would thus be of limited interest. Still, this sector has options that can be implemented on a relatively short term even without additional legislation and governmental incentives, thereby enabling sequestration of CO₂ and preparing for the circular carbon economy. Essential for this is to realize that the steel industry produces valuable off gases containing oxidized carbons, CO and CO₂. The energy in these gases is currently being used for the generation of internal heat and power. The latter market will reduce with the increase of solar and wind power and valorization of these gases into value added chemicals now becomes a viable proposition. We will present the technological route and economic possibilities to achieve effective use of works arising gases by synthesis of urea and dimethylether, as a combination of storing excess CO₂, hydrogen production from renewable electricity and CO₂ utilization.