



# Hydrogen Resistant Steels

University of Oulu

Centre for Advanced Steels Research (CASR)

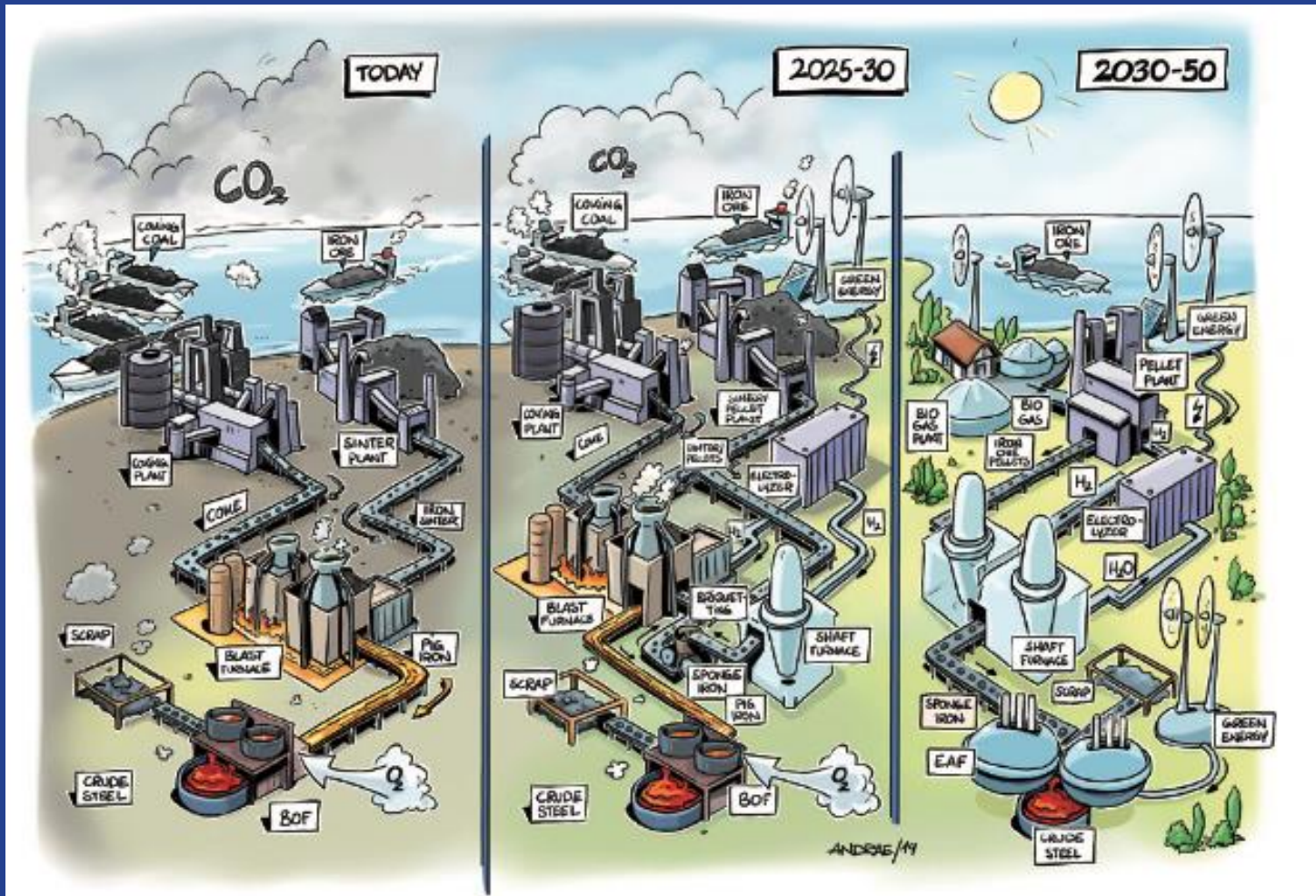
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# Steelmaking, Steels, Steel Applications & Future

- Steels include more than 85% of the metal's consumption and it is growing about 5 Mtn per year
- Yearly consumption of steel is about 300 kg/person (industrial countries) and about 200 kg / person (developing countries)
- More than 80 % of steel is recycling (in Finland about 100 %)



Finnish metals industry is committed to reduce greenhouse gas emissions by 70 % from the level of 2008 by year 2015.

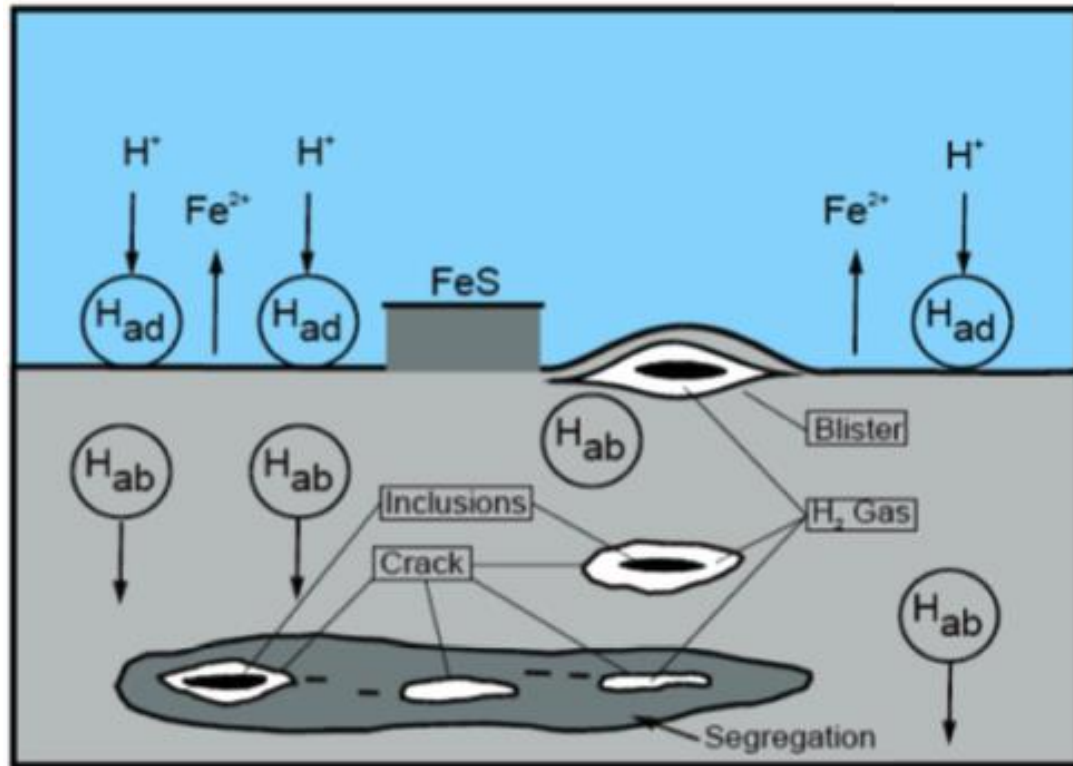
In addition, it is estimated that the use of **ultrahigh-strength steels** in vehicles will decrease greenhouse gas emissions by at least the same amount.

So, even 15 % reduction in Finland's CO<sub>2</sub> emissions is possible, with enormous potential on a global scale.

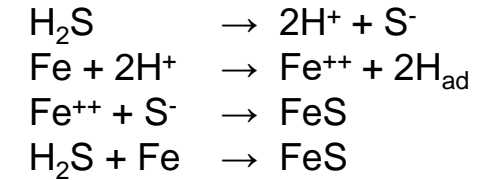


# Hydrogen induced cracking – a well-known problem in the M&O industry (HSS)

The term **Hydrogen Induced Cracking (HIC)** has been introduced to designate the phenomenon of cracking without external load.



Corrosion reaction



Hydrogen absorption into steel

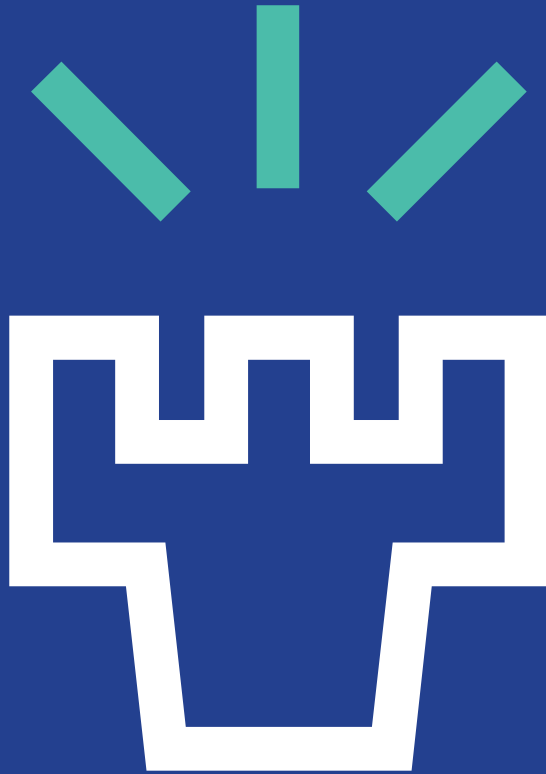


Hydrogen absorption at interphases and lattice defects



Crack initiation

Crack propagation



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