Institute of Energy and Climate Research (IEK)

Techno-Economic Systems Analysis (IEK-3)

JÜLICH Forschungszentrum

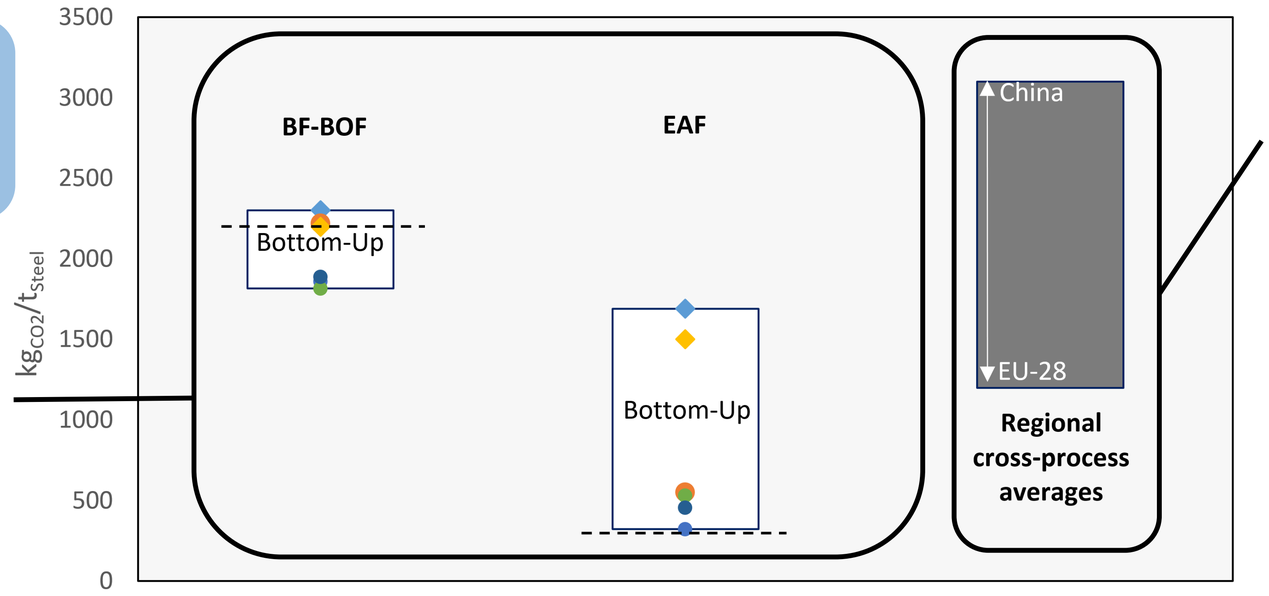
COMPARING THE CO_2 EMISSION INTENSITY OF THE STEEL INDUSTRIES IN THE EU AND CHINA RESULTING FROM TOP-DOWN AND BOTTOM-UP APPROACHES

Why are there inconsistencies in steel industry´s regional specific CO_2 emissions in literature?

Considerable disparities in specific CO_2 emissions are reported in same regions:

The Bottom-Up approaches provide process based specific CO_2 emissions for:

1. Blast Furnace-Basic Oxygen Furnace (BF-BOF) route
2. Electric Arc Furnace (EAF) route



The Top-Down approach provide emissions based on the economic activity in a region

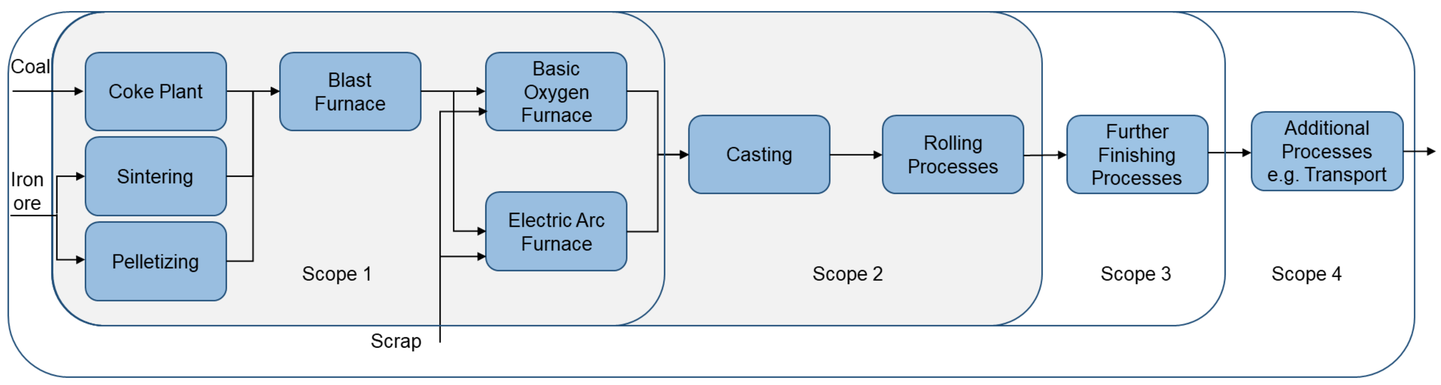
Global Average

China

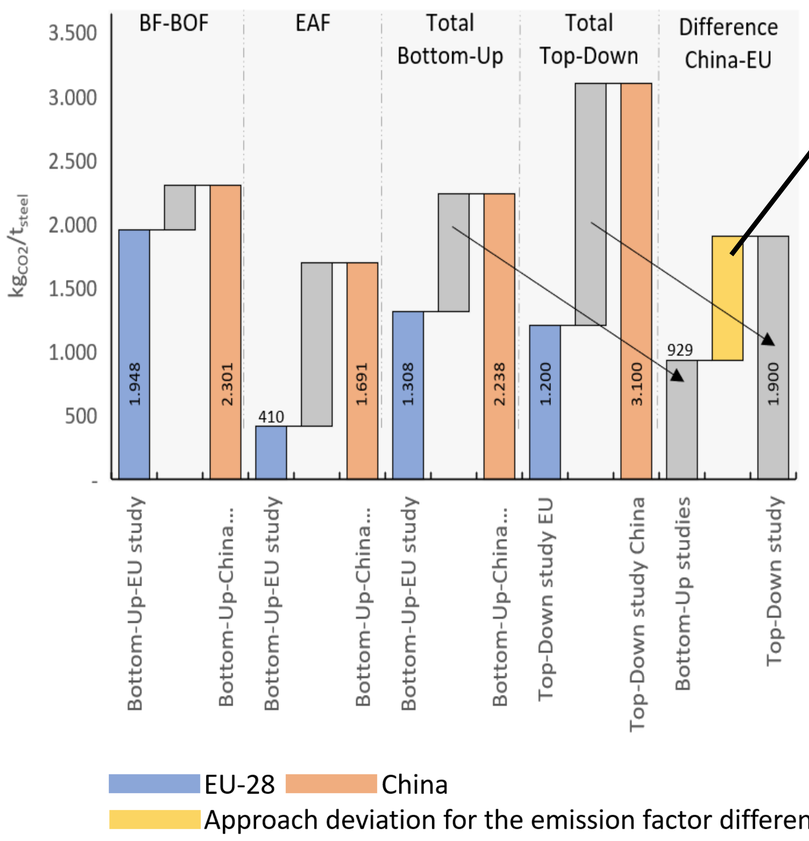
Europe

Methodology to investigate the underlying reasons for inconsistencies in CO_2 emissions

1. **A**djust investigation scopes in steel industry
2. **T**race regional disparities to
   - Raw materials
   - Steel production process shares and connections
   - Steel process energy demand and emissions

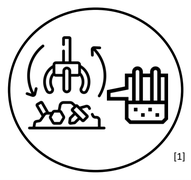
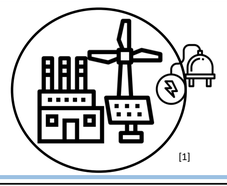
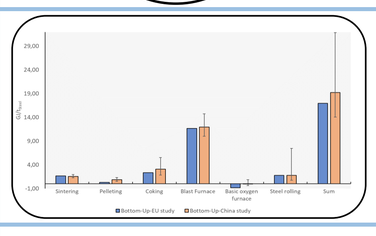
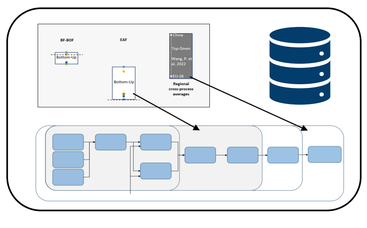


Inconsistencies in regional specific emissions cannot be harmonized based on available meta data



Regional disparity in Top-Down approach is twice as high as the disparity from the Bottom-Up approach.

Reasons deviations in regional disparities are not transparent

Reasons for deviations	Evaluability
 [1] **1. S**crap share in regional steel production	👍
 [1] **2. E**lectricity mix especially for secondary steel	👍
 **3. P**rocess based differences • Energy demands • CO_2 reduction measures	👎
 **4. E**mission meta data • Scopes • Emission factors • Material flows	👎

Data availability prevents global, reliable and consistent CO_2 emission factor determination

Evaluable Influences	Non-Evaluable Influences	Outlook
Evaluable influences cannot fully explain the regional disparities in CO_2 emission factors: • Pig iron- & production route share • Electricity mix	The influence of different scopes and process efficiencies towards regional CO_2 emission factors in the steel industry remains an uncertainty in available data.	This study demonstrates the necessity for a compilation of • additional meta information • or new steel energy demand and emission data for consistent and clear comparisons.

[1] 'image: Flaticon.com'