CO_2-free Steel Production by Means of Hydrogen

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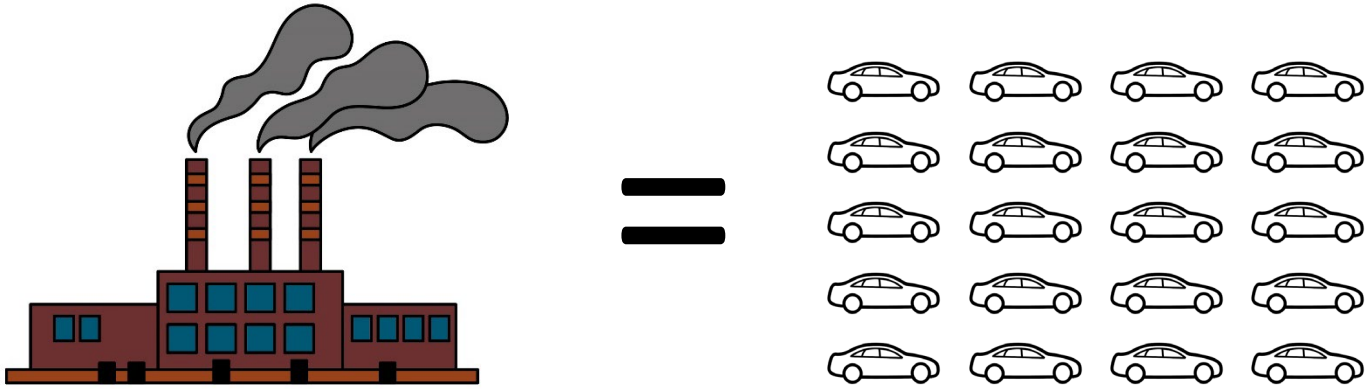
24. Oktober 2019

CO_2-Emissions by the German Steel Industry

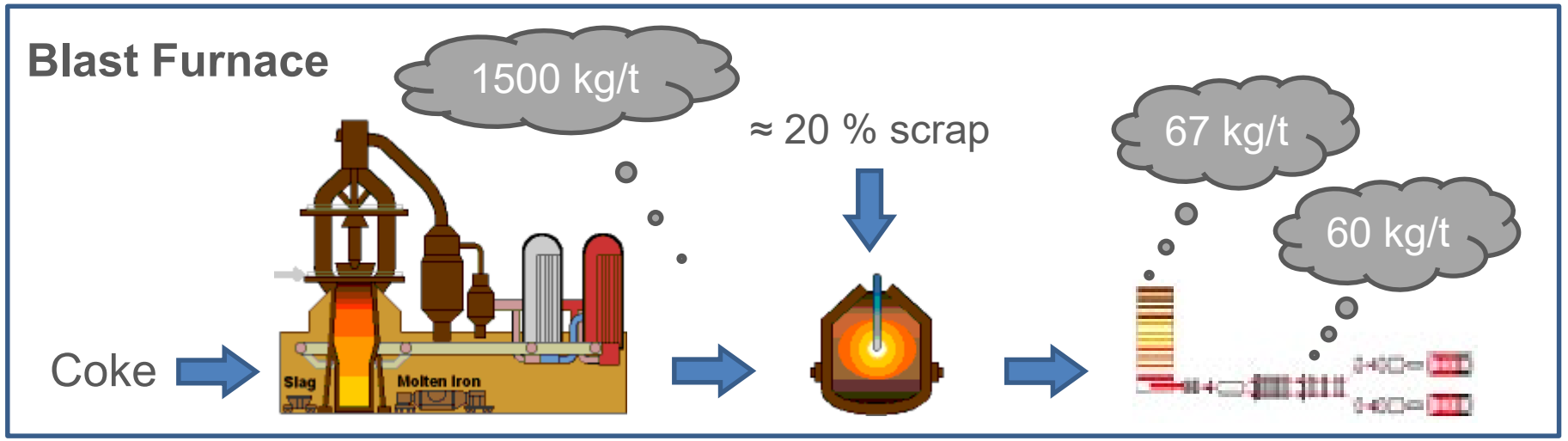
Steel Industry (GER) ≈ 19.000.000 cars

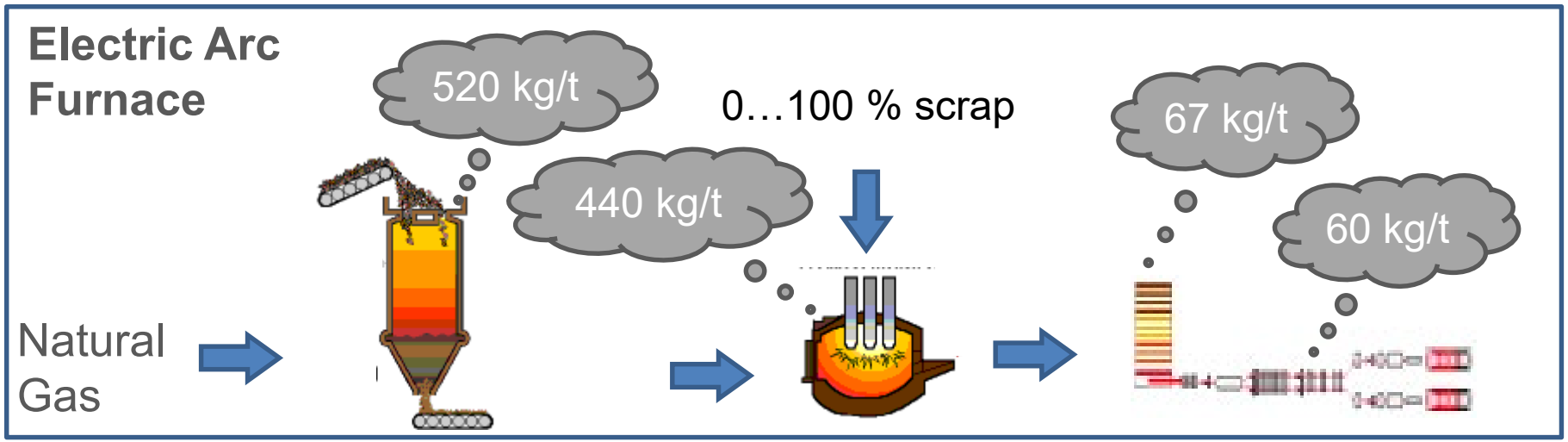


- Total CO_2-Emissions of Germany
  → approx. 800 Mio. t/a
- CO_2-Emissions of German steel industry
  → approx. **57 Mio. t/a (≈ 7%)**
- Equivalent to 19 Mio. cars* (46,5 Million cars in total in GER)

[*: Assumption of 20.000 km/a and 150 g CO_2/km → 3 t CO_2/a per car]

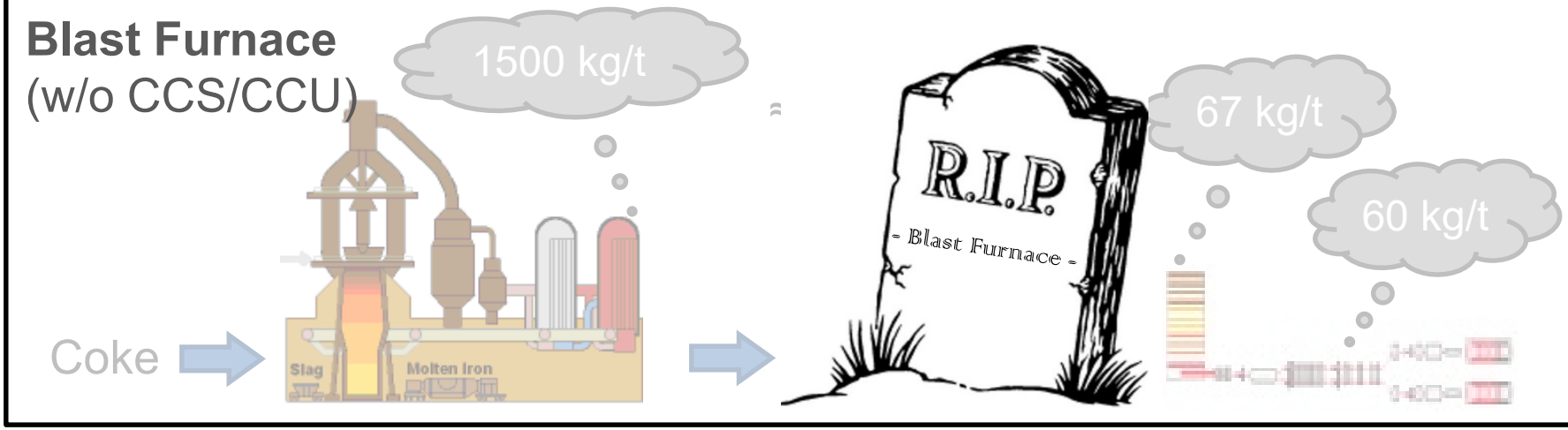
Production Routes 2019 (with spec. CO_2-Emiss.)



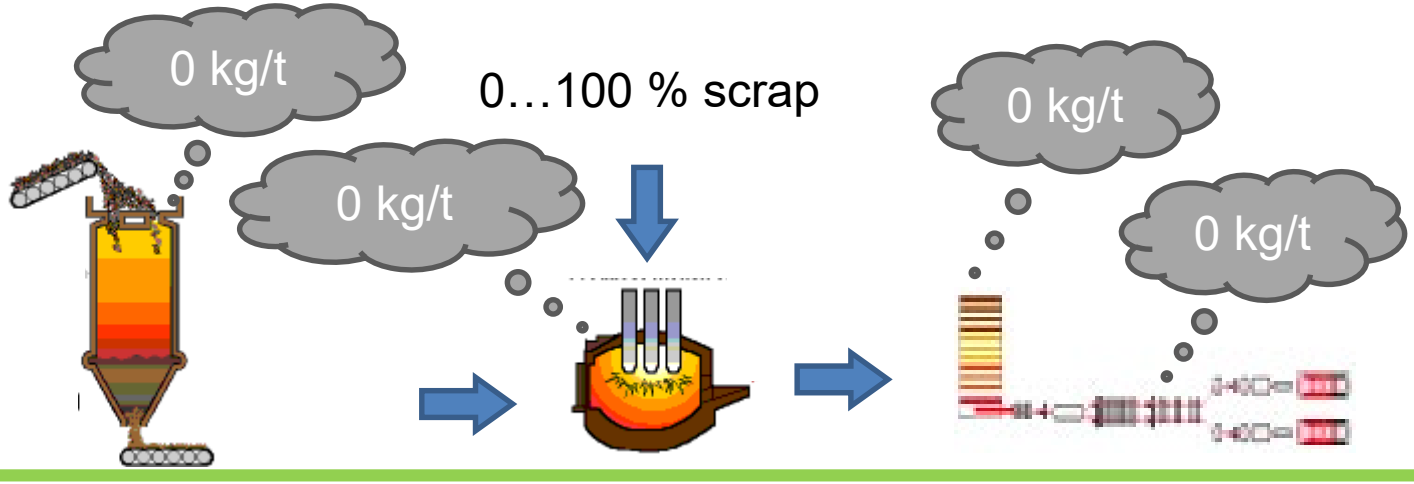


Production Routes 2050 in Germany

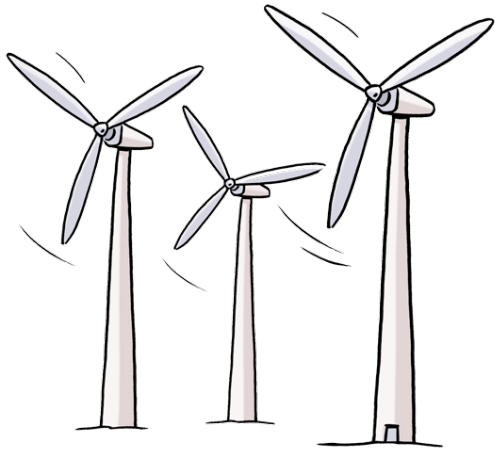
Blast Furnace
(w/o CCS/CCU)



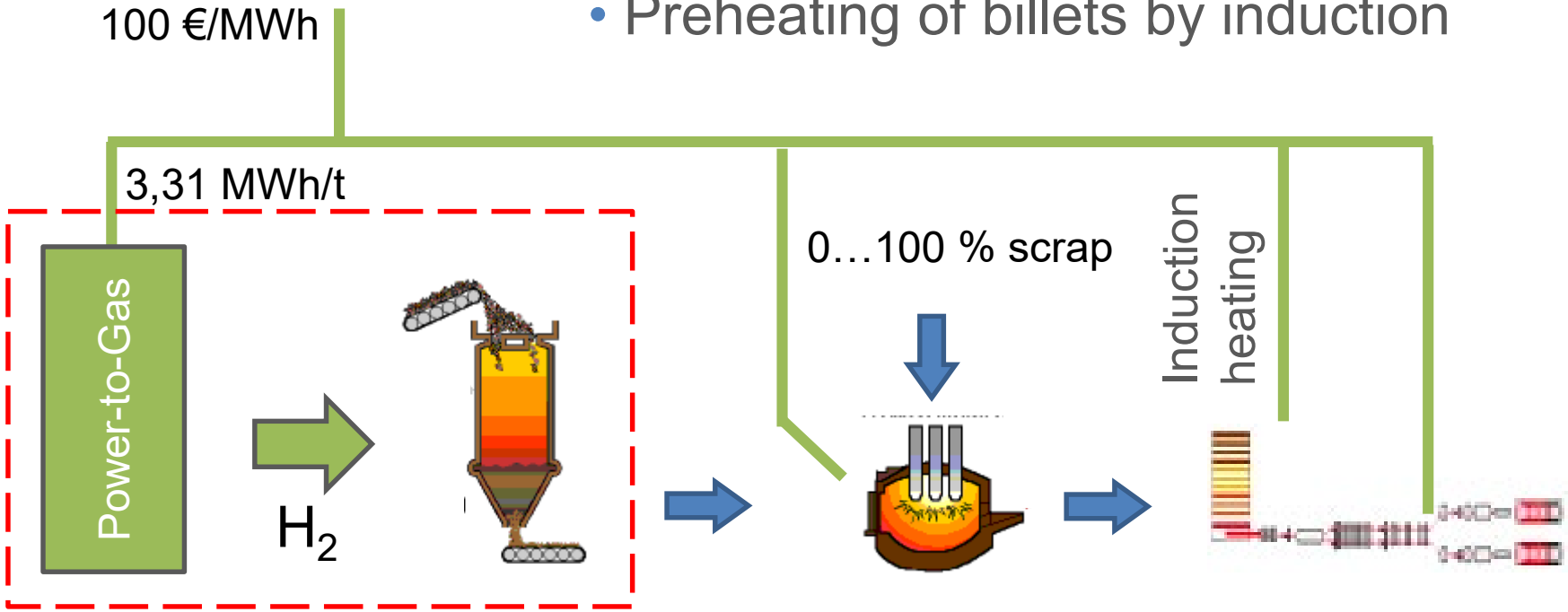
Electric Arc Furnace



CO_2-free Steel Production in 2050



- Usage of 100% Renewables
  → Energiewende!
- Direct Reduction with **Green Hydrogen** instead of Natural Gas
- Preheating of billets by induction



Constraints and Opportunities

- Reduction by H_2 is technologically feasible
- Poor profitability under current conditions (330 €/t (green H_2) vs. 65 €/t (natural gas))
- Future outlook:
  - → Increase of CO_2-costs
  - → Increase of costs for fossil fuels
  - → Cost decrease of renewable energies
  - → Cost decrease of electrolysis

- **Process Development has to start right now !**

Thank you for your attention!

WELTGRÖßTER STAHLKONZERN

Arcelor-Mittal baut Wasserstoff-Anlage in Hamburg

Der größte Stahlkonzern der Welt will weniger CO2 ausstoßen – und startet ein Wasserstoff-Projekt am Standort in Hamburg.

Kevin Knitterscheidt

16.09.2019 - 04:05 Uhr • Kommentieren • 27 x geteilt

[Handelsblatt, 16.09.19]

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