The German energy inventory

A short description

Specificities

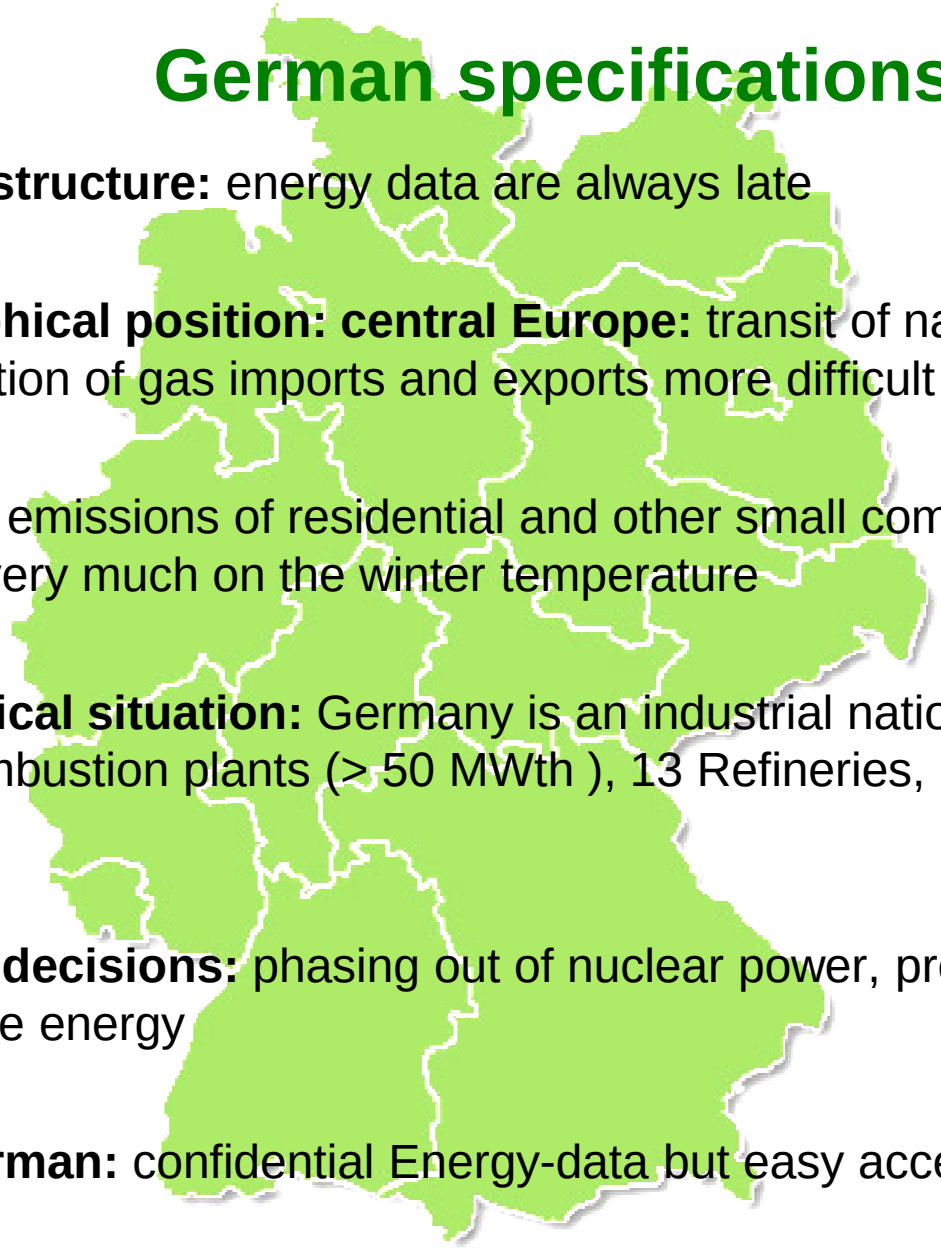
Challenges

& Experiences

Kristina Juhrich

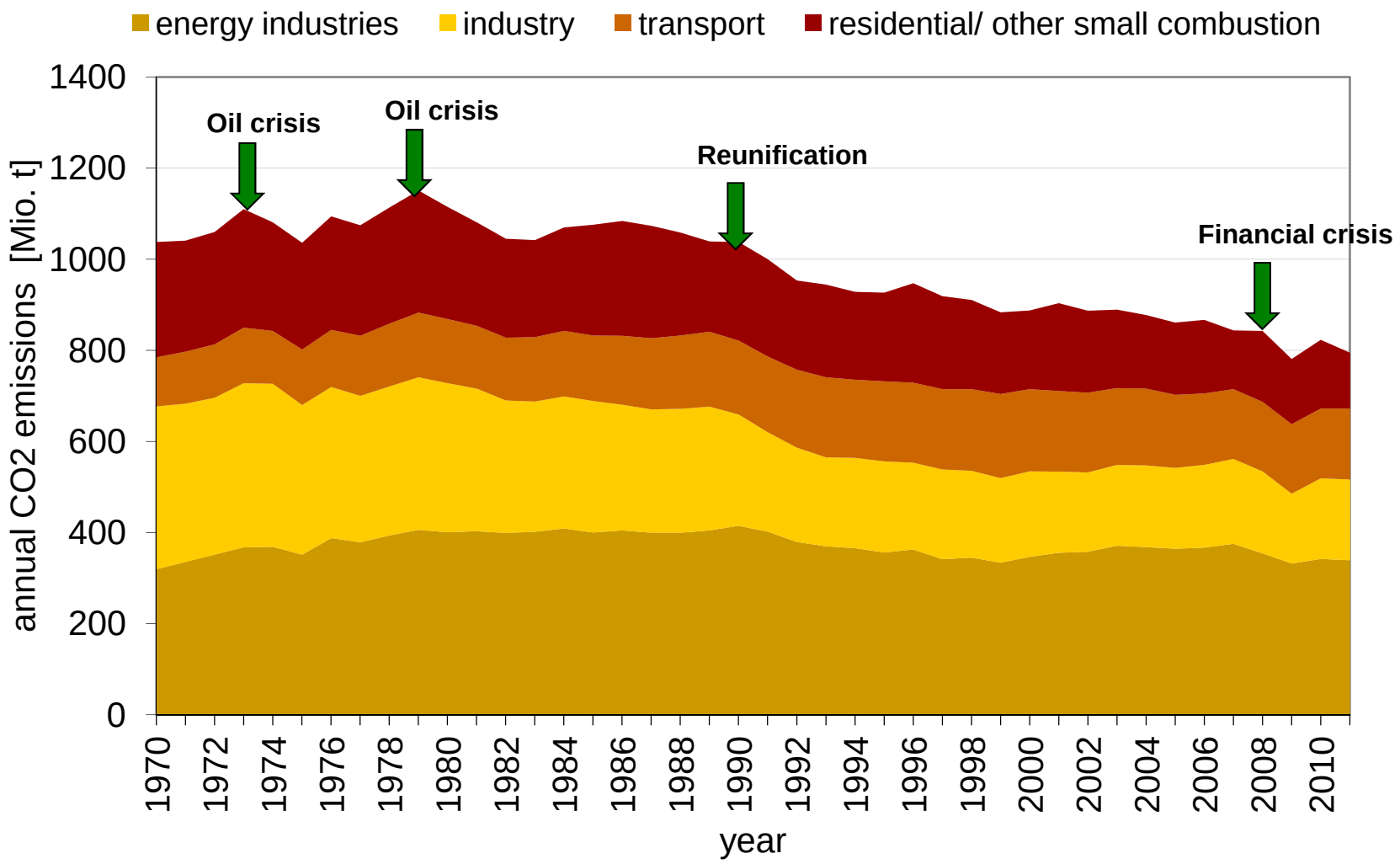
Federal Environment Agency

German specifications



- **Federal structure:** energy data are always late
- **Geographical position: central Europe:** transit of natural gas makes the identification of gas imports and exports more difficult
- **Climate:** emissions of residential and other small combustion plants depend very much on the winter temperature
- **Economical situation:** Germany is an industrial nation with about 600 large combustion plants (> 50 MWth), 13 Refineries, 6 integrated steel works…
- **Political decisions:** phasing out of nuclear power, promotion of renewable energy
- **Very German:** confidential Energy-data but easy access to fuel data from military

Annual CO_2 emissions



Energy Balance for the Federal Republic of Germany 2010 [TJ]	Natural gas
Indigenous production	451 691
Imports	3 306 808
Stock removal	132 045
Energy supply	3 890 544
Exports	719 979
International marine bunkers	-
Stock build-up	-
PRIMARY ENERGY CONSUMPTION	3 170 565
Coking plants	-
Hard coal and lignite briquette factories	-
Public thermal power stations	431 769
Industrial power stations (only for electricity)	143 749
Nuclear power stations	-
Hydro, wind, photovoltaic and other power stations	-
Public cogeneration plants	141 811
District heating stations	110 465
Blast furnaces	-
Refineries	-
Other energy producers	-
Total conversion input	827 794
Total conversion output	-
Coking plants	-
Hard coal mines, briquette factories	-
Lignite mines, briquette factories	-
Power stations	-
Petroleum and natural gas production	8 457
Refineries	26 425
Other energy producers	24 795
Total energy consumption in the conversion sector	59 677
Flaring and transmission losses	384
ENERGY AVAILABLE	2 282 710
NON-ENERGY CONSUMPTION	110 434
Statistical differences	75 050
FINAL ENERGY CONSUMPTION	2 247 327
Mining and quarrying, manufacturing industry	796 595
Railways	-
Road transport	8 768
Air transport	-
Inland navigation	-
Transport	8 768
Households	1 016 567
Trade, commerce, services and other consumers	425 397
Households, trade, commerce and services	1 441 964

The National Energy balance is the principle basis of the energy inventory.

Most important data for inventory compiling is fuel consumption (marked in green colour).

Next steps are cross-cutting issues:

- Reference approach
- Non-energy use
- Flaring and transmission losses

Emission factors

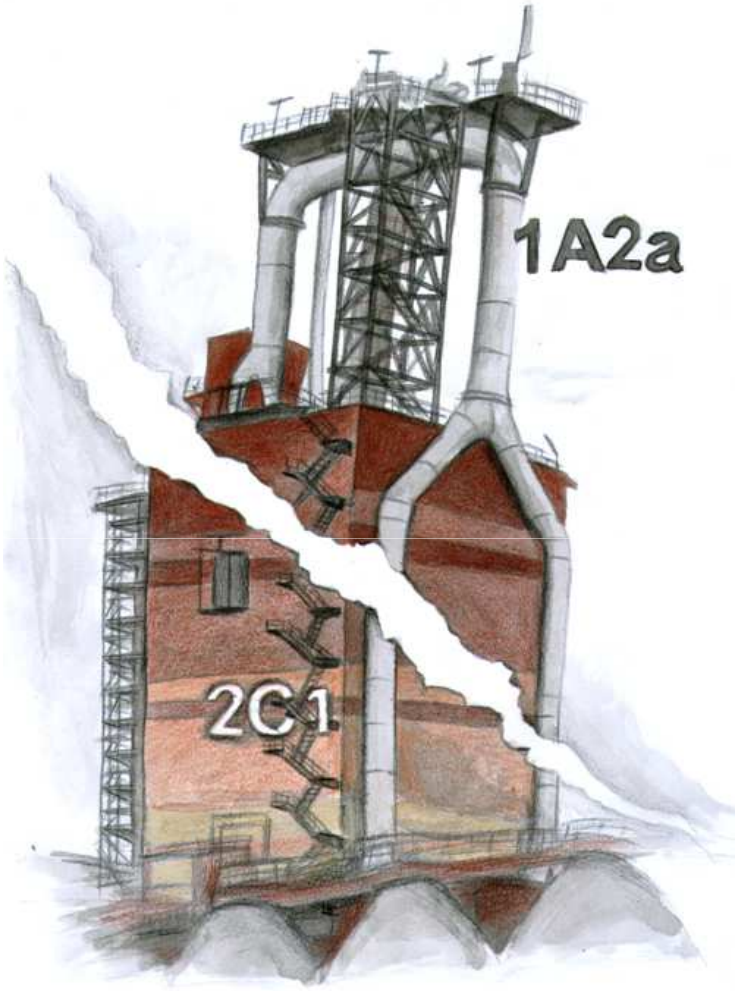
- **CO_2 emission factors** derived from fuel analyses without oxidation factor. Usually a robust, rather conservative average is used.
- CO_2 emission factors of oil products are fairly constant over the years due to the standardization.
- CO_2 emission factors of coal vary more – it's necessary to distinguish between the different countries of origin.
- Most difficult are derived gases and waste fuels – a specific approach is needed.

- **N_2O emissions** from combustion processes are not so relevant, just 0.8 % of GHG in 1.A (mainly from fluidized-bed combustion)
- **CH_4 emission** from combustion processes are of small importance, just 0.4 % of GHG in 1.A (mainly from gas engines and small combustion plants).

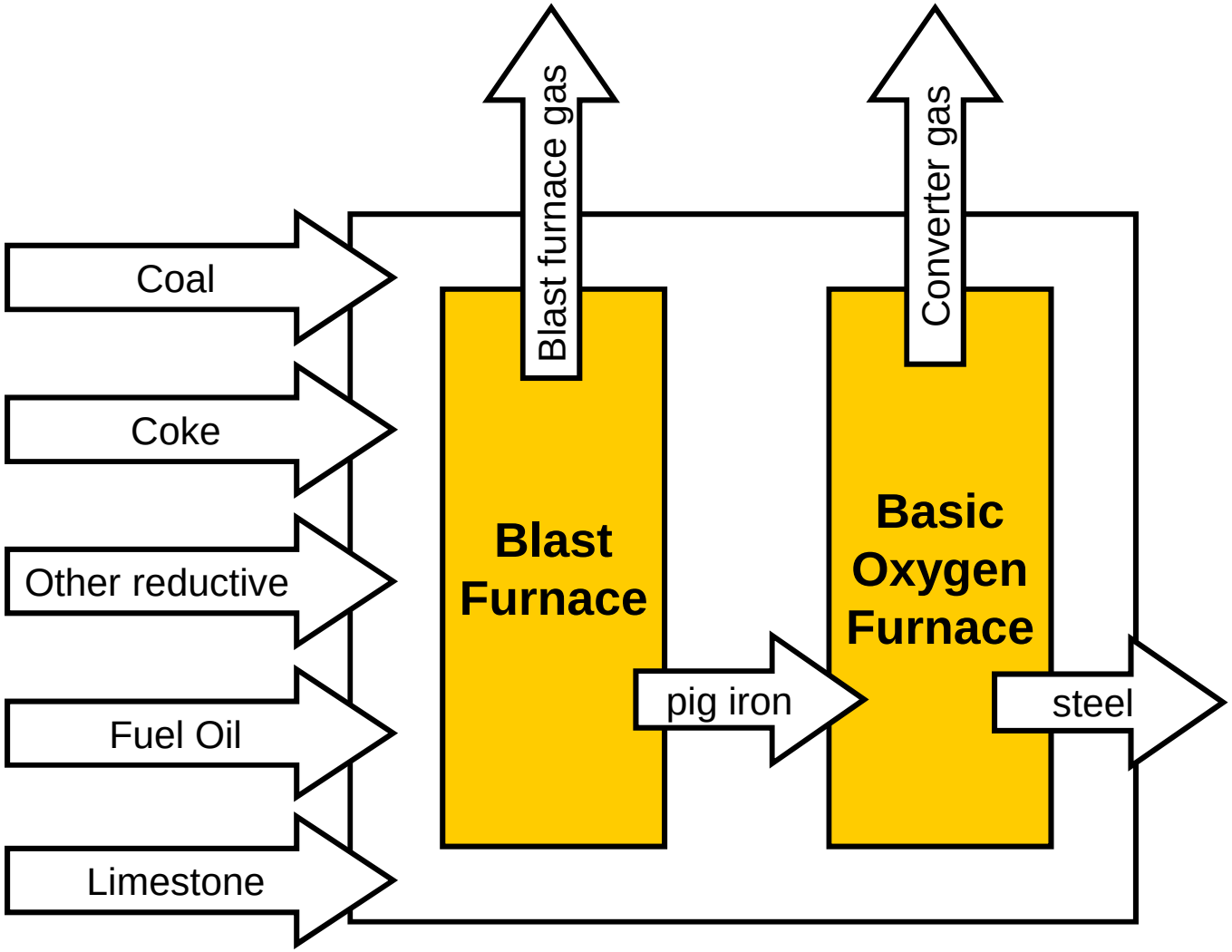
Iron and steel

The use of blast furnace gas for electricity generation leads to problems with the reporting structure. The Guidelines require to report all CO_2 emissions, caused by reducing agents, in the industry sector.

Possibly there are less problems if blast furnace gas is just emitted.



Carbon balance steel production



Derived gases

Coke oven gas,

Basic oxygen furnace gas,

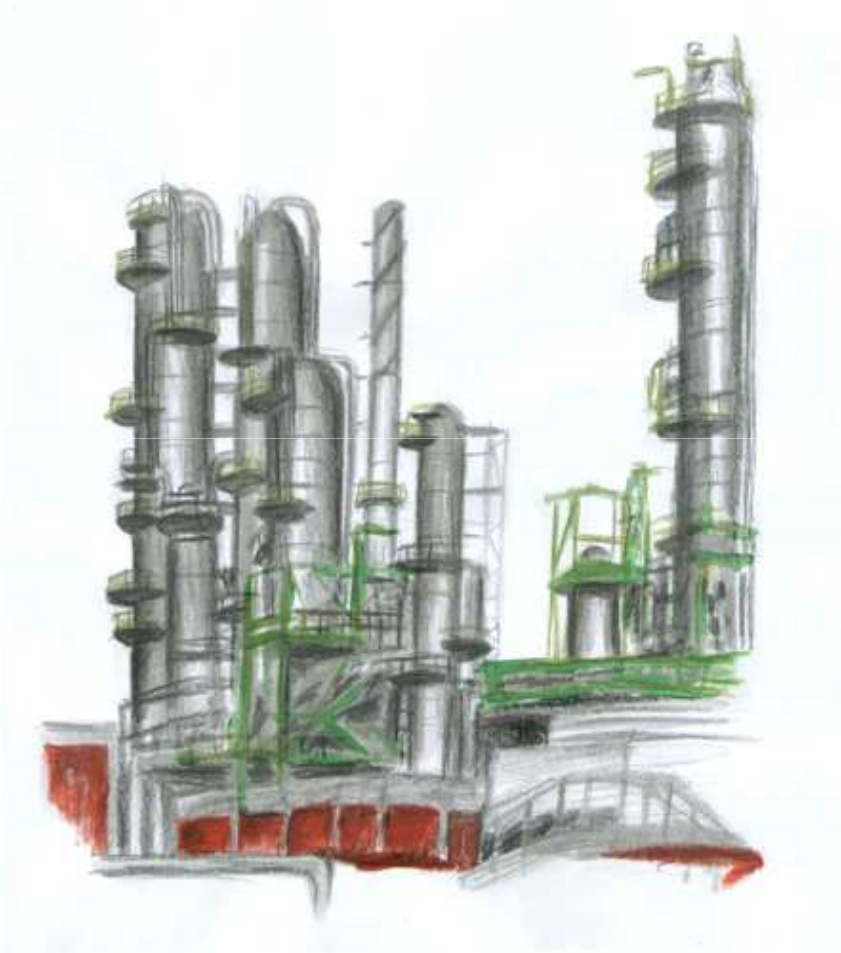
Blast furnace gas: gas composition varies to a certain degree – problem: only a mix of gases (blast furnace gas + oxy-gas + coke oven gas + natural gas) is used. Therefore it's difficult to find the original gas composition.

Refinery gas: variable net calorific value and CO_2 emission factor

Other gases (chemical industry): wide range of net calorific values and CO_2 emission factors

Refineries

- Need for energy and carbon balance
- More difficult than steel production
- Several processes, complex structure
- Standardized products but diverse waste gases and waste oils
- Overlap with chemical industry



Thank you very much for your attention!