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ERCST Roundtable
EU-ETS: Looking ahead
BASF perspective

Susanne Kuschel

Brussels, 27 February 2018

Internal

Chemicals – a growth industry
Global annual growth rate of ~3.6%*
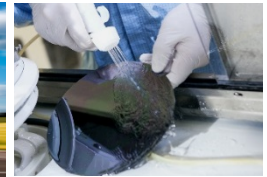
Agriculture	Health & nutrition	Energy & resources	Construction & housing	Consumer goods	Transportation	Electrical & electronics

Chemistry as enabler to meet current and future needs

~10bn

… people by 2050

70%

… of the world population will live in cities by 2050

50%

… more primary energy consumption by 2050

30%

… more food needed by 2050

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* Average annual real change 2017-2019; BASF Report 2016 p.121

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Energy and climate protection

Greenhouse gas emissions

per metric ton of sales product
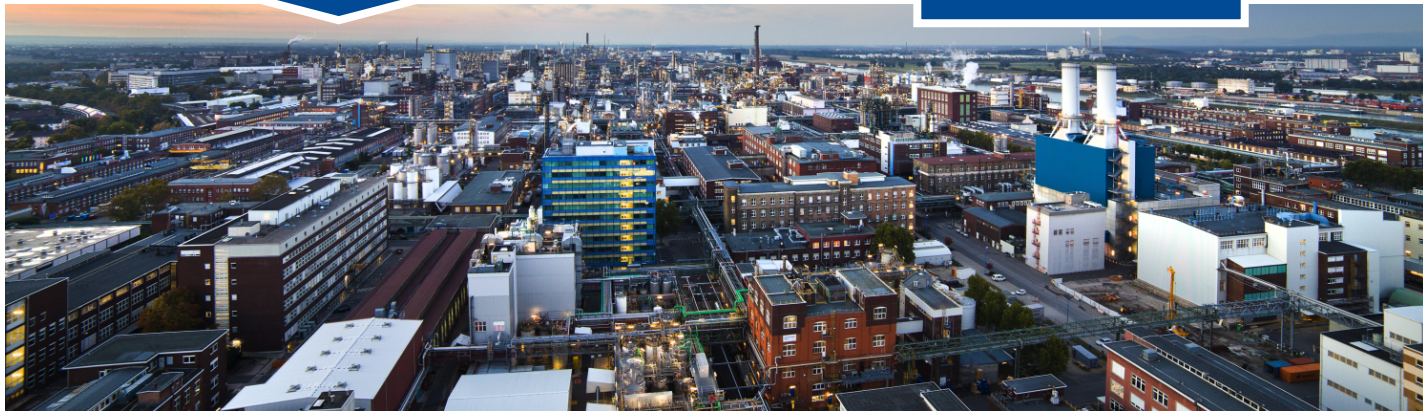by 2020 (baseline 2002)*

-40%

Status
2016:
-37.2 %

Energy efficiency

Coverage of our primary energy demand
through certified energy management
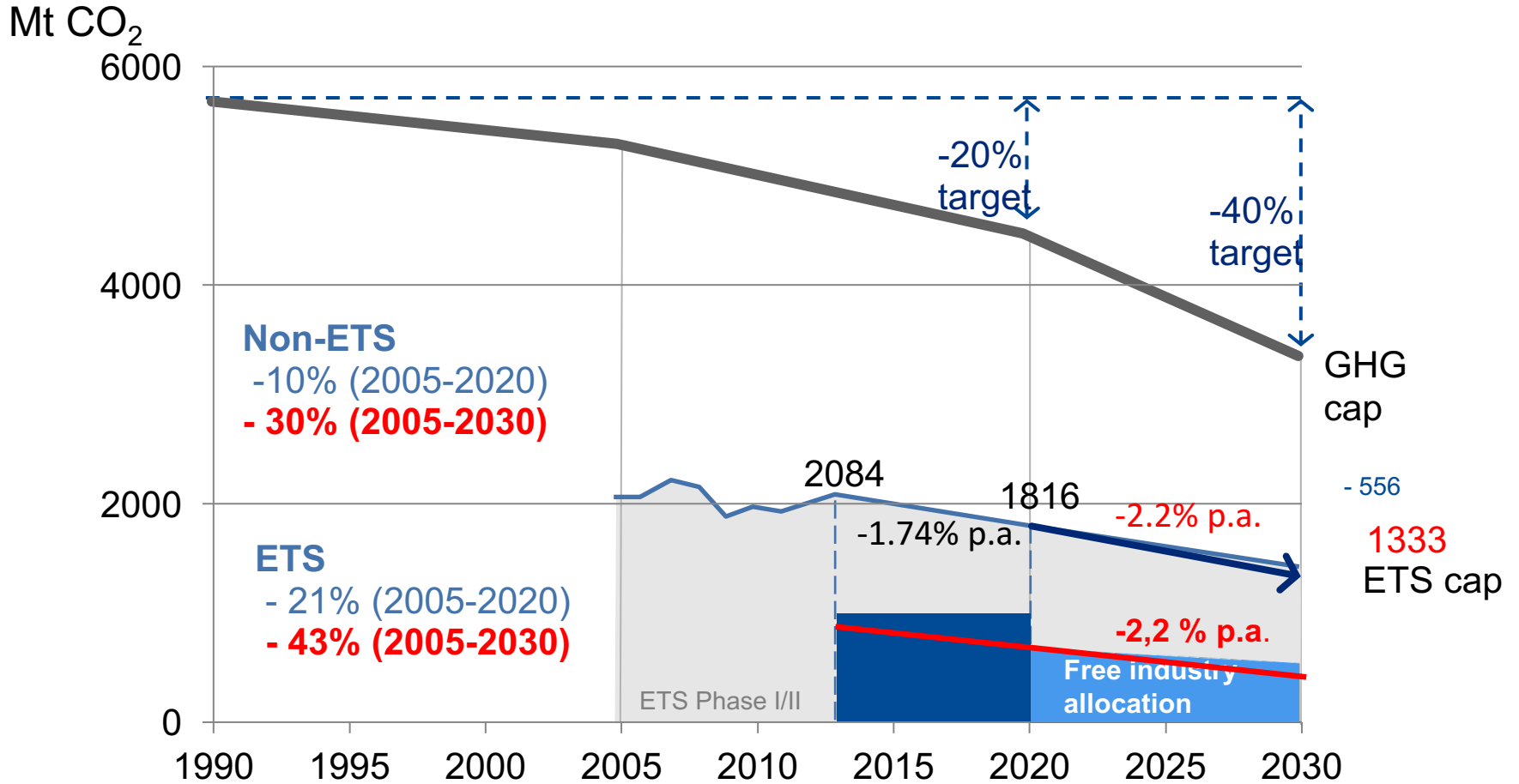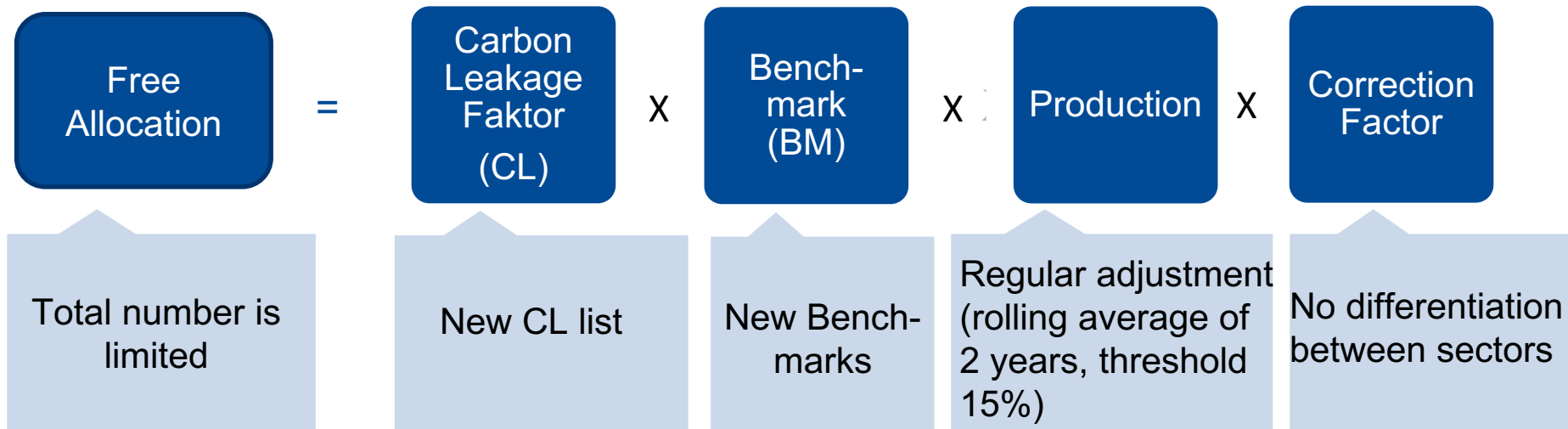systems (ISO 50001) at all relevant sites

90%

Status
2016:
42.3 %

* Excluding oil and gas production

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ETS targets up to 2030

Mt CO_2

6000

-20% target

-40% target

4000

GHG cap

Non-ETS
-10% (2005-2020)
- 30% (2005-2030)

2084

1816

- 556

-2.2% p.a.

1333
ETS cap

2000

-1.74% p.a.

ETS
- 21% (2005-2020)
- 43% (2005-2030)

-2,2 % p.a.

Free industry allocation

ETS Phase I/II

0

1990   1995   2000   2005   2010   2015   2020   2025   2030

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EU Emission Trading 2020 - 2030

Free Allocation = **Carbon Leakage Faktor (CL)** X **Bench-mark (BM)** X **Production** X **Correction Factor**

Total number is limited	New CL list	New Bench-marks	Regular adjustment (rolling average of 2 years, threshold 15%)	No differentiation between sectors

- Competitiveness most likely preserved until 2030 (unknowns: MSR + LRF reviews after 2020)
- A change towards CO2-neutral production requires massive investments and can't be re-financed through the ETS

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Forthcoming implementation measures

- **2018:** Innovation fund eligibility criteria
  - ✓ RES, CCS and CCU projects for chemical industry need to get included

- **2018-2019:** Delegated / implementing acts
  - ✓ Chemicals need to be on carbon leakage list: deadline 31-12- 2019
  - ✓ Cross-check benchmark update: deadline 30-09-2019
  - ✓ Safeguard free allowances allocation rules
  - ✓ Accompany Monitoring Reporting Verification regulation
  - ✓ State Aid Guidelines review on indirect emission compensation
  - ✓ Secure fair treatment of industrial CHP

- **Until 2021:**
  - ✓ Prepare for scheduled review dates during ETS phase IV : first MSR review in 2021

- **After 2021:**
  - ▶ LRF review in line with Paris agreement

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Carbon leakage rules

- Sectors exposed: 100% free allocation of the benchmark
- Less exposed sectors
  - ▶ 3. Trading Period: 80% going down to 30 %
  - ▶ 4. Trading period: 30 % phased-out after 2026 until 2030
- Current carbon leakage list prolonged until 2020, new list valid for 10 years
- **Quantitative assessment:** Based on trade intensity multiplied with emission intensity (threshold: 0,2)
- **Qualitative assessment possible** for sectors between 0,15 and 0,2 and a limited number of carbon leakage sectors (Prodcom)

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How Carbon Intensity is calculated
(and why qualitative assessment is essential)

NACE-Code	20.14	20.13.	20.11 GVA Company	...	xx.xx	GVA other activities	Reports GVA to NACE
BASF	●	●	●		●	x	20.14
Company 1	●	●	●		●		20.13
Company 2		●	●			x	20.11
...							
Company x	●		●		●	x	20.14

$$\text{Carbon Intensity} = \frac{\Sigma \text{ kg CO2 (all installations)}}{\Sigma \text{ EUR GVA (all companies which report under this NACE-Code)}}$$

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# Benchmarks in the EU ETS
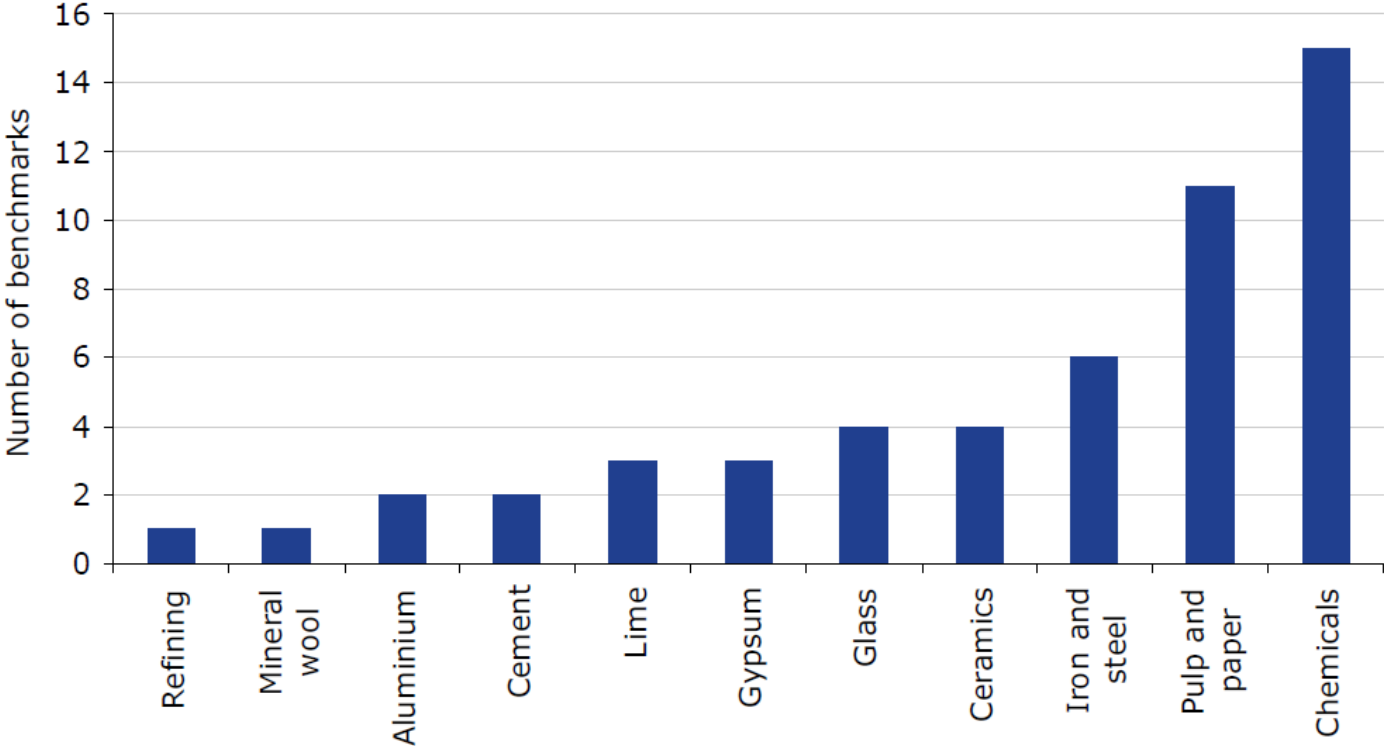
Source: ETS Handbook

Benchmark update

- Update of benchmark values for all 54 benchmarks
    - ▶ Current benchmarks relate to 2007-2008
    - ▶ First benchmark update for 2021-2025 on the basis of 2016-2017 data
    - ▶ Second benchmark update for 2026-2030 on the basis of 2021-2022 data

- Methodology:
    - ▶ Based on this data, determination of annual improvement rate for each benchmark (min.: 0,2% p.a.; max.: 1,6% p.a.)
    - ▶ Phase 3 benchmark values reduced with that annual rate applied over the period 2008-2023 and 2008-2028
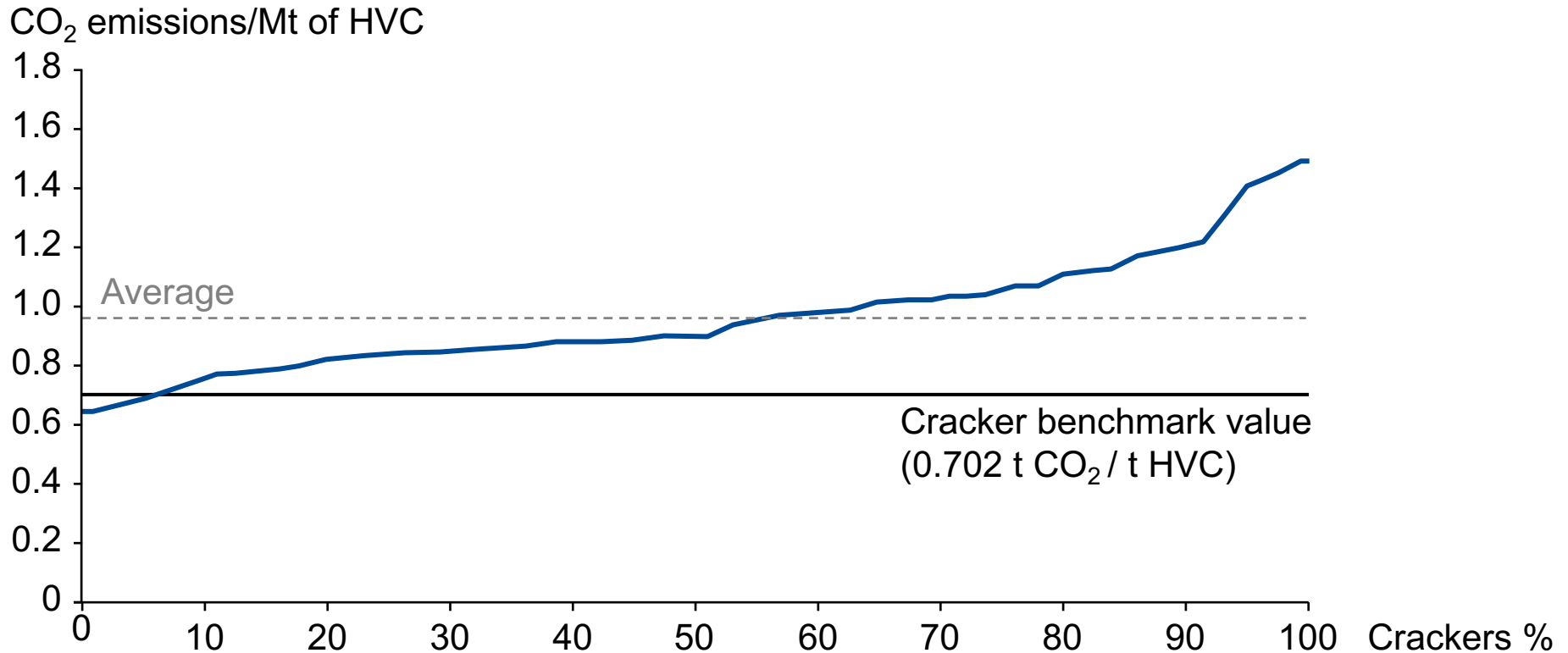   - ▶ Exception: hot metal benchmark will be reduced by 3% (0,2%) for 2021-2025 period

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Product Benchmarks

Product benchmark
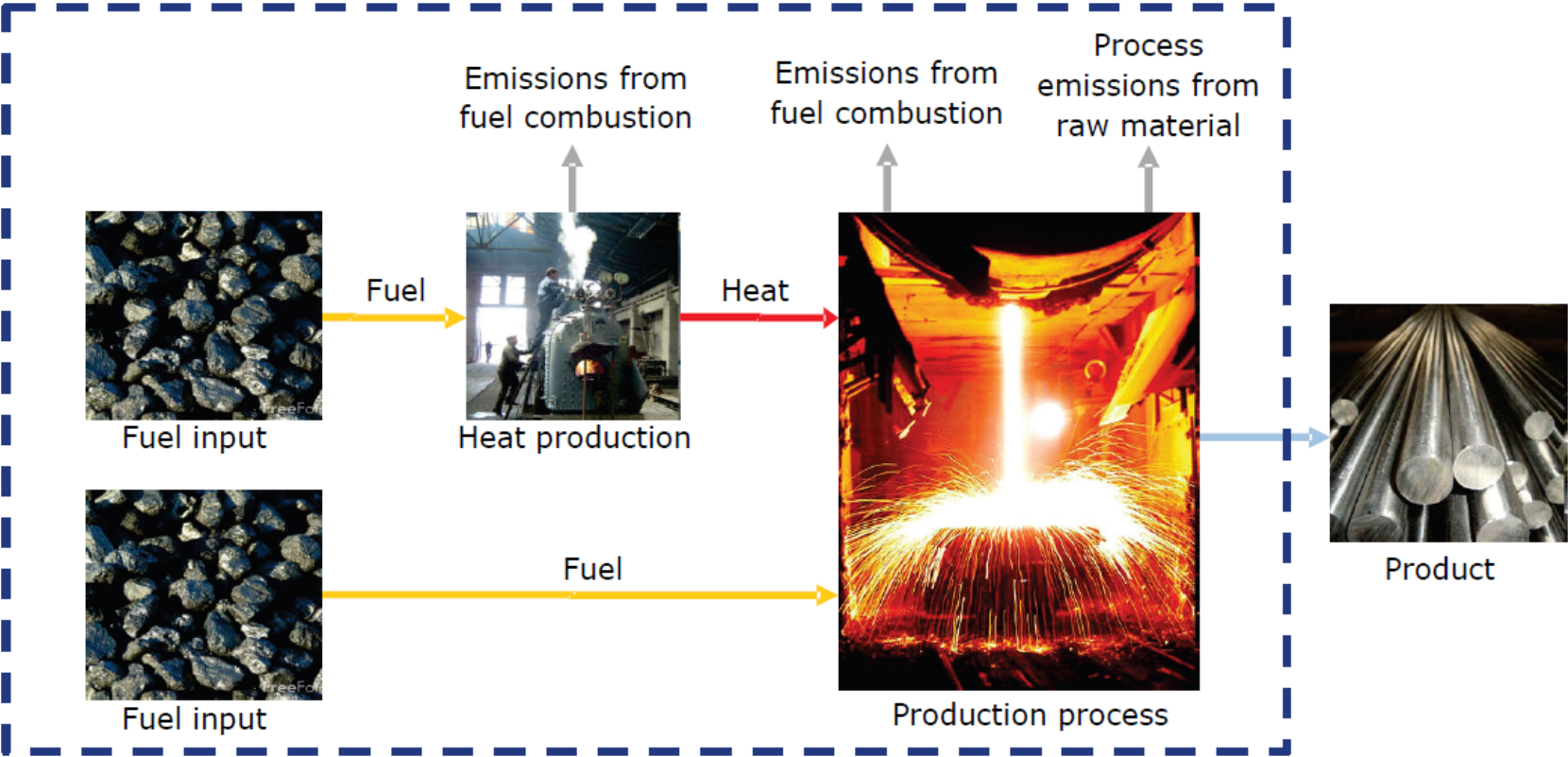
Source: ETS Handbook

EU Cracker Product Benchmark
(2007/08)

CO_2 emissions/Mt of HVC

Average

Cracker benchmark value
(0.702 t CO_2 / t HVC)

Crackers %

- Values include both direct emissions (process and steam) and indirect emissions (electricity)
- HVC = ethylene + propylene + contained butadiene + contained benzene
  + hydrogen (non fuel fraction) + acetylene as products

Fall Back Benchmarks
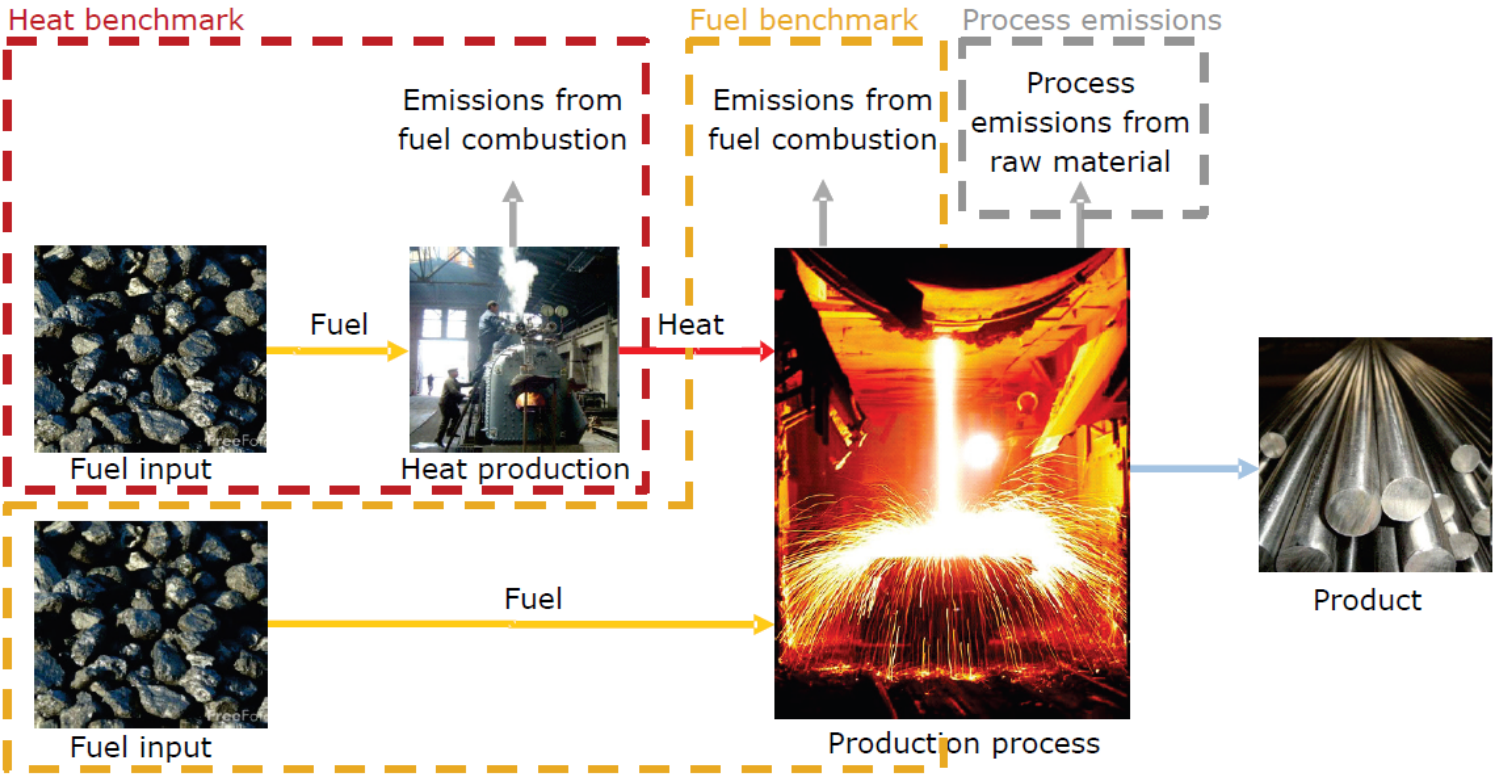
Source: ETS Handbook

EU ETS system for allocation of free certificates

	Product-BM → no	**Heat-BM** → no	**Fuel-BM** → no	**Historic Emissions**
Historic activity level	Product output of plant	Measurable heat consumption of plant	Fuel consumption of plant	Emissions
Benchmark	GHG efficiency of process $t\ CO_2\ /\ t\ product$	GHG efficiency of heat generation $t\ CO_2\ /\ TJ$	GHG efficiency of fuel $t\ CO_2\ /\ TJ$	
Benchmark Value	Individual values for 15 GHG intensive processes	$62{,}3\ t\ CO_2\ /TJ$ *(natural gas fired boiler with 90% efficiency)*	$56{,}1\ t\ CO_2/TJ$ *(emission factor for burning natural gas,*	**97%** of historic emissions

(x)

Product Benchmark is the first priority: 70% of chemical industry emissions stem from processes covered

Heat Benchmark, Fuel Benchmark, Historic Emissions are fall-back options

Example: Chemical plants BASF SE Ludwigshafen:
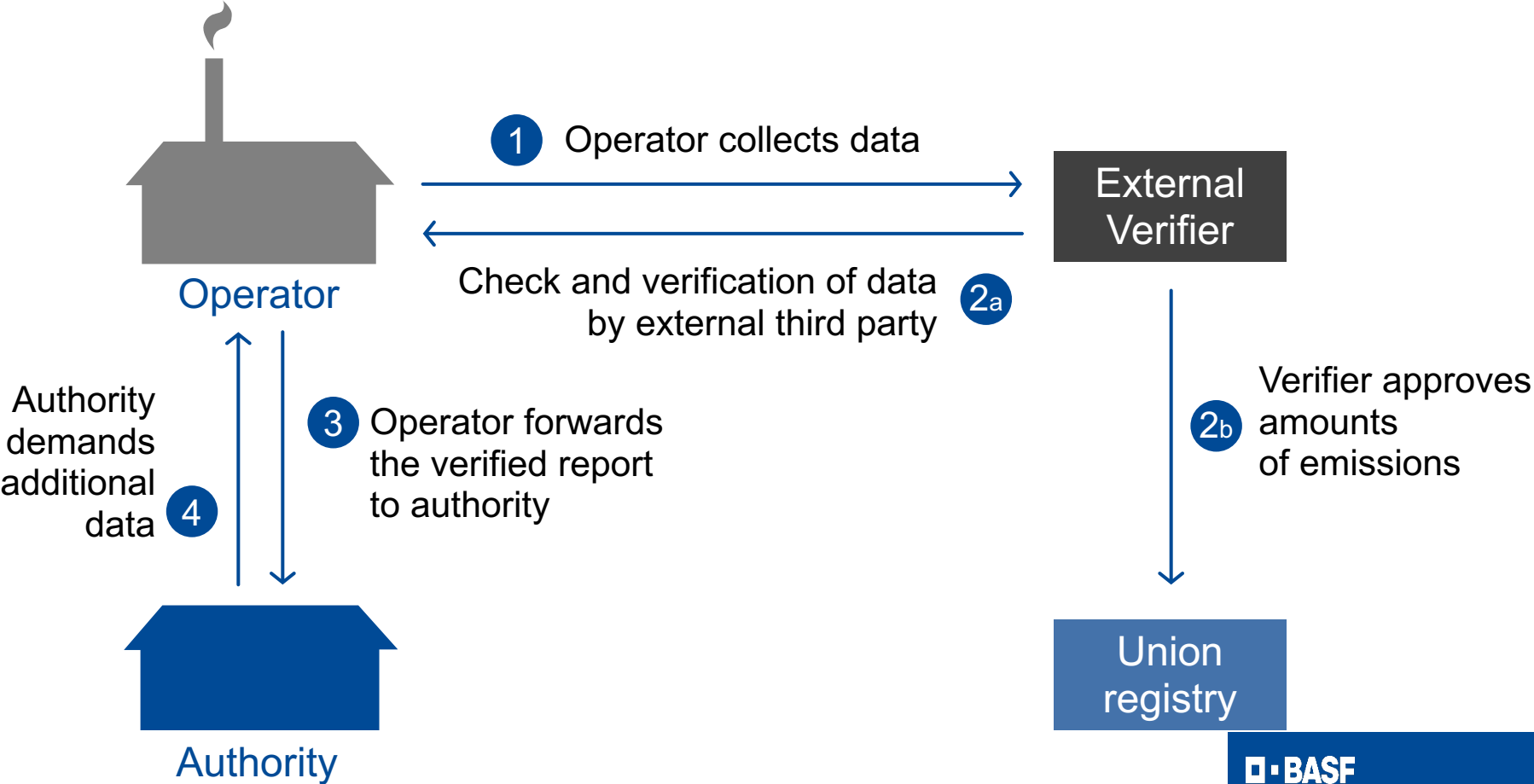Percentage of emission certificates allocated according to respective methodology

62%   **33%**   **5%**

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EU ETS system for allocation of free certificates to the chemical industry (2/2)

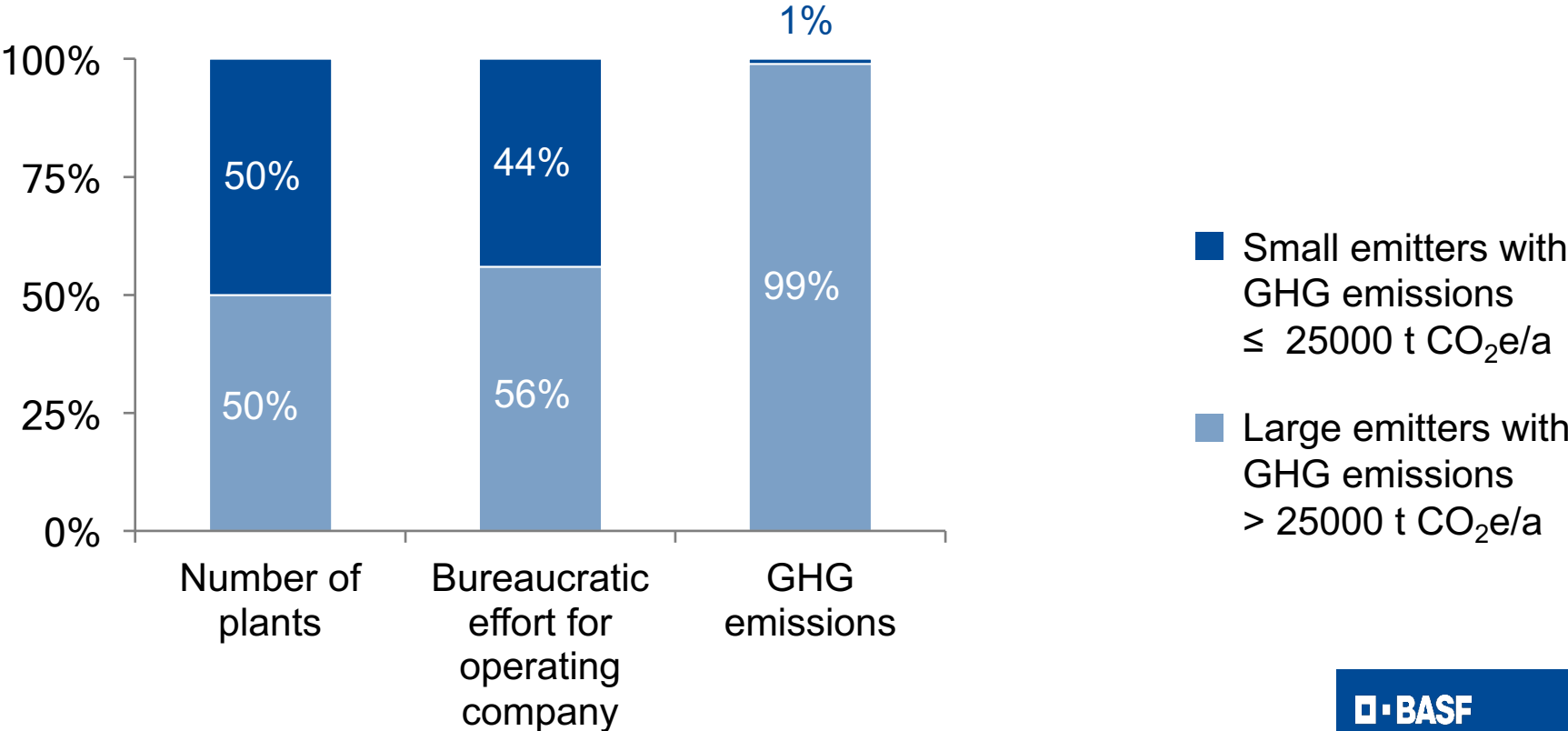|	Product-BM	$\xrightarrow{\text{no}}$	Heat-BM	$\xrightarrow{\text{no}}$	Fuel-BM	$\xrightarrow{\text{no}}$	Historic Emissions
Strengths	Pushes technical improvement of plants: ■ production process ■ heat generation		Pushes technical improvement of plants: ■ heat generation				
	Pushes shift to low-carbon fuel		Pushes shift to low-carbon fuel		Pushes shift to low-carbon fuel		
			Easy set-up		Easy set-up		Very easy set-up
Weaknesses	Complex set-up						
			Only weak push for technical improvement of plant: ■ production process		Only weak push for technical improvement of plants: ■ production process ■ heat generation		Only weak push for technical improvement of plants: ■ production process ■ heat generation
							Only weak push for fuel shift
			Early movers are disadvantaged		**Early movers are disadvantaged**		**Early movers are disadvantaged**

Data flow of emission reporting

① Operator collects data

②a Check and verification of data by external third party

②b Verifier approves amounts of emissions

③ Operator forwards the verified report to authority

④ Authority demands additional data

Operator

Authority

External Verifier

Union registry

Bureaucratic effort of ETS

Example: BASF SE Ludwigshafen

Legend:
- Small emitters with GHG emissions ≤ 25000 t CO_2e/a
- Large emitters with GHG emissions > 25000 t CO_2e/a

Chart values:
- Number of plants: 50% (small), 50% (large)
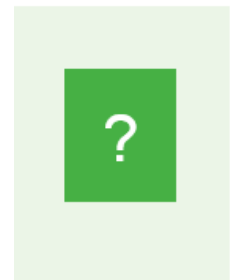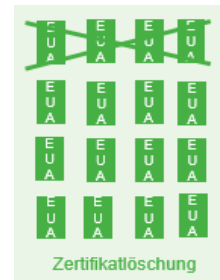- Bureaucratic effort for operating company: 44% (small), 56% (large)
- GHG emissions: 1% (small), 99% (large)

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Key Learnings on Measuring, Reporting & Verification

- Qualified and well-trained personnel required at
  - ► operating company
  - ► authorities
  - ► external verifiers

- Setup of well-functioning data flow / IT-structure is essential and takes time

- Definition of methods to guarantee accuracy of measurement influences time and cost requirements at operators

To start a system requires much more than a political decision

What is needed in the future?

- Until 2030, the ETS with Carbon Leakage protection measures is the key instrument for climate protection measures

- Options in the Non-ETS-Sector to be fully exploited

- Decarbonization in global production only possible in a global context

- Industry needs support, not additional burden

Market Stability Reserve

Förderung Erneuerbarer Energien

Carbon Price Floor

Kohleausstieg

Zertifikatlöschung

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A fair ETS saveguards production in Europa

1. Sufficient free allowances for the whole value chain
   - → Compensate for differences between non-EU- and EU Industry

2. Enable investments
   - → Give a perspective for industrial growth in Europe

3. Strengthen innovation
   - → Realistic expectations about timescales

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Go for global Climate Protection