

# Managing carbon pricing and energy transition

Towards fossil-free living within one generation

Claire Sandevair and Stefan Feuchtinger

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VATTENFALL

# This is Vattenfall

## Basic facts

- One of Europe's largest producers of electricity and heat
- 100% owned by the Swedish state
- Main products: electricity, heat, gas and energy services
- Main markets: Sweden, Germany, Netherlands, Denmark and the UK
- Almost 20,000 employees

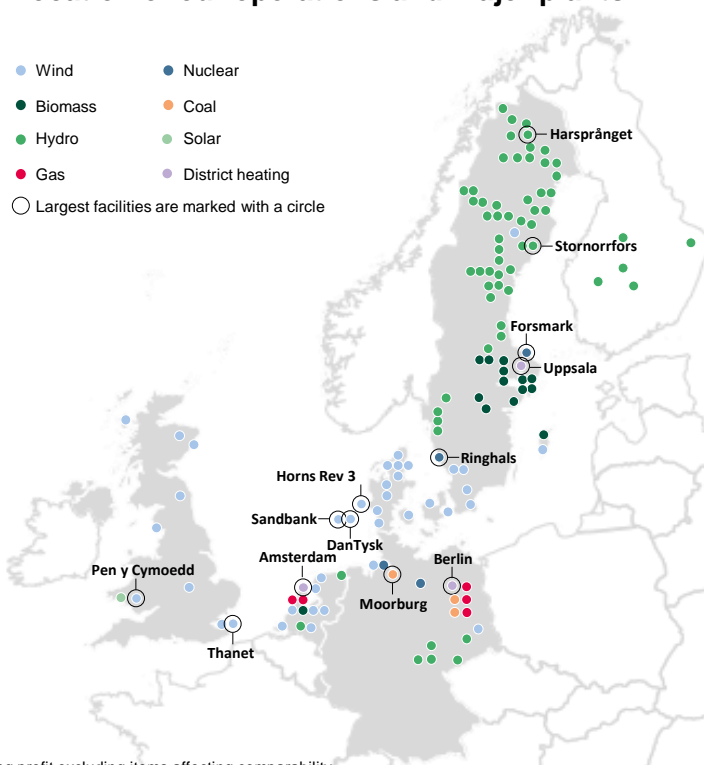
## Key data

SEK bn	FY 2019	FY 2018
Net sales	166.4	152.1
Underlying operating profit <sup>1</sup>	25.1	19.9
Operating profit (EBIT)	22.1	17.6
Profit for the period	14.9	12.0
Return on capital employed, %	8.5	7.0
Return on capital employed excl. items affecting comp., %	9.6	7.9
Funds from operations/adjusted net debt, %	26.5	20.7

TWh	FY 2019	FY 2018
Electricity generation	130.3	130.3
Customer sales, electricity	119.0	119.2
Customer sales, heat	17.1	18.3
Customer sales, gas	59.2	60.7 <sup>2</sup>

## Location of our operations and major plants



# Vattenfall's value chain



## Production

Production from

- Hydro
- Nuclear
- Coal
- Natural gas
- Wind
- Solar
- Biomass
- Waste

Actively phasing out fossil-based production

## Electricity distribution

- Guarantees secure supply via well-functioning distribution networks and smart network solutions
- Enables customers to feed self-generated electricity into the grid ("prosumers")
- Flexibility services to both electricity producers and consumers to optimise network functionality

## Sales of electricity, heat and gas

- Sells electricity, heat and gas to consumers and business customers
- Focuses on various price and service models, and gives customers the opportunity to understand and reduce their environmental impact

## District heating

- Drives the transformation towards fossil-free heating and cooling solutions together with partners, cities and regions
- One of Europe's largest producers and distributors of district heating

## Energy services & decentralised generation

Offers energy services

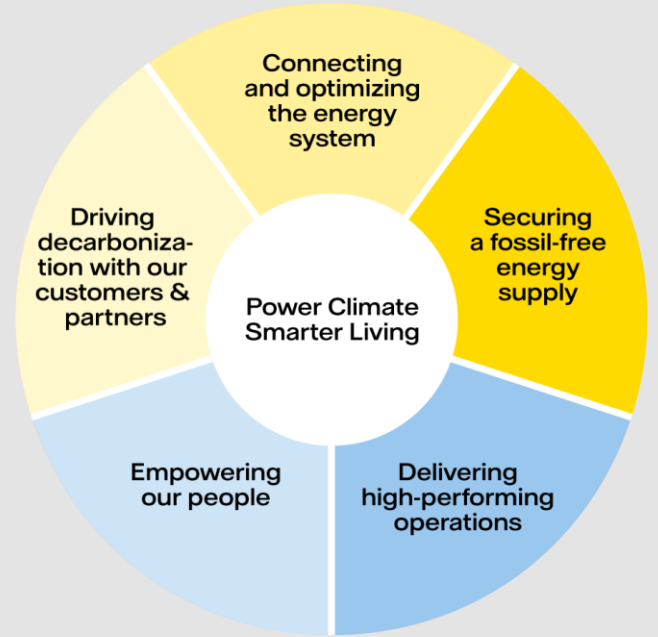
- Heat pumps
- Solar panels
- Charging solutions for electric vehicles
- Battery storage
- Network services
- Smart meters

Provides marketplaces and access to marketplaces where customers can buy and sell electricity

# Facing the challenge of climate change



# A strategy for leading the energy transition



# Impact our CO<sub>2</sub> emissions throughout the value chain

Enabling fossil-free living within one generation

## CO<sub>2</sub> – emissions 2018



Suppliers

~ 5 Mt

- Transparency on climate footprint
- Collaboration for phasing out fossil fuels
- Incentivising CO<sub>2</sub> reductions in project design and material choices



Own business

~ 19 Mt

- Fossil-free in the Nordic region by 2025
- Coal phased out 2030 in the heat portfolio
- 2030 emissions-reduction trajectory aligned with climate science
- Fossil-free within one generation



Customers<sup>1</sup>

~ 14 Mt

- Products and services with clear climate footprint (EPD<sup>2</sup> / LCA<sup>3</sup>)
- Renewable decentralised solutions
- Low carbon district heating
- Fossil-free alternatives to natural gas, such as biogas
- Climate targets together with cities
- E-mobility
- Electrification of industries

<sup>1</sup> Primarily related to natural gas sales

<sup>2</sup> EPD – Environmental Product Declaration – a third-party environmental declaration in accordance with ISO 14025

<sup>3</sup> LCA – Life cycle Assessment

# An attractive partner in the energy transition

Examples of partnerships

Research project for  
a carbon dioxide-  
free steel industry



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Electrification of  
mines and smelters



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Powering  
sustainable data  
centres



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Market place for  
energy sharing



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Support of a major  
enterprise for  
battery production  
in Sweden



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Northern Europe's  
largest charging  
network for  
e-vehicles



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Co-operation for  
e-mobility



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Storage projects at a  
number of wind parks

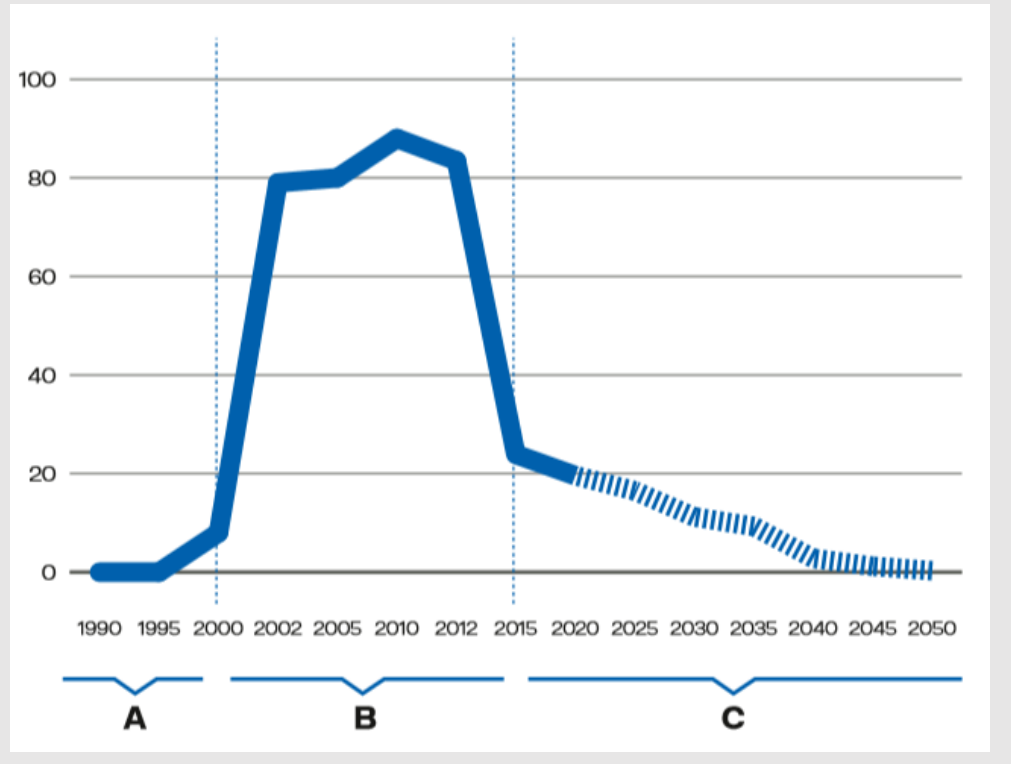


VATTENFALL

# Our CO<sub>2</sub> roadmap

## This is how Vattenfall is driving the transition

Vattenfall's CO<sub>2</sub> emissions (Mtonnes, 1990-2050 – forecast)





# Our milestones towards fossil-free living within one generation

2020

Fossil-free energy solutions available for all our customers

Our operations in the Netherlands are coal-free

2021

We close our last coal fired power plant in Germany by mid-2021

Fossil-free operations in Sweden

2025

We generate fossil-free electricity to power 30 million homes

We pilot 100 MW of green hydrogen gas production from fossil-free electricity

The Nordic production fleet is free from fossil fuels

2030

Coal is phased out from all our heat operations

Our emissions are reduced by 40%, in line with required level to limit global warming to below 2°C

2035

We are not done, more to come...

# Vattenfall supports the EU ETS



- It drives emission reduction in a **cost-efficient** manner
- It creates a **level playing field** among covered activities (power sector, industry...)

- It is fully compatible with the **internal market principle**

- It can provide **long-term stability** and certainty for investors

- It support **innovation** – not only through the CO2 price but also via auction revenues used for R&D (Innovation Fund)

# Learnings from 15 years of EU ETS system



Power sector has been very receptive to the CO2 price signal



CO2 abatement can be achieved much cheaper than expected a few years ago



Earmarking ETS revenues to energy transition



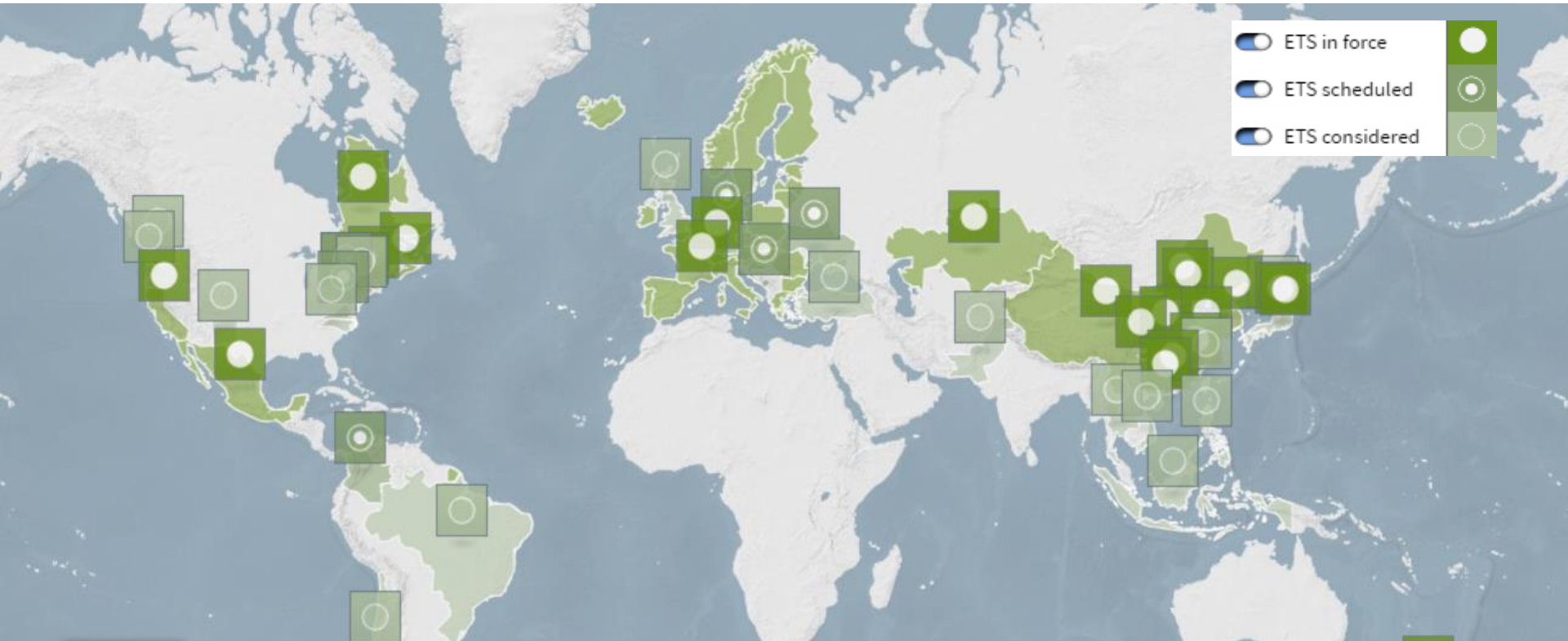
Solidarity provisions to ensure fair burden-sharing and Just Transition (Modernisation Fund...)



A politically created market may need repeated political support, while keeping the system as simple as possible

# Global carbon markets

## Compliance markets, not voluntary or CDM



# Players in the EU ETS



## Utilities

- No free allocation as of Phase 3 → Auction participants
- 2400 companies account for 53% of all ETS emission
- Hedging behavior

## Industry

- Over-allocation during economic crisis
- 3700 companies, 44% of all ETS emission
- Diverse set of strategies (banking, borrowing)

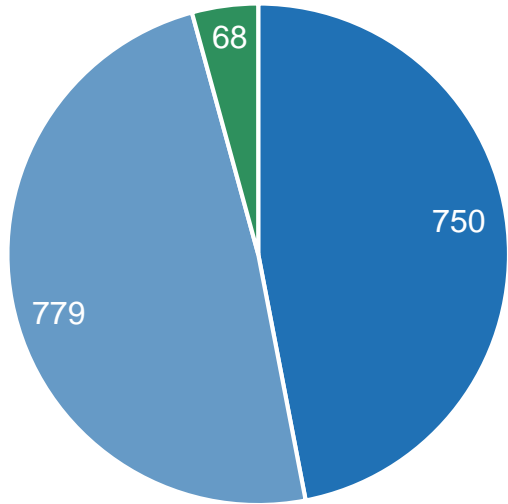
## Aviation

- Fast growing sector (+20% emission since 2013)
- 3.5% of all ETS emission
- Net-buyer of EUAs, traders
- ICAO CORSIA to replace EU ETS?

## Financials

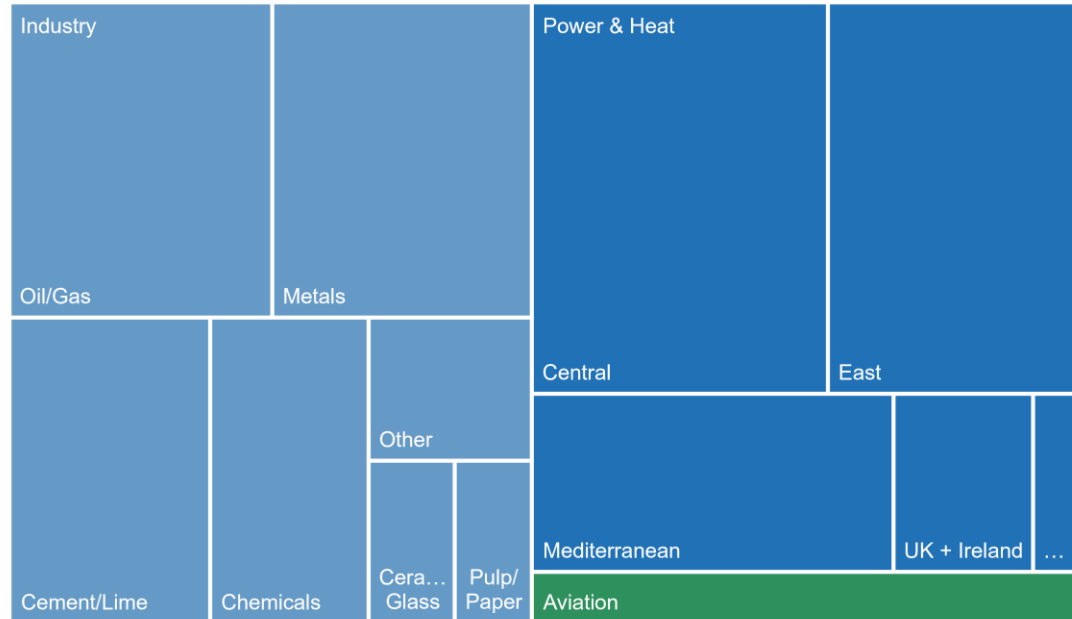
- No compliance obligation
- Provide liquidity
- No proprietary trading for a long time
- Comeback in 2017/2018

# EU ETS covered emissions in mt

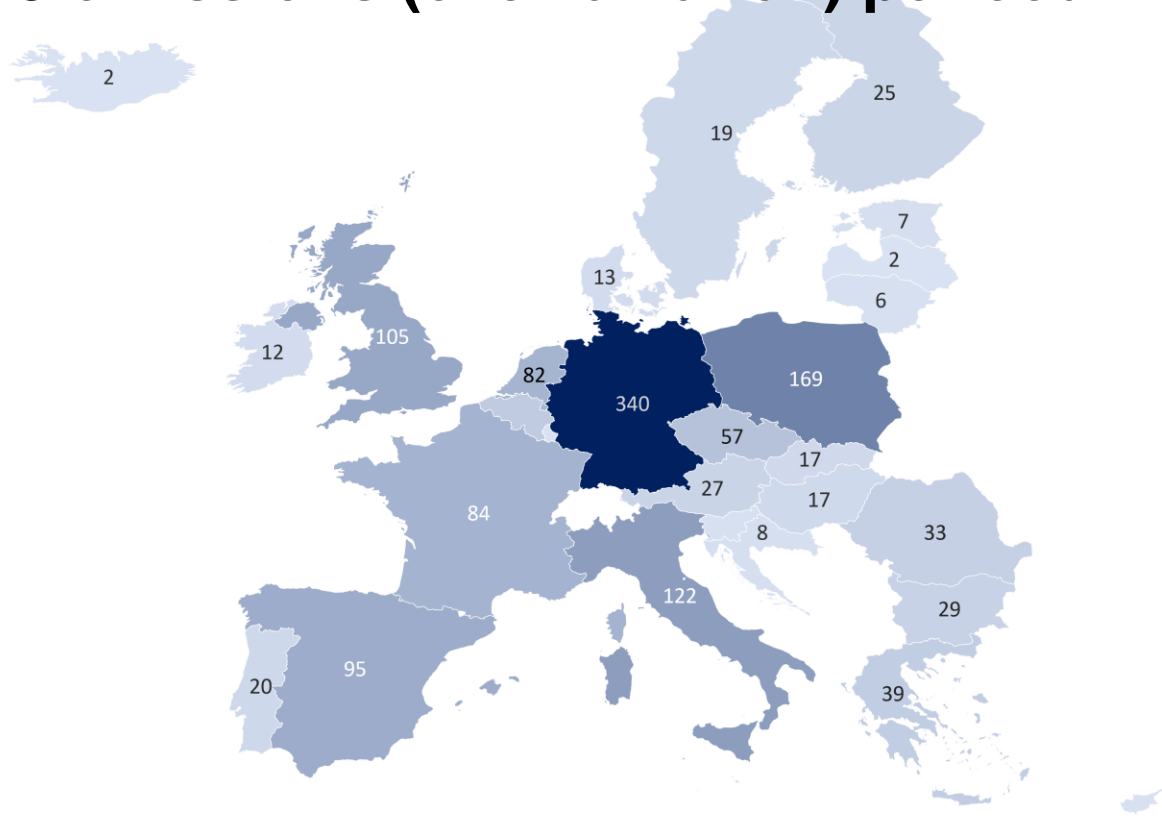


- Power & Heat
- Industry

- Power & Heat
- Industry
- Aviation



# Total 2019 emissions (excl. aviation) per country



# Fundamentals: a lot of input factors needs to be considered to forecast supply/demand balance

## DEMAND

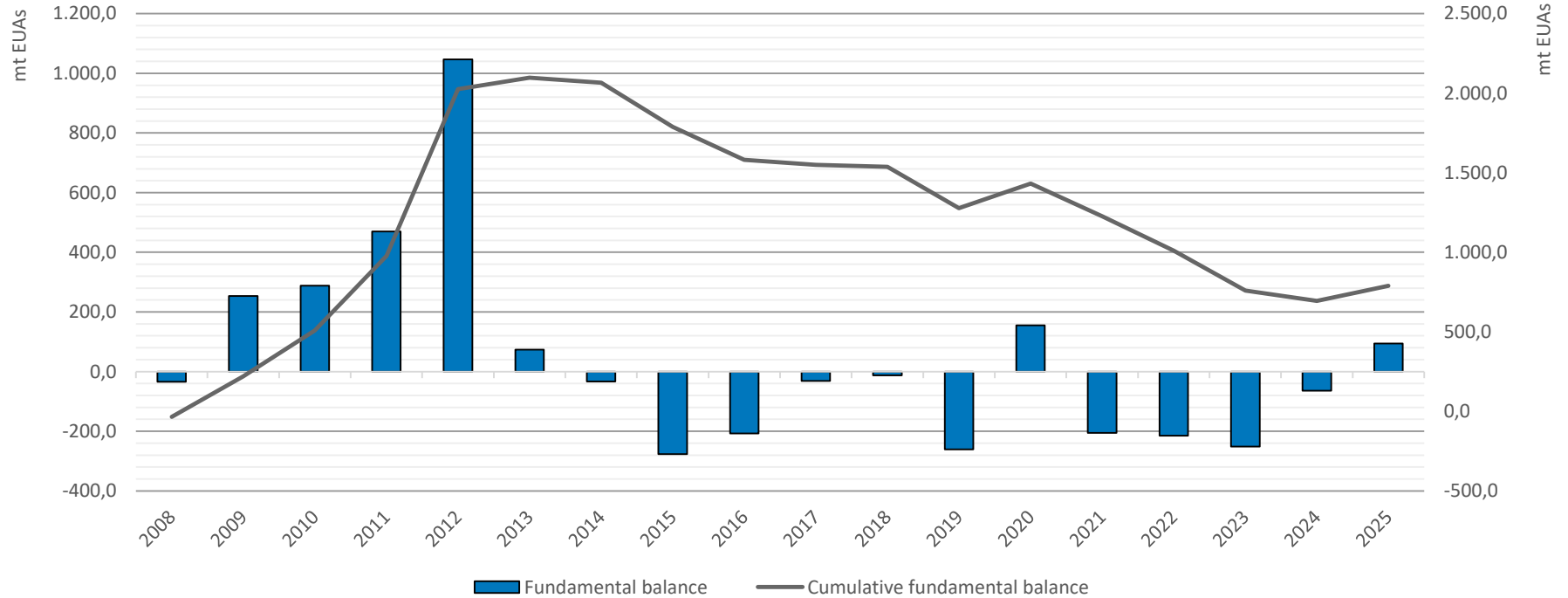
- Power sector: GDP, fuel prices (coal/gas/oil), renewable capacity development, power demand, thermal capacity development, weather, ...
- Industrial sectors: GDP, industrial growth, carbon efficiency developments, more macroeconomic factors, ...

## SUPPLY

- Generally more easy on carbon markets as defined by legislation
- Allocation developments: fixed for the trading period, only minor year-on-year changes
- Auction developments: generally fixed for one trading period, Market Stability Reserve brings flexibility as of 2019



# Fundamental balance of the EU ETS: heavy oversupply



# Short history of the EU ETS

## Phase 1 (2005 – 2007)

95% Free allocation allowed – almost no auctioning

Free of charge Grandfathering leads to over-allocation

## Phase 2 (2008-2012)

Benchmarks instead of Grandfathering

Economic crisis

CDM & JI offsets

## Phase 3 (2013-2020)

Auctioning for electricity producers (no free allocation)

Linear reduction of Cap (LRF 1.74%)

Backloading

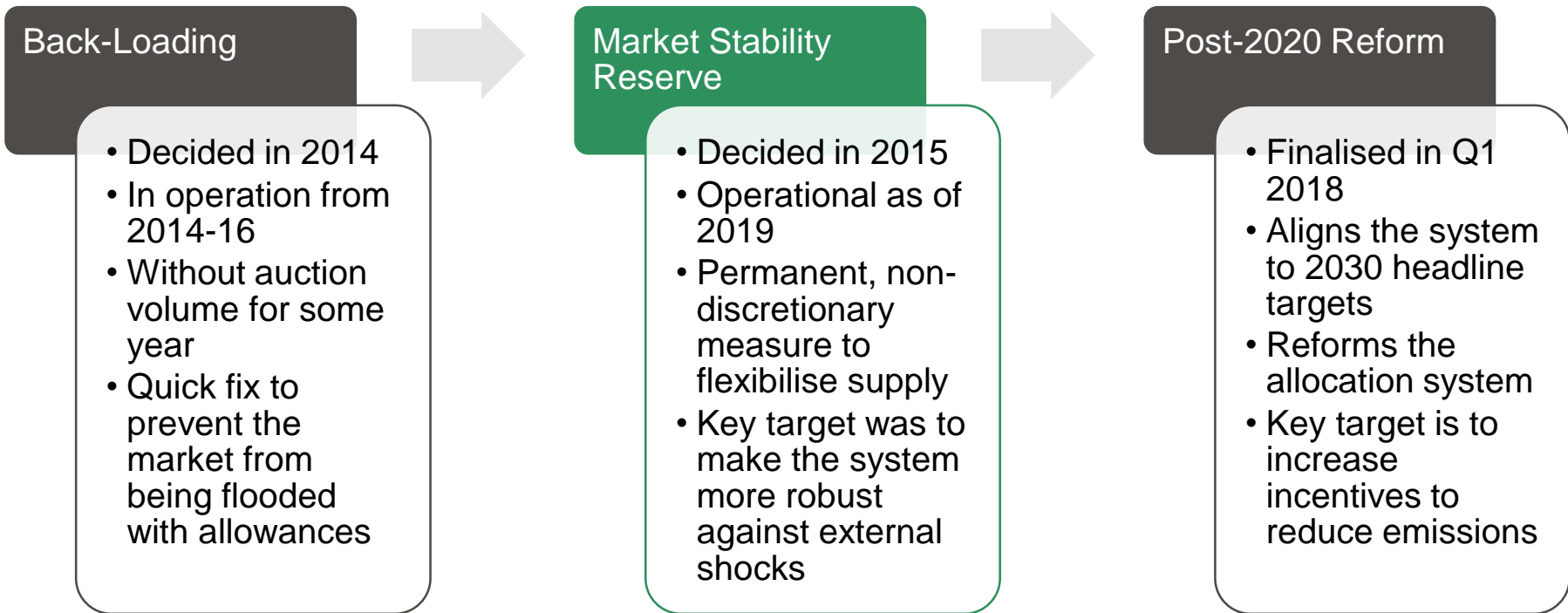
## Phase 4 (2021-2030)

MSR

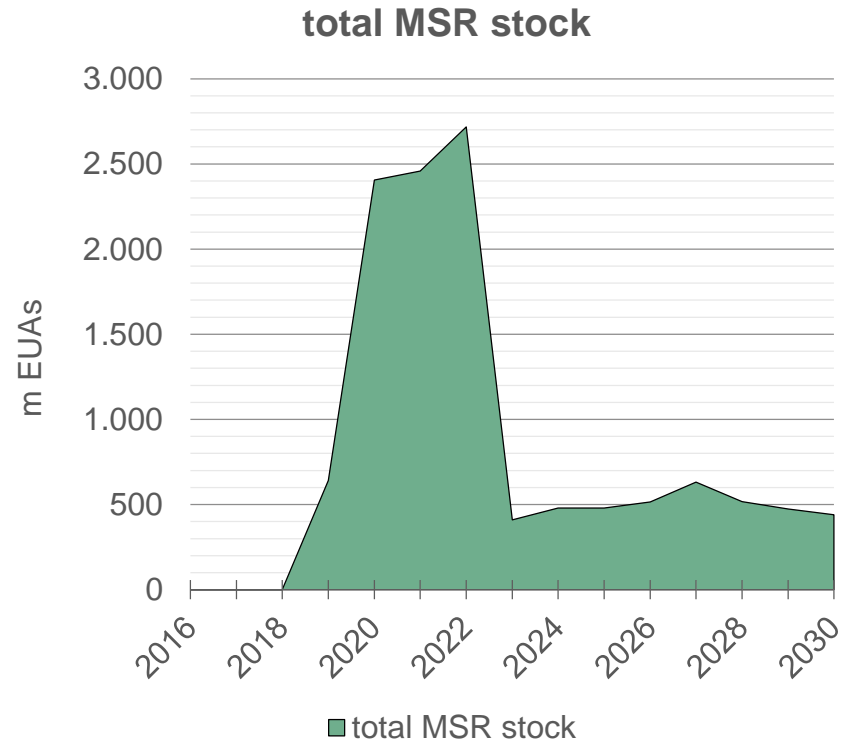
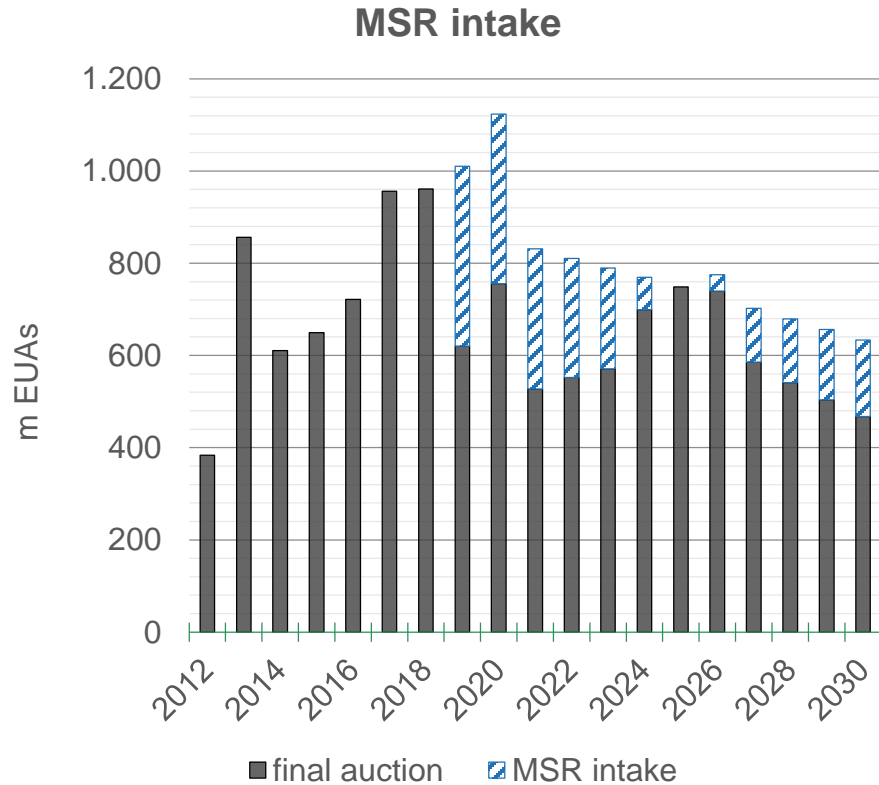
Increased LRF (2.2%)

Phase-out of free allocation for some

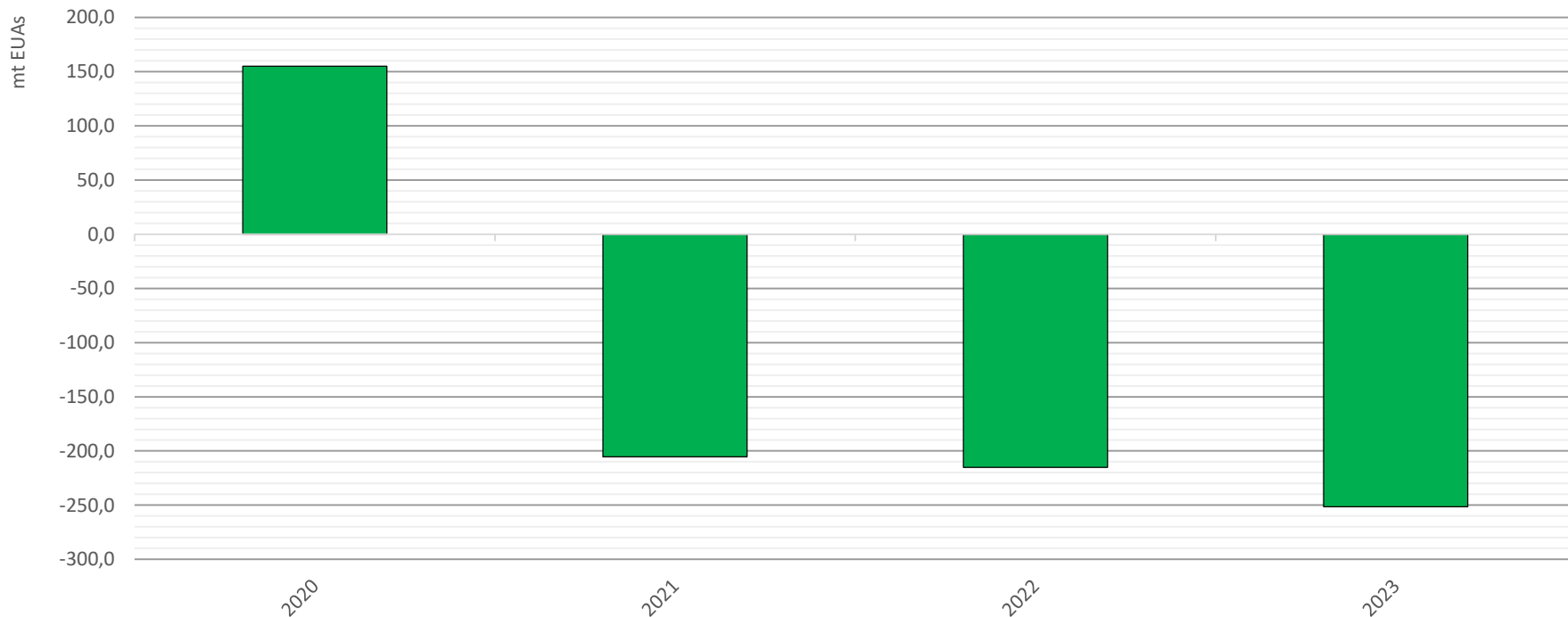
# Under constant revision: most recent changes to the system



# MSR Deep-dive: the key supply-side mechanism to create scarcity



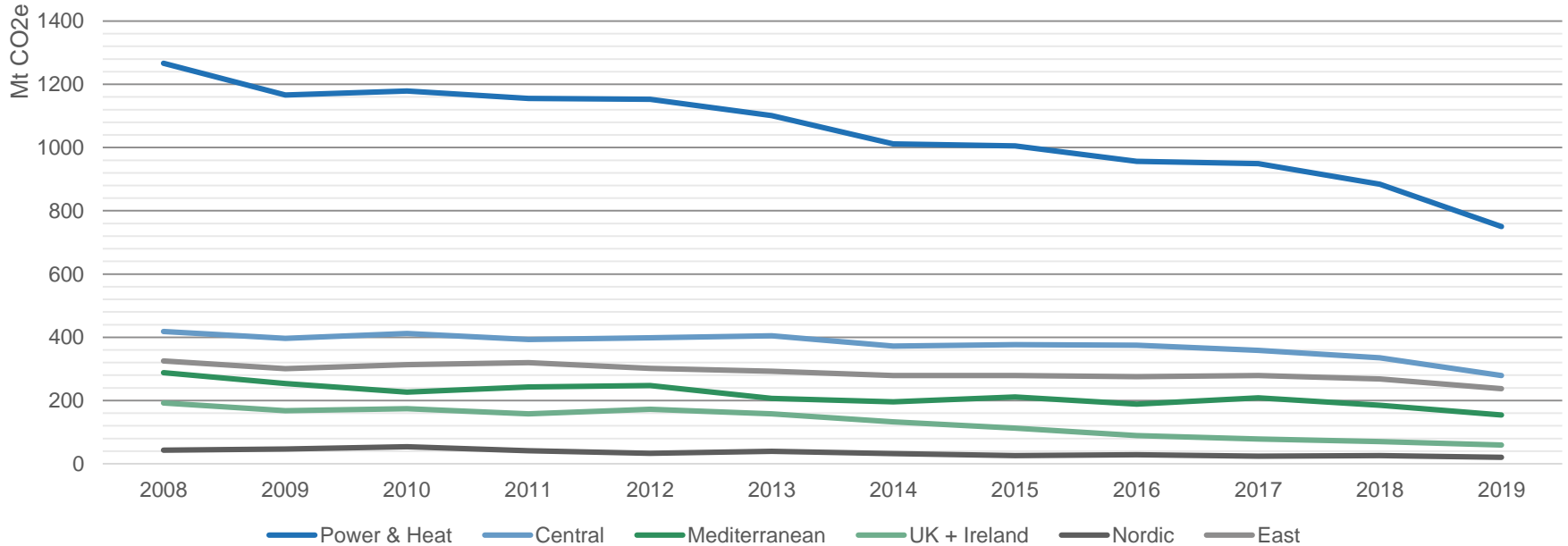
# Because of these changes, a strong squeeze is about to hit the market



# Has the EU ETS been effective lately?

Significant emissions reductions in the power sector, at least partly triggered by EU ETS

## EU power emissions



# Allocation has been reformed as well, but with special attention to carbon leakage



benchmark\*

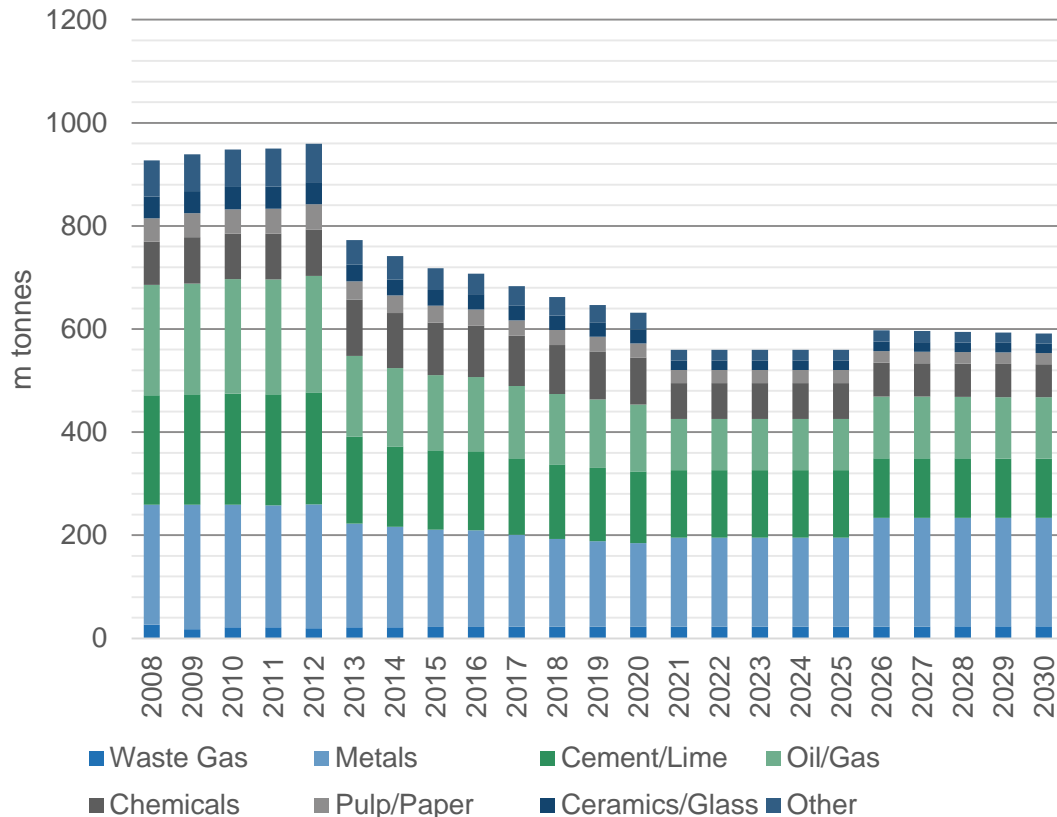


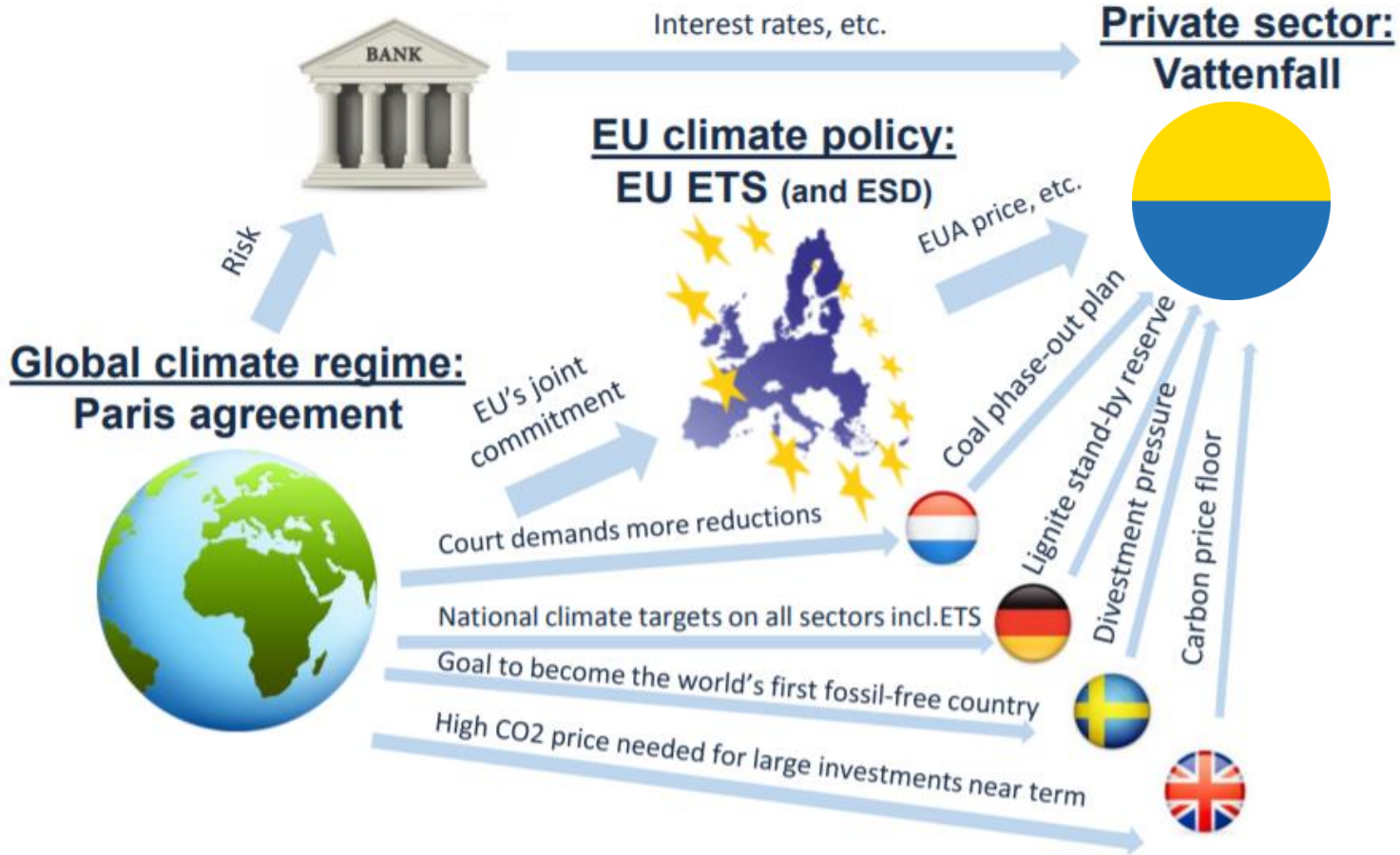
Preliminary allocation

[kg produced]  
Historic production

[kg CO2/kg produced]  
Based on 10% most efficient installations in 2008 and **benchmark reduction factor**

Final allocation forecast per industry sector





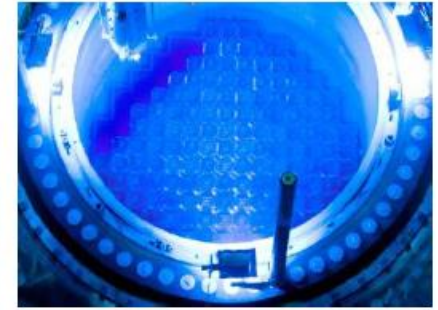


# 15 YEARS OF EU ETS – Vattenfall experience

- The optimal mix of allowances for compliance/hedging is determined by several factors
  - Cost
  - Availability
  - Time
  - ETS restrictions i.e. EU allows only x% of CERs to be used for compliance
- In the case of the EU-ETS compliance has to be achieved by April each year

# 15 YEARS OF EU ETS – WHAT HAVE WE LEARNED?

- Determine your carbon exposure before anything else
- The best carbon management strategy is the one that will provide the company with certainty and lower compliance costs than the competition
- Nobody can exactly predict the direction of carbon prices in the future
- Very important to assign clear roles and responsibilities within different units linked to carbon, to avoid unnecessary conflicts and costs
- Do not wait until the last day for compliance! It will be risky and most likely expensive



Power  
Climate  
Smarter  
Living

**Vattenfall will help customers reduce the need for fossil fuels and enable the next generation to live fossil free**

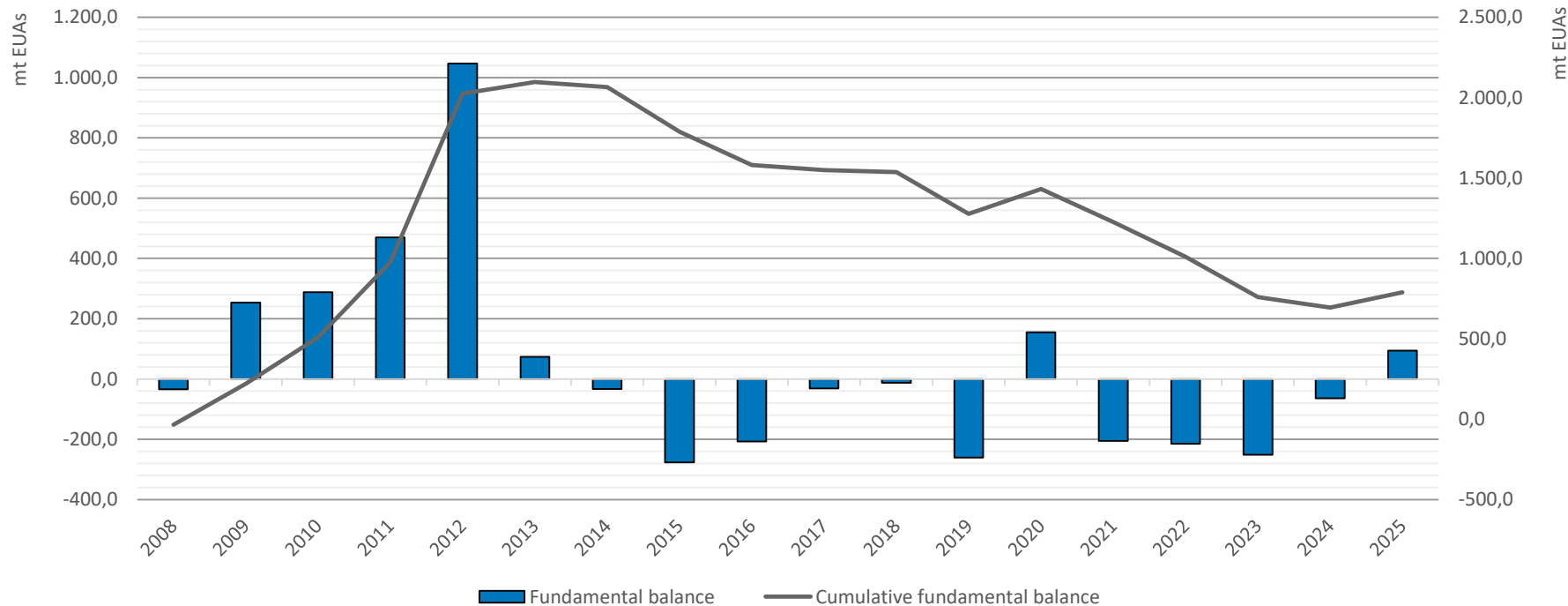
Contact : [claire.sandevair@vattenfall.com](mailto:claire.sandevair@vattenfall.com)  
[stefan.feuchtinger@vattenfall.de](mailto:stefan.feuchtinger@vattenfall.de)

# Backup slides



# Fundamental balance of the EU ETS: heavy oversupply

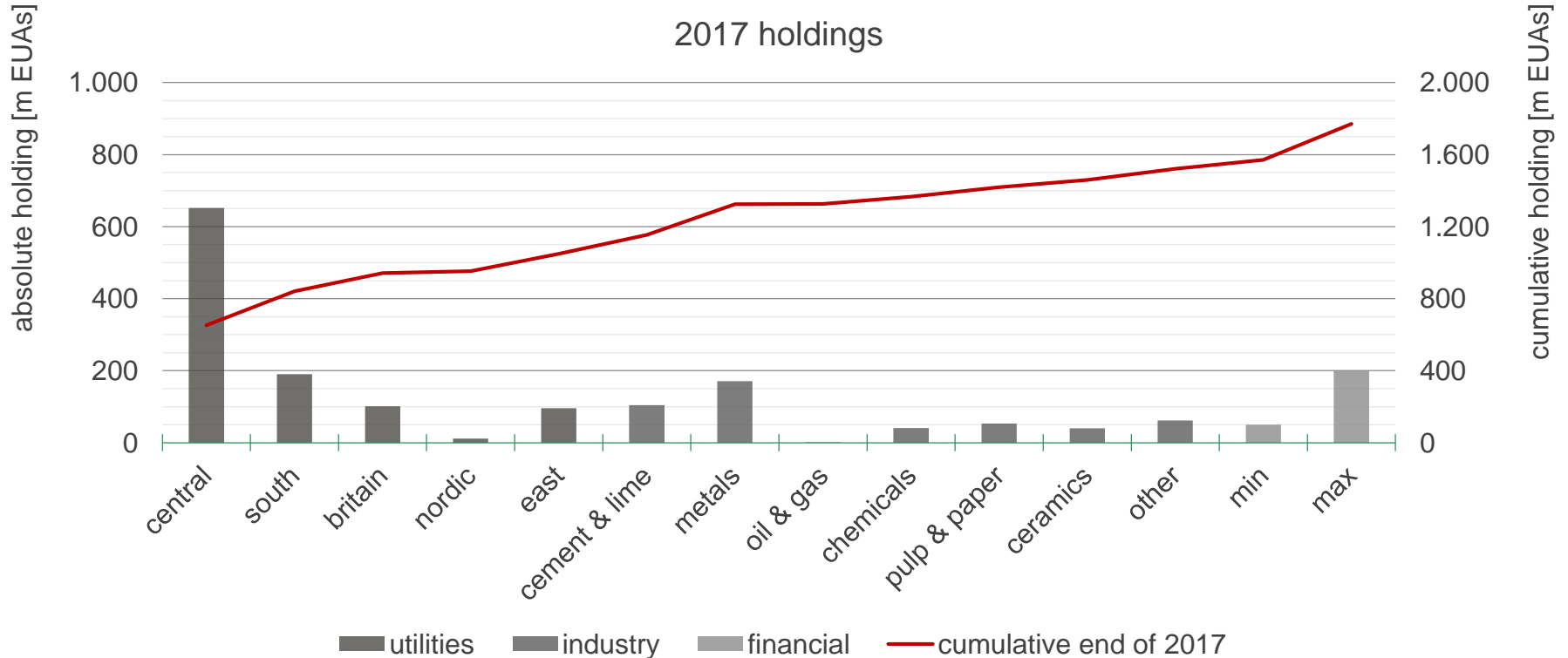
## If this was the whole picture, why are prices not close to 0?



# But are fundamentals the whole picture?

	Normal commodity	Emission rights	Financial product
Storage costs	high	only capital costs	only capital costs
Transportation costs	yes	no	no
Purchase prior to consumption	yes	no	-
Needed for production	yes	yes	no

# But are fundamentals the whole picture?

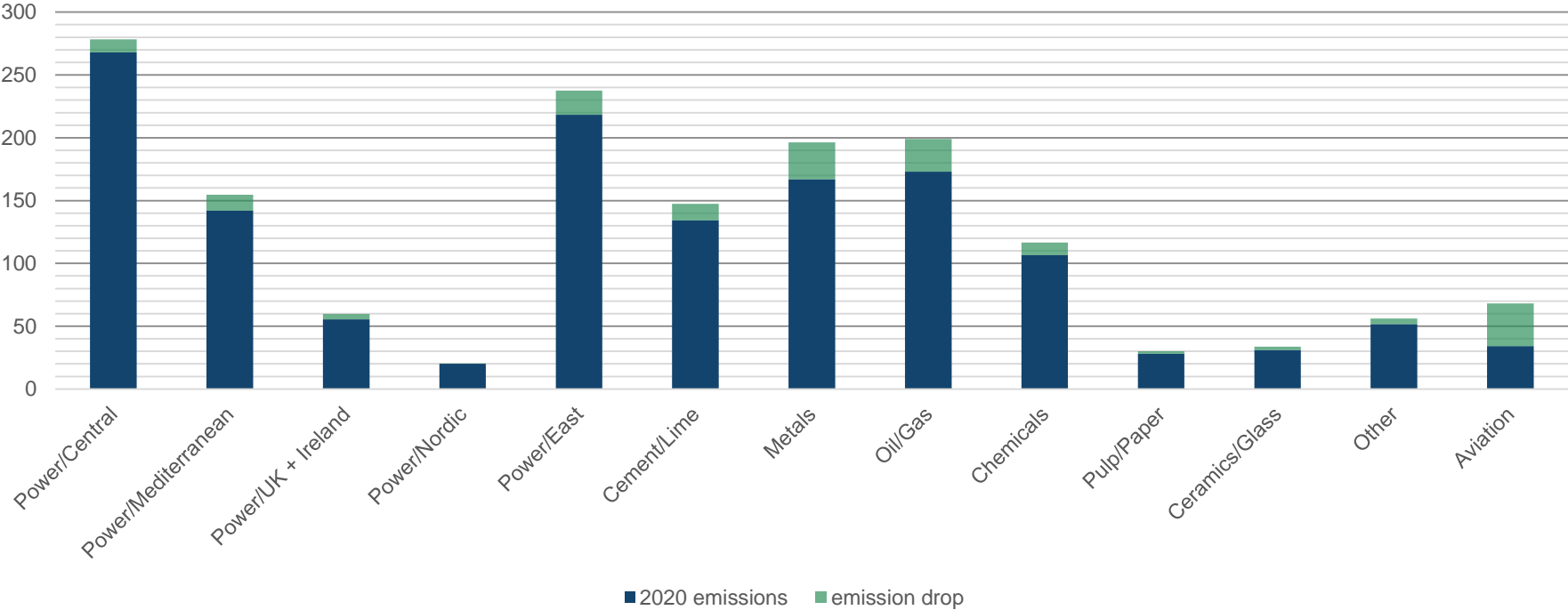


# Discussion: impact of COVID-19 on the EU ETS

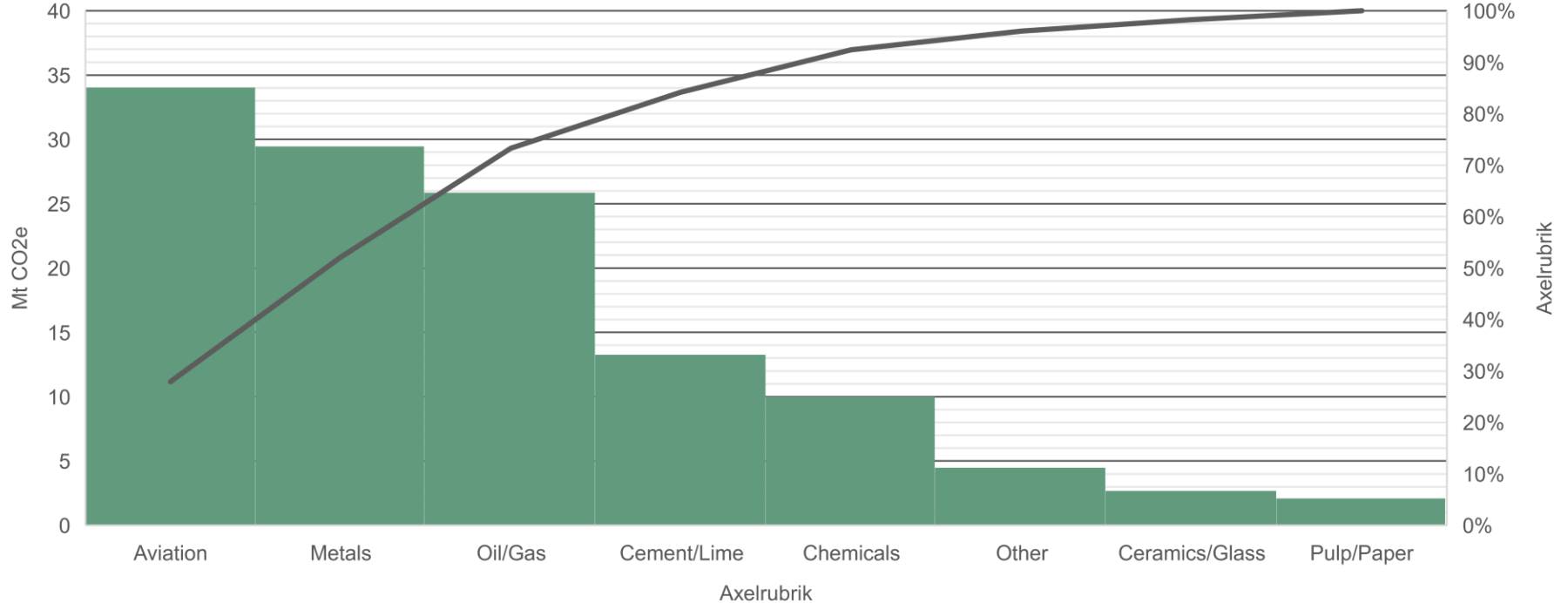




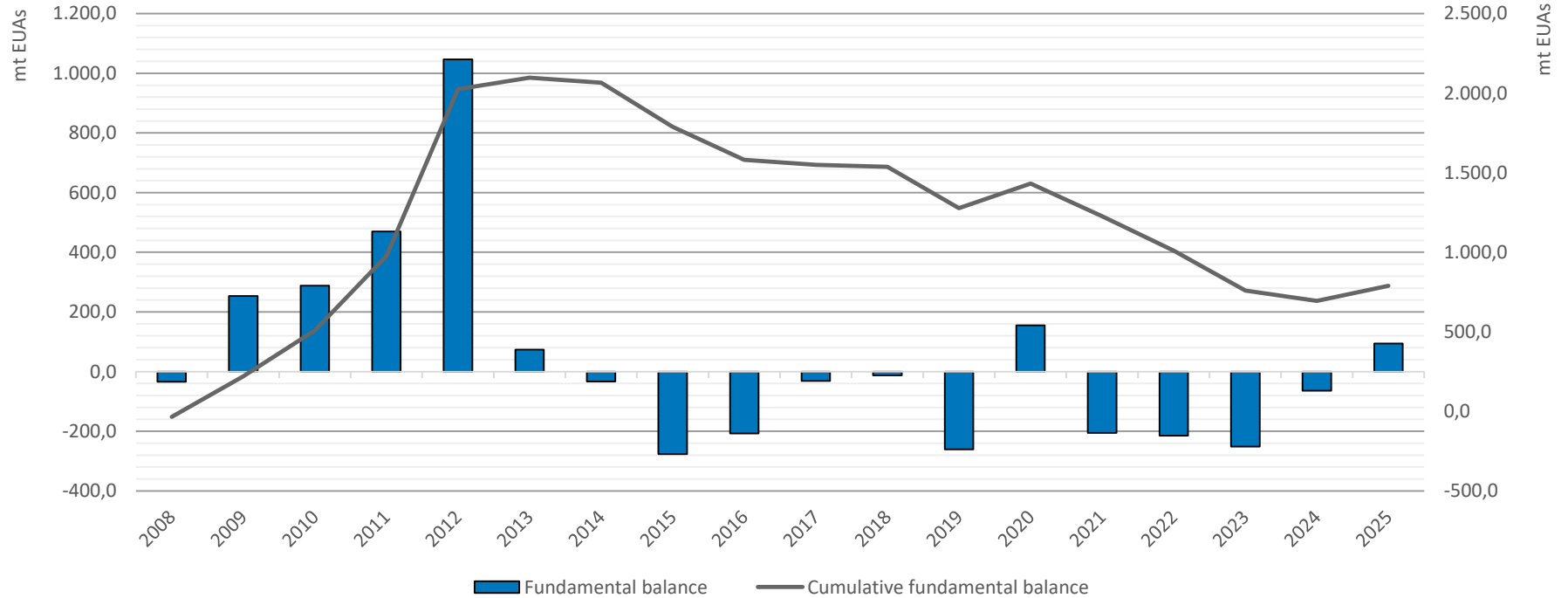
# Will Covid-19 have the same effect like the 2008 crisis?



# V – scenario 2020 industry emission drop assumptions: aviation -50%, metals -15%, oil/gas -13%, other sectors -7 to -9%



# Fundamental balance of the bull (V) scenario: 180m emissions drop do not lead to a long term trend reversal



# **Market outlook: how politics decide mid-term price fundamentals**



# The Green deal and the next reform

2030 target change could imply amendments to the LRF

	LRF p.a. (2021- 2025)	LRF p.a. (2026- 2030)	LRF 2021-25	LRF 2026- 30
<b>LRF – current setting</b>	48.4 Mt	48.4 Mt	2.2%	2.2%
<b>LRF (50%)- all TP4</b>	70.6 Mt	70.6 Mt	3.2%	3.2%
<b>LRF (50%)- half TP4</b>	48.4 Mt	92.8 Mt	2.2%	4.2%
<b>LRF (55%)- all TP4</b>	81.7 Mt	81.7 Mt	3.7%	3.7%
<b>LRF (55%)- half TP4</b>	48.4 Mt	115.0 Mt	2.2%	5.2%

Source: EC, ICIS

