April 26, 2022

2022 State of the EU ETS

Stakeholder consultation

ERCST

Roundtable on
Climate Change and
Sustainable Transition

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2022 State of the EU ETS - outline

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Key Takeaways

1. **Background**

2. **An EU ETS "fit for purpose"**

3. **Phase 3: a comprehensive analysis**
   - 3.1. The recovery phase of the EU-ETS
   - 3.2. Climate Delivery
   - 3.3. Economic Delivery

4. **Regulatory developments**
   - 4.1. EU developments
   - 4.2. International carbon price developments

5. **Market Sentiment Survey**

6. **Environmental delivery**
   - 6.1. Delivery against phase 4 target
   - 6.2. Delivery against EU long-term domestic environmental commitments

7. **Socio-economic delivery**
   - 7.1. Is the EU ETS a driver for change?
   - 7.2. Social impacts
   - 7.3. Industrial decarbonization
   - 7.4. Innovation
   - 7.5. Carbon Leakage

8. **Market functioning**
   - 8.1. Market functioning trackers
   - 8.2. Supply-demand balance and evolution of TNAC
   - 8.3. Price forecasts
   - 8.4. Market participation

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Chapters

1. **Background**
2. An EU ETS “fit for purpose”
3. Phase 3: a comprehensive analysis
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5. Market Sentiment Survey
6. Environmental delivery
7. Socio-economic delivery
8. Market functioning
9. Conclusions

1. Background

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State of the EU ETS Report is meant to be a "**snapshot**"

- Provides policymakers and stakeholders with an overview of how the EU ETS is doing by April of each year, based on previous year data.
- **2022 Context:**
  - Covid-19
  - Fit for 55 package
  - COP26 outcome on Article 6 rule book
  - Rise in carbon and energy prices
  - War in Ukraine
  - Global stocktake in 2023

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2. An EU ETS “fit for purpose”

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What do we expect the EU ETS to deliver?

3 key deliveries:

1. **Environmental delivery.** Does it deliver against absolute environmental targets?
2. **Socio-economic delivery. Macro-economic efficiency** and cost effectiveness for compliance. Does it provide effective, and proportional, **protection against** the risk of **carbon leakage**? Is it a **driver for change**? Does the EU ETS ensure a **just transition**?
3. **Market functioning.** It is worth having a market only if it **functions well** and leads to **good price discovery**?

Implicit expectations:

1. Contributes to long-term competitiveness
2. Promotes carbon pricing

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3. Phase 3: a comprehensive analysis

3.1. The recovery phase of the EU-ETS

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- Phase 2 was in a trouble with the crash of the EUA price in 2009 and its long decline trend until 2018.
- In Phase 3, EU ETS structural problems were recognized :
  - The surplus of EUAs due to the inflexibility of the EUA supply to EU ETS external chocks.
  - The unanticipated effect of overlapping of EU energy and climate policies on the EU ETS
  - The lack of long-term visibility for EU ETS players
- Phase 3 was a decade of changes to restore the EU-ETS in a complex economic and COVID crisis context :
  - The phase down of free allocation and the short-term measure of backloading of auctions between 2014-16 until 2019-20.
  - The MSR implementation in 2019 to (re)balance the EU ETS and to improve its resilience.
  - The revised EU ETS directive for its Phase 4 adopted in 2018 with notably a new EU ETS 2030 target aligned with the Paris agreement ambition.
  - The EU Green Deal in 2020 with a higher EU climate ambition towards the carbon neutrality and the forthcoming review of the EU ETS to accelerate its ambition.

3. Phase 3: a comprehensive analysis

3.2. Climate Delivery

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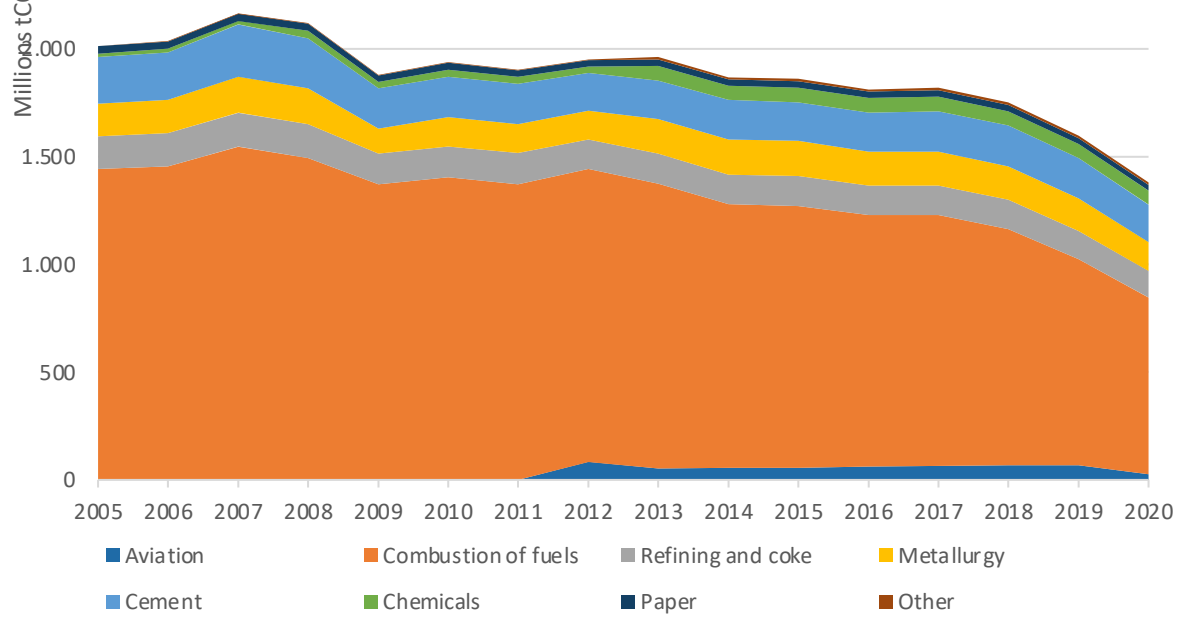
- The Phase 3 EU ETS reduction target of – 21% in 2020 (compared to 2005 levels) has been achieved since 2014.
  - CO2 emissions fell by 29% in Phase 3 (2013-2020) for all stationary installations (20% from 2013 to 2019), driven by the combustion sector.
  - The largest annual decrease of emissions took place from 2019 to 2020 due to Covid : -11% compared to -5% on average in Phase 3.

- During Phase 3, several signals demonstrate the start of the decarbonization :
  - The carbon intensity of combustion plants decreased by around 30% from 2013 to 2019.
  - In other installations : modest but consistent decrease in the carbon intensity of production.

Verified emissions by ETS sector, data: Ecoact based on European environmental agency data



Note: The combustion sector not only includes electric utilities, but also combustion plants of other sectors falling over the 20 MW participation threshold

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

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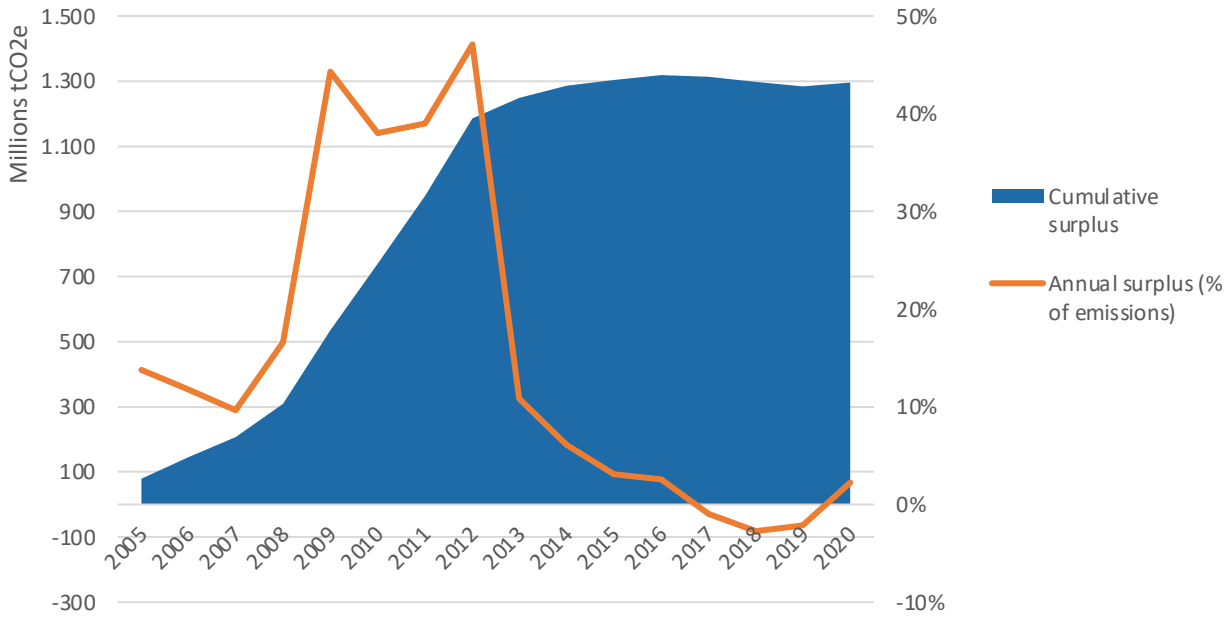
- Phase 3 reforms resulted in stabilizing the cumulative allowance surplus that had built up since Phase 2.
- Since 2017, the manufacturing sector experiences a yearly allowance deficit of 2-3% of its emissions.

Annual and cumulative allowance surplus, all stationary installations except combustion. Source: Ecoact based on EEA data



3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

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- Breaking down the yearly permit deficit unveils significant variations between ETS sectors : combustion plants had to buy the bulk of allowances in auctions, while process emissions could be covered by free allocation to a large extent.
  - Results change when considering the banking flexibility, as process emissions of all sectors except refining and coke could have been covered by the permit bank built up since 2013, provided banked allowances remained in account holders' hands.
- In aggregate, the effective carbon cost was multiplied seven-fold from 2013 to 2020, due to the phase down of free allocation and increasing EUA prices. It is highest in aviation, combustion installations and process installations of the refining and coke sectors.

Yearly allowance surplus (green) and deficit (red) in Phase 3 by ETS sector, in percentage of the sector's verified emissions. Source: Ecoact based on EEA

		2013	2014	2015	2016	2017	2018	2019	2020
Combustion of fuels	All Sectors	-73%	-74%	-78%	-80%	-83%	-84%	-84%	-85%
Process emissions	Refining and coke	-17%	-16%	-20%	-22%	-22%	-22%	-23%	-19%
	Metallurgy	26%	22%	20%	21%	17%	15%	18%	26%
	Cement	16%	4%	4%	3%	-2%	-6%	-5%	-1%
	Chemicals	11%	9%	2%	2%	-2%	-1%	-2%	-2%
	Paper	19%	20%	16%	12%	7%	6%	6%	9%
	Other	40%	32%	18%	8%	0%	-7%	8%	18%
All stationary installations exc. combustion		**11%**	**6%**	**3%**	**3%**	**-1%**	**-3%**	**-2%**	**2%**
Aviation		**-40%**	**-41%**	**-44%**	**-49%**	**-49%**	**-55%**	**-56%**	**21%**
Total		**-47%**	**-48%**	**-51%**	**-52%**	**-55%**	**-55%**	**-53%**	**-49%**

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

- When taking into account the rolling bank of allowances built since 2008, the estimated yearly number of allowances needed shrinks to zero in stationary installations other than combustion and refining.
  - Calculating the yearly need of permits by sector shows that, provided it held on extra permits, the manufacturing sector could tap on the rolling permit bank to cover its emissions in Phase 3.

Table : yearly permit need in Phase 3 by sector (based on EU ETS classification) taking into account banking since 2008, in % of verified emissions

		2013	2014	2015	2016	2017	2018	2019	2020
Combustion of fuels	All sectors	-73%	-74%	-78%	-80%	-83%	-84%	-84%	-85%
Process emissions	Refining and coke	0%	0%	-3%	-22%	-22%	-22%	-23%	-19%
	Metallurgy	0%	0%	0%	0%	0%	0%	0%	0%
	Cement	0%	0%	0%	0%	0%	0%	0%	0%
	Chemicals	0%	0%	0%	0%	0%	0%	0%	0%
	Paper	0%	0%	0%	0%	0%	0%	0%	0%
	Other	0%	0%	0%	0%	0%	0%	0%	0%
All stationary installations exc. combustion		**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Aviation		**0%**	**0%**	**0%**	**-16%**	**-49%**	**-55%**	**-56%**	**0%**
Total		**-19%**	**-48%**	**-51%**	**-52%**	**-55%**	**-55%**	**-53%**	**-49%**

$$\mathbf{EUA\ need_t} = \max(0;\ \mathbf{emissions_t} - \mathbf{allocation_t} - \mathbf{bank_{t-1}}) \quad \text{with}$$
$$\mathbf{bank_t} = max(0;\ ;\ \mathbf{allocation_t} - \mathbf{emissions}_t + bank_{t-1})$$
$$\mathbf{bank_{t=2008}} = max(0\ ;\ \mathbf{allocation_{t=2008}} - \mathbf{emissions_{t=2008}})$$

The bank cannot be negative : if the previous year's bank cannot cover the yearly permit deficit, the sector has to go to the market (i.e., permit need)

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

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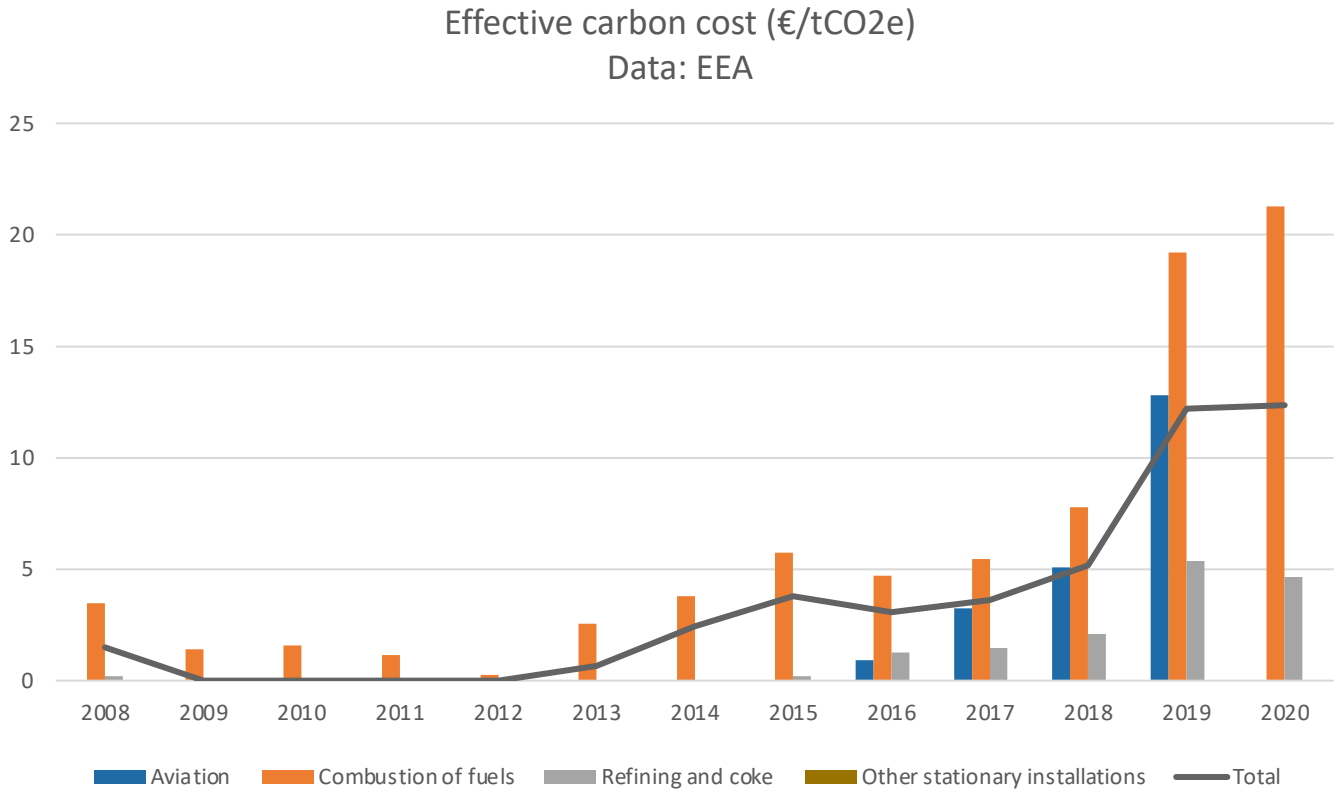
- The effective cost of carbon borne by EU-ETS plants was multiplied by more than 15 over Phase 3, and was entirely driven by the combustion of fuels and refining sector.
  - The phase down of free allocation, coupled with an increase in the EUA price, reinforced the cost passed on to industrial plants of the combustion of fuels and refining sectors.
  - In other industrial sectors (metallurgy, cement, chemicals) the rolling bank was large enough to cover the yearly deficit of allowances, hence the effective cost is 0.
  - However, the price signal remains the same whatever the effective cost of carbon may be, since the opportunity cost of selling a permit remains valued at the EUA price.



$$\textbf{Effective cost}_t = (permit\ need_t \times average\ EUA\ price_t)/emissions_t$$

Graph based on the calculated permit need (see previous slide for details). The effective cost takes into account the rolling bank of allowances: if the accumulated bank is large enough to cover the permit deficit, then the effective cost of carbon is zero because the sector, in aggregate, does not have to go to the market to buy permits.

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

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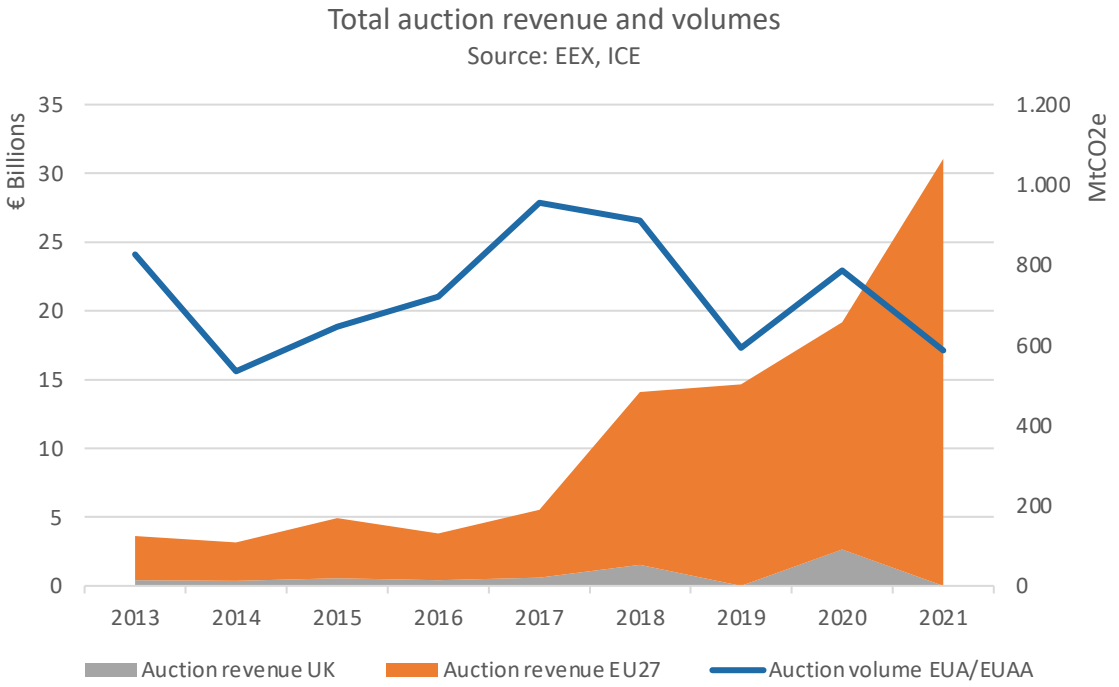
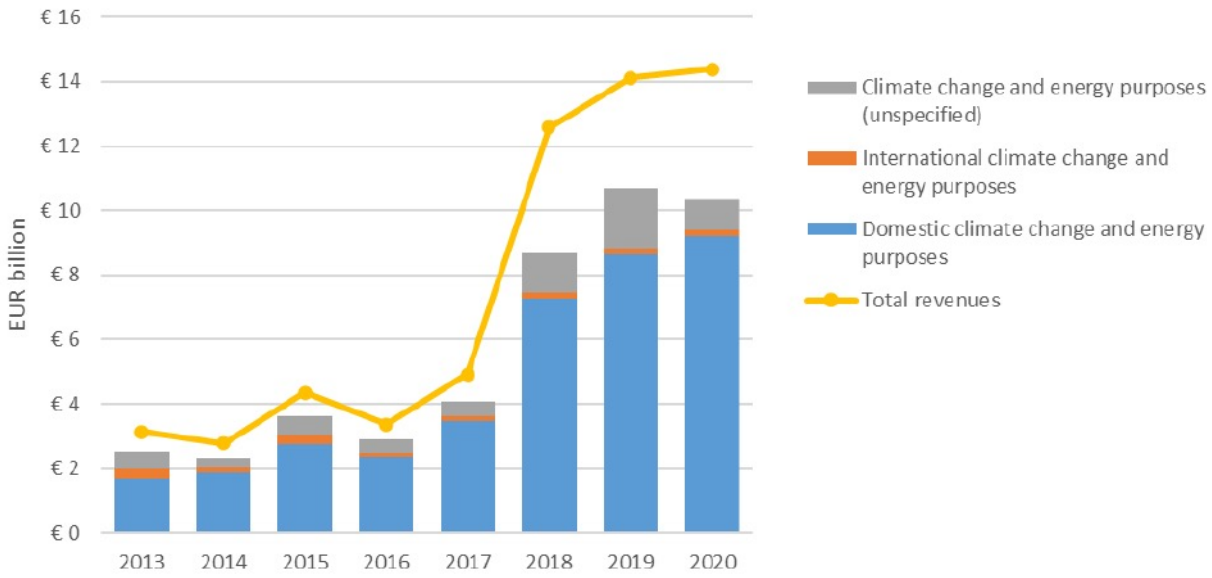
- EU ETS revenues have been multiplied by 4.5 during Phase 3 and have been increasingly allocated to climate-energy issues :
  - During Phase 3, Member States generated some 65.5 bn € from auctioning ETS allowances. Based on annual reporting, it is estimated that 75% of total revenues (€56.5 bn) was used for climate and energy purposes during phase 3 and 72% in 2020 - well above the 50% required in the legislation.
  - 88% of the auctioned allowances were distributed to EU Member States, 10% was allocated to lower-income EU Member States and the remaining 2% distributed among nine Member States that reduced 2005 emissions by 20% compared to the base year, hence the difference between figures.





Auctioning revenues and reported usage (€Bn) – EU 27
Source : EU Climate Action Progress Report 2021

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

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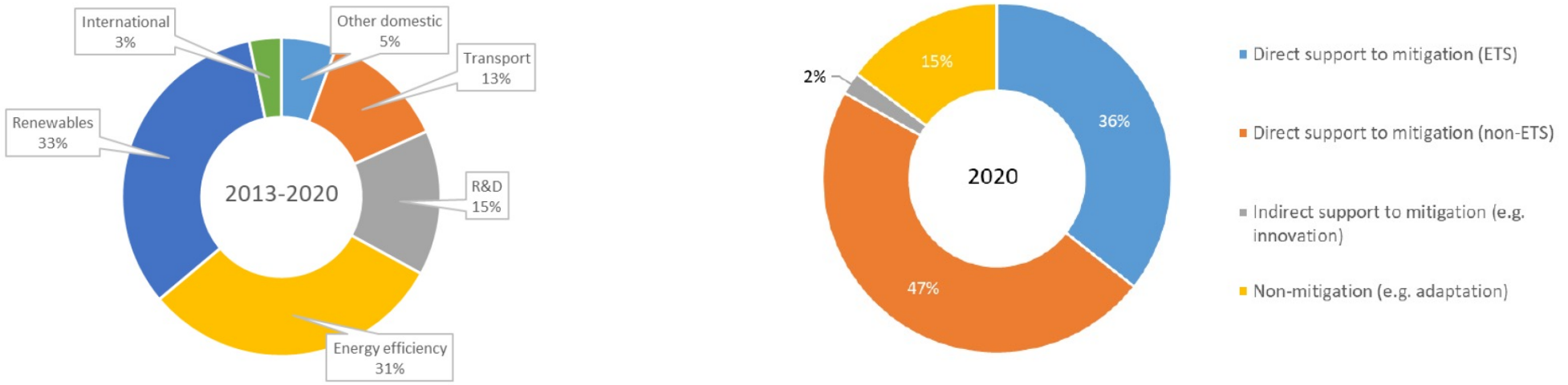
- In 2020, Member States spent most of their reported revenues on direct support, i.e., on the installation of technologies that reduce emissions (e.g., renewables).
  - Around 60% of the EU ETS revenues in 2020 was used in non-EU ETS sectors.
- In 2020, revenues from ETS auctioning are mainly used to develop renewable energy to meet the EU's target (northern and southern Europe), encouragement of a shift to low-emission and public forms of transport (central and eastern Europe), energy efficiency measures (eastern Europe). An important share goes to other domestic GHG reduction measures.



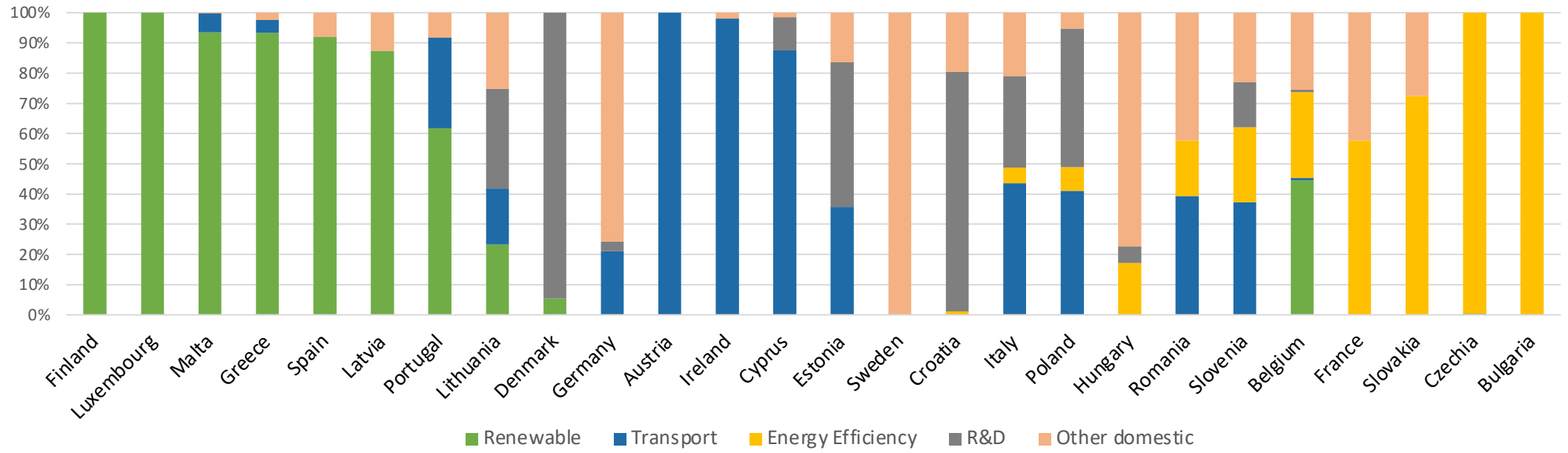
Reported share per sector and type of support spent on climate change and energy domestically (incl. planned) in 2020, EU 27
Source : EU Climate Action Progress Report 2021

3. Phase 3: a comprehensive analysis

3.3. Economic Delivery

- In 2020, revenues from ETS auctioning are mainly used to develop renewable energy to meet the EU's target (northern and southern Europe), encouragement of a shift to low-emission and public forms of transport (central and eastern Europe), energy efficiency measures (eastern Europe). An important share goes to other domestic GHG reduction measures.

Self reported use of ETS auctioning revenues spent on climate change and energy in 2020
Data : Reportnet dataflows



Note: some Member States do not earmark revenues from auctions, meaning that the national spending on climate energy purposes can be co-financed by other revenues of the general budget. See the Staff Working Document accompanying EU Climate Action Progress Report 2021 for details (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0298&from=EN)

3. Phase 3: a comprehensive analysis

3.4. Resilience of the EU-ETS

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- The MSR has been implemented to support and stabilize prices in face of external shocks.
- Its implementation coincided with a strong increase in EUA prices, but the role played by the MSR's action is not clear.
  - No causal link has yet been found between the TNAC and EUA prices, suggesting that other factors such as hedging, and speculation could have played an equally important role in driving prices.
- The MSR's support function can be perceived as a success as prices remained high during Covid-19 pandemic, however the stability function is not so clear in 2021 with the recent escalation in prices.
  - Academic studies have raised that the MSR may lead to increase price volatility. The TNAC is backward-looking and may not represent the balance of the market, which also depends on anticipation of future prices and hedging behaviors. The cancellation mechanism could also create uncertainty around the future cap on emissions.

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4. Regulatory developments

4.1 EU developments

- Secondary legislation for phase 4 of the EU ETS
- Fit for 55

4.1.1 Secondary legislation for phase 4

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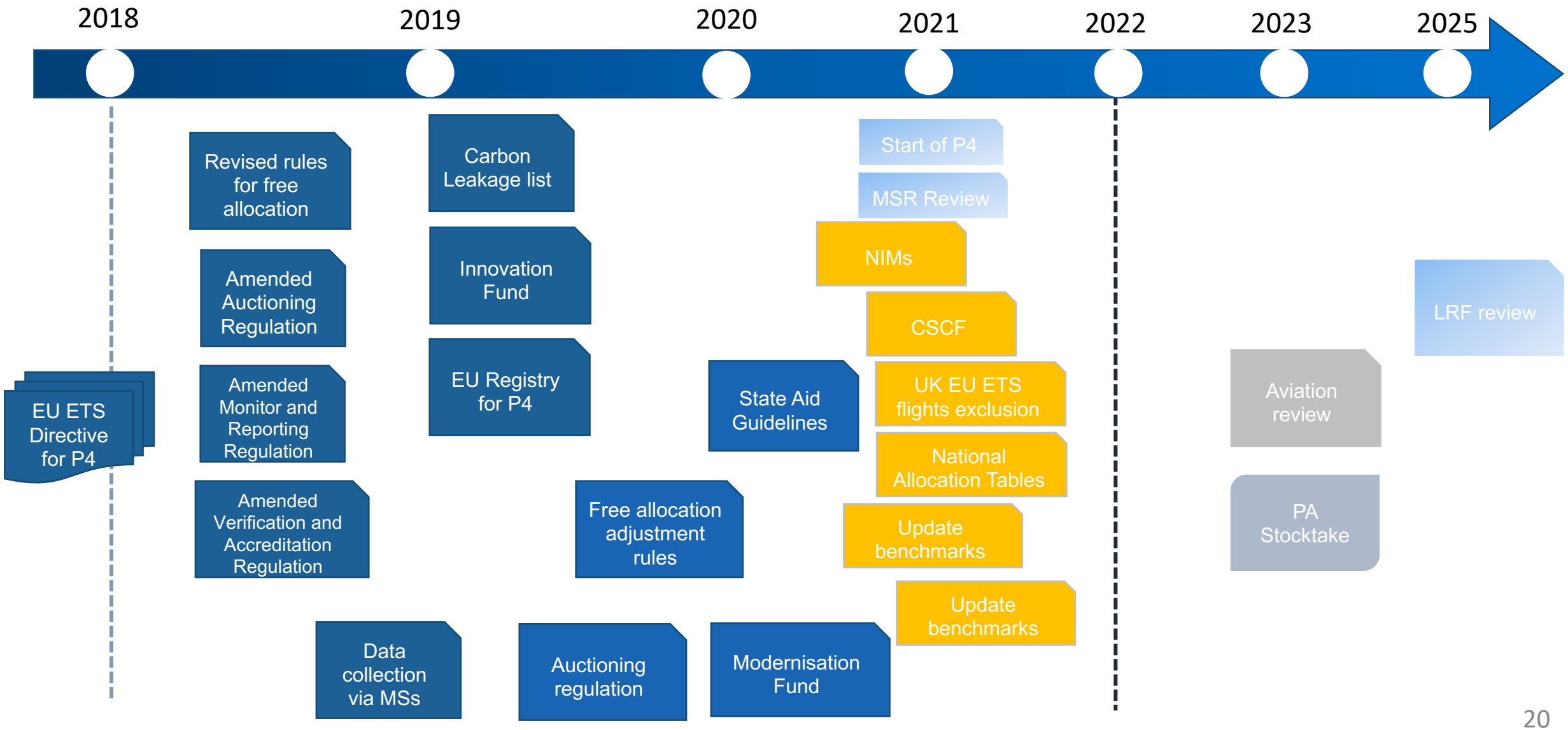

4.1.1 Secondary legislation for phase 4 of the EU ETS

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2021 Overview of developments

- Update of benchmark values for free allocation for 2021-25
- National Implementation Measures 2021-25
- Cross-Sectoral Correction Factor 2021-25
- National Allocation Tables 2021-25
- Exclusion of incoming flights from the UK from the EU ETS

4.1.2 Fit for 55

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On July 14 2021, as part of the Fit for 55 package, EC published its legislative proposal for the ETS revision and MSR review

- European Climate Law sets 2030 -55% target & Net-Zero by 2050.
- **Higher EU ETS ambition**: From -43% to -61% (vs 2005) by 2030.
- **Free allocation**:
  - Benchmark max update rate of benchmarks from 1.6% to 2.5%, starting in 2026.
  - CBAM sectors phased out by 2035, with a 10% annual reduction rate
- Lower emissions cap: From 2.2% to **4.2% LRF + 117M allowances rebase** in 2024.
- **MSR**: 24% IR until 2030. Cancellation over 400M allowances.
- **Funds:** +2.5% of cap for MF, +200M allowances for IF, CCfDs.
- Exemption for **CCU** which is permanently **chemically bound** in a product.

4.1.2 Fit for 55

Aviation

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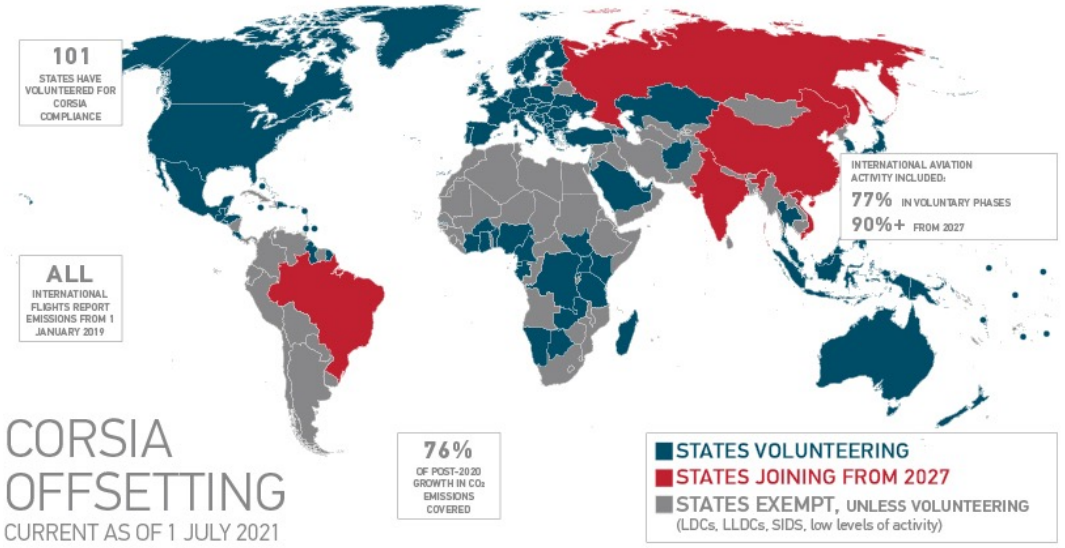
- Fit 4 55 package : proposed amendments to the EU ETS Directive as regards aviation's contribution to the EU emission reduction target.
  - Gradual Phase-out of the free allowances distributed to aircraft operators from 2024 to 2026 (25%, 50% and 75%) and complete Phase-out from 2027 onwards.
  - Same linear reduction factor as stationary installations (i.e., 4.2% instead of 2.2%) and rebasing of total number of allowances on active aircraft operators in 2023.
- Scope of the EU ETS would remain unchanged, i.e., it would cover flights within the intra-European Economic Area plus flights to the UK and Switzerland.
  - These flights would be exempted from the CORSIA, which voluntary Phase begun in 2021.

4.1.2 Fit for 55

Aviation

- CORSIA's voluntary phase has begun in 2021, with 100+ states participating, representing 77% of international aviation activity.
- The fit 4 55 Package proposes continued intra-European application of the EU ETS, while applying the international CORSIA system to extra-European flights.
  - Flights within EEA → EU ETS
  - Flights from EEA to UK/Switzerland → EU ETS
  - Flights outside EEA and between states that apply CORSIA → CORSIA
  - Flights between EEA and State that applies CORSIA outside the EEA → CORSIA



Source : aviation benefits

4.1.2 Fit for 55

Transport and buildings

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- **EU ETS 2 for road transport an buildings**
  - **Independent ETS**, to be gradually integrated into the existing system
  - **Starting in 2026**, with **5.15% LRF** in line with 61% emission reductions by 2030.
  - Separate **MSR,** operational as from 2027.
  - 25% of expected revenues to go towards a newly created **Social Climate Fund**.

- **Maritime Transport**
  - Under **current EU ETS**. + 79 million allowances
  - For large EU ships with above 5000 gross tonnage
  - As of **2026**, shipping companies must **surrender 100% of their applicable emissions**.
    - **20%** verified emissions as reported for **2023**, **45%** as from **2024**, **70%** as from **2025**.
  - Applicable emissions: **100%** CO2 emissions* from intra-EU, **50%** between EU and non-EU port, and **100%** at berth in EU port.

**ships covered by Regulation (EU) 2015/757 performing voyages with the purpose of transporting passengers or cargo for commercial purposes*

4. Regulatory developments

4.2 International carbon price developments

- Brexit implications for the EU ETS
- Linking with other emission trading systems
  - Swiss ETS
  - UK ETS
- Article 6 of the Paris Agreement

4.2.1 Brexit implications for the EU ETS

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- The split between EU and UK ETS has been operational since 1st January 2021. The UK ETS was modelled after the EU ETS, except its market stability mechanism.
  - UK ETS auctions began in May 2019 and are hosted by ICE Futures Europe. The 2022 auction calendar was published in November 2021.
  - Same approach to free allocation as the EU-ETS, parallel registry. The UK chose an auction reserve price set at 22£/tCO2e and a cost-containment mechanism instead of an MSR.

- Practical implications for the EU ETS mostly concern the aviation sector.
  - Aircraft operators participating in the EU ETS need to be administered by a participating state under the EU ETS. Migration scheduled soon after May 2021.

4.2.2 Linking with other emissions trading systems

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Swiss ETS

- Under the linking agreement, both systems remain independent, but emissions generated under either system can be covered by surrendering allowances issued in either system.
  - As of September 2020, the linking enables the physical transfer of emission allowances between the two systems
- Stationary installations covered under either system hardly used allowances of the other system for compliance. Aircraft operators used the linking flexibility to a larger extent, however

Breakdown of allowances used by EU and Swiss ETS installations for compliance in 2020, Ecoact elaborations on the Commission's Carbon Market Report, October 2021.

		Allowances used for compliance in 2020 (% of total)				
		EU ETS general allowances	EU ETS aviation allowances	Swiss general allowances	Swiss aviation allowances	CER
EU ETS	Stationary installations	99.99%		**0.01%**		
	Aviation operators	48.2%	49.4%	0%	**2.3%**	
Swiss ETS	Stationary installations	**0.2%**		97.6%		2.2%
	Aviation operators	0.1%	**40.5%**	0%	57.5%	1.9%

4.2.2 Linking with other emissions trading systems

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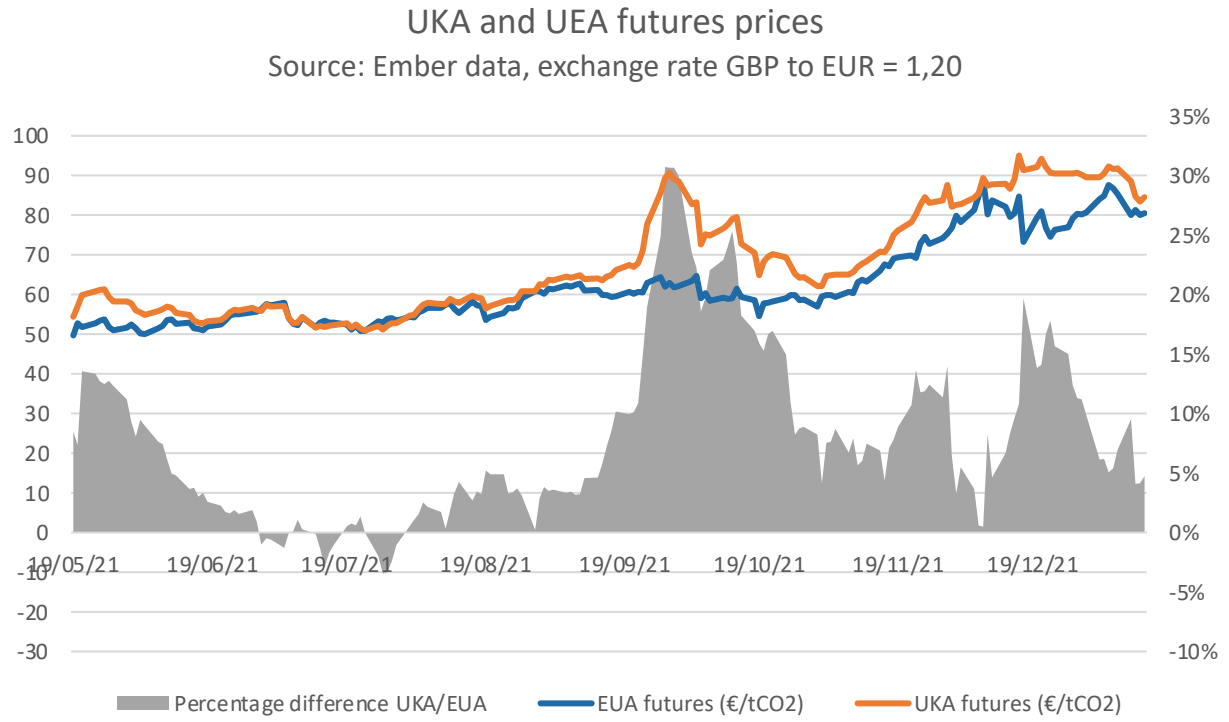
UK ETS

- Prices have been on average 8% higher on the UK ETS than the EU ETS since May 2021.
  - Possible explanations include UK's low gas storage capacity and utilities switching over from the EU to the UK allowance system. Regulated actors also point to a lack of liquidity of the UK market ESMA final report, March 2022.
- UK industry is concerned of a competitive disadvantage to the EU and calls for linking with the EU ETS.
  - Although post-Brexit trade deal agrees to give "serious consideration" to linking carbon markets, there is no sign of negotiations to date.



4.2.3 Article 6 of the Paris Agreement

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In November 2021, the Glasgow Climate Pact was agreed at COP26

- Emphasis on 1.5°C, scale up mitigation ambition and phase down coal
- Completion of the Paris Agreement work programme

Article 6 rule book

- Progressive view largely prevailed where it mattered
- Additional clarity on relationship between Art. 6 and voluntary markets.

→ Still a long way ahead before actual implementation and operationalisation

Why does it matter for EU ETS?

- EU opponent of market mechanisms under Kyoto Protocol, severed link between **ETS and international carbon markets** based on concerns regarding environmental credibility
- Since **EU succeeded in achieving its "asks"** in Article 6 negotiations, should re-establishing of the EU ETS link with international markets under Article 6 be considered?
- So far, the topic **still seems taboo** in the current EU ETS review.

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5. Market Sentiment Survey

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Survey Questions in 2021

Each question included an explanatory note

1. The EU ETS provides a first mover advantage for the EU business community.
2. The EU ETS can drive EU climate change policy post 2030.
3. Revolutionary changes are needed in the upcoming ETS review in order to make it 'fit for purpose'.
4. The Market Stability Reserve should:
    1. Have more frequent (qualitative) reviews of its functioning and parameters than it currently has.
    2. Have more dynamic parameters than it currently has.
5. The EU is able to provide carbon leakage protection and level the playing field without introducing an adjustment at the border.

5. Market Sentiment Survey

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Survey questions in 2022

1. The EU ETS provides a first mover advantage for the EU business community.
2. The EU ETS in its present form can drive EU decarbonisation post 2030.
3. Significant changes are needed in the upcoming ETS review in order to make it ‘fit for purpose’.
4. **The current proposal for ETS review by the Commission adequately addresses concerns raised by stakeholders.**
5. **Does the EU ETS, as proposed in the Fit for 55 Package, will drive technological innovation?**
6. **The present EU ETS governance allows to respond to market dynamics.**
7. **The combination of EU ETS and CBAM proposals for the EU will address competitiveness and carbon leakage concerns.**

**A rational to the questions is provided in the Market Sentiment Survey*

5. Market Sentiment Survey

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Explanatory Notes

Q1: The functioning of the EU ETS will lead to changes in behaviour, production, and investment towards a net zero economy, which will in the medium to long-term should provide a (competitive) first-mover advantage to the covered companies.

Q2: The EU ETS, in its present form, would be an appropriate instrument after 2030 to drive EU decarbonisation in the sectors covered by providing to the economy clear signals in terms of price.

Q3: Significant changes are understood to be those changes that would significantly alter the design of the EU ETS such as introducing new elements or changes going beyond altering existing parameters. E.g., elements like a higher LRF, update of the benchmarks, and changes to the MSR parameters would NOT be seen as 'architectural', while the introduction of a price mechanism (e.g., price ceiling, price floor), extension to other sectors, gradual phase out of free allowances as a consequence of CBAM or phasing out free allocation completely would be seen as significant.

Q4: Concerns raised by stakeholders under the on-going EU ETS revision include impact on low-income households, distributional concerns between Member States, carbon leakage risk, industrial competitiveness, use of revenues, energy efficiency, delayed decarbonisation in the industrial sector, deployment of innovative climate-neutral technologies, coverage, emission reduction, regulatory uncertainty and transparency, price volatility, the potential role of speculation etc.

**A rational to the questions is provided in the Market Sentiment Survey*

5. Market Sentiment Survey

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Explanatory Notes

Q5. A number of stakeholders have questioned the EU ETS's ability to send sufficiently credible medium to long term signals to drive innovation. More specifically price uncertainty is excessively high. Others have argued that the decreasing cap trajectories and the long-term targets are already stimulating innovation. The design proposed by the EC for the EU ETS has been strengthened to further drive innovation in lower carbon emitting technologies (e.g., hydrogen).

Q6. Instruments such as Article 29a of the EU ETS Directive can be seen as being disconnected from market functioning, in terms of timing as well as decision making processes with the ultimate goal of balancing timely and effective intervention with regulatory transparency and predictability. The governance of the EU ETS could be a hybrid between triggering points combined with effective decision-making processes.

Q7. The European Commission proposals to revise the EU ETS Directive and the CBAM refer to phasing out free allocation between 2026 and 2035 for CBAM sectors, with a review clause after three years from its entry into application.

**A rational to the questions is provided in the Market Sentiment Survey*

Market Sentiment Survey (1)

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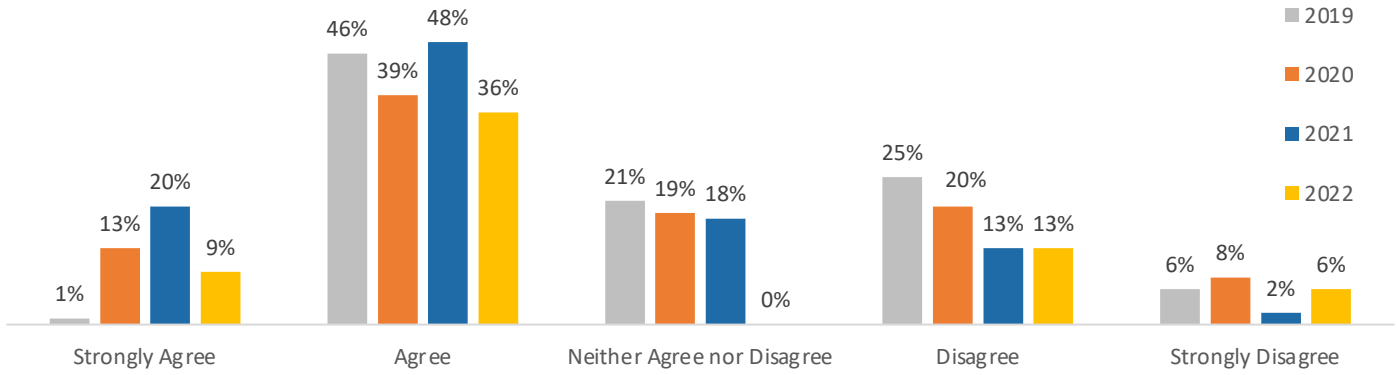
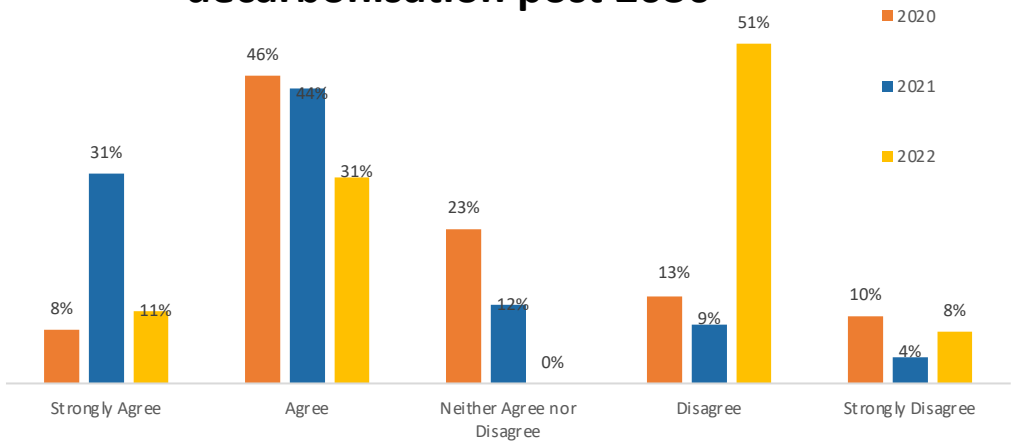
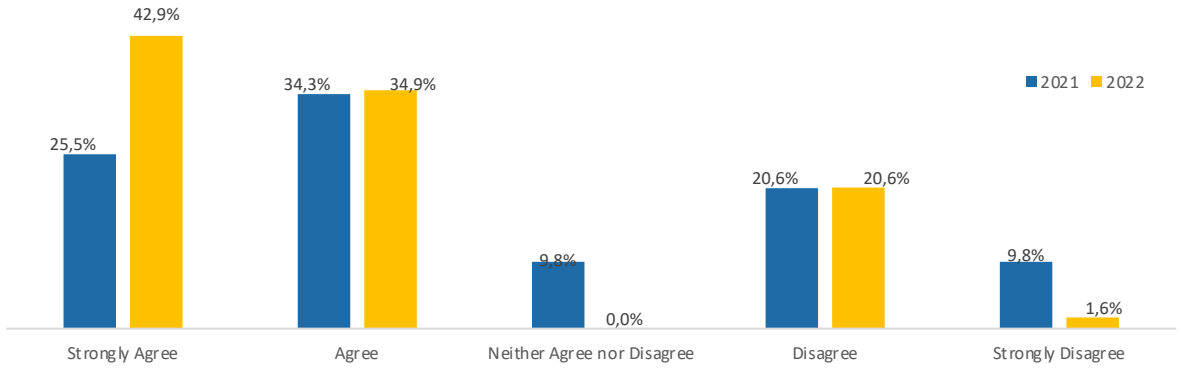
1. **The EU ETS will provide a first mover advantage for the EU business community**



2. **The EU ETS in its present form can drive EU decarbonisation post 2030**



3. **Significant changes are needed in the upcoming ETS review in order to make it 'fit for purpose'**



Market Sentiment Survey (2)

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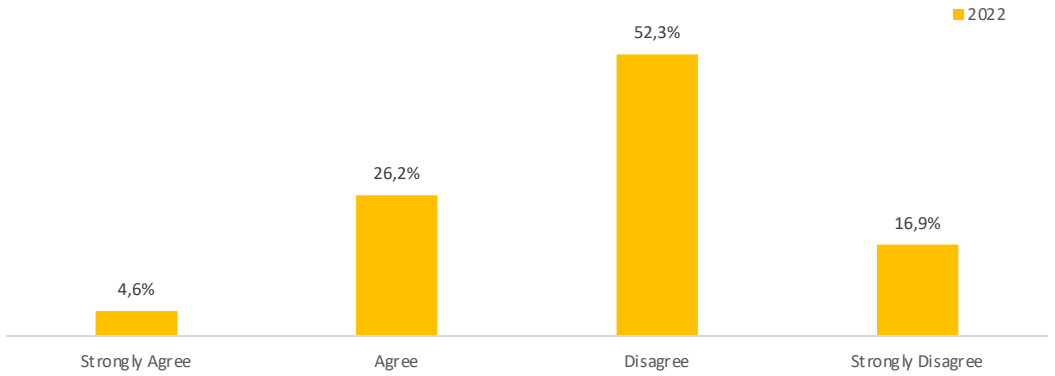
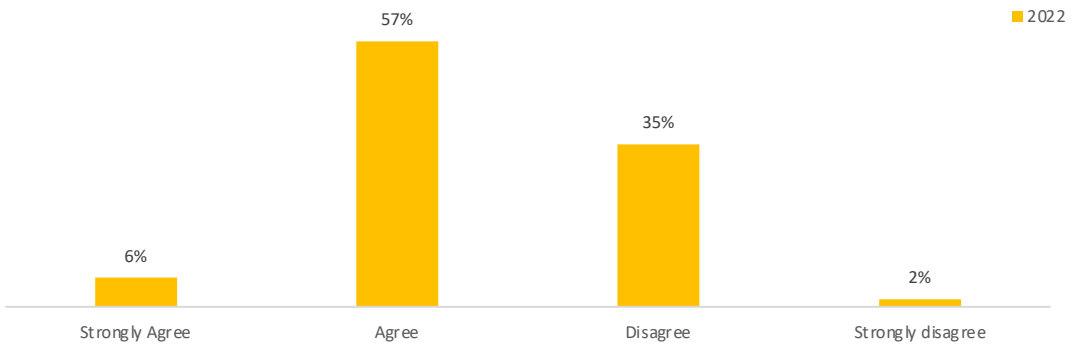
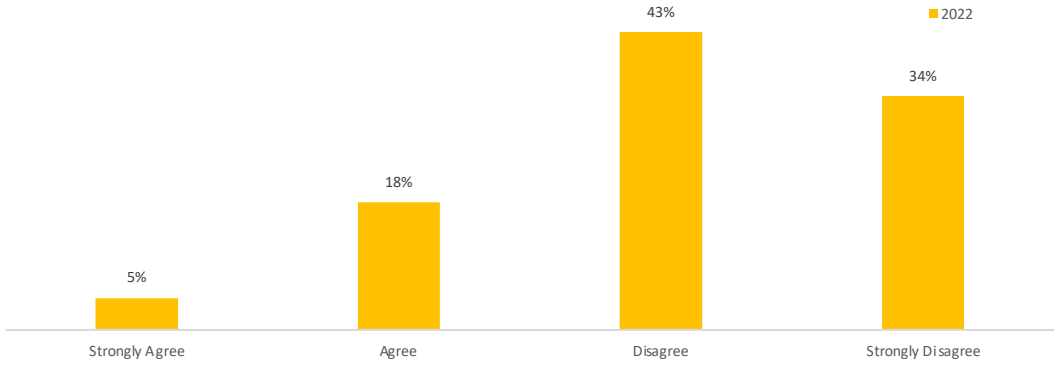
4. The current proposal for ETS review by the Commission adequately addresses concerns raised by stakeholders



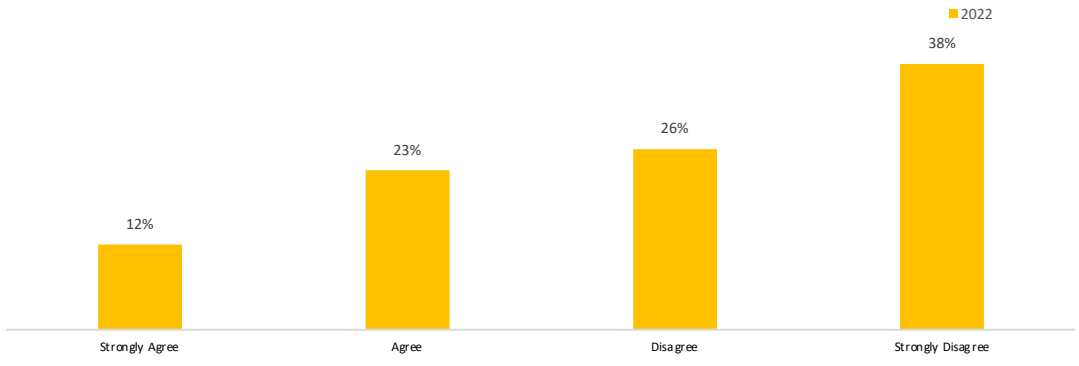
5. Does the EU ETS, as proposed in the Fit for 55 Package, will drive technological innovation?



6. The present EU ETS governance allows to respond to market dynamics



7. The combination of EU ETS and CBAM proposals for the EU will address competitiveness and carbon leakage concerns



2022 State of the EU ETS - outline

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Chapters

1. Background
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Switching from the phase 3 to the phase 4 targets
Upcoming stringency in phase 4

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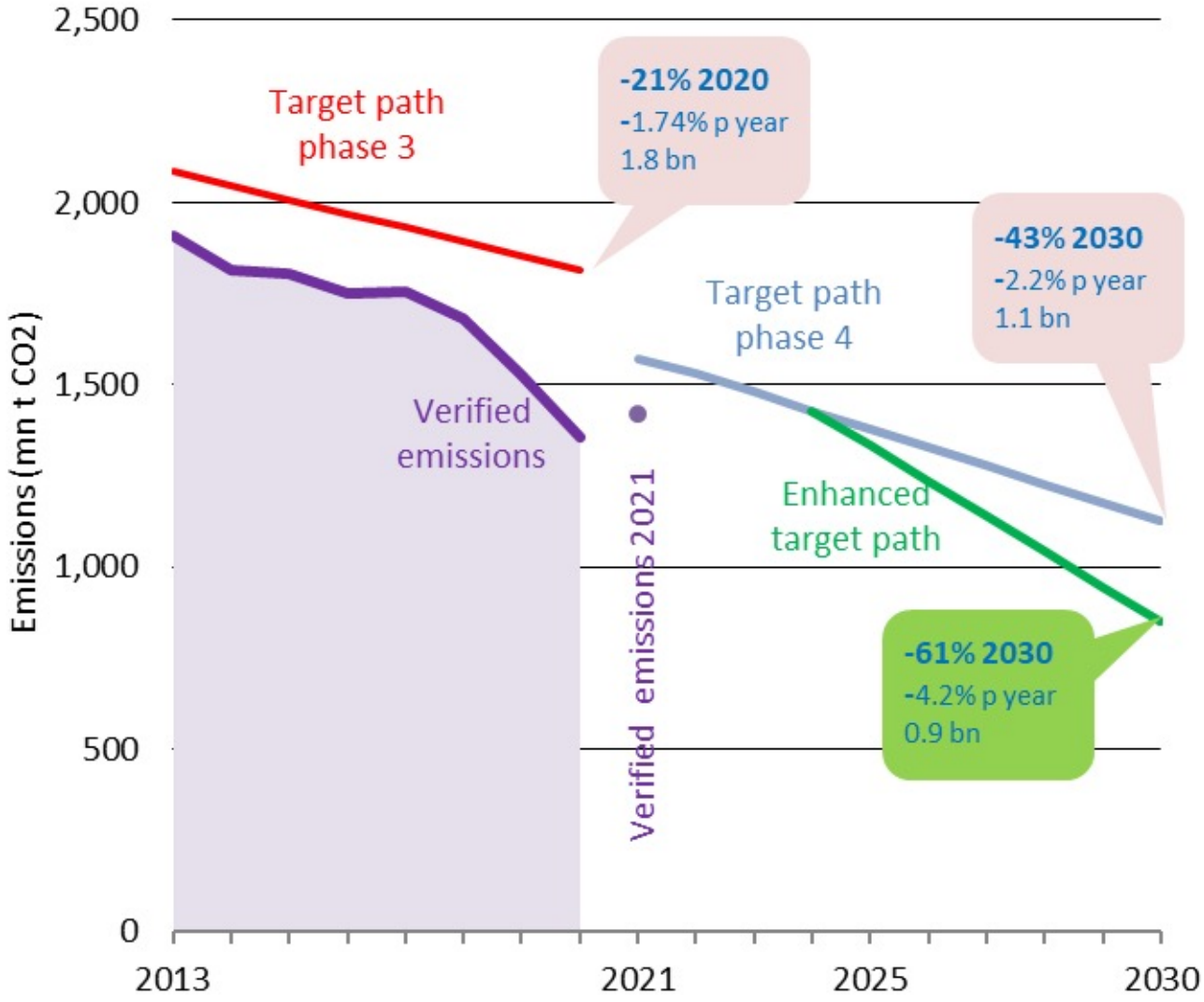
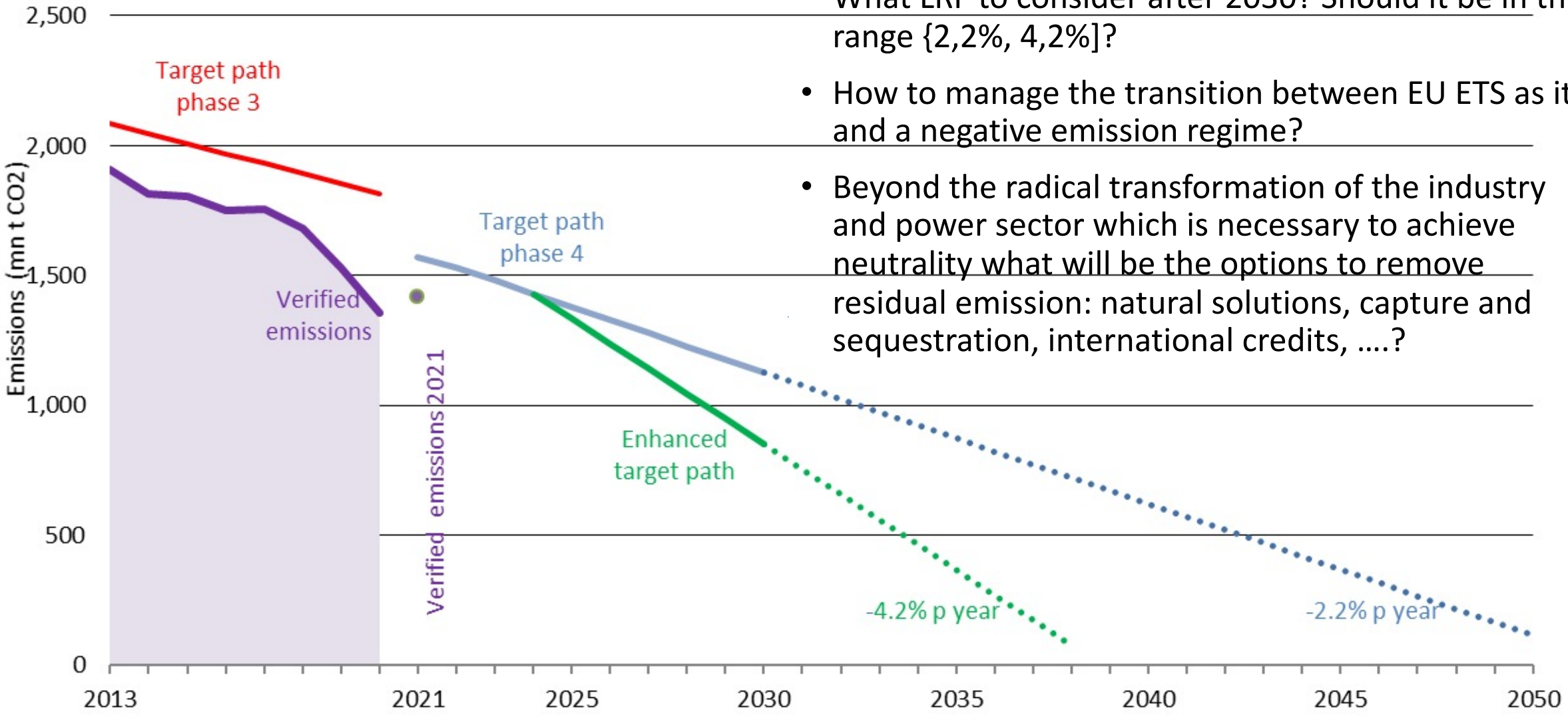
- Verified emissions were constantly below the target path in phase 3.
- In phase 4 the currently valid target path leads by 2030 to a reduction of 43 % over 2005.
- In the Fit for 55 package an enhanced target of 61 % is suggested with an accordingly adjusted path after 2024.



Source: EUTL, European Commission Carbon Market Reports, European Comr

Delivery against the long term targets (reduction and neutrality)

How to manage the transition with 0 and negative emission regime



- What LRF to consider after 2030? Should it be in the range {2,2%, 4,2%]?
- How to manage the transition between EU ETS as it is and a negative emission regime?
- Beyond the radical transformation of the industry and power sector which is necessary to achieve neutrality what will be the options to remove residual emission: natural solutions, capture and sequestration, international credits, ….?

Source: EUTL, European Commission Carbon Market Reports, European Commission proposal for reform of EU ETS in phase 4.

Delivery against the targets in phase 4
Increasing need for abatement in industry

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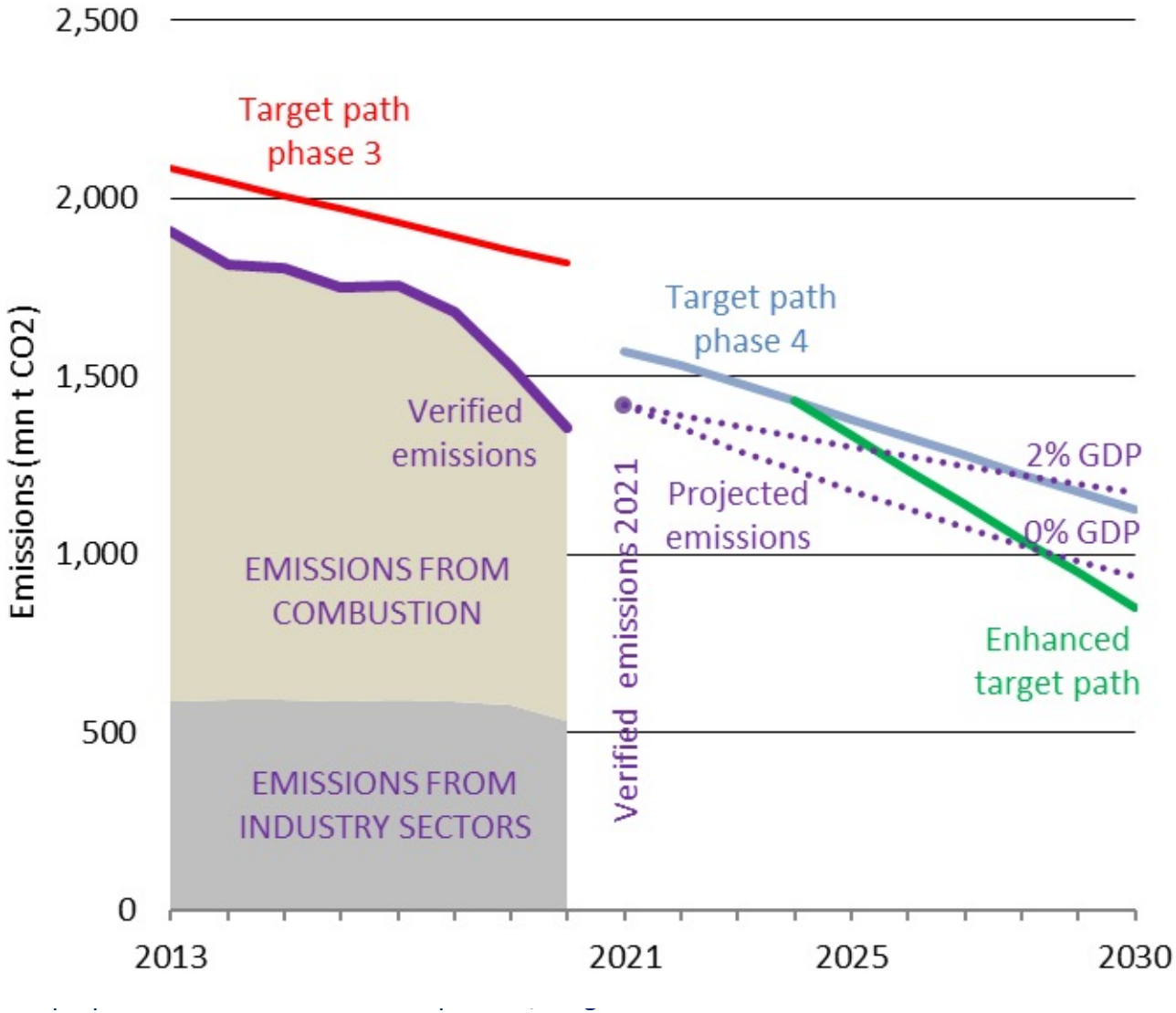
- Projected emissions based on a corridor of GDP growth between 0 and 2 % p year might soon hit the target paths in phase 4.
- By partitioning verified emissions between combustion and industry we realize that so far, the emission reductions in EU ETS result almost only from the combustion sector.



Source: EUTL, European Commission Carbon Market Reports, European Comm

Delivery against the targets in phase 4
Increasing scarcity of free allocations

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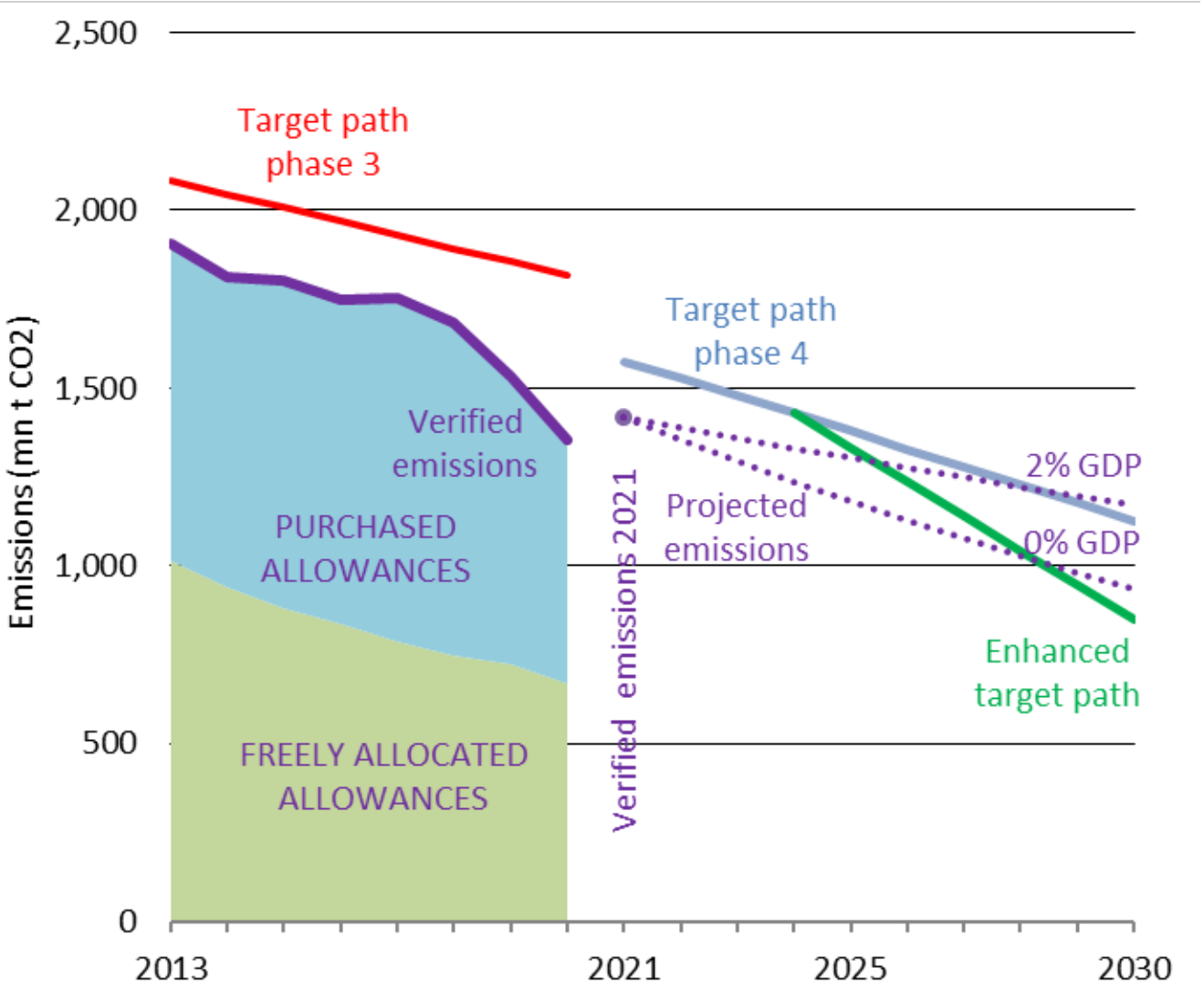
- By partitioning the volume of verified emissions between those that were covered by free allocations and those that result from auctioning, we realize the increasing scarcity of free allocations which will affect particularly industry.



Source: EUTL, European Commission Carbon Market Reports, Europea

Market stringency
Supply versus demand of allowances

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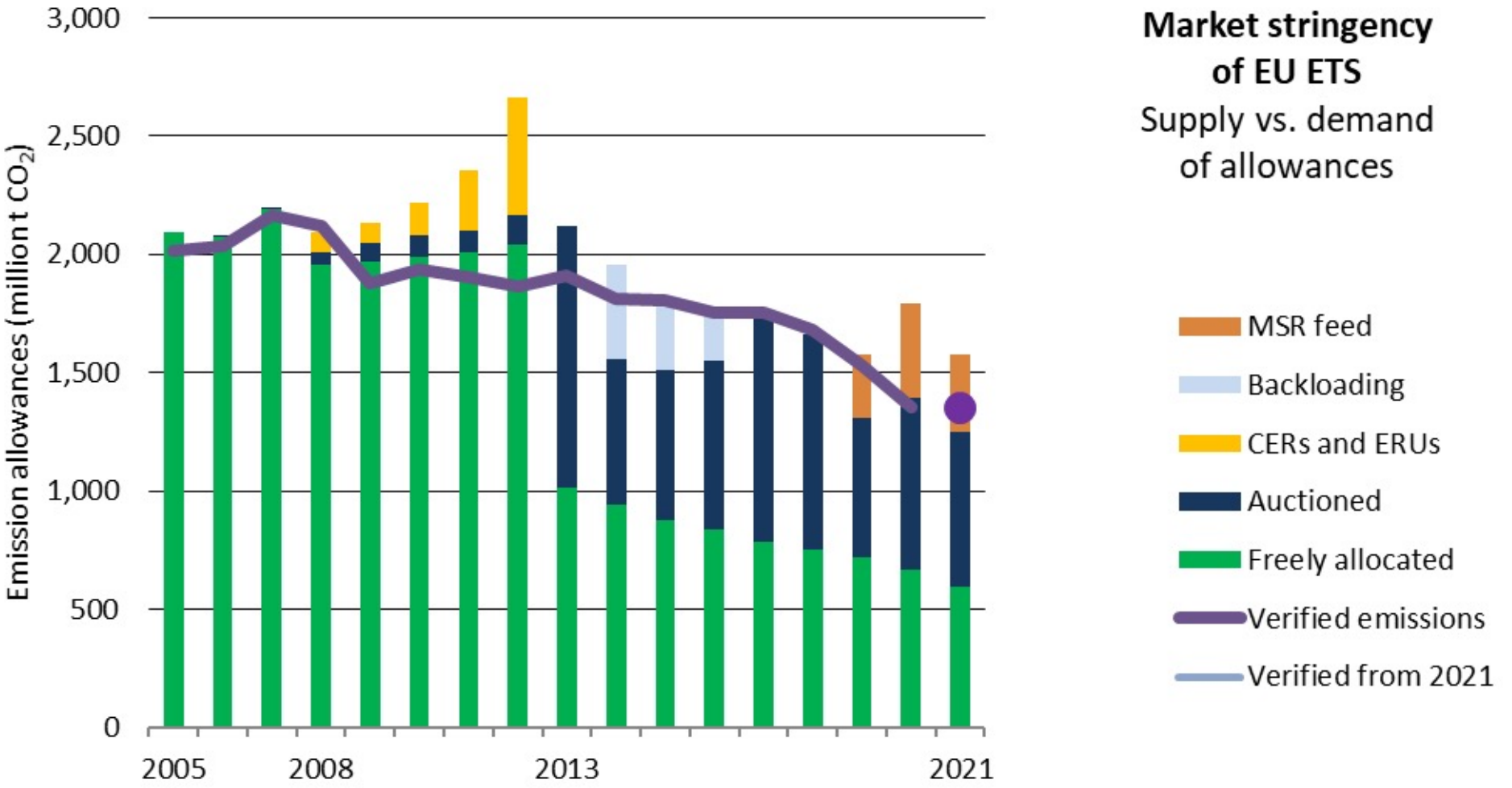
- Actions in phase 3 for responding to the gap between supply and demand of allowances comprise two procedures: the Backloading of 900 mt and the start of the Market Stability Reserve.



Source: EUTL, European Commission Carbon Market Reports

Market stringency
Cumulated surplus of allowances

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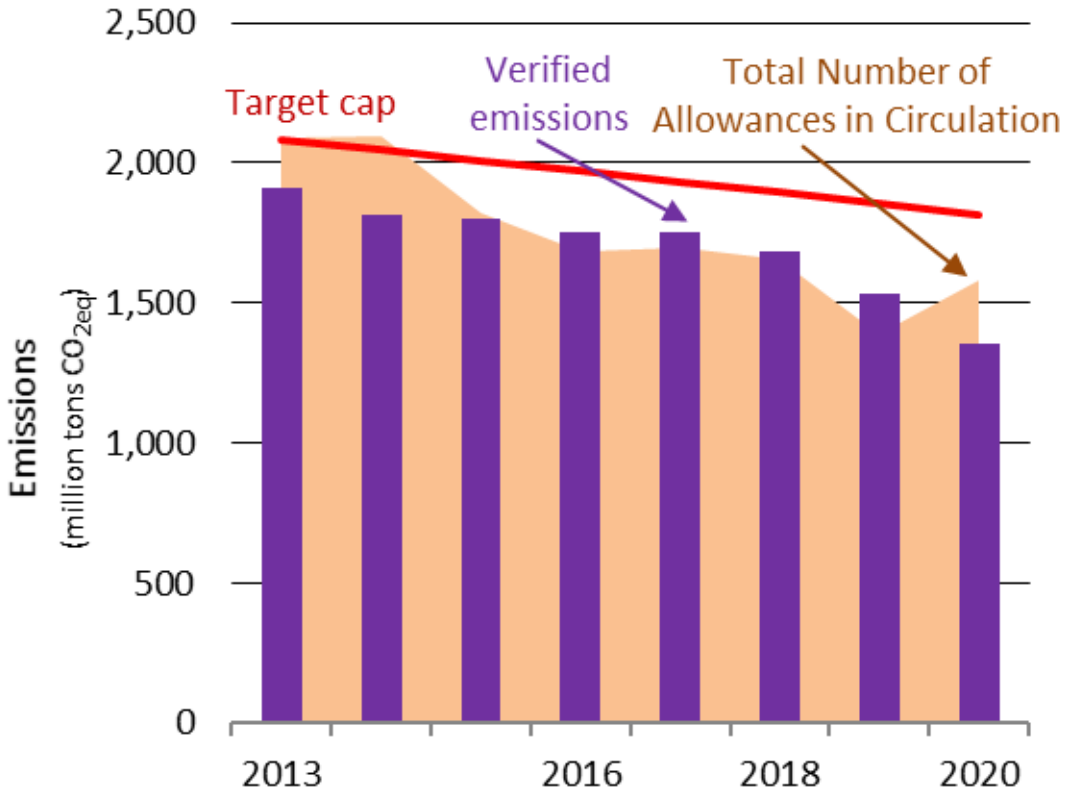
- Despite the instruments of Backloading and Market Stability Reserve, there remains still a huge surplus of allowances in the system.



Source: EUTL, European Commission Carbon Market Reports, European Commission TNAC documents

Structural shifts
Combustion and industry exhibit different dynamics

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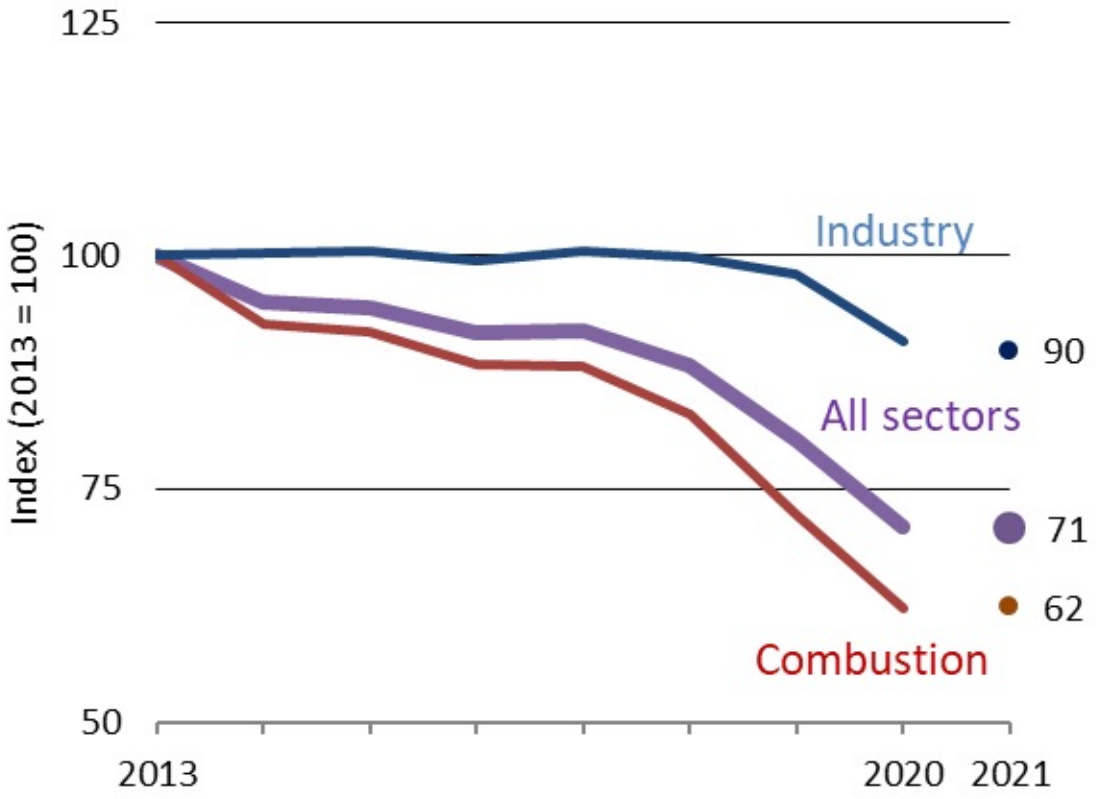
- The dynamic of the emissions in phase 3 show two remarkable features.
- Emissions started to decline rapidly after 2017 because of the expansion of renewables and natural gas in the combustion sector.
- The Covid-19 dip in 2020 was almost fully compensated already in 2021.



Source: EUTL

6. Environmental Delivery

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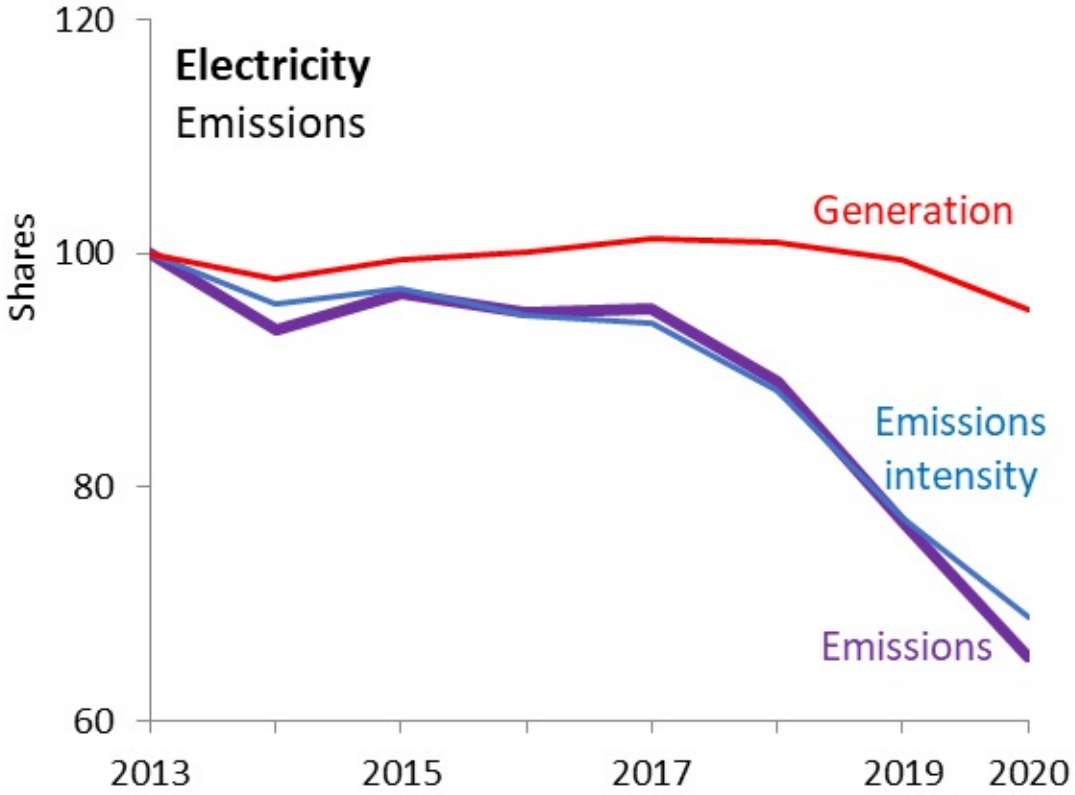
Electricity

The rapid decline of emissions

- CO_2 emissions from electricity generation declined by about one third in phase 3
- The volume of electricity generation was roughly stable, but emissions intensities declines sharply after 2012

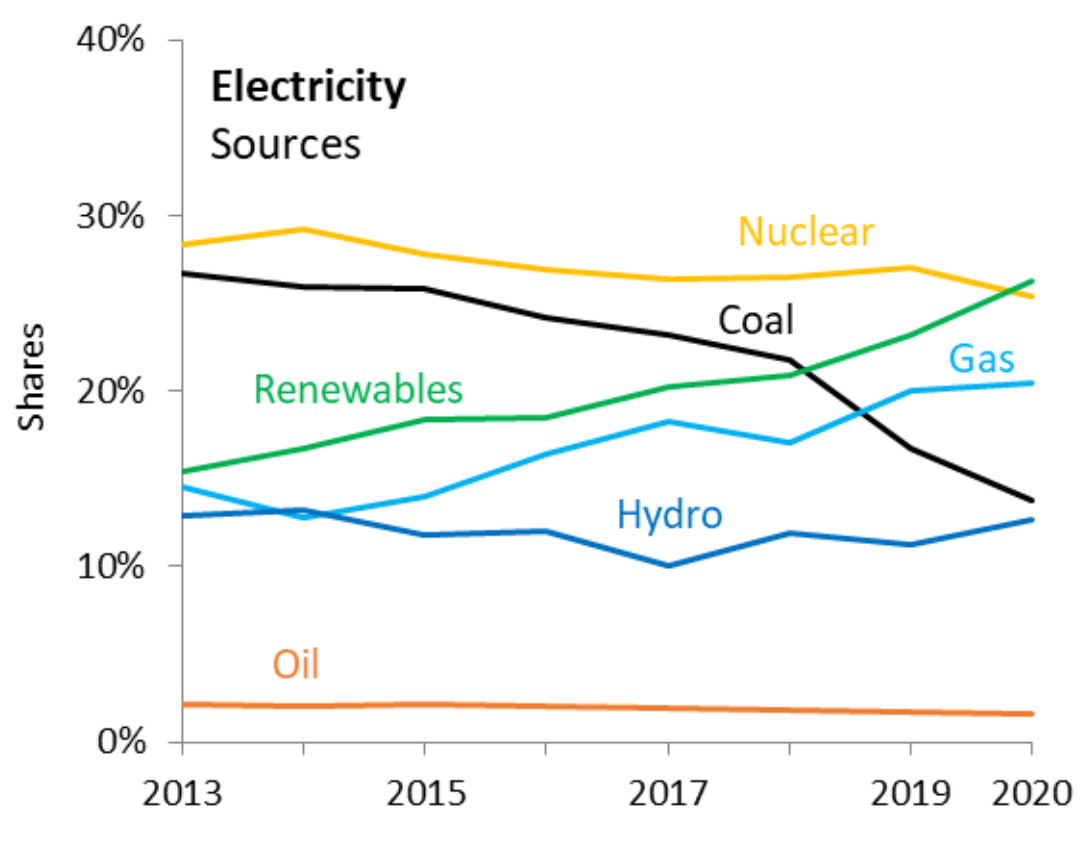


6. Environmental Delivery

Electricity

The sharp shift of sources for generation

- Renewables (without hydro) have now the highest share in electricity generation.
- Coal is declining fast.
- Gas is expanding substantially.
- Nuclear is on a declining and hydro on an expanding path.
- These shifts mainly reflect the impact of policies not directly related to EU ETS.



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6. Environmental Delivery

Electricity

The recent decline of coal and nuclear

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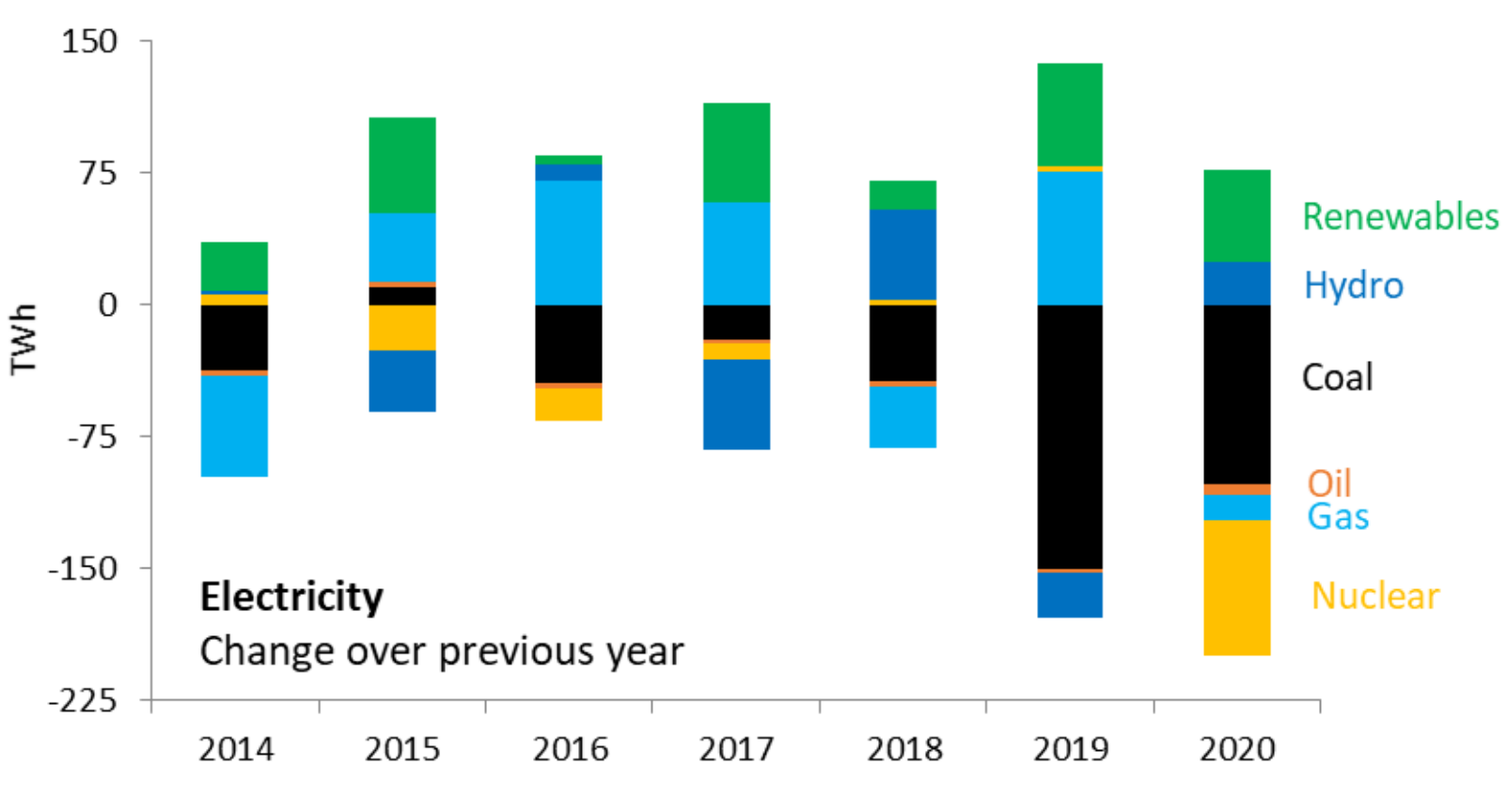
- The shifts in the mix of resources for electricity generation accelerated since 2019.
- The decline of coal and nuclear is basically substituted by renewables and gas.



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7. Socio-economic delivery

7.1. Is the EU-ETS a driver for change?

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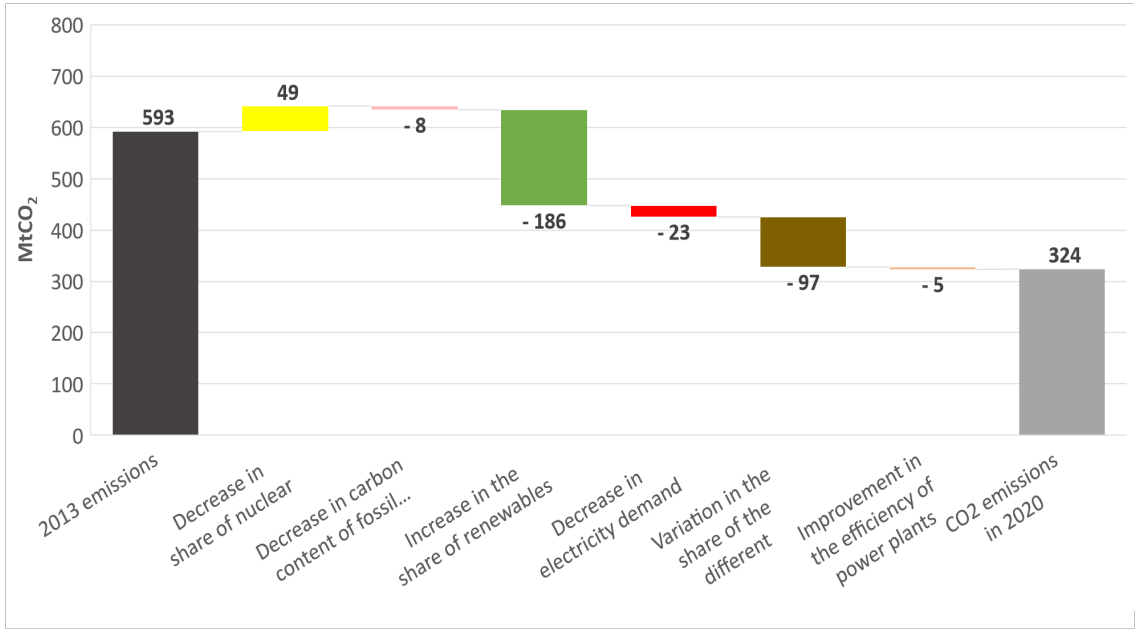
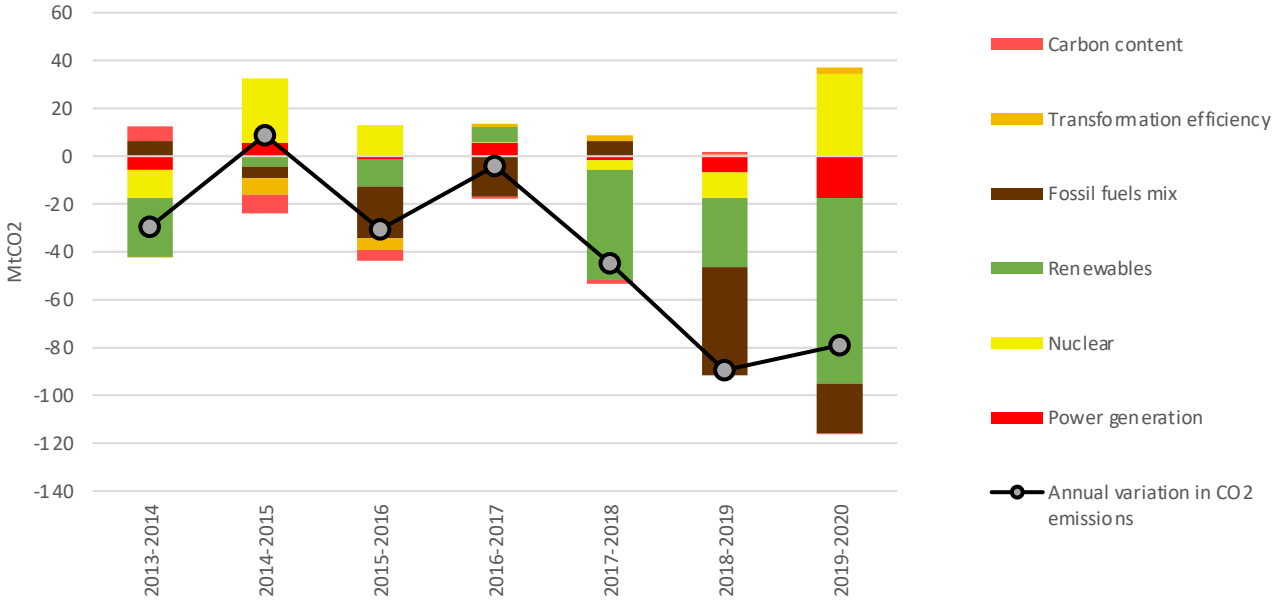
- Decomposition (LMDI) analysis of drivers of GHG emissions in the power sector shows that the penetration of renewable, decrease in the share of nuclear production and the switch to a less carbon intensive energy mix are the main contributors to reducing GHG emissions over 2013-2020.
  - The LMDI methodology does not give the causal effect of the EU ETS on these variables, but rather evaluates the contribution of each factor.

Drivers of GHG emissions variations in the power sector in the EU (2013-2020). Ecoact elaborations on I4CE methodology. Data: Eurostat





7. Socio-economic delivery

7.1. Is the EU-ETS a driver for change?

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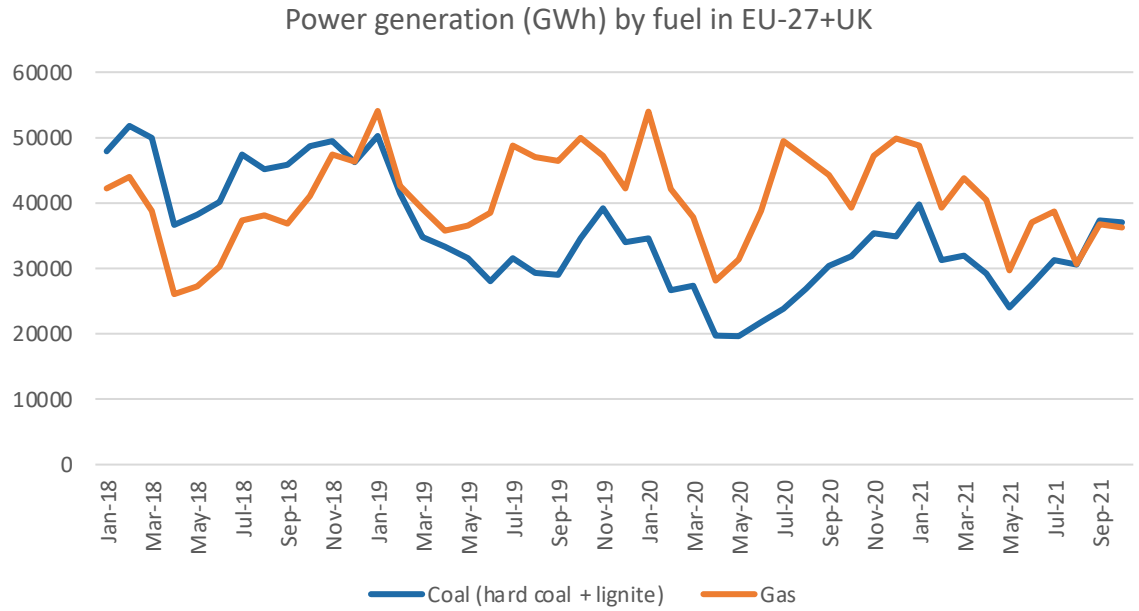
Focus on the power sector

- In 2021, EU's coal powered generation exceeds that of gas for the first time since December 2018.
  - Lower Russian flows heightened competition for LNG supplies to fill storage as winter approaches.
  - Coal expected to remain more cost effective in 2022 winter according to analysts, maintaining pressure on EUA prices.

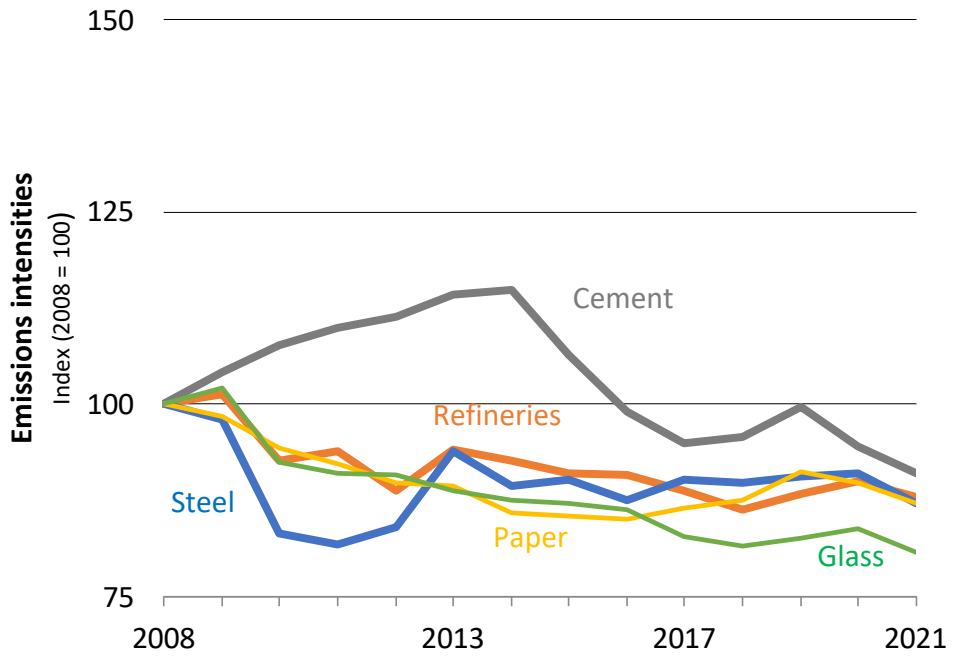


Source: Ember dataset

7. Socio-economic delivery

7.3. Industrial decarbonization

Figure: Emissions intensities in selected industry sectors.



The sharp decline of emissions in steel production reflects the impact of investments into electric furnaces. Cement clinker decreased its emissions intensities by almost 20%.

Source: Wegener Center based on EUROSTAT STS and PRODCOM data.

Economic impacts of the EU ETS
Do costs trigger structural changes?

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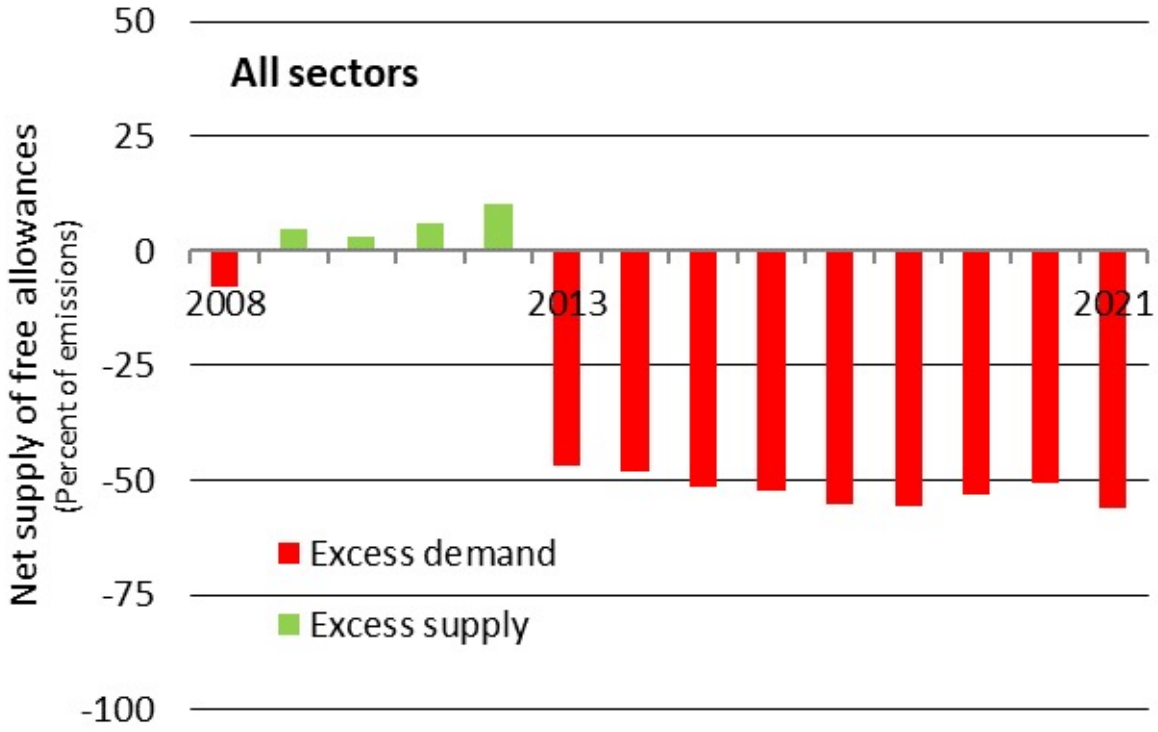
- Because of the rising EUA price of allowances and the decline of freely allocated allowances, installations are facing increasing costs from the EU ETS.
- The direct economic impacts result from the net supply of free allowances, i.e. the difference between the supply of free allowances and the demand by emissions.
- Starting with phase 3, for the whole EU ETS the shift from free allocations to auctioning required installations to purchase allowances for about half of their emissions.
- If these costs are drivers for structural change is difficult to identify because of the many other influences on company strategies.



Source: Based on EUTL

Economic impacts of freely allocated allowances
Combustion versus industry

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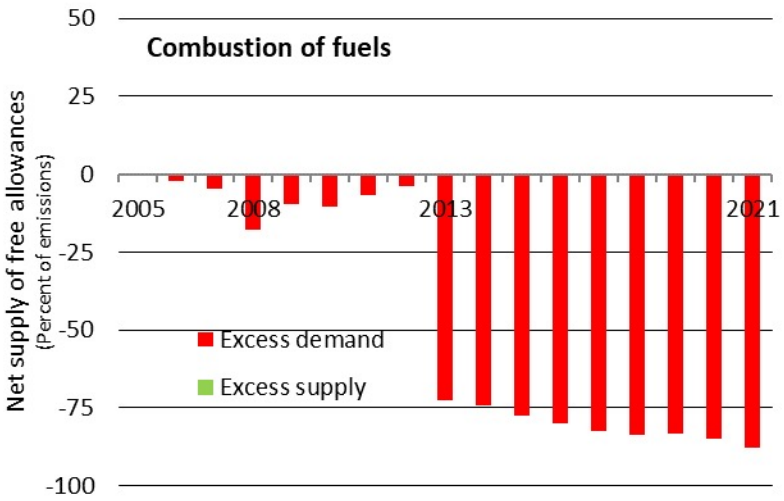
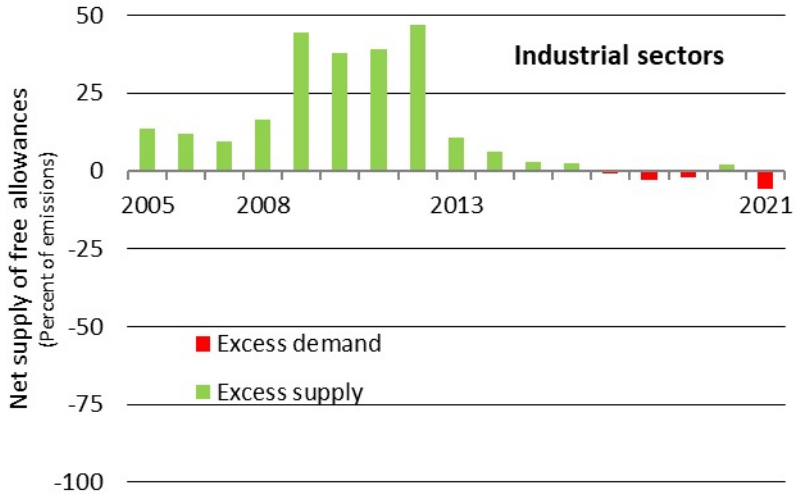
- While the combustion sector obtained free allowances for only about one fifth of its emissions, the industrial sector could still cover almost all of its emissions by free allocations.
- In view of the suggested CBAM, this raises discussions of how to protect industry against carbon leakage and what role carbon costs should be given for triggering innovations in the industrial sector.





Source: Based on EUTL

Economic impacts of the EUA price
Risks related to price volatility and expectations

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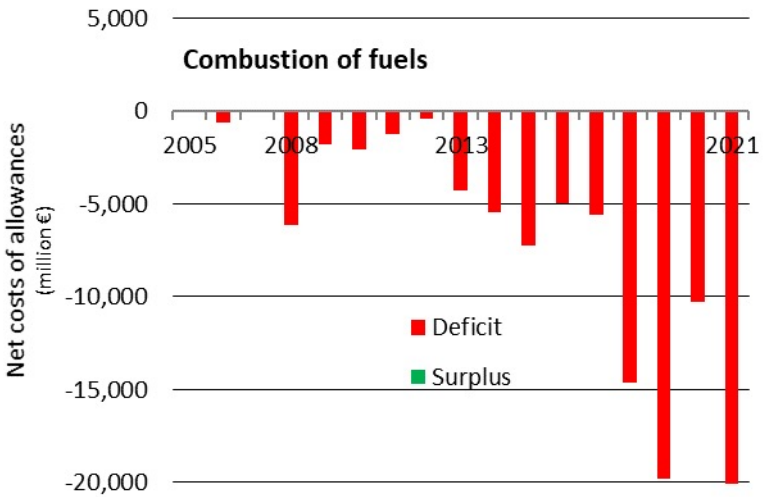
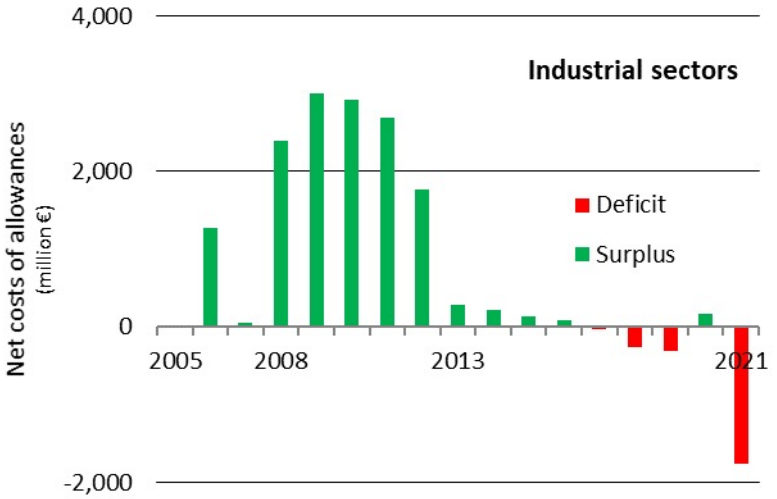
- EUA prices exhibit a high volatility in the past and a sharp increase up to almost 100 €/t in 2022. This adds risks to the economic impact of the EU ETS.
- Despite of the smooth decline of emissions in the combustion sector and the fairly constant share of allowances this sector needs to purchase, the related costs fluctuate considerably and reached 2019 and 2021 about €20 bn.





Source: Based on EUTL and Trading Economics

Cumulated surpluses of allowances in key industries
Refining

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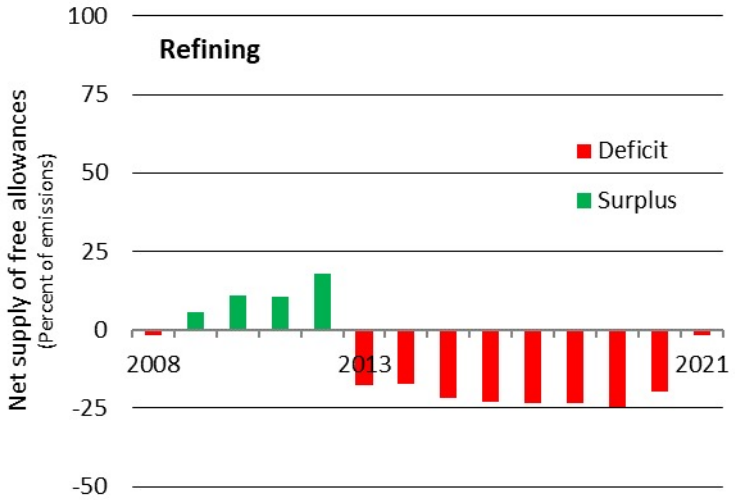
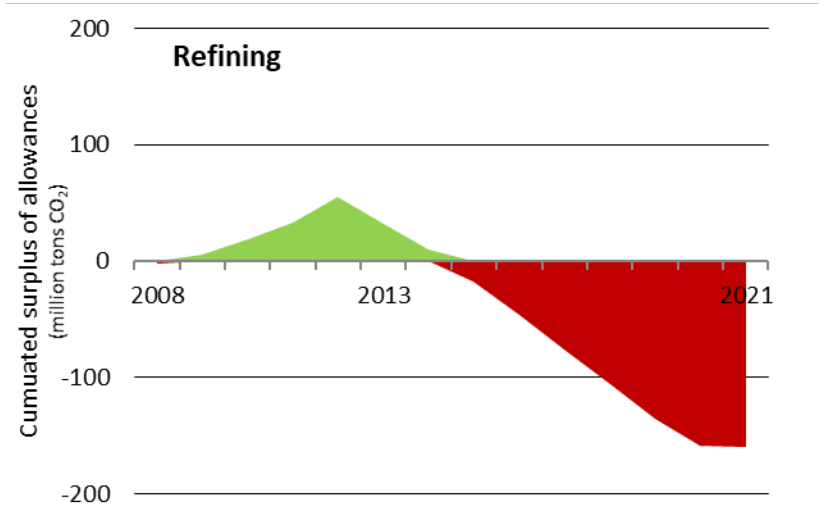
- In refining, the cumulated surpluses in phase 2 quickly melted away afterwards because of consistently negative supply of free allowances.





Source: Based on EUTL

Cumulated surpluses of allowances in key industries
Steel

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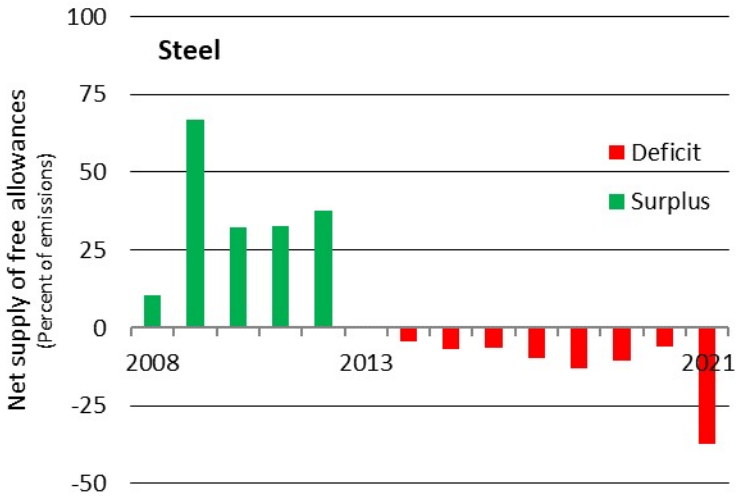
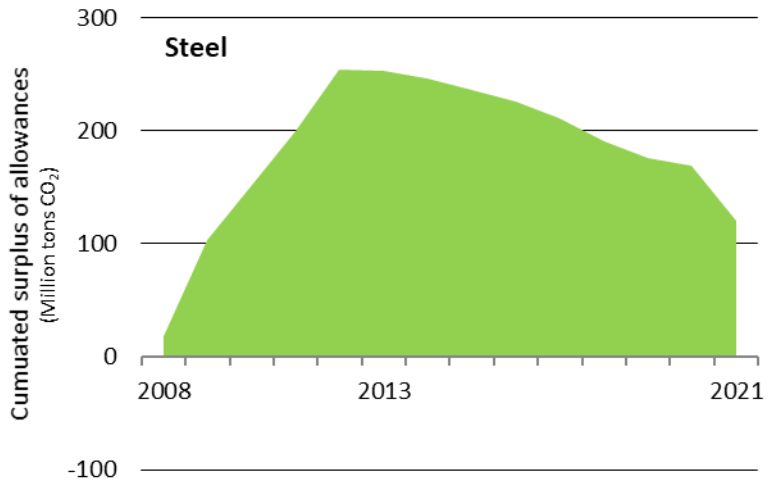
- The steel sector could accumulate considerable surpluses of allowances in phase 2 that are gradually reduced in phase 3.





Source: Based on EUTL

Cumulated surpluses of allowances in key industries

Cement

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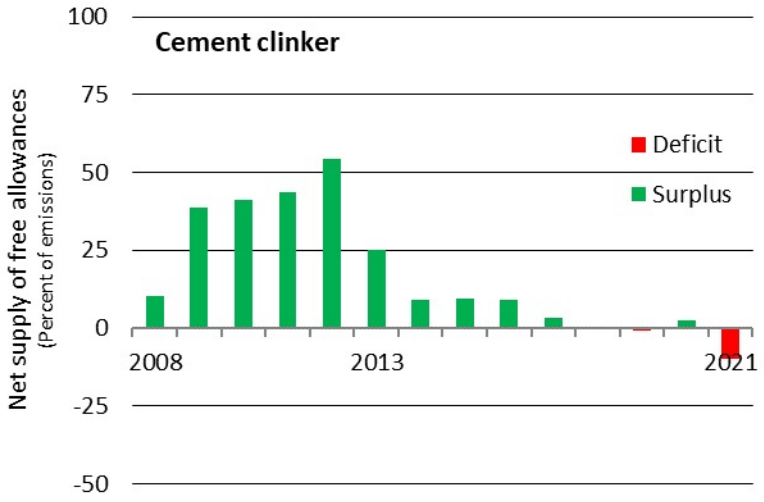
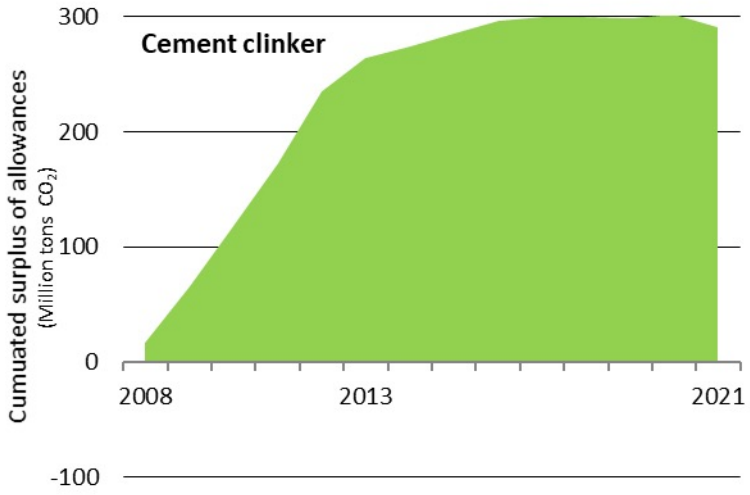
- Cement clinker exhibits surpluses of free allowances up to half of the sector emissions. These surpluses are being reduced in phase 3.





Source: Based on EUTL

7. Socio-economic delivery

7.2. Social impacts

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In 2021, the **EU energy crisis** resulted in **record electricity prices**:

- Observers have been quick to **blame the ETS** and high carbon prices for the spike in electricity prices.
- While largely the product of a combination of demand and supply factors, studies have shown that the **ETS did contribute to price spike**:
  - Commission estimates indicate that ETS prices are responsible for **about 1/5 of current price** developments
  - Estimates by the **Spanish Central Bank attribute 20**% of 2021 price developments to ETS prices (Banco de España, 2021)
  - The price increase of emitting a tonne of carbon (in the EU-ETS) equates to **10% of the increase in gas generation costs** in 2021 (Ember, 2022)

7. Socio-economic delivery

7.2. Social impacts

The EU ETS aims to address social impacts of the carbon price through:

- Mitigating carbon leakage risk.
- Modernisation Fund, systemic effect on national jurisdictions and distributional effect on households, workers, and energy systems.
- Just Transition Mechanism (not an EU ETS instrument, but impact on affected regions).

Energy prices have a social impact, but the **EU ETS** has **not** been the **main driver** of the increased energy price.

In the 2022 report, we want to look at the **two first calls of the Modernisation Fund** to explore the extent to which it is used to mitigate the social impact of the green transition.

7. Socio-economic delivery

7.2. Social impacts

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Modernisation Fund

- Supporting decarbonisation in Central and Eastern Member States.
- **2%** of the **total allowances 2021–2030** i.e. estimated at **310 million allowances.**
- Operational in January 2021.
  - In the first biannual disbursement cycle, **6 multiannual schemes** were confirmed in **Hungary, Poland and Czechia** for a total volume of **EUR 304 million**.
  - The schemes include investments in **renewable energy**, **energy efficiency**, **smart grids**, and **developing power grids** and **energy communities**.

*244 M allowances if AMB2c: 4,22% LRF from 2024 with 119 million rebase.
Source: COM(2021) 551 final. Pp 563.

Source: DG CLIMA website, COM(2021) 962 final

7. Socio-economic delivery

7.2. Social impacts

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- **Just Transition challenges** measuring social impact:

1. **Transport poverty**
2. **Access to infrastructure**
3. Regional **income inequality**
4. **Level** of EU/National/Regional **Technical Assistance (TA) strategies**
5. Technical **innovation** and **funding** in hard-to-abate sectors
6. **Employment** (notably re-skilling) strategies
7. **Investments**

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7. Socio-economic delivery

7.4. Innovation

Funding from the EU Innovation Fund
Results of the first call for large-scale projects

- A major step for incentivizing and enabling these transitions was the start of the Innovation Fund with 450 million allowances

- Which corresponds to a monetized value beyond EUR 30 billion, at current EUA prices.

The projects funded with EUR 1 billion under the first call for large-scale projects :

- provide orientation for driving innovation, such as steel from renewable hydrogen, and capturing, storing, and reusing CO2.
- These projects demonstrate value chains with (CCUS) are essential for transforming the hard-to-abate (HTA) industries.
- These projects would not become viable just from a higher EUA price because of the technological and financial risks involved.

7. Socio-economic delivery

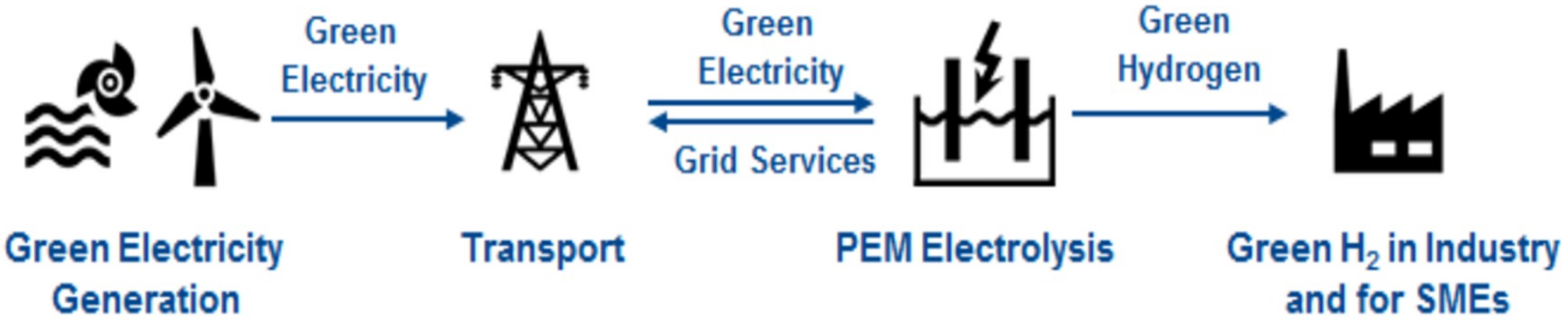
7.4. Innovation

Emerging policy strategies for targeted innovations

New instruments needed for the HTA industries

- **Switching the wording from decarbonization to carbon management**
  Carbon recycling may become feasible for HTA industries
- **Encouraging integrated solutions along the whole value chain of a product**
  Steel and cement could be reduced in buildings up to 70 percent without compromising mechanical and thermal functionalities
- **Integrated instead of fragmented policy strategies**
  A hydrogen strategy, e.g., needs a vision of where hydrogen is essential and from where it could be supplied
- **New and big amounts of financing is needed for the radical transitions of the HTA industries**
  Instruments as the EU Innovation Fund might become important drivers of targeted innovations

Technology Roadmap 1: Linear integration
E.g., hydrogen from green electricity for low carbon steelmaking



- Hydrogen can be used for substituting fossils in almost all HTA industries.
- The amount of hydrogen needed is huge.
- Voestalpine, an Austrian steel company, is the biggest emitter in the industry sector of EU ETS and would need about half of total electricity generated in Austria.

Technology Roadmap 2: Circular integration
e.g., carbon captured from cement is used for polymers

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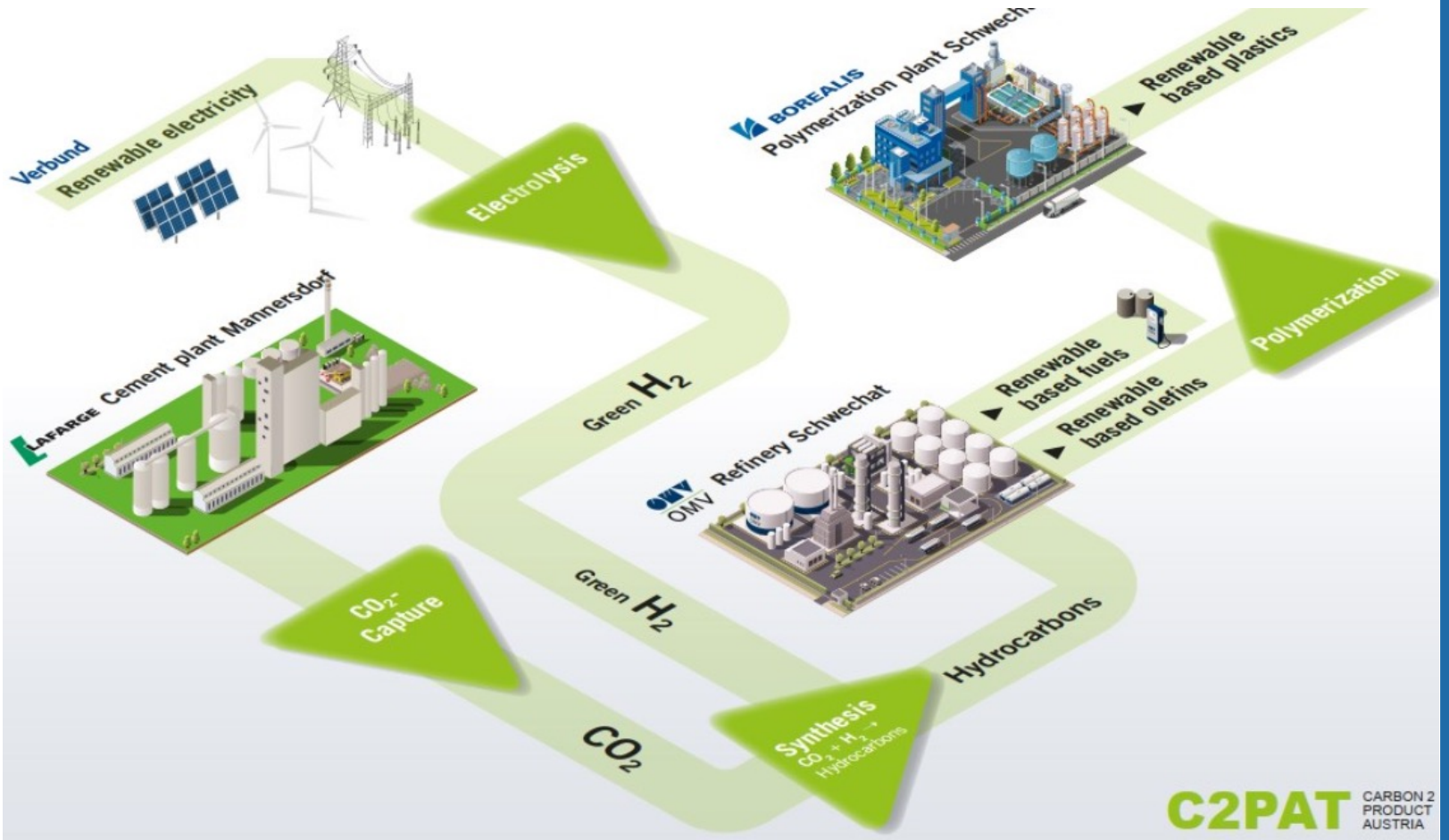
- Even more ambitious are experiments with recycling carbon in circular production / consumption processes.
- A cement plant, e.g., could become both the source for recycled carbon and the location for recycling carbon from waste.
- This vision is being developed in the C2PAT project of leading Austrian HTA industries.



Technology Roadmap 3: Focusing on the value chain

High upfront costs for industry but low cost for consumers

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	Cost to Producer	Cost to Consumer
Steel	+30% per ton of steel	+1% for new car
Cement	+100% per ton of cement	+3% on cost for new building

Source: Energy Gransion Commission (2018). Mission Possible: Reaching net-zero carbon emissions from harder-to-abate sectors. energy-transitions.org.

- The upfront costs to producers for switching to new processes, clean fuels, and carbon capture are expected to be very high, but the cost to consumers are rather minimal.
- This requires market designs that integrate the full value chain of products, in a next step even over the life-cycle of products..

Sector roadmaps: The example of steel
Clean Steel Partnership

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- **Circular Economy (CE)**
  The overarching strategy by ncreasing the recycling of steel scrap and residues, thus improving smart resources use.
- **Carbon Direct Avoidance (CDA)**
  Steel production through carbon direct avoidance
- **Smart Carbon Usage (SCU)**
  Smart carbon usage technologies through carbon capture, utilisatio and storage (CCUS) and process integration (PI)

Cross-cutting transition options
Guiding R&D&I

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- **Electrification**
  For thermal processes, heat pumps, electrochemical processes
- **Hydrogen**
  For high temperature compbustion but also as a derived energy carrier and storage medium for fossil-free electricity.
- **Carbon Capture**
  As a first step for storing and recycling carbon in products that ultimately leads to full circular carbon economy.

Incentives for the transition to low-carbon industries
Enablers for radical innovations

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- **Updated Industrial Strategy**
  This 2021 update of the Industrial Strategy emphasizes support for Industrial Alliances as a tool to accelerate coordination for research, innovation and development of new industrial technologies.
- **EU Taxonomy and sustainable finance**
  R&D and technologies for the reduction of carbon emissions in the production of cement, aluminum, iron and steel and organic basic chemicals are listed for redirecting financial funds.
- **Important projects in the common European interest (IPCEI)**
  This funding instrument is designed for supporting first industrial deployment for the successful implementation of an R&D&I activity.

7. Socio-economic delivery

7.4. Innovation

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- Empirical studies find that the EU ETS has caused plants to increase investment in pollution abatement technologies, all the more "integrated" ones rather than end-of-pipe, causing a decrease in the carbon intensity of production in the first two phases.
  - A. Goerger (2021) finds that from 2013 to 2016 in the French manufacturing sector, investment in low-carbon technologies has accelerated by compared to Phase 2. The EU ETS caused regulated firms to invest, on average, 38% more than comparable unregulated firms.
  - Calel (2020) finds evidence for causal effect of the EU ETS on green R&D spending and low-carbon patenting by regulated firms.

- Empirical studies also find that EU ETS firms have a better economic performance than non-ETS ones, pointing towards the Porter hypothesis (i.e., well-designed and stringent environmental regulation can stimulate innovations, which in turn increase the economic performance of firms)
  - Rosendahl et al (2020) find that the EU ETS had a large positive effect on the value added and productivity of regulated Norwegian plants in Phase 2.
  - Dechezleprêtre et al (2018) find a large and statistically significant increase in revenue and fixed assets of regulated firms from 2005 to 2014. They also find the EU ETS did not have a negative impact on the number of employees and profits.

7. Socio-economic delivery
7.5. Carbon Leakage

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Direct costs

- Three channels for carbon leakage are identified in the economic literature : the competition channel, the energy channel and the innovation channel.
    - Econometric studies find no evidence of carbon leakage in the EU ETS. However, they focus on Phase 1 and 2 where the carbon price was low and free allocation was the default allocation method.
    - Studies based on ex-ante CGE models find that up to one quarter of the emission reductions induced by a unilateral policy can be compensated by an increase of emissions elsewhere. In particularly trade-exposed and carbon intensive industries, leakage rates are even larger, at prices below 100€/tCO2.

- An assessment of the EU ETS on the ferro-alloy and silicon industry conducted by ERCST shows that direct costs have increased significantly since 2018, consistent with carbon price levels and the phase down of free allocation.
    - Authors find that free allocation could largely mitigate direct costs in Phase 4, provided the cross-sectoral correction factor is not triggered.

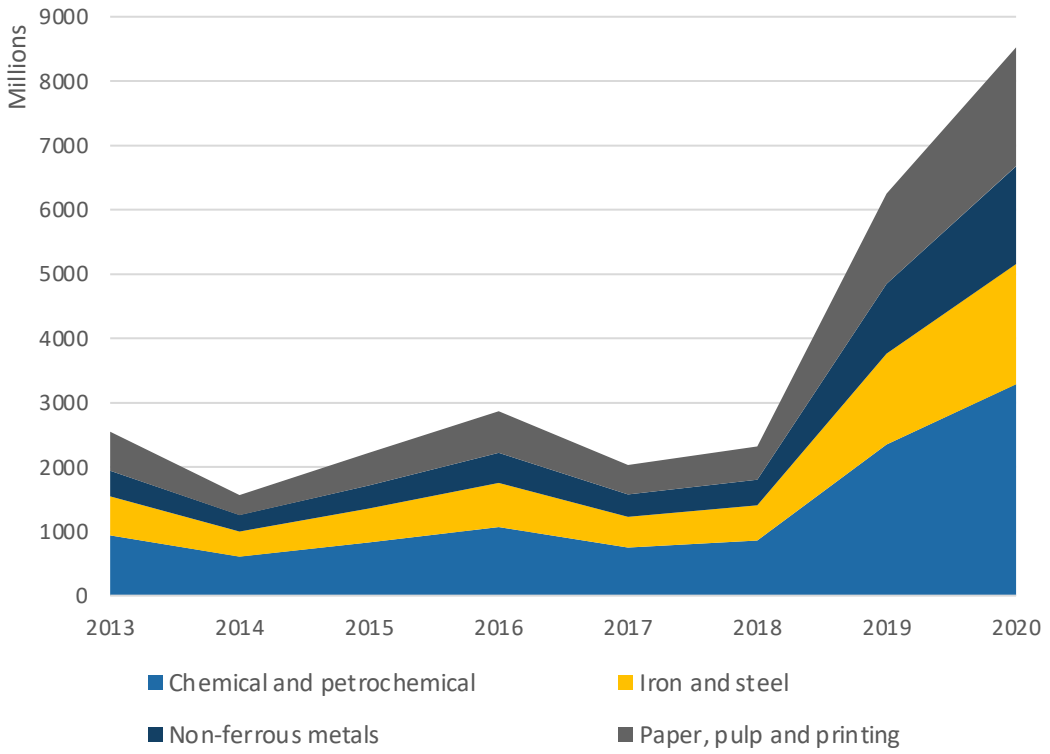
7. Socio-economic delivery

7.5. Carbon Leakage

Indirect Costs

- Indirect costs of the EU ETS may lead energy-intensive industries to relocate their means of production outside the EU or increase imports, causing carbon leakage.
  - The Commission has approved 16 schemes in 15 Member States. Czechia and Italy have started compensating in 2021.
  - Indirect costs were in the range of € 2-3 billion from 2013 to 2018, and almost quadrupled to over € 8 billion in 2020, due to higher carbon prices
- In the ferro-alloys and silicon industry, indirect costs after compensation are considerably higher than direct costs. This is mainly because the compensation provided by Member States covers a smaller share of indirect costs than free allocation covers direct costs.
  - Despite indirect cost compensation schemes, indirect costs could rise to unmanageable levels by the end of Phase 4, leading to carbon leakage.

High-end estimation of indirect costs for four sectors exposed to carbon leakage due to indirect emission costs (million euros). Ecoact based on Eurostat data.



2022 State of the EU ETS - outline

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Chapters

1. Background
2. An EU ETS “fit for purpose”
3. Phase 3: a comprehensive analysis
4. Regulatory developments
5. Market Sentiment Survey
6. Environmental delivery
7. Socio-economic delivery
8. **Market functioning**
9. Conclusions

8. Market functioning

8.1 Market functioning trackers

Strong market functioning in 2021

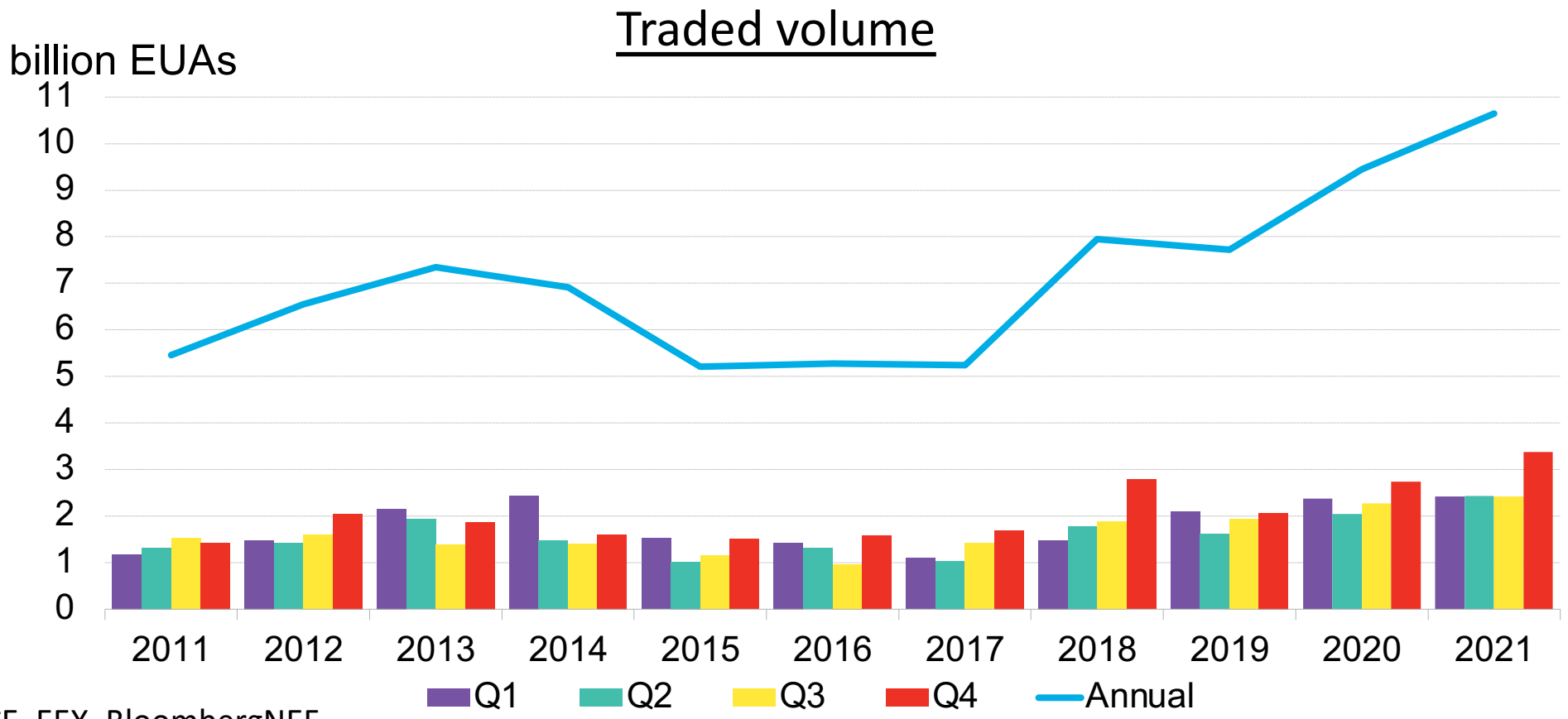
Indicator	2019/2020	2020/2021
Volume		
Open interest		
Auction participation		
Auction coverage		
Auction versus spot spread		
Cost of carry		
Ask-bid spread		
Volatility		

Source: BloombergNEF. Note: Green indicates improvement, red worsening, amber stable

8. Market functioning

8.1 Market functioning trackers

Record traded volumes rise 13% to surpass 10 billion

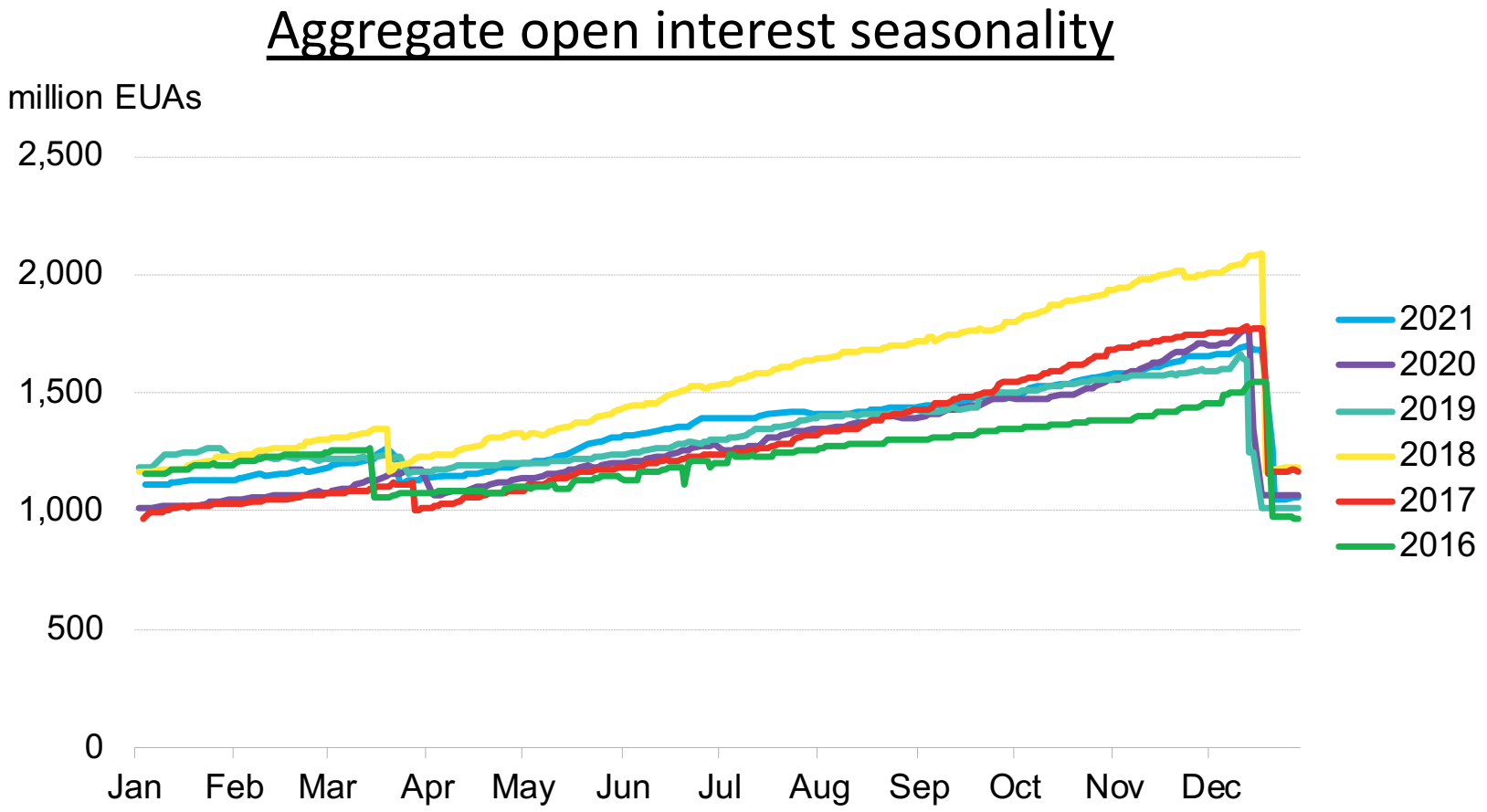


Source: ICE, EEX, BloombergNEF

8. Market functioning

8.1. Market functioning trackers

Higher open interest suggests increased hedging

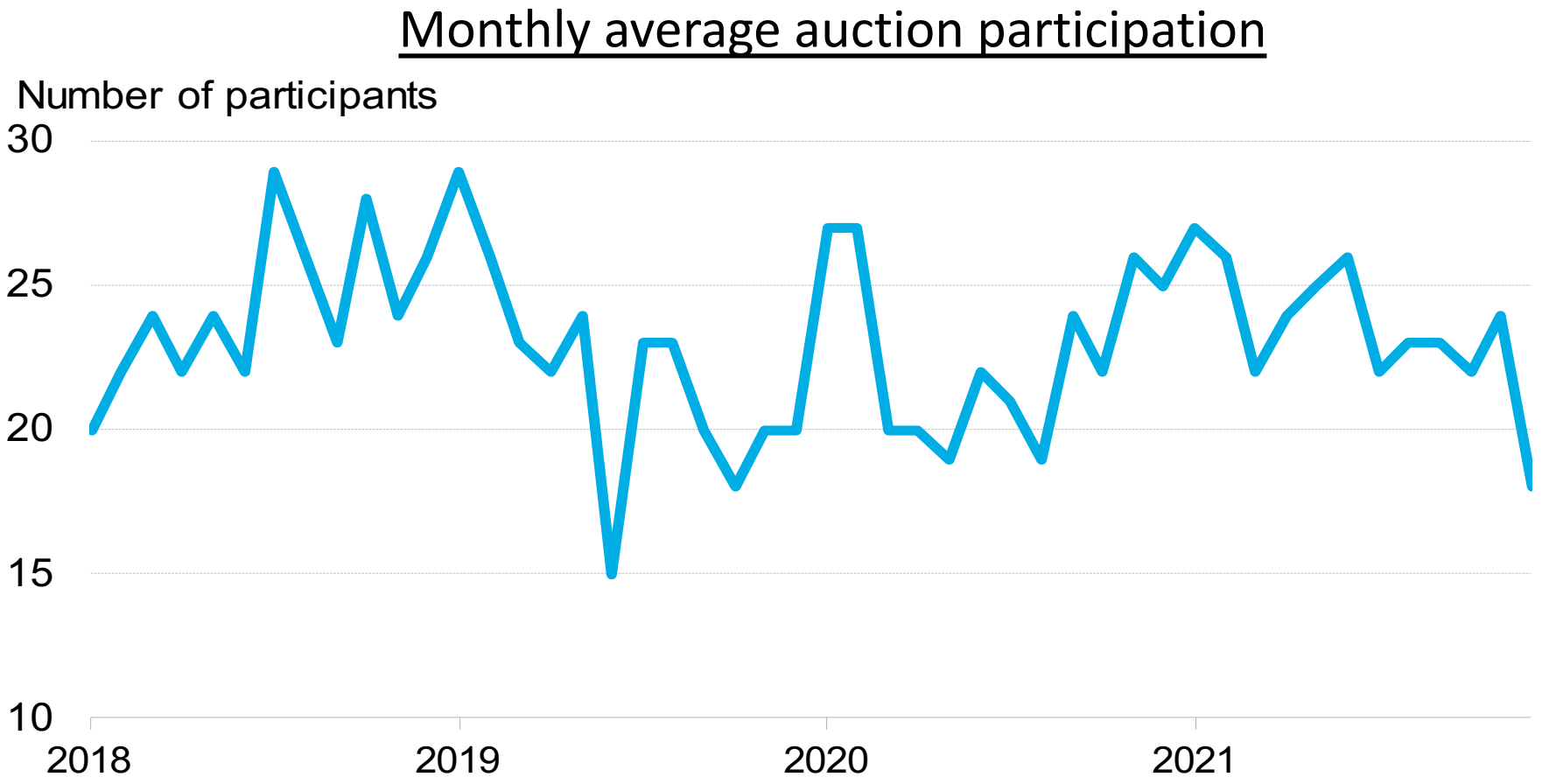


Source: BloombergNEF, ICE, EEX

8. Market functioning

8.1 Market functioning trackers

Participation remains strong in primary supply

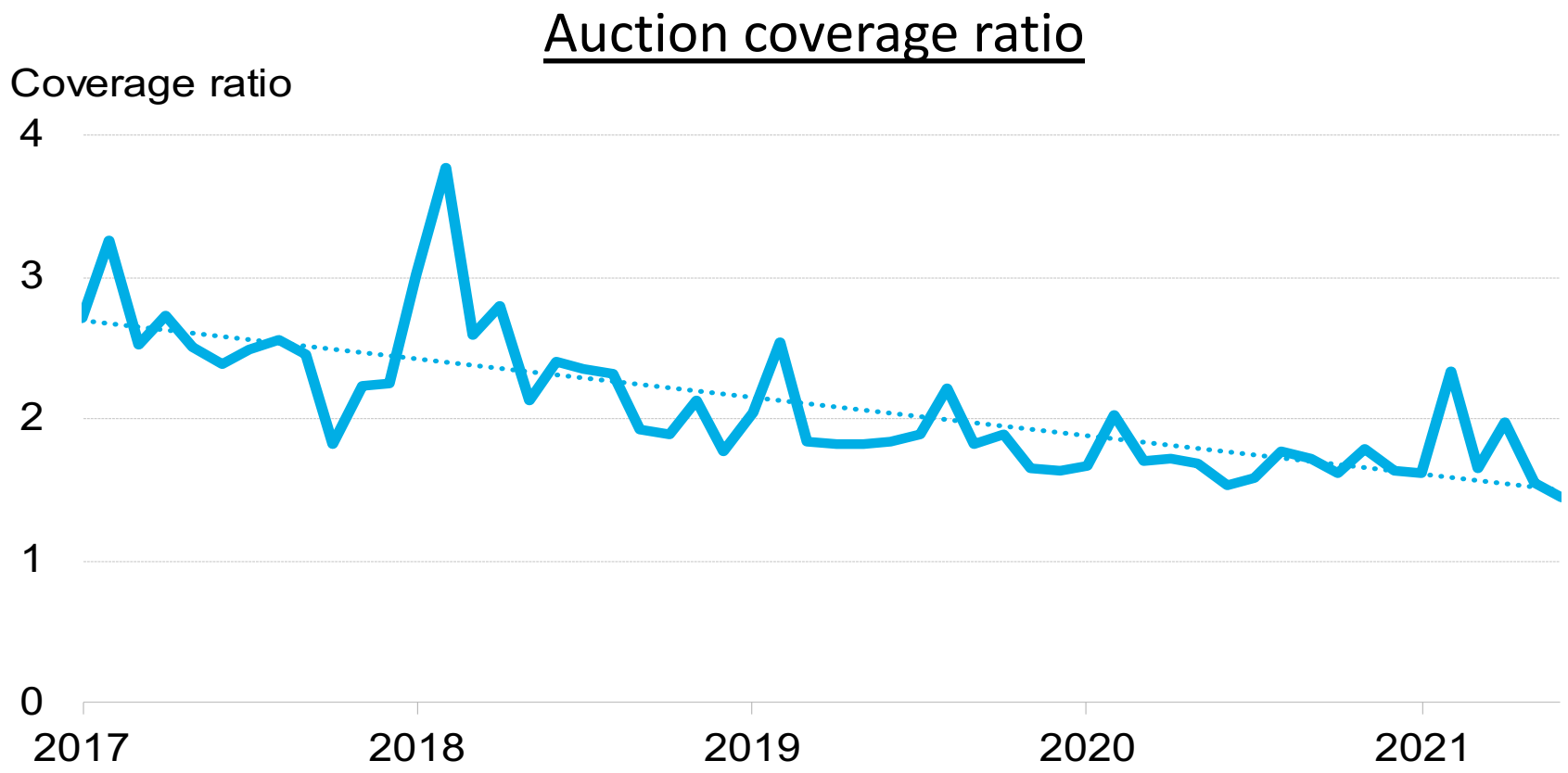


Source: EEX, BloombergNEF

8. Market functioning

8.1. Market functioning trackers

Coverage ratio declining, but holding above 1



Source: BloombergNEF, EEX. Note: Coverage ratio is defined as the number of bids in an auction per available EUA.

8. Market functioning

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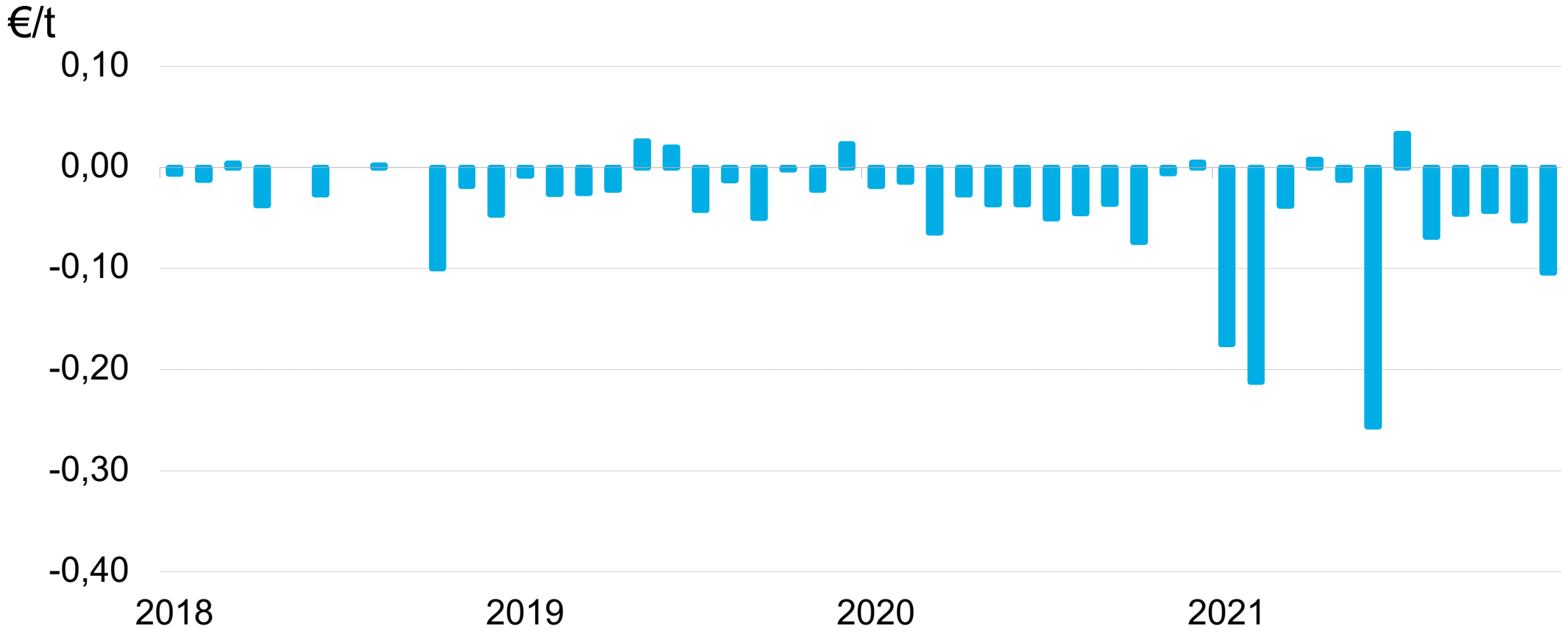
Auction-spot differential grew in line with EUA price

Monthly average difference between auction and spot price



Source: BloombergNEF, EEX

8. Market functioning

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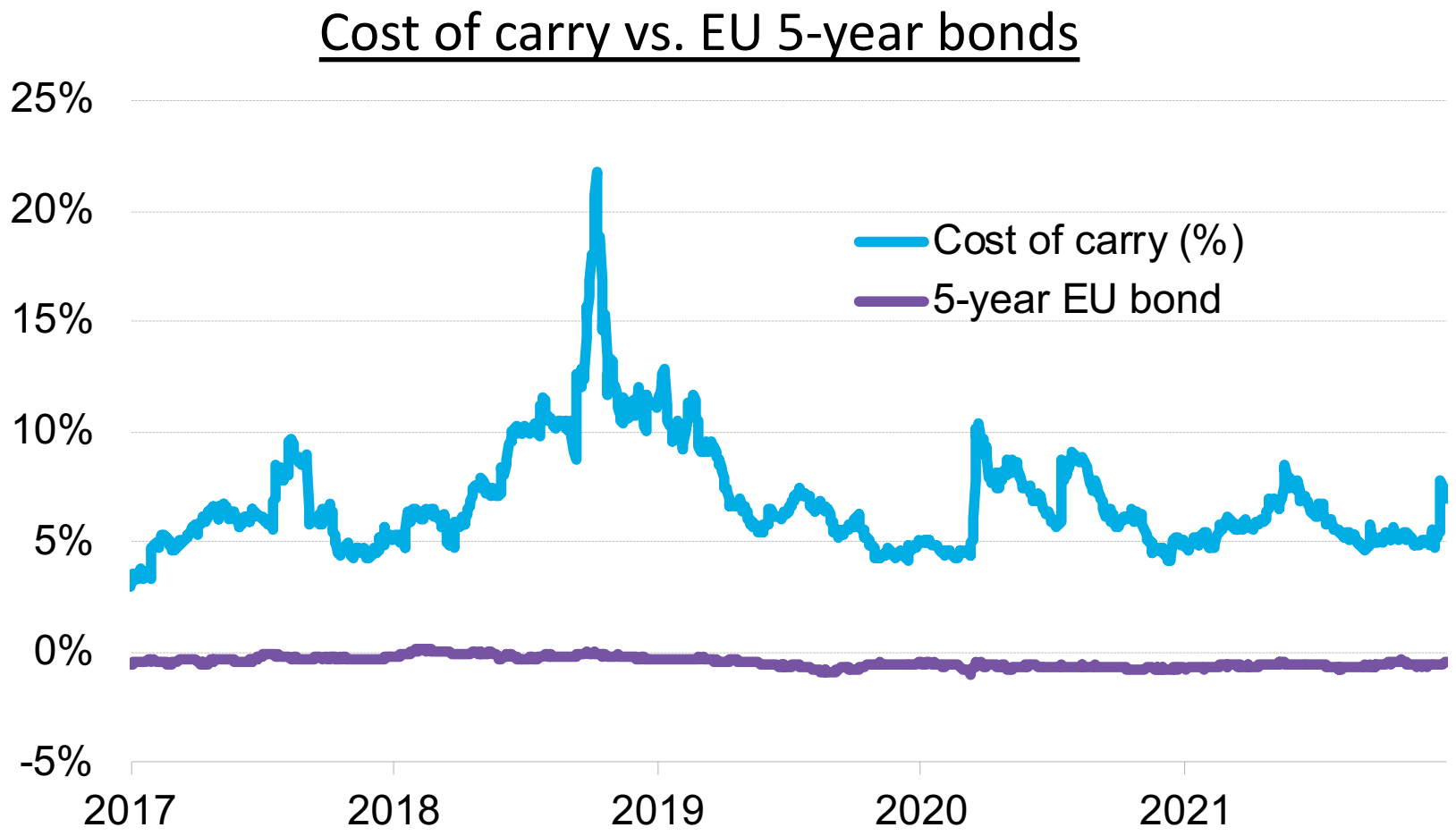
Low cost of carry shows small premium placed on future contracts



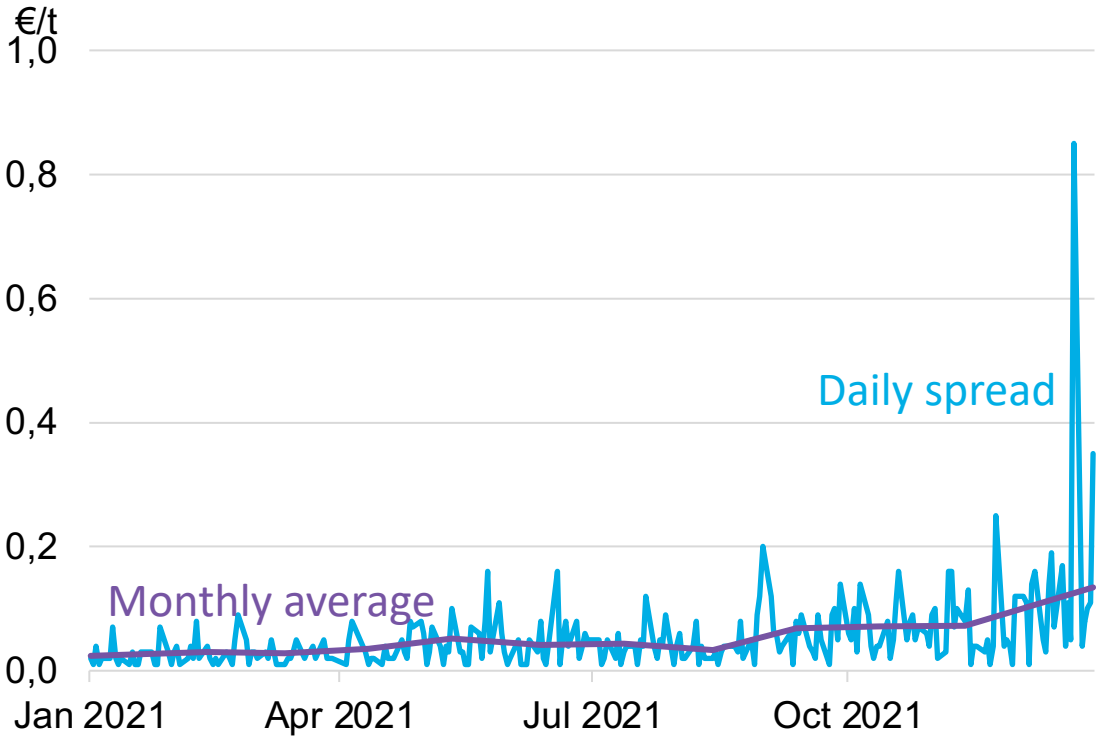
Source: ICE, BloombergNEF

8. Market functioning

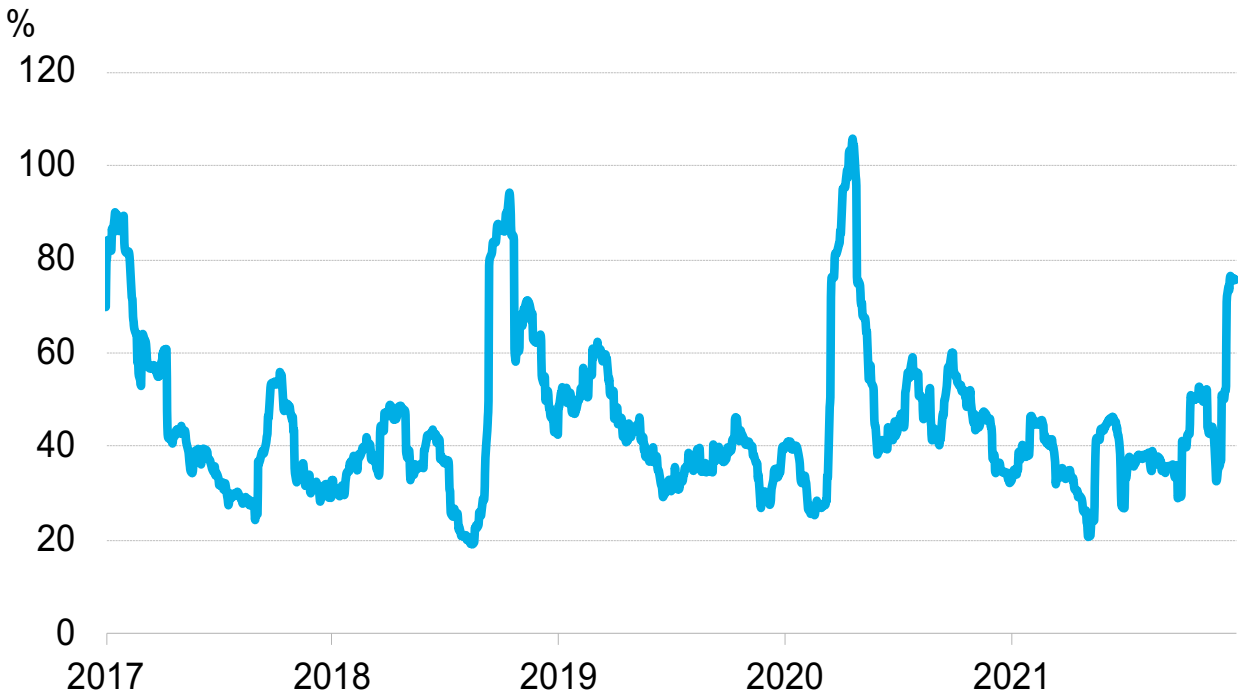
8.1 Market functioning trackers

Widening bid-ask spread signals higher volatility

Ask-bid spread on ICE



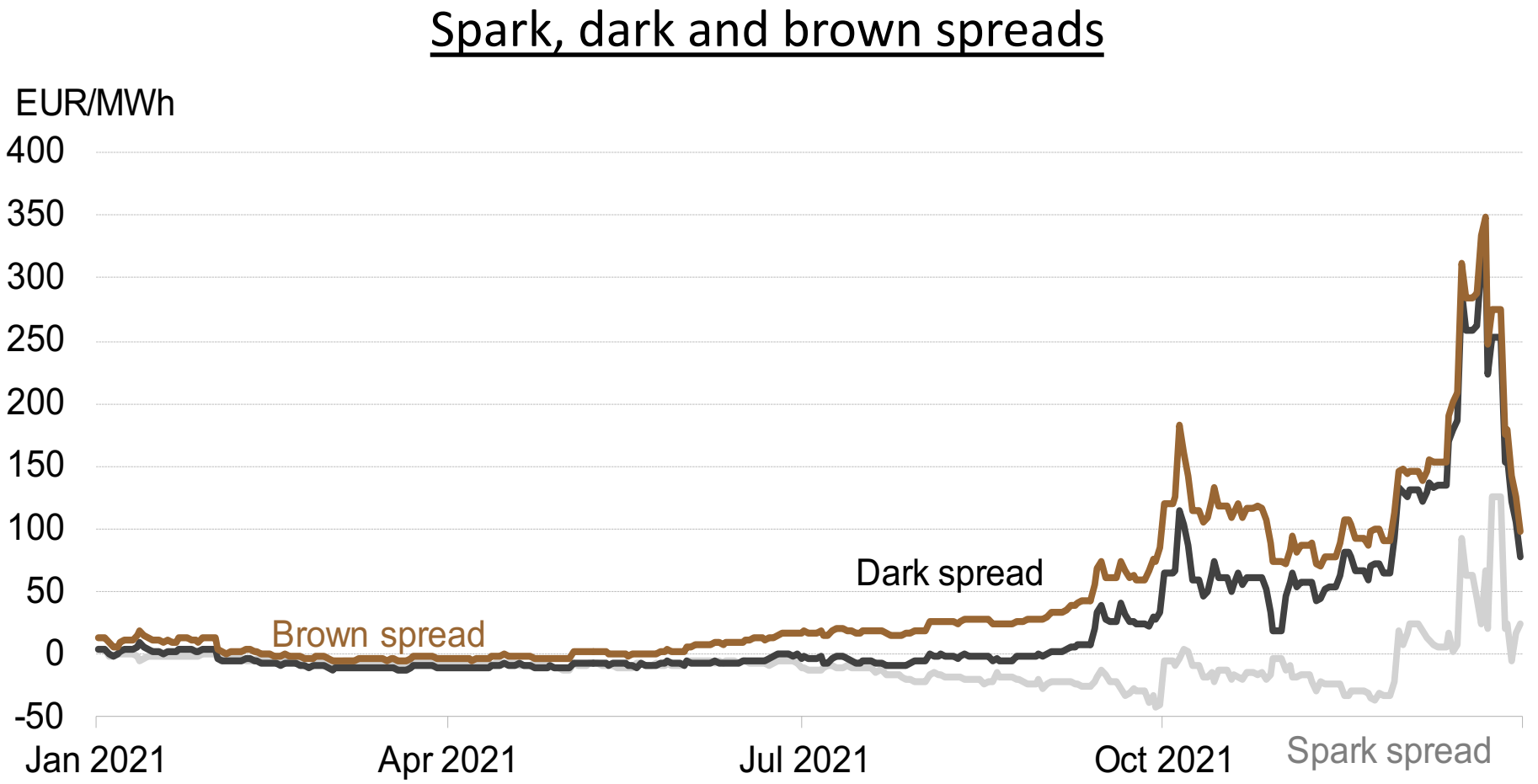
Volatility



Source: ICE, BloombergNEF

8. Market functioning

Coal- and lignite-fired generation in the money in 2021



Source: BloombergNEF

8. Market functioning

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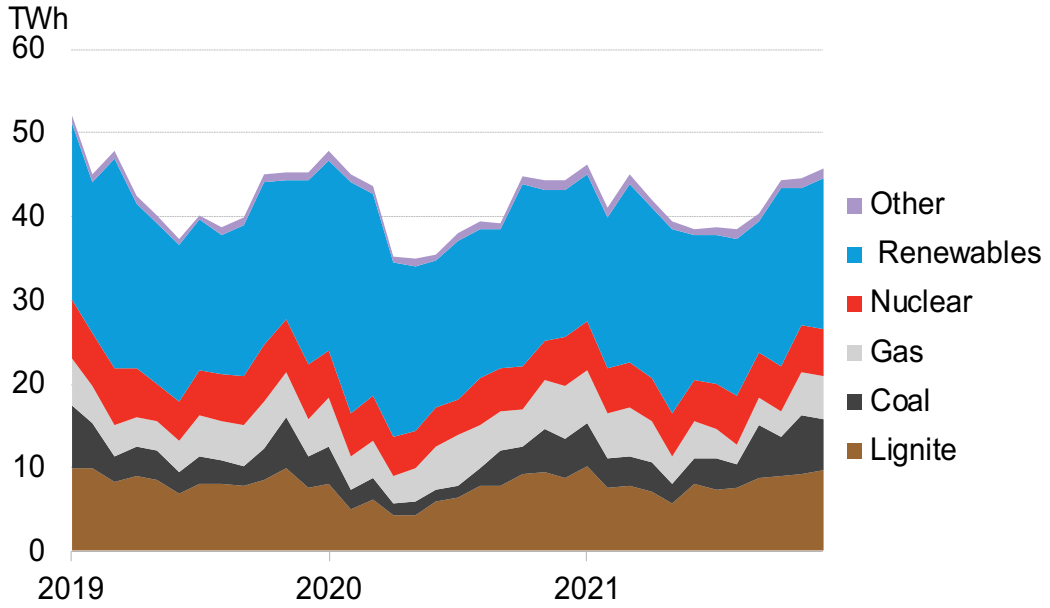
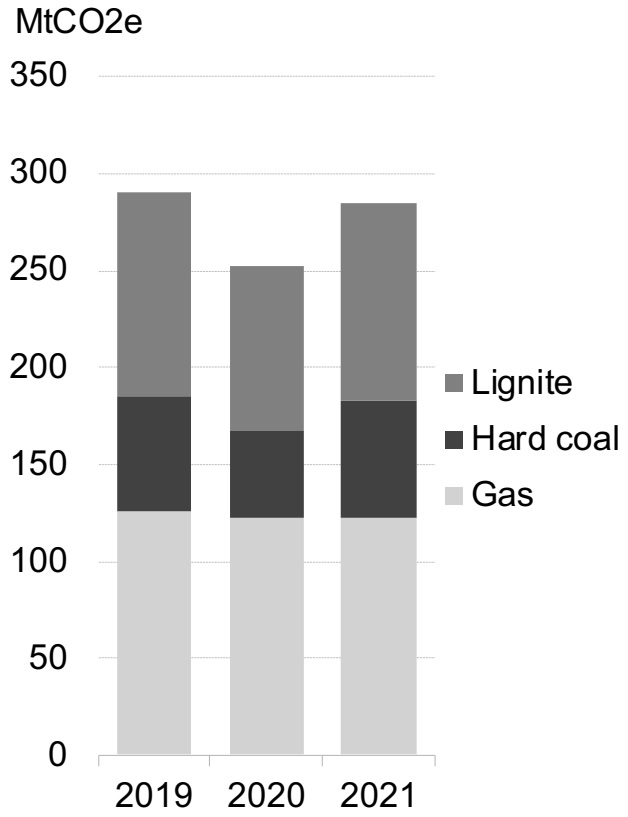
Power sector emissions up 13% in 2021 in major European countries

German power generation



Emissions in Germany, Italy, France, U.K.



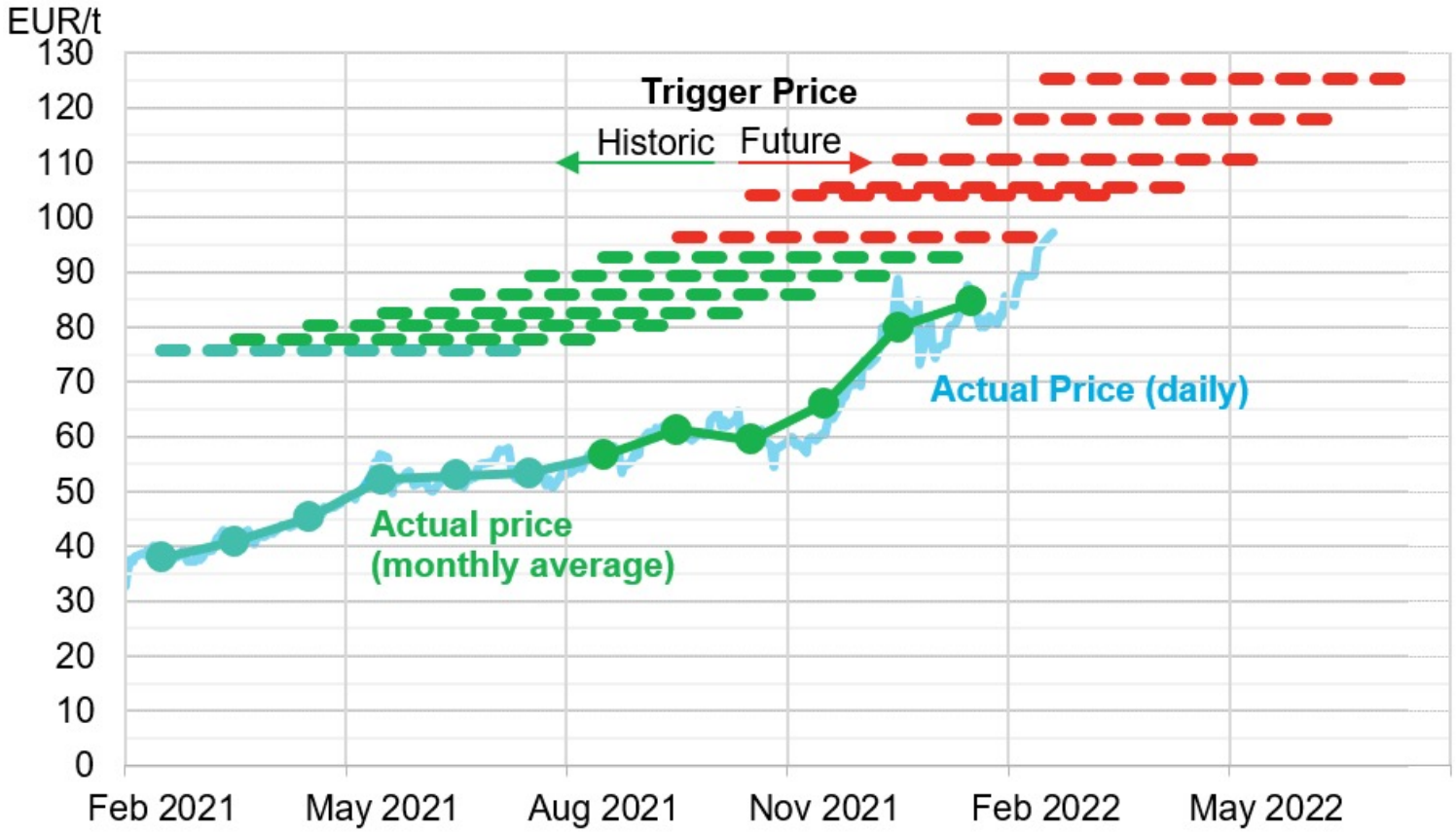
Source: BloombergNEF

8. Market functioning

8.1 Market functioning trackers

No cost containment intervention despite price rise

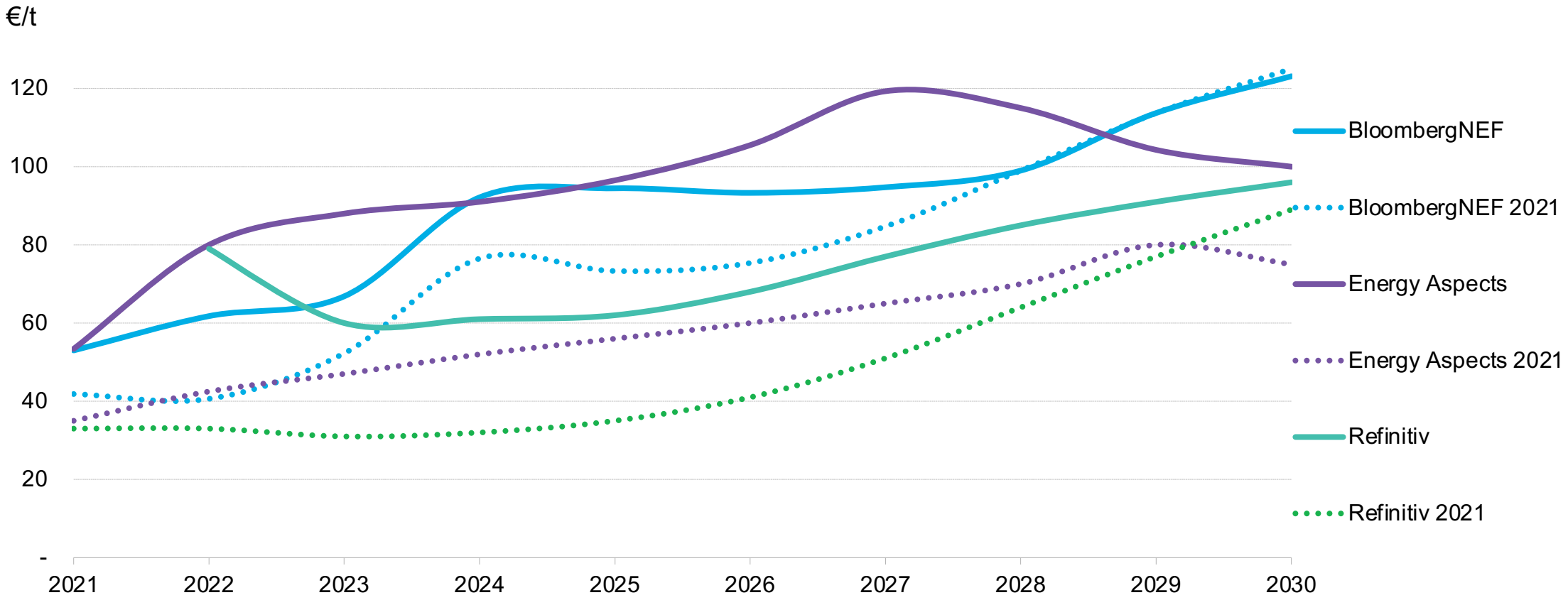
Article 29a CCM trigger prices for each six-month period



Source: BloombergNEF.

8. Market functioning

8.3. Price forecasts

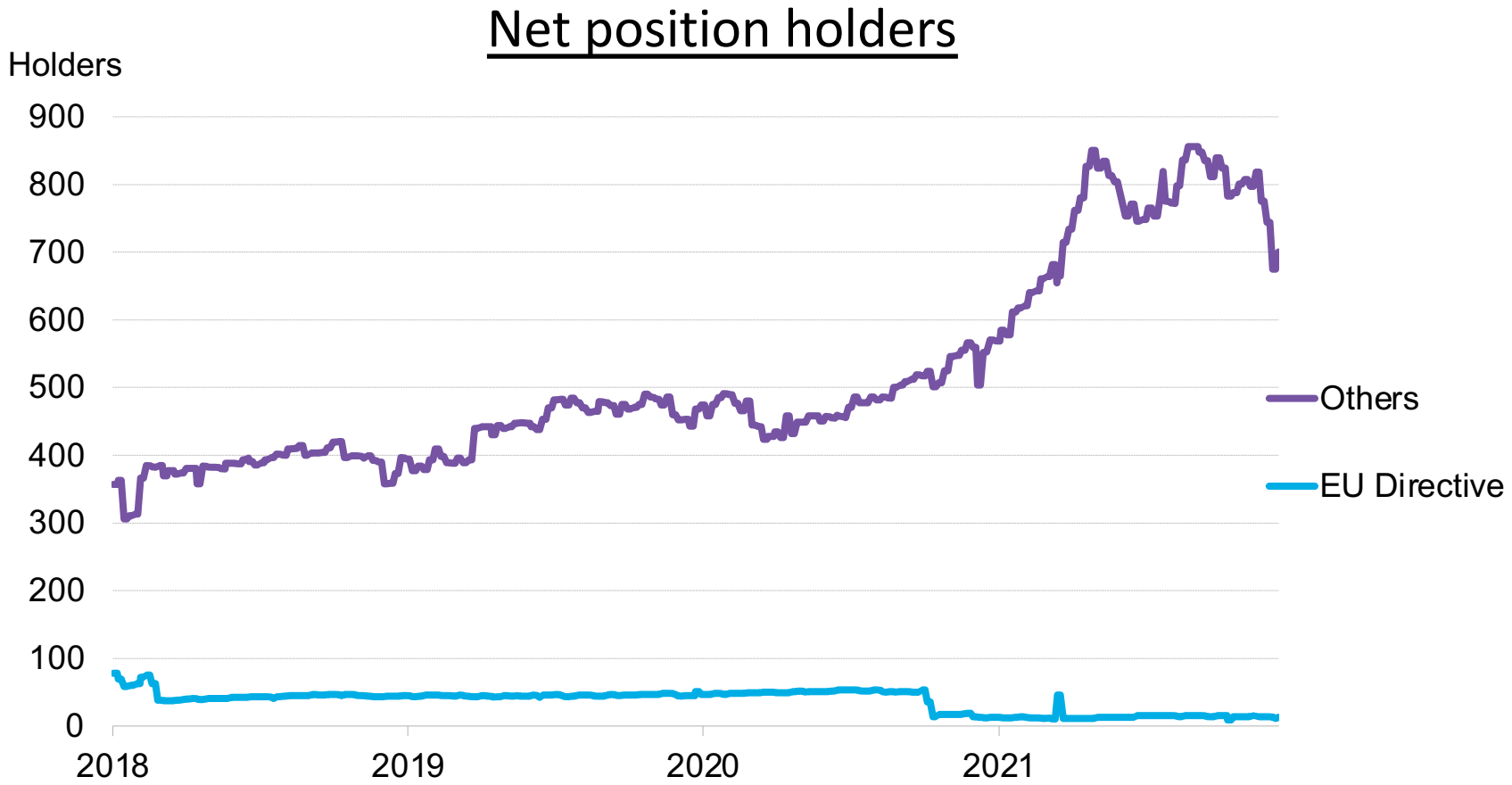


Source: BloombergNEF, Energy Aspects, Refinitiv. Note: Prices are in real 2021 € per metric ton.

8. Market functioning

8.3 Market participation

Record participation of entities not regulated under ETS Directive

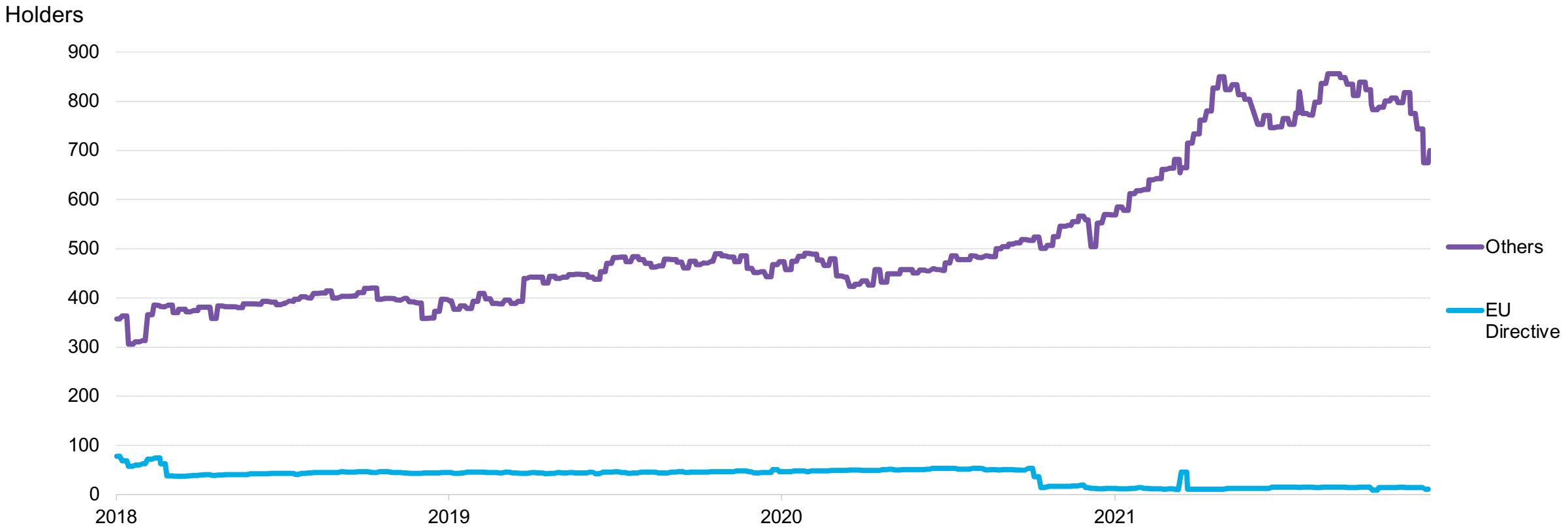


Source: ICE, EEX, BloombergNEF. Note: Data is from Commitment of Traders (CoT) database.

8. Market functioning

8.4. Market participation

Net position holders

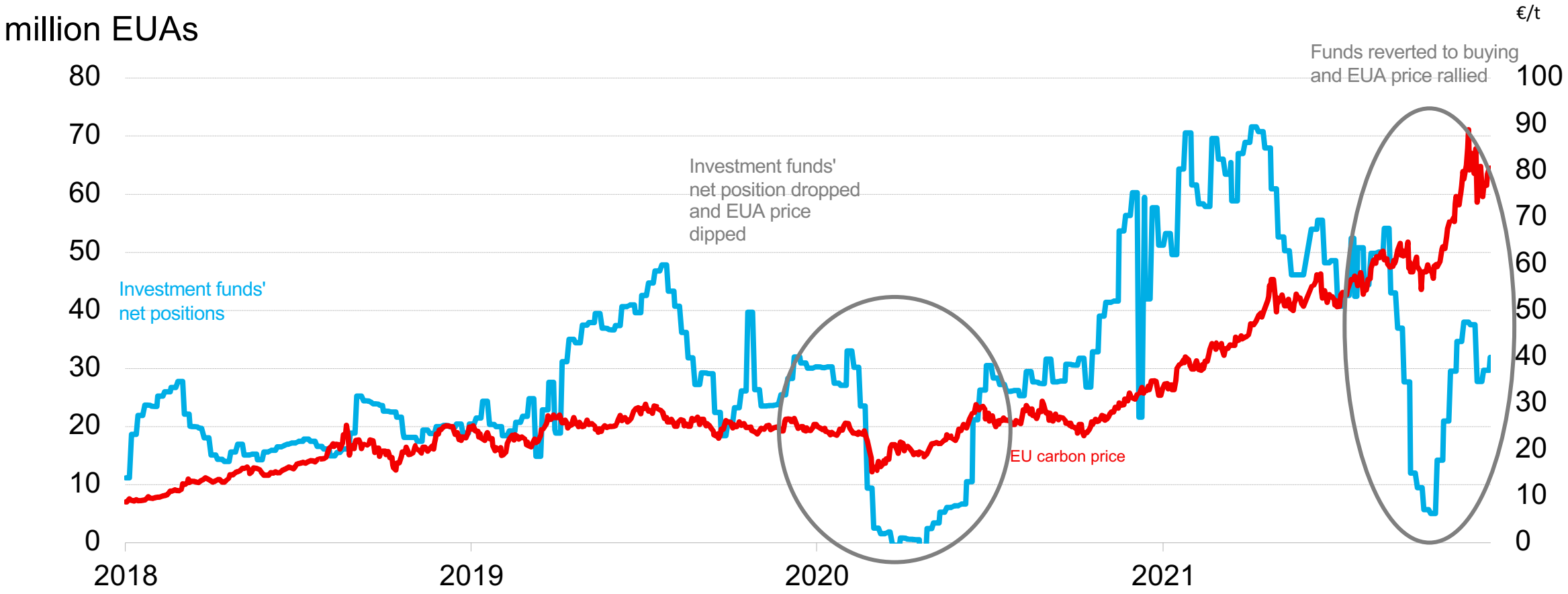


Source: ICE, EEX, BloombergNEF. Note: Data is from Commitment of Traders (CoT) database.

8. Market functioning

8.4. Market participation

Investment funds' net positions



Source: ICE, EEX, BloombergNEF. Note: Data is from Commitment of Traders (CoT) database.

9. Take aways/conclussions

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- The European Climate Law is providing a new reality to become net zero by 2050.
- However, the EU ETS debate may not be as visible as in the past as CBAM have become the focus of attention.
- 2021 as a period of completion of secondary legislation from the EU ETS Directive in 2018, but also a proposal to revise the current framework.
- While some elements are still at stake, Phase 4 of the EU ETS is the first one without UK installations.
- Need to further envisage the role of the EU ETS and international carbon markets under Article 6 of the Paris Agreement.
- The annual market sentiment survey shows some questioning of the role of the EU ETS. Still, stakeholders consider the EU ETS as the best of the instruments to drive decarbonisation.
- Estimates indicate a 9.1% increase of total emissions in 2021 vs 2020. Still, the dip in emissions caused by lower economic activity in 2020 had not yet been overcome in 2021.
- Discussion influenced by the energy crisis on the carbon market and the increased high volatility of carbon prices.
- This as the time to start a exploring the role of the EU ETS post 2030