

Carbon Allowances and Financial Accounts:

CROCI's approach and the need for an international accounting standard

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- Given that carbon markets are becoming increasingly important to the task of achieving Net Zero emissions, this report emphasizes the importance of developing an accounting standard that creates a level playing field for how corporate balance sheets value and report on emission allowances. This will contribute to providing a "true and fair" picture of corporates' real performance, risks and opportunities in the environment in which they operate¹.
- Carbon markets are growing in economic value: the global compliance carbon market soared to EUR 865 billion in 2022², nearly three times its value in 2020. This was driven by a doubling of the EU carbon price, which hit EUR 100 per tonne of CO₂ in 2022. Previous DWS research³ examined how the EU emission allowances have evolved into investable assets.
- The influence of carbon on corporates is likely to grow. CROCI analysis⁴ of a hypothetical global EUR 80 carbon price earlier found utilities' earnings would be wiped out with earnings also reduced in materials, energy, and industrial sectors.
- In this report, we set out guidelines on how CROCI⁵ treats emission-allowances-related items from the financial statements to integrate them in the measurement of companies' real profitability and valuation. Our analysis of major European companies finds insufficiently detailed and non-comparable carbon allowance financial disclosures.
- European investors have already called on companies and accountants for better, more consistent financial disclosures to ensure Paris-aligned accounts⁶. However, for 17 years, accounting standards have failed to develop a standard⁷ for how companies account for emission allowances and other green credits in their financial statements. We call on policy makers, accountants, corporates, investors, and accounting standard setters (IFRS) to quickly develop a common carbon allowance and green credit accounting standard.

We thank Murray Birt, Senior ESG Strategist for comments on this paper.

1 Climate policy initiative (2011), Emissions Trading Schemes under IFRS - Towards a "true and fair view"

2 Refinitiv (2023), Global carbon market value hits new record

3 DWS (Feb 2022) www.dws.com/insights/global-research-institute/carbon-pricing-and-carbon-allowances

4 DWS (Jan 2023) CROCI Outlook, <https://www.dws.com/en-gb/capabilities/active-investments/croci/the-croci-way/>

5 CROCI is a registered trademark of DWS

6 IIGCC (2020), Investor Expectations for Paris-aligned Accounts www.iigcc.org/resource/investor-expectations-for-paris-aligned-accounts

7 IFRS (2005-2022), Emissions Trading Schemes IASB meetings summary

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1 / Introduction

Emission allowances accounting frameworks are required to preserve a "True and Fair" perspective and give climate policy matters the attention they warrant

One of the most pressing challenges of our time is reducing greenhouse gas (GHG) emissions. Recognizing the urgency, an increasing number of governments and businesses are making commitments to achieve net-zero emissions within their jurisdictions or businesses. Net-zero emissions will be achieved when all GHG emissions from human activities are reduced significantly and the remaining balance is offset by removing GHGs from the atmosphere, in a process known as carbon removal. The simple but profound adage "reduce what you can, offset what you can't" has never been more relevant in the quest for net zero. Regulators all over the world are implementing various schemes and climate policies to encourage a shift to cleaner energy sources and reduce emissions. To meet the Paris Agreement's climate targets, widespread use of schemes such as carbon pricing will be required to steer the world onto a low-carbon path.

Carbon taxes and emissions trading schemes (ETS) are the two primary policy tools for carbon pricing. A carbon tax places a fee on the carbon emissions content of fossil fuels, and market dynamics then determine the resulting quantity of emissions reductions. An ETS places a cap on the total quantity of emissions and allows the market to determine the price for tradable emission allowances. By putting a cap on emissions and letting businesses buy and sell their unused allowances, these programmes encourage the switch to renewable energy. Presently, 34 national, subnational, and regional jurisdictions have active ETS programmes in place, which account for 17.5% of the global GHG emissions. Of these, 17 well-known programmes account for 8.4 GtCO₂e, or 16.0% of the global GHG emissions⁸ (Figure 1). Emission allowances have evolved into investable assets that businesses can use as part of their net zero and decarbonisation strategies⁹. In a late and disorderly climate transition scenario, where a sharp increase in the price of carbon emissions is expected¹⁰, investments in emission allowances could offer downside protection. Woodside Energy Group, for example, has already secured enough offsets to meet the offset requirements through 2025¹¹.

Figure 1: Summary of major national and regional emission trading schemes (ETS) implemented

Name of the initiatives	Type of jurisdiction covered	Jurisdiction covered	Year of implementation	Total GHG emissions (2018) [Mt CO ₂ e]	% GHG emissions covered by the initiative	GHG emissions [Mt CO ₂ e] covered by the initiative	% of Global GHG covered	Price level (USD/Mt CO ₂ e) ⁸
Austria ETS	National	Austria	2022	85	40%	34	0.1%	37
Canada federal OBPS	National	Canada	2019	762	7%	53	0.1%	40
China national ETS	National	China	2021	13,740	33%	4,500	8.8%	9
EU ETS	Regional	EU +27	2005	4,001	41%	1,629	3.2%	87
Germany ETS	National	Germany	2021	874	40%	350	0.7%	33
Kazakhstan ETS	National	Kazakhstan	2013	368	46%	169	0.3%	1
Korea ETS	National	Korea	2015	758	73%	553	1.1%	19
Mexico pilot ETS	National	Mexico	2020	801	40%	320	0.6%	NA

⁸ The World bank, Carbon pricing dashboard, accessed on 14 February 2023

⁹ DWS (Feb 2022) www.dws.com/insights/global-research-institute/carbon-pricing-and-carbon-allowances

¹⁰ European Central Bank (2022), Macro-financial scenarios for the 2022 climate risk stress test

¹¹ Australian Financial Review, (2022), Woodside sweeps up carbon offsets for 2030 target

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Name of the initiatives	Type of jurisdiction covered	Jurisdiction covered	Year of implementation	Total GHG emissions (2018) [Mt CO ₂ e]	% GHG emissions covered by the initiative	GHG emissions covered by the initiative [Mt CO ₂ e]	% of Global GHG covered	Price level (USD/Mt CO ₂ e)
New Zealand ETS	National	New Zealand	2008	85	49%	42	0.1%	53
Switzerland ETS	National	Switzerland	2008	48	11%	5	0.0%	64
UK ETS	National	UK	2021	464	28%	130	0.3%	99
California CaT	Subnational	California	2012	418	74%	309	0.6%	31
Alberta TIER	Subnational	Alberta	2007	242	58%	140	0.3%	40
Ontario EPS	Subnational	Ontario	2022	165	25%	41	0.1%	32
Quebec CaT	Subnational	Quebec	2013	78	78%	61	0.1%	31
RGGI	Subnational	RGGI	2009	612	11%	67	0.1%	14
Tokyo CaT	Subnational	Tokyo	2010	66	20%	13	0.0%	4
Total				23,567		8,418	16%	

Source: The World bank, Carbon pricing dashboard, accessed on 14 February 2023.

The ETS programmes should fundamentally display homogeneity, but underlying climate policies are heterogeneous globally, hence it is critical for users to understand the economics under each scheme and apply the appropriate accounting.

Financial accounting standards need to catch up with carbon market developments

There is no specific financial accounting definition for emission allowances (or carbon credits or environmental certificates for that matter), nor is there a clear, comprehensive standard for accounting for these new financial instruments. Emission allowances are generally disclosed in non-financial reports, but not consistently disclosed in the financial statements. Concerns about the lack of consistent and comparable financial disclosures have led to an increase in the number of investors advocating for Paris-aligned accounts. **Our main concern is that accounting standard setters are lagging in their efforts to create a comprehensive framework.**

The International Sustainability Standards Board (ISSB) recently issued the [Draft] IFRS S2 Climate-related Disclosure (the Exposure Draft). The Exposure Draft highlights requirement for entities to provide information about their exposure to climate-related risks and opportunities. This Exposure Draft includes a definition of carbon offset (not allowances) for reporting purposes only.

However, until now, the financial accounting for carbon offsets¹² is not explicitly addressed by the International Accounting Standards Board (IASB), which indicates lack of interconnectedness between financial and non-financial standards. In the absence of authoritative guidance from the IASB / Financial Accounting Standards Board (FASB), several approaches to accounting for the financial effects of emission allowances have developed. In fact, a survey conducted by PwC and the International Emissions Trading Association (IETA) discovered up to fifteen accounting variations¹³. If emission allowances are not consistently measured and accounted for in financial accounts, it will be difficult to give a true and fair assessment of their actual impact on economics and financials of corporates. Therefore, a new accounting standard for emission allowances and associated instruments is required to contribute to globally uniform Paris aligned accounts¹⁴.

¹² While the ISSB used the word 'carbon offset', it appears that the ISSB is using the term carbon offsets in the broader context which includes three market-based mechanisms (Article 6, 12, 17)—emissions trading, the clean development mechanism and joint implementation.

¹³ International emissions trading association (2007) Trouble-Entry Accounting – Revisited

¹⁴ IIGCC (2020), Investor Expectations for Paris-aligned Accounts

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2 / Evolution of the global carbon markets

Carbon markets are trading platforms where carbon credits are bought and sold. One tradable carbon credit is equivalent to one tonne of CO₂, or the equivalent amount of another greenhouse gas reduced, sequestered, or avoided. It comprises all the compliance market and a small part of the voluntary market. Compliance carbon markets (CCMs), where mandatory national, regional, or international regimes trade and regulate carbon allowances, lead to emissions reductions ultimately, as these allowances are capped and will most likely decrease over time. In contrast, voluntary carbon markets (VCMs), where companies and individuals trade carbon credits on a voluntary basis, allow to offset existing emissions (rather than reduce them). The majority of the existing supply of voluntary carbon credits is produced by private organisations that create carbon projects or by governmental organisations that create carbon-certified programmes that result in emission removals or reductions¹⁵.

Figure 2: Compliance Markets vs. Voluntary Carbon Markets

Particulars	Mandatory/Compliance Markets (CCM)	Voluntary Carbon Markets (VCM)
Framework	Allowances are created by a central authority and allocated/auctioned to participants. In a cap-and-trade system, an upper limit on emissions is fixed, and emission permits are either auctioned out or distributed for free according to specific criteria.	Carbon offsets are generated via individual projects and freely tradable. The VCM is a decentralized market where businesses, investors voluntarily buy and sell carbon credits that represent certified removals or reductions of greenhouse gases in the atmosphere.
Unit	Permit to emit one metric ton of CO ₂	Verified reduction of one metric ton of CO ₂
Dynamics	Homogeneous product with transaction and price discovery via exchanges.	Offsets are issued by various registries, which typically lack a formal verification and accounting system. The price depends on the specifics of the project (kind, vintage, benefits, etc.).
Supply and demand dynamics	Supply centrally determined by regulatory bodies; regulatory mandates create demand for allowances	Project developers and third-party brokers originate offset credits. Demand is driven by corporate responsibility and sustainability programmes.
Liquidity	High Liquidity	Low Liquidity
Examples	EU ETS, China ETS etc.	Verra Verified Carbon Units (VCUs)
Price range	USD 4 to USD 100 per metric ton	USD 2 to USD 10 per metric ton

Source: World Bank, Bloomberg Finance LP, DWS and CROCI, accessed on 14 February 2023

The compliance and voluntary carbon markets have both grown at a record pace over the past two years. The compliance market soared to an estimated value of about EUR 865 billion in 2022¹⁶, nearly three times its value in 2020 (Figure 3), while the voluntary market value quadrupled to about EUR 1.9 billion in 2021¹⁷ over 2020. Simultaneously, it is anticipated that VCMs will continue to expand and will increase fivefold by 2030¹⁸, enabling businesses to meet their net zero commitments, which call for carbon offsets.

¹⁵ United Nations Development Programme (2022) What are carbon markets and why are they important?

¹⁶ Refinitiv (2023), Global carbon market value hits new record

¹⁷ Shell (2023), The voluntary carbon market: 2022 insights and trends

¹⁸ McKinsey (2021) Blueprint for scaling the voluntary carbon market

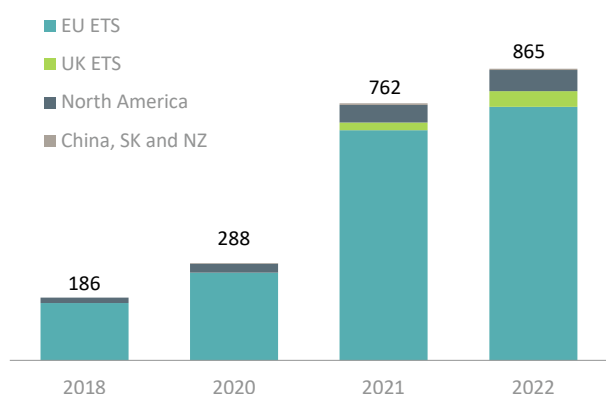
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The European Union's Emissions Trading System (EU ETS), the largest CCM and one of the first to be implemented, is frequently regarded to as the cornerstone of EU climate policy. The programme, which represents 90% of the value of the global CCM¹⁹, is a trailblazing effort to address GHG emission reduction in high-intensity carbon emitting businesses. Sectors covered by the EU ETS were able to reduce emissions in Europe by one third between 2010 and 2020, as opposed to a reduction of one fourth in total EU emissions²⁰ (Figure 4). Currently, 40% of the greenhouse gas emissions in Europe are covered by the EU ETS²¹. With the programmed expansion of the EU ETS to other industries like shipping, road transportation, and buildings, the coverage is expected to increase to 75%²².

Figure 3: Evolution of carbon markets

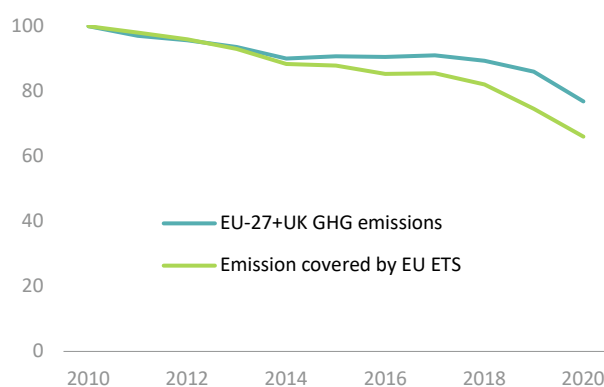
(in EUR billion)



Source: Refinitiv

Figure 4: Total EU and EU ETS covered GHG emissions

Rebased to 100



Source: Eight National Communication and Fifth Biennial Report. The European Environment Agency

The history of the EU ETS, however, has not been without turbulence; it has been defined by numerous problems that needed to be solved and subsequent changes made along the road. The EU ETS has an inherent fundamental vulnerability that the 2008 financial crisis highlighted, undermining its credibility, and prompting a thorough revision of the entire system²³. The price of EU ETS fell from nearly USD 25/Mt CO_{2e} in mid-2008 to less than USD 4/Mt CO_{2e} in mid-2013 (Figure 6). Due to the economic downturn and limited incentives to invest in clean and low-carbon technologies, the demand for these allowances was less than the number of allowances available on the ETS market, resulting in cumulative surplus allowances (Figure 5). Furthermore, between 2008 and 2012, approximately 90% of all emissions under the EU ETS were still distributed for free, resulting in massive oversupply²⁴. To address falling prices and the scheme's revival, the EU implemented several measures, including the "backloading" of 900 million allowances between 2014 and 2016 and the establishment of the Market Stability Reserve (MSR)²⁵. This resulted in a significant increase in the price of ETS allowances beginning in 2018 (Figure 6).

19 Reuters (2022), Global carbon markets value surged to record \$851 bln last year-Refinitiv

20 UNFCCC (2022), Eight National Communication and Fifth Biennial Report and The European Environment Agency

21 European commission (2022), EU Emissions Trading System (EU ETS)

22 Energy post (2023), Understanding the new EU ETS (Part 2): Buildings, Road Transport, Fuels. And how the revenues will be spent

23 European Roundtable on Climate Change and Sustainable Transition (ERCST) (2021), The Review of the Market Stability Reserve (MSR)

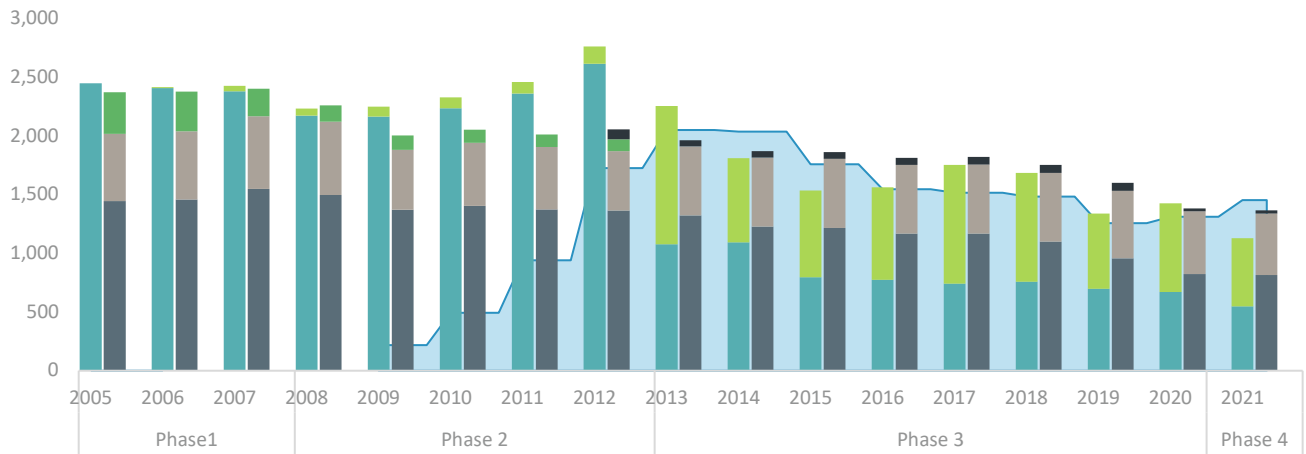
24 Carbon MarketWatch (2022), EU ETS 101 – A beginner's guide to the EU's Emissions Trading System

25 European Roundtable on Climate Change and Sustainable Transition (ERCST) (2021), The Review of the Market Stability Reserve (MSR)

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Figure 5: Supply of Allowances, Verified Actual Emissions, and Surplus Allowances in the EU ETS, 2005-2021 (Mt CO₂e)



Area chart: Cumulative surplus allowances
1st bar: Supply of allowances Free allowances Auctioned allowances
2nd bar: Verified actual emissions* Combustion of fuels Industrial installations Change in scope Aviation

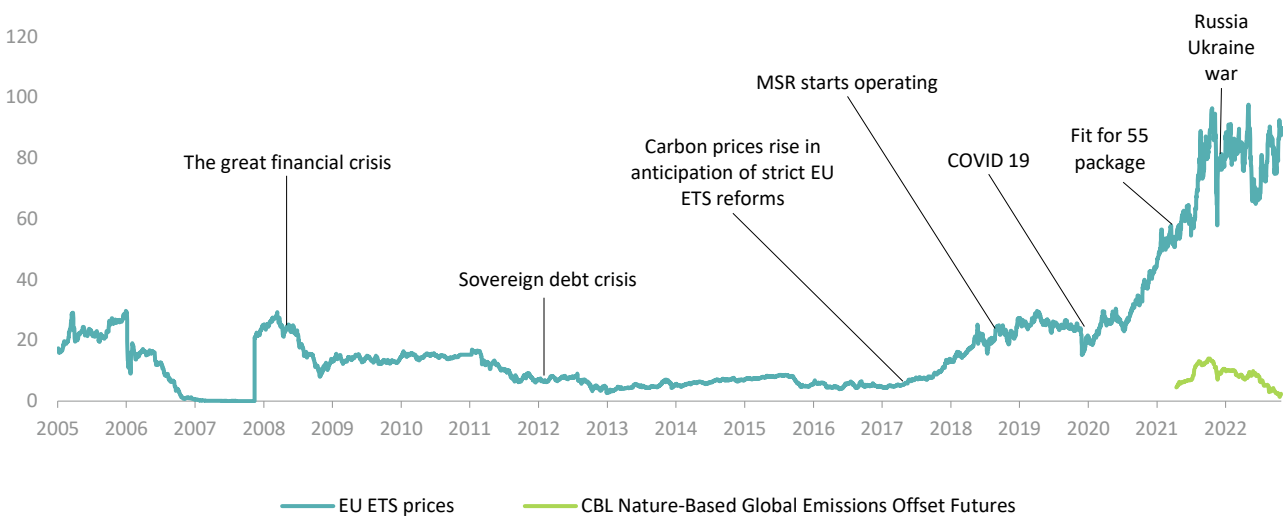
Source: The European Environment Agency. Trends and projections in the EU ETS in 2019, 2020 2021 and 2022, DWS and CROCI. European Union Transaction Log (EUTL) extracted 14 February 2023: The EEA produces estimates of emissions and allowances for 2005–2012 to reflect the current scope of the EU ETS (third trading period from 2013 to 2020). This is because the scope of the EU ETS has evolved since it was created in 2005 (inclusion of new countries, activities, and gases), therefore the trends in emissions and allocated allowances directly based on the EUTL are not fully consistent over time. See EEA’s background note for details available.

Activities in Scope includes combustion of fuels in installations with a total rated thermal input exceeding 20MW (except in installations for the incineration of hazardous or municipal waste). Industrial installation includes Oil refining; coke production; metals; cement; lime; glass; ceramics; pulp; paper; chemicals and Aviation includes flights inside ETS area.

The cumulative surplus allowances represent the difference between allowances allocated for free, auctioned or sold plus international credits surrendered or exchanged from 2008 to date minus the cumulative actual emissions.

* Verified actual emissions: The EU ETS requires that actual greenhouse gas emissions from installation are verified annually, to determine whether an organisation is in compliance with its allowance.

Figure 6: Evolution of EU ETS and VCM carbon price (USD per Mt CO₂e)



Source: The European Environment Agency, Bloomberg Finance LP., DWS and CROCI

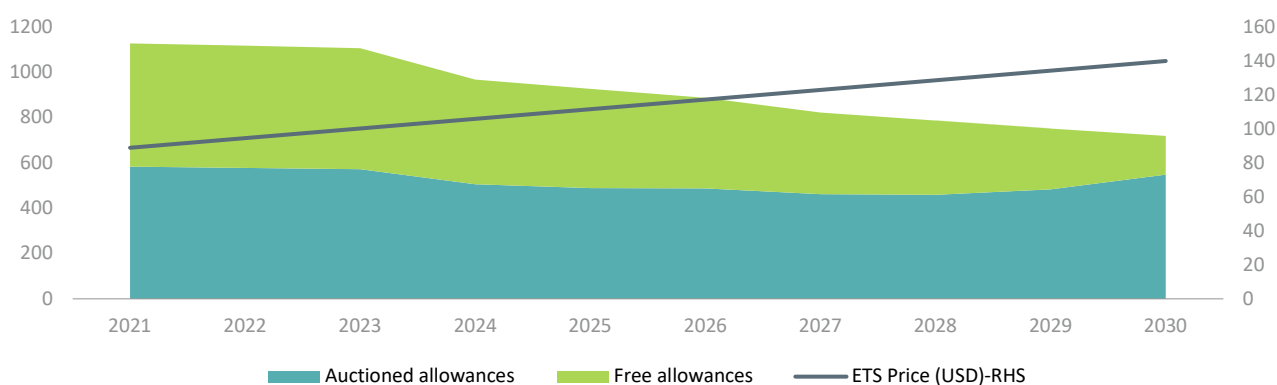
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3 / Carbon allowance accounting rules have lagged behind the growth of carbon markets

Carbon instruments are clearly having an increasing impact on companies' financials, with EU carbon prices now exceeding EUR 100 per tonne of CO₂, more than doubling from two years ago. There is a possibility that the cost of carbon compliance may rise significantly for businesses as a result of an expanding number of new regulations and levies. It is noteworthy that despite rising energy costs and a recent period of relative political and economic instability, the EU has decided to strengthen the ETS scheme, extending its scope: maritime transport and municipal waste incineration, as well as a separate carbon market for buildings and road transport²⁶. The targets have also been upgraded: now sectors covered by the ETS will have to cut their emissions to levels 62% below 2005's by 2030 – a significant increase on the current 43% reduction target²⁷. The total number of allowances in circulation will be reduced by a so-called "linear reduction factor". The EU agreed that the linear reduction factor will be increased (i.e., available allowances will be reduced) from the current 2.2% to 4.3% for the period 2024-2027 and to 4.4% for the period 2028-2030 (Figure 7)²⁸. The agreement will also gradually phase out free emission allowances and phase in the Carbon Border Adjustment Mechanism (CBAM) between 2026 and 2034 for the sectors in scope.

Figure 7: Outlook of the supply of auctioned and free allowances (MtCO₂e) and price forecast until 2030 (USD per Mt CO₂e)



Source: DWS and CROCI calculation based on the projections of EU Member States, which were compiled from the European Environment Agency. Trends and projections in the EU ETS in 2019, 2020 2021 and 2022. ETS Price estimates sourced from IEA GEC Model 2022.

The shift from free allocations to the auctioning of allowances (Figure 7) coupled with significantly tighter supply of emission allowances could make carbon-intensive production more expensive. For example, the aviation industry is currently receiving a significant portion of emission allowances for free, but this is set to end by 2026. The European Union has revised its carbon regulations for the aviation sector. The revised regulation reduces the number of these free allowances by 25% in 2024 and 50% in 2025, with the goal of eliminating them entirely by 2026 (Figure 8). Ryanair has already made environmental tax payments totaling more than EUR 540 million in 2019 and EUR 630 million in 2020 (an increase of 17%). This was equal to EUR 4.12 per passenger, or 11% of the average fare Ryanair charged in 2020 (Figure 9). By the middle of the next decade, the cost of flying could increase by about 30%, potentially contributing to the end of low-cost air travel in Europe²⁹, as a result of the implementation of the new regulations.

²⁶ The European Parliament (2022), Climate change: Deal on a more ambitious Emissions Trading System (ETS)

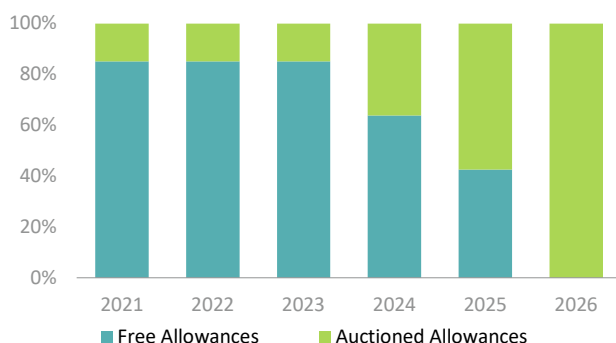
²⁷ The European Council (2022), 'Fit for 55': Council and Parliament reach provisional deal on EU emissions trading system and the Social Climate Fund

²⁸ The International Carbon Action Partnership (ICAP) (2022), EU reaches landmark provisional agreement on ETS reform and new policies to meet 2030 target

²⁹ AINonline (2022), EU's Decarbonization Policies Will Drive up Costs for Airlines, DWS and CROCI estimate 2023

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Figure 8: Evolution of free allowances in Aviation sector

Source: The European Commission, December 2022

Figure 9: Ryanair Environmental Taxes (EUR million)

	FY 2019	FY 2020
UK Air Passenger Duty (APD)	330	383
EU ETS Payments	115	150
German APD	88	85
Scandinavia APD	5	5
Austrian APD	5	6
Total	544	630
Cost per Passenger	EUR 3.82	EUR 4.12
% of average ticket cost	10%	11%

Source: Ryanair, Sustainability Report 2021

Further, according to the International Energy Agency, if the world achieves net zero emissions by 2050, carbon prices will increase to an average of USD 250 per tonne of CO₂ in developed nations and to USD 200 per tonne of CO₂ in China, Brazil, Russia, and other major economies (Figure 10)³⁰. In fact, Network for Greening the Financial System (NGFS), an umbrella group of the world's top central banks, projects that a carbon price of about USD 160 per tonne³¹ will be required by the end of the decade to encourage a transition to net zero emissions by 2050, indicating that the effects of the transition may be chaotic. The aforementioned factors will certainly have a greater impact on the financial statements of corporates.

Figure 10: CO₂ prices for electricity, industry, and energy production in selected regions by International Energy Agency climate scenario

USD per Mt CO ₂ e	2030	2040	2050
Stated Pledges Scenario			
Canada	54	62	77
Chile, Colombia	13	21	29
China	28	43	53
European Union	90	98	113
Korea	42	67	89
Announced Pledges Scenario			
Advanced economies with net zero emissions pledges ¹	135	175	200
Emerging market and developing economies with net zero emissions pledges ²	40	110	160
Other emerging market and developing economies	-	17	47
Net Zero Emissions by 2050 Scenario			
Advanced economies with net zero emissions pledges	140	205	250
Emerging market and developing economies with net zero emissions pledges	90	160	200
Other emerging market and developing economies	25	85	180

¹ Includes all OECD countries except Mexico.² Includes China, India, Indonesia, Brazil, and South Africa.

Note: The values are rounded. Source: IEA GEC Model 2022.

Source: The International Energy Agency (2022), Global Energy and Climate Model

30 The International Energy Agency (2022), Global Energy and Climate Model

31 The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) (2021), NGFS Climate Scenarios for central banks and supervisors

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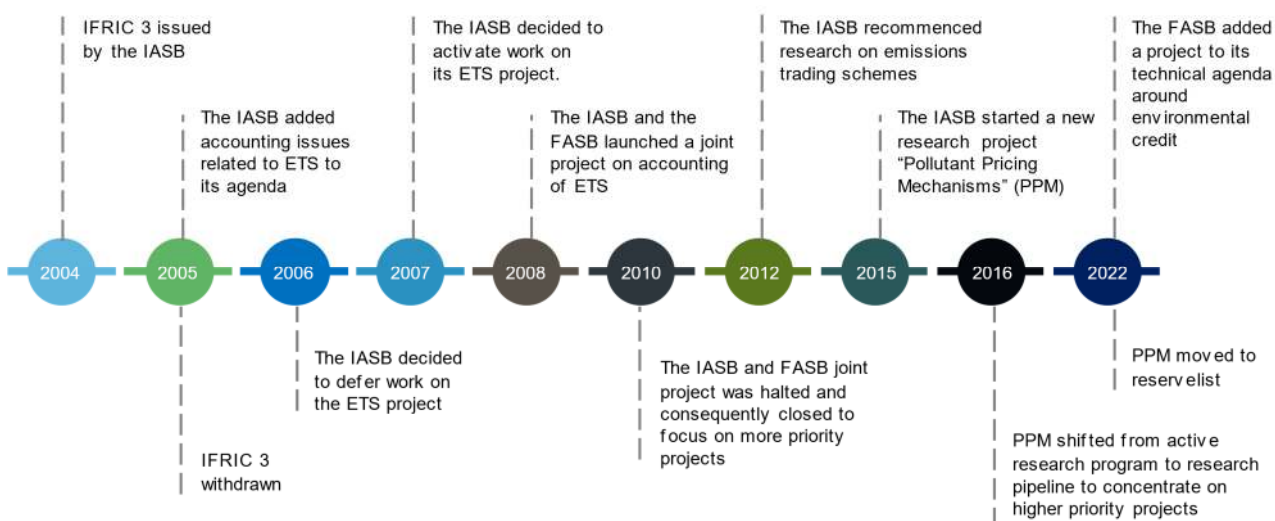
Accounting rules for carbon allowances need to be developed

On the accounting front, to address the recognition and measurement of emission allowances, the IASB issued IFRIC 3 Emission Rights in December 2004 even before the first ETS launched. The guidance was intended primarily to address the accounting for cap-and-trade schemes such as the EU ETS, with an acknowledgement that it may be relevant to other types of schemes. However, IFRIC 3 was withdrawn in 2005³² because many thought that the accounting mismatches that it created, both in recognition and measurement bases, were inappropriate.

Following the withdrawal of IFRIC 3, in 2008, the IASB launched a joint project with the FASB to find a better solution³³. This project once again focused on cap-and-trade schemes, and the Boards made some preliminary decisions about what the scheme's assets and liabilities were, when to recognise them, and how to measure them. However, the project was halted in 2010 due to time and resource constraints³⁴, which was understandable given the economic and policy environment and also because the impact on the financials of corporates was limited.

Again, in 2015, the IASB initiated a new research project named "Pollutant Pricing Mechanisms". However, despite a renewed push from regulators to revive and enhance the carbon market, the IASB once more shifted the project from the active research programme to the research pipeline in order to concentrate on higher priority projects³⁵. Separately, on May 25, 2022, the FASB added a project to its technical agenda³⁶ to improve the recognition, measurement, presentation, and disclosure requirements for participants in compliance and voluntary programs that result in the creation of environmental credits and for the non-governmental creators of environmental credits.

Figure 11: Timeline depicting the evolution of the ETS accounting system



Source: The International Financial Reporting Standards, DWS and CROCI

The EU ETS's economic and political surroundings have evolved dramatically over the past few years, but the accounting standard setters have failed to draw guidance on this subject, illustrating (Figure 11) the passive attitude taken by standard setters to develop emission allowances accounting frameworks.

³² IFRS (2005), Emissions Trading Schemes IASB meeting summary

³³ IFRS (2008), IASB Update (including IASB-FASB joint meeting)

³⁴ IFRS (2014), Staff Paper - Emissions trading schemes

³⁵ IFRS (2016), Staff Paper - Draft work plan 2017-2021

³⁶ The Financial Accounting Standards Board (FASB) (2022), Disclosure Framework: Disclosures—Interim Reporting

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4 / The economics behind emission allowances

Ultimately, accounting of the emission allowances within financial statements published by corporates should reflect the underlying economics and therefore allow full comparability across companies. In reality, General Accounting Principles serve different interests and stakeholders so tend not to give the realistic picture of a company's economics in which a global fundamental investor would be interested. Analysts and investors need to keep in mind these potential gaps and therefore adjust the pro-forma accounts, including for carbon allowances. As ETS schemes spread worldwide and the carbon price surges, these allowances gain in economic importance and so there is increasing urgency to account for them appropriately when assessing the real profitability and valuation of companies. So how should that be achieved? Emission allowances were created to establish a baseline for controlling companies' emissions. So their primary and most common purpose is to fund the emission obligations incurred during production under ETS schemes. This means that the related assets and liabilities are operating in nature and should be treated as such, i.e. incorporated within operating capital invested. Now let's dig further into the various cases encountered about emission allowances used to cover obligations:

- **Emission allowances granted for free:** There is no cash component but instead they are treated as a counterpart to the regulatory obligation to cover emissions generated during the production. In most cases, these free allowances and relating obligation are recognised at nil by companies. But in a few cases, companies recognise these free allowances at market value at the time of grant liability, with a 'government grant' as a counterpart. Economically, considering the absence of cash component, these assets and liabilities relating to free allowances clearly have no impact on the cash flow but neither should they be included in operating capital invested nor enterprise value, even if recognised by the company in its balance sheet.
- **Emission allowances purchased by the company to cover its obligations:** A purchase cash outflow is observed in this case and recognition of an asset is the contra of the decrease in cash or increase in debt in the balance sheet. This asset, i.e. purchased carbon allowances, is an operating net working capital (NWC) element in nature in our opinion: these allowances are needed to cover emissions generated while producing under ETS schemes, so operating in nature. These allowances are exhausted as consumed also, as opposed to an intangible asset which 'consumption' spread over several years. Finally, emission allowances don't necessarily have an 'expiration date'. As for the obligation to cover emissions generated during the production process and in excess of those covered by free allowances, it is also a (negative) NWC element. The obligation to cover emissions recognised by the company is de facto, partly offset by carbon allowances that have been granted for free or purchased by the company and would cancel out within NWC. What is then left are those emissions generated during the production that are not covered by any carbon allowances owned by the company and which accruals would be treated as a cash out in the (CROCI³⁷) cashflows (CF) like any short-term (ST) operating provision.

Now, emission allowances are sometimes held for trading purpose and to speculate on the future emission allowance prices. In this case they should be treated as derivative instruments rather than operating assets/liabilities held in the context of operating activities. Take Shell as an example. While emission certificates held for compliance purposes are classified as intangible assets, those held for trading purposes are classified as inventory³⁸. We believe that assets held for trading do not meet the economic criteria for classification as operating assets, unless the core business is about trading activity. In the case of BP, the cost of allowances purchased to cover a shortfall is recorded as an intangible asset, and if the group's emission allowances are risk-managed by the shipping & trading function, they are recorded on the balance sheet as inventory³⁹, though not material. Without a complete disclosure of the emission allowances held by the shipping and trading function, it is difficult to understand the underlying economics and, as a result, whether the classification is appropriate.

A third economic aspect of emission credit can be seen with Tesla as an example; the company generates revenues by producing and selling electric vehicles which allow emission avoidance compared to combustion engine vehicles. Emission avoidances are materialised into tradable emission credits earned by the company under various regulations related to zero-emission vehicles

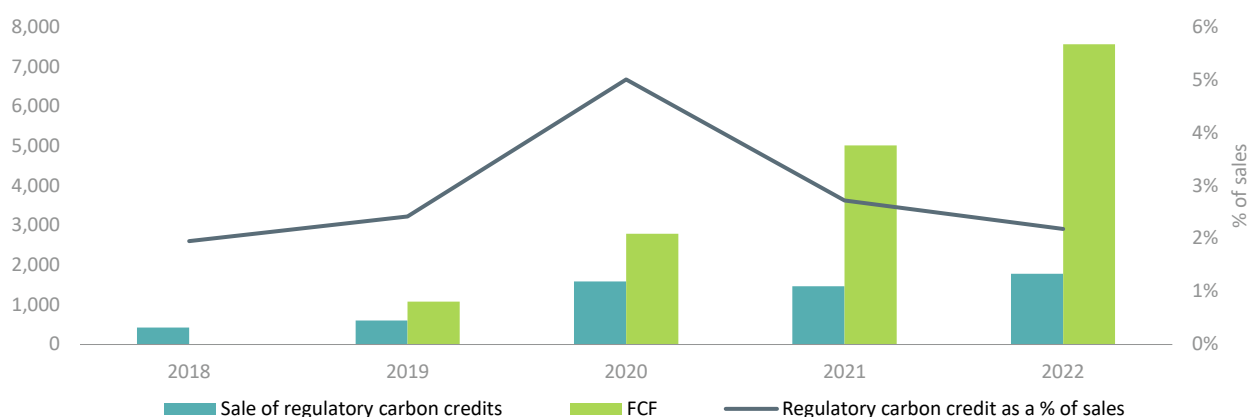
³⁷ CROCI is a registered trademark of DWS

³⁸ Shell Plc, 2021 annual report

³⁹ BP Plc, 2021 annual report

("ZEVs"), greenhouse gas, fuel economy and clean fuel. As per the company's disclosure, it generates regulatory credits using the following programmes: California LEV III NMOG +NO_x, US CAFE, US GHG, US Tier 3 NMOG + NO_x, Canada GHG, Quebec ZEV, EU CO₂ Pooling, and Switzerland GHG Credits and Low Carbon Fuel Standards credits. Tesla sells these credits to other regulated entities/companies who can use the credits to cover any of their gaps and thereby comply with emission standards and other regulatory requirements. Sales of these credits are recognized within 'automotive regulatory credits revenue' in the consolidated financial statements. They are now disclosed as a separate line item on the income statement after the regulator⁴⁰ required it. Previously, the company chose to combine the sale of government credits with vehicle sales. Tesla's regulatory carbon credit sales in 2022 were USD 1.8 billion, representing 23% of the company's reported free cash flow (FCF) of USD 7.6 billion for the year (Figure 12). These revenues are in the nature of operating revenues and cash flow as they are generated out of core operating activities of the company. But there is no asset recognised in the balance sheet of Tesla for those indirectly generated emission credits, other than existing and traditional operating assets relating to the Electric Vehicle (production) value chain.

Figure 12: Tesla's sale of regulatory carbon credit and FCF (USD million)



Source: Tesla Inc. financial statements, DWS and CROCI

As illustrated above, the purpose and the economics of emission allowances and obligations are not always (and only) to cover the company's own emissions.

Ultimately, the treatment of the relating accounting line items by financial analysts and investors must best reflect these underlying economics so that to allow

- 1/ calculation of the **real** return on capital generated by the company and its fundamental valuation ;
- 2/ a true comparison of companies' profitability and valuation ratios.

But adding to the complexity, the reality is that the accounting of these emission allowances and obligations by companies in their financial statements takes many different forms. Reconciling accounting statements with the underlying economics is exactly what CROCI has pursued as its main objective for more than twenty five years.

⁴⁰ Tesla Inc, SEC filing dated 8 Feb 2022

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5 / Appraisal of the various accounting approaches for emission allowances and liabilities

After looking at various companies to understand how they recognize emission allowances and obligations in their financial statements, our key observations are as follows:

- While most companies recorded granted (for free) allowances at nil cost, EasyJet and Michelin recorded these granted emission allowances at fair/market value on the grant date (Figure 13).
- Emission allowances related assets were recorded as intangible assets, inventory, or other current assets. Classification under inventory was associated with those allowances held for trading activity.
- All companies examined (except for E.ON) carried forward capitalized assets at cost without amortizing them; E. ON did so in accordance with IAS 38 (Intangible Assets) (Figure 13).
- Emission obligations were recognized when actual emissions occurred that give rise to an obligation. They were mainly recorded at carrying value of emission allowances in hand and/or forward contract price and/or market value.
- Emission allowance assets and liabilities were derecognized when the allowances were surrendered to regulators.

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Figure 13

	RWE AG	E.ON SE	Shell Plc
Balance sheet			
Initial recognition	Certificates are accounted for as intangible assets and reported under 'other current assets' (Recording of free allowances – not disclosed. Power generators generally do not receive free allowances).	Certificates are capitalized at cost at the date of acquisition and reported under current assets (Recording of free allowances – not disclosed. Power generators generally do not receive free allowances).	Certificates are initially recognized at cost and classified under intangible assets. (Nil in the case of granted allowances). Certificates that are held for trading are recognized at the lower of cost or net realizable value, and classified under inventory.
Subsequent recognition	Stated at cost and not amortized.	At amortized cost under IAS 38 (Intangible Assets).	Stated at cost and not amortized.
Emission obligations	A provision is recognized to cover the obligation to submit CO2 emission allowances and certificates for renewable energies to the respective authorities. — Covered by certificates: Valued at secured price of certificates — Uncovered emissions: Market price	A provision is recognized at the best estimate of the future settlement amount. Given emission assets are recorded at amortized cost, we guess, provisions are recognized only for uncovered emissions, which is at future settlement amount.	An emission liability is recognized under other liabilities when actual emissions occur that give rise to an obligation. — Covered by certificates: Value of emission certificates — Uncovered emissions: market value
Derecognition	Not disclosed. However, we guess the emission certificates and the emission liabilities are derecognized upon settling the liability with the respective regulator.	Not disclosed by the company. Ideally, assets would be derecognized gradually on amortization as per IAS 38 and emission liabilities would be derecognized on purchase of emission allowances to be settled.	The emission certificates and the emission liability are derecognized upon settling the liability with the respective regulator.
Income statement			
Provisions for emissions	Not disclosed by the company	Not disclosed by the company	Production and manufacturing expenses

Source: company filings, DWS and CROCI

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	BP Plc	Easy Jet Plc	Michelin
Balance sheet			
Initial recognition	Certificates are initially recognized at cost and classified under intangible assets. (Nil in case of granted allowance). — Emission allowances, whether acquired or generated, which are risk-managed by the shipping & trading function are recognized on the balance sheet as inventory	Certificates are held as current intangible assets. — Free allowance: recognized at fair value, with a corresponding liability recognized simultaneously. — Purchased allowances: at purchase price	Certificates are recognized as an intangible asset at their price on the transaction date. — Free allowances: a government grant is recognized in liabilities at price on the grant date. — Purchased allowances: at purchase price
Subsequent recognition	Stated at cost and not amortized.	Stated at cost and not amortized	Stated at cost and not amortized.
Emission obligations	Liabilities are based on the excess of actual emissions over the free allowances held or set baseline in tonnes (or other appropriate quantity) and are valued at the actual cost of any allowances that have been purchased and held for own use on a first-in-first-out (FIFO) basis, and, if insufficient allowances are held, for the remaining requirement based on the spot market price of allowances at the balance sheet date.	Recognized throughout the year as the liability is incurred through flying, is based on a weighted average cost of the free and purchased allowances estimated to be surrendered (on the FIFO basis). — Uncovered emissions: market value	The cost and liability corresponding to actual emissions and the income corresponding to the use of the government grant are accounted for using the price on the grant date.
Derecognition	Not disclosed. However, we guess the emission certificates and the emission liability are derecognized upon settling the liability with the respective regulator.	Both the related asset and liability are extinguished only at the point that the allowances are surrendered.	Not disclosed. However, we guess the emission certificates and the emission liability are derecognized upon settling the liability with the respective regulator.
Income statement			
Provisions for emissions	Not disclosed by the company	Not disclosed by the company	Not disclosed by the company

Source: company filings, DWS and CROCI

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6 / The three main alternative approaches

As shown in the tables above (Figure 13), different practices could result in variations in how emission allowance assets and liabilities are recognized. And these variations might result in inconsistent valuation metrics. Although the PWC survey⁴¹ found that there could be up to fifteen different approaches, three main approaches were typically used by reporting organizations (Figure 14). We have summarized them in the table below where we also provide CROCI team's view on the appropriate economic 'treatment' of related carbon allowances items, both at Cash Flow level and Net Capital Invested level. Refer to annex 1 for a bird's-eye view of the various accounting possibilities.

Figure 14

	Nominal Amount Approach	Initial Market Value Approach	Full Market Value Approach
Initial recognition – <i>Allocated allowances</i>	Recognize and measure at cost, which for granted allowances is nil.	Recognize and measure at market value at date of issue; corresponding entry to government grant.	
<i>CROCI view</i>	Free allowances exhibit the nature of government grants to meet certain operating expenses (carbon emission costs). In both, nominal amount approach and market value approach, impact of emissions to the extent of covered by free allowances should be nil. In case of market value approach, CROCI treats amortization of government grants to be an offsetting credit in the income statement, matching the accrual of the obligation to cover the emissions during the production process'.		
Initial recognition – <i>Purchased allowances</i>	Recognize and measure at cost.		
<i>CROCI view</i>	Purchased emission allowances exhibit the nature of a liquid instrument earmarked to fulfil certain operating obligations, hence from a CROCI perspective they should be netted off against related emission obligations.		
Subsequent treatment of allowances	Allowances are subsequently measured at cost, subject to review for impairment.	Allowances are subsequently measured at cost or market value, subject to review for impairment.	
<i>CROCI view</i>	Subsequent measuring of emission allowances at cost and then performing impairment reviews are in line with the CROCI approach. However, CROCI tends to eliminate any upward revaluation of the operating assets. Additionally, CROCI doesn't consider the revaluing of assets in accordance with associated obligations to be an overstatement because it would be neutral on a net basis.		
Subsequent treatment of government grant	Not applicable	Government grant amortized on a systematic and rational basis over compliance period.	
<i>CROCI view</i>	CROCI view highlighted in the first point (initial recognition)		
Recognition of liability	Recognize liability when incurred (i.e. as emissions are produced in excess of allowance allocated).	Recognize liability when incurred (i.e. as emissions are produced).	

41 International emissions trading association (2007) Trouble-Entry Accounting – Revisited

<i>CROCI view</i>	Stated treatments are in line with underlying economics (as highlighted in the first point) and accounting principles. CROCI would treat the net emission obligations as current operating liability, i.e., negative net working capital.	
Measurement of liability (at each period end)	The carrying amount of allowances in hand on a FIFO or weighted average basis + the market value of allowances to cover any excess emissions	The market value of allowances at each period end that would be required to cover actual emissions, regardless of whether the allowances are on hand or would be purchased from the market.
<i>CROCI view</i>	Measurement of liabilities at carrying value of allowances in hand plus market value of shortfall will approximate the cash outflow required to meet the obligation and is therefore in line with the CROCI philosophy. In the case of the full market value approach, though the closing market value could overstate or understate the cash required to settle the obligations, this will produce same results if the valuation of emission allowances in hand (assets) follows the same methodology. CROCI would treat the revaluation loss/ gain of emission obligations as operating income/ expenses on par with any other short term operating liabilities.	

CROCI adjustments aim at neutralizing the inconsistencies in the above three alternative and most common accounting methods. So, the intention is that, ultimately, CROCI profitability and valuation metrics should be nearly identical whatever the accounting approach followed by companies. However, CROCI's own preferred accounting method would be for companies to record their emission allowances/obligations on an 'Initial Market Value approach', as this could help investors understand the intensity of carbon emissions in financial terms consistently across all companies (irrespective of whether it is free or purchased). Investors could easily simulate the effects of a change in regime—for instance, from freely allocatable to auctioned—and an increase or decrease in allowance prices—with the help of this information.

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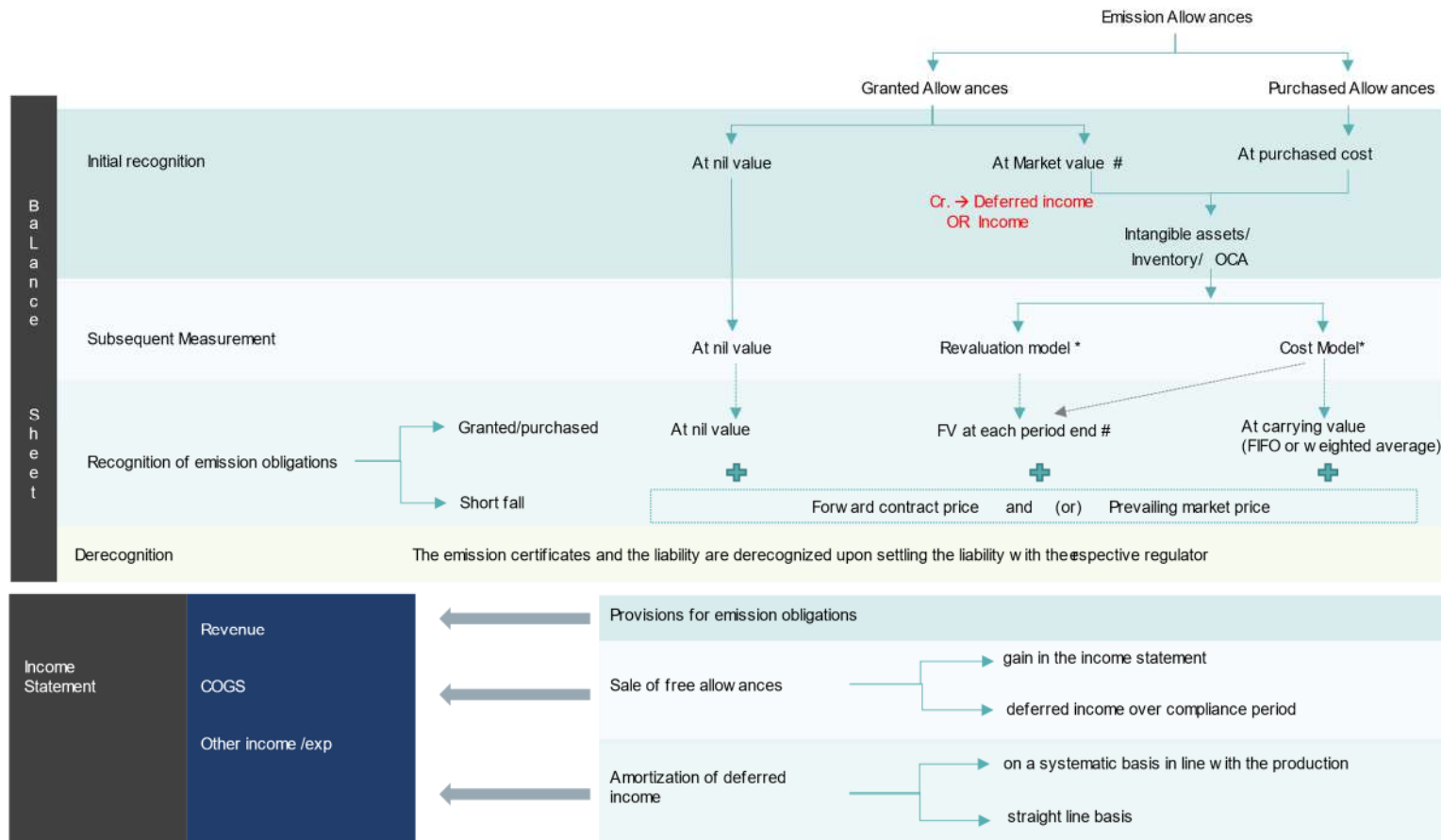
7 / The way forward and expectations: Towards a true and fair accounting

Emission allowances and other forms of carbon pricing are important tools in the transition to a low-carbon economy and will be required by most companies to address the climate transition. To reflect a "true and fair view" of corporate performance, financial reporting standards will need to bring more transparency to the potential impact of climate transition (including carbon tariffs, emission allowances, etc.) on organisations, including any impact on going concern.

However, until we get a clear directive from those who set accounting standards, investors and asset managers should ask companies about their exposure to carbon emission allowance units. The following information should be included by the company in its financial report:

- Appropriate disclosures on actual emissions including the emissions from activities and countries covered ETS Schemes or Carbon Tax.
- Accounting principles and underlying assumptions for recording and valuing emission allowances
- Number of emission allowances units that a company is required to surrender for the compliance period
- Free emission allowances granted to the company for the compliance period, with market value on the allocation date
- Emission allowances that the company purchased, including the cost of the purchase, to meet regulations, voluntarily reduce emissions, and/or engage in market trading
- Details on the unutilized emission allowances (both free and purchased) at the end of the reporting period
- Details on the forward purchases and sale arrangements with regards to emission allowances

8 / Annex 1: Birds-eye view of emission allowances accounting approaches



as per IFRIC 3; * Subject to review for impairment; source: company filings, PWC survey

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