



PROMOTING BIOGENIC CARBON CAPTURE AND STORAGE IN THE NORDIC REGION THROUGH CARBON MARKETS

When and how to cooperate under Article 6 of the Paris Agreement?

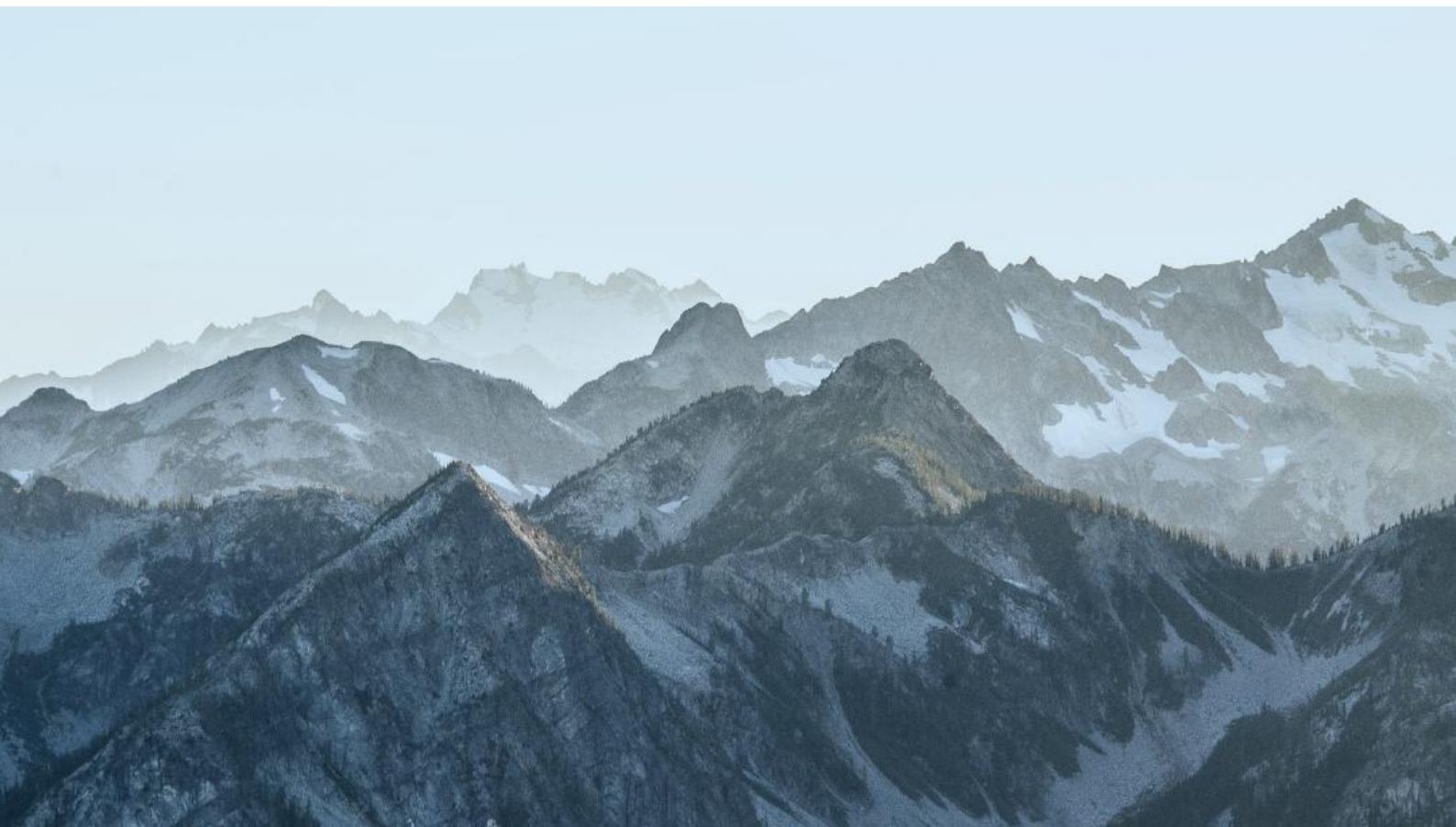
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Summary

This paper explores the opportunities and challenges of promoting biogenic carbon capture and storage (bio-CCS) in the Nordic region with carbon credits.

Chapter 1 provides an overview of the role of bio-CCS in combatting climate change and the principles of market-based cooperation involving carbon credits, including their generation, potential authorisation as internationally transferred mitigation outcomes (ITMOs) under the Paris Agreement, and possibilities for use for compliance and voluntary purposes. Bio-CCS generates removals by capturing CO₂ from biogenic sources and storing it durably. Nordic countries lead in bio-CCS deployment: Denmark, Finland and Sweden have substantial existing biogenic CO₂ sources, while Norway, Denmark, and Iceland provide geological storage potential. Carbon credits can mobilise finance for removals from bio-CCS in cases where surplus removal potential exists beyond what would be incentivised by national policies and public support and where there are buyers willing to purchase these credits. These removals could count towards the host country's climate change mitigation target or, if the host country authorises these removals as ITMOs, they would represent mitigation beyond the host country's national targets. A host country must apply corresponding adjustments to its emissions balance for all ITMOs that it authorises and first transfers, thus excluding them from being counted towards the host country's targets. This makes ITMOs suitable for uses that require a unique claim, including towards other countries' targets or other types of international compliance or for voluntary offsetting or a contribution to global ambition-raising.

Chapter 2 illustrates when and how carbon credits could be used to mobilise finance for bio-CCS, with or without state support. Where climate change mitigation is the only benefit associated with capturing and storing biogenic CO₂, bio-CCS is financially viable only if these mitigation benefits can be monetised, for example, through state support and/or the sale of carbon credits. Carbon credits can be issued for removals that would not happen without carbon credit revenue. The amount of carbon credits generated depends on the crediting baseline. Combining state support and carbon credit revenue can fund a greater amount of removals, compared to a situation where removals are funded with only state support or carbon credit revenue, provided that the funding is not used solely for boosting profits and/or reducing the total amount of state support available for bio-CCS activities. Governments should calibrate bio-CCS subsidies so that the combined revenue from subsidies and carbon credits is sufficient to make projects viable. Key considerations include setting appropriate crediting baselines to reflect additional mitigation, preventing over-subsidisation, and balancing funding sources, as demonstrated in case studies like Ørsted and Microsoft's bio-CCS project. Transparent reporting and robust claims, such as contribution claims, can align corporate and national climate goals while maintaining market integrity.

Chapter 3 describes relevant international requirements and national considerations for engaging in cooperation involving ITMOs. Engaging in ITMO cooperation under Article 6.2 of the Paris

Agreement requires countries to establish systems for authorising, tracking, and reporting ITMOs while ensuring environmental integrity and preventing double counting. National arrangements, including legislation, governance frameworks, and registries, must align with international guidance covering ITMO authorisation, transfer, and reporting, with oversight from technical expert reviews. Bilateral or multilateral agreements can coordinate ITMO transactions with NDCs and sustainable development goals, while activity-level contracts between buyers and sellers define transaction terms.

Chapter 4 explores relevant EU targets and legislation, and their implications to the opportunities and challenges for EU Member States to engage in cooperating involving ITMOs. The EU aims to achieve net-zero emissions by 2050 and a 55% reduction by 2030 compared to 1990. The Carbon Removals and Carbon Farming (CRCF) Regulation establishes a framework for certifying removals that should contribute to EU targets. As of January 2025, however, removals from bio-CCS cannot be counted towards the existing EU targets, which cover the the land use, land use change and forestry (LULUCF), Effort-Sharing Regulation (ESR) and emissions trading system (ETS) sectors. The joint nature of the EU NDC means that any Article 6 cooperation involving corresponding adjustments to the EU NDC must be managed at the EU level. While the EU intends to meet its 2030 NDC without international credits, its cooperation with countries like Norway, Iceland, Liechtenstein, and Switzerland falls under Article 6.2. This requires the EU to establish EU-level arrangements for Article 6 implementation. As of January 2025, these are not yet in place. Existing and planned EU legislation does not enable EU Member States or non-state entities to engage in any authorisation, transfer or use of ITMOs that would require corresponding adjustments to the EU emission balance, such as hosting ITMO-generating activities or using ITMOs towards the EU NDC. Member States and non-state actors can only acquire ITMOs from non-EU Member States for use for other international mitigation purposes, such as towards national targets or voluntary offsetting.

Chapter 5 concludes that removals from Nordic bio-CCS activities could be issued as carbon credits under various carbon crediting programmes and sold to buyers that wish to voluntarily contribute to global efforts to scale up removals. Nordic countries can cooperate to promote consistent reporting and accounting of removals from bio-CCS, paving way for their potential authorisation as ITMOs and possible integration into EU policies and targets.

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The views presented in this paper are of the authors' and do not represent the position of the Swedish Energy Agency.

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Abbreviations

AEA	Annual Emission Allocation
AEF	Agreed Electronic Format
AI	Annual Information
A6.4ER	Article 6.4 Emission Reduction
BAU	Business As Usual
BECCS	Bioenergy Carbon Capture and Storage
Bio-CCS	Biogenic Carbon Capture and Storage
BTR	Biennial Transparency Report
CARP	Centralized Accounting and Reporting Platform
CCQI	Carbon Credit Quality Initiative
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CDR	Carbon Dioxide Removal
CMA	Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
CO ₂	Carbon Dioxide
COP	Conference of The Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CRCF	Carbon Removals and Carbon Farming
DACCS	Direct Air Carbon Capture and Storage
EOR	Enhanced Oil Recovery
ESR	Effort-Sharing Regulation
ETS	Emissions Trading System
EU	European Union
EU ETS	EU Emissions Trading System
EUA	European Union Allowance
GHGs	Greenhouse Gases
ICVCM	Integrity Council for the Voluntary Carbon Market
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IR	Initial Report
ISO	International Organization for Standardization
ITMO	Internationally Transferred Mitigation Outcome
LULUCF	Land Use, Land Use Change and Forestry
MCUs	Mitigation Contribution Units
MtCO ₂ e	Million Tonnes of Carbon Dioxide Equivalent
NDCs	Nationally Determined Contributions
NGO	Non-governmental Organisation
OIMP	Other International Mitigation Purposes
PACM	Paris Agreement Crediting Mechanism
RI	Regular Information
SBTi	Science-Based Targets Initiative
tCO ₂ e	Tonnes of Carbon Dioxide Equivalent
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

1.1. The role of bio-CCS in combatting climate change

The Paris Agreement includes a collective goal to limit temperature rise to 1.5°C. According to the Intergovernmental Panel on Climate Change (IPCC), this requires limiting the accumulation of greenhouse gases (GHGs) in the atmosphere through pathways that halve global net carbon dioxide (CO₂) emissions by 2030¹ and achieve a balance between global emissions and removals² around 2050 (IPCC, 2018). This, in turn, requires both accelerating CO₂ and other GHG emission reductions and enhancing the removal of CO₂ from the atmosphere. Countries' current Nationally Determined Contributions (NDCs)³ fall critically short of the required efforts; even if fully implemented, global GHG emissions⁴ are estimated to *increase* by almost nine per cent by 2030 compared with 2010 levels⁵ (UNFCCC, 2023).

To keep the Paris Agreement's temperature goal within reach, it is imperative to accelerate the pace and scale of emission reductions around the world. However, even with drastic emission reductions, it is not feasible to fully eliminate all emissions for technical, financial, or other reasons, especially in the short-to-medium term. Removing GHGs from the atmosphere therefore has a key role in achieving the 1.5°C goal in the short, medium and long term (Bednar et al., 2023). On the way to net zero, removals have a complementary role alongside deep emission reductions in reducing global net emissions and minimising the overshoot of the 1.5°C-aligned carbon budget. An additional tonne of removals has an equivalent impact on global net emissions as an additional tonne of emission reductions (Möllersten et al., 2024). To achieve global net zero, removals are needed to counterbalance remaining emissions and, post-net-zero, removals can contribute to reversing the overshoot and achieving a global state of net negative emissions, if removals exceed remaining emissions.

Human activities can enhance the removal of CO₂ from the atmosphere, for example, by increasing the sequestration of CO₂ by forests and other natural carbon sinks, capturing CO₂ from the combustion of biomass or other biogenic material (such as organic waste), or capturing it directly from the atmosphere.⁶ Importantly, to have a lasting impact on climate change mitigation, the

¹ Compared with 2010 levels

² IPCC (2022) refers to this state as GHG neutrality or net zero GHG emissions.

³ NDCs may be unconditional (achieved with domestic resources) or conditional (conditional to receiving international support) or a combination of the two. In this report, an NDC refers to a unconditional NDC, unless otherwise specified.

⁴ Excluding emissions and removals from land use, land use change and forestry

⁵ This represents a 2% reduction in global emissions compared with current policy projections (UNEP, 2023).

⁶ IPCC (2022) defines "anthropogenic removals" as "the withdrawal of GHGs from the atmosphere as a result of deliberate human activities. These include enhancing biological sinks of CO₂ and using chemical engineering to achieve long-term removal and storage. Carbon capture and storage (CCS), which alone does not remove CO₂ from the atmosphere, can help

sequestered or captured carbon needs to be durably stored. Storage types differ in terms of their durability and risk of reversal, ranging from some natural sinks with relatively short-term storage capacity (of some years or decades) - and an inherent risk of reversal - to long-term storage, for example in underground geological formations or subsurface carbon mineralisation in igneous rock, of hundreds, thousands or even millions of years, with negligible risk of reversal.

The IPCC (2022) defines “Carbon Dioxide Removal” (CDR) as “anthropogenic activities removing CO₂ from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical CO₂ sinks and direct air carbon dioxide capture and storage (DACCS) but excludes natural CO₂ uptake not directly caused by human activities”.

In this paper, the term “removal” refers to removals of CO₂ and other GHGs that are associated with durable storage. Such removals are sometimes referred to as “permanent removals” or “negative emissions”. This paper focuses on removals achieved through bio-CCS, that is, capturing CO₂ from biogenic sources and durably storing the captured CO₂ in geological formations. These are sometimes referred to as “technical removals”, “industrial removals” or “engineered removals”. Bio-CCS results in carbon removal when it is based on sustainable biomass, meaning that the regrowth of the biomass stock is ensured. Bio-CCS can be applied in various sectors: waste (solid and liquid), pulp and paper, energy, cement (biomass co-firing), ethanol production and other industrial biomass processing.

The vast majority of existing bio-CCS plants in the world are linked to ethanol production where a fermentation process generates highly concentrated CO₂ of high purity (IEA, 2024). In many of the cases, the resulting CO₂ is utilised for enhanced oil recovery (EOR) which generates financial returns. Bio-CCS in association with biomass combustion is an emerging technology with some of the first demo plants about to be implemented (Global CCS Institute, 2024; Smith et al., 2024).

The carbon capture and storage (CCS) component of bio-CCS activities generates removals at an additional cost to the project owner without generating additional financial benefits, except in the case of EOR. Currently, the only current potential sources of revenue for removals from bio-CCS activities (without EOR) are government subsidies and revenue from the sale of carbon credits (Möllersten and Zetterberg, 2023).

Bio-CCS is a relatively expensive activity compared with traditional emission reduction and land-based removal options but it has lower marginal abatement costs than important mitigation

reduce atmospheric CO₂ from industrial and energy-related sources if it is combined with bioenergy production (BECCS), or if CO₂ is captured from the air directly and stored (DACCS)”.

options for some of the hardest-to-abate emissions, such as converting to some advanced biofuels or synthetic e-fuels in transportation (Bednar et al., 2023).

1.2. Promoting biogenic carbon capture and storage in the Nordic region

The Nordic countries want to lead by example. Besides committing to NDCs under the Paris Agreement, individually or as part of the European Union (EU)⁷, they have set ambitious national interim and long-term targets that go beyond these NDCs. While most Nordic national targets aim to achieve net zero or even net negative emissions, they differ in terms of scope and timeframe (Lind et al., 2023). The Nordic countries have also agreed to cooperate to step up efforts towards carbon neutrality in the Nordic region and globally (Nordic prime ministers, 2019).

To achieve their targets, the Nordic countries must first and foremost implement deep and fast emission reductions. However, even with steep emission cuts, some hard-to-abate emissions will remain in 2050, for example in industry and agriculture. To achieve net zero or carbon neutrality at national level⁸, any remaining emissions need to be counterbalanced.

In the Declaration on Nordic Carbon Neutrality, Nordic countries have agreed to intensify Nordic cooperation to reduce emissions and enhance removals (Nordic prime ministers, 2019). One area of cooperation is the further development and deployment of bio-CCS, conducting research to resolve the remaining technical challenges and developing business models for its implementation.

In the Nordic region, there is significant, but unevenly distributed potential for removals through bio-CCS. Cooperation between Nordic countries is key for unlocking this potential. Most of the existing large point sources of biogenic CO₂ emissions (for example from biomass-based heat and power generation, pulp and paper production, and biogenic waste incineration⁹ are located in Finland and Sweden, while the storage potential is located mainly offshore Norway and Denmark and Iceland's basaltic rock deposits (Möllersten et al., 2023).

Since the capture and storage of biogenic CO₂ incurs costs and does not generate revenue, it is not financially feasible without state subsidies or other financial incentives (Honegger et al., 2021;

⁷ The EU has a joint NDC for 2030 under the Paris Agreement, and an EU-wide target to achieve climate neutrality by 2050. Under EU legislation, EU Member States, including Denmark, Finland and Sweden, have individual mitigation targets for emissions that are not covered by the EU Emissions Trading System (EU ETS). EU ETS emissions are covered by an EU-wide target. Norway and Iceland, though not EU Member States, are cooperating closely with the EU by participating in the EU ETS and aligning their mitigation actions in sectors outside the EU ETS (European Commission, 2019).

⁸ Nordic countries have used net zero, zero net and carbon neutrality interchangeably. While net zero and carbon neutrality are synonyms at the global level, they are generally not synonymous at the sub-global levels. Note that the requirement to counterbalance remaining emissions with removals to achieve net zero applies to the global level but not necessarily to the national level. For example, Sweden's "zero net" target includes the possibility to use international carbon credits, including those based on emission reductions, to counterbalance remaining emissions (Swedish Environmental Protection Agency, n.d.).

⁹ In waste incineration, it is common to have a mix of waste with organic and fossil origin. Consequently, the CO₂ captured from such processes will in many cases consist of a mixed fossil/biogenic CO₂ stream.

Zetterberg et al., 2021). In the EU, the Innovation Fund has allocated grant funding to be used for the development of bio-CCS pilot activities. Nordic countries are also actively supporting bio-CCS as part of their efforts to meet their national climate targets (Möllersten et al., 2023). Norway has provided support for a waste incineration plant that has a bio-CCS component, as well as for facilities to geologically store CO₂ that has been captured by CCS activities. Denmark supports bio-CCS through national funds and, through another public fund, the Danish state is a co-owner of CO₂ exploration and storage licences in Denmark (Danish Energy Agency, 2024, n.d.). Sweden is preparing a state support system for bio-CCS based on reverse auctions (and intends to pilot international trading of removals from technologies such as bio-CCS with Switzerland (Swedish Energy Agency, 2022, 2023; European Commission, 2024b). Iceland is host to the world's largest direct air capture plant and is supporting the development of CO₂ storage as a service (Climeworks, 2024). Finland is planning to set a target for the use of “technological sinks” and introduce a reverse auction for “negative emissions”¹⁰ or similar mechanism. Where applicable, a “carbon sequestration”¹¹ market” will be used to fund this mechanism (Finnish Government, 2023).

1.3. Promoting biogenic carbon capture and storage with market-based cooperation

Market-based cooperation is a potential means to mobilise finance to support bio-CCS. Entities can generate carbon credits by reducing emissions or removing CO₂ from the atmosphere and receive revenue from selling these credits on carbon markets.¹² Michaelowa et al. (2023) describe how international carbon markets can promote removals. Public and private actors can buy carbon credits to support mitigation outside their value chains or boundaries, voluntarily or to comply with legal obligations. This mitigation could support existing national mitigation targets or global ambition-raising beyond these targets. Through market-based cooperation, countries and companies can support more mitigation than what they could achieve on their own, provided that they ensure the integrity of carbon credits, and their use and related claims. This means that carbon credits must represent real and additional mitigation, they are used to complement, not to substitute, other mitigation efforts, and related claims are clear, truthful and not misleading.

¹⁰ Technological sinks and negative emissions refer to removals achieved through the capture and durable storage of CO₂ from the atmosphere (DACCS) or from biogenic sources (bio-CCS). These activities are sometimes referred to as technological, industrial or engineered carbon removal activities.

¹¹ Carbon sequestration may refer to enhancing the removal of CO₂ from the atmosphere through land-based activities, such as afforestation, and/or generating removals from “industrial” removal activities, such as bio-CCS and DACCS.

¹² Carbon markets also include the trading of emission allowances, such as EU Allowances under the EU Emissions Trading System, but this discussion paper focuses on markets for carbon credits generated under baseline-and-credit systems (see Michaelowa et al. (2019) for a detailed description of carbon market approaches implemented to date).

1.3.1. Generating carbon credits

A carbon credit represents a tonne of carbon dioxide equivalent (tCO_{2e}) of GHG emission reductions or removals (hereafter jointly referred to as mitigation outcomes) that are additional, meaning that they would not have happened without the incentive from carbon credits. The first set of internationally agreed criteria and processes, designed to ensure the environmental integrity of carbon credits, were adopted in 2001 under the Kyoto Protocol.¹³ Ensuring environmental integrity means ensuring that the generation and use of carbon credits contribute to, and at least do not undermine, global mitigation efforts. While the high-level integrity criteria for carbon credits (Box 1) have remained relatively constant over time, the tools and methodologies that are used to operationalise these criteria and apply them to a diverse and broadening range of activities are improved and developed on an ongoing basis.

Box 1. Integrity criteria for carbon credits

- **Demonstration of additionality**, meaning that the mitigation outcomes would not have happened without the incentives from the sale of carbon credits, considering all financial sources (including any subsidies), as well as all relevant laws, regulations and policies.
- **Robust crediting baseline**, meaning a plausible and conservative scenario for emissions and removals without the mitigation activity, considering uncertainties and relevant national laws and policies. Carbon credits are quantified relative to the baseline.
- **Robust monitoring and reporting**, meaning that the activity's emissions and mitigation outcomes are quantified based on appropriate and conservative approaches for measurement and estimation of emissions and removals that do not overestimate the additional mitigation outcomes attributed to the activity, including by taking into account potential leakage.
- **Third-party validation and verification**, meaning the ex-ante assessment of a mitigation activity (validation) and ex-post assessment of mitigation outcomes (verification) by a competent independent third-party against relevant criteria.
- **Permanence**, meaning that the mitigation outcomes are durable and any reversals are fully addressed.
- **Avoidance of double counting**, meaning that the same mitigation outcome is not issued as more than one carbon credit ("double issuance"), the same carbon credit is not used more than one time ("double use") or the same mitigation outcome is not claimed by more than one entity ("double claiming").
- **Environmental and social safeguards**, meaning that activities that generate carbon credits should not cause negative environmental and social impacts.

Furthermore, carbon crediting programmes that issue carbon credits should meet criteria relating to robust governance and transparency.

Sources: (Ahonen, Berninger, et al., 2022; Laine et al., 2023; ICVCM, 2024; CCQI, n.d.)

¹³ See Michaelowa et al. (2019) and Ahonen, Kessler, et al. (2022) on the evolution of international rules for carbon credit generation.

Carbon credits are issued by carbon crediting programmes for emission reductions or removals from activities that meet the programme's criteria and apply methodologies approved under the programme (see Figure 1). While all reputable crediting programmes issue carbon credits against common criteria (see Box 1), they differ in terms of their methodological approaches, sectoral or geographic scopes and governance, as well as their (perceived) credibility. Some crediting programmes are governed by United Nations bodies (e.g. the Paris Agreement Crediting Mechanism, see Box 2), others by bilateral committees (E.g. Joint Crediting Mechanism), national authorities (e.g. Australian Carbon Credit Unit Scheme) or private organisations (e.g. the Verified Carbon Standard and the Gold Standard). The number of carbon crediting programmes has increased significantly over time and, in the Paris era, several programmes specialised in removals have emerged (e.g. Puro.Earth and Isometric). The first methodology applicable to bio-CCS was introduced by Puro.Earth in 2021, and further methodologies have been developed by the Gold Standard, the CCS+ Initiative (via the Verified Carbon Standard) and under the EU Carbon Removals and Carbon Farming (CRCF) certification framework.

Box 2. Carbon market cooperation under Article 6

Article 6 recognises that Parties may choose to engage in market-based cooperation to allow for higher ambition and promote sustainable development. **Article 6.2** provides for cooperation involving internationally transferred mitigation outcomes (ITMOs), while **Article 6.4** establishes an international crediting programme (Paris Agreement Crediting Mechanism, PACM).

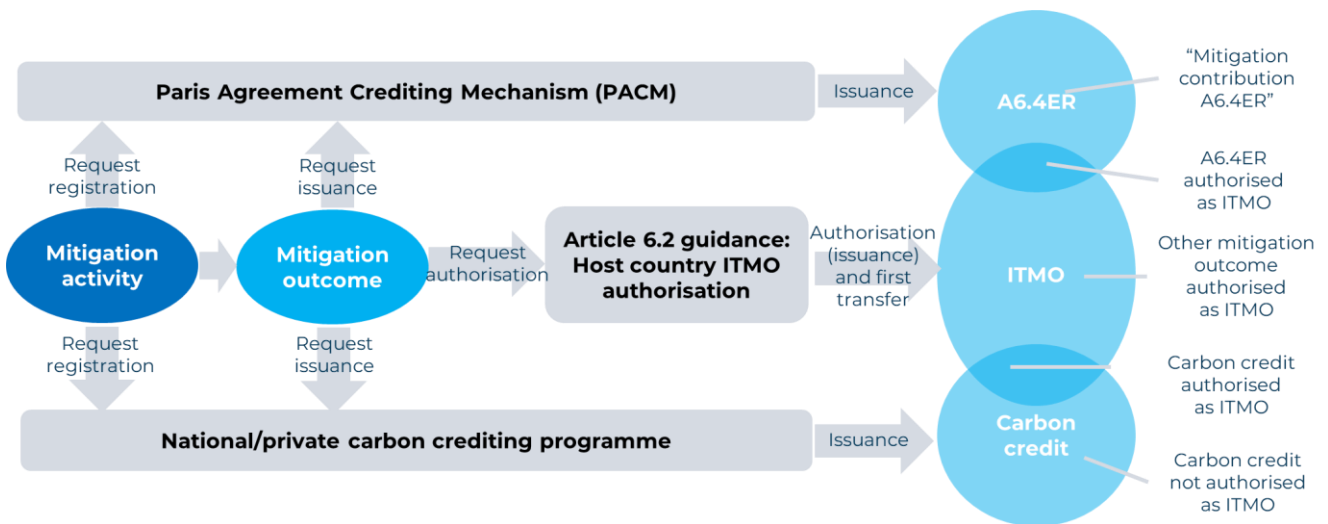
ITMOs are real, verified and additional emission reductions and removals that are measured in tCO₂e or other non-GHG metrics and generated from the year 2021 onwards, authorised and transferred by the host country for use towards an NDC, for international mitigation purposes or for other purposes. Countries engaging in cooperation involving ITMOs are required to ensure environmental integrity and transparency, apply robust accounting, including to avoid double counting, and promote sustainable development in accordance with international Article 6.2 guidance. Host countries account for first-transfers of ITMOs and acquiring countries account for ITMO use towards NDCs through corresponding adjustments in their respective emissions balances.

The **PACM** issues carbon credits (Article 6.4 Emission Reductions, A6.4ERs) for mitigation outcomes that meet the mechanism's requirements. The mechanism's international Supervisory Body is responsible for developing and implementing detailed standards and procedures as well as for approving methodologies, the registration of activities and the issuance of A6.4ERs. Host countries may authorise A6.4ERs as ITMOs in line with the Article 6.2 guidance. A6.4ERs that are not authorised as ITMOs are referred to as "mitigation contribution units" (MCUs) and they may be used, inter alia, for results-based climate finance, domestic mitigation pricing schemes or domestic price-based measures, as well as voluntary mitigation contributions.

In addition to the core established carbon credit criteria (Box 1), ITMOs and A6.4ERs must also meet further requirements, such as setting baselines below business-as-usual.

The Paris Agreement's Article 6 enables public and private entities to engage in cooperation involving internationally transferred mitigation outcomes (ITMOs) and establishes the Paris Agreement Crediting Mechanism (PACM) (see Box 2 and Figure 1). Participating Parties (i.e.

countries or regional economic integration organisations and their member states)¹⁴ are responsible for ensuring environmental integrity and robust accounting of cooperation involving ITMOs, in accordance with international Article 6.2 guidance. A key feature of ITMOs is that they represent emission reductions or removals that are not counted towards the host country’s NDC and are thus available to be exclusively counted for the buyer. Host countries decide which emission reductions and removals they authorise as ITMOs, and under which conditions. The PACM is a mechanism for assessing emission reductions and removals against international requirements, overseen by its Supervisory Body (UNFCCC, n.d.). Carbon credits issued under PACM can, but do not have to be, authorised as ITMOs. Under the PACM, the approval of new methodologies – potentially also for bio-CCS – could start in 2025.



Source: Authors

Figure 1. Options for generating carbon credits and authorising ITMOs

Since the emergence of carbon crediting in the late 1990s, stakeholders have questioned the ability of carbon crediting programmes to consistently ensure the integrity of carbon credits. To address this challenge, carbon crediting programmes regularly review and update their standards and methodologies, various initiatives assess carbon crediting programmes and methodologies, and private carbon rating agencies assess individual carbon credit-generating activities. In the voluntary carbon market space, stakeholder-led initiatives such as the CCQI and ICVCM seek to assess carbon credit integrity at the level of carbon crediting programmes and methodologies. In 2026, the European Commission will start to recognise carbon crediting programmes that meet the requirements of CRCF Regulation, enabling these programmes to certify removals against methodologies approved by the Commission (see Box 4). In the compliance space, regulators can

¹⁴ In this report, “Parties” and “countries” are used interchangeably, although Parties could also include regional economic integration organisations and their member states, such as the EU which is itself a Party to the Paris Agreement. In addition to the EU being a Party, each EU Member State is also a Party to the Paris Agreement.

specify eligibility criteria for carbon credits that can be used for compliance. For example, carbon credits from programmes that are deemed to meet the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA) Emissions Unit Eligibility Criteria can be used by airlines for CORSA compliance.

1.3.2. Using carbon credits and internationally transferred mitigation outcomes

Carbon credits can be used for various purposes, including to comply with international targets and national obligations or to voluntarily offset emissions or contribute to climate action. However, not all types of carbon credits are suitable for all types of uses. Their suitability for specific uses is determined by aspects such as the carbon crediting programme used and whether the underlying emission reductions or removals are authorised as ITMOs. ITMOs can be used for international compliance and they are also suitable for other purposes, such as voluntary offsetting and contributions to global ambition-raising. Carbon credits that are not authorised as ITMOs can be used to voluntarily contribute to the host country's mitigation target and they can also be suitable for domestic compliance, provided that they are reflected in the national GHG inventory and are within the scope of the target.

In the compliance space, the Paris Agreement enables governments to use ITMOs towards their NDCs. Relevant authorities, such as the regulators of emissions trading systems or carbon taxes, decide whether to accept carbon credits towards compliance, and on what conditions. For example, Swiss fossil fuel importers are required to purchase ITMOs and surrender them to the Swiss government as a contribution towards meeting the Swiss NDC, while companies covered by Singapore's carbon tax may use ITMOs to offset up to 5% of their taxable emissions (Singapore National Environment Agency, 2023; FOEN, 2024). International airlines will need to use ITMOs to meet their obligations for carbon-neutral growth under CORSA. These ITMOs must fulfil CORSA Emissions Unit Eligibility Criteria (International Civil Aviation Organization, 2019).

In the voluntary space, in the Kyoto era, non-state actors used carbon credits to counterbalance ("offset") emissions relating to e.g. their operations or products, often to claim that they are "carbon neutral" as a result. Corporate net zero guidelines and standards allow for limited use of carbon credits that are based on permanent removals to "neutralise" any value chain emissions that remain in the net zero target year after an organisation has achieved its long-term net-zero reduction target for its value chain emissions. Using carbon credits for neutralisation to achieve corporate net zero is also a form of offsetting, given that it is defined as counterbalancing emissions (ISO, 2023; Gold Standard, 2024). Also some governments, such as Sweden, have purchased carbon credits for voluntary offsetting, delivering results-based climate finance and/or raising ambition (Ahonen,

Inclan, et al., 2023). In the Paris era, Sweden is buying ITMOs towards its national climate target.¹⁵ In the Paris era, contribution claims are emerging as an alternative to offset claims. Contribution claims convey that an organisation has contributed to global or national mitigation efforts by voluntarily supporting mitigation outside its value chain, without implying that this support counterbalances the organisation's value chain emissions (SBTi, 2024b).

Stakeholders have raised concerns that the voluntary use of carbon credits has resulted in greenwashing and is being used as an excuse to avoid necessary reductions in own emissions. In the compliance space, the latter concern is addressed by limiting the amount of carbon credits that can be used to substitute own emission reductions. While the voluntary use of carbon credits *per se* is unregulated, corporate use of carbon credits and related climate claims are subject to increasing public scrutiny as well as good practice guidance and regulation on anti-greenwashing and corporate climate disclosure. Numerous standards and initiatives offer guidance on using carbon credits and making related claims (for a summary, see e.g. Laine et al. 2023). Some guidelines, such as guidance on beyond value chain mitigation, apply to a range of carbon credit use cases, while others focus on specific uses of carbon credits, such as the SBTi for corporate net zero and the ISO 14068-1 for carbon neutrality. Consumer protection regulation requires marketing claims to be clear, truthful, and not misleading, and many countries are introducing specific requirements for communicating and substantiating climate claims based on carbon credits (for more information on the EU Green Claims Directive, see section 4.2.2). Corporate sustainability reporting is also increasingly subject to regulation, and may specify disclosure requirements for removals and carbon credits, as well as organisations' own value chain emissions and targets to reduce them in line with science.

While there is wide agreement on the fundamental good practice principles for the voluntary use of carbon credits, there is an ongoing debate on what these principles mean in practice. For example, the overarching principle of mitigation hierarchy – prioritising emission reductions over removals, and prioritising reductions in own value chain emissions over the use of carbon credits – is generally accepted (WWF, 2020b). However, there is an ongoing debate on which claims organisations should be allowed to make in case they do not reduce their own value chain emissions in line with science. Regarding claims, there is broad consensus that claims based on carbon credits should be truthful and not misleading. Stakeholders have diverging views, however, on whether this means that voluntary offsetting should be banned altogether as a categorically misleading claim and whether voluntary offsetting claims are credible and valid only if they are based on a unique claim, i.e. mitigation outcomes that are not counted towards any government's target. Many non-governmental organizations (NGOs), several good practice guidelines as well as the ISO 14068-1 Carbon Neutrality Standard are of the view that credible offsetting – including carbon neutrality and

¹⁵ Note that Sweden's national target is distinct from an NDCs. As an EU Member State, Sweden is part of the EU NDC and does not have its own NDC.

net zero – requires a unique claim, which includes avoiding double claiming between voluntary offsetting and national targets (Carbon Market Watch, 2020; Ahonen, Berninger, et al., 2022; Laine et al., 2023; Gold Standard, 2024). This makes a case for using ITMOs for voluntary offsetting, based on the fact that, by definition, ITMOs allow for a unique claim. Some initiatives, such as the SBTi and the Voluntary Carbon Market Integrity Initiative, remain silent about double claiming, while some stakeholders, including several bio-CCS industry actors, explicitly oppose the requirement to avoid double claiming (Bioenergy Europe, 2024). Meanwhile, other stakeholders are promoting the concept of contribution claims as an alternative to voluntary offsetting (Carbon Market Watch, 2020; WWF, 2020a, 2024; Fearnough et al., 2023; Gold Standard, 2024). Contribution claims are a means to avoid double claiming when using carbon credits that are not authorised as ITMOs (Ahonen, Berninger, et al., 2022; Gold Standard, 2024).

Last but not least, it is widely accepted that only carbon credits based on (permanent) removals should be used to achieve corporate net zero. However, in the context of voluntary offsetting and carbon neutrality claims, there is an ongoing debate on whether carbon credits based on emission reductions and removals are equally valid or whether (and why) one or the other should be preferred. Many guidelines recommend to increase the share of removal-based carbon credits over time (Hewlett et al., 2024), but there is no science-based reason for prioritising removals over emission reductions when offsetting (or otherwise taking responsibility for) unabated emissions (Gold Standard, 2024; Möllersten et al., 2024).

1.3.3. National GHG inventories and emissions balance

Countries report their GHG emissions and removals to the Paris Agreement through national GHG inventories, applying the IPCC's inventory guidelines (IPCC, 2006). According to the guidelines, captured CO₂ is reported in the inventory only if it is durably stored. For CCS, the guidelines include only Tier 3 methods¹⁶, which are based on detailed modelling or measurements at sub-national or even activity-level. Sometimes the CO₂ is captured in one country (Country A) and transported to another country (Country B) for injection and storage. Under this scenario, Country A should report the amount of CO₂ captured, any emissions from transport and/or temporary storage that takes place in Country A and the amount of CO₂ exported to Country B. If the captured CO₂ is generated by biomass combustion, including bio-CCS activities, they would be removals that should be reported as “negative emissions” in the GHG inventory¹⁷. Country B should report the amount of CO₂ imported, any emissions from transport and/or temporary storage (that takes place in Country B),

¹⁶ The IPCC provides three tiers of methods, with Tier 1 being the simplest, based on default values, and Tier 3 the most demanding, based on detailed modelling or measurements.

¹⁷ For the purposes of GHG inventory reporting, emissions are reported as a positive value and removals as a negative value.

and any emissions from injection and geological storage sites. The IPCC guidelines currently provide emission estimation guidance for carbon dioxide transport, injection, and geological storage only. If and when other types of storage options mature, guidance for compiling inventories of emissions from these technologies may be given in future revisions of the guidelines. The IPCC expects to publish a methodology report on CDR and carbon capture, utilisation and storage (CCUS) by the end of 2027 (IPCC, 2024).

In the context of the Paris Agreement, the emissions balance is used to assess and account for the country's progress towards, and achievement of, its NDC. The emissions balance consists of the national GHG inventory data of the GHG emissions and removals within a country's boundaries, adjusted to match the scope of the NDC target as well as for any transfers or acquisitions of mitigation outcomes. If the host country transfers mitigation outcomes to another country or a non-state actor in the form of ITMOs, the host country must correspondingly adjust its emissions balance, to exclude the transferred mitigation outcomes from being counted towards its target. This prevents the double counting of the same mitigation outcome by both the host country and the buyer. If the ITMOs are used towards another country's target, this (end-user) country must correspondingly adjust its emissions balance, to count the transferred mitigation outcomes towards its target. If they are used by a non-state entity, only the host country needs to correspondingly adjust its emissions balance.

1.3.4. Corporate GHG inventories and reporting

Many organisations prepare GHG inventories to quantify and report GHG emissions and removals within their value chains. Inventories provide information on the sources and volume of emissions that organisations are responsible for, and they can be used to track emissions trends and progress towards organisation-level targets for reducing emissions. At minimum, companies should report their direct (scope 1) and indirect energy (scope 2) emissions. Companies should also strive to report other indirect (scope 3) emissions, which are a consequence of the activities of the company but occur from sources not owned or controlled by the company. Together, these direct and indirect emissions constitute the company's value chain emissions. The main standards for preparing corporate-level GHG inventories are the GHG Protocol's Corporate Accounting and Reporting Standard and Corporate Value Chain (Scope 3) Standard, and ISO 14064-1 on quantification and reporting of organisation-level GHG emissions and removals. The GHG Protocol has also developed Land Sector and Removals Guidance which explains how companies should account for and report GHG emissions and removals from land management, land use change, biogenic products, CO₂ removal technologies, and related activities in GHG inventories (GHG Protocol, 2022).

When companies implement internal activities that reduce emissions from their operations, the resulting reductions would ideally be captured in their inventory's boundaries and reflected as lower emissions. These reductions may also be reflected as lower national net emissions in the national GHG inventory of the country in which they occur if the country's inventory method is accurate

enough to detect activity-level emission reductions and removals. The fact that the same emissions reductions and removals may be reflected in both the corporate and national GHG inventories is a natural consequence of overlapping reporting of emissions which occurs when inventory boundaries overlap. The corporate inventory describes the direct and indirect emissions and removals of the company while the national inventory describes the direct emissions and removals of a country. Under the Paris Agreement, countries are ultimately liable for all the emissions occurring within their boundaries. The corporate inventory quantifies the emissions and removals directly and indirectly associated with the company, within one or more countries. The overlap in national and corporate reporting should not be confused with double claiming (see above) which is a form of double counting and can undermine environmental integrity.

In addition to reducing their value chain emissions in line with science, best practice guidance encourages companies to take responsibility for their unabated (past/current) emissions by supporting mitigation beyond their value chains, for example by buying and voluntarily retiring carbon credits. SBTi and Gold Standard have developed guidance for supporting and reporting beyond value chain mitigation (Hewlett et al., 2024; SBTi, 2024a).

Corporate sustainability reporting, including disclosure of climate-related information, is becoming mandatory to an increasing share of companies around the world. In the EU, for example, large and listed companies that have contributed to removals within their value chain or supported GHG mitigation projects through carbon credits must report them separately from their own scope 1, 2 and 3 emissions and disclose additional information on e.g. the quantity and quality of carbon credits (European Union, 2023a).

2. Supporting biogenic carbon capture and storage with carbon credits

2.1. Financing Nordic biogenic carbon capture and storage with market-based cooperation

For the Nordic countries, market-based cooperation could offer opportunities to untap the region's significant, yet unevenly distributed, bio-CCS potential. Key conditions for supporting additional removals from bio-CCS with carbon credits are the existence of (1) surplus bio-CCS potential beyond what would be incentivised through national policies and state support; and (2) public and/or private buyers, from Nordic countries or beyond, that want to harness this surplus potential by buying carbon credits (Möllersten et al., 2023).

Potential bio-CCS developers could leverage finance for implementing additional removals from bio-CCS through offtake agreements, whereby a buyer commits to purchasing carbon credits generated by the bio-CCS activity in the future at pre-agreed terms. Buyers may have various

motivations to support additional removals from bio-CCS. Buying carbon credits is a means to contribute to global efforts to scale permanent removals and transition to net zero. Buyers that wish to uniquely claim the associated removals can use carbon credits that are authorised and first transferred as ITMOs under Article 6.2. For ITMOs, the host country must adjust their emissions balance to ensure that the corresponding mitigation outcomes are not counted towards its NDC. ITMOs can be used for international compliance, as well as voluntary purposes that require a unique claim, such as a carbon neutrality claim in line with the ISO 14068-1 Carbon Neutrality Standard. While the EU does not intend to use market-based cooperation under Article 6 to meet its 2030 NDC, Nordic EU Member States could use ITMOs to meet their national targets and Nordic companies could use ITMOs for voluntary purposes (see section 4.2). To support removals that contribute to meeting the EU’s NDC and EU carbon neutrality targets, Nordic countries and companies could make use of the EU CRCF framework, which is expected to be operational in 2026 (see Box 4).

2.2. Generating carbon credits from bio-CCS with and without state support

In the absence of obligations to support removals from bio-CCS, there are three theoretical options for making a bio-CCS activity financially viable: (1) financing it fully with state support, (2) financing it fully with carbon credit revenue, i.e., without state support; or (3) financing it with a combination of state support and carbon credit revenue. This section considers additionality, carbon credit volume and carbon credit unit price in three illustrative scenarios based on these options (Table 1).

Table 1. Additionality, carbon credit volume and price in illustrative scenarios

Scenario	Additionality	Carbon credit volume		Carbon credit unit price	
		Option A: Baseline at BAU	Option B: Baseline below BAU	Option A: Baseline at BAU	Option B: Baseline below BAU
1. State support only	Not additional	None	None	N/A	N/A
2. Carbon credit revenue only	Additional	All removals compared to BAU	Lower than Option A	Sufficient to reach viability	Higher than Option A
3. State support + carbon credit revenue	Depends on level of state support	Same as Scenario 2	Lower than Option A	Lower than Scenario 2	Higher than Option A

In Scenario 1, the bio-CCS activity is fully financed with state support and no carbon credit revenue is used.

- **Additionality:** The activity is not deemed additional from the perspective of carbon crediting, if it is financially viable with state support. Thus, it would not be eligible for generating any carbon credits.

In Scenario 2, the bio-CCS activity is fully financed with carbon credit revenue and no state support is used.

- **Additionality:** The activity is deemed additional from the perspective of carbon crediting, if it needs carbon credit revenue to be financially viable and could not generate removals in the absence of the carbon credit revenue.
- **Carbon credit volume:** There are two main options for setting the crediting baseline. Removals beyond the crediting baseline are issued as carbon credits. Under Option A, the crediting baseline would be set at the level of business-as-usual (BAU), meaning that all removals achieved beyond BAU would be issued as carbon credits. In contexts where there are no obligations to support removals from bio-CCS activities, it is reasonable to assume that the BAU scenario includes no removals from bio-CCS. Thus, all achieved removals would be issued as carbon credits. Under Option B, the crediting baseline could be set below¹⁸ BAU. Under Option B, the volume of carbon credits issued would be less than under Option A, despite the activity generating the same amount of removals in both cases. This is because more removals are included in the baseline scenario under Option B compared with Option A. The more below BAU the crediting baseline is set, the less credits are issued, and vice versa. The Article 6.2 guidance and the PACM require the crediting baseline to be set below BAU but do not specify how much below BAU the crediting baseline should be set.
- **Carbon credit price:** The carbon credit unit price would need to be sufficient to make the activity viable. Under Option A, the carbon credit unit price would need to exceed the unit cost of generating removals. Under Option B, the carbon credit unit price would need to be higher than under Option A, given that the same amount of finance is needed in both cases but less carbon credits are issued under Option B. The larger the difference between BAU and the crediting baseline, the larger the difference between the carbon credit unit price and the unit cost of removals. For example, if the crediting baseline were set 50% below BAU, meaning that two tonnes of CO₂ of removals would need to be generated for each carbon credit issued, the carbon credit unit price would need to be more than twice the unit removal cost.

In Scenario 3, the bio-CCS activity is financed with a combination of state support and carbon credit revenue.

- **Additionality:** The activity is deemed additional from the perspective of carbon crediting if it can be demonstrated that carbon credit revenue results in removals that would not have occurred without the incentives from carbon crediting. This could be because the state support on its own would be insufficient to make the activity financially viable (e.g. because

¹⁸ Setting a crediting baseline “below BAU” means setting the crediting baseline to represent a higher level of removals or a lower level of emissions compared with BAU.

it covers costs only partially, or fully but without providing any rate of return) or because carbon credit revenue would enable the generation of more removals than what would have been possible with state support alone (e.g. because the state support does not cover the full removal potential of the activity). In this context, the activity would be deemed non-additional if carbon credit revenue substitutes rather than complements state support; and/or if carbon credit revenue is used to increase profits rather than to reach financial viability. In these non-additional cases, combining state support with carbon credit revenue results in reduced public expenditure or higher profits for the bio-CCS activity owners, rather than more removals (see below for further discussion).

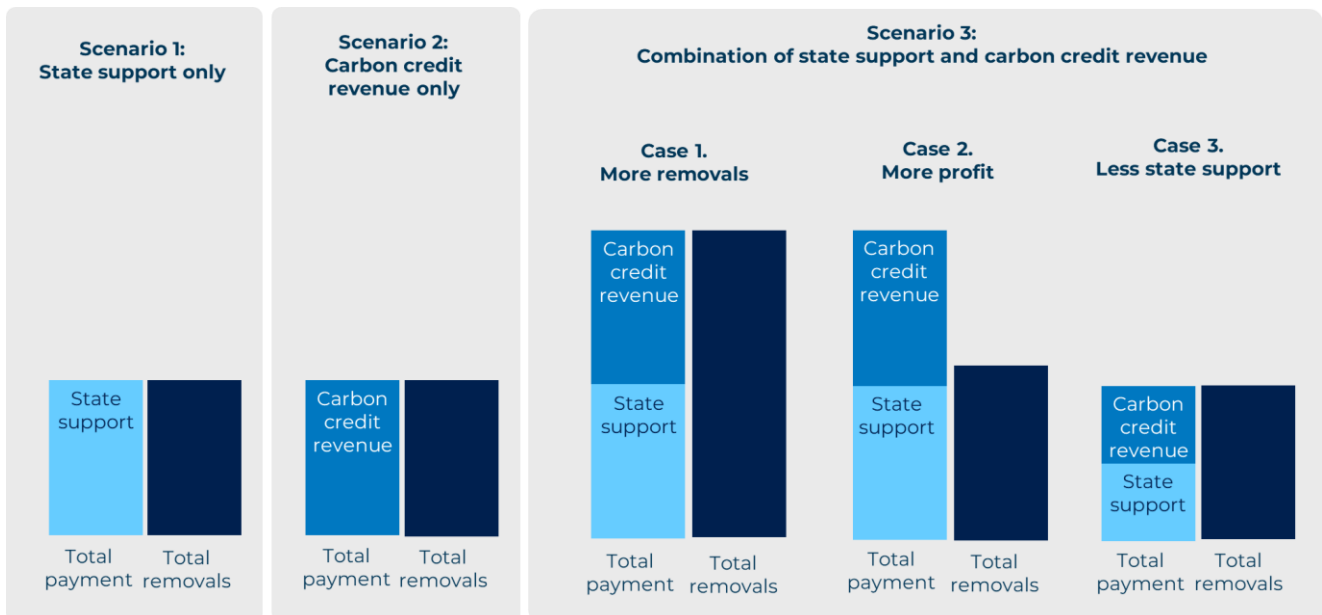
- **Carbon credit volume:** Like in Scenario 2, there are two main options for setting the crediting baseline. Under Option A, the crediting baseline would be set at the BAU level, meaning that all removals achieved with the combination of state support and carbon credit revenue beyond BAU would be issued as carbon credits. In Option B, the crediting baseline is set below BAU, meaning that less credits are issued than under Option A. The question is by how much, and on what basis. One possibility would be to include removals representing the share of state support in the crediting baseline, and issue carbon credits only for the removals representing the share of carbon credit revenue.
- **Carbon credit price:** The combination of the state support per unit and the carbon credit unit price should be sufficient to make the activity viable. Compared with Scenario 2, a lower carbon credit unit price would generally be required. This is due to the existence of the state support which covers part of the unit removal cost and thus effectively subsidises the carbon credit unit price, except when the crediting baseline includes removals proportionate to state support, as described above. Under Option A, the higher the state support per unit, the lower the required carbon credit unit price, and vice versa. Assuming a constant state support per unit, the carbon credit unit price would be lower under Option A compared with Option B, due to the lower volume of carbon credit in the latter option. The closer the baseline is set to BAU, the more the state support will effectively subsidise the carbon credit unit price, and vice versa. If the share of removals financed with state support were included in the baseline, the state support would effectively not subsidise the carbon credit unit price. In this case, the price would need to be equivalent to Scenario 2, Option A, and exceed the unit cost of removals. Beyond this point, the required carbon price would be equivalent to Scenario 2, Option B.

In all scenarios that include carbon credits (i.e., Scenarios 2 and 3), double claiming would occur if the same removals are counted by the host country towards its mitigation targets and claimed by the carbon credit buyer for voluntary offsetting (e.g. to meet a carbon neutrality or net zero target). Carbon credit buyers have two options for avoiding double claiming. If all the removals are counted by the host country towards its climate targets, the carbon credit buyer could avoid double claiming by communicating that it contributes to additional removals outside its boundaries or value chain by purchasing carbon credits, without claiming that its value chain emissions have been offset as a

result. The carbon credit buyer can avoid double claiming also by making voluntary offsetting claims based on removals that are not counted towards the host country's climate targets. This could be either because these removals have been authorised as ITMOs by the host country or because they are not covered by the host country's targets.

Combining state support and carbon credit revenue (Scenario 3) can have different implications on the incentives for cost-effective mitigation, depending on how the removals are accounted for and claimed. Under Scenario 3, double claiming would imply that the host country and buyer are effectively subsidising each other's targets. Each of them pays only part of the cost but both claim the full results. Paying a subsidised unit price for removals could potentially disincentivise the carbon credit buyer from investing in internal mitigation that costs more than the subsidised price for removals but less than the full cost of removals (Dufour et al. 2024). These potential disincentives would be eliminated if the host country and carbon credit buyer would claim only their share of the removals, thereby paying the full cost per unit of removal. The latter case could include the host country authorising the carbon credit buyer's share of removals as ITMOs, so as not to count them towards its targets, or overachieve its target by the amount financed by the carbon credit buyer.

Combining state support and carbon credit revenue (Scenario 3) could generate a higher total volume of removals than with only state support (Scenario 1) or carbon credit revenue (Scenario 2), provided that more finance is mobilised in total in Scenario 3 compared with Scenarios 1 and 2 and it is used to generate more removals rather than only to boost profits or reduce state support.



Source: Authors

Figure 2. Combining state support and carbon credit revenue – illustrative cases

Figure 2 presents illustrative examples¹⁹ of how state support can be combined with carbon credit revenue to achieve more removals or more profits or to generate a specific amount of removals with less state support. If the carbon credit revenue is used to complement the state support budget, this would result in a higher total budget for removals and enable generating more removals than without carbon credit revenue (Case 1 in Figure 2).

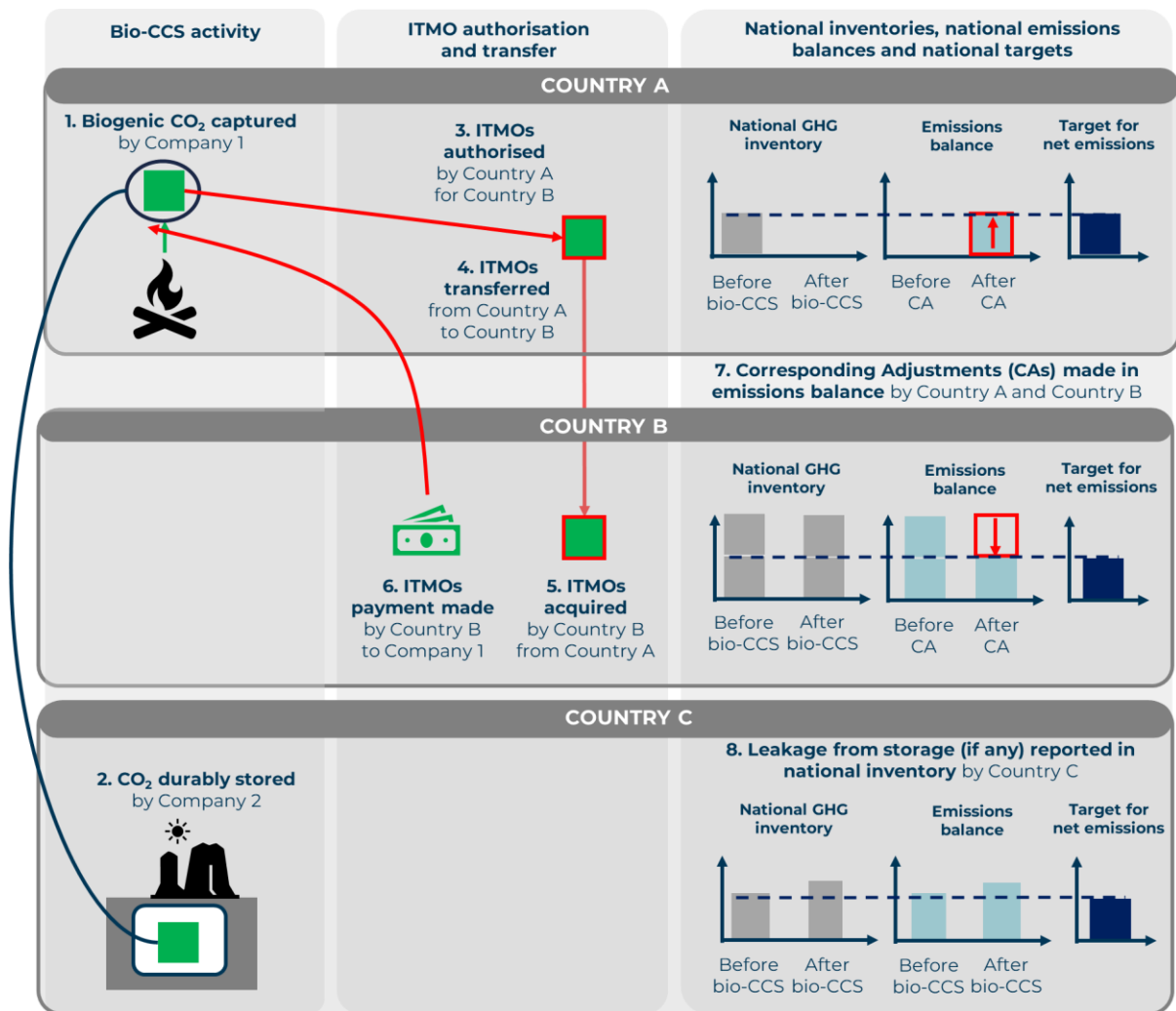
However, the combination of carbon credit revenue and state support could also result in an economic rent in excess of what the activity needs to be financially viable, instead of more removals, in case the carbon credit revenue is used mainly to boost profits rather than to finance more removals, as illustrated in Case 2 in Figure 2. This would be an ineffective way to use scarce public resources. In case the carbon credit revenue is used solely to boost profits, that is, the state support would be sufficient to reach financial viability, carbon credit revenue would not generate additional removals compared to the situation without the carbon credit revenue. The government needs to carefully design the state support to prevent over-subsidisation (Dufour et al. 2024). The best approach could be a reverse auction for the state support level where the bidders take into account the likely carbon credit revenue. This requires sufficient competition and needs to be organised in a way that prevents collusion between bidders. However, the carbon credit revenue may be unknown at the time of bidding. The state could require deducting any realised carbon credit revenue from the state support and reallocate the freed-up state support for additional mitigation.

There is also a possibility that carbon credit revenue substitutes, rather than complements, state support, leading to less state support rather than more removals (Case 3 in Figure 2). For example, consider a host country that has set a separate national target to generate a certain volume of removals from bio-CCS within its boundaries and earmarked a budget for state support sufficient for reaching this target, as illustrated in Scenario 1 in Figure 2. If some of these removals are financed with carbon credit revenue, the country could potentially reduce the amount of state support earmarked for bio-CCS compared to a situation without the carbon credit revenue. Unless this state support is reallocated to further removals, there is a risk that the carbon credit buyer pays for removals that would have otherwise been paid with state support, as illustrated in Case 3 in Figure 2. In that case, the carbon credit revenue does not result in additional mitigation but merely reduces public spending on removals.

2.3. Example: Market-based cooperation to support bio-CCS

Governments and companies can buy carbon credits to support additional removals from bio-CCS outside their own boundaries, from countries that have excess bio-CCS potential. Below, the entities and steps involved in ITMO cooperation are described in more detail.

¹⁹ Scenario 3 in Figure 1 includes three illustrative cases, each with total payments shared evenly between state support and carbon credit revenue. A wide range of other combinations are, however, also possible.



Source: Authors

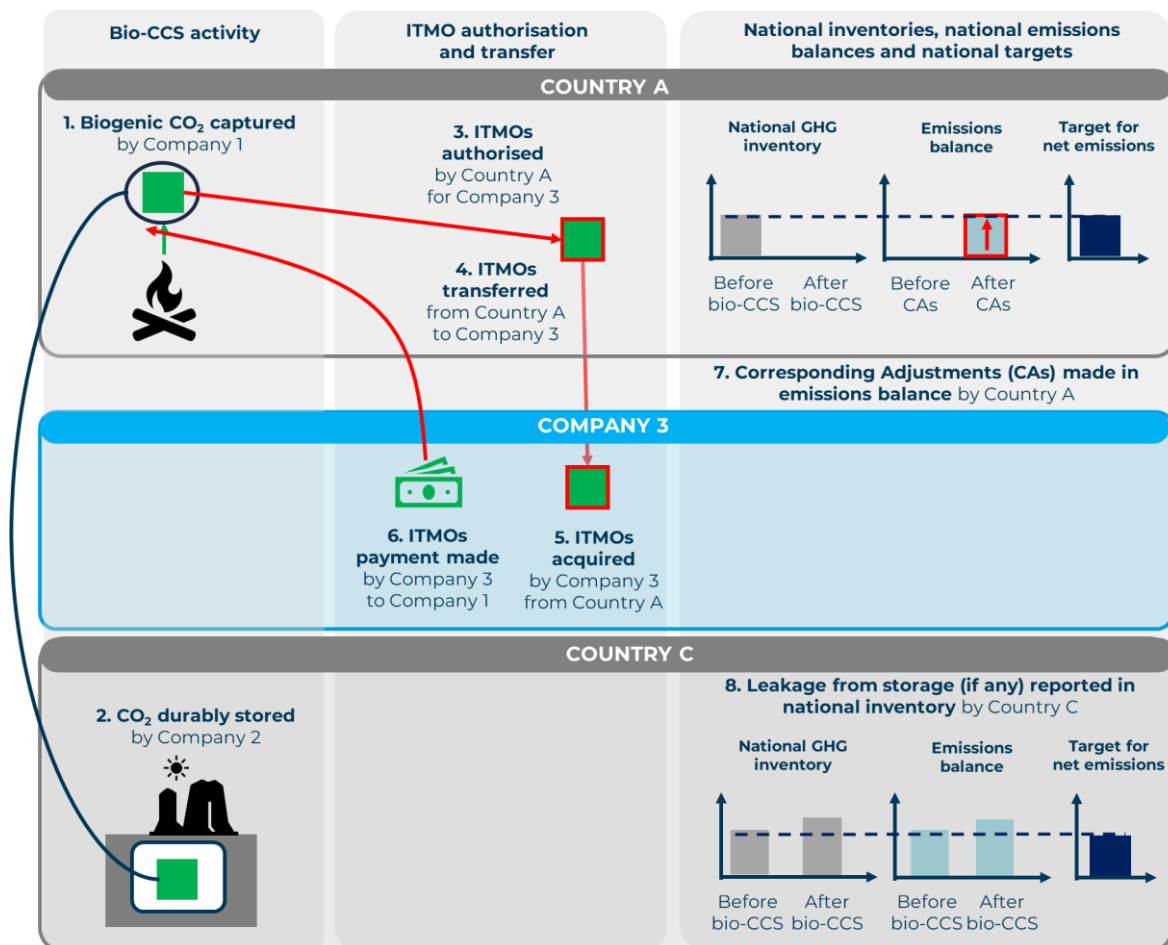
Figure 3. ITMO cooperation: Government as ITMO buyer for use towards its national target

Figure 3 illustrates a case where two countries engage in ITMO cooperation. Biogenic CO₂ is captured by Company 1 in Country A (step 1 in the figure) and transported to and durably stored in Country C by Company 2 (step 2).²⁰ Country A can meet its national target even without this removal while Country B's national emissions exceed its national target. Country A can thus “afford” to authorise the removal as ITMOs (step 3), transfer it to Country B (step 4), and apply corresponding adjustments in its emissions balance so that the removals are not counted towards its national target (step 7). By acquiring the ITMOs (step 5) and applying corresponding adjustments in its emissions balance to count to removals towards its target (step 7), Country B can meet its target. Country B pays Company 1 for the removal (step 6). In step 7, Country A applies corresponding adjustments to exclude the removals from being counted towards its target, while Country B applies corresponding adjustments to count the removals towards its target. Country C needs to

²⁰ Note that there may be further countries and/or companies involved in the transport of carbon from Country A to Country C. For the sake of simplicity, these have been excluded from the figure.

monitor and report any leakage of carbon from its storage within its boundaries as emissions in its national GHG inventory (step 8). Countries would need to monitor and report any leakage of carbon during transport within their boundaries as emissions in their national inventories. The same logic applies if a company buys an ITMO for use towards Country B's target (e.g., Swiss fossil fuel importers that must buy ITMOs to meet their national obligations to contribute to the Swiss NDC).

If a company buys ITMOs for purposes other than towards a national target, the same logic applies, with the notable exception of step 7, as illustrated Figure 4. Step 7 – the application of corresponding adjustments in a national emissions balance – differs depending on how ITMOs are used. In all cases, the host country must apply corresponding adjustments in its emissions balance for any ITMOs that it authorises and first-transfers (see section 3.2). In case the ITMOs are used towards Country B's national target, Country B applies corresponding adjustments in its emissions balance (Figure 3). If the ITMOs are not used towards any national target, only the host country should apply a corresponding adjustment (Figure 4). This allows the ITMO to be uniquely claimed by the buyer, regardless of which country it is located in.



Source: Authors

Figure 4. ITMO cooperation: Company as ITMO buyer for use other than towards national target

Box 3. Case study of Ørsted-Microsoft-Denmark-Norway

In May 2023, the Danish Energy Agency awarded the first contract under the Danish CCUS subsidy scheme to Ørsted Bioenergy & Thermal Power A/S, providing payments against removals for twenty years. From 2026, the project will capture and store 430,000 tonnes of carbon dioxide (tCO₂) annually from two biomass-fired combined heat and power plants, amounting to 8.6 million tCO₂ (MtCO₂) during 20 years. The captured carbon will be shipped to the Northern Lights storage reservoir in the Norwegian part of the North Sea. In addition to the state support, the project will be financed through the sale of 3.76 MtCO₂ removal credits over eleven years to Microsoft (Ørsted, 2024). According to Ørsted (2024) and Microsoft (2024), the carbon credit revenue from Microsoft enabled Ørsted to make a competitive bid under the Danish subsidy scheme, which places emphasis on the lowest amount of subsidy per tonne.

The Danish CCUS subsidy scheme aims to contribute to the Danish national climate target of reducing domestic [net] emissions by 70% by 2030 compared to 1990 (Danish Council on Climate Change, 2023). Microsoft intends to use the purchased carbon removals towards its goal to become carbon negative by 2030 by reducing their GHG emissions by more than half, removing the rest, and removing the equivalent of its historical emissions by 2050 (Microsoft, n.d.). To this end, Microsoft is developing a portfolio of carbon removal activities around the world, initially focusing on removals from nature-based solutions, and shifting to technology-based removals, such as bio-CCS, when they become more viable. When assessing additionality, Microsoft (2024, p. 10) pays attention to the level of state support and analyses “where there may be practical gaps to the achievement of national policies (including NDCs) and how Microsoft’s ambition to be carbon negative might effectively pair with policy ambition around carbon removal”.

Regarding reporting and claiming the resulting removals, the Danish Energy Agency seems to conflate GHG inventory reporting with claims. According to Romm (2023, p. 23), the Danish Energy Agency considers that “the claiming of the credits under the voluntary scheme will not affect the site-specific emissions from neither the seller nor the buyer of the [credits], as the specific emissions from the buying party are reported as emissions in the national GHG inventories. As the national GHG inventories and the voluntary [carbon] credit market are two separate accounting systems, we do not consider that the agreement entered by Ørsted and Microsoft lead to double claiming”. As noted in Section 1.3.4, the overlap in national and corporate reporting should not be confused with double claiming. The former is a natural consequence of different reporting boundaries while the latter can lead to misleading corporate climate claims.

In this regard, Microsoft proposes that “that private sector actors incorporate [claims based on removals] into voluntary emissions pledges or claims at a global level (for example, worldwide net-zero rather than country-specific claims) and then report the volumes and national domiciles of any CDR to connect private-sector and national-level claims”. Their recommendation is “to transparently report the sources and national domiciles of each credit (which may contribute to a global claim), so that there is a clear linkage between the corporate inventory and the national accountings for any credit.” (Microsoft, 2024, p. 4-6)

If Microsoft’s carbon negative claim is interpreted as a corporate offsetting claim, their proposed approach would lead to double claiming the same removals from the Ørsted plants towards both voluntary offsetting by Microsoft of its value chain emissions and towards Denmark’s national target, and potentially also EU’s NDC. So far, no party in the transaction has mentioned the application of corresponding adjustments to removals purchased by Microsoft, which would enable Microsoft to use these removals for offsetting while avoiding double claiming.

Alternatively, Microsoft could avoid double claiming by framing its investment in removals as a contribution claim, for example as its contribution to global net zero through supporting the capture of biogenic carbon in Denmark and its durable storage in Norway. Microsoft’s reference to “global claims” seems to imply an openness to corporate contribution claims, that is, claims about contribution to global net zero, and recognition that these contributions are based on removals that may count towards the host country’s NDCs. If Microsoft opts for the contribution model, it could become an influential pioneer of this emerging approach.

3. Institutional requirements for cooperation under Article 6.2

3.1. General requirements for ITMO cooperation

While it is voluntary for countries to participate in cooperation involving ITMOs, countries that choose to do so must follow the international Article 6.2 guidance. This guidance consists of the relevant decisions adopted by the Paris Agreement's decision-making body (CMA²¹) and covers requirements relating to, inter alia, participation, authorisation, recording, tracking and reporting ITMO-related information, and accounting for ITMO transfers and use.

The high-level principles were adopted in 2015 in Article 6 of the Paris Agreement (United Nations, 2015, pp. 7–8). Article 6.1 recognises that some countries “choose to pursue voluntary cooperation in the implementation of their nationally determined contributions to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity”. Article 6.2 specifies that “Parties shall, where engaging on a voluntary basis in cooperative approaches²² that involve the use of internationally transferred mitigation outcomes towards nationally determined contributions, promote sustainable development and ensure environmental integrity and transparency, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting” consistently with the international guidance. Article 6.3 states that the use of ITMOs is voluntary and must be authorised by participating Parties. Detailed guidance for operationalising these high-level criteria was adopted in 2021 in Glasgow, enabling countries to start engaging in ITMO cooperation, and guidance on outstanding issues was agreed for the most part in 2024 in Baku. Some further guidance is expected in 2028.

The international Article 6.2 guidance leaves ample room for countries to decide whether, how and under which conditions they wish to participate in ITMO cooperation. Countries can design national strategies, legislation, criteria and infrastructure to fit their objectives and circumstances, and multi- and bilateral cooperation frameworks with partner countries and organisations. ITMO cooperation involves a host country as well as the ITMO end-user, which could be another government²³ or a

²¹ CMA stands for the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement, and it meets once a year in parallel with the Conference of the Parties (COP) which is the decision-making body for the UNFCCC.

²² The international Article 6.2 guidance refers to cooperative approaches but does not define them. In this report, “a cooperative approach” is considered to mean any cooperation involving the authorisation, transfer, acquisition and use of ITMOs towards NDCs and/or for purposes other than towards NDCs. Due to the lack of a universal definition for cooperative approach, this report uses the term “ITMO cooperation” to refer generally to cooperation that involves the authorisation, transfer and use of ITMOs.

²³ When ITMO cooperation involves two or more countries, it is sometimes referred to as a bilateral or multilateral cooperative approach, respectively. ITMO cooperation that involves no other countries except for the host country are sometimes referred

public or private entity. Mitigation outcomes become ITMOs when they have been authorised and first-transferred by the host country. The timing of authorisation and first-transfer can differ across mitigation outcomes and use cases. ITMOs can be traded in the carbon markets before they are used and thereby removed from circulation. The commercial terms of the sale and purchase of specific ITMOs are agreed between the buyers and sellers, for example through activity-specific mitigation outcome purchase agreements.

The international Article 6.2 guidance also leaves some room for interpretation. While this does not prevent ITMO cooperation, it can create uncertainties and confusion and increase the risk of inconsistent approaches between countries (Ahonen, Keßler, et al., 2023; Michaelowa, Ahonen, et al., 2023). Countries can reduce uncertainties and confusion and promote consistency by providing clear interpretations and applying robust approaches at the national level and coordinating with other countries, for example through bi- or multilateral cooperation agreements.

3.1.1. International Article 6.2 guidance

The international Article 6.2 guidance requires participating Parties to be Parties to the Paris Agreement, have NDCs and national inventory reports in line with the relevant international rules, establish national arrangements for authorisation, and have access to a registry for tracking ITMOs. Participating countries are responsible for ensuring environmental integrity and transparency, including in governance, applying robust accounting, including to avoid double counting, and promoting sustainable development in their ITMO cooperation. They are required to minimise, and if possible, avoid, negative environmental and social impacts, and ensure that their participation contributes to the implementation of its NDC and long-term targets and the long-term goals of the Paris Agreement, and does not lead to a net increase in emissions of participating countries. They should also respect and promote their obligations on, inter alia, human rights, the rights of indigenous peoples and local communities, as well as gender equality, empowerment of women and intergenerational equity. Furthermore, the international Article 6.2 guidance strongly encourages participating Parties to contribute resources for adaptation and overall mitigation in global emissions.²⁴ To foster transparency and accountability, the international guidance includes requirements for reporting and international review.

to as a “unilateral” approach. An example of a unilateral approach would be the host country authorising ITMOs for use for OIMP and transferring them to an international airline for use towards CORSIA compliance or to a private company for use as a basis of a voluntary climate claim.

²⁴ Contributions to adaptation could take the form of, for example, financial contributions to the international Adaptation Fund or verified adaptation co-benefits of ITMO-generating activities. Contribution to overall mitigation in global emissions usually means retiring a certain amount of ITMOs for this purpose, without counting them towards any other purpose. Under the PACM, these contributions are mandatory and include a 5% levy of A6.4ERs at issuance and a monetary contribution related to the scale of the activity for the Adaptation Fund, as well as the cancellation of at least 2% of issued A6.4ERs as a contribution to overall mitigation in global emissions.

3.1.2. National considerations

At the country level, key building blocks for national readiness to implement ITMO cooperation include strategic considerations, enacting legal foundations and governance, and establishing institutional arrangements, operational procedures and infrastructure for ITMO authorisation, tracking and reporting (see Table 2). It is also crucial to build national capacity across relevant public and private stakeholders.

Strategic decisions about engaging in ITMO cooperation include the objectives and types of cooperation, guiding principles and eligible sectors and activity types (UNFCCC, 2024a). This provides clarity for domestic and international stakeholders. When making strategic decisions, the host country should strive for alignment with its NDC and long-term strategies, so as to ensure that ITMO cooperation supports – or at least does not undermine – the achievement and enhancement of its NDCs. This requires understanding how ITMO cooperation could contribute to the NDC, whether the NDC is defined in a way that allows for the clear allocation of mitigation outcomes associated with ITMO cooperation, and what are the opportunities, uncertainties, risks and challenges involved (Heras et al., 2023). The national criteria should be designed to ensure that only mitigation that is additional to the (unconditional) NDC is authorised as ITMOs. This could involve assessments of marginal abatement costs of different mitigation activities (UNFCCC, 2024a). Strategic considerations on ITMO cooperation should be integrated into the broader national NDC planning, implementation, reporting and update process. Besides NDC alignment, strategic considerations could include alignment with other national objectives, for example related to environmental and social safeguards and national sustainable development priorities.

The national legislation would need to, at a minimum, assign the relevant responsibilities and processes for ITMO authorisation, tracking and reporting. These could include appointing a national Article 6 focal point and establishing a national registry. The national regulatory framework could also include guidance, for example, for sourcing mitigation activities and negotiating bilateral cooperation agreements. Such agreements offer opportunities to coordinate and align key elements of ITMO cooperation, such as criteria and procedures. Bilateral agreements are especially useful for cooperation that involves the use of ITMOs towards NDCs, but they can facilitate also other ITMO use cases.

National arrangements relating to ITMO cooperation are typically embedded in the NDC implementation and update processes, including national and sectoral monitoring and reporting systems. Inter-ministerial committees could be set up to make high-level policy decisions, while a lead ministry would be mandated to provide guidance to the Article 6 focal point which implements key functions such as the authorisation of ITMOs, the execution of ITMO transfers and the recording and reporting of relevant information. The focal point could receive technical support from experts and coordinate with relevant (sectoral) ministries and stakeholders to ensure consistency with relevant national and sectoral objectives, making use of existing infrastructure and procedures.

Countries also need to assess the financial needs for operating the processes related to ITMO cooperation and determine how these can be funded. Potential sources of funding include fees and levies on ITMOs and financial or capacity building support from partner countries. Part of the funding raised through these levies and fees could be earmarked for financing broader national climate action, (e.g. to support adaptation or additional mitigation) or other priorities (e.g. benefit-sharing with local communities). The fee levels and their use should be transparently communicated, as they influence the investment decisions of activity developers and ITMO buyers.

Table 2. Building blocks for readiness for ITMO cooperation

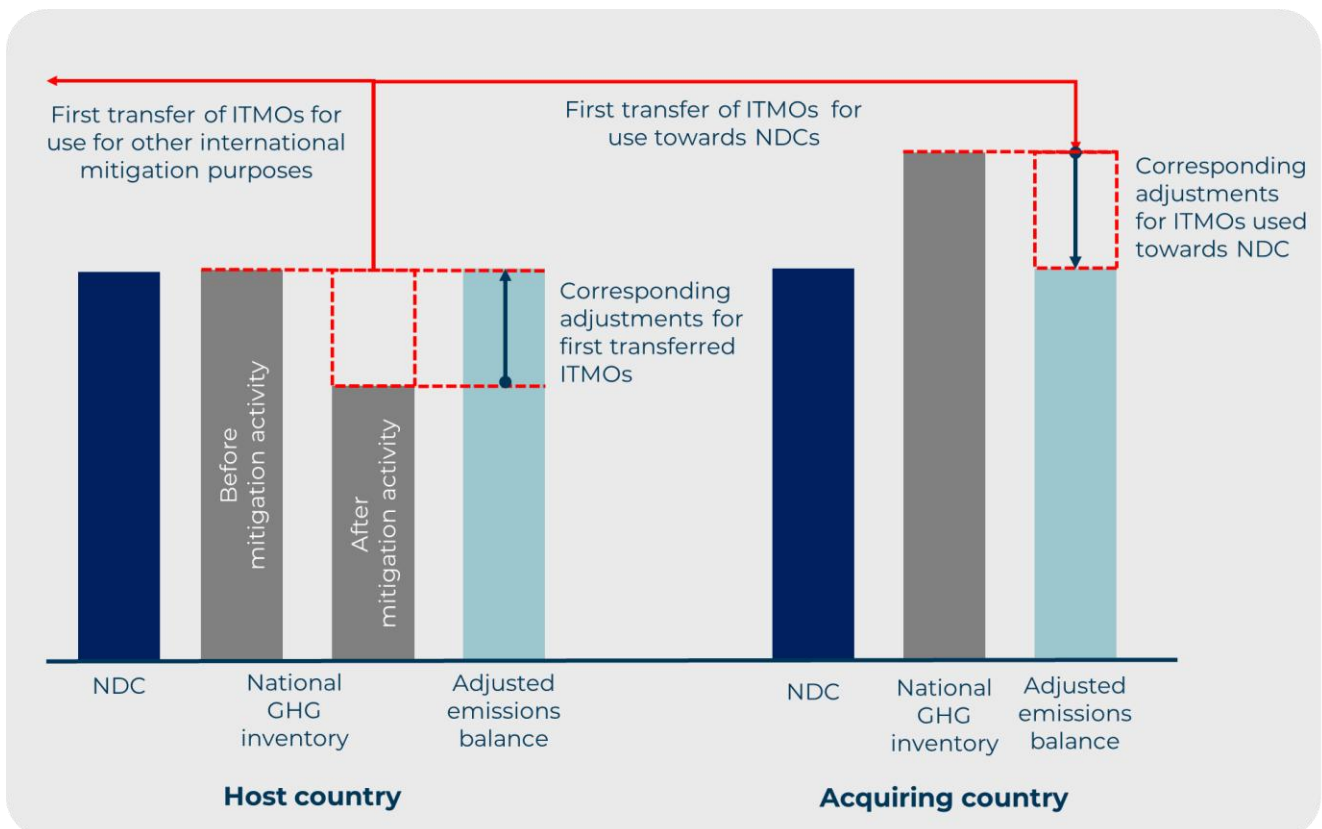
Building blocks	Description and elements
Strategic considerations	<p>Elaboration of whether, why and how to engage in ITMO cooperation:</p> <ul style="list-style-type: none"> • Gap analysis and mapping of potential for ITMO cooperation • Political mandate • Purpose and type of ITMO cooperation • Alignment with NDC, long-term strategy and global Paris goals • Guiding principles (e.g. environmental integrity, sustainable development goals) • Eligibility criteria • Capacity building plan
Legal foundations and governance	<p>Legal basis and processes for governing ITMO cooperation:</p> <ul style="list-style-type: none"> • Mandate for country and assigned institutions to engage in ITMO cooperation • Legal foundation for regulatory framework and governance structure • Budget and other resources for ITMO cooperation • Cooperation agreements with partner countries
Institutional arrangements	<p>Elaboration of roles and responsibilities for ITMO-related tasks:</p> <ul style="list-style-type: none"> • Establishment and support for national Article 6 focal point • Institutional arrangements for participation in ITMO cooperation (oversight functions; technical functions; administrative functions) • Engagement with auditors, private sector and other stakeholders
Operational procedures	<p>Elaboration of technical and procedural tasks related to ITMO cooperation:</p> <ul style="list-style-type: none"> • Guidance and support for prospective mitigation activities • Sourcing, piloting and/or assessment of mitigation activities • Authorisation of cooperative approaches, mitigation outcomes and entities • Validation, verification and issuance of mitigation outcomes • Accreditation of auditors • Reporting • Tracking • Application of corresponding adjustments
Infrastructure	<p>Systems and tools for ITMO cooperation:</p> <ul style="list-style-type: none"> • Monitoring, reporting and verification tools (e.g. data collection, management, monitoring, reporting, storage) for mitigation activities • Registry for tracking activities and mitigation outcomes

Adapted from: NDC Partnership and Perspectives Climate Research (2024)

3.2. Authorisation, first transfers and corresponding adjustments

3.2.1. International Article 6.2 guidance

A mitigation outcome becomes an ITMO once it has been authorised and first transferred by the host country. Authorisation includes three components – authorisation of the cooperative approach, ITMOs and entities – and could involve a single consolidated process or sequential processes to cover all the required information. The international Article 6.2 guidance implies that a host country authorisation is required for all ITMOs while authorisation by an acquiring country is not mandatory. In some cases, for example where ITMOs are used for CORSIA compliance or voluntary offsetting by a non-state entity, no acquiring country is involved in the ITMO cooperation. Authorisation implies that the authorising country has ensured environmental integrity and triggers responsibilities for reporting and tracking of ITMO-related information (see Section 3.3). The first transfer triggers host country responsibilities for applying corresponding adjustments, in order to avoid double counting. The use of ITMOs towards another country’s NDC triggers corresponding adjustments by that country. Figure 5 illustrates first transfers and corresponding adjustments.



Source: Authors

Figure 5. First transfers and corresponding adjustments

The international Article 6.2 guidance specifies the elements that shall be included in the authorisation, such as the participating Parties and/or entities (if known), the uses covered, the duration of the authorisation and the circumstances in which changes could be made (see Table 3). Mitigation outcomes can be authorised for use towards an NDC, use for international mitigation purposes other than achievement of an NDC and/or for other purposes. The latter two are jointly referred to as "other international mitigation purposes" (OIMP). Use for CORSIA compliance is an example of the use of an ITMO for international mitigation purposes, and cancellation for voluntary offsetting is an example of the use for other purposes. Authorisations must specify the circumstances for making any changes – including revocation – to the authorisation (e.g. human right violations or fraud), and the process for managing them in a way that avoids double counting, thus providing important predictability to participants. This could include predetermined circumstances where changes apply also to ITMOs that have already been first transferred.

Table 3. Contents of the authorisation

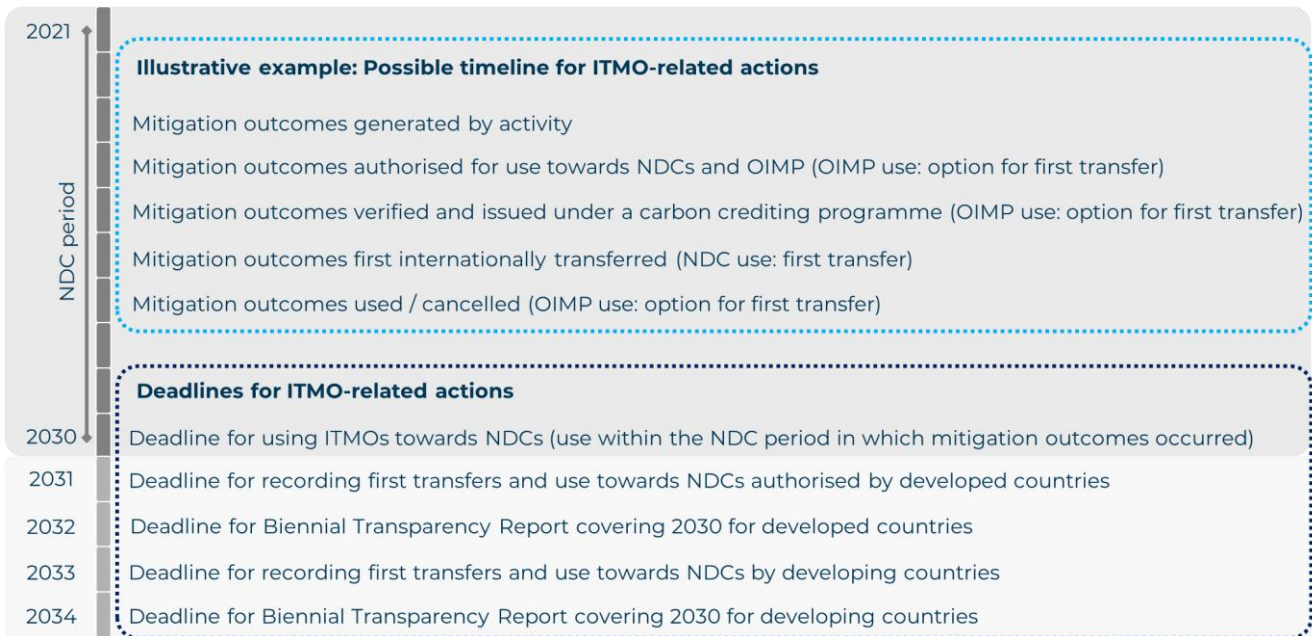
Elements that shall be included in the authorisation

- A unique identifier for the cooperative approach, obtained from the centralised accounting and reporting platform, where available
- The name(s) of the participating Party(ies) and/or entities, if known, covered by the authorisation
- The date and duration of the authorisation, including the final date for mitigation outcomes to be issued, or to be used or cancelled, in connection with the first transfer specified by the Party
- The specification of the first transfer of the mitigation outcome
- The uses covered by the authorisation
- The identification of or cross-reference to underlying regulations, frameworks, standards or procedures, including any specific methodologies underpinning the cooperative approach
- Where changes to the authorisation may occur, information on the circumstances in which such changes may occur and a description of the process for managing them in a way that avoids double counting
- The quantity of ITMOs, if applicable
- Identification of the registry the participating Party has, or has access to, for the purpose of tracking and recording ITMOs
- Identification of the relevant registry(ies) in the underlying regulations, frameworks, standards or procedures that (1) contain mitigation outcomes or inform their calculation by the participating Party(ies) and (2) transparently track the status of underlying mitigation activities and outcomes as well as participation and transactions by entities, as applicable
- The vintage(s) covered by the authorisation
- The metrics and units of measurement or conversion and the GHGs covered by the authorisation
- The sector(s) covered, if applicable
- The activity type(s) and/or activity(ies) covered, if applicable

Source: UNFCCC (2024b), paragraph 5

Parties must report information related to authorisation as part of their reporting under the Paris Agreement (see Section 3.3.1). The international Article 6.2 guidance identifies information that

countries are required, requested or encouraged to report. The Parties' authorisation statements and/or copies of authorisation, including any changes or updates made to them, will be publicly available. A voluntary user-friendly template for authorisation will be developed.



Source: Authors

Figure 6. Illustrative timeline and deadlines for ITMO-related actions

The timings of the authorisation and first transfer are flexible and can differ across mitigation outcomes and use cases, as illustrated in Figure 6. Although the timing of authorisation has not been explicitly restricted, changes to authorisation do not in general apply to ITMOs that have already been first transferred, implying that first transfer is the latest point for authorisation. For ITMOs authorised for use towards NDCs, the first transfer means the first international transfer. For ITMOs authorised for OIMP, the first transfer can mean the authorisation, issuance, or use or cancellation²⁵. This can be specified by the host country in the authorisation and annual information. If first transfer is defined as authorisation, its timing would be flexible: it could be before issuance, between issuance and use or cancellation or at the point of use or cancellation. While authorisation after the use or cancellation of a mitigation outcome is not explicitly prohibited, it could be problematic from the perspective of the host country, end-users and environmental integrity.²⁶ For ITMOs authorised for OIMP, the first transfer of the mitigation outcome must be recorded at least one year before the submission of the final reporting for the NDC period in which it occurred, allowing the corresponding adjustment to be reported for that NDC period. For developed and

²⁵ In this context, the term “use” refers to the use of ITMOs for international mitigation purposes and “cancellation” refers to the cancellation of ITMOs for other purposes.

²⁶ For further analysis of the implications of the timing of authorisation and possible changes and revocations, see Ahonen et al. (2023).

developing countries with NDC periods ending in 2030, this would mean recording the first transfer latest by December 2031 or 2033, respectively. Defining the first transfer as the use or cancellation would set an implicit use-by date for ITMOs, while defining first transfer as issuance would allow ITMOs to be used for OIMP also after the NDC period. In either case, the first transfer will trigger corresponding adjustments within the relevant NDC period, thus avoiding double counting. ITMOs that are used towards NDCs must be used in the same NDC period in which the associated mitigation outcomes occur. Figure 6 illustrates a potential timeline and deadlines for ITMO-related actions.

Participating countries must account for the first transfer and use of ITMOs by applying corresponding adjustments to the emissions and removals from the sectors and GHGs covered by their NDC, for the year in which the mitigation outcomes occurred, as part of their regular reporting under the Paris Agreement. The host country must apply corresponding adjustments for all authorised and first transferred mitigation outcomes, while acquiring countries apply corresponding adjustments when using ITMOs towards their NDC. Corresponding adjustments can be applied to a multi-year emissions trajectory or budget. Countries with single-year targets also have the option to apply an annual averaging method. The selected method must be applied consistently throughout the NDC period. For a host country with an NDC measured in GHG metrics²⁷, corresponding adjustments mean adding the quantity of the first-transferred²⁸ ITMOs, thereby excluding the mitigation from being counted towards its NDC. For a buyer country with an NDC measured in GHG metrics, corresponding adjustments mean subtracting the quantity of the used ITMOs, thus counting them towards its NDC. The resulting emissions balance is used as a basis for assessing NDC implementation and achievement. Further guidance on the methods for applying corresponding adjustments is expected in 2028. The host country must ensure that it has robust arrangements in place to receive notification of the first transfer event, to ensure the timely application of corresponding adjustments. This is relevant whenever the first transfer event (e.g. issuance or cancellation) occurs in a registry that is not managed by the country.

3.2.2. National considerations

Authorisation triggers reporting responsibilities for the host country (Section 3.3) and first transfers trigger the application of corresponding adjustments. Thus, a country should authorise ITMOs only once it has national arrangements in place, at least for authorising ITMOs and reporting initial

²⁷ This paper focuses on Nordic countries which have NDCs measured in GHG metrics. Article 6.2 rules provide guidance also for applying corresponding adjustments to NDCs measured in non-GHG metrics.

²⁸ For mitigation outcomes authorised for use towards NDCs, the first transfer refers to the first international transfer, while for mitigation outcomes authorised for OIMP, the first transfer can be the authorisation, issuance or use or cancellation of the mitigation outcome, as specified by the participating Party.

information, and it is also confident that it will be able to record and track ITMO transfers and use, and apply corresponding adjustments.²⁹

For a host country, authorising and first transferring mitigation outcomes means that they will not count towards its NDC. Thus, it is in the host country's interest to authorise only mitigation outcomes that are additional and robustly quantified, and also additional to what is needed to achieve its (unconditional) NDC and enhance it over time. Furthermore, it is in the interest of the host country to authorise mitigation outcomes only to the extent that they are detected in the national GHG inventory in the sectors and GHGs covered in the NDC. For example, if the host country authorises and first-transfers mitigation outcomes that are outside the scope of the sectors or GHGs covered by the NDC, it will need to adjust its emissions balance upwards by that quantity even though the authorised mitigation outcomes have resulted in lower emissions outside the scope of its emissions balance (which only includes emissions and removals for sectors and GHGs covered in the NDC). Authorising mitigation outcomes that are non-additional, overestimated, needed for achieving the NDC and/or not reflected in the national inventory for the sectors and GHGs covered by the NDC would make it harder for the host country to achieve its NDC.

The national criteria for authorisation can and should reflect the national context and priorities. They could include lists of prioritised/deprioritised/excluded sectors, GHGs and activity types, nationally appropriate methods for additionality testing, baseline setting and monitoring, entities eligible for validation and verification, obligations to address reversals and leakage, and requirements for environmental and social safeguards and sustainable development impacts. Additionality criteria could, inter alia, include activity type-specific requirements (e.g. on sustainable biomass in case of bio-CCS) and lists of activity types that the host country has excluded, prioritised or deemed additional without activity-level additionality testing. National criteria for baseline setting could include, for example, nationally tailored standardised baselines. Countries could also identify specific conditions for authorisation, e.g. the implementation of the underlying activity in line with specific environmental and social safeguards or standards, the successful verification of the mitigation outcomes consistently with national GHG inventory methodologies and/or the delivery of specified co-benefits, as well as guidance on specific use cases and associated claims. They should also specify circumstances under which changes could be made to authorisations, for example in case of fraud or human rights violations, and the process to manage these changes, including what evidence could trigger the changes and how double counting would be avoided. Some criteria could be differentiated based on whether the country authorises mitigation outcomes achieved within its boundaries for use by others (i.e. as host country), or mitigation outcomes achieved abroad for use towards its NDC (i.e. as an acquiring country).

²⁹ For further national considerations relating to authorisation, see e.g. Marr et al. (2023).

In developing national criteria for authorisation and assessing authorisation requests against these criteria, it is important to involve relevant national experts, ministries and agencies. This includes line ministries responsible for national climate policies and national GHG inventories and experts with capacity to develop criteria and assess activities with regard to (regulatory and financial) additionality, the validity of baselines (to avoid over-crediting), the potential role of specific activities and mitigation outcomes in achieving the NDC, and the alignment of MRV with national GHG inventory data for the sectors and GHGs covered by the NDC.

National authorities may choose to make use of methodologies and crediting processes under the PACM and other carbon crediting programmes, as well as assessments by, for example, the CORSIA's Technical Advisory Body, initiatives such as the CCQI and ICVCM or private carbon rating agencies. However, countries should not outsource the decision-making to non-state actors, since the international Article 6.2 guidance hold participating country responsible for ensuring environmental integrity and transparency and applying robust accounting.

National authorities should also establish a dialogue with the private sector to communicate the requirements for authorising ITMOs for mitigation that is generated in the country or eligible for use under domestic policies that contribute towards the country's targets³⁰.

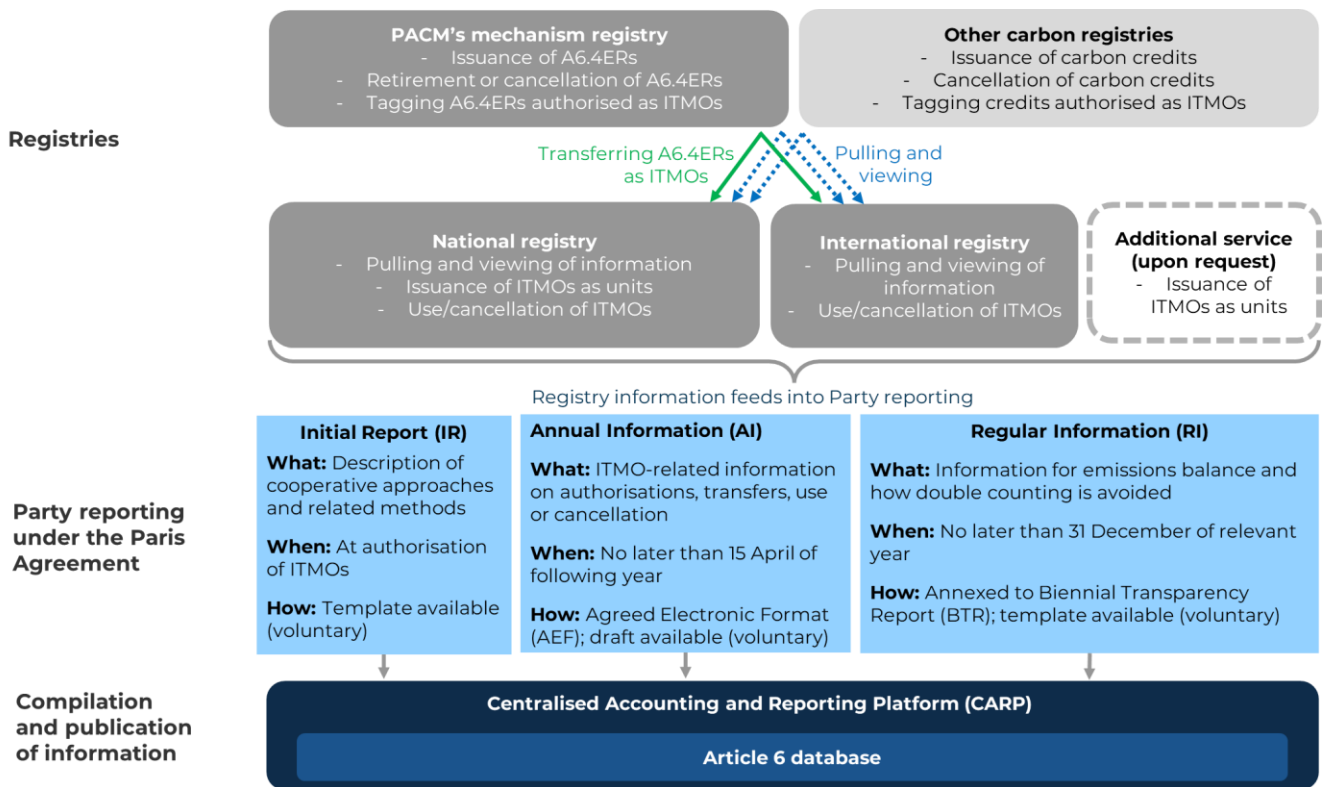
3.3. Tracking, reporting, and review

3.3.1. International Article 6.2 guidance

Figure 7 provides an overview of the framework for registries and reporting under Article 6.2, including links to the PACM.

Parties must have in place, or access to, a registry for recording and tracking ITMOs and ITMO-related actions, including authorisation, first transfer, transfer, acquisition, use towards NDCs, authorisation for use towards OIMP, and voluntary cancellation (including for overall mitigation in global emissions, if applicable). The registry has accounts for ITMOs, as necessary, and tracks, maintains records and accounts for ITMOs, including through unique identifiers. The unique identifier must, at minimum, consist of identifiers of the cooperative approach, originating Party registry and first transferring Party, as well as a serial number and the vintage (year of generation) of the underlying mitigation outcomes. ITMOs can be tracked and recorded in blocks. The registry produces, maintains and compiles records and information consistently with the Parties' reporting requirements (see below).

³⁰ Examples of such domestic policies include the obligation of Swiss fossil fuel importers to purchase ITMOs as a contribution towards the Swiss NDC (F. O. for the E. FOEN, 2024) and the possibility of companies in Singapore to use ITMOs to offset part of their domestic carbon tax liability (Singapore National Environment Agency, 2023).



Source: Authors

Figure 7. Registries and reporting

Parties can set up a national registry or use the International Registry provided under the Paris Agreement. Mitigation outcomes authorised as ITMOs can be issued as units in a national registry. Parties that use the International Registry have the option to request additional services to issue authorised mitigation outcomes as units in the registry. Alternatively, they could be issued as carbon credits by a carbon crediting programme, in which case the actual units would reside in the registry of that programme and the national or International Registry would “pull and view” relevant information relating to the units authorised as ITMOs.

In cases where Parties authorise A6.4ERs as ITMOs, these A6.4ERs would be issued under the PACM in the Mechanism Registry and they could be retired or cancelled in the Mechanism Registry, with the national or International Registry pulling and viewing relevant information, or transferred as units into a national registry or the International Registry.

Table 4: Required information for cooperation under Article 6.2

Category	Information to be reported ³¹	Report*
Participation	Demonstrate that the participating Party fulfils the participation responsibilities	IR, RI
Metrics and methods	Communicate the ITMO metrics and the method for applying corresponding adjustments	IR, RI
NDC quantification	Quantify the Party's mitigation information in its NDC in tCO ₂ e, including the sectors, sources, GHGs and time periods covered by the NDC, the reference level of emissions and removals for the relevant year or period, and the target level for its NDC; or, where this is not possible, provide the methodology for the quantification of the NDC in tCO ₂ e	IR, RI
Cooperative approach description	Provide, for each cooperative approach, a copy of the authorization by the participating Party, a description of the approach, its duration, the expected mitigation for each year of its duration, and the participating Parties involved and authorized entities	IR, RI
	Provide updates to the information provided in its initial report	RI
Ensuring environmental integrity	Describe how each cooperative approach ensures environmental integrity, including: <ul style="list-style-type: none"> • That there is no net increase in global emissions within and between NDC implementation periods; • Through robust, transparent governance and the quality of mitigation outcomes, including through conservative reference levels, baselines set in a conservative way and below 'business as usual' emission projections (including by taking into account all existing policies and addressing uncertainties in quantification and potential leakage); • By minimizing the risk of non-permanence of mitigation across several NDC periods and how, when reversals of emission reductions or removals occur, the cooperative approach will ensure that these are addressed in full 	IR, RI
	Describe how a cooperative approach provides for the measurement of mitigation outcomes in accordance with the methodologies and metrics assessed by the IPCC and adopted by the CMA	RI
Avoiding double counting	Describe: <ul style="list-style-type: none"> • How corresponding adjustments undertaken in the latest reporting period ensure that double counting is avoided and are representative of progress towards implementation and achievement of its NDC, and how those corresponding adjustments ensure that participation in cooperative approaches does not lead to a net increase in emissions across participating Parties within and between NDC implementation periods • How it has ensured that ITMOs that have been used towards achievement of its NDC or mitigation outcome(s) authorized for use and that have been used for other international mitigation purposes will not be further transferred, further cancelled or otherwise used 	RI

³¹ This tables lists the reporting requirements for cases where the mitigation outcome is measured and transferred in GHG metrics. Some requirements differ in case non-GHG metrics are used.

Category	Information to be reported³¹	Report*
Promoting sustainable development	Describe how each cooperative approach will: <ul style="list-style-type: none"> • Minimise and, where possible, avoid negative environmental, economic and social impacts • Respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity; • Be consistent with the sustainable development objectives of the Party, noting national prerogatives; • Apply any safeguards and limits to the transfer and use of ITMOs; • Contribute resources for adaptation, if applicable; • Deliver overall mitigation in global emissions, if applicable. 	IR, RI
ITMO information	Information on: <ul style="list-style-type: none"> • Mitigation outcomes authorised as ITMOs for use towards achievement of NDCs and for use for other international mitigation purposes • The cooperative approach or other international mitigation purpose associated with the ITMO • Entities authorised to use mitigation outcomes authorised for use for other international mitigation purposes • First transferred ITMOs • First transferring participating Party • Vintage (year in which the mitigation occurred) and sector(s) • Activity type(s) and unique identifiers • Transfer, acquisition and holdings of ITMOs • Cancellation, voluntary cancellation, voluntary cancellation of mitigation outcomes or ITMOs towards overall mitigation in global emissions • Use towards NDCs • The using participating Party or authorised entity or entities (as soon as known) • Any changes to earlier authorisations 	AI, RI AI, RI IR, AI, RI AI, RI AI AI, RI AI AI AI AI, RI RI
Emissions balance information	Information on: <ul style="list-style-type: none"> • Annual anthropogenic emissions by sources and removals by sinks from the sectors and GHGs covered by its NDC • Annual quantity of ITMOs first transferred • Annual quantity of mitigation outcomes authorised for use for other international mitigation purposes • Annual quantity of ITMOs used towards achievement of its NDC • Net annual quantity of ITMOs, per the cooperative approach, sector, transferring Party, using Party and vintage of the ITMO for each cooperative approach • Total quantitative corresponding adjustments used to calculate the emissions balance • An annual emissions balance 	RI

* IR = Initial Report, AI = Annual Information, RI = Regular Information

Parties participating in ITMO cooperation are required to report relevant information through Initial Reports (IR), Annual Information (AI) in Agreed Electronic Format (AEF) and Regular Information (RI) in Biennial Transparency Reports (BTRs) (see Figure 7 and Table 4). Countries must submit an IR or an updated IR with information on a cooperative approach no later than upon authorisation of ITMOs. This can be before or in conjunction with submitting AI or RI on ITMOs from that approach. The reported information is included in the Centralized Accounting and Reporting Platform (CARP) and its Article 6 database. As of January 2025, only a draft AEF has been provided. Countries are encouraged to apply the draft AEF and other international guidance in their reporting.³²

The Article 6 database will enable the UNFCCC Secretariat to perform an automated consistency check of the submitted information. Furthermore, an Article 6 Technical Expert Review team will review the consistency of the reported information with the Article 6.2 rules and provide recommendations, as needed, on how to improve consistency. The team determines whether any identified inconsistencies are “significant” and/or “persistent”, based on the reviewers’ own definitions. The review reports will be made publicly available on the CARP. Parties must make reasonable efforts to resolve the identified inconsistencies and demonstrate their resolution as soon as possible. They are also requested not to use ITMOs towards NDCs in case they are identified as inconsistent in the consistency check and would have an impact on the adjusted emissions balance.

3.3.2. National considerations

Participating countries must decide how to gather and report ITMO-related information, whether to track ITMO-related information through a national registry or the International Registry and whether to issue ITMOs as units or merely pull and view information on units issued in other carbon registries. Many countries already have national systems for tracking and reporting progress towards their climate targets, including for national inventories and reporting under the international climate regime. These provide an important basis for ITMO tracking and reporting. The national arrangements should ensure the accurate and timely recording and tracking of authorisation, transfers, use and cancellations, including the timely flow of relevant information from any underlying registries to the authorities that are responsible for reporting and applying corresponding adjustments.

Upon the first authorisation of ITMOs, countries need to submit an Initial Report which describes the country's approach to ITMO cooperation and describes how it meets the participation requirements. Registry access is a participation requirement and a mandatory content requirement for authorisation, and is thus needed latest at the time of authorisation of the ITMOs. Thereafter, the

³² Latest templates are available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/cooperative-implementation/carp>

country needs to track and submit Annual and Regular Information on authorisations, transfers and ITMO use or cancellation.

While information about ITMO authorisations is readily available to the national Article 6 authority, information about the issuance, transfer and use or cancellation of ITMOs may not in all cases be readily available to the authority. This could be the case for carbon credits authorised as ITMOs that are issued, transferred and used or cancelled in registries that are operated by non-state actors and cater for specific carbon crediting programmes. Carbon credit issuances, transfers and use or cancellation are recorded and tracked in these registries. Registries can contain, or provide access to, key information about the underlying activity and mitigation outcomes, such as the host country, activity type, applied methodologies, vintage³³ and any sustainable development co-benefits. Registries play a key role in avoiding double issuance³⁴ and double use³⁵. In cases where countries authorise carbon credits as ITMOs, they need consider how to access and utilise the information that is available through the crediting programme and the associated registry. In this context, the Climate Action Data Trust is a centralised metadata platform that links, aggregates and harmonises all major carbon credit registry data to facilitate transparent accounting in line with Article 6 of the Paris Agreement.³⁶

In cases where a country transfers ITMOs to another country, the registries used by these countries would need to be connected. Bilateral ITMO cooperation agreements could include provisions for registry connections as well as coordination of information flows and reporting.

3.4. Legal arrangements

The international Article 6.2 guidance leaves legal arrangements relating to ITMO cooperation up to the participants. At the national level, countries need to incorporate their national ITMO arrangements into domestic law, including the requirements, processes and mandates for granting authorisations, establishing and operating a registry and reporting to the Paris Agreement.

At the inter-governmental level, countries can enter into agreements with other countries regarding the removals value chain, if more than one country is involved in the capture, transport and storage of biogenic carbon, and regarding ITMO cooperation, if countries want to develop a framework to facilitate multiple ITMO transactions. An example of an inter-governmental agreement on the removals value chain is the Declaration of Intent on Cooperation on Carbon Capture and Storage and Carbon Dioxide Removals between Switzerland and Norway. These

³³ Vintage refers to the year in which the mitigation outcome underpinning the carbon credit occurred.

³⁴ Double issuance occurs if more than one carbon credit is issued for the same mitigation outcome.

³⁵ Double use occurs if the same carbon credit is used by more than one end-user.

³⁶ See <https://climateactiondata.org/>

agreements cover issues such as the roles, rights and responsibilities of parties in the removals value chain, including the monitoring and reporting CO₂ capture, storage and any leakage (during transport and/or storage), and addressing any reversals. They also need to anticipate risks associated with e.g. private parties defaulting or otherwise reneging on obligations relating to monitoring or addressing reversals. Bilateral ITMO framework agreements are typically concluded to facilitate the authorisation of ITMOs for use towards an NDC, although the same framework could also pave the way for authorising ITMOs for use for other international mitigation purposes (such as towards Sweden's national target or for voluntary offsetting). For example, Japan, South Korea, Sweden and Switzerland have concluded agreements with various partner countries. Sweden and Switzerland have also concluded a Memorandum of Understanding (MoU) with each other on piloting the transfer of removals under Article 6.2 of the Paris Agreement. Inter-governmental agreements typically include the general principles, criteria, responsibilities and processes for authorising and transferring ITMOs between the two countries. They do not cover the commercial terms of specific ITMO transactions.

At the level of individual activities, the entities involved in these activities need to conclude agreements on the rights, responsibilities and commercial terms relating to the removals value chain and the generation, sale and purchase of carbon credits. The activity developers are typically private entities while the carbon credit buyers may be public and/or private entities. In some cases, a single buyer may commit to purchasing all or part of the expected carbon credits at a pre-determined unit price. The contract could include conditions relating to, for example, milestones for the successful registration of the activity, the issuance of carbon credits and/or their authorisation as ITMOs by certain dates.

Note that, even where ITMOs are used towards an NDC of a country, the buyer of these ITMOs may be a private entity rather than the government of that country. For example, Switzerland requires entities that import fossil fuels into the country to buy ITMOs for use towards the Swiss NDC to offset the emissions caused by burning these fuels in Switzerland. The private KliK Foundation purchases such ITMOs on behalf of fossil fuel importers.

4. EU-specific considerations for cooperation under Article 6.2

4.1. Overview of EU's climate framework

4.1.1. EU climate targets and the role of removals

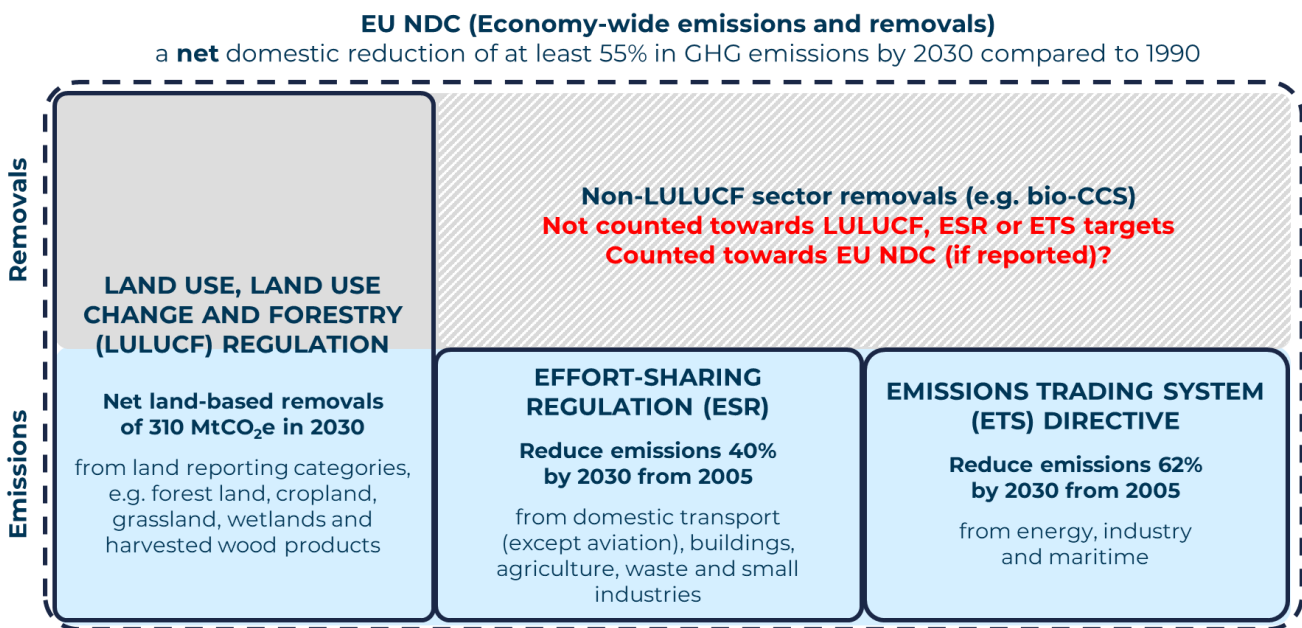
The European Climate Law sets EU-wide targets for 2030 and 2050 (European Union, 2021). The objective encompasses GHG emissions and removals regulated in EU law. By 2050, the EU aims to achieve a balance between economy-wide emissions by sources and removals by sinks³⁷ of GHGs domestically within the EU, thus reducing EU-wide emissions to net zero. Thereafter, the EU aims to achieve “negative emissions”. For 2030, the EU has a binding target to reduce domestic net GHG emissions (i.e. emissions after deduction of removals) by at least 55 % compared to 1990 levels. This target is aligned with the EU NDC for 2030, which is a single joint NDC covering the EU and its Member States (European Union, 2023f). In this context, “domestic” refers to achieving the target without using international credits.

The EU NDC refers to EU legislations to deliver this target, including the Effort-Sharing Regulation (ESR), the Land Use, Land Use Change and Forestry (LULUCF) Regulation and the Emissions Trading System (ETS) Directive (Figure 8) (European Union, 2023c, 2023d, 2024b). The ESR and LULUCF Regulation set national targets for each Member State, while the ETS Directive sets an EU-wide cap for emissions covered by the EU Emissions Trading Scheme (EU ETS). The regulations allow for some flexibility between years, sectors and Member States in meeting these targets. Although Iceland, Liechtenstein and Norway are not EU Member States, they participate in the EU ETS and have agreed to implement the Effort Sharing and LULUCF Regulations with the same obligations and flexibilities as EU Member States (European Commission, 2019, n.d.). Furthermore, the EU ETS is internationally linked with the Swiss ETS (European Union, 2023b; F. O. for the E. FOEN, 2024).

For now, the EU has a removal target only for land-based removals, of achieving 310 MtCO₂e of net land-based removals by 2030 in the LULUCF sector. The only EU-level incentive for industrial carbon removals is the Innovation Fund, which uses EU ETS-generated revenue to fund the demonstration of innovative low-carbon technologies. The EU's Industrial Carbon Removal Strategy confirms that “industrial” carbon removals, from activities such as bio-CCS, are not currently covered by the EU ETS Directive nor the ESR or LULUCF Regulation, meaning that these “negative emissions” will not be taken into account when calculating emissions that fall under the scope of the ESR or EU ETS (European Commission, 2024c). By contrast, given that the EU NDC for 2030 is defined as economy-wide and covering all emissions and removals within the EU, it seems possible that removals from

³⁷ Sinks include natural and technological solutions, as reported in the EU's GHG inventories to the UNFCCC.

bio-CCS could count towards the EU NDC, to the extent that such removals are reported by Member States as part of their EU reporting and subsequently by the European Commission as part of EU-level reporting under the Paris Agreement (see below). If removals from bio-CCS count towards the EU NDC but not towards the Member States' ESR targets, they would effectively serve as a safety valve for (over)achieving the EU NDC. Counting removals from bio-CCS towards the EU NDC would introduce a risk of double claiming between voluntary offsetting and the EU NDC.



Source: Authors

Figure 8. EU NDC and EU targets for LULUCF, ESR and ETS sectors for 2030

Looking forward, the European Climate Law includes a process for setting the 2040 target. This process was launched in early 2024, with the publication of the European Commission's assessment for a 2040 EU climate target (European Commission, 2024c), recommending a 90% reduction of the EU's net GHG emissions by 2040 relative to 1990. To achieve this, the Commission estimates that the level of remaining EU GHG emissions in 2040 should be less than 850 MtCO₂e and carbon removals (through land-based and industrial carbon removals) should increase to 400 MtCO₂e. Modelling indicates that almost half of the removals should come from bio-CCS or DACCS in 2040, which would require their drastic scaling from the current near-zero levels, and even from projected levels of 5 MtCO₂e through removals from bio-CCS by 2030 (European Commission, 2024c).

Box 4. EU Carbon Removals and Carbon Farming Regulation

On 27 November 2024, the European Parliament and Council adopted a regulation establishing an EU certification framework for permanent carbon removals, carbon farming and carbon storage in products also known as the Carbon Removals and Carbon Farming (CRCF) Framework (European Union, 2024d).

According to the regulation, carbon removals, carbon storage in products, and soil emission reductions can be certified under the framework. The regulation specifies the quality criteria and rules for verification, certification, issuance and use of certified units, as well as of rules for the functioning and recognition by the Commission of certification schemes.

The framework aims to enhance the environmental integrity and transparency of permanent carbon removals, carbon farming and carbon storage in products and promote trust in their certification while reducing the associated administrative costs. Existing and new public and private crediting programmes that seek to certify emission reductions and removals under the CRCF framework can apply for recognition by the Commission under the CRCF Regulation. However, they can operate in the EU even without such recognition.

The regulation includes the following units which should be distinct from each other:

- Permanent carbon removal units
- Carbon farming sequestration units
- Carbon storage in products units
- Soil emission reduction units

All units need to meet relevant criteria on quantification; additionality; storage, monitoring and liability; and sustainability. The activities should take place within the EU, with the Commission considering the possibility of allowing geological carbon storage in neighbouring third countries (e.g., Norway and UK).

The Commission will establish certification methodologies in close consultation with the Expert Group on Carbon Removals. The Commission must prioritise the development of methodologies for those activities that are the most mature, have the potential to provide the largest co-benefits or where EU legislation relevant for the development of those methodologies has already been adopted. Regarding bio-CCS, the regulation notes that the Innovation Fund sets out rules relevant for the development of certification methodologies for bio-CCS.

Clear liability mechanisms will be introduced within the certification methodologies in case of reversals and the consequences of incomplete monitoring and non-compliance by the operators during the monitoring period.

To generate certified units, activity operators must obtain a certificate of compliance for the activity from a crediting programme that is recognised by the Commission, and undergo regular re-certification audits. Until an EU-wide Union registry is established and maintained by the Commission, certified units may be issued by crediting programmes into registries that meet relevant criteria.

Regarding the use of units, the regulation states that that the units generated under this framework shall contribute to the EU NDC and its climate objectives, and not to third party NDCs or international compliance schemes.

In the coming years, the EU will assess options for EU targets for carbon removals, including a separate target for “permanent” carbon removals, as well as options for policies and support mechanisms for “industrial” carbon removals, including whether and how to account for them in

the EU ETS (European Commission, 2024c). The Commission will share its assessments in July 2026. In parallel, the Commission is developing a framework for certifying CRCF (see Box 4 for details), including for safely and permanently stored carbon removals obtained through technological solutions, within the EU. Although the CRCF Regulation states that all removals certified under the scheme should contribute towards EU's climate commitments, there is currently no direct link between the removals to be certified and their accounting towards the EU climate objectives (European Commission, 2024a). The scheme's entry into force is a precondition for analysing the accounting of industrial carbon removals under EU law (European Commission, 2024c). When integrating industrial removals into EU law, the key objectives to consider are: (1) Removals serve to offset hard-to-abate emissions and then to go net-negative; (2) The ramp-up of both industrial and nature-based carbon removal solutions should be incentivised; (3) Double counting should be avoided (European Commission, 2024a).

4.1.2. Reporting

Progress towards EU targets is monitored and reported by the Commission at the EU level, based on information submitted by the EU Member States and EU ETS installations. The Governance Regulation sets common reporting rules for Member States, including to track progress towards ESR and LULUCF targets and to comply with the reporting requirements under the Paris Agreement (European Union, 2023e). Member States must submit their GHG inventory every year and a progress report on the domestic implementation of the EU NDC and any other national targets and objectives every two years. A related Commission implementing act provides guidance on the structure, format, submission processes and review of the information reported by Member States (European Union, 2024a). Since May 2024, Member States have been able to report removals from bio-CCS³⁸ to the EU through the ESR reporting template (Directorate-General for Climate Action, 2024). The ETS Directive includes reporting rules for ETS installations, including on annual reporting of verified emissions.

Based on the information provided by the Member States and ETS installations, the Commission will assess annually whether the EU and its Member States have made sufficient progress towards meeting the EU NDC and report the findings in the EU Climate Action Progress Report and the State of the Energy Union Report (European Commission, 2023, 2024d) as well as the EU-level GHG inventory and BTR under the Paris Agreement. In addition, each Member State must submit a national GHG inventory and BTR under the Paris Agreement. Given that the EU and its Member States have a single joint NDC, some information relating to tracking the implementation and achievement of the NDC, such as the structured summary and the emissions balance, will need to

³⁸ In May 2024, a new row was added to the ESR reporting template for reporting "Negative emissions from CO₂ captured from biomass combustion and transferred to long-term storage plus biogenic CO₂ captured from industrial processes and transferred to long-term storages".

be reported at the EU-level. The IPCC 2006 inventory guidelines enable the EU and its Member States to report removals from bio-CCS in their GHG inventories.

4.1.3. Registries

The Union Registry has a key role in tracking progress towards and demonstrating compliance under the EU ETS and ESR. It includes accounts for ETS installations and Member States³⁹ and tracks transfers of units between accounts as well as the use of flexibilities. The Central Registry Administrator calculates the compliance status by checking whether Member States and ETS installations have fully covered their relevant emissions with Annual Emission Allocations (AEAs) or EU Allowances (EUAs), respectively (European Union, 2025).

According to the Governance Regulation, the EU and its Member States must also set up and maintain registries to accurately account for the EU NDC and for ITMOs pursuant to Article 6, and the Commission shall adopt delegated acts to set up such registries. It is unclear when such registries would be set up and whether and how they would be connected to the Union Registry.

4.2. Implementing Article 6.2 in the EU context

4.2.1. General principles and current status

In principle, the EU and its Member States could engage in cooperation involving ITMOs on the demand and/or supply side. Corresponding adjustments would need to be applied in the EU emissions balance if the EU or its Member States wish to use ITMOs towards the EU NDC or authorise and first-transfer ITMOs based on mitigation that is achieved within their boundaries. By contrast, if the EU or its Member State would use ITMOs originating from third countries towards other international mitigation purposes, for example towards a national target⁴⁰ or to support ambition-raising beyond the EU NDC, the EU emissions balance would not need to be correspondingly adjusted.

The current EU NDC explicitly states that the EU target for 2030 is to be achieved domestically, i.e. without international credits. This said, the EU cooperates with some third countries in ways that could involve the transfer of mitigation outcomes across EU borders as ITMOs and their accounting in line with Article 6.2 guidance. The EU NDC states that the EU will account for its cooperation with

³⁹ For the effort sharing sector, the Union Registry includes an ESR Compliance Account for each Member State, as well as an ESR AEA Total Quantity Account, an ESR Deletion Account and an ESR Safety Reserve Account. In case of any modification of the total (EU-level) quantity of AEAs that would lead to a decrease of a Member State's AEAs during the compliance period, the Central Administrator shall transfer the corresponding quantity of AEAs from the Member State's relevant ESR Compliance Account to the ESR Deletion Account. The Deletion Account could also include AEAs that are transferred upon closure of an ESR Compliance Accounts or downward revision of the use of EUAs. Besides AEAs, also LMUs can be transferred to the ESR Deletion Account but EUAs cannot.

⁴⁰ I.e. not towards the Member State-specific national ESR and LULUCF targets

third countries in a manner consistent with relevant (i.e. Article 6.2) guidance under the Paris Agreement.

In the EU ETS sector, the Article 6.2 guidance will be used to account for transfers of allowances between the EU and third countries, such as Iceland, Norway and Switzerland. In principle, ITMO accounting should reflect the shift in the emissions resulting from the linking and match the changes in emissions observed in the national GHG inventories (Hynes and Schneider, 2023). This may, however, be challenging to implement in practice.⁴¹

In the LULUCF and ESR sectors, current EU legislation enables Member States that overachieve their LULUCF or ESR targets to transfer the excess mitigation to other Member States, Iceland or Norway for use towards the acquiring country's respective targets. Trading among Member States would not involve ITMOs, while (net) transfers between a Member State and a non-Member State, such as Iceland or Norway, would constitute ITMO trading and require ITMO accounting. In principle, excess mitigation achieved in one Member State could be authorised and transferred as ITMOs without jeopardising the EU NDC, provided that, overall, the EU is on track to meeting its NDC without this excess mitigation. To avoid double counting, the emissions balance of the transferring country would need to be adjusted in the Union Registry and a corresponding adjustment would also need to be applied in the EU emissions balance (Dufour et al., 2024).

To implement cooperation involving ITMOs, the EU needs to have in place EU-level arrangements for authorising and tracking ITMOs, applying corresponding adjustments for the EU emissions balance, and reporting ITMO-related information. This will require the EU to adopt new EU legislation, amend existing legislation and cooperation agreements, and establish registries to account for the EU NDC and ITMOs. As of January 2025, the EU does not yet have the required arrangements and registries in place. The Governance Regulation mandates the Commission to set up Article 6 registries through delegated acts but does not provide a timeline. Other existing references to Article 6 of the Paris Agreement are in the LULUCF Regulation and the CRCF Regulation. The LULUCF Regulation requires the Commission to submit a report six months after the first global stocktake under the Paris Agreement (i.e. by June 2024), including an assessment of progress made at international level on the Article 6 rules and, where relevant, proposals to amend this Regulation, in particular to avoid double counting and apply corresponding adjustments. For now, the Regulation on the EU CRCF framework (Box 4) focuses solely on certifying removals and soil emission reductions that contribute to the EU NDC and climate neutrality target, thus excluding the possibility of authorising such units as ITMOs. This said, by 31 July 2026, the Commission should assess additional requirements to align the CRCF Regulation with the rules and guidance of Articles 6.2 and 6.4 of the Paris Agreement and best practices in the voluntary carbon markets and, where

⁴¹ Hynes & Schneider (2023) discuss key challenges in detail and present four approaches to estimate the shift in emissions as a result of ETS linking.

appropriate, propose legislation. The assessment should compare methodological requirements and address requirements relating to authorisation and corresponding adjustments. It should also consider the appropriateness of differentiating end uses for each type of units and identify requirements for the use of units by private actors or third parties, including for the voluntary carbon markets and international compliance schemes, in line with relevant Union legal acts.⁴²

Member States may establish their own national arrangements for authorising and tracking ITMOs, but they are not currently in the position to apply corresponding adjustments to the EU emissions balance. To the extent that Member States intend to buy ITMOs from third parties and use them for purposes other than towards the EU NDC, they avoid the need to apply corresponding adjustments to the EU emissions balance. Sweden is currently the only EU Member State with a plan to buy ITMOs. The Swedish Energy Agency is managing a national programme to procure ITMOs from third countries for use towards Sweden's national target. Such ITMO use does not require the application of corresponding adjustments in the EU emissions balance, given that these ITMOs are not used towards the EU NDC. The Swedish Energy Agency has also concluded a non-binding Memorandum of Understanding with Switzerland on piloting the international transfer of a "symbolic amount" of ITMOs from industrial carbon removal activities, such as bio-CCS, between the two countries (Swedish Energy Agency, 2023). Private entities could be involved as sellers and/or buyers in both countries. This pilot cooperation aims "to engage with private stakeholders to advance the use of Article 6 of the Paris Agreement for development and deployment of carbon removal technologies and to enhance the understanding of the necessary frameworks at international and national level" (Swedish Energy Agency and Federal Department of Environment, Transport, Energy and Communications of the Swiss Confederation, 2023). If removals generated in Sweden were authorised as ITMOs and first-transferred to Switzerland, this would trigger corresponding adjustments for the EU emissions balance. These ITMOs could, in principle, be used towards the Swiss NDC or OIMP. However, as noted above, the current EU legislation does not enable ITMO authorisation or transfer of mitigation achieved within the EU. If removals generated in Switzerland were authorised as ITMOs and transferred to Sweden, they could be used for purposes other than the towards EU NDC. Current EU legislation does not enable ITMOs to be used towards the EU NDC. If, in the future, the EU and Switzerland were to decide to incorporate removals from bio-CCS into their respective ETSs, Swedish and Swiss ETS entities could buy and sell removals from bio-CCS via the EU-Swiss ETS link. ITMO accounting would apply to these transfers.

4.2.2. Using carbon credits to make climate-related claims in the EU

The EU anti-greenwashing legislation provides guidance and requirements for claims based on the voluntary use of carbon credits. In 2024, the EU agreed to ban product-level offset claims based on

⁴² E.g. the Corporate Sustainability Reporting Directive and the Governance Regulation as well as the forthcoming registries for ITMOs and the Green Claims Directive

carbon credits (European Union, 2024c). In 2024, the EU also adopted the CRCF Regulation (European Union, 2024d). The CRCF Regulation states that removals certified under the CRCF shall contribute towards the EU NDC and climate neutrality target (see Box 4 for details). They would thus be suitable for making contribution claims. They would not be authorised as ITMOs and thus, their use towards voluntary offsetting could lead to double claiming with the EU NDC (see section 1.3.2 for further information on claims). This said, the regulation tasks the Commission to study voluntary carbon market best practices and Article 6 and report back by June 2026 on potential revisions to the regulation. In 2025, the Commission expects to propose delegated acts on certification methodologies⁴³ and an implementation act on verification and registries, enabling certification to start in 2026 (Holzleitner, 2024).

In 2025, the EU is expected to agree on the Green Claims Directive, which complements existing anti-greenwashing legislation with further guidance on communicating and substantiating green claims, including claims based on carbon credits. The positions of the European Parliament and the Council of the EU, which were adopted in 2024, recognise the use of carbon credits for contribution claims and offset claims, and restrict the latter only to the organisation-level and only for organisations with science-aligned targets (Council of the European Union, 2024; European Parliament, 2024). The European Parliament's position would further limit offset claims only to "residual" emissions, to be defined by the Commission, and only based on carbon credits certified under the CRCF or an equivalent crediting programme, as determined by the Commission.

Based on these positions, it remains to be seen whether and to what extent the Green Claims Directive will align with international best practice for the voluntary use of carbon credits, including with regard to avoiding double claiming of the same mitigation outcomes for voluntary offsetting and towards NDCs. The Parliament's position seems to allow for double claiming of removals certified under the CRCF towards both for voluntary offsetting and the EU climate targets, contrary to international best practice. The Council's position remains silent about double claiming and includes a mandate to the Commission to develop further rules by the end of 2027, including to elaborate harmonised requirements for offsetting and contribution claims, taking into account "relevant international standards" and, "where necessary, authorisations and corresponding adjustments" related to the implementation of Article 6 (Council of the European Union, 2024). These rules represent an opportunity to align EU requirements with international best practices, including avoiding double claiming, thereby potentially driving voluntary demand for carbon credits, including carbon credits authorised as ITMOs. These rules could potentially provide clarity also on whether and how removals certified under the EU CRCF framework should be used for offsetting and contribution claims.

⁴³ Note that these methodologies could also be applied without seeking EU certification, e.g. as a basis for requesting ITMO authorisation for bio-CCS removals.

5. Conclusions

In the Nordic region, there is significant potential to finance additional removals from bio-CCS through the sale of carbon credits, and there is increasing demand for such carbon credits in the voluntary carbon market. This potential is already being realised, with Nordic companies such as Ørsted and Stockholm Exergi inking deals with international tech giant Microsoft on the sale of removal credits from bio-CCS. While these investments also require state support to reach financial closure, the carbon credit revenue reduces the required amount of state support per tonne of removal. Combining state support with carbon credit revenue could fund more removals from bio-CCS activities, compared to a situation where removals are funded only with state support or carbon credit revenue, provided that the funds are not used solely for boosting the profitability of funded activities and/or reducing the total amount of state support available for bio-CCS. The required carbon credit unit price per removal will depend on the amount of state support and the volume of carbon credits issued. The latter depends on the stringency of the crediting baseline. Under Article 6 of the Paris Agreement, crediting baselines should be set below business-as-usual.

Under Article 6 of the Paris Agreement, carbon credits could be authorised as ITMOs, making them suitable for use towards NDCs, international mitigation and other purposes, such as voluntary offsetting and voluntary contributions to global ambition-raising. The existing EU targets and legislation, however, limit the Nordic countries' opportunities to engage in cooperation involving ITMOs (see Table 5). Currently, Nordic EU Member States – namely Denmark, Finland and Sweden – can acquire ITMOs generated in other countries but they cannot host ITMO-generating activities. ITMOs cannot be used towards the EU 2030 NDC but they could be used for other purposes, such as towards the Nordic countries' national targets, as Sweden intends to do. Nordic companies could buy ITMOs and use them for CORSIA compliance or for voluntary purposes, such as offsetting or contributions to global ambition-raising. EU Member States cannot authorise ITMOs for removals occurring within their boundaries, as this would require applying corresponding adjustments in the EU emissions balance. As of January 2025, the EU does not have legislation or procedures in place to enable such adjustments. However, work is ongoing at the EU level to enable the EU to engage in some forms of ITMO cooperation.

Table 5. Illustrative examples of international cooperation involving removals from bio-CCS with and without authorisation as ITMOs

Host	End-user	ITMO?	Use case	Currently possible?
Switzerland	Sweden	Yes	Towards national target	Possible to use ITMOs generated outside of the EU towards national targets
Switzerland	Sweden	Yes	Towards EU target	Not possible to use ITMOs towards EU Member States' EU targets
Sweden	Switzerland	Yes	Towards NDC	Not possible for EU Member States to host activities that generate ITMOs
Sweden	Swiss company	Yes	Towards other purposes	Not possible for EU Member States to host activities that generate ITMOs
Sweden	Switzerland	No	Contribution to Swedish national target	Possible to use carbon credits not authorised as ITMOs for contributions
Sweden	Swiss company	No	Contribution to Swedish national target	Possible to use carbon credits not authorised as ITMOs for contributions
Finland	Sweden	Yes	Towards national target	Not possible for Member States to host activities that generate ITMOs
Finland	Sweden	No	Towards EU target	Not possible to use removals from bio-CCS towards EU Member State's targets

Source: Authors

In the meantime, removals from Nordic bio-CCS activities could be issued as carbon credits under various carbon crediting programmes and sold to buyers that wish to voluntarily contribute to global efforts to scale up removals. Nordic countries can cooperate to promote consistent reporting and accounting of removals from bio-CCS, paving way for their potential authorisation as ITMOs and possible integration into EU policies and targets. To safeguard the achievement of national targets, host countries should only grant ITMO authorisation to removals that are reported in the national GHG inventory; within the scope of their targets; and additional to what is needed to meet the national target. Otherwise, applying the required corresponding adjustment would make it more difficult for the host country to meet its targets. Currently, all countries can report removals from bio-CCS in their national GHG inventories and EU Member States can also include them in their EU climate reporting. While removals from bio-CCS are not within the scope of the existing EU targets for Member States and the emissions trading sector, their inclusion in future EU targets and policy will be considered in the coming years.

Specific recommendations for Nordic countries and other stakeholder are provided in a separate policy brief.

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