COUNTRY GUIDANCE FOR
NAVIGATING CARBON MARKETS

MODULE 2

How can host countries approach the decision of whether to authorize credits and how to price them?

Paris Agreement Article 6 Implementation Partnership

GGGI

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

THE INTEGRITY COUNCIL FOR THE VOLUNTARY CARBON MARKET

UNDP

United Nations Climate Change

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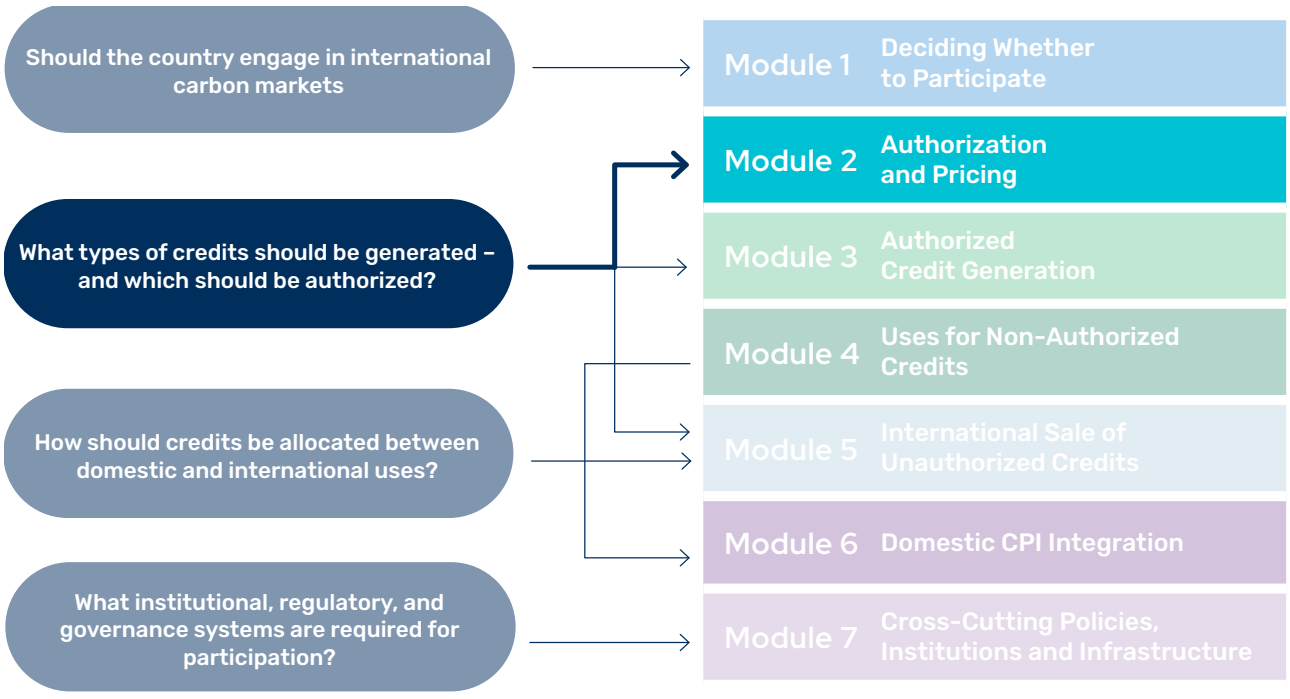
Abbreviations

A6.2	Article 6.2 of the Paris Agreement
A6.4	Article 6.4 of the Paris Agreement
AML	Anti-Money Laundering
ART	Architecture for REDD+ Transactions
CCP	Core Carbon Principles
CDA	Community Development Agreement
CDAC	Community Development Agreement Committee
CDM	Clean Development Mechanism
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPI	Carbon pricing instrument
DOE	Designated Operational Entity
D4C	Digital for Climate
EAC	Environmental attribute certificate
ERR	Emission reduction or removal
ETS	Emissions Trading System
FPIC	Free, prior, and informed consent
FRA	Financial Regulatory Authority (Egypt)
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
ICVCM	Integrity Council for the Voluntary Carbon Market
IOSCO	International Organization of Securities Commissions
IPLC	Indigenous Peoples and local communities
IT	Information technology
ITMO	Internationally Transferred Mitigation Outcome
JCM	Joint Crediting Mechanism
KYC	Know Your Customer
LDC	Least Developed Country
LT-LEDS	Long-term Low Greenhouse Gas Emission Development Strategy
MACC	Marginal Abatement Cost Curve
MCU	Mitigation Contribution Unit
$MtCO_2e$	Million tonnes of carbon dioxide equivalent
NDC	Nationally Determined Contribution
OIMP	Other International Mitigation Purposes
OMGE	Overall Mitigation of Global Emissions
PACM	Paris Agreement Crediting Mechanism
PFM	Public financial management
RBCF	Results-based climate finance
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goal
SIDS	Small Island Developing State
SOP	Share of Proceeds
TCAF	Transformative Carbon Asset Facility
TREES	The REDD+ Environmental Excellence Standard
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Markets
VCMI	Voluntary Carbon Markets Integrity Initiative

Countries seeking a significant role as host countries in international carbon markets must make key decisions on whether and when to 'authorize' credits, and how to price them. Authorization lies at the heart of Article 6 of the Paris Agreement.

This section explores the issue through three policy-relevant questions:

- **Question 2.1:** How might a country decide which activities can generate authorized credits at different points in time?
- **Question 2.2:** How might a country approach the pricing of any authorized credits?
- **Question 2.3:** How (else) can countries manage any overselling risks associated with authorization?



Question 2.1 How might a country decide which activities can generate authorized credits at different points in time?

What are the key actions or options host countries may consider?

Authorizing a credit for specific uses turns it into an internationally transferred mitigation outcome (ITMO). An ITMO can be used toward another country's NDC (through Article 6 of the Paris Agreement) or for "other international mitigation purposes" (OIMP), such as CORSIA compliance (International Air Transport Association 2024) or by voluntary users of carbon credits. However, voluntary buyers of credits may also elect to purchase non-authorized credits (more in Module 4).

The act of authorizing a credit (creating an ITMO) and its subsequent first transfer1 requires the host country to apply a "corresponding adjustment". This corresponding adjustment increases the host country's reported emissions by the number of authorized credits that are transferred. This aims to prevent double counting — ensuring the same mitigation outcome is not claimed by both the host country and the buyer**.**

Authorization is a critical decision. After a credit has been authorized and the point of first transfer has passed, the underlying ERRs associated with the authorized credits will effectively not count toward the host country's NDC[2]. This may mean that the host country will have to find additional ERRs to meet its NDC.

Specific language applies to authorized and unauthorized credits generated through the Paris Agreement Crediting Mechanism (PACM)/ Article 6.4 mechanism (see Figure 1). In this case, authorized credits are called Authorized Emission Reductions (AERs), while unauthorized ones are called Mitigation Contribution Units (MCUs). The accounting rules for AERs, in terms of the need to make corresponding adjustments, are identical to those for other authorized credits i.e. AERs are a type of ITMO.

1 For credits that have been authorized for use towards another Party's NDC, first transfer is defined as the 'the first international transfer of the mitigation outcome'. For credits that have been authorized for use for OIMP, the host country has more flexibility to define the point of first transfer, see Question 3.5.

2 Decisions at COP29 clarified that the option to remove the authorization of credits that have been first transferred can only take place if 'specified by the Parties participating in the cooperative approach in applicable terms and conditions of the authorization that specify the x

What factors might shape decision-making?

Table 2.1 summarizes the key pros and cons for host countries when deciding whether to authorize credits. The core trade-off is between securing potentially higher prices for authorized credits alongside lower reputational risks versus the higher opportunity and transaction costs that authorization may involve.

Table 2.1 Pros and cons for host countries considering whether to authorize credits

Relative benefits of providing an authorization	Relative benefits of not providing an authorization
Greater potential demand and higher prices enabling delivery of more costly/challenging ERRs • Authorizations are required for credits used for NDC achievement or CORSIA compliance. This is expected to become the main source of credit demand in the medium term. Some voluntary buyers also favor authorized credits for perceived integrity benefits. • Market reports indicate a price differential of around $20-$25 per credit (in 2024) while the World Bank iCRAFT transaction[1] had a $15 difference between authorized and non-authorized credits.	**Lower NDC attainment risk and therefore lower opportunity cost** • All of the ERRs can be counted toward the host country's decarbonization efforts, so unauthorized credits do not jeopardize NDC attainment or carry the reputational risks associated with failure to meet targets.
Host country may be perceived as capable of supporting climate action, both domestically and internationally • Authorization process involves establishing robust regulatory, legal, and institutional frameworks, which in turn incentivize greater private sector participation in climate action. • Host countries can boost global climate goals by helping others meet NDCs or CORSIA targets, especially given their vulnerability to climate impacts.	**Quicker financial flows/lower transaction costs** • Authorization requires more complex governance structures and resources, while unauthorized transfers can proceed more quickly, accelerating revenue flows.

How to trade-off these pros and cons of providing an authorization will depend both on the source of credit, and may vary over time, as discussed in the subsections below.

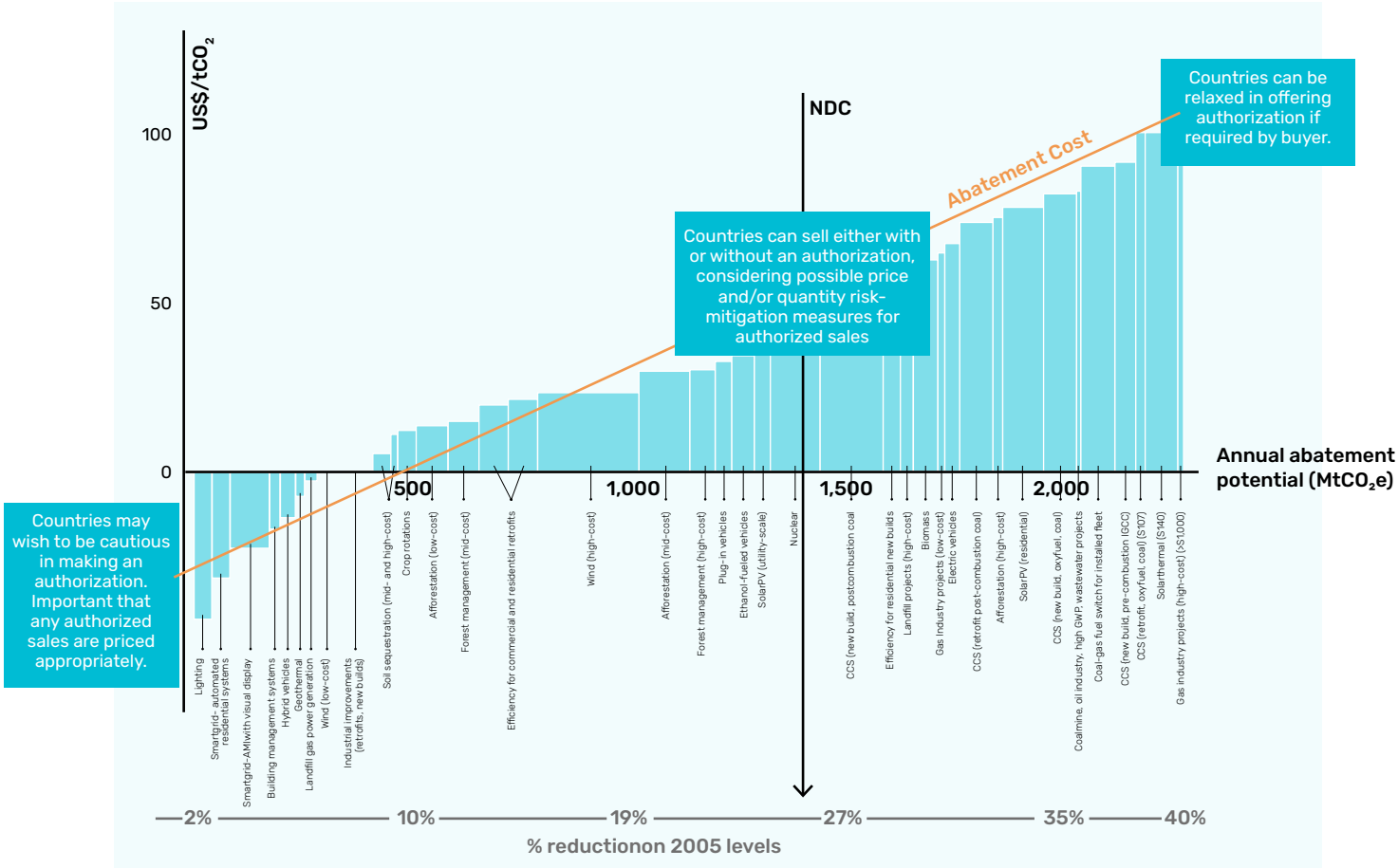
1 iCRAFT is a $45 million program in Uzbekistan, financed by the World Bank's Transformative Carbon Asset Facility (TCAF). The program supports energy sector reforms, including subsidy reductions, to cut CO_2 emissions.

Credit source

Host countries may want to be cautious about authorizing credits from activities / sectors that they expect to use to meet their NDC[1]. These will most often be activities that provide low-cost ERRs. If host countries authorize credits associated with these ERRs, they may need to rely on higher-cost alternatives to fulfil their NDC. This concern is heightened if policies are already in place to achieve these ERRs, as the country's policy efforts and associated costs will end up supporting the achievement of another Party or entity's climate targets.[2]

When countries have both an unconditional and a conditional NDC, they need to pay particular attention to how they intend to meet their unconditional NDC. The unconditional NDC will be the baseline against which countries' performance will be judged: failing to meet this target carries greater reputational risk than missing a conditional NDC, making authorizations of credits from sectors tied to the unconditional NDC particularly sensitive.

Figure 2.1 Using MACC analysis to help determine authorization strategy



Source: World Bank, adapted from Bloomberg

1 This discussion focuses on the interaction between authorization and a host country's current NDC. However, host countries may also wish to consider plans for their future NDCs as well. The same principle – that host countries need to consider how authorization may affect NDC achievement – also applied.

2 While this Guidance focuses on the perspective of host countries, buyers may also be less interested in purchasing authorized credits associated with ERRs that derive from activities that expected to form part of the country's strategy for meeting its NDC, as the buyer may also be concerned about whether the ERRs are additional. This concern will be greater if the buyer has doubts on whether the host country will be able to source alternative ERRs once the authorization is provided.

Consequently, host countries might consider using marginal abatement cost curve (MACC) analysis to help guide authorization decisions. Host countries may be more flexible in authorizing high cost ERRs unlikely to be needed for their unconditional NDC while being more cautious with low-cost ERRs that could be used to meet it. In such cases, pricing strategies to ensure that the sale price of ERRs reflects the opportunity cost not just the project cost (Q2.2) but also risk mitigation measures (Q2.3) become crucial. This is illustrated in Figure 2.1 above.

However, while MACCs may be useful as a starting point, they can also be costly and time-consuming to develop and possess other limitations[1], so other factors may also ultimately shape decision-making on which sectors should (and should not) generate authorized credits. As already mentioned, if host countries have already introduced policies[2] to deliver emission reductions in line with their unconditional NDC, it may be imprudent to then sell authorized credits from that sector internationally as its policy effort will end up supporting other actors meet their emission targets. Given the expectation that demand/willingness to pay for authorized credits may be higher than for unauthorized credits, host countries may also wish to use authorization decisions to target specific technologies, especially if these are expected to be important in meeting a LT-LEDS, or to focus on activities that are expected to have high sustainable development benefits. In addition, complementary analyses—such as technology needs assessments, national SDG strategies, or sectoral development plans—can help refine the scope of activities considered for authorization. Countries may also wish to apply a structured prioritization process, such as a multi-criteria analysis, to evaluate and weigh opportunities through stakeholder engagement.

Host countries should be cautious about authorizing credits (creating ITMOs) from sectors outside their NDC scope. Many host countries have developed NDCs that exclude certain sectors of their economy. The Article 6 Rulebook confirms that if countries provide authorized credits derived from sectors outside their NDC, the host country must still make a corresponding adjustment. This means host countries may still then need to achieve additional reductions in sectors covered by their NDC. As a result, countries should be cautious in authorize these credits unless they are confident that they can still meet their NDC. However, this could still be desirable if the resources generated from selling authorized credits from sectors outside their NDC helps to fund emission reductions in hard to abate sectors inside their NDC.[3] Countries should also be cautious of authorizing credits from sectors covered by domestic CPIs as this will impact the environmental integrity of both credits and CPIs and may result in reputational risks for buyers.

Another consideration is whether the underlying activity generating authorized credits will receive other forms of international support, particularly:

- **Other environmental attribute certificates (EACs).** In some countries, mitigation activities may also be eligible to participate in other EAC markets. For example, renewable energy projects may also consider participation in International Renewable Energy Certificates (I-REC)[4] or Tradeable Instruments for Global Renewables

1 MACCs have other limitations, including its inability to account for evolving NDCs, country-specific institutional and technical constraints, and interdependencies between sectors and technologies. Additionally, it provides a static snapshot that overlooks dynamic changes in costs and potentials, omits key co-benefits and trade-offs, and fails to assess the MRV-readiness of mitigation options. Further, in data-scarce contexts in particular, MACCs may not always be helpful given that they require significant amounts of data, making it difficult to generate reliable results. Even where sufficient data is available, doing analyses of national and sectoral strategic documents can also help to refine the MACC's scope (e.g., type and number of measures) and data needs.

2 The exception to this is if the ERR from that sector associated with the authorized credit would not be achieved by the domestic policy instrument. There may be some domestic policy instruments where this is easy to demonstrate e.g. technology mandates. By contrast, it will be difficult to demonstrate this for other domestic instruments including, notably, carbon pricing instruments. Sectors covered by a domestic CPI will generally not suitable for authorized credit sales. Module 6 explores the interaction between domestic carbon pricing instruments and domestically generated carbon credits in more detail

3 A further consideration is that if host countries are confident that they can still meet their NDC then allowing authorized credit sales from sectors beyond the NDC's scope may help catalyze future emission reduction activity within that sector, making it more attractive to bring the sector within the scope of future NDCs.

4 This requires compliance to the International Attribute Tracking Standard and the associated product code for electricity. See *https://www.trackingstandard.org/the-standard/*

(TIGR) markets, or nature-based projects may seek to sell biodiversity credits. Typically, this so-called 'stacking' of revenues from carbon credits sales with those from another EAC will be prohibited by the rules/methodologies associated with the generation of each credit (see question 3.3 below). This is because it is difficult for each to demonstrate additionality i.e. that the purchases of the certificate/credit make the critical difference in allowing the activity to proceed, especially if the credits/certificates are sold to different buyers.[5] Even when it is not explicitly prohibited by the market standards, host countries should only allow for the parallel sales of authorized credits (ITMOs) and EACs from the same activity when both the (expected) buyer of the authorized carbon credit and the (expected) buyer of the EACs are informed of and agree to such an arrangement. Beyond ITMOs, buyers of carbon credits (irrespective of status of authorization) as well as EACs may have concerns related to double counting or double use of the environmental benefits of the same activity. In the case of renewable energy projects for instance, generating a carbon credit and other EAC from the same MWh of electricity generated would constitute double counting, by seeking to monetize the same environmental and social attributes. Furthermore, governments may seek to avoid "double dipping", or the same activity benefitting twice from payments for environmental attributes. To avoid the potential negative reputational risks that could arise if host countries were to sell multiple credits/certificates without the informed consent of the buyers, host countries can establish clear rules defining the attributes that can be generated, traded, and claimed. Such rules are typically based on the principle of attribute exclusivity. This can be reinforced by maintaining a comprehensive registry that tracks all environmental attributes certificates, including carbon credits (see section 3.6 below). For example, Australia allows stacking of biodiversity certificates and carbon credits, where methodologies align such as replanting native forest and woodland ecosystems.[6]

Considering these factors, host countries may find it useful to establish either/or:

- **Positive lists:** Activities resulting in ERRs/credits that will typically receive authorization. These are activities not needed to meet the country's unconditional NDC (ideally informed through LT-LEDS and potentially through a MAC curve analysis), where the country wishes to see further investment and where there are no other forms of international support for those activities (or there is clarity on the relationship between that support and that provided from authorized credit sales).

- **Negative lists:** Activities resulting in ERRs/credits that will typically not receive authorization, except in exceptional cases and with risk mitigation. These are likely to be activities critical to meeting the unconditional NDC, already supported by domestic policies (such as domestic CPIs- more in Module 6), outside the current NDC scope, or supported with other forms of international assistance, where it has been agreed that support from authorized credit sales (ITMOs) will not be pursued.

Several countries use positive and/or negative lists to determine which sectors or activities can generate authorized credits as discussed in Box 2.1.

5 There may even be situations where the same underlying activity is claimed to deliver ERRs (and authorized credits) through two different carbon crediting programs. For example, reductions in unsustainable fuelwood harvesting could be claimed as delivering ERRs by both a clean cooking program and a REDD program. This should be avoided both to avoid double counting risk and/or that the host country may need to apply unnecessary corresponding adjustments. Host countries can avoid this risk by requiring program registration and approval before issuing credits, promoting coordination between different agencies involved in carbon credit programs (especially those looking to generate authorized credits) and transparent reporting on the provenance of all carbon credits (including authorized credits).

6 Project owners can stack benefits by earning both Australian Carbon Credit Units (ACCUs) and biodiversity certificates for the same land activities, such as replanting native ecosystems, under aligned carbon and biodiversity project methodologies. A new Biodiversity Market Register, developed by the Clean Energy Regulator (CER), will publicly track registered biodiversity projects and issued certificates. See for more: *https://www.dcceew.gov.au/environment/environmental-markets/nature-repair-market#:~:text=about%20biodiversity%20certificates.-,Aligning%20carbon%20and%20biodiversity%20markets,forest%20and%20woodland%20ecosystems%20method*.

Box 2.1 Countries using positive and/or negative lists to determine which sectors/activities can generate authorized credits

India: Its positive list focuses on facilitating emerging technology adoption and includes sectors such as renewable energy with storage, green hydrogen, fuel cells, sustainable aviation fuel, green ammonia, and carbon capture utilization and storage

Cambodia: has a positive list which contains all mitigation activities that are designated as "conditional" under the updated NDC

Ghana: Uses both a white-list and a red-list. The white-list covers activities linked to the *conditional* elements of Ghana's NDC (25 programs of action), while the red-list focuses on activities critical to *unconditional* NDC delivery.

Sources: Ministry of Environment, Forest and Climate Change 2023; GGGI 2023b; Government of Ghana 2022; Hoffman, Spalding-Fecher, and Marcias Diaz 2025

There are potential caveats and nuances to this approach:

- First, the sector or activity generating ERRs — and whether they contribute to the unconditional NDC — can be ambiguous. For example, improved cooking solutions could be classified as residential energy use or as reducing emissions from deforestation (REDD+). To avoid confusion, countries should establish and document a clear, shared understanding of how such "borderline" ERRs fit into NDC delivery, ensuring this is reflected in policy and guidance.

- Second, low-cost emission reductions could still be authorized if appropriate risk mitigation measures are applied — for example, through pricing strategies (see question 2.2) or careful baseline setting or other measures (see question 2.3).

Across time

Several factors suggest host countries may be reluctant to authorize credits and create ITMOs early in an NDC implementation period. Countries may lack clarity on how they will achieve their NDCs or what the costs will be. This uncertainty is compounded by the need to regularly update NDCs with increased ambition within the duration of the same NDC implementation periods. This means that host countries know that they are expected to make their current NDC more ambitious but may not have had the opportunity to determine how much more ambitious they will be and how this will be achieved. Some countries may also prefer to build institutional knowledge by observing others' Article 6 transactions first. In this context, flexibility is valuable.

On the other hand, early authorizations offer potential advantages. Countries with ambitious NDCs that move quickly to authorize credits could establish themselves as leading providers of authorized credits (ITMOs), strengthening their market position.[1] The benefits of being an early mover are increased by Article 6 rules which require authorized credits used for NDC achievement to apply within the same NDC implementation period — meaning demand for these credits could fall near the end of implementation periods (e.g., by 2030), as unused credits cannot be banked for future periods (Greiner 2023).[2]

1 In contrast, countries with unambitious NDCs are unlikely to secure high prices for their authorized credits, even if they bring them to market quickly.

2 Demand could also rise toward the end of the NDC period if buyers only realize late that they are off track. Meanwhile, the option to sell authorized credits for other international mitigation purposes (OIMP) will remain.

Different host countries will weigh these considerations differently, but better prepared countries and ambitious countries will have an advantage. Countries with ambitious NDCs, clear implementation strategies, good cost data, and alignment with long-term low-carbon development plans will be best placed to make informed decisions on when to authorize credits from specific ERRs.

How does responding to question 2.1 relate to the obligations or opportunities countries have under Article 6 Guidance?

The requirements around authorization, and the application of corresponding adjustments, are primarily set out in chapters I and III of the Annex to *Decisions 2/CMA.3*. This includes paragraph 14 which confirms that host countries should apply corresponding adjustments for authorized credits (ITMOs) associated with ERRs that are outside the scope of the NDC.

Decision 4/CMA.6 provides further detail concerning what information must be reported when making an authorization and clarifies the circumstances in which authorization can be withdrawn (paragraph 7).

Confirmation that it will be possible under Article 6.4 to convert mitigation contribution units (i.e. unauthorized credits) into ITMOs (i.e. authorized credits) later is in *Decision 6/CMA.6* of COP 24 in Baku (paragraph 12).

Links and dependencies to other questions in the Guidance

This issue links closely to several other elements of the Guidance. Most importantly, it links closely to questions 2(b) below on pricing strategies and 2(c) on (other) risk-mitigation measures for authorized credits. A careful approach to pricing and/or the adoption of other risk mitigation measures may make it safer for host countries to take advantage of the expected market demand for authorized credits, even for low-cost ERR activities.

Other resources

Interested readers will find further insights and discussion on the authorization decision in these documents:

- The World Bank's '*Developing an Article 6 Strategy for Host Countries*' and '*Letter of Authorization and Acknowledgement*', part of its Article 6 Approach Paper Series (World Bank 2022b). The Letter of Authorization paper in particular provides an illustrative template with schedule of terms that may be useful for host countries for all authorizations granted.
- GGGI's *Developing an Article 6 Host Party Strategy*, part of its Supporting Preparedness for Article 6 Cooperation series (GGGI 2023b) while its report on *Promoting Ambition and Transformational Change using Article 6* also discusses factors that might shape authorization decisions (especially Chapter 2) (GGGI 2024).
- A6IP Center's '*A6IP Capacity Building Tools: Article 6 Introductory Guide*' provides an overview of Article rules and guidance on authorization, key consideration and country practices (Article 6 Implementation Partnership Center 2025).
- A number of countries have published their overall approach to Article 6 in which they specify how they will approach authorization decisions, or have otherwise published information on their approach to authorization. This includes *Zambia* (Government of the Republic of Zambia 2025), *Sri Lanka* (Ministry of Environment, Sri Lanka 2024), *India* (Ministry of Environment, Forest and Climate Change 2023) and *Bhutan* (Ministry of Energy and Natural Resources, Bhutan 2025).
- Further information on options for sharing emission reductions between climate finance and carbon market sales is available in the Transformative Carbon Asset Facility (TCAF) discussion paper: *Blending climate finance and carbon market mechanisms* (Fuessler, Kansy, and Spalding-Fecher 2019).

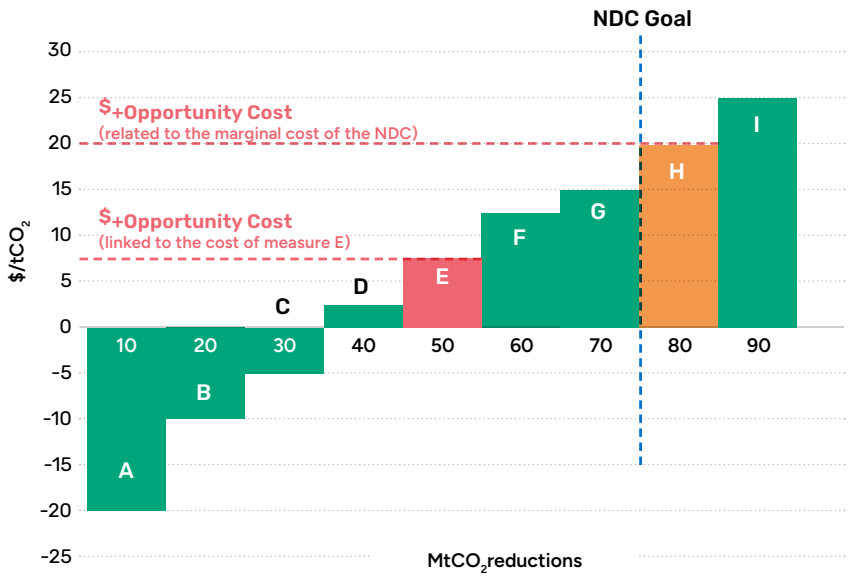
Question 2.2 How should host countries approach the question of pricing authorized credits?*

What are the key actions or options host countries may consider?

Host countries will not want to sell authorized credits (or see authorized credits sold) at a price below the marginal cost of generating them[1]. If prices fall below this threshold, either the activity will not proceed, or the host country will need to support ERR delivery — despite those ERRs not contributing to its NDC. This cost assessment should also include the transaction costs involved in selling authorized credits (ITMOs), recognizing that the lower that these costs are kept, the more attractive its credits will be in attracting buyer interest.

However, some analysts recommend opportunity cost pricing for authorized credits. This approach prices ITMOs high enough to cover the cost of delivering additional ERRs needed to meet the host country's NDC.[2] For example, in the stylized case in Figure 2.2, an authorized credit (ITMO) costing $7.50/tCO$_2$e would be priced at around $20/tCO$_2$e to reflect the cost of additional mitigation (option H) required to maintain NDC achievement after selling the ITMOs from option E. In cases where a host country government was the activity proponent this pricing approach could be reflected in its negotiation strategy with potential buyers. In cases where credit generating activities are led by the private sector, the approach would be implemented as a levy/fee applied on top of any market-determined price.

Figure 2.2 Opportunity cost pricing of ITMOs



Source: World Bank 2023a

1 Taking account of any complementary income streams that the credit generating activity may be able to access.

2 In principle, this analysis might also take account implications for future NDC achievement as well as the current NDC, although this may be difficult to assess.

What factors might shape decision-making?

Opportunity cost pricing ensures host countries benefit from selling authorized credits. This approach guarantees that revenue exceeds the costs of applying corresponding adjustments including the cost of any additional mitigation needed to ensure NDC achievement. While some countries may worry this pricing could reduce competitiveness, if the approach is carefully calibrated, it ensures the country does not sell authorized credits when this would be detrimental. Box 2.2 below summarises the experience of a number of countries thar have, or are in the process of, establishing opportunity cost pricing.

Box 2.2 Countries developing opportunity cost pricing approaches

Ghana: Ghana requires that parties acquiring authorized credits pay a 'corresponding adjustment fee' which ranges between $3 and $5 per ITMO, depending on the scale and type of activities generating the authorized credits. 90% of the proceeds will be reinvested in additional mitigation activities, with the remaining 10% used to cover the costs of authorizing, transferring and reporting on authorized credit sales.

Cambodia: Although the specific amounts have not been identified as yet, Cambodia has indicated that it intends to introduce a 'corresponding adjustment fee' to cover the opportunity costs associated with the authorization and transfer of ITMOs, which will be used to raise funds for additional mitigation and adaptation action.

Zimbabwe: Zimbabwe has indicated that 30% of the share of proceeds from carbon market transactions must be deposited in the Environment Fund, which is referred to as an 'environmental levy'. Of the total capitalisation of the Environment Fund, 55% must be reinvested into climate change adaptation and low-carbon development projects.

Source: Hoffman, Spalding-Fecher, and Marcias Diaz 2025

Countries with emissions well below their NDC target, those authorizing credits from sectors/activities that are not expected to be needed for their NDC or those countries with no quantitative sectoral or economy-wide target may have near-zero opportunity costs[1]. In contrast, countries selling authorized credits (ITMOs) associated with low-cost ERRs but needing expensive ERRs to meet their NDC would require a high premium. World Bank modeling suggests that, on average, many host countries may need to charge more than $25 per authorized credit, in addition to ERR generation costs (World Bank 2023a)[2].

The main challenge with opportunity cost pricing is implementation. While $25/$tCO_2e$ is a helpful benchmark, the ideal premium will vary by ERR type/cost and over time, and potentially also take account of domestic co-benefits from the ERR. This makes accurate pricing technically complex. It is notable that none of the countries that have developed some guidance on the pricing to date have developed an approach that tries to account for differences by ERR type (to any significant extent), or over time. This suggests that that the conceptual benefits of the approach may be difficult to realize in practice. Host countries may wish to engage development partners to support this process.

1 In principle, opportunity costs may be above zero if the host country may wish to use the associated ERRs for future NDC attainment.

2 If host countries have a comprehensive Emissions Trading System (ETS) that is playing an important role in driving NDC attainment, then some insight into the appropriate price for selling authorized credits (ITMOs) will be provided by market price in this system. Note that, as discussed in question 2.1, host countries may wish to be cautious in authorizing credits covered by a domestic CPI such as an ETS.

How does responding to question 2.2 relate to the obligations or opportunities countries have under Article 6 Guidance?

The Article 6 Rulebook places no restrictions or guidance in relation to the pricing of authorized credits (ITMOs). However, under *Decision 2/CMA.3* Annex (paragraph 4), host countries must be able to demonstrate that participation in authorized credit sales contributes to the implementation of its NDC and long-term low-emission development strategy, if it has submitted one. Opportunity cost pricing can be one way to demonstrate this (see below).

Links and dependencies to other questions in the Guidance

Robust opportunity cost pricing gives host countries greater confidence in selling credits from ERRs they might otherwise need to meet their NDC (question 2.1). This is because the additional revenue raised can directly fund the extra mitigation needed to ensure NDC achievement — provided the host country has the time and institutional capacity to allocate funds effectively.

Opportunity cost pricing is often framed as a tool to manage overselling risk — the risk that authorized credit sales undermine NDC attainment (question 2.3). By creating a dedicated funding stream for additional mitigation, it helps safeguard NDC achievement. However, even if a host country was fully confident about its NDC pathway after selling credits, it would still benefit from applying opportunity cost pricing to ensure it captures sufficient value from credit sales. Reallocating any revenues raised to further mitigation would allow the host country to demonstrate, as required under Article 6, that its participation in authorized credit sales has contributed to the implementation of its NDC and (if relevant) its long-term low-emission development strategy. If there is uncertainty around setting the right premium, host countries may also want to apply additional overselling risk mitigants as discussed in question 2.3.

Countries that apply opportunity cost pricing will need to determine how these funds can be best allocated, including the institutional arrangements. This is discussed further in Module 7 (question 7.4).

Further resources

Interested readers will find further insights and discussion on the opportunity cost pricing at the World Bank report: *Corresponding Adjustment and Pricing of Mitigation Outcomes* (World Bank 2023a).

More details on Ghana's approach to setting fees for international carbon market activity, including its opportunity cost fee approach is available in its *Carbon Market Framework* (Government of Ghana 2022), for Cambodia in its *Operations Manual* (Ministry of Environment, Cambodia 2024) while the approach in Zimbabwe is described in its *Carbon Credits Trading (General) Regulations SI 150/2023* (Government of Zimbabwe 2023.

Question 2.3 How (else) can countries manage any overselling risks associated with authorization?*

What are the key actions or options host countries may consider?

Host countries may be unsure whether they can meet their unconditional NDCs after authorizing credit transfers — a concern known as overselling risk. If this risk materializes and a country fails to meet its NDC, the consequences might be severe including potentially reduced access to international climate finance, weakened investor confidence, and strained international partnerships. At a global level, widespread non-achievement — especially by large emitters — could undermine the credibility of the climate regime, with disproportionate impacts on climate vulnerable nations relying on strong international action. The measures discussed in questions 2.1 and 2.2 — including positive/negative lists and opportunity cost pricing — can help reduce overselling risk or ensure funding is available for additional mitigation if needed. Box 2.3 outlines further no-regret actions that can further mitigate risk.

Box 2.3 No-regret options to reduce the risk of over-selling authorized credits

Choose appropriate (conservative) baselines: Oversupply risk can be reduced by aligning crediting baselines with the sector's expected contribution to the unconditional NDC target. Countries that have developed their LT-LEDs may be better placed in this regard. For others, this often requires analytical work to allocate the NDC target across sectors — a complex task (although one that aligns with the eligibility requirements for authorized credit sales). For example, in its NDC Action Plan on Mitigation 2021-30, Thailand has taken it overall NDC target (a 30% reduction in emissions relative to business as usual by 2030, increasing to 40% subject to adequate and enhanced access to technology development and transfer, financial resources and capacity building support) and allocated this across sectors. It has then identified that the expected contribution from Article 6 could be up to 3% on top of its conditional NDC. Zambia has also implemented this approach, explicitly requiring that activity baselines aligned to its NDC target while Ghana requires that 'underlying assumptions and quantitative figures used in the Ghana NDC baseline' must be used when choosing crediting baselines for activities that will generate authorized credits (ITMOs).

Align emissions inventory and crediting methodologies: Crediting methodologies often measure emissions and ERRs more precisely than national inventories. This mismatch can lead to corresponding adjustments (CAs) being applied for ERRs that are not reflected in the emissions inventory — complicating NDC attainment. Host countries may wish to consider improving the detail of their inventory, especially in sectors like avoided forest land, forest management, cement, and nitric acid production. GGGI's Supporting Preparedness for Article 6 Cooperation (SPAR6C) program has supported the Government of Zambia with evaluating the level of detail and quality of data in their GHG inventory, with a specific focus on the forestry sector and energy sectors to both improve long-term emissions planning as well as ensure credible, conservative baseline setting for potential carbon transactions under Article 6.

Develop up-to-date MAC curves with clear sector boundaries: As noted in question 2(a), MAC curve analysis helps shape authorization decisions, but inconsistent sector definitions between stakeholders create risks. Regularly updated MAC curves with clear sectoral delineation can help minimize overselling risk, particularly in the absence of LT-LEDs.

Sources: (GGGI 2023d; World Bank 2022b; Government of the Republic of Zambia 2025; Government of Ghana 2022)

Another approach is to authorize only a portion of the ERRs from a given activity, retaining the rest to support the host country's NDC.[1] Different sharing rules can be applied to allocate ERRs between the buyer and host country. Figure 2.3 illustrates three examples:

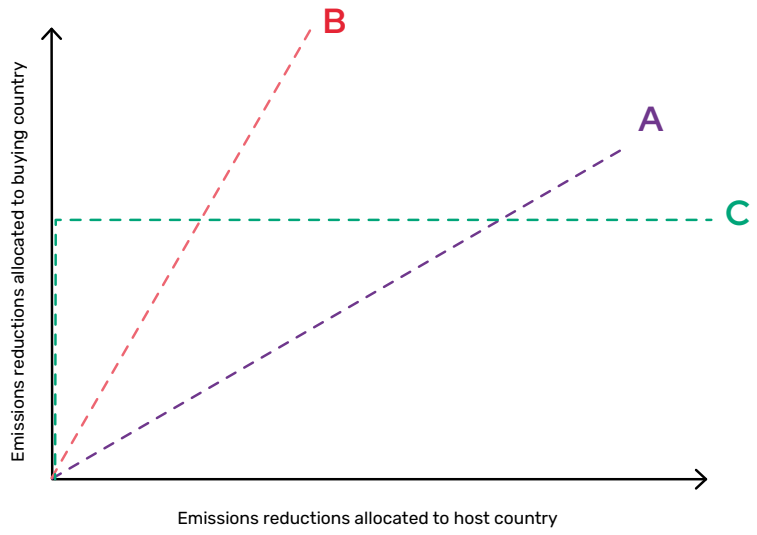
- **Profile A:** ERRs split 50:50 between the buyer and the host country;
- **Profile B:** the sharing rule is 70:30 in favor of the buyer;
- **Profile C:** Buyer receives all ERRs up to a threshold, with any excess retained by the host. This could be applied, for example, by adjusting rules across different crediting periods.

Several host countries have or intend to implement this approach (GGGI 2023c; Republic of Vanuatu 2023)[2]:

- Ghana retains 1% of total ERRs from mitigation activities for its own NDC;
- Paraguay uses a value of 3%;
- Indonesia plans to retain 10-20% of ERRs from NDC-covered activities, rising to 20% for activities outside the NDC scope;
- Vanuatu, in the context of its Article 6.2 agreement with Switzerland concerning emission reductions from the development of mini-grids, has indicated that 5% of emission reductions will be retained for its own NDC, or to secure an Overall Mitigation in Global Emissions (see question 3.7).

This approach also allows for the creation of buffer stocks — credits not immediately authorized, but which could be authorized later if the host country gains confidence in meeting its NDC. This flexibility was further enhanced by the COP29 decision allowing MCUs under Article 6.4 to be converted into ITMOs at a later stage.

Figure 2.3 Sharing ERRs between buyer and host country



1 This might include including selling this remaining portion of the credits without an authorisation, at a lower price. This sharing approach is equivalent to the sharing of ERRs between ITMOs and climate finance discussed in Question 2.1.

2 As well as host country's using this approach, some buyers also make use of this approach, as they recognize the long-term risks associated with overselling. For example, Japan's Joint Crediting Mechanism (JCM) involves sharing authorized credits/ERRs between Japan and the host country (Government of Japan 2024).

What factors might shape decision-making?

Table 2.2 summarizes the pros and cons of requiring host countries to retain a portion of ERRs. This approach provides a simple safeguard against overselling risk, with the added benefit of allowing flexible adjustments over time as NDC achievement becomes clearer. It also supports the host country to meet Article 6 participation requirements regarding contributing to host country NDC and LT-LEDS implementation. However, determining an appropriate retention rate can be complex. Higher retention rates can reduce revenue generation, potentially undermining the financial viability of the credit generating activity. Attempts to offset this by increasing credit prices could, in turn, reduce the activity/country's competitiveness. Likewise, any attempt to share credits between host and buyer over time will need to consider when the buyer requires the authorized credits. As a result, host countries may choose moderate retention rates, while relying on other safeguards — such as positive/negative lists, opportunity cost pricing, and the measures in Box 2.3 — to further manage overselling risk.

Table 2.2 Pros and cons of sharing ERRs between buyer and host country

Pros	Cons
↑ Straightforward way to reduce overselling risk	↓ Requires careful calibration/negotiation to set the 'right' sharing rule in order to not undermine the financial viability of ERR activities.
↑ Credited activity immediately contributes to NDC (hence meeting the host country's participation requirements) reducing need for extra ERRs later	↓ May reduce host country's attractiveness to buyers, for example, by leading to higher prices or reduced credit availability when buyers have the greatest demand for credits.
↑ Buffer stock approach provide flexibility over time	

How does responding to question 2.3 relate to the obligations or opportunities countries have under Article 6 Guidance?

The Annex to *Decisions 2/CMA.3* (paragraph 4) states that any participation in Article 6 shall contribute to both Parties' NDC implementation and the long-term goals of the Paris Agreement.

Links and dependencies to other questions in the Guidance

This issue links closely to those discussed in relation to question 2(a) and 2 (b). As discussed above, the more that countries make use of the strategies discussed in relation to these questions (positive and/or negative lists, pricing) – which effectively reduce the extent of overselling risk – the smaller will be the residual risk that will need to be managed through sharing emission reductions.

Countries that retain a share of the ERRs associated with crediting activities and then proceed to meet their NDC without these ERRs may choose for these 'surplus' ERRs to be counted as contributing to an Overall Mitigation in Global Emission (OMGE) (see question 3.7).

Further resources

A report for the Swedish Energy Agency by Carbon Limits – *Practical Strategies to Avoid Overselling* - discusses this issue in more, depth. The GGGI guide on *Developing an Article 6 Host Party Strategy* is a further useful resource (GGGI 2023b).

References for Module 2

1. **GGGI. 2023b**. 'Developing an Article 6 Host Party Strategy'. Seoul, Korea: Global Green Growth Institute. *https://gggi.org/wp-content/uploads/2023/12/SPAR6C-Guide-2-Developing-an-Article-6-host-party-strategy.pdf*

2. **GGGI. 2023c.** 'Implementing Article 6 of the Paris Agreement: Options for Governance Frameworks for Host Countries'. *https://gggi.org/wp-content/uploads/2023/08/GGGI_InsightBrief_07_Final.pdf*.

3. **GGGI. 2023d.** 'Screening and Developing Article 6 Activities'. Seoul, Korea: Global Green Growth Institute. *https://www.greenpolicyplatform.org/sites/default/files/2023-12/SPAR6C%20-%20Guide%205%20-%20Screening%20and%20developing%20A6%20activities_FINAL_30-11-2023.pdf*.

4. **Government of Ghana. 2022.** 'Ghana's Framework on International Carbon Markets and Non Market Approaches'. *https://cmo.epa.gov.gh/wp-content/uploads/2022/12/Ghana-Carbon-Market-Framework-For-Public-Release_15122022.pdf*.

5. **Government of Japan. 2024.** 'Recent Developments of the Joint Crediting Mechanism (JCM)'. *http://carbon-markets.env.go.jp/document/20240517_JCM_goj_eng.pdf*.

6. **Government of the Republic of Zambia. 2025.** 'Zambia Carbon Market Framework'. *https://www.spar6c.org/sites/default/files/downloads/best-practices/SPAR6C%20-%20A%20collection%20of%20case%20studies%20from%C2%A06%C2%A0host%C2%A0countries_28-02-2025.pdf*.

7. **Greiner, Sandra. 2023.** 'The No-Banking Rule in the Article 6 Rulebook'. Amsterdam, The Netherlands: Climate Focus. *https://www.tcafwb.org/sites/default/files/2023-09/6_ITMO%20no-banking%20note.Final_.%20June%2015.pdf.*

8. **Hoffman, Paula, Randall Spalding-Fecher, and Paula Marcias Diaz. 2025.** 'Article 6 Governance Frameworks in Action: A Collection of Case Studies from 6 Host Countries. A GGGI Publication.' *https://www.spar6c.org/sites/default/files/downloads/best-practices/SPAR6C%20-%20A%20collection%20of%20case%20studies%20*

9. **International Air Transport Association. 2024.** 'CORSIA Handbook'. *https://www.iata.org/contentassets/fb745460050c48089597a3ef1b 9fe7a8/corsia-handbook.pdf.*

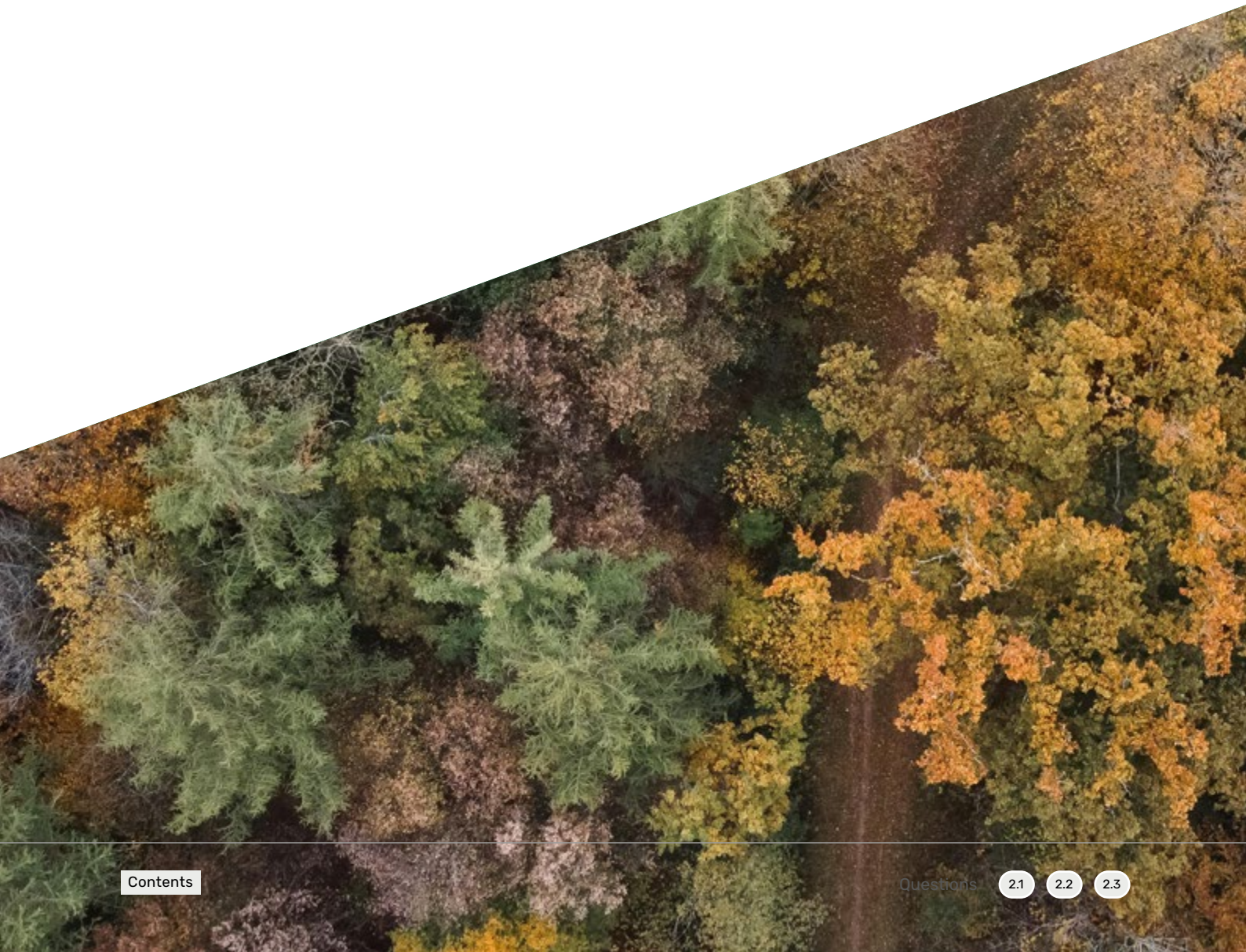
10. **Ministry of Environment, Forest and Climate Change, India. 2023.** 'Activities Finalised to Be Considered for Trading of Carbon Credits under Article 6.2 Mechanism to Facilitate Transfer of Emerging Technologies and Mobilise International Finance in India'. 17 February 2023. *https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1900216*.

11. **Republic of Vanuatu. 2023.** 'Article 6, Paragraph 2, Initial Report (AIR) by the Republic of Vanuatu in Respect of ITMOs Authorization from the Cooperative Approach between the Republic of Vanuatu and the Swiss Confederation'. *https://unfccc.int/sites/default/files/resource/1%20Initial%20Report%20Template%20Vanuatu_FINAL.pdf*.

12. **World Bank. 2022b.** 'Developing an Article 6 Strategy for Host Countries'. Washington, DC: World Bank. *https://openknowledge.worldbank.org/server/api/core/bitstreams/98a81bfd-c244-4577-8e8e*

13. **World Bank 2023a.** 'Corresponding Adjustment and Pricing of Mitigation Outcomes'. Washington, DC: World Bank. *https://ppp.worldbank.org/public-private-partnership/sites/default/files/2023-10/Corresponding%20Adjustment%20and%20Pricing%20of%20Mitigation%20Outcomes.pdf*.

14. **Yin, Ivy. 2024.** 'COP29: Industry Players Highlight Synergy of Article 6 with Voluntary, Compliance Carbon Markets'. 13 November 2024. *https://www.spglobal.com/commodity-insights/en/news-research/latest-news/energy-transition/111324-cop29-industry-players-highlight-synergy-of-article-6-with-voluntary-compliance-carbon-markets*



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