

GUYANA'S FOREST CARBON ECONOMY

Carbon Credits, National Development, Market Integrity and Long-Term Climate Accountability

From verified forest performance to transparent finance, Indigenous participation and auditable climate claims

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Independent policy and market research. No affiliation or endorsement by the Government of Guyana, ART, ICAO, ICVCM, Hess, Chevron or the author's employer is implied.

Abstract

Guyana's forest-carbon programme combines national-scale forest monitoring, independently verified jurisdictional credits, an agreed multiyear offtake, international carbon-accounting procedures and earmarked community financing. By September 2026, its design has reached a significant practical test: the country must reconcile a growing series of carbon vintages with registry transactions, buyer claims, annual forest outcomes and publicly understandable expenditure results. This paper explains the accounting and commercial structure, examines the positions of proponents and critics, traces the disclosed money flows, and supplies auditable decision frameworks for government, companies, Indigenous communities, researchers and international institutions. It separates independently issued credits, contracted purchases, government-reported receipts, payments allocated to villages, future projections and unresolved evidence gaps. It also considers the effects of evolving CORSIA eligibility, the May 2026 ICVCM methodology decision, domestic deforestation pressures and the separate emissions associated with petroleum production and use.

Executive decision brief

Guyana's forest-carbon programme is a financing arrangement built around a measurable environmental result. It is not a sale of trees, an unqualified certificate of national carbon neutrality, or a permanent exemption for purchasers from cutting their own emissions. The first verified issuance comprised **33.47 million ART TREES credits for 2016-2020**. Another **7.14 million** credits for the 2021 vintage were issued in February 2024, and **9,085,923** for 2023 were issued in February 2026. The latter two issuances were described as CORSIA-eligible under the applicable programme and host-country requirements. Credit status must still be checked by serial number before use. [\[1\]\[2\]\[3\]](#)

The December 2022 Hess contract covers **37.5 million credits across vintages 2016-2030**, at a stated minimum value of **US\$750 million**, with floor prices of US\$15, US\$20 and US\$25 per tonne for the three five-year blocks. The agreement is a contract for delivered and future issuances, not proof that its full face value has been paid or that every future credit already exists. Government LCDS reporting listed cumulative payments of **US\$353.5 million through March 2026**, a disclosed receipt figure rather than an independently reconciled audit finding in this paper. [\[4\]\[5\]](#)

The benefit-sharing framework allocates **15% of programme revenue directly to participating Indigenous and hinterland communities** for locally approved village plans. The other **85%** supports wider LCDS objectives. The government reported that the 2026 allocation of G\$2.5 billion would bring village disbursements under the programme to G\$16.9 billion; readers

should distinguish an allocation announcement from confirmed final expenditure or audited outcomes. Participation, consent, land rights, procurement, delivery and the fairness of the complaint system remain essential governance questions. [6][7][8]

International labels require precision. ART is a crediting programme. ICAO CORSIA eligibility is an aviation-compliance determination subject to its own applicable periods and conditions. ICVCM Core Carbon Principles recognition is a separate market-integrity assessment. In May 2026 the ICVCM required remedial actions for the **ART TREES v2.0 HFLD crediting level** before granting CCP approval to that category. The broader ART programme had programme-level eligibility, and the ICVCM decision did not, by itself, erase issued credits or equate to a CORSIA delisting. [9][10][11]

A credible account of national climate performance requires parallel ledgers for (a) forest carbon stocks and annual emissions, (b) credited outcomes against the applicable reference level, (c) registry transactions and retirements, (d) treasury receipts and programme spending, (e) community decisions and outcomes, and (f) territorial and exported fossil-fuel emissions. These ledgers answer different questions. Combining them into one headline without explicit boundaries invites error. This paper proposes transparent reconciliation tests without presuming the outcome of any future review.

Key figures and their proper interpretation

Measure	Public figure	What the number establishes	Boundary or qualification
ART TREES issued, 2016-2020	33.47 million credits	Historical verified issuance	Five-year vintage block; not annual cash [1]
ART TREES issued, 2021	7.14 million credits	Separate 2021 issuance	Serial status and any cancellation need registry check [2]
ART TREES issued, 2023	9,085,923 credits	Separate 2023 issuance	Reported by ART in February 2026 [3]
Hess agreement	37.5 million credits	Contracted quantity, existing plus future	2016-2030 vintages, deliveries conditional [4]
Hess minimum contract	US\$750 million	Nominal multiyear minimum if contract performed	Not the same as receipts [4]
Government-reported receipts	US\$353.5 million	Reported cumulative payments to March 2026	Independent financial audit not undertaken here [5]
Village revenue share	15%	Programme allocation commitment	Trace actual transfers and outcomes [6]
Forest loss, 2023	9,353 hectares, 0.053%	Mapped annual deforestation in 2023 MRVS	Not equal to the quantity of issued credits [12]
MRVS forest emissions, 2023	13.94 million tCO ₂ e	Estimated deforestation plus degradation emissions	National MRVS accounting boundary [12]

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1. Research purpose and evidence rules

This study considers the national programme as a linked system rather than as an isolated carbon-credit sale. Climate science, land administration, legal rights, commodity contracts, national accounting and social investment all affect the performance of that system. A credit represents one tonne of carbon dioxide equivalent under a defined methodology and specified accounting period. It does not automatically establish that a tonne of carbon was newly removed from the atmosphere. Guyana's HFLD pathway rewards verified forest-climate performance under the ART TREES framework, including the value of maintaining a jurisdiction with high forest cover and low historical deforestation. [1][13]

Five classes of evidence are distinguished. **Verified issuance** means programme records and independent validation and verification reporting. **Official disclosure** means national statements or published administrative accounts, which are attributed rather than independently re-audited. **Primary international rules** include the ART standard, ICAO eligibility decisions and UNFCCC documentation. **Stakeholder submissions** record positions and experience and

require attribution. **Author analysis** consists of calculations, scenarios, proposed tests or interpretations explicitly identified as such. A commercial forecast is never labelled as an environmental outcome.

The research cut-off is 25 September 2026. A public announcement may precede a registry update, an appropriation may precede a payment, and a payment may precede expenditure or delivery of the intended benefit. The available material does not establish a fully reconciled serial-level credit ledger or transaction-by-transaction independently audited expenditure database. Where proof is incomplete, this paper identifies the missing reconciliation instead of assigning a favourable or unfavourable result. Such distinctions matter when an international buyer uses a credit for a regulated obligation or when a village is asked to evaluate the effectiveness of a funded project.

The analytical framework asks six questions for every major claim: What precisely happened? Which entity recorded the event? What unit and time boundary were used? Which independent check applies? Who holds the associated right or obligation? What record permits a third party to reproduce the result? These tests allow readers to separate programme design from measured performance. They also preserve space for legitimate disagreement about HFLD methodologies, local participation and the relationship between conservation finance and resource extraction.

2. Guyana's forest and economic context

Guyana occupies a distinct position among tropical forest countries. Its large standing forest and relatively low historical rate of forest conversion create a public-good problem familiar in environmental economics: conventional markets reward timber extraction, mining and land conversion more directly than the global climate benefit of maintaining forest cover. National forest-finance policy seeks to make conservation-compatible development more financially feasible. The original LCDS and its 2030 update link forest services with renewable energy, climate adaptation, employment and access to modern public services. [14]

According to the Guyana Forestry Commission's 2023 MRVS, annual deforestation totalled 9,353 hectares, or 0.053% of the relevant forest baseline, while mapped deforestation and forest degradation produced an estimated 13.94 million tonnes of CO₂ equivalent. The independently sampled assessment estimated 8,250 hectares of land-cover change, with a standard error of 1,229 hectares. Differences between mapped and sample-based estimates should be explained by method and uncertainty, not read as a simple contradiction. The report used satellite imagery and separate validation of mapped results. [12]

Economic growth expands pressure on land governance. Gold mining, associated roads, infrastructure expansion and agricultural demand compete with forest conservation on specific sites even when national forest cover remains high. In 2023 mining and mining infrastructure accounted for 5,853 hectares, about 62% of mapped deforestation; fire was another notable driver. These figures identify management priorities for the reference year but do not predict

subsequent annual outcomes. Effective national monitoring therefore depends on spatially resolved information from mining, forestry, land, environment and protected-area authorities. [12]

The forest-carbon programme also operates alongside a growing petroleum economy. Domestic electricity emissions, emissions from producing and transporting oil, and emissions released when exported hydrocarbons are eventually burned sit in different reporting scopes. National forest credits should not silently be netted against all these flows. The climate implications of petroleum development require separate disclosure by territory, corporate operational boundary and consumption or value chain. Detailed treatment appears in Chapter 19.

3. From results-based payments to carbon markets

Guyana's model developed in stages. The 2009 arrangement with Norway linked forest performance to results-based financing before the present forest-credit market existed. The LCDS reports over US\$220 million in performance-related receipts and investment income under the earlier arrangement. Its national Monitoring, Reporting and Verification System was retained and expanded after the original payment period. As a result, a historical observation series existed before the 2022 carbon-credit issuance. This continuity improves traceability while leaving each crediting method responsible for demonstrating its own baseline and safeguards. [14][15]

In December 2022 ART issued 33.47 million verified TREES credits for 2016-2020. Guyana and Hess then announced a 37.5-million-credit purchase agreement spanning the 2016-2030 vintage years. The combination matters because contract value emerged from two different assets: credits already issued for historical performance and the prospect of future credits, subject to subsequent validation, verification and issuance. The government also retained the opportunity to market credits outside the contracted Hess volume. [1][4]

In February 2024 the country announced 7.14 million 2021-vintage credits and associated Article 6 authorization and corresponding-adjustment reporting intended to support first-phase CORSIA use. In February 2026 ART confirmed an additional 9,085,923 credits for 2023, with CORSIA-eligible labelling. The disclosed dates establish issuance milestones but should not be treated as a complete series. In particular, the precise status of each intervening vintage, retirement and transfer needs registry verification at the point of any investment or compliance decision. [2][3]

The second stage of development is institutional, not merely commercial. Forest-credit revenue enters public decision-making through national programmes, while a defined portion flows to village-controlled initiatives. The third stage is international regulatory exposure: Article 6 accounting, aviation requirements, external integrity labels and demand

from companies each introduce distinct verification gates. Changes in one gate do not automatically determine status at another. The central management task is to keep these gates visible and reconcile them over time.

4. How jurisdictional forest credits work

Jurisdictional crediting covers national or large subnational forest performance rather than treating one concession or conservation site as the whole accounting area. The programme establishes a forest-monitoring boundary, a reference-level method, rules for measured change, conservative adjustments, safeguards and third-party verification. Each issued credit receives a unique registry identity, enabling the holder to transfer or retire the unit without issuing the same unit twice. The jurisdictional scale addresses some displacement risks that arise when land conversion moves from one project location to an adjacent unmonitored site. It does not eliminate all international leakage or guarantee permanence. [13]

A simplified sequence begins with land-cover mapping and emission factors, proceeds through annual monitoring and reference-level calculations, undergoes validation and verification, and ends with serialized issuance after programme approval. Sale transfers ownership under a commercial contract. Retirement or cancellation then determines whether a purchaser has permanently consumed the credit for a specified claim or compliance obligation. Ownership, authorization, sale and retirement are separate states. An issued unit held in Guyana's account is therefore not identical to a unit sold but unretired, or a unit retired by an airline.

For an HFLD jurisdiction, crediting seeks to reward keeping a historically intact landscape intact, not merely reducing already high rates of deforestation. A reference level that recognises a limited allowance for future pressure will generate different credit outcomes from a purely historical baseline. Methodology settings, uncertainty deductions and the documented risk of future forest loss determine how persuasive that outcome will be to critics and buyers. This tension explains why HFLD integrity has remained an active technical debate. [9][13]

A credit is also a contractual and accounting instrument. Its relevant attributes include programme, methodology version, vintage, jurisdiction, serial number, status, eligible use, host authorization, corresponding-adjustment status where applicable, and any claims about community or biodiversity benefits. A diligence record lacking these fields does not give an external reviewer enough information to confirm what was purchased. A public transaction dashboard should expose them without disclosing commercially sensitive details such as confidential counterparty margins.

5. HFLD accounting, additionality and counterfactuals

The most consequential methodological question is the counterfactual: what amount of forest emissions would reasonably have occurred without the credited activity or supporting policy? Conventional avoided-deforestation methods often compare observed loss with historical or modelled future loss. In a high-forest, low-deforestation jurisdiction, an exclusively historical baseline may assign little financial value to maintaining a large forest despite emerging conversion pressures. HFLD methods seek to address the incentive problem, but assumptions about future risk must be sufficiently conservative to avoid issuing credits for losses that were never plausibly at risk. [9][13]

Guyana's case presents a concrete example. The existence of forest does not by itself quantify additional mitigation. The accounting method must connect observed performance, the agreed reference level, monitoring, reserves or deductions and the programme's treatment of reversals. A scientifically useful review asks whether historical emissions meaningfully understate credible future emissions, whether land-use permits and infrastructure plans support that finding, and whether external reviewers tested the evidence independently. These are method questions, not judgments about whether forest protection deserves public finance.

In May 2026 the ICVCM decided that ART TREES v2.0's HFLD crediting level did not yet meet the criteria for Core Carbon Principles approval and set out remedial actions. One specified requirement concerns evidence that historical baseline emissions significantly underestimate likely future emissions and independent verification of the threatened increase. A separate remedial-action finding applied to the removal crediting level. The decision concerns CCP labelling of the relevant methodological categories. It should not be misreported as termination of ART programme eligibility, wholesale invalidation of all issued units or automatic withdrawal of aviation eligibility. [9][10]

The government and supporting forest-finance organisations argue that HFLD payments prevent an economic incentive to deforest and recognise standing forest stewardship. Critics and integrity assessors emphasise proof of additionality, credible baselines, local rights and buyer use of credits alongside direct reductions. These viewpoints address partly different policy questions. The evidence-based response is to publish the counterfactual assumptions, sensitivity ranges, independently reviewed loss-risk indicators and the exact rule changes required by integrity assessors rather than reduce the debate to a single label.

6. Monitoring, reporting and verification

The Guyana Forestry Commission's MRVS combines geospatial interpretation, national land-use records, emission factors and independent checking. The 2023 report describes wall-to-wall mapping of change above its detection criteria, classification by causes such as mining and fire, and external accuracy assessment by Durham University. It records both forest

conversion and degradation from activities including harvesting and infrastructure. This matters because a visually intact canopy alone does not measure all carbon released through selective extraction or edge damage. [12]

An audit of MRVS quality needs three distinct steps. First, test **measurement**: satellite dates, cloud cover, spatial resolution, interpretation rules, sampling design and emission-factor versions. Second, test **process**: access controls, archived GIS layers, mapping-team independence, quality-control logs and change-management records. Third, test **claim translation**: the bridge from physical forest observations to approved crediting calculations and registry issuance. Successful validation of a map is not sufficient proof that every commercial credit has the correct corresponding-adjustment label.

In the 2023 mapped series, deforestation was 9,353 hectares and estimated deforestation emissions were 9.89 million tCO₂, while degradation emissions were approximately 4.05 million tCO₂. The combined reported total was 13.94 million tCO₂e. Independent sample-based change was estimated at 8,250 hectares with a 97.5% confidence interval of 5,842 to 10,658 hectares. These quantities are not interchangeable: one estimate is a sample-based land-change measure, another the operational mapped measure, and another the resulting carbon-emission calculation. Any chart must label the metric and uncertainty explicitly. [12]

The next stage of assurance should permit a qualified third party to reproduce an annual result using a frozen dataset and a documented method version. Sensitive Indigenous land information requires appropriate permissions, but aggregated maps, anonymised variance statistics, calculation logic and audit statements can be published. A dataset release should specify when records were corrected, who approved the correction, whether credits from the affected period need review and how any necessary registry adjustment would occur. This approach makes improvements visible without assuming the earlier output was either flawless or invalid.

7. Forest-change trends and domestic drivers

Trend assessment should not rely on a single low deforestation percentage. In 2022 the GFC reported 6,470 hectares of deforestation, an annual rate of 0.036%, and approximately 10.68 million tonnes of forest-related CO₂ emissions. In 2023 the operational mapped estimate rose to 9,353 hectares, or 0.053%, and 13.94 million tonnes. The difference identifies an increase for those reported years, while uncertainty, the drivers of change and later observations are necessary for judging whether the change represents a persistent trend. [12] [16]

The 2023 driver distribution shows why targeted institutional responses matter. Mining and mining infrastructure represented 5,853 hectares of deforestation, roughly 62% of mapped loss. Fire represented 1,513 hectares, agriculture 475 hectares, shifting cultivation 431 hectares, infrastructure 541 hectares and forestry infrastructure 339 hectares, with settle-

ments accounting for another 201 hectares. A national rate alone hides these operational differences. Monitoring should join spatial changes to the relevant concession, permit, enforcement action or fire incident where the records permit. [12]

Deforestation and degradation require different interventions. Direct land conversion is an area-based event. Degradation may arise from timber removal, associated damage or roads while the area remains classified as forest. The 2023 MRVS attributed approximately 3.60 million tonnes of degradation emissions to reported timber harvest volume and another 0.44 million tonnes to skid trails; smaller categories related to illegal logging and road-adjacent damage. Control design should therefore incorporate logging permits, concession performance, rehabilitation plans and independent timber-volume validation as well as satellite loss maps. [12]

For public reporting, a useful annual forest outcome statement would show gross mapped loss, sample-based change with uncertainty, gross degradation, estimated removals where methodologically supported, reference-level assumptions, permitted conversion, compliance findings and any recategorised land. Location-sensitive Indigenous or enforcement data should receive appropriate protection. Such a statement would allow readers to distinguish a year of higher loss caused by wildfire from one linked to mining expansion and assess whether policy implementation changed afterward.

8. Credit issuance, vintage and registry reconciliation

Credit vintages are accounting periods, not issuance dates. A 2016 credit issued in 2022 remains a 2016-vintage unit. Guyana's 2016-2020 issuance therefore cannot be recorded as 33.47 million tonnes of newly measured 2022 performance. The 2021 credit volume and 2023 issuance must likewise stay attached to their respective activity years. The contract schedule draws on multiple vintages, so comparing total Hess purchases with a single-year issuance produces a misleading picture. [1][2][3][4]

The published milestone figures are 33.47 million credits for 2016-2020, approximately 7.14 million for 2021 and 9,085,923 for 2023. A UNFCCC Caribbean report refers to Guyana authorizing up to 8,732,929 tonnes for the 2022 vintage; this authorization figure should not be equated with current unretired registry inventory. The exact 2022 issuance and current serial-level transaction status for every year should be checked directly on the ART registry; this paper does not substitute estimated figures where direct confirmation is missing. The verified issuance totals do not alone establish the number of unencumbered credits available for new purchase. Credits reserved against an existing offtake, transferred, retired or subject to an authorization condition must be separated. [1][2][3]

A complete registry reconciliation uses opening inventory, new issuance, transfers in, transfers out, retirements, cancellations and closing inventory for each vintage. It then attaches contract encumbrances and authorization records to serial ranges. National receipt records follow a different schedule because payment dates and credit delivery dates need

not coincide. A simple public ledger with transaction IDs and aggregated commercial values would substantially improve auditability without revealing private buyer information beyond accepted disclosure obligations.

The reconciliation must also capture the relationship between voluntary and compliance use. An authorized mitigation outcome sold for another country's NDC or CORSIA obligation has different international accounting implications from a non-authorized unit used in a corporate contribution claim. Buyers should not infer their right to claim a corresponding adjustment merely from the programme name or vintage. The necessary verification package is the serialized unit, programme status at relevant dates, applicable host-country authorization, evidence of adjustment where required and final retirement record.

9. Commercial architecture of the Hess agreement

The December 2022 agreement establishes a multiyear purchase arrangement between the Government of Guyana and Hess Corporation. Public fact sheets identify 37.5 million credits across fifteen vintage years from 2016 to 2030. The original 2016-2020 block contributes 12.5 million units, and the 2021-2030 years contribute a contracted 2.5 million units annually. A purchasing commitment is economically valuable because it provides more predictable financing than dependence on annual spot-market sales, but the contractual commitment does not itself certify credits for years still in the future. [\[4\]\[17\]](#)

The published minimum unit prices increase from US\$15 for 2016-2020 to US\$20 for 2021-2025 and US\$25 for 2026-2030. Multiplying 12.5 million contracted units by each price produces minimum block values of US\$187.5 million, US\$250 million and US\$312.5 million, respectively, for a combined nominal US\$750 million. The public transaction summary also describes a mechanism under which Guyana shares in price increases above the applicable floor. A financial projection should use the actual signed contract and documented reference index before assuming that any such upside has accrued. [\[4\]\[17\]](#)

Contract risk extends beyond price. An accurate diligence exercise examines force majeure, failure of anticipated future issuance, eligibility changes, registration delays, delivery windows, permitted substitutions, taxes, governing law, buyer ownership changes and remedies for non-delivery. These clauses are not confirmed in full by the public headline summary. A public white paper should therefore refrain from inventing detailed legal protections and should present them as document requests. For a treasury cash-flow model, base-case receipts should be separated from contractual downside scenarios and from contingent market-price participation.

The agreement's national-development significance depends on its conversion of future crediting performance into predictable fiscal inflows. That structure raises a governance obligation: disclose cash received by date, the applicable vintage delivered, the exchange-rate conversion where relevant and expenditure financed. Receipt of an advance before all

underlying credits are delivered should be shown with its corresponding performance obligation. Otherwise the public may wrongly interpret an early inflow as profit on a completed environmental transaction.

Figure 1. Published minimum value of the three Hess contracted vintage blocks. Values are US\$ millions and represent nominal contractual floors, not money received. [4]



Contract arithmetic

Vintage block	Contracted credits	Published minimum price	Published minimum block value
2016-2020	12.5 million	US\$15	US\$187.5 million
2021-2025	12.5 million	US\$20	US\$250.0 million
2026-2030	12.5 million	US\$25	US\$312.5 million
Total	37.5 million	Weighted average US\$20	US\$750.0 million

Source: the public Hess transaction fact sheet. This table reproduces the announced minimum economics, not an independent review of the confidential full agreement. [4][17]

10. Cash flows, contract exposure and price design

Government LCDS disclosures list seven receipts in connection with the carbon-credit programme through March 2026: US\$75 million in December 2022; US\$37.5 million in January 2023; US\$37.5 million in July 2023; US\$37.5 million in January 2024; US\$50 million in July 2024; US\$58.1 million in March 2025; and US\$57.9 million in March 2026. These reported payments sum to US\$353.5 million. Their sum is an arithmetic check of the published payment schedule, not confirmation that all amounts have been independently audited in this study. [5]

The publicly stated programme commitment does not imply a straight-line payment schedule. Historic credits were paid for according to the early transaction structure, whereas later years depend on the applicable floor price, delivery and actual performance. When the annual issuance falls below contracted quantity, the risk allocation depends on the contractual terms and any permitted carry-forward arrangements. Where a year produces more verified units than the contracted 2.5 million, uncommitted surplus might be marketed elsewhere, subject to registry ownership, authorization and market conditions. Neither case should be used to infer actual revenue absent the necessary records.

Price design should be analysed in real and nominal terms. A nominal US\$25 floor in a later period has less purchasing power than US\$25 in an earlier period when inflation is positive. Annual programme budgets should therefore evaluate local-currency exchange rates, import-price escalation, implementation delays and the effect of committed payments on the maintenance of completed assets. Gross carbon-credit proceeds should never be presented as net discretionary cash if verification costs, implementation costs, refunds or other contract obligations remain outstanding.

A useful financing discipline divides receipts into immediately committed expenditure, multi-year construction obligations, village-account transfers, project operating costs and a separately identified contingency reserve where permitted by the legal framework. The public should be able to trace each approved capital project through contract award, milestone payment, commissioning, service delivery and subsequent maintenance. The same dataset should reconcile with national budget reporting and the Bank of Guyana or treasury confirmations within the limits of lawful disclosure.

Disclosed payment series

Date	Government-reported receipt	Cumulative receipts
December 2022	US\$75.0m	US\$75.0m
January 2023	US\$37.5m	US\$112.5m
July 2023	US\$37.5m	US\$150.0m
January 2024	US\$37.5m	US\$187.5m
July 2024	US\$50.0m	US\$237.5m
March 2025	US\$58.1m	US\$295.6m
March 2026	US\$57.9m	US\$353.5m

Source: LCDS website payment schedule, accessed September 2026. Amounts are rounded to US\$0.1 million as published. [5]

11. Revenue allocation and national development

The LCDS benefit-sharing framework distinguishes two uses of carbon-credit revenue: 85% for national and multi-community investments and 15% for participating Indigenous and hinterland communities to manage through their own approved plans. For a US\$100 million receipt, these percentages correspond to US\$85 million and US\$15 million before considering any programme-specific accounting nuances. Applying the same arithmetic to cumulative receipts of US\$353.5 million would imply US\$53.025 million as a 15% benchmark and US\$300.475 million as the 85% benchmark. Those derived quantities are not claims that exactly those amounts were transferred, spent or held in accounts by September 2026. [5][6]

The national portfolio described in LCDS 2030 includes sea defences, drainage and irrigation, low-carbon energy, health and education services, digital connectivity, agricultural competitiveness and biodiversity-related research. Each project type serves a different policy outcome and should not be evaluated solely in tonnes of carbon. A drainage canal's result may be avoided flood damage; a solar investment's may be displaced diesel and reliable electricity; a hinterland connectivity programme's may be access to education or medical consultations. Outcome indicators should reflect the project's primary purpose without converting every social benefit into speculative carbon units. [6][14]

The allocation formula is only the starting point for assessment. The public should also see committed, disbursed and expended amounts within each category, the geographic spread of funding, procurement outcomes, completion dates, recurrent maintenance requirements and project-level environmental and social impacts. A nominally equitable distribution formula may still yield unequal service results if some settlements lack technical capacity, market access or sufficient operating budgets. Conversely, allocating some national resources to large shared infrastructure may serve multiple communities even when the cash does not enter individual village bank accounts.

A mature monitoring framework reports **financial additionality** and **service additionality** separately. Financial additionality asks whether carbon-credit revenue funded expenditure beyond the counterfactual budget, and whether it displaced or supplemented existing appropriations. Service additionality asks what changed for intended beneficiaries, measured through use, reliability, cost and distribution. Public evidence of both categories would help distinguish new investment from relabelled expenditure and a completed asset from a service that continues to function.

12. Indigenous communities and village investments

The 15% village allocation is among the programme's most consequential institutional design choices. The government reports that participating villages prepare Village Sustainability Plans and receive resources for locally chosen investments in agriculture, transport, tourism, public services and other priorities. The government stated in July 2026 that an additional G\$2.5 billion allocation would bring disbursements under the programme to G\$16.9 billion across more than 240 villages. This is an attributed administrative figure; verifying individual village receipts and actual outcomes requires account-level records and a common reporting period. [6][7]

Village control has at least four distinct components. The first is a meaningful decision by the relevant community to participate. The second is approval of an investment plan through the required local process. The third is control of funds and procurement subject to lawful accounting requirements. The fourth is authority to assess and amend priorities when conditions change. Recording only the amount transferred measures one component, not the full quality of participation. A good annual village report would attach meeting minutes, an approved plan, bank confirmation, procurement documents and beneficiary feedback.

Project delivery requirements differ by location. A solar mini-grid requires technical maintenance, spare parts and tariff or subsidy arrangements. A tractor or boat requires fuel, operator training and a replacement reserve. A cassava-processing facility needs product demand, food safety systems, land and transport. A digital-connectivity project requires reliable electricity and affordable subscriptions. Evaluating these investments against identical financial-return targets would ignore their different objectives. A common reporting standard should instead record each project's approved purpose, cost, expected users, operating responsibilities and measurable results.

Social safeguards should protect dissent as well as approval. Women, youth, elders and households outside village leadership may experience investments differently. Independent beneficiary checks should therefore measure access and use, not simply record that village representatives endorsed an initiative. Publication should preserve sensitive financial and personal information while allowing each participating community to challenge an inaccurate summary. Disputes over consent, territorial rights or the use of funds should be routed to a process able to offer a remedy, rather than treated merely as a communications concern.

13. Participation, tenure and grievance procedures

Consent and land tenure have generated documented disagreement. Government explanations describe a seven-month LCDS consultation, an endorsed programme and procedures under which communities voluntarily opt in and approve plans through village meetings. The government also refers to the Amerindian Land Titling programme and the statutory responsibilities of village governance. These records establish the government's stated procedural framework, but they do not eliminate the need to verify what particular villages understood, agreed to and recorded at the relevant time. [6][8]

The Amerindian Peoples Association (APA) filed a 2023 complaint with ART alleging inadequate consultation and concerns about respect for Indigenous rights. The National Toshias Council chair and the government publicly disputed the APA's claims. ART published the complaint, responses, an independent complaint review and appeal-related records. The initial complaint was rejected. The subsequent appeal process ended amid disagreement about terms of reference, as documented in ART's public record and APA's own statements. The existence and procedural outcome of the complaint should neither be hidden nor interpreted as a comprehensive judicial resolution of every local land-tenure concern. [8][18][19]

Three questions deserve separate testing. **Programme consultation** asks whether national engagement complied with applicable standards. **Community consent** asks whether a named village, through its lawful institutions, had clear information about participation and its consequences. **Tenure protection** asks whether forest finance affects existing or outstanding titles, extensions, customary use and legitimate land-related claims. Evidence relevant to one question is not sufficient to settle the other two. A programme could comply with a formal

consultation step yet still confront a local implementation complaint. Equally, an allegation from an organisation requires examination of the specific record rather than automatic acceptance.

An accessible grievance mechanism should state standing, language arrangements, filing channels, deadlines, evidence rules, independence safeguards, interim measures and possible remedies. Communities should receive a clear explanation of whether a complaint concerns a village project, national land title, ART verification or a buyer's separate safeguard policy. Each pathway has different authority. Published anonymised case statistics and periodic third-party process reviews would permit stakeholders to judge the mechanism on actual handling of disputes rather than competing broad assertions.

14. Public financial management and auditability

Public carbon-credit receipts enter a national financial system and finance approved expenditure. The first Hess payment was reported as deposited in a US-dollar account held by the Bank of Guyana overseas for conversion and transmission to the Consolidated Fund. The resulting programme is consequently subject to financial questions beyond those addressed by carbon-credit validation: bank reconciliation, legal appropriation, authorisation, procurement, contract administration, fixed-asset recording and audit of public money. A verifier's opinion about a forest reference level is not a financial audit of a community investment. [20]

An end-to-end audit trail would assign a unique identifier to each receipt, appropriation, programme, project, procurement contract and payment. The same identifier would appear in budget reports, implementing-agency ledgers and published project summaries. For village transfers, the ledger should separately show amount due under the allocation method, amount authorised, date and value of bank transfer, any returned payment, balance held and expenditure supported by receipts. Reconciliation breaks should be disclosed and resolved on a dated schedule.

Programme accounting also requires control of overlap. A sea-defence upgrade financed partly by oil revenues, partly by carbon receipts and partly by an international loan should report each source of funds without counting the entire project as a carbon-financed investment. Co-financing is often desirable but must be transparent. The same principle applies to reported job creation: a person employed on two sequential project contracts should not automatically count as two distinct beneficiaries. Clearly defined metrics permit fair comparisons across years and reduce the risk of promotional double counting.

Independent external audit should verify cash existence and expenditures using standard government audit processes. Performance evaluation is a second exercise that asks whether completed projects function. The third exercise, safeguard assurance, asks whether rights, participation and environmental commitments were upheld. A unified annual report could

present all three opinions while distinguishing their scope, qualification and limitations. Audit findings should be accompanied by responsible agencies, agreed corrective actions and evidence of completion rather than merely a general assurance statement.

15. Article 6 and corresponding adjustments

Article 6 of the Paris Agreement governs forms of international cooperation in mitigation, including transfers used toward another country's nationally determined contribution. A corresponding adjustment is the accounting mechanism intended to prevent both the transferring host and the purchasing country from claiming the same mitigation outcome toward their respective international targets. Authorization, first transfer, reporting and adjustment requirements depend on the applicable Article 6 route and authorized use. Non-authorized voluntary contribution claims must be described differently. These distinctions are material to the price and legal use of a credit. [2][21]

Guyana announced in February 2024 that it had authorized the 2021 ART TREES issuance for specified international use and had reported the associated corresponding adjustment to the UNFCCC, enabling its first-phase CORSIA label. This was an important early implementation of international accounting rules. The status of a given 2021 serial number must still be checked because a general national announcement does not tell a prospective buyer whether that particular unit is already held, transferred, retired or subject to any other restriction. The same check applies to the separate 2023 issuance. [2][3]

A buyer's claim should identify at least four facts. The first is the environmental activity and vintage. The second is whether a host-country authorization applies to the intended use. The third is the applicable registry retirement and associated serial range. The fourth is the company's own gross emissions and emissions-reduction plan, which are separate from credit acquisition. An adjustment prevents specified double claiming in international accounting; it does not independently resolve additionality, permanence, buyer overclaiming or the distribution of benefits to communities.

National accounting should preserve the difference between greenhouse-gas inventory reporting and carbon-market adjustments. A corresponding adjustment changes how a mitigation outcome is accounted for toward international targets; it does not reverse the physical forest measurements recorded by the MRVS. The record needs an audit trail from authorization decision to registry label, first-transfer evidence, UNFCCC reporting and subsequent national inventory and NDC accounting. This is particularly important as Guyana implements its NDC 3.0 submitted to the UNFCCC in July 2026. [21]

16. Aviation compliance under CORSIA

CORSIA is the International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation. It specifies an eligibility process for emissions-unit programmes and use of approved units by qualifying airline operators in defined compliance

periods. Programme eligibility is not the same as the eligibility of every credit issued by that programme. Vintage limitations, methodology exclusions, host-country authorizations and cancellation requirements must be satisfied for the relevant compliance period. ICAO's eligible-emissions-unit document is the controlling public reference. [11]

Guyana reported that its 2021-vintage credits were the first to receive the relevant CORSIA-eligible label for the scheme's 2024-2026 first phase after completing authorization and adjustment procedures. ART's March 2026 communication recorded 9,085,923 2023-vintage credits issued to Guyana in February 2026 with CORSIA-eligible labelling. Both milestones increase potential market access, but a seller must still verify current eligibility for the specific period and serial number at delivery and at cancellation. A label is not a guarantee of a sale or a fixed price. [2][3][22]

ICAO publishes periodic updates to eligible programme lists, and market participants should inspect the document version applicable to their purchase. This matters when airlines purchase forward units or when a rule is amended during the contract term. A well-structured aviation offtake should specify the buyer's compliance period, eligible unit class, host authorization, delivery conditions, registry retirement responsibility and consequences of a later change in eligibility. Exchanging carbon credits without these fields creates avoidable uncertainty about whether the purchaser ultimately satisfies its obligation.

The importance of CORSIA extends beyond airline demand. Eligibility may affect the perceived quality and bargaining position of Guyana's credits in wider carbon markets, while compliance demand can also create concentration risk if a regulatory change narrows the eligible supply. Separate monitoring of voluntary corporate demand, sovereign transactions and airline compliance prevents an overreliance on a single purchaser category. A public sales statement should report completed transactions rather than confidential negotiations or market potential as recognised revenue.

17. ICVCM assessment and market integrity

The Integrity Council for the Voluntary Carbon Market applies Core Carbon Principles at programme and category levels. A programme-level assessment concerns its overall governance and rules; category-level assessment examines specific crediting methodologies. Its May 2026 announcement stated that ART TREES v2.0 HFLD and removals methodologies required remedial actions before qualifying for CCP approval. The decision followed examination of the HFLD reference-level method, including what evidence demonstrates credible future deforestation pressure beyond historical emissions. [9][10]

This distinction should appear in every official and commercial explanation. **ART programme eligibility**, **CORSIA unit eligibility** and **ICVCM category approval** operate under different mandates. A programme may satisfy one while still addressing outstanding requirements in another. Saying every Guyanese carbon credit carries a CCP label would exceed the published May 2026 decision. Saying the same decision automatically invalidated Guyana's

issued credits or terminated their ICAO eligibility would also exceed the evidence. The accurate description is a category-level remedial-action requirement at the stated date. [9][10][11]

The assessment has practical commercial effects even when existing units remain on the registry. Some buyers include CCP approval in procurement policies or pricing criteria. Others accept CORSIA eligibility, independent ratings, direct due diligence or specific national safeguards. A seller needs a claim matrix that lists what each label means, the current status, relevant conditions and the documentary evidence. A buyer should request the complete assurance package instead of using a single quality mark as a substitute for examining the carbon accounting and local benefit-sharing record.

Methodology revision creates a transition question. Future rules may alter the volume, category or eligibility of credits produced by similar forest performance. Contracting teams should evaluate how verification timing, approved method versions and any transitional arrangements affect forward deliveries. Technical teams should retain baseline-input provenance, future-loss evidence and verification comments so the response to an integrity review is reproducible. This constitutes ordinary audit readiness, not an assumption that a particular outcome from the next assessment is assured.

18. Carbon-credit demand and commercial strategy

International carbon markets include voluntary corporate buyers, airline compliance purchases, government-to-government transactions and other regulated demand. Each channel values different attributes. Voluntary buyers may prioritise biodiversity, community participation, reputational controls or avoidance of double claiming. Airline purchases must meet ICAO's formal eligible-unit requirements. Sovereign purchasers often demand Article 6 cooperation terms. A marketable credit therefore requires both credible environmental performance and a clear permitted use. [11][23]

The World Bank's 2026 State and Trends of Carbon Pricing report found that carbon-credit issuance rose around 8% between 2024 and 2025, while credit prices declined slightly across 2025 overall. Credits meeting certain compliance or quality conditions continued to attract a premium. The same report notes that global market development remains uneven across project types and mechanisms. Guyana's published Hess minimum prices should not be treated as a universal market quote for every uncommitted vintage or a reliable estimate of future spot prices. [23]

A diversified commercial model would report separately the contracted Hess portfolio, already delivered units, unsold inventory and any contemplated new sales. The reported 2025 purchase and retirement of 100,000 Guyanese credits by Apple, described by the government in June 2025, illustrates an additional buyer channel, but the transaction should be

verified at the relevant registry before inclusion in any authoritative inventory or earnings analysis. The government announcement did not establish a general market-clearing price for the remainder of Guyana's supply. [24]

Future sales face the trade-off between predictable long-term offtake and potential higher spot prices. A long-term contract reduces exposure to a weak year in buyer demand but also encumbers future supply. Spot sales preserve flexibility but create budget uncertainty. Price floors, price-index participation, payment security, eligibility conditions and buyer claims all affect the comparison. The appropriate evaluation is a transparent range of expected and stressed cash flows, with explicit assumptions and no presentation of hypothetical revenue as an achieved national financial result.

19. Petroleum, exported emissions and credible climate claims

Guyana's forest-carbon programme and its petroleum expansion must be assessed with explicit accounting boundaries. A national land-sector emission estimate measures carbon released or removed within the monitored forest estate under a defined method. Offshore oil-production emissions concern extraction, processing, flaring, fuel consumption and associated infrastructure. Emissions from combustion of exported crude normally occur outside Guyana's national territorial inventory. A buyer's corporate Scope 1, Scope 2 and Scope 3 inventory represents yet another accounting perimeter. Adding or subtracting figures from different perimeters without identifying the boundary would misrepresent physical climate outcomes. [12][21][25]

The December 2022 forest-credit agreement was signed with Hess Corporation. Chevron completed its acquisition of Hess in July 2025, making Hess a Chevron subsidiary. The public transaction facts should therefore distinguish the original contracting counterparty from its later corporate ownership. A change in ownership does not establish the precise contract assignment, guarantee or liability provisions, which would require the underlying executed documents. Commercial diligence should confirm the current obligor, delivery correspondence, payment-security arrangements and any consent requirements triggered by changes of control. [4][25]

Three statements warrant separate treatment. First, Guyana has independently verified forest-carbon issuances under ART TREES for named historical vintages. Second, the country is an expanding petroleum producer and its oil industry carries direct and value-chain emissions. Third, carbon finance and petroleum policy have independent fiscal, social and international climate implications. The first statement does not erase the second, and the second does not render every forest-monitoring result scientifically irrelevant. A national climate report should present both with no automatic netting. [1][12][21]

Buyers face a parallel obligation. Purchase or retirement of a forest credit is not evidence that a purchaser has reduced its gross operational or product-related emissions. When credits are used for permitted compliance, the claim must state the exact compliance

programme and retired unit details. When they support voluntary claims, the purchaser should disclose gross emissions, reduction progress, accounting approach, authorization status, credit vintage and any material limitations. Terms such as carbon neutral, zero impact and emissions-free carry materially different implications and should not be inferred from a purchase receipt alone. [11][13][21]

A useful public dashboard would distinguish Guyana's territorial emissions, land-sector inventory, exported fuel volume, a separately identified estimate of potential end-use combustion emissions, forest credits issued, credits internationally authorized, credits retired and the government's NDC progress. The exported-fuel estimate would be a policy-context metric, not an adjustment to the UNFCCC territorial inventory. Whenever an inventory or emissions factor changes, the dashboard should preserve the previous version, explain the revision and document whether credit calculations are affected.

The policy choice is therefore not a contest between a single oil number and a single forest-credit number. It is an institutional requirement to specify where mitigation occurs, who pays, who claims an outcome and which emissions remain. Independent reviewers should test each ledger on its own rules before evaluating the consistency of national development plans, the scale of transition investment and the credibility of public claims.

20. Mining, land-use change and enforcement

The 2023 MRVS attributes 5,853 hectares of mapped deforestation to mining and mining infrastructure, approximately 62% of the reported 9,353-hectare total. The same report assigns 6.15 million tonnes of CO₂ emissions to this driver, while overall estimated 2023 deforestation and degradation emissions reach 13.94 million tonnes. These are historical 2023 results. They establish the scale of an observed pressure but do not establish an unchanged rate in 2026. Updating the diagnosis requires later validated MRVS releases, concession data and independent ground checks. [12]

Mineral extraction creates distinct pathways to forest impact: mine footprints, tailings and waste storage, settlement expansion, access roads, river diversion, fuel and power infrastructure and indirect clearing after a road opens. Satellite analysis identifies much of the direct land-cover change, but not every change in water quality, contamination risk, social access or forest ecological function. A mining-linked forest-control system therefore needs geospatial change detection connected to permits, inspections, rehabilitation security and closure plans. Those datasets should share location and time identifiers, while restricting disclosure of sensitive enforcement and community information.

The first operational control is prevention. Concession and environmental-permit boundaries should be spatially checked against a common forest-baseline layer before approval. An agency approving a road or lease should document expected forest conversion and mitigation measures; it should not rely on another agency to discover impacts after construction. The second control is contemporaneous detection. Alert systems should flag new clearing

outside permitted polygons and assign a responsible inspector. The third is remedy. Enforcement decisions should record corrective orders, restoration obligations, deadlines, independent site verification and, where applicable, sanctions.

Rehabilitation effectiveness requires more than planted seedlings. A restoration completion certificate should distinguish stabilised land, restored soil function, tree survival, hydrology, biodiversity and long-term monitoring. Mine operators should budget for several years of upkeep and failure replacement. Where residual emissions are material to the national forest account, reporting should explain whether restoration is treated as immediate recovery, future removals or neither under the applicable method. Recovery claims made before biological outcomes occur would overstate immediate carbon benefits.

Data provenance matters when two authorities report different figures. A mapped area may cross more than one licence, contain both legal and illegal activity or have no confirmed operator. The reporting system should use a consistent hierarchy: observed physical change; likely activity class; permit status; confirmed operator where documented; and enforcement finding if reached. Publishing the observed deforestation independent of unresolved legal attribution avoids suppressing an environmental result while a case proceeds. Linking later enforcement outcomes to the original alert produces a measurable control-performance record.

The opportunity for responsible mining is to demonstrate measurable site discipline, rather than to claim that a national carbon programme automatically offsets company impacts. Useful site indicators include hectares disturbed inside and outside approved plans, emissions and water-quality results, restoration survival, closure-security coverage and time from deforestation alert to corrective action. Regulators and investors gain more information from these measurable outcomes than from broad commitments without verified follow-through.

21. Energy, resilience and programme selection

Low-carbon development combines mitigation, adaptation and service-delivery objectives, but each calls for a different evaluation method. Solar power and efficient grids may reduce diesel consumption and associated domestic emissions where the counterfactual fuel and dispatch pattern are credible. Sea defences and drainage lower physical climate risk rather than automatically generating carbon credits. Broadband, education and health investments can strengthen the social capacity of hinterland communities, but their primary benefits do not have to be converted into speculative avoided emissions to qualify as development outcomes. LCDS 2030 places these objectives within a common national financing strategy.

[14]

Project selection should therefore use a multi-objective appraisal with separate columns for climate mitigation, climate adaptation, service access, local economic opportunity, Indigenous governance, biodiversity, fiscal cost and operating viability. These are distinct

dimensions, not interchangeable numbers. A project with modest carbon savings might serve a settlement facing severe flood risk; a high-emissions-saving project may be unaffordable where no institution can fund maintenance. The appraisal should disclose trade-offs and affected groups instead of collapsing them into an opaque score.

For a proposed renewable-energy project, the minimum technical file includes site demand; hourly or seasonal load; existing fuel consumption; generation profile; storage and reserve needs; grid stability; land footprint; procurement and warranty terms; maintenance obligations; and a baseline emissions factor. Monitoring should compare actual diesel displacement with the approved baseline after commissioning. Where carbon-credit revenue funds part of the capital cost, a separate legal review should determine whether future emissions reductions are being credited under another mechanism and whether any overlapping claim creates a double-counting concern.

For adaptation, the core file includes a site-specific hazard assessment, exposure of people and assets, design standard, alternative locations, nature-based options, maintenance needs and expected beneficiaries. Drainage performance can be measured in flood duration or depth, pumping reliability, road accessibility and avoided service interruption, with caution about attributing all improvements to a single project. Independent engineering checks should review major works before construction and after completion.

For village infrastructure, procurement rules should recognise difficult transport and market access without normalising weak financial controls. Publish the approved budget, scope, supplier-selection record, delivery confirmation, warranty, maintenance responsibility and a basic community-service indicator. A project completion photograph is not adequate evidence of long-term performance. An annual follow-up should ask whether equipment is functioning, who uses it, what it costs to operate and whether the community wants to revise the service model.

Portfolio governance should assign each project a primary outcome and a small number of secondary outcomes. The Ministry of Finance and the implementing ministry need one shared investment register rather than competing project lists. Audit follow-up should distinguish a cost overrun, a procurement weakness, an environmental incident and a failed development outcome. These events demand different remedies and different disclosures. Carbon finance earns public confidence when it funds functioning services and when the public understands the relationship between financial decisions and demonstrated results.

22. Biodiversity, ecosystem services and safeguards

Carbon is one ecosystem service among several. Guyana's forests also affect species habitat, watershed integrity, soil, cultural practices and the ability of forest-dependent communities to maintain livelihoods. Carbon accounting uses a tonne of carbon dioxide equivalent as its unit. Species persistence, water quality and cultural significance have no simple conversion

into that unit. Biodiversity benefits should therefore be assessed through separate baselines, indicators and safeguards, and any biodiversity-credit claim should require a distinct method and verified unit definition. [12][14]

A forest area may retain significant biomass while losing ecological function through fragmentation, roads, fire, illegal hunting or selective extraction. Conversely, some production landscapes maintain habitat features without satisfying the carbon-market definition of intact forest. A biodiversity monitoring plan should combine mapped habitat extent, ecological connectivity, threats, field-based biological observations and community knowledge. Publication of threatened-species locations should be risk assessed to prevent poaching or damage to culturally sensitive sites.

Benefit sharing has a biodiversity dimension. A village that depends on a river, hunting grounds, medicinal plants or customary routes may value conservation outcomes differently from a national project appraiser. Community monitoring protocols should identify locally selected indicators, consent to data use and rules for who owns sensitive observations. Local monitors need predictable compensation and training; they should not become unpaid data suppliers to external certification systems. Involving women and youth requires direct attention to participation conditions rather than relying exclusively on household-head or village-council summaries.

A biodiversity safeguard screen for proposed spending should address legal land status, protected-area designation, customary use, threatened species, water impacts, invasive species, pesticide use, road access and potential displacement of traditional practices. A proposed eco-tourism project could support revenue but place pressure on culturally sensitive spaces. A mini-grid could reduce diesel use but disturb a wetland through siting. Screening before investment approval costs less than remedy after construction and helps avoid claiming sustainability benefits that have not been demonstrated.

There is a material risk of double monetisation where the same ecosystem outcome supports carbon, biodiversity and watershed-service transactions. Selling different, independently verified attributes from one area is not necessarily double counting, but the claim boundaries must be explicit and contractual rights compatible. A public attribute register should identify spatial overlaps, accounting periods, credited activities and permitted claims. If a buyer claims an ecological outcome outside the purchased instrument, the issue lies in claim governance even when the underlying projects are sound.

A national nature-finance strategy could integrate forest and biodiversity monitoring without merging their verification criteria. The same geospatial base, permits and safeguards records may lower measurement costs, while separate indicator systems preserve ecological meaning. The goal is to fund durable conservation and development under transparent terms, not to transform every ecosystem function into an unexamined financial asset.

23. Risk register and response instruments

A serious fiscal and environmental programme needs a live risk register with named owners, detection triggers, mitigation budgets and evidence of closure. A list of risks alone adds little value. Each risk should have an observable leading indicator and a defined decision point. The register should be refreshed after every new verification, significant market-rule change, payment event, material grievance and new MRVS result. The following risk taxonomy is proposed for public and internal reporting, not presented as an existing government control framework.

Risk	Early indicator	Responsible function	Example control and evidence
Baseline or additionality challenge	Method review finding or inconsistent future-loss inputs	Forest technical lead and independent verifier	Versioned counterfactual file and sensitivity review
Lower-than-contracted issuance	Preliminary verified volume below annual delivery requirement	Contract and registry teams	Delivery forecast, legal review and contingency plan
CORSIA eligibility change	Updated ICAO exclusions or host-authorization conditions	Article 6 authority and transaction counsel	Serial-level eligibility matrix before sale
CCP-label limitation	Unresolved methodological remedial action	Crediting-programme liaison	Corrective-action log and buyer disclosure
Forest reversal	Fire, illegal clearing or altered forest-carbon stock	GFC and environmental authorities	Incident mapping, buffer review and restoration plan
Village-fund misuse	Unreconciled bank or procurement records	Village authorities and audit function	Independent financial checks and remedy tracking
Rights-related dispute	Filed grievance or contested land boundary	Competent land and grievance authorities	Accessible appeal, independent review and documented remedy
Payment interruption	Scheduled receipt not received on agreed date	Treasury and contract manager	Cash buffer and documented counterparty contact
Buyer claim overreach	Advertising exceeds authorized unit use	Seller compliance and buyer legal team	Standard claims schedule and contractual correction right
Deforestation from new roads	Alerts inside or adjacent to approved works	Sector regulator and permit holder	Before-and-after map and inspection closure record

The first stress group concerns environmental integrity. Baseline assumptions, measurement uncertainties, leakage and reversals interact. An apparently small methodological revision may reduce available issuance, trigger a contract delivery question and alter the public

revenue forecast. The risk owner should therefore be a cross-functional group capable of linking technical findings to financial decisions, rather than leaving method reviews isolated in the forestry unit. [9][12][13]

The second group concerns market acceptance. ICAO eligibility and ICVCM methodology assessment answer different questions. A rule change affecting one market does not automatically remove eligibility in another, but a market participant may voluntarily impose narrower purchasing standards. Treasury planners should build an explicit downside case for restricted demand and slower settlement. Commercial teams should not present unsold credit inventory as cash or budget an expected premium before the transaction closes. [9][11][23]

The third group concerns legitimacy and execution. Indigenous benefit allocation, participation, land issues and project outcomes require local records and functioning remedy channels. A national programme may have accurate satellite measurements while a particular project fails to deliver services, or a local dispute may arise without changing the national forest estimate. Incident reports should identify the affected perimeter and remedy without treating every criticism as either proof of total programme failure or a public-relations inconvenience. [6][8][18][19]

Risk committees should review incidents with a consistent chain: event, affected claim, financial exposure, rights impact, evidence preserved, interim control, accountable decision, independent confirmation and public disclosure threshold. A material event should remain open until the risk owner produces evidence of remedial completion. Audit committees should examine repeated overdue actions and changes made to risk thresholds after an incident. These procedures are proposed controls and not statements that Guyana already operates every element.

24. Scenarios for 2027-2030

Scenario analysis should test decision resilience rather than predict market prices or political choices. Four illustrative combinations are considered: stable verified issuance and steady demand; higher integrity requirements with continued eligibility; temporary issuance disruption from forest events or delayed verification; and weaker international demand with tighter budget conditions. No scenario is a forecast. Contractual cash flows, future credits, voluntary spot revenue and development spending respond differently to each combination.

Illustrative scenario	Forest and verification condition	Market condition	Priority management response
A. Operational continuity	Verified credits delivered on normal schedule	Buyer demand and programme rules broadly stable	Reconcile serials and channel receipts to multi-year priorities
B. Integrity transition	Revised HFLD tests change available issuance or documentation	Buyers request enhanced evidence	Preserve baseline evidence and stress contract delivery assumptions

Illustrative scenario	Forest and verification condition	Market condition	Priority management response
C. Forest disturbance	Fire or illegal conversion creates monitoring and reversal work	Market demand unchanged	Apply incident procedures and protect essential village commitments
D. Demand and fiscal stress	Issuance continues but uncommitted inventory accumulates	Spot prices or purchasing volumes weaken	Avoid treating projected spot sales as appropriated cash

Scenario A assumes no material rule or weather shock. The main risk is administrative complacency. Normal deliveries still require correct serial reconciliation, transparent allocation, village-project monitoring and independent review of environmental changes. A predictable offtake can disguise slow procurement or rising operating costs if reporting focuses only on the receipt side. A continuity scenario therefore deserves the same outcome audit as a crisis scenario.

Scenario B treats the May 2026 ICVCM remedial-action decision as a relevant example of methodology transition, not as proof of a future outcome. Technical staff would need to reproduce reference-level choices, future-threat evidence, data provenance and verifier responses under revised rules. Commercial staff would classify which buyers legally require CCP approval and which rely on other standards. Treasury would distinguish existing contractual floor arrangements from hypothetical premiums on unsold credits. [\[9\]\[10\]](#)

Scenario C assumes a material disturbance affecting part of the national forest. Emergency response, mapping and forest-restoration decisions arrive before the complete carbon-accounting effect is known. A conservative management approach would avoid releasing disputed inventory, preserve the applicable buffer rules and maintain critical village services using lawfully available financing. Separate reporting would record immediate physical damage, later revised estimates and any consequential change to credit balances. This is a proposed stress test, not a statement that a specific disturbance is expected.

Scenario D assumes weaker demand for uncommitted units. The Hess contract's published floor prices offer partial contractual protection for delivered quantities, but the full executed terms and counterparty risk must be reviewed. A buyer concentration problem remains if budgets depend on the same long-term counterparty and a narrow group of compliance-market purchasers. Revenue planning should prioritise received cash, contracted deliverables and legally committed expenditure rather than extrapolate a favourable spot-price sample across remaining estimated supply. [\[4\]\[5\]\[23\]](#)

A useful board-level exercise combines scenarios rather than considering them in isolation. If forest disturbance and weak demand occur together, verified volume and market price may decline simultaneously while restoration spending rises. If new eligibility documentation is required during a payment negotiation, a temporary liquidity gap may appear even with

positive long-run demand. The practical output is a decision table listing which expenditures remain protected, which contracts permit rescheduling and when additional legislative or community consultation would be required.

25. Financial sensitivity and stress testing

Financial models require an auditable distinction between observed payments and conditional forecasts. The public Hess fact sheet fixes an illustrative minimum schedule of 12.5 million credits in each of three five-year blocks, with floors of US\$15, US\$20 and US\$25. The arithmetic produces US\$750 million over the announced contract, conditional on contractual performance. Government reporting records US\$353.5 million in cumulative receipts through March 2026. Neither number establishes the net present value of outstanding payments, the market value of all uncommitted Guyanese credits or the cash available to an individual village. [4][5]

An illustrative model starts with verified eligible issuance for each vintage. From this, subtract units already delivered, retired or reserved under binding contracts and any mandatory buffer or restriction that applies to the relevant pool. The remaining number is an indicative technical inventory, not a commercial sale forecast. Price only the quantity supported by an identifiable buyer, permitted credit use, timing assumption and credible transaction evidence. Then calculate gross receipts, programme and transaction costs, any contract-linked adjustments and net fiscal receipts. The assumptions should appear beside the result.

Variable	Illustrative low case	Reference assumption	Illustrative high case	Evidence required before budgeting
Uncommitted future credit volume	2m	5m	8m	Verified issuance forecast, free inventory and exclusions
Assumed spot price per tCO ₂ e	US\$8	US\$15	US\$22	Dated comparable sales and eligibility alignment
Illustrative gross spot revenue	US\$16m	US\$75m	US\$176m	Both volume and price assumptions satisfied
Village allocation benchmark at 15%	US\$2.4m	US\$11.25m	US\$26.4m	Actual lawful receipts and allocation rules

All figures in this table are hypothetical sensitivities, not expected proceeds or official forecasts. Gross revenue equals volume multiplied by assumed price. Allocation benchmark does not equal disbursement.

The price choices reflect a stress range and should not be confused with the public Hess contractual floors. The World Bank reported that credit prices softened across 2025, while credits satisfying selected international-compliance or perceived-quality requirements achieved premiums. A price appropriate for a specific CORSIA-eligible serialized unit may not apply to a voluntary unit without the same authorization. A finance model needs separate product categories and a dated market-evidence file rather than a blended headline price. [23]

For the contracted portfolio, measure exposure by vintage block and date of deliverable verification. A delay in a 2027 issuance does not automatically mean that the entire remaining Hess minimum will be lost. The outcome depends on delivery windows, remedies, payment timing and contractual provisions that are not fully established by the public fact sheet. Sensitivity should therefore model delayed cash independently from permanently lost volume and show any contingent liquidity requirement without asserting unverified contract clauses.

A disciplined model publishes its calculation sheet and assumptions log, while separately securing any confidential contractual text. Key controls include cell-level references to source documents, explicit unit labels, versioned exchange rates and a prohibition on overwriting prior baselines after results are known. The public output should provide an uncertainty interval, a cash-receipt reconciliation and an explanation of which components remain contingent. That information is more decision-useful than a single projected multibillion-dollar valuation of all future forest services.

26. Institutional responsibilities and control ownership

The institutional design of a carbon programme should separate the entity responsible for collecting environmental data from the entity authorizing international use and from the bodies responsible for receiving, appropriating and spending money. Some functions may sit within the same ministry, but the audit trail should remain separable. The purpose is not to create additional bureaucracy. It is to ensure that a registry correction, treasury receipt, complaint and project-completion decision each reach the official legally empowered to resolve it.

The Guyana Forestry Commission operates the national forest MRVS and provides the technical basis for forest-change monitoring. ART governs its crediting standard, independent validation and verification requirements, registry processes and programme complaints mechanism. Guyana's competent national authorities determine host-country authorization and NDC accounting in line with the UNFCCC framework. Treasury and implementing agencies handle public receipts and expenditure through applicable national procedures. Village

authorities develop and govern eligible local plans under the relevant domestic framework. These functions intersect, but no institution's assurance should be reported as though it independently covers every other function. [1][6][12][13][21]

Accountability question	Lead record	Independent check	Public output
What changed in forest cover?	National geospatial MRVS	Independent accuracy assessment	Annual mapped and sampled change
What credits were issued?	ART project and issuance registry	Approved validation/ verification bodies	Vintage, serial and issue-date reconciliation
Which uses were authorized?	Host-country authorization register	UNFCCC reporting and technical review	Authorization, scope and adjustment trail
What was sold and delivered?	Contract manager and registry accounts	Financial, legal and registry reconciliation	Volume and transaction status by vintage
What money arrived?	Treasury and bank records	Government audit and bank confirmation	Dated receipt and currency record
What funded a village?	Village decisions and bank records	Community and financial audit	Approved plan, transfer and result
Which complaints were resolved?	Relevant grievance body	Independent process review or appeal	Anonymised outcome and remedy tracking

Separation of responsibilities becomes especially important when data are corrected. If the forestry team revises a historical GIS classification, the verified calculation must establish whether the change affects issuance. Registry staff then address any consequent serial status. The host authorization authority evaluates whether its international accounting record needs a correction. The contract manager evaluates delivery obligations, and the finance authority adjusts public forecasts if necessary. An incident protocol should notify all affected entities without allowing any individual institution to silently rewrite another's record.

The same principle applies to Indigenous participation. A ministry's statement about national consultation does not substitute for a named village's meeting record; a village's financial audit does not settle a land-title dispute; and an ART decision on compliance with its standard does not replace the authority of a domestic court. A published pathway map should identify where each type of grievance belongs, language assistance available, what interim measures protect people during review and how outcomes are communicated back to the community.

Institutional performance indicators should measure reliability rather than volume alone. Examples include the proportion of annual forest data released with a reproducible methodology, the time between verification and serial publication, the share of government receipts reconciled to bank and budget entries, the proportion of village projects with functioning

maintenance arrangements and the average time needed to close substantiated complaints. Each indicator requires a defined denominator, reporting period and independent checking rule.

27. Public disclosure and performance dashboard

The public should be able to trace the national carbon programme using a small number of linked, versioned datasets. At present, relevant facts appear across ART documentation, government LCDS announcements, financial statements, GFC MRVS reports, ICAO eligibility records and UNFCCC filings. These sources answer different questions. A central dashboard would cross-reference them rather than replace the primary registries. Every displayed total should disclose the update date, counting unit, vintage boundary and whether the figure is verified, officially reported or an analytical calculation. [5][11][12][13][21]

A practical dashboard has six tabs. The forest tab covers mapped loss, degradation emissions, detection methods, revised figures and uncertainty. The credit tab covers issuances by vintage, buffer deductions where applicable, delivered and retired units, cancelled units and encumbered inventory. The authorization tab covers permitted international use and relevant UNFCCC reports. The finance tab covers invoicing, receipts, exchange rates, appropriations and expenditure. The community tab covers approved village plans, transfers and independently reviewed outcomes. The complaints tab reports process performance and anonymised remedies while protecting personal information.

Comparability demands stable definitions. 'Issued' must mean registry creation, not a press announcement. 'Sold' should identify legally contracted units, while 'transferred' means a completed registry movement and 'retired' means an irreversible cancellation for a defined purpose. 'Paid' is cash received by the specified account, while 'allocated', 'appropriated', 'disbursed' and 'spent' describe different public-finance stages. A single large running total that merges these categories risks giving the public a materially wrong understanding of programme performance.

Version control should work like a scientific dataset. Each annual release receives a version number, fixed release date, machine-readable files, methodology note, change log and archived predecessor. If a village, verifier or buyer reports an error, the corrected record links to the original and the authority approving the change. For geospatial outputs, include map projection, spatial resolution, image dates, class definitions and the uncertainty associated with area estimates. For financial outputs, preserve original currency alongside converted values and identify the exchange rate used.

The dashboard's external assurance statement should specify its scope. A financial auditor may confirm recorded receipts and sampled expenditure while taking no position on HFLD additionality. An ecological reviewer may check habitat indicators while offering no assurance about procurement. A registry's issuance statement establishes the units issued

under its rules but does not establish that each village project was completed. Short assurance summaries should therefore state the tested population, methodology, materiality threshold, exceptions and actions due, with direct links to full independent reports.

An accessible public edition should include compact visualisations and downloadable records, but low-bandwidth availability matters for hinterland communities. Provide printable village summaries, offline meeting packs and translated explanation where locally appropriate. Communities should receive their own financial and project data before external publication and have a documented opportunity to correct errors. Public transparency and data protection work together when the release protocol differentiates national aggregates, community-controlled data and individual personal records.

28. An independent assurance work programme

Independent assurance should proceed as a series of reproducible engagements rather than as an assertion that the programme is ‘audited’ in an undifferentiated sense. The key audit questions concern environmental measurement, methodological eligibility, unit ownership and transfer, international accounting, financial reporting, benefit sharing, rights safeguards and project outcomes. Each workstream needs a clear set of criteria and an appropriate professional discipline. [\[12\]](#)[\[13\]](#)[\[21\]](#)

For forest MRVS, the engagement should select a risk-based sample of mapped land changes, test image dates and classifications, repeat calculations from archived GIS files and compare field or high-resolution observations where feasible. The team should examine how errors near the mapping threshold are treated, how road-associated degradation is estimated, whether emission factors are current and how independent statistical sampling is incorporated. Results should distinguish data-quality exceptions from disputes over carbon-credit baseline design.

For credit accounting, obtain the applicable ART TREES methodology version, approved monitoring report, validation and verification statements, issuance statements, buffer entries, registry exports, ownership records and retirement certificates. Reconstruct a vintage-by-vintage ledger. Check whether each transfer complies with the contract and whether the buyer’s intended use matches registry eligibility and host authorization. Review all material revisions between verification, issuance, transfer and retirement. A small number of incorrect serial references could materially alter a buyer’s compliance claim even when the national issuance total is correct.

For finance, tie public receipt announcements to original transaction advice, bank records, exchange-rate documentation and treasury posting. Trace sampled appropriations to procurement, bank payments, delivery confirmations and asset registers. Reconcile the 15% community allocation policy to the chosen legally defined revenue base and actual funds transferred. Test both overpayment and underpayment risk, including timing differences and

projects reported complete before final acceptance. Any figure published as cumulative disbursement should have the same start date and beneficiary population across the report.

[5][6]

For social safeguards, reviewers should independently select a sample of participating and nonparticipating communities and examine consultation records, local-language access, complaints, land-tenure concerns and benefit distribution. Interviews should occur under informed-consent and confidentiality protocols. An absence of filed grievances is not proof that every participant had safe access to a complaints mechanism. The review should assess whether people know where to file, whether women and marginalised households are heard and whether an adverse finding leads to an enforceable remedy. [8][18][19]

For programme outcomes, technical specialists should inspect infrastructure and livelihood projects after an appropriate operating period. A solar system should be tested for availability, actual load served, spare parts and maintenance financing. A transportation investment should be checked against its approved service and operating cost. A biodiversity project should be assessed against ecological indicators appropriate to its objectives. The review should capture unsuccessful projects as well as functioning assets and identify practical corrective actions rather than hide exceptions in an aggregate completion percentage.

Assurance reports should include the applicable standard, sample population, methods, material findings, management response and deadline for independent closure. They should disclose where evidence was unavailable or access was restricted. A report with carefully defined limitations is more informative than an unqualified statement extending beyond the reviewer's remit. The appendix provides a proposed evidence-request list and a series of reconciliation tests that a commissioning institution may adapt.

29. Comparative international lessons

International experience offers institutional contrasts, not a universal template. Countries differ in land tenure, forest pressure, legal authority, public-finance capacity, carbon methodology, buyer demand and vulnerability to climate shocks. A mechanism that works in a high-deforestation frontier may not fit a high-forest, low-deforestation jurisdiction. Comparisons should focus on programme design choices and documented outcomes, not rank countries by headline carbon revenue per hectare.

The Guyana-Norway partnership illustrates an earlier results-based financing pathway. It paid for defined forest-climate performance under a bilateral arrangement and helped support LCDS investments. Its public documentation identifies US\$220 million in the main 2009-2015 programme, while current LCDS reporting also describes total performance-based payments of about US\$230 million when using its wider programme presentation. The differing boundaries need to be retained rather than collapsed into a single inconsistent historical claim. The later Hess arrangement moves to serialized ART TREES units, multiyear buyer delivery and exposure to formal carbon-market eligibility rules. [4][14]

Costa Rica offers a contrast in how environmental-service payment policies can draw on domestic funding alongside international forest finance. Its model highlights the importance of a durable institution for landowner participation, payment administration and landscape monitoring. The comparison does not prove that the same legal landholder-payment formula fits Guyana's Indigenous governance system. Guyana's 15% village-led allocation represents a different distribution and accountability design. A useful comparative review would test transaction costs, tenure records, independently verified service benefits and long-run public-budget obligations rather than import a percentage from another country.

Other jurisdictional forest programmes underscore the value of predictable programme rules and early preparation for authorization. A country that secures high-integrity issuance without deciding which units it will authorize for cross-border claims may later face buyer uncertainty. Conversely, authorizing too much prospective supply before national NDC accounting and development priorities are assessed may constrain domestic flexibility. The relevant lesson is a transparent national allocation policy that specifies eligible uses, reserves and adjustment liabilities ahead of commercial negotiations. UNFCCC Article 6 reporting rules provide a shared framework for those decisions. [21]

Comparisons also reveal a tension between ecological scale and community specificity. National programmes can address leakage from one district to another and establish uniform technical monitoring. They nevertheless need local procedures for land rights, consent and benefit delivery. Project-scale programmes may offer greater direct connection to a named site but struggle to address jurisdiction-wide displacement. Guyana's institutional design should preserve the technical advantages of national monitoring while producing community-level evidence that beneficiaries and independent reviewers can inspect.

A comparative learning programme could publish matched case studies every two years using the same questions: baseline rule, independent verification, reversal provision, title and participation framework, international authorization, revenue allocation, grievance outcomes, public-finance audit and measured local service results. Including difficult cases and documented failures would improve learning. Selecting only successful press announcements would overstate the transferability of any individual model.

30. Policy and institutional options

The options below are analytical proposals rather than a statement of existing legal commitments. They respond to identifiable evidence gaps: incomplete public serial-to-cash reconciliation, evolving HFLD assessment, contested participation claims, exposure to market and verification delays and the difficulty of separating carbon-market outcomes from wider development and petroleum questions. Adoption would require consultation with the responsible public authorities, village governments, legal advisers and relevant independent bodies.

Proposed measure	First-year deliverable	Long-run assurance test
Publish a six-ledger carbon statement	Linked annual MRVS, registry, authorization, finance, community and emissions tables	Independent reconciliation to primary source records
Maintain a public issuance and contract register	Aggregated vintage-by-vintage inventory with encumbrance notes	Exception report for unreconciled quantities
Document the HFLD method response	Archived evidence and responses to each remedial action	Independent reproducibility of baseline inputs
Formalise an authorization decision file	Standard pre-transfer legal and accounting checklist	Full match to registry and UNFCCC reporting
Expand village outcome checks	Common service indicators and community-controlled correction route	Sample-based independent field verification
Improve cross-agency land-change response	Shared alert and enforcement reference codes	Time from observed change to verified remedy
Introduce multiyear revenue stress testing	Cash-only baseline and delayed-delivery scenario	Budget variance and project continuity review
Publish a safeguard and grievance map	Clear filing channels, translation arrangements and referral authorities	Independent access and remedy assessment

The earliest actions are organisational. Assign named owners to each data field, issue a common glossary, freeze the current registry and financial extracts and reconcile the most recent completed year. Publish unresolved exceptions rather than waiting for perfection. A cross-agency control committee should review technical, legal, financial and community issues with separate documented decisions. The first report should make no claim of assurance beyond the audits completed at the publication date.

The next phase is methodological. Prepare a complete HFLD reference-level evidence package with independent peer review, maintain dialogue with ART and relevant integrity bodies, and identify contractual exposure for future vintages if methodologies change. Work on new credit categories should not displace the maintenance of existing forest monitoring. Buyers should receive standardized unit-use and claim disclosures; public statements should specify whether a reference concerns ART certification, ICAO eligibility or ICVCM CCP status. [\[9\]\[11\]](#) [\[13\]](#)

A parallel social and financial phase should place village investment records and remedies on a regular calendar. Each participating community should receive a readable statement showing its allocation basis, amounts received, approved projects, expenditure, operating liabilities and rights to request correction. Independent sampling of project use and maintenance should complement the account reconciliation. Respect for community autonomy requires a meaningful role in designing the indicators and determining which sensitive local information is released.

The medium-term outcome should be an annual national forest-finance report with a stable evidence model. Its aim is not to eliminate legitimate debate over carbon markets, fossil-fuel development or Indigenous rights. Its aim is to permit disagreements to be tested against dated methods, original records and clearly defined institutional responsibilities. Comparable annual evidence would support better investment decisions, easier external review and more accurate public discussion.

31. Research findings and closing assessment

The available evidence establishes a material, functioning national forest-carbon programme with documented historical ART TREES issuances, a public US\$750 million minimum Hess purchase arrangement and government-reported receipts of US\$353.5 million through March 2026. It also establishes a 15% community-allocation commitment, measured forest losses in the 2023 MRVS, new international-market eligibility pathways and an unresolved category-level ICVCM remedial-action requirement identified in May 2026. Each finding applies to a different measurement or regulatory system; none should be converted into a blanket statement of universal market acceptance or audited national net benefit. [\[1\]\[3\]\[4\]\[5\]\[6\]\[9\]\[12\]](#)

Three evidence gaps remain especially consequential. First, the public needs a reconciled serial-level account that distinguishes issued, contracted, internationally authorized, transferred, retired and uncommitted units by vintage. Second, revenue reporting needs clearer linkage from the exact receipt to appropriation, village transfer, spending and measured service performance. Third, methodological and safeguards claims require transparent response records, including documentation of contested issues and the scope of the institution empowered to resolve them. These gaps are opportunities for targeted evidence release, not grounds for inventing an adverse or favourable result.

Future programme economics depend on verified forest outcomes, applicable methods, authorization rules, buyer demand and contract execution. A national strategy therefore benefits from conservative budgeting against received cash, explicit contingency planning and public clarification of any sale premium earned beyond contract floors. Equally, long-term environmental outcomes depend on control of mining-linked conversion, fire, degradation and competing land-use pressures. Neither income received nor a low historic annual deforestation rate substitutes for those annual operating results.

Guyana's approach is relevant to international debates about how the world finances standing tropical forests, how high-forest jurisdictions demonstrate credible additionality and how climate finance reaches forest-dependent communities. Its future evidence base should be assessed using transparent environmental accounting, financial reconciliation, enforceable rights safeguards and measured development outcomes. These tests create an accountable basis for continued public scrutiny regardless of whether an observer supports or opposes any particular form of carbon-market finance.

Technical appendices

Appendix A. Evidence inventory and data definitions

The purpose of this appendix is to provide a reproducible bridge from public statements to analytical use. A reader should locate the named primary source, confirm the publication and vintage dates, examine the precise counting unit, and note when an independent auditor rather than the publishing agency verified the measure. A data field should never be upgraded from announcement to independently verified result through repetition in secondary reporting.

Data item	Published value or status	Reference and date	Use permitted in this study	Remaining validation
ART TREES initial issuance	33.47m credits, 2016-2020	ART / government, Dec 2022 [1]	Historic issuance	Current serial balances and retirements
ART TREES 2021 issuance	About 7.14m	ART / government, Feb 2024 [2]	2021 vintage issuance	Exact issued quantity and unit-level status
ART TREES 2023 issuance	9,085,923	ART, Feb-Mar 2026 [3]	2023 vintage issuance	Latest transaction and cancellation record
2022 authorization disclosed in a UNFCCC regional report	8,732,929 tCO ₂ e	UNFCCC regional synthesis, 2025 [21]	Authorized quantity, subject to source review	Match exact issued serials and host letter
Hess contracted quantity	37.5m credits	Public contract fact sheet, Dec 2022 [4]	Nominal offtake exposure	Full agreement and amendment status
Contract published minimum	US\$750m	Public contract fact sheet, Dec 2022 [4]	Nominal minimum, conditional on performance	Detailed payment and remedy terms
Cumulative government-reported receipts	US\$353.5m	LCDS dashboard, Mar 2026 [5]	Reported revenue milestone	External bank-to-budget reconciliation
National village allocation	15% of revenue	LCDS benefit-sharing framework [6]	Policy commitment	Revenue base and transfer audit
2026 village allocation announcement	G\$2.5bn, cumulative G\$16.9bn claimed	National reporting, Jul 2026 [7]	Attributed official announcement	Village-account settlement records
Mapped deforestation	9,353 ha in 2023	GFC MRVS, Aug 2024 [12]	2023 historical land-cover result	Current data release and any revisions

Data item	Published value or status	Reference and date	Use permitted in this study	Remaining validation
2023 deforestation emissions	9,887,029 tCO ₂	GFC MRVS, Aug 2024 [12]	Modelled 2023 deforestation impact	Method assumptions and uncertainty
2023 forest degradation emissions	4,049,453 tCO ₂	GFC MRVS, Aug 2024 [12]	Modelled 2023 degradation impact	Field and volume validation
2023 total deforestation and degradation emissions	13,936,482 tCO ₂ e	GFC MRVS, Aug 2024 [12]	National MRVS total for the stated activities	Inventory boundary reconciliation
ICAO first-phase ART programme status	Listed with limitations	ICAO summary, Apr 2026 [11]	Formal programme channel, not blanket unit approval	Current serial, vintage and host criteria
ART HFLD CCP category decision	Remedial actions required	ICVCM, May 2026 [9]	Category-level assessment state	New decision, if released, after cut-off

A.1 Definitions governing every data table

A vintage is the calendar year or period in which an environmental outcome is credited. An issuance date is when an approved programme creates units on its registry after applicable verification. A registry transfer changes account control; an encumbrance reserves units under a contract even if the registry holder is unchanged. A retirement or cancellation removes a unit from circulation for the stated purpose. An authorization is a host-country decision allowing specified international uses, and a corresponding adjustment is a separate national accounting treatment required for relevant transfers. These processes may happen months or years apart and must not be conflated. [11][13][21]

A forest-emission estimate is not the same as a credited reduction. Observed deforestation emissions are computed from mapped change and relevant emission factors. A crediting calculation applies additional programme rules, approved reference levels, deductions, leakage and reversal protections. Payment is a monetary event. Community allocation is a policy and accounting stage. Village disbursement is another monetary event. A completed investment and an independently observed improvement in household services are further stages. The study uses these distinct terms throughout.

For financial figures, 'US' means United States dollars and 'G' means Guyana dollars. The exchange rate is material for converting receipt and allocation disclosures, so comparisons between USD receipts and GYD allocations should use exact transaction dates or a disclosed conversion convention. Numerical sensitivity examples are author calculations, not new

public data. Reported rounded totals may differ slightly from the sum of unrounded source ledger entries; any material discrepancy belongs in an exception log instead of being silently adjusted.

A.2 Reproduction protocol

The minimum repeatable review stores a frozen copy of the source PDF or webpage, retrieval date, checksum where possible, extracted figure, original units, computation performed and final displayed result. The independent reviewer should retrace every calculation from source to headline without asking the analyst for undocumented inputs. If a primary source changes, retain the archived predecessor and issue a correction note. Where no direct serial-level export is obtained, the field should read 'not reconciled', not zero and not an implied estimate.

For the 2023 GFC MRVS, the independently displayed arithmetic is 9,887,029 tonnes from deforestation plus 4,049,453 tonnes from degradation, equalling 13,936,482 tonnes. The two decimal rounding conventions in summary and detailed tables need consistent treatment. The 5,853-hectare mining component divided by total mapped deforestation of 9,353 hectares is approximately 62.6%; the report presents 62% in the driver category table. Quoting either number requires a clear rounding description rather than a misleading impression of exact precision. [12]

The map-derived estimate and statistical accuracy assessment measure related but nonidentical quantities. The MRVS operational mapped figure is used to classify areas and drivers. Durham University's independently sampled assessment measures accuracy against a statistical frame. Statistical confidence intervals should accompany samples rather than be attached by implication to the mapped operational number. A new analyst should inspect the full report and its appendix before comparing 2023 with a later year that uses a different image set or error adjustment.

Appendix B. Contract and public-finance calculation workbook specification

This appendix describes a spreadsheet structure for an independent model. It is a specification, not a representation of a reviewed signed contract. The file should contain separate tabs for source records, contract assumptions, issuance, serial transactions, host authorizations, receipts, allocations, projects, scenarios and audit exceptions. Formula cells should never contain unexplained hard-coded prices or vintage quantities. Every source assumption needs a citation and a last-verified date.

B.1 Published contract-floor arithmetic

Vintage interval	Units assumed under published fact sheet	Floor US\$/unit	Derived nominal floor revenue
2016-2020	12,500,000	15	187,500,000

Vintage interval	Units assumed under published fact sheet	Floor US\$/unit	Derived nominal floor revenue
2021-2025	12,500,000	20	250,000,000
2026-2030	12,500,000	25	312,500,000
Total	37,500,000	Weighted average 20	750,000,000

The first block contains existing historical issuance as of the signing; the later blocks include the forward-delivery commitment. The public fact sheet describes an upside arrangement under which Guyana shares 60% of the difference between an applicable higher reference market price and the floor. Its full implementation needs the contract's price-definition and settlement clauses. A conditional illustrative formula for an eligible unit is $\text{floor_price} + 0.60 \times \max(0, \text{applicable_reference_price} - \text{floor_price})$. The model must not apply this simplified formula to an unverified market index, unissued credits or a date on which no settlement occurred. [4]

B.2 Receipt and allocation checks

The disclosed receipt series is US\$75.0 million, US\$37.5 million, US\$37.5 million, US\$37.5 million, US\$50.0 million, US\$58.1 million and US\$57.9 million for the dates listed in Chapter 10. The sum is US\$353.5 million. A hypothetical 15% calculation against that entire gross amount yields US\$53.025 million, while 85% yields US\$300.475 million. These are arithmetic benchmarks. They do not prove what revenue definition, currency conversion, timing treatment or eligible costs apply to actual village disbursements. The 2026 GYD announcement and cumulative USD receipts therefore belong in separate tables until the responsible records are reconciled. [5][6][7]

Reconciliation test	Formula or evidence bridge	Failure mode
Payment completeness	Bank-confirmed deposits = posted treasury receipts plus timing items	Omitted or duplicated payments
Gross-to-net revenue	Gross receipts minus agreed fees, adjustments and refunds = relevant recognised amount	Allocating from inconsistent bases
Village allocation	Defined eligible revenue multiplied by 15%, with policy exceptions disclosed	Systematic under- or over-allocation
Community bank transfer	Approved allocations = settled transfers plus lawful outstanding balances	Unrecorded delays or suspense items
Community project expenditure	Opening balance + funds received - approved expenditure = closing balance	Unsupported or mistimed spending
Capital-project lifecycle	Contract award -> certified delivery -> final payment -> asset in service	Paying for assets with no service

Reconciliation test	Formula or evidence bridge	Failure mode
Inventory balance	Opening units + issuance + incoming - outgoing - retired - cancelled = closing units	Registry quantity mismatch
Free inventory	Closing units - contractual reserves - regulatory restrictions = available units	Selling units twice

B.3 Stress-testing sequence

Start with legally confirmed contract cash flow, not a speculative estimate of every unit Guyana might earn. Apply delayed issuance to the delivery schedule and a separate timing change to cash receipts. Add currency sensitivity to domestic project budgets, noting that imported equipment prices and local wages respond differently to exchange-rate movements. Evaluate an eligibility restriction for voluntary unsold stock separately from Hess's public floor commitment. Apply governance and restoration expenditures where documented, and show the ability to protect agreed village allocations if revenues arrive later than expected.

The model should show three measures: nominal gross cash received, net discretionary resources after documented commitments and the financing gap under a downside timing case. Discounted present-value results require a published discount rate, date convention and cash-flow table. An annual report should never present discounted contract value as an additional revenue line on top of the undiscounted total, since the two views measure the same underlying transaction. If confidential contract clauses materially change downside exposure, the public summary should state their existence and the uncertainty they create without publishing privileged text.

Appendix C. Environmental accounting formulas and verification tests

The general land-emission calculation multiplies an observed activity quantity by the relevant emissions factor and adds applicable gas conversions and uncertainty adjustments. In simplified notation, $\text{gross_emissions} = \sum(\text{activity_area_i} \times \text{emission_factor_i}) + \text{degradation_emissions}$. This form is conceptual. The real MRVS includes categories expressed in area, timber volume, road length and other units, each requiring a compatible factor. Analysts must preserve the GFC's stated measurement unit and method version rather than insert all observations into an area-only spreadsheet. [12]

The conceptual credited-outcome calculation is $\text{gross_performance_relative_to_approved_reference} - \text{applicable_deductions}$. The value and composition of the reference depend on the selected TREES pathway and approved HFLD rules. Deductions may reflect uncertainty, leakage, risk buffering or other standard-specific requirements. A report should not assert that the number of credits equals the country's

annual absolute forest-emissions savings without reproducing the full approved calculation and baseline. The ICVCM's 2026 HFLD remedial-action decision makes transparency over credible future deforestation pressure a distinct due-diligence priority. [9][13]

C.1 Reproducibility tests

Test	Required input	Expected review output
Land-class consistency	Frozen boundary map and land definitions	No double-counted polygons; documented exceptions
Imagery coverage	Sensor dates, cloud masks and resolution	Coverage assessment and gaps with response plan
Change classification	Versioned interpretation rules and training set	Repeatable classification and error sampling
Driver attribution	Permit layers, ancillary imagery and field records	Distinct observed event and confirmed cause
Emission-factor integrity	Factor source, applicability and units	Correct multiplication and uncertainty note
Independent accuracy	Statistical sampling frame and reference observations	Confidence interval with matching population
Method-version lock	Approved TREES text and verification period	Reproduced credit calculation for selected vintage
Reversal protection	Buffer rules, forest disturbance data and registry	Correct adjustment under applicable standard
International authorization	Letter, serial range and permitted use	No unsupported authorized-unit claim
Temporal consistency	Vintage dates, issue date and transfer date	No mixing of measurement and commercial periods

When testing high-forest, low-deforestation crediting, reviewers should identify the counterfactual drivers the methodology includes and ask how each is independently evidenced. A road concession, commodity-price change or expansion plan may indicate plausible future forest pressure, but it does not establish the probability, area or timing of conversion without an explicit model. Sensitivity should test lower and higher credible loss-risk assumptions, alternate time windows and data-availability limits. The conclusion should be stated in units that match the methodology, with uncertainty intervals where defensible.

The physical inventory and carbon-credit accounts need a documented bridge but should remain distinct datasets. A national inventory may report gross sector emissions and removals, while a crediting programme computes eligible outcomes under additional rules. A corresponding adjustment then changes the international claim allocation, not the underlying satellite image. By preserving these separations, policymakers avoid accidental inflation of both national achievement statements and buyer claims. [12][21]

Appendix D. Village participation, benefit-sharing and grievance templates

A village-level evidence package should be useful to the community itself before it serves national reporting or international certification. Every participating village should have access to its approved plan, applicable allocation rule, received amount, open procurement commitments, completed investments, current service indicators and its options for requesting a correction. The content should be available in the language and format the village chooses where practicable. Sensitive household data, community-held ecological knowledge and disputed customary-use boundaries should not be made public without the appropriate local process.

D.1 Meeting and participation record

Field	Minimum information	Review question
Meeting identification	Village, date, venue, convening authority	Was adequate notice given?
Participation	Total attendees, relevant groups and selected language support	Were different groups able to participate?
Material presented	Programme description, expected benefit, restrictions, future obligations	Did residents receive information before the decision?
Questions and objections	Recorded concerns and written responses	Were contrary views represented accurately?
Decision authority	Applicable legal rule and documented resolution	Was the decision made by an authorised process?
Project selection	Alternatives, costs, operating demands and reasons	Did the community choose its own priorities?
Financial responsibility	Named signatories, procurement and audit arrangements	Are duties clear and independently checkable?
Future review	Date, contact details, amendment process and grievance route	Is ongoing participation meaningful?

A single template cannot settle a legal dispute over customary ownership or replace requirements of the Amerindian Act and other relevant law. The objective is to document the process actually followed and surface material disagreement before irrevocable financial decisions occur. Where consent standards apply, an independent reviewer should examine the underlying legal obligations and the relevant group's own governance rather than infer informed consent from attendance alone. ART's publicly available 2023 complaint history demonstrates why process scope and appeal rules must be transparent to all parties. [8][18][19]

D.2 Standard village financial statement

The opening section states the reporting period, revenue-allocation basis and total transfer confirmed by bank advice. The next section reports approved projects, cash expenditure and legally committed unpaid bills, with the original currency preserved. The third section shows physical asset status and annual operating needs. The fourth identifies procurement exceptions, complaints and remedial work. The final section presents the next community review date and contact channel. Where a project serves more than one village, the report should avoid attributing its full asset value separately to every participating settlement.

A working template should use these columns: project ID; village plan reference; approved purpose; original budget; revised budget and reason; contracted supplier; amount paid; physical completion; acceptance date; service users; operating custodian; maintenance reserve; reported complaints; independently verified findings. A project that is 100% paid but not operational requires a different flag from a project that is only half built or a fully operational project with incomplete documentary filing. These differences should be visible rather than hidden by a universal 'project implemented' label.

Community oversight requires understandable feedback channels. A quarterly presentation should provide a short plain-language summary and the underlying records for people seeking more detail. The village should be able to challenge an incorrect transfer entry or a disputed project outcome through an identified national or local process. The national dashboard should mark the published figure 'community review pending' when a material correction is under examination. This protects residents and avoids putting inaccurate information into external investor presentations.

D.3 Grievance intake and escalation

Every grievance record should include a unique ID, date received, chosen language, complainant's preferred contact method, confidential or public classification, alleged event, affected village or project, requested remedy, relevant jurisdiction, initial risk level, interim protection, decision maker, independent review option and closure evidence. The public register should report aggregate counts and anonymised categories. It should not expose a person's identity or sensitive land information merely to demonstrate transparency.

Different allegations need different decision pathways. A missing village transfer belongs first in financial reconciliation, subject to an accessible appeal. A disputed consultation process belongs in the competent programme and legal review route. A land-title claim requires the legally responsible authority and applicable judicial procedures. An ART verification complaint follows the ART rules, while the purchase and use of a specific carbon unit may raise separate issues for a buyer or registry. Referring a case between institutions should never erase the initial filing date or restart complaint time limits without the complainant being informed.

An independent annual assessment should sample closed and open cases, including those withdrawn or rejected, and test whether affected people understood the reasons and any available review. The review should distinguish substantive rejection, lack of jurisdiction, procedural dismissal and successful remedy. It should also record any unresolved disagreement about the fairness or accessibility of the process without declaring the dispute settled beyond the authority of the institution involved. [8][18][19]

Appendix E. Credit-buyer due diligence and claims protocol

A purchaser of Guyana's forest credits should ask for an assurance file for the precise serialized units being acquired. General national achievements, an ART programme-level description or an airline-eligibility announcement are not substitutes for a unit-level record. The documentation should identify the vintage, approved methodology, issuance date, original owner, transfer history, current account holder, registry restrictions, host authorization for intended use and any final retirement or cancellation requirement. [11][13][21]

E.1 Pre-purchase evidence checklist

Evidence requested	Purpose	Proposed red flag requiring resolution
Registry export and serial numbers	Establish existence and current unit status	Serial not found or already retired
Monitoring and verification reports	Understand the quantified environmental activity	Unexplained methodological revision
Applicable TREES standard and HFLD calculation	Assess the crediting level and deductions	Baseline inputs not reproducible
Buffer and reversal conditions	Understand durability and replacement response	No clear application of relevant rule
Public safeguards and complaints record	Assess process and unresolved concerns	Material unresolved case omitted from disclosure
Host-country authorization	Confirm intended cross-border claim is permitted	Authorization absent or mismatched to use
ICAO eligibility, if relevant	Match unit vintage to compliance period	Programme eligible but unit excluded
CCP status, if claimed	Avoid unsupported integrity-label advertising	Method category not approved as claimed
Transaction and contract authority	Confirm ownership and right to sell	Duplicate reservation or unsupported authority
Cancellation and claim instructions	Prevent resale and double use	No agreed retirement party or purpose

Marketing statements should be tied to documentary evidence. An airline that purchases an eligible unit still needs the applicable cancellation and reporting process. A company making a contribution claim should not imply that Guyana made a corresponding adjustment unless a valid authorization and relevant accounting record support that statement. A public claim should not combine an old forest vintage with a new corporate emissions year in a way that conceals either period. The buyer must also comply with the rules governing its own jurisdiction and emissions-reporting framework. [11][21]

The contractual claims schedule should specify permitted wording, restricted claims, evidence to retain, correction procedures if eligibility changes and an escalation process if either party becomes aware of a material error. Buyer communications often outlive the initial transaction, so documentary retention must continue through the relevant reporting and regulatory challenge periods. A later change to a methodology's integrity label should prompt a review of affected claims rather than an automatic assumption that every historic use was unlawful or fully validated.

E.2 Specific 2026 status distinctions

As of the research cut-off, ICAO's April 2026 summary includes the ART programme for first-phase and later listed eligible periods with detailed exclusions and host-country requirements. ART's March 2026 newsletter says Guyana's 2023 credits issued in February 2026 meet requirements for CORSIA-eligible labelling. The ICVCM's May 2026 decision states that ART TREES v2.0 HFLD crediting level requires remedial actions before CCP category approval. A compliance claim should therefore cite ICAO and the exact serial eligibility; a claim to a CCP integrity label requires the relevant methodology/category approval and issuance applicability; and a generic ART registration statement must not be treated as either one. [3][9][11]

A buyer's scientific diligence extends beyond these labels. Request the relevant forest-change and emissions reports, the counterfactual crediting-level rationale, leakage and reversal treatments, social-safeguard evidence and any known corrective actions. Test whether the purchase supports a defined climate strategy with disclosed gross-emissions reductions. High-quality disclosure should allow an independent reader to understand both the mitigation outcome funded in Guyana and the emissions that remain in the buyer's operations or value chain.

Appendix F. Implementation calendar and reporting glossary

The proposed timetable below is illustrative. It assumes the responsible authorities choose to establish a cross-agency transparency programme and that no new statutory authority is created without the required process. The sequence places documentary reconciliation before new public claims. A verified, limited dataset released early has greater evidentiary value than a comprehensive dashboard containing unreconciled figures.

Period from adoption	Technical and financial deliverable	Community and governance deliverable	External assurance output
First 30 days	Name ledger owners; freeze current source files; agree glossary	Publish consultation and data-access plan	Independent scoping memo
Days 31-90	Reconcile existing issuances, transfers and dated receipts	Pilot village statement and accessible correction route	Exception log and priority sampling plan
Months 4-6	Release first six-ledger dashboard; document authorization fields	Pilot service checks and grievances reporting	Limited independent testing of published fields
Months 7-9	Complete next MRVS-to-credit reconciliation and financial variance review	Expand field checks and community feedback	Review of environmental and financial exception closure
Months 10-12	Publish annual integrated forest-finance report and contract-sensitivity update	Village outcomes and safeguards assessment	Distinct technical, financial and social assurance summaries
Year 2 onward	Annual versioned datasets and rule-change response	Regular village-led corrections and service reviews	Periodic rotating deep-dive audits

The most important early milestone is an agreed data dictionary. Without one, financial, forestry and international-market institutions may report different values using identical words. Each field needs a precise definition, source owner, extraction schedule, unit, temporal boundary, confidentiality class and responsible reviewer. Dashboards should refuse to aggregate incompatible fields and should flag unavailable records rather than turn missing data into implied zero.

F.1 Terms used in this study

Additionality: The extent to which a credited outcome is beyond an applicable baseline or reference-level expectation under the governing standard. In HFLD systems the counterfactual and incentives for maintaining forest cover are particularly important to examine. **Authorization:** A host country's formal permission for specified international use of mitigation outcomes under relevant Article 6 rules. **Buffer:** A mechanism or reserve used under certain crediting standards to manage specified reversal risks. **Carbon credit:** A serialized unit representing one tonne of carbon dioxide equivalent quantified under a particular standard and method. [13][21]

CORSIA: ICAO's Carbon Offsetting and Reduction Scheme for International Aviation. Its eligible-units document sets relevant programme and unit conditions. **Corresponding adjustment:** An accounting adjustment intended to prevent the same internationally transferred mitigation outcome from being claimed toward incompatible international targets. **CCP label:** A Core Carbon Principles designation under the ICVCM assessment process; programme eligibility and methodological category approval are separate steps. **Crediting period:** The

defined period in which eligible performance is evaluated. **Deforestation:** Conversion from forest to another land use under the applicable forest definition. **Degradation:** Loss of forest carbon or function without necessarily crossing the definition into deforested land. [9][11][12][21]

HFLD: High forest cover and low historical deforestation, a category requiring carefully documented reference-level rules. **Issuance:** Formal creation of approved credits on a registry. **Leakage:** A shift of emissions-generating activities outside the accounting area as a result of the credited intervention. **MRVS:** Monitoring, reporting and verification system used to generate and review national forest-change and emissions evidence. **NDC:** Nationally determined contribution under the Paris Agreement. **Retirement:** Permanent removal of a serialized credit from circulation for an identified use. **Reversal:** A later loss of an underlying carbon stock or previously credited benefit under the applicable standard. **Vintage:** The period when the credited environmental performance occurred, which may differ from the issue or payment date. [12][13][21]

F.2 Editorial and audit limitations

This study uses public material available by 25 September 2026, including official programme statements, registry-related announcements, independent MRVS reporting, international standard-setting decisions and public stakeholder complaints. The author has not obtained the complete executed Hess agreement, direct access to every live ART registry serial entry, source bank confirmations for every reported receipt, a complete audited national village-expenditure database or independent interviews with a representative sample of all affected Indigenous communities. Therefore the report makes no claim to having independently audited these unavailable populations. Proposed controls and hypothetical scenario values are clearly labelled analytical material.

Several dates require careful reading. The GFC's 2023 monitoring period produced a report published in August 2024. The first 2016-2020 credits were issued in December 2022. The March 2026 ART communication describes an issuance for the 2023 vintage. The LCDS dashboard's March 2026 payment is a financial receipt. The May 2026 ICVCM announcement concerns methodology assessment. Moving any one of these to another year would materially distort the chronology. Current registry status and any new decisions after the research cut-off require refreshed primary-source checks before a unit is sold or used in a regulated filing.

Appendix G. Source register

The following numbered sources correspond to the bracketed citations in the body. An organisational publication establishes what its issuing body states or records within its competence. It does not substitute for an independent check of another institution's records.

For contested safeguards questions, this bibliography deliberately includes the underlying complaint, the programme's disposition and an external rights-based critique alongside the government's account.

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