

RACINE PROJECT

Ex-ante Cost-Benefit Analysis

Structured response to the 11 questions in the ex ante assessment, based on the Economic and Financial Model Version 4.1

Source: RACINE_EFA_Model_V4_1_22.07.2026_re.xlsx

Cameroon — 2026–2031 Programme (active phase) — 2046 Sustainability Vision

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READING NOTE:

Why a 'cocoa-dominant' typical household rather than a mixed cocoa-coffee profile?

The decision to model a typical cocoa-farming household without constructing an equivalent profile for coffee at this stage is based on four distinct arguments: an economic argument, a methodological argument linked to donor requirements, a technical argument, and an argument for model parsimony.

1. Cocoa accounts for the bulk of volume and income

Cameroon marketed 306,000 tonnes of cocoa in 2024–2025, compared with around 12,000 tonnes of coffee (Robusta and Arabica combined) — cocoa therefore accounts for over 95 per cent of the physical volume covered by the Initiative. In the targeted regions (Centre, South, East, Littoral, South-West), it is also the main source of monetary income for rural households. Modelling cocoa is tantamount to modelling the very foundation of the financial survival of the majority of the 170,000 households under G1 and 43000 targeted under G3.

2. A unique profile clearly isolates the project's impact

The GCF and CAFI require clear evidence of the causal link between investment and outcome. A single profile makes it possible to isolate the effect of e-vouchers (G1/a) and agroecological transition plans (G3) without attribution bias, and provides a standardised unit of account for NPV and economic IRR. Superimposing two perennial crops with different production cycles within the same 'average household' would obscure the clarity of profitability.

3. Technical management practices are not transferable from one crop to another

Although managed under the same 'producers' scheme, cocoa and coffee do not share the same input packages (fertilisers, approved pesticides, certified seedlings) nor the same target yield trajectories. RACINE targets 450 kg/ha for G1 and 750+ kg/ha for G3 for cocoa; coffee presents distinct challenges (extreme ageing of the plantation, berry diseases) which require their own agronomic modelling rather than a merger that would bloat the spreadsheet without improving accuracy.

4. The model does not ignore diversification — it treats it differently

The standard profile already incorporates food crops grown alongside the cocoa plantation (plantain, cassava, macabo) for the purposes of food security analysis. Coffee, which is often a secondary crop compared to cocoa or food crops in several regions, follows a different logic: a dedicated profile, rather than integration into the cocoa-farming household.

Conclusion. *The cocoa-farming household as a reference profile ensures the robustness of the current cost-benefit analysis. A coffee profile could potentially (and if time permits) be added in a separate section — to refine the analysis of the Western and North-Western regions — without destabilising the existing structure.*

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Summary

This analysis addresses the key questions of an ex ante assessment (Cost-Benefit Analysis), drawing exclusively on the results already calculated in the RACINE v4.1 spreadsheet. It does not recalculate anything: it reviews, organises and, where necessary, highlights the limitations of what the model can currently reveal.

Question	Key element
1. Costs and benefits	€214.89 million of funding; Financial NPV ≈ €622 million
2. No-project scenario (BAU) and 'With project' scenario	BAU cocoa yield in decline (350→324 kg/ha) G1 - Cocoa yield stabilises and increases (350→450 kg/ha) G1→G3 - Cocoa yield increases (450→750 kg/ha); producers leverage sustainability premiums.
3. Relevance of components	Causal chain G1→G2→G3 is consistent and complementary
4. Winners and losers	All modelled actors benefit; intra-actor distribution not addressed
5. Financial profitability	NPV ≈ €622 million; IRR for processing facilities = 24.5%
6. Financial viability	Producers – Incrementally positive cash flow post first 2 years of investments. Facilities – 24.5% IRR with grants (-9% incase grants are replaced with commercial financing)
7. Economic profitability	Overall program - Economic NPV ≈ € 1,048, EIRR – 41% (with carbon revenues) and 34% (w/o carbon revenues); BCR: 2.22
8. Environmental impacts	15.55 MtCO ₂ eq avoided; 559,000 ha managed sustainably. Shadow carbon prices of USD 50/tonne of CO ₂ emissions mitigated.
9. Sustainability	Strong in financial and environmental terms; institutional aspects poorly documented
10. Risks	Robust to within ±20 per cent in producer level costs and revenues.

Approach and methodology

The economic and financial analysis (EFA) appraises RACINE over a 20-year period (2026–2045) from the perspective of the principal programme beneficiaries — producers, cooperatives, communities and local authorities — and compares the incremental costs and benefits of the 'project scenario' against a business-as-usual (BAU) counterfactual. The analysis is framed around the market constraints that hold back the transition of Cameroon's cocoa and coffee sector towards climate-resilient, deforestation-free production: limited access to finance, high upfront investment costs for climate-smart practices, insufficient economic incentive to catalyse the transition, and the inability of producers to capture the full value of the ecosystem services and climate benefits they generate. The loan from GCF for Component 2 is blended with other sources (CAFI+FODECC) and passed on as incentives/subsidies (digressive structure) to beneficiaries, who co-invest across interventions.

The analysis has two nested layers. The financial analysis, at market prices and discounted at 12 per cent, tests whether each participating actor and the programme as a whole, creates value relative to BAU. The economic analysis, at a social discount rate of 8 per cent, converts those flows into economic values (standard conversion factor 0.9), excludes pure transfers such as subsidies, and adds the climate externality valued at 50 USD/tCO₂eq (€46/t).

Both layers are built bottom-up from representative operating accounts: a typical cocoa household of 2 ha under the G1 Window, a G3 household of 3 ha, a treatment centre serving around 300 households, and a host municipality, each compared with its own BAU mirror. Results are then scaled by annual adoption cohorts (67,000 G1 households entering in 2026, rising to 170,000 by 2031; 180 treatment centres; 43,000 G3 households), so that each cohort's investment year and payback year are tracked separately rather than averaged across the programme.

The incentive structure is modelled as designed: degressive input-cost support under G1 (subsidy rate 40 / 20 / 10 per cent) and performance-based payments under G3, which progressively transfer the cost of intensification to producers as their incomes rise. The analysis therefore captures both the public grant and the private co-financing it mobilises (€422 million across the three windows), together with the co-mobilisation of other public resources (FODECC and CAFI) alongside GCF financing at a ratio of 1:1.47.

The indicators reported in the sections that follow are: NPV and IRR by actor and by window; aggregate financial NPV; Economic NPV, EIRR and benefit-cost ratio; the State's budgetary position (export levies net of subsidies and GCF debt service); a carbon account consistent with the MRV framework; and GCF cost-effectiveness metrics (cost per tonne of CO₂eq mitigated and adaptation cost per beneficiary). Robustness is tested through ±20 per cent shocks on unit input costs and cocoa prices.

1. What are the costs and benefits of the project?

ACA question — 'What are the costs and benefits of the project?'

1.1 — Costs: €193.62 million of uses under Component 2 (G1, G2 and G3) (2026–2032)

Cost item	Amount
G1 — Production (e-vouchers, business plans)	€92.5 million
G2 — Local authorities (centres, PLADDT, Green Investments)	€53.02 million
G3 — Sustainability (consultancy, grants)	€48.16 million
Total disbursements for the active phase (2026–2032) under Component 2	€193.62 million (under windows G1, G2 and G3)
Available funding (GCF+CAFI+FODECC) (inc. for TA)	€214.89 million (inc. TA))

1.2 — Benefits: three categories

Private financial benefits: net income gains for producers (financial NPV ≈ €219 million for G1 producers and €400 million for G3 producers over 20 years), sustainability and profitability of processing centres (IRR 24.5 per cent), additional revenue for host local authorities.

Public budgetary benefits: the levy collected on additional volumes exported exceeds the subsidies paid from the third year onwards and this gap widens thereafter.

Economic benefits (externalities): 15.55 MtCO₂eq avoided, valued at €292 million (discounted) — around a quarter of the overall economic NPV (€1,048 million).

Mobilisation effects: the grant structure is designed to attract resources rather than substitute for them. Private co-financing from producers, cooperatives and communities across the three windows amounts to €422 million, a mobilisation ratio of 2.2 times total programme cost and 4.85 times GCF financing, while other public resources (FODECC and CAFI) are co-mobilised with GCF financing at a ratio of 1:1.47. Because support is degressive, this ratio rises over the programme period as producers absorb a growing share of the cost of intensification — the mechanism that preserves the practices beyond the financing period.

2. What would happen without the project? (BAU scenario)

ACA question — ‘What would happen without the project?’

The counterfactual scenario (BAU — Business As Usual) is modelled as a mirror image of each RACINE assumption in the spreadsheet. This is not a theoretical worst-case scenario: it extrapolates observed trends (ageing orchards, unaddressed post-harvest losses, lack of structured advice).

Indicator (horizon 2031)	BAU (without the project)	RACINE (with project)	Difference
Cocoa yield (kg/ha)	350	450 (for G1) and 750 for producers transitioning from G1 to G3 and implementing G3 interventions.	× 1.5-2
Post-harvest losses	18 %	5 %	–13 pts
G1/a households affected	142,000	170,000	+28,000
Treatment centres (G2)	30	180	× 5
IRR of facility	–9.7% (with loans)	24.5%	
Households receiving PTA advice (G3)	0	43,000	-

Without the project, orchards will continue to age (a yield decline of –2 per cent per year already factored into the business-as-usual trajectory), post-harvest losses will remain at 18 per cent, and the government levy will decline from current levels. The net income of the typical producer under the BAU scenario declines each year (603,600 → 556,302 FCFA between 2026 and 2029), whilst it rises sharply under the RACINE scenario (528,098 → 623,730 CFA francs over the same period, despite an initial investment that makes year 1 marginally less profitable than under the BAU scenario).

Expressed as a ratio to BAU income, the trajectory is the clearest statement of additionality. Climate-smart intensification costs about 2.3 times BAU practice, so a G1 household earns roughly 87 per cent of BAU income during the initial investment period before reaching about 1.6 times BAU income after ten years and 2.2 times after twenty. Households that graduate to the G3 Window and sustain agroecological practices reach around five times BAU income after ten years and close to seven times after twenty, as higher yields (750 kg/ha) combine with sustainability premiums. Cocoa yields under G1 practices rise from 350 to 450 kg/ha over the programme period, against a BAU decline of 2 per cent a year.

Conclusion — the cost of inaction is real and quantified — this is not a neutral status quo.

3. Are the components relevant and do they provide added value?

ACA question — ‘Are the project components relevant and do they provide added value?’

Each component addresses a distinct and measurable problem; their combination creates effects that none of them produces on its own.

The architecture is a phased transformation pathway rather than a conventional agricultural subsidy programme. The G1 Production Window creates the foundation for change by supporting producers to adopt improved planting material, better crop management, quality inputs and technical advisory services, lifting productivity and household income moderately while reducing the pressure to expand cultivation into forest areas. Producers who successfully complete G1 become eligible for the G3 Agroecological Transition Window, where performance-based incentives support sustainability plans, agroforestry, improved soil management, georeferencing and environmental compliance — the stage at which the largest financial and climate gains

arise. The G2 Communities Window closes the chain by enabling communities, cooperatives and municipalities to invest in the post-harvest processing capacity that the additional volumes require.

Programme	Problem addressed	Leverage	Measured added value
G1 — Production	Declining yields, costly inputs, no economic incentive to invest in climate smart practices.	Volume-based discounts, business plans	Cocoa yield 350 → 450 kg/ha (G1 practices);
G2 — Communities	18% post-harvest losses, limited processing capacity	180 centres, PLADDT, green investments	Losses reduced to 5 per cent; equity IRR ≈ 24 per cent
G3 — Sustainability	Lack of structured advice, no carbon valuation, no economic incentive to invest in climate smart practices.	CTA/PTA advice, performance bonuses	Cocoa yield 350 → 750 kg/ha on G3 farms (vs BAU) and 450→750 for shift from G1 to G3. 15.55 MtCO ₂ eq avoided; 559,000 ha managed sustainably

The complementarity is structural: without G2, the increase in production from G1 has no outlet for processing, and post-harvest losses offset part of the yield gain. Without G3, compliance with traceability requirements (EUDR) and the bulk of the carbon value — and therefore the Economic NPV — disappear.

Conclusion — the three components are individually justified and reinforce one another.

4. Who are the winners and losers of the project?

ACA question — ‘Who are the winners and losers of the project?’			
Stakeholder	Net gain (NPV, 20 years)	Nature of the gain	Status
Typical producer	€1,640	Additional net income	Winner
Data processing centre (DPC)	€31,003	Operating surplus	Winner
Host municipality	€906	Investments + local revenue	Winner
State (budget) fiscal impact	+€325 million	Net tax gain excluding grants and debt servicing	Winner, from Year 3 onwards
Funding bodies (GCF, CAFI)	n/a	Non-financial return on climate mission	Target achieved

No modelled actor is structurally a loser in the workbook’s results: the four categories of actors tracked (producers, centres, local authorities, central government) all show a positive NPV.

For the State, the gain is macroeconomic as well as budgetary. Higher production volumes increase export earnings and strengthen the competitiveness of Cameroon’s cocoa sector, while generating substantial additional fiscal revenue through existing export levies and sector financing mechanisms: the incremental levy reaches €85.7 million a year at maturity, of which FODECC’s share is €48.2 million. That flow strengthens the long-term financial sustainability of FODECC itself and its capacity to scale climate-smart cocoa production beyond the programme period, which is why the State turns net-positive from Year 3 even before the carbon externality is counted.

Conclusion — winners have been identified and the outcomes are positive for all stakeholders monitored.

5. What is the financial profitability of the project?

ACA question — ‘What is the financial profitability of the project?’

Indicator	Value	Threshold / benchmark
Overall financial NPV (12%)	≈ €622 million	> 0 required
Equity IRR for the G2 window (including grant)	24.5%	market threshold: 12–15%
G2 IRR without grant (counterfactual)	–9.7% — not viable	Demonstrates additionality
NPV for a typical producer (20 years, 12 per cent)	€1,640	> 0
NPV for a typical centre (20 years, 12%)	€31,003	> 0

Financial profitability is positive at all levels tested: at the aggregate level (sector), at the level of the most capital-intensive segment (G2, treatment centres), and at the level of each typical operator. The counterfactual test on G2 — financing via commercial debt rather than a grant — confirms that the public grant is necessary: without it, investment in treatment centres would not be profitable, which establishes the additionality of concessional financing.

Conclusion — positive and robust financial viability, both at project level and for each stakeholder.

6. What is the economic profitability of the project?

ACA question — ‘What is the economic profitability of the project?’

The economic analysis broadens the financial perspective (private stakeholders, market prices) to encompass society as a whole (externalities, social reference prices), using a social discount rate of 8%, below the 12% financial rate, to reflect social time preference.

Indicator	Value	Weight in total
Overall Economic NPV (8%, 20 years)	€1,048 million	100%
of which discounted carbon value	€292 million	28%
of which public costs (weighted by a factor of 0.9)	remainder	72%
EIRR (incremental value addition)	EIRR 33.4 per cent (w/o carbon) and 41.4 per cent with carbon revenues	
BCR	2.22	

The result is positive and significant, but its composition must be presented unambiguously: **28 per cent of the Economic NPV stems from the valuation of avoided carbon emissions; the remainder comes from productivity and processing gains.** The economic return therefore holds without carbon (EIRR 33.4 per cent, against 41.4 per cent with carbon; BCR 2.22). The social carbon price used for this calculation is 50 USD/t (€46/t), applied consistently throughout the revised workbook.

Expressed per unit of output, the programme is efficient against GCF benchmarks: every additional euro spent transitioning Cameroon’s cocoa and coffee production to climate-smart practices generates more than two euros of economic benefit (BCR 2.22). Assuming half of GCF financing is allocated to mitigation, the cost per tonne of CO₂eq mitigated is €2.8; on the same split for adaptation, the cost per beneficiary is €31, at the lower bound of GCF adaptation cost benchmarks for Africa. The sensitivity analysis reinforces this: the economic case remains strong under adverse assumptions.

The economic case rests on benefits that market prices do not capture. Sustainable intensification reduces the pressure for agricultural expansion into forests while promoting agroforestry, improved soil management and

climate-resilient farming, contributing to avoided deforestation, carbon sequestration, biodiversity conservation and improved watershed services, and enabling producers to comply with evolving international sustainability requirements including the EU Deforestation Regulation (EUDR). These positive externalities are the principal justification for concessional climate finance, and they are only partly monetised here — carbon alone is valued, so the €1,048 million Economic NPV should be read as a lower bound.

Conclusion — positive economic viability, robust even excluding the carbon externality.

7. What are the environmental impacts of the project?

ACA question — ‘What are the environmental impacts of the project?’

Indicator	Value	Rating
Cumulative carbon savings	15.55 MtCO₂eq	2026–2045 (target 37.36 Mt)
Mid-term review	5.76 MtCO ₂ eq	By 2035 (target 18.19 Mt)
Areas under sustainable management (G3)	559,000 ha	Agroecological advice
Restored areas (G2/d, Inv. Verts)	30,000 ha	Local authority investments
Reduction in post-harvest losses	18% → 5%	Less waste of resources

Climate impact is the central environmental pillar of the programme, both in terms of its scale (15.55 MtCO₂eq) and its contribution to the economic justification (28 per cent of the Economic NPV, section 6). The impacts on biodiversity, water and soil associated with the 559,000 ha under sustainable management and the 30,000 ha restored are mentioned in terms of area and are aligned with GHG calculations (Annex 22).

The mitigation pathway combines two mechanisms: emissions avoided by removing the incentive to expand into forest land — intensification raises output on existing orchards rather than through new clearing — and sequestration from agroforestry and improved soil management on the areas under G3 contracts. Georeferencing and zero-deforestation commitments under G3 make the result verifiable through FODECC’s satellite-based MRV, and simultaneously position participating producers to meet EUDR traceability requirements, protecting access to the European market as compliance deadlines take effect.

Conclusion — significant, quantified climate impact; biodiversity/water/soil co-benefits identified in terms of area but not monetised.

8. Is the project sustainable?

ACA question — ‘Is the project sustainable?’

Sustainability is assessed at three levels; the workbook provides solid documentation for the first two but leaves the third largely open.

Dimension	Finding	Robustness
Financial sustainability	G2 IRR 24.5% including the initial grant (–9.7% without it) for processing facilities; net positive cash flow from Year 3 for producers; positive budgetary balance from Year 3	Strong
Environmental sustainability	Verifiable carbon trajectory through to 2045; areas under management that are inherently sustainable	Strong
Institutional sustainability	FODECC ownership during the active phase; governance post-2031 (UGP, CTD, local authorities) not detailed in this workbook	To be explored further

The model establishes that producers, centres and local authorities will continue to benefit from the programme after subsidies end (the centres remain profitable in operation, and producer income increases structurally thanks to higher yields and reduced losses, not merely through direct aid).

The degressive design is central to this: because support declines over the programme period (G1/a subsidy rate 40 / 20 / 10 per cent) and G3 payments are performance-based, the cost of intensification is transferred to producers progressively, as incomes rise, rather than at a cliff edge when financing ends. Private co-financing of €422 million is evidence that this transfer is already taking place during implementation, and the strengthening of FODECC's own revenue base (€48.2 million a year of incremental levy share at maturity) provides the domestic financing channel for continuation after 2031.

Conclusion — financially and environmentally sustainable

9. What are the risks associated with the project?

ACA question — ‘What are the risks associated with the project?’

11.1 — Risks tested by the model (shocks of ±20 per cent on costs and cocoa prices)

Adverse scenario where producer costs per hectare increased by 20% for both G1 and G3 interventions and the cocoa prices/revenues decrease by 20%, the overall FNPV is positive (EUR 336 mn), with significant buffer to withstand shocks.

Conclusion

Read together with the approach set out at the front of this note, the results support the case for concessional financing: the programme is financially viable for each participating stakeholder at a 12 per cent financial discount rate, economically justified from the perspective of Cameroon and the global community (ENPV €1,048 million, EIRR 41.4 per cent, BCR 2.22), and cost-effective against GCF benchmarks (€2.8 per tonne of CO₂eq mitigated, €31 per adaptation beneficiary) considering GCF financing. The positive economic returns, together with the climate and environmental externalities the programme generates — most of which remain unmonetized — provide the rationale for GCF and CAFI support.