SARGASSUM

An 8,850 km belt of toxic algae

An 8,850 km belt of toxic algae

DIEGO

45-YEAR-OLD FISHERMAN IN DOMINICAN REPUBLIC

Sargassum **chokes his nets**

Sargassum **poisons his reef**

Sargassum **makes his children sick**

The Sargassum Crisis

14 years of cost with no infrastructure to show for it

$3.5B

Annual **economic damage**
Caribbean-wide

$120M

Annual **reactive cleanup**
generating
$0 ROI

11.6%

GDP contraction during
hyper-bloom events

24%

of monitored coastal sites
exceed WHO H_2S safety thresholds

WHY NO ONE HAS SOLVED THIS

Three barriers making the problem structurally unfundable

Free-Rider Trap

No hotel funds offshore collection that benefits competitors.

Only a sovereign mechanism breaks it.

Feedstock Volatility

Supply varies 13:1 between years.

No bank finances a factory whose input might vanish.

Credit Ceiling

DR is Ba2. 80% of institutional capital is mandated IG-only.

Without enhancement, it's inaccessible.

Each is self-reinforcing. Fixing one without the others does not work.
We've built an instrument that breaks all three.

WHAT WE ARE BUILDING

A $150M blue bond that turns the crisis into its own cure

PROTECT

Sovereign levy funds offshore interception, unlocks free-rider trap

Collected via IATA like an existing tax code: **Every tourist contributes, revenue flows from Day 1.**

PRODUCE

Cascade biorefinery converts waste to revenue

Converts the seaweed from a $120M/yr cleanup cost **into sellable industrial products – alginate, bio-stimulants, biochar.**

DE-RISK

Credit enhancement unlocks credit ceiling & feedstock volatility

Partial Credit Guarantee (PCG) from the Inter-American Development Bank (IDB) to **lift credit rating, unlocking institutional capital**

Parametric insurance (PSSI) wraps 13:1 feedstock volatility.

Blue Barrier Capital

SARGASSUM RESILIENCE BOND

Size	**$150M**
Tenor	**12 years**
Senior	**$90M, 7%**
Mezzanine	**$37.5M, 4%**
Junior	**$22.5M, 0-3%**

Survives at zero biorefinery revenue.

WHY THE DOMINICAN REPUBLIC

The DR is the only Caribbean state that meets all five conditions required for the SRB simultaneously

TOURISM SCALE
$21B GDP (16–20% of economy), **893,000 direct jobs**, 11M+ arrivals/yr

IMPROVING CREDIT
Ba2/BB
(Moody's 2025 upgrade)
IDB PCG → BBB+

SATELLITE DATA
15 years of USF AFAI coverage – required for PSSI calibration

OPERATIONAL COLLECTION PARTNER
SOS Carbon: 25 LCMs, operational Punta Cana since 2021, 13K+ tonnes removed

INVESTOR TAX INCENTIVES
CONFOTUR: **10-year statutory exemption** (Law 158-01)

TAILWINDS

Declared a regional emergency at the UN Ocean Conf. (Jun 25), approved regulations (Mar 26)

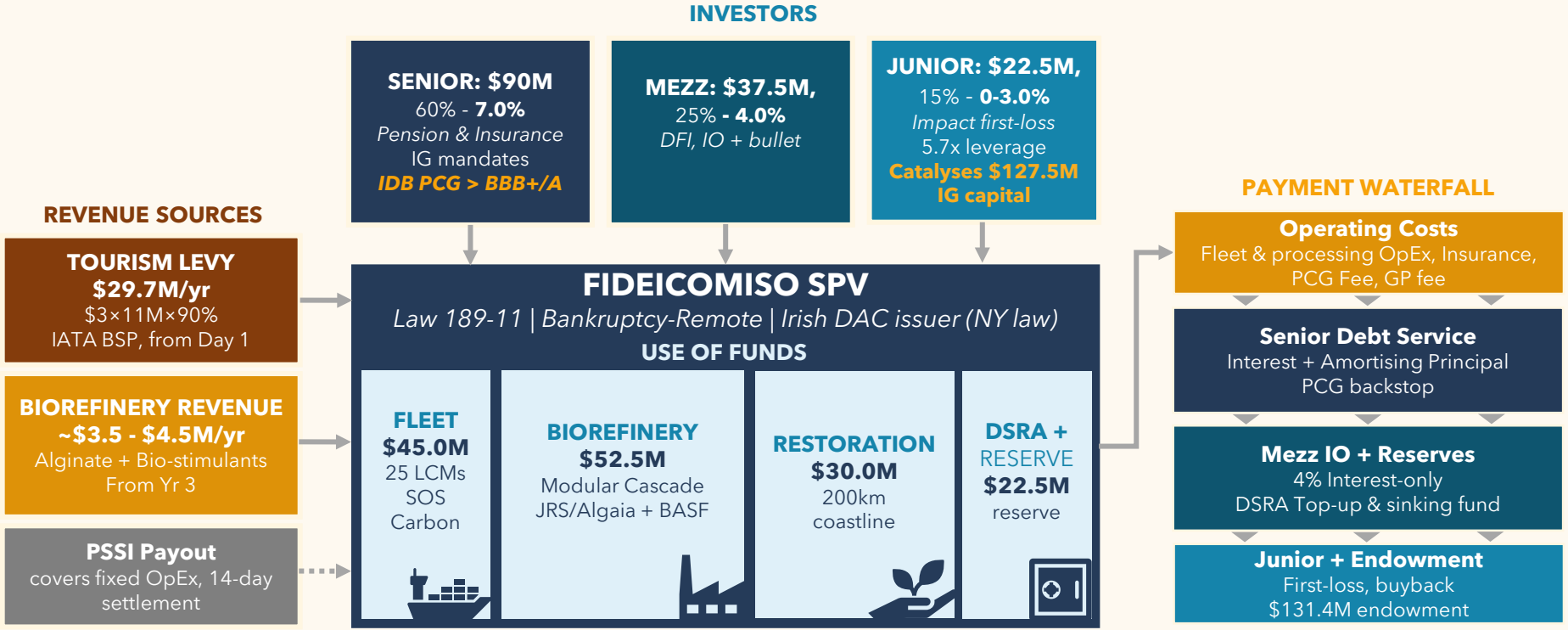
DR–EU Working Group on sarg. valorisation launched Jul 25

Regional execution template already exists - IDB completed Blue Bond credit enhancement in Barb. (2022) and Bah. (2024)

Blue bond structuring compressed from 4 years (Seychelles 2018) to 12–18 months (Bahamas 2024)

THE DEAL

Every dollar tracked, ring-fenced and waterfall-protected: from tourist ticket to investor coupon



SPV: Fideicomiso (Law 189-11) → DAC Issuer (Irish Section 110, NY law) → Bondholders
Notes listed Euronext Dublin GEM.

STAKEHOLDER STRATEGY

Every stakeholder has a reason to participate — and each one strengthens the deal for the rest

STAKEHOLDER	WHY THEY PARTICIPATE	WHAT THIS ENABLES
KEYSTONE **IDB Invest** PCG + Mezz anchor	Already engaged via Sargassum Innovation Quest 4 Caribbean blue PCGs in 3 years Within existing blue economy mandate	**Ba2 > BBB+, opens the deal to 80% of institutional capital**
DR Government Levy + legislation	**$3 levy** that protects 16% of GDP, removes a visible crisis at no fiscal cost	**Funds the deal -** $29.7M/yr sovereign levy flowing from Day 1, same Law 189-11 as RD-Vial ($1.4B)
Operators SOS · JRS · BASF	**SOS Carbon:** 25 LCMs + $5M/yr **contracted revenue;** **JRS/Algaia:** alginate supply at **20% below kelp pricing**	**Execution proof -** 13K+ tonnes removed, 100 fishermen trained
Junior Anchor TNC · GEF · Mirova	**5.7× catalytic leverage** - highest in Caribbean blue finance	**Signals deal quality -** validates the impact thesis for IDB, cushions Senior downside
Senior Pension · Insurance	**7% IG-grade coupon** on sovereign infrastructure - this product does not exist without the PCG	**Participate last -** only after PCG, levy, operators, and Junior are in place

PRE-CLOSE GATES: Binding operator agreement | Arsenic rem. audit at commercial scale | Binding PSSI quote | Levy legislation enacted | IDB PCG committed

RISK ARCHITECTURE

Structured to survive its own worst case

RISK	EXPOSURE	MITIGANT	BOND IMPACT
SOVEREIGN	*Government diverts levy*	**Five-layer sovereign protection.** IDB PCG: irrevocable – no withdrawal precedent in any Caribbean bond.	**Levy is $30M/yr – diversion jeopardises $4.9B IDB relationship**
FEEDSTOCK	*13:1 supply variation*	**Parametric insurance > fixed annuity:** Descartes Underwriting has the only commercial sargassum parametric insurance – we invert the trigger.	**Biorefinery pauses, levy revenue continues, bond unaffected**
FIRST-OF-A-KIND (FOAK) TECH	*No commercial biorefinery*	**Modular build –** bio-stimulants generate revenue from Yr 2 $10.5M contingency + 4-year interest-only grace.	**Even at total failure, levy covers Senior at 1.66×**
CREDIT	*Ba2 excludes 80%*	**IDB PCG elevates to BBB+,** 130bps Bahamas 2024: PCG lifted $200M bond to Aaa.	**80% of IG capital accessible**

ZERO BIOREFINERY – 1.66x
Levy alone covers Senior debt service with +$10.1M/yr positive cashflow: No alginate, no bio-stimulants, no carbon – the bond survives**. The environmental outcome happens regardless.**

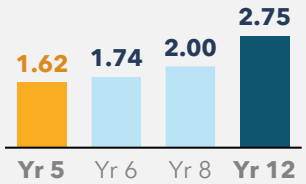
PCG covers scheduled debt service; acceleration waiver per IDB standard terms (Ecuador 2023 precedent).

THE NUMBERS

The deal holds in every scenario except sustained pandemic — and we've designed for that

SCENARIO	LEVY	ARRIVALS	UTILISATION	SENIOR DSCR
BASE	**$3, 90%**	**11M**	**55%**	**1.62x**
BULL	$3	**11.9M**	**70%**	**1.76x**
ZERO BIOREFINERY	$3	11M	**0%**	**1.66x**
BEAR (3 stressors)	$3, **80%**	**9.5M**	**40%**	**1.21x**
COVID (actual 2020)	$3, **19%**	**2.1M** (actual)	55%	**0.18x**

BASE DSCR TRAJECTORY:
YEAR 5 IS THE TROUGH, NOT THE TREND



Senior principal amortises: interest declines $5.5M by maturity
Sinking Fund at Y12 = $172M, covers Mezz bullet 4.6-5.1x, residual for cons. endowment

DOWNSIDE PROTECTION

Bear (1.21x): Cash-positive (+$1.6M/yr). DSRA stays fully funded. Lock-up activates - cash trapped at Senior level.
Levy alone: 1.41x vs Senior debt service.

COVID (0.18x): DSRA bridges ~1 year. IDB PCG backstops Senior. Debt deferral clause activates. DR recovered within 2 years.

All DSCRs at Year 5 (trough). Levy rate ($3) stays constant — no Caribbean tourism levy has ever been legislatively reduced. DSCR Lock-up covenant at 1.50x.

IMPACT – THEORY OF CHANGE

From Diego's crisis to permanent institutional change

PROBLEM	INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES	SYSTEMATIC CHANGE
Diego can't fish $120M/yr destroyed Three market failures with no solution	**$150M SRB** FOAK bond, PSSI, IDB PCG, 5.7× leverage: $22.5M catalytic mobilises $127.5M	**Diego captains an LCM** Biorefinery processes, 200km restoration, levy via IATA	**100K+** wet tonnes/yr intercepted 5K dry tonnes > alginate, bio-stimulants, fucoidan, biochar	**Diego's reef recovers - 200km, 15Kha protected** **30K+ tCO_2e avoided** **850 H_2S poisoning cases eliminated** **250+ direct jobs**	**$131.4M** conservation **endowment & replicable blueprint** **The bond retires, but Diego's livelihood, and the institution does not**

ADDITIONALITY – Remove any lever and the chain breaks:
No levy, no fleet; No PSSI, no bank finances volatility; No PCG, 80% of capital excluded.
The financial architecture is the impact mechanism.

Endowment: SF residual $153.9M − Junior buyback $22.5M = $131.4M. Carbon credits $0 base – biochar removal via Puro.earth in Bull only.

WHAT THIS BECOMES

Each phase de-risks the next - concessionality dissolves as economics are proven

PHASE 1 - CURRENT

DOMINICAN REPUBLIC

$150M: 1 hub, 25 LCMs, 200km coastlines

WHAT THIS PROVES:

- Levy compliance via IATA
- Cascade at $652/dry tonne
- SOS Carbon at 50K+ wet tonnes/yr

PHASE 2 - YEAR 3-7

QUINTANA ROO & BARBADOS

New bond per jurisdiction, standardised biorefinery modules

WHY IT'S EASIER:

- **FOAK premium eliminated**
- Existing tax vehicles (ISH near-100%, BESF)
- SPV template proven
- New operator relationships required per jurisdiction — AlgeaNova operational in Quintana Roo since 2021.

PHASE 3 - YEAR 7+

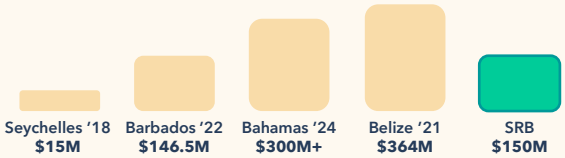
PAN-CARIBBEAN PLATFORM

Multi-country fund, shared parametric insurance

WHAT CHANGES:

- Shared insurance pool across 5–10 states reduces premium per jurisdiction
- $3 levy × 30M+ Caribbean tourists = $90M+
- Long-term aspiration: Phases 1–2 are the executable plan

CARRIBEAN BLUE FINANCE – GROWING 20x IN SIX YEARS



All precedents were debt conversions. We deploy new capital for new infrastructure.

ROAD TO MARKET RETURNS

- Phase 1: catalytic (FOAK + sub-IG)
- Phase 2: reduces the concession (technology proven, credit track record)
- **Phase 3: targets commercial viability - graduation from blended to market-rate is the measure of success.**

Phase 2 vehicles: Mexico ISH (state-level hotel tax, near-100% compliance). Barbados BESF (operational July 2024). AlgeaNova: sargassum collection and processing in Punta Cana since 2021 (fallback operator). Phase 3 arithmetic: $3 × 30M tourists × 90% = $81M+. CCRIF: 23 member states.

We've identified the operators.

We've modelled twelve years of cashflows across five stress scenarios.

We've mapped the legislative pathway and the sovereign precedents.

We've designed the parametric insurance and identified the underwriter.

Diego's livelihood was drowning, now it's the engine that protects a $60 billion economy.

That's what we're building.

MARIA FERNANDA ALAS

CLARE LOO

Blue Barrier Capital

MAHI VIRAGI

SHAYAN ANVAR

Key model inputs – levy at 90% collection efficiency

REVENUE

Source	Mechanism	Annual
Tourism Levy	$3 × 11M arrivals × 90%: IATA BSP, Day 1	**$29.7M**
Alginate	5K dt × 80kg/dt × $8/kg 55% seasonal utilisation	**$1.6M**
Bio-stimulants	Residual biomass > $2/L wholesale BASF, Yr C2	**$1.9M**
Carbon credits	$0 base - Puro.earth biochar $150-177/$tCO_2e$ = Bull only	**$0**
TOTAL	**Levy = 88%, biofuel excluded (TRL 3-4)**	**~$34M**

COSTS & STRUCTURE

Input	Assumption	Annual
Fleet + Processing OpEx	25 vessels: fuel, crew > $100/wet tonne $652/dry tonne, incl. arsenic remediation	**~$4.2M**
PSSI premium	~9% effective Junior tranche absorbs subsidy	**~$350K**
GP mgt fee	1.25% on $150M	**$1.875M**
IDB PCG fee	~130bps on $90M Senior tranche	**$1.17M**
TOTAL OpEx		**~$7.6M**

STRUCTURE & KEY OUTPUTS

Bond tenor	**12 years:** 2yr construction + 10yr ops
IO grace period	**4 years** (Yr 1–4), IO: $6.3M (Sr) + $1.5M (Mezz)
DSCR at trough, Yr5	**1.62x** (28.5M CFADS ÷ $17.6M DS)
DSCR at Yr12 exit	**2.75x**: DS declines to $12.0M
Levy-only DSCR	**1.83x** (zero biorefinery output vs Sr DS)
Lock-up covenant	**1.50x** DSCR: auto cash-trap
DSRA	**$12M** from proceeds, **$15.7M:** 6-month reserve maintenance target (levy top-up)
Sinking fund	**4.6-5.1x** Mezz $37.5M **bullet coverage**
CONFOTUR exemption	10-year statutory (Law 158-01)
Blended IRR	**6.1%**, catalytic structure consequence
Net CFADS (base)	**~$28-33M/yr** (Yr5+) rising with amortization
GP Carry	12.5% of SF residual over 6% hurdle

DR benchmark Feb 2025 6.95% 2037 | Tranche IRRs: Senior 8.3%, Mezz 4.5%, Junior ~0% | Yr 5 DS: $19.05M ($17.55M Sr + $1.5M Mezz IO)

Tranche outcomes by stress scenarios

Scenario	Levy Comp.	Arrivals (M)	Bioref Util.	Bioref Start	Sr DSCR (Yr 5)	SENIOR	MEZZ (BULLET)	JUNIOR Carry	What This Tests	What This Proves
BASE CASE	90%	11.0	55%	Yr 3 (on time)	**1.62×**	Full 7.0% coupon amort. Yr 5–12	Full 4.0% IO SF 4.14×	Accruing Carry above 6% hurdle	**Reference case:** Does the structure work as designed?	All tranches performing, DSRA untouched
ZERO BIOREFINERY	90%	11.0	**0%**	**Never operates**	**1.66×**	Full coupon Levy floor holds	Suspended SF 3.1× Bullet still covered	No carry Par return only	**The survivability proof:** Is this really a tourism infrastructure bond?	Levy alone covers Sr at 1.66× with +$10.1M/yr CFADS, bond survives.
BEAR (4 stresses)	**80%**	**9.5**	**40%**	**Delayed +1yr**	**1.21×**	Full coupon DSRA drawn Cash-positive (+$1.6M)	Suspended SF 2.4×	First-loss absorbs No carry	**Multi-factor stress:** What happens when four things go wrong at once?	Lock-up activates by design, cash-positive even under 4 stressors, DSRA stays funded.
COVID REPLAY (actual 2020)	**19% ($5.7M)**	**2.1 (actual)**	55%	Yr 3	**0.18× (at Yr 5 DS)**	Paid in full DSRA drew $14.5M PCG on standby	Suspended SF preserved No bullet risk	No distributions PCG not triggered	**Tail event:** Does the DSRA + PCG cascade actually work?	**Real-world empirical proof:** DSRA ($15.7M) bridged full $14.5M gap, Sr DS paid in full IDB PCG never activated cascade held without needing the backstop. DR recovered within 2 years.
BULL (all drivers outperform)	**95%**	**11.9**	**70%**	Yr 3 (on time)	**1.76×**	Full coupon Ahead of schedule Early amortisation	Full 4.0% IO SF 4.6×+ Buyback Yr 5–7	Full carry Junior return 3–5% (incl. biochar)	**Full upside:** What does Junior actually earn? Is there real carry?	Higher arrivals (Jamaica '24 trajectory), higher compliance (Jamaica TEF precedent), bio-ref at 70% utilisation + biochar via Puro.earth. SF accelerated, endowment grows beyond $131.4M.

DR benchmark Feb 2025 6.95% 2037 | Tranche IRRs: Senior 8.3%, Mezz 4.5%, Junior ~0% | Yr 5 DS: $19.05M ($17.55M Sr + $1.5M Mezz IO)

Tranche outcomes by stress scenarios

Scenario	Levy Comp.	Arrivals (M)	Bioref Util.	Bioref Start	Sr DSCR (Yr 5)	SENIOR	MEZZ (BULLET)	JUNIOR Carry	What This Tests	What This Proves
BIOREF DELAY +2 years	90%	11.0	55% (when online)	**Yr 5 (+2yr delay)**	**1.48×**	**Full coupon** DSRA top-up Lock-up 1 period	Temporarily suspended **SF 3.7×**	Deferred pending covenant restore	**FOAK risk:** Does the 4-yr IO grace period do its job?	**Lock-up triggers for one period, DSRA ($10.5 contingency) bridges – Sr covered.** Modular 3×167t/day design mitigates FOAK risk. IO grace absorbs the delay.
LEVY 80% (single-variable)	**80%**	11.0	55%	Yr 3	**1.40×**	**Full 7.0% unaffected**	**Suspended SF 2.4×** Distributions suspended	**First-loss absorbs** No carry	**Levy isolation:** How much compliance can you lose before Sr is at risk?	Tests levy alone - Sr coupon paid in full even at 80%. Lock-up cash-traps Mezz/Junior automatically. 1.50× covenant catches problems before Sr is threatened. **Breakeven Sr coverage: ~63% compliance.**
COMBINED STRESS (Levy 80% + 2yr bio-ref delay)	**80%**	11.0	55% (when online)	**Yr 5 (+2yr delay)**	**1.24×**	**Coupon paid** DSRA + PCG standby	Suspended **SF 2.8× Bullet still covered**	First-loss active No carry	**Worst credible combination:** Do the protections cascade correctly?	Two independent risks - DSRA covers 6+ months Cascade of protections (DSRA → lock-up → PCG final backstop) performs as designed.
PSSI SCARCITY TRIGGER (3 cons. low-biomass years)	90%	11.0	**15% (scarcity)**	Yr 3	**1.58×**	**Full coupon** PSSI pays fixed OpEx annuity	Full 4.0% IO SF 3.8×	Reduced carry Par return likely	**PSSI mechanism:** Does the parametric insurance actually convert volatility to a fixed annuity?	Descartes pays fixed OpEx annuity within 14 days, covers bio-ref gap - volatility becomes a budgetable cost.

DR benchmark Feb 2025 6.95% 2037 | Tranche IRRs: Senior 8.3%, Mezz 4.5%, Junior ~0% | Yr 5 DS: $19.05M ($17.55M Sr + $1.5M Mezz IO)

Satellite-triggered, commercially underwritten, 14-day settlement – the scarcity inversion has no commercial precedent

TRIGGER MECHANISM

Primary index	USF AFAI: weekly satellite, publicly available 15-yr dataset (2011–present)
Scarcity trigger	**Biomass <50% of 5-yr average:** pays fixed OpEx, converts drought to annuity
Surge trigger	**Biomass >150% capacity:** pays emergency disposal costs
Settlement	Within 14 days, no adjuster
Premium (gr)	12–15% of limit per annum
Premium (eff)	~9% after Junior absorbs subsidy (0–3% Junior return)
Underwriters	WTW, Descartes Underwriting, Munich Re
Yr 1–4 calibration	USF AFAI 2011–present used as pre-contract baseline, validated pre-close CP

CCRIF: listed sargassum as future peril Feb 2025 – no product, no timeline. SRB PSSI does not rely on CCRIF. Pre-close CP: binding PSSI term sheet required. PCG acceleration waiver per IDB standard terms (Ecuador 2023 precedent).

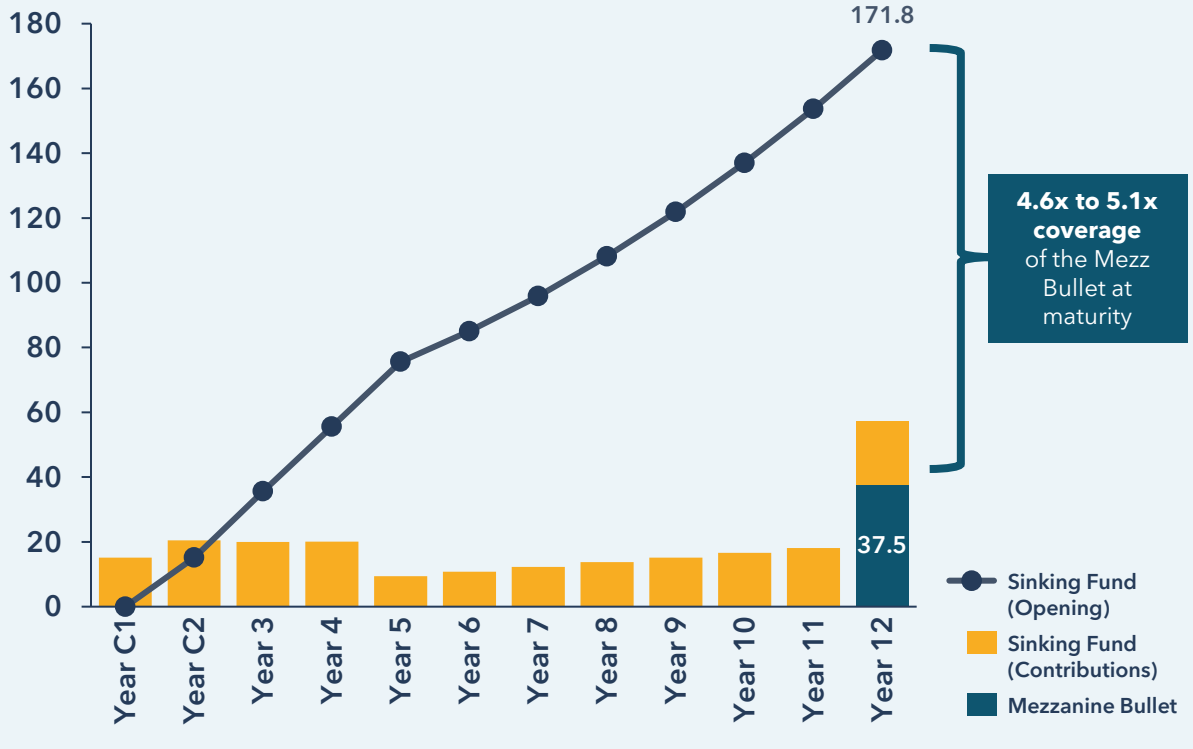
BASIS RISK CATEGORIES & MITIGANTS

Type	Description	Mitigation
Spatial	Satellite measures biomass offshore; factory needs it at gate	Stranding probability model Sentinel-2 sub-pixel calibration GPS fleet, 3-month rolling average
Temporal	AFAI timing may not align with processing demand	Weekly updates, trigger timing aligned to seasonal patterns, continuous not point-in-time
Contract design	Imperfect AFAI-to-factory correlation	Dual trigger (scarcity + surge) 5-yr moving average smooths noise DSRA covers residual
Data quality	Limited operational history at this scale	15-yr USF AFAI baseline NASA MODIS cross-validation, agent validated pre-close
Residual basis	Cannot eliminate all basis risk	DSRA 6-month buffer IDB PCG backstops Senior after DSRA exhausted

THE GENUINE INNOVATION

Descartes' existing product pays on sargassum excess (tourism protection). SRB's PSSI pays on scarcity (biorefinery protection). This inversion has no commercial precedent.

Sinking Fund Accumulation & Maturity Waterfall



MATURITY WATERFALL MECHANICS – YEAR 12

Repay Mezzanine Bullet
$37.5M

Junior Tranche Par Buyback
$22.5M

GP Carry
12.5% over 6% hurdle

Conservation Endowment +
LP Residual
$131.4M permanent endow.

Funds never touch general government budget

PROVEN PRECEDENTS

DR $10 TOURIST CARD
IATA L8 seamlessly embedded since 2018

JAMAICA TEF
Ticket-embedded model achieving ~99% compliance

Requires primary legislation with irrevocable assignment during bond tenor. Executive decree insufficient for bond-grade certainty. Fideicomiso serves as operating trust receiving and managing levy revenue; notes issued by offshore DAC under NY law indenture.

APPENDIX VI: COMPETITIVE LANDSCAPE – BLUE BOND COMPARISON

The SRB is the only blue bond with all five structural differentiators simultaneously present

Bond / Instrument	New Capital	Revenue-Gen.	Dedicated Levy	PSSI / Bioref	Blended Stack	What It Proved
Seychelles '18, $15M	✗	✗	✗	✗	~	MDB credit enhancement works at sovereign level
Belize '21, $364M (swap)	✗	✗	✗	✗	~	Sovereign-scale debt conversion viable
Barbados '22, $146.5M	~	✗	✗	✗	✓	New-capital blue bond executable in Caribbean
Bahamas '24, $300M+ (swap)	~	✗	✗	✗	✓	IDB appetite scales to $300M+
Rhino Bond '22, $150M (WB)	✓	~	✗	✗	✓	Outcome-based parametric triggers bankable
SRB, $150M	✓	✓	✓	✓	✓	**First physical revenue asset + unconditional cashflow anchor + PSSI**

WHAT CAME BEFORE: Debt swaps dominated. Belize and Bahamas refinanced existing debt – conservation came from the interest saving, not new capital. Barbados raised new capital but deployed it as grants. In every case, the sovereign would have refinanced anyway.

REPAYMENT DOESN'T DEPEND ON SOVEREIGN CREDIT. A dedicated levy, a revenue-generating biorefinery, and parametric insurance converting feedstock volatility into a fixed annuity. All five structural differentiators co-present for the first time.

ADDITIONALITY IS STRUCTURAL. No hotel funds a shared fleet. No lender underwrites a biorefinery against order-of-magnitude feedstock volatility. No Ba2 sovereign clears IG mandates unaided. Remove any element and the outcome collapses.

$15.25B raised in blue finance to date.
SRB is the first scalable blueprint for industrial-scale oceanic restoration – beyond pure conservation funding.

The cascade configuration is the only viable design – alginate-only NPV is negative; biofuel is explicitly excluded

Collection (SOS Carbon Fleet)

25 LCMs x 70 wet t/day = 1,750 wet t/day
100K+ wet t/yr
AFAI satellite-guided
Operational Punta Cana since 2021

Drying (Water Removal)

85% water removed
7:1 wet-to-dry ratio
100K wet → ~14K dry t/yr

Remediation (Arsenic Treatment)

Citric acid wash
62.2 → 0.8mg/kg
(vs 40ppm ag limit)
Demonstrated at scale

CASCADE EXTRACTION:

Fraction 1: Alginate	80kg/dt · 25th-pct floor · food-grade · 55% seasonal	**$1.6M/yr** 5K dt × 80kg × $8/kg, 55%
Fraction 2: Bio-stimulants	Residual biomass → liquid extract · $2/L wholesale	**~$1.9M/yr** BASF distribution network, Yr C2
Fraction 3: Biochar	Residue pyrolysis · Puro.earth · $150–177/$tCO_2e$	**$0 base** Bull scenario ONLY

WHY CASCADE IS THE ONLY VIABLE DESIGN

Alginate-only NPV: negative (−$2.74M)
Cascade (alginate + biostimulants): positive
Biofuel: TRL 3–4, 12% cellulose, DuPont/POET/Abengoa destroyed $1B. Every survivor pivoted away, Biofuel explicitly excluded from all scenarios

UNIT ECONOMICS

Cost: $652/dt fully loaded incl. arsenic remed.
Gross margin: 15–30%
Processing CapEx: $52.5M (midpoint validated range $34–103M, Gray et al.)
Collection cost: ~$100/wet tonne fully loaded
55% seasonal utilisation assumed conservatively

FOAK MITIGANTS – WHY THE PLANT IS FUNDABLE

3 × 167t/day modules (not monolithic plant)
$10.5M contingency
Bio-stim revenue from Yr C2
Binding JV/O&M pre-close
4-yr IO grace absorbs delay
SOS Carbon LCMs = NOT FOAK

Conversion: 100K wet t → ~14K dry t (7:1) → ~5K dt at 55% seasonal. Alginate 80kg/dt (25th pctile, 60–150 range). Arsenic: citric acid wash demonstrated at scale (Origin by Ocean pilot data).

Binding Operator Ecosystem

Fleet Operations
SOS CARBON
Operates the 25 Littoral Collection Modules (LCMs), operational in Punta Cana since 2021; 13,000 tons removed.

Cascade Technology
ORIGIN BY OCEAN/CABB
Provides cascade tech via Manufacturing-as-a-Service model, targets Finland first-of-a-kind in 2028.

Alginate Off-take
JRS/ALGAIA
The global alginate leader, manages alginate co-extraction and off-take.

Bio-stimulant Distribution
BASF
Secures massive agricultural off-take, utilizing the recent Acadian Plant Health distribution template.

All binding agreements are Conditions Precedent – the bond does not proceed to marketing without executed contracts. Arsenic remediation audit at commercial scale is a separate pre-close gate.

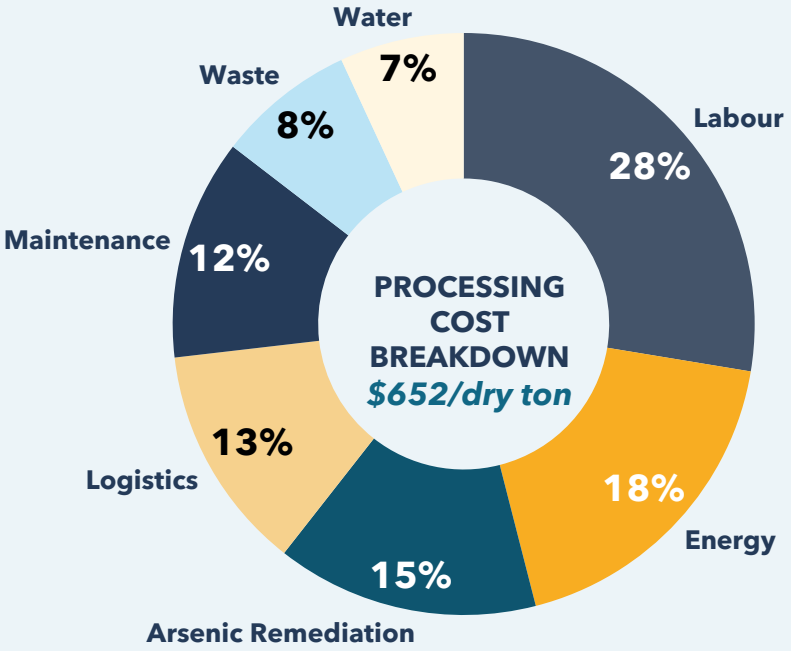
APPENDIX IX: SCALABILITY DETAILS

The hub model replicates wherever the seaweed belt meets a tourism economy: concessionality dissolves as unit economics are proven

	PHASE 1: PILOT Dominican Republic, $150M	PHASE 2: SCALE Quintana Roo + Barbados, ~$450M	PHASE 3: REGIONAL Pan-Caribbean (10+ states), $1B+
OBJECTIVE	**Prove unit economics, validate arsenic remediation, bind offtake contracts**	**Scale hub model: 2–3 new biorefineries, 50+ LCMs across 3 sovereign jurisdictions**	**Replicate proven template: multi-sovereign parametric pool, market-rate debt only**
LEVY VEHICLE	**IATA BSP for $3 levy/pax × 11M arrivals × 90%** = $29.7M/yr Jamaica precedent: ~99% compliance	**ISH hotel occupancy surcharge, $207M/yr (2025) ~100% compliance (state authority)** *NOT Visitax: <10% collection, voluntary, no airline integration*	**CCRIF-style pooled facility, multi-sovereign levy aggregation, parametric insurance pool**
CAPITAL STRUCTURE & CONCESSIONALITY	**60/40% -** $90M Senior 7%, $37.5M Mezz 4% DFI $22.5M Junior first-loss FOAK derisking: first-loss essential	**80/20% commercial-catalytic - track record replaces guarantee,** junior first-loss layer reduced Mezz: market-rate DFI (~4.4%)	**Conventional project finance: 100% commercial, zero catalytic dependency** Standardised, predictable infrastructure DFI exits – proven model stands alone
WHY THIS WORKS	**Only Caribbean state with all 5 conditions:** (i) tourism scale (ii) SOS Carbon operational (iii) CONFOTUR (iv) Ba2 improving (v) satellite data coverage	**Q.Roo:** ISH mechanism already operational **Barbados:** extends existing $146.5M IDB blue bond – no new sovereign vehicle required	CCRIF COAST fisheries: 3yr concept-to-launch precedent Sargassum product follows same path Tonnage data gap: the product's incentive to close
JOBS CREATED	~250 direct / 500+ including indirect (175+ fleet crew, artisanal fishermen)	~15,000 across Q.Roo + Barbados	**72,900+ pan-Caribbean at full Phase 3 scale**
REPLICATION CONDITIONS	Three conditions required for hub replication, if 12+ Caribbean states meet all three: (i) Sargassum belt exposure (ii) Tourism levy vehicle - ticket-embedded, high compliance (iii) Coastal fleet infrastructure		
BEYOND CARIBBEAN - What to Watch	**WEST AFRICA:** different revenue model needed, 10+ year vision – not near-term pipeline. Fish: 70% protein (Sierra Leone, Senegal), no tourism levy equivalent, municipal fees or export tariffs needed		**US Gulf –** regulatory conflict NOAA: sargassum = Essential Fish Habitat Removal faces legal challenges absent in Caribbean Requires policy resolution before investment

The SRB converts a liability the market cannot solve into an asset class it can own.

Validated Processing Costs & CapEx Assumptions



COLLECTION COST PROFILE	BIOREFINERY CAPEX VALIDATION
$100/wet ton fully loaded service fee	**Model uses $52.5M**
Includes crew wages, fuel, maintenance, QC, CapEx amortisation. Surpasses misleading published marginal rates ($4-8/wt hardware only).	*Validated against published TEA baselines adjusted for Caribbean construction premiums (30-60%), and FOAK premiums (20-40%). Places the facility firmly in plausible $34-103M range.*

Benchmark: Compares favorably to US DOE BETO target of $674/t AFDW.
Arsenic Remediation (62 to 0.8mg/kg) validated via citric acid wash demonstrated at scale.

Measurable, time-bound, independently verifiable outcomes — not proxy indicators

SDG ALIGNMENT — SPECIFIC TARGETS & MEASURABLE SRB METRICS

SDG	Target	SRB Metric
SDG 14	14.1 Marine pollution	100K+ wet t/yr intercepted · H_2S prevented · seagrass loss curtailed
SDG 14	14.2 Coastal ecosystems	200km coastline · est. 15,000 ha · 76% coral survivorship (TNC-monitored) · 40,000+ substrates (FUNDEMAR)
SDG 13	13.1 Climate resilience	Reduction in $3.5B/yr damage · methane avoidance TBD post-commissioning (0.15–0.40 tCO_2e/wet t, Brooks 2021)
SDG 3	3.9 Hazardous chemicals	H_2S eliminated in interception zone · 850+ poisoning cases documented (Resiere et al., 2026)
SDG 8	8.5 Decent employment	~250 direct jobs Phase 1 · ~15,000 direct Phase 3 (order-of-magnitude)
SDG 9	9.4 Sustainable industry	First commercial sargassum cascade biorefinery · PSSI parametric instrument innovation
SDG 12	12.5 Reduce waste	Sargassum waste → alginate + biostimulants + biochar · zero landfill policy
SDG 17	17.3 Mobilise finance	$22.5M first-loss catalyses $127.5M = 5.7× blended leverage

QUANTIFIED OUTCOMES — PHASE 1 VS PHASE 3

Metric	Phase 1 (DR)	Phase 3 (Pan-Carib)
Wet tonnes valorised/yr	100K+	1M+
Coastline protected	200km	2,000km+
Direct jobs created	~250	~15,000+*
Tourism GDP protected	$21B DR	$60B+ Caribbean
Carbon credits (base)	$0	$0
Carbon credits (bull)	Puro.earth biochar $150–480K/yr	Upside only

CARBON CREDIT DISCIPLINE — WHY $0 IN BASE CASE IS THE RIGHT CALL

Voluntary carbon market in structural distress (Running Tide shut down 2024) Avoidance credits ~$5/t — immaterial. Biochar removal at $150–177/$tCO_2e$ via Puro.earth MCFS is the only credible upside mechanism, bull only.

ICMA ALIGNMENT & INDEPENDENT VERIFICATION

SPO: S&P Global Ratings — aligned with their June 2024 SPO on DR's sovereign green bond framework · Independent PSSI calculation agent appointed pre-close (CP) · Annual impact KPI report to indenture schedule

**Jobs: ~250 direct Phase 1 DR, ~15,000 direct Phase 3 pan-Caribbean (order-of-magnitude) · WTTC 2.9× ratio — no other multiplier · Methane avoidance TBD.*