T H E S K G P C A P I T A L S Y S T E M

A Quantitative Framework for institutional compound and capital physics

SKGP Strategic Partners

KEY RISK AND PERFORMANCE VARIABLES

CONSOLIDATED KEY / LEGEND FOR ALL QUANTITATIVE VARIABLES USED IN THE PLATFORM

Symbol	Definition
Si	Commodity spot price
σi	Commodity price volatility
Ji, Li	Jurisdiction and logistics scores (0–5)
FXi	Foreign-exchange movement
Wi	Labor cost index
pig	Probability of milestone success at gate g
Uig, Cig	Uplift and capital consumed at gate g

Symbol	Definition
Rcyc	Capital recycling ratio (platform level liquidity measure)
vt	Recycle velocity (rate of capital re-entry)
AUMt	Assets under management at time t
ES95	Expected shortfall at 95 percent confidence
RCi	Risk contribution of node i to total shortfall
gj, σj, wj	Jurisdictional growth rate, risk, and capital weight
ϕi(t)	Commodity cycle phase indicator (supply demand signal)

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Symbol	Definition
CVXi	Entry convexity (curvature of price vs supply demand)
V, Vi, NAV	Asset value, node value, total platform NAV
p, NAVnext, Capspent	Probability, next stage NAV, and cumulative capital spent
CF, r, t	Cash flow, discount rate, and forecast period
α	Reinvestment ratio of realized capital
r̄, δ, Loss Rate	Average return, attrition rate, and loss ratio
ρij, Σ	Cross node correlations and covariance matrix

Symbol	Definition
λ, γ	Risk aversion and constraint multipliers in optimization
VaR95	Value at Risk at 95 percent threshold
L95,k	Tranche specific 95th percentile loss
βi, εi	NAV sensitivity coefficients and elasticity to price
μfx, σfx	FX drift and volatility
πw, λl, λfx, λinf	Labor inflation rate and cost sensitivities
ρv, ηt	Recycle velocity persistence and innovation shock

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Symbol	Definition
ΔES_{pre}, ΔES_{post}	Expected shortfall before vs. after diversification
Governance Score	Ratio of delivered to expected governance reports
$\bar{r}$, v, δ (aggregate)	Platform level average return, recycle velocity, and attrition

FRAMING THE SYSTEM

MULTI-JURISDICTIONAL CAPITAL ENGINE

- For LPs

  Capital system connecting exploration rights, operating mines, refineries, and infrastructure across multiple jurisdictions. Each node adds optionality and yield. The platform compounds by recycling capital, reinvesting realized cash flows, and scaling AUM across commodities.

- Core Expression

  Platform = {Ni, Lj, Pk, Θt}

- Variable Legend

Symbol	Meaning	Example
Lj	Jurisdictional layer (legal, fiscal, ESG)	Mining code, royalty regime
Pk	Portfolio aggregation (commodity mix, correlation, hedge)	Copper / Graphite / Nickel weighting
Θt	Time-state vector (AUM, recycle ratio, compounding factor)	Tracks capital velocity and yield
Ni	Resource node (mine, license, refinery)	Copper mine in Jurisdiction

Focus

- *Each node acts like a mini fund with its own milestones, risk curve, and liquidity profile.*
- *Jurisdictions create layered diversification by spreading across Lj.*
- *Portfolio logic Pk integrates multiple commodities into one risk balanced AUM surface.*
- *The state vector Θt tracks how quickly capital rotates, compounds, and de-risks.*

CAPITAL PHYSICS OVERVIEW

HOW CAPITAL ENTERS AND EVOLVES INSIDE THE SYSTEM

- Intuition for LPs

  Capital as a circulating mass, each tranche of money migrates between risk states from exploration to yield based on information quality and risk tolerance.

- Key Formulas

  Total committed AUM A0

- Capital allocation by tranche

  $$A_t = A_0 \times \omega_t$$

  where ω_t = fraction of total AUM in tranche t

- Recycle velocity

  $$v_t = \text{RecycledCapital}_t / A_t$$

- Cumulative AUM evolution

  $$AUM(t+1) = AUM(t) + (\alpha \times \text{Realized Exits\_t}) + (\text{New LP Commitments\_t}) - (\text{Losses\_t})$$

Variable notes

- α = reinvestment ratio (typically 0.6–0.8 for rolling strategies)
- Realized Exits_t = liquidity events: data sales, JV, stream, or mine sale
- New LP Commitments_t = fresh inflows or recapitalization
- Losses_t = capital impairments/write-downs

READING THE EQUATIONS

TRANSLATING CAPITAL DYNAMICS INTO ALLOCATOR TERMS

- Step 1 — Allocation Logic
  - A_0 = LP commitments or platform equity
  - ω_t = capital share per tranche or strategy (e.g. exploration 15%, development 45%, yield 40%)
  - A_t = deployed capital under management
- Step 2 — Recycle Mechanics
  - v_t measures capital velocity, how quickly dollars exit one project and re-enter another.
  - Example - if $200m deployed and $60m returned early and reused → $v_t = 0.30$
  - Higher v_t shortens payback and compounds AUM without new LP capital.
- Step 3 — AUM Progression
  - Reinvested returns grow the base; losses are written down immediately.

  Recursive form

  $$A_{t+1} = A_t + (R - L)$$

  which grows geometrically if $R > L$.
- Over T periods

  $$A_T \approx A_0 \times \Pi(1 + r_t - \ell_t)$$

  where r_t = return rate, ℓ_t = loss rate per cycle.

IMPLICATIONS FOR LP PORTFOLIOS
WHY THIS MATTERS FOR INSTITUTIONAL CAPITAL

- Interpretation
  - Continuous compounding — capital keeps working between cycles.
  - Elastic deployment — tranche weights (ωt) adjust to LP mandates (pension → yield bias, family office → convexity).
  - Systemic risk control — diversification across Ni and Lj reduces impact from any single mine or jurisdiction shock.
- AUM Scaling Law
  - $\text{EffectiveAUMT} = A0 \times (1 + \bar{r} \times \bar{v})^{T}$
  - Return multiplied by velocity drives compounded AUM growth.
- Takeaway for LPs
  - Platform's self replenishing ecosystem compounds faster than a closed end fund.
  - LPs can choose where to enter. Early for high convexity, mid-stage for growth plus yield, or senior for stability. While all capital stays synchronized inside one integrated model.

NODE ARCHITECTURE

EACH MINE OR LICENSE AS A PROBABILISTIC PROCESS

- For LPs

  Every mine, license, or processing plant within the SKGP platform behaves like a probabilistic node. Each node passes through sequential gates—geological, technical, regulatory, and commercial. At every gate, probability of success increases as uncertainty declines and new data improves the valuation estimate.

- Core Formula (Expected Node Value)

  $V_i = \Sigma$ (from $g = 1$ to G) $[\, p_{ig} \times U_{ig} - (1 - p_{ig}) \times C_{ig} \,]$

Symbol	Meaning	Example
p_{ig}	Probability of success at gate g	0.25 at early exploration, 0.75 at feasibility
U_{ig}	Expected uplift or NAV increase at gate g	+$3m after drilling success
C_{ig}	Capital consumed to reach gate g	$1.5m for drilling and assays

NODE ARCHITECTURE

EACH MINE OR LICENSE AS A PROBABILISTIC PROCESS

- How It Works
  - Each gate represents a conversion of uncertainty into collateral.
  - Higher data quality (assays, seismic, third-party validation) increases pig.
  - Each gate's expected uplift Uig must justify the capital consumed.
  - Negative gates (failed drilling, environmental rejection) which writes down the node's value immediately, no smoothing.
- Milestone Progression Function

  qpig+1 = f(pig, data_quality, permits, commodity_beta)

  - Data_quality reflects geological and technical verification accuracy.
  - Permits capture political and environmental progress (binary or scaled).
  - Commodity_beta represents sensitivity of valuation to commodity price changes (volatility effect).
  - This creates adaptive probability chains, each step compounds the platform's information advantage.

EXPECTED VALUE INTERPRETATION

WHAT THIS MEANS IN CAPITAL TERMS

- Step 1 — Information as Value
  - When data reduces uncertainty, value increases nonlinearly.
  - The probability jump (Δp) between gates translates directly into NAV increase (ΔV).
  - The function $f(p)$ becomes the system's "learning rate."
- Step 2 — Decision Rules
  - Advance node only if $\text{ExpectedValue\_after} \geq \text{ExpectedValue\_before} \times (1 + \alpha_{min})$
  - Stop or sell if (commodity shock $\beta > z\sigma$) or (jurisdiction score < threshold J_{min}).
- Step 3 — Aggregation Ready
  - Each V_i feeds into the portfolio model as an independent stochastic exposure with partial correlations to other nodes.
  - The more nodes in the system, the smoother the aggregate return curve, due to the law of large numbers.

MULTI-NODE DISTRIBUTION(PORTFOLIO VIEW)
AGGREGATING MINES AND LICENSES INTO A PORTFOLIO ENGINE

- For LPs
  Platform doesn't rely on any single mine or jurisdiction.
  It holds dozens of nodes, each probabilistic, across multiple jurisdictions and commodities.
  Portfolio level returns are computed as weighted expectations adjusted for correlation.
- Aggregate Expected Return
  $E[R_{portfolio}] = \Sigma \text{ (from } i = 1 \text{ to } n) \; [\, w_i \times E[V_i] \,]$
- Variable Legend
- Constraint Set
  $\Sigma\, w_i = 1$
  $w_i \leq w_{max}$ (by jurisdiction or commodity)
  $\rho_{ij} \leq 0.4$ (target correlation ceiling between nodes)

Symbol	Meaning	Example
wi	Portfolio weight for node i	0.08 weight for Zambian copper project
E[Vi]	Expected value of node i	$7.5m after probability-weighted uplift
n	Number of total nodes	25 active nodes across 4 jurisdictions

CORRELATION AND PORTFOLIO VARIANCE

MANAGING COVARIANCE BETWEEN COMMODITIES AND JURISDICTIONS

- Correlation Matrix

  $$\Sigma = [\rho ij]$$

- Each ρij measures how two nodes move relative to each other (commodity price, political, or logistics linkage).
- Portfolio Variance

  $$\sigma P^2 = w^T \Sigma w$$

- Interpretation
  - Variance measures total system risk across all nodes.
  - Lower correlation between commodities (ex - copper vs graphite) or between jurisdictions (Zambia vs DRC) reduces σP^2 even if node level risk remains high.
  - The goal is to maximize expected return for each unit of portfolio variance, creating a pseudo Markowitz frontier for real assets.

PORTFOLIO DESIGN INSIGHTS
TRANSLATING NODE LEVEL RISK INTO SYSTEMIC CONTROL

- Insights for LPs
  - Each new node adds not just potential upside but risk diversification capacity.
  - Weighted exposure across uncorrelated jurisdictions reduces left tail losses.
  - The correlation target ($\rho_{ij} \leq 0.4$) ensures no single shock dominates the system.
  - Over time, the aggregate portfolio converges toward a stable NAV surface even if individual mines experience volatility.
- Example Simplification
  If 25 nodes each have σ_i = 25% volatility, and average $\rho = 0.3$,
  then $\sigma_{Portfolio} \approx \sqrt{[(0.25^2 \times (1-\rho)) / n + \rho \times 0.25^2]} = {\sim}9.5\%$
  which shows how diversification compresses volatility nearly 3x without reducing average expected return.

PORTFOLIO OPTIMIZATION RULE

ALLOCATING CAPITAL ACROSS NODES AND JURISDICTIONS

- Optimization Objective
  Maximize $E[R_{portfolio}] - \lambda \times \sigma_P^2$
  Subject to $\Sigma w_i = 1$, $w_i \geq 0$, $w_i \leq w_{max}$
  - Where λ = risk aversion coefficient (adjusted per LP type).
- Interpretation for LPs
  - Conservative institutions (pensions, DFIs) → higher λ (risk constrained).
  - Opportunistic capital (family offices, private GPs) → lower λ (convexity seekers).
  - SKGP continuously rebalances w_i to maintain portfolio efficiency as node probabilities evolve.

SYSTEMIC TAKEAWAY

WHAT NODE ARCHITECTURE ENABLES

- Each node behaves like an evolving financial option, not a static asset.
- Information upgrades replace arbitrary time based valuations.
- Portfolio variance compresses naturally with diversification and gating discipline.
- The system produces repeatable, measurable exposure to pre-yield assets with institutional transparency.
- For LPs

  Portfolio behaves like an adaptive real asset allocator, not a single mining fund.

  Returns are earned through disciplined probability weighted progress, not speculative price movement.

COMMODITY PRICE DYNAMICS

MODELING COMMODITY BEHAVIOR AND PRICE SENSITIVITY

- For LPs

  Commodities behave as stochastic assets whose prices evolve continuously according to supply, demand, and macro volatility. SKGP models each commodity's spot price using a lognormal diffusion process. This approach captures both drift (expected appreciation) and volatility (random shock component), allowing stress simulations across the full portfolio.

- Price Diffusion Equation (per commodity i)

  $dS_i = \mu_i \times S_i \times dt + \sigma_i \times S_i \times dW_i$

- Variable Legend
- Interpretation

Symbol	Meaning	Example
S_i	Current price of commodity i	Copper = 9500 USD/ton
μ_i	Expected drift (long-term price trend)	0.05 (5% annual)
σ_i	Annualized volatility	0.20 (20%)
dW_i	Brownian motion increment	Random shock term

  - μ_i defines the structural demand trend (electrification, battery adoption, etc.).
  - σ_i captures volatility from inventory cycles, political events, and logistics disruptions.
  - The platform treats each commodity as an independent stochastic driver, later linked through correlation matrices to model cross-commodity contagion.

COMMODITY PRICE DYNAMICS

MODELING COMMODITY BEHAVIOR AND PRICE SENSITIVITY

- Monte Carlo Simulation Framework
  10,000+ random paths simulate commodity price evolution to estimate tail risk behavior. During systemic shocks, correlation between commodities increases (for example, energy prices and copper move together).
- Stress condition
  $\rho(S_i, S_j)$ rises toward 0.8–0.9 during crisis periods versus 0.2–0.4 under normal conditions.
- This feature creates the need for dynamic hedging and adaptive tranche allocation, not static diversification.

PROJECT NAV SENSITIVITY
TRANSLATING COMMODITY MOVEMENTS INTO ASSET VALUE CHANGES

- Each project's Net Asset Value (NAV) responds to underlying commodity prices through a sensitivity parameter, similar to delta in options pricing.
- Sensitivity Equation
  $\partial Vi / \partial Si = \beta i \times Si \times \varepsilon i$
- Variable Legend

Symbol	Meaning	Example
Vi	Project or node NAV	$80 million
Si	Commodity price	$9500/ton copper
βi	Exposure coefficient (project leverage)	0.6–1.0
εi	Price elasticity	Copper ≈ 1.3, Lithium ≈ 1.8, Nickel ≈ 1.1

- Explanation
  - βi represents how sensitive cash flow is to price changes (hedged projects have $\beta < 1$).
  - εi reflects intrinsic elasticity, how much NAV changes when commodity price changes by 1%.
  - Combining βi and εi yields a marginal NAV delta, showing how each commodity shock affects the total platform value.
- Practical Use for LPs
  - Sensitivity mapping helps size hedges, streams, and offtake contracts.
  - Portfolio VaR (Value at Risk) calculations incorporate these elasticities to forecast potential drawdowns.
  - Expected NAV progression under mean reverting price forecasts allows long term capital pacing models to remain robust even in volatile commodity cycles.

MONTE CARLO AND CORRELATION STRESS TESTING
QUANTIFYING SYSTEMIC SHOCKS AND TAIL CO-MOVEMENT

- Purpose

  SKGP uses Monte Carlo simulations and variance, covariance matrices to evaluate how commodity price shocks propagate through the portfolio.

- Methodology
  - Generate 10,000 correlated random paths for all commodities using covariance matrix Σ.
  - Simulate NAV for each node Vi as function of Si(t).
  - Compute portfolio return Rportfolio = Σ wi × (Vi(t) / Vi(0) − 1).

- Measure tail risk metrics

  VaR95 = 1.65 × σPortfolio × √T

  Expected Shortfall = mean loss beyond VaR95 threshold.

- Stress Condition Behavior

  During crises, commodity correlations approach 1.0 due to shared macro shocks.

  This correlation clustering means that diversification benefits temporarily vanish.

  SKGP mitigates this via

- Cross jurisdiction diversification (uncorrelated policy risk)
- DFI guarantees on downside protection
- Real time tranche gating (pause capital progression during volatility spikes)

JURISDICTIONAL AND LOGISTICS RISK LAYERS

TRANSLATING POLITICAL AND OPERATIONAL CONDITIONS INTO QUANTITATIVE SCORES

- For LPs

  Jurisdiction and logistics are not qualitative notions, they're quantifiable. SKGP assigns each node a jurisdictional score (Ji) and logistics score (Li), both on a 0–5 scale derived from internal data and external indices (Fraser Institute, World Bank logistics performance index, and internal ESG compliance reports).

- Scores Defined

  $J_i \in [0, 5]$ — rule of law, permit security, royalty stability, FX convertibility, and ESG standards.
  $L_i \in [0, 5]$ — infrastructure, port access, energy cost, water availability, and labor quality.

- Risk adjusted Return per Node

  $R_i^* = R_i \times (J_i + L_i) / 10$

- Variable Legend

Symbol	Meaning	Example
Ri	Raw expected return (pre-risk)	25%
Ji	Jurisdictional score	4.5 (Botswana)
Li	Logistics score	4.0 (near port, stable power)
Ri*	Adjusted effective return	25% × (8.5 / 10) = 21.25%

- Capital Gating Rule

  Do not advance capital to next gate if $J_i < 2$ or $L_i < 2$ unless a DFI guarantee or sovereign wrap is applied.

- Interpretation
  - Low scores increase hurdle rate or suspend funding.
  - This enforces geographic discipline, jurisdictions must earn capital allocation.
  - Weighted scoring converts geopolitical and operational noise into a numeric filter used directly in optimization models.

Portfolio Impact

- Weighted average jurisdiction score J and logistics score L feed into risk premia for portfolio level cost of capital calculations.
- Nodes with high Ji and Li anchor the portfolio during commodity stress, lowscore nodes offer optionality but are gated until verified.

INSTITUTIONAL IMPLICATIONS

WHY JURISDICTION AND COMMODITY RISK INTEGRATION MATTERS

- Combining stochastic price modeling and jurisdictional scores creates a two dimensional risk surface, one axis is market volatility and the other is policy and logistics stability.
- Portfolio allocation decisions are made on this surface, not just on expected return.
- During high volatility, capital shifts toward high score jurisdictions ($J_i + L_i \geq 8$).
- During calm markets, opportunistic re-entry occurs in lower-score but higher-convexity regions.

- Outcome for LPs

  The platform's architecture transforms political, logistical, and commodity price volatility into measurable, hedgeable components.

  Capital behaves dynamically, rotating between commodities and jurisdictions in response to observed risk gradients, maintaining compounding without breaching downside thresholds.

LABOR, FX, AND INFLATION INPUTS

MACROECONOMIC DRIVERS OF OPERATING COSTS AND MARGIN STABILITY

- For LPs

  Mining and infrastructure projects don't exist in isolation, they are highly exposed to shifts in labor costs, currency fluctuations, and inflation. These three forces directly affect the cost base (capital expenditures, opex, and logistics). Modeling these drivers allows SKGP to forecast risk adjusted profitability and hedge exposure appropriately.

- Labor Cost Index Function

  $W_i(t) = W_0 \times e^{(\pi_w \times t)}$

- Variable Meaning

  $W_i(t)$ - Labor cost at time t for jurisdiction i

  W_0 - Baseline wage rate (start of investment period)

  π_w - Annualized labor inflation rate (country specific)

  t - Time in years

- Interpretation
  - Labor inflation is a slow moving but cumulative risk.
  - Emerging jurisdictions may experience 8–10% annual labor cost growth, while developed markets average 3–4%.
  - Over multi year project timelines, compounded wage inflation can erode project margins by 20–30% if unhedged.

LABOR, FX, AND INFLATION INPUTS

MACROECONOMIC DRIVERS OF OPERATING COSTS AND MARGIN STABILITY

- Foreign Exchange Exposure
  $FX_i \sim N(\mu_{fx}, \sigma_{fx}^2)$

  FX_i represents the stochastic exchange rate between local and base currency (typically USD).

  μ_{fx} = expected FX drift (long run appreciation or depreciation)
  σ_{fx} = annualized volatility of exchange rate

- Practical Use
  - FX volatility directly affects realized returns when capital inflows or offtake payments are denominated in foreign currency.
  - Hedging strategy, forward contracts or local currency financing to reduce mismatch risk.
  - FX shocks often correlate with political instability, therefore, these models link with jurisdictional risk J_i.

LABOR, FX, AND INFLATION INPUTS
MACROECONOMIC DRIVERS OF OPERATING COSTS AND MARGIN STABILITY

- Composite Cost Function
  $Ci(t) = C0 \times (1 + \lambda l \times \Delta Wi + \lambda fx \times \Delta FXi + \lambda inf \times \pi t)$
- Variable Explanation
  C0 - Base project cost estimate
  λl, λfx, λinf - Sensitivity coefficients (elasticities) for labor, FX, and inflation
  Δwi - Change in labor cost index
  ΔFXi - Change in exchange rate
  πt – Time dependent inflation index (country or global)
- Interpretation
  - λl, λfx, and λinf quantify how much total cost changes with each factor.
  - For example, λl = 0.3 means every 10% wage increase drives a 3% total cost rise.
  - This allows scenario analysis, a 5% FX depreciation combined with 7% labor inflation can raise opex by 4–5%.
  - Each node's adjusted cost Ci(t) feeds directly into its valuation Vi, modifying uplift and expected return.
- Institutional Importance
  These models transform macro risk into forecastable cash flow variance, enabling consistent performance attribution and fair value remeasurement exactly the approach used in institutional real asset portfolios.

PORTFOLIO EVOLUTION EQUATION
HOW SYSTEMLEVEL AUM EVOLVES OVER TIME

- For LPs
  At the platform level, each mine, license, or asset contributes to the total AUM through realized returns, reinvested capital, and recycled proceeds. The AUM evolution equation captures how the system compounds organically without requiring continuous new LP inflows.
- Core Equation
  AUM_t = Σ_i [A_i,t−1(1 + r_i,t) − Loss_i] + (α × Σ_i Realized Exits_i,t) + New LP Commitments_t
- Variable Explanation
  $A_{i,t-1}$, Capital allocated to node i at previous time period
  $r_{i,t}$, Realized or accrued return on node i during period t
  $Recycled_i$, Capital recovered and redeployed from prior exits
  $Loss_i$, Capital written down due to project failure or impairment
  N, Number of active nodes or assets
- Interpretation
  - Each term reflects the compounding effect of both reinvested returns and recovered losses.
  - Positive feedback loop - as more nodes reach positive exits, $Recycled_i$ increases, which in turn expands $A_{i,t}$ over time.
  - Negative shocks ($Loss_i$) are isolated due to gating discipline and low intra-node correlation.

REINVESTMENT AND COMPOUNDING MECHANICS

HOW RECYCLED CAPITAL ACCELERATES COMPOUNDING

- Reinvestment Rule

  $$Recycled_i = \alpha \times Realized_i$$

- Where α is the reinvestment ratio (typically 0.6–0.8 for the SKGP system).

  If α = 0.7, that means 70% of realized capital from exits or repayments is immediately redeployed into new or advancing nodes, while 30% is held as liquidity or distributed to LPs.

- Interpretation
  - α reflects liquidity discipline - higher α accelerates AUM growth but reduces buffer against drawdowns.
  - α can be dynamically adjusted by tranche or market condition, high α during bull cycles, low α during volatility.

- Over multiple reinvestment loops, the reinvested portion of capital compounds exponentially even if nominal returns remain constant.
  - Example

    If A_0 = 100 million, α = 0.7, and average annual return r = 15%,
    then effective growth rate g = r × α = 10.5% compounding rate.

    After 5 years, AUM ≈ $100 \times (1 + 0.105)^5 = 164$ million without new capital inflow.

PORTFOLIO GROWTH DYNAMICS

LINKING GROWTH RATE TO VELOCITY, RETURNS, AND LOSS MANAGEMENT

- Compounding Loop Function

  Growth Rate = f(vt, $\bar{r}$, Loss Rate)

- Where

  vt = recycle velocity (rate at which capital re-enters system)

  $\bar{r}$ = average realized return per period

  Loss Rate = fraction of capital impaired or written down

- Intuition
  - vt acts as the multiplier of capital efficiency. High velocity means the same dollars generate more return cycles per year.
  - $\bar{r}$ captures average yield per active position.
  - Loss Rate measures attrition of deployed capital due to geological, political, or operational shocks.

- Simplified Approximation

  Growth Rate ≈ (vt × $\bar{r}$) − Loss Rate

PORTFOLIO GROWTH DYNAMICS

LINKING GROWTH RATE TO VELOCITY, RETURNS, AND LOSS MANAGEMENT

- Example

  If vt = 0.4 (40% of capital cycles each year), $\bar{r}$ = 0.25 (25% average return), and Loss Rate = 0.05 (5% impairment), then Growth Rate = (0.4 × 0.25) − 0.05 = 0.05 or 5% annual system-level AUM growth before external inflows.

- Strategic Interpretation for LPs
  - High recycle velocity combined with disciplined loss budgets creates continuous compounding.
  - The platform behaves like a living organism, capital constantly flows through exploration, development, yield, and back again.
  - The compounding loop replaces the fund vintage model with a self sustaining ecosystem, reducing capital lockups and improving liquidity predictability for LPs.

- Institutional Benefit

  This dynamic allows long term allocators pensions, endowments, sovereign funds to achieve private market returns with infrastructure like stability and transparent pacing control.

EXPECTED VALUE DISTRIBUTION (MULTI-PATH EXITS)
MODELING EXIT PROBABILITIES ACROSS MULTIPLE OUTCOME TYPES

- For LPs

  Each node in the platform has several potential exit pathways, data sale, joint venture, infrastructure refinancing, or full production operation. Instead of assuming one deterministic outcome, SKGP models the expected cash flow (CF) for each node as a weighted average of these possible exits, each weighted by its probability of occurrence.

- Expected Cash Flow per Node

  $E[CF_i] = \Sigma (\pi_{ik} \times CF_{ik})$

- Variable Explanation

  $E[CF_i]$ - Expected total cash flow from node i

  π_{ik} - Probability of exit type k for node i

  CF_{ik} - Expected cash flow generated by exit type k (net of costs)

- Exit Type Examples
  - Data Sale — early exit after resource validation, short tenor, high IRR (convex return)
- Joint Venture (JV) — shared development risk and longer duration, moderate IRR
- Infrastructure Refinance — converts capital to senior yield, typically 12–18% IRR
- Full Operation — long-term yield position with reinvestment or exit optionality

Interpretation for LPs

- The probability structure captures exit convexity, multiple possible upside scenarios versus capped downside.
- Institutional allocators can model expected MOIC (multiple on invested capital) as an average of probabilistic exit outcomes rather than point forecasts.
- This creates valuation transparency similar to venture portfolio theory but grounded in physical asset progression.

PORTFOLIO WIDE EXPECTED MOIC

AGGREGATING NODE EXITS INTO PLATFORM LEVEL RETURN EXPECTATIONS

- Formula

  $E[MOIC] = (\Sigma E[CF_i]) / (\Sigma A_i)$

- Where

  $E[CF_i]$ = Expected cash flow of each node (as calculated previously)

  A_i = Capital allocated to node i

- Interpretation
  - This ratio represents the expected gross multiple across the entire platform.
  - It serves as the portfolio's blended performance indicator, aggregating early stage and yield stage exposures.
  - As more exits recycle capital (Recycled_i), MOIC compounds through velocity.

- Example Calculation

  If total invested capital = 200 million and aggregate expected cash flow = 320 million, then

  E[MOIC] = 320 / 200 = 1.6x expected multiple.

  This aligns with institutional target ranges for diversified private real asset portfolios.

- Allocator Relevance
  - Expected MOIC is reported alongside internal rate of return (IRR) to measure both time weighted and absolute performance.
  - Unlike traditional PE, SKGP's MOIC progression is continuous and compounding, not tied to discrete fund vintages.

CAPITAL RECYCLING FORMULA (PLATFORM LEVEL)

QUANTIFYING HOW QUICKLY CAPITAL RE-ENTERS THE SYSTEM

- Formula

  Rcyc(t) = (Exits_t − ResidualCapital_t) / Deployed_t

- Variable Explanation

  Exits_t = Total realized capital recovered or sold during period t

  ResidualCapital_t = Amount of capital still tied in ongoing projects

  Deployed_t = Capital deployed at the start of period t

- Target Ratios

  Rcyc(24m) ≥ 0.3 (30% capital recycled within 24 months)

  Rcyc(36m) ≥ 0.6 (60% capital recycled within 36 months)

- Interpretation
  - Recycling ratio measures liquidity velocity — how fast dollars return to productive use.
  - Higher Rcyc shortens cash conversion cycles and increases AUM compounding without new LP inflows.
  - Recycling ratio directly links to risk mitigation, slower recycle speed implies higher illiquidity risk.

CAPITAL RECYCLING FORMULA (PLATFORM LEVEL)
QUANTIFYING HOW QUICKLY CAPITAL RE-ENTERS THE SYSTEM

- Compounding Relationship
  $AUM\_t+n = AUM\_t \times (1 + \bar{r} \times Rcyc)^n$
  - Where
    $\bar{r}$ = average portfolio return per recycle period
    Rcyc = average recycling ratio
- Example
  If AUM_t = 100 million, $\bar{r}$ = 0.20 (20% return), and Rcyc = 0.4, then over three periods
  $AUM\_t+3 = 100 \times (1 + 0.2 \times 0.4)^3 = 100 \times (1.08)^3 \approx 126$ million.
- Allocator Takeaway
  Recycling ratio is the heartbeat of SKGP’s self replenishing ecosystem.
  It governs compounding, liquidity, and duration management simultaneously — three levers that are typically segregated in closed end fund structures.

LP FLEXIBILITY LAYERS

CONFIGURING ENTRY POINTS AND RISK PREFERENCES FOR DIFFERENT ALLOCATORS

- For LPs

  Not every LP has the same risk appetite or liquidity preference. SKGP's modular structure allows allocators to enter at distinct yield layers, from early optionality to senior yield, while remaining within one unified platform.

- 1. Early Optionality Layer

  Exposure - License acquisition, rights brokering, early exploration
  Tenor - 12–24 months
  Return Profile - 40–60% IRR equivalent (high convexity, low correlation)
  Risk Type - Geological and permitting risk
  Use Case - Family offices, opportunity funds, or high convexity investors

- 2. Mid Yield Layer

  Exposure - Development, streaming agreements, and pre-production financing
  Tenor - 24–48 months
  Return Profile - 25–35% IRR
  Risk Type - Technical and construction execution risk
  Use Case – Growth focused allocators, hybrid infrastructure funds

LP FLEXIBILITY LAYERS

CONFIGURING ENTRY POINTS AND RISK PREFERENCES FOR DIFFERENT ALLOCATORS

- 3. Senior Yield Layer
  - Exposure - Operating mines, logistics, and infrastructure assets
  - Tenor - 36–84 months
  - Return Profile - 10–18% IRR with stable cash flows
  - Risk Type - Operational and commodity price risk (hedged)
  - Use Case - Pensions, DFIs, insurance companies seeking steady yield
- 4. Co-GP Participation Layer
  - Exposure - Blended access across all nodes, co-investment rights, or SMA entry
  - Return Profile - Weighted average of all layers
  - Flexibility - LPs choose blend ratios to match internal benchmarks and liquidity mandates
- Key Insight for LPs
  - The platform allows capital to be custom paced, not fixed in fund vintages.
  - Each LP can align tranche exposure with their own ALM (asset liability management) constraints.
  - Returns scale with risk acceptance but always within the same transparent governance and reporting framework.
- Strategic Benefit

  This modular structure transforms SKGP from a static investment vehicle into an adaptive capital ecosystem where LPs can dial exposure, compounding velocity, and yield tenor according to their mandate.

RISK BUDGET AND EXPECTED SHORTFALL

MEASURING AND ALLOCATING RISK CAPITAL ACROSS THE PLATFORM

- For LPs

  Institutional capital requires explicit control of downside exposure.

  SKGP measures portfolio risk through Expected Shortfall (ES95), the mean loss in the worst 5 percent of outcomes and then allocates risk capital to each node based on its contribution to that shortfall.

  This method, standard in banking and pension risk frameworks, ensures capital discipline and consistent portfolio-level loss ceilings.

- Expected Shortfall Formula

  $ES95 = E[L \mid L > VaR95]$

- Meaning - the average loss if the portfolio loss L exceeds its 95 percent Value at Risk.

- Risk Capital Allocation

  $RC_i = w_i \times (\partial ES / \partial w_i)$

- Where

  w_i = weight of node i in the portfolio

  $\partial ES / \partial w_i$ = marginal contribution of node i to overall Expected Shortfall

RISK BUDGET AND EXPECTED SHORTFALL

MEASURING AND ALLOCATING RISK CAPITAL ACROSS THE PLATFORM

- Rebalancing Rule

  If $RC_i > RC_{max}$ (the allowed risk budget for any node), reduce position i until compliance is restored.

- Interpretation
  - Each node consumes a measurable portion of the platform's total downside capacity.
  - Rebalancing ensures concentration risk never exceeds the system's governance limits.
  - This approach replaces subjective gut feel sizing with transparent quantitative discipline.

- Institutional Implication

  Risk budgeting allows SKGP to report risk adjusted performance, return per unit of shortfall comparable to Sharpe or Information ratios used by endowments and sovereign funds.

AUM GROWTH SIMULATION

PROJECTING SYSTEM LEVEL COMPOUNDING UNDER DIFFERENT MARKET CONDITIONS

- Deterministic Baseline Model

  $AUMt = A0 \times e^{((r - \delta) \times t)}$

  - A0 = initial AUM
    r = average return rate
    δ = attrition rate (losses, redemptions, or frictional costs)
    t = time in years

- Interpretation
  - Provides the smooth steady state projection often used in long term policy studies.
  - Useful for comparing base case AUM growth against stochastic simulations.

AUM GROWTH SIMULATION

PROJECTING SYSTEM LEVEL COMPOUNDING UNDER DIFFERENT MARKET CONDITIONS

- Stochastic Simulation Model
  $AUM_{t+1} = AUM_t \times (1 + r_t - \delta_t + v_t)$
  - r_t = random return draw, normally distributed $N(\mu_r, \sigma_r^2)$
    δ_t = time varying attrition
    v_t = recycle velocity (term capturing capital flow through)
- v_t follows a mean reverting AR(1) process
  $v_{t+1} = \rho \times v_t + (1 - \rho) \times \bar{v} + \varepsilon_t$
  where ρ is persistence ($0 < \rho < 1$) and ε_t is white noise.
- Simulation Purpose
  - Produces probability bands for AUM growth instead of single point forecasts.
  - Allows stress testing of liquidity under multiple recycling and return conditions.
  - Provides inputs for expected shortfall and risk budget models.
- Example Result
  After 10 years, 95 percent confidence band for AUM ranges between 1.4× and 2.3× initial capital, depending on velocity persistence and loss management.

CAPITAL ALLOCATION SURFACE
OPTIMIZING PORTFOLIO WEIGHTS FOR RISK-ADJUSTED RETURN

- Objective Function
  Maximize expected utility of returns
  $U = E[R] - \frac{1}{2} \lambda \times \sigma P^2$
  - $E[R]$ = expected portfolio return
    σP^2 = portfolio variance
    λ = risk aversion parameter
- Lagrangian Formulation
  $L = \Sigma\, wi\, E[Ri] - \frac{1}{2} \lambda\, wi^T\, \Sigma\, wi - \gamma\, (\Sigma\, wi - 1)$
  - Where Σ is the covariance matrix of returns and γ is the constraint multiplier enforcing $\Sigma\, wi = 1$.

CAPITAL ALLOCATION SURFACE

OPTIMIZING PORTFOLIO WEIGHTS FOR RISK ADJUSTED RETURN

- Optimal Weights Solution
  $w^* = (1 / \lambda) \times \Sigma^{-1} \times (E[R] - \gamma \times 1)$
- Interpretation
- This represents the classical mean variance efficient frontier.
  - λ governs how aggressively the portfolio trades return for risk
    • High λ → defensive, low volatility allocation
    • Low λ → growth oriented, convex allocation
  - In practice, SKGP extends this framework to multi layer real asset portfolios where Σ captures both commodity and jurisdictional covariances.
- Allocator View
  - The surface plot of expected return vs volatility defines feasible allocations under institutional constraints.
  - LPs can select their operating point based on liquidity tolerance and mandate.

TAIL RISK CONTROL VIA TRANCHE HIERARCHY

STRUCTURING TRANCHES TO CAP LEFT TAIL LOSSES

- Concept

  Each tranche has a defined loss budget that limits the impact of worst case scenarios on total portfolio NAV.

  Capital advancement is gated by milestones, so probabilistic failures stop early before losses compound.

- Portfolio Level Loss Budget

  $L95 = \Sigma\ wk \times L95,k$

  - Where L95,k = 95th-percentile loss estimate for tranche k, and wk = its portfolio weight.

- Control Mechanisms
  - Cap loss budget per tranche (exploration ≤ 35%, development ≤ 20%, yield ≤ 10%).
  - Trigger automatic pause or sale if a tranche approaches its limit.
  - Reallocate to higher security assets or hold cash until volatility normalizes.

Simulation Results

- Left tail (loss beyond 95th percentile) reduced to roughly 0.2 times baseline through gating and staged deployment.
- Early exits (data sales or JVs) convert uncertainty into cash collateral, reducing exposure to deep loss events.

Allocator Meaning

- Tranche discipline translates into structural capital protection without needing external guarantees.
- Risk hierarchy ensures systemic solvency under extreme stress while preserving compounding capability.
- Institutional investors gain comfort that no single failure can jeopardize platform level continuity.

COMPOUNDING ACROSS JURISDICTIONS
MEASURING CROSS JURISDICTION GROWTH AND DIVERSIFICATION EFFECTS

- For LPs
  SKGP operates across multiple jurisdictions, each with unique growth rates, risk profiles, and governance scores.
  Jurisdiction level compounding captures how diversified capital exposure across countries stabilizes the platform’s overall AUM growth while maintaining convex upside.
- Weighted Platform Growth Equation
  $G_{platform} = \Sigma (w_j \times g_j) - \frac{1}{2} \Sigma (w_j^2 \times \sigma_j^2)$
- Variable Explanation
  g_j = expected annualized growth rate for jurisdiction j
  σ_j = standard deviation of returns (jurisdictional risk)
  w_j = capital weight in jurisdiction j
- Interpretation
  - The first term, $\Sigma (w_j \times g_j)$, represents weighted average growth across jurisdictions.
  - The second term, $\frac{1}{2} \Sigma (w_j^2 \times \sigma_j^2)$, represents the volatility penalty that reduces compounded growth.
  - This formulation mirrors geometric mean adjustments used in long term capital growth models (FCLT Global framework).

COMPOUNDING ACROSS JURISDICTIONS

MEASURING CROSSJURISDICTION GROWTH AND DIVERSIFICATION EFFECTS

- Diversification Measurement
  Diversification benefit = ΔES_pre – ΔES_post

  ΔES_pre - Expected Shortfall before diversification (single jurisdiction exposure)
  ΔES_post - Expected Shortfall after diversification

- A positive ΔES_pre – ΔES_post means diversification has reduced left tail exposure, proof that spreading across multiple jurisdictions enhances systemic resilience.

- Allocator View
  - Jurisdictional diversification is measurable through reduced expected shortfall and higher compound growth.
  - Capital discipline requires maintaining jurisdictional exposure ceilings and correlation thresholds.
  - This forms the geopolitical equivalent of sector diversification in traditional portfolios.

DYNAMIC REINVESTMENT LOGIC

MODELING FEEDBACK BETWEEN RECYCLE VELOCITY AND AUM GROWTH

- Recycle Velocity Feedback Function
  $v_{t+1} = \rho_v \times v_t + \eta_t$

- Variable Explanation
  - v_t = recycle velocity at time t (rate of capital turnover)
  - ρ_v = persistence coefficient ($0 < \rho_v < 1$), ensures mean reversion
  - η_t = innovation term representing stochastic shocks (policy delays, market cycles, etc.)

- Interpretation
  - v_t behaves like a self correcting process, capital recycling accelerates in stable markets but slows during volatility.
  - This prevents overshooting, a natural brake on excessive reinvestment in overheated cycles.
  - The system continuously recalibrates how much capital should flow forward versus remain idle or reserved.

DYNAMIC REINVESTMENT LOGIC

MODELING FEEDBACK BETWEEN RECYCLE VELOCITY AND AUM GROWTH

- Impact on Compounded AUM
  $AUM_T = A_0 \times \Pi_t (1 + r_t + v_t - \delta_t)$

- Where
  r_t = average project level return at time t
  δ_t = capital attrition or drawdown at time t
  v_t = recycle velocity

- Interpretation
  - AUM growth depends jointly on realized returns, reinvestment speed, and loss discipline.
  - This recursive relationship mirrors compounding in self funding ecosystems.
  - LPs can visualize it as a self reinforcing cycle where recycling velocity amplifies returns but is bounded by governance and loss control thresholds.

- Allocator Insight
  Dynamic feedback modeling gives institutions visibility into expected liquidity pacing and compounding paths, similar to portfolio glide paths in endowment management but with live operational feedback.

SUPPLY DEMAND TIMING MODEL

CAPTURING COMMODITY CYCLE CONVEXITY AND ENTRY TIMING

- Commodity Cycle Phase Indicator
  $\phi i(t) = (\text{Inventories\_t} / \text{5y\_Avg}) - (\text{CapEx\_t} / \text{5y\_Avg})$
- Interpretation
  - $\phi i(t)$ measures relative supply tightness.
  - High inventories and high CapEx → oversupply (bear phase).
  - Low inventories and low CapEx → deficit phase (bullish setup).
  - This signal mirrors frameworks used in commodities risk premium and asset allocation studies.
- Entry Convexity Metric
  $CVXi = -\partial^2 Pi / \partial \phi i^2 > 0$
- Meaning
  When the second derivative of price with respect to the supply demand indicator is positive, the environment exhibits convex upside, small changes in ϕi produce large price effects.

SUPPLY DEMAND TIMING MODEL

CAPTURING COMMODITY CYCLE CONVEXITY AND ENTRY TIMING

- Allocator Application
  - SKGP targets entry during high convexity phases (deficits + low CapEx).
  - This captures asymmetric payoffs while controlling downside exposure.
  - Timing logic ensures capital enters before macro rotation, converting market dislocation into compounding opportunity.
- Integration with Platform Strategy
  - ϕi(t) becomes a leading input for both exploration allocation and exit timing.
  - Combined with jurisdictional risk (Ji, Li), it defines the optimal point on the multi commodity frontier maximizing return for each marginal unit of system risk.
- Institutional Meaning

  This converts macro cycle exposure from subjective intuition into a measurable timing variable that can be reported, audited, and simulated, aligning with institutional decision processes.

VALUATION STACK PER NODE

FROM CASH FLOW TO PLATFORM NAV MULTI LAYER VALUATION FRAMEWORK

- 1. Operating Mines (Cash Flow Driven)
  $V = CF \times (1 + r)^t + ResidualValue$
- CF = projected annual cash flow from production
  r = discount rate or yield expectation
  t = forecast horizon in years
  $ResidualValue$ = salvage or continuing value after t
- Interpretation
  - Standard discounted cash flow (DCF) approach adjusted for risk premiums and commodity price expectations.
  - Residual value captures infrastructure reuse, offtake contracts, or sale of processing assets.
- 2. Pre-Yield Assets (Probabilistic Value)
  $V = p \times NAVnext - Capspent$

  p = probability of success at next gate
  $NAVnext$ = expected value after milestone completion
  $Capspent$ = total capital already deployed
- Interpretation
  - Represents Bayesian valuation logic, expected value updates as new information arrives.
  - Aligns with probabilistic resource estimation frameworks used in exploration finance.

VALUATION STACK PER NODE

FROM CASH FLOW TO PLATFORM NAV MULTI LAYER VALUATION FRAMEWORK

- 3. Total Platform NAV

  NAVtotal = Σ Vi (across all nodes i)

- 4. Write Up / Write Down Rules
  - After each milestone or gate, update Vi using Bayesian posterior expectation
    EVnew = EVprior + (Weight × (Observed − Expected))
  - Write ups occur only after independent verification (assays, permits, offtake contracts).
  - Write downs are immediate upon failure or loss of economic viability.
- Allocator Meaning
  - Ensures NAV reflects verifiable progress, not speculative revaluation.
  - Produces a transparent valuation stack suitable for third party audit, rating agency review, or DFI participation.
  - Enables consistent mark to model reporting, similar to real asset valuation policies under IFRS or institutional accounting frameworks.

VALUATION STACK PER NODE

FROM CASH FLOW TO PLATFORM NAV MULTI LAYER VALUATION FRAMEWORK

- Strategic Summary for LP’s
  - Cross jurisdiction compounding spreads geopolitical risk while maintaining yield velocity.
  - Dynamic reinvestment logic regulates pacing and prevents systemic overextension.
  - Supply demand timing converts macro dislocation into alpha generating convex entries.
  - The valuation stack translates probabilistic milestones into auditable NAV growth.
  - Together, these complete the mathematical and operational backbone of SKGP’s Strategic Partners institutional investment architecture, converting complex, cyclical, jurisdictional, and operational risk into structured, repeatable, and measurable return systems.

LP ALLOCATION SPECTRUM

HOW LPS SELECT EXPOSURE ACROSS THE PLATFORM'S RETURN SURFACE

- For LPs
  Not all allocators share the same liquidity tolerance or return objective.
  The SKGP platform allows LPs to allocate along a continuous return surface where each layer offers distinct profiles of IRR, volatility, and recycle velocity.
  This design replaces the rigid one fund for all model with flexible, modular entry points that adapt to institutional mandates.
- Allocation Spectrum
- Early Optionality Layer
  - Focus: Convexity, early exploration, license acquisition
  - Typical IRR: 40–60%
  - Volatility (σ): High (0.35–0.50)
  - Recycle Ratio (Rcyc): 0.2–0.3 within 18–24 months
  - Characteristics: Short tenor, information optionality, high learning rate
- Mid Term Yield + Growth Layer
  - Focus: Development, pre-production, streaming, or infrastructure buildout
  - Typical IRR: 25–35%
  - Volatility (σ): Moderate (0.20–0.30)
  - Recycle Ratio (Rcyc): 0.4–0.6 within 36 months
  - Characteristics: Balanced between capital appreciation and income yield

LP ALLOCATION SPECTRUM

HOW LPS SELECT EXPOSURE ACROSS THE PLATFORM'S RETURN SURFACE

- Senior Infrastructure Layer
  - Focus: Operating mines, logistics corridors, or long-term offtake contracts
  - Typical IRR: 10–18%
  - Volatility (σ): Low (0.10–0.15)
  - Recycle Ratio (Rcyc): 0.6–0.8 over 3–5 years
  - Characteristics: Lower convexity but stable, yield driven compounding
- Allocator Insight
  Each layer maps to a different institutional profile
  - Pensions or insurance LPs → senior yield focus
  - DFIs and sovereign investors → mid term balanced layer
  - Family offices and PE style investors → early optionality for convex upside
  - The platform thus acts as a single ecosystem spanning early alpha generation to mature income, all governed by the same repo rting and risk discipline.

PLATFORM VS. PRIVATE-EQUITY COMPARISON
HOW THE SKGP MODEL DIFFERS FROM TRADITIONAL BUYOUT FUNDS

- Interpretation
    - Traditional PE relies on brand and management arbitrage. SKGP relies on structural, jurisdictional, and timing arbitrage.
    - Commodities are decomposable, their value is physical, not narrative.
    - Rolling exits through streaming, data sales, and refinancing create a continuous compounding loop instead of a single fund maturity.
    - The model enables permanent capital dynamics within a regulated institutional framework.
- Allocator Benefit
  Exposure to the real asset base layer of the economy without exposure to equity market beta.

Metric	PE Buyouts	SKGP Resource Platform
Asset Type	Companies (brand dependent)	Commodities and infrastructure (decomposable)
Value Driver	EBITDA growth through leverage	NAV progression and flow optionality
Exit Path	M&A, IPO, recapitalization	Multi-path, data sale, JV, refinancing, yield retention
Market Correlation	High correlation to equities	Low or counter cyclical to equities and credit
Asset Risk	Dependent on management quality and brand	Driven by commodity cycle, jurisdiction, and infrastructure quality
Liquidity Pacing	Fund bounded (10 year lockups)	Node bounded (rolling exits and reinvestment)

GOVERNANCE, REPORTING, AND ENDGAME ARCHITECTURE

HOW QUANTIFIED GOVERNANCE ANCHORS INSTITUTIONAL CREDIBILITY

- Governance and Reporting Framework
- Reporting Cadence
  - Monthly operations report (quantitative and ESG metrics)
  - Quarterly investment committee memorandum (valuation and pacing)
  - Semi annual third party audit and verification
- Monitored Metrics
  - Δp per gate (probability progression), recycle ratio, ES95, jurisdiction drift (Ji changes), ESG and health and safety events
- Governance Quantification
  - Governance Score = (Reports Submitted / Expected Reports) × 100%
- Interpretation
  - Governance Score measures procedural compliance — the metronome of institutional reliability.
  - Quantifying governance transforms a subjective metric into a measurable system variable, integrating into platform dashboards.

ENDGAME-INSTITUTIONAL COMPOUNDING ENGINE

LONGTERM LIMIT STATE – THE PLATFORM AS A PERMANENCAPITAL ECOSYSTEM

- As Time Approaches Infinity
  $\lim (t \to \infty) AUMt = A0 \times e^{((\bar{r} + v - \delta) \times t)}$
- Meaning
  - $\bar{r}$ = structural return rate across assets
  - v = long run recycle velocity
  - δ = steady state attrition or loss rate
  - This defines the asymptotic growth path of a mature capital engine, where inflows are no longer required for scale.
- Structural Composition in Steady State
  - Some nodes evolve into steady cash yield mines producing ongoing distributions.
  - Some nodes are sold or refinanced for NAV uplift and redeployed elsewhere.
  - Some nodes act as perpetual feeders, seeding new jurisdictions and commodities.

ENDGAME-INSTITUTIONAL COMPOUNDING ENGINE

LONGTERM LIMIT STATE – THE PLATFORM AS A PERMANENT CAPITAL ECOSYSTEM

- Outcome

  Continuous compounding, jurisdictionally diversified exposures, and a durable permanent capital base capable of producing allocator grade returns independent of equity or credit cycles.

- Institutional Endgame Vision

  SKGP matures into a self sustaining compounding engine, one that merges operational diversification, jurisdictional balance, and capital velocity into a unified ecosystem of permanent, transparent, and repeatable growth.

PERFORMANCE ATTRIBUTION FRAMEWORK

BREAKING DOWN RETURNS INTO STRUCTURAL, TACTICAL, AND VELOCITY COMPONENTS

- For LPs

  Understanding where returns come from is central to institutional accountability.

  SKGP decomposes realized performance into three measurable layers, structural alpha, tactical cycle capture, and velocity dri ven compounding.

  Each is tracked quantitatively so LPs can isolate durable value creation from cyclical or timing based effects.

- Attribution Decomposition
- Total Return (Rt) = Structural + Tactical + Velocity + FX + Friction
- Where
  - Structural (Rs) Long term return from NAV accretion, mine build-out, and jurisdictional compounding.
  - Tactical (Rtac) Cycle timing and supply demand positioning captured via ϕi(t) and CVXi indicators.
  - Velocity (Rvel) Incremental uplift from capital recycling ($vt \times \bar{r}$).
  - FX Currency translation effects across jurisdictions.
  - Friction Losses, carry costs, and administrative drag (δt).

PERFORMANCE ATTRIBUTION FRAMEWORK

BREAKING DOWN RETURNS INTO STRUCTURAL, TACTICAL, AND VELOCITY COMPONENTS

- Formula Representation

  Attribution Share i = (ΔComponent i / ΔTotal Return) × 100 %

- Interpretation
  - Structural alpha demonstrates quality of platform design and jurisdictional selection.
  - Tactical alpha captures timing and market intelligence.
  - Velocity alpha shows operational efficiency and reinvestment discipline.
- Allocator View

  Quarterly reports will show attribution tables breaking each node’s performance into these categories.

  This makes SKGP analyzable with the same rigor as multi asset or hedge fund portfolios.

COST OF CAPITAL AND WEIGHTED PERFORMANCE METRICS

INTEGRATING REAL ASSET CAPITAL COSTS AND RETURN EFFICIENCY

- 1. Weighted Cost of Capital (WACC)
  $WACC = (E / V) \times Re + (D / V) \times Rd \times (1 - T)$
  - Where:
    E = equity capital
    D = debt or structured credit
    V = total capital (E + D)
    Re = cost of equity (expected LP hurdle rate)
    Rd = cost of debt (weighted average borrowing rate)
    T = jurisdictional tax rate
- Interpretation
  - Each jurisdiction carries a unique cost of capital based on its fiscal regime and risk premium.
  - Weighted across nodes, this yields a platform level hurdle rate.
- 2. Weighted Internal Rate of Return (IRR)
  $IRR_{weighted} = \Sigma (w_i \times IRR_i)$
  - Each node's IRR is weighted by its deployed capital.
    Comparing IRRweighted to WACC measures how efficiently the platform exceeds its blended capital cost.

COST OF CAPITAL AND WEIGHTED PERFORMANCE METRICS

INTEGRATING REAL ASSET CAPITAL COSTS AND RETURN EFFICIENCY

- 3. Risk-Adjusted Return Metrics
  - Sharpe = (E[R] − Rf) / σP
    Sortino = (E[R] − Rf) / σDown
    Information = (E[Rp − Rb]) / Tracking Error
  - Rf = risk free rate; σP = portfolio volatility; σDown = downside deviation.
- Allocator Interpretation
  - SKGP's excess return above WACC defines intrinsic value creation, similar to economic profit models in PE but grounded in real asset flows.
  - Sharpe and Sortino ratios are tracked quarterly and benchmarked against inflation linked infrastructure indices.
  - This permits direct comparability to other institutional real asset programs.
- 4. Sensitivity Mapping
  Scenario analysis is run for ±10 % shifts in
  • commodity prices (Si)
  • recycle velocity (vt)
  • attrition rates (δt)
  • cost of capital (WACC)
  These generate elasticities for each variable's contribution to long term AUM compounding.

INSTITUTIONAL SUMMARY AND END-STATE INTEGRATION
CONVERGING CAPITAL, OPERATIONS, AND GOVERNANCE INTO A SCALABLE ENGINE

- For LPs

  The SKGP system evolves into an allocator grade platform that merges infrastructure logic with financial engineering discipline. By converting resource exposure into structured, measurable capital loops, it achieves continuous compounding and jurisdictional diversification under institutional governance.

- End State Architecture
  - Capital Layer – diversified LP structures, SMA and co-GP options, rolling commitments.
  - Operational Layer – multi jurisdictional assets managed through probability gated milestones.
  - Velocity Layer – capital recycling system driving organic AUM growth.
  - Governance Layer – quantified reporting cadence, third party verification, and ESG integration.
- Unified Equation of Continuity
  - Platform Performance ≈ Structural Return + Velocity Feedback − Attrition + Governance Stability
  - As attrition (losses, slippage) declines and governance stability rises, the feedback loop becomes self sustaining.

INSTITUTIONAL SUMMARY AND END STATE INTEGRATION

CONVERGING CAPITAL, OPERATIONS, AND GOVERNANCE INTO A SCALABLE ENGINE

- Institutional Takeaways
  - Transparency - Quantitative, repeatable metrics replace subjective valuation.
  - Resilience - Jurisdictional diversification and tranche gating suppress systemic drawdowns.
  - Scalability - Modular architecture allows expansion across commodities, countries, and capital types.
  - Permanence - Continuous recycling and yield reinvestment form a self replenishing capital base, a permanent capital compounder.
- Closing Frame
  For allocators, SKGP represents a system of capital rather than a series of funds .An ecosystem designed to evolve, compound, and persist.
  The goal is simple but structural, translating resource optionality into institutional compounding through data, discipline, and velocity.