

The National Energy Bank

A Self-Financing Solution to the UK's
Curtailment Crisis and a Cornerstone
of National Energy Security

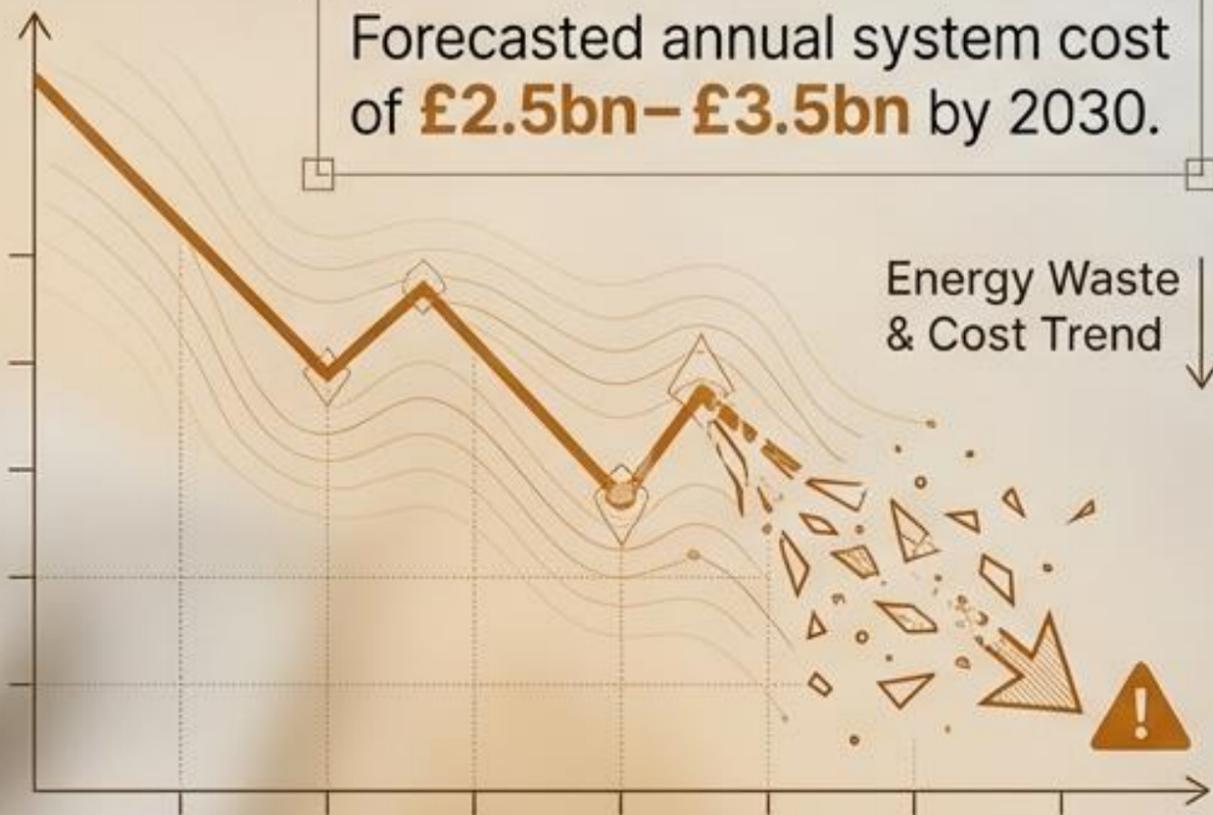


A Policy and Financial Prospectus for HM Treasury

The £3.5 Billion Drain

8.3 TWh of clean energy wasted in 2024 (enough for 2M homes).

Forecasted annual system cost of **£2.5bn – £3.5bn** by 2030.

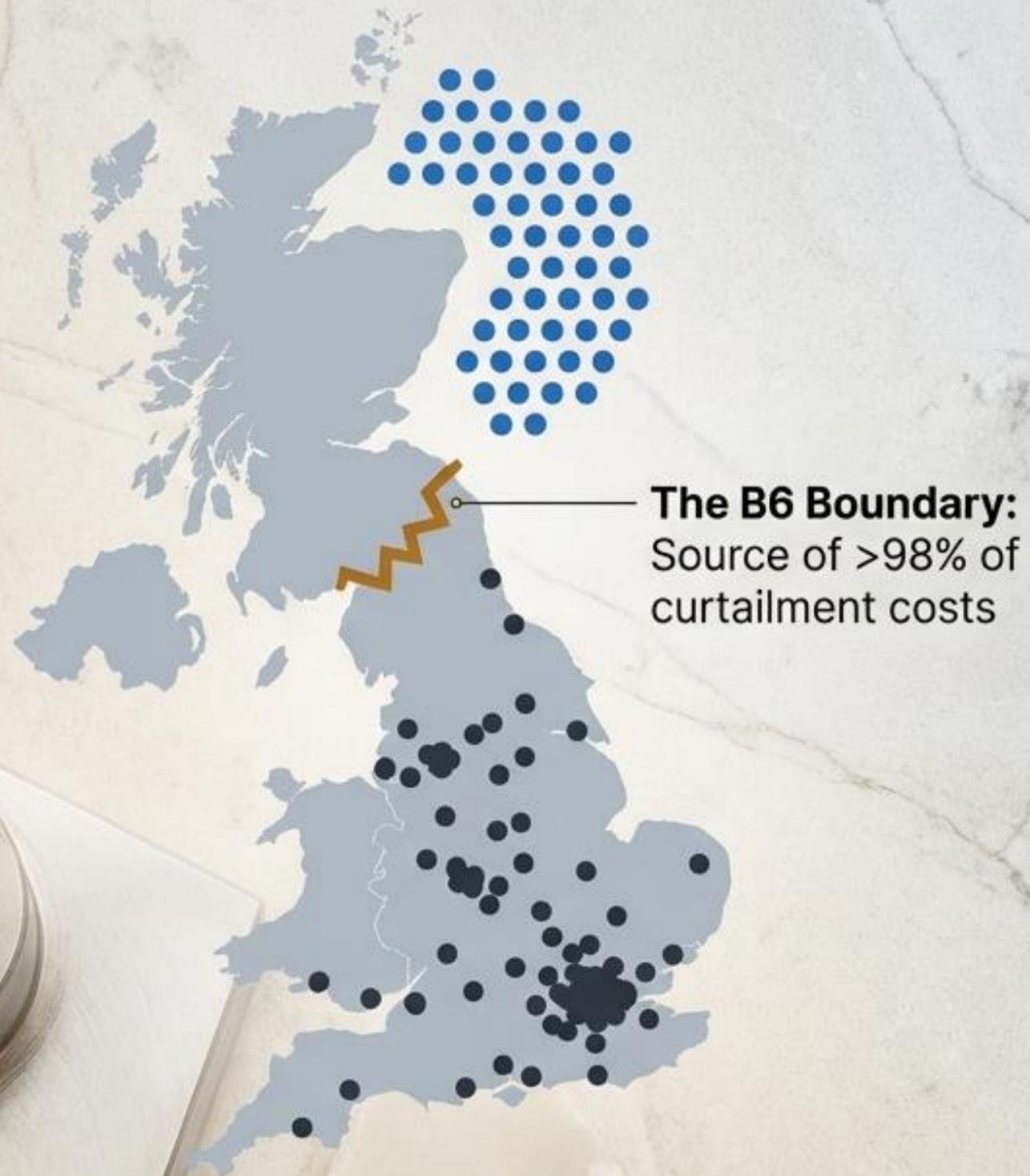


The Sovereign Engine

A **£940M** strategic fleet of Heat Vaults.

Financed entirely by private debt via HM Treasury guarantee. **Zero net capital outlay** from the Exchequer.



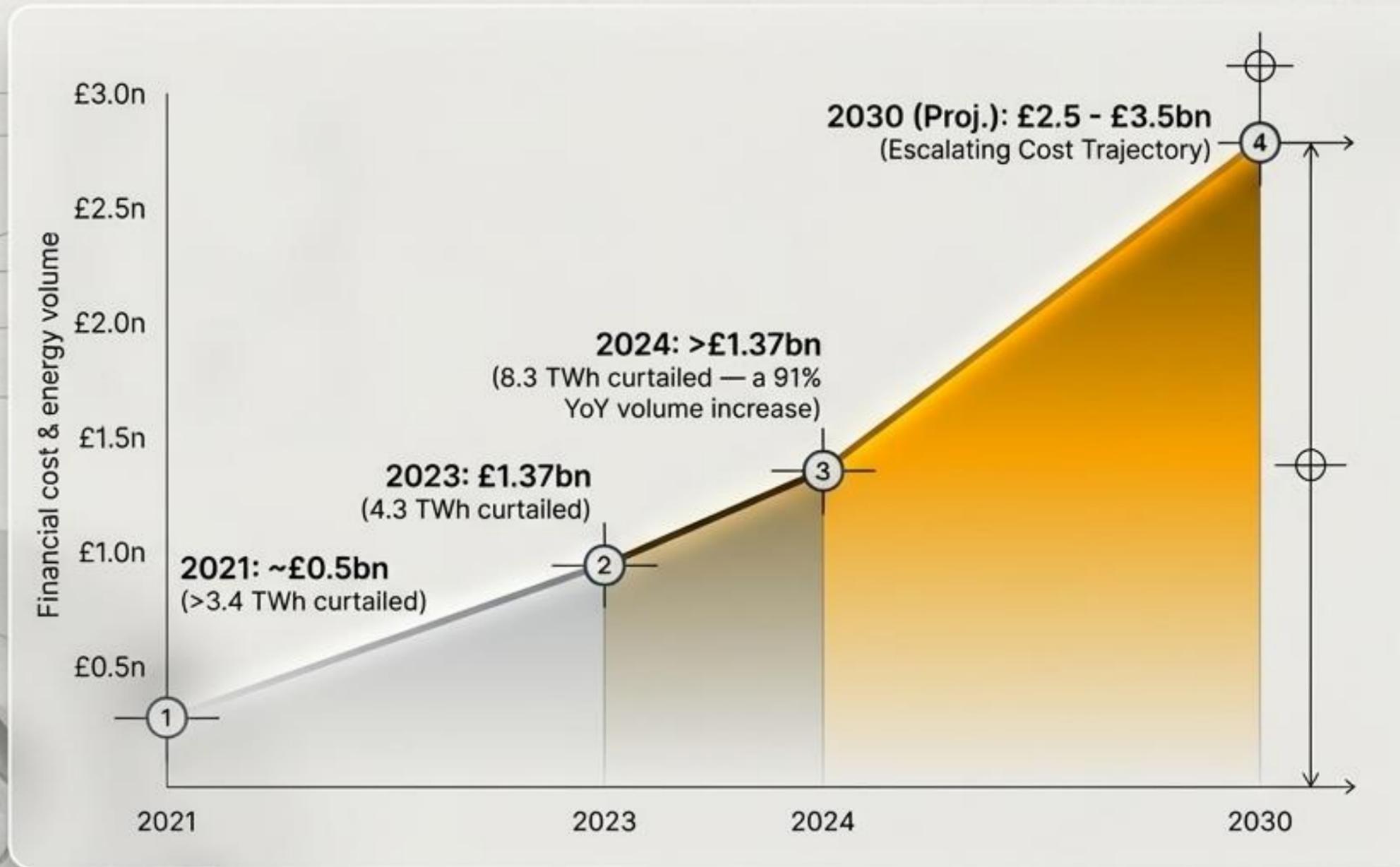


The Anatomy of a Constraint

The national grid, a legacy system, physically cannot transport peak northern renewable generation to southern demand centres.

When physical limits are reached, the system operator (NESO) must intervene to prevent blackouts.

The Escalating Cost of Inaction



NESO warns of a cumulative £16 billion burden on consumers by 2030 if no action is taken.

This is not just an operational issue; it is a systemic economic drain.

The Absurdity of the Balancing Mechanism

**Constraint
Event**



Pay Wind to Stop

Inter Regular
Accounts for ~24% of constraint costs.



Pay Gas to Start (The "Second Payment")

Inter Regular
Accounts for ~76% of constraint costs. Driven by volatile wholesale gas prices.

The Seagreen Anomaly

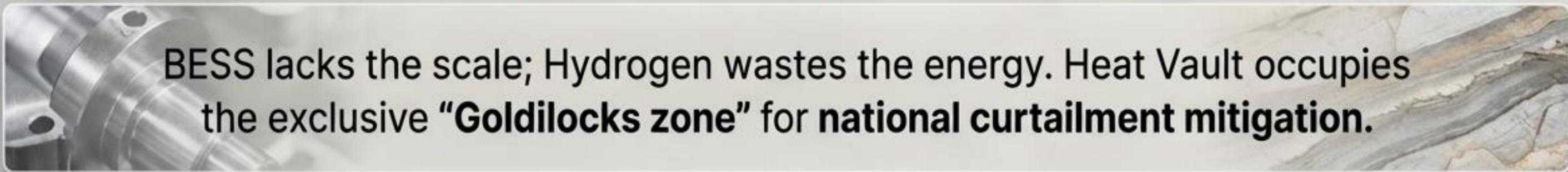
In 2024, the Seagreen wind farm deferred its £55/MWh CfD to operate on a merchant basis, capturing £367M and delivering power at an effective cost to the consumer of £270/MWh.

Conclusion: The current market actively rewards capital investment in grid congestion.



Core Argument: Any solution failing even one of these pillars is mathematically or economically incapable of acting as the National Energy Bank.

BESS (Lithium-Ion)	Green Hydrogen (Salt Caverns)	The Heat Vault (GTES)
⚠ Fails on Duration (1-4 hours typical)	⚠ Fails on Efficiency (30-40% RTE — — wastes 60-70% of energy)	✔ Passes on Duration (Days to Seasonal)
⚠ Fails on LCOS for long-duration (>£250/MWh due to scaling energy capacity costs)	⚠ Fails on Geography (Requires specific salt caverns in England, disconnected from Scottish wind)	✔ Passes on Efficiency (~75% RTE)
⚠ Fails on Lifespan (10-15 years, requires battery replacement)	⚠ High LCOS (>£200/MWh)	✔ Passes on Geography (Sited anywhere with suitable rock) ✔ Passes on LCOS (£100-£150/MWh)


 BESS lacks the scale; Hydrogen wastes the energy. Heat Vault occupies the exclusive **“Goldilocks zone”** for **national curtailment mitigation.**

The Heat Vault: Geological Thermal Energy Storage (GTES)

A National Energy Bank Within the Earth



Market Credibility: TRL 9 Achieved. Validated by a fully operational 1-2 GWh renewables-connected showcase facility in Western Sweden. Protected by a global patent portfolio.



**[HM Treasury
Infrastructure
Guarantee]**

+

**[Institutional
Debt
Financing]**

=

**[£940M
CAPEX Fully
Funded]**

The Catalyst

The guarantee is a signaling mechanism, not a subsidy. It provides the "bankability" required to unlock large-scale, low-cost institutional capital (pension funds, insurance).

Zero Cost to Exchequer

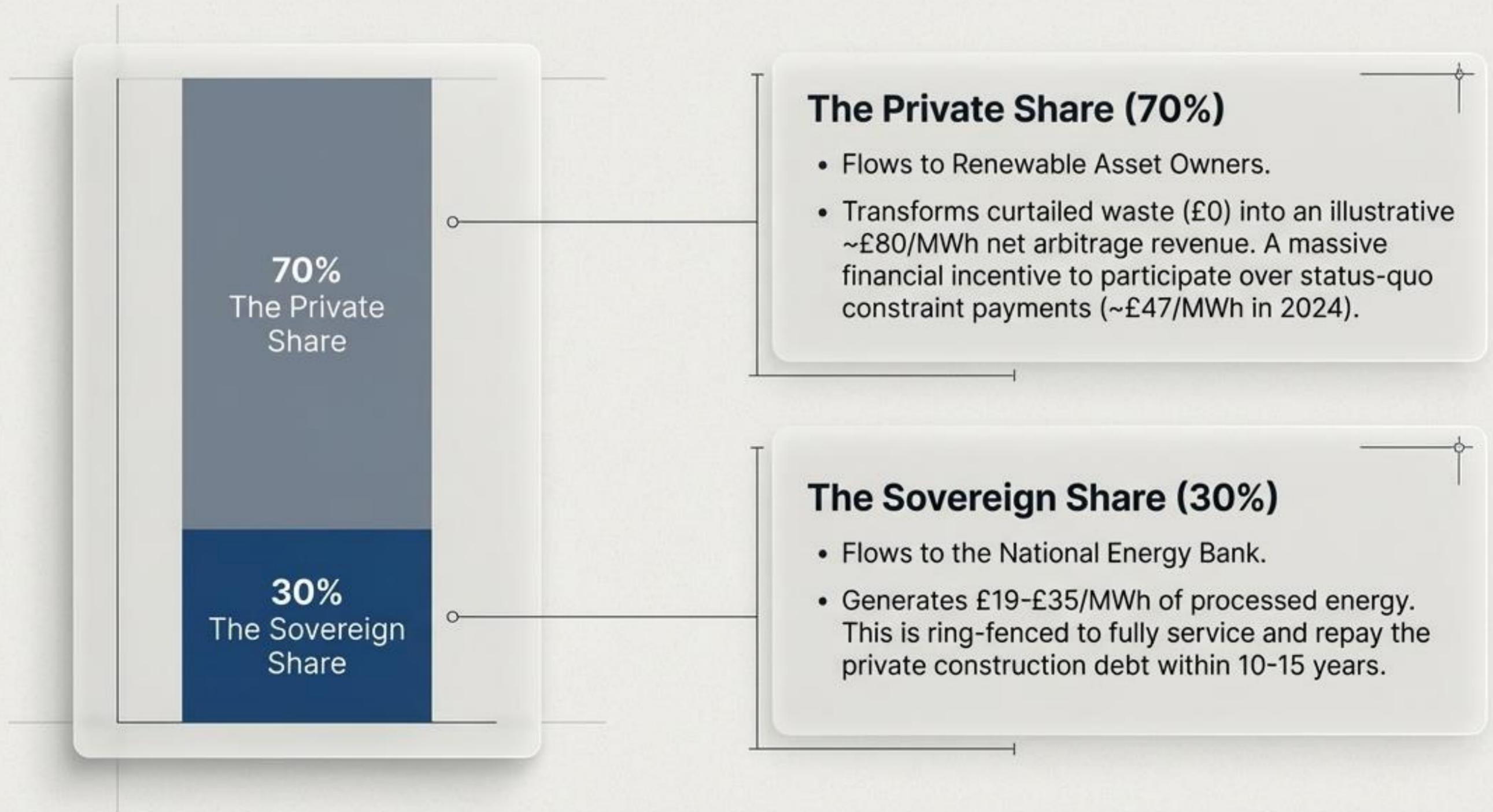
The project is 100% self-financing through operational revenues. No direct government grants or capital outlays are requested.

The ROI

A one-time underwriting of £940M eradicates a recurring £2.5B–£3.5B annual economic drain.

Effective payback period on avoided system costs: <1 Year.

Phase 1: De-risking & Debt Service (Years 1-12)

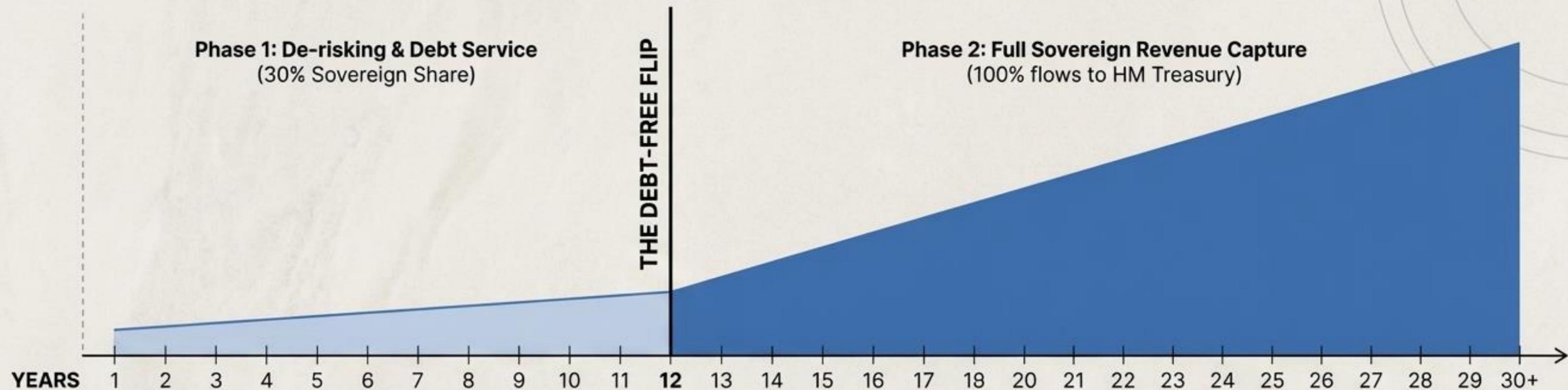


The Private Share (70%)

- Flows to Renewable Asset Owners.
- Transforms curtailed waste (£0) into an illustrative ~£80/MWh net arbitrage revenue. A massive financial incentive to participate over status-quo constraint payments (~£47/MWh in 2024).

The Sovereign Share (30%)

- Flows to the National Energy Bank.
- Generates £19-£35/MWh of processed energy. This is ring-fenced to fully service and repay the private construction debt within 10-15 years.



Fixed Share Outcome

£450 M



Cumulative Revenue
(100% Private Share)

Tapered Model Outcome

£1,050 M



Cumulative Revenue
(100% Sovereign Share)

+133% Increase in Government Revenue

CORE INSIGHT: The government inherits a fully operational, de-risked, and debt-free strategic asset, creating a perpetual Sovereign Wealth pipeline **funded entirely by the monetisation of waste.**



Ready for the 2025 LDES 'Cap and Floor' Allocation

	Minimum Duration (>8 hrs)	Exceeds. Heat Vault provides multi-day to seasonal storage.
	Technology Readiness (TRL 9)	Meets. Validated by the GWh-scale Swedish showcase.
	Minimum Capacity (>100 MW)	Exceeds. Designed specifically for grid-scale bottleneck deployment.
	Contribution to Net Zero	Meets. Replaces carbon-intensive gas backup with zero-carbon dispatchable power.

Takeaway: The National Energy Bank is the ideal first-mover for Stream 1 of the Cap and Floor scheme.



The Fiscal Imperative

- ❑ Eradicate a projected £3.5B annual economic drain.
 - ❑ Secure TWh-scale, TRL 9 energy security infrastructure.
 - ❑ Create a permanent, revenue-generating Sovereign Wealth asset.
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Issue the national infrastructure guarantee. Unlock the institutional capital. Build the National Energy Bank at zero cost to the taxpayer.