HM TREASURY

Infrastructure and Projects Authority • Public Spending Directorate

Carbon Free Future Programme

Gated Pathway Endorsement

Senior Analyst Recommendation to the Chancellor of the Exchequer

OFFICIAL — SENSITIVE (FISCAL)

Reference: HMT/CFF/2026/ENDORSE-001

April 2026 • Version 1.0

Based on CFF Full Business Case V2.0 & Government White Paper V2.0

✔ ENDORSED FOR STAGE 1

HMT Submission: Gated Pathway Endorsement

TO	Chancellor of the Exchequer
FROM	Senior Analyst, Infrastructure & Public Spending
SUBJECT	Endorsement of Carbon Free Future (CFF) Gated Pathway — Stage 1 (Demonstrator Phase)
DATE	April 2026
CLASSIFICATION	OFFICIAL — SENSITIVE (FISCAL)
REFERENCE	HMT/CFF/2026/ENDORSE-001
BASIS	CFF Full Business Case V2.0 (Green Book Five Case Model) & Government White Paper V2.0

Recommendation: Endorse the CFF White Paper for the introduction of a National Energy Sovereignty Act, but restrict the initial financial and statutory commitment to **Stage 1 (Demonstrator Phase)** only.

1. Why the Decision Has Shifted from "Reject" to "Gated Endorsement"

The Version 2.0 papers represent an "honest" business case. In April 2026, the CFF programme team submitted revised papers that directly addressed every concern raised in the Treasury's initial assessment of Version 1.0. The key methodological improvements are:

1.1 Green Book Compliance Restored

By applying a **+40% central cost uplift** (Flyvbjerg reference-class methodology) to account for First-of-a-Kind (FOAK) nuclear risk, and by removing £500bn+ of fiscal transfers (tax revenue and welfare savings) from the Benefit-Cost Ratio numerator, the team has produced a bankable BCR of **2.1–2.8**.

> **Assessment:** A BCR of 2.1–2.8 sits firmly in the HM Treasury "High Value for Money" category, even when assuming significant cost overruns. The central BCR of 2.4 (including option value) exceeds the threshold for major infrastructure programmes. For comparison, HS2 Phase 1 had a BCR of 1.5–2.5 at the time of its approval.

1.2 Double-Counting Eliminated

Version 1.0 included GDP contribution, tax uplift, and welfare savings as additive benefits within the BCR. Version 2.0 correctly:

- Reports GDP contribution as a contextual indicator only (not in BCR)
- Reports tax uplift (£25–40B/yr) and welfare savings (£3.2B/yr) as Exchequer impacts in a separate fiscal annex
- Limits the BCR numerator to genuine social welfare benefits: avoided carbon damage, avoided energy import costs, avoided air-quality damage, knowledge/technology spillovers, energy security premium, and option value

1.3 Reference-Class Forecasting Applied

The revised case adopts the Flyvbjerg methodology as its central case (not the pessimistic case), which is methodologically correct for a programme with no UK precedent:

Parameter	V1.0 (Rejected)	V2.0 (Endorsed)	Change
Total CAPEX	£425B	£595B (central)	+40% Flyvbjerg uplift
BCR	4.5–6.2	2.1–2.8	Transfers excluded, costs uplifted
Schedule	2025–2050	2026–2053 (+3yr)	Reference-class delay
Payback period	8.5 years	~15 years (central)	Adjusted for higher CAPEX
Committed cost	£425B implied	£15–20B demonstrator only	Gated commitment

2. Fiscal Exposure Is Now Manageable

The decisive structural change between V1.0 and V2.0 is the shift from a "blind" £425B commitment to a **gated £15–20B demonstrator phase** as the only authorised expenditure.

2.1 Information Value Approach

The £15–20B demonstrator investment functions as an "information option". It purchases real-world data on:

- HTGR module construction costs and schedule (vs. FOAK estimates)
- HTSE hydrogen yield and efficiency at operational scale
- Operational reliability and maintenance profiles
- Supply chain readiness for fleet build-out

This data is essential to the Fleet Decision Gate (Stage 3, approx. 2032). Without it, any commitment to the full programme would be speculative.

2.2 National Debt Impact

Fiscal context: A £15–20B hit to Public Sector Net Debt represents approximately 0.6% of GDP. This is sustainable, especially when compared to:

- The £40B sunk cost of the 2022 Energy Price Guarantee, which created zero assets
- The £48B+ Hinkley Point C commitment (single reactor site, no hydrogen, no desalination)
- The £100B+ HS2 programme (transport only, no energy/industrial co-benefits)

Crucially, the demonstrator phase creates tangible assets: 48 operational HTGR modules, an HTSE hydrogen production facility (2,072 t/day), a desalination plant (50,000 m^3/day), Heat Halo district heating to ~280,000 homes (£500/yr unlimited), and a supply chain proving ground. Even if the fleet decision is negative, these assets retain operational and knowledge value.

2.3 Balance Sheet Treatment

The revised case proposes that NESC be classified as a public corporation under ONS rules, with:

- Initial CAPEX scoring against PSNB during construction
- Reclassification to self-financing public corporation once operational revenue exceeds 50% of costs
- Long-term trajectory: revenue-positive entity that reduces PSND as hydrogen, electricity, and Heat Halo sales mature

3. Strategic Alignment with Net Zero and Energy Security

3.1 Firm Power — The Missing Backbone

The UK's current energy strategy is critically exposed to intermittency risk. CFF provides the missing **101.3 GWe "backbone"** of firm, flexible power that current intermittent renewables cannot deliver. This addresses:

- **System failure risk:** The National Grid ESO has repeatedly warned that firm capacity margins are thinning. CFF eliminates this vulnerability.
- **Constraint payments:** Currently £1.1B/year and rising. Firm baseload from CFF would substantially reduce these costs.
- **Renewable complementarity:** CFF does not compete with wind/solar; its Safe-Flex mode releases up to **~50.4 GW** to the grid when HTSE load is reduced, providing the ultimate backup for intermittent generation.

3.2 Hard-to-Abate Hydrogen — Policy Aligned

Version 1.0 proposed mass hydrogen deployment for domestic heating and transport, which conflicted with the Government's electrification-first policy. Version 2.0 has correctly reframed hydrogen output:

Hydrogen Allocation	Share	TWh/yr	Policy Alignment
Hard-to-Abate Industry (steel, chemicals, cement)	33%	~232	✔ CCC priority sector
Heavy Transport & Freight	14%	~99	✔ Electrification impractical for long-haul
Strategic Reserve	10%	~70	✔ Energy security buffer
Sovereign Surplus (export/domestic conditional)	43%	~303	⚠ Domestic use gated on demonstrator evidence

Assessment: The top three allocations (57% of output, ~401 TWh/yr) are fully aligned with the Climate Change Committee's hydrogen strategy and the Government's Net Zero pathway. The "Sovereign Surplus" provides strategic flexibility without locking in any specific domestic application.

3.3 Energy Independence

Endorsing CFF fulfils the manifesto commitment to "Energy Sovereignty." At maturity, the programme replaces an annual £50–80B import drain (oil, gas, refined fuels) with a state-owned revenue generator. The UK would become a net energy exporter for the first time since the 1990s North Sea peak.

4. Key Points for Decision

Decision Point	Assessment
Methodology	The revised case (V2.0) is Green Book compliant. It accepts a £595B total cost estimate (up from £425B) to account for nuclear construction reality while still returning a positive NPV of +£480B.
The Gated Lock	Legislation should include Stage Gates. HMT will not authorise the roll-out of the 27 remaining coastal sites until the 48 demonstrator HTGR modules provide real-world data on LCOE and HTSE hydrogen yields.
Exchequer Impact	Beyond the BCR, the project is an "Exchequer-positive engine". The ~500,000 jobs created are projected to yield £25–40B/year in additional tax revenue at maturity — effectively paying for the capital cost of the programme every 15–20 years.
Energy Independence	Endorsing CFF replaces an annual £50–80B import drain with a state-owned revenue generator, fulfilling the manifesto commitment to Energy Sovereignty.
Heat Halo Revenue	7.84 million homes at £500/year generates £3.92B/year in district heating revenue — a stable, inflation-linked income stream that also eliminates fuel poverty and creates NIMBY→YIMBY planning dynamics.
Legislative Pathway	The 3-stage legislative approach (Enabling Act → Fleet Authorisation Act → Perpetuity Act) avoids the V1.0 error of locking in a 200-year statutory framework before demonstrator evidence.

5. Risks and Handling

Risk	Likelihood	Impact	Mitigation
FOAK Failure	Medium	High	If the HTGR demonstrator fails, the state loss is capped at £20B. This is a high-cost trial, but it prevents a £600B "white elephant." Stop/Go gates at Years 5, 8, and 10 provide exit points.
Cost Overrun	High	Medium	Already priced in. The +40% Flyvbjerg uplift means the central case assumes significant overrun. Even at +60% (the "high" case, £680B), the BCR remains above 1.8.
Schedule Delay	High	Medium	+3 years already built into the central schedule. IPA Gateway Reviews at each stage gate provide independent assurance.
Technology Risk (HTSE)	Medium	Medium	HTSE is less mature than PEM electrolysis. The demonstrator will validate hydrogen yields. If HTSE underperforms, modules can be operated in electricity-only mode (zero hydrogen risk to power generation).

Risk	Likelihood	Impact	Mitigation
Public Perception	Medium	Medium	Framing is critical. This is not "a new nuclear project"; it is a "National Energy System Upgrade" that produces water, heat (£500/yr unlimited), and fuel alongside power. The 120m earth berm passive safety model aids public acceptance. Heat Halo creates NIMBY→YIMBY dynamics.
Supply Chain Readiness	Medium	High	The UK has no domestic HTGR supply chain. Stage 1 includes explicit supply chain development targets with international partnerships (Japan, China reference designs). Fleet decision contingent on demonstrated UK fabrication capability.

6. Comparison: V1.0 (Rejected) vs V2.0 (Endorsed)

Issue	V1.0 (April 2026 — Rejected)	V2.0 (April 2026 — Endorsed)
BCR Methodology	GDP + tax + welfare in numerator (double-counting)	Social welfare benefits only; transfers in separate annex
BCR Range	4.5–6.2	2.1–2.8 (central: 2.4)
Cost Estimate	£425B (unverified)	£595B central (+40% Flyvbjerg)
Committed Spend	£425B implied full programme	£15–20B Stage 1 only
FOAK Risk Treatment	Fleet learning assumed; no reference class	HTR-PM, HTTR, PBMR cited; +40% cost, +3yr schedule
Hydrogen Strategy	Mass deployment for heating & transport	Hard-to-abate priority; domestic conditional
Fiscal Scoring	£425B against PSNB/PSND	£15–20B demonstrator; progressive self-financing target
Legislative Framework	200-year statutory commitment	3-stage: Enabling Act → Fleet Auth → Perpetuity Act
Governance	NESC self-governing	IPA Independent Reviewer; Gateway Reviews; Stop/Go gates
Payback Period	8.5 years	~15 years (reference-class adjusted)
Heat Halo	Free district heating	£500/yr unlimited — £3.92B/yr revenue stream; NIMBY→YIMBY
Firm Power	51 GWe baseload	101.3 GWe flexible; ~50.4 GW Safe-Flex backup

7. Outcome

✔ ENDORSED FOR STAGE 1

Proceed with the establishment of the National Energy Sovereignty Corporation (NESC) and the Stage 1 Demonstrator Phase (£15–20B).

Fleet decision deferred to Gate 3 (approximately 2032), contingent on demonstrator performance data, IPA assurance, and a refreshed Full Business Case.

Conditions of Endorsement:

1. Legislation limited to the **National Energy Sovereignty (Enabling) Act** — no fleet-level powers until Gate 3
2. Stop/Go gates at Years 5, 8, and 10 with IPA Gateway Reviews at each stage
3. Independent IPA Reviewer embedded in NESC governance from inception
4. Annual reporting to the Public Accounts Committee on cost, schedule, and performance vs. reference-class benchmarks
5. HTSE hydrogen yields must be validated against design targets before any fleet hydrogen infrastructure commitment
6. Supply chain readiness assessment before Gate 3, with minimum 60% UK content target for fleet phase

8. Recommendation to the Chancellor

This analyst recommends that the Chancellor:

1. **Endorse** the CFF programme on a gated, conditional basis as described above
2. **Authorise** the Department for Energy Security & Net Zero to proceed with drafting the National Energy Sovereignty (Enabling) Act
3. **Allocate** £15–20B for the Stage 1 Demonstrator Phase, to be drawn over approximately 6 years (2026–2032)
4. **Commission** the IPA to establish a bespoke assurance regime for CFF, including embedded independent review
5. **Reserve judgment** on the full fleet programme (£595B central estimate) until Stage 1 delivers auditable performance data at Gate 3

Value for Money Assessment

Based on the revised Full Business Case (V2.0), the CFF programme represents **High Value for Money** under Green Book guidelines. The BCR of 2.1–2.8, combined with the gated commitment structure, provides an acceptable risk-return profile for public investment. The strategic co-benefits (energy sovereignty, industrial regeneration, hydrogen economy, Heat Halo fuel poverty elimination) are substantial but have been correctly excluded from the BCR and reported separately.

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