ENERGY · PAPER 07

Other Energy Sources and Storage

Hydro, storage and local heat under a common appraisal framework.

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Households, factories and local heat users lose when useful projects are excluded or weak ones receive automatic support. The system needs energy, flexibility and usable heat at the right place and time; each resource should be assessed for the service it can actually deliver.

We will prioritise appraisal of hydro upgrades, storage and credible local heat opportunities, while keeping a competitive route for other useful resources. Purchases and bounded research will follow the same service, value and delivery tests as the wider programme.

The problem we are trying to fix

A technology list can conceal different services. A reservoir hydro station produces energy; pumped storage consumes electricity to move it between periods. Geothermal heat can displace gas or electricity without adding electrical generation. Biomethane supplies a fuel, while electrolytic hydrogen converts electricity into a different carrier. Compare what each project delivers at the required place and time, including the costs and constraints of using it.

The programme also needs a clear route for opportunities outside its preferred generation mix. Automatically excluding a useful project could raise system cost. Automatically granting a subsidy could protect a weak project from scrutiny. The shared purchasing and infrastructure framework should expose the service required, alternatives, public downside and test of performance.

Our policy and its boundary

Apply common appraisal and competitive purchasing without a universal subsidy entitlement. The ownership perimeter in UK Energy Reform Programme Annex Appendix A applies; other resources may use private, community or voluntary mutual arrangements. Implementation begins on taking office, with jurisdiction-specific consents.

Transport and Heat Demand sets heating and vehicle demand policy; the gas-infrastructure boundary in UK Energy Reform Programme Annex Appendix C applies. Heat projects need their own customers and funding.

1 A common decision rule for useful services

Specify the requirement before choosing a project

NESO identifies electricity requirements under the shared system plan. Heat projects need credible customers, temperatures, seasonal load and receiving networks; the electricity purchaser has no automatic mandate to buy heat or hydrogen. Publish the service, location, earliest credible availability and performance conditions. Separate annual energy from dependable contribution, stored energy and the duration of delivery. Appraise the same stress scenarios and network assumptions across competing technologies.

REQUIREMENT	EVIDENCE BEFORE COMMITMENT
Useful output	Deliverable electricity, heat or fuel at stated times, quality and location.
Whole-system value	Capital, finance, inputs, networks, losses, backup, operation, closure and public exposure against alternatives.
Deliverability	Validated resource, consents, land, customers, equipment, workforce and connection schedule.
Finance and performance	Executable revenue terms, private loss capacity, funded contingency and tested remedies.
Public intervention	Identified market failure or strategic service, additionality, payment limit and exit.

Avoid rewards for the same benefit twice

Keep electricity, capacity, flexibility, heat, fuel and public support revenues visible in one project account, without selling the same obligation twice. Apply Appendix C’s carbon tax settlement, replacing the UK ETS with a £10 per tonne CO2e carbon tax and abolishing UK CBAM from the start of year two, with pre-closure costs, the replacement tax and delay sensitivities. Retain other operating duties and ordinary fuel duties.

Compare a proposed contract with credible alternatives, including smaller works, life extension, demand flexibility and doing nothing. A public or mutual owner receives no exemption from cost and performance scrutiny. Publish independent benchmarks and conflicts. Preserve existing permissions and rights while changing future procurement through the agreed transition.

2 Hydro and electricity storage

Prioritise credible upgrades and location

Appraise existing hydro refurbishment, operating improvements and justified new capacity before assuming that a wholly new station is the best purchase. Model hydrology, drought, reservoir restrictions, water uses and outages. Annual output does not establish winter or scarcity availability. Keep flood management, environmental outcomes and any water-supply role distinct; attribute shared costs and permissions rather than charging each programme for the entire asset.

Buy storage duration and replenishment

Pumped hydro, batteries, compressed air and other storage can supply flexibility and security where their duration and charging route match the requirement. Publish power, usable energy, discharge duration, cycling limits, degradation, conversion losses and time to replenish. A large turbine with a small store cannot cover a prolonged shortfall. Test a low-wind period with restricted imports and nuclear outages, including whether charging supply remains available.

Storage requires purchase of charging electricity and usually returns less electricity than it consumes. Evaluate its value through avoided scarcity, constraints and operating costs, including the cost of its inputs. Locate projects where they can relieve the relevant bottleneck; charging and discharging on the wrong side of a constraint can worsen it. Preserve opportunities for short-duration and long-duration assets to compete for different services.

Use the inherited investment route without duplicate guarantees

Ofgem already operates a long-duration electricity storage cap-and-floor programme, with a provisional first-window portfolio and final decisions expected later in autumn 2026. The regime can provide consumer-funded floor payments and return receipts above the cap. These are contingent commitments requiring appraisal, not costless finance. Confirm actual awards and conditions inherited on taking office. [1-2]

Honour valid awards. For new projects, compare the existing route with competed availability and flexibility contracts under the purchaser framework. Retain a cap and floor where it buys the required service at better total cost; do not stack a new revenue guarantee on top of one already sufficient. Publish recourse, public or consumer exposure and performance remedies. Any extension of the strategic British-control or mutual designation to storage requires an explicit decision; no extension is assumed here.

3 Geothermal useful heat and combined heat and power

Treat heat as a useful output

Appraise deep geothermal heat, mine-water and shallow ground-source opportunities against the heat customers actually need. Ground-source and mine-water systems may require heat pumps and electrical input; they do not provide free heat. Establish source temperature, flow, longevity, pumping energy, water chemistry, subsurface risks and the cost of delivery. Geothermal electricity needs a separate resource and conversion appraisal. Government has published an assessment distinguishing heat and power costs and their uncertainties. [3]

Connect credible customers before building a network

Useful industrial, commercial or district heat needs appropriate temperature, distance, seasonal demand and a receiving system. Evaluate heat recovery from power stations, industry and computing where customers can use it. Low-temperature data-centre heat may need upgrading, while distant or seasonal demand can make a technically abundant source uneconomic. Price pipes, pumping, backup and contractual interruption before assigning a saving.

Retain the inherited heat-network framework while heating policy is reviewed separately. Current consumer authorisation and proposed zoning have their own legal machinery; this essay does not order households to connect or replace their boilers. Qualifying projects can use the infrastructure framework for lawful permissions. A local physical heat monopoly needs transparent tariffs, service and continuity protections rather than an assumption that consumers can switch pipes. [4]

Appraise both outputs of combined heat and power

Combined heat and power can serve sites with sustained demand for electricity and heat. Test the two outputs jointly against separate supply, allowing for changing production schedules, outages and fuel costs. Do not assume the electricity and heat benefits can each be credited with all the same fuel saving. Private customer contracts should allocate delivery and backup obligations before finance closes.

Use the fracking engineering programme to share relevant subsurface data, monitoring methods and independently verified research where contracts permit. Geothermal and shale have different geology and operating patterns; use consistent consequence objectives with justified site-specific controls. Shared research must buy a defined output and avoid duplicate grants. New public work packages need separate authorisation within Appendix E, not an automatic claim on the fracking ceiling.

4 Biomass waste and renewable gas

Settle biomass on actual contracts and inputs

Biomass can provide dispatchable electricity and heat, but feedstock cost, transport, reliability and environmental conditions determine its value. Domestic origin does not establish a sufficient supply; imported pellets create dependencies. Compare continued operation, conversion, refurbishment and replacement under common security assumptions. Eligible inherited biomass electricity policy support follows the 100% tax-funded legacy settlement. Keep technology and contract ledgers distinct without excluding eligible support merely because the fuel is biomass.

Drax confirms a signed dispatchable Contract for Difference covering four biomass units from April 2027 to March 2031. Register the actual agreement, rights and performance conditions. Explicitly allocate its eligible legacy renewable-electricity policy-support components to taxation under Legacy Renewable Commitments; identify commercial electricity and service purchases separately and prevent double recovery. Further support or carbon-capture conversion needs its own value case, funding and permissions. Company forecasts of savings are not programme costings. [5]

Assess waste treatment and energy together

Energy-from-waste projects must establish viable residual feedstock, treatment capacity, gate-fee and heat customers, emissions controls and residue disposal. Assess waste management alongside the electricity and heat output. Long contracts that require unnecessary burning or divert material from better treatment can erase an apparent electricity benefit. Do not double-count gate-fee income as both a public waste saving and a reduction in electricity cost without reconciling the payer.

The current energy National Policy Statement covers biomass, waste and combined heat opportunities. Reuse valid permissions and evidence within scope; preserve pollution, waste and public-health duties unless expressly amended through the shared framework. The planned UK Emissions Trading Scheme

expansion to waste incineration was postponed in August 2026 from its original 2028 date. Confirm the inherited position and sensitivity before a new award. [6-7]

Keep biomethane commercially accountable

Biogas and upgraded biomethane may supply useful fuel from appropriate feedstocks. Test sustainable feedstock availability, competing uses, methane leakage, processing, digestate handling and gas-grid acceptance. The Green Gas Support Scheme provides 15-year tariff support funded by the Green Gas Levy. Register accrued and conditional entitlements separately; closure to new applicants does not terminate existing payments. Future support must pass the common value and public-exposure test. No blanket move of these costs to taxpayers is authorised by this essay. [8]

5 Tidal wind and solar generation

Preserve access for useful renewable output

From year one, new wind and solar may bid for the central purchaser’s long-term, price-stabilising energy contracts under UK Electricity Market Reform. Compare whole-system value, location and production profile after networks, balancing, backup and public risk. Preserve valid inherited commitments; additional awards enter the Supply paper’s model only when their incremental deliverable output is established.

Price curtailment and connection exposure

Specify firm or non-firm connection rights, permissible curtailment, price settlement and the responsibility for imbalance. A generator cannot assume unrestricted dispatch or a payment for every possible unit. Preserve inherited terms and offer new terms prospectively. Storage or flexible demand may improve the project's value, but assess the combined cost and compatible obligations rather than assigning each asset the same avoided-constraint saving.

Give tidal projects a proportionate appraisal route

Tidal stream and tidal-range projects should retain access to assessment and procurement where credible. Predictable cycles can aid scheduling, but tidal output is periodic and location-specific; it is not continuous firm supply. Evaluate the actual hourly profile and seasonal combination with other resources, with storage and connection costs included where required. Public predictability does not establish the project's construction performance or financing price.

Assess barrage and lagoon schemes on a whole-project basis, including civil works, sediment, navigation, flood management, ecology, closure and any claimed co-benefit. Price those benefits and establish which institution would buy them. A small stream demonstrator and a major tidal-range scheme need different evidence and risk capital. National Policy Statements already provide a planning starting point, which the replacement objectives and integrated-consent route must amend expressly. [6]

Limited public demonstration may be justified by shared learning, with independent performance verification and a published stop rule. A successful test earns the next appraisal stage; it does not guarantee a commercial order. No permanent tidal quota or new subsidy ceiling is created here. Use

competing designs and disclose any strategic capability premium paid above a credible alternative.

6 Hydrogen and carbon capture

Identify the product and conversion chain

Hydrogen is an energy carrier and industrial input. Assess its value against the customer's actual process or storage requirement. For electricity-derived hydrogen, include electrolysis, compression or conversion, storage, transport and any subsequent generation losses and costs. Cheap curtailed electricity during some hours does not establish a low full-year delivered hydrogen cost when capital utilisation and infrastructure are included.

Private industrial customers may contract supply where it solves their process requirement. Power use should compete for a specified dependable or long-duration service, with fuel availability and replenishment demonstrated. The electricity purchaser has no automatic duty to finance a hydrogen industry or to buy its output. Domestic heating use and transport-fuel mandates remain outside the decisions made here.

Preserve existing support and test future commitments

Hydrogen production already has signed private-law support agreements under the government business model. Register contracts, capital grants, conditional awards and future allocation ambitions separately. Energy Act 2023 funding powers and the proposed gas-shipper funding mechanism require an explicit inherited-policy audit. Honour signed rights; no blanket cancellation, new levy or 100% tax-funding extension follows from this essay. [9-10]

Carbon capture, transport and storage likewise have contracts and public exposures distinct from renewable electricity. Retain valid rights and operational safeguards while publishing the full support account. Any new support must identify the industrial product or security service, the public policy benefit purchased, total cost, loss allocation and limit. Honour those commitments through the carbon tax transition. Reassess new capture projects against the £10 carbon tax rather than UK ETS allowance prices; identify the product, contracted revenue or explicit public benefit supporting the investment.

Treat optional conversion as a priced choice

For new gas, biomass or waste generation, apply the shared policy of replacing mandatory future conversion proof with independently assessed, priced options where the expected benefit warrants the cost. Amend the actual permitting and planning provisions before relying on a changed operating envelope. Retain pollution, water and safety obligations. A speculative future hydrogen supply or capture network cannot be counted as a completed fallback, and no future conversion guarantee is implied.

7 Research and emerging technologies

Buy evidence that changes an investment decision

Retain a bounded route for wave energy, advanced reactors, novel storage and other technologies that can plausibly improve useful supply or national capability. Existing public research commitments continue under their actual terms. New support needs a defined technical uncertainty, baseline, independently verified target, test access and a costed authorisation. Distinguish spending to acquire shared knowledge from support for commercial production.

Use competitive work packages, staged grants and open challenge prizes where outputs can be measured reliably. Permit outsiders and international expertise under clear intellectual-property and deployment terms. Pay for verified progress, provide proportionate data and testing access, and stop work that no longer justifies its next tranche. Separate the commissioning team from judges and procurement decisions. Do not fund the same output twice through a grant, prize and contract.

Keep emerging nuclear options separate from the repeat fleet

Advanced nuclear may offer heat, different fuel use or other services, but each design needs its own maturity, licensing and supply-chain assessment. Research must not continually reopen the approved repeat-fleet specification. Evaluate alternatives for a defined future service or credible vendor fallback. Do not count an experimental reactor as dependable capacity in the baseline or assume it uses the same fuel and waste route as the chosen fleet.

Fusion has a published 2026 government strategy covering research, demonstration, planning and future market arrangements. Retain worthwhile industrial and scientific options under staged evidence and funding. Forecasts of eventual commercial power do not establish a near-term generating asset. Register actual commitments and cancellation terms, and obtain separate authority for new market support. [11]

Measure learning and capability

Report reproducible performance, remaining uncertainties, private follow-on investment and deployment. Jobs, patents and laboratory results can be useful outputs, but none alone demonstrates cheaper energy. Retain usable data and knowledge after failed tests, with spillovers valued explicitly. Publish funding expiry and a reasoned decision to close, redesign or authorise a further bounded stage.

8 Ownership procurement and retained responsibilities

Apply the existing ownership boundary

Apply UK Energy Reform Programme Annex Appendix A’s ownership rule. Hydro, storage, heat, renewable gas, wind, solar and tidal are outside the mandatory strategic-generation mutual perimeter; any extension requires an explicit decision and appraisal.

British control is distinct from British-only capital. Assess critical dependencies and applicable security obligations without imposing domestic ownership of every small project or component. International finance and technology remain welcome on enforceable terms. A mutual structure supplies no guarantee

of classification, low yields or public purchase.

Keep technical operation with NESO

NESO retains technical specification, operational balancing and service procurement within its assigned remit. The central purchaser buys electricity and expressly assigned strategic services. Before it assumes a mandate, implement the market paper's service-allocation schedule covering inherited contracts, buyer, funding recovery, delivery owner and renewal dates. Prevent duplicate procurement and payment. This creates neither another system operator nor a second set of engineering standards. [12]

Keep heat and fuel counterparties identifiable

Heat customers, gas buyers, storage-service buyers and public authorities must contract within their actual powers. A project with several outputs needs a reconciled account and consistent delivery obligations. Ofgem applies relevant licences and consumer protections; ministers and Parliament authorise public spending. The infrastructure route supplies permissions within scope, not a commercial customer or an entitlement to a subsidy.

9 Implementation and the evidence required

Prepare the first programme on taking office

Within the first implementation year, publish a resource and project register covering credible hydro upgrades, storage requirements, local heat opportunities and inherited support. Use existing data and project records rather than restarting every assessment. Identify readiness, service, customers, connection, private capital and latest decision date. Publish common appraisal assumptions and alternative demand cases while heating and transport policies remain under separate review.

Release commitments through the shared plan

From taking office to the end of year two, determine qualifying consents and issue competed offers for evidenced requirements, using inherited contracting routes until the new purchaser is ready. Preserve commitments and align any voluntary migration with existing support. Start new research only after a costed award and appropriation. Physical completion follows each validated critical path; decision windows do not guarantee construction dates.

Through year five, measure commissioned output and usable storage, additional useful heat, dependable delivery, avoided costs and public exposure. Compare outcomes with the original alternative. Scale successful projects and stop weak commitments within their lawful terms. Report failures and the cost of replacement, rather than quietly changing the baseline.

Record the obligations before promising savings

Use UK Energy Reform Programme Annex Appendix E as the single assumptions and funding register. Eligible biomass electricity support belongs in the legacy ledger; hydrogen, capture, heat and biomethane retain separate treatment. Distinguish signed liabilities, conditional awards and budgets, then apply the shared release test.

Apply UK Energy Reform Programme Annex Appendix C’s fiscal, carbon and retained-policy schedule, with the required jurisdiction-specific permission changes before purchases rely on them.

No new technology-specific budget, installed-capacity quota or funding total is established here. Priority appraisal does not authorise spending. Each new public obligation requires a priced service or research purpose, independent challenge, lawful funding, a limit and an exit. Publish unresolved entries rather than treating them as zero. Apply the market paper's procurement and subsidy-control schedule to new research, prizes and support before relevant awards.

What this paper does not claim

Priority appraisal grants no subsidy budget or automatic contract. Storage shifts energy and requires charging; useful heat needs customers. Emerging technologies are outside dependable supply until demonstrated.

Sources and programme boundary

Policy status is assessed at 12 October 2026. These sources establish the inherited framework; the appraisal, ownership boundary and delivery commitments in this essay are our proposal. Recheck actual awards, law and funding on taking office. The companion papers supply the market, renewable legacy, strategic generation, extraction, fracking and infrastructure arrangements.

[1] Ofgem. Long duration electricity storage regime. Cap and floor operation and current publications.

https://www.ofgem.gov.uk/energy-regulation/low-carbon/long-duration-electricity-storage

[2] Ofgem. Window 1 minded-to decisions. Provisional portfolio and intended autumn 2026 final decision.

https://consult.ofgem.gov.uk/energy-generation/ldes-window-1-minded-to-decision/consult_view/

[3] Department for Energy Security and Net Zero. UK geothermal energy review and cost estimations. 11 August 2025.

https://www.gov.uk/government/publications/uk-geothermal-energy-review-and-cost-estimations

[4] Department for Energy Security and Net Zero. Heat network zoning consultation response. January 2026 proposals and implementation route.

https://www.gov.uk/government/consultations/proposals-for-heat-network-zoning-2023/outcome/proposals-for-heat-network-zoning-2023-government-response-accessible-webpage

[5] Drax. Support mechanism for Drax Power Station. Company confirmation of signed 2027 to 2031 dispatchable contract; its value claims require independent appraisal.

https://www.drax.com/what-we-do/support-mechanism-for-dps/

[6] Department for Energy Security and Net Zero. National Policy Statement EN 3 2025. In force from January 2026; biomass, waste, pumped hydro, wind, solar and tidal stream.

https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3-2025/national-policy-statement-for-renewable-energy-infrastructure-en-3-2025-accessible-webpage

Sources continued

[7] Department for Energy Security and Net Zero. UK Emissions Trading Scheme policy overview. August 2026 waste-expansion postponement.

https://www.gov.uk/government/publications/uk-emissions-trading-scheme-uk-ets-policy-overview

[8] Department for Energy Security and Net Zero. Green Gas Support Scheme July 2026 forecast statement. Tariff duration and levy funding.

https://www.gov.uk/government/publications/green-gas-support-scheme-ggss-expenditure-forecast-statements-and-tariff-change-notices/green-gas-support-scheme-expenditure-forecast-statement-for-the-quarter-ending-31-july-2026

[9] Department for Energy Security and Net Zero. Hydrogen production business model. Private-law agreements and published completed contracts.

https://www.gov.uk/government/publications/hydrogen-production-business-model

[10] Department for Energy Security and Net Zero. Proposed Gas Shipper Obligation consultation. Funding options under Energy Act 2023; proposed design is not treated as enacted.

https://www.gov.uk/government/consultations/funding-mechanism-for-the-hydrogen-production-business-model-proposed-design-of-the-gas-shipper-obligation

[11] Department for Energy Security and Net Zero. UK fusion strategy 2026. Research, demonstration and proposed market and planning arrangements.

https://www.gov.uk/government/publications/uk-fusion-strategy-2026/a-new-energy-revolution-the-uks-plan-for-delivering-fusion-energy-accessible-webpage

[12] National Energy System Operator. Operability Strategy Report and Electricity Markets Roadmap. Technical requirements and existing work programme.

https://www.neso.energy/publications/operability-strategy-report-and-electricity-markets-roadmap