UK Energy Strategy

Nuclear First

Why gas must be secondary in UK power strategy

This brief makes no argument about carbon emissions or climate change. The case against gas as the primary source of UK power is purely financial and strategic: lifetime costs, supply security, planning economics and industrial logic.

£400bn

£400bn–£770bn difference in lifetime cost between a gas-first and a nuclear-first energy strategy over 80 years — largely exported abroad.

Cllr Adam Parkins PhD

EXECUTIVE SUMMARY

The financial and strategic case.

The political appeal of gas rests on its low capital cost. A modern 1 GW combined cycle gas turbine can be built for approximately £900 million to £1 billion. A nuclear plant costs several times more upfront. This comparison is profoundly misleading because it ignores the fuel bill that arrives every quarter for the entire operating life of the plant — and ignores that gas plants must be replaced every 25–30 years while nuclear runs for 60–80 years.

Over an 80-year horizon, gas costs ~£830bn–£1,200bn. Nuclear costs ~£430bn–£580bn depending on configuration. The difference — £400bn–£770bn depending on gas prices — is almost entirely money exported permanently abroad to foreign energy producers. Nuclear keeps the majority of its lifetime spend within the UK economy, while gas generation is dominated by fuel costs that flow abroad.

More critically, a serious gas programme would exhaust UK domestic reserves in as little as a decade at the projected AI-era consumption rates, creating permanent import dependency structurally similar to Germany's reliance on Russian gas via Nord Stream 2. The plants would be almost entirely reliant on imports for 10–17 years of their operating life.

Gas has unique properties — rapid dispatchability for grid balancing, feedstock value for fertilisers and pharmaceuticals — that should be preserved and utilised as a strategic resource. Burning the UK's gas reserve in continuous baseload generation is the industrial equivalent of burning furniture to heat a house.

> **Recommendation: designate nuclear as UK primary baseload, phase out renewables, and reserve gas for grid balancing and industrial feedstock. Begin serial SMR production immediately to unlock the UK's unique £250 billion export opportunity. Simplify regulation, consolidating regulators and standardising design certification so approved reactors can be replicated across sites.**

FOUR PILLARS OF THE ARGUMENT

1. **Lifetime cost.** Gas costs ~£830bn–£1,200bn over 80 years. Nuclear costs ~£430bn–£580bn. Even with zero carbon costs assumed on gas.
2. **Supply constraint.** Domestic gas resources would cover only a limited share of long-term demand — likely around 8–15 years under optimistic assumptions — creating permanent import dependency structurally similar to Germany's Nord Stream gas reliance.
3. **Planning bandwidth.** The same planning effort and grid connections that approve gas sites deliver up to three times the value per site over the investment horizon if directed at nuclear.
4. **Gas has better uses.** Rapid dispatchability for grid balancing, and feedstock for fertilisers, pharmaceuticals and chemicals — uses that continuous baseload consumption permanently destroys.

01 · LIFETIME COST

Gas is not cheap. It only looks cheap.

A gas plant lasts 25–30 years. Over an 80-year planning horizon — the operational life of a modern nuclear plant with life extension — gas requires four complete build cycles, each with full capital costs. Nuclear requires one. The comparison below excludes carbon costs in the core analysis. The impact of carbon pricing is shown separately for reference.

TOTAL 80-YEAR COST — 150–185 TWH NEW BUILD PROGRAMME

Gas — high incl. carbon (for context)	*~£1,590bn*
Gas — high-price case, 4 build cycles	**~£1,200bn**
Gas — central case, 4 build cycles	**~£830bn**
APR1400 fleet	**~£430bn**
Mixed nuclear: APR1400 + SMR	**~£525–£580bn**

Gas bars exclude carbon costs unless labelled. Gas bars include four build cycles plus fuel over 80 years. All figures are new build programme costs only — existing generation continues to operate but is excluded from these comparisons, which model only the marginal expansion required. Gas costs are based on DESNZ central and high fuel price scenarios (FFPA 2025), assuming 80% load factor, 52% HHV efficiency.

> **Nuclear costs roughly half to one-third of gas per MWh over the full lifecycle — even assuming zero carbon costs on gas and maximum future efficiency improvements.**

Where the money goes

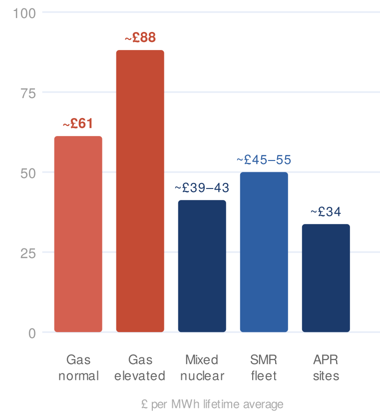
Of the ~£830bn–£1,200bn gas total over 80 years, approximately ~£590–965 billion represents fuel costs exported permanently abroad — to Norway, Qatar, the United States and Algeria. Nuclear's ~£430bn–£580bn is largely retained in the UK through construction, manufacturing and operations. The Rolls-Royce SMR programme specifically generates a potential **£250 billion export industry** supplying reactors to Europe — Czech Republic already selected, Sweden in final selection.

These nuclear cost estimates assume a state-backed delivery model similar to programmes in South Korea and the UAE. Gas converts electricity demand into long-term imports. Nuclear converts it into domestic investment and capability.

The four-cycle problem

Over 80 years, gas requires four complete planning, financing and construction cycles. Nuclear requires one. By 2060, the UK would be simultaneously operating second-generation gas plants, planning a third generation, and managing a 100% import-dependent fuel supply chain. Nuclear built now would be in mid-life with decades of remaining capacity.

COST PER MWH — LIFETIME AVERAGE



TECHNOLOGY	£/MWH
Gas (central)	~£61/MWh
Gas (high)	~£88/MWh
Mixed nuclear	~£39–43
APR1400 sites	~£34
RR SMR fleet	~£45–55

LCOE (£/MWh, excluding carbon costs; based on DESNZ FFPA 2025 gas assumptions, 80% load factor, 52% HHV efficiency). Nuclear assumes 4% state-backed financing (sovereign/export-credit); gas assumes 7% commercial project finance. Modelled lifetime cost divides total programme cost by total electricity generated. Not directly comparable to CfD strike prices, which include private financing costs and construction risk.

UK FUEL IMPORT BILL AVOIDED

£590bn–965bn

retained in UK economy instead of exported to foreign gas producers over 80 years

RR SMR EXPORT POTENTIAL BY 2050

£250bn

Czech Republic, Sweden already engaged

02 · SUPPLY SECURITY

The Nord Stream lesson, repeated.

Germany decommissioned its nuclear fleet and structured its economy around Russian pipeline gas. By 2022, it was paying ten times the US gas price following the invasion of Ukraine. The damage to German industrial competitiveness — in chemicals, manufacturing and energy-intensive industry — has been severe and enduring.

A UK reliant on gas for power would become structurally dependent on imports. Supply routes would run to Norway, Qatar and the United States rather than Russia, but the underlying vulnerability is structurally similar. Norway's own North Sea production is declining. Qatar faces persistent geopolitical instability. US LNG export policy is subject to domestic political decisions entirely outside UK control, as decades of US export restrictions and recent approval pauses have demonstrated.

> **A country that exhausts its domestic gas reserves within a decade and then operates 20–25 gas plants on 100% imported fuel for the remaining years has reproduced Germany's strategic error in slow motion.**

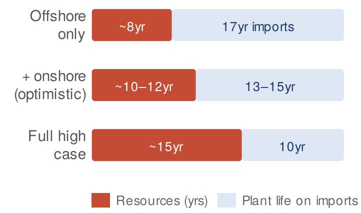
How quickly do reserves run out?

Even under highly optimistic assumptions — including expanded North Sea production and potential shale development — UK gas resources would cover only around 8–15 years at the consumption levels required for a large-scale gas programme. New gas plants would therefore spend the majority of their operating life dependent on imports, with costs determined by global markets rather than domestic supply.

The import ramp-up problem

Domestic production cannot be ramped to 92–97 bcm per year instantly. During the 5–10 year production ramp-up period, virtually all gas would need to be imported regardless of reserve size. The Energy and Climate Intelligence Unit calculated that the UK spent approximately **£105 billion** buying gas on wholesale markets in just 2.5 years of the 2021–2023 gas crisis. At elevated consumption rates, crisis-level spending would run continuously rather than episodically.

RESOURCES VS REMAINING PLANT LIFE



RESOURCE SCENARIO	YEARS AT ~95 BCM/YR
Offshore only	~8 yrs
Offshore + onshore (optimistic)	~10–12 yrs
Full high case (incl. shale)	~15 yrs

AI-ERA GAS DEMAND	BCM/YR
AI power generation	~30–35
Domestic heating	~27
Power gen (existing)	~14
Industrial use	~13
Other	~8
Total	**~92–97**

~50% above current UK consumption (~62 bcm/yr). Source: DUKES 2025.

BEST CASE UK RESOURCES

~15 yrs

~1,200–1,400 bcm at ~95 bcm/yr total demand

GAS CRISIS COST — 2.5 YEARS ONLY

£105bn

£75bn above normal — ECIU estimate

CURRENT UK GAS CONSUMPTION

~62 bcm

DUKES 2025 — lowest since 1992

The UK already owns part of the answer.

A strategically advantaged position

The UK benefits from a structurally advantaged position in the nuclear fuel supply chain. Raw uranium is sourced from a diversified set of suppliers — including Canada, Australia, and Kazakhstan — reducing single-source dependency. Critically, the UK is not merely a consumer of enriched fuel: through its one-third ownership of Urenco, it holds a direct stake in one of the Western world's largest enrichment operations at Capenhurst. This gives the UK control over a strategically critical processing stage that most nuclear nations must import entirely.

Looking ahead, the £196m government investment in a HALEU enrichment facility at Capenhurst positions the UK as a leading Western European producer of the advanced fuel required by next-generation SMR designs.

Different time horizons

Nuclear fuel supply operates on fundamentally different time horizons to fossil fuels. Uranium is typically procured under long-term contracts, often years in advance of use, and enrichment and fabrication occur well before loading. Reactor operators maintain forward fuel inventories, and once loaded, fuel is consumed over multi-year cycles.

This creates a built-in buffer against short-term price volatility and supply disruption that does not exist in gas-fired generation. A gas price shock translates directly and immediately into operating costs. A uranium price shock — even a severe one — is absorbed across a long procurement cycle, and the fuel cost itself represents a far smaller share of total generation cost.

> **The UK is one of very few nations with both a domestic enrichment capability and a direct stake in a major Western enrichment company. This is a strategic asset that a gas-first energy policy does nothing to leverage.**

UK OWNERSHIP OF URENCO

1/3

One of the West's largest uranium enrichment operations — Capenhurst, Cheshire

HALEU FACILITY INVESTMENT

£196m

Government-backed enrichment facility for next-gen SMR fuel — Capenhurst

URANIUM SUPPLIER DIVERSITY

4+

Canada, Australia, Kazakhstan, Niger — no single dominant source

FUEL COST SHARE — NUCLEAR

~15%

vs ~65–80% for gas plants — insulates against commodity shocks

Same sites. Up to three times the value.

The UK's planning approval system and grid connection queue represent a finite resource. Ofgem has already reported that 140 proposed data centre projects alone are seeking 50 gigawatts of grid connection — exceeding current total peak demand. Every planning approval consumes the same regulatory bandwidth regardless of whether it serves a gas plant or a nuclear plant.

For a realistic AI-era programme delivering 150–185 TWh of new generation per year, gas requires 6–8 sites. So does a comparable nuclear programme. The nuclear sites deliver the same electricity output for 60–80 years at roughly half the cost and with no ongoing fuel import dependency.

> **Over 80 years, gas requires four complete planning cycles on the same sites. Nuclear requires one. The hidden cost of perpetually rebuilding gas infrastructure never appears in simple capital cost comparisons.**

Four APR1400 reactors on a single coastal site deliver 5.6 GW for 60–80 years — equivalent to five large gas plants. The UAE delivered four units from a standing start in under 15 years, in a country with no prior nuclear industry, with each reactor completed in approximately 8 years and later units delivered progressively faster.

The disappearing speed advantage

Gas is conventionally assumed to offer a speed advantage over nuclear. In the current UK environment that assumption no longer holds. Gas turbine delivery lead times have stretched to as much as 5–7 years — the binding constraint in the current market. Domestic gas supply cannot be ramped to meet programme requirements for at least 5–10 years, meaning the programme operates predominantly on expensive imported fuel from day one. The speed case for gas has dissolved. What remains is a technology that costs more, exhausts domestic supply faster, and creates permanent import dependency — with no compensating advantage.

Gas turbine lead times: Utility Dive (September 2025); S&P Global (May 2025); RMI (June 2025). GE Vernova: new turbines not available until late 2028 at earliest; Mitsubishi: turbines ordered today not delivered until 2028–2030.

APPROACH	SITES	GW	FUEL (LT)
20–25 gas plants	6–8	20–25	**£590–965bn**
APR1400 fleet	~4	19.6	**~£65bn**
APR + SMR mix	6	20.4	—

New build programme costs only. Existing generation excluded. Nuclear fuel costs shown for APR1400 fleet. Mixed nuclear fuel costs are of similar order but depend on final SMR deployment mix.

BARAKAH: 4 APR1400S, ONE SITE

5.6 GW

= 5 large gas plants · 40 TWh/yr · 60–80yr life

WYLFA FULL BUILD (8 RR SMRS)

3.76 GW

= 2.7 APR1400 equivalents, one site

GAS TURBINE DELIVERY LEAD TIME

5–7 yrs

Binding market constraint — GE, Siemens, Mitsubishi all reporting

RR SMR — WYLFA TARGET

Mid-2030s

First units to grid — comparable timeline to new CCGT

Burning furniture to heat the house.

Rapid dispatchability

Gas turbines can go from cold standby to full output within minutes — a capability no other generation technology matches at scale. This is genuinely irreplaceable for grid balancing. But it requires maintained gas capacity, not 20–25 baseload plants running continuously. A rolling programme of new peaking plants to maintain the existing gas fleet as a strategic reserve provides this capability at a fraction of the fuel consumption of continuous baseload operation.

Industrial feedstock

Natural gas is the primary feedstock for nitrogen fertilisers that underpin UK and global food security, and a critical input for pharmaceutical manufacturing, plastics and industrial chemicals. Burning the UK's entire domestic gas reserve in power stations over 7–8 years destroys this industrial capability permanently.

> **Burning the UK's gas reserve in continuous baseload generation permanently destroys the capability to manufacture goods that depend on gas as a chemical input, not merely as a fuel.**

AI investor price certainty

Technology companies sign 20–30 year power purchase agreements requiring electricity price certainty. Nuclear provides it: fuel cost is fixed from construction completion. Gas cannot — every geopolitical event and supply disruption feeds directly into operating costs. Microsoft, Google and Amazon are already signing nuclear PPAs globally. A UK energy proposition built on gas baseload **actively deters the AI investment it is designed to attract.**

DATA CENTRE PPA HORIZON

20–30 yrs

Requires price certainty nuclear provides; gas cannot

RESERVE GAS FOR

- Grid balancing and peaking
- Fertiliser production (Haber-Bosch)
- Pharmaceutical feedstock
- Industrial chemicals and plastics
- Emergency security of supply

Six actions for UK energy policy.

The financial and strategic case for nuclear primacy is clear. These recommendations follow directly from the evidence, ordered by urgency.

01 **Designate nuclear as primary baseload**

Establish a clear system hierarchy: nuclear for baseload, gas for peaking and balancing, phasing out renewables. This provides long-term clarity to investors, data centre operators and the nuclear supply chain.

02 **Accelerate the Rolls-Royce SMR programme**

Commit to a fleet of at least 16 units, scaling toward ~20+ as part of a full system build-out, with government-guaranteed offtake contracts, pre-approved sites and factory expansion to multiple production facilities. Serial production is the only path to cost-competitive nuclear at scale — and to capture a significant share of a £250 billion global SMR export opportunity.

03 **Pursue two to three APR1400 multi-unit coastal sites**

Four APR1400 reactors on a single site deliver 5.6 GW for 60–80 years — equivalent to several large gas plants, at roughly half to one-third of the lifetime cost depending on fuel prices. The UAE built four units from a standing start in under 15 years with no prior nuclear industry. The UK has the workforce, the sites, and the regulatory framework.

04 **Cap new gas at peaking plants**

Sufficient for grid balancing and system resilience. Reserve domestic gas reserves for industrial feedstock — fertilisers, pharmaceuticals, chemicals — and emergency security of supply. Avoid sustained baseload operation that would increase reliance on imported gas and divert supply from higher-value industrial uses.

05 **Simplify regulation and standardise approvals for conventional nuclear**

Establish a single lead regulator and implement a standardised design approval framework: once a reactor design is approved, identical deployments should not re-examine resolved design and safety issues. Set national risk tolerance at the government level, rather than allowing it to emerge through project-by-project regulatory escalation, eliminating the cumulative gold-plating that has made the UK one of the most expensive nuclear construction environments globally.

06 **Offer long-term nuclear PPAs to AI and data centre investors**

Microsoft, Google and Amazon are signing nuclear power purchase agreements globally because nuclear enables 20–30 year fixed-price contracts — something gas structurally cannot offer. These agreements do not just provide price certainty; they also reduce financing costs by turning nuclear into a predictable, infrastructure-grade asset. A credible UK nuclear programme would turn energy policy into a competitive advantage for attracting AI investment rather than a liability that deters it.

Sources: NSTA, UK Oil and Gas Reserves and Resources Report (end 2024) · Offshore Energies UK analysis (20 February 2026) · Oxford Economics, The UK's data centre boom: growth trends, drivers, and the rising power challenge (8 December 2025) · IEA, Energy and AI (10 April 2025) · UK Government, Electricity generation costs 2023 & 2025 · DESNZ, Fossil Fuel Price Assumptions 2025 (January 2026) · DESNZ/CEPA/GHD, Unabated Gas Electricity Generation Costs (2025) · Rolls-Royce SMR published specifications · ENEC / Barakah Nuclear Energy Plant operational data · World Nuclear Association · NEI, Nuclear Costs in Context (2025) · Energy and Climate Intelligence Unit, The Cost of Gas in 2.5 years of the Gas Crisis (2024) · UK Parliament POST, North Sea oil and gas (11 March 2026) · Ofgem, Connections end-to-end review / Demand Connections Reform (2025–26) · DUKES 2025, DESNZ · Utility Dive / S&P Global Commodity Insights / RMI on gas turbine lead times (2025)

£400–770bn

lifetime cost difference depending on gas prices
gas vs nuclear over 80 years