

DRAFT FOR CHAIR OF E&S REVIEW

Guildhall Boiler Replacement

Business Case Paper

Like-for-like gas replacement compared with a hybrid (gas plus ASHP) system

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Status	Draft v0.4, rebuilt on verified consumption new ESPO contract rates
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Note to Chair: This version differs Figures use verified 2024/25 Guildhall consumption (full building, no apportionment) and ESPO contract rates and DESNZ forecasts. Text highlighted in yellow marks figures carrying uncertainty that Officers will be firm up before the formal committee paper.

1. Executive Summary

The Guildhall's gas boilers (installed around 2007) are past their working life and need replacing. Officers have appraised the options to inform a member decision. Electric-only boilers were ruled out as not commercially viable at this scale, which leaves two realistic choices. Both include the planned rooftop solar upgrade.

This version rebuilds the paper on verified inputs. The consumption figures now use the Council's actual last 3 year Guildhall totals. The energy prices are the Council's new ESPO contract rates. Together they should sharpen the comparison, and they change the analysis from that presented previously .

The central finding is that Hybrid is no longer cheaper in overall cost terms*

The Council's contracted gas price is very low, around 3.4p/kWh for 2027/28, while electricity is around 23.6p/kWh. That is a ratio of about **7 to 1**. The Climate Change Committee's guidance is that heat pumps need a ratio below about 3.4 to 1 to compete with gas on running cost. At 7 to 1 the hybrid is a long way from that point.

Two consequences follow. The gas-for-gas efficiency saving is modest, about £1,075 a year, because saving 15% of a cheap fuel does not free up much cash. And the hybrid costs more to run than gas-for-gas: about £5,400 a year more before solar, and still about £670 a year more once solar is credited. On the verified rates the hybrid does not pay its way on running cost, even with solar.

The case for the hybrid now rests on carbon and on the position handed to the successor unitary authority, not on running cost. It cuts heating emissions by about 39%. Whether it ever becomes the cheaper option depends on the gap between electricity and gas prices closing over the boilers' 15 to 20 year life and assumptions around self-consumption from our new solar PV array vs export. Section 8 sets out what the evidence says about that, drawing on DESNZ, the Climate Change Committee and Energy UK.

Headline comparison

Measure	Option 1, Gas-for-Gas	Option 2, Hybrid
Indicative capital (heating only)	about £52,000	about £95,000
Within SAMP envelope (about £70k)?	Yes	No, about £35k over
Heating cost at verified rates	about £6,100/yr	about £11,500/yr
Heating cost with solar credited	about £6,100/yr	about £6,800/yr
Confirmed efficiency saving	about £1,075/yr	n/a (different basis)
Heating CO ₂ e per year	about 38.5 t	about 23.3 t
Heating carbon cut vs Option 1	—	about 39%
Climate Strategy alignment	Weak	Strong
Delivery risk	Low	Moderate

Highlighted cells depend on the day/night electricity, consumption from our solar PV and the longer-term forecast rates, both of which should be subject to sensitivity analysis

2. Background and Verified Baseline

2.1 The asset

The Guildhall in Gainsborough is the Council's main operational building. Its gas boilers date from around 2007, so they are near 18 years old and past their typical 15-year life. They still run, but they are out of warranty and the risk of an unplanned failure rises each year. Replacing them in a planned way keeps the choice with members and avoids the cost and disruption of an emergency swap.

2.2 Verified consumption and emissions

The figures below are the Council's verified Guildhall totals for the full building, with no apportionment applied, adjusted for the relevant conversion factors. 2024/25 is the latest full year and forms the baseline for this paper.

Year	Electricity kWh	Gas kWh	Elec tCO ₂ e	Gas tCO ₂ e
2022/23	250,976	197,631	48.53	36.08
2023/24	251,946	204,380	51.64	37.39
2024/25	251,946	211,068	52.17	45.27

Total Guildhall emissions were 97.44 tCO₂ e in 2024/25, up from 89.03 the year before. Gas heating accounts for about 45 tCO₂ e of that, so it is the single largest source of emissions in the building and the main opportunity to cut them.

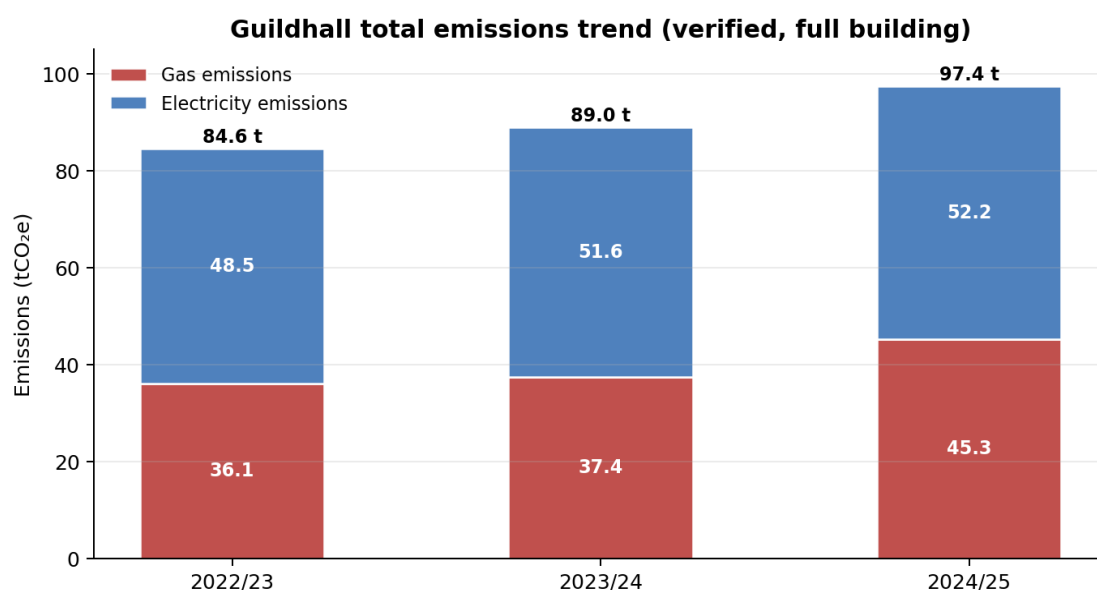


Figure 1. Verified Guildhall emissions, full building. Electricity is the larger share, but gas has risen year on year and is where the heating decision bites.

2.3 New gas supply contract and verified rates

The Council has signed a new mains gas contract through ESPO for supply from 1 April 2027 to 31 March 2031. It uses a Purchased in Advance strategy, so the price is fixed each year, and the ESPO fee is £0.60 per supply point per day. The ESPO trading team has now supplied the contracted rates and its forecast.

Item	Rate
Gas unit rate 2026/27 (confirmed)	3.1584p/kWh, plus £7.2706/day standing charge
Gas forecast 2027/28	5% to 10% above 2026/27, so about 3.32p to 3.47p/kWh

Electricity day rate (07:00 to 24:00)	21.0124p/kWh
Electricity night rate (00:00 to 07:00)	17.8245p/kWh
Electricity forecast Oct 2026 to Sep 2027	10% to 20% above current, so about 23p to 25p/kWh blended
Electricity standing / capacity	£13.81/day; capacity £1.14 per kVa per month on 120 kVa

Baseline used in this paper. The plant runs from April 2027, so the analysis uses the mid-point of the ESPO 2027/28 forecast: gas at about 3.4p/kWh and electricity at a blended 23.6p/kWh. The electricity blend assumes about 85% day and 15% night use, which is typical for a daytime office but has not been confirmed from half-hourly data. Both figures are highlighted because they move the numbers and should be verified.

2.4 Strategic context

- **Climate Strategy.** The Council has committed to decarbonising its operations. New gas plant works against that, and the Guildhall is the largest heating-emissions source in the estate. **The latest Environment and Sustainability Action Plan and our published 2025 Strategy states, as a net-zero milestone, that “by 2028 the Guildhall will be heated using a renewable energy source.” This wording is on the published action plan and in the strategy.**
- **Greater Lincolnshire LGR.** Vesting day is currently anticipated in April 2028. Anything installed now passes to the successor authority, and a gas-only replacement may need revisiting to meet that authority's own targets. The ESPO gas contract runs to 2031 and cannot be assigned without ESPO consent, so it will need managing through the transition.
- **External funding.** The Public Sector Decarbonisation Scheme closed to new bids in June 2025. Great British Energy prioritises rooftop solar on public buildings and remains a possible route for the solar element.
- **Funding held.** Circa £70k in the SAMP for boiler replacement, about £75k in the reserve, and about £407k uncommitted in the Climate Reserve as possible match funding. The hybrid needs about £35k above the SAMP envelope.

3. Options Considered

- **Option 1, Gas-for-Gas.** Replace the existing boilers with a modern condensing cascade (three 150 kW Ideal Evomax 2 units). Better modulation and sequencing give a confirmed efficiency gain. Indicative cost about £52,000.
- **Electric boilers.** Investigated and ruled out. No commercially viable supplier covers the mid-market range a building of this size needs.
- **Option 2, Hybrid.** Replace one unit with an Air Source Heat Pump to carry the base load, with gas units for winter back-up. Indicative installed cost about £95,000 (supply only about £71,000).

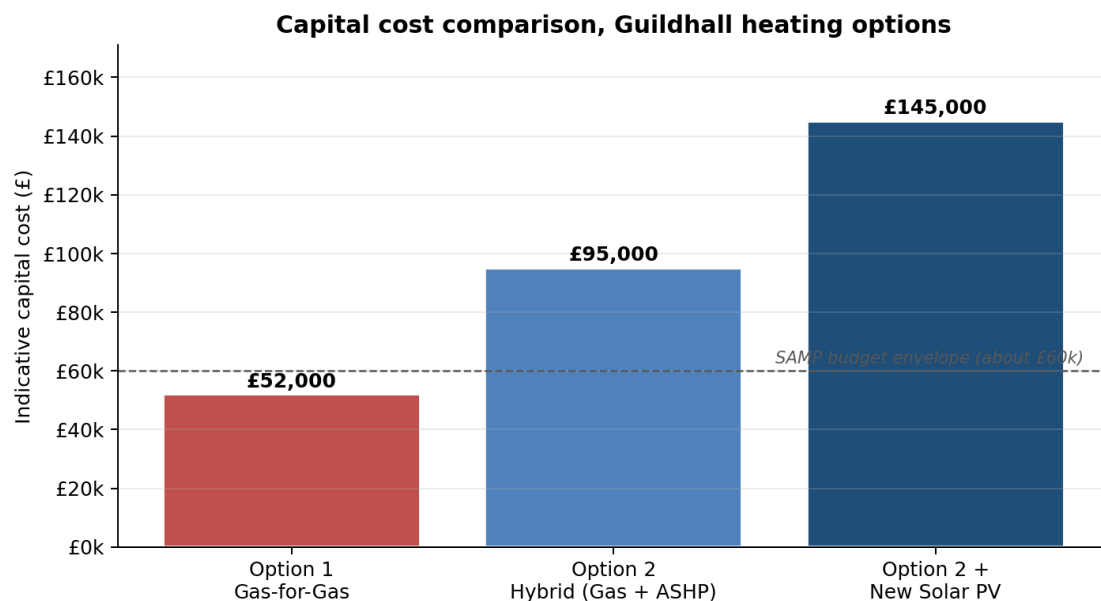


Figure 2. Indicative capital cost. The SAMP envelope applies to Option 1. The third bar adds the £75k solar reserve to the hybrid.

4. Business Case: Option 1, Gas-for-Gas

4.1 Description

A like-for-like replacement with a modern condensing cascade. Most of the gain comes from better modulation and modern sequencing controls rather than headline boiler efficiency. The option assumes no change to distribution, emitters or building fabric.

4.2 Capital and running costs

- Indicative installed cost: about £52,000, inside the SAMP envelope
- Current gas use (2024/25): 211,068 kWh
- Use after a 15% efficiency gain: about 179,400 kWh
- **Gas cost at the 2027/28 rate: about £6,100 a year. Saving: about £1,075 a year**, or up to about £2,150 if the full 30% efficiency is reached.

The saving is modest because the gas price is so low. This is not a flaw in the option, it is a direct result of the Council's keen gas rate. A cheap fuel gives little cash reward for using less of it.

4.3 Carbon

- Heating emissions: about 38.5 tCO₂ e a year, down from about 45.3, in line with the 15% gain
- The saving comes from efficiency, not from changing fuel, so there is no decarbonisation pathway in this option

4.4 Advantages and risks

- Lowest capital, fits the SAMP envelope, lowest delivery risk, familiar technology
- Clearly the cheapest to run at current and forecast prices
- Against: commits the Council to gas for 15 to 20 years, works against the Climate Strategy, and most likely leaves the successor authority to fund a heat-pump retrofit within the life of the new boilers

5. Business Case: Option 2, Hybrid (Gas plus ASHP)

5.1 Description

Replace one boiler with an Air Source Heat Pump to carry the base load, with modern condensing gas units for winter back-up. DESNZ recognises this hybrid arrangement as a credible transition technology, and the retained gas units answer the concern about heat-pump performance in cold weather.

Main assumptions: the heat pump carries about 60% of annual heat, gas covers about 40%, and the seasonal CoP is 2.5, reflecting the building's 70°C flow temperature. A boiler-only swap does not lower that flow temperature, so a conservative CoP is right.

5.2 Capital and running costs

- Indicative installed cost: about £95,000, about £35,000 above the SAMP envelope
- ASHP electricity: about 38,300 kWh a year; gas back-up: about 71,800 kWh a year
- Heating cost at verified rates: about **£11,500 a year, roughly £5,400 more than gas-for-gas**

Why the gap is so wide. With electricity at about 7 times the gas price and a CoP of 2.5, each unit of heat from the heat pump costs about 7 divided by 2.5, or nearly 2.8 times the same heat from gas. The heat pump only beats gas once the price ratio falls below the CoP, and the ratio is currently well above it. The Council's unusually cheap gas makes this gap wider than it would be for most organisations.

Caveat on the hybrid numbers. Luke as the operations expert has been clear that hybrid systems cannot be modelled accurately without specialist software, and that the hybrid figures should be treated with caution. Chair should note that the numbers here are a sound mid-case for discussion, not a final design figure. A specialist M&E review should precede any commitment.

5.3 Carbon

- **Heating emissions: about 23.3 tCO₂ e a year, a saving of about 15.2 tCO₂ e, roughly 39% against Option 1**
- The advantage grows over time as the grid electricity factor keeps falling while gas does not

5.4 Advantages and risks

- A clear carbon cut of about 39% on heating, well aligned with the Climate Strategy
- Retained gas back-up answers the cold-weather concern raised by members
- Gives the successor authority a partial decarbonisation pathway to extend rather than a retrofit from scratch
- Against: higher capital, higher running cost at current prices, more delivery complexity, and figures that need specialist validation

6. Cost and Carbon Comparison

6.1 Running cost and the price ratio

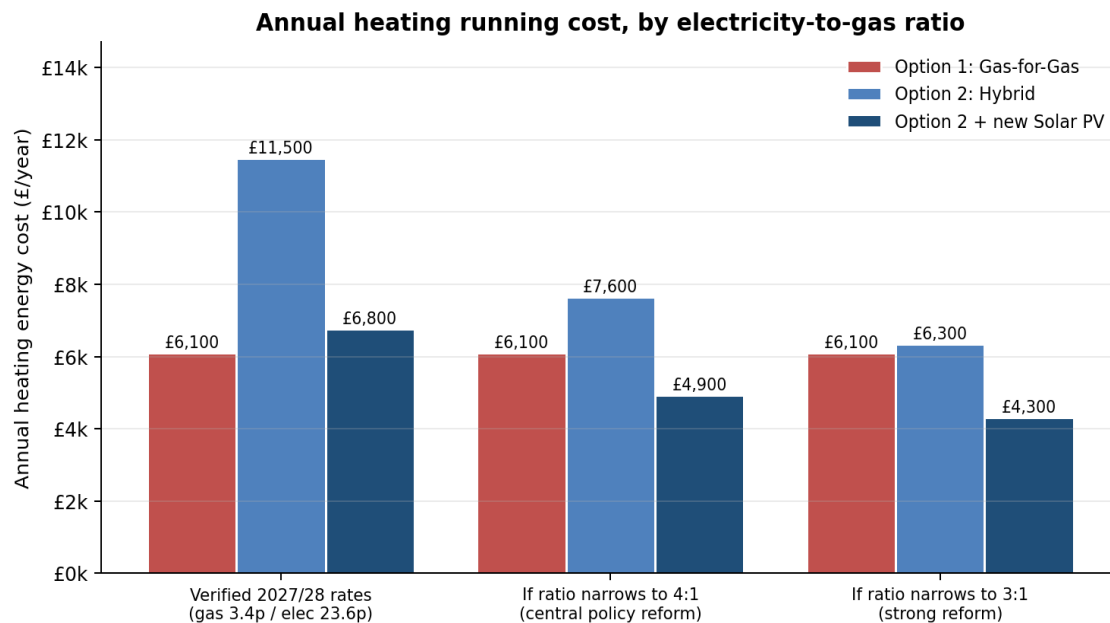


Figure 3. Heating running cost at the verified rates and if the electricity-to-gas ratio narrows. At today's 7 to 1 ratio, gas-for-gas is clearly cheapest. The hybrid, even with solar, only becomes cheaper once the ratio falls a long way. This is the heart of the decision and is examined in Section 8.

6.2 Carbon

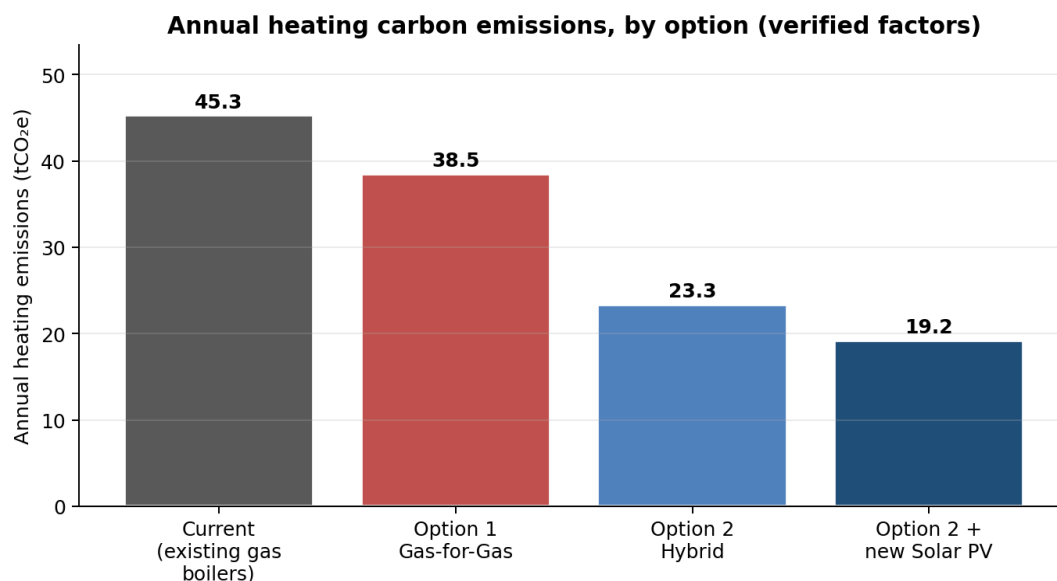


Figure 4. Annual heating emissions using the verified conversion factors. Option 2 with solar cuts heating emissions to less than half the current level.

6.3 The financial bottom line

- At verified rates, gas-for-gas is cheaper on capital, on running cost and over the whole life
- The hybrid costs about £5,400 a year more to run before solar, and about £670 a year more even with solar credited
- The hybrid is a carbon and strategic choice on these prices, not a saving. Whether that changes over the boilers' life depends on the price ratio, covered next

7. The Solar PV Upgrade

The Council holds £75,000 in a separate reserve to replace and upgrade the rooftop solar. EP Consulting's study specifies a 39.6 kWp system, 88 panels, generating 46,744 kWh a year, up from about 12,763 now, of which 39,711 kWh is used on site and 7,033 kWh exported.

Under gas-for-gas, building electricity demand does not change, so more of the extra solar output is exported at a low tariff. Under the hybrid, the heat pump adds daytime electricity demand, so more solar is used on site. Crediting about 20,000 kWh of that to the heat pump lowers the hybrid's heating cost from about £11,500 to about £6,800 a year. That narrows the gap to gas-for-gas to about £670 a year, but at the verified rates it does not close it. Solar helps the hybrid more than it helps gas-for-gas, but on current prices it is not enough on its own to make the hybrid cheaper to run.

8. Energy Prices over the Boilers' 15 to 20 Year Life

Because the new boilers will run for 15 to 20 years, the decision depends less on today's prices than on where gas and electricity prices go, and on the gap between them. This section sets out what the published evidence says. It is the analytical heart of the choice between the two options.

8.1 The question that matters

The hybrid only becomes cheaper to run than gas-for-gas if the electricity-to-gas price ratio falls. On the verified rates that ratio is about 7 to 1. The Climate Change Committee's guidance is that heat pumps need a ratio below about 3.4 to 1 to compete with gas boilers on running cost. For this specific project the maths gives two thresholds:

- The hybrid alone becomes cheaper than gas-for-gas once the ratio falls below about **2.8 to 1**.
- The hybrid with solar becomes cheaper once the ratio falls below about **5.9 to 1**, because solar offsets some of the heat pump's electricity.

So the hybrid with solar needs the ratio to fall from 7 to below about 5.9, a drop of roughly 16%, just to break even on running cost. To become clearly worthwhile it needs to approach the CCC's 3.4 to 1.

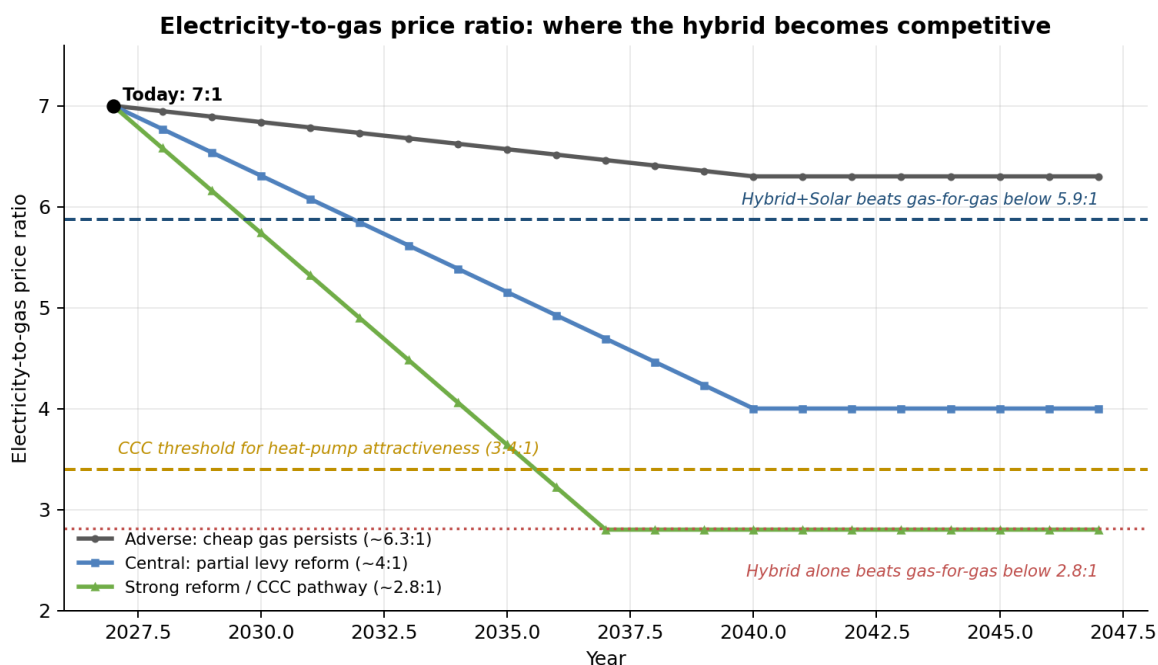


Figure 5. The electricity-to-gas ratio under three scenarios, against the break-even points for this project. The hybrid-with-solar line is crossed only under the central and strong-reform scenarios, and not before the early 2030s.

8.2 What the evidence says about gas

Government appraisal guidance points to gas staying broadly flat or falling in real terms over this period, not rising.

- **DESNZ Fossil Fuel Price Assumptions 2025** (the standard source for public-sector appraisal) has central wholesale gas easing from about 94p/therm in 2025 to about 66p/therm by 2040 in real terms, then flat to 2050. That is roughly 2.25p/kWh wholesale, which shows the Council's 3.4p delivered rate is already keen. DESNZ attributes the slight fall to lower projected demand as heating and transport electrify.
- **Cornwall Insight** expects wholesale prices to hold broadly level to 2027, then fall from 2028 as more liquefied natural gas and new renewables come on, while cautioning that prices remain above historic averages.

The practical read for this paper is that the near-term 5% to 10% rise the Council faces in 2027/28 is a contract-cycle effect, not the start of a long climb. Officers should not assume large real-terms gas inflation to justify the hybrid.

8.3 What the evidence says about electricity and the ratio

- **Energy UK** (April 2025) reports a non-domestic electricity-to-gas ratio of about 4 to 1 to 5 to 1 in recent years, and up to 8 to 1 for the largest users, driven mainly by policy levies sitting on electricity rather than gas. The Council's 7 to 1 is wide mainly because its gas is so cheap, not because its electricity is unusual.
- **The Climate Change Committee's Seventh Carbon Budget** (February 2025) assumes the ratio falls well below 3 to 1 on its Balanced Pathway, which would make heat pumps clearly cheaper to run than gas. Independent analysis notes that without faster levy reform, running-cost parity may not arrive until around 2035.
- **Autumn Budget 2025** began shifting policy costs off electricity bills, which moved the domestic price-cap ratio from about 4.7 to 1 toward about 3.6 to 1 during 2026. This is real but modest, and some of it is temporary, with Renewables Obligation costs due to return to bills from 2029/30.
- **Carbon pricing** is a live upside risk to gas costs. Gas heating currently carries no carbon price. If the UK Emissions Trading Scheme is extended to buildings, the gas price for larger consumers would rise, which would narrow the ratio from the gas side. This is under consideration but not yet in force.

8.4 Three scenarios for the appraisal

Drawing these together, officers recommend testing the decision against three scenarios rather than a single forecast.

Scenario	Basis	Ratio by about 2040
Adverse	Cheap gas persists, levies stay on electricity, national pricing retained	about 6.3 to 1
Central	Gas flat in real terms, partial levy reform, some rebalancing	about 4 to 1
Strong reform	CCC pathway, levies moved off electricity, or ETS extended to gas	about 2.8 to 1

Reading the scenarios against this project. The hybrid with solar only becomes cheaper to run than gas-for-gas below about 5.9 to 1. That point is reached in the early 2030s under the central and strong-reform scenarios, but never under the adverse scenario. The hybrid becomes clearly worthwhile, near the CCC's 3.4 to 1, only under strong reform, and not before the mid-2030s. In other words, choosing the hybrid is a bet that policy will move the ratio over the next decade. That bet is reasonable given the direction of travel, but it is a bet, and it should be presented to members as one.

This scenario framework, and the recommendation that the ratio be treated as the central sensitivity, should carry through to the formal committee paper.

9. Recommendation and Decision Route

9.1 Officer view

Both options are deliverable. On the verified rates the position is honest and clear:

- Gas-for-gas is the lower-cost and lower-risk option on capital, running cost and whole-life cost, and the higher gas price has not changed that because the gas price is still very low relative to electricity

- The hybrid is stronger on carbon and on the position handed to the successor authority, but it costs more to run and only becomes cheaper if the electricity-to-gas ratio narrows over the boilers' life

The decision comes down to how much weight members give to a roughly 39% cut in heating carbon and a decarbonisation pathway for the successor authority, set against a higher capital cost and a running-cost penalty that only reverses if energy-price policy moves as the CCC expects. If members want to align with the Climate Strategy and accept that the running-cost case depends on future price reform, the hybrid with solar is the option. If members want the lowest cost and risk on the evidence available today, gas-for-gas is the sound choice, and it is defensible.

9.2 Recommendations for the Working Group

- **(a) Note** that the very low gas price makes the hybrid more expensive to run at today's prices with current solar PV consumption assumption;
- **(b) Note** the 15 to 20 year price outlook and that the hybrid's running-cost case depends on the electricity-to-gas ratio narrowing, which the evidence expects but cannot guarantee;
- **(c) Decide** whether to weight carbon, stated public 2028 commitment and the LGR inheritance position above near-term running cost;
- **(d) Direct officers** on the route to a formal decision and the further validation needed, including the confirmed electricity day/night split and specialist hybrid modelling.

10. Assumptions, Uncertainty and Validation

Figures carrying real uncertainty are highlighted in yellow through this paper and listed here.

Assumption	Value used (source / status)
Gas and electricity use	2024/25 verified Guildhall totals, full building (211,068 kWh gas; 251,946 kWh electricity)
Emission factors	Currently (about 0.215 gas, 0.207 electricity kg/kWh) as per our GHG report, but an update is pending
Gas rate 2026/27	3.1584p/kWh, confirmed by ESPO
Gas rate 2027/28	about 3.4p/kWh, ESPO forecast +5% to 10%, to confirm
Electricity blended rate	about 23.6p/kWh, assumes 85% day / 15% night and ESPO +10% to 20% forecast. Battery storage not accounted for
Efficiency gain	15% conservative (up to 30% achievable)
ASHP CoP and heat share	CoP 2.5, 60% of heat; indicative, needs specialist modelling
Solar credited to ASHP	about 20,000 kWh a year, is a conservative estimate
Price ratio trajectory	Three scenarios, policy-dependent (Section 8)

10.1 Validation before the formal paper

- Confirm the electricity day/night consumption split from half-hourly data, which sets the blended rate
- Confirm the ESPO 2027/28 gas rate once notified
- Commission specialist hybrid modelling to firm up the CoP, heat share and running costs
- Confirm the solar self-consumption credit under each option
- Confirm Climate Reserve availability for the £35k hybrid variance
- Engage the LGR programme on capital commitments and on novating the gas contract

10.2 Sources for the price outlook

DESNZ Fossil Fuel Price Assumptions 2025; DESNZ Energy and Emissions Projections 2024 to 2050; Climate Change Committee Seventh Carbon Budget (February 2025); Energy UK, Reducing non-domestic electricity prices to drive economic growth (April 2025); House of Commons Library briefing CBP-9714; Cornwall Insight power price projections; HM Treasury Autumn Budget 2025.

Draft v0.4, Guildhall Boiler Replacement Business Case, verified rates and 15 to 20 year price outlook, SL 01/07/26