

Decarbonising a terraced house in rural England.



Liquid Gas UK



**Terraced house
1945-1964**

Floor area:
88m²

**No major
renovations**
Solid walls &
uninsulated

**Energy needed for
heating:**

13,165 kWh/m²* per
year

This report outlines the most appropriate methods for heating rural, off-grid homes in England. It takes into account the type of house and any renovations and improvements made over the years.

In the document we look at a typical terraced property located off gas grid in a rural village location.

Approximately 14% of English homes aren't connected to the gas grid which means that oil boilers are the most widely used method for heating this type of home. Replacing these boilers will have a significant impact on carbon emissions.

Many of the low carbon alternatives available come at a high cost whether that comes from the up-front cost of purchase or installation, or the costs associated with retrofitting properties in order to make them more energy efficient.

LPG is a fossil fuel with a much lower carbon intensity than oil, it is clean burning and has low levels of NO_x, SO_x and particulate matter. It is currently used as a transitional fuel for BioLPG which is produced from sustainable fuel stocks making it an even lower carbon alternative

Cost Breakdown:

Heating system	CapEx (£)	OpEx (£/yr) (2020)	Levelized Cost (£/MWh) (2020)	Carbon Emissions (kgCO2e/yr) (2020)
Oil Boiler	3,950	975	89	4,878
Coal Boiler	4,391	869	84	6,817
LPG Boiler	1,600	1,321	98	3,458
BioLPG Boiler	1,600	1,558	114	785
ASHP	8,270	1,474	142	1,180
ASHP (+R) *	13,375	670	157	536
Hybrid	9,430	1,383	148	1,101
Hybrid (+R) *	14,675	714	179	536
Biomass Boiler	11,544	1,081	128	319

Can rural households in England afford this?*

Heating system (CapEx)	Percentage of households who can afford this capital cost?
BioLPG Boiler (£1,600)	<u>73%</u>
ASHP (£8,270)	39%
Hybrid (£9,430)	36%
Biomass (£11,544)	31%
ASHP + R (£13,375)	26%

Analysis:

We know cost is an important consideration when making decisions about which heating methods to recommend. The lowest cost, low carbon, heating system is a bioLPG boiler at **£1,600**. All other recommended options carry a much higher up front cost making them an unviable option for many households.

The heating system with the lowest operational cost is the air source heat pump with renovations to improve fuel efficiency within the home. Unfortunately the up-front cost of purchasing a heat pump and subsequent renovations to install it makes it a costly option

which is unrealistic for many people. Only 26% of people can afford the costs of circa **£13,375** to purchase and install an air source heat pump.

The low capital cost of purchasing a bioLPG boiler, coupled with the levelized cost (ongoing costs throughout the duration of the boiler life span) makes the bioLPG the most financially accessible option for this type of home with 73% of consumers saying they can afford the cost of **£1,600** for a bioLPG boiler.

Conclusion:

- **BioLPG Boilers** have a much lower up-front cost compared with heat pumps and biomass
- They offer a **low carbon solution** which meets Net Zero ambitions
- The **transition from oil to LPG is simple** - no renovations and large upfront sums of money required
- The **transition from LPG to bioLPG is seamless** as each product is chemically identical so can be mixed.

* This information has been taken from the Archetype Analysis work conducted by Ecuity Consulting comparing the suitability of heating methods between a variety of archetype properties in England. The full report can be found at liquidgasuk.org/uploads/DOC61793185F31C0.pdf

* It was assessed if rural households could afford the heating methods suggested after taking into account disposable income available.