

Decarbonising a detached family home in rural England.



Liquid Gas UK



**Detached house
1919 - 1944**

**Floor area:
153m²**

**No major
renovations**

Solid walls & loft
uninsulated

**Energy needed for
heating:**

22,338 kWh/m²* per
year

There are approx
42,000 English
properties of this
type.

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 this document we look at a typical detached property located off gas grid in a rural village location.

Approximately 14% of English homes aren't connected to the gas grid, and there are 42,000 detached homes of this type using oil boilers as the main source of heat supply. 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

DECARBONISING A DETACHED FAMILY HOME IN RURAL ENGLAND

Cost Breakdown:

Heating system	CapEx (£)	OpEx (£/yr) (2020)	Levelized Cost (£/MWh) (2020)	Carbon Emissions (kgCO2e/yr) (2020)
Oil Boiler	4,150	1,658	80	8,299
Coal Boiler	5,077	1,478	76	11,599
LPG Boiler	1,900	2,208	94	5,883
BioLPg Boiler	<u>1,900</u>	<u>2,605</u>	<u>110</u>	<u>1,336</u>
ASHP	13,060	2,472	137	1,979
ASHP (+R) *	29,690	<u>1,023</u>	177	818
Hybrid	13,300	2,329	138	1,850
Hybrid (+R) *	30,470	1,109	192	825
Biomass Boiler	18,100	1,839	123	<u>543</u>

Can rural households in England afford this?*

Heating system (CapEx)	Percentage of households who can afford this capital cost?
BioLPG Boiler (£1,900)	<u>68%</u>
ASHP (£13,060)	27%
Hybrid (£13,300)	27%
Biomass (£18,100)	20%
ASHP + R (£29,690)	10%

Analysis:

In addition to environmental concerns, we know cost is also an important consideration when making decisions about which heating methods to recommend. The lowest cost, low carbon, heating system presented for this type of home is a bioLPG boiler at **£1,900**. All other recommended options carry a much higher up front cost making them an unviable option for many families.

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. Only 10% of people can afford the costs of circa **£29,690** 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 68% of consumers saying they can afford the cost of **£1,900** for a bioLPG boiler.

Conclusion:

- **BioLPG Boilers** have a much lower up-front cost compared with heat pumps and biomass systems
- 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 here: <https://www.liquidgasuk.org/uploads/DOC61793185F31C0.pdf>

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