Decarbonising a traditional detached period home in Scotland.

Liquid Gas UK

Detached house Pre 1918

Floor area:
198m2

No major renovations
Solid walls, uninsulated but with some insulation in the attic rooms

Energy needed for heating:

142 kWh/m_2* per year

There are approx 20,228 properties of this type.

This document outlines the most appropriate methods for heating a traditional detached home with period features in Scotland. It takes into account the specific type of house and any renovations and improvements made over the years.

Households which aren't connected to the gas grid often rely on high carbon, alternative sources of heating such as oil or coal. This means oil boilers are the most widely used method for heating this type of home, and replacing these boilers will have a significant impact on carbon emissions.

Many of the low carbon alternatives available come at a high cost, particularly with this type of property where any retrofitting to improve energy efficiency is very expensive. This makes the installation and retrofit costs of low carbon technologies extremely prohibitive to most families.

LPG is a fossil fuel with a much lower carbon intensity than oil, it is clean burning and has low levels of NOx, SOx 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. In addition it doesn't require any retrofitting to install and for existing LPG users the transition to bioLPG is seamless.

Cost Breakdown:

Heating system	CapEx (£)	OpEx (£/yr) (2020)	Levelized Cost (£/MWh) (2020)	Carbon Emissions (kgCO2e/yr) (2020)
Oil Boiler	4,150	2,096	77	10,493
Coal Boiler	6,093	1,868	75	14,665
LPG Boiler	2,000	2,777	92	7,438
BioLPg Boiler	**2,000**	**3,276**	**108**	**1,689**
ASHP	18,270	3,040	139	2,433
ASHP (+R) *	30,990	**1,216**	158	973
Hybrid	14,960	2,886	131	2,284
Hybrid (+R) *	31,270	1,335	170	988
Biomass Boiler	18,100	2,325	113	**686**

Can rural households in Scotland afford this?*

Heating system (CapEx)	Percentage of households who can afford this capital cost?
BioLPG Boiler (£2,000)	**67%**
Hybrid (14,960)	31%
ASP (£18,270)	25%
Biomass Boiler (£8,100)	25%
ASHP (+R) (£30,990)	16%

Analysis:

Cost is an important consideration when making decisions about which heating methods to recommend, particularly with this type of property where retrofit is so expensive.

The lowest cost, low carbon, heating system is a **bioLPG boiler at £2,000**. All other recommended options, particularly the air source heat pump with retrofitting 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 very costly option.

In fact just 16% of people have the disposable income to be able to afford the cost of circa £30,990 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 67% of consumers saying they can afford the cost of £2,000 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 Scotland. The full report can be found here: **https://www.liquidgasuk.org/uploads/DOC617931B5BFE25.pdf**

***** Displays the approximate percentage of Scottish households that have an annual disposable income greater than the capital cost of each of the low carbon heating systems for a house of this archetype.