



HEATING WITH LIQUID FUELS:

Pathway for a sustainable future

The potential for liquid fuels to contribute to the EU's energy and climate policy objectives in 2030, 2050 and beyond.

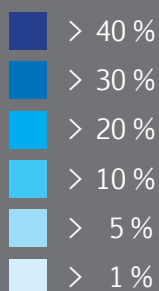
OIL HEATING IN EUROPE TODAY

A life without heating oil is unthinkable for around 20 million households in the EU. These homes are currently using oil to heat their homes and their water, while new liquid fuel replacements are being developed. There are many advantages of having a liquid energy source for heating. It is easy to transport, can be stored on site and is an economic way to provide heating – especially in rural areas. Such locations usually are not connected to the gas grid and have a limited electricity network. Off-grid people

20 million homes

heated with liquid fuels in the EU, mainly in rural and residential areas

17% of households



At least
200,000 European jobs
related to oil heating

12,500 SMEs
active in the industry:
installers, fuel distributors,
equipment manufacturers, etc.

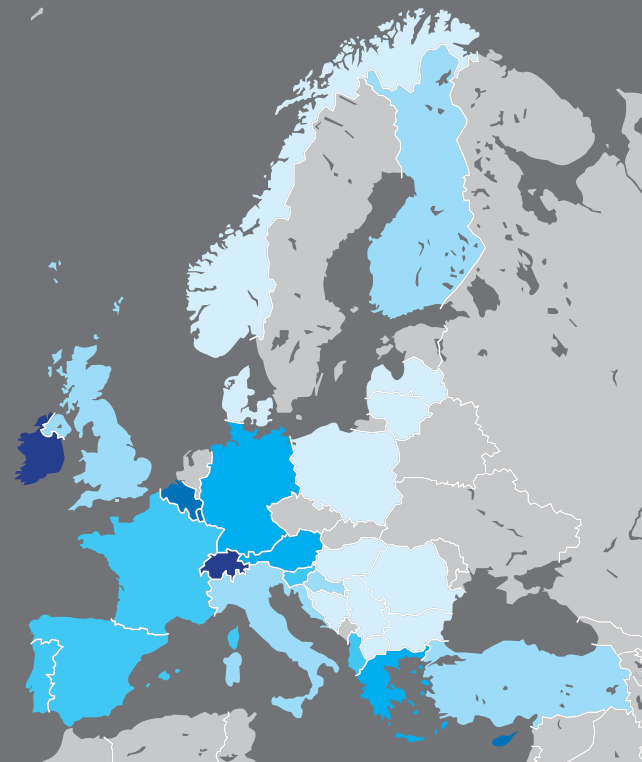
Share of oil heating



Proven technologies for
more than 80 years

need energy supply and at present heating oil stored in tanks is the only way they can have it.

To replace fossil fuels, new liquid fuels, which are greenhouse gas-neutral, can be easily deployed. To future-proof their buildings, homeowners just have to modernise their heating, without replacing it. In this way, all the houses now using oil heating systems will be able to achieve Europe's long-term climate targets.



Advantages of liquid fuels

SUITABLE SOLUTION FOR OFF-GRID AREAS

In rural areas, liquid fuels or LPG are the only available options as the gas grid is not available and the electricity distribution network is not able to meet increased demand. In these areas in particular, the life cycle approach needs to be taken into account to ensure that the energy carrier will best fit the needs without generating more emissions earlier in the production phase.

COST EFFICIENT

Thanks to the lower capital investment and running costs, heating oil systems are part of the solution against energy poverty.

EASY COMBINATION WITH RENEWABLE ENERGIES

Liquid fuel heating systems can be combined with renewable energy such as solar thermal, photovoltaic or biomass.

HIGH ENERGY DENSITY

Liquid fuels have a high “energy density” so one delivery of fuel into a storage tank can heat a home for many months.

EASY TO TRANSPORT AND STORE

Liquid fuels are easy to transport and ensure an independent and reliable supply of energy.

SECURITY OF SUPPLY

Liquid fuels are stored in a tank at the property. Having independent energy storage offers the house owner a secure supply of heating.

SUITABLE FOR THE EXISTING BUILDING STOCK

Old buildings with poor insulation need high temperatures for heating radiators. For this reason, liquid fuels, with their superior energy density, work efficiently in such buildings while heat pumps are often not suitable or can lead to high running costs for homeowners.

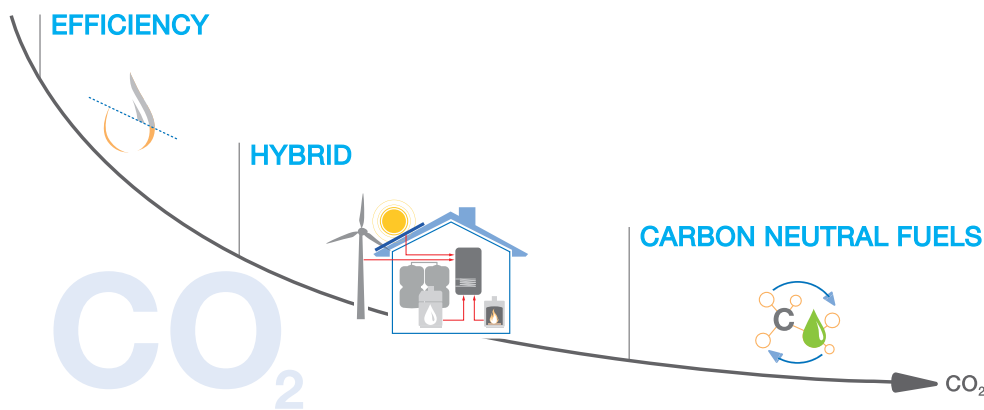
HIGH EFFICIENT HEATING

Modern condensing boilers offer efficiencies close to 100% and will get an A label in efficiency. Combined with renewable energy sources these packages will get an A+ label.

PROVEN AND RELIABLE TECHNOLOGY

Experienced personnel guarantee the easy installation and maintenance of liquid fuel heating systems.

HEATING WITH LIQUID FUELS CAN CONTRIBUTE TO THE SUCCESS OF THE ENERGY TRANSITION



The three-step approach for oil heated buildings

Putting into action such a challenging energy transition for European buildings is fundamental, and needs to be open to all types of technology. Policy makers should not prohibit certain fuels, allowing at the same time others. We suggest to EU policy makers to set targets while remaining “technology neutral”. If the climate goals are to be achieved, all solutions must play a role. Heating with liquid fuels will contribute to the success of the energy transition.

Step 1: MAXIMISE BOILER EFFICIENCY

Installing modern oil-fired condensing boilers in all buildings would have immediate benefits. They reduce both fuel oil consumption and the greenhouse gas emissions - by up to 30% compared to outdated boilers.

Step 2: MOVE TO HYBRID HEATING SYSTEMS

Hybrids build on the strengths of different technologies – ie. renewables which reduce greenhouse gas emissions, and oil which is readily available independently of the wind and sun. This can provide a cost-effective solution to reduce greenhouse gas emissions in the building sector.

Step 3: INTRODUCE CO₂ NEUTRAL LIQUID FUELS

Deploy new liquid fuels that are CO₂ neutral, to comply with the long-term climate objective.

NEW FUELS FOR A GREEN FUTURE

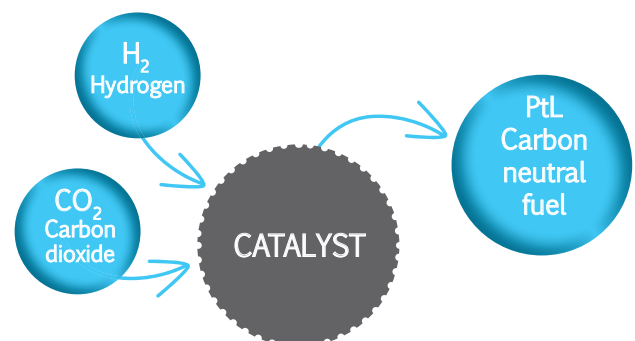
The future of oil heating systems in Europe will be based on liquid low carbon fuels. Their production is being researched intensively. The raw materials for the liquid fuels can be different – but they have one thing in common: the feedstock will not compete with food production. These fuels can be used in modern condensing boilers without the need for alterations. Furthermore, the existing supply infrastructure can be used. Different types of carbon-neutral liquid fuels are already in production.

Plant photosynthesis is the natural pathway of a closed carbon cycle. In the **BtL** (biomass-to-liquid) processes, liquid fuels, with a greenhouse gas reduction potential of up to 90%, can be generated from a variety of vegetable raw materials such as algae, waste, wood or straw. Waste from households or industry also can serve as a carbon source in the process. **FAME** (Fatty Acid Methyl Ester) is based on vegetable oil, which is processed with methanol to a liquid fuel, suitable for oil heating.

HVO (Hydrotreated Vegetable Oil) is produced from used cooking oil, residues from the food industry and from vegetable oils which are not intended for food. HVO is an aromatics-free blend of paraffins and is the basis for a clean and complete combustion. The hydro-treating of vegetable oils and suitable waste, as well as waste fats, for the production of HVO is now a mature technology and the fuel is available on an industrial scale.

The **PtL** (Power-to-Liquid) process generates a synthetic

liquid fuel by using renewable electricity, carbon dioxide from the atmosphere or other sources, and water. Hydrogen is produced from renewable electricity by way of electrolysis. Carbon dioxide is captured from the atmosphere or other sources. The e-fuels are synthesized in a catalyst driven process called the “Fischer-Tropsch” process.



These synthetic liquid fuels, also called e-fuels or future fuels, are carbon-neutral and a viable way to reduce greenhouse gas emissions via a closed carbon cycle while keeping the fuel in liquid form. They can also be mixed with traditional fuels or further processed into products with the same properties such as gasoline, diesel, heating oil or kerosene.

The new world: carbon-neutral liquid fuels

The carbon-neutral heating fuels will be “drop in” replacements for oil. Using the suggested step-by-step approach it is possible to reach the EU’s heating decarbonisation goals for heating by 2050.

OUR MESSAGES TO POLICY-MAKERS

Solutions for the 20 million oil heated homes in Europe to achieve zero-carbon emissions:

- Follow a technology-open pragmatic approach which recognises the potential of CO₂-neutral fuels. Policy objectives should include all heating technologies and all potential fuels which offer the opportunity to reach the emission targets.
- Follow a “full life cycle” approach to emission calculations. They should include emissions relating to exploration, extraction, transport, refining and delivery of fuels, as well as the impact of the different combustion substances on the atmosphere.
- Push forward innovation: specific fuel or technology bans will stop research and development by industry which could give answers to the challenges of achieving a successful energy transition.
- Create a policy framework which is reliable and predictable, and which gives the right signals to the market to invest in renewable fuel production and distribution.
- Consider the social implications of the energy transition and its affordability for those on lower incomes. Also consider the practicality of converting to zero-carbon liquid fuels in older and remote rural homes instead of converting to a completely different system.
- Improve efficiency standards of buildings, including heating, in a socially acceptable way. Energy poverty has been identified as an important topic to address in the Clean Energy Package. Incentives for energy efficient solutions should therefore be driven by such awareness. Currently, there is a lack of affordable low or zero carbon heating alternatives in rural areas due to the lack of infrastructure connections.

Recommended political measures to reach the climate targets - 2030 and beyond

- **EFFICIENCY:**
Support and speed up the replacement of obsolete and inefficient heating systems through financial and policy incentives.
- **HYBRID:**
Promote and fund the installation of hybrid heating systems for most houses (e.g. solar linked to liquid fuel-condensing boilers). This will provide substantial emission reductions while maintaining a secure supply of energy for citizens.
- **CARBON-NEUTRAL FUELS:**
Call for a stable and enabling policy framework which includes grants for research and innovation on carbon neutral liquid fuels as a substantial long-term contribution to the reduction of carbon emissions from heating.

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