



WHY LIQUID FUELS SHOULD BE PART OF THE ENERGY TRANSITION

Low carbon fuels are being trialled successfully
in heating projects across Europe

ABOUT EUROFUEL

The European Heating Oil Association (Eurofuel) represents organisations that promote the use of liquid fuels for domestic heating in Europe.

Our membership covers 10 European countries and over 10,000 companies. Eurofuel encourages innovation and

promotes existing and new liquid fuels and techniques for heating in the domestic market. Our members are committed to ensuring the competitiveness and efficiency of heating with oil and liquid fuels, while also reducing its environmental footprint.

ABOUT EHI

The European heating industry (EHI) brings together companies that are leaders in the production of efficient heating systems.

To reach the 2030 climate targets and achieve carbon neutrality by mid-century, the greenhouse gas emissions from buildings will need to be reduced by 60 % by 2030 in comparison to 2015. Space and water heating will have to contribute most to reach these objectives. For this massive shift, the potential of efficient and renewable-based heating technologies, as well as of sustainable energy carriers has to be leveraged, in a socially responsible way

leaving nobody behind. A one-size-fits-all concept would be counterproductive.

EHI therefore advocates for a multi-technology approach to achieve the goal of climate neutrality for buildings by 2050. Increased electrification via heat pumps and hybrid heaters will be a key part of the future mix. As a complement, to attain our CO₂ emission reductions goals, we will need to use renewable fuels, in combination with efficient appliances. These fuels include hydrogen and biomethane - as substitutes for natural gas - as well as sustainably generated biomass and renewable liquid fuels.

To gain experience, EHI and Eurofuel have launched a field trial in which boilers are operated with different renewable liquid fuels. The framework conditions of this large-scale European field trial are summarized in the flyer.

WHY LIQUID FUELS SHOULD BE PART OF THE ENERGY TRANSITION

20 million households in Europe rely on heating oil. They need it to warm their homes and to provide hot water. For them, oil heating systems offer a reliable and cost-efficient option. Sometimes it is the only viable option when living in rural off-gas grid areas. But how will they ever reach the climate targets without changing their heating systems? The solution's simple: their boiler should be "future fuels ready".

FIELD TEST STARTED: MORE THAN 100 HOMES IN EUROPE NOW USE LOW CARBON FUELS

Several European countries have started field tests to show that older houses with oil boilers can reach the climate goals as well as new build houses. In total, more than one hundred family homes across Europe now use low carbon liquid fuels, reducing their greenhouse gas emissions considerably. The objective of these field trials is to test the new fuels in real life, in real homes and with real people who use the heating systems and make sure that the climate goals are achievable.

WE NEED TO DECARBONISE!

To achieve carbon neutrality by 2050 in the EU, all sectors need to make a considerable effort – including the heating sector. However, it is not always easy to switch to a different heating technology. There are many financial and practical reasons why it isn't possible for many households. But, if they are oil-heated, they can reduce their emissions in three steps – and meet the target.

- decrease energy consumption through efficiency improvements, such as better insulation and the installation of modern oil condensing boilers;
- integrate solar energy by utilising a hybrid system using the best of each technology;

- progressive conversion to low-carbon liquid fuels, with zero greenhouse gas emissions achieved by 2050.

Step 3 is the main focus of our joint field test. Reducing energy consumption through modernisation with a high efficiency oil condensing boilers first, integrating maybe a solar-thermal or photovoltaic system on the roof and using low carbon liquid fuels for the household's remaining energy needs.

FLEXIBILITY, RELIABILITY AND AFFORDABILITY

People that use liquid fuels are convinced by them. Flexibility, reliability and affordability are the three main reasons for these households to stick to their existing heating systems. Liquid fuels can be supplied everywhere, there are no grids needed. The storage is also very easy and safe. And, if the fuels can become low carbon within the next years, it is a perfect solution for oil-heated homes.

Low carbon liquid fuels can be obtained through FAME, Fatty Acid Methyl Ester by processing used cooking oil or from HVO, hydrotreated vegetable oil. They can also be synthetic products achieved through innovative technologies such as Power-to-Liquid where green electricity is synthesized into a liquid hydrocarbon.

WHICH COUNTRIES ARE INVOLVED IN THE FIELD TRIALS?

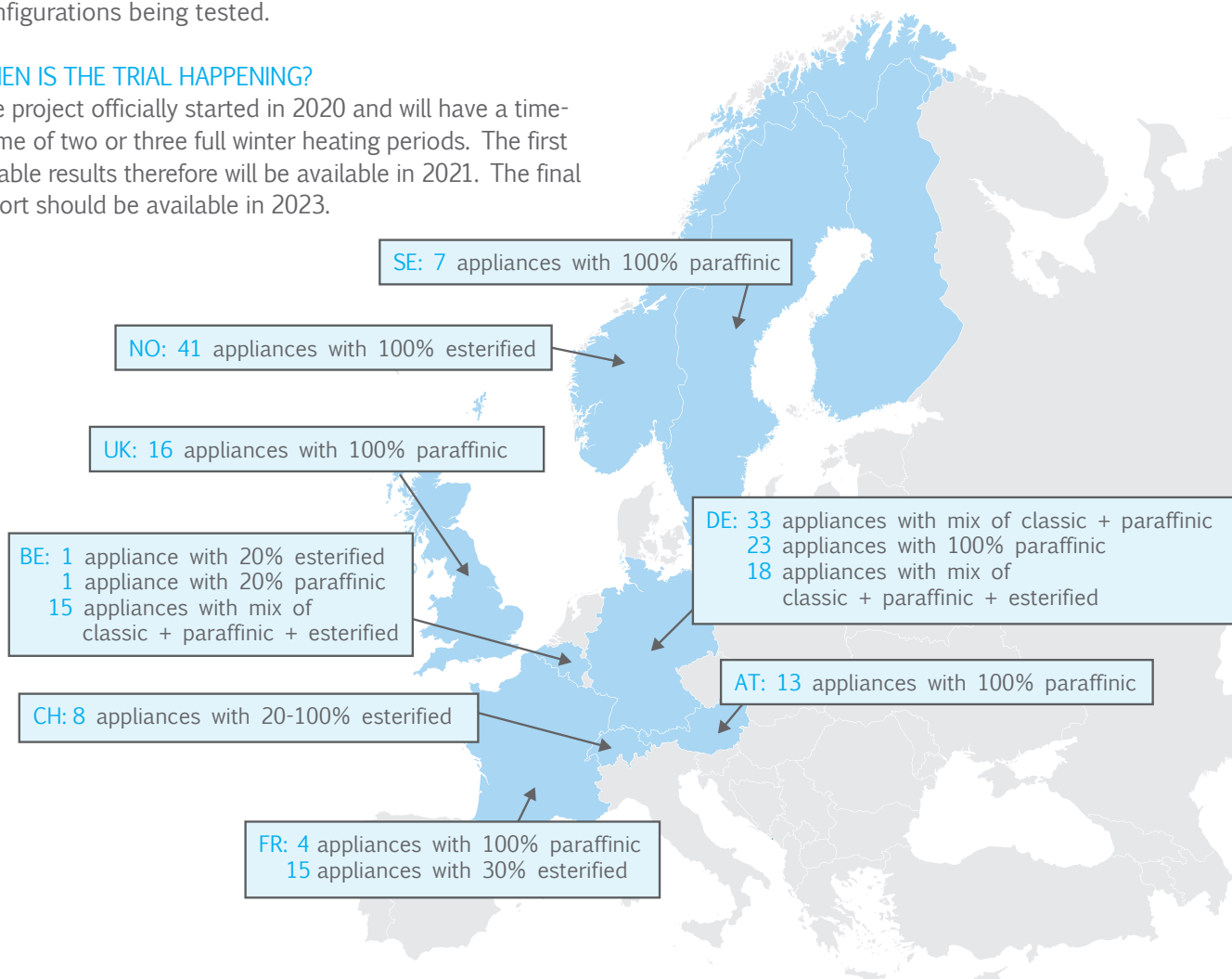
Companies and organisations from seven European countries have joined the current field test. The participants are from Austria, Belgium, France, Germany, United Kingdom Sweden and Switzerland. Different numbers of homes have joined the test in each country – with a variety of different renewable fuels and heating system configurations being tested.

WHEN IS THE TRIAL HAPPENING?

The project officially started in 2020 and will have a time-frame of two or three full winter heating periods. The first reliable results therefore will be available in 2021. The final report should be available in 2023.

Manufacturers of heating appliances, storage tanks, ancillary components and fuel distributors have joined forces to ensure the success of this initiative.

In 2020, the European Heating Industry (EHI) and the European Heating Oil Association (Eurofuel) signed an agreement to conduct joint field trials.



LIQUID FUELS WITH LESS CO₂ – SOME ABBREVIATIONS IN COMMON USE

There are different types of low-carbon liquid fuels (REDII conform), which are drop-in products that can be mixed in different quantities in the total blend. There are therefore several options to consider.

esterified fuels



FAME
Fatty Acid Methyl Ester

UCOME
from residues like
Used Cooking Oil (UCO)
or from Vegetable Oil
(e.g. Rapeseed Methyl Ester - RME)

paraffinic fuels



Hydrotreated Oils
HUCO from residues like
used cooking oil (UCO)
or HVO from vegetable oil
(e.g. rapeseed oil) and waste



E-Fuel (PtL)
based on
green electricity,
e.g. produced by
Fischer-Tropsch-Synthesis

A FEW PROJECTS: WHAT ARE WE DOING IN THE COUNTRIES

AUSTRIA

100 % hydrotreated products (HVO): In 2018 IWO Austria has launched an Austria-wide test project to prove the readiness to use of hydrotreated products (HVO) and their compatibility with conventional condensing boilers. The test project not only involves established boiler-manufacturers as well as energy suppliers. In the framework of the project, a total of 13 test facilities were set up in both residential and non-residential buildings. The facilities have been supplied with HVO and have been running without malfunction since the starting point in 2018. Prior to the



operation, no adjustment of the existing infrastructure was required. Tank cleaning was optional. During the test period of two heating seasons, besides the CO₂-reduction, the usage of HVO has proven successful in practice. An elaborate testing protocol regularly recorded the CO emissions (-50%), NO emissions (-10%) and the energy yield (+3%). The test project was expanded by two heating seasons.



BELGIUM

Domestic Heating Oil + 20 % FAME: In order to test a mix of 80% standard heating oil and 20% FAME, Informazout organised a collaboration between Cargill (who delivered the FAME for the test), a local heating oil dealer (who provided the fuel and a suitable heating installation) and the boiler manufacturer (who checked the combustion parameters and the condition of the boiler). The test began in December 2019 on a condensing oil boiler of a showroom and office building. A mix of 1600 l heating oil

and 400 l FAME was used for the test. The boiler itself was not modified in any way.

The service report shows that the boiler in Boom is operating smoothly and safely after one year. The measurements indicate 2.65 mg/kWh for CO, which is excellent considering the legal limit of 150 mg/kWh, a smoke index of 1 and a combustion efficiency at full load of 99.2% Hi. The combustion efficiency is thus almost perfect and well above the legally required 90% Hi.

The pilot plant driven by the mixture of heating oil and FAME is running without any problem. After the consumption of 2.000 liter of the mixture, not a single problem occurred. The combustion efficiency is higher than 99% (Hi) and thus complies with the local regulations for maintenance and inspection of central heating appliances. According to the supplier, FAME reduces CO₂ emissions by 70%. Because 20% FAME is used for the mixture, the CO₂ reduction is therefore a fifth of 70%. In other words: 14%.

GERMANY

R33 (67 % DHO + 7 % FAME + 26 % hydrotreated products): In Germany a total of 21 residential buildings are already supplied with a blended fuel called R33 fuel combination, one third of which consists of greenhouse gas-reduced components. The aim is to test their readiness for use. 26 % of the R33 blend used in the new joint project consists of second generation hydrotreated biofuel derived from waste material, which does not compete with food cultivation.

IWO Germany has already been using such paraffinic fuels without any problems since 2017 as an admixture to classic heating oil in a smaller number of its own model projects. In the joint project now with the Federal Association of the German Heating Industry (BDH) launched together with the heating appliance industry, the fuel mix used will be further expanded to include a 7 percent share of esterified bio-oils, so-called FAME. Since the two renewable fuel components together account for 33 percent, the mixture is also known

as R33 fuel. If this combination also proves successful in practice, it would further expand the range of greenhouse gas-reduced liquid energy sources suitable for oil heating.

