

## Climate change & the rural decarbonisation challenge

Climate change is happening and action is necessary. At the Paris climate conference, governments agreed on a global action plan to put the world on track to avoid dangerous climate change by limiting global warming. Several routes are being explored to deliver the EU's commitment to the Paris Agreement, and to the energy transformation overall. The main challenge is to make this transition work for everyone in Europe, including **40.7 million European households located in rural areas that are not connected to the gas grid**. In the current debate on emissions reduction, rural areas and energy solutions for those areas are too often overlooked.



114 MILLION  
EU citizens live in rural areas



OFF-GRID  
Off-gas grid homes are typically older and less energy-efficient



45%  
of rural heat comes from heating oil and coal (off-the-gas-grid & non-electrical)



DIVERSE  
The off-grid building stock is diverse in characteristics



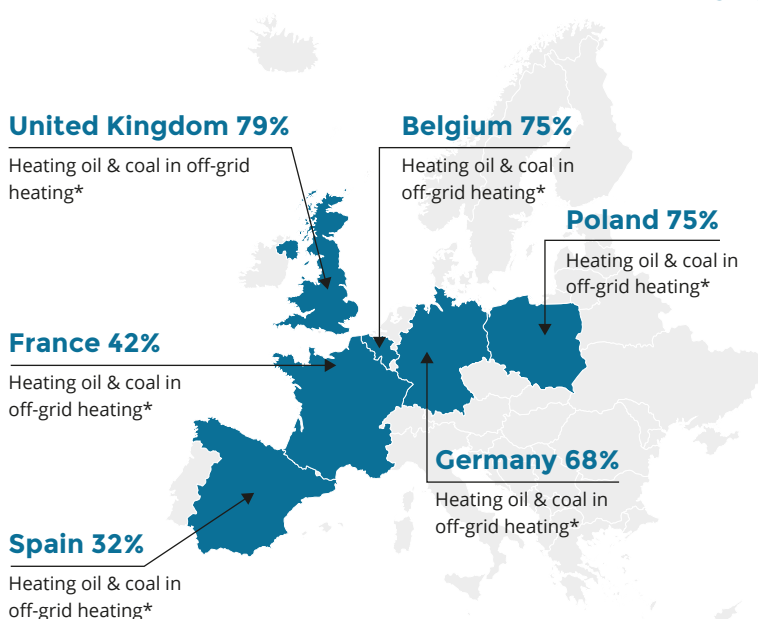
24%  
of people in rural areas are at risk of poverty or social exclusion



72%  
of heating & cooling demand of single-family homes is consumed in rural areas

This rural decarbonisation modelling study shows, that by phasing out heating oil and coal in the six European countries in which they have the highest penetration, considerable progress can be made towards reaching the EU's 2050 targets to cut greenhouse gas emissions to 80% below 1990 levels. By tapping into the vast potential of these fuels LPG and BioLPG in rural areas, this important target can be met at lower cost.

### THE STUDY



The study initially focused on six countries where the decarbonisation challenge in rural areas is particularly problematic, as these countries consume the greatest volumes of heating oil and coal (together 73% of Europe's consumption).

The model's conclusions can be applied to the rest of Europe to help ensure that rural areas deliver on the EU's 2050 targets.

The scenarios took account of each countries':

- Housing characteristics, climatic conditions, and their impact on appliances' performance
- Fuel prices
- Heating system costs

**\*Model includes:**

- Carbon emissions saved by switching away from oil and coal heating
- The consumer cost (technology and fuel) of the heating transition
- Off-grid heating = non-natural gas & non-electrical heating consumption
- The rural building stock is diverse with a varying technical/cost potential for different types of thermal insulation. To avoid complexity the impact of thermal insulation is not considered, and the focus has been exclusively on heat in evaluating scenarios

# Oil and coal phase out will be needed in rural homes



**PARIS TREATY**

Keep temperature increase well below 2°C



**EU 2050 TARGET**

80% CO<sub>2</sub> emission reduction



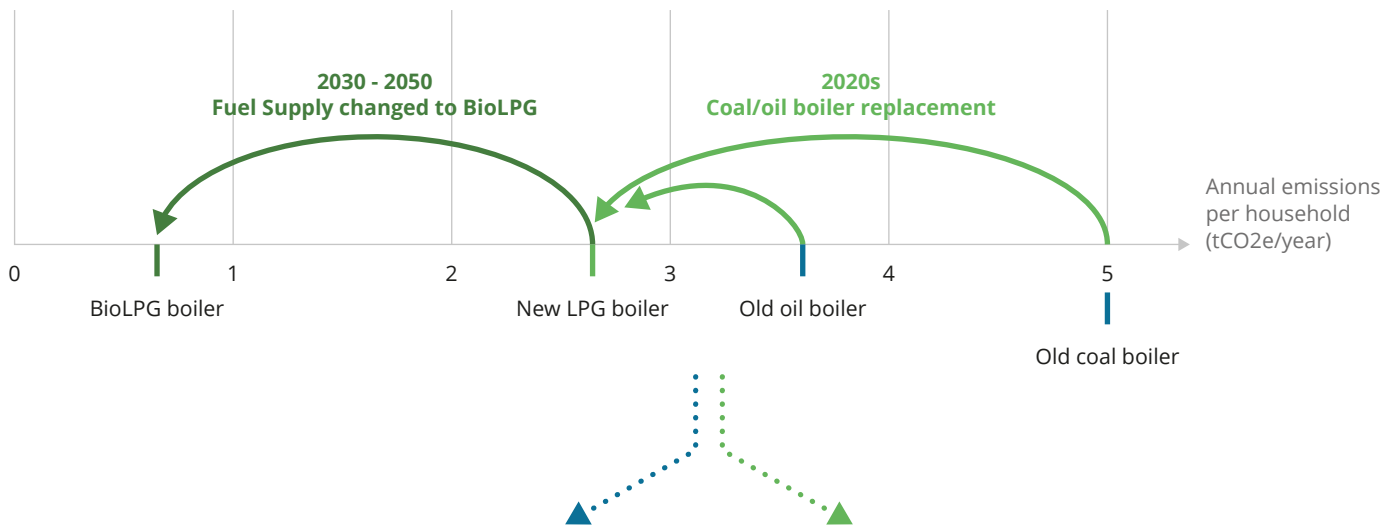
**DOING-NOTHING SCENARIO**

13% CO<sub>2</sub> emission reduction in rural heating

## LOW HANGING FRUIT

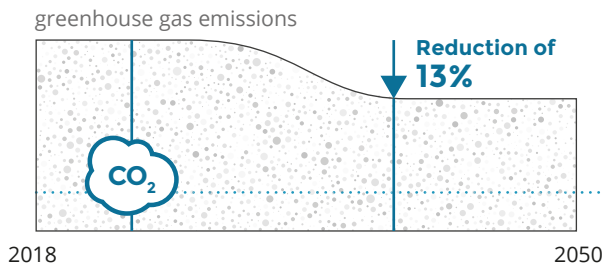
Phase out the most polluting fuels first

Old coal and heating oil boilers emit 92% and 39% more CO<sub>2</sub> emissions than a new LPG boiler



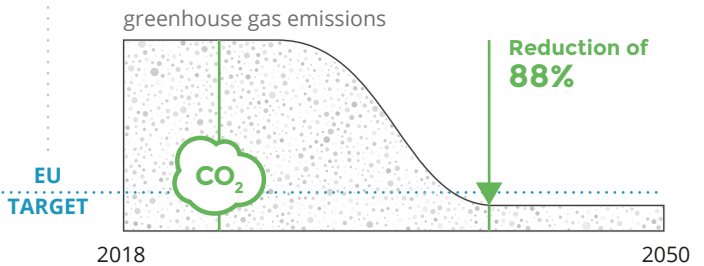
## BUSINESS-AS-USUAL

Policy does not stimulate switching to lower carbon heating fuels



## RAPID SWITCHING SCENARIO

Policy supports an accelerated phase out of heating oil and coal to (Bio)LPG and others



## SOME EUROPEAN COUNTRIES HAVE ALREADY PUT POLICY MEASURES IN PLACE TO PHASE OUT HEATING OIL AND COAL



France



Phase out heating oil foreseen for 2027



Denmark



Phase out heating oil by 2030



United Kingdom



Phase out heating oil and coal by 2030



Belgium



Phase out new heating oil boilers by 2035

# A mixed technology decarbonisation approach is more cost-effective

The study examines two pathways for decarbonising rural, off-grid areas in the six European countries with the highest heating oil and coal penetration. **The first depends on full electrification** – oil and coal boilers are replaced by electric heat pumps. **The second pathway allows for a broad mix of technologies**, including biomass, (Bio)LPG boilers and heat pumps. Below is a comparison of both scenarios in terms of greenhouse gas reduction potential and cost.



## SINGLE TECHNOLOGY PATHWAY

100% Electric Heat Pumps



90% CO<sub>2</sub> emissions reduction



€ 30 billion

Additional costs of alternative heating systems and fuels above heating oil and coal



## MIXED TECHNOLOGY PATHWAY

44% Biomass | 44% (Bio)LPG  
12% Electric Heat Pumps



88% CO<sub>2</sub> emissions reduction



€ 11 billion

Additional costs of alternative heating systems and fuels above heating oil and coal

€ 19 billion cheaper

Equivalent to the cost of 38 state-of-the-art hospitals (based on Charleroi Hospital, Belgium)



## CONCLUSIONS

**1 Policy support is needed now for deep decarbonisation of heat**  
Both the mixed technology and the single technology pathways deliver deep decarbonisation, with more than 85% reductions in emissions by 2050, but require policy interventions to start a transition away from heating oil and coal immediately. Delaying this process means that 2050 climate change targets become very difficult to meet.



**2 A mixed technology pathway is considerably more cost-effective**  
The mixed technology pathway is significantly cheaper by 19 billion euro. Electrification implies a high investment burden for consumers. In rural areas, where people are more likely to be living in poverty, this is an important factor.



**3 There is no silver bullet for heating**  
Heating systems perform in a diverse manner according to building type, national energy cost levels, insulation levels, climate and use. For instance, in newer and better insulated homes heat pumps tend to perform better, whereas in older homes (Bio)LPG is more cost-effective. Policy should recognise the unique characteristics of rural homes and heating.

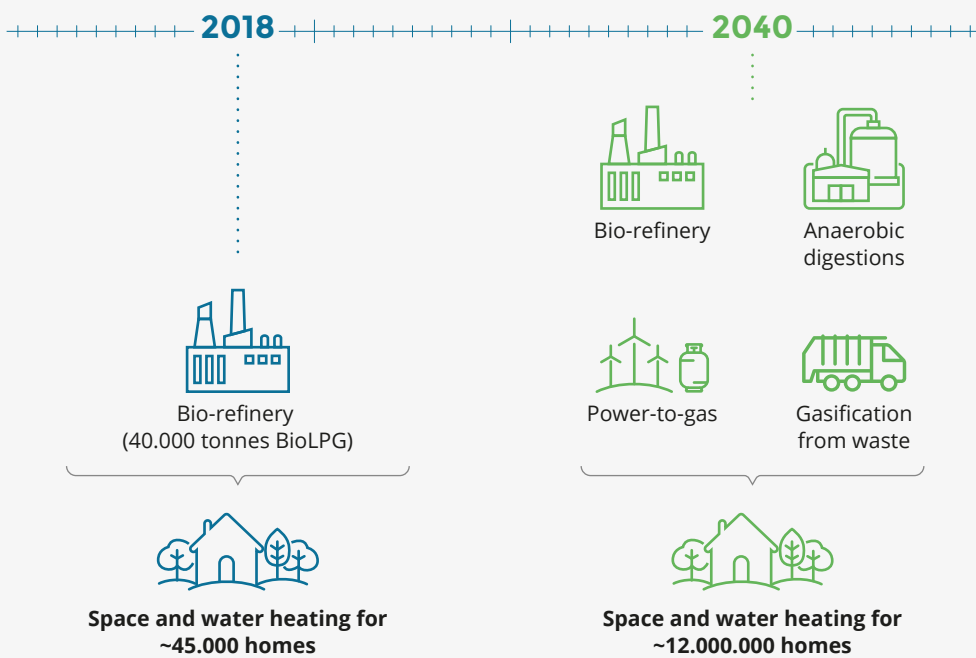
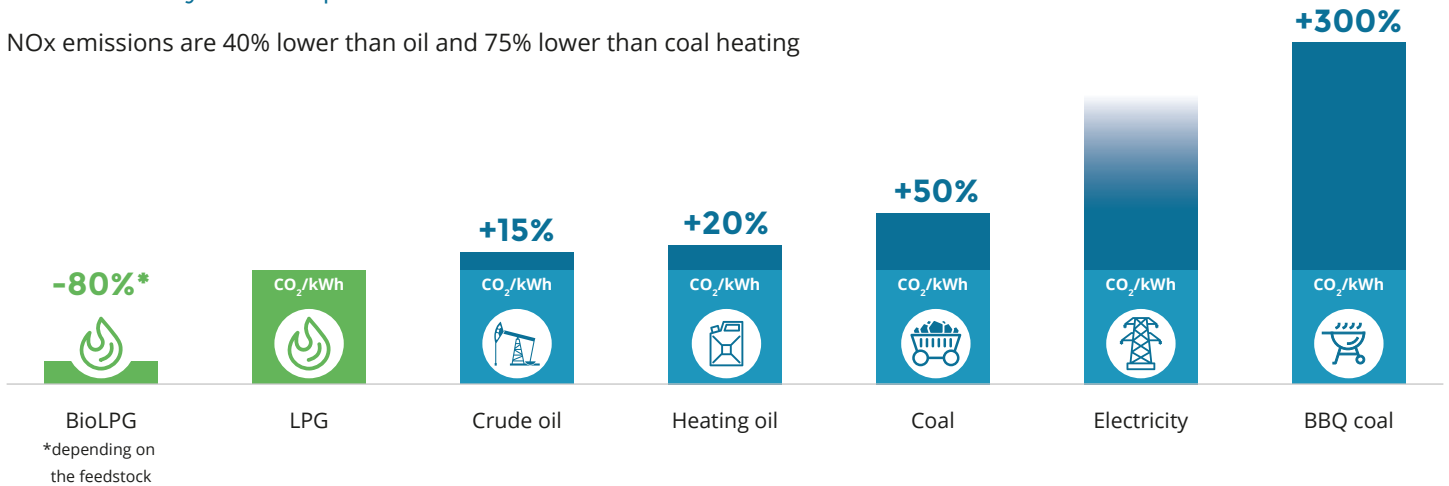


# LPG today, BioLPG tomorrow

The LPG supply chain has a role to play in delivering cost-effective decarbonisation of rural areas as part of a mix of solutions. Initially, as an immediate like-for-like alternative to carbon-intensive heating oil and coal. In the long term, as an agent for deep decarbonisation through delivery of BioLPG.

## LPG IS LOWER CARBON THAN OTHER FOSSIL FUELS and has very low air pollutant emissions

NOx emissions are 40% lower than oil and 75% lower than coal heating



## RURAL ENERGY MATTERS

One of the challenges with biofuel development is the expectation that feedstocks will be scarce. Policymakers should look to support sustainable biofuel deployment where it can provide the greatest benefit.

Rural heating is one such area where there are few cost-effective alternatives to (Bio)LPG.



The Future of Rural Energy in Europe (FREE) initiative was created by SHV Energy in 2010 to promote the use of sustainable energy within rural communities. FREE is supported by a variety of stakeholder groups, together giving a voice to all those who believe that rural energy needs are important, and aiming to add new perspectives to the EU's energy and climate debate. Identifying untapped potential in Europe's rural areas to decarbonise and improve air quality in a cost-effective manner. Filling in rural energy data gaps. Engaging and supporting rural communities is essential if government energy, climate and environment policies are to be realised.