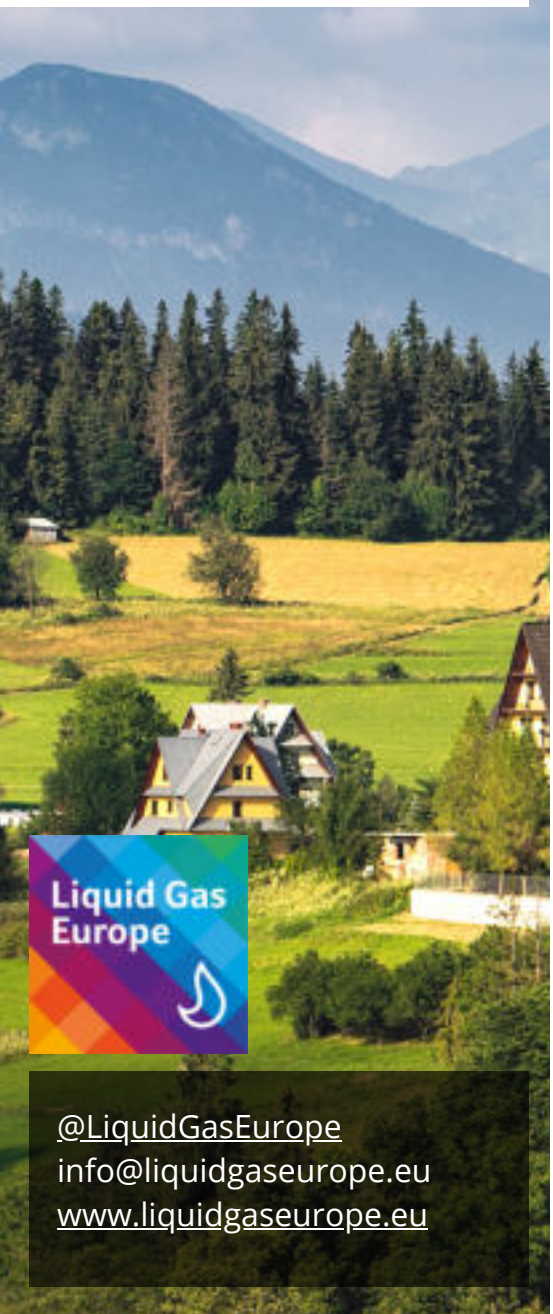
80% of Poland's electricity generation comes from coal

Coal is the largest source of energy in the residential sector, around 30%

3.5 million homes are fitted with coal-fired boilers

70% of single-family homes are heated by coal



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POLAND

Case study: residential heating
#BeyondTheGasGrid

70% of single-family homes in Poland are heated with coal, which represents around 3.5 million coal-fired boilers. The vast majority of these homes (about 3 million) are heated by manual-fed coal boilers that are technologically outdated, inefficient and responsible for high carbon emissions and air pollution.

This analysis considers a typical detached, single-family house in Poland that uses an old coal boiler and estimates the fuel bill and emission savings if the house retrofitted external wall insulation and switched to a new LPG boiler.

LPG annual CO2 savings: 86%
BioLPG annual CO2 savings: 96%

89% NOx emissions savings

99% Lifetime PM emissions savings

€374 Annual energy bill savings

Capital cost payback = 2.6 years

From 2030 onwards, it is assumed that the boiler is fuelled by bioLPG.

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Alternative technology options available:

The table below compares how alternative technology options compare to an existing coal boiler. The different heating systems include a new LPG boiler, an air source heat pump and a biomass boiler.

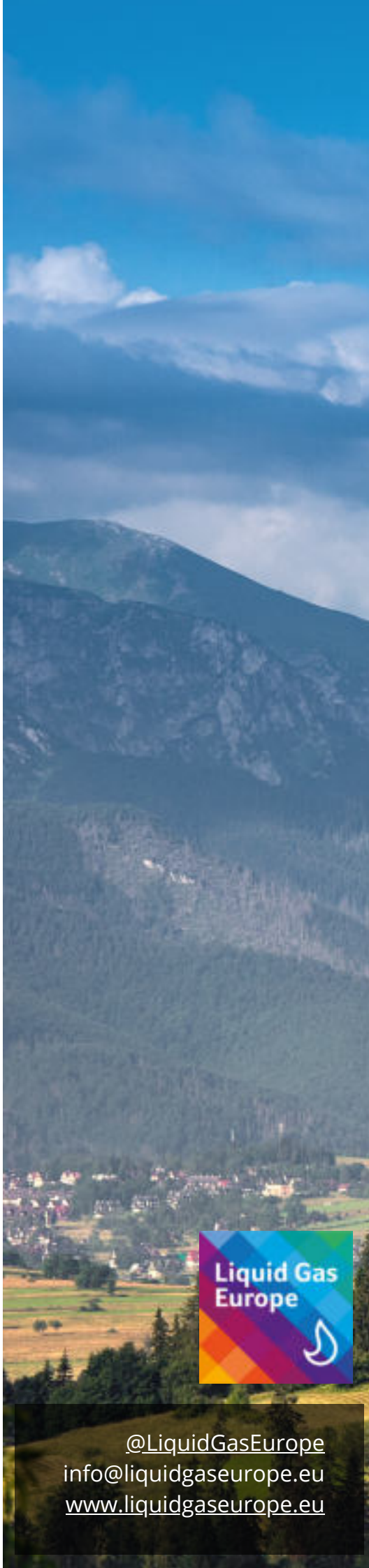
performs worse than old coal boiler

performs better than old coal boiler

Technology Options	Upfront cost*	Running cost	Lifetime CO_2 reduction	Lifetime air pollution reduction
LPG boiler: *New, condensing* + **Thermal insulation**	Lower than coal boiler	Lower than coal boiler. Thermal insulation reduces energy demand, lowering running cost	Substantially lower than coal boiler (80% - 90% dependent on using LPG or bioLPG)	Substantially lower than current coal boiler (up to 99%)
Air Source Heat Pump + **Thermal insulation**	4-5 times more expensive than current coal boiler	Substantially lower, assuming relatively higher operating efficiency of the ASHP is achieved	Substantially lower than current coal boiler (up to 80%)	Substantially lower than current coal boiler (up to 99%)
Biomass boiler: *New, automatic (Pellets or log fuelled)* + **Thermal insulation**	6-7 times more expensive than current coal boiler	Substantially lower, largely drive by a relatively low price for wood pellets/logs	Substantially lower than current coal boiler (more than 90%)	Lower than coal boiler (30% to 90% - pellets provide the largest PM reduction)

**Upfront cost differences are case-specific; in this case the upfront cost for a heating system is modelled for an energy demand of 18,000kWh/annual.*

Sources: Fraunhofer, Eurostat, Covenant of Mayors, VHK, European Environment Agency, European Commission, European Pellet Council, Novatek Polska, Statistics Poland, Institute of Environmental Economics, TABULA Webtool and Covenant of Mayors.



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