
Briefing – April 2023

Ecodesign: Risks and opportunities for a phase out of gas boilers

On Thursday 27th April, the European Council will host a Consultative Forum on the Ecodesign Directive, to discuss and vote on proposals to phase out fossil fuel boilers by 2029. Ecodesign was a response to Russia's war in Ukraine – an EU-wide Framework Directive aimed at reducing Europe's reliance on fossil fuels, by providing an end date to the sale of "stand-alone" fossil fuel boilers. Using Ecodesign minimum energy efficiency standards, gas boilers can be phased out by 2029 via the EU single market without causing disruption to families across Europe.

The EU working together to end the sale of new gas boilers would be transformative for securing the EU's energy independence, creating green jobs for the future, reducing household bills for families, creating the biggest market in the world for low carbon heating systems, and helping the EU hit its climate targets.

There remain, however, a number of hurdles to achieving this transformation. One of those is the promotion of hydrogen-ready boilers, defined as gas boilers that can be retrofitted to burn either 100% hydrogen or a blend of hydrogen and gas. But, as we detail in more depth below, hydrogen heating is expensive, dangerous and bad for the climate – and little more than an effort by the gas industry to stay relevant and profitable, and to bake gas into our future energy system.

The opportunities

The focus of April's Consultative Forum will be to discuss new Ecodesign measures for space and water heaters - in this instance, options for raising their energy-efficiency threshold. Gas boilers operate at an efficiency level of 88-94%, while alternatives such as heat pumps are far more efficient, operating at between 130-179% efficiency.

Raising the energy efficiency threshold of gas boilers would result in a de facto ban on them, but would not require households to replace their gas boiler immediately. Rather, once the boiler reaches the end of its life, after approximately 25 years on average, it will be replaced by a more effective alternative such as a heat pump.

This provides an opportunity to act decisively, in ways that will pave the way to a greener, more energy secure future for decades to come. A new fossil fuel boiler is installed every 8 seconds in the EU and an inefficient boiler installed today could be used up to 2050, prolonging Europe's reliance on fossil fuels and jeopardising its commitment to tackling climate change.

Consumer costs

Phasing out gas boilers is a key mechanism for lowering the burden on consumers and tackling energy poverty. The International Energy Agency estimates that transitioning to renewable energy sources for home heating could save the average European household €818 in energy bills each year¹. By 2050, alternative electrified heating sources and retrofitting buildings can cut the average energy bill for a European household compared to current levels, according to the European Climate Foundation and the European Alliance to Save Energy².

Energy security

Transitioning to clean energy is a core component of the EU's REPowerEU strategy to reduce its dependence on Russian fossil fuels, with heat pumps recognised as a particularly effective means of doing so. Since the beginning of the war in Ukraine, the EU has paid €151bn to Russia for fossil fuel imports, €59bn of which was payment for gas. The EU's spending on Russian fossil fuels could have funded the installation of 2,355,159 heat pumps or insulated 688,467 homes, according to Beyond Fossil Fuels³.

¹ International Energy Agency, 2022. The future of heat pumps. <https://www.iea.org/reports/the-future-of-heat-pumps/executive-summary>. Note the original source states a saving of \$900 per year, which we converted using conversion rates on 25.04.23 from the following conversion website [900 USD to EUR - US Dollars to Euros Exchange Rate \(xe.com\)](https://www.xe.com/).

² European Climate Foundation and the European Alliance to Save Energy. Building Europe's net-zero future retrieved on 25.04.23 from <https://europeanclimate.org/wp-content/uploads/2022/03/ecf-building-emissions-problem-march2022.pdf>

³ Beyond Fossil Fuels tracker of EU member state spending on Russian fossil fuels retrieved on 25.04.23 from <https://beyondfossilfuels.org/russian-fossil-fuel-tracker/>

Green alternatives

Alternative energy sources such as heat pumps are a hyper-efficient and climate-friendly solution to Europe's reliance on fossil fuels. The 20 million heat pumps currently installed across Europe avoid approximately 54 Mt of CO₂, equivalent to the annual CO₂ emissions of Greece, according to the European Heat Pump Association⁴. Several EU states have already made moves towards a ban on gas boilers in recognition of the effectiveness of alternatives like heat pumps.

The risks

We can expect heavy resistance from the gas industry against Ecodesign's proposal on gas boilers – it has been arguing that boilers have a future as they can run on hydrogen or biogas further down the line. But hydrogen is little more than a thinly veiled attempt for these companies to stay relevant and profitable, by ensuring that gas infrastructure and production is maintained.

While hydrogen will play a role in the green transition, this role should be reserved for hard-to-abate sectors like steel and ceramics. For several reasons it would be a disaster to heat our homes using hydrogen. In fact, the evidence against it is so clear that a review of 32 independent studies internationally revealed that none of them support widespread use of hydrogen for heating⁵.

There are two ways of producing “low carbon” hydrogen - either using fossil gas with carbon capture and storage or using electricity. Both are extremely energy intensive, inefficient and costly⁶.

- > **Explosive:** Hydrogen is four times more explosive and four times more likely to result in a fatality or injury in homes than fossil gas – as shown by the UK Government's own commissioned safety assessment⁷.
- > **Costly:** Hydrogen is significantly more expensive than using fossil gas for heating. At the household level, green hydrogen boilers are estimated to be the most expensive heating option for

⁴ European Heat Pump Association. Heat pump record: 3 million units sold in 2022, contributing to REPowerEU targets. Retrieved on 25.04.23 from https://www.ehpa.org/press_releases/heat-pump-record-3-million-units-sold-in-2022-contributing-to-repowereu-targets/

⁵ Rosenow, J. 2022. Is heating homes with hydrogen all but a pipe dream? An evidence review. https://www.researchgate.net/publication/363913282_Is_heating_homes_with_hydrogen_all_but_a_pipe_dream_An_evidence_review

⁶ Lowes, R. & Cebon, D., 2022. 'Wrong side of history': Wake up to the hype around green hydrogen for heating. <https://www.rechargenews.com/energy-transition/wrong-side-of-history-wake-up-to-the-hype-around-green-hydrogen-for-heating/2-1-1282365>

⁷ ARUP, 2021. Hy4Heat Safety Assessment, Work Package 7. p. 89 <https://static1.squarespace.com/static/5b8eae345cfd799896a803f4/t/60e399b094b0d322fb0dad4/1625528759977/conclusions+inc+ORA.pdf>

consumers⁸. To run a boiler on hydrogen from renewable electricity compared to a heat pump could cost between twice⁹ or even six times as much, according to the Hydrogen Science Coalition¹⁰.

- > **Harmful to health:** Hydrogen produces dangerous nitrous oxide (NOx) emissions when burned, which can have serious health impacts. Even short-term exposure can cause inflammation of the airways and increase vulnerability to respiratory infections and allergens, as well as worsening the symptoms of people with existing lung or heart problems.
- > **Polluting:** Hydrogen is terrible for the climate. If produced from fossil gas, hydrogen's greenhouse gas footprint is more than 20% greater compared to directly using the gas for heating, according to research by Cornell and Stanford University¹¹. If produced using electricity, it would require extensive additional renewable electricity. This risks diverting renewable electricity from other uses or could mean that fossil fuel-based electricity is used instead.
- > **Insecure:** Europe's dependence on fossil gas would increase rather than decrease. It is estimated that, if a ban on gas boilers was introduced in 2023, gas consumption across the EU would fall by 460TWh by 2030. This would save the equivalent of 11% of the EU's 2020 total gas imports, or 28% of the EU's Russian gas imports¹².
- > **Uncertain:** The carbon capture and storage technology needed to produce low carbon hydrogen using fossil gas has not been proven at scale¹³.
- > **Delaying:** Relying on any form of hydrogen for heating - no matter how it will be produced - creates serious delays to existing climate friendly and cheaper alternatives, such as heat pumps.

In summary, the proposal by Ecodesign to phase out standalone gas boilers by increasing their required energy efficiency level offers a major opportunity to address the EU's overreliance on gas, in order to deliver environmental and economic benefits, and to shore up the bloc's energy

⁸ European Climate Foundation and the European Alliance to Save Energy. Building Europe's net-zero future retrieved on 25.04.23 from <https://europeanclimate.org/wp-content/uploads/2022/03/ecf-building-emissions-problem-march2022.pdf>

⁹ Gabbatiss, J., 2023. Heat pumps 'up to three times cheaper' than green hydrogen in Europe, study finds. https://www.carbonbrief.org/heat-pumps-up-to-three-times-cheaper-than-green-hydrogen-in-europe-study-finds/?utm_source=cbnewsletter&utm_medium=email&utm_term=2023-02-24&utm_campaign=This+week+China+s+giant+food+system+Heat+pump+savings+Creating+carbon+space+

¹⁰ Hydrogen Science Coalition, 2022. Briefing on the Energy Bill. <https://h2sciencecoalition.com/wp-content/uploads/2022/12/Energy-Billbriefing-by-H2SC-2022-12-09.pdf>

¹¹ Howarth, R. W. & Jacobson, M. Z., 2021. How green is blue hydrogen? <https://onlinelibrary.wiley.com/doi/full/10.1002/ese3.956#:~:text=Perhaps%20surprisingly%2C%20the%20greenhouse%20gas%20footprint%20of%20blue%20hydrogen%20is%20more%20than%2020%25%20greater%20than%20burning%20natural%20gas%20or%20coal%20for%20hEat>

¹² Cool Products, 2022. Impact of a ban of fossil heating technologies on NECPS and national energy dependency. Retrieved on 26.04.23 from <Coolproducts-gas-boiler-ban-2022-11-July-22.pdf>

¹³ Global Witness, 2021. World cannot meet climate targets relying on carbon capture and storage. <https://www.globalwitness.org/en/campaigns/fossil-gas/world-cannot-meet-climate-targets-relying-carbon-capture-and-storage/>

UK Parliament Science and Technology Committee, 2022. Hydrogen is not a panacea for reaching Net Zero, warn MPs. <https://committees.parliament.uk/committee/135/science-and-technology-committee/news/175146/hydrogen-is-not-a-panacea-forreaching-net-zero-warn-mps/#:~:text=Currently%2C%20hydrogen%20is,to%20emissions%20reductions.>

independence. Conversely, industry efforts to promote hydrogen heating as a viable alternative to gas boilers need to be seen for what they are, namely a self-serving attempt to keep the EU hooked on gas.

The European Commission needs to support raising the energy efficiency threshold of gas boilers which would result in a de facto ban on these heating systems, pushing the least sustainable products off the market and promoting the use of more efficient technologies.