Pan-European “boiler ban” in 2029: another way is possible and preferable

Position paper

June 2023

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ABOUT MARCOGAZ

Founded in 1968, MARCOGAZ represents 29 member organisations from 20 countries. Its mission encompasses monitoring and policy advisory activities related to the European technical regulation, standardisation and certification with respect to safety and integrity of gas systems and equipment, rational use of energy as well as environment, health and safety issues. It is registered in Brussels under number BE0877 785 464.

DISCLAIMER

I. Executive Summary

The draft revision of the Ecodesign regulation (EU) 813/2013, presented to the Consultative Forum on April 27th, 2023, proposes a ban on the sale of standalone boilers from September 1st, 2029.

MARCOGAZ shares the European decarbonization objectives, and those of the Fit for 55 and REPowerEU packages. But to achieve these objectives, it is questionable whether the boiler ban is the best measure or whether won't it do more harm than good for the ecological transition and affordability of heating.

This contribution wishes to draw the Commission's attention to all the technical issues that such a measure would pose, issues that were moreover widely raised by the Member States during the Consultative Forum. It also aims to show that it is possible, and even much preferable, to take another path than a boiler ban:

- **Boilers are high performance heating appliances**, reaching up to 95% seasonal efficiency, and even 98% with intelligent control systems; and that they are renewable fuels-ready with no conversion costs – the Commission has set ambitious targets in this regard, for example 380 TWh of biomethane to be produced by 2030[1].
- **Boilers are a key support to the energy transition** and, as shown by a study of the European Heating Industry Association titled "Decarbonization pathways for the European building sector", boilers are an important asset for optimizing the cost, speed and efficiency of the energy transition in the building sector.
- **Ecodesign regulation focuses on isolated appliances 'theoretical' energy efficiencies**, but this is not the only element to consider to decarbonize heating in buildings affordably, in fact other dimensions are essential, related to the building (insulation, flexibility, decarbonized supplies opportunities, etc.) and related to the energy system as a whole (infrastructure investment needed, storability, flexibility needs, efficiency along the value chain, ancillary costs and emissions, and others). It is at this level of building and energy system, that optimal decarbonization guidelines for the building stock can be apprehended, and for that, keeping boilers in the toolbox is helpful[2]:

[1] Within the framework of REPower studies are showing that total European potential is 1600 TWh.

[2] It is the reason why the version of the Energy Performance of Buildings Directive voted by the European Parliament on 03/14/2023, indicates that "boilers certified to operate with renewable fuels" are among the solutions to be considered to decarbonise buildings.

- it is helpful for affordability: boilers cost at least 3 times less than heat pumps (10k€ less), which leaves financial means available for the no-regret insulation of dwellings.
- it is helpful for cost-effectiveness of the transition, for demand-flexibility, resource adequacy and resilience, especially because it lowers seasonal and hourly electric peaks and variance issues in winter, and the investments that they will need.
- it is helpful for households facing a technical impossibility or legal deadlock to install a heat pump or to connect to district heating… It will prevent them from having no choice but to turn to direct electric heating, which is twice less efficient than boilers (note that with 39 to 53% seasonal efficiency, direct electric heating is not proposed to be banned, whereas best gas boilers are proposed to be, even with 95%).
- Last but not least, it is helpful for social acceptability of production of renewable gases: people are more likely to accept a methanizer in the landscape if it is also useful to heat their dwellings, local school, etc., valorize local wastes, lowering heating bill costs locally efficiently.

➔ **For all these reasons (and others developed in this note, in the following pages), MARCOGAZ recommends boilers to be kept in the transition toolbox.**

The ongoing trialogue on the Energy Performance of Buildings Directive, then its transposition to Member States, will thus be able to ensure a clean but market-oriented, customer-choice based role for boilers in energy transition, among the various solutions in the decarbonization toolbox.

<u>If it were, nevertheless, to be implemented, a boiler ban would have several unfavourable impacts:</u>

- **For households**: boilers are an affordable entry-level solution, compared to heat pumps whose investment cost is 3 to 4 times higher. Even with subsidies, many households will not be able to finance their heat pumps in several EU countries; thus, lacking any clean alternatives, they would be encouraged to extend the life of their old equipment, or even switch to Joule effect heating which is less expensive to buy, but much less efficient and more expensive to operate than the boilers it would replace, whilst placing additional burdens in the electricity system in times of need… These households (and with them the whole heating system) would be pushed towards a worse energy situation. Other households, incentivized and pushed to buy a heat pump, may give up on its maintenance, because it is more expensive than boiler maintenance, and not subsidized (whilst it may be causing more costs in consumption too). Confining customers to more limited choices in the clean applications they need to finance, and denying diversity of situations, will ultimately result in amplifying the phenomena of bad installation practices, neighborhood complaints, and less social onboarding.
- **For a pan-European affordable and eco-efficient heating sector**: boilers are produced more locally by (mostly) European manufacturers, unlike heat-pumps and some of their components which are (mostly) produced outside Europe under deficient ecological and social standards that are not subject to Carbon Border Adjustment Mechanism scrutiny yet. Indeed, heat pump key players are non-European and many of them do not comply with the same eco-requirements placed on European manufacturers.
- **For the resilience and costs of strengthening and operating the electricity system**. Today, boilers represent a flow of more than 5 million pieces of equipment sold per year in the Union; a boiler

ban would result in massive transfers to electric heating (heat pumps and Joule effect), and therefore a sharp increase in electricity demand and in the winter peak of electricity, putting the resilience of the electricity system at risk and leading to the need for massive over-investment in electricity networks, peak power generation capacities and flexibility means. These latter, for the time being, do not have very affordable means of mass storage available (none for long duration energy storage, except if we consider molecules and sector coupling, sector coupling for which boilers, gaseous biomass and clean gases are essential).

- **Electricity networks are subject to unscheduled flows and many other physical, market coupling, and operational constraints**. These latter have not been sufficiently considered from whole system level perspective in the Ecodesign Directive. The estimated difference between an exclusive electrification scenario and a more balanced one (taking advantage of boilers and renewable gases in particular), corresponds to more than 500 billion euros, according to the EHI study quoted before. In addition, the potential biases indicated above (switching to Joule effect radiators, heat pumps installed in thermal sieves and/or poorly maintained, need for other backup systems, etc.) can have an aggravating effect on the need for electricity grids and their congestion leading to an explosion of tariffs and added user costs. This effect starts to be appreciated today.

- **For the decarbonization of the building and the energy mix**. For mid-tier socioeconomic layer households, the high cost of heat pumps will unavoidably lead to trade-offs with the always no-regret insulation work on the envelope, therefore a slowdown in the renovation of buildings and a lesser than foreseen reduction in energy needs (an essential assumption that has already been factored within the electricity network development plans to keep grid infrastructure costs under control). In addition, the development of renewable gases could be affected by the exclusion from their use for direct heating of buildings (even where these are the most efficient solution): the exclusive targeting of renewable gases to power plants or other needs such as maritime, air transportation or industry, rather than to households, will not promote the efficient integration of this source of renewable production. It will only cause more infrastructure needs and affordability problems. Hence, hindering sector coupling, the prospects for cheap seasonal mass storage, and for a better integration of electric and non-electric renewables (in the form of an efficient, synergic, and well-designed, well-diversified heating system to better fit the diversity of the European climates, budgets and building stock).

Finally, it should be noted that the installation of heat pumps is encountering numerous difficulties, major ones in collective housing, but also numerous ones in many individual houses:

- **Architectural constraints** (recognized via a local urban plan or by decree).
- **Technical impossibilities in dense areas** (impossible to install an outdoor unit), or in small dwellings (lack of space to position an indoor unit with a hot water tank).
- **Aesthetic, acoustic restrictions**, etc. imposed by subdivision, or condominium regulations.
- **For heat pumps powered exclusively by electricity**, technical constraints related to the need to strengthen the electricity distribution network, particularly in rural areas. The need to reinforce the whole electric distribution of each building, not sized for electric heating is never discussed while it will increase the overall cost for end-users.

The draft revisions of regulation Ecodesign and Energy Labelling (EU) 813/2013 and 811/2013 also present two other important issues that must be considered:

1. In the current state of the draft, collective hybrid heat pumps (to be installed in building boiler rooms, or in the commercial sector) will be excluded from September 1st, 2029. Indeed, these consist of an assembly of distinct products, chosen to comply at best with the building thermal needs, and cannot be, like the individual hybrid heat pumps, a "2-in-1" product out of the factory. As the package approach is no longer mentioned in the draft, if the collective gas boiler disappears in 2029, then the collective hybrid heat pump will also disappear.

2. Moreover, innovative efficient systems like “double heat pumps” (hybrid systems including gas heat pump and electric heat pump with intelligent control) cannot be valorised (global performance cannot be compared to other solutions without package).

➔ **Therefore, MARCOGAZ recommend the Package approach, including gas systems, to be reinstated in the Labelling regulations.**

➔ **It implies also that the standalone collective boilers may have their own achievable seasonal efficiency requirements in Ecodesign after 2029.**

As the Energy Labelling Regulation proposal currently stands, only cases of heat emitters operating at low or medium temperatures are considered, whereas these very often operate at high or even very high temperatures (>65°C) in existing buildings. This is the reason why many heat pumps will require backup equipment.

➔ **MARCOGAZ recommends additional labelling to be provided in the case of emitters operating at high temperatures to help consumer’s choice.**

II. ‘Boiler ban’ in 2029: another way is preferable to achieve energy transition

1. Boilers using renewable fuels are one of the key necessary tools for a rapid and cost-effective energy transition

Boilers are high-efficiency products according to the benchmarks of the European Commission, with performances of up to 95% seasonal efficiency – and that can even reach 98%, with intelligent control systems. This is higher than Joule-effect heating and its 39 to 53% seasonal efficiency.

- Of course, we can point out that electric heat pumps are more efficient (with seasonal efficiencies corresponding to 110% with a Primary Energy Factor of 2.5; or 145% with a Primary Energy Factor of 1.9), but this difference between boilers and electric heat pumps corresponds to a very significant price difference, ranging at least from 1 to 3.
- By prohibiting the sale of boilers, we therefore prohibit affordable products for households, entry-level solutions which are appreciated both for the cost levels (of investment and operation) and for the levels of comfort (heating and domestic hot water) which are required.
- It must also be added that boilers are completely compatible with the decarbonization targets, as the Net Zero Industry Act demonstrates by classifying biomethane and biogas technologies as Strategic Net-Zero ones, hence with the legal right to be supported (rather than banned) for roll-out. Renewable gases today have sufficient reality and proven potential in Europe, for them to be considered and direct part of them towards heating and hot water production in the building sector.
- In Europe, renewable gases are part of the ambition clearly set out in REPowerEU: the European Commission has set itself a renewable gas production target of 380 TWh by 2030. Studies also show that the European potential by 2050 is around 1600 TWh.

A study on a European scale, commissioned by the European Heating Industry (EHI, representing manufacturers of heating systems, boilers and heat pumps in particular) and titled "Decarbonisation pathways for the European building sector", confirms that there is a place for boilers fuelled with biomethane and clean gases, in the mix of solutions to decarbonize the building stock, and that these are an asset to optimize the total system cost, to lower the emissions, and increase the speed and scale of the transition of the building sector.

- The study, conducted by Guidehouse, compares two decarbonization scenarios for the building sector, both meeting EU objectives (Fitfor55, REPowerEU for 2030, carbon neutrality for 2050) and in which heat pumps and renovation have a decisive role in the transition.
- But they differ in that Scenario A aims for a very high level of electrification, with a restricted place for other technologies, while in Scenario B more room is made available for hybrid systems and the use of green gases (specially to supply Very High Performance boilers).

- The study shows that, at the European perimeter, Scenario B, which is more balanced and diversified, achieves the objectives of Fit for 55 and REPowerEU in a simpler, more economical, more flexible, and more socially acceptable way than Scenario A of massive electrification. This, with an aggregate financial benefit of 520 billion euros by 2050, and a reduction of the winter electricity peak by 50%.

There is another way than banning boilers: maintain the boilers, and work to decarbonize them by supplying them with growing shares of green gases. It is the path suggested in the version of the Energy Performance of Buildings Directive (EPBD) voted by the European Parliament on March 14:

- This enacts a ban on "fossil-fuel heating solutions" as soon as the directive comes into force, but it immediately indicates that "boilers certified to operate with renewable fuels" should not be considered as "fossil fuel systems" and therefore should not be banned.
- Admittedly, the European Parliament's version must now be compared, in the context of a trialogue, with the initial version proposed by the European Commission in 12/2021, and with what has been published by the European Council in 10/2022, but it is important that the discussion between the Commission, Council and Parliament can take place leaving all the clean solutions for decarbonizing the building sector on the table.
- It is indeed at the level of the building and within the framework of the reflection on the EPBD that the optimal solutions for the decarbonization of the European building stock can be correctly apprehended. These do not only depend on the intrinsic performance on which the Ecodesign text focuses, but also on other considerations related to the building: insulation, flexibility, decarbonization of the energies supplying it, etc. (and of energy system as a whole).

Therefore, it would be damaging if the Ecodesign deprives the trialogue on the Energy Performance of Buildings Directive of a decarbonization solution that is nevertheless valid, clean, and essential.

2. A pan-European ‘boiler ban’ would have very negative impacts

2.1 Adverse impacts on households and insulation works, worsening fuel poverty

The abolition of gas boilers would generate additional costs downstream (more expensive equipment) and upstream (reinforcement of networks and the power generation fleet) with considerable cost consequences for consumers and loss of resilience for the energy system:

- In any case, the high demand for thermodynamic equipment would create bottlenecks in the supply chain, causing delays in delivery and sustaining high prices.
- Low-income households, which are often those occupying the least insulated housing, would be unable to install heat pumps adapted to their needs (high-temperature heat pumps remain too expensive despite the aid), and could be encouraged extend the life of their boiler as much as possible, or switch to Joule-effect heating, contributing to making them more precarious.

- Wealthier households who would be able to finance the installation of a 100% electric heat pump (High Temperature heat pump or Low Temperature heat pump associated with a change of radiators and in many cases backup systems, many of them Joule-effect), would have a smaller residual budget to spend on insulating their homes. It is to be noticed that the mid-class socioeconomic levels vary across Member States, so do climate and building stock characteristics.

Thus, the pace of improvement in the efficiency of housing and reduction in energy bills (compared to a scenario of generalization of the high-efficiency boiler and massification of the insulation) would be considerably degraded. So would be the affordability of electricity system as a whole (infrastructure needs being considerably increased, for an efficiency considerably lower than theorised).

The exclusion of gas boilers reduces the range of solutions available to households too much and slows down the treatment of the real problem: the insulation of housing and the switch towards renewable fuels of all heating applications (electricity ones included).

2.2 Economic risks on the European energy efficiency sector

The removal of boilers could lead to a destabilization of the energy transition in buildings, the economic consequences of which could be harmful for markets and for the energy system as a whole:

- The relatively high employment of the boiler sector over the entire value chain in Europe(manufacture/distribution/installation/maintenance), compared to the heat pump/thermal water heater sector, suggests a risk of job losses, whilst many employments of the new value chain for heat pumps will be created in third countries practicing socio-ecological dumping.
- Boilers are produced locally by European manufacturers, unlike heat pumps, many of the components of which are produced outside Europe and of which non-European players have a significant market share. These third country manufacturers are neither subject nor practice the same social and environmental standards that European manufacturers respect and this is not contemplated by CBAM yet. The impact on Gross Domestic Product (excluding subsidies) in Europe of a ban on boilers will be negative.

2.3 Risks to the security of energy supply and to the decarbonization of the mix

In the short-medium term, replacing gas boilers with 100% electric equipment would, at best, have a very small impact on the rate of decarbonization of buildings.

- In the short term, the electrification of heating will have no impact on the rate of connection of renewable, or nuclear plants, therefore any excess demand for electricity in winter will have to be covered by additional carbon production.
- Assuming that the boilers are replaced by electric heat pumps, the combination of significant constraints in the electrical supply chain (low efficiency) and an average efficiency of heat pumps under renovation (i.e. over high temperature regimes) lower than in new buildings, plus the presence and activation of heating back-up systems will mean that the overall GHG emissions balance would not improve or do so only very slightly, unless major building renovation is carried out.

- If the ban on boilers leads to conversions to Joule-effect systems, GHG emissions could on the contrary increase.

In the medium to long term, a ban on boilers, which today represent a flow of more than 5 million pieces of equipment per year, would result in massive transfers to electric heating, and therefore a sharp increase in winter demand. of electricity, putting the resilience of the electricity system at risk.

- It does not seem realistic to develop in 5 years a sector able to install equivalent of 6.5 million electric heat pumps per year (1.4 million today, plus the 5.1 million to replace boilers).
- In the longer term, the electrification of heat-sensitive uses presupposes strengthening the electrical networks and interconnexions, and building additional peak means so as not to degrade the security of supply. In comparison, the gas grid is already built and is perfectly capable to carry biomethane, plus it can be repurposed for other clean gases at a fraction of that cost. Furthermore, it is already connected to existing cheap mass long-duration storage.

Finally, the exclusion of gas boilers poses a risk to the development of green gases:

- The exclusive targeting of renewable gases to power plants (or to other needs such as maritime, air or industry) rather than to households near production sites would not encourage acceptance of this source of production by the population.
- Exclusion of the building heating outlet could also make it more difficult to finance green gas production projects, or artificially create stranded costs in appliances and infrastructure that (otherwise) would have been perfectly fit to keep serving the public (with no or very reduced added financing needs).

3. In a large number of situations, a 'boiler ban' would lead to technical or legal deadlocks

The Appendix below makes a more exhaustive inventory, by market segment, of the obstacles to the installation of alternative solutions in dwellings currently heated by a gas boiler.

APPENDIX

(High efficiency) Renovation without the boiler

Technical argument / inventory of obstacles to the installation of alternative solutions in homes currently heated by a boiler

1. Detached single-family houses in a diffuse sector

This type of housing benefits from an offer of heating and domestic hot water production solutions that are alternatives to the relatively developed gas boiler (heat pumps, wood-fired boilers). On this segment, however, difficulties can be identified for full electrification:

- **Problem related to heat emitters**: a large majority (> 60%) of the heat emitters encountered in the existing stock are high temperature radiators (>70°C). In order to supply this type of emitters, it is necessary to install a "high or very high temperature" heat pump. This will have the effect of absorbing significant electrical power to maintain the level of comfort previously provided by the boiler, which will lead to a sharp drop in its efficiency (up to more than 50%), regardless of the outside temperature. One solution is to replace the radiators in place with low-temperature radiators, but since this operation is expensive (~€10,000 on average), it is rarely carried out in practice, especially since these radiators require a footprint 2 to 4 times higher than that of existing radiators.
- **Problem related to the weaknesses of the electricity distribution network**: the installation of 100% electric heat pumps, which generate high power demands regardless of their average performance level, will require a reinforcement of the electricity distribution networks. This is costly, in particular when the accommodation concerned is located at the end of the line (i.e. far from a transformer station). The cost of this reinforcement may call into question the relevance of the installation from an economic point of view. This happens very often in most rural environments (precisely the same place where all the biomethane is produced locally).

In these dwellings already supplied with gas, the potential hybridization of a heat pump with a gas boiler - a solution still emerging today - is particularly relevant because it provides the same benefits as a 100% electric heat pump in energy and environmental terms, while being adapted to existing heat emitters and allowing the growth of the electric peak to be limited.

2. Individual houses grouped together or isolated in urban housing

These dwellings are characterized by less (or even no) exterior surface and a generally smaller interior space. These restrictions, which are added to neighbourhood constraints and easements, which can represent a brake on the installation of renewable energy equipment (heat pumps, wood-fired boilers). The main problems are:

- **Issues related to the installation of an outdoor unit**: the configuration of the house can make it impossible to install the outdoor unit of a heat pump according to the rules of the art. This impossibility can also be linked to constraints imposed by a local urban plan (e.g. remarkable heritage sites) or by subdivision regulations, for aesthetic, or acoustic reasons. Indeed, the rotating parts making up the outdoor units can generate previously non-existent noise pollution, particularly if the subdivision or neighborhood is deemed quiet.
- **Problems related to interior integration**: unlike a wall-mounted boiler capable of producing hot water instantly (or in semi-accumulated mode with a small integrated tank), a 100% electric heat pump will systematically require a large hot water tank to ensure the production of Domestic Hot Water in the dwelling, which it will not always be possible to install in a small dwelling. The installation of a wood-fired boiler, which will require the presence of a storage space for the fuel (logs or pellets) is also strongly constrained.

3. Collective dwellings supplied by a collective heating system

In this type of building, connection to a "virtuous" heating network located nearby can be considered technically feasible even if its relevance should be questioned on a case-by-case basis with regard to the energy mix supplying it, connection costs which may be disproportionate, and sometimes significant heat losses that affect this solution (23% on average, source: SNCU 2019).

The replacement of the old collective gas boiler by a collective heat pump can theoretically be envisaged, but comes up against several pitfalls:

- **An extremely limited commercial offer**: the available offer is currently limited, as the main manufacturers do not have products suitable for collective housing. They have equipment intended mainly for the tertiary sector, designed to provide cold, whose mode of operation (regulation, individualization of heating costs, heating power) is not adapted to the collective residential market. Offers should be marketed soon but the sector being still nascent, the production and therefore marketing costs will necessarily be high. In addition, equipment that must operate at high temperature water regimes imposed in the existing system will see their performance significantly degraded in practice if they manage to reach economically the required temperatures for domestic hot water and heating in the cold of winter without any backup systems, which is already a question mark in terms of costs, total efficiency and affordability.
- **Problem related to the integration of the solution into the frame**: the space required for the installation of the outdoor units is often not available. When possible, this installation poses both problems of architectural integration and noise disturbance (in new buildings, the building can be built around the technical solution, but this is never the case in renovations). The replacement of a boiler in the basement and the air intake on the roof involves lengths of pipes and significant

differences in level, therefore high refrigerant charges, making it difficult to comply with existing standards. On the roof, when it is possible in terms of space, problems related to the neighborhood but also to the size and weight of the heat pump on the structure are generally significant.

4. Collective dwellings equipped with individual boilers

The District Heating is generally not an economically viable solution, due to the complexity - linked in particular to the lack of space - and the cost inherent in the installation of a secondary hot water loop or individual substations. In the short/medium term, the large-scale development of thermodynamic solutions is also unthinkable in these dwellings, due to numerous constraints:

- **Problem related to the installation of an outdoor unit**: the installation of an outdoor unit is generally not possible due to lack of space, and the difficulties related to the need to carry out a renovation on an occupied site are added to these technical constraints. When it is technically possible (e.g. presence of a balcony), it is generally prohibited by the co-ownership regulations or by the town planning rules.
- **Problem related to the installation of an indoor unit**: the lack of space for the installation of a hot water tank is a major problem in an apartment.
- **Problem of adaptation to existing high-temperature emitters, excluding hybrid-type solutions and/or associated work to insulate the building envelope.**
- **Problem related to operation/maintenance**: Since the heat pump in collective housing is recent, its maintenance calls on the skills of refrigeration engineers, who are currently not as numerous as plumbers and heating engineers. Heat pump maintenance times can therefore be extended, which can lead to prolonged operation of the electrical backup (Joule effect) thereby affecting the energy bill.