Technical position paper

Draft ecodesign and energy labelling regulations for space and combination heaters

Brussels, October 2021

Highlights

ECOS, EEB and the Coolproducts campaign have followed both the preparatory study and the follow-up study for the review of the space and combination heaters Ecodesign and Energy Labelling Regulations since 2018. We have provided comments all along the process, including on the draft regulations released this summer 2021.

The following comments refer to the draft ecodesign and energy labelling regulations for space and combination heaters.

We are particularly concerned by the **absence of ambition concerning the ecodesign requirements for space and combination heaters**. This proposal foresees no end to the sales of inefficient electric appliances and fossil fuel heating systems. To be coherent with the climate neutrality and GHG emission reduction targets, the minimum requirement for seasonal heating energy efficiency should be set at 110%[1] for all technologies to stop the sales of inefficient and fossil-fuel fired heaters from 2025, as recommended by the IEA[2].

We strongly support the proposed rescaled energy label which should enter into force at the latest in January 2023. We are however **concerned about the inclusion of the indication on hydrogen readiness** on the label. Using hydrogen for space heating does not make sense as direct electrification is both more efficient and economical.

[1] This would phase out inefficient electric and fossil-fuel fired appliances.
[2] https://www.iea.org/reports/net-zero-by-2050

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Ecodesign Regulation

Article 1 – Subject matter and scope

We agree with the proposal to extend the scope to space heaters with a rated output up to 1 MW. On this basis, in-situ testing should be possible as there is a limited number of test laboratories capable of testing these large heaters. However, we do not agree with the proposal to exclude from the scope the combination heaters with a rated output above 400 kW, as this will create a loophole in the regulation. For the largest combination heaters, in-situ testing should also be possible, or a combination of laboratory and in-situ testing, where for instance the water heater function is tested in a laboratory and the space heating function in-situ.
We propose that circulating water heaters comply with the NOx limits and information requirements. If these water heaters are designed for temperature regimes similar to space heaters, i.e., producing hot water below 80°C, they shall then follow the ecodesign requirements for space heaters.
Regarding biogas and bio-oil fired heaters that are designed to be used exclusively for use with biogas and/or bio-oil, we agree with the proposal to exempt boilers from ecodesign and energy labelling requirements, as the market shares will likely be small.

Article 4

We propose that all space heaters are subject to third party conformity assessment to increase the overall quality of the appliances and avoid the so called 'free riders'. Therefore, we propose that all heaters in the scope of this regulation are tested and certified with the option 'examination of a specimen, representative of the production envisaged, of the complete product (production type)', following the module B of the decision 768/2008/EC. The test and certification should cover space heating energy efficiency, as well as sound power, emissions, and for combination heaters, water heater efficiency and load profile.

Annex I – Definitions applicable for Annexes II to V

We propose some improvements of the currently unclear definitions regarding:

- (20) 'efficiency at minimum heat input' should be the ratio between minimum part load output (P_0) and lowest input.
- (35) 'maximum bivalent temperature' there should be only one bivalent temperature for the declared capacity.
- (42) 'annual equivalent active mode hours' must refer to average climate.
- (54) 'auxiliary electricity factor' where it should either concern heat pumps with no speed control or when the Pdh(Tj) is understood as the minimum heat power in continuous operation at the Tj.
- (54 & 56) 'auxiliary electricity factor' and 'cycling' seem to be in contradiction.
- (58) 'adjusted outlet temperature for cycling' must be the average outlet temperature
- (71) 'fuel supplementary heater capacity' we propose to delete this definition and refer to a hybrid appliance instead
- (82–85) 'LT heat pump heater', 'MT heat pump space heater', 'low-temperature application' and 'medium temperature application': it should be possible to declare a heat

pump for high temperature application, as it is the case in the draft of the energy label regulation.

- (88-89) These definitions should be aligned with the definitions used in the 2020 revision of the EN 14825, as follows.
    - switch temperature boiler off $T_{fb,off}$: for a hybrid unit, lowest outdoor air temperature at which the gas or liquid fuel boiler is not providing any heating capacity as it is switched off by the controls and heat is only provided by the heat pump.
    - switch temperature heat pump on $T_{hp,on}$: for a hybrid unit, lowest outdoor air temperature at which the heat pump starts providing heating capacity and below which the heat capacity is only provided by the gas or liquid fuel boiler.
- (96) 'peak temperature' where the peak temperature T_p should be renamed as 'draw-off temperature' and be defined as the average water temperature during a draw-off instead of the 'minimum' temperature. The current wording causes confusion also in the development of the standards.
- (117) 'on/off cycle' the period with on/off cycling should be better defined.

Annex II – Ecodesign requirements

1. Requirements for seasonal space heating energy efficiency

Given the importance to decarbonise energy use and specifically heating, we propose to use ecodesign to **stop the installation of fossil fuel boilers by 2025. This will only be possible by raising the ecodesign energy efficiency requirements to 110% by 2025**, as recommended by the IEA in its recent "Net Zero by 2050" report[3].

We propose that the minimum seasonal space heating efficiency for all the space heating technologies in scope of the regulation is set at 110%. For hybrids heaters, we propose a minimum efficiency of 130%, which is easily achievable for most hybrid heaters. In addition, we propose that the energy inputs for hybrid heaters is at least 60% electricity and less than 40% fossil fuel. The current proposal with only 25% of the energy input from electricity will perpetuate too large a share of fossil fuel in heating.

2. Requirements for water heating energy efficiency

Given the importance to decarbonise energy use and specifically heating, we propose to increase water heater energy efficiency requirements for all combination heaters to the level of the heat pump combination heaters by 2025.

We propose that the minimum energy efficiency of hybrid combination heaters is set at the level of heat pump combination heaters.

4. Requirements related to emissions.

We propose that the allowed emissions for tests with G30 and G31 reference gases are reduced by 30% for boilers. The emission should be checked for every gas family an appliance is qualified for.

[3] https://www.iea.org/reports/net-zero-by-2050. The report states "In buildings, bans on new fossil fuel boilers need to start being introduced globally in 2025, driving up sales of electric heat pumps"

We do not support the proposed emissions limit of 420 mg/kWh and propose to reduce NOx emission limits of all cogeneration heaters to 200 mg/kWh and to 160 mg/kWh for cogeneration heaters above 400 kW, in line with the Medium Combustion Plant Directive[4]. For engines that cannot meet this limit, the manufacturers shall equip them with flue-gas NOx reduction technologies.
We support the proposals requiring combination heaters to modulate to lower than 30% of full load without cycling. We also find appropriate the proposed limit of 15% of the full load (Annex II, 4d). Given that the heat demand is below 30% around 1/3 of the heating season[5] and that many heaters have a higher capacity than needed to provide heating during the coldest hours (-10°C for average season), this proposed limit of 15% of the full load should also be considered for other types of heaters than gas-fuelled heaters.

We strongly oppose the requirement for all gas-fired fuel boilers to be able to operate with a blend of fossil gas and up to 20% hydrogen. There will not be enough green hydrogen produced to replace the amount of gas currently used for space heating. Burning hydrogen in gas boilers is extremely inefficient and costly, and direct electrification of the heating stock should be the preferred option[6].
The requirement for gas fired boilers to be able to operate with at least 20% biomethane is not needed, as already today the gas networks provide up to 100% biomethane without any change of boilers needed.

5. Material efficiency requirements

- (1) Availability of necessary spare parts

The replacement of parts and repair & maintenance information should be available during the lifetime of heaters, which is on average 17 years according to the recent review study.

- (2) Maximum delivery time of spare parts

15 working days to deliver spare parts is too long for heating appliances as consumers cannot be expected to live without a functioning appliance for over 3 weeks during the coldest season.

- (3) Access to repair and maintenance information

The access to spare parts and information for repairs that do not impact critical functions for safety or operation shall be available for all repairers (not only for registered but also professional repairers).

6. Requirements for product information

We propose to change “Fuel source” into “Energy source” and include electricity, propane, and butane. The only indication of “LPG” instead of propane and butane is not sufficient given the different requirements for propane fuelled and butane fuelled boilers.

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[4] The Medium Combustion Plant Directive, (EU) 2015/2193 sets the limit for NOx emissions for engines above 1 MW fuelled with gasous and liquid fuels to 190 mg(m3, which is equal to 163 mg/kWh. This is except gas engines fired with natural gas, where the limit is only 95 mg/m3.
[5] In the average climate, the lowest bin is -10’C with 1 hours/year. If the nominal capacity of a heater is for -10’C, where the heater is heating the house 26’C to 16’C (as the rest of the heating is with internal heat soruces in the house as people and equipment), then 30% capacity will heat the house 1/3 of 26’C = 8.66’C, which is from 7.33’C to 16’C. Of the 4910 hours of the heating season in the average climate, 2038 hours or 41% are at temperatures above 7’C. This concludes that more than 1/3 of the time of the heating season is with less than 30% of the load.
[6] https://theicct.org/publications/hydrogen-heating-eu-feb2021

We do not support that H_2-ready boilers are supplied with a conversion kit, to avoid the unnecessary production and waste generation for the material used in the conversion kit itself.
The 'IMPORTANT NOTICE' for products declared as 'H_2-ready' should be visible not only on the product information fiche but also on the packaging of the product and clearly displayed in visual advertisement, promotional material, and in case of distance selling through the internet.

The efficiency of a heat pump at high temperature (HT) regime should be shown on the product information fiche, in addition to the label. The most likely temperature regime for hybrids to be used at is the HT regime, therefore minimum efficiency values should be set for the HT regime. If a heat pump is close to its limit at the medium temperature regime, its contribution on the high temperature application might be drastically reduced.

7. Requirements related to monitoring

In general, we strongly support the proposal for new requirements related to monitoring. The information generated should be easily understandable for consumers who should be able to assess if the installation of their heating appliances brings optimal efficiency.
The information gathered on energy consumption and heat delivered per hour shall be stored at least for three years. The calculation of energy efficiency shall be given as weighted average of efficiencies calculated from measured values. For space heating, the annual average efficiency shall also be calculated as η_s based on measured values, but it should include auxiliary energy consumption and factors F(1), F(2), F(3). The values that are not measured can be declared values (for instance if a fuel boiler does not measure auxiliary electricity consumption).
The information shall be retrievable by the end-user in a common data format (csv, excel, dif) for data processing by the end-user and his advisers.
One more piece of information that should be gathered that could allow to better evaluate the durability of appliances is the lifetime of appliances. Manufacturers should keep a registry of the most common failures, failures causing the end of the life of the appliance, and date of end of the life of the appliance to gather information about its lifetime.

The information collected through this new monitoring requirement should be handled in conformity with the data protection regulations in force.

Annex III – Measurements and calculations

As a general comment, we believe that the main features of the measurement and calculations should be set in this Annex, especially a set of boundaries and guidelines. However, in the specific case of EN14825 we find that there are some improvements in the 2020 version of the standard which are regrettably not reflected in the draft of the regulation.
Another point to note is that there is currently no alignment between the standards to measure the performance of heat pumps and the standards to determine the energy consumption of a building under the EPBD. There is an ongoing effort by standardisers to align the standards and use the results of the product testing as entry points for the EPBD calculations. The revised regulation should support this effort.

2. General conditions for measurements and calculations

For heaters, we propose that manufacturers should use the compensation method for new heaters from the moment the requirements of this regulation enter into force. For models put on the market until then, manufacturers can choose between the existing measurement at fixed speeds and the compensation method.
Given that the compensation method gives a lower efficiency than the method with the fixed compressor, we propose a malus factor for the method with fixed compressor of about 10-15%.
For hybrid space heaters, we recommend the use of the combined method as the separate method does not take the control system of the unit into account.

3. Seasonal space heating energy efficiency

It seems that E_{aux} is interchangeable with Q_{aux} on p. 26 (above table 2) so this should be clarified.
The air volume allowed for ventilation air for heat pumps is 100 m^3/kW. We propose to reduce this to 50 m^3/kW while the rest of the ambient heat should be taken from outdoor air[7].
In general, and to reduce ventilation losses, the amount of ventilation should be defined based on CO_2 measurements and not on a default value.

4. Seasonal space heating energy efficiency in active mode

For cogeneration space heaters, we support that efficiency η_{son} shall be calculated with measured thermal input values instead of declared values.
For electric heat pumps, we support that efficiency η_{son} shall simply be calculated with measured values, including inter-and extrapolation where needed.
For heat pumps, the specification of cycling does not seem to be valid for modulating heat pumps (with variable compressor speeds).

5. Control, auxiliary energy and standby heat loss corrections

We propose that heat pumps have the possibility to be declared as HT, and if so, their performance needs to be tested in $P_{designh}$ condition, with 100% capacity. This shall be included as an extra line in Table 4.
We do not support the proposed change of the brine temperature for ground source heat pumps from 0°C in current regulation to +5°C in the proposal. Ground source heat pumps are used in different installations where the two most common are with vertical drillings and with horizontal tubes 0.6 -1.5 m below ground:

- A vertical drilling supplying to one well-insulated dwelling is often able to deliver a temperature of 5°C in average climate during the heating season.
- Horizontal tubes below ground are often designed for heat pump inlet temperatures around 0°C (colder mid-winter, warmer rest of heating season)[8].

Rather than setting different inlet temperatures for different brine systems, we propose that the brine inlet temperature is set at 2°C as an average.

[7] With energy content of air of 1.2 kj/m3'C, and cooling of the air with 25'C, the useful energy content in 1 m^3 air is 30 kJ. 1 kW heat pump can then heat 1/30 m^3 air/s equal to 60 m^3/hour. If the heat pump is to replace the ventilation air in the design condition, it shall not use more than 60 m^3/hour
[8] See graph on page 80, Den Lille Blå om Varmepumper, 2019, https://elforsk.dk/udgivelser/lille-bla-om-varmepumper-2-udgave

For the part load test conditions for heat pump heaters, for the indoor heat exchanger we propose to change from fixed outlet temperature to fixed average temperatures. With the current proposal, where only the outlet temperatures are specified, it is possible to claim higher efficiencies while testing with low inlet temperatures.

6. Sound power of heat pumps and hybrid heaters

We propose that heat sound power is measured for full speed of fans, which is the condition $P_{designh}$, but the full load can be realised at a higher outdoor temperature, as proposed. In addition, we support that the manufacturer ensure that there is not higher sound power at other fan speeds.

7. Water heating energy efficiency of a combination heater

We do not support the use of the correction factor Q_{cor}, as the assumed heat gain in many situations is compensated by heat losses from use of indoor combustion air.
We also do not support the inclusion of smart control coefficient because the testing is not straightforward and could lead to loopholes.

Annex IIIa – Transitional methods

5. Electric heat pump space heaters

We agree that the compensation method needs to be better described than it currently is in the draft regulation.
For hybrid heaters, the combined test method should be better described, including the information that tests should be performed for the standard conditions in Annex III, table 4, with the use of the controls of the heaters (not with fixed compressor speeds).

Annex IV – Product compliance verification by market surveillance authorities

A solution needs to be found to lower the uncertainty in the measurement for the efficiency of air-to-water heat pumps (8%) and the measurement for NOx emissions (20% uncertainty), as these are currently very high. We propose to reduce the tolerance for the NOx measurement in the regulation from 20% to 10% to incentivise manufacturers to reduce the emissions.

Annex V – Indicative benchmarks

1. Benchmark for seasonal space heating energy efficiency

We propose to increase the benchmark on energy efficiency of hybrid heaters to 160%, which we find can be realised with 70% of the heating provided by an efficient air-source heat pump (180% efficiency) and 30% of the heating provided by an efficient gas boiler (94% efficiency).

2. Benchmarks for water heating energy efficiency

Benchmarks for water heating with electric heat pumps are lower for the larger heaters (XL and above) than for the M size heaters. We believe this to be a typo.

Energy Labelling Regulation

Annex II – Energy efficiency classes

1. Seasonal space heating energy efficiency classes

We support the proposed energy efficiency classes for seasonal space heating. If a manufacturer only wants to test the heat pump in the HT regime, the results for this test can be used to determine the energy efficiency class in MT regime.

2. Water heating energy efficiency classes

The very low energy efficiency values for the S-size water heaters will result in a much higher energy class for an S-size water heater than for a M-size water heater, which is misleading for consumers. We propose the energy efficiency for the classes for S-size water heaters to be 25% lower than the values for M-sized water heaters.

Annex III – The labels

4. Electric heat pump space heaters, thermally driven heat pump space heaters, hybrid space heaters

We support to have an icon for smart grid connectivity, where the heat pump can be turned on and off based on signals from the grid. This icon is already included for water heaters, and it should also be the case for space and combination heaters.

Label 6: Gas fired space heater, H_2-ready and Label 7: Fossil fuel, electric resistance and cogeneration combination heater, H_2-ready

We find the inclusion of information on H_2-readiness on the energy label to be highly misleading for consumers. Should there be a strong push in favour of mentioning H_2-readiness on the label from other stakeholders, we could only support this inclusion if it came with the current proposal to accompany it with an energy efficiency scale, and for the efficiency to be clearly displayed. The proposed PEF should absolutely be kept as it accurately shows the inefficiency to burn hydrogen in boilers. On a side note, we also want to highlight that a recent study has shown that the type of hydrogen that is considered here ('blue-hydrogen' based on 95% methane steam reforming) could have a higher environmental impact than directly burning methane (i.e., 'natural gas')[9].

Annex IV – Product information sheet

1. General

[9] How green is blue hydrogen ? https://onlinelibrary.wiley.com/doi/full/10.1002/ese3.956

We propose that the Product Information Sheets for ecodesign and energy labels are combined, so the users only have one set of technical documentation.

2. Space heating of heaters

We propose to change "Fuel source" into "Energy source" and include electricity. We support that the current draft includes the possibility of the inclusion in the Product Information Sheet of the information on heat pump efficiency in HT regime.
The 'IMPORTANT NOTICE' for products declared as 'H_2-ready' should be visible not only on the product information fiche but also on the packaging of the product and clearly displayed in visual advertisement, promotional material, and in case of distance selling through the internet, and be as visible as the energy label.

4. Temperature control

We support the inclusion of the description of the chosen temperature control.

10. Packages of space heaters

We support the inclusion of the description of the chosen temperature control.

Annex V – Technical documentation

2. Space – and combination heaters

For the B1 boilers and combi-boilers, the text added to the product information should clearly highlight the inefficiency of the appliance and be at least same font size as the indication of the model.
We suggest that Table 1 includes the choice of heat pump for HT regime or multiple regimes.
The information requirements are not limited to Table 1 but shall also include the information required in the Product Information Sheet.

Annex VI – Information to be provided in visual advertisements, in technical promotional material or other promotional material, in distance selling on the internet

The simple arrow with climate indication should include the word 'climate', so that it reads for instance 'Average climate' instead of only 'Average'.

Annex VII – Information to be provided in the case of distance selling through the internet

There is no need for a black and white arrow for distance selling on the internet.

Annex VIII – Measurements and calculations

For sections 1-6, our comments are the same as for the ecodesign regulation except that HT regime is included for heat pumps.

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