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Review of Ecodesign and Energy Label Regulations for Space and Water Heaters, Lot 1 and 2

Position paper on proposed amendments to draft Final Report of the Task 6 “Options” for the Review study of Commission Regulation (EU) No. 813/2013 (Ecodesign) and Commission Delegated Regulation No. (EU) No. 811/2013 (Energy Label) from March 2019

EHPA Working Group Thermally Driven Heat Pumps (WG-TDHP)

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Content

1 Background

Thermally Driven Heat Pumps (TDHP), both Gas Ab-/Adsorption Heat Pumps (GAHP) as well as Gas Engine Heat Pumps (GEHP) can allow for substantial energy efficiency improvements, use of energy from renewable sources and CO2, NOx and PMs emission savings in "Space and Water heating applications" compared to existing technologies. Based on the current ErP regulation, maximum average nominal efficiency (Seasonal Primary Energy Efficiency, SPER) is around 125% (confirmed by field test measurements and round robin tests).

In almost all European countries, TDHPs are indeed one of the most cost effective solution (Euro/kWhth) to deliver space and water heating service by including renewable energy and decreasing the carbon foot print.

Under the existing ErP frame and associated measures, tens of thousands of systems have been sold across Europe in residential building blocks and "light commercial" applications and several new residential products are currently under development for introduction across Europe. Especially GEHP are also used for industrial and commercial applications.

The choices that the European Commission will make by adopting a revised ErP could accelerate the adoption of TDHP technology or could completely exclude this technology from the market.

The current proposal of the consultant of the European Commission strongly puts at risk the existence of TDHP technology in Europe. Mainly, two issues arise from the proposed draft of options for the revision:

1. **minimum thresholds** of efficiency proposed for TDHP are currently unreachable and
2. **positioning of TDHP technology** in the class labelling will be limited to classes A, not representative of the major improvement in energy efficiency and operating cost savings for end users compared to condensing boilers.

2 Critically important amendments to proposed draft

In the following, we list the key elements that affect TDHP and the recommendations of EHPA WGTDHP about the specific points.

2.1 Conversion factor, Minimum Energy Efficiency level and efficiency classes

a. ISSUE:

Proposed new minimum energy performance limits for Medium and High Temperature HPs (resulting from changing Coefficient of Conversion from 2.5 to 2.1) is set as "eta_s 130%" from currently 110%.

For LT HPs the minimum is proposed to be 150% instead of currently 125%.

According to current test conditions and European measurement norms (EN12309 for GAHP and EN16905 for GEHP), this minimum threshold is neither achieved by any of the TDHPs (GAHPs and GEHPs) currently available, nor is it expected to be achievable by near future TDHP(GAHPs and GEHPs) products due to techno-economical limitations.

Therefore, the threshold contained in the current proposal will exclude TDHPs (sorption and gas engine) from the market.

b. RECOMMENDATION:

EHPA WGTDHP proposes two possible approaches to address the issue:

i) Apply same efficiencies for all technologies using the same energy source.

In this case, the minimum threshold and class levels for TDHPs should be consistent with the one for other (mainly) gas driven products (Boilers, hybrid appliances etc.).

In this case, the minimum threshold should be placed at "eta_s = 87%" (consistent with current gas boiler threshold).

ii) Define a new ad-hoc classification (scale and minimum threshold) for TDHP to promote and incentive best technology in the category.

This approach has been already applied to electrically driven heat pumps, where minimum energy efficiency thresholds and scales have been differentiated based on the application ("High Temperature" vs. "Low Temperature").

Given the peculiar nature of TDHP, that represents a technological evolution of the gas boiler in the same application area, TDHP have substantially higher level of performance) and innovative technology immediately available that allow to use all output energy contributes (for example, energy heat recovery by engine) reducing heat losses, a dedicated scale is required to promote the technology (similarly to what has been done for LT HP, which were separated out due to their peculiar performance).

In the case of TDHP "high and medium temperature" applications (radiators), the minimum threshold should be placed at "eta_s = 110%" (consistent with current HP threshold).

In the case of TDHP "low temperature" applications the minimum threshold should be placed at "eta_s = 125%" (consistent with current HP threshold).

Note: all above considerations are based on assuming the same currently unchanged "test conditions". In case of change (see below) new values will need to be calculated based on test conditions and further technical study.

iii) Lower the eta_s (LT and MT/HT) for TDHP

A third alternative could be to lower the minimum energy performance limits proposed for TDHP only, including for Gas Engine Heat Pumps, to a reasonable level that will be achievable in the future, both for low temperature applications and also medium and high temperature applications.

The new minimum energy performance limits and eta values have been adjusted to consider the new conversion factor value. Thus, electrical heat pumps benefit from a 'lift' on eta value and SCOP target. However, this is not the case for gas heat pumps for which the SCOP value is increased without benefiting from an increase of their eta value with the change in conversion factor.

Thermally driven heat pumps are a credible energy efficient alternative to less energy efficient heating systems. TDHPs are dedicated to specific situations – not only where electrically driven heat pumps cannot be used, due to challenging conditions linked to the connections to electricity grid, the availability of sufficient power, or when it is not economically viable/advantageous for customers to update their electricity installation in order to install commercial systems.

2.2 Labelling (10 classes: A+++ to G)

a. ISSUE:

The limits of the proposed classes do not currently offer proportional reward for the increase in performance of a TDHP and do not maintain the best TDHP technology in the class labelled A++ or higher.

b. RECOMMENDATION:

See recommendation above "b.ii" Point 1: Conversion factor, Minimum Energy Efficiency level and efficiency classes with adoption of linear and evenly spaced classes to emphasize "reward for performance".

2.3 "Green Gas" or "e-fuels"

From the point of view of the EHPA Working Group Thermally Driven Heat Pumps, in general the introduction of an H2-ready bonus is doubtful and should be discussed thoroughly.
If it is really decided to introduce such a bonus, the following recommendations should be taken into account.

a. ISSUE:

Proposal for 20% bonus for "bio-methane and 20% hydrogen" (Green Gas) products needs to be immediately applicable to TDHPs otherwise it will result in penalization (conversion factor is immediately applicable for electrical products). Current proposal does not indicate definition of the criteria that would enable the eligibility for the bonus.

b. RECOMMENDATION:

Clear definition of the criteria for eligibility should be made available and immediately applicable to TDHPs at time of introduction of the reviewed regulation.
Possible approach could be based on:
i. Use of transitional methods should provide guidelines for defining Green Gas (example: Biomethane and H2 @20%).
ii. Use of CE marking based approval process (Gas Appliance Regulation and EN437) to enable manufacturer to declare compatibility with "Green Gas" based on transitional method definition of "Green Gas".
iii. Manufacturer declaration of compatibility with "Green Gas" should be sufficient for eligibility for bonus.

2.4 LOT 2

a. ISSUE:

Current ErP 1.0 regulations and proposed draft for ErP 2.0 revision do not include TDHP for Water Heating applications. Savings of Water Heating applications have been demonstrated to be as large as the ones achievable in Space Heating applications. Several manufacturers are already designing appliances or selling appliances for this specific application.

b. RECOMMENDATION:

Inclusion of TDHP technology during review of EcoDesign and EcoLabelling of Lot2.

2.5 Test conditions for TDHP

a. ISSUE:

According to VHK report, no issue on test conditions has been identified for TDHP. As described by VHK and several studies about Sorption TDHP, real life results are in line with results obtained by using EN12309. The situation is similar for GEHP (EN 16905).

Considerations about a new approach ("dynamic testing": proposed to reduce the gap between values declared according to EN14825 and measured in field testing) do not apply to TDHP technology.

b. RECOMMENDATION:

Therefore, test conditions for TDHP should not be modified since already in line with European standards (EN12309 and EN16905).

2.6 SCOP

a. ISSUE:

Proposed draft frequently uses acronym "SCOP". This acronym is not defined for TDHP (indeed in EN12309 and EN 16905 the term SGUE-Seasonal Gas Utilization Efficiency is used for expressing energy efficiency in seasonal applications).
In case of GEHP, it should be considered also the Energy Heat Recovery from the engine, so the energy efficiency is described by PER – or Seasonal PER.
The use of SCOP in the regulation will make it inapplicable to TDHP and therefore will exclude this category of products.

b. RECOMMENDATION:

Measures and regulation must refer ONLY (as in ERP1.0) to primary energy index (eta_s, SPER) and not to "technology-specific" definitions (COP, SCOP, GUE or SGUE)

2.7 Displaying of Seasonal Efficiency

a. ISSUE:

Display of the efficiency value on the label is expressed in "SCOP"

b. RECOMMENDATION:

Should this change be included in new legislation, then measures and regulation must refer ONLY (as in ERP1.0) to primary energy index (etas, SPER) and not to technology specific definitions (COP, SCOP, GUE or SGUE).

2.8 Tolerances

a. ISSUE:

Tolerances for efficiency measurements of TDHP are results from gas appliances specific measurement uncertainty (as with Gas Boilers) and heat pump specific measurement uncertainty (as with electrical Heat Pumps).

b. RECOMMENDATION:

Tolerances for TDHP should set equal to EHPs+Boilers or, in any case, not lower than the larger of the two.

2.9 NOx emission

a. ISSUE:
Measurement of "NOx is made on energy input"; this conventional measurement approach does not reward reductions in emissions resulting from energy efficiency improvements.

b. RECOMMENDATION:

Measurement of "NOx must be made on energy output".

2.10 Noise

a. ISSUE:
Currently, quality products are penalized by ambiguity in current norm.

b. RECOMMENDATION:

Eliminate ambiguity for noise measurement by clearly defining test conditions (partial load and delta temperatures).

2.11 Temperature controls

a. ISSUE 1):
Current proposal does not include the possibility for manufacturer of applying one single label for "product sold together with its own control". TDHPs are always sold and installed with manufacturer controllers. The product label does not value the embedded control and forces to have a separate and more expensive control architecture and complex labelling.

b. RECOMMENDATION 1):

Allow TDHP manufacturers to incorporate in the product label the bonus of the embedded control.

c. ISSUE 2):
According to VHK draft report and TDHP manufacturer experience deviation from nominal value of efficiency is normally due to poor commissioning/monitoring.

d. RECOMMENDATION 2):

In case "control" allows for remote control/monitoring, a "monitoring bonus" is added (example: +5% for "connected control").

3 References

Space and combination heaters - Ecodesign and Energy Labelling; Draft Review Study, VHK, Delft (NL), for the European Commission, DG ENER C.3; March 2019

About EHPA

The European Heat Pump Association (EHPA) is a Brussels based industry association which
aims at promoting awareness and proper deployment of heat pump technology in the European market place for residential, commercial and industrial applications. EHPA provides technical and economic input to European, national and local authorities in legislative, regulatory and energy efficiency matters. All activities are aimed at overcoming market barriers and dissemination of information in order to speed up market development of heat pumps for heating, cooling and hot water production. EHPA coordinates quality initiatives: including the HP KEYMARK, a Quality label for heat pumps and Certification standards for heat pump installers. The association compiles the annual heat pump statistics and organizes a number of events, among them an annual heat pump conference.