EHPA comments on final report on water heaters (Lot 2) and discussion paper for WG4 meeting - proposal on minimum efficiency thresholds for TDHP Water Heaters and Combi TDHP

April 2020

**Introductory note:** EHPA would like to thank the study team for the work already carried out and welcome the opportunity given to comment on the options proposed in the final reports as well as the discussion paper for the first WG4 meeting. Please find below EHPA’s proposal on minimum efficiency thresholds for TDHP Water Heaters and Combi TDHP.

### Proposal on minimum efficiency thresholds for TDHP Water Heaters and Combi TDHP

Currently TDHP are explicitly recognized within ErP regulation for their contribution only to the space heating applications. Substantial energy savings are provided also by this category of appliances also for DHW preparation. Indeed, the market shows interest for applications where the TDHP are used as standalone appliance for DHW preparation. Hence the request for inclusion in Lot 2 was generated.

This document is intended to formulate a proposal on the thresholds for the Minimum Efficiency Performance Level of Thermally Driven Heat Pumps (TDHP) in DHW production operation (both “stand alone” and “combi”).

Please consider that the following considerations refer to the application of a “TDHP and a storage tank” in absence of any other additional renewable energy sources (e.g. PV, TH solar). Renewable contribution is therefore included exclusively as low temperature heat recovered by the environment.

Based on EHPA members understanding and experience, it is difficult to set limits able to meet both the criteria of being high enough to avoid the presence of inefficient products on the market and fair enough to be met by a product manufactured for mass market.

The first issue concerns the standards currently available to measure the performances of TDHP for DHW production, the EN 13203-6. This standard provides a test method that is mainly aimed at testing appliances for the instantaneous production of DHW. This can be inferred from several points. Among the issues, we can mention that some of the performance figures, as the “wasted water” cannot be used as they are for a TDHP.
Another example is the definition of “steady state operation”, which is typical of instantaneous water heater, but can be hardly found with a heat pump coupled with a storage.

Again, the definition of the measure cycle doesn’t take into account the peculiarities of this kind of technology. In fact, it is based on the gas consumption, a significant indicator for gas boilers, which can be ineffective for TDHP as it does not consider that the machine operates (i.e. run the circulation pump and deliver heating capacity) even after the burner has been switched off. These examples shows that the Standard can be used for testing TDHP, but it requires some arbitrary adaptations.

Alternatively, the EN 16147 can be used as reference for a test method for TDHP. As this Standard is designed to test (electrical) heat pumps, under some points of view, it is more suitable also for TDHP, even if it presents the drawback of not providing indication about how to deal with the gas input.

The second issue to be considered is the limited number of TDHPs currently available on the market and the very limited number of laboratory tests which have been performed.

In addition, Politecnico di Milano has been part of two projects (HEAT4U and ECOTEST) where the DHW performances of gas absorption heat pumps have been measured and in both the cases the test method has been derived combining the EN 12203-6 and the EN 16147.

Even if Politecnico is not in position to share the details about the projects outcomes, we can mention that in both the cases the application of method resulted in efficiencies substantially lower of what measured in real applications (field tests) of the gas absorption heat pumps.

On the one hand this suggest that the test methods failed to provide a fair representation of the actual performances of TDHP in DHW application. On the other hand, it has to be admitted that in both the cases the tested system (TDHP + storage + hydraulics) was not designed nor optimized to achieve the best performances under laboratory test conditions.

Based on the aforementioned considerations, we suggest the proposed thresholds.

In particular, we recommend to set the limits for TDHP to a value which is 10% above the corresponding limits for a gas boiler with storage (see Table 1). Simultaneously, clarifications, specific definitions and calculations should be included in corresponding EN norms to remove ambiguity in the use and application of the relevant norms.
This proposal takes into consideration both the available results of laboratory tests and the expected room for improving the performances thanks to both a better system layout and more adequate test protocol. Moreover, it considers that a TDHP is expected to perform better than a gas boiler, but also that the inertia of the machine, coupled with the intermittent nature of DHW production, prevents the TDHP to fully exploit its thermodynamic advantage. Again, this proposal does not include additional contribution from renewable sources other than low temperature ambient heat.

Table 1 – proposed threshold for TDHP efficiency in DHW production

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<th>Tapping profile</th>
<th>TDHP VHK 1st Proposal Task 6</th>
<th>TDHP VHK 2nd Proposal WG4 20JAN2020</th>
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