Unlocking the potential of Waste Water Heat Recovery in the recast of the Energy Performance of Buildings Directive (EPBD)

Position of the European Association for Waste Water Heat Recovery to the EPBD recast proposed by the European Commission on 15 December 2021

March 2022

Waste Water Heat Recovery is an available and effective energy efficiency solution to reduce the energy demand for domestic hot water via the direct heat recovery from shower drains. **It can save around 40 percent of final energy and related CO_2 emissions from domestic hot water production**. Products are available from multiple European SMEs. Yet, only few Member States (e.g. Portugal, France, Germany and The Netherlands) are considering the benefit of waste water heat recovery within their energy performance of buildings calculation method. Indeed, **the EPBD Annex 1 only requires considering the efficiency of the hot water supply and their insulation characteristics**. Requiring Member States to integrate the heat recovery characteristics of the hot water system into their calculation method (EPBD Annex 1) can **unlock a potential of 4.5 Mtoe** according to a study of the European Commission[1]. The presence of heat recovery system should also be considered into Energy Performance Certificate (EPC) and Renovation Passports (RP).

Mainstreaming the Energy Efficiency First principle in the building sector is paramount, particularly with the current energy prices/security crisis which makes this revision very timely and crucial to sustainably reduce energy bills and alleviate energy poverty. The Energy Efficiency First principle applied to hot water systems can reduce their energy need by at least 40% thanks to waste heat recovery, without lowering the comfort or demanding a behavioural change of the end-user.

As rightly stated in proposed recital (15): "**Energy performance requirements for technical building systems should apply to whole systems**, as installed in buildings, and not to the performance of standalone components, which fall under the scope of product-specific regulations under Directive 2009/125/EC…." and considering the **Energy Efficiency First principle[2]**, we recommend unlocking full energy saving potential of wastewater heat recovery in buildings.

Applying correctly the **technology neutrality principle** also implies that all potential solution should be able to contribute: efficient production, insulation **and** heat recovery.

Potential of energy savings of domestic hot water systems

Every day, more than 22 million m³ of hot water are consumed by European homes, accounting for 418 TWh final energy per year. Hot water preparation is the main source of energy consumption for new buildings, accounting up to 70% of total energy demand of most efficient newly built passive houses, and vast majority of this heat ends up in sewers and is wasted after just 2 seconds of use while showering.

Considering up to 80 percent of hot water is used in showers, harvesting heat from shower drains in buildings could be a simple and cost-effective way to **save around 40 percent of final energy and related CO_2 emissions of hot water production and represents a saving potential of 4.5 Mtoe final energy by 2030 according to a study of the European Commission[1]**.

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[1] Technical assistance services to assess the energy savings potentials at national and European level: Summary of EU results and Member state annex report

[2] whenever solutions on the demand-side, such as energy efficiency improvements, deliver higher economic and environmental net benefits than the generation, transport, and consumption of energy, these measures should be implemented first

If the energy demand for domestic hot water could be reduced by optimisation of water heating systems by WWHR, systems will become smaller & cheaper and easier to be operated deploying renewable energies – an excellent example how system level energy efficiency and the deployment of renewable energy complement each other.

Unlocking the potential in EPBD recast

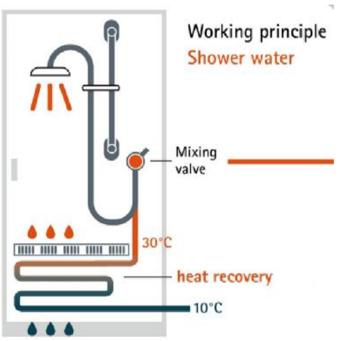
Calculation methods exist but are applied in some Member States only (e.g. Portugal, France, Germany and The Netherlands), and solutions available are less attractive if their benefit is not considered when calculating the energy consumption of the building according to the EPBD. **We can easily unlock this substantial potential by amending EPBD Annex 1, with the addition of heat recovery characteristics to the aspects to be considered in calculation methodology (point 4), and to ensure that heat recovery is considered in the planning and optimization of hot water systems**. There is no reason why insulation should be considered and not heat recovery characteristics as well.

As availability of information on energy demand of domestic hot water preparation is paramount to deploy energy efficiency measures therefore our industry welcomes adding the "**energy use, peak load, size of generator or system, main energy carrier and main type of element for each of the uses: heating, cooling, domestic hot water, ventilation and in-built lighting**" into ANNEX V, Template for Energy Performance Certificates (EPC). Considering the importance of visibility of this information we suggest moving it into chapter 1, among mandatory indicators to be published on the front page of EPCs.

About WWHR technology

Wastewater heat recovery systems (WWHR) – A specifically engineered heat exchanger transfers waste heat energy from the waste hot shower water to the incoming fresh water supply, warming it from around 10 up to 30°C.

WWHR systems can be used in single- and multi-family homes, and non-residential premises with higher hot water consumption: sports facilities, hairdressers, hotels, and swimming pools. **Due to ease of installation, they can be applied in renovations as well.**



Annual energy and emission savings in an average EU household

As shown in the following table, in an average EU household (2.3 persons) around 40% of total final energy consumption (total energy consumed by end users) for domestic hot water (DHW) production can be saved with deployment of WWHR system. The data is based on actual energy consumption and the individual mix of technologies used for domestic hot water (DHW) heating in each EU country.[3]

	Household without WWHR		Household with WWHR		SAVINGS with WWHR	
Total DHW preparation	**Final Energy consumption per year**	**CO_{2e} emissions per year**	**Final Energy consumption per year**	**CO_{2e} emissions per year**	**Final Energy per year**	**CO_{2e} emissions per year**
Average EU household	2 148 kWh	340 kg	1 289 kWh	204 kg	859 kWh	136 kg

Made by European SMEs

WWHR systems are developed and manufactured by innovative European SMEs. Europe has the greatest technological lead in the world on WWHR, with 326 patent applications since 2010, representing 70 percent of all patent applications in the world. Installed WWHR systems have already recovered 300 GWh corresponding to the annual domestic hot water consumption of 17,000 households and they respect the stringent drinking water regulations (KIWA, DVGW etc). Quick and easy installation of WWHR units in both new build and renovation sectors can be performed by qualified local plumbers, no special knowledge required.

Cost efficiency

Even in combination with an already highly efficient heat pump, the cost of additionally saved energy (based on the additional investment and maintenance costs of the WWHR technology), the fixed price for each not consumed kWh, delivered as a result of heat recovery during the lifetime of the WWHR system (25 years**), is as low as 0.06 EUR/kWh, nearly a fourth of the average electricity price of 0.232 EUR/kWh in the EU (1st half of 2021)**.[3]

Additional benefits

1. **Circular construction**: systems have a long lifespan and contain easy to recycle and highly recycled materials such as copper and stainless steel.
2. **Grid stability and smaller peak demands**: Since the use pattern of showers tends to be highly concentrated at certain times of day and assuming electrification, as most effective way of decarbonisation of hot water systems (e.g. heat pumps), lower energy consumption of the electrified hot water preparation will contribute to the grid stability.

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[3] The potential of Wastewater Heat Recovery Systems in reducing the energy need for water heating in the EU in a cost-efficient way, Study, University of Innsbruck, Passive House Institute, March 2022

3. **Optimised DHW systems**: thanks to WWHR the uneconomic peak demands and storage capacity can be optimised, and the domestic hot water infrastructure reduced.
4. **Real time production**: the recovery and generation of energy adapt continuously and in real time with the usage, without over- or under-production (no storage and control system necessary)
5. **Aesthetics**: systems are integrated into showers, in ducts or technical rooms, so they are hidden.
6. **Easy-to-understand technology**: because of the obvious functional principle, WWHR will be a no-brainer for planners and end-user and act as a door opener for more complex technology.
7. **No behavioural change:** the WWHR technology works due to basic physical processes and does not require any interaction with the end-user and does not need any complex control system.
8. **No loss of comfort:** because WWHR does not have any impact on the flow of shower heads or the desired shower temperature, the end-user doesn't have any loss of comfort.

About EuroWWHR

Since 2018, the European Association for WasteWater Heat Recovery (EuroWWHR) gathers inventors, manufacturers and distributors that all have in common the thrive for durability.

All wastewater heat recovery systems sold by members of the association have been tested by an independent laboratory and meet EU and national water safety codes.

Members of the association

ACO (The Netherlands)

BIOFLUIDES ENVIRONNEMENT (France)

CERIAN SHOWER (Spain)

COUNTER FLOW The Netherlands

DUTCH SOLAR SYSTEMS (The Netherlands)

EUROPEAN COPPER INSTITUTE (EU)

EHTECH (France)

EVOLSYS (France)

GAIA GREEN (France)

HAMWELLS (The Netherlands)

JOULIA (Switzerland)

MEED (The Netherlands)

Q-BLUE (The Netherlands)

QUANTIA (France)

RECCAL (France)

RECOUP (United Kingdom)

SANURA (The Netherlands)

SOLARONICS (France)

TECHNEA (The Netherlands)

THERMIUP (France)

ZYPHO (Portugal)