Future Homes Standard risks overlooking the biggest household energy use: hot water

Response from the waste water heat recovery sector in relation to:

The Building Regulations Approved Document Part L (England) Regulations 2026

for implementation of the Future Homes Standard

Overview

The aim of this paper is to highlight an apparent inconsistency within the methodology for compliance with the Future Homes Standard (FHS) under SAP 10.3. In particular, the paper identifies a significant missed opportunity to address domestic hot water consumption, which is expected to represent one of the largest sources of energy demand within future homes.

In raising these issues, we believe there is a clear need for constructive dialogue with government departments, including the Ministry of Housing, Communities and Local Government (MHCLG) and the Department for Energy Security and Net Zero (DESNZ), to ensure that:

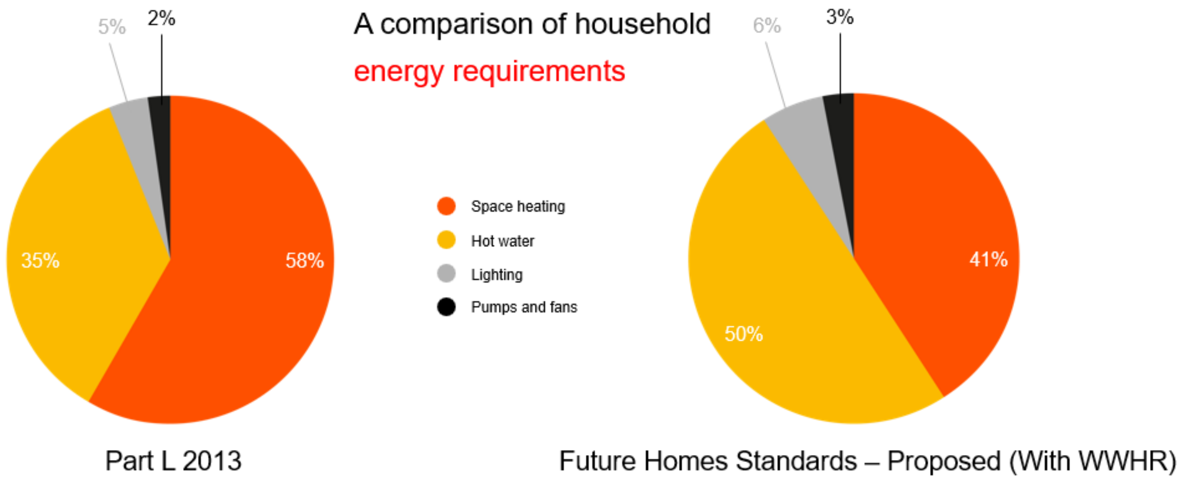
- The opportunity to minimise the building performance gap is fully realised;
- The increasingly prescriptive approach to housebuilding — focused on fabric performance, heat pumps and photovoltaic systems — does not inhibit innovation or the continued adoption of technologies that reduce demand at the point of use;
- Household energy bills are reduced through lower domestic hot water consumption;
- New homes are genuinely zero-carbon ready; and
- The Home Energy Model (HEM), when introduced, accurately reflects the impact and benefits of demand-reduction technologies.

Addressing these matters at an early stage will help ensure that the Future Homes Standard is underpinned by a more robust and effective policy framework, thereby reducing the likelihood of unintended or adverse outcomes.Under Part L 2021 (the interim Future Homes Standard), waste water heat recovery (WWHR) systems have been widely adopted. Since 2024, around 160,000 new-build homes have been equipped with WWHR. These passive, low-maintenance and cost-effective systems have low embodied carbon and contribute to circular construction and wider sustainability goals. Typically made from highly recyclable and reusable copper, they have a functional lifespan exceeding 20 years—often outlasting the heat pumps and photovoltaic systems they support. By integrating energy recovery into the building fabric—effectively “insulating the drains”—WWHR helps ensure that new homes are genuinely net-zero ready, while remaining affordable and comfortable for occupants without requiring changes to everyday behaviour.

However, with the introduction of the Future Homes Standard in March 2027, WWHR systems are effectively being designed out of buildings when assessed under SAP 10.3. While it is encouraging that WWHR remains part of the Government’s notional building specification, in practice there is little incentive to include these systems, when modelled under SAP 10.3: A modelling tool that was neither intended for use with the Future Homes Standard or Consulted on as a compliance modelling tool for Future Homes Standard.

The issues around modelling WWHRS in 10.3 appear to be largely due to the heat pump assumed in the notional dwelling having a coefficient of performance (CoP) of 2.5, which is penalised by ‘in-use’ factor of 0.6, rendering the actual target COP of 150%. This in-use factor appears to be derived from DHW cylinder assumptions that appear to trigger in-use factor penalties, which in turn reduce the apparent need for additional DHW demand reduction measures, such as WWHRS.

This approach overlooks the single largest energy demand within a home: domestic hot water (DHW). Historically, government policy has successfully prioritised demand reduction, earning strong support across the industry. However, in the context of the Future Homes Standard, that focus appears to have diminished.



Source: SEA paper on hot water efficiency in homes 2020

Immediate consequence of SAP 10.3 as a FHS compliance tool.

The CoP of the heat pump in the notional house type being set at 2.5, with an imposed "in-use factor"

Under Part L 2021, the notional dwelling was based on a mains gas boiler with a seasonal efficiency of approximately 89.5% (SEDBUK). This provided a realistic upper benchmark aligned with the performance of leading models commonly used in new-build housing at the time.

By contrast, Part L 2026 does not follow the same principle. A review of leading heat pump manufacturers and the models likely to be specified for compliance with the Future Homes Standard shows that the coefficients of performance (CoPs) recorded in the Product Characteristics Database are typically well above 2.5 for heating and above 1.5 for DHW). The assumed CoP of 2.5 appears to be an average across all entries in the database, including data that is more than 15 years old. Given the significant advancements in heat pump technology and efficiency over that period, this results in an unrepresentative and outdated performance assumption being applied within the notional dwelling.

It is also understood from discussions with MHCLG (stated at the HHIC/EUA Heating and Hot Water Policy Meeting on 30th April 2026) that the relatively low performance assumed for the heat pump in the notional dwelling is a "workaround" intended to assist compliance in apartments and flats, making compliance via SAP 10.3 more straightforward, by allowing direct electric systems to be specified. However, without backstops for DHW demand reduction, in the same way as for space heating via FEES, this negates the requirement for WWHR systems in many standard house types. It was also stated during this meeting, that SAP 10.3 could be adjusted to use different COP values based on the dwelling type being modelled. (this is discussed further in more detail)

It is further noted that the Notional Dwelling DHW COP routinely appears to be impacted by the application of an in-use factor for the water heating efficiency based on Appendix N of SAP 10. Where the hot water cylinder does not meet the reference values on the PCDB entry for the notional ASHP, an in-use factor of 0.6 is applied (250%*0.6 =150% or 250%*0.95 =237.5%).

This will typically result in a notional DHW efficiency of 150%. A DHW CoP of 1.5 is a very low bar for modern heat pumps to compete with. ~~and so~~ As a result, a house with a heat pump receives significant benefit on DHW efficiency due to modern heat pumps having an in-use factor of 0.95 as opposed to the notional at 0.6.

This "workaround"—arising from the Home Energy Model (HEM) not being introduced alongside the Future Homes Standard—has wider implications for multi-storey dwellings and was not subject to consultation.

We consider that, as SAP 10.3 was not initially intended for use as a Future Homes Standard compliance tool, and therefore was not actively consulted on in that context, these unintended consequences resulting from artificially low notional DHW efficiencies should be reviewed . There is a risk of introducing a significant performance and cost penalty to hot water production in new-build houses seeking compliance under SAP 10.3. This, in turn, will translate to higher energy bills than predicted and could be counterproductive in the roll out of the FHS.

The result of the above mechanisms observed within SAP 10.3 has a direct and adverse effect on the incentive to incorporate WWHR or other energy-saving technologies and smart controls when using SAP 10.3. The assessments below illustrate this clearly, demonstrating that compliance can be achieved through the specification of a readily available air source heat pump (ASHP), combined with fabric energy efficiency measures (FEEs) and the baseline requirement for photovoltaic (PV) systems—without the need for additional efficiency interventions.

An independent report from UK energy assessor AES Consultancy has been submitted in support of this response document.

The attached AES Sustainability Consultants report provides supporting evidence from SAP 10.3 modelling. Using an anonymised two-storey, three-bedroom detached house configured to mimic the SAP 10.3 notional specification, together with two actual house types currently being built in England, the report found that all tested dwellings achieved compliance without WWHR when paired with currently available air source heat pumps from mainstream manufacturers. It also found that adding WWHR improved outcomes, reducing annual running costs by around £50–£57 in the notional-house comparison, by £50 in a small mid-terrace, and by £83 in a large detached house.

Indicative results from the AES SAP 10.3 analysis

Scenario	Without WWHR	With WWHR	Reported impact
Notional dwelling with current ASHP models	All tested options passed SAP 10.3 compliance	All tested options also passed with improved results	Running costs reduced by about £50–£57 per year; primary energy performance improved materially
Actual house type A (small mid-terrace)	Passed SAP 10.3 compliance	Passed with stronger results	Running costs reduced by £50 per year; regulated energy demand reduced by 10.8%
Actual house type B (large detached)	Passed SAP 10.3 compliance	Passed with stronger results	Running costs reduced by £83 per year; regulated energy demand reduced by 7.4%

Implications

- The notional dwelling specification is difficult to replicate in SAP 10.3, as heat pumps with a CoP of 2.5 for heating and hot water are not commonly available in current mainstream product ranges.

- Under SAP 10.3, compliance is largely prescriptive (FEES, mandatory PV, ASHP), leaving limited scope for design-led innovation. As a result, additional technologies such as WWHR tend to become optional enhancements rather than measures that materially contribute to achieving compliance.
- The divergence between the Future Homes Standard notional dwelling—which includes WWHR—and the SAP 10.3 modelled actual dwelling may lead to a widening performance gap. The analysis below indicates that the cost of domestic hot water may increase significantly between Part L 2021 and Part L 2026 scenarios, despite the introduction of heat pumps in the latter.
- DHW demand typically doubles where WWHR is not present.

The AES analysis also reinforces the wider policy point on domestic hot water demand. In its actual-house examples, hot water accounted for 52% of regulated energy demand in the small mid-terrace dwelling without WWHR, and the introduction of WWHR reduced total regulated energy demand by 10.8%. Even in the large detached dwelling, WWHR reduced total regulated energy demand by 7.4%. This supports the argument that domestic hot water demand remains a material target for demand reduction.

- It is likely that, with the introduction of the Home Energy Model (HEM), specification requirements may need to evolve, creating additional challenges for house builders. This could result in a dual approach to compliance, with one specification required for developments assessed under SAP 10.3 and another for those designed using HEM.
- In addition, homes delivered under SAP 10.3 are expected to have higher running costs than those modelled using HEM. This discrepancy could have a negative impact on the perceived consistency and overall credibility of the Future Homes Standard, particularly where neighbouring developments are built to different assessment methodologies and therefore exhibit materially different operational costs.

Possible corrective action

- Maintain the current notional house type for apartments/flats.
- Use the same notional house type with an increased CoP of 3.5–4.0 for dwellings under three storeys, to reflect more accurately the performance of products currently available where the dwelling type is appropriately specified. As SAP 10.3 was not consulted upon in this role, it should be possible to make this change quickly and effectively.
- Maintain the Notional PV requirement at 40% but reduce the functional requirement to 30% (as recommended by Future Homes Hub). This approach will allow the balance to be addressed by other technologies, which would allow greater design freedom, promote innovation; and allow individual developers to optimise for cost and performance.
- Make it a functional requirement to reduce domestic hot water demand by a minimum of 25%. This would reduce running costs, deliver carbon reductions to one of the largest end uses of energy in the dwelling, and help future-proof the Future Homes Standard against its stated aim of zero-carbon new-build homes by 2030.

Other points for consideration

- **With up to a 20% increase in the uptake of heat pumps Electricity grid peak demand could rise from between ~6 GW – 7.5 GW** *("The addition of heat pump load profiles to GB electricity demand: Evidence from a heat pump field trial" July 2017, available from University College London Discovery*). While more recent studies suggest that peak demand in well-designed, Future Homes Standard-compliant dwellings may be lower than these worst-case projections, there will still be a measurable increase at the local distribution level. In practical terms, individual homes with heat pumps are expected to impose an additional electrical load of around 1–2 kW. This will likely necessitate upgrades to local distribution infrastructure, including cabling and substations, leading to increased costs for developers at a local level. It may also result in delays to connections, driven by the need for reinforcement of the existing distribution network.
- **WWHR can help with addressing local grid challenges.** In the UK, peak electrical stress typically occurs on winter evenings, when space heating demand is at its highest and photovoltaic (PV)

generation is negligible. At a site level, WWHR can reduce peak demand by approximately 5–10%, although its most significant contribution is in reducing overall energy consumption and associated energy bills, rather than peak load alone.

To achieve meaningful reductions in peak electrical load, measures such as smart controls for heat pumps, smart EV charging strategies, and battery or thermal storage solutions will be required, with WWHR offering a limited but useful contribution. However, when designing Future Homes Standard dwellings using SAP 10.3, these additional demand-management measures are unlikely to be adopted, largely due to the influence of the 2.5 CoP assumption in the notional dwelling, which reduces the perceived necessity for further system optimisation.

- At the end of 2019, the Labour Party produced a paper **"The fastest path to decarbonising UK energy and boosting the economy while we are at it. Thirty Recommendations by 2030".** In it WWHR featured prominently and was recognised as the 7th largest potential contributor to demand side savings for existing homes, with energy savings of some 7.79 TWh per year for GB, generating a combined saving greater than the impact of Heating Controls, Loft Insulation top-up and LED lighting upgrades combined) . This demand-side energy saving would calculate as 15.35 TWh of Primary Energy saving (@1.97 primary energy factor), were these homes also all to be removed from the gas network, as is the current policy direction.

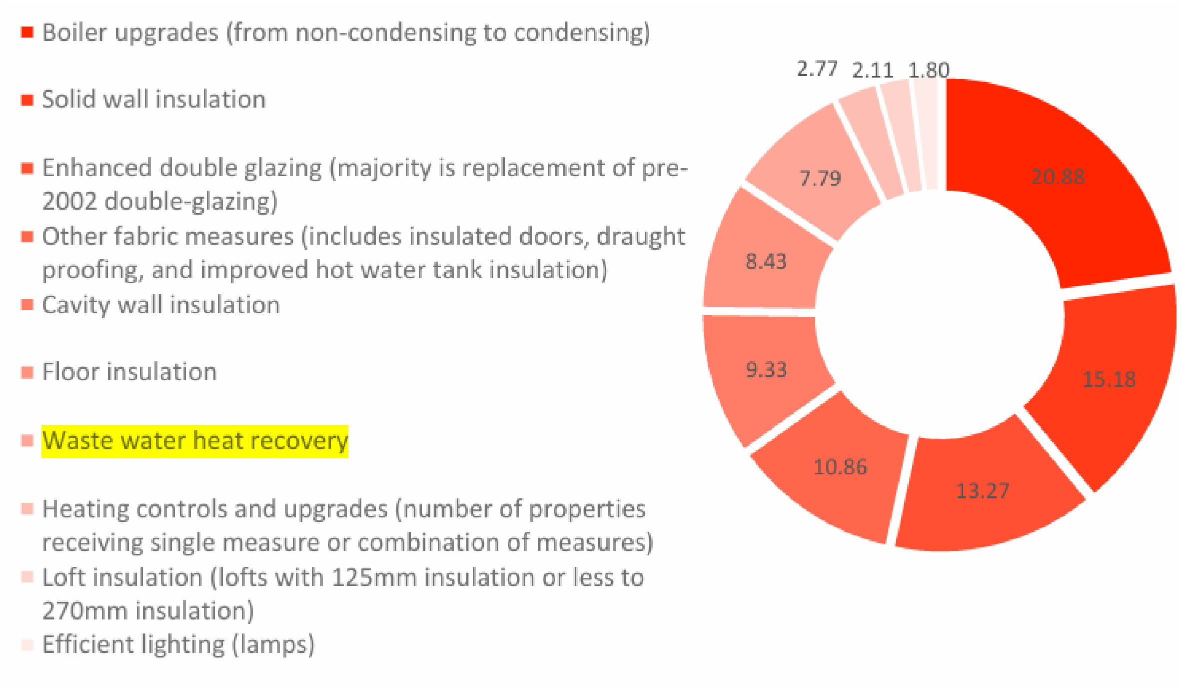


Figure 10 Demand only savings (TWh) from housing stock

- **With the introduction of heat pumps, domestic hot water and space heating can no longer be considered separate processes.** The Home Energy Model (HEM) treats hot water demand very differently from SAP 10.3. Rather than relying on a simple monthly estimate based on floor area, HEM models individual usage events—such as showers, baths, and tap use—throughout the day. It also incorporates stratified cylinder modelling, tracking temperature layers within the hot water storage tank. As a result, the Future Homes Standard (FHS) assessment demands much more detailed information about the hot water system. In practice, this leads to more accurate modelling of homes with hot water cylinders (which are essential for heat pump systems).
- **Demand-side energy reduction measures such as WWHR will reduce bills.** As demonstrated earlier, the energy savings will be approximately 35% of total domestic hot water costs. A report commissioned by Showersave and undertaken by the Centre for Sustainable Technologies, University of Ulster in 2022 shows that the energy savings generated, when heat pumps are partnered with WWHRS, will reduce

bills by £88 per year. Adjusted for 2026 cost of energy, this equates to £158 per year based on 3 people showering at, low 8 l/min, flow rates for 6 minutes each (https://showersave.com/wp-content/uploads/2024/11/UoU_trials_analysis_report_FINAL-28-Jun-21-Domestic-Heat-Pumps_WWHRS.pdf).

- **The 2026 edition of Approved Document L, Volume 1**, indicates that air source heat pumps should be capable of modulating to meet a dwelling's typical mid-season heating load (paragraph 4.14). This encourages more precise sizing of heat pumps for space heating. However, while this represents clear progress, it introduces challenges for domestic hot water delivery, particularly in terms of response times. When waste water heat recovery (WWHR) is excluded under SAP 10.3 design assumptions, the heat pump must meet the full demand for heating cold mains water. An important unintended consequence is the more frequent use of direct electric immersion heaters, which can significantly increase running costs and reduce overall system efficiency.
- **Investment and employment curtailed in the sector.** As a result of the implementation of Part L 2021, several companies invested heavily in the UK to ensure the delivery of a substantial uplift in demand for WWHR systems. However, early indications suggest this investment may need to be scaled back by 2029 due to the negative influence of the notional dwelling specification within SAP 10.3. This is expected to have wider repercussions, including reduced commitments to job creation, research and development, and product innovation—ultimately limiting progress in retrofit WWHR solutions.
- **Space heating demand and space heating efficiency has been enhanced** and protected by measures designed to reduce energy use for space heating. However, this level of protection has not been the case for hot water heating. As an example, Thermostatic Radiator Valves are a mandated technology under "Heating Controls" in ADL2021 and now ADL 2026, yet the impact of smart controls such as TRVs, when modelled as part of the Notional specification can be negligible when compared to the impact of WWHRS.
- To illustrate this, we modelled an example developer-designed 2-bed house type (with ASHP) in 4 different configurations, to compare the impact of WWHRS (Pipe HEX | System A) against a set of TRV radiator valves as they appear in SAP (SAP default PCDB 2210).

	SAP Rating:	CO2 Emission:	DER: (kgCO2/yr/m2)	TER: (kgCO2/yr/m2)	% DER<TER :	Absolute difference (kgCO2/yr/m2)	DPER (kWh/m2/yr)	TPER: (kWh/m2/yr)	DPER<TPER: %	Absolute difference (Primary Energy: kWh/m2/yr)	10.3 Compliance
1. No WWHRS / No TRVs	95 A	-0.07 t/yr	-0.46	-0.46	N/A	0.00	10.59	10.53	-0.60%	-0.06	FAIL
2. WWHRS / No TRVs	97 A	-0.09 t/yr	-0.79	-0.46	71.74%	0.33	3.52	10.53	66.54%	7.01	PASS
3. No WWHRS / TRVs	95 A	-0.07 t/yr	-0.5	-0.46	8.70%	0.04	9.84	10.53	6.51%	0.69	PASS
4. WWHRS & TRVs	97 A	-0.09 t/yr	-0.82	-0.46	78.26%	0.36	2.78	10.53	73.62%	7.75	PASS

- Whilst it demonstrated that there is an impact on Primary Energy reduction with the presence of TRVs, the impact of a single vertical WWHRS pipe, is >10x the impact on Primary Energy demand. When the impact of each measure is compared to the relative cost of installing these into this particular house type, we have demonstrated that the WWHRS has a significantly higher impact to £ spend, in the region of 185-250% better value in this instance.
- Whilst we acknowledge that the heating controls specification for an ASHP system is more nuanced than a gas boiler installation, where individual TRVs becoming part of a wider controls strategy, the fact remains that these measures are mandated under ADL 2026, despite having less relevance and impact where ASHPs are likely to dominate, yet, WWHRS has the potential to be omitted entirely from 10.3 calculate house types.

Summary

The document highlights several important observations regarding SAP 10.3 modelling for FHS/ADL 2026 compliance and the way waste water heat recovery (WWHR) systems are currently represented, despite their strong potential to reduce energy demand, particularly for domestic hot water (DHW) use in homes built to the Future Homes Standard.

In summary, the key point is not that WWHR lacks value, but rather that the current SAP 10.3 compliance mechanism does not demonstrate a need in the calculation, in contrast to the stated make up of the notional house in the Future Homes Standard. The combination of a relatively conservative notional heat pump CoP assumption, associated in-use factors, and a compliance pathway that can already be achieved through ASHPs, FEES and mandatory PV means that WWHR may often be omitted. This is despite its ability to deliver meaningful reductions in domestic hot water demand, improve primary energy performance, and lower household running costs.

An opportunity is being lost to further strengthen demand-side energy reduction measures at a time when domestic hot water will account for an increasing proportion of regulated household energy use.

Taken together, the attached AES report demonstrates a consistent trend: SAP 10.3 currently enables standard house types to achieve compliance without WWHR, despite the technology continuing to provide measurable benefits in both running cost reductions and regulated energy demand. This evidence supports consideration of either adopting a more representative notional heat pump performance assumption for houses, or introducing a specific domestic hot water demand-reduction metric, helping ensure that practical, low-maintenance technologies such as WWHR remain appropriately recognised within compliant design strategies.