Housing and Communities Overview and Scrutiny Panel – 19 March 2025

Environmental Monitoring 12-month Review - Penman House

Purpose	For Review
Classification	Public
Executive Summary	This report introduces a review of energy efficiency and comfort data collected at Penman House since December 2024.
Recommendation(s)	**That the Panel consider the environmental and energy insights with resident feedback, as being a healthy, energy efficient building.**
Reasons for recommendation(s)	The Council considers the technology and improved building standards having a positive effect on its residents, which supports other developments utilising the same building standards and technology.
Ward(s)	All
Portfolio Holder(s)	Cllr Steve Davies – Housing and Homelessness
Strategic Director(s)	Richard Knott – Housing and Communities
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Introduction and background

1. Penman House was the Council's first Future Home Standard (FHS) development, containing twelve, one and two-bedroom flats. The scheme completed in January 2024 as part of the Greener Housing Strategy 2022 to 2032.

2. The Council is an early adopter of the Future Homes Standard, which mandates all new homes built from 2025 onwards, will be zero-carbon ready. This means they will have minimal carbon emissions from heating, hot water, and appliances, with any remaining emissions offset by renewable energy sources.

3. The standard also aims to make newly constructed homes produce 75-80% less carbon emissions than homes built under the current Building Regulations.

4. This has presented an opportunity to tackle fuel poverty and consider the health of future occupants. Placing an emphasis on a building's fabric through triple glazed windows and doors and high volumes of insulation in walls, floors and roofs. While controlled ventilation and improved air quality aim to improve health outcomes.

5. Penman House incorporates a range of technology.

    - Air Source Heat Pumps (ASHP)
    - Photovoltaic (PV) Panels
    - High recovery hot water cylinders
    - Triple glazing to all windows and glazed doors

6. Nearly all homes have achieved an Energy Performance Certificate (EPC) of A, with two flats achieving B ratings. Properties are given a rating between A (best) to G (worst) on how much carbon dioxide (CO2) they produce each year.

Environmental monitoring

7. As an early adopter of the FHS, the Council wanted data to evidence how the building performed and understand how successfully occupants would use technology like ASHP and ventilation.

8. Environmental monitors have recorded 12 months of information through small sensors placed in living areas, bedrooms and corridors outside of bathrooms, within six flats prior to occupation in December 2024. Data from the monitors is fed back every 30 minutes measuring
   Comfort

Air quality and ventilation
Energy patterns of usage

9. The council also worked with the ASHP manufacturer to gain additional data to support the efficiency of each ASHP over a 12-month period.

Comfort

10. This is measured by the number of hours each home spent in the recommended comfort zone (18°-22°c) in winter. For homes that are heated by a heat pump we would expect a constant temperature throughout the day, as this is the most efficient way to run the heat pump.

11. The data collected indicates comfort is subjective. While most flats did maintain a consistent temperature of 21°c. Some residents preferred much lower temperatures ranging between 16 - 18°c while others maintained a constant temperature of 24°c. We enquired into the reasons some residents wanted both higher and lower temperatures and were told this was because of comfort and health reasons.

Air quality and ventilation

12. Good air quality contributes to improved health outcomes and a reduction in damp and mould.

13. The FHS requires buildings are constructed to a high fabric specification with ventilation being used to improve air quality. The environmental monitors sense carbon dioxide (CO2) levels in each home, in parts per million (ppm).

14. The data is affected by resident behaviour, for example opening a window or turning on a kitchen fan. Readings over 1000ppm indicate poor indoor air quality. Penman House has averaged readings between 400ppm and 1000ppm, 98% of the time in winter and 100%, in summer months which is excellent.

15. The effects of ventilation have also been monitored. This has ranged from 0.41p/h to 0.81p/h. The table below, gives the ventilation rate or air changes measured per hour(ph).

Excellent	Good	Average	Poor
0.25 – 0.75	0.75 – 1.5	1.5 – 2.25	2.25 +

Heating

16 The Council has worked with the heat pump manufacturer to understand the efficiencies of the Air Source Heat Pumps (ASHP). This has been calculated through a metric called the Seasonal Coefficient of Performance (SCOP). Heat Pumps at Penman House have an (SCOP) of 2.5 - 3. This means that for every one unit of electricity the heat pump uses. The pump generates between 2.5 and 3 units of heat. The higher the SCOP number, the more efficiently it is.

17. Residents have told us their bills are on average £660 per year. This included other white goods and individual energy usage for electronics. This is excellent when compared to similar sized properties averaging £1,120.

Resident support

18. To help residents get the best from the improved building standards and technology. Each household was offered a face-to-face appointment as they moved into Penman House.

19. Residents also had access to information about their new home through the Council's digital platform, Go Vocal. This online platform contains help and advice along with user guides and manuals. An additional opportunity was given to residents in November 2024, to help those who moved in throughout the summer and did not need to use their heating for several months.

Corporate plan priorities

20. The Council is committed to its legal and moral obligations as a landlord of social housing. Every Tenant has the right to a warm, secure, and decent home and to be treated with dignity and fairness.

Consultation undertaken

21. Working with the tenant engagement team. A comfort, use and energy evaluation questionnaire was sent to each household in November 2024, which asked six questions.

Comfort, use and energy evaluation questionnaire

The temperature of your home

- Overall, how have you found the temperature in your home?
- The temperature inside my home is comfortable.
- The temperature inside my home is too warm.
- I have found my home too cold.

Heating and Hot water

- Are you able to control the hot water and heating within your home easily?
- Have you experienced a fault with your heating and hot water.
- If so, was your repair resolved quickly and efficiently?
- (link to Go Vocal)

Ventilation

Is the extract ventilation within your bathroom effective? **Yes** **No**

Would you rate the air quality in your home as **Excellent** **Good** **Poor**

Energy Efficiency

Please provide us with the below information. This information can be found on your latest electric bill.

- Annual Energy Usage in kilo watt hours (kWh)
- Monthly cost of electricity
- Current meter reading for electric

• Current meter reading for PV (Solar Panels)
What if any benefits have you noticed, living in a highly insulated home with renewable technology
Would you recommend this type of home to family and friends

22. A total of six households responded.

- 100% said the temperature inside their home was comfortable.
- There was a mixed response to question 2 (heating and hot water) We determined more work was required to understand the responses. Face to face visits were arranged to give additional advice on how to operate heating and hot water controls.
- 100% said the air quality in their home is 'good', with only one respondent suggesting the extractor fans were ineffective.
- All were able to provide some readings for energy usage – but it was mixed in terms of all boxes being completed by all respondents.
- 100% would recommend this type of home to family and friends. Comments on benefits include:

23. Additional Comments

- "haven't needed to have the heating on yet".
- "Extremely well sound proofed. Although very warm in hotter weather, I've yet to need the heating on and it the end of October".
- "I do believe the monthly costs are good & the solar panels bring a massive help to energy usage".
- "I would like further help on how to use the heating system".

Financial and resource implications

24. The cost of environmental monitors for 12 months cost £3000.

Legal implications

25. None

Risk assessment

26. The Council foster a collaborative partnership culture to support our tenants. This collaboration supports our tenant engagement strategic priorities of '**listening to our tenants**', '**putting tenants first**', '**knowing our tenants**', and '**how we communicate with tenants**', to ensure everything we aim to achieve is supported by the tenants' voice, and those who will implement the actions.

Environmental / Climate and nature implications

27. Environmental sensors within these properties have provided actionable insights into indoor environmental conditions, providing real-time data for analysis and decision-making for improving energy efficiency and resident engagement.

Equalities implications

28. We know that some residents may be more vulnerable to fuel poverty and the effects of poor indoor air quality. The data will continue to give us data insight and help us engage with residents effectively.

Crime and disorder implications

29. There are no crime and disorder implications arising directly from this report.

Data protection / Information governance / ICT implications

30. No Personal data is collected through the environmental sensors.

31. The Council will respond proactively, sensitively and with urgency should data make us aware of environmental conditions which need action, like damp and mould or poor indoor air quality.

Conclusion

32. Through data insights and resident engagement. Penman House is a comfortable and efficient building that residents tell us they would recommend to others. This has been supported by the data collected, which does show good thermal efficiency and excellent indoor air quality.

Appendices: **Background Papers:**

None