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Accelerating Heat Pump Uptake in Irish Homes

Behavioural and Technical Considerations

SEAI Energy Show 2024

Today's Topics

Behavioural Research into Heat Pump Intake

- *Hannah Julienne, Programme Manager for the Behavioural Economics Unit*

Heat Pump/Heat Loss Indicator Pilot Study

- *Joel Franklin, Programme Manager for Programme Evaluation*
- *Jose Cordero, National Retrofit Technical*
- *Stephen Farrell, Programme Manager for National Retrofit Technical*
- *Mike Meaney, Active Energy Control*

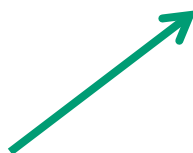
Behavioural Research into Heat Pump Uptake

Hannah Julienne

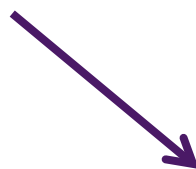
Programme Manager, Behavioural Economics Unit

Behavioural research into heat pump uptake

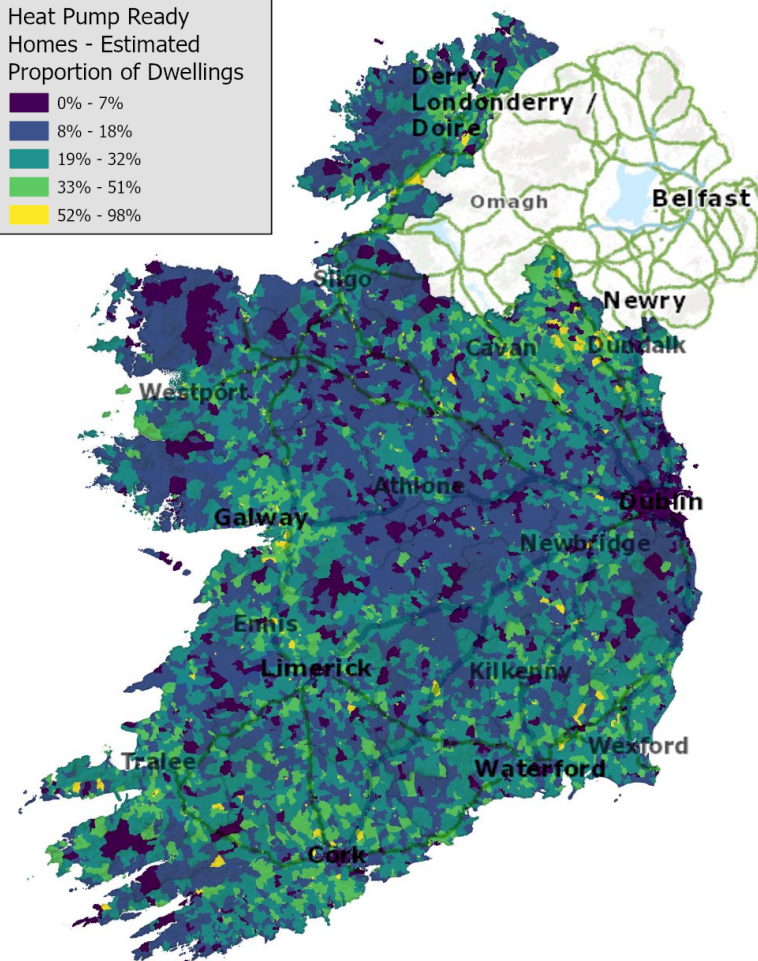
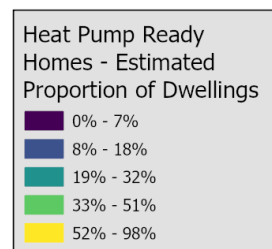
Significant carbon savings



Focus on **oil-heated** homes considered
“heat pump ready”



Less hassle to switch



- Estimate approx **250,000** oil-heated heat pump ready (HLI under 2.3) homes in Ireland

Research methodology

Interviews with heat pump installers
(April '22)



n=12

- Perceptions of barriers & drivers, and which are most relevant to heat pump ready oil-heated homes.
- Perceptions of potential policies/interventions to encourage heat pump adoption.

Targeted homeowner survey
(Sep '22)



n=24

Switched to Heat Pump

Experience of switching to heat pump

Other information & sociodemographics

n=1,402

Still on oil

Awareness, knowledge & perception of heat pumps, SEAI and grants

Willingness-to-pay experiment

Other information & sociodemographics

Scenario 1: Boiler end-of-life

Please **imagine that your current oil boiler is coming to the end of its life** and you're trying to decide whether to replace it with another oil boiler or to switch to a heat pump.

Factors	Heat pump	Oil boiler
Installation cost	€13,000	€3,000
SEAI grant	SEAI heat pump grant: €6,500 Bonus for scrapping oil boiler: [€0 - €6,500] TOTAL: € [6,500 + X]	N/A
Technical assessment	Required – approx. €650 (€200 rebate after installation)	Not required
Installation	Approx 4 days Moderate to high disruption	Less than a day. Little disruption.
Environmental impact	Low (uses renewable energy)	High (uses fossil fuels)
Running costs	A little lower than current costs	Same as current costs (but will rise with price of oil)
Lifespan	20 years	15 years

Assuming all this information were accurate, which option would you choose to replace your old boiler?

- Heat pump/New oil boiler

Scenario 2: Next 12 months

Please now think about your **current real-life situation** instead.

Factors	Heat pump
Installation cost	€13,000
SEAI grant	SEAI heat pump grant: €6,500 Bonus for scrapping oil boiler: [€0 - €6,500] TOTAL: € [6,500 + X]
Technical assessment	Required – approx. €650 (€200 rebate after installation)
Installation	Approx 4 days Moderate to high disruption
Environmental impact	Low (uses renewable energy)
Running costs	A little lower than current costs
Lifespan	20 years

Assuming all this information were accurate, and bearing in mind your current circumstances, how likely would you be to switch to a heat pump **in the next 12 months?**

➤ Not at all likely/Unlikely/Likely/Very likely

Catch-22

- Homeowners are willing to pay for a heat pump, but only when their heating system needs replacement



Scenario 1: Boiler end-of-life

HP vs. new oil boiler?

Average WTP: €5,000

95% CI: [€3,000 - €6,900]

Scenario 2: Next 12 months

Likelihood to switch?

[Very likely vs. not]

Average WTP: -€1,700

95% CI: [-€3,000 - -€400]

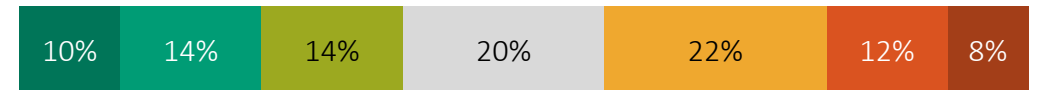
Note: Applies to homeowners in oil-heated heat pump ready homes that responded to our survey. WTP likely to be lower among general population.



- SEAI grant process (paperwork & need for additional works) a barrier, **especially when boiler urgently needs replacement**. Some are installing without a grant because of hassle involved.



How much of a hassle do you think it would be to apply for this grant?



■ 1.No hassle at all ■ 2 ■ 3 ■ 4 ■ 5 ■ 6 ■ 7.More hassle than it's worth

Some recommendations

- Target interventions at **homes with older boilers**, e.g.:
 - Alert homeowners to the suitability of their home for a heat pump
 - Pre-emptively carry out enabling works (e.g. replacing radiators)
- Increase the convenience of heat pumps as an option for **distress purchases**, e.g.:
 - Offer temporary boiler or electric heaters
 - Allow heat pump installation prior to enabling works
- Consider further grant support (e.g. radiator replacement grant) but simplify grant processes & **revisit technical requirements that lead to additional costs.**

To find out more

<https://www.seai.ie/data-and-insights/behavioural-insights/>



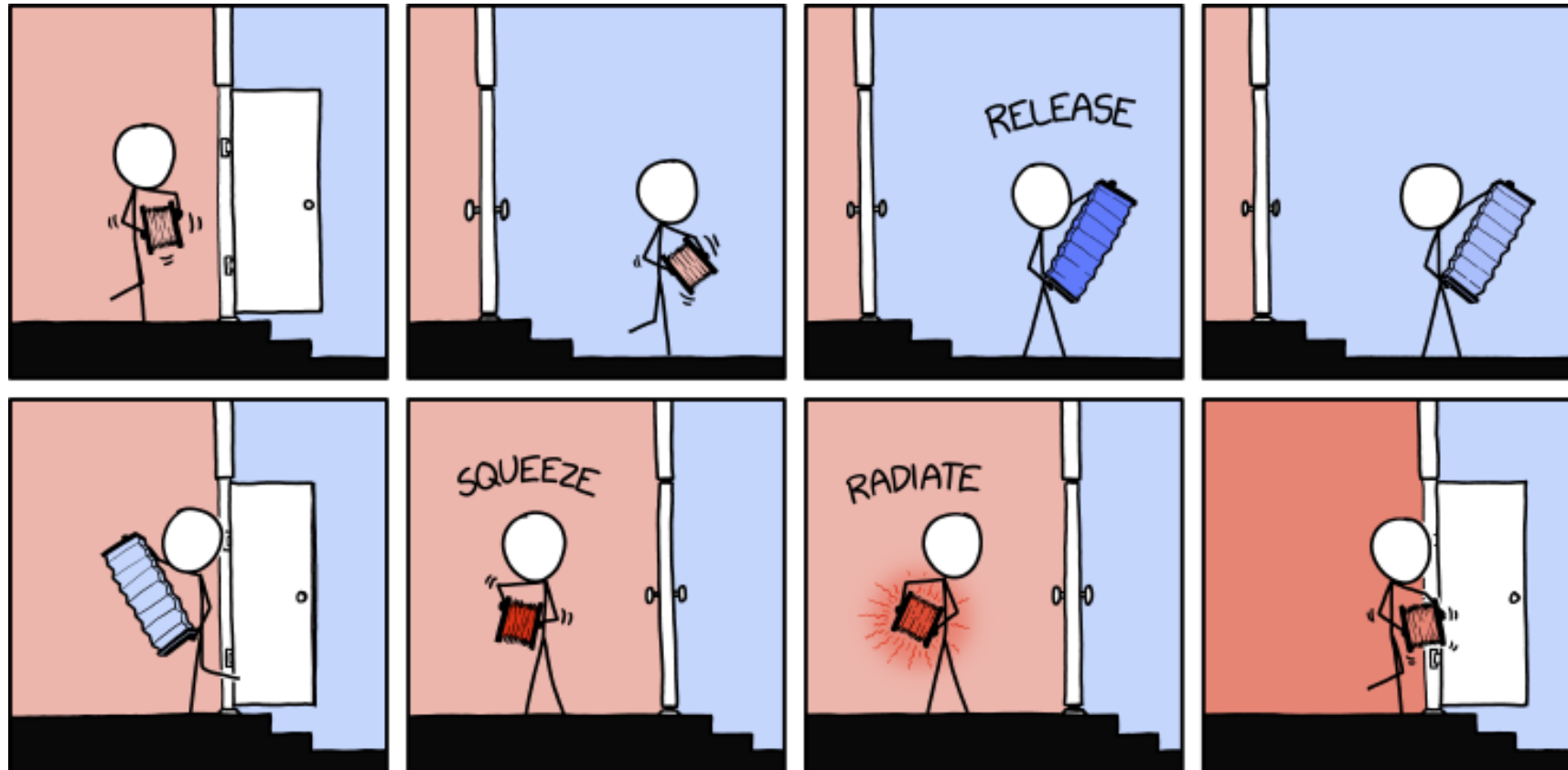
HLI Pilot Study: Testing Heat Pump Performance in Moderate Heat Loss Homes

Joel Franklin

Jose Cordero

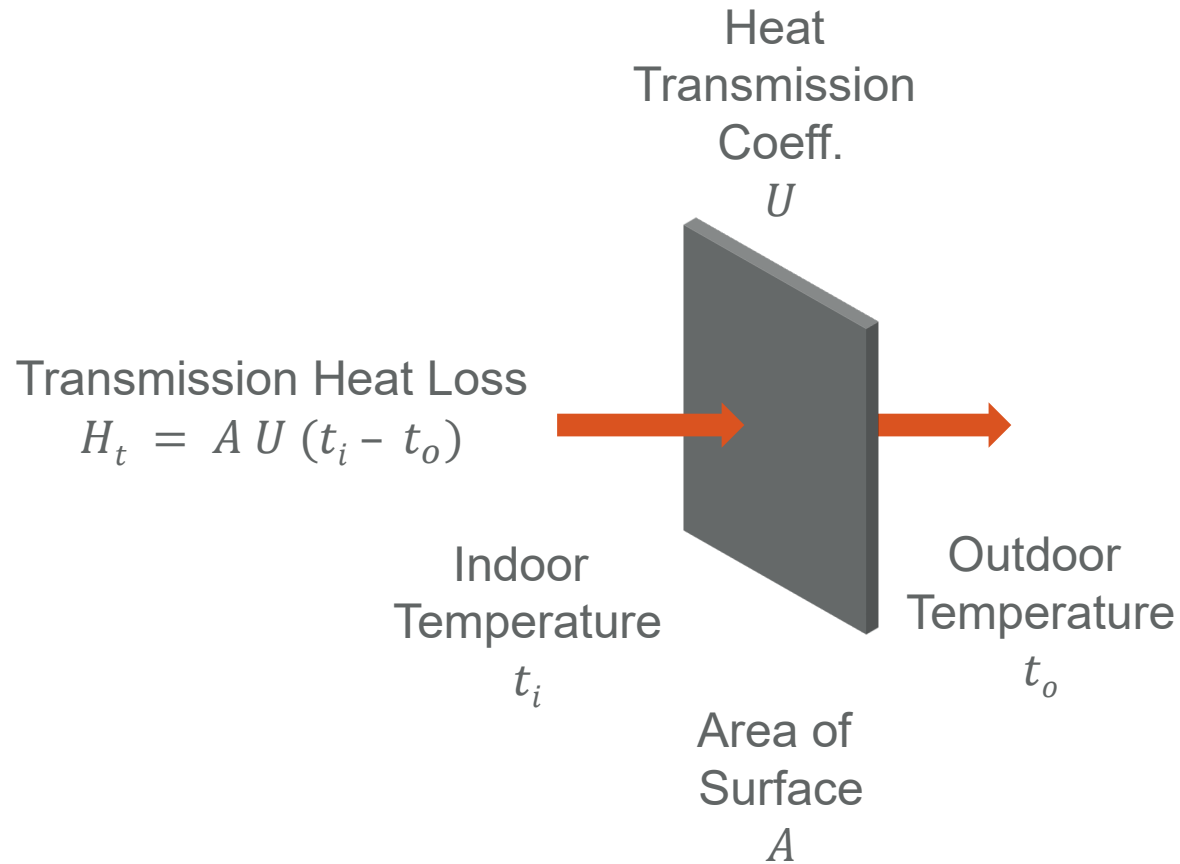
Stephen Farrell

Heat Pumps and Heat Loss



MANUAL HEAT PUMPS ARE SUCH A PAIN.

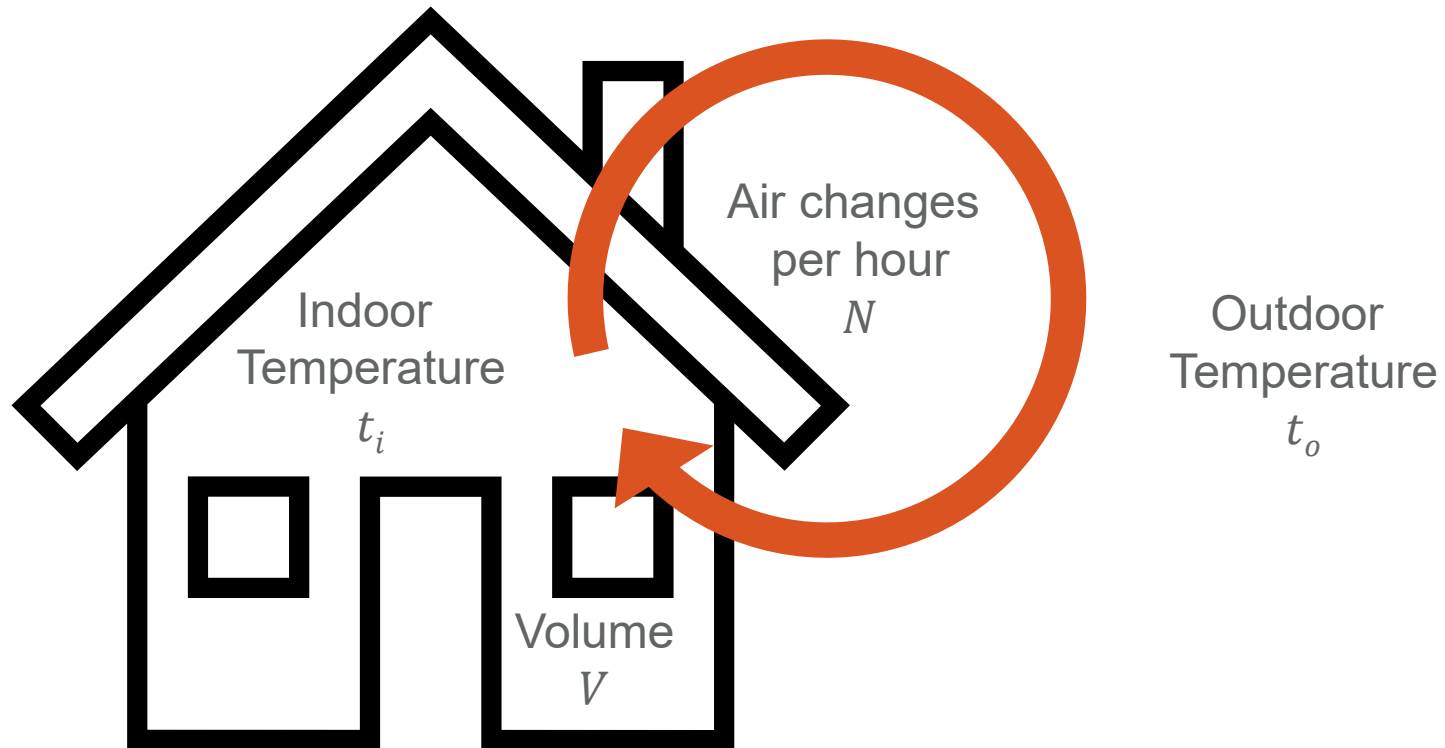
Fabric Heat Loss



Ventilation Heat Loss

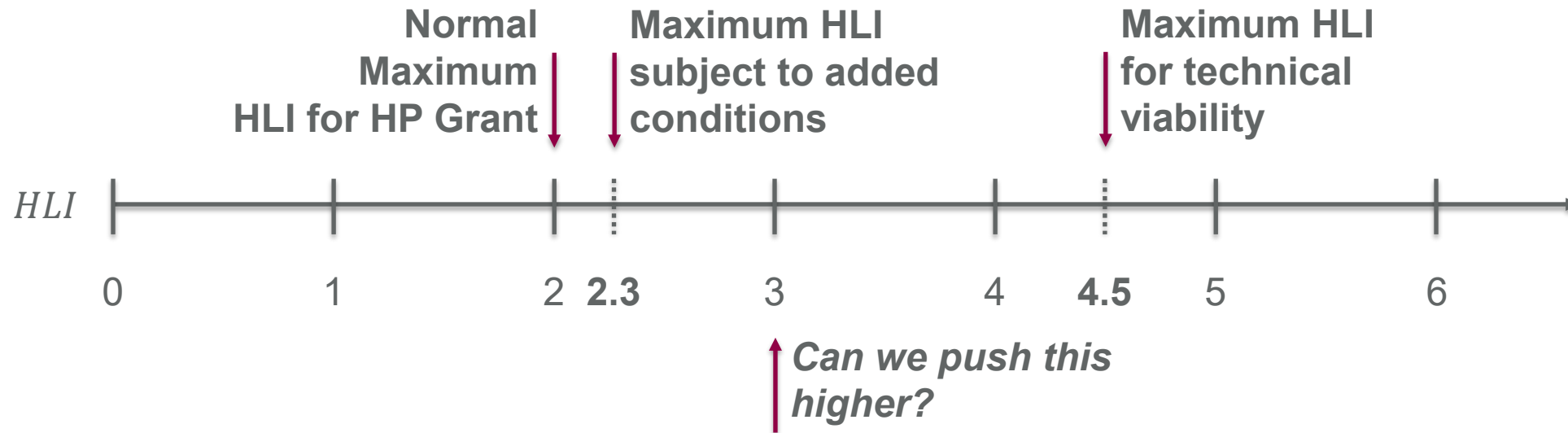
Ventilation Heat Loss

$$H_{ventilation} = 0.33 V N (t_i - t_o)$$



Heat Loss Indicator

$$HLI = \frac{H_{Walls} + H_{Windows} + H_{Doors} + H_{GroundFloor} + H_{Roof} + H_{Ventilation}}{Floor\ Area}$$



Heat Pump/Heat Loss Indicator Pilot Study

Key Questions

1. How does **heat pump technical performance** compare between homes with a HLI >2.3 and ≤ 3.0 and homes with a HLI of ≤ 2.3 during the test period?
2. What do home participants report regarding their use of, **experience, satisfaction and comfort** with the new heating system and secondary heating sources across the various homes and HLIs?
3. What is the difference in **heating consumption, costs and carbon emissions** between test group and control group following installation of heat pump and energy efficiency measures?

Research Plan – Field Trial



1. Heat Pump and Heat Loss Indicator (HLI) Research Pilot

- Field trial on up to 400 Irish homes to assess the impact of widening Heat Loss Indicator from $2.0/2.3 \text{ W/m}^2\text{K}$ to $3.0 \text{ W/m}^2\text{K}$
 - Test Group A: 200 homes with HP recruited through One Stop Shops
 - Group A1: HLI 2.3-3 (not currently eligible for grant funding)
 - Group A2: HLI up to 2.3 (currently eligible)
 - Control Group B: 200 homes without heat pump recruited through past grant schemes
- Will collect high-frequency monitoring data, before and after metered energy consumption data, survey data on participants

Research Plan – Desktop Study

2. Analysis of historical energy consumption data of homes with heat pumps

- >62k homes identified in BER database with heat pumps
- HLI ranges from 0.23 – 7.15 W/m^2K
- Aim is to link homes with metered electricity consumption data and assess variation in consumption across HLI levels and other relevant variables
- Limitations:
 - Bimonthly electricity consumption data
 - Whole-home data incl. appliances
 - No data on quality of heat pump installation/commissioning/usage



HLI pilot enrolment

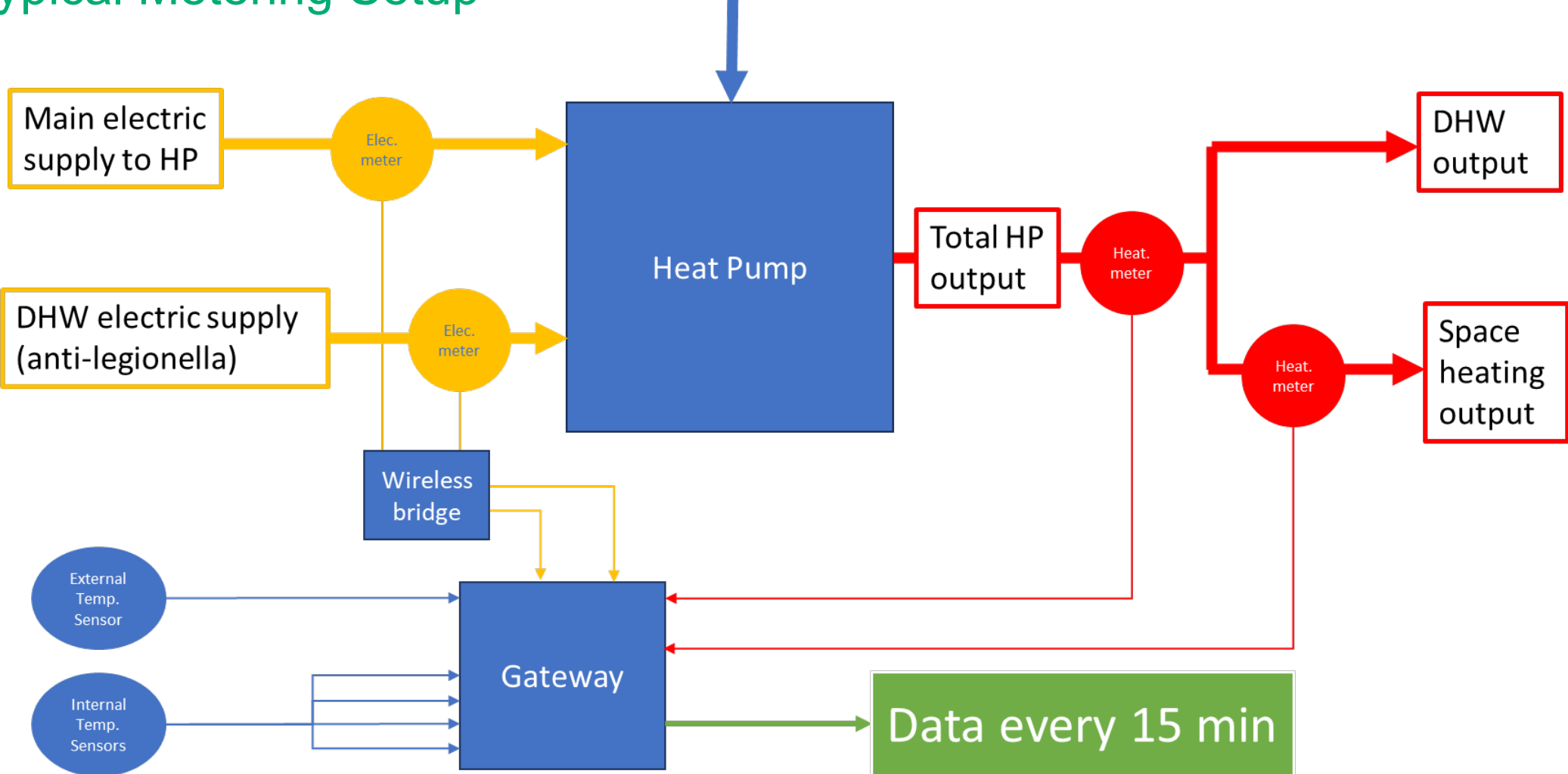
➤ Prerequisites

- $2.3 < \text{HLI} < 3.0$
- HP design meets heat losses with flow temperature of 43 degrees or lower.
- Maximum exposed wall U-value $0.60 \text{ W/m}^2\text{K}$.
- Maximum roof U-value $0.16 \text{ W/m}^2\text{K}$ or $0.40 \text{ W/m}^2\text{K}$ where not accessible.
- Maximum Window U value $3.1 \text{ W/m}^2\text{K}$.
- Infiltration of less than $5 \text{ m}^3/\text{h}/\text{m}^2$ at 50 Pa and ventilation in compliance with Part F of the building regulations.

➤ Grants

- Same as $\text{HLI} < 2.3$
- Plus up to €2,500 for metering equipment and up to €400 for pre-works airtightness test.

Typical Metering Setup



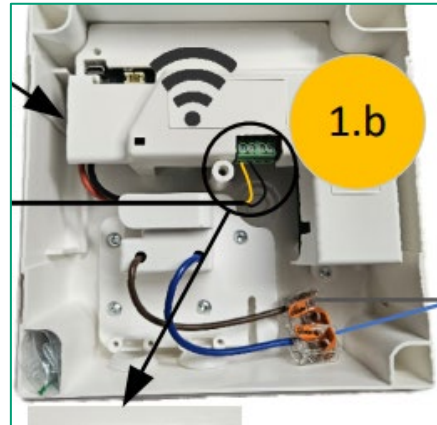
Metering equipment



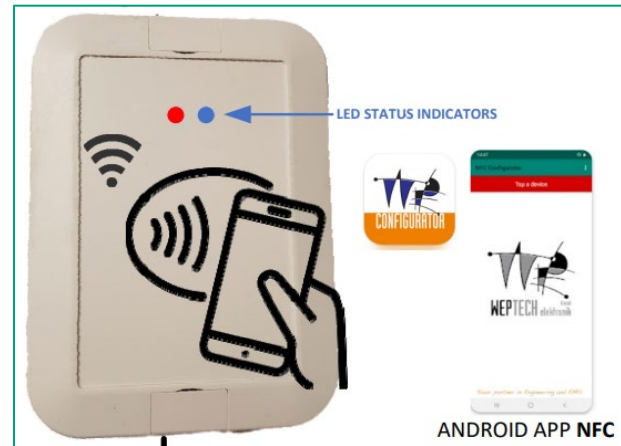
1. Electric meter



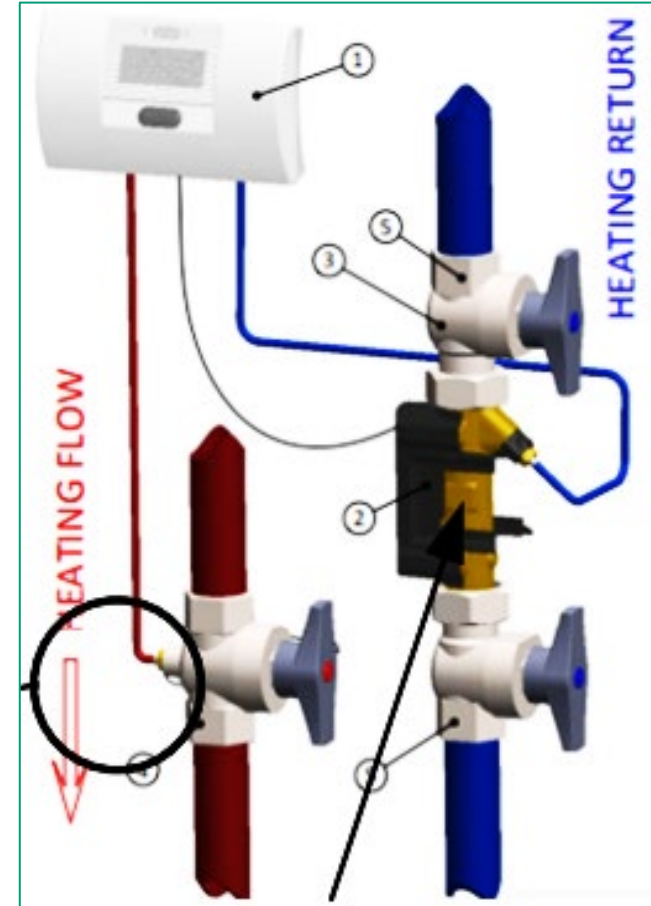
2. Temperature sensors



4. Wireless bridge

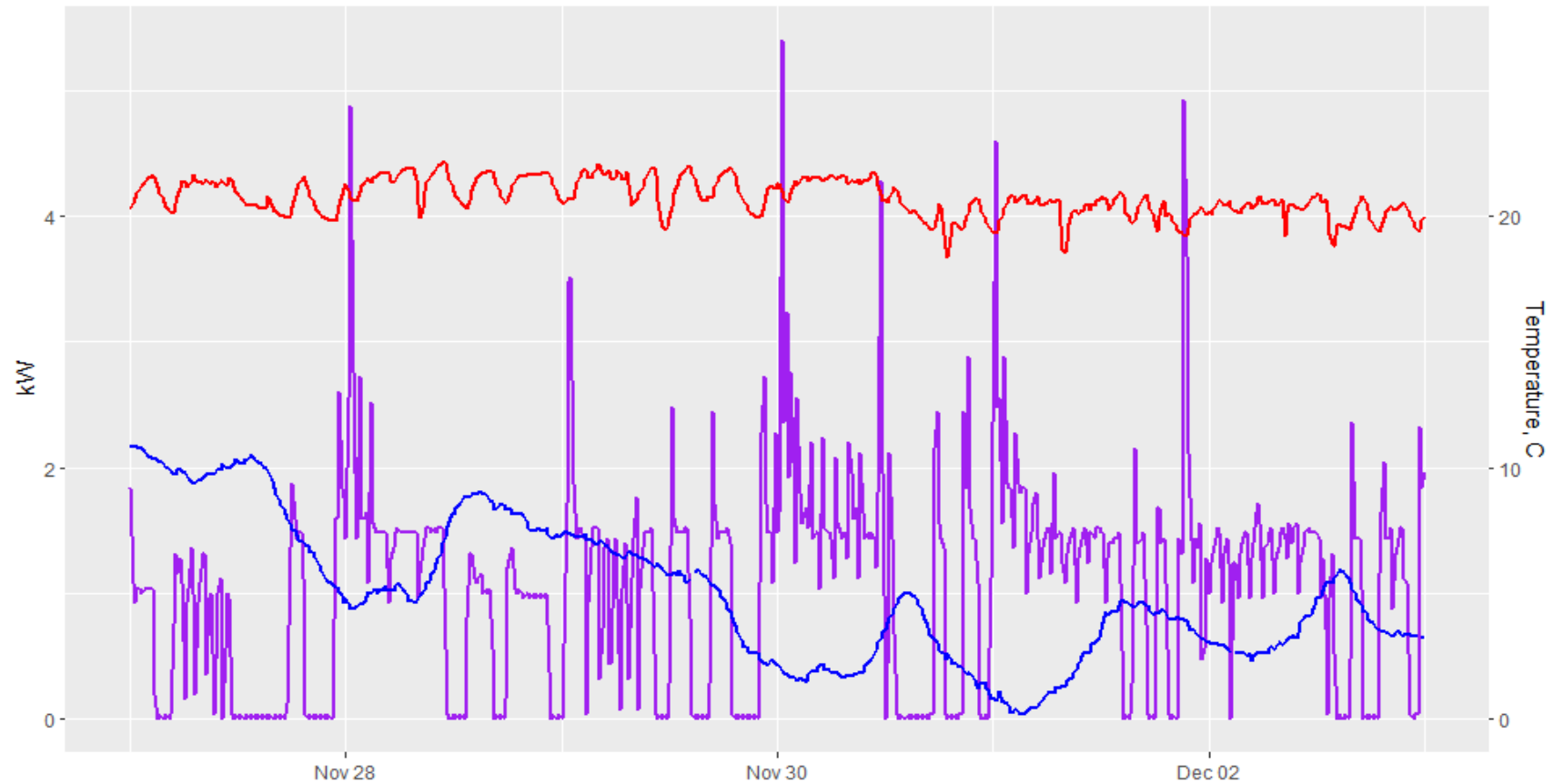


5. Gateway with App



3 Heat meter with sensors diagram

Example data



Heat Pump, kW Indoor Temperature Outdoor Temperature

Recruitment to date

	Total	Research Group HLI > 2.3	Control Group HLI < 2.3
Closed Projects	10	5	5
Meters installed	14	6	8
Total in pipeline	57	49	8

- Main focus on Research group (HLI > 2.3)
 - Dwellings with HP already installed
 - HP-ready dwellings
 - Dwellings about to be retrofitted (incl. a HP)

Strategy to accelerate recruitment and insights

1. Improvement of the process via One Stop Shop
2. Mailshot to heat pump-ready, high-HLI homes
3. Local authorities
4. In-unit monitoring data from heat pump-equipped, high-HLI homes
5. UK-based Electrification of Heat Study data

Time plan for expected results

- Autumn 2024: Preliminary data results (mostly warmer weather)
 - Start analysing data and elaborating data models
 - Assess the potential of the research
 - High-level forecasts of HP efficiency and energy consumption trends
- Summer 2025: Final results (full winter heating season)
 - Comprehensive analysis of the data
 - Results communication
 - Re-evaluation of existing regulations
 - Decision making

Questions?

Comments?

