Evaluating Energy Savings and Retrofit Strategies in Ireland's Warmer Homes Scheme

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Policy Context: Climate Action Plan & Energy Poverty Action Plan

- Climate Action Plan (CAP):
  - Retrofitting 35% of homes to an EPC of B2 or better.
  - Installing heat pumps in 20% of existing homes.

- Energy Poverty Action Plan (EPAP):
  - Energy poverty a barrier to health, wellbeing, and social inclusion.
  - Retrofitting a sustainable long-term solution to energy poverty.
  - Commits to a just transition by prioritising vulnerable households.

- Whole-of-Government Approach:
  - Coordinated delivery involving DCEE, SEAI, DSP, CRU, and others.
  - €8 billion committed to retrofit delivery by 2030.

The Warmer Homes Scheme

- Provides free energy upgrades to low-income households:
  - Attic and wall insulation, ventilation, heating system upgrades, etc.
  - Ongoing heat pump pilot.

- History & Scale:
  - Operational since 2000 with over 155,000 homes upgraded.
  - Record €230 million budget in 2024, plus €248 million ERDF funding (2022–2027).

- Recent Changes:
  - Prioritises homes built before 1993 with EPC E, F, and G ratings.
  - Deeper measures (e.g., external wall insulation, heating system upgrades).
  - Expanded eligibility to groups in receipt of various welfare supports.

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Purpose of the Assessment

Why Reassess the Warmer Homes Scheme Now?

- Recent structural changes to WHS warrant a fresh evaluation.
- High-quality 2024 data now available: matched pre- and post-retrofit EPCs.
- New methodology allows granular observation of energy performance changes.

Assessment Goals:

- Estimate modelled **energy and carbon savings**.
- Analyse trends in **measure uptake, EPC band transitions, and fuel-switching**.
- Identify **common retrofit strategies** using clustering analysis.
- Compare strategies in terms of:
  - Energy and carbon savings.
  - Cost of efficiency uplift (€ per kWh/m² saved).

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Data & Methodology

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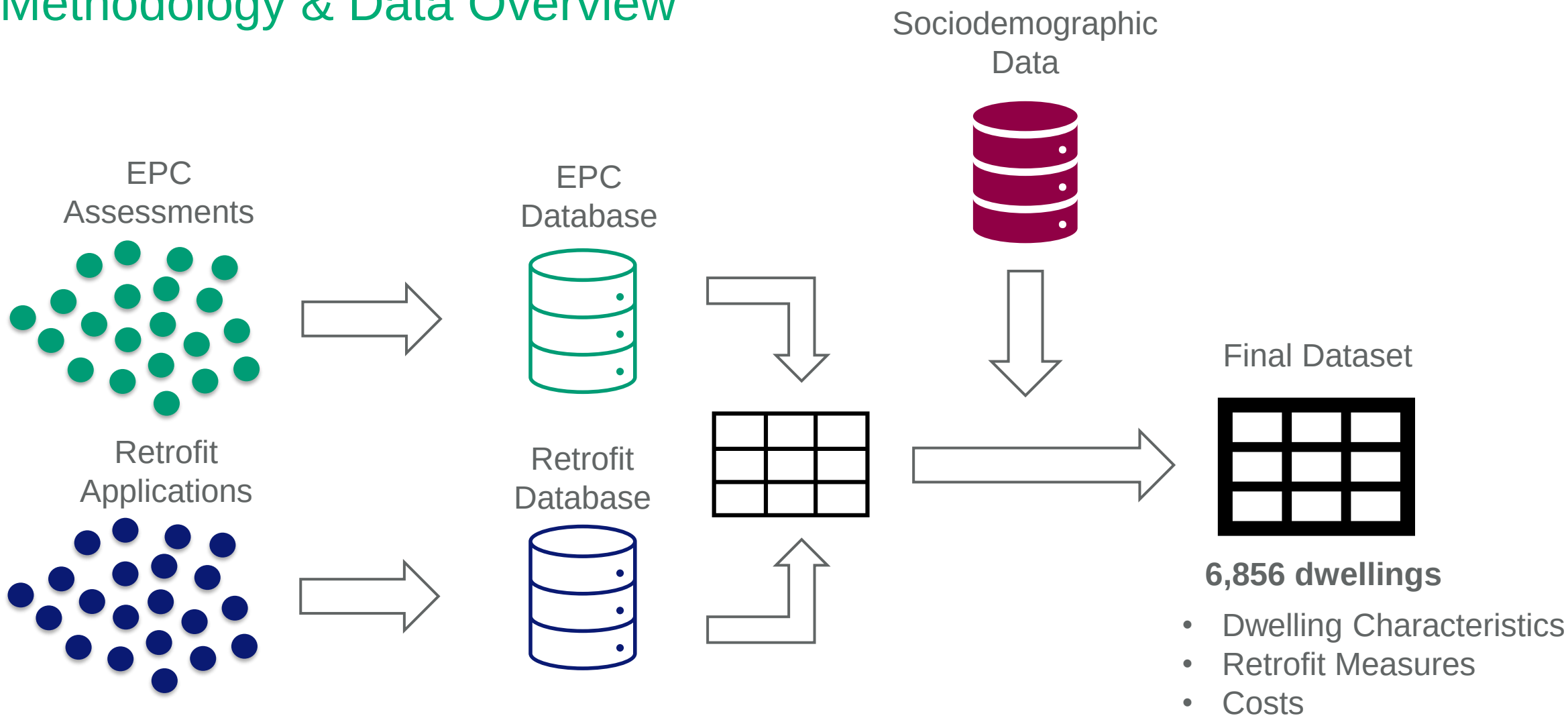
Methodology & Data Overview



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WHS 2024 Sample: Characteristics and Activity

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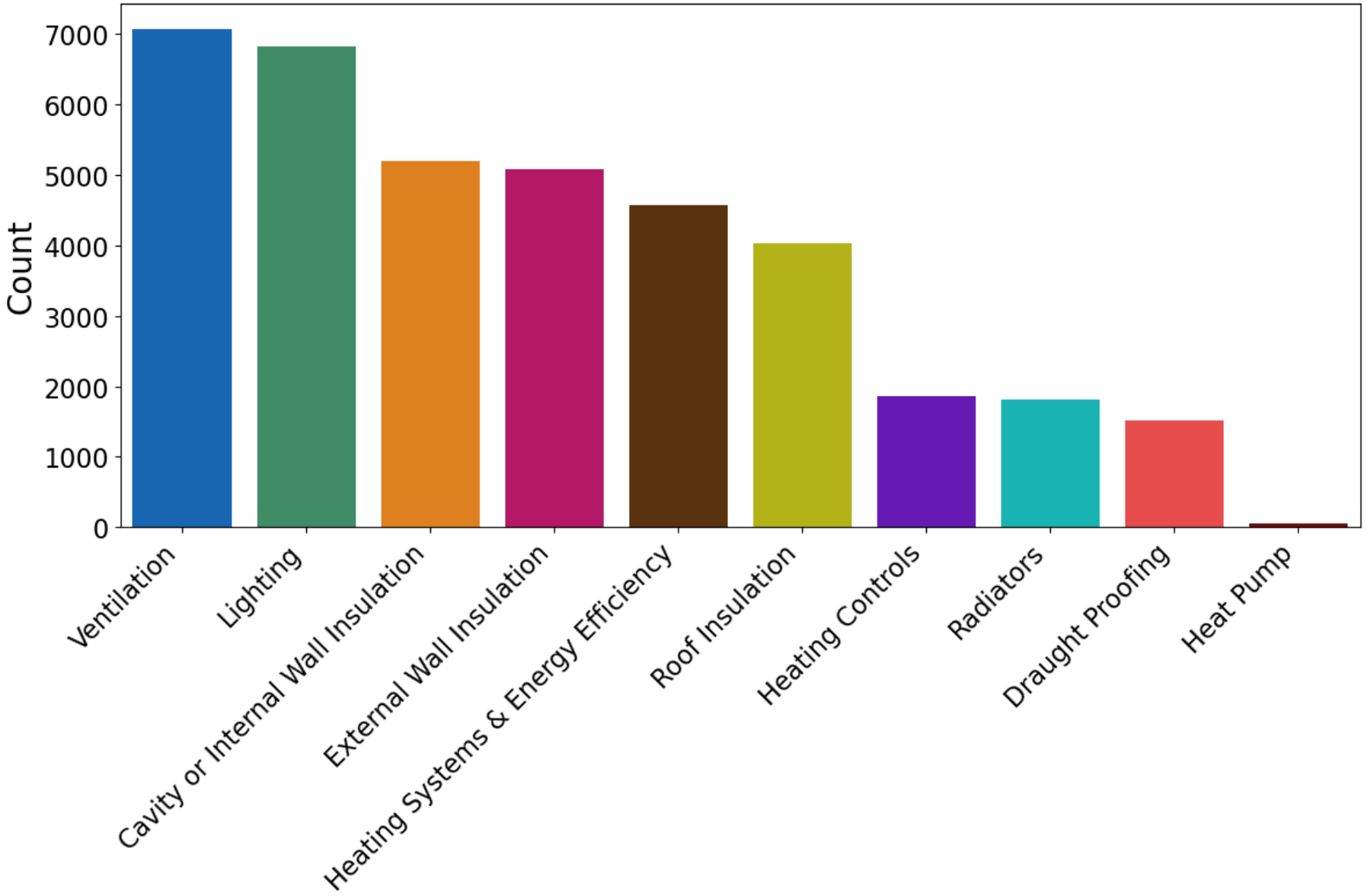
Installed Measures



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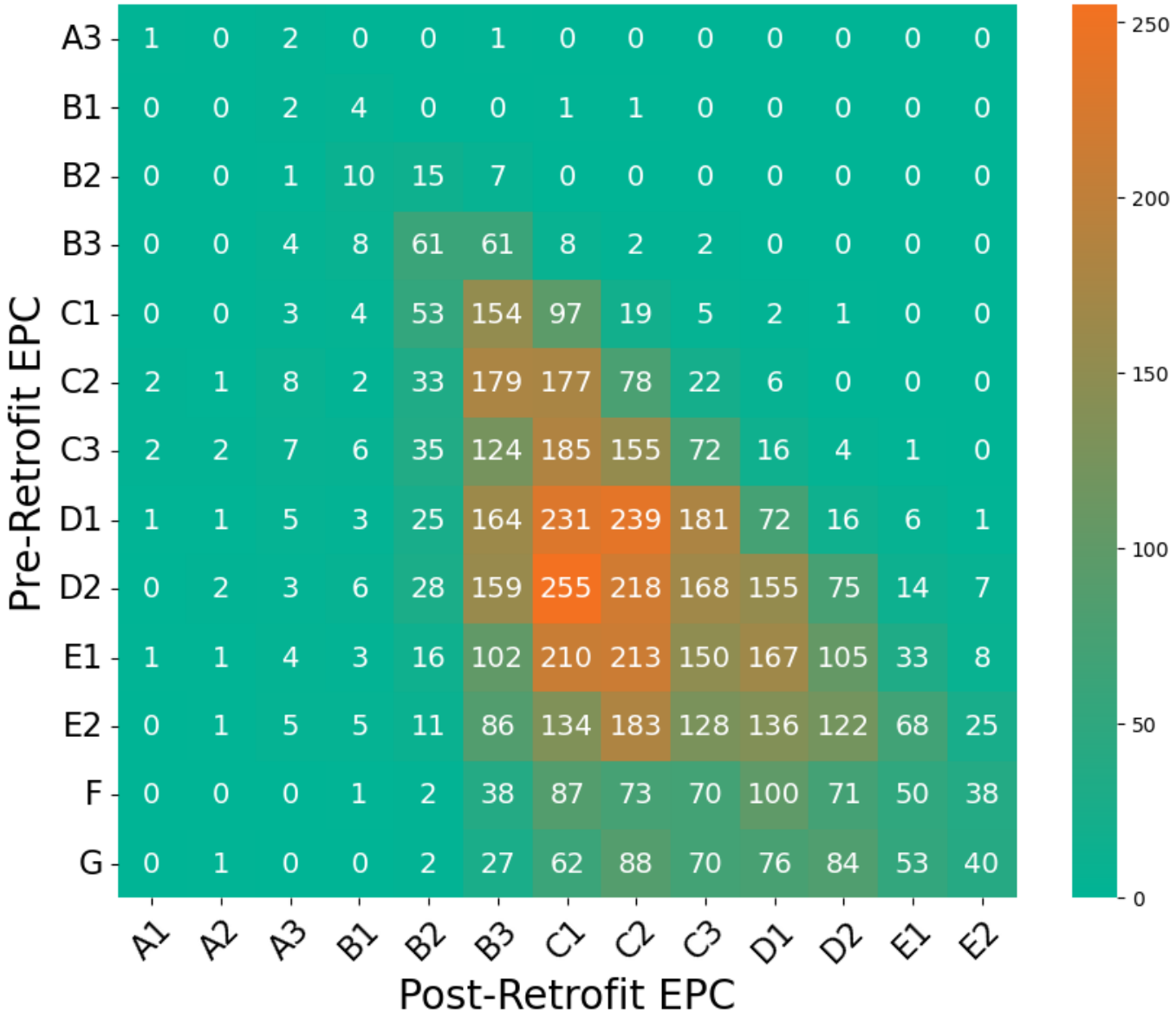
EPC Transitions



- Average EPC improvement: E1 → C3
- Pre-scheme updates: D2 → C3

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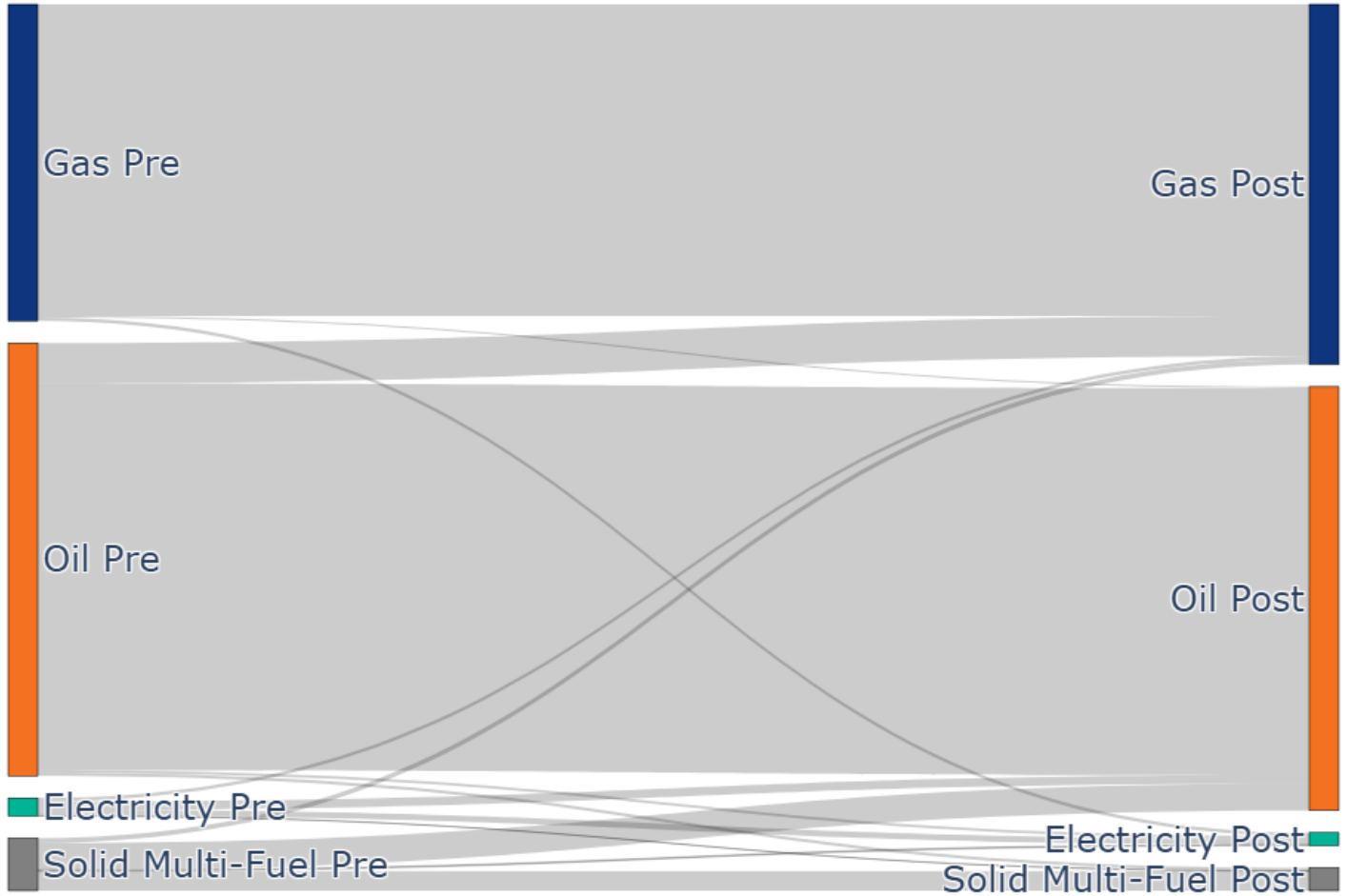
Fuel Switching



- 12% of homes switched fuel type.
- 99% of homes remained on fossil fuels post-retrofit.
- Heat pumps installed in 1.2% of upgrades.

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Results

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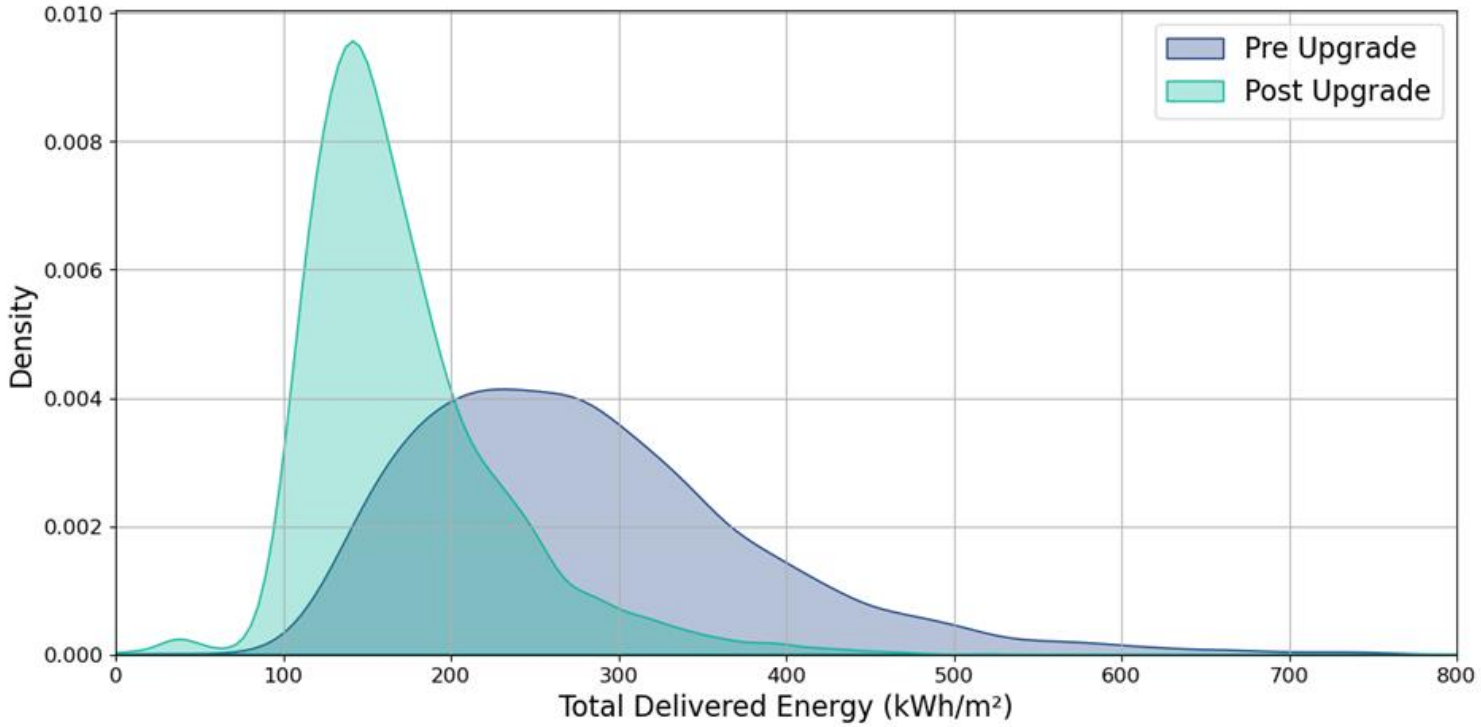
Technical Energy and Carbon Savings



- 9,293 kWh/year per home (threefold increase since 2018).
- 3.2 tonnes CO_2/year per home.

Rebound-Adjusted Savings

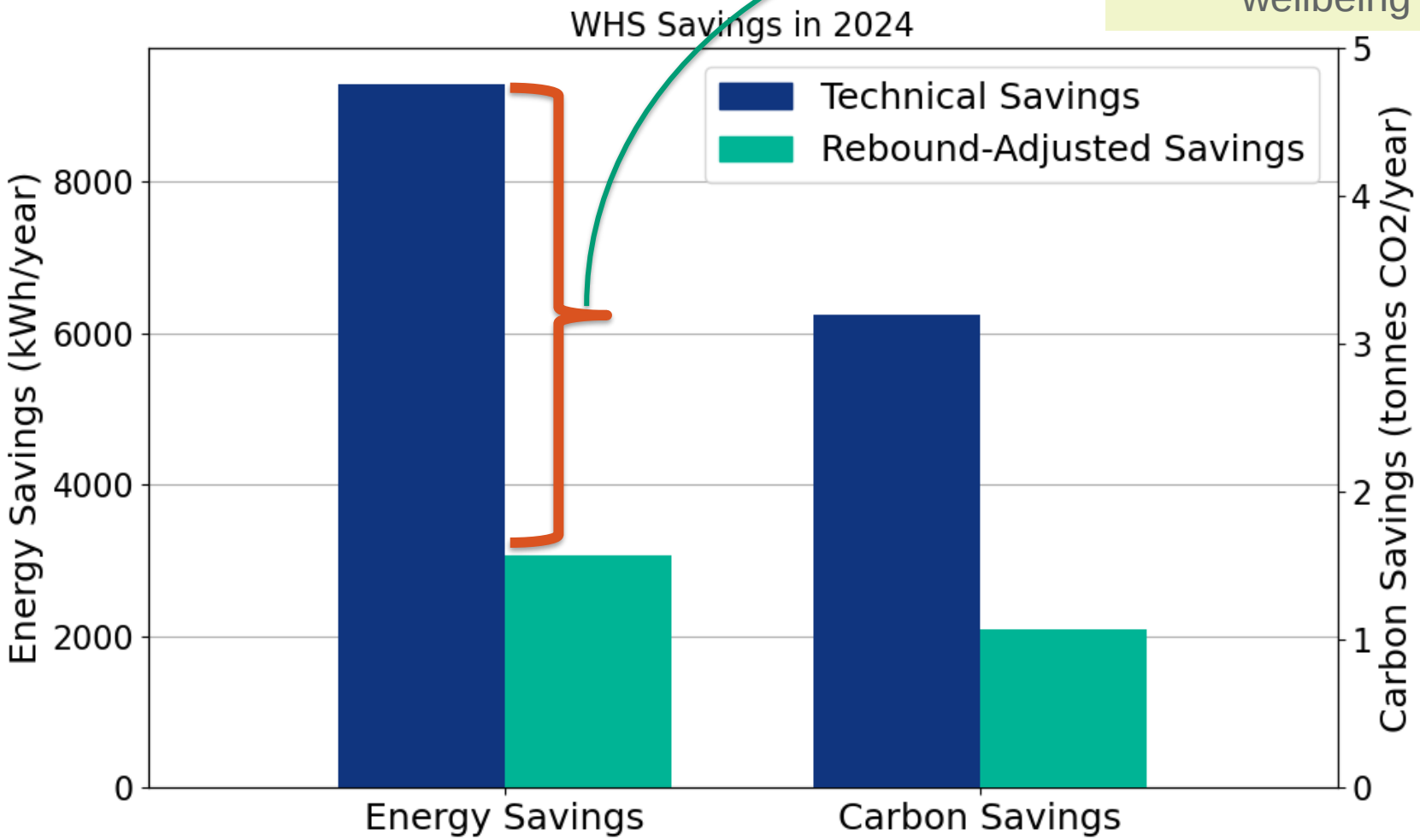
- Why adjust for rebound?
  - Households often respond to improved efficiency by increasing energy use for comfort.
  - Particularly relevant for energy-poor households.

- Evidence from Ireland:
  - **Coyne, Lyons & McCoy (2018)** found that ~33% of technical savings were realised.
  - The remainder was taken back as increased internal temperatures.

- Implication for WHS analysis:
  - A realisation factor of 0.33 is applied to techical savings to reflect realistic outcomes.

Rebound-Adjusted Savings

Unreaslised savings
≈
increased comfort and wellbeing



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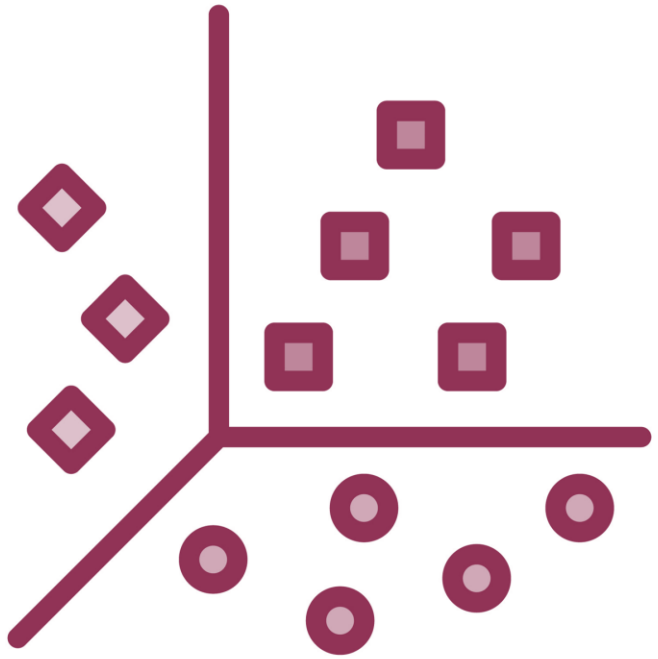
Retrofit Pathways: Clustering Analysis

- K-Means clustering applied to binary indicators of installed retrofit measures to identify common retrofit strategies.

- Two clusters identified:
  - **“Fabric-First” Retrofits**
    - Fabric upgrades (roof, cavity/internal wall insulation), lighting.
  - **“Comprehensive” Retrofits**
    - Extensive upgrades: heating systems, controls, external wall insulation.



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Retrofit Pathways: Clustering Analysis

Cluster	Key Features	No. of Dwellings in Cluster	Median Energy Savings (kWh/m^2/year)	Median Emissions Savings (kg/CO_2/m^2/year)	Median Cost (€)	Median Cost of Uplift (€/kWh/m^2/yr)
Fabric-First Retrofits	Roof, cavity/internal wall insulation,lighting	4946	23.0	8.4	18,751	814
Comprehensive Retrofits	Full heating system upgrades, controls, insulation	1910	51.2	16.2	41,737	816

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Policy & Research Insights

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Balancing Cost-Effectiveness with Strategic Goals

- Trade-off between depth of retrofit and scale of delivery:
  - “Fabric-First” retrofits attractive where budget constraints or logistical barriers exist.
  - Shallow retrofits incompatible with climate targets.
  - Cheaper retrofits may not deliver the greatest wellbeing gains.

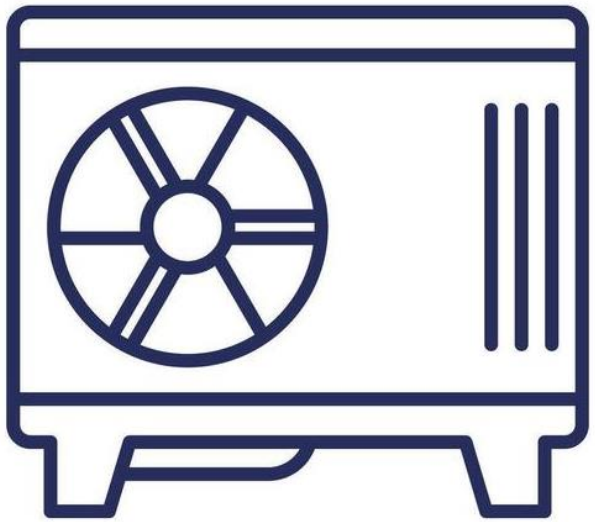
- Tiered approach:
  - Use fabric-focused where heat pumps are not currently feasible.
  - Apply “step-by-step” retrofits to prepare homes for future deep interventions.
    - Future-proofed for heat pump compatibility.
    - Avoid locking in fossil fuel systems or limiting future upgrade potential.
  - Dedicate a defined share of resources to deep retrofits that achieve B2 and enable heat pump installation.

Enabling Heat Pump Uptake

- Persistence of fossil fuels:
  - 46% of WHS homes received heating system efficiency upgrades,
  - Revised EPBD: financial incentives for fossil fuel boilers are prohibited from January 1, 2025.
  - Rapid transition from piloting heat pumps to scaled delivery needed.

- Barriers to uptake remain:
  - Poor fabric performance (high HLI).
  - Electrical incompatibility and lack of funding for associated enabling works.
  - Behavioural concerns (cost, complexity, unfamiliarity).

- Policy options:
  - Expand WHS grant provisions to include enabling works.
  - Enhance homeowner engagement using comfort-focused messaging and peer testimonials.



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Dwelling-Level Reporting as an Evaluation Tool

- Linking programme and EPC data at the dwelling level:
  - Enabled direct observation of energy performance changes.
  - Delivered granular insights into:
    - Energy and carbon savings.
    - Measure uptake and fuel switching.
    - Retrofit strategy effectiveness.
    - Value for money.

- Next steps for evaluation:
  - Use dwelling-level reporting to support ongoing, adaptive policy design.
  - Incorporate metered energy data to validate modelled outcomes.
  - Develop metrics to capture occupant wellbeing (comfort, health, satisfaction).

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Thank you

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