Mechanical Ventilation with Heat Recovery (MVHR)

MVHR is a continuous mechanical ventilation system that simultaneously extracts stale indoor air and supplies fresh outdoor air while recovering heat from the extracted air to pre-warm incoming air. This process ensures energy-efficient ventilation with minimal heat loss.

Key Components

1. **Heat exchanger**: Transfers ~90–95% of heat from outgoing air to incoming air.
2. **Dual fans**: One fan extracts stale air; another supplies fresh air.
3. **Duct network**: Distributes air between rooms and the central MVHR unit.
4. **Filters**: Remove pollutants (e.g., pollen, dust) from incoming air.

How It Works

- **Extraction**: Stale, humid air is removed from **wet rooms** (e.g., kitchens, bathrooms).
- **Supply**: Fresh air is delivered to **dry rooms** (e.g., living rooms, bedrooms).
- **Heat recovery**: The outgoing air stream warms the incoming air via the heat exchanger, reducing heating demand.
- **Energy savings**: Typical UK retrofits report **20–30% reductions in space heating costs**.

Practical Applications in UK Housing

Example 1: New Builds

- **Compliance**: MVHR is increasingly specified in **Passivhaus-certified homes** to meet Part L (Conservation of Fuel and Power) Building Regulations.
- **Case study**: A 2024 London development used MVHR to achieve an **Air Tightness of <1.5 $m^3/(h \cdot m^2)$** while maintaining air quality.

Example 2: Retrofit Projects

- **Challenge**: Older UK homes often lack airtightness, making MVHR installation complex.
- **Solution**: Post-retrofit, a Victorian terrace in Manchester reduced its **annual CO_2 emissions by 1.2 tonnes** after pairing MVHR with insulation upgrades.

Advantages for UK Homes

- **Regulatory alignment**: Supports compliance with **Part F (Ventilation)** and **Future Homes Standard 2025**.
- **Health benefits**: Mitigates condensation and mould risks in airtight properties.
- **Cost efficiency**: Payback periods of **5–8 years** in energy bills are common.

Key Considerations

- **Installation**: Requires professional design to balance airflow rates (typically **0.3–0.5 air changes per hour**).
- **Maintenance**: Filters need replacing every **6–12 months** (cost: £30–£60).

- **Limitations**: Less effective in poorly insulated homes; optimal performance requires airtightness **<5 $m^3/(h \cdot m^2)$**.