# Why Can’t MVHR Be Used for Cooling?

**Mechanical Ventilation with Heat Recovery (MVHR) systems are designed primarily for heat exchange, not cooling. They transfer heat from outgoing stale air to incoming fresh air, improving energy efficiency. However, MVHR cannot actively cool indoor spaces because it lacks a refrigeration cycle and cannot lower supply air below the cooler of the two airstreams. In summer, when outdoor air is warmer, MVHR may even slightly increase indoor temperatures by transferring heat from the hotter outdoor air to the cooler indoor air. Additionally, ventilation airflow rates are too low to meet typical cooling demands, and MVHR systems do not address latent (humidity) loads, making them unsuitable for effective cooling.**

## Understanding MVHR’s Core Functionality

MVHR systems are engineered to enhance energy efficiency by recovering heat from exhaust air and transferring it to incoming fresh air. This process reduces the need for additional heating during colder months, making it an excellent solution for maintaining indoor comfort while minimising energy consumption. However, this heat exchange mechanism is inherently passive and does not involve any active cooling components.

## The Limitations of MVHR for Cooling

1. **Passive Heat Exchange Mechanism**
   MVHR systems rely on a heat exchanger, which transfers sensible heat from one airstream to another. Unlike heat pumps or air conditioning units, MVHR does not have the capability to generate cooling. It can only move heat from the warmer airstream to the cooler one, meaning it cannot produce temperatures lower than the coolest of the two airflows.
2. **Inadequate Cooling Capacity**
   The ventilation airflow rates mandated for MVHR systems are typically insufficient to meet the cooling demands of a building. For example, a standard residential MVHR system might provide 150 $m^3/h$ of airflow, which translates to a cooling capacity of around 0.25 kW when the outdoor air is 5°C cooler than indoors. However, peak summer cooling loads for a small house can range from 2–4 kW, making MVHR-delivered cooling ineffective.
3. **Summer Heat Flow Direction**
   During warmer months, outdoor air is often hotter than indoor air. In such cases, a conventional MVHR system will transfer some of the indoor “coolth” to the incoming hot air, raising the supply air temperature closer to the indoor temperature. While this reduces the peak incoming air temperature rise, it still results in a net heat gain indoors.
4. **Lack of Latent Load Removal**
   True comfort cooling often requires the removal of moisture from the air. Standard MVHR systems do not have active condensation surfaces or cold coils, meaning they cannot reduce absolute humidity. Even systems with enthalpy exchangers may retain humidity rather than remove it, depending on the core type.
5. **Risk of Condensation and Hygiene Issues**
   Attempting to force cooling by pre-chilling the exhaust air could lead to condensation inside the heat exchanger. This poses risks of microbial growth, efficiency loss, and hygiene issues, as MVHR cores are not designed with drainage paths for condensation.
6. **Comfort Constraints**
   Boosting airflow to achieve meaningful cooling increases fan energy, causes drafts, and raises

noise levels. These factors make MVHR a poor cooling distribution system compared to dedicated air conditioning or hydronic cooling solutions.

## When Can MVHR Assist in Cooling?

While MVHR cannot actively cool, it can support broader passive cooling strategies:

- **Summer Bypass Mode:** This mode allows hot outdoor air to bypass the heat exchanger, preventing additional heat transfer from exhaust air.
- **Night Purge:** Running the system (or supplementary purge fans) during cooler nights can help flush out accumulated heat from thermal mass.
- **Ground Preconditioning:** Integrating earth tubes or brine loops can pre-cool supply air before it reaches the MVHR, leveraging subsoil temperatures.
- **Synergy with Passive Measures:** Combining MVHR with shading, insulation, and thermal mass can enhance its tempering effect.

## Practical Advice for Effective Cooling

If active cooling is required, consider the following alternatives:

1. **High-Efficiency Heat Pumps:** Ducted or mini-split heat pumps offer superior cooling performance and efficiency.
2. **Optimise Passive Strategies:** Focus on external shading, low-g glazing, air-tightness, and strategic night cooling.
3. **Integrated Systems:** Explore “ventilation heat pump” products that combine MVHR with active cooling capabilities, but ensure they meet seasonal efficiency and humidity control requirements.

## Common Misconceptions About MVHR Cooling

- **Misconception:** “MVHR can reverse and act like air conditioning.”
  **Reality:** MVHR lacks a refrigeration cycle and cannot generate cold air.
- **Misconception:** “High heat-recovery efficiency means it will harvest coolth in summer.”
  **Reality:** MVHR reduces peak incoming air temperature rise but still results in net heat gain indoors.
- **Misconception:** “Adding more ducts increases cooling capacity.”
  **Reality:** Cooling capacity is limited by outdoor air conditions and humidity, making air volume scaling inefficient.

**Understanding MVHR’s limitations ensures you choose the right solutions for effective cooling and indoor comfort.**