

Fire-Safe Build



Read Inside:

- ✓ Need Of Fire Safety
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- ✓ Ventilation Controls

With the growing number of green homes being built today (rooftop solar panels, battery storage, natural insulation, efficient ventilation), it is essential that the development of green technology and sustainable building practices also addresses the fire safety concerns related to the installation and use of these systems.

Research has shown that green homes are not statistically at risk of fire; however, due to increased energy efficiency, many systems need to be installed and maintained correctly and regularly in order to provide for continued safety from fire.

Need of Eco-Friendly

HOUSEHOLDS AND FIRE SAFETY

The push towards a greener approach to living has been growing a lot faster than most people may think:

- By the end of 2023, the world had surpassed approximately 1.6TW (terawatts) of installed solar energy capacity.
- As eco-conscious households look to protect themselves from energy price fluctuations and become less reliant on external power supplies, home battery systems are becoming increasingly popular.
- The use of natural insulation materials such as cellulose, wool, and hemp is rapidly taking over from synthetic products.
- Ventilation systems are moving away from simple "open" designs and into sophisticated "closed" approaches.



The data doesn't support any real growth in fire incidents associated with "green" technologies.

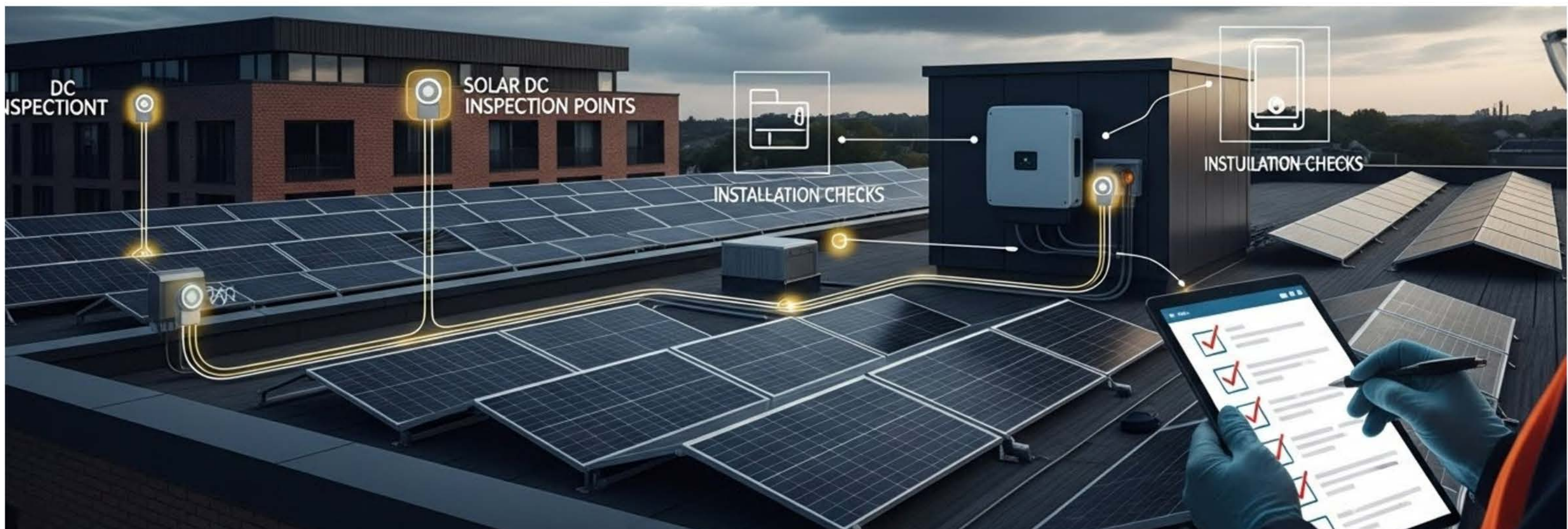
For instance:

- Based on the NFPA's (National Fire Protection Association's) report of over 10,000 building fires tracked in 2022 and 2023, only 152 fires (i.e., less than 2%) were recorded as originating from solar panel systems.
- The majority of the fire incidents involving solar panel systems were related to improper installation practices, wiring that didn't meet safe minimum wiring standards, poor installation practices (wiring), bad or inadequate maintenance of the different components of solar panel systems, and/or any other issues related to solar panel systems.

SOLAR SAFETY

Building Fire Statistics/Findings

- "Solar-related fire incidents only account for below 2% of fires reported in buildings."
- According to insurers in the UK and EU insurance providers, most of the solar fire investigations that were carried out have shown that there were:
 - Loose/incompatible DC connectors
 - Faulty inverter installation
 - Damaged cable insulation
 - Missing commissioning documentation



The Causes of Common Solar Fire Hazards include

- Overheating on DC isolators or junction boxes
- Water ingress through rooftop's wiring boxes
- Damage to outside cables caused by mice/rats
- The use of mismatched connectors from different manufacturers



Ways to Reduce Your Chance of Solar Fire Hazards

Use licensed (certified) & experienced solar installers.

Always make sure that you receive all documentation regarding the installation of solar panel systems before committing to them; ask for complete compliance documentation (for example, commissioning reports produced to comply with the IEC 62446 standard) for all solar panel systems.

Ensure that all installed DC connectors are torque-tensioned in accordance with manufacturer's instructions.

Install arc-fault detection devices where required.

Have an annual/predictive maintenance check for example usage of thermal imaging on your photovoltaic system.

BATTERY PROTECTION

It is imperative that lithium-ion home battery systems are installed and managed properly to ensure that there is minimal risk of fire when using a lithium-ion home battery system for backup power.

Safety Standards Are Important

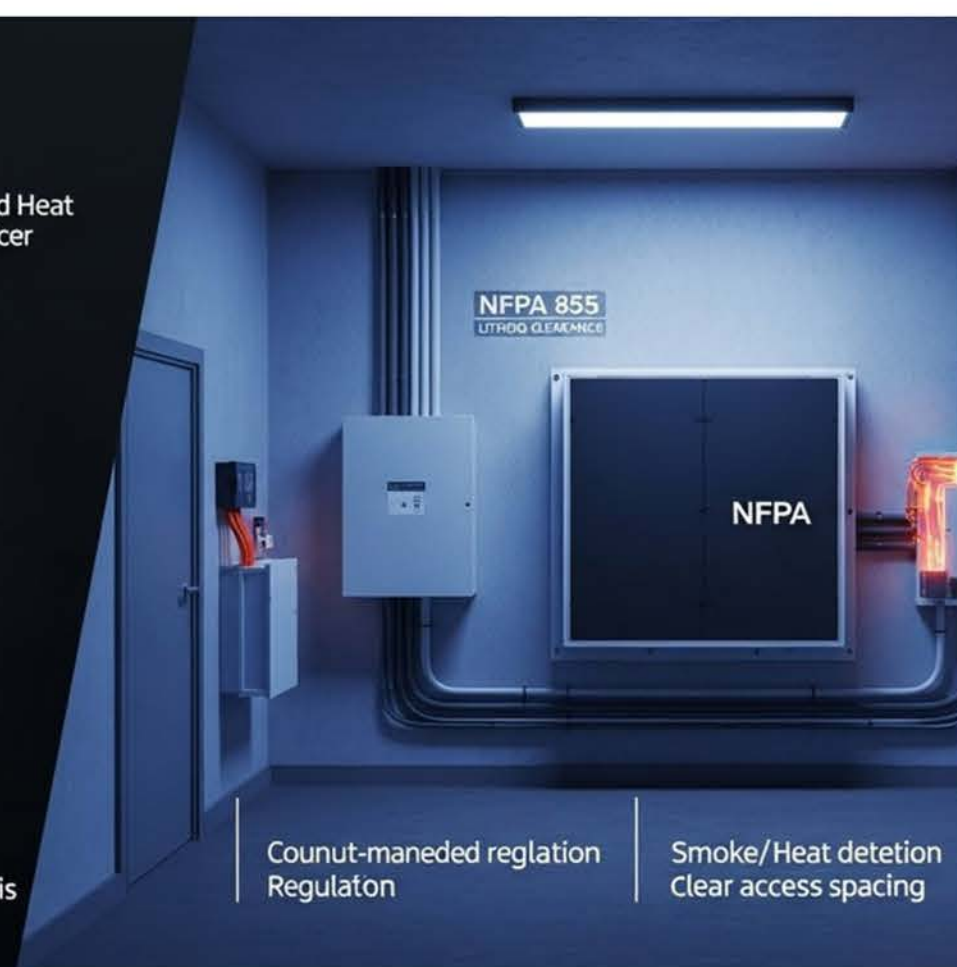
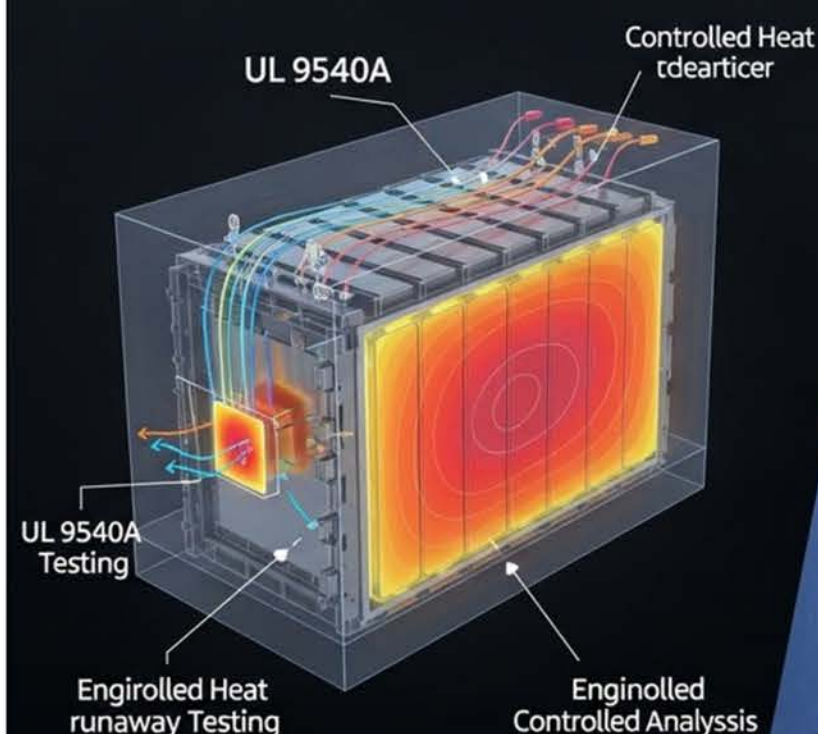
When cells are:

- (1) Overcharged
- (2) Subjected to high-temperature conditions
- (3) Have a damaged internal structure
- (4) Installed in a location where they are inappropriate, the likelihood of a thermal runaway will increase.

To mitigate these risks and develop standards that ensure safe operation of residential battery systems the following were developed:

- (1) **UL 9540A** - establishing how Thermal Runaway occurs,
- (2) **NFPA 855** - establishing how to install residential battery systems safely.

Thermal Runaway Testing



Global Incident Learning

The batteries that caught fire between 2018-2022 have led to improved requirements for

- (1) Ventilation
- (2) Space between system components
- (3) Compartmentisation (Fire separation between components)
- (4) Fire suppression (What is required for fire suppression systems to be designed).

Best Practices

Use only UL 9540A tested products in the installation of all solar panel systems.

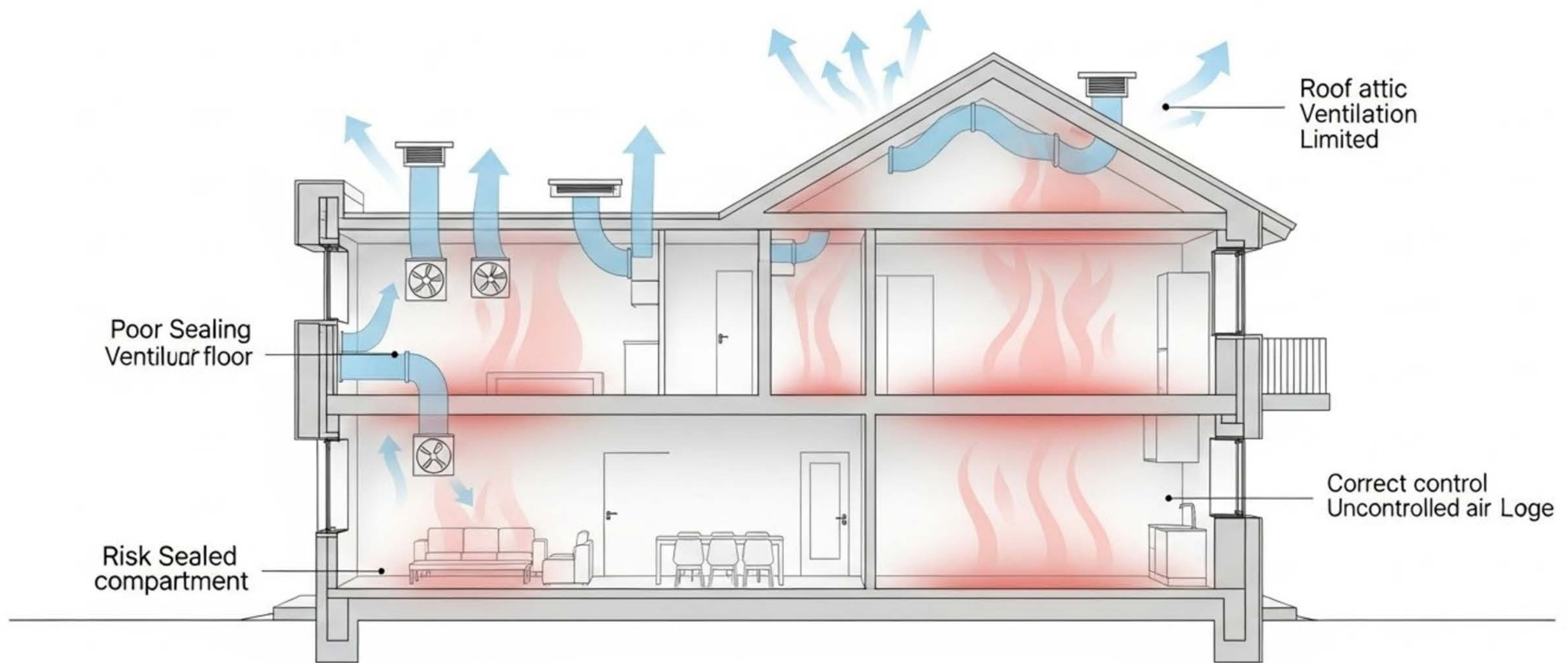
Batteries should NOT be installed in sealed or poorly ventilated areas.

The safest place to install solar panel systems is in a garage, utility room, or an area that is considered "outdoors".

Enable and test the Battery Management System (BMS) alerts.

Maintain all manufacturer recommended clearances around the system.

VENTILATION CONTROLS



Modern homes built to be energy-efficient utilize controlled ventilation; unfortunately, if designed poorly or sealed improperly, this forms additional avenues for fire to spread.

Key Considerations

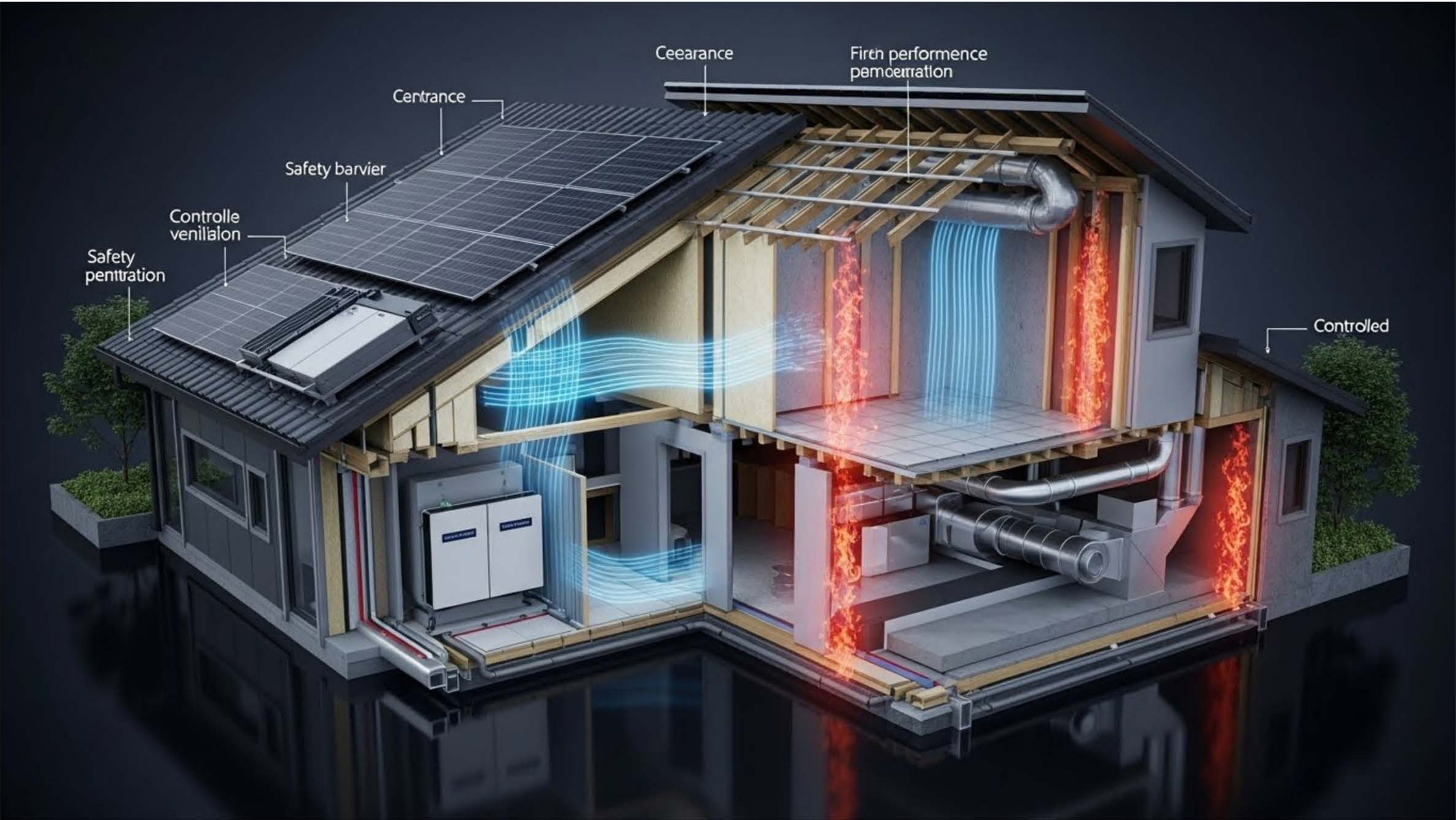
- It should be noted that there are additional considerations when considering Airflow.
- Too much airflow can increase Fire Spread in certain cavities within the building.
- The Stack Effect moves smoke and heat between different levels of floors within a building.
- The placement of attic vents near Solar Wiring can affect the Direction of Fire Movement.
- Unsealed spaces in the ceiling can allow Smoke to move rapidly through those areas.

Recommendations for Fire-Safe Ventilation

- Rooms and Levels should have Compartmentation (separating the roof and wall space).
- All areas of the attic should have a complete seal with the exception of the locations where Vents are designed to vent.
- Never place any vent directly beneath Solar Cable Runs.
- Maintain building HVAC ducts in order for those systems to operate effectively and reduce.
- Ensure that all exhaust fan locations and locations of passive vent systems are associated with proper ventilation of the HVAC ducts and other air movement devices.

Safe, Sustainable and Future-Proof Homes

The development of sustainable homes has changed forever the way we live our lives. Sustainable homes offer lower energy costs, increased environmental responsibility and greater comfort for future residents.



The data supports this statement, as follows:

When designed correctly, maintained regularly and installed using proper venting and insulation methods, green technology is safe.

With an appropriate level of foresight, infrastructure, and authority throughout the entire process, it is possible to successfully achieve both sustainability and exceptional fire protection with today's modern home.



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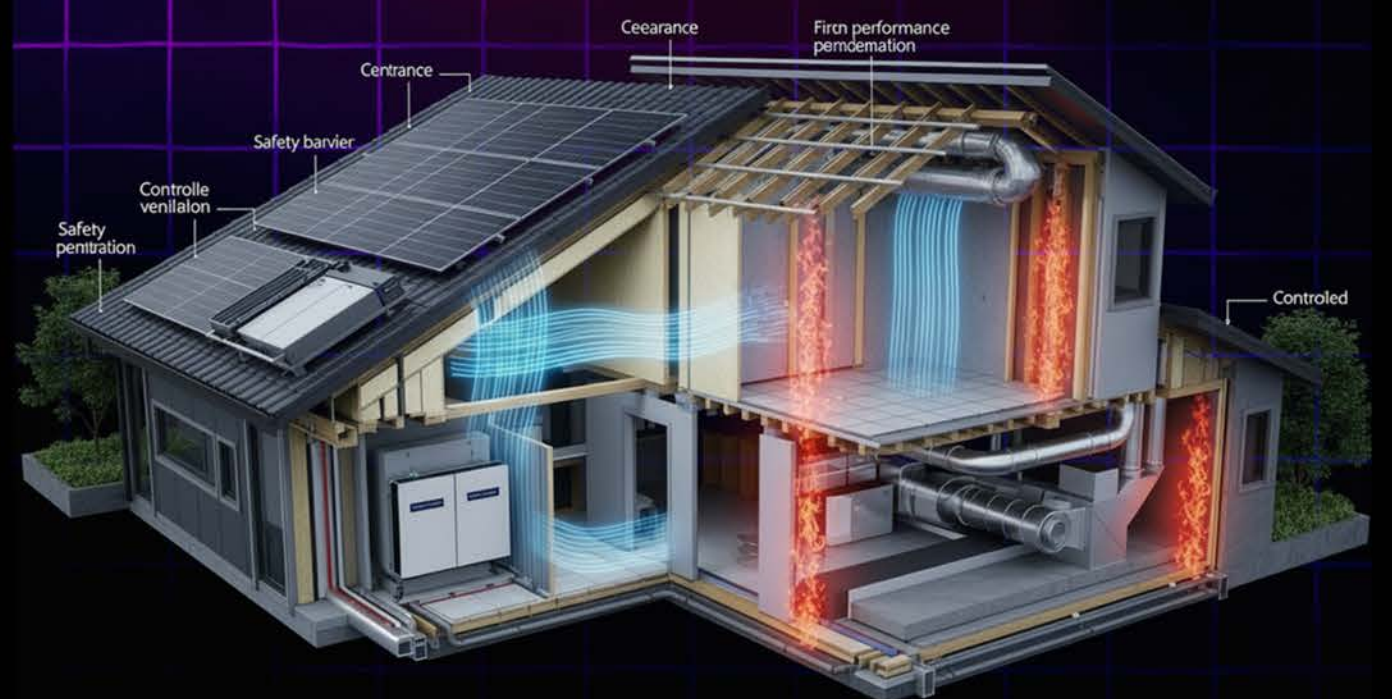
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