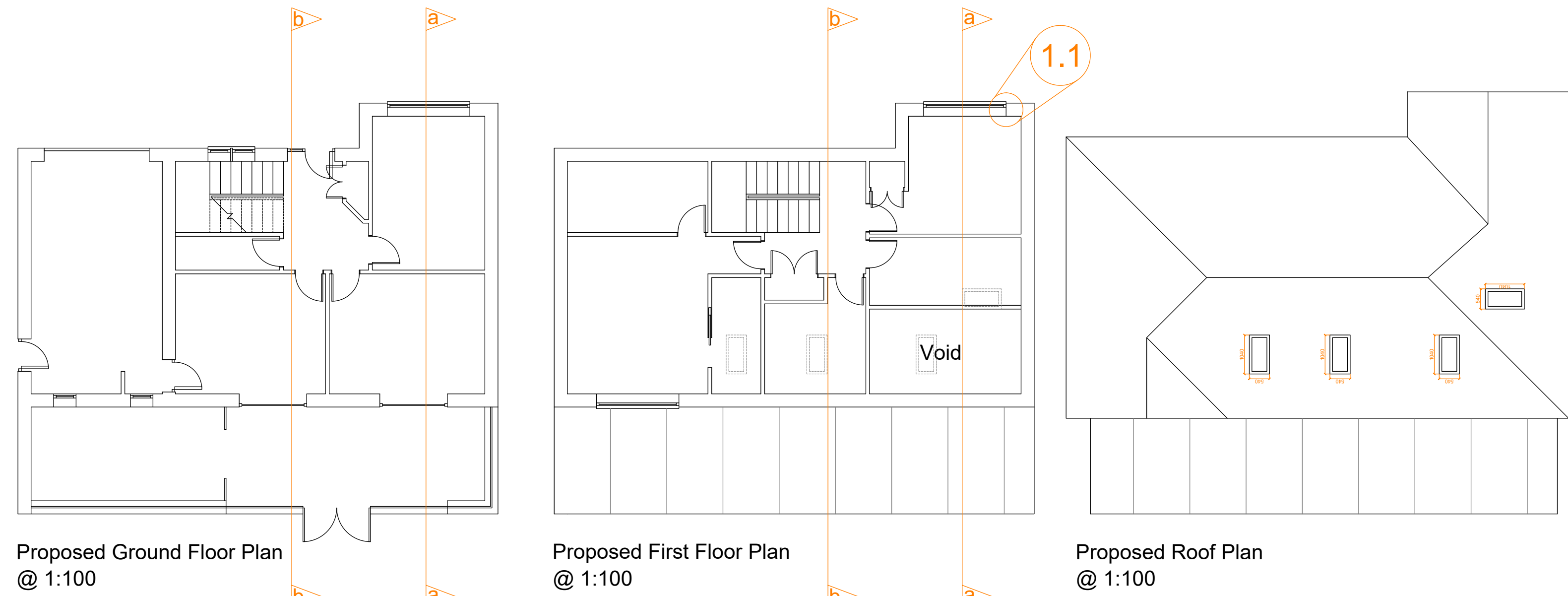
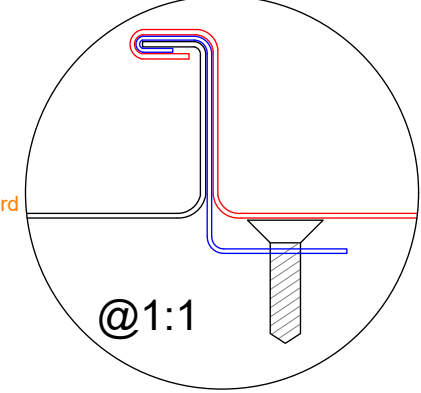
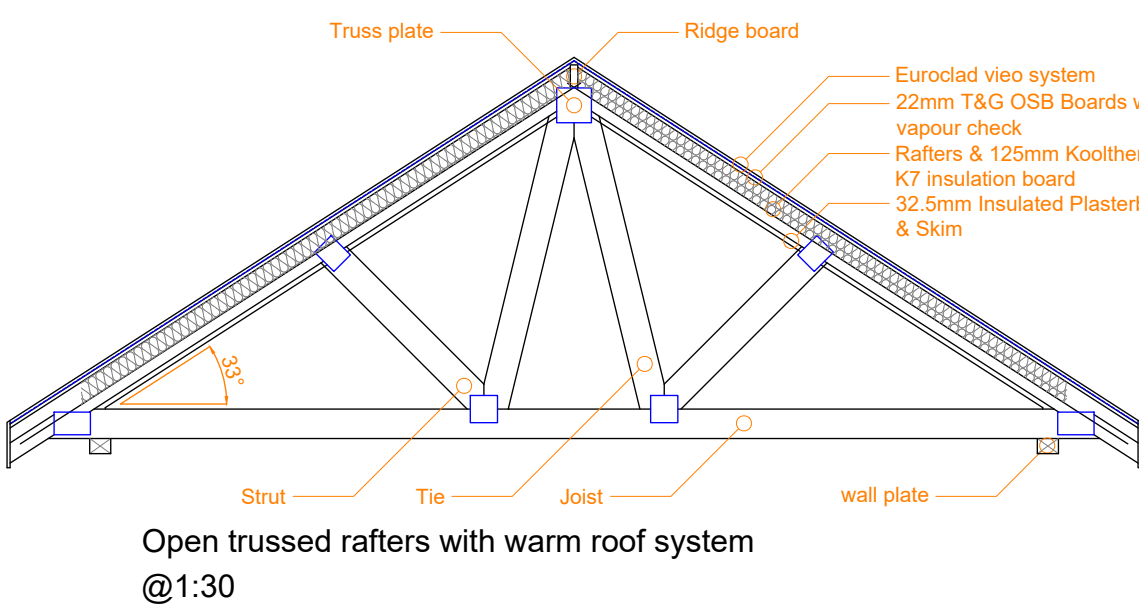




Proposed Ground Floor Plan
@ 1:100

Proposed First Floor Plan
@ 1:100

Proposed Roof Plan
@ 1:100



Euroclad Veho
Detail

Euroclad veo system should be fitted to all manufacturers details & guidelines. Joins between sheets to be as above, this should be formed using Euroclad tools. All fittings & fixings to be euroclad veo system and fitted to manufacturer specifications. Euroclad (2021)

U Values (W/m ² ·K)		
	Building Regulations Min	Estimated Value
Walls	0.3	0.15
Roof	0.2	0.18
Floor Slab	0.25	0.18
Windows	2.0	1.3

Steel Profile Roof

The roof system detailed here shows in an open trussed system with PIR insulation between the rafters and capped with a formed steel profile sheet.

Advantages.

- Lightweight system makes installation easier.
- Lightweight system puts less strain on timber frame structure.
- Steel can be coated in any colour.
- Steel is easily recyclable at the end of the buildings life.
- If properly maintained it can last much longer than a traditional tile roof. Upper estimates are of a 70 year lifespan.
- Can be made from a percentage of recycled steel.
- Creates a more efficient seal than traditional roofing.

Disadvantages.

- More expensive than a traditional roof covering.
- Will require specialist fitters.
- Steel has poor acoustic properties.
- Repair will take knowledge of the system and a manufacturer qualified contractor.
- Steel is a good conductor of heat, making it more difficult to maintain a constant habitable temperature.
- Steel contains a large amount of embodied energy. Shawn Hendrick (2015).

Roofing alternative - Composite Tile Roof

A more traditional alternative to a steel roof would be to have composite slate tiles, they however come with their own pro's and cons.

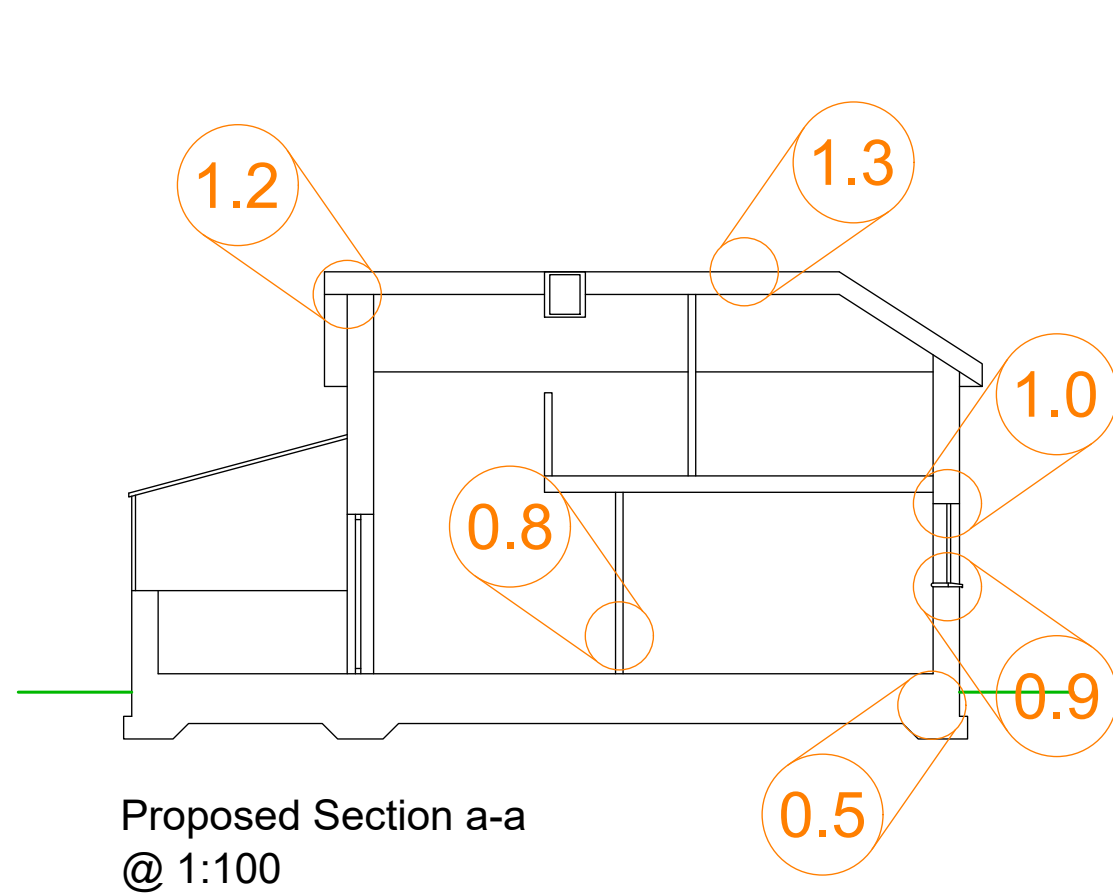
Advantages.

- A cheaper alternative.
- Have the traditional look of Welsh housing.
- Can be made from recycled materials.
- Easy to repair and source replacement tiles.
- Installers are widely available.
- Tiles are durable , long lasting and hardwearing.
- Light when compared to slate tiles.

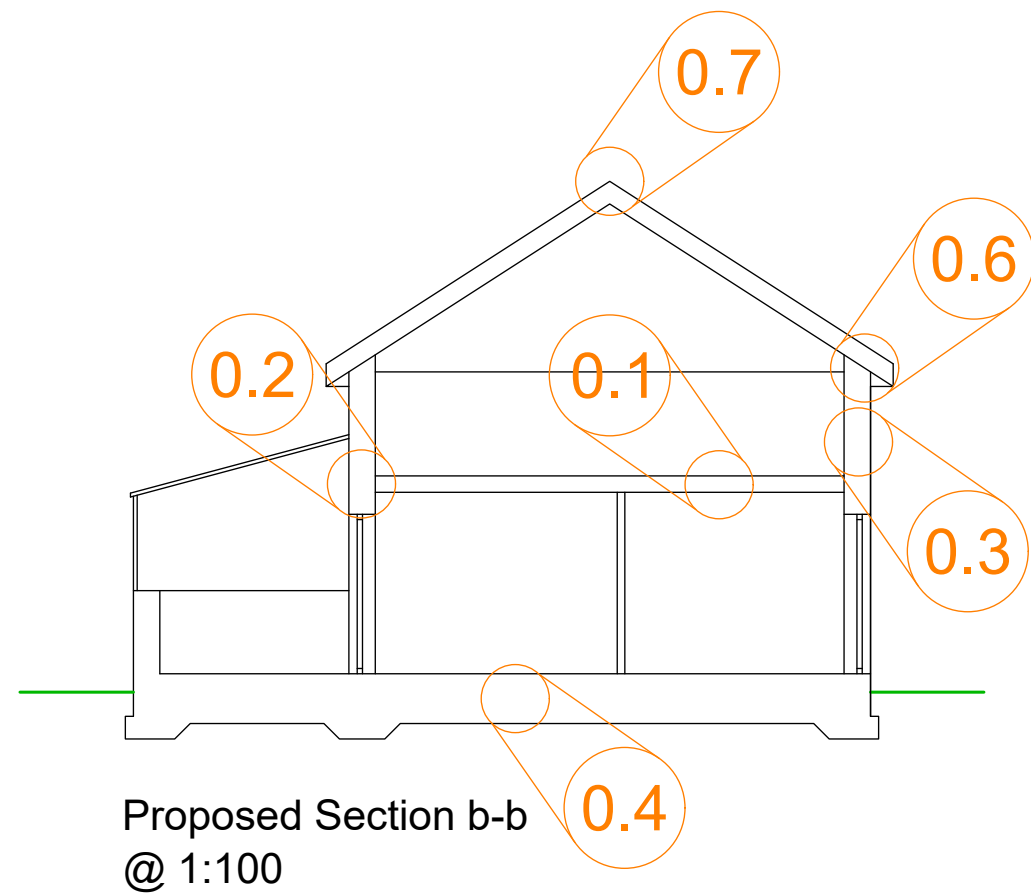
Disadvantages.

- Synthetic tiles are not widely recyclable.
- Limited in colour and aesthetics.
- Timber frame & roof trusses may need to be altered to take the increased load

The decision to go with steel sheets for this project is advisable. From an architectural standpoint it allows more control over the aesthetics of the building, it will allow the colour to match window frames and will set the building apart from the traditional tile look we think of as a standard. From a construction standpoint it means we are putting less weight on the timber frame design, we will require smaller members from the timber frame and truss designer. This will allow us to open up the inside and have open trusses with skylights giving a much bigger and more open feel to the interior. Qualitysmith (2021).



Proposed Section a-a
@ 1:100



Proposed Section b-b
@ 1:100

Ventilation & Condensation

As we seal up our houses to make them more thermally efficient we have the knock on effect of increasing damp and condensation. The water vapour or moisture content within the air is measured in RH (relative humidity; percentage of water vapour in the air as a percentage of total air volume.) If the building is properly and correctly sealed all of the sources of condensation within the house are created by the inhabitants. Water vapour is mainly generated in two areas of the house, the kitchen and the bathroom but will be created passively in all the rooms by the inhabitants breathing. The first of these main areas would be the kitchen, steam created by kettles and water boiling on the stove are the biggest contributors to condensation in this room. The second main source of water vapour would be in the bathroom, bathing & showering cause large amounts of water vapour. Depending on the house plan you may also have a third key area, if you have a utility room that's used for drying cloths this will also increase the moisture content of the air. If the house doesn't have a utility room then radiators will be used for drying cloths, this will mean there is an increased RH value in the house as a whole. If the building is not sealed correctly, is poorly maintained or has become damaged then water can enter the superstructure in a number of different ways. Most commonly this is in the form of 'damp' If the damp proof course has become damaged or incorrectly installed then water can work its way into the building, the first sign of this is usually black mould, locating and fixing an issue with the damp proofing can be difficult once construction is complete and can be a trial and error process. The effects of a high RH within the property can be extremely detrimental to the structure if not rectified quickly. Moisture within the timber frame can lead to wet or dry rot depending on the percentage of water content, this would severely effect the structural integrity of the building. If it is discovered that large amounts of the timber is compromised then this timber will need to be replaced or strengthened with much of the buildings fabric having to be stripped back for this work to take place. If the water gets through to the inside skin or if the RH inside the property is high then mould can form, this will damage any finishes and can, in large amounts be harmful to asthma sufferers. richardsonandstarling (2021)

Condensation inside a building comes in two forms, the first being surface condensation; this is when water vapour inside the house because of a high RH condenses on cold surfaces. This is usually seen on the inside of windows where the warm moist inside air condenses on the cold glass it can run down windows causing mould growth and damage to any timber cills below. Surface condensation can also be a sign of cold bridging, if a thermal bridge is left in the enveloping of the building then a cold interior surface can be formed, undertaking a thermal imaging survey can be an effective way of identifying this. Surface condensation is easily noticed allowing the inhabitants to install an effective ventilation system or attempt to reduce any cold bridging. The second type of condensation is interstitial condensation, this is where water condenses within the construction layers and hidden from the inhabitants sight. Interstitial condensation usually goes unnoticed while damaging the materials such as the timber frame, cracking of interior plaster or sagging of floor joists can be the first signs that initial condensation is taking place. Kingspan (2016)

Ventilating the structure

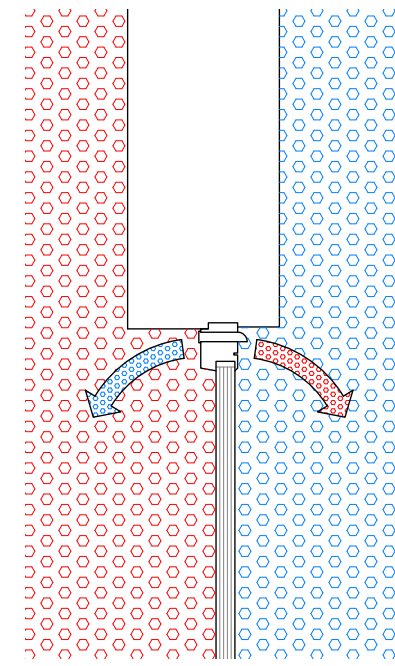
Controlling the RH inside the layers of construction is important so as to reduce the chance of interstitial condensation. Cavity walls give moist air a place to build up so its important to insure they are adequately ventilated, this can and should be done in a number of ways. Weep vents should be installed at the bottom of the cavity so that any liquid water from condensation of from a wet outside skin can escape, the bottom of the cavity should be clean from cement so as not to block up these vents. While weep vents can offer a small amount of ventilation it is often not enough, specific air vents should also be installed. They can come in the form of a air brick or as a formed steel or plastic vent, these are installed at regular intervals and allow the air to circulate throughout the cavity lowering the RH. Loft spaces are another area where ventilation is important, the roofing materials such as slate or steel can provide the ideal cold surface for water to condense on, if this happens it can drip down and make the loft insulation wet and cause damage to ceilings. To avoid this sufficient ventilation should be installed, this can be in the form of vent tiles, soffit or over fascia ventilation. rts.vents (2015) Even when correct ventilation is in place its important to have a vapour check layer built into the structure to stop water ingress when condensation takes place. This usually takes the form of a breathable membrane that is water resistant but allows passage of air, the membrane is lapped and folder over various elements of the structure (see detail so it 1.0) so tat it forms a continuous barrier to water ingress.

Ventilating habitable rooms

To reduce the RH value in the house you should install a method or a system of ventilation

Trickle vents

These vents can be installed in window or door frames, they give a passive ventilation that allows air to move both directions. When the whole house is fitted with vents like this you will find that air moves in from one side of the building and out through the other. The negative to this is that its not controlled, it will allow warm air to escape and cold air to enter the house which isn't good for air energy efficiency.



Extractor Fans

Fans can be fitted in areas where high levels of moisture are known to be an issue. Fitted in kitchens, bathrooms and utility rooms they are usually wired to the lighting circuit and come on when the light is switched on. This allows you to control and boost the ventilation in these rooms when necessary. In the kitchen they can be made into a feature, having a large extractor hood over the hob that's controlled by its own switch.

MHVR (mechanical ventilation with heat recovery)

This form of ventilation is usually only added to new build housing where a high level of air tightness can be achieved. The system includes a vent in all habitable rooms, connected with ducting to a constantly running heat exchanger. This brings in cold fresh air from outside and heats it up using the warm air from inside before it enters the rooms, this gives you the benefit of good ventilation and air movement but without the heat loss. David Hilton (2020).

