

## Recommendations for New Build houses (2023)

The following suggestions set out to achieve a very low heat loss property requiring minimal space heating demand with minimal running costs. The standards far exceed the requirements of the UK Building Regulations which should be viewed as the absolute minimum or worst case.

The more spent now on a high specification of insulation means lower running costs for ever and a smaller, cheaper heating system in the first instance.

Element	Target U Value w/m <sup>2</sup> .K	Method/Material
Walls	0.12	Light weight inner blockwork/or medium density concrete blocks 150mm Cavity full filled with 150mm Cavitytherm PIR insulation (Lamda Value 0.21) See <a href="http://cavitytherm.com/">http://cavitytherm.com/</a> or Celotex equivalent
Ground Floor	0.12	160mm PIR rigid foam insulation with perimeter insulation between the slab/screed and inner wall leaf.
Ceiling - Vaulted	0.14	100mm PIR insulation between rafters plus 80mm PIR insulated plasterboard taped at joints and wall plate.
Ceilings – Flat areas	0.12	400mm Mineral Wool – 200mm between ceiling joists plus 200mm cross layered on top so joists are fully covered.
Windows	0.9 or less	This should be the whole window U Value – Triple Glazed, warm edge spacers, Argon Filled sealed units, soft low E coatings. See examples: <a href="http://www.nordvest.co.uk">http://www.nordvest.co.uk</a> <a href="http://www.velfac.co.uk/">http://www.velfac.co.uk/</a> <a href="http://www.idealcombi.com/domestic">http://www.idealcombi.com/domestic</a> <a href="http://www.viking.ee/en/viking-window">http://www.viking.ee/en/viking-window</a> <a href="https://www.greenbuildingstore.co.uk/triple-glazed-timber-windows-doors/">https://www.greenbuildingstore.co.uk/triple-glazed-timber-windows-doors/</a>

Airtightness	2.0m <sup>3</sup> /m <sup>2</sup> /Hour @ 50Pa or less	Careful attention to detail during the build to ensure the building is well sealed as the build progresses. See separate guidelines and information on building to a high standard of airtightness and Whole House Ventilation with Heat Recovery (WHVHR)

**Renewable Energy Recommendations:**

Where there is sufficient ground area for a Ground Source Heat Pump then we suggest Slinky trench heat collectors are used. Where space is tight then vertical boreholes can be used. We install heat pumps from NIBE of Sweden that include a 7 year manufacturer's warranty. An 12Kw NIBE S1155 should be adequate assuming heat loss is reduced to 25-30w/m<sup>2</sup>. We would require a copy of the Design SAP Report to confirm the final sizing. The installation would require 1 or 2 borehole ground collectors. The depth will be calculated and based on the heat load throughout a full year. You should get £7,500 back from the Government in BUS subsidy.

If an Air sourced heat pump was preferred, then this could sit on a concrete base behind the house or at the side. Budget cost for this would be £13-20,000. You should get £7,500 back from the Government in BUS subsidy.

The figures above are for guidance and we should be asked to quote for the options once the building specification is set and a Design SAP energy model completed by your consultant.

**Whole House Ventilation with Heat Recovery (WHVHR)** – If you were to build a particularly airtight property, (below 3m<sup>3</sup>/m<sup>2</sup>@50P pressure) then a whole property ventilation system would be required to ensure sufficient indoor air quality. Standard building regulations and build quality mean most new build property is still quite leaky, and a substantial proportion of energy used for space heating is lost by accidental or unintended ventilation. By paying attention throughout the build to sealing the external envelope, a reasonably airtight property can be created reducing such losses. Up to 90% of the energy that would normally be lost through air leaks and extractor fans is saved and passed to the incoming fresh air. WHVHR systems extract stale humid air from the wet rooms (kitchen, bathrooms and WCs) pass it over a heat exchanger and transfer that heat to the incoming fresh air that is then distributed to all the other rooms via ducts. We install systems from the award-winning Monsoon range from National Ventilation. Budget cost installed - £10,000-20,000 to include all ducting and commissioning depending on the size and house design. Open flued log burners should be avoided.

### **Wood Burning Stove**

If you are intending to have a wood burning stove in the property, then you would be best advised to keep to a unit with a maximum heat output below 5Kw, otherwise a combustion air vent will be required which would drastically compromise the efficiency of a ventilation system. There are stoves available from various manufacturers that are room-sealed which take the air for combustion directly from outside via a duct. Bear in mind also, that in a well insulated property, a high output stove will tend to overheat the room and be impossible to operate at a low enough output. Pellet burning stoves are a far more controllable and efficient option with ducted combustion air as standard.

### **Solar overheating**

Great care must be taken when designing super-efficient houses that they do not overheat in the summer from direct solar gain through too much south facing glazing. We can advise on mitigation measures both passive and non-passive when an initial design is produced.

### **Thermal Mass**

You should create as many hard dense surfaces into the property as possible to reduce the effects of hot summer temperatures and solar gain. This would then increase comfort levels in the summer and reduce the house heating season in the Spring/Autumn. Thermal mass stores day time heat gains and then gently releases the heat as the air temperature reduces at night. Thermal mass can be achieved by tiling solid floors, rendering/hard wall plaster and skimming, medium density concrete block walls and screeded/tiled upstairs floors where possible.

**Solar PV system** –Carbon Legacy offers solar PV panels from several of the world's best manufacturers such as Qcells, Sunpower and REC. We can design a system to suit your building design but it is helpful when one or more roofs are orientated between SW and SE. It is still worth looking at East/West roofs and sometimes even North facing roofs when choices are limited.

We would also look at your total likely consumption and generation capacity and recommend a home battery storage system to suit. This would allow storing of surplus daytime solar electricity for use in the evening/night. There is also the option to allow night time cheap rate charging from the grid when the weather forecast is poor for the following day. Advanced systems from Tesla can do all this for you automatically. We have many homeowners who have reduced their electricity consumption by 70-90%. We are experienced battery installers, and more information can be seen on our web site [www.carbonlegacy.co.uk](http://www.carbonlegacy.co.uk)