

# Passive House Building -Our Self Build of a Certified Passive House(Passivhaus) in Wicklow, Ireland

Started in late 2010 we are self building ( i.e. no main contractor) a Passive House which will be certified Passivehaus from the Passivhaus Institute (phi.de) in Germany. Using passive design, detailing, construction and techniques that are novel in the indigenous construction scene, has its highs & lows - these are our observations & learnings.

FRIDAY, AUGUST 13, 2010

## Day 1



Well, the purpose of this blog is to document the construction process we are about to undertake for a certified Passivhaus in Wicklow, Ireland. We'll add in photos, videos, detail issues and hopefully act as a guide to other trying to do the same thing. Expect that the process will take about a year from today to complete.

We believe that low energy houses such as passive houses (see [www.passiv.de](http://www.passiv.de)) is the future of housing. Here in Ireland we are well behind the curve, to date, in implementing effectively building regs and many design / construction techniques that have become the norm in the rest of Europe. The ubiquitous concrete block and lack of attention to detail during the 'boom' exacerbated this. However given our timing of wanting to build a house now, there is a general lack of both professional and contractor experience in this specialist field- its a work in progress & in a few short years we would hope it will have matured significantly. In the meantime it needs people to just get started.

## What is a Passivhaus?

Well, there are so many experts out there, many of the selling something that the conclusion is that its a superinsulated house, very airtight with its own airhandling system. There are purists who say that no heating systems is required, it should be made of straw, etc.....None of this is true and usually just reflects the opinions of early adopters of this approach in Ireland. Doctors differ..... patients die, come to mind.

Unlike a normal house, the build is regularly inspected, calculations carried out , has triple glazing, usually is timberframe but can be block build, and is pressure tested before completion to prove it is airtight

There is a publication from an Irish government body which shows what this means in practice ( at a high level anyway) which has a good summary of how such a building stacks up against a house that meets Irish Building Regulations

[www.seai.ie/Renewables/Renewable...for.../SEI\\_Passive\\_House\\_A4.pdf](http://www.seai.ie/Renewables/Renewable...for.../SEI_Passive_House_A4.pdf)

**WEDNESDAY, SEPTEMBER 1, 2010**

## Photos of site works - how do i post more photos?



THURSDAY, SEPTEMBER 2, 2010

## Suppliers!

Maybe I've worked as a professional for too long & am used to meeting time commitments I make myself, but the amount of suppliers who make commitments & fail to deliver consistently is amazing

Is it Irish people not wanting to say no, me being too pushy or many of the people who work in sales & construction. I would understand if they were looking to pay me money & were being tardy...but it's the opposite way around; I'm looking to buy from them. Putting pride aside, I need the best product / price mix.

Lesson learnt...just call them & hassle. Once this is built these petty niggles will be long forgotten...but it's still a little wearing

TUESDAY, SEPTEMBER 21, 2010

## Progress in mid sept - muck & walls!



Well the last few weeks have been all about digging & shifting muck. We have to put in a retaining wall & decided against straight concrete for aesthetic & cost reasons. In the end we chose a segmented retaining wall i.e. an engineered concrete block, that looks vaguely like cut stone - photos to follow once it's put up next week. Final setting out of the road & services will happen shortly & the site is really starting to take shape.

**SUNDAY, SEPTEMBER 26, 2010**

## **More digging**

Well... there has been a lot more digging onsite, retaining wall & materials have now been purchased. Setting out the sites took a lot longer than expected, was connect to where is the centre of a hedge etc... but that is nearly resolved.

**WEDNESDAY, NOVEMBER 10, 2010**

## **Construction Basics : Site Boundaries , foundations & progress**

Well we've been in the lull period between the finishing of the site works and the house frame going up. The last few wet weeks have not had any impact as the main much shifting was already done.

Foundation will be going in shortly & will include about 400mm of insulation to get the U value down below 0.1. There are a number of propriety foundation systems out there but the increased cost over other solutions is €10-20k; some of these systems has potential issues with spec'ing up a high degree of radon protection ( in excess of building regulation requirements) which is a personal requirement

As regards site boundaries, advice is to get a good series of site boundary photos - in detail, including looking into ditches and hedges, before you touch anything on site. This type of information can made a real difference should any dispute arise during the build or later

WEDNESDAY, NOVEMBER 10, 2010

## PHPP - what is this?

Called the PHPP, this is a detailed MS excel package with about 20 tabs which allows you / one to model up the energy performance using a bottom up approach by providing in the technical details for each building component e.g. local weather, window, glazing, shading , foundations, doors etc... its a very detailed package and has been proven by the PHI (Passive Haus Institute) over many years to be a great design tool. For someone who knows their way around it, there is 1-2 days of input work. It is relatively easy to use and even takes into account summer shading from trees, impact of local terrain etc...much of which simpler tools choose to ignore

More over , this is the basic validation tool that the PHI require you to submit for certification when the building is complete.

SEAI Website - buying the PHPP:

[http://www.phyhost.ie/dev/reioshop/catalog/product\\_info.php?products\\_id=36&osCsid=aaec8343a9a9d04c455069143fc7df03](http://www.phyhost.ie/dev/reioshop/catalog/product_info.php?products_id=36&osCsid=aaec8343a9a9d04c455069143fc7df03)

Wiki article on PassivHaus

<http://en.wikipedia.org/wiki/Passivhaus>

FRIDAY, NOVEMBER 19, 2010

## Windows & Slab



Foundations going in now , the weather has been great thankfully & windows being ordered today - more information on that to follow. The process of selecting a window & supplier has been a very interesting one. Ideally you would select from great & certified product from a supplier with a long history in Ireland & a long guarantee...but this is the ideal! We believe with Pazen ( [www.pazen.eu](http://www.pazen.eu)) we have a great Irish agent, a good product at a fair price... nonetheless the price of windows for a certified passive house are astonishing

**SATURDAY, NOVEMBER 20, 2010**

## **Youtube Series on designing & building a passive house - UK**

An excellent 12 part series on the process of going about designing & building a certified passive house (PH). Called the Denby Dale house in the UK, this is the UK's first PH.

**WEDNESDAY, NOVEMBER 24, 2010**

## **Passive House Coming out of the Ground! : Rising walls going in onto Slab**



Rising walls going in on the slab; radon layer, timber frame & insulation are next. Started putting plants down on site too - its the time of year to plant those daffodils & we had received a large consignment of them.

Part of the approach to building to passive house levels of low energy use is to agree the construction details and material in advance. This is particularly true where walls meet or there are unusual junctions which need to be well planned. Then on site, the quality of workmanship - which must tally with the agreed construction details - is vital.

**SUNDAY, NOVEMBER 28, 2010**

## **still snowing & next steps**



close up of the rising walls after a damp proof course applied, the frame will be going up shortly.

Also have been meeting with potential M&E contractors ( mechanical & electrical i.e. plumbing, heating, air, power, phone, data....) regarding the heating system, underfloor, solar etc...They hope to put a lot of this plant out in the garage ( actually in the roof space) which would be a great step forward. Word of warning though, these systems have to be designed by an engineer and correctly installed - secondly, in domestic situations fancy control systems , such as were ubiquitous during the celtic tiger rarely get used - lesson: make it simple to control & reliable. There is no point getting first class equipment if its not design to fit into a system for your particular house or is installed ( & commissioned) by rookies

**MONDAY, JANUARY 3, 2011**

## **Passive House Self Build : Snow & Progress**





Weather in Ireland in December was obviously fairly poor , now just as we start the new year we are up at tool level with all the main structural walls up and the roof, including slates, due to go up over the next few weeks. We are very happy with the quality of the structure and with the attention to detail being paid to airtightness, this should result in a good airtightness result from the preliminary test in a few months. The initial documents are going to the Passive House Institute in Germany shortly which should help smooth the process.

The windows are now due to arrive in about 6 weeks ( mid Feb) so by the end of February we will have a well sealed building and the initial internal works ( insulation, airtightness, mechanical & electrical ) will start then. A few photos of the last few weeks attached.

As the detailing of how the build is to be completed has been agreed in advance there are less variables on site. However, the protection of the airtight layer, some of which is installed as the frame is being erected, is paramount.

TUESDAY, JANUARY 18, 2011

## Closing in the Passive House - Putting on the Roof

Kilbroney Timber Frame have made great progress in the last 2 weeks. The roof is now going on, we've decided to go for a warm roof, which is unlike most Irish roofs (where the insulation is on the flat of the room ceiling) in having the insulation on the slope at rafter level. In addition the build is being made windtight (as evidenced by all the tape) using Siga products and the roof will have a sarking board (9mm panelvent, a vapour diffuse wood fibre sheet) to decrease wind infiltration into the structure. Warm roofs, wind tightness and sarking board are very common techniques in Europe and Scotland but are not common in Ireland yet - I strongly suspect they will as they dramatically improve building thermal performance quite cheaply. We have used Panelvent in preference to other products due to its wind resistance and ability to release any condensation that occur (i.e. breathability) rather than trapping it like some products like OSB do. In addition the frame is covered in breather membrane on the outside and is windtight using Siga products.

Also we're looking at the plumbing, heating and bathrooms to finalise the requirements and get equipment and sanitaryware ordered. The windows arrive in mid February at which stage the building will be weather tight & internal works will start at pace. We even started putting in some plants last week as this is prime planting season.

Also work will be starting on running services - gas, power, comms, foul, water, stormwater - over the next few weeks now that much of the heavy vehicle movement is over and hence damage to newly buried services will hopefully be limited. Will be interesting to see how busy the services providers are at the moment & how much they will try to charge!





**MONDAY, FEBRUARY 7, 2011**

## Progress update 7 Feb

Lots happening at the moment. Up on site the windows arrived from Germany on a truck this morning ( see photo) & are currently being installed. As with all window suppliers there is an approximately 50% payment due on order placement - which is a leap of faith, trust me. A further approx 50% is due on delivery & checking to site; an residual then is due on installation. These are industry standard terms so not much one can do about it. The windows are triple glazed alucad from Pazen & they are PHI ( Passiv Haus Institute) certified; the wood on the inside is a painted eucalyptus (sp?) and the outside a pearlescent silver, which looks grey to me! Only issue with the aluminium colour finish is that any scratches during construction will be hard to remedy / hide. So far so good though.

As regard utilities, we road (approx 150m) with services and stormwater to installed. BG & ESB have been out and we've received quotes for their utility installations ( which they do themselves). The foul, water & stormwater we do ourselves but the council does inspect to make sure its up to standard.

Slates will be going on the house roof now shortly - delays caused by recent very high wind - photo below shows the wind tightness layer, felting & battening complete. Pretty soon we'll be working on the inside in particular the wall /roof insulation , airtightness layer, slab insulations & screeds. There are a number of items that can have a lead time so we're looking at these now with an eye to placing orders soon. Will probably order the bathrooms / sanitaryware from Germany due to the massive cost differences - approx 30% - dont worry this isnt going to shrink the budget , just move us up the quality scale.

At the same time we're looking at site landscaping as you can plant bareroot plant between now and the end of March & still get a growing season in this year. The alternative is to get rootballed plant / trees - these work out about 3 times more expensive.



**FRIDAY, FEBRUARY 18, 2011**

## **Update - Fri Feb 19**

Its been a fairly busy 2 weeks. Physically the wintight wooden structure is up and most of the slates are on the roof. Windows have been installed but the opes are not fully sealed. There is a photo below of an installed window with the cill sitting proud of the panelvent / breather membrane. We're battening the outside of the building in preparation for the cementation board & internally, insulation ( from the inside) should using a dense rigid fibreglass start next week.

Bad news this week was the one of the nights, some uninvited guests to the site removed most of the lead valleys from the roof. Have obviously not been found.

Big decisions this week included

- Mechanical systems ( in particular the heating system and the extent of the rainwater recovery which due to water being free in Ireland at the moment, has an infinite ROI...go figure); quote & scope agreed
- Electrical : extent of cabling, type of data cable etc..awaiting quote
- Colour of the external render - its a permanent colour so need to get it right
- Bathrooms - ordered from Germany, ETA about 3 weeks, hope this decision does not prove 'interesting'
- Wood flooring - purchased
- Landscaping - awaiting final quotes for the supply of bare rooted trees will need to be put in the ground by the end of March to catch the growing season



WEDNESDAY, MARCH 2, 2011

## Passive House Construction Update : Airtightness, External Render System, Insulation Installation : Progress Update 2 March



Pace on the build has really increased in the last week. The roof is now fully complete & the exterior board (no block!) is going up on the outside. The board which sits proud of the building by approx 50mm to give a ventilated cavity round the structure will then receive a permanent monochrome render.

Inside the insulation work, airtightness membrane sealing & putting up the OSB which will be the internal airtightness layer and provides racking strength. The service cavity will be further inside the OSB then. The insulation being put in by Baker Insulation is a slab form of fibreglass which comes in blocks (rather than rolls) & reduces the chance of sagging over time. There is over 300mm in the external wall buildup and an additional 100mm to go into the internal service cavity - this should give a U value of around 0.1 W/m<sup>2</sup>K; We are targeting similar U values for the roof and the floor. We're using Siga products throughout on the airtightness due to their proven longevity. Kilbroney are even taping over the nail holes where they put up the sheets of the 18mm OSB sheets



Photo below of the vertical battens on the structure ready to receive the render board & further photo below of the first few sheets applied. The product is from REP and which it has no thermal properties, it should never need painting and is one of the few such products where no moss / discolouration has been noted in Irish conditions.



Insulation for the floor slab is now on site & will be put in shortly. penetrations though the slab will be identified at the same time as the insulation is installed. All looks OK with the bathroom / sanitaryware order from Reuter Badshop in Germany. Starting to do planting tomorrow as we are running out of time for planting bare root stock. Daffodils are now up on site - photos to follow!

FRIDAY, MARCH 4, 2011

## Suppliers We are using

Completing this house & getting it certified by the Passiv Haus Institute (PHI) has meant using suppliers who have both a good product, consistent attention details & can install it well it well on site. In order of installation:

### Timber Frame

Great quality frame from this family run business; Mark Cooper is the contact  
[www.kilbroneytimberframe.com/](http://www.kilbroneytimberframe.com/)

### Insulation & Airtightness - Baker Insulation

A family run company with great attention to detail on site; Mark Baker is the main man  
[www.bakerins.ie](http://www.bakerins.ie)

MONDAY, MARCH 7, 2011

## General Progress

The exterior render board has now been fixed to the building & the seams between the sheets rendered; this sits proud of the building by about 50mm which will allow us to run any services e.g. lighting wiring, along the outside of the building concealed. The flat roofs are also going in, just need to make sure the drip for the cap is away from the render & the metal cills below. Inside the insulation (the fibreglass batts) on the exterior walls has been fully installed, the exterior walls are now being airtightened with OSB & Siga airtight tape. If you've not seen airtightness tape before this is an amazing product - super sticky & lasts for decades apparently

Also received my Passive House Institute Certification as a Passive House Consultant today following the exam in December - it was an excellent course covering the design principles and details of such low energy house design



FRIDAY, MARCH 18, 2011

## 18 March 2011

Bit of a transition happening on site as the timber frame work closes out & Baker & Co are working on the airtightness. Any of the perforations of the air tightness layer & insulation need to be planned at this stage and then properly sealed / dealt with. We're probably about 3 weeks away from our preliminary air tightness test. The scope of the services has been agreed and equipment chosen - I'm not going to jinx myself by naming brands until I've seen them perform!

As regards site works, have returned all the information needed by the utility companies so that process is slow but at least its started.

Here in Ireland its coming to the end of bare root planting season. You might ask why in this blog thats anyway important. Well , the main reason is that a tree like silver birch is a fantastic source ( technically & cost wise) of solar shading to limit building over heating : no leaves in winter & loads in summer. So we got some trees - about 3-4m high from Tully Nurseries in north Dublin ; Toby there was great in giving us direction on what to choose & general advice on planting.

Have included a few photos below of what the air tighted windows looks like on the inside with a 100mm service cavity looks like on the inside.





FRIDAY, APRIL 1, 2011

## The transition from the structural elements onto services & finishes

Well, been a interesting 2 weeks since the last post. Still in the transition phase between wrapping up the structural work and starting on the internals. Its an interest point in any project where the main decisions have been make, the money allocated or spent - well, now is time to execute, make sure that its done properly and no shortcuts taken. Its a tough market on construction companies and people will bid tightly for work, often too tightly. However tempting, make sure that whatever you agree and has been hammered out over discussions, that its noted down, best signed by both parties...even better an diary is a great idea. Just recently I've started to note down peoples commitments / observations on a phone App under the trades - this has been a real asset for logging issues and is very handy on the phone.

On the outside the Parex Lanko monocouche basecoat render will be applied next week. The various flat roofs cannot the full completed until the render is applied. The foundations for the garage were started this week and we're going to put the concrete rainwater harvesting tank under the garage. This system will have UVs and filter treatment and will be used for all domestic hot water....showers in rainwater!

On the inside and ducts are being run, with attention to be paid to any pentetrations through the foundation blockwork. Some of the services runs have been a bit of a challenge, the fact we went with vaulted ceilings and for a warm roof construction ( ie insulation is on the slope rather than tradition Irish approach of insulation on the ceiling with a ventilated attic space) has made routing a lot simpler. This warm roof construction is still rather new in many countries and the detailing of it properly to eliminate cold bridging must be worked out in advances & well implemented in site.

On a lighter note, the daffodils are in full flower and we planted another 20 silver birch and beech during the week. This has really started the process of turn it from a construction site to a house and garden.

SUNDAY, APRIL 17, 2011

## Steady does it ! : Airtightnes, floor build, rainwater reuse

The job is progressing well, tying up lots of loose ends ; the airtightness test is now scheduled which will be a moment of truth for us all. If you're not familiar the Passivhaus requirement is for 0.6 airchanges per hour when the house is pressurised to 50Pascals ( equivalent of a storm force 5 I believe). This is about 10 times the airtightness required by building regulations( which are signed off/ detailed on paper by an architect/engineer rather than field tested).



Inside we're been moving stud work to get the doors correctly positioned and the floor is now being built up with 400mm of polystyrene. When you actually see this much insulation under the floor it is quite a shock. The large rainwater tank is due tomorrow to go under the garage. Also the sections of flat roof have now been completed ( in a light grey colour) & we'll test these with a hose now shortly.

So far the self build option is going well, particularly as I did a lot of research on the field of Passivhaus before we even started & gained the PHI qualification earlier this year. The challenge with self build is that if something doesn't work, then it falls back to you, & your wallet, to rectify - rather than having a contractor who takes the hit / risk & of course charges a risk premium for that. This is particularly important for something like a certified Passivhaus which has to meet very specific performance criteria or else it fails. The old addage is that the person who has most control over the process is the person best placed to take the risk. In a PH self build this means if that you dont fully understand the required outcomes & how to get there then this route is likely not for you. For a regular self build though - without the strict performance criteria - then this simply doesn't hold though & its is a lot less daunting. Towards the end of the job I'll do a better job of the pros & cons / ups & downs of the route we chose.





MONDAY, MAY 9, 2011

## Airtight to Passive House Levels & moving beyond the Structure!

Been very busy on site for the last few weeks, internal floor slab poured, building made airtight & blower door tests conducted. Without question the biggest challenge in building a passive house is getting the airtightness down to the 0.6 ac/hr required by the Institute in Darmstadt . There has been much discussion over the year if this is too strict a level to aim for & i suppose the jury is still out on that. As a benchmark, it is between 5 and 15 times better than new homes are supposed to be built to even though they are not actually field test with a power door fan ( see below) and the regular test would involve blocking up all the 'deliberate' building opening e.g. ventilation holes in the wall.



The blower doors test was done to to the Passivhaus standards which means pressurising and depressurising by 50Pascals ( feels like a strong wind when opening & closing doors) and we passed the criterion. Photo below of the fan fitted to an open window for the test.





Also the large precast tank has now been fitted under the garage & is well weighted down - it wont be floating away!



Inside we've been making good progress, a reminder than when plastering on the outside to have the windows and cills very well wrapped in plastic - this is an in progress photo from when the monocouche render was applied...same goes for any render or plaster application though.

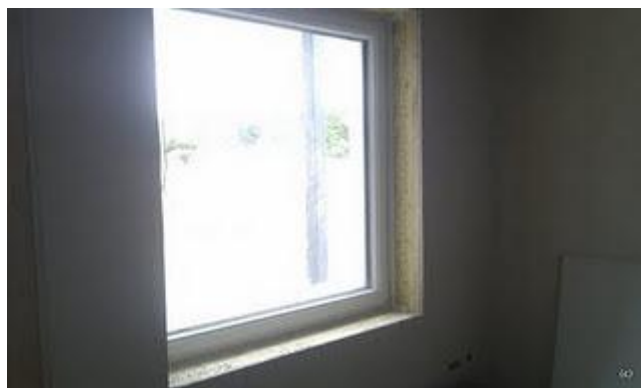
All in all the result for airtightness is demonstrable proof that the time & attention to detail on site has been really consistent.



FRIDAY, JUNE 10, 2011

## Passive House Design & Construction decisions - Part 1

Its been another steady few weeks where the plastering has been completed & the scaffolding taken down. Have included a few photos below that show the next step since the photos in the last post. In part 1 of Passive House Design & Construction decisions I will be highlighting the following areas: Foundations, Rainwater Harvesting, Rainwater Goods & Fascia / Soffit.





Have gotten a few question from people on various material / techniques / approaches we've taken & in each post going forward will describe our solution for a number of items.

**Slates** - this is a oldie! For planning reason we were limited to blue black or a derivative thereof. There are many , hundreds actually, of manmade & natural options. Some people swear by the colour fastness & strength of the manmade. As many vote the other way. We ended up choosing a large brazilian natural slate from Capco, which we also fixed with stainless steel hooks given our hilltop location. They have been up for 4 months, through some heavy storms & only a few were damaged.

*Pros: amazing colour, expected longer life, great size; Con: more brittle than man made, more labour installing*

**Foundation** - As you may gather from the older posts we did not go with a raft system from one of the 'insulated foundation systems' companies. The solution we came up with, in consultation with the structural engineer uses polystyrene ( rather than closed cell insulation) overlapping to give the thermal breaks, using rising walls.  
*Pros: 50% saving over system type foundation ; Con: if you have already engaged an engineer they may not accept it*

**Rainwater Use-** Have installed a large tank under the garage for use for all household water which will be filtered & UV treated, with the exception of cold water taps  
*Pros: House not as dependent on the mains system & potential shortages , reducing consumption by about 60% ; Con: No return on investment (ROI) in the absence of water metering, this is a fairly fundamental negative*

**Rainwater Goods** - There are a myriad of profiles & materials - just need to select one that fits our budget & requirements. Our guttering is square aluminium with plastic downpipes( to minimise noise / dripping during rainfall,) all painted/powdercoated in a similar gray to the windows; had to take care that all the fixing are corrosion resistant as they are being secured into the monocouche rather than a paintable surface. We have limited the number of downpipes on the structure - its just one of these things I notice when its not done well, its a finishing detail.



**Fascia / Soffit** - there is none like in many traditional house, the fascia / soffit we are used to seeing is apparently an import from the UK British Standards transposed in the 1960s. Regardless, you need to have this understood as the start of the build so that this is allowed for, its too late to decide half way through.  
*Pros: Need to decide early, additional labour, sharper building lines ; Con: Less room for error in workmanship & tolerances*

In further blog postings we'll at other design & construction decisions in more detail,

bearing in mind that many of these are indeed relevant to any modern house build, not just a passive house or a self build.

FRIDAY, JULY 22, 2011

## Passive House Design & Construction Decisions - part 2

Just to continue what I started in June of looking at various decision points along the way & the conclusions we've come to. In part w of Passive House Design & Construction decisions I will be highlighting the following areas: Window Cills, Heat Recovery ventilations ( MHRV) , Boiler Plant Room Location & Skimmings vs Tape & Fill.

**Window Cills** - usually in Ireland these are concrete or granite, and are supported by the external blockwork. However the catch is that we'r using a renderboard so that load bearing structure is not there. In short this leaves 2 viable options - either metal or a lightweight plastic. We choose powder coated cills in the same colour as the windows.

*Pros : no maintenance, drip from cill extends beyond building      Cons : get scratched during construction, cannot be stood on*

**Heat Recovery Ventilation** - houses generally have vents in the walls, trickle vents on windows or a central MHRV unit. The use of these units draw quite strong opinion from people based on their experience or not. The topic has been well flogged on many forums but is basically a requirement for a certified Passive Haus. The trick here is not to turn it on until the house is dust free lest dust be draw into the ducting. Space has to be left for the ducting in the building structure in order to keep it big ( & therefore with low velocities and noise). These systems need to be properly sized, designed, installed & commissioned. Many cheaper units are not as efficient and hence use more electricity to run.

*Pros : better air quality apparently ( its filtered entering & leaving the house)., lower heating bills      Cons : expense*

**Boiler / Plant room location** - In many houses this is simply a back room where the equipment ( boiler / tank ) etc... are jammed in. In many countries the basement is used. In our case we've chosen to go with putting much of this in the garage. In addition I've heard it recommended to put the tumble dryer ( if you have one that is) out in the garage as they are a significant source of fires / smoke damage in domestic houses.

*Pros : garage space per square meter is about 65% cheaper ;      Cons : longer pipe runs*

**Skimming ( plastering) vs tape & fill** - this is another chestnut where people have either had great or awful experience. The usual approach in this a wet plaster skim over plasterboard - in the future if you want to put up a picture frame or similar then

you have to find the stud behind as the plasterboard is not weight bearing. The results is highly dependent on the skill of the plasterer obviously. The tape & fill approach ( not widespread in Ireland) uses sheets of a dense load bearing material such as fermacell with the joints between sheets filled. I have heard that this not as skilled a job & the results a lot more variable / inconsistent. We ended up going for skimming.

*Pros : with a good plasterer the finish is perfect. Cons : more expensive, regular plasterboard is not load bearing, wet plaster introduces water to the building which has to dry over about 4 weeks.*

In further blog postings we'll at other design & construction decisions in more detail, bearing in mind that many of these are indeed relevant to any new house build, not just a passive house.

WEDNESDAY, AUGUST 24, 2011

## Passive House Design & Construction Decisions - part 3

Just to continue what I started in June of looking at various decision points along the way & the conclusions we've come to. The bottom line is that the area of Passive House design & construction is new in many markets, not just here. There are real reasons to be skeptical, or just plain inquisitive, as regards both the services the professionals sell you and material / equipment you buy from rather young companies. In part 3 of Passive House Design & Construction decisions I will be highlighting the following areas: Acoustics, Breathable Wall Systems, Insulation types & Windows.

**Acoustics** - this is an area that timber frame buildings have usually let themselves down and give timber frame building a poor quality image - especially in semi-detached suburban housing estates. It comes down to inadequate measure being taken during construction to reduce sound transmission between properties and even with properties. Measures that are suitable for your build are unlikely to suit another for reasons of cost, cosmetics, floor types. Practical solutions we have employed include double slabbing ( with plasterboard) some rooms / space, 90mm acoustic insulation between all rooms, 150mm insulation between the floor , the use of I beams between the floors. Other options include the use of underlays and screed in the first floor floor buildup. As the doors in a passive house need to be slightly undercut for airflow & there is MHRV ducting, remedial action at a construction stage can avoid expensive retrofitting at a latter stage.

*Pros : reduced noise in building*

*Cons : expense*

**Breathable Wall System** - this means the ability of a wall to dissipate any moisture it collects over the year during the warmer months. It doesn't mean the ability of the wall to let air pass through it. At one end of the spectrum this can mean a hemp

building which is highly vapour permeable ( like a good wool coat). At the other end are building with OSB sandwich constructions which should never letter water in & if it does get in, then it certainly aint getting out ( much like a plastic bag). The latter issue has been the subject of much investigation in the US, with the conclusion that any moisture build up, in particular the OSB sandwich walls , can result in Sick Building Syndrome (SBS). This can be hugely complicated area, many experts differ & in the end we chose a breathable wall system, using Panelvent a woodfibre board on the outside which will allow moisture out if / when it gets in but has the cost and strength advantages of using OSB for racking strength. There is a calculation tool caled WUFI that many professionals use to determine how a wall will perform as regards interstitial condensation over time.

*Pros : reduced chance of SBS & mould developing; more durable structure*

*Cons : expense*

**Insulation Types** - every insulation manufacturer has a myriad of product at various price points. Products range from hemp to sheeps wool to polystyrene to glass wool. Each product has pros and cons including cost / issues with water or condensation / carbon footprint, ease of installation. However , in the end we went for fibreglass batts installed by Baker Insulation & supplied by Superglass in Scotland . The reason being that as they are a rigid sheet, they are self supporting in our wall cavities and not likely to sag. These are similar to ubiquitous the rolls of fibreglass we are used to seeing, but it comes in a more rigid slab form

*Pros : wont sag, proven trackrecord      Cons : more expensive than some alternative, not as eco as other products, less eco-bling!*

**Windows** - The windows on a passive house are generally tripple glazed and very highly insulated. There are few window manufacturers in this country so to date we have been largely reliant on imported product installed by local agents. As this is a new area, experience is somewhat thin on the group and a number of installers have ceased trading recently. We chose an aluclad triple glazed window. You will need to make sure that the windows , as installed, take cognizance of local building regulations ( with its idiosyncrasies) as some of these issue will not make sense in the German or Austrian context. Generally speaking, the windows for a certified passive house, need to carry PHI certification & use high quality plastic/ rubber spacers (e.g. Thermix / Swiss spacers) in the glazing panels itself . Just make sure that your window supplier has sufficient ( & real!) after sales support in your area to deal with any issues that crop up.

*Pros : PHI certified windows meet a high independent quality threshold for technical performance      Cons : PHI certified windows are expensive & the lead time is about 8-10 weeks if imported; make sure local expertise is available ;lack of track record of some agents or manufacturers in your local area; lack of flexibility in PHI windows mean they may not suit all types of construction; idiosyncrasies of local building regulations may be 'foreign' for some importers / producers*

Just to recap, this a new and emerging field of passive house construction and design in many markets, not just Ireland. Many sales people and professionals are now cottoning on that. For that reason, there are a lot of people and companies with slick marketing, great logos, great technical product, PHI certificates etc.... All of this is lovely and great, BUT, do they really have the practical knowledge, skills, experience and attitude to deliver the high quality engineered components you will

need to get your home performing as it should. A construction site is not the place for on the job training, first installations or theories. For exactly this reason there are real reasons to be skeptical, or just plain inquisitive, as regards both the services the professionals sell you and material / equipment you buy. It really pays to be a smart customer.

**SUNDAY, SEPTEMBER 11, 2011**

## **Passive House Design & Construction Decisions - part 4**

In previous posts we've concentrated on technical design & construction decisions & issues. However as a self builder one of the principal issue you face is that you are not a repeat customer for the suppliers you are using. If you contrast this position with that of a normal building contractor where there is an onus on the supplier to act true to their word as there is likely going to be repeat business in the future. In the current construction climate especially, many suppliers are hungry for business and willing to make commitments that may prove difficult or impossible to actually deliver on. Before going through a case study of one of the issues we've faced, its worth clearly stating that the vast majority of suppliers, tradesmen & professionals we've used have been excellent - delivering on commitments, have a good eye for detail & most importantly willing to stand over their work & word.

At the end of the day, in a passive build or any other build, its not possible to write everything down contractually and there is an element of trust that what has been committed to by a supplier will be delivered. This is particularly so when a company is supplying a product which will subsequently be installed by others you hire - this means that all payment is due on delivery or indeed in advance. Put simply, that means that once the delivery truck leaves the site then you have little bargaining power with the supplier.



A case in point to the date has been the supply of our monocouche render system by Parex Lanko ( a French company), supplied by REP Ltd. in Ireland as part of our wall buildup. Technically, the outer skin of the building consists of a ventilated cavity battened out out, a 9mm magnesium renderboard which is then coated in an approx

8mm monocouche render which is a self coloured plaster. Such a system is somewhat unusual in residential applications, virtually maintenance free, comes with a long colour warranty and should not require painting. We selected the product as one of the best on the market & proven in Irish conditions. The application of a coloured render / monocouche is becoming more popular with the introduction of external insulation systems ( EIFS) in residential retrofits as a means of protecting the insulation & as a bonus is maintenance free as long as you are happy with the colour of the render.

First of all REP supplied and had installed a different Parex Lanko renderboard product to that what had been agreed during site visits and for which certification / agreement has been supplied. This was resolved to some extent as the documentation on what was committed to ( versus what was supplied to the site) was very clear. To be very honest, with hindsight, this should have forewarned us.

Secondly, having visited a number of sites we chose a brilliant white and grey monocouche colour for the building ( bearing in mind that monocouche is a permanent coloured finish!). When the Parex Lanko monocouche was applied we suggested during site visits and in writing that the colour supplied was not that agreed & were dismissed as needing to dry out / scaffolding shading / wind / aspect etc....Needless to say, 4 months later & numerous meetings/discussions later REP agree(1) that the colour of the house is not white and , (2) that we indeed ask for what white BUT.....having tested the bags of colour in France that it really wasn't their problem & they did their very best. In short, we are left with a colour that we did not order & no bargaining power over REP to deliver on their commitment. None of this would matter at all if we wanted to paint the building afterwards, but given that the incremental cost of the Parex Lanko / REP monocouche is the price of a new car - then it really is a blow to us.

In summary , because we are not a repeat customers you get messed about. To be honest we are not sure how this issue will resolve itself with Paex Lanko/REP.Perhaps we should simply have demanded that the work be stopped on site - i.e. down tools! - until we were 100% sure that what was delivered was actually was ordered. The lesson is that it become difficult to remedy once installed & the site guys just want to get cracking & finish up. Bottoms line is that cracking on is possibly not in your best interest.

In addition, this should clearly highlight the importance of keeping a good site diary, taking lots of photos / videos, making sure that issues are noted/ responded to in email & raised as early as possible. Most importantly, if at all possible, retaining some of the invoiced amount ( or maybe even pay by credit card) until you are sure that what you have ordered & was committed, was actually delivered ( along with all its sub-components / accessories).

The experience with Parex Lanko/REP has not been a positive one despite the clear terms of payment & our order. As a self builder you are likely in transaction mode rather than repeat custom. It is likely that were we using a regular building contractor that the complaint would be taken more seriously / less readily dismissed. Again, given the current bidding / tendering climate, it pays to be a skeptical consumer no matter what seemingly well intentioned commitments you are given on site by a sales rep & get it down in writing where possible. Again, the vast majority of

suppliers, tradesmen & professionals we've used have been excellent & would happily stand as references for them.

