

Certifying Passivhaus in the UK

peter warm BSc CEng MCIBSE MIE

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Sep 2010 CAT AECB Conference



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Passivhaus – a Comfort standard?

- No draughts
 - No cold radiant
 - No summer overheating
 - Fresh air always
 - Whole house warm
 - Fuel Poverty eliminated
- all by simply improving



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Passivhaus standard

Air-tightness	0.6ach @ 50Pa	Comfort
Surface temp (windows)	>17degC	Comfort
Summer overheating	Max 10% >25degC	Comfort
Vent	~30m ³ /hr.person	Comfort
Heating	15kWh/m ² K @20C	Energy
Primary Energy	120kWh/m ² yr	Energy

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Passivhaus – Simplicity

- Extra Insulation
- Extra panes of glass
- A full ventilation system
- And clever design.....
 - Site layout
 - Insulation and thermal bridges
 - Solar gain and protection
 - Airtightness and Ventilation

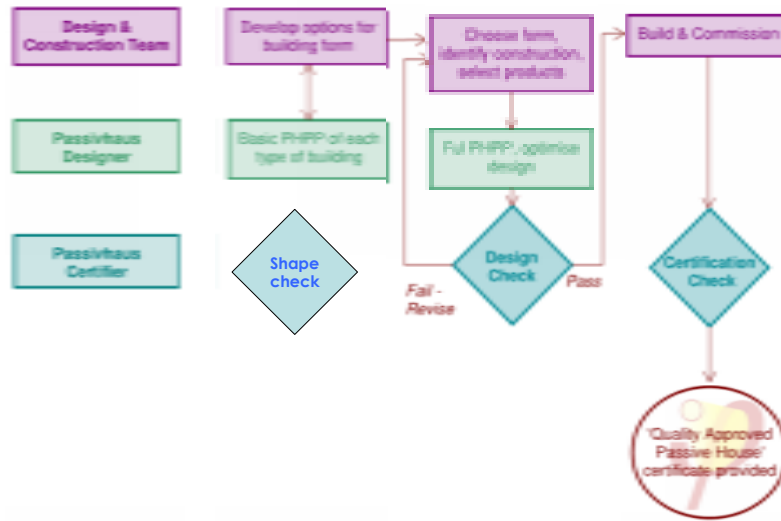
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Why Certify?

- Quality, Quality Quality
- Avoids “greenwash” – Independent Check
- Feedback loop present
- Take advantage of Certifiers experience

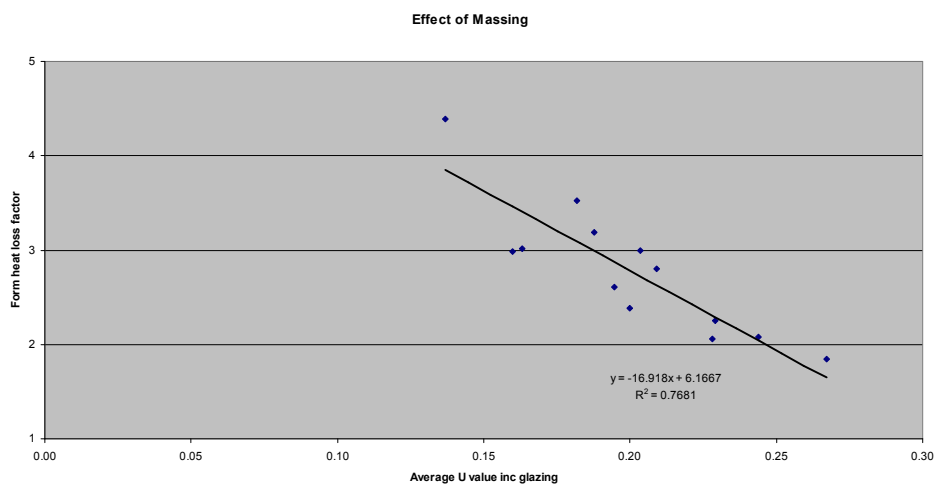
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Certification Process



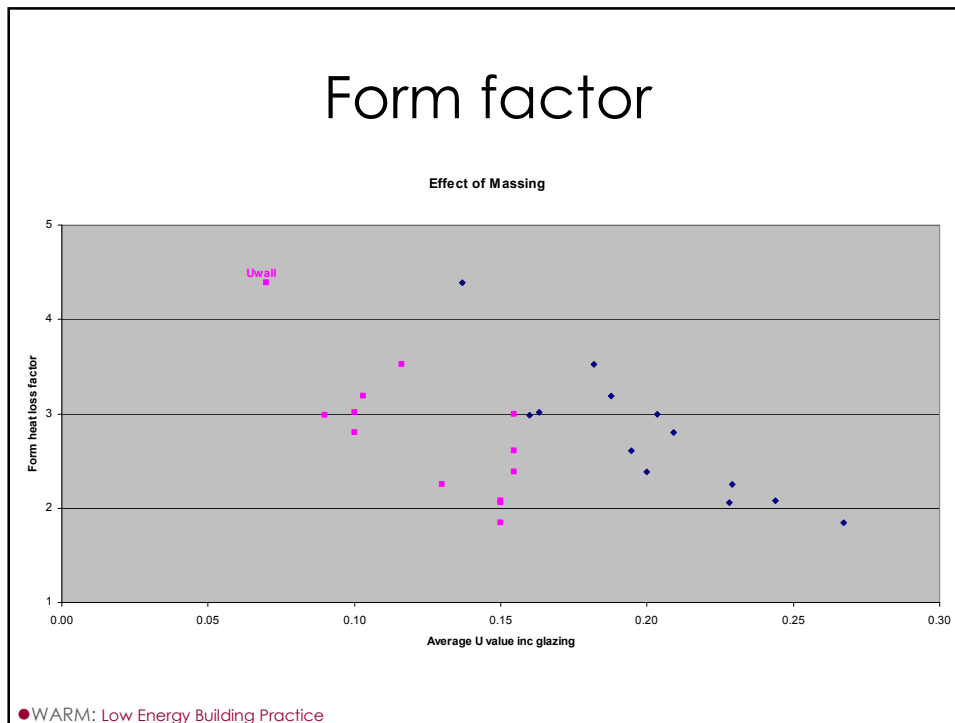
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Form factor



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Form factor



Certification

- Shape check – pre planning
- Design Check – pre construction
- Final Certification – after building built and tested

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Treated Floor Area (TFA)

- 15 or 120 kWh **per m2 TFA**
- Critical to get right at start
- TFA:
 - Internal floor area
 - Ignores partitions, stairs, plant areas
 - “area useful to occupier”
 - Less than Sap TFA

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Weather data file

- Currently 5 regions:
 - Glasgow; Manchester; Birmingham; London; Plymouth
- Will be 22 regions with BRE data:
 - Same as SAP degreeday regions
- Meteonorm software can generate data
- Crucial agree non standard weather data with certifier early on

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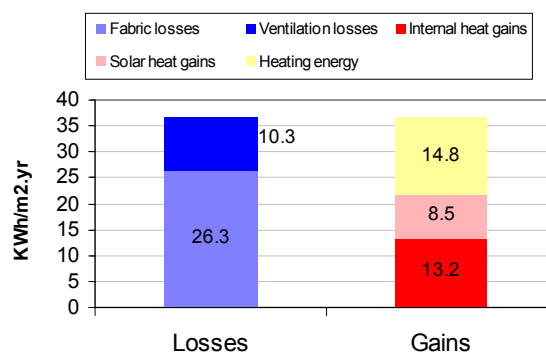
Initial target

- Suggest aim for 12/13 kWh/m²
- Gives a margin of error for:
 - Unexpected Thermal Bridges
 - Window Choice
 - General Calculation errors

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PHPP

- Detailed energy balance model:



- Excel sheet, hence built from scratch by certifier

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3 types of certification

Building

- Tested and calculated using PHPP, by a person/organisation appointed by the German Passivhaus Institute (PHI)

Component

- A component such as windows is certified as having certain values that can be used directly in PHPP. Currently direct with PHI or appointed bodies.

Designer

- This certification shows that a person has undergone sufficient training and passed an exam to demonstrate their understanding of Passivhaus principles

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Who can certify?

- Can Certified Designers certify their own designs?
 - No
 - Certification per normal building certification routes
 - Assurance to clients
- Do you have to be a Certified Designer to design a certified building?
 - No
 - A Certified Designer has demonstrated ownership of the skills
 - Lower risk of failing from client perspective

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Certification

- No site visits
- Design certified
- Certification then requires certificates for:
 - Airtightness
 - MVHR commissioning
 - Conductivity certificates
 - Window Schedule and Thermal data
 - Site supervisor declaration

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Documentation required 1

2. Plans

Scaled pdfs please, preferably scale bar marked on each plan for scale checking. We need a complete list of plans submitted, with revision numbers and issue dates.

a) Floor plans

For each level;

- Showing 1m and 2m height restriction lines where appropriate (eg under eaves, under stairs)
- Indicating Plant rooms/Cupboards
- Showing all interior partitions and doorways.
- Showing which areas are intended to be heated in case of doubt (eg basements)
- Showing marked up line for base of exterior measurements (normally outside of construction insulation, but excluding rainscreen)
- Mechanical Ventilation and Heat Recovery (MVHR) locations and duct runs
- Heating and Hot water pipe routes

b) Elevations

Sufficient to allow view of all external heat loss areas;

- Showing finished floor and ceiling lines/levels
- (optional) Showing external heat loss envelope lines/levels (else on construction build up detail or section)
- All openings to be numbered to correspond to window schedule (see below)

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Documentation required 2

c) Sections

Sufficient to explain arrangement of spaces/voids in design

- Main elements constructional build-up (or can be in separate detail drawing)
- Identification of external heat loss base line

d) Details

Sufficient to show all joins between wall/window/roof/floor

- Main element constructional build-up, with materials, thicknesses, bridging materials percentage, and assumed k values if not common.
- Allowing easy identification of continuity of insulation around junctions
- Extra details required where structural or other thermal bridges occur (steel beams/ balcony fixings etc)
- Crucial to include for each type of mounting, the head, jamb and cill detail of windows, doors, roof windows etc. These will also be used for shading calculation dimensions.

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Documentation required 3

3. Psi calculations

To be supplied where thermal insulation is not continuous.

- Show scaled drawing of section modelled
- Psi value calculation position line marked up on drawing
- Declare k values assumed
- Signed declaration by modeller in accordance with En ISO 10077-2

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Documentation required 4

4. Primary Energy

e) Heating System

Heating system type, pipe runs length and insulation, fuel, boiler/heater efficiency from SEDBUK database.

f) Hot Water system type

Hot water distribution pipe lengths, insulation, fuel, boiler/heater efficiency.

g) Appliances

Cooking type, clothes drying, appliances, lighting etc

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Documentation required 5

6. Certificates required for certification

These are required after building has been built and tested

h) Material Conductivities Certificates

Where conductivities are claimed that are based on unusual materials or with an unusually low conductivity manufactures test certificates will be required. Note that the inclusion of these certificates is not necessarily an acceptance of the material: we need to be sure we are using a representative conductivity value, not the "declared" or best test results the manufacturer has obtained.

i) Airtightness Test Certificate

Certificate to show:

- Result in m³/hr at 50 Pa, for both depressurise and pressurise
- Calculation of internal air volume, hence above results expressed in airchanges per hour.
- Signed declaration by modeller in accordance with ATTMA or equivalent standard
- (permeability optional, but beware UK conventions use internal heat loss area)

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Documentation required 6

j) Ventilation Commissioning Certificate

- Invoice to show unit model installed.
- Commissioning certificate to show system balanced with target and actual air flows obtained at each chosen speed.

k) Windows and Doors

Delivery invoice/schedule

- Showing numbered windows to correspond to elevations
- Showing external frame dimensions
- With glass type indicated, separate Ug and g value certificate for each glass type
- With frame type indicated, separate Uf and head, jamb, cill thickness certificate for each frame type

l) Building Supervisor Certificate

- Signed statement of Construction; detailing:
- List of plans and revisions received and followed in building
- Any differences to plans (there are always some of these)
- Certification that the building has otherwise been constructed according to plans, particularly in respect of:
 - Detailing round junctions being thermal bridge free
 - Insulation installed as drawn
 - Insulation materials and glazing installed were make and manufacturer declared on plans
- Photographs to illustrate the build process – concentrating on the joints between walls, roof, openings, floor, to demonstrate how the joins are “thermal bridge free” ie thermally coherent according to plans.

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Examples

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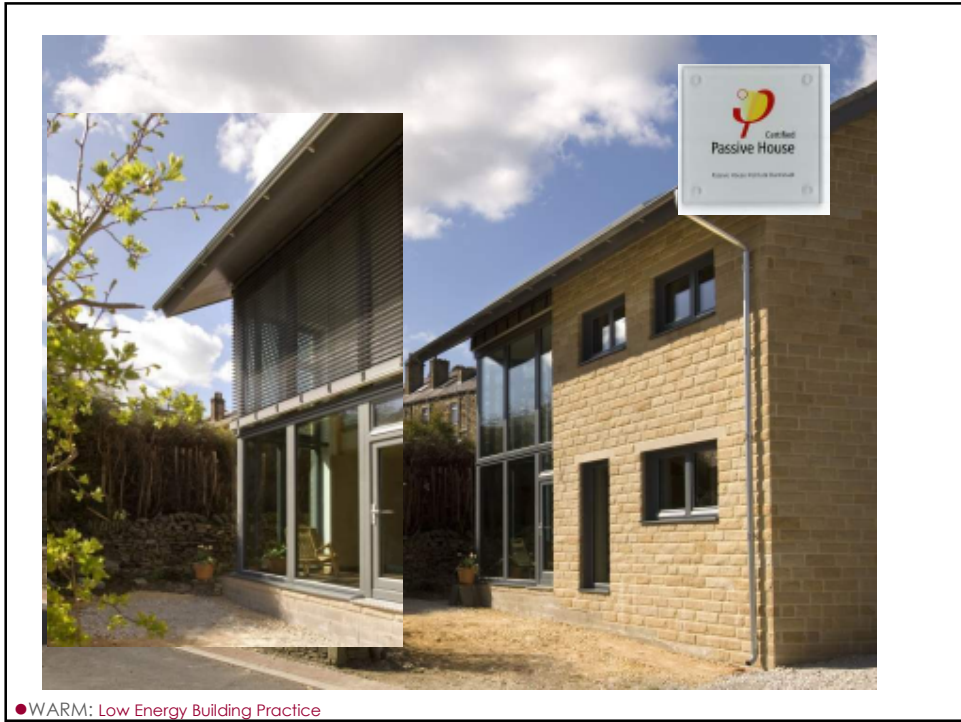
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Perryfields



What does PH cost?

- **PHI: 5-10% of build cost, decreasing with experience to 5% (over BRegs):**
 - Consultancy/Training
 - Materials : MVHR & windows
 - Certification
- **Certification: Single house <£2k, but no consultancy included, huge reductions on estates**

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What does PH cost?

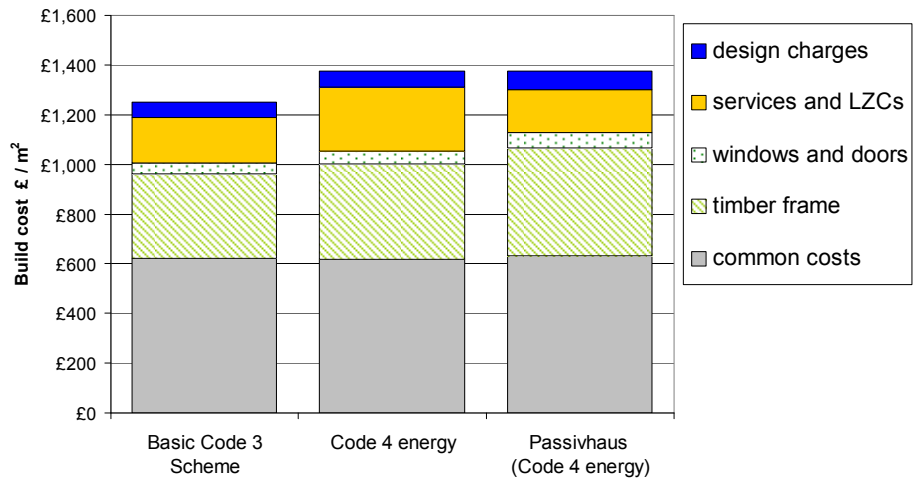
Budget Certification costs for a single detached or semi-detached house of average complexity;

Discount for multiple house designs; increase for added complexity
AECB based on timecharge - breakeven pricing is the aim

		PHPP Consultant	PHPP Consultant and experienced design team	AECB Certification process
nominal day rates:		500	500	500
stage		days	days	days
1	outline design	4	1	
1	pre planning design check	2	1	(1 optional)
2	advice to improve design (depends heavily on client/design team)	6	1	
3	pre construction check	2	1	1.5
4	collect required documentation during construction	3	1	
5	AECB certification check inc PHI Licence charge (£0)			1.5
days:		17	5	3
cost:		8500	2500	1500
Overcost for whole project		£10,000	£4,000	5-10% project cost

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Costs re CSH



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Source: Randall & Simms QS: 20 units St Ive

Who does certification ?

- BRE
- Scottish Passive House Centre
- Inbuilt
- Mosart
- WARM

- PHI
- Hans Eek



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AECB CarbonLite Training

- **1 day Understanding the PassivHaus standard**
 - 25thOctober NEWCASTLE
 - 15thNovember LONDON
 - 22ndNovember BRISTOL
- **2 day Using PHPP software for low energy design**
 - 26/27thOctober NEWCASTLE
 - 16/17thNovember LONDON
 - 23/24thNovember BRISTOL
- **1 day 2D Thermal Bridging**
 - 28thOctober NEWCASTLE
 - 18thNovember LONDON
 - 25ndNovember BRISTOL



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www.aecb.net or www.peterwarm.co.uk

Thanksgiving



Happy
Birthday
Sally!



● W