

#UKPHC19



Passivhaus at Scale: Progress in Wales

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Passivhaus Pilot

- Paola Sassi, Welsh School of Architecture
- “Strategies for Sustainable Architecture”, 2006
- Elm Street Passivhaus in Cardiff, 2008



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Welsh Government



- Building Regulations devolved, 2014
- Wellbeing of Future Generations (Wales) Act, 2015
- Environment (Wales) Act, 2016
- Innovative Housing Programme, 2017-2020
 - 3 year programme totalling £90M
 - 100% grant funding for “innovative elements”
 - Aimed at “upscaling” previously piloted technologies
 - Ongoing monitoring a condition of funding



Caerphilly Magistrate's Court



- 34 Over 55s Apartments



Caerphilly Magistrate's Court



- Four 3B5P houses for general needs social housing



Caerphilly Magistrate's Court



- Traditional build
 - Brick and block
 - Parge coat
 - Mineral wool full fill cavity insulation
- Building integrated photovoltaics



Procurement



- Competitive tender
- 6 contractors bid
- JCT Design & Build Contract
- Commenced 2018
- Completion forecast March 2020



Cost comparison



- Newport scheme with 57 Over 55s apartments
- Same contractor, same timescale, not Passivhaus



Cost comparison



- Newport scheme contract value £5.2M for 57 units
 - Apartments costing £91,000 each
- Caerphilly Passivhaus contract value £5M for 38 units
 - Apartments costing £135,000 each
- Passivhaus scheme costing almost 50% more

Phase 2



- Purchase of adjacent police station site



Phase 2 - Challenges



- Caerphilly Council keen on Passivhaus
- IHP funding not available for “Phase 2”
- Additional requirement for SUDS in Wales from January 2020



Phase 2 - Opportunities



- Same design team & aesthetic approach
- Opportunity to negotiate with same contractor and draw on their experience
- Opportunity for Cost v Function analysis to apply lessons learned – review Linc’s standard spec
- Early adoption of Part L review to update Building Regulations

Value Engineering



- Series of value engineering workshops
- Attended by architect, M&E engineer, contractor
- Analysis of trade off between M&E strategy and building fabric

Lessons learned



- 2 kinds of additional costs with Passivhaus:
 - **Unavoidable** – extra materials you can't build Passivhaus without
 - **Avoidable** – non Passivhaus OR elements that can be designed out

Unavoidable costs of Passivhaus



- Extra insulation
- Triple glazed windows
- MVHR
- The above costs can all be measured
- Remember to omit cost of conventional ventilation, heating etc.



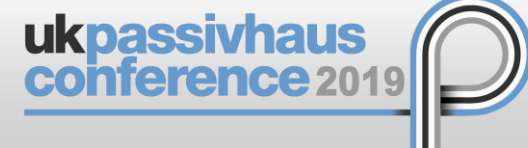
Variable costs of Passivhaus

- Airtightness (depends on detailing)
- Additional time for trades and management (more difficult to measure)
- Beware of overspecification of tapes etc.
- Non Passivhaus costs hugely significant
- Variable costs can be small (Porotherm blocks)

Certification costs



- Additional airtightness testing
- Passivhaus certification fee
- Passivhaus designer fees
 - Often additional member of design team



First time costs

- Training
- Additional time
 - Procurement of materials
 - Site supervision and QA inspection
 - Airtightness “champion”



Avoidable costs - Design



- Restrain architectural “statements”
 - Expensive elements (lintels)
 - Cost effective ornamentation (brick panels)
- Avoid additional innovation
- Keep structure simple
 - No cantilevers
 - Straight line loads

Avoidable costs - procurement



- “Risk money”
- Inherent costs of Design & Build contract
- Programming & planning



The “Skills Gap”



- Performance gap across construction industry
- Trade skills blamed
- Trades will do what they are told to do and paid to do
- Does fault lie with designers “Belt and braces” approach to airtightness?
- Are unrealistic performance figures forecast?

The real “Skills Gap”



- Major skills gap with Quantity Surveyors
- Estimators price Passivhaus incorrectly
 - Inadequate knowledge
 - No training prior to pricing
 - Innapropriate “trade” training, often only once contract is won
 - Lack of accurate historic cost data (not shared)
- Projects sequenced incorrectly
 - Time taken for additional elements such as taping unknown

The real “Skills Gap”



- Client’s cost plans don’t identify that designs are beyond budget
- Employers Agents amend contracts so Passivhaus is guaranteed by the contractor (JCT clause)

Risk premium



- Contractors add money to cover their risk
- Justified in doing so?:
 - MVHR won't fit in kitchen cupboards
 - Lifting eyes required for RC planks
 - Drying times increased with smaller windows

Designed in costs



- Form should follow function
- Aesthetics should not be first consideration
- Ornament buildings later in design process
- Architects usually brought in first
- Role of architect as lead consultant outdated

Learning curve



- 25% additional costs possible with first time clients, design teams, contractors, subcontractors
- 5% additional costs not unrealistic if lessons are learned and applied
 - **Bring in experience early – PM, M&E, Passivhaus Designer**
 - **Early training for project team**
 - **Form must follow function**
 - **Early training for bidding contractors – procurement!**
 - **Detailed design prior to contract – procurement!**
 - **Early contractor involvement – procurement!**

Passivhaus by another name



- Part L being reviewed
- Insulation requirements tightened further
- Airtightness increased further
- MVHR as standard – indoor air quality
- Passivhaus experience will increasingly become a competitive advantage even if only building to Regs

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ukpassivhaus conference 2019



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Thank you...

