

LEHII Case History: Hartington Road



April 2018

Report prepared by Mari Martiskainen and Paula Kivimaa, Centre on Innovation and Energy Demand,
photos by Alistair Nicholls

April 2018

For further information please contact:

Mari Martiskainen
Sussex Energy Group
SPRU- Science and Technology Policy Research
University of Sussex
Brighton, BN1 9QE

Email: m.martiskainen@sussex.ac.uk

<http://cied.ac.uk/research/emergence/lowenergyhousinginnovations>

The Low Energy Housing Innovations and the role of Intermediaries (LEHII) research project is part of the Centre on Innovation and Energy Demand, a research centre funded by UKRC. The LEHII project is conducted by Dr Paula Kivimaa and Dr Mari Martiskainen.

1. Introduction

Hartington Road is a self-build eco-house designed and built by Jason Thawley, a mechanical engineer and a product designer, who has experience in sustainable design especially using wood-based materials. The 80m² house cost a total of £170,000 and was built on an old paint shop site in Hanover, a residential area of Brighton. Jason had been looking for a suitable plot in Brighton for several years as rising house prices had meant that the kind of a house that his family needed was financially possibly only through a self-build. Jason started building the two-bedroom house in 2010 and it took approximately two and a half years to completion. The house has a range of sustainability features, including a timber frame, high levels of insulation, double glazing, mechanical ventilation with heat recovery (MVHR), solar thermal and a wood burning stove. It is not connected to the gas network. Hartington Road has been featured in a BBC documentary, as well as in Brighton and Hove City Council's Eco Open Houses event. This case history is based on an interview with Jason Thawley.

Technical features

- Airtight construction
- High performance double glazing
- LED lighting
- Low energy appliances
- Mechanical ventilation with heat recovery (MVHR)
- No boiler necessary
- Passive solar gain
- Rainwater harvesting
- Solar thermal
- Sustainable and low embodied energy materials
- Timber frame and part cladding
- Underfloor insulation
- Water saving fittings
- Woodburning stove

1.1. Key features/insights of the case

- Jason wanted to build a family home that would be sustainable and far from his previous experiences of living in cold and draughty houses
- While sustainability was a key motivation for the Hartington Road project, it had to be met within a strict budget
- Throughout the build Jason was an expert in minimising waste, taking every opportunity to reuse materials and off cuts
- Self-builders need to make informed choices over materials and building processes - online resources, discussion groups and events like Eco Open Houses can provide useful spaces for sharing experience and learning from others

2. The beginning: Sustainability as the pinnacle of design principles

Hartington Road is the brainchild of Jason Thawley, an engineer with a passion for sustainable and renewable materials. Jason had studied mechanical engineering, and afterwards spent several years as a product designer. The company he worked for specialised in professional audio equipment such as mixing desks and amplifiers used for example in recording studios and concerts. As part of his role Jason was involved in designing mechanical and electrical productions, but also thermodynamics and heat distribution. A few years later in 2004, Jason launched his own design practice, focusing on sustainable design. Having grown up in a farm, Jason had always been inspired by nature and balance, and he wanted to create products along those lines.

“At the time English companies going into Chinese production was getting more prevalent. A lot of the stuff we were doing was very budget based design and turn it out to get it made as cheaply as possible. I was more interested in the sustainable side of design and manufacture.” (interview comment, Jason Thawley).

That was also the time when LEDs were starting to emerge in the lighting market. While Jason was carrying on freelance product design work for the companies he used to work for, he also started to develop his own range of LED and low energy lighting products. Many of his designs use sustainable materials, including for example recycled materials and wood, and resource efficiency has always been important to Jason’s design principles.

“As an engineer when you study engineering and when you do engineering you always try and design or make something in the most efficient way. I think what I saw from a lot of use of plastics, other materials and manufacturing processes they were quite inefficient and very energy hungry. That just went against what I thought as an engineer and as a designer.” (interview comment, Jason Thawley).

Jason’s decision to build his own house was influenced by his previous experience of living in homes that were draughty and cold and the challenge of finding a reliable and affordable builder. However, he was also motivated by the prospect of actually designing a house that would meet his personal values.

“Living in Brighton in rental accommodation getting very aggravated with old boilers, draughty houses and cold houses. It was probably more my interest in using wood as a material and my whole product specialism before in sustainable build, which meant if I was going to build a house it was going to follow those same morals, concepts and philosophies. I built the house because it was the only way I could afford a house of the size I wanted in Brighton at the time. I have always been the sort of person who thinks, “Oh that is nice, I can do it myself.”” (interview comment, Jason Thawley).

First and foremost, building his own house was a lifestyle choice and Jason wanted to create a house that was meant for his family to live in rather than for him to explore sustainable building design. Jason was inspired by the Passivhaus standard, but as that seemed too expensive for him to achieve, so he set out to ensure that he would build the most sustainable house possible within his budget.

“If you look to build a house and you think, “Which is the best house around?” It is not something that is built out of bricks, lots of concrete, isn’t very well insulated and is going to cost a lot to run. That is not a good product. A good product is something that is well insulated, well built and has been efficient in its building because efficiency in a way means reduced cost. Also I think going forward overheads of running of that house thereafter were quite important. That all comes down to a sustainable build and energy conscious build.” (interview comment, Jason Thawley).

3. Finding a site: Pooling resources

Jason started his self-build with a clear budget in mind. He had £10,000, which he knew was not going to be enough for a deposit on a £180,000 house in Brighton, but would work as a deposit on a land that was under £100,000. Even though Jason had been looking at existing houses, he was keen to build his own and he had secured a self-build mortgage. The timing of Jason’s mortgage application had been fortunate as he did it just before the 2008 financial crash hit the UK’s housing market.

“I had applied for the mortgage at the time I had my own business, so it was a self-build, self-certification mortgage. Then the economy collapsed and if I had applied for that mortgage a week later I wouldn’t have got it. At the time when I did it, it was quite possible

to get those types of mortgages and banks were lending whatever they wanted really.”
(interview comment, Jason Thawley).

In terms of putting the mortgage into use, it took Jason four years to find a suitable plot in Brighton that he could actually afford. He had been looking at plots, but had often ended up competing against developers with more financial resources who would, especially at auctions, *“just pick it up, they had the money there ready and they didn’t have to go through mortgages and things like that”* (interview comment, Jason Thawley). Jason had in fact spotted the Hartington Road plot at an auction in 2009, but had initially dismissed it due to its high price and location on one of the steepest roads in Brighton.

“I saw this coming up for auction and I came to look at it. I sort of dismissed it at the time because the auction guide price was about £120,000 or something. The auction was going to go ahead and I hadn’t had any finances or anything sorted out. It was up this hill and I was living over the other side of Brighton right in the centre and I thought it was a bit out the way and I am not that interested in it.” (interview comment, Jason Thawley).

However, about a month later Jason spotted that the plot was on sale again, this time via estate agents with a guide price of £80,000. Jason thought that Hartington Road was the perfect sized plot and as he could afford it, he decided to buy it. At the time the UK housing market had been badly affected by the aftermath of the financial crisis, which had also affected the type of plots that developers were purchasing. Jason thinks that especially difficult plots like Hartington Road – being cornered by neighbouring properties and on a slope - were not attractive for larger developers at the time, which provided an opportunity for him.

“The developers weren’t going for them because they probably knew what was going to happen and they had to tighten their belts a bit, which is probably why I was able to get this.” (interview comment, Jason Thawley).

4. Design and planning stage: finalising planning details and building knowledge

The Hartington Road plot was located on the site of an old paint store and it came with an outline planning permission which had been granted for a residential development, before Jason and his wife bought the plot. This included initial drawings and certain requirements, such as two flat roofs and white rendered exterior walls.

“I think the people who owned the painter and decorator store and this plot had just put in a standard application to get it converted over to residential from commercial.” (interview comment, Jason Thawley).

In terms of planning requirements, Jason had to meet certain building regulations, but overall local planning authority Brighton and Hove City Council was not really interested in how Jason was going to build the house and out of which materials, as long as it met the Council’s outline requirements.

“Otherwise there was pretty much free rein for me to determine how I was going to build it and what I was going to build it out of. I think in effect I exceeded a lot of their sustainability codes and their housing codes at the time.” (interview comment, Jason Thawley).

Jason did a lot of research for the building design, mainly using the Internet, magazines and books as information resources, as well as *“watching lots of TV programmes like ‘Grand Designs’ and things like that”* (interview comment, Jason Thawley). Jason was especially inspired by Scandinavian-style houses and his visit to the Brighton Eco Open Houses event, which taught him valuable lessons in building design and *“seeing all of those places probably in a way gave me a bit more of a push to go and do it myself”* (interview comment, Jason Thawley).

Jason considered different build types and opted for a timber-frame build as that seemed the best option for him in terms of sustainability and costs. A timber-frame build is designed and priced up beforehand, and made in a factory environment, so it does not have the same potential pitfalls as a block build constructed on site might have, such as build delays due to bad weather or unexpected

additional costs. Furthermore, with a timber frame building, insulation can be built in the walls before the frame is erected on site.

“It can all be very much more exact than if you have got a builder on site and it is a windy day and they haven’t quite got that bit of insulation in properly or rushing to get it finished before the end of the day.” (interview comment, Jason Thawley).

Jason found a company based in Sussex, Solo Timber Frame, who gave him an affordable quote, and also offered a service of complete build, but due to his budget, Jason only chose the frame. While *“some people couldn’t get a mortgage in England if you had a timber frame house 20 years ago”*, timber-frame buildings have become more popular in the last ten years following trends in sustainable buildings (interview comment, Jason Thawley). For Jason, choosing a timber-frame meant a more reliable, and largely a fixed cost, build.

In terms of Jason’s vision and expectations for the house, he had to design and build the house according to his budget, while the size and shape of the house were constrained by the plot, which is bounded by houses, back gardens and a road. As a north facing plot, there were limitations on the availability of light and sun, which influenced the siting of windows and the use of skylights. Furthermore, as Jason did not want to use gas or electricity as a principal heat source, utilising as much passive sun as possible was key to the build. Jason incorporated large, pyramid-shaped, skylights in the design which give *“more volume within light”* (interview comment, Jason Thawley).

“The design of the skylights was really to get as much light and heat into the house from a natural environment as we could. There is one here [ground floor open plan living area] and the house steps up like that and then upstairs in the main bedroom the same size skylight up there. That was a really important thing.” (interview comment, Jason Thawley).

Jason designed most of the house himself and the timber-frame company took his initial drawings and did structural design as part of their manufacture of the frame. They were very helpful with Jason’s design-specific questions on materials, as well as specific requirements such as the large skylights due to which the company created a deeper ceiling beam to support the roof.

“If you look at it from an architect’s point of view and I was the architect in a way defining how the space was going to be used, where the light was going to come from and where things would be placed within it.” (interview comment, Jason Thawley).

5. Construction: Holistic approach to using building materials

Jason started building Hartington Road in 2010 and it took him around two and a half years to complete the build. This meant hard work and long hours as Jason also had a full-time job and two young children at the time.

“I was here [at the building site] during the day, go back and work at night. You could have built this place in six months if you had a big proper team behind you. It took the time it did because that is how we could afford it.” (interview comment, Jason Thawley).

Jason did as much of the building work himself as he could, mainly to stay within his budget. For example when it came to doing the foundations, there was still a garage on the site and Jason demolished it himself as the quote he had received had been too expensive. So for *“two weeks in a really nice summer I came down here with a sledgehammer and some other things and took the thing down myself”* (interview comment, Jason Thawley). Digging the foundations also showed Jason the limitations of the plot, in relation to issues such as the proximity of neighbours’ gardens and the depth required for the foundations.

“Once I had dug down you start to realise your site more. We started to realise that next door’s back garden is up here and then the house is over here. All the levels on the plot and how deep we are going in. Then you realise the foundations need more engineering because you have got to have a retaining wall here and then you have got to support that retaining wall and another one there. Then we have got to step the foundations down. Initially I thought a timber frame is a great way to go because it is lightweight and it won’t need any heavy foundations, but then the site needed something more specialised.” (interview comment, Jason Thawley).

Jason, however, was able to use his existing networks and one of his friends, a structural engineer, was able to help him with the tricky aspects of the site.

Doing most things by himself meant that Jason took a holistic approach to the whole building process, doing it as efficiently as possible, minimising waste and reusing materials where possible. The triangular shape of the house meant that there was a lot of potential wastage and Jason needed to plan to avoid wasting potentially useful materials. There were for example offcuts of plywood from the roof which Jason later turned into window sills. He also reused leftover plasterboard cuts and *“like a jigsaw puzzle just screwed it onto that wall”* (interview comment, Jason Thawley), creating a four-layer thick plasterboard wall which also acts as a thermal mass behind the wood stove.

“If you buy a carpet it is square or it is rectangular and if you want to stick it in a triangular room you have to buy it all and you have got this bit of wastage. It is looking at I have got this other bit of carpet here and I can use the rest of it to make a stair runner. There was a lot of that in the build really saying, “This is what I have got to get and this is what I have left over now, how can I use that?” (interview comment, Jason Thawley).

In terms of dealing with building control and the council, Jason ended up using an independent building inspector BBS Building Control rather than the council’s building inspector as this had been recommended to him by the timber-frame company. Jason chose BBS Building Control as they offered the whole package of builder manufacturer’s warranty, an NHBC¹ type warranty scheme, and they also undertook all the required checks such as building regulations, Energy Performance Certificate and air tightness. This cost more than if Jason would have dealt directly with the council’s building inspector, but Jason chose the independent building inspector as they were more specialised in the type of build that he was building.

“If we had gone with the council I think at the time they had three building inspectors working. One of them was okay, one of them knew his stuff and the other one was a bit more old school. You could have run into difficulties if they didn’t quite understand what you were doing with more of a newer build and a slightly different build.” (interview comment, Jason Thawley).

Jason’s main contact at the Council’s Sustainability Department was very supportive. Jason negotiated with them for example on the requirements for rendered outside walls as he wanted to use more sustainable timber cladding. He also suggested the use of timber windows instead of grey aluminium

ones that had been specified on the outline planning permission. Jason for example sent the Council samples of materials that he wanted to use and *“they were really encouraging of the things I was trying to do. It got accepted quite well.”* (interview comment, Jason Thawley). Furthermore, as the plot had already had outline planning permission, Jason did not have to go through lengthy planning applications as is often the case with self-builders starting from a blank canvas.

Much of the building process, Jason spent *“finding suppliers, trying to get discounts off suppliers and trying to get costs down”*, to see if he could *“get a little bit more for what I was buying”* (interview comment, Jason Thawley). This was hard work as sourcing materials and arranging discounts took a lot of Jason’s time. Even though Jason’s budget very much dominated his choices, it also pushed him to being more sustainable. Jason utilised his own skills, and those of others he knew, to the maximum. For example Jason ended up cutting and glazing the pyramid shaped skylights with the help of his step-father.

“I wanted these sustainable features and these things were going to give me free lighting and free heat. I did a lot of the work myself to be able to afford that and get them featured in the house.” (interview comment, Jason Thawley).

One opportunity for Jason to negotiate discounts with suppliers presented when he was given a chance to take part in a BBC TV programme called ‘To Build or Not to Build’ – a series following people who were self-building houses. The BBC had originally approached the timber-frame company who then passed on the details to Jason, who thought that it would be a good opportunity.

“I was like this could be good because if I have got a TV crew following me it means I can go to a supplier and say, “I need some stuff, it is going to be on TV can I have a discount?” That is why I did that in the main instance.” (interview comment, Jason Thawley).

While the programme provided an opportunity for Jason to negotiate discounts, it also worked as a way to document the building project, providing a keepsake for the whole family.

“Looking back and after that show came out it was amazing and it was brilliant to have somebody film you in a way and document you building your first house. That is a nice record as well.” (interview comment, Jason Thawley).

One pressing challenge during construction was the self-build mortgage which seemed to have been designed for more conventional building projects. The self-build mortgage was released in staged payments, so that Jason received his first payment after the land was purchased, second payment after foundations were completed and so on. However, there were times when the staged payments did not arrive on time for Jason to buy certain materials for example. This meant that some things with the build took longer, as Jason had to either delay the build or find funds from elsewhere.

“If I didn’t have that money to do it and I had to finish that stage before the mortgage company would lend it out to me, it would be that it took longer because I would have to do things slower or I would have to do things all myself or I would have to earn a bit of money so I could pay for something before I could finish it off.” (interview comment, Jason Thawley).

6. Sustainable energy provision: high energy efficiency and renewable energy

In terms of construction, as the timber-frame company made the shell of the house with the insulation included, it was a matter for Jason to choose the level of insulation. Jason wanted to make the house as airtight as possible, to reduce potential heat loss and heating requirements. Jason had three options in the timber-frame, and they were based on the level of insulation. Jason had budgeted for the base option of a 140mm thick wall with 90mm insulation. However, when he got to the building stage he started to have second thoughts about the level of insulation as *“once I get this plasterboard on I can’t do anything else to those walls”* (interview comment, Jason Thawley). Jason went on to find other solutions to increase the level of insulation and found a company called Seconds and Co who buy factory seconds of insulation and sell them with big discounts. This enabled him to include more insulation in the building.

“I had 90mm of insulation in the wall and then you have a 50mm gap before you hit the end of the stud, which all the cabling and pipes are going into. After finding this company I

bought an extra 60mm thick insulation sheets which I put on over the studs before putting the plasterboard on. That stops your heat transfer through the wooden studs and that gave you a much better U-value. We didn't need the foil on the insulation because it was already on the stuff in the walls." (interview comment, Jason Thawley).

Initially Jason had wanted to use underfloor heating, but for that he would have needed a new gas connection and a whole new gas central heating system with new pipes, boiler and radiators, which would have cost him almost £15,000. Instead, Jason opted for a wood burning stove, which cost him less than £1,000 and provides all heating requirements for the house for around £300 a year. Jason also installed a heat recovery ventilation system himself, which moves warm air around the house and also improves air quality, which is vital in a well-insulated house. The wood-burning stove acts as the principal heat source, but the house has small electric heaters as back up. Solar thermal panels are used for heating water. During an Energy Performance Certificate (EPC) process and assessing the house, it had an excellent score for energy use due to the solar gain, insulation and use of the woodstove as primary source of heating. However, with the amount of glass surface the house has in the skylight and its large windows, the overall EPC score was affected due to solar heat gain in the summer. The EPC did not take into account solar blinds used to counteract this.

7. Learning: Acting as an example to others

The process of building his own house has taught Jason a great deal and he has actively shared his learning with others. After completing the build, Jason for example contacted the Eco Open Houses team and offered his house to be included in the tours. He believed that as he had learnt from others, others could also learn from him by visiting and seeing his self-built eco-house in person. By taking part in the Eco Open Houses event, Jason also wanted to address the myth that self-build and eco-build are expensive and show what can be achieved by building efficiently, using off cuts and recycling materials.

"After building mine I thought it would probably be a good option for them to include this into that. I had learned a lot from going around and looking at other people's houses before this. Probably a lot of people can learn stuff from seeing this house as well." (interview comment, Jason Thawley).

The Eco Open Houses events provided an opportunity to meet like-minded people in Brighton, who have either built their house or completed a significant refurbishment on an existing house. Furthermore, there are also small meet up groups in Brighton who usually get together once a month and provide people an opportunity to discuss and share learning². These groups are especially useful as the process of self-build requires much research, problem-solving and decision-making on all aspects of the building process, including the right materials and suppliers to use. For example Jason had seen a business in London, where people can see a far wider range of building materials than is available through standard builders merchants, giving self-builders especially an option to compare materials and costs. Furthermore, Jason mentioned online resources such as Materia³ – a Dutch-based company which has a library resource of thousands of materials – as very useful.

“There is a lot of time spent in researching what is the right thing to do. Not so much the right thing to do, but what are all the right options that you can do, how much are those options and which one can I go for?... There are so many suppliers and there are so many different companies who make different products. It is a real look at those in detail and get a broad idea of all that is available. It is like studying to be an architect in a way I suppose. When you do a build you gain all of that knowledge of all of those little details and everything else. That is your learning curve mainly on the build.” (interview comment, Jason Thawley).

Furthermore, taking part in the BBC programme ‘To Build or Not to Build’ also meant that Jason’s lessons were available for a much wider, national audience. His house has also been featured by the ‘Homebuilding and Renovating’ magazine⁴ as an example of a low budget self-build. Since Jason built his home, there has been an increasing amount of information available for the self-build community, including for example the launch of a government endorsed website ‘Self Build Portal’ in 2012⁵, as well as general encouragement towards self-building amidst the recession hit construction industry.

“It was a few years ago the government were starting to see that self-builders were building a lot of housing in the UK. More so when there was a bit of a decline and developers weren’t doing it so much. They were thinking, “Let’s encourage self-builders.” I think one of the good things that could have come out of that was more of a fast track service for self-builders in planning because you haven’t got the back up of a big company

behind you. If you are having to delay three plus months on a build waiting for a planning decision as a self-builder that can be crippling.” (interview comment, Jason Thawley).

In Jason’s view it is important that local councils especially differentiate between self-builders and developers, and support the former as self-builders are going to “*build their houses better*” as they will be living in those houses, and are less profit-oriented than developers (interview comment, Jason Thawley). Furthermore, for many self-builders like Jason building their own house is the only option they can afford.

The Hartington Road house has overall met Jason’s initial expectations and even though the build process was stressful at times and involved a lot of hard work, It was also fun and Jason might take on another self-build in the future. Jason decided in 2016 to sell the Hartington Road house as his children were growing up and he needed more space. However, the legacy of Hartington Road, of using wood as a material and building efficiently, has continued in Jason’s other designs, one of which is a suspended tree tent⁶ which enables people to stay in a woodland with minimal environmental impact. The UK has planning restrictions for buildings in woodlands and as the tree tent is a suspended structure with no need for foundations it enables people to stay in the woods for research or leisure. The tree tent concept has been shown in a Channel 4 TV programme ‘George Clarke’s Amazing Spaces’ and has subsequently had worldwide interest. Jason has spent the last few years developing the tree tent concept into a business in its own right, to sell the product around the world.

“That is what I have probably been doing for the past five years is more getting into sustainable structure design rather than smaller products which I was doing before. I think that all stemmed from when I built the house.” (interview comment, Jason Thawley).

8. Summary

Building Hartington Road has been a real a personal journey and a learning curve for Jason. Driven by sustainability and efficient use of materials, Jason set out to build his own house with a limited budget and little previous experience in house building. Utilising his design and engineering skills, Jason took the view that he would build the best house possible for his family to live in. Jason was active in seeking opportunities, such as discounts, that would enable him to stay within his budget. Having a

dedicated building inspector and supportive planning team at the local council meant that meeting planning requirements was a relatively straightforward process.

Jason was fortunate in securing a self-build mortgage just before the financial crash hit the housing market, even though in practice the staged-payments design of the mortgage delayed his build at times. Even though Jason very much had an attitude that he wanted to do the build himself, he utilised his network of helpful friends and also spent a lot of time researching and visiting other similar projects. Furthermore, Jason has been willing to share his learning and experience with others, especially through activities such as taking part in TV programmes and magazine interviews, as well as opening his home for others to visit during the Eco Open Houses event.

References

¹ NHBC is the UK's leading standard-setting body and provider of warranty and insurance for new homes: <http://www.nhbc.co.uk> [Accessed 16.03.2016]

² For example AECB, The Association for Environment Conscious Building, holds regular meet ups in Brighton: <https://www.aecb.net/events/category/brighton-south-east/> [Accessed 16.03.2016]

³ Materia is a global network, which encourages joint innovation towards sustainable and high-quality materials for the built environment: <http://materia.nl> [Accessed 16.03.2016]

⁴ Crittenden, J. (2015). Brighton Self Build for £90k, Homebuilding & Renovating, 23.07.2015: <https://www.homebuilding.co.uk/brighton-self-build-for-90k/> [Accessed 16.03.2016]

⁵ DCLG (2012). Downing Street hosting the self-build boom: <https://www.gov.uk/government/news/downing-street-hosting-the-self-build-boom> [Accessed 16.03.2016]

⁶ Luminair Tree Tents: <http://www.luminair.co.uk/tt/> [Accessed 16.03.2016]