

# LEHII Case History: The Nook

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## 1. Introduction

The Nook is an old Victorian building, located in Preston Village, Brighton. It is owned by Two Piers Housing Cooperative<sup>1</sup>, which was set up in 1978, and has over the years become the largest housing co-operative in Brighton. Two Piers Housing Cooperative acquired The Nook in 1984 and in 2009-2010 the building went through a large retrofit, funded by Innovate UK's (then the Technology Strategy Board) 'Retrofit for the Future' programme<sup>2</sup>. The team working on the project included architects BBM Sustainable Design and the builder Earthwise Construction. The building's energy performance was improved from an F-rating to a B-rating and installed measures include for example wall, floor and roof insulation, energy efficient windows, mechanical ventilation with heat recovery and solar thermal panels. The Nook has been featured for example in a book by Marion Baeli<sup>3</sup> and it was showcased to the public as part of the Eco Open Houses Brighton & Hove event<sup>4</sup> three times during 2010-2012.

### Technical features

- Airtight construction
- External & internal wall insulation
- Ground floor insulation
- High performance glazing
- Low energy appliances
- Mechanical ventilation with heat recovery (MVHR)
- Solar thermal panels

### 1.1. Key insights

- A national programme, Retrofit for the Future, provided £150,000 (86% of total costs) towards a whole house retrofit of a large Victorian 'energy guzzler'
- Working together with an architect, a housing co-operative, a Brighton-based sustainable construction company delivered a retrofit in which building fabric was addressed first (insulation and airtightness), followed by energy efficiency and renewable energy measures (e.g. low energy lighting, solar thermal, mechanical ventilation with heat recovery)
- The Nook was an early pioneering retrofit project and provided a precedent in Brighton for acquiring planning consent in a Conservation Area with an Article 4 Direction in place. Out of the houses retrofitted as part of Retrofit for the Future, the Nook was one of three houses in a Conservation area and the only one with an Article 4 Direction
- Key learning from the project has included the importance of adequate budgets, as well as post-occupancy monitoring, in relation to retrofit projects, to ensure that projects are completed to decent standards

- The builder acted as a project intermediary but also had multiple intermediary and champion roles in the local niche by being a director of a not-for-profit environmental organisation. Technology Strategy Board was a champion and intermediary at the ‘cosmopolitan level’.

## **2. Background: from an old squatting place to co-operative living**

The Nook, nestled in the small lane of Lovers Walk in the Preston Village area of Brighton, is a two-storey 177m<sup>2</sup> house with six bedrooms, two bathrooms and an open plan kitchen living room. It was built in 1895 and was originally used as a rectory. The building has since 1980s been part of Brighton-based Two Piers Housing Co-operative (referred to as Two Piers from now on). Two Piers was founded in 1978 by Brenda Boardman in order to address the needs of single parent housing in the city, and it became a registered housing association in 1979<sup>5</sup>. In 1982, residents squatting in The Nook contacted Two Piers to see if they could save the house from a Compulsory Purchase Order which was linked to nearby railway development<sup>5</sup>. Two Piers bought the property in 1984 and it became a licenced member of the Two Piers.

Two Piers is managed by its residents, who are members of the co-operative with a flat democratic structure, so that each member has a vote on issues affecting the co-operative (interview comment, Mischa Hewitt, Earthwise Construction). The co-op has seven working groups which have dedicated areas of responsibility, including well-being of members, future development and growth, sustainable development, new membership allocations, property maintenance, financial management, and communications and planning<sup>6</sup>. Two Piers owns six different buildings across Brighton, including four renovated shared houses, one renovated house of seven flats and one new-built block of 11 flats<sup>7</sup>, with a total of 68 tenancies<sup>6</sup>.

### **2.1. Retrofit for the Future programme**

The Nook suffered from problems typical to houses built in the Victorian times – no sufficient insulation in walls, floors or the roof and poor single glazed windows meant that the building was cold, draughty and required a large amount of energy to heat.

*“The boiler they had before, literally it was just like a solid lump of metal. I don’t know when it was installed, but it was an absolute relic. They spent more money than they would*

*have done otherwise because they had such an inefficient house. A beautiful house, a massive Victorian villa, but just an absolute energy guzzler” (interview comment, Mischa Hewitt, Earthwise Construction)*

Retrofitting plans for The Nook were initially started by a Brighton-based Sustainability Consultant Mischa Hewitt in 2009. Hewitt runs an energy consultancy Earthwise<sup>8</sup> and is a Director of Low Carbon Trust<sup>9</sup>, a not-for-profit organisation set up in 2001 to create and manage environmental projects. Hewitt has been involved in low energy buildings since 2003 and he project managed the award-winning Earthship Brighton project<sup>10</sup>, wrote a book about earthships in Europe<sup>11</sup>, completed a Master’s degree in Architecture: Advanced Energy & Environment Studies at the Centre for Alternative Technology<sup>12</sup> in Wales and is a Certified Passivhaus Designer.

In 2009, Hewitt attended Ecobuild<sup>13</sup> – now one of the UK’s largest events on built environment – and came across the then Technology Strategy Board’s (now InnovateUK) presentation by Neil Morgan on their new programme called ‘Retrofit for the Future’ (interview comment, Mischa Hewitt, Earthwise Construction).

*“It was somebody from the Technology Strategy Board, which is now Innovate UK. He was presenting about Retrofit for the Future, and it seemed like an amazing project. Literally it was very fresh. It was very new. I think they had only decided to do it a month or so before the presentation.” (interview comment, Mischa Hewitt, Earthwise Construction)*

Hewitt was very impressed by the presentation and the Retrofit for the Future programme, which seemed to provide substantial funding for whole house retrofit projects. The UK government had passed the world’s first Climate Change Act in the previous year, in 2008, and there was generally a lot of interest in creating sustainable homes by the then Labour government (interview comment, Mischa Hewitt, Earthwise Construction). Retrofit for the Future was at the time the largest demonstration study of whole house retrofits in the UK<sup>14</sup>. The £17 million programme was run in two phases. First funding was available for 194 feasibility studies, of up to £20,000 each, and second, of those feasibility studies 86 project were chosen to receive of up to £150,000 each for the actual retrofit works<sup>15</sup>. The programme’s aims were three-fold: social, environmental and economic. The programme wanted to 1) drive retrofitting in poor performing social housing, and do it innovatively, 2) reduce emissions, and 3)

help builders to deliver more efficient buildings<sup>2, 15</sup>. It also wants to retrofit different types of social tenancy homes across the UK, to examine the *“viability of different systems, and give them an opportunity to be showcased”* (interview comment, Mischa Hewitt, Earthwise Construction), as well as to stimulate business opportunities for the UK’s retrofit market<sup>2</sup>.

*“The idea was that they would give project teams some money to do feasibility studies, and then from there, if they were successful, they would choose a number of those feasibility studies and actually give them a sum of money to deliver the capital work.”* (interview comment, Mischa Hewitt, Earthwise Construction)

The programme especially encouraged housing providers to collaborate with designers, contractors and researchers, to retrofit properties with a goal of achieving an 80% CO<sub>2</sub> emission reduction each<sup>2</sup>.

*“Specifically the idea with the project was to put together a social landlord, an architect, and a contractor, and that was basically the project team, to deliver a very retrofitted social house. The idea of the project was to demonstrate how a house could be taken and its carbon emissions could be cut by 80% over the baseline of whatever it was.”* (interview comment, Mischa Hewitt, Earthwise Construction)

Immediately outside the presentation, Hewitt crossed paths with an architect he knew, Duncan Baker-Brown of BBM Sustainable Design, and told him about the Retrofit for the Future programme. Both Baker-Brown and Hewitt were very inspired by it and once Hewitt was back in Brighton a few days later, he *“started ringing around social landlords”* to find a potential social housing partner (interview comment, Mischa Hewitt, Earthwise Construction). At first Hewitt found it difficult to find a social housing landlord that would be interested in the project as either he did not get through to the right person or *“most of them weren’t particularly amenable to the idea”* (interview comment, Mischa Hewitt, Earthwise Construction).

*“To be frank, I just rang people up cold and tried to speak to the best person I could, so I was limited really to who I could get through to at that point in time. They really just didn’t understand the basic point that the government were prepared to invest £150,000 on an energy demonstration project on one of their houses. Yes, quite extraordinary really. Those*

*conversations didn't really go very far.” (interview comment, Mischa Hewitt, Earthwise Construction)*

Hewitt then contacted Brighton & Hove City Council, with whom he had worked on a previous project, and also Two Piers Housing Co-operative, where one of his colleagues had used to live (interview comment, Mischa Hewitt, Earthwise Construction).

*“We had been working with Brighton & Hove City Council on this the year before, and the people in my company I worked with used to live in a Two Piers Housing Co-operative, so we had direct experience with both organisations.” (interview comment, Mischa Hewitt, Earthwise Construction)*

Together with Brighton & Hove City Council and the Two Piers Housing Co-op, Hewitt applied for funding from the Retrofit for the Future programme to conduct feasibility studies on two properties in Brighton, both of which received funding. However, only one of the houses, The Nook, was successful in securing funding for the actual retrofit works (interview comment, Mischa Hewitt, Earthwise Construction).

*“We applied for feasibility funding for two projects, which we got. The other was 105 Preston Road, which is actually just around the corner to The Nook, but we did feasibility studies on both projects, on how to achieve 80% carbon reductions on them. Then they went into the competition, and we received full funding to do The Nook and not the other one.” (interview comment, Mischa Hewitt, Earthwise Construction)*

At the time, Hewitt was also doing a training course in passive house design in Scotland – he is now a Certified Passivhaus Designer - and he was very keen to *“basically just do an incredibly deep level retrofit”* (interview comment, Mischa Hewitt, Earthwise Construction). The Retrofit for the Future seemed like an excellent opportunity to deal with one of the key barriers to retrofit that Hewitt had come across in other projects, i.e. that of money (interview comment, Mischa Hewitt, Earthwise Construction).

*“Most of the projects that we had done up until that point as a building company we found that people obviously have limited money, and generally they choose to put that money into things other than energy efficiency. So you can get a certain amount done, but it’s very hard to get people to put a large amount of their capital into improving their housing. There are examples out there where that’s not the case, but generally from our experience that was one of the limiting factors. So for us it was a very exciting opportunity to overcome the issue of there not being enough money to actually do the work on the house.” (interview comment, Mischa Hewitt, Earthwise Construction)*

The funding provided by the Retrofit for the Future programme was especially welcome as it allowed Hewitt and partners to first and foremost focus on delivering a low energy retrofit in a large Victorian property, with the use of energy efficiency and renewable energy measures being key objective in the works.

*“It was nice to have just a chunk of money that was just purely put at the energy efficiency measures, and renewable energy, as opposed to having to then use some of it for a new kitchen, or a new bathroom, or whatever. Yes, that was one of our drivers. We were just very, very keen to just deliver a very low-energy retrofit.” (interview comment, Mischa Hewitt, Earthwise Construction)*

### **3. Design and planning stage**

In terms of putting the designs together for The Nook’s refurbishment, Hewitt was keen to work with architects BBM Sustainable Design and did not consider other firms as he knew that BBM was *“a very good local practice”* (interview comment, Mischa Hewitt, Earthwise Construction). The vision for the retrofit was to achieve 80% reduction in carbon emissions, using passivhaus principles, energy efficiency measures and renewable energy.

*“We went into it thinking there were a certain number of measures we would like to do, and then basically we had them all modelled with the Passive House Planning Package, and in SAP as well, and from there that’s what we went on to do.” (interview comment, Mischa Hewitt, Earthwise Construction)*



Ideally the designs would have included more renewable energy, but the project did not have enough funds to deliver that. The Retrofit for the Future programme provided £150,000 for the project and Two Piers Housing Co-op a further £22,500. Given the large size of the property, wall insulation alone cost £40,000 and used a large part of the budget.

*“In total we spent £172,500 on energy efficiency measures for that house. I think we spent £40,000 just insulating the walls. The wall area is huge. So the square meterage cost might not be that high, but then there are hundreds of square metres. It was just expensive. It’s a very large property.” (interview comment, Mischa Hewitt, Earthwise Construction)*

For insulation for instance, the availability of products in 2009 was rather limited compared to what it is today, and solutions were chosen largely based on cost (interview comment, Mischa Hewitt, Earthwise Construction).

*“We went with phenolic. I think it was the Wetherby System. That’s basically 100mm or 120mm of phenolic foam, with acrylic polymer render. We went with that system because it’s relatively cheap for the amount of insulation that you get and the U-value.” (interview comment, Mischa Hewitt, Earthwise Construction)*

At the feasibility study phase, the main partners Earthwise Construction, BBM and Two Piers had been using quite a large number of subcontractors for actions such as quantity surveying and health and safety checks, but in the end the core team ended up undertaking much of the works themselves as they had the skills to do so (interview comment, Mischa Hewitt, Earthwise Construction). For example, the MVHR system was designed by Green Building Store, but the project team actually built it and at the end Green Building Store checked and commissioned it (interview comment, Mischa Hewitt, Earthwise Construction).

*“Mostly it was just the core team, really, of us as the contractor, the social landlord, and the architect, supported by a few subcontractors. When it came to delivery we did everything ourselves, other than we got some specialist subcontractors in for certain elements of it.” (interview comment, Mischa Hewitt, Earthwise Construction)*

### 3.1. Retrofitting in a Conservation Area

One key driver for The Nook project was to examine the possibilities for a large-scale retrofit in a Conservation Area, which had strict limitations on further development (interview comment, Mischa Hewitt, Earthwise Construction). The Nook is located in an area which has an 'Article 4' in place, meaning that there are additional planning restrictions and 'permitted development' rights are not in place for "*certain alterations, such as new porches, replacement windows and doors, replacement roof coverings and painting of the exterior of a building*"<sup>16</sup>. Hence The Nook project team had to have a clear idea of what they were planning to do to the property and being located in a Conservation Area influenced the planning stage of the project (interview comment, Mischa Hewitt, Earthwise Construction).

*"It was in a conservation area with an Article 4 direction in place. It's basically the hardest type of conservation area to develop. That was a big, big issue for us, and it really informed exactly what we did and why we did what we did." (interview comment, Mischa Hewitt, Earthwise Construction)*

The planning application process took a long time and slowed down the project quite considerably (interview comment, Mischa Hewitt, Earthwise Construction). The start of the project was delayed by four months<sup>3</sup> but the team "*were not prepared to start on-site until we had all of the planning permissions achieved*" (interview comment, Mischa Hewitt, Earthwise Construction).

The team applied for planning permission in December 2009 (planning permission for all elements of the project was finally obtained on 16 August 2010) and especially the initial plans for the new triple-glazed windows proved complicated, "*because the conservation officer at the time in the council wasn't very keen on the windows that we were proposing*" (interview comment, Mischa Hewitt, Earthwise Construction).

*"Because it was the conservation area, the conservation officer had very, very strong opinions about the glazing that we proposed. Which, to be frank, I think his opinions were not very helpful. He was talking about millimetres of detail. Given that the house is set back probably five or six metres, you would need incredibly good eyesight to see that level of*

*detail from that distance. But, because of that, we couldn't put triple-glazing in the front.”*  
*(interview comment, Mischa Hewitt, Earthwise Construction)*

The team had to come up with new solutions, which included using double glazed windows in the front of the house and triple-glazed on the side and rear of the house<sup>3</sup>. There were also issues with the street facing façade, which due to Article 4, had to be treated with a different wall treatment from the rest of the walls, even though the team would have preferred to use the same material throughout the house (interview comment, Mischa Hewitt, Earthwise Construction).

*“The house is quite unusual. It's called Lovers Walk because it's got a very big, beautiful stairway. It's quite gothic, in a way, a sort of film-noire stairway past it. So there is an obvious street facing façade, even though it's the end of a cul-de-sac, but there's a side of the house as well that's quite visible, because you've got this amazing staircase walking up to the road above. Ideally we would have used the same wall treatment throughout, same windows throughout, for economy of scale, but just ease of approach.”* (interview comment, Mischa Hewitt, Earthwise Construction)

The planning team advised The Nook team that they *“could do whatever we wanted with the street facing façade, but it would have to be put back to looking exactly as it did”* (interview comment, Mischa Hewitt, Earthwise Construction). The wall treatment costs were estimated at an extra £15,000, which the project could not afford, so in the end the team ended up insulating the front of the house internally, which in turn affected the type of windows the project could use (interview comment, Mischa Hewitt, Earthwise Construction).

*“In the end we ended up internally insulating at the front, with returns to eliminate the thermal bridges going back to the chimney breast, which is about a metre, and then it was external insulation at the sides and the rear. It also hugely impacted what windows we could choose.”* (interview comment, Mischa Hewitt, Earthwise Construction)

In the end the team were advised by the planning department to submit two separate planning applications, *“one for the general works and one for the windows”* (interview comment, Mischa Hewitt, Earthwise Construction).

Planning permission for the retrofit was finally approved in August 2010, and works could begin on-site. In fact, the Nook was the only house of the Retrofit for the Future projects in an area with Article 4 restrictions, meaning that the team *“chose the largest most challenging project nationally out of all of the houses that got funded”* (interview comment, Mischa Hewitt, Earthwise Construction). However, the work that the team did around receiving planning permission for the windows was ground-breaking, because it meant that there was then a precedent in the city for that type of development (interview comment, Mischa Hewitt, Earthwise Construction).

*“Town planners hate the word precedent. They don’t like the word precedent because they know exactly what it is. It is the fact that other people can come along and say, “Well, you allowed that there. Why aren’t you allowing it here?”. The fact is for that project we got planning precedent of very high specification windows in an Article 4 area, which is very difficult to do.”* (interview comment, Mischa Hewitt, Earthwise Construction)

## **4. Retrofitting stage**

Following a successful planning approval, The Nook retrofit started in August 2009. As the Retrofit for the Future programme was a six-month programme, it meant that The Nook team *“ended up finishing quite a lot of the project in the middle of winter, which was not ideal”* (interview comment, Mischa Hewitt, Earthwise Construction).

In terms of actual retrofitting of the property, this involved four different elements. First, to install high levels of insulation on external surfaces to improve U-values and deal with thermal bridges (interview comment, Mischa Hewitt, Earthwise Construction). Second, to improve air tightness. Third, to install a mechanical ventilation system, which was especially important as the retrofit included *“airtightness to the point where natural background ventilation wouldn’t be enough”* (interview comment, Mischa Hewitt, Earthwise Construction). Fourth, to install highly energy efficient services and, where possible, renewable energy.

### **4.1. Installing high levels of insulation and improving airtightness**

Insulation of the property was started with the floors, which proved to be rather complex, as the team found out that *“for some reason in the 1980s a concrete slab had been poured throughout”* the ground

floor, which meant that the team had to *“basically build the whole of the ground floor up to the level of the first step on the stairs”* – this was not really an issue due to the high ceilings of the property. However, the team had to cut the lintels out and move all the doors up, before they could build the new floor (interview comment, Mischa Hewitt, Earthwise Construction). During that time, the tenants were moved out of the house because the floor treatment *“was incredibly invasive”* (interview comment, Mischa Hewitt, Earthwise Construction). There were parts to the floor that could not be treated, such as a small, one m<sup>2</sup> porch area as the threshold levels did not work at the doors, but otherwise the whole of the rest of the ground floor was insulated.

As for treating the walls and loft, this included various types of insulation solutions, in both internal and external walls. For example, the team members went over *“each individual joist to make it very airtight”*, followed by *“phenolic boards down in-between, and then over the top”* and resulting in good U-value (interview comment, Mischa Hewitt, Earthwise Construction).

*“The walls we did internally with 120mm of phenolic on the front, with metre returns down the side. Then on the sides and the rear elevations we did 120mm of phenolic externally, and that wrapped over at the front, so you had the metre return on the inside, and then you had straight up to the front on the outside. So there was no thermal bridge at that point. Then we went up and we insulated all around the chimney breast as well, and capped it all off, so it was very neat. Then in the loft we insulated at joist level. I think we used phenolic again.”* (interview comment, Mischa Hewitt, Earthwise Construction)

The aim of all the insulation was to eliminate any thermal bridges wherever possible, and the works included for example *“returns on all of the windows”* and all the frames were wrapped (interview comment, Mischa Hewitt, Earthwise Construction). The windows included both double and triple glazed frames, with triple-glazed windows installed at the back of the house and double-glazed windows to the front, as per planning requirements. The team also installed a well-insulated triple-glazed back door.

#### **4.2. Sustainable energy provision: Providing energy efficient services and renewable energy on site**

Following works to insulate the house, a new A-rated gas condensing boiler with a good thermal store was installed. The project also included the provision of renewable heat generation on site, a system including two roof-mounted evacuated tube solar thermal arrays and *“a twin coil tank that took feed from the solar thermal system and the condensing boiler”* (interview comment, Mischa Hewitt, Earthwise Construction). The solar system provides hot water as well as top-up space heating through the existing radiators<sup>3</sup>. To ensure adequate ventilation in an airtight house, a mechanical ventilation system with heat recovery was installed in the loft (interview comment, Mischa Hewitt, Earthwise Construction).

#### **4.3. Working on a fully occupied house**

During the retrofit works, the tenants lived in the house most of the time, apart from a three-week period when the floor insulation was installed. As the tenants were also members of the Two Piers Housing Co-op, they were effectively their own landlords and decided not to move out for the duration of the project. This, however, proved a challenge to both the retrofit team as well as the tenants.

*“They were living there whilst we did the work, and it was very disruptive for them, and it was very disruptive for us. My colleagues who were on-site building every day would clean up at the end of the day, and every day I think there were five adults living there at the time would come back. They weren’t happy because the house wasn’t cleaned to the level they wanted, because they lived there. Nevertheless, we spent a lot of time cleaning to a level that they weren’t happy with.”* (interview comment, Mischa Hewitt, Earthwise Construction)

Insulating the floor was very invasive, dusty and messy, but as the house was empty, Hewitt and his team decided to do as many things as possible in that time. In fact, the team *“got more done in that three weeks towards completing the project than we did in the rest of the six months of the project!”*, moving the project forward significantly (interview comment, Mischa Hewitt, Earthwise Construction).

#### 4.4. Monitoring and evaluation

Part of the Retrofit for the Future programme was monitoring and evaluation, and each project was required to have building performance monitoring for at least two years following completion of works<sup>14</sup>. The minimum requirements were to monitor gas and electricity use, internal room temperature, internal CO<sub>2</sub> and internal humidity<sup>14</sup>. As a result, the project team installed several sensor kits at The Nook.

*“They put in a little weather station, so they had air temperature and relative humidity for outside. Then they put in temperature probes in different rooms to get air temperature. They also put in a CO<sub>2</sub> sensor in a couple of places, I think in the main living space, in one of the bedrooms as well, and other bits and pieces as well. So there was fairly good monitoring.” (interview comment, Mischa Hewitt, Earthwise Construction)*

For example, primary energy consumption reduced from 316 kilowatt hours/m<sup>2</sup>/year (kWh/m<sup>2</sup>/yr) to 115 kWh/m<sup>2</sup>/yr, while indoor quality too was reported to be of good quality<sup>3</sup>. Hewitt was especially pleased about the monitoring aspects of the project.

*“One of the things I really liked about the project was the fact there was a lot of monitoring and evaluation in there, and they did a lot of... pre and post air pressure testing. They did thermography as well.” (interview comment, Mischa Hewitt, Earthwise Construction)*

In terms of the actual project team reporting to the funder InnovateUK, Hewitt and his team had very little interaction with them during the project, with the project team only required to produce a final report at the end of The Nook project (interview comment, Mischa Hewitt, Earthwise Construction).

*“Pre project I think we submitted two feasibility applications to them. They gave us the money. We had three months to produce the feasibility studies, using a set pro forma and whatever supporting documents we wanted. We did that, and then we got a letter from them saying that they were awarding the full amount, and I think they just released the money in tranches. I don't remember there being much reporting during the project. We had to fill a final report out at the end.” (interview comment, Mischa Hewitt, Earthwise Construction)*

## 5. Learning

The Nook project has provided ample opportunities for learning about whole house retrofit, and the challenges as well as opportunities linked to such projects. The Nook has been used as a case study in several occasions and disseminating the project include actions such as taking part in the Eco Open Houses Brighton & Hove event<sup>4</sup> three times during 2010-2012, being featured in a book<sup>3</sup> as well as a report by the Energy Saving Trust in relation to the Retrofit for the Future project<sup>17</sup>. Hewitt has presented the project at several events, including for example a national retrofit conference in Birmingham in 2013 as well as several local events in Brighton. The project was also shortlisted in the Retrofit Awards in 2012, and even though The Nook did not win the competition it was disseminated through that nevertheless (interview comment, Mischa Hewitt, Earthwise Construction).

### 5.1. Having an adequate budget for the right solutions

Completing the project led Hewitt not only to learn better technical solutions and test software such as the Passive House Planning Package<sup>18</sup>, but also that retrofit projects generally “*need to come up with a way of raising significantly more money than generally is there to do them*”, so that projects can be completed “*correctly and appropriately*” (interview comment, Mischa Hewitt, Earthwise Construction). One key outcome for Hewitt from The Nook project was that the budget available allowed the team “*do stuff that we otherwise wouldn’t or generally have the time to do*” (interview comment, Mischa Hewitt, Earthwise Construction).

*“For example, with the external wall insulation we dug a trench all the way around the building, and then we insulated using XPS rather than the phenolic foam. I can’t remember if it was half a metre maybe further down, below the damp proof course. I’ve never seen anyone else do that on an external wall insulation job, and yet that thermal bridge will always be there, unless you do that treatment, but that treatment is expensive.” (interview comment, Mischa Hewitt, Earthwise Construction)*

There were also tasks that Hewitt only realised later that could have been accomplished in much easier ways, like for example the installation of the loft insulation.

*“I was only thinking about it afterwards, and I was just thinking, “Why didn’t they just put the boards down, and just insulate with a flat membrane, tape it at the sides, and then put*



*insulation over the top?” But you live and learn. Which I guess is the point of the project.  
(interview comment, Mischa Hewitt, Earthwise Construction)*

While the project did not necessarily use new, innovative technologies, nevertheless what Hewitt and colleagues completed was first of its kind in Brighton, *“just good, solid, fabric first retrofit, to a very high standard, and a very good level, that simply hadn’t been done before”* and with little follow-up of similar projects since (interview comment, Mischa Hewitt, Earthwise Construction).

*“The thing is, in many ways our project, I would argue, wasn’t that innovative, in the sense of what we were doing wasn’t that innovative, other than the fact it just simply wasn’t being done. I would throw the gauntlet down now and say, “Is there another house in Brighton & Hove that’s been renovated to a higher standard than that house?” I would suggest no. I’ve certainly not seen one, and we finished that project five years ago.”  
(interview comment, Mischa Hewitt, Earthwise Construction)*

## **5.2. Working with a housing co-operative**

Another key learning for Hewitt was working with a housing co-operative, where every member had a vote and say in each issue, which at times resulted in the need to deal with several people (interview comment, Mischa Hewitt, Earthwise Construction). However, on the positive side, people were also very engaged with their housing (interview comment, Mischa Hewitt, Earthwise Construction).

*“In principle they [co-ops] work very well. In practice, it can be complicated ... They [Two Piers] have different groups doing different things. So when we were costing the budget out, and we were doing stuff, and we realised we needed extra money, we had to go and find a certain group and then present to them what we were doing and what we needed.”  
(interview comment, Mischa Hewitt, Earthwise Construction)*

One challenging issue that resulted from working with a co-op for example was the Two Piers’ decision to not to move people out of the house during the retrofit project. In the future Hewitt would ensure working on an empty house because this would make the process much easier for everyone, given the amount of disruption retrofit projects include, so that *“they [client] will be happier and we will be happier too”* (interview comment, Mischa Hewitt, Earthwise Construction).

However, Hewitt feels that Two Piers received a good project with relatively little investment required from themselves (interview comment, Mischa Hewitt, Earthwise Construction). The project thrived for delivering value for money and this was further enabled by the team's accountant who at the time pointed out a VAT Notice<sup>19</sup>, which provides a reduced VAT rate of 5% for the installation of energy saving materials (interview comment, Mischa Hewitt, Earthwise Construction). This enabled the team to do a very detailed VAT analysis of what they were spending on what materials, saving them money that could be then invested back into the project (interview comment, Mischa Hewitt, Earthwise Construction).

### **5.3. Post-occupancy behaviour**

With a high energy efficient retrofit, occupant behaviour is a factor that will influence final use of energy in the building and cannot be easily predicted. While Hewitt and his team did not have formal follow-up procedures in place for The Nook, Hewitt happened to see some of the residents by chance a few times after the project finished. The tenants seemed generally happy with the building, apart from some initial noise issues with the MVHR system, which the Green Building Store most likely fixed (interview comment, Mischa Hewitt, Earthwise Construction).

Last time when Hewitt was there in 2012, giving tours during the Eco Open Houses Brighton & Hove event, he noted that some of the tenants were lightly dressed, indicating that they were perhaps heating the house more than he would have expected (interview comment, Mischa Hewitt, Earthwise Construction).

*"I was standing there, just talking to the group, and I noticed these two figures at the back, dressed a little bit like the people in Pulp Fiction when they're wearing T-shirts and shorts. I thought, "That's a bit strange." Then everyone left, and I realised that the two people there in T-shirts and shorts were two of the people that lived there. So I went over and said, "Hello. How are you doing?", and they said, "Yes, it's all about T-shirts and shorts these days. It's lovely and warm." It is amazingly warm in there, really, really comfortable, but instead of using less energy to heat their house they've chosen to take the comfort instead. So the house is much hotter. It did make me think, "Great. We spent the best part of £200,000 improving the energy performance of this house, and the people are choosing to take the comfort." I guess that's part of the learning, really." (interview comment, Mischa Hewitt, Earthwise Construction)*

Despite the tenants preferring comfort over energy saving, The Nook nevertheless uses much less energy since the retrofit Hewitt thought that as a result *“it has dramatically cut their bills”* even though he did not have their actual bill data (interview comment, Mischa Hewitt, Earthwise Construction). In an evaluation of the whole Retrofit for the Future programme, nearly 85% of all the cases’ occupants had a positive opinion of their homes post retrofitting, with tenants feeling safer and healthier, and their energy bills were lower<sup>14</sup>.

In potential future projects, Hewitt would want to ensure *“really good monitoring”*, in order to learn from completed projects and share that learning with others too (interview comment, Mischa Hewitt, Earthwise Construction). Post-occupancy monitoring especially is important, to determine how for instance building fabric and ventilation are working once users have moved in, which in turn will help to make *“sure that you end up with a good, high-quality product”* (interview comment, Mischa Hewitt, Earthwise Construction).

#### **5.4. Future of the UK’s retrofit market**

Hewitt says that the support that projects like The Nook, and the UK’s retrofit marketplace, require is *“just a very simple plan, that’s here for the next 40 years, on how we’re going to retrofit all of our houses”*, that will enable businesses to plan properly (interview comment, Mischa Hewitt, Earthwise Construction). This also requires a plan for training and skills, so that the UK’s housing stock retrofit can actually be delivered, and to good quality and standards. Training needs were also one key finding from the evaluation of the whole Retrofit for the Future Programme conducted by the Energy Saving Trust<sup>14</sup>. This would involve training professionals across the building trade, including especially training for those *“that design and do energy calculations, and people that survey buildings, particularly with things like external wall insulation and internal wall insulation”* (interview comment, Mischa Hewitt, Earthwise Construction).

*“If we’re going to retrofit twenty-five million houses we need a very strong SME network of quality builders, and other professionals, that can actually deliver that to a high standard. So we don’t end up with poorly retrofitted buildings, that have unintended consequences and slightly perverse outcomes.”* (interview comment, Mischa Hewitt, Earthwise Construction)

Successful projects completed in the Retrofit for the Future programme had active engagement with every relevant stakeholder, ensuring consistency of results<sup>14</sup> and in The Nook's case too, the project team worked closely together not only between each other but also with the local planning authority and relevant contractors. In terms of the clients, Hewitt has first-hand experience of what people usually require, given his involvement with the Eco Open Houses since 2008, and seeing many people who have wanted to retrofit their homes.

*“Consistently every year we do monitoring and evaluation [of Eco Open Houses], and every year people say the same thing. “What can I do to my house? How can I get independent impartial information about it? Who locally is there that can do it to a high standard? How do I find a good quality builder?” And thirdly, “What mechanisms are there to pay for it?” It’s pretty telling.” (interview comment, Mischa Hewitt, Earthwise Construction)*

While many people have paid for retrofits through their savings, a programme such as the Green Deal was too complicated and admin heavy, especially as often many interventions that people were looking at installing were costing relatively small sums of around £1,000-£2,000 (interview comment, Mischa Hewitt, Earthwise Construction). Providing a certain marketplace, and with some form of subsidy, with a good five to ten-year plan, and general direction of travel, would be an important start (interview comment, Mischa Hewitt, Earthwise Construction).

*“Once again, having a sensible funding regime, and not just having a very small pot of money that people subscribe to, and that closes down within 24 hours. That’s not helpful. It doesn’t help anyone with their business planning. From the householder’s point of view, we just need good quality impartial information, a good network directory of builders that can do it, and a clear funding mechanism.” (interview comment, Mischa Hewitt, Earthwise Construction)*

However, in the present political moment with a government which “*doesn’t care about green issues*” but instead treats “*energy efficiency as a kind of add-on that certain people of a certain political persuasion have*”, it will be difficult to convince the government of the business opportunity that retrofits could provide (interview comment, Mischa Hewitt, Earthwise Construction). Therefore, “*until there is very strong political will behind it we have what we have now, which is the pioneers and the*

*very, very early adopters, who are out there doing it.”* (interview comment, Mischa Hewitt, Earthwise Construction).

## 6. Summary

The Nook is a pioneering whole house retrofit project, completed in Brighton in 2009. With funding from InnovateUK’s Retrofit for the Future programme, as well as the building’s owner Two Piers, it went through a £172,000 retrofit, which included multiple energy saving and renewable energy measures. The Nook is located in a conservation area with strict planning restrictions, requiring careful design from the project team and revised plans were needed for windows and external façade works for instance. Nevertheless, with approved planning, The Nook set a precedent for retrofit projects in Brighton. Having been used as a case study in several occasions, learning from The Nook has been shared via avenues such as books, seminar talks and guided tours during Eco Open Houses. At a time of limited political support for whole house retrofits, projects like The Nook can act as reminders of the benefits that whole house retrofits produce through both improved comfort and opportunities for energy saving.

## Data Sources

The case study history is based on one digitally recorded and transcribed in-depth interview, carried out in person. The research team contacted Two Piers Housing Co-operative for an interview but this did not materialise as several new members have joined the co-operative since The Nook’s retrofit. Furthermore, the architect for the project was not available for an interview due to lack of time. The case history also draws on background material such as Retrofit for the Future literature and Eco Open Houses Brighton & Hove archives<sup>4</sup>.

## References

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<sup>1</sup> Two Piers Housing Co-operative: <http://twopiers.coop> [Accessed 19.08.2016]

<sup>2</sup> Retrofit for the Future - Reducing energy use in existing homes: <https://retrofit.innovateuk.org> [Accessed 19.08.2016]

<sup>3</sup> Baeli, M. (2013). *Residential Retrofit: 20 Case Studies*. RIBA Publishing, London. ISBN: 978 1 85946 5011.

<sup>4</sup> Eco Open Houses Brighton & Hove: <http://www.ecoopenhouses.org> [Accessed 19.08.2016]

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- <sup>6</sup> Two Piers Housing Co-operative, Management: <http://twopiers.coop/management> [Accessed 22.08.2016]
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- <sup>8</sup> Earthwise: <http://earth-wise.co.uk/>
- <sup>9</sup> Low Carbon Trust: <http://www.lowcarbon.co.uk> [Accessed 23.08.2016]
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- <sup>15</sup> RETROFIT FOR THE FUTURE. Reducing energy use in existing homes. A guide to making retrofit work. <https://retrofit.innovateuk.org/documents/1524978/2138994/Retrofit%20for%20the%20future%20-%20A%20guide%20to%20making%20retrofit%20work%20-%202014> [Accessed 19.08.2016]
- <sup>16</sup> Brighton & Hove City Council, Heritage, What is an Article 4 Direction? <http://www.brighton-hove.gov.uk/content/planning/heritage/what-article-4-direction> [Accessed 19.08.2016]
- <sup>17</sup> See for example Bradford, J., Stevens, G., Byrne, T., and Ryssevelt, P. (2013). 'Retrofit for the future': reducing the carbon emissions of the UK's housing stock. Proceedings of eceee 2013 Summer Study, Rethink, renew, restart. <http://proceedings.eceee.org/vispanel.php?event=3> [Accessed 24.08.2016]
- <sup>18</sup> Passive House Planning Package: [http://www.passipedia.org/planning/calculating\\_energy\\_efficiency/phpp\\_-\\_the\\_passive\\_house\\_planning\\_package](http://www.passipedia.org/planning/calculating_energy_efficiency/phpp_-_the_passive_house_planning_package) [Accessed 23.08.2016]
- <sup>19</sup> Tax on shopping and services. VAT on energy-saving products: <https://www.gov.uk/tax-on-shopping/energy-saving-products> [Accessed 23.08.2016]