

Subject: Middlegate TCosy Project

Report to: Management Team – 4th March 2019
Housing and Neighbourhoods – 14th March 2019

Report by: Head of Property and Asset Management

SUBJECT MATTER/RECOMMENDATIONS

To grant permission for Beattie Passive to undertake the retrofit of the TCosy Passivhaus System to the Middlegate block numbered 89-90 consisting of 6 flats, at a nil cost to the Council. In line with funding requirements to approve access for monitoring purposes both pre and post retrofit to providing vital design information for use by Beattie Passive to enable further develop of the system for wider rollout across the country.

1. BACKGROUND

- 1.1 The TCosy system is being developed to provide a retrofit solution to existing properties to bring the existing building to a Passivhaus standard, reducing energy costs for the tenant whilst reducing issues such as damp and condensation.
- 1.2 The system aims to produce a fast, efficient and cost-effective solution providing a deep retrofit which involves a wrap around the whole block creating a continuous void from on top of the roof to a defined depth below the ground which is then filled with insulation.
- 1.3 The basic objective of the system is to produce a super insulated envelope to the building in which the thermal bridge around the perimeter of the ground floor, at the eaves, windows and doors are also addressed. These are to be designed to ensure that no moisture or mould damage may occur to the existing structure.
- 1.4 The system included new triple glazed, insulated windows installed within the cladding system along with an individual mechanical ventilation system for each flat, to maximise the benefit of the retrofit in achieving target CO₂ and energy bill reductions.
- 1.5 Fire engineering is a high priority of the system and may involve an innovative integrated low flow sprinkler system that can be activated by the fire brigade which cools down the cladding system sufficiently in the event of a fire.
- 1.6 The upgrade provides other benefits including improved visual appearance and reduced maintenance of the fabric of the building.
- 1.7 To achieve the Passivhaus standard the retrofit must be capable of achieving at least 75% reduction in space heating for the property (and therefore a significant reduction in CO₂ emissions).
- 1.8 The retrofit system must be fast to install with minimal time onsite, and the aim is to reduce costs of deep retrofit as far as possible. It must also be non-invasive to the tenants, allowing them to remain in-situ with as little disturbance as possible.

- 1.9 The retrofit project will need to look at an array of different details to understand how it is best to achieve high thermal comfort, fire resistance and speed of erection.

2. CURRENT POSITION

- 2.1 As part of the opportunity to further develop this retrofit solution the Department of Business Energy and Industrial Strategy (BEIS) through the Thermal Efficiency Innovation Fund are looking for projects to further advance the TCosy system to enable this product to continue to be developed and refined in relation to both cost and design challenges around type of building and speed of delivery.
- 2.2 A scheme has been completed on two houses in Birmingham, see appendix 1 and a proposal is currently underway in Solihull, appendix 2. As part of the continued development of the system Great Yarmouth Community Housing has been approached with a view to BEIS providing a fully funded retrofit using the TCosy system on a block of 6 council flats in Great Yarmouth. In order to review this proposal a potential block has been identified which is traditional 1950s style terrace and thus provides solutions to challenges that can be overcome on this project, aiding its roll out more widely around the country.
- 2.3 The block identified is within the Middlegate Estate and although work is ongoing in relation to the regeneration of this area the block under consideration is one that would be retained following any regeneration of the estate but that would clearly benefit from this type of retrofit system.
- 2.4 The external challenges regarding this retrofit are provided through its terraced nature, and so the way that the new structure interacts with the neighbouring properties is of high interest and will most likely require further innovation for this detail to be a success, further leading to benefits in relation to wider roll out around the country. External challenges to overcome will be around the existing balconies on each flat, and whether the systems can incorporate them into the design or if they will have to be removed.
- 2.5 Should approval be given for this development opportunity the block identified is located in an area of national heritage, meaning that the design will have to be aesthetically sensitive by nature.
- 2.6 The range of complexities highlighted above are typical of large-scale retrofits throughout the country, for which any one of these issues can present a threat to the success of the project. The benefit, therefore, in this project is that a proposal will be developed to cater for each issue. The chosen building is not a 'clean' slate but has a number of difficulties which are frequently associated with retrofit making it an ideal opportunity.

3. THE SYSTEM

3.1 The following challenges have been identified and will be addressed as part of the retrofit:

- With the events of the Grenfell Tower fire, moving away from any combustible materials is a must for any retrofit system.
- The retrofit needs to create a 300mm void around the existing structure, be lightweight but strong enough to enable fixing of the cladding finish.
- Speed of delivery needs to be achieved.

3.2 The system, options for consideration and solutions have been developed by Beattie Passive and are attached as appendix 3 of this report.

4. FINANCIAL IMPLICATIONS

4.1 As a development scheme this project would be fully funded through BEIS and Beattie Passive, the Council are providing authority for works to be undertaken on the Community Housing asset identified in the report, at no cost to Great Yarmouth Borough Council. As part of the project GYBC will approve access to the asset for monitoring purposed to assist in reducing the longer term costs and time of delivery to increase the potential for rollout across a wider section of the country.

4.2 From a Great Yarmouth perspective by undertaking this project we would need to identify if this system provides a wider solution as a retrofit across a number of assets within the Community Housing Stock. The cost and solution will be essential to model as part of this delivery for any future options. The system will not provide additional properties but may offer a solution to extending the efficiency and increasing the life of properties.

4.3 The system is installed with tenants in occupation and therefore relocation costs associated with decanting for whole house refurbishment are removed by this type of retrofit.

4.4 Further consideration will need to be given to heating refurbishments to further enhance the model as heating changes are excluded from the retrofit but these can be considered as part of the Capital replacement programme and do not need to be undertaken at the time of the retrofit works.

4.5 Internal works are not included as part of this project and therefore any bathroom or kitchen replacements will continue to be programmed as part of the Capital Programme.

5. RISK IMPLICATIONS

5.1 The proposal for the retrofit of 6 flats at 89-90 Middlegate is fully funded however there is a risk that following the initial project costs are still such that a wider rollout of the retrofit is not feasible or cost-effective leaving this as the only block within the Borough of this type.

5.2 That design developments in relation to some of the challenges identified above result in tenants needing to be relocated during the works. This would need to be explained carefully to the tenants at the commencement of the project to ensure they are aware that this is a development project.

6. CONCLUSIONS

6.1 It is important to consider the final block aesthetics, maintenance and safety. Attached appendix 4 is a computer-generated image (CGI) of both before and after the retrofit. A number of the individual components, as examples; final roof finish, external cladding, use of sprinkler system, will continue to be developed during this project to identify the most appropriate product for the location which delivers the required efficiency and safety to best develop the process.

6.2 The residents should realise significant savings in energy bills, monitoring of this following the retrofit will form part of the monitoring.

6.3 The retrofit will provide a mechanical ventilation and heat recovery system (MVHR) filtering air by bringing fresh filtered air into the home and removing stale air offering the potential to improve respiratory issues.

6.4 The retrofit will see triple glazed windows installed as standard.

6.5 A full fact sheet in relation to the Beattie Passive TCosy system is included as appendix 5.

6.6 Some of the next steps in relation to this project following approval will include:

- Submission in relation to planning and building control.
- Engagement with tenants
- Installation of monitoring devices within the block to record current levels
- Further development of the areas of challenge identified in this report
- Timeline for retrofit and commencement on site
- Installation of system
- Continued monitoring of completed project to identify benefits

6.7 Should this project be approved work is timetabled to commence in the Spring.

7. RECOMMENDATIONS

7.1 To grant permission for Beattie Passive to undertaken the retrofit of the TCosy Passivhaus System to the Middlegate block numbered 89-90 consisting of 6 flats, at nil cost to the Council.

Area for consideration	Comment
Monitoring Officer Consultation:	
Section 151 Officer Consultation:	Included
Existing Council Policies:	
Financial Implications (including VAT and tax):	Considered
Legal Implications (including human rights):	None
Risk Implications:	Considered
Equality Issues/EQIA assessment:	Nonepp
Crime & Disorder:	None
Every Child Matters:	None

Offsite Retrofit Project Birmingham



Description:

As one of the partners of the Innovate UK initiative for 'Scaling up retrofit of the nation's homes, were asked to retrofit two semi-detached houses to EnerPHit performance standards.

Using the innovative offsite TCosy™ system, two of **Birmingham City Council's** semi-detached homes were quickly and easily retrofitted, lifting the performance of the houses, reducing energy bills and making the homes a more comfortable and healthier environment for the residents to live in.

The TCosy™ project delivered the following benefits for the council and their tenants:

- **2 houses retrofitted to Passivhaus standard** – TCosy™ achieves Passivhaus standards of build and incorporates Passivhaus Certified windows and doors and a Mechanical Heat Recovery and Ventilation system. This delivers a high performance, high quality home
- **Fast build** - the Passive Panel system was manufactured offsite and installed onsite in a few weeks
- **Limited disturbance** - residents remained in their homes for the duration of the retrofit
- **Lifting tenants out of fuel poverty** - reduced heating requirements and energy bills by up to 85%
- **Created healthier, more comfortable** homes to live in
- **A new look home** - we worked with the council to provide a new external façade. Birmingham City Council were keen that the newly retrofitted properties blended in with the other houses in the cul-de-sac
- **Regular engagement with the tenants** to ensure they understood the process and benefits of the Retrofit
- **Increased Asset Value** of the housing stock



Thermal image of the building prior to work commencement, bright colours indicate high heat losses from central heating radiators

“Following on from the initial selection process for the two houses to be retrofitted by the Beattie Passive TCosy™ system, we will be carrying out evaluations to monitor the buildings from both the council's perspective as well as the tenants'. We can see the benefit and are fully on board with the reasons to encase or 'TCosy' a property as this reduces our building repair commitment due to a brand new exterior and changes such as removing gas fires eliminates the need and cost of annual gas checks. This system does also address our social responsibility commitments when targeting fuel poverty, which remains a major issue affecting tenants in our region.”

Joe Muxlow - Contract Team Manager

Interview with Birmingham City Council's Residents

The residents share their thoughts and views on the process of their newly retrofitted homes

Elisabete - Gressel Lane Resident

1. What was your perception of your house prior to the Retrofit.

Before the retrofit my house was cold all the time, even with the heating on and we did not feel very comfortable living here in the winter.

2. What was your perception of your house after the Retrofit?

We now have a very nice atmosphere in our house. We don't need to have the heating on all the time and only need to switch the heating on once a day if it is very cold outside.

3. How would you rate the overall performance of the house including comfort and energy?

The overall performance after the retrofit is excellent. The house is really warm and quiet as we don't hear noise from planes anymore (house is under the flight path). We sleep very well nowadays and feel very comfortable. With the MVHR we have fresh air all the time and there are no bad smells or mold. I can't ask for more, well done good work!

4. How did you feel living in the house when the retrofit was in progress?

I felt very comfortable as I was in my own home and didn't have to move somewhere else during the project. I didn't have any disruption from the workmen, I was out during the day most of the time and didn't experience anything bad.

5. What do you think the best thing is about the retrofit?

Having a warm house and reduced energy bills is the best thing about this project. Energy is now not lost from the building and I have started to save money already, which is very important to us. Also the fact that we essentially have a new house with a new door, triple glazing, new roof and new walls. There are many good things that have happened to us. Thank you for the opportunity, there are so many changes for the better.

6. What do you think is the worst thing about this retrofit?

Nothing. Only minor things like the dust.

7. Are there any matters you wish to tell us about?

I don't have any problems, thank you very much for letting us be a part of this project. I am so grateful for everything that has been done. I am happy to live here now.

Catherine – Gressel Lane Resident

1. What was your perception of your house prior to the Retrofit?

We used to be very cold and use the heating a lot, the heating didn't stay in the house for very long. To keep warm, we would often spend most of our time in the living room with blankets. Now it feels warmer. It is nice.

2. What was your perception of your house after the Retrofit?

Now we don't use very much heating and the rooms stay warmer for longer. We used to top up the gas all the time. Now we don't need to. It feels good and we are very happy with the house.

3. How would you rate the overall performance of the house including comfort and energy?

All good! Before the retrofit some of the rooms felt colder than others, now we have a nice temperature throughout the house.

4. How did you feel living in the house when the retrofit was in progress?

It was ok, the workmen were nice and very helpful throughout the process.

5. What do you think the best thing is about the retrofit?

I think the best things is that the house now looks really good outside and it is warmer.

6. What do you think is the worst thing about this retrofit?

I can not think of anything.



Gressel Lane Residents



Case Study

Retrofit for Social Housing – Solihull, Birmingham



Before



After

Beattie Passive has delivered an innovative project for Solihull Community Housing in the Midlands using its patented Retrofit solution TCosy™ which provides a fast, low cost and highly replicable solution for a wide range of buildings. The TCosy™ dramatically reduces energy requirements, creates a healthier living environment and can be delivered whilst residents remain in their home.

The project partners are:

- **Beattie Passive** - inventors of the patented TCosy™ Retrofit build system. Designed, manufactured and delivered the retrofit.
- **Encraft**: energy consultants and Passivhaus designers, who were the innovative lead partner.
- **Coventry University**: for tenant involvement and assessment
- **Solihull Community Housing**: a subsidiary of Solihull Metropolitan Borough Council, who own the block of 6 flats to be retrofitted.

The project had a three stage approach:

1. Analysis of tenant energy usage pre-retrofit
2. Retrofit of apartments block containing 6 flats
3. Analysis of tenant energy usage post-retrofit

Technical Specification:

Wall U value:	0.099 W/m ² k
Roof U value:	0.1 W/m ² k
Perimeter Floor U value:	0.43 W/m ² k
Air Tightness:	0.93 ³ /hm ² @50pa



“We’ve enjoyed working with Beattie Passive and seen with great interest the impressive transformation of these six flats. We are looking forward to the feedback from our tenants and seeing the impact of their new super insulated homes”

**Mark Pinnell, Head of Asset Management
Solihull Community Housing**



Retrofit Stages using TCosy™:

- **Contractor completes Retrofit:** Beattie Passive certified contractors manufacture and erect the TCosy™ system, fit passive standard windows and doors, install MVHR and fit external finish
- **On-site compliance checks:** Every Retrofit is tested at structural completion including structural compliance, thermal continuity testing and air testing
- **Beattie Passive Certification:** Beattie Passive undertake detailed checks to ensure the retrofit is delivered as designed
- **Completed Retrofit:** Delivering a new energy efficient, healthier, more comfortable home.



Project Benefits:



There was minimal disruption to residents as they remained in their homes for the duration of the retrofit process.



Energy bills will be dramatically reduced (anticipated 84% reduction from £1,064 per flat to £166 per year) and residents will also benefit from an enhanced and healthier living environment.



The project is estimated to deliver CO₂ savings, typically in the range 2-4t CO₂ per year per dwelling. On realistic assumptions of rapid scale up to 1000-5000 properties a year, will contribute up to 20,000t CO₂ savings a year to the national effort to reduce CO₂ emissions.



The approach provided training and labour opportunities which is hoped to have a positive impact on social inclusion and long-term economic benefits for local communities. The Jericho Foundation manufactured the TCosy™ structure, developing the skill and experience of the trainees.



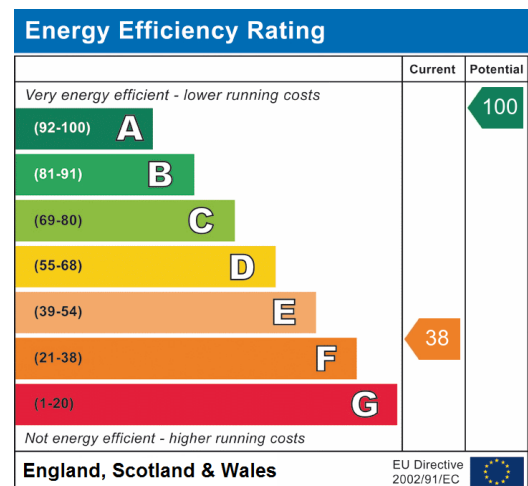
The project developed models for best practice in tenant and community engagement, ongoing liaison and feedback loops which ensure energy use is optimised but also ensures tenants and communities are happy with the outcomes of the project.

"What every retrofit project needs is a low risk, whole building approach, capable of delivering superior thermal protection and air tightness, as well as fit for purpose heat recovery ventilation. Beattie Passive's TCosy™ does all of this and more."

Helen Brown: Head of Building Physics, Encraft

For more information on TCosy™ for the Retrofit market, visit www.beattiepassiveretrofit.com

Retrofit Customer Journey



Feedback from the residents

"We are very pleased with the work that has been done. We have noticed that there are no draughts around the windows anymore and our whole flat feels much warmer. We certainly don't put our heating on as often as we did before the work was done. The MVHR system has made a real difference to the quality of the air, especially the boost button which gets rid of stale air ever so quickly, especially after smoking"

Mr & Mrs Dooley

"It has made an incredible difference. I have only had to switch my heating on twice so far since the work was completed a few months ago. Even today (29/11/16) which is really cold (less than 5°C) I haven't had to put the heating on. I budget for my energy costs and usually put £10 credit on each time. This is now lasting a lot longer than it was before we had the work done and I am even building up credit on my account"

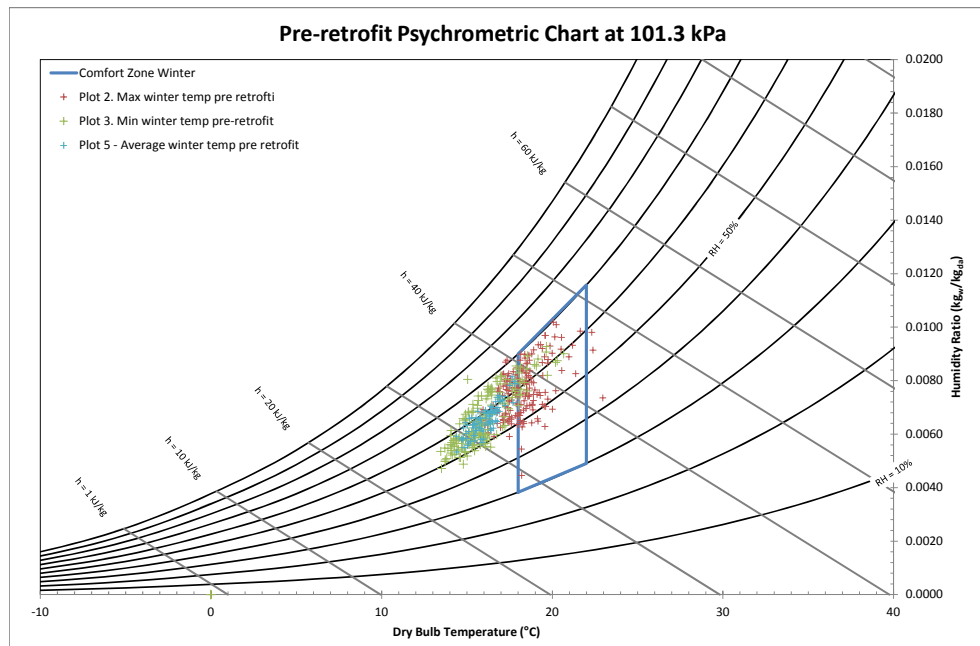
Miss Freeman

Winter Comfort Levels pre and post Retrofit

These graphs demonstrate the considerable improvement in the indoor comfort levels for residents following the retrofit.

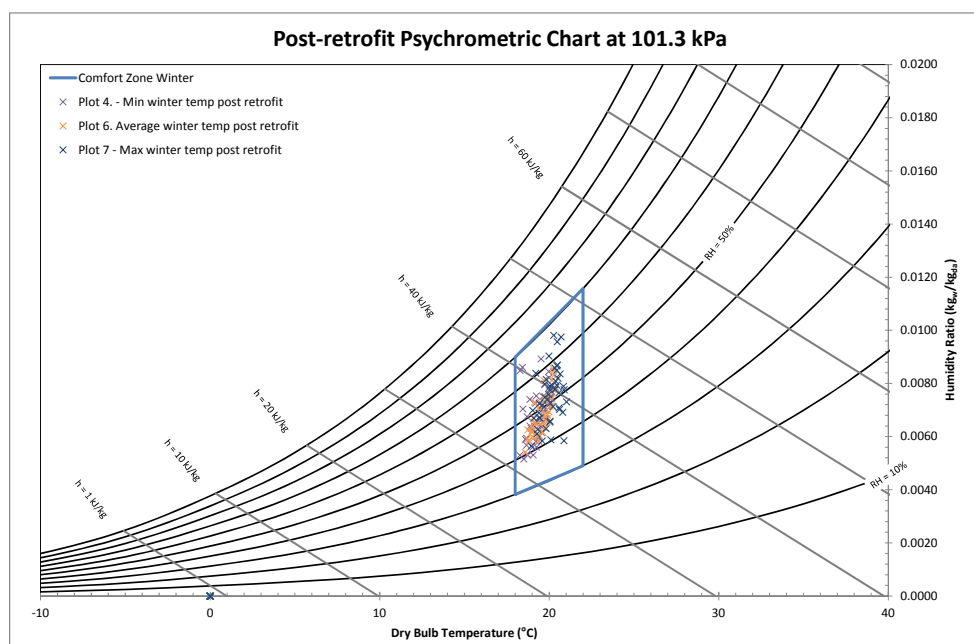
Comfort Level Pre-Retrofit:

Prior to the retrofit the graph shows that the majority of the minimum and maximum winter temperatures were below the comfort zone.



Comfort Level Post-Retrofit:

After the retrofit the graph shows that all of the minimum and maximum winter temperatures were within the comfort zone.



BEIS Retrofit Project
Thermal Efficiency Innovation Fund – Gt Yarmouth Retrofit

TCosy™ Retrofit Overview



King Street – Flats 89, 89a, 89b, 90, 90a and 90b

Support System

The following challenges need to be overcome:

- With the tragic events of the Grenfell Tower fire, moving away from any combustible materials is a must for any retrofit system.
- The new support systems needs to be able to create a 300mm void around the existing structure whilst being lightweight but strong enough to enable the fixing of the cladding finish.
- Speed of erection needs to be achieved, and adjustment of different levels and planes needs to be accommodated.

System options

Through extensive research and development, we have looked at many different cladding support systems to understand the best system that meets these requirements. We believe that the Nvelope N1, which incorporates thermal isolators to the wall bracket currently is the closest product to be developed. The product will be thermally modelled, along with our other components, and the identification of any thermal shortcomings reviewed and further development of the system proposed. This will be augmented within the overall Passive House Planning Package (PHPP) to give the performance design of the complete retrofit.

The Nvelope N1 system has adjustment of 40mm on the vertical plane and horizontal plane to align for wall finishes, meeting the need of adjustment to compensate for unevenness in the facades of older buildings. Additionally, the brackets and rails are aluminium which is lightweight and with a tensile strength of 36 N/mm², which should make it suitable structurally although thermally poor. The thermal isolator and other products need to be evaluated further.

Once the external finish has been designed, structural calculations will need to be completed to establish design loadings, wind and point loads. These will need to be proven for any situation where this system is likely to be used.

APPENDIX 3

Airtightness Layer

It is proposed that the airtightness layer within the new system is located on the existing buildings external surface but on the internal side of the retrofit system. It is to be vapour permeable to ensure the free passage of moisture vapour. This combined with an external wind tight layer, ensures low thermal bypass in the insulation zone and achieves an airtightness of 0.1 ach^{-1} @50Pa or better. This airtightness layer will need to be securely fixed to the building's facade to prevent any flapping and noise whilst the external cladding is being fitted.

When considering what product to use for the internal airtightness layer, it's important to consider its durability with regards to fire and life cycle.

There are four potential products that could be considered suitable:

- Wraptight Red external air tightness membrane: this product is self-adhesive and could be secured back to the brickwork. However, this is a very expensive product.
- Wraptight Yellow: this is a possibility, but we need to test this product further to understand whether the membrane can adhere to brick and rendered surfaces.
- Pro Clima DA Weather Resistant external membrane: has an adhesive lap of 150mm on bottom of roll which would help with fixing in windy conditions but we would need to find a way to fix the full membrane permanently to the building.
- A recent innovation the UK industry is a spray-on airtight membrane which is currently being evaluated for robustness and cost of installation. Practically it could alleviate some of the issues identified above.

Insulation

It is vital that the insulation used is fire and water repellent plus also has very high insulating properties.

- Ecobead: has the required water repellent and thermal properties. It is a tried and tested product. We are looking at upgrading the fire properties by adding a liquid to the bead material. We are considering the use of a new liquid fire retardant product, not yet available on the market and is currently being patented.
- Rockwool EnergySaver[®] cavity fill insulation: has the correct fire requirement but is not water repellent. This will mean that the insulation will sag and lose its insulation properties if it becomes wet. Work will need to be done to see if the repellent properties can be enhanced.
- Vermiculite: has good fire and thermal properties and could be used as a fire break between floors, this product will need to be tested for the effect of water on the material and whether it retains its fire and thermal properties.

Fire stops

We need to research and test expanding fire stops that allow the passage of water. There is a potential to have expanding plastic covered pouches between floors that will only expand when heated and will not impede the flow of water.

Fire Sprinkling System

The initial idea is to incorporate an external fire sprinkler system into the insulated 300mm void. This could allow the fire brigade to extinguish any fire that was rising externally within the fire protected area. This could involve a simple ring main pipe system with floor by floor isolation valves to be able to isolate as appropriate. Water flow levels would not need to be high but enough to suppress the rise of the fire within the void. This will need to be tested to work out an appropriate flow rate. Work will also be done with fire consultants and fire brigade to design the levels of suppression required at different heights of building. Collection and water disposal at foundation level and thermal compliance around external water levels will need to be ascertained and a rapid over flow system built into the existing drainage.

APPENDIX 3

External Cladding Finish

External cladding will need to be light weight prefinished boards which are supported from the fire proof wall board with thermal battens. These boards will need to be a class A fire rated product which is cut and manufactured offsite. A design requirement is that these boards will need to be attached quickly without full scaffolding.

Potential cladding finishes include:

- Equitone Natura By Marley Eternit
- Rock Panel
- Steni Board

Mechanical Ventilation Heat Recovery (MVHR) Integrations

MVHR will need to be provided for each property separately, this will need to meet the Passivhaus criteria for MVHR and be designed in accordance with both this and the current building regulations. Above all it must operate below audible threshold whilst maintaining the indoor environment.

Current design practice uses small bore 75mm flexible pipe system with little or no joints encapsulated in the insulation and providing supply and extract air for each dwelling. This, however, results in significant ductwork within the new insulation void reducing the impact of the overall insulation and as such other innovative products or new products will need to be reviewed.

Each MVHR unit will need to be externally housed so maintenance can be carried out without entering the properties. Each unit will be fitted with boost buttons inside the home to enable residents to purge ventilate when necessary.

Roof System Structural Components

The roof option will require light weight structural trusses to be fixed over the existing roof timbers to form the 300mm void. Weather tightness and offsite manufacture with easy fast fixing to existing structure is essential. Scaffolding may be required at eaves level and will be completed with single finish materials, such as prefinished roofing sheets with tile formats or flat sheet would be most suitable.

The airtightness membrane may be the same material as used on the walls but, nevertheless, will need to deliver the same results.

The use of EasiJoists will allow insulation to flow through the void, as well as the additional benefit of being both strong and lightweight. Aluminium brackets and rails fixed off the existing structure will create the 300mm void over the roof.

Bargeboards and Gutters

Bargeboards and gutters will be externally fitted to the back of the Magply boarding to form overhangs of 600mm minimum outside the thermal and fire zone.

Windows and doors

Windows will be Passivhaus standard, high-performance and triple-glazed. These must achieve a very good air tightness. They are potentially a high cost item and therefore finding an affordable, reliable retailer is essential.

APPENDIX 3

Doors will be of the highest thermal and air tightness standard available. Front doors will need to be secure first and foremost, and therefore we will work with the Council's suppliers to make sure these meet the highest performance.

Information required for handover

Handover documentation and training may need to be developed and will need to cover at least the following items;

Heating: The heating system is not part of the retrofit, however the heating systems needs to be able to modulate efficiently down to the much lower outputs that will be required once the retrofit is completed. A survey of the current heating system (controls, distribution, boilers etc.) will need to be completed for each flat. This will inform the specification for upgrade or replacement that may be completed at a later date.

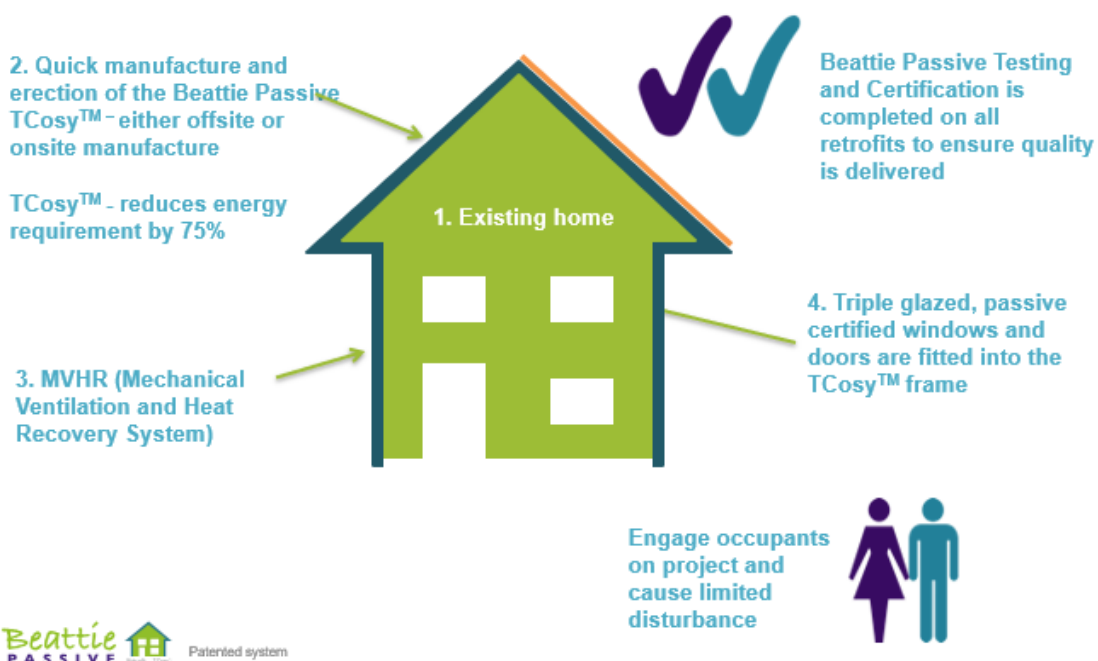
Ventilation: The residents will not be familiar with living with an MVHR system and will therefore need training and information on how they work and window opening. The landlords will also require maintenance information regarding the MVHR system.



What does the Beattie Passive TCosy™ do?

The Beattie Passive TCosy™ involves increasing the energy efficiency of existing buildings with the aim to help households save money on their bills, reduce their emissions, and make their homes warmer and more pleasant places to live.

The TCosy™ product takes existing buildings and wraps around a highly insulated frame (“tea cosyng” the existing property).



What is the Beattie Passive system?

The Beattie Passive system is a super-insulated structure that incorporates a unique and patented construction method that provides a continuous insulated seal around the core of a structure.

Beattie Passive has built over 150 Passivhaus new homes and retrofits of existing homes across the UK.



What are the main benefits of the Beattie Passive TCosy™ system?



You can **stay in your home** for the duration of the Retrofit

The Retrofit can easily be manufactured and erected whilst you remain in the comfort of your home. This means you do not need to move out of your home for any period of time and can continue with your daily life as normal. The contractors will only need to enter your home on a select number of days to change the windows (to Passive quality triple glazed windows) and to secure the entry / exit holes for the Mechanical Ventilation and Heat Recovery system. You will be informed of all requests for entry in advance and made aware of the dates and times.



Your home will be **more energy efficient** and your **energy bills may be less**

Your new home will be significantly more energy efficient. If you use your new home properly then the retrofit is expected to reduce your heating bills. Guidance on this will be provided nearing completion of the Retrofit.



Your home will be **healthier to live in**

Not only will your home feel warmer in winter, it will also be healthier. The Mechanical Ventilation and Heat Recovery System that will be installed in the TCosy™ brings fresh filtered air into your home and takes the exhaust air (old, stale air) out. The positive mechanical ventilation means any respiratory issues, e.g. Asthma, related to poor air quality will be greatly reduced from air borne pollutants such as Smoke, CO₂, Mould, and Humidity. It also means you will not be breathing in as much pollution fumes and other airborne pollutants (e.g. pollen that causes hay fever) when you open the windows as they will be extracted out as well.



Your home will feel **more comfortable** to live in

The TCosy™ will enable your home to keep a consistent air temperature – no more drafts from gaps around your windows or vents. The design of the buildings aim to provide the optimum comfort for living – warm rooms in winter with no drafts and cool rooms in summer that do not overheat.



You will have a **new look home**

We are totally transforming the look of your home. Beattie Passive have designed a new look that brings these flats into the 21st Century. This is an exciting opportunity to give your home an external facelift.



New **triple glazed windows**

All your windows will be replaced with triple glazed Passive Certified windows – these will provide you with the optimum performance – no drafts and can be easily opened.



Reducing you **carbon footprint**

The TCosy™ combined with Mechanical Ventilation and Heat Recovery will reduce the carbon footprint of the flats.

Retrofit Process



Future vision for 89/90 King St