

Date: Wednesday 29th April 2015

Time: 13:00 – 16:00

Venue: Principal Seminar Room 1, Reid Building,
Glasgow School of Art

Event Resources: [Available here](#)

JISCMail List: [Please email scotland@eauc.org.uk](mailto:scotland@eauc.org.uk) if you wish to join



Sustainable Construction Topic Support Network Environmentally and Socially Sustainable Refurbishment

Attendees:

David Somervell	(DS)	University of Edinburgh	Convenor
Rebecca Petford	(RP)	EAUC	Coordinator
Liz Davidson	(LD)	Glasgow School of Art	Speaker
Colin Porteous	(CP)	Glasgow School of Art	Speaker
Andrew Arnott	(AA)	University of Edinburgh	
Erin Clerihew	(EC)	SRUC	
Graham Esplin	(GE)	Edinburgh Napier University	
Kasia Janik	(KJ)	Edinburgh Napier University	
Christina Kincaid	(CK)	University of Aberdeen	
Sarah MacKinnon	(SM)	Glasgow School of Art	
Loic Pellizari	(LP)	Edinburgh Napier University	
Sarah Peterson	(SP)	Harley Haddow	

1	<p>Welcome from the Convenor <i>David Somervell, TSN Convenor, University of Edinburgh</i></p> <p>This meeting was an opportunity to ponder on some of the challenges faced by our sector. Signing up to commitments to reduce carbon dioxide emissions shows commitment, but it doesn't seem to be filtering through to whole-institutional action. Despite a lot of work to reduce the carbon intensity of buildings, emissions are flat-lining due to expansion. In the UK we seem generally to just be sleepwalking, doing very little, and not gripping opportunities to really create a low carbon estate. The purpose of the Sustainable Construction TSN was to share good practices and learn from each other.</p> <p>Everyone was invited to introduce themselves to the room.</p>
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Passivhaus Retrofits in Zurich and Graz – Lessons for Scotland

Prof Colin Porteous, Mackintosh School of Architecture, Glasgow School of Art

Slides available [here](#).

Document containing these and other case studies is available to download: [IEA ECBCS Annex 50 – Building Renovation Case Studies](#)

Zurich (Germany) project to transform four storey tenement to very low energy:

- Originally built 1954, to a style similar to Scotland in terms of thermal construction but with solid brick walls – at that time our architecture had more in common with the continent
- Developer bought up the buildings
- Insulation was added to the outside
- Mechanical ventilation and heat recovery in housing is the current thinking for low energy, but this is hard to do with the low ceiling heights on these buildings. The ceiling was raised to allow ducts on the top floor, but for the other floors duct work was incorporated into prefabricated units added to the outside of the building.
- In the UK we tend to have an air recovery system per house, but this tends to be one per building on the continent, as with this project
- High performing ground source heat pump and mechanical ventilation heat recovery unit
- Good air mixing and consistent temperature at all levels within the room
- U-values were massively reduced
- Solar PV produced around 2,400 kWh per apartment per year
- Solar thermal collectors for hot water
- Risk factors with a mechanical ventilation heat recovery system can be that it isn't designed well, the quality of installation is poor, and it under-performs in terms of delivered air. Regulations don't cover air quality on domestic properties
- Project was on site when the Glasgow team visited, but similar projects by the same teams had very good air quality after completion.

Graz (Austria) project:

- Originally built in 1952, with multiple blocks and facades with back-to-back apartments on each floor
- This wasn't altered in the refurbishment, with the important challenge being to ensure good ventilation for all properties
- Housing association didn't want to disrupt the lives of the residents, and realised a lot of money could be saved by keeping people on-site, so almost all of the work was done from the outside
- New windows were fitted on the outside but the internal windows were left in until the last minute to minimise disruption
- Two solar devices – solar thermal plate collectors for domestic hot water, and a solar comb (layers of corrugated cardboard at right angles to the glass which reduces heat loss) to make the wall more energy efficient
- Decentralised heat recovery system in each room. This is less efficient than a centralised system but easier to install as part of prefabricated panels
- Heating was on the outside of the wall as heating coils as part of the prefabricated units
- Below Passive House standard for space heating based on the best simulated knowledge

	<p>available at the time</p> <ul style="list-style-type: none"> • Passive solar sun spaces • Lighter external panels have slots at the top and bottom to let air through, with heat recovery device on the inside of the panel. • Water source heat pump in the basement – most efficient heat pump of all • Not moving people was key to the affordability, although money wasn't the priority <p>UK vs. Europe: Cash up front is needed for projects like these and the UK never seems to have enough. Countries with relatively higher tax can afford these projects. They also still value outdoor or semi-outdoor spaces such as the sun spaces, with are like balconies, which we don't tend to include in flats any more. UK quality is a level lower than on the continent – people don't consider doing refurbishments to passive house standards, usually just minimal.</p> <p>'Seal tight, ventilate right' is an old mantra, and we now have a good understanding of sealing tight but ventilation is still less considered. Non-domestic buildings are starting to put in CO2 sensors to measure air quality and trigger ventilation systems to switch on, but this is the exception rather than the rule.</p> <p>Newly-built Reid Building at Glasgow School of Art has multiple sources of light and ventilation, in a combination of automated and manual.</p>
<p>3</p>	<p>Discussion: Current Retrofit Project Plans, Ideas and Challenges in the FHE Sector</p> <p>LD: With the Mackintosh Building, the fire has brought an opportunity for a 3 year project to restore and upgrade the building, rather than just the usual small-scale, opportunistic projects over the summer that have been possible throughout the building's history.</p> <p>Generally the priority is not money, as insurance is covering the cost to the damaged part of the building, but to 'do it properly' – understand the building's structure, respect in and work with it, while considering sustainability and the distinctive systems in the original design.</p> <p>Feedback from group discussion on Challenges and Solutions with all retrofit projects:</p> <ul style="list-style-type: none"> • Financial constraints – get them on the table early on • Poor quality of engineering • Diverse building stock, what standards should be worked to? Is BREEAM the best standard? • Running costs / whole life costs are not properly evaluated at the start, and initial cost budgets are set far in advance • Lighting requirements mean different systems are needed in different areas – daylight AND movement sensors perhaps optimal solution • Need to educate building users, including through: <ul style="list-style-type: none"> o Post-occupancy evaluation mechanisms o Government Soft Landings – users included at design stages o Balance user demands and designer experience, including when doing room data sheets early in a project
<p>4</p>	<p>Re-discovery and Re-imagination... taking advantage of diversity <i>Liz Davidson, Senior Project Manager, Mackintosh Restoration Project</i></p>

Slides available [here](#).

- Desire to build in sustainability and low carbon technologies as much as possible in this project, but can't over-clad the building! This is a masterpiece in architecture and must be treated with care.
- Fire on May 23rd 2014 affected half of the building, completely destroying the iconic library
- Liz's role is to lead on the restoration project, which is scheduled to last for 3 years following the fire – now almost into year 2 – see timeline on slides
- Very strong Scottish design team for the restoration project
- The building was originally built in two halves due to a lack of money, and during the fire the east side was protected by what used to be an external wall
- Technologies have not yet been considered, but as the building is A-listed the restoration cannot fundamentally alter the appearance
- The original timber and brick passive vertical ventilation system, which had been decommissioned in the 20s, helped the fire spread between floors in a localised way
- The library was destroyed with all 3 floors collapsing, with little surviving. The columns left behind gave some insight into how the building had been built
- A triage system was put in place to assess all the materials brought out of the building
- The Mackintosh lecture theatre in the basement was fine except for the roof which was taken down due to water damage
- The insurance money and any other that can be raised will be used to bring the restored building to meet modern standards – the restored building must be functional, safe and compliant, but there is a desire to be as energy efficient as possible – creative and clever ideas are being sought, and the research will be a fascinating process
- Many people to please, with the “Mockintosh” controversy ongoing. However Mackintosh designed but didn't build the building, and the design teams will be true to his concepts
- The strong building is still there, but internal walls and decor have been destroyed
- The fire revealed some of the building's secrets, including cheap materials and names written on the walls, which had been hidden by cladding or alterations over the years
- This restoration will allow the team to hide some of the services added to the building over time, allowing the look to be more true to the original design
- The desire is to create a good, functional building with good interaction
- An important question is what to do in terms of upgrading the undamaged half of the building, for which there is no insurance money
- Use of the building once it is restored is being discussed by the school – it was Fine Art before and is likely to remain so, but with a more productive use of space
- Normally Estates team only have summer to do building upgrades, with constant fight against time. Fire has provided opportunity to do something more significant & meaningful
- A fire suppression system was being installed at the time of the fire – and this will be developed in a way which will be effective and also true to the design
- The architects in charge won the contract due to their commitment to a piece-by-piece approach to carefully restore the iconic building

Tour of the Mackintosh Building – Led by Liz Davidson

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Minutes prepared by Rebecca Petford (EAUC-S Scotland Programme Coordinator)
May 2014

