Bournville Low Carbon Retrofit

Our project is a low-carbon retrofit to a mid-terrace house built c.1901 in Bournville, Birmingham. The house is not listed or in a conservation area, but is a nonetheless a characterful example of a very common historic domestic building type.

We had two overarching aims, to: i) to undertake a whole-house retrofit (following the STBA approach), reducing heat-loss and minimising embodied carbon, and ii) retain and add to the house's character and improve the layout and relationship with the garden. Working on a fairly tight budget, we also had to carefully balance these with cost and practicality and be willing to phase the work and do some things ourselves.

As our professional interests lie in heritage and building retrofit, we were aware that a balanced approach and carefully considered compromises would be needed. Neither of us had undertaken any kind of building project before so we wanted to learn from the process and end up with a case study of pragmatic, achievable retrofit that we could share with the wider community.

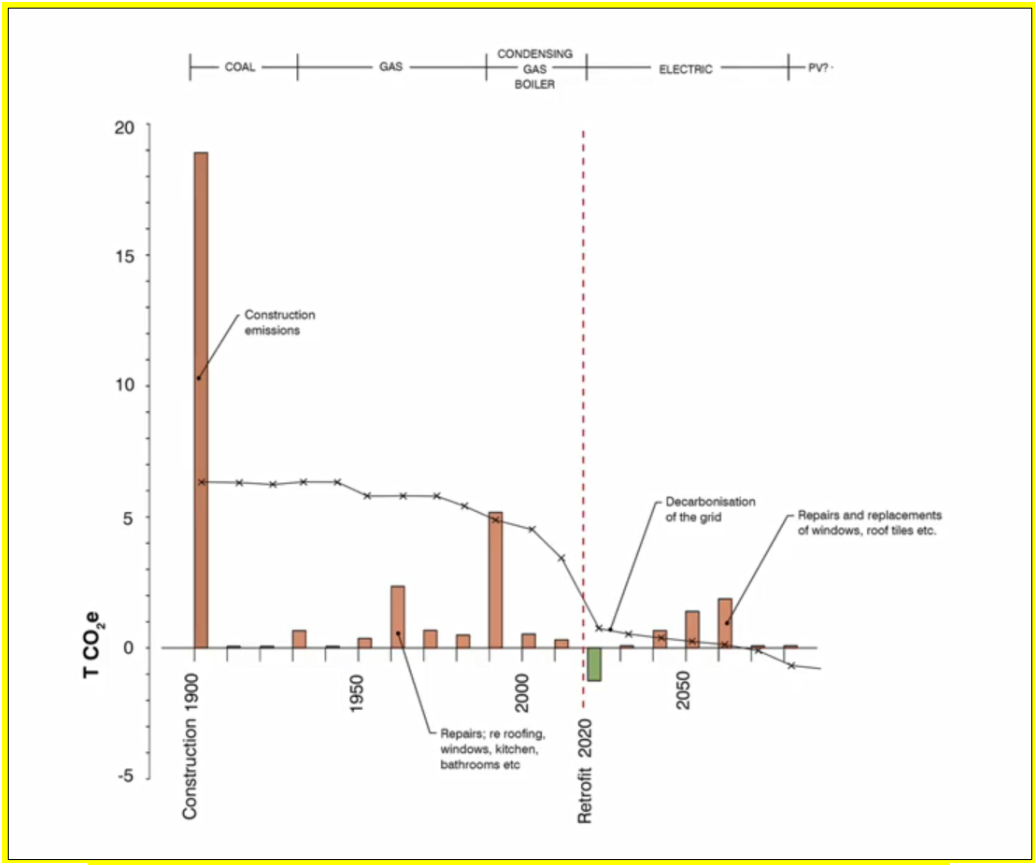
After working up a detailed brief, we engaged an architect specialising in retrofit, Harry Paticas (Arboreal Architecture). We are convinced that good design and professional input, where necessary, are essential to achieving good outcomes and can save money in the long run. We frontloaded survey work, undertaking a condition survey, airtightness test, thermal imaging, space heating modelling (PHPP, SAP), moisture simulation (WUFI) and monitoring existing internal conditions, also considering qualitative aspects including comfort and feel, and most importantly lived in the house for a few years to get to know it. A project partner – Jane Anderson (Construction LCA) – has also undertaken Life Cycle Analysis to review carbon emissions over the lifecycle of the project and inform decisions.

The main design interventions are a contemporary 'garden room' extension and first floor oriel window, with minor internal layout changes. Retrofit works include insulation (floor, loft and internal walls), airtightness, new triple-glazed windows, ventilation and new services - replacing the gas boiler with Herschel radiant (infra-red) panels and a Sunamp thermal store. Waste is reduced through reclaiming materials wherever possible, e.g. re-using bricks and glazing in the new extension, or else sourcing locally other reclaimed / low-impact materials. We are also using lots of timber (wood fibre insulation, new structural elements and window frames) which, when carbon sequestration is taken into account in the calculation of the project's embodied energy, actually renders it carbon negative!

To assist decision making, we created a schedule to assess all proposed changes against their impacts (thermal / carbon / historic fabric), aiming to minimise intervention rather than create a "grand design". For example we initially considered removing a wall to create an open-plan living room/hall, which would involve a high loss of fabric and wasted carbon. Instead we are installing an internal window to improve light levels and visual connections.

The project will not going to meet any recognised retrofit standards (e.g. EnerPhit), but we are estimating a 70% reduction in space heat demand (to (88/293kWh/m2/a) and hope to end up with a warm, comfortable and delightful home, having avoided as much carbon impact as possible.


Strategies of waste minimisation, reuse, re/freecycling and low carbon specification (Arboreal Architecture)
HIGHER RES VERSION TO BE SUPPLIED




Full Carbon History of the building 1901-20 (Arboreal Architecture)
IMAGE TO BE UPDATED