

Zero Carbon Case Study  
Edinburgh Home Demonstrator

*A collaborative approach to net zero  
standards for affordable homes*

Project: **Edinburgh Home Demonstrator Programme**

Contract value: **circa £1m**

## A partnership to build and test a new business model

### **The Edinburgh Home Demonstrator – a new business model for affordable homes built to net zero standards**

The Edinburgh Home Demonstrator Programme was established to explore and develop a new business model for the construction of affordable homes. Based on collaborative procurement, whole-life costings, development pipeline and greater standardisation, it has potential to transform both the productivity and performance of affordable housing, and to enable the move towards homes built to net zero standards.



“There are considerable potential advantages from greater use of offsite construction in affordable housing.”

**Mark Turley**, Chair, Edinburgh Home Demonstrator Programme Project Board

## THE BACKGROUND

The Scottish Government's Affordable Housing Supply Programme is working to deliver 50,000 homes across Scotland via a range of funding mechanisms for affordable housing providers, and by supporting the Local Housing Strategies of Scotland's local authorities.

The Scottish Government and partners began to explore the possibilities offered by greater use of offsite construction, commissioning Edinburgh Napier University to research and report back on whether that would be of benefit.

The research found considerable potential advantages from greater use of offsite construction in terms of costs, quality and speed of delivery. It also, through the greater precision that can be

achieved, strengthens the pathway to building affordable homes to net zero standards.

To realise those benefits, however, the University recommended a total change in the way housing development was being done, moving to a model based on design for manufacture rather than for on-site construction. The Edinburgh Home Demonstrator project was established to develop that model and apply it to the construction of 1,000 homes.

## SCOTTISH GOVERNMENT CONSULTATION 'HOUSING TO 2040'

The EHD programme is a key component of the collective vision for our homes and communities in 2040, as published by the Scottish Government in March 2021. The report is available on [gov.scot/publications/housing-2040](https://gov.scot/publications/housing-2040)

### THE PROJECT TEAM

The Edinburgh Home Demonstrator project team represents a collaboration between government, industry and academia, represented by:

- Scottish Government
- Construction Scotland Innovation Centre
- City of Edinburgh Council

- Scottish Futures Trust
- Edinburgh Napier University
- Offsite Solutions Scotland (OSS)

The ambition is to develop a business model that can be applied across the wider Edinburgh City Region. The team also works closely with the other local authorities across Scotland.



## BUILDING TO NET ZERO STANDARDS

Off-site manufacturing benefits significantly from greater standardisation of component parts than on-site construction. It also allows for greater exactness – insulation fitted in a factory environment, for example, will be more reliably installed than insulation put in place on site in the wind and rain. And that precision can then be replicated again and again.

The finished result is a home that's considerably more airtight than one built on site, which supports the use of alternative heating systems like ground or air source heat pumps. And because those systems run on electricity, they produce far fewer emissions than gas central heating would do.

While the key focus of the net zero aspect of the programme is on carbon generated when the homes are in operation, it is also looking at the development of 'community carbon projects'. That might mean, for example, solar panels that generate more electricity than the homes need, then being used to charge cars that are part of a community car sharing scheme.

The 'community carbon' idea was initially developed in response to the fact that the electricity grid is not yet decarbonized, meaning that when people use (for example) air source heat pumps, they contribute to carbon emissions. So until the grid is decarbonized, the energy going into the homes can't be zero carbon.

With regulations beginning to be drafted that don't ask for emissions from the grid to be offset, however, any gains from these community projects could be offset against the embodied carbon in the buildings. Which would allow the finished homes to achieve net zero standards both operationally and in terms of embodied carbon, substantially increasing their contribution to Scotland's climate change targets.

Net zero can be supported through community carbon projects

“ Offsite manufacturing allows homes to be produced quicker and to a higher standard of precision and quality. That increases the chances that we can create homes that are very energy efficient. ”

**Mark Turley**, Chair, Edinburgh Home Demonstrator Programme Project Board

## SETTING UP NEW SYSTEMS

Housing procurement, particularly in the public sector, has traditionally been ruled by cost. Local authorities and housing associations usually invite tenders, and almost always appoint the lowest priced. The model being developed and tested by the Demonstrator Programme aims to move the emphasis from initial cost to whole-life cost of the homes.

It also suggests a different approach to procurement, moving away from individual tenders for one project at a time to a partnership-based approach in which a supplier might be contracted for a longer period, rather than a single project. The idea is that both procurer and supplier will learn as they go, and can work together towards specified performance targets that will benefit both.

As well as looking at procurement, the Programme examines the idea of developing a pipeline, allowing builders to see future opportunities and plan for them. That's particularly important in periods of

uncertainty like the COVID-19 pandemic, which naturally discourage people from making investments in the plant and skills they would need to be part of an offsite construction process.

The Programme is producing a pipeline, a visible plan of each Council's future investment intentions across the City of Edinburgh region, showing builders that there are long-term opportunities available.

In effect, the Programme allows a client-led move towards change, focusing not only on better materials and low-carbon performance, but also on the entire procurement and build process.

## ADDRESSING THE ISSUES

The procurement/tender cycle has been in place for so long that it's become instilled into client and contractor behaviour.

The Demonstrator Programme is trying to break out of that cycle and encourage everyone to see procurement in terms of overall life cost, so that cheapest capital cost isn't always best. It also aims to promote collaborative working, in which all parties work together to achieve the same objectives.

One of the other key problems the Programme addresses is the fear of standardisation. It's keen to emphasise that standardising some of the components used in housebuilding doesn't mean all houses from now on will look the same.

Rather, the proposal is for a range of options in, for example, windows and doors, so that designers have perhaps 15 or so to choose from and manufacturers are always able to meet those specifications. Right now the industry uses many more different designs, some of which have only minute differences. Those differences, however, if they resulted in having to recalibrate equipment

*“ There's an endemic problem in construction. It's what we call a race to the bottom. You see lower and lower tenders as builders compete for work. Then they can't do it for that amount, so quality as well as profit gets dragged down. ”*

**Mark Turley**, Chair, Edinburgh Home Demonstrator Programme Project Board

for every new design, would make off-site manufacture less competitive.

The Edinburgh Home Demonstrator Programme is currently based on the use of closed panel systems, in which panels incorporating insulation, ducting, doors and windows are all created off site – building the house, in fact, almost exactly as it would be done on site. That reduces the risks associated with on-site assembly. Similar systems in use in other countries around the world have shown that in the long run, they can actually prove less costly than traditional building methods.

## STARTING THE JOURNEY TOWARDS NET ZERO

From 2024, the Scottish Government intends to implement regulations that require new homes to be built with zero emissions heating. Which means the end of gas boilers. It is widely recognised that we must significantly increase the pace of decarbonizing Scotland's domestic and non-domestic buildings, while still meeting the need for affordable, warm homes.

The way to achieve that, according to Mark Turley, Chair of the Edinburgh Home Demonstrator Programme Project Board, is to focus on the opportunities presented by forthcoming change.

*"At the moment, Scotland fits about 1500 - 2000 heat pumps a year," he says. "If you think about the move to zero emissions heating, that probably means we'll need many more. Add to that the fact that over the next 10 years, we've got to retro-fit about another million existing homes. There's a massive supply chain opportunity.*

*"Instead of generating a couple of thousand heat pumps a year, we'll need to generate tens of thousands. And if that can be done in Scotland, it means fantastic job and skill development opportunities. Plus moving towards more offsite construction offers the prospect of attracting a*

*different range of people, which is one of the big challenges the industry faces right now.*

*"This project is an excellent example of industry working with government and academia to get it right. The fact that we've got such a strong partnership, locally and nationally, bodes very well."*



## PILOT PROJECT

The pilot project for the Edinburgh Home Demonstrator (EHD) is going to be located within the Granton area of Edinburgh, part of the Granton waterfront development framework. The pilot project will deliver approximately 80 homes which will utilise zero emissions heating, be net zero carbon and pilot a community carbon strategy. The homes will be constructed using the design output from the EHD programme, which is centred around the use of modern methods of construction (MMC).

## THE EDINBURGH HOME DEMONSTRATOR PROGRAMME AT A GLANCE

- A new model based on **collaborative procurement**
- Will initially develop **1,000 affordable homes**
- **Six partners** from government, academia and industry
  - Offsite Solutions Scotland
  - Scottish Futures Trust
  - City of Edinburgh Council
  - Scottish Government
  - Construction Scotland Innovation Centre
  - Edinburgh Napier University
- **Six** local authority partners
  - City of Edinburgh Council
  - West Lothian Council
  - East Lothian Council
  - Midlothian Council
  - Fife Council
  - Scottish Borders Council

*This case study was prepared by Construction Scotland Innovation Centre on behalf of the Scottish Construction Leadership Forum – March 2021.*

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