## Scottish policy for energy efficiency and buildings workshop

26<sup>th</sup> June 2018

Edinburgh Centre for Carbon Innovation









### Agenda

12.30 – LUNCH

13.00 – Andy Robinson - Scottish Government

13.20 – Professor Karen Turner - Centre for Energy Policy, University of Strathclyde

13.40 – Dr Tanja Groth - Carbon Trust

14.00 – DISCUSSION

14.45 – BREAK

15.10 - Sarah-Jane Stewart & Jess Edwards - Atkins

15.30 - Elaine Waterson - Energy Saving Trust

15.50 – Professor Jan Webb & Dr Faye Wade - Heat and the City Team, University of Edinburgh

16.10 - DISCUSSION









## Andy Robinson Scottish Government









### **Energy Efficient Scotland**

Andy Robinson
Scottish Government





### OUR CLIMATE CHANGE PLAN<sup>14</sup> SETS OUT A TRAJECTORY TO 2032 WHICH REQUIRES:

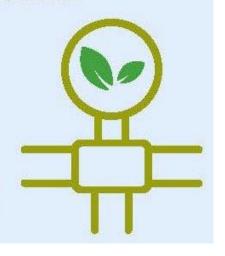
35%

OF DOMESTIC AND

70%

OF NON-DOMESTIC

HEAT TO BE SUPPLIED BY LOW CARBON TECHNOLOGIES



### PROMOTING DECARBONISATION OF HEAT



59% SEMISSIONS REDUCTION IN THE NON-DOMESTIC SECTOR

REMOVING POOR ENERGY EFFICIENCY AS A DRIVER OF FUEL POVERTY

23%

EMISSION REDUCTIONS IN SECTOR BY 2032 ON 2015 LEVELS



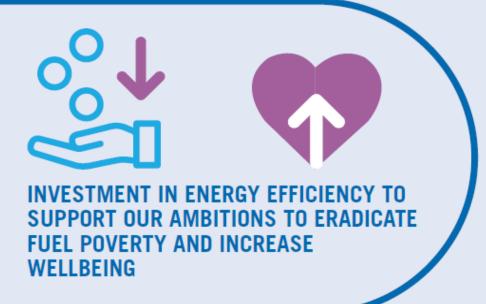


EVERY £100 MILLION SPENT ON ENERGY EFFICIENCY IMPROVEMENTS IN 2018 IS ESTIMATED TO SUPPORT APPROXIMATELY 1,200 FULL TIME EQUIVALENT JOBS ACROSS THE SCOTTISH ECONOMY



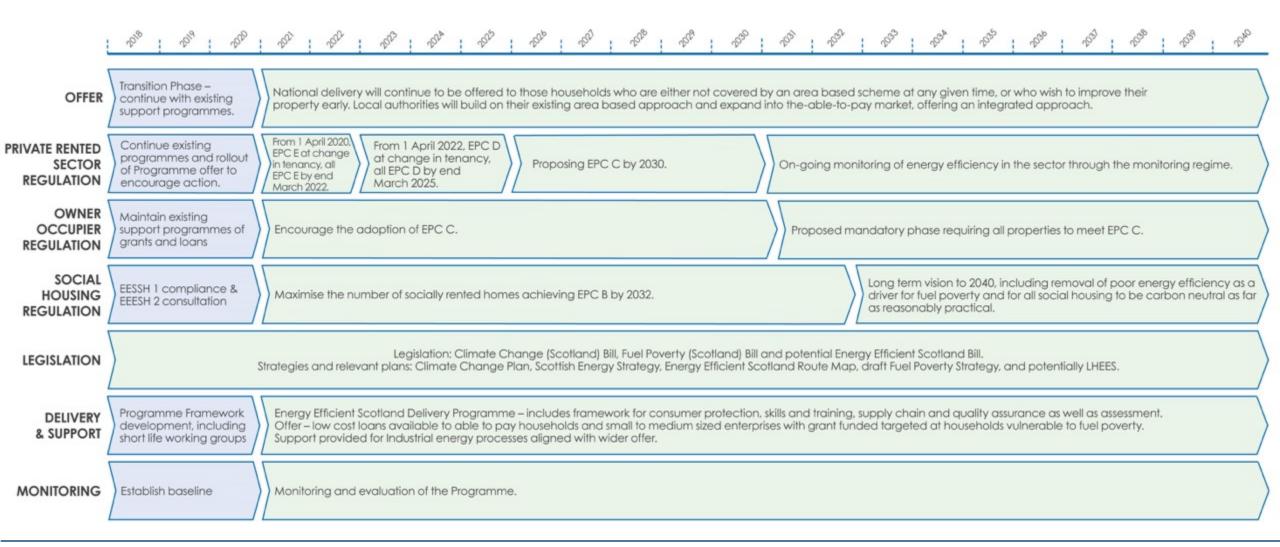
BOOST GDP, WITH RESEARCH SHOWING A 10% IMPROVEMENT IN THE ENERGY EFFICIENCY OF ALL UK HOUSEHOLDS WILL SUSTAIN GDP EXPANSION OF AROUND 0.16%





#### Domestic

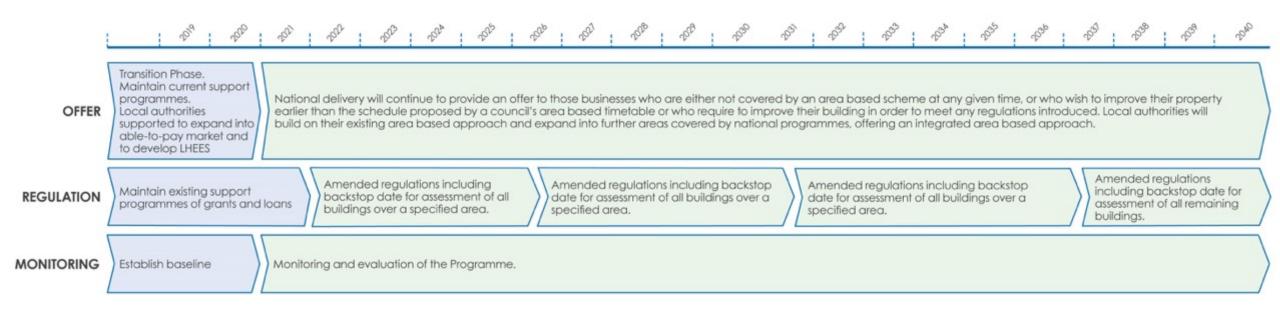
#### DOMESTIC PROGRAMME SUMMARY





#### Non-domestic

#### NON DOMESTIC PROGRAMME OVERVIEW



### National Policy framework and delivery

Potential Energy Efficient Scotland Bill

National Fuel
Poverty
Programmes
(Warner Homes
Scotland)

Fuel Poverty (Scotland) Bill

#### Combined National & Local Area based support & Delivery Advice - Home Salix Loans, Non-Domestic and domestic energy Energy Non-Domestic District Heating efficiency framework, Scotland & Loan Funding energy Project development Resource efficiency loans Efficient Scotland Unit Local Area based delivery Area-based fuel Local support for Local Heat & Energy able to pay property poverty Efficiency Strategy programmes owners

### **Pilots and Transition**

SEEP Pilots – phase 1	<ul> <li>Funding to 11 Councils for energy efficiency programmes</li> </ul>
SEEP Pilots Phase 2	<ul> <li>Funding to 15 Councils for energy efficiency programmes</li> </ul>
Energy Efficient Scotland Transition Programme	<ul> <li>Funding to 12 councils for Energy Efficiency Support Programmes</li> <li>6 Local Heat and Energy Efficiency Strategy Pilots</li> </ul>

### **LHEES – Challenges**

- Statutory or Non-Statutory Approach?
- Staffing and resourcing
- Political/Executive leadership and support
- Standardised vs. local approaches
- Data

### **Delivery - Partnership with Local Government**

Proposing that local authorities offer a facilitated, integrated service covering:

- advice, support and assessment for domestic and non-domestic buildings
- tackling fuel poverty
- domestic and non-domestic able-to-pay energy efficiency (with loan funding provided by national loan schemes)
- public sector energy efficiency

AND take a lead role in helping to identify and plan for the delivery of low regrets heat decarbonisation

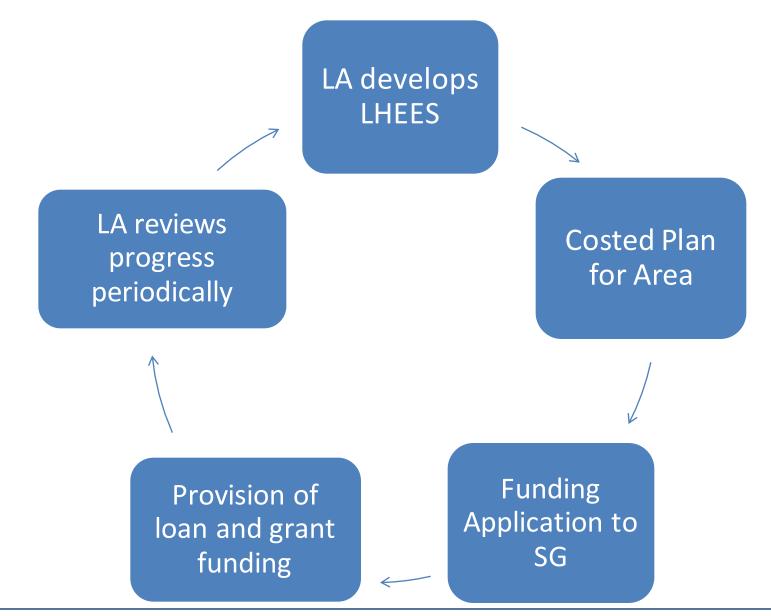
.... All done through Local Heat & Energy Efficiency Strategies (LHEES)

### **Partnership with Local Government**

Local authorities would have a statutory duty to develop **Local Heat & Energy Efficiency Strategies** (LHEES), which would:

- cover a 15-20 year period;
- set out an authority-wide overall energy efficiency and heat decarbonisation strategy;
- Socio-economic assessment of potential energy efficiency and heat decarbonisation solutions
- designate zones that set out the most appropriate energy efficiency and heat decarbonisation options for the area. These zones would help to phase the operation of area based delivery programmes for energy efficiency.

Prior to commencement of this duty, local authorities would be offered capacity and support to develop LHEES.



Thank You,

Any Questions?

### Professor Karen Turner & Ragne Low Centre for Energy Policy, University of Strathclyde













## Potential economic impacts of the Energy Efficient Scotland programme

Workshop: Scottish Policy for Energy Efficiency and Buildings Edinburgh Centre for Carbon Innovation, 26 June 2018

Professor Karen Turner, Centre for Energy Policy
University of Strathclyde
EPSRC grant ref: EP/M00760X/1



BOOST GDP, WITH RESEARCH SHOWING A 10% IMPROVEMENT IN THE ENERGY EFFICIENCY OF ALL UK HOUSEHOLDS WILL SUSTAIN GDP EXPANSION OF AROUND 0.16%



Energy Policy 111 (2017) 157-165

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journal homepage: www.elsevier.com/locate/enpol





Making the case for supporting broad energy efficiency programmes: Impacts on household incomes and other economic benefits



Gioele Figus<sup>a,\*</sup>, Karen Turner<sup>a</sup>, Peter McGregor<sup>b</sup>, Antonios Katris<sup>a</sup>

<sup>&</sup>lt;sup>a</sup> Centre for Energy Policy, University of Strathclyde, United Kingdom

<sup>&</sup>lt;sup>b</sup> Fraser of Allander Institute, University of Strathchyde, United Kingdom



### Policy Brief May 2018

**CENTRE FOR ENERGY POLICY** 

### Potential wider economic impacts of the Energy Efficient Scotland programme

Karen Turner, Antonios Katris, Gioele Figus and Ragne Low, Centre for Energy Policy, University of Strathclyde



## Scenario: How might a 20-year programme of spending on residential energy efficiency impact the wider economy?

Based on a continuation of real spending on Scottish residential energy efficiency, but now in a new 20-year funding framework, we considered the impacts of £8billion in spending over 20 years on improving residential energy efficiency in Scotland. 20% of this is Scottish Government grants (all directed to low income households), a further 15% via the Energy Company Obligation (ECO) and 65% in household contributions (via interest free loans). Data compiled by the Scottish Government and the Energy Saving Trust suggest that this will lead to an average 9.6% reduction in energy required to run Scottish households by the end of the 20 year programme. And in the 20% of households with the lowest incomes, this rises to 13.2%.

### Policy Brief May 2018



### Potential wider economic impacts of the Energy Efficient Scotland programme

Karen Turner, Antonios Katris, Gioele Figus and Ragne Low, Centre for Energy Policy, University of Strathclyde

**Cumulative GDP impact: £7.8bn in real GDP over the next 30 years** 

Sustained rate of GDP expansion: 0.2% additional GDP over the long term

Jobs: 6,000 sustained jobs could be created

The importance of realising energy efficiency gains to free up household spending

### Breaking these potential impacts down



### In year 2:

An estimated 5,250 additional FTE jobs, over 4,000 of which are in the Construction sector. The bulk of the remainder are in the services, retail and public sectors.

The lowest income quintile group of households gets a projected 0.13% real income boost

### In **year 15**, when we see the peak in GDP expansion:

An estimated 8,800 more FTE jobs of which almost 5,000 are in the Construction sector.

The bulk of the remainder are in services and retail.

And the lowest income quintile's incomes have risen by an estimated 0.54%.

### By year 30:

An estimated 6,000 sustained additional FTE jobs, spread across sectors but particularly in services & retail (Construction sector boost more limited and not direct).

And the lowest quintile's incomes have risen by an estimated 0.83%.

### **Conclusions**



There are real economic growth benefits from the projected increase in public + private investment in energy efficiency

The size of these benefits depends upon:

- (i) the level of investment actually achieved; and
- (ii) the energy savings realised from that investment



Professor Karen Turner, Centre for Energy Policy University of Strathclyde

### Dr Tanja Groth Carbon Trust











# Socioeconomic modelling for local heat and energy efficiency strategies

Dr Tanja Groth

**Energy Efficient Scotland Routemap** 

26<sup>th</sup> June 2018



### Agenda

- 1. Overview of socioeconomic analysis
- 2. The building blocks of socioeconomic modelling
- 3. Final points



Overview of socioeconomic analysis



### What is socioeconomic analysis?

Quantify direct and indirect impacts where you can; evaluate the remainder qualitatively

### Quantification of all known impacts of a proposed project on society

Typical financial model

A typical financial model will only include impacts felt by the investors, e.g. the opportunity cost of capital investment

Financial model with co-benefits

Some financial models will include a comparison against a Business-as-Usual scenario

Socio-economic model

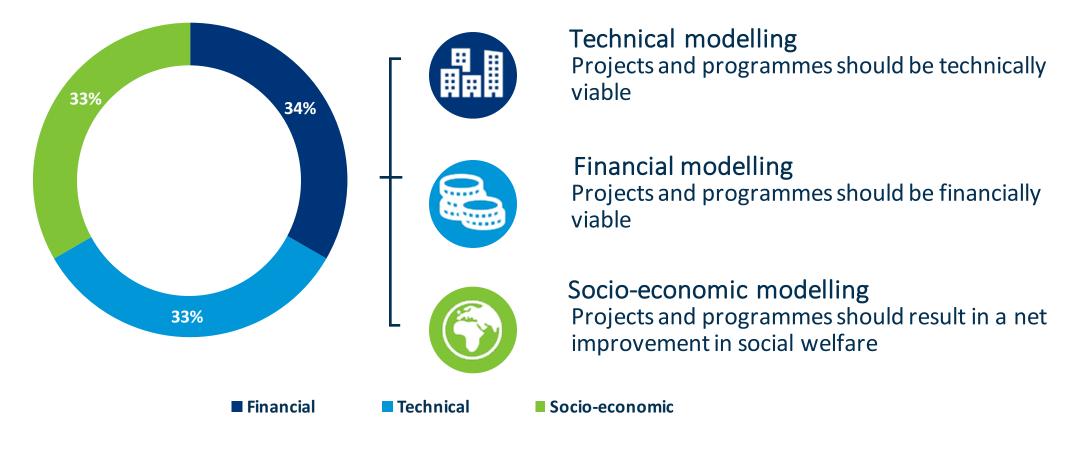
Socio-economic models take a step back and view the wider impacts on the region – Scotland Plc



### Why should you use socio-economic analysis?

Most public sector procurement includes elements of wider socioeconomic impact already

### Socio-economics is the dimension you never knew you were missing





### There are three common types of socioeconomic analysis

- 1. Cost-effectiveness analysis
- 2. Multi-criteria analysis
- 3. Cost benefit analysis



### **Cost-effectiveness analysis**

 CEA is an approach to compare projects delivering the same output (at different scales). It is useful when:

Projects produce only one output which is easily quantifiable

Project outputs are a **critical good** – e.g. heat, power, water

The aim of the project is to produce the project output at the lowest cost possible

The cost per unit of output is clearly defined and easily comparable – e.g. cost per MWh of heat

There are no relevant externalities

Benchmarks for project performance are easily accessible to ensure that the project is meeting minimum required cost performance criteria



### Multi-criteria analysis

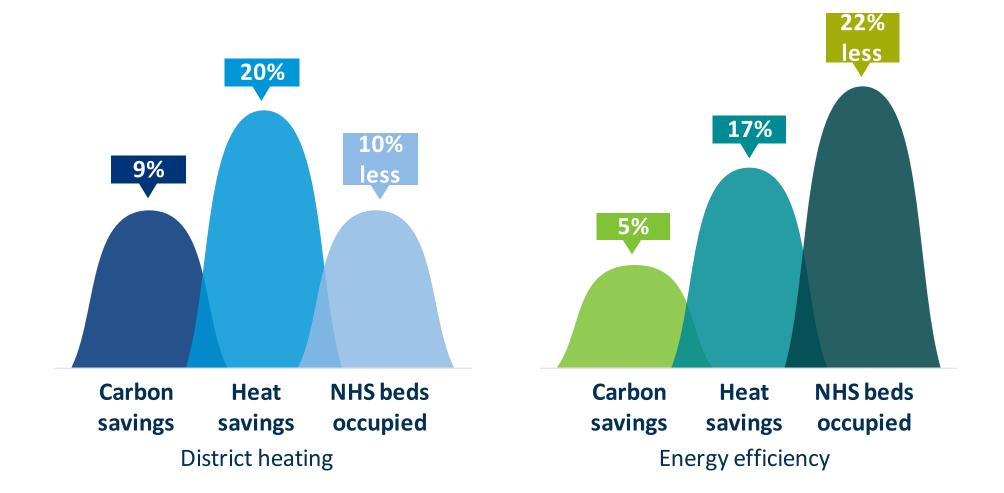
- MCA is an approach designed to evaluate programmes which deliver multiple objectives simultaneously – e.g. carbon reduction, fuel poverty reduction, job opportunities etc. It is useful when:
- Quantification of impacts is insufficient or impractical
- You are assessing multiple projects delivering multiple outputs/objectives in parallel
- It is possible to weight objectives according to their relative importance
- It is possible to forecast the impact of each project on achieving overall objectives and the relative likelihood/timeline of each impact happening



### Multi-criteria analysis - usefulness

This makes it easier to compare prioritised drivers

### MCA allows comparison of multiple priorities





3

### **Cost benefit analysis**

• CBA is one of the primary tools used by policy-makers to calculate the net social implications of new investments. It is useful when:

Where there are **substantial monetary and non-monetary** impacts of a project outside the direct transaction between the supplier and buyer(s);

To justify **public intervention** in a competitive (?) market;

Indirect and direct impacts of a project need to be summarised into a **single** quantifiable figure



### Differences between Financial and Economic CBA

- Uses cashflow forecasts to estimate financial returns of a project in NPV and IRR
- Financial returns calculated from the perspective of an investor, using market prices
- Uses market discount rates to reflect opportunity cost of capital

- Uses financial and nonfinancial costs and benefit forecasts to estimate economic returns of a project in NPV and IRR
- Economic returns calculated from the perspective of society in the region/country considered, using "shadow prices"
- Uses social discount rates to reflect opportunity cost of capital, e.g. Green Book rate



### **Building blocks of socioeconomic modelling**

- A) What is the project / investment
- B) What am I comparing to?
- C) What change results from the project?
- D) Measuring the impact key challenges
- E) Measuring the impact techniques
- F) Accounting for time and uncertainty



### Final Points - Calculating your social NPV

Remember that the social NPV is calculated from the difference between the costs and benefits of the two scenarios in each year of the project's lifetime

### COUNTERFACTUAL

Replacement costs eg new gas boilers

Fuel costs

Operating costs

Carbon emissions

Air quality impact

Jobs created

Health impact

### PROJECT SCENARIO

Replacement costs eg new gas boilers

Fuel costs

Operating costs

Carbon emissions

Air quality impact

Jobs created

Health impact

### NET IMPACT

Net capital costs

Net Fuel costs

Net Operating costs

Net Carbon emissions

Net Air quality impact

Net Jobs created

Net Health impact



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### **DISCUSSION**









### **BREAK**









# Sarah-Jane Stewart, Atkins











# Local Heating and Energy Efficiency Strategies Sarah Jane Stewart

Jess Edwards

### A world leader

Founded in 1911, SNC-Lavalin is one of the leading engineering and construction groups in the world and a major player in the ownership of infrastructure. From offices in over 50 countries, SNC-Lavalin's employees provide EPC and EPCM Services to clients in a variety of industry sectors, including mining and metallurgy, oil and gas, environment and water, infrastructure and clean power. SNC-Lavalin can also combine these services with its financing and operations and maintenance capability to provide complete end to end project solutions.





Our values are the essence of our company's identity. They represent how we act, speak and behave together, and how we engage with our clients and stakeholders.

SAFETY
INTEGRITY
COLLABORATION
INNOVATION

We put safety at the heart of everything we do, to safeguard people, assets and the environment.

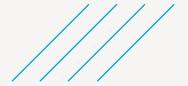
We do the right thing, no matter what, and are accountable for our actions.

We work together and embrace each other's unique contribution to deliver amazing results for all.

We redefine engineering by thinking boldly, proudly and differently.







# Agenda

**Executive Summary** 

Scope of LHHES Study

Notes on Tools and Methodologies

**Supporting Local Authorities** 

**Process Overview** 

**Target Setting** 

Challenges





### **Executive Summary**

Atkins part of the SNC Lavalin Group have been appointed to support the following local authorities with specific tasks to help the production of their Local Heating and Energy Efficiency Strategies:

- 1. Shetland Isles Council
- 2. Highland Council
- 3. Aberdeen City Council
- 4. Dundee City Council
- 5. Perth and Kinross Council
- 6. Stirling Council
- 7. Clackmannanshire Council
- 8. Glasgow City Council
- 9. Dumfries and Galloway Council

The Atkins led team for this commissions includes the sub-consultants Resource Efficient Solutions (REFSOL), Changeworks and the Carbon Trust

### **Scope of Commission**

Each LA has asked for differing support in relation to LHEES development; the overarching pilot study aims to test different part of the LHEES process, hence allowing a comprehensive approach to be reported as an output of the pilot. Atkins have used this to help guide our plan for supporting each of the 9 LA's. Supporting 9 Local Authorities with specific tasks to help the production of their LHEES. Tasks include:

- Baseline data reporting
- Energy efficiency
- Heat, decarbonisation
- Target setting
- Socio economic assessment
- Costed delivery plans
- Facilitating Stakeholder Engagement
- Building Surveys

The second part of the scope is proving an overarching Technical Review & Evaluation of the overall Pilot Programme, to be used as an evidence base for the possible future role out of LHEES as a mandatory requirement for local authorities.





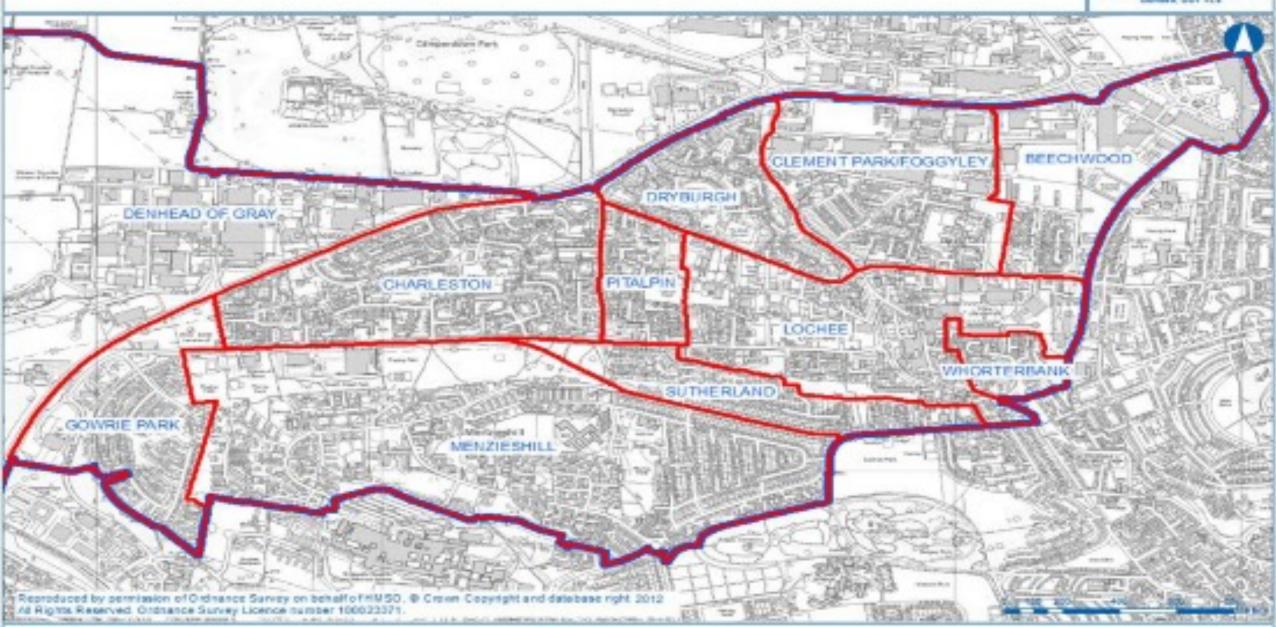




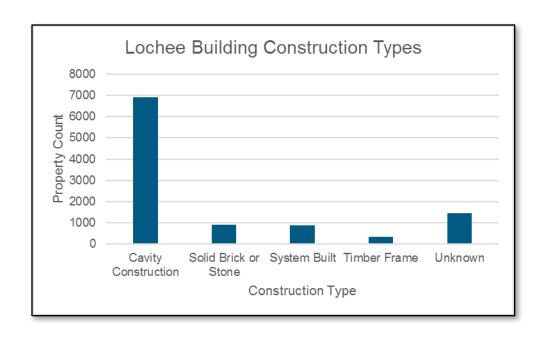


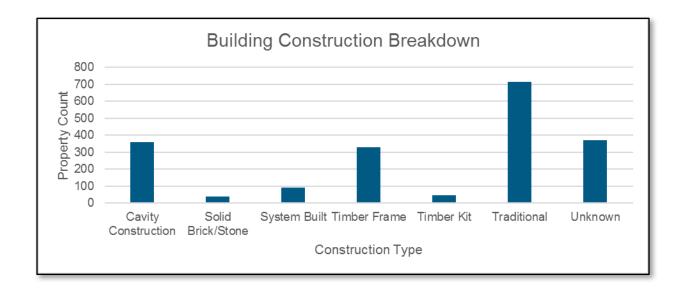
### Lochee Local Community Partnership Planning - Community Areas





### **Lochee Construction Types**



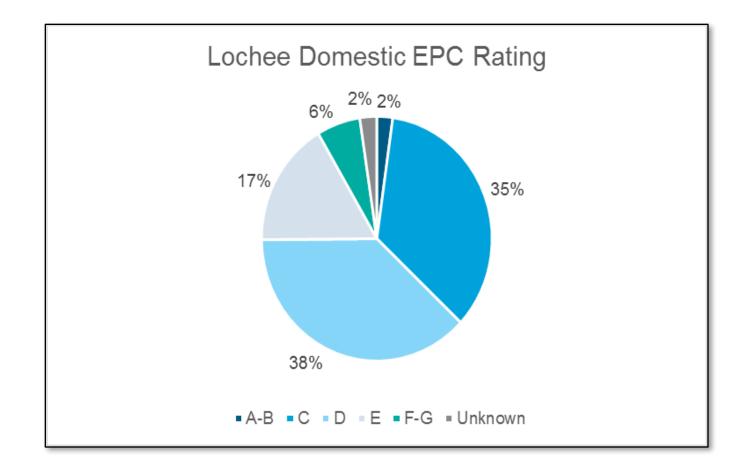








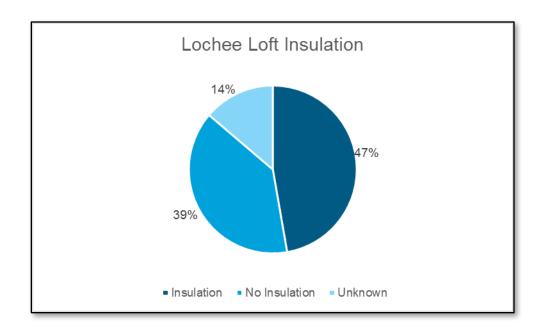
### Lochee Domestic EPC Ratings

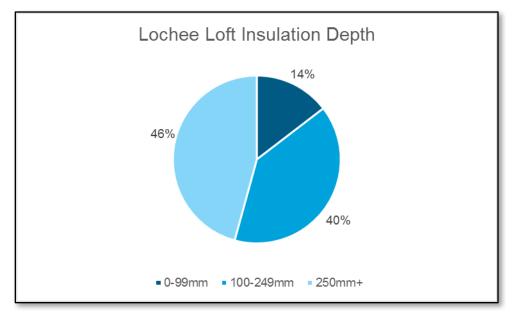






### **Lochee Insulation**











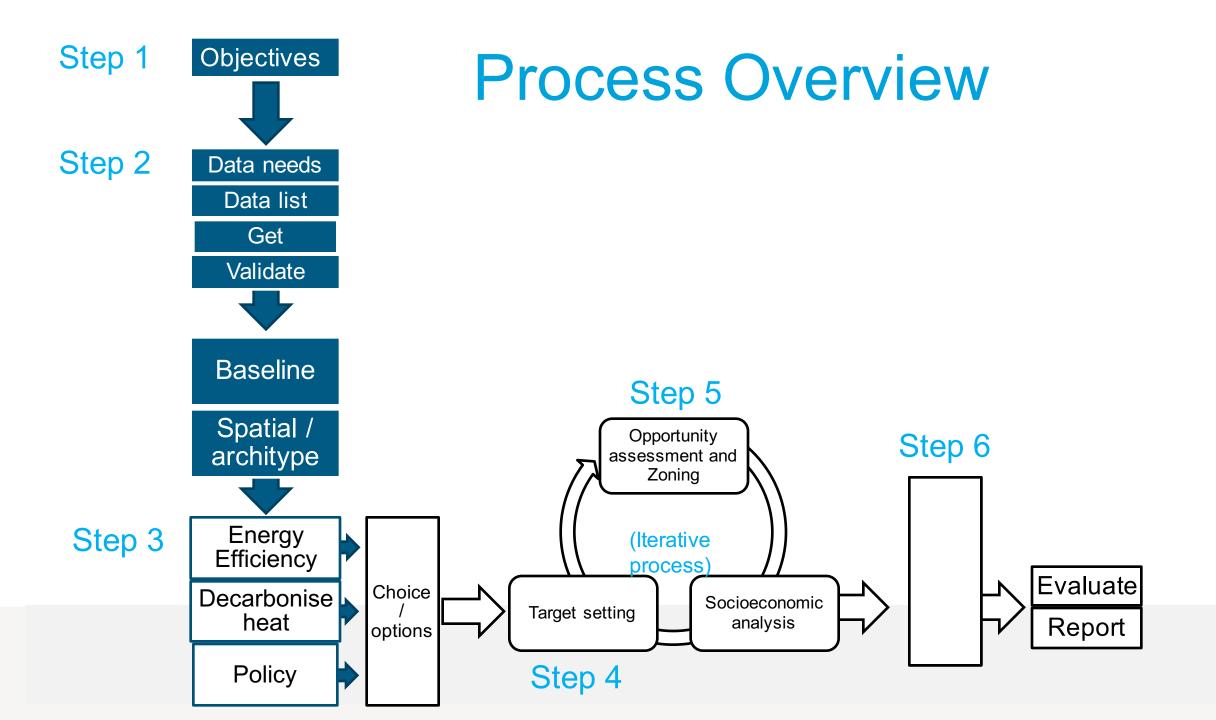


### Note on tools & methodologies

A key aim of the Scottish Government is to understand tools & methodologies for Energy Efficiency and heat decarbonisation, as part of the development of a LHEES. Where possible, the pilot study should look to consider alternative tools & methodologies, and record the learning with regards successes/ issues/ areas for further development.

However, as a general rule, Atkins will not deploy methodologies & tools that are considered to have little chance of success. Instead we will focus on confirming those already known to work (i.e. has been used previously), and those we think have a good chance of working (i.e. new tool, or one that hasn't been deployed significantly to date).







### Target Setting – Energy Hierarchy

Priority 3 .....

Priority 2 .....

Priority 1 .....



Energy Efficiency

Reduce Demand







# CHALLENGES



### Challenges – Data Analysis

### DATA SHARING AGREEMENTS

If external consultants are to be involved, data sharing agreements need to be in place to allow the use of assessor data.

#### STANDARDISATION OF FIELD CATEGORIES

No standardisation of field categories across different datasets – makes it difficult to set selection criteria and analyse

### NON-DOMESTIC DATA

There is data available relation to non-domestic buildings in some locations and none in other locations. Where there is a lack of data in this instance the only recommendation is that the need for the non-domestic buildings to be surveyed.

### DOMESTIC DATA SETS

The current datasets are good for an overall area, however it currently does not have the correct resolution to be looking at property by property, which is why broad approaches are needing to be used.







### Challenges – Stakeholder Engagement

#### CIBSE TM46

Where heat demand data is not available, it is calculated using the CIBSE TM46 benchmarks. Therefore we cannot use the TM46 to identify buildings performing well or poorly.

## SOCIO ECONOMIC IMPACTS

Decisions have to take account of the location, the technical applicability of solutions in conjunction with the socio-economic analysis.

## TRIED AND TESTED TECHNOLOGIES

Systems which are tried and tested should be considered for adoption, the main focus is selecting the solution which is right for the tenants.

#### STAKEHOLDER ENGAGEMENT

It is important to engage with to non-domestic building owners early on in the process of developing and LHEES so that you can find out if they have any monitoring data available or so that you can build up a good relationship with them to allow you to arrange for a detailed survey of the property to be undertaken.







# Thank you

If you'd like to find out more visit: <a href="https://www.snclavalin.com">www.snclavalin.com</a>

sarah-jane.stewart@atkinsglobal.com





# Elaine Waterson Energy Saving Trust











# Lessons from the technical monitoring of the SEEP pilots

**Elaine Waterson June 2018** 



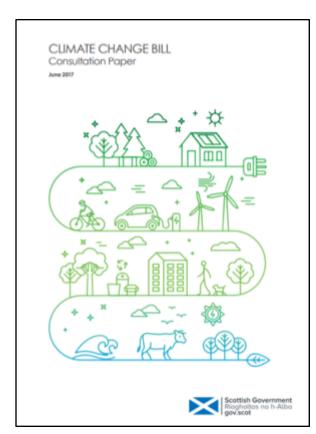
# Why take action on energy efficiency in homes in Scotland?

Scotland 2050 80% carbon reduction target. Aim for a 15% carbon reduction from homes

by 2032.

Decarbonising heat a particular priority.

- 26% of householders in fuel poverty
- Growing awareness of wider benefits of energy efficiency in housing – especially health and well-being.
- 15 year programme of infrastructure investment in energy efficiency (£0.5bn for next 4 years).





## SEEP (now EES)...

- Is a key infrastructure priority
- Will require huge spend (>£10 billion)
- Will be in place over lifetime of many Scottish Governments
- Will touch majority of Scotland's households and businesses
- Is tackling IMPORTANT issues





## Monitoring and Evaluation: Why do it?



Accountability/proof of impact for funders

Inform decision-making process

Lessons from successes and challenges

Better programme design and management

Real vs. modelled performance



#### SEEP evaluation - phase 1 pilots

#### Technical evaluation

Evaluation of changes in energy consumption, temperature and humidity. This work is led by the **Energy Saving Trust**.

# Social and organisational evaluation

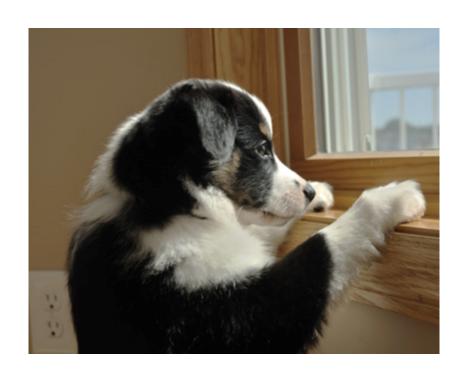
Exploring the influence of programme design, delivery approaches and experiences of building occupants

This work is led by the **University of Edinburgh** and uses a variety of social research techniques.

Data from both work streams analysed together to generate overall lessons from the evaluation



# So, for example...





#### Technical evaluation - roles

#### EST:

- Develop research methodology for assessing impact of the pilot programme interventions
- Provide technical guidance to participating Local Authorities
- Provide advice and technical support to Local Authorities to install the appropriate monitoring equipment, download data and remove sensors.
- Analyse the technical monitoring data

#### Local authorities:

Led on recruitment, procurement and installation of equipment, gathering of data





#### Aiming for data from:

- Heating season of 2016/17 (pre-installation)
- Heating season of 2017/18 (post-installation)

#### Sample size:

 Sufficiently large that the results can be extrapolated to all buildings in the pilot

However...



# Technology available for monitoring

- Technology
  - Monitoring equipment market
  - Smart meters
  - Connectivity









# A slight aside...

 Scottish Government's Home Energy Scotland network should be smart-meter ready later this year!







#### Issues encountered

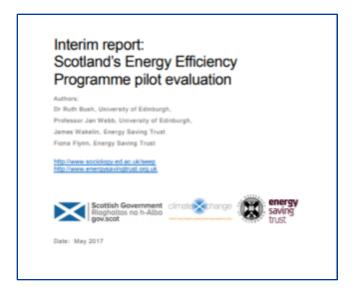
- Resource requirements
- Expectations about monitoring sample sizes
- Procurement of monitoring equipment
- IT issues
- Recruitment of monitoring sample





## Interim progress report

- Interim report published in May 2017
- Identified series of 16 lessons
- Available on Scottish Government's website:



http://www.gov.scot/Resource/0051/00518361.pdf



## Next steps

- Publication of report imminent...
- Lessons being taken into account in the evaluation of phase 2 of the SEEP pilots (now underway)
- Questions?



# Lessons from the technical monitoring of the SEEP pilots

**Elaine Waterson June 2018** 

# Professor Jan Webb, Dr Faye Wade Heat and the City Team, University of Edinburgh













# **Evaluating Energy Efficient Scotland pilots**

Prof Jan Webb, Dr Faye Wade, Dr Ruth Bush, Prof David McCrone, University of Edinburgh

Ms Debbie Sagar, Scottish Government

And all participating Local Authority Officials, Project Partners, Households, Non-residential Building Managers....

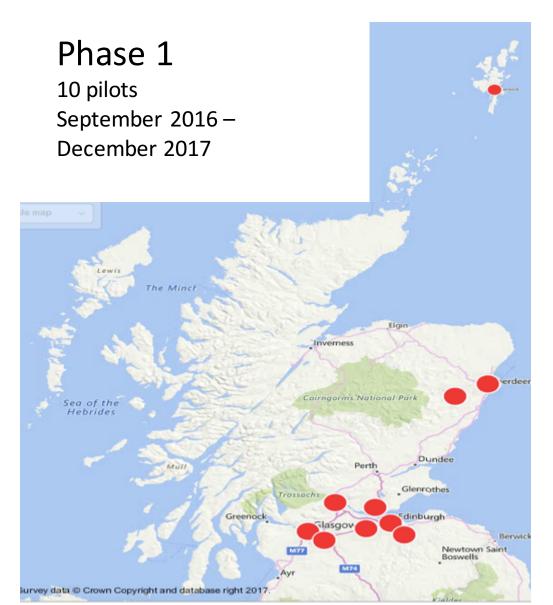


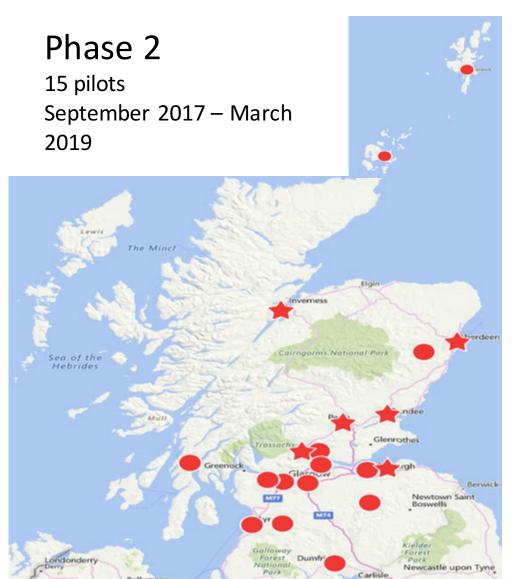




## The Energy Efficient Scotland Pilots





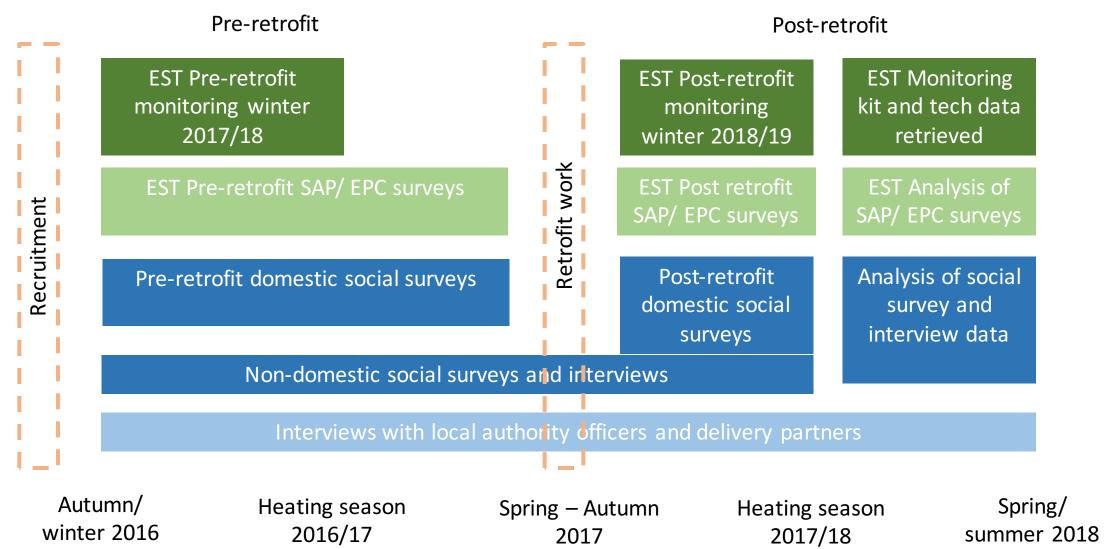




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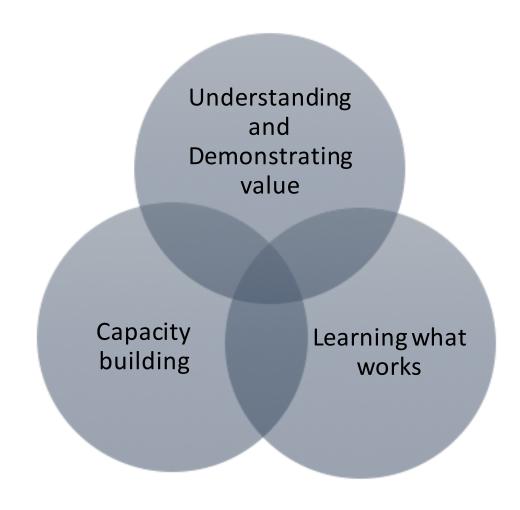
### Evaluating Phase 1 Pilots





## How Pilots Contribute to Energy Efficient Scotland Programme





## Phase 1 Domestic Pilots: Diversity



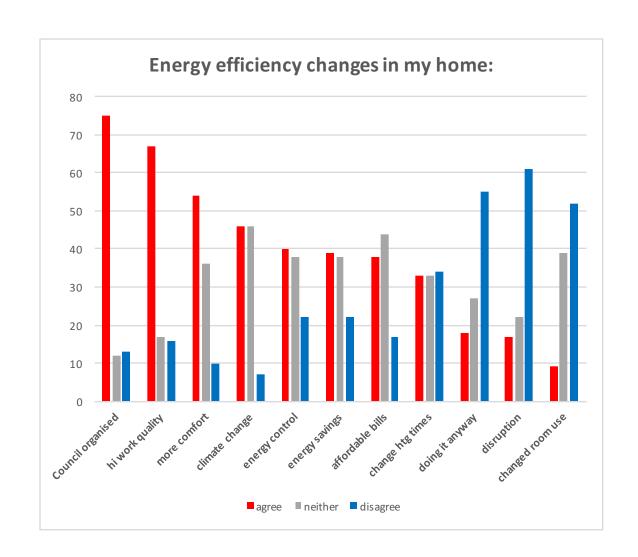


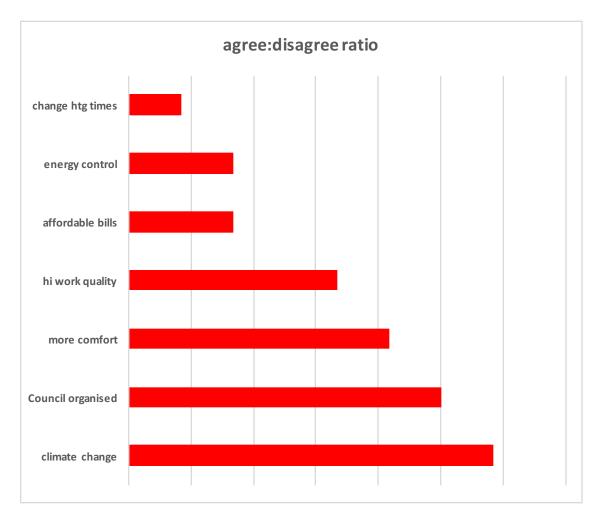
Glasgow – Mixed tenement blocks

HEEPS

## Phase 1 Domestic Pilots: Snapshot of Findings







#### Phase 1 Non-Domestic Pilots



#### Fife: Dunfermline Business Centre

Owned by the local authority and managed on a commercial basis Former maternity hospital, opened in 1937, closed in 1993. Opened as a Business Centre in 1996. Now rents spaces to SMEs.

Expansion of a biomass heating system from 20% to 100% of building. Installation of new LED lighting in communal areas.



#### **Glasgow: Greater Easterhouse Supporting Hands (GESH)**

Registered charity established in 1979; 32 community and care organisations use it and 600 people attend on a weekly basis.

1980s single storey building with metal frame and corrugated construction External wall insulation
Upgrading the lighting to LEDs
Replacing the heating controls
Improving the water efficiency



## **Involving Multiple Parties**



Delivery partners and contractors are a significant and influential part of the delivery jigsaw. Their available resources and capacities need to be taken into account when considering scaling up and timescales of programme delivery.



Red brick, pre-1919 tenement building Planned measures:

- Significant repairs to the rear screens at the back;
- External Wall Insulation to the rear and gable ends;
- Internal Wall Insulation to the front wall.
- 13 commercial units; 8 were responsible financially for the works at the rear of the building
- Mix of owners and tenants some on a full repairing and insuring lease; some owner occupiers.
- 38 Privately owned, 68 housing association owned flats.

Delivery of the works was coordinated by the housing association

#### **Community Development**



#### **GESH**

"The fact that you're engaging wi' an organisation who [...] don't have any funds. You are then aspirationally looking at trying to drive this project and when people start tae think it's beginning tae fail or beginning tae falter because o' all the other issues then you know there's an awareness that starts to happen and that might come through political media and other routes."







- 50:50 match funding between SEEP: Changeworks & Scottish Borders Council
- Renting previously unoccupied space on high street
- Rent goes back into community fund
- Full time advisor employed
- Early & ongoing engagement

### **Unified Databases**



- Short timescales for project completion
- EPCs useful for project specification, but not always recent/ accurate
- LA building logs sometimes available, but not always up to date; information held informally by site-managers



### **Procurement & Supply Chains**



Procurement needs to be reviewed and redesigned before the national programme commences, in order to streamline delivery, reduce bottlenecks and avoid price increases.

"...SEEP was introduced but there wasn't a delivery vehicle available for us to use so we had a contracted framework for HEEPS but it only allowed us to do domestic properties and then SEEP was introduced so it was difficult to find a delivery vehicle for that and there hadn't been one created you know in terms of how, how are we going to deliver this so Scottish Government brought that out but we didn't have a route, we didn't have a contractor."

"...the property services have contract administrators and a programme office so they work with...a range of frameworks and contract arrangements to engage the different companies that are needed for the different functions...we didn't have direct dealings with the contractors that was done through the property colleagues as well"

#### Conclusions



- Evaluation & review can only proceed from what is actually tested in pilots
  - Important to understand what influenced how the pilots were designed & managed
- Phase 1 LAs didn't see it as a way of trying something "innovative"
  - Too little time in bid writing & delivery timescales
  - Many projects based on already established need/ existing feasibility studies
  - Funding specifications limited flexibility had to deliver on what was in the bid
  - Limited staff resource
  - Don't want to announce projects to community / local politicians if they aren't going to go ahead
- Pilots building on established processes within local authorities
- Learning, coordination and collaboration between LAs, government and supply chain critical
- Need for innovation, and 'space to fail', in pilots and national programme

#### **DISCUSSION**







