

The Value of Site-Based Research in Retrofit

Dr Moses Jenkins MCIOB
Historic Environment Scotland

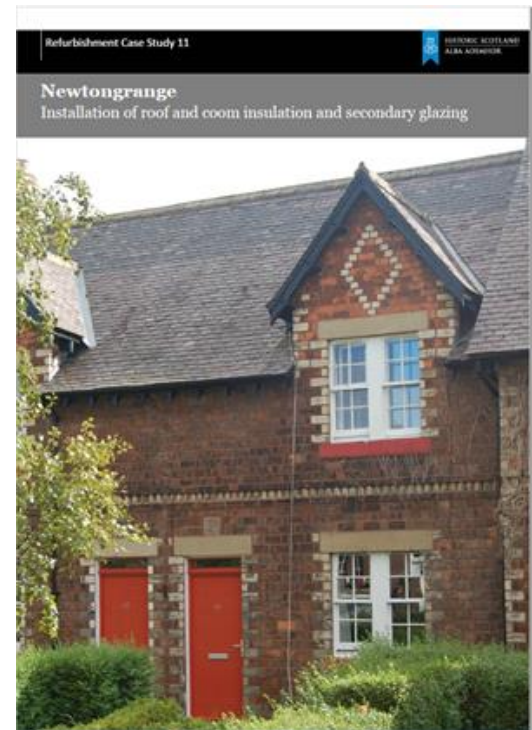
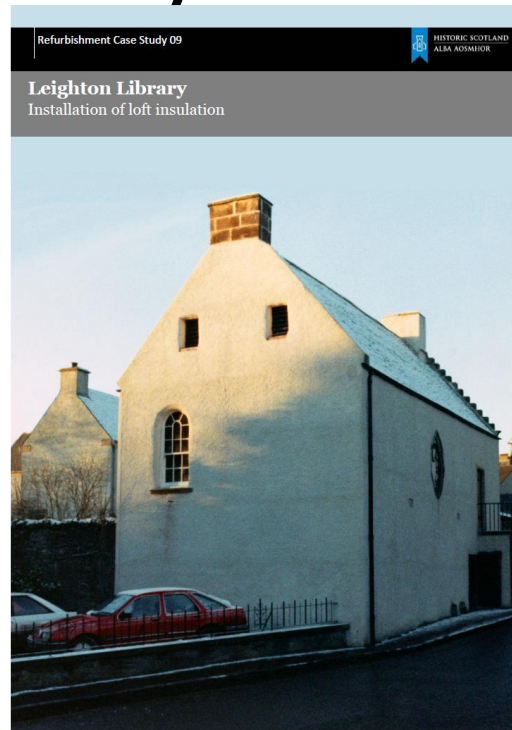
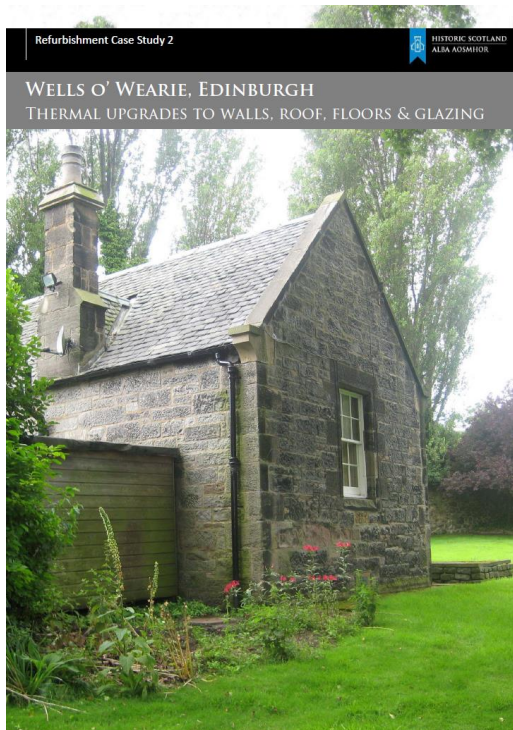
Types of research

- Desk-based
- Modelling
- Controlled environments
- Site-based
- Focus today is on retrofit, but relevant to all interventions to a building

Definition of site-based research

- Based on work to a building
- Generally, the building will be occupied and in use - either currently or in the future
- Will involve monitoring of elements of building performance
- The process used for installation of measures will follow general practice unless the methods are experimental

HES have undertaken considerable site-based research over the last 15 years



The focus of this has been on:

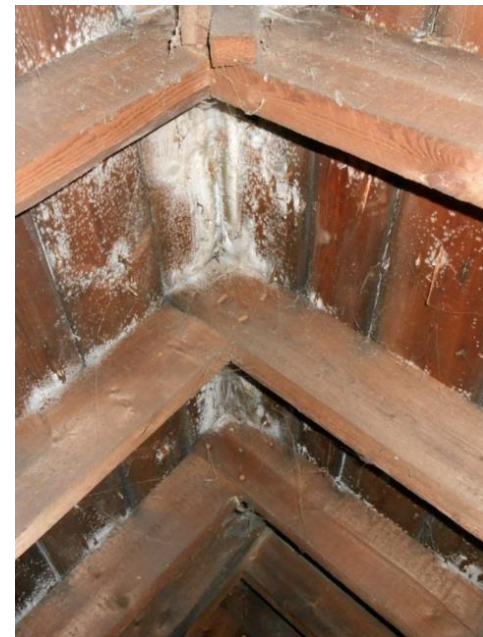
- Mainly looked at thermal performance of traditional buildings in the form of in-situ U-value measurement
- Includes pre-improvement U-values, as well as post-retrofit work
- Have also looked at moisture levels mainly on the surface of masonry walls and within masonry
- Lots more that can be done . . .



We have sought to
investigate what
might work on a
particular building...

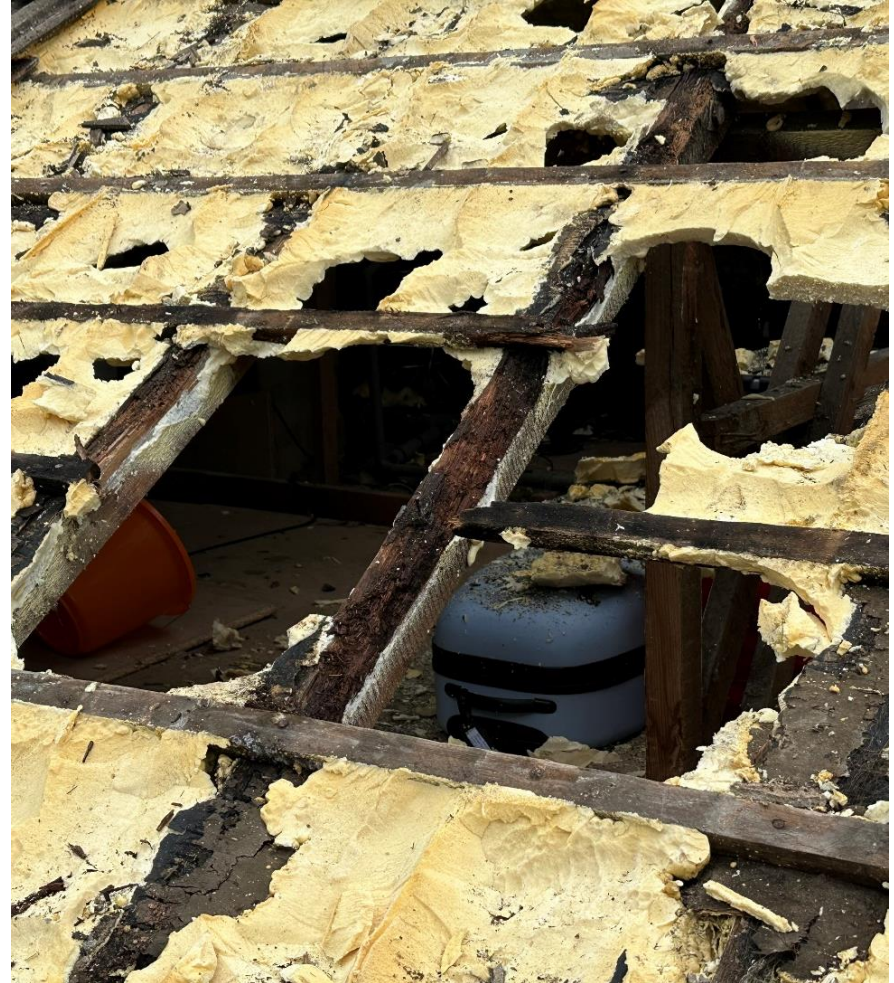
To demonstrate the art of the possible, category A listed vernacular building



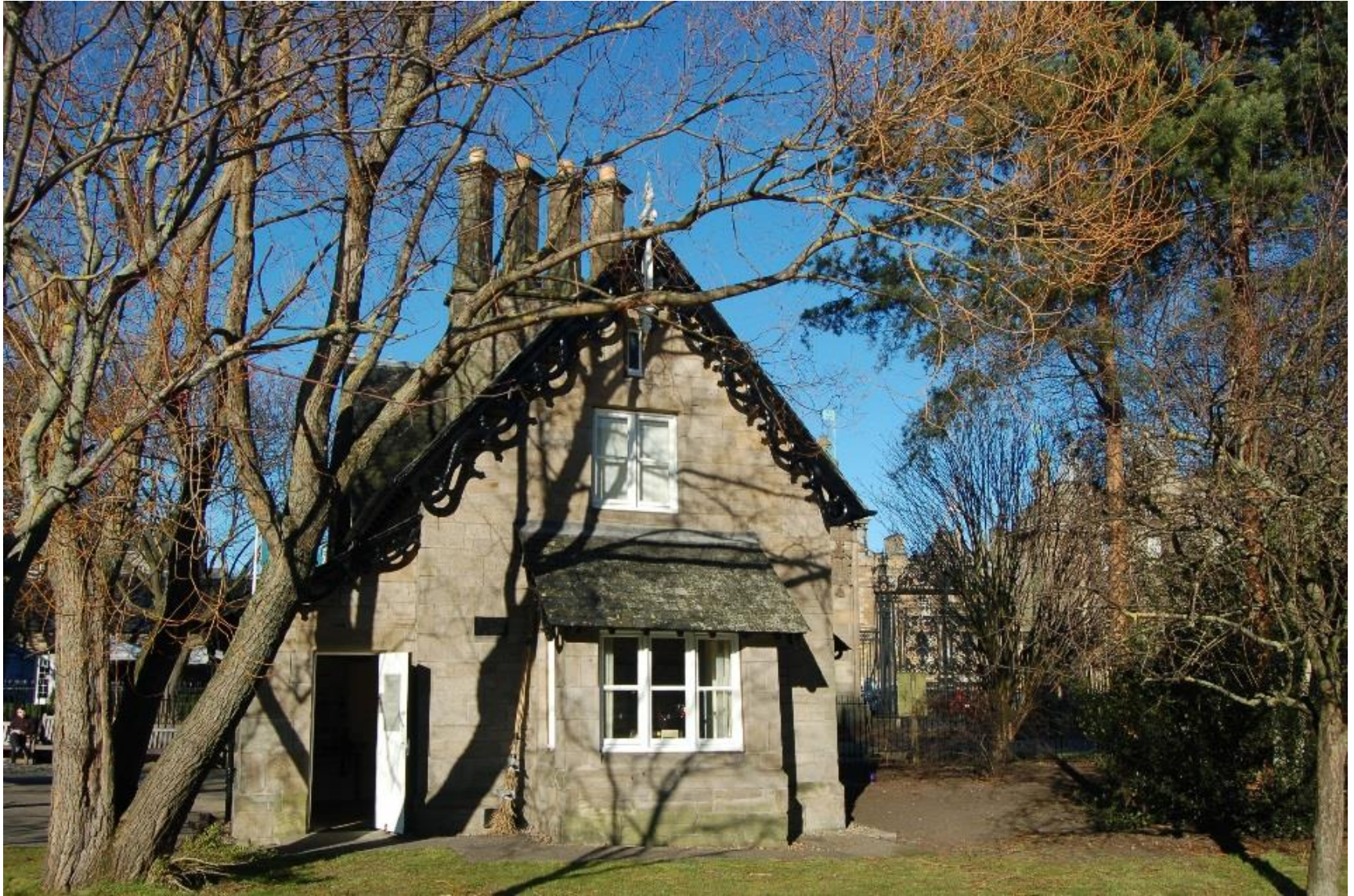


It can also flag
unintended
consequences...

And be used to investigate why something has gone wrong – maladaptation / defects caused by retrofit



Site-based research - Holyrood Park Lodge, B listed detached house



Roof and floor insulated with wood fibre board insulation





Cellulose Insulation
behind lath and
plaster wall lining

Improved glazing using original frames and casements along with draught proofing



MONITORING WORK CARRIED OUT

ArchiMetrics Holyrood Park Lodge Roof Insulation IHGM



Internal Surface



External Surface



Solar

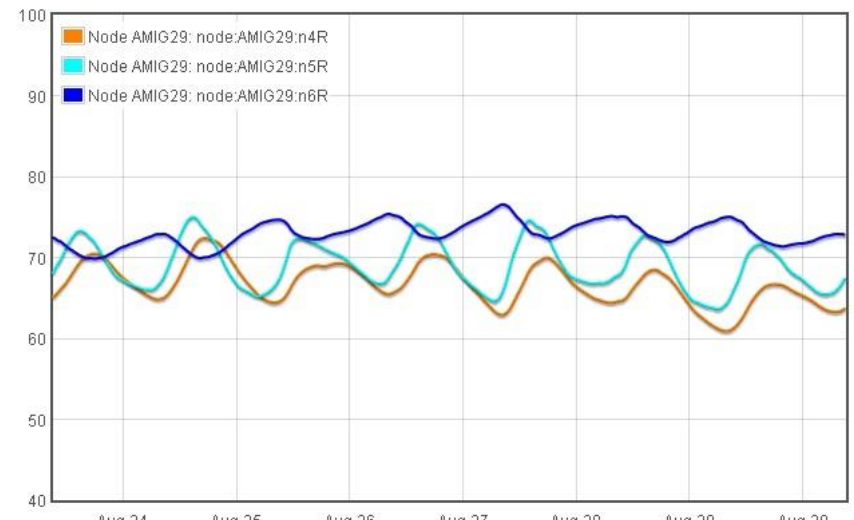
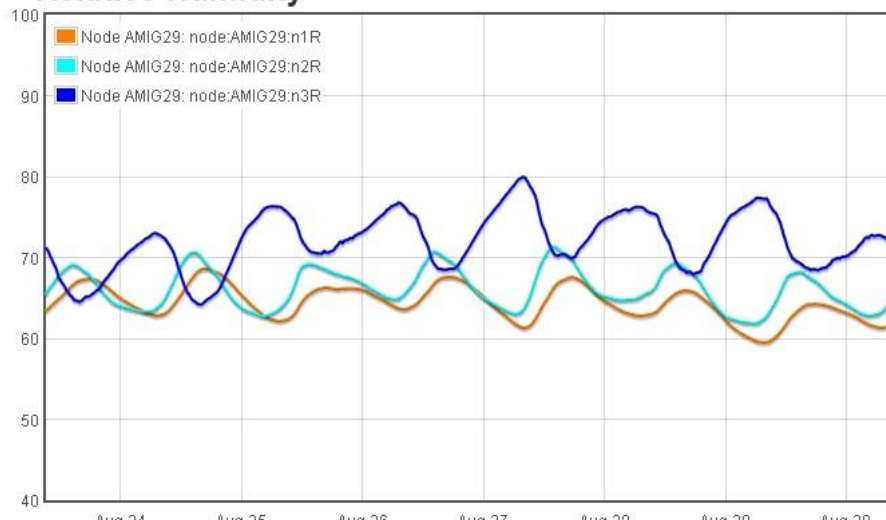


Heat Flux

With Interface Void

Without Interface Void

Relative Humidity



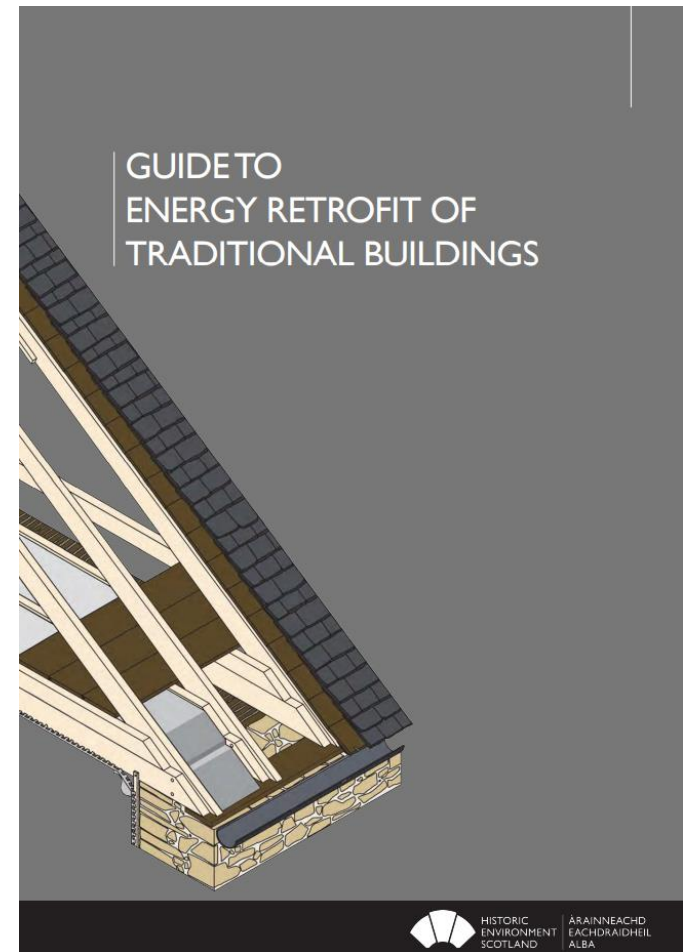
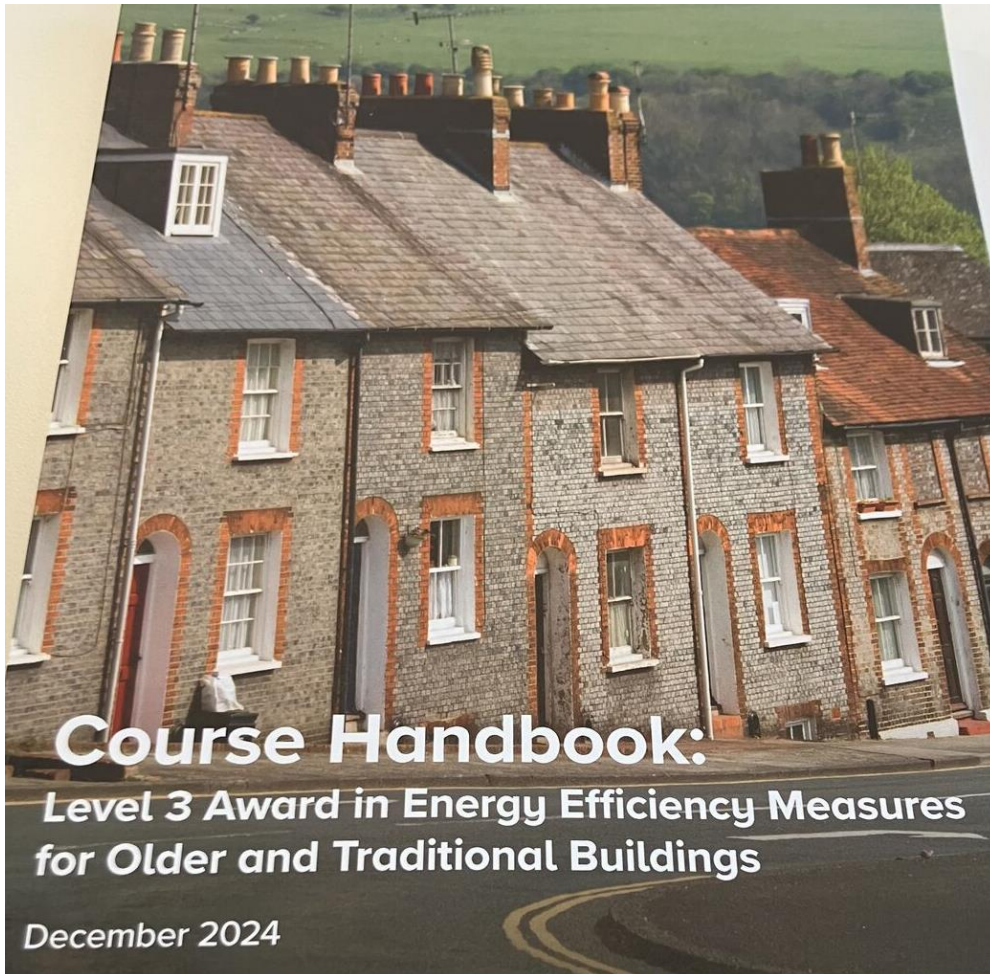
Site-based research influences policy and standards

- In-situ U-value measurements resulted in changes to values for traditional buildings in RdSAP
- Site-based research provides evidence to add credibility to proposed changes to standards, such as PAS2035
- Government standards, such as Scottish Government Heat in Buildings Bill, informed by site-based research

It also influences guidance, education and skills provision

- HES technical and planning guidance influenced by site-based research
- The content of the Level 3 qualification on retrofit of traditional buildings is based on a range of research
- CPD delivery also contains the learning gained from these interventions
- Knowledge and credibility gained through real site experience

Guidance, Qualifications and Skills



Retrofit Lab in Stirling

- Will provide a hub for retrofit skills and innovation for traditional buildings and low-carbon retrofit materials
- Funding provided by UKRI AHRC RiCHES Fund
- Includes provision for organisations to use in-situ monitoring equipment
- Results will be collated and accessible to inform other research, etc.

WELCOME

EDUCATE DEMO EXHIBIT

EQUIP

RETROFIT LAB

ENGINE SHED

National Cycle Network Route 76

River Forth

Stirling Train Station

VIEWS

THE ENGINE SHED
AN SEADA EINNSEIN
SCOTLAND'S BUILDING CONSERVATION CENTRE

ENGINE SHED
RETROFIT LAB - CONCEPT
ANC030-NIP-DRG-20231010-SK

Future site-based research

- 15 HES domestic properties provide a significant opportunity
- Need to look to expand to look more at moisture in timber, airtightness and indoor air quality, for example
- Climate change effects, including overheating will also play a part

The democratization of site-based research

- As the cost of equipment falls, more site-based information will be gathered
- An increasing awareness of building performance monitoring by organisations, such as housing associations
- How do we harness the power of this data?
- How to do we ensure accuracy of results?

Conclusion

- HES have undertaken a broad range of site-based research
- Significant opportunities going forward; need to look at what data to gather and how this can be harnessed effectively
- Site-based research influences a broad range of outcomes including policy, guidance, standards and qualifications
- More details on the Historic Environment Scotland Website
- Contact me at moses.jenkins@hes.scot