![Department for Business, Energy & Industrial Strategy logo]

International review of domestic retrofit supply chains

Technical report – project methodology

May 2021

Acknowledgements

Contents

Introduction

Research aims and objectives:

BEIS commissioned this research project with the aim of bringing the relevant international evidence together to create an overview of different domestic energy efficiency retrofit supply chain practices, with a view to identify the factors leading to a successful retrofit supply chain and whether they are replicable in the UK market.

The main report presents the main overview of the methodology and the findings. This accompanying technical report presents the methodology in more detail.

.

Project methodology

The project was structured in two phases:

- Phase 1 - Rapid Evidence Assessment (REA)[1]: collation of the evidence in the literature related to the international domestic retrofit supply chain, using a defined search strategy developed from the RQs posed by BEIS. Peer reviewed (white) literature and high-quality grey literature were both included. This work was delivered between September and December 2019.

- Phase 2 - Deep Dive: further, deeper analysis of relevant literature, supplemented by interviews with experts, including academics, and stakeholders from the building industries, to gain a deeper understanding of how the retrofit supply chain operates successfully in a small number of selected examples. The results from this were then synthesised with phase 1 to produce this report.
  This work was delivered between January and April 2020.

This technical report provides a description of the project methodology across both phases of the project.

Phase 1: Research questions

The questions posed by BEIS were:

Supply chain success

"*RQ1: Which countries have the most successful domestic energy efficiency retrofit supply chains?*"

Examples of things that were explored were:

- Which countries have the greatest uptake on home retrofit through the supply chain?

- Which countries have the cheapest home retrofit when delivered by the supply chain? Can this be compared with the cost of general home improvements?

- Which countries have the most highly skilled retrofit supply chain?

Supply chain operation

"*RQ2: How do domestic energy efficiency retrofit supply chains operate in different countries?*"

Examples of things that were explored were:

- What stakeholders operate within the retrofit supply chain?

---

[1] An REA is a form of evidence review which aims to search and synthesise a large volumes of information in a transparent and unbiased way. The REA undertaken in this project followed the "Defra NERC guide to scoping reviews and rapid evidence assessments".

- How do different members of the supply chain interact with each other? What are the relationships and interactions between manufacturers, sellers, and installers? What are the implications of these relationships for consumer uptake and cost of home retrofit?

- Are there local partnerships that are, or can be, exploited by the supply chain to improve the uptake of retrofit?

- How do retrofit supply chains identify their market? How are retrofit services advertised and sold?

Supply chain upskill

"*RQ3: How do members of the domestic energy efficiency retrofit supply chain upskill in different countries?*"

Examples of things that were explored were:

- How do members of the supply chain gain their skills in home retrofit?

- Is retrofit part of a wider suite of skills or do the suppliers specialise?

- Is training usually undertaken on courses, or is it done peer to peer?

- How frequently do members of the supply chain train in new methods?

- How aware are the supply chain of new techniques? How is awareness gained and spread?

- Does upskilling have an impact on the uptake of energy efficiency retrofit?

Supply chain consumer interaction

"*RQ4: How do consumers interact with the domestic energy efficiency retrofit supply chain?*"

Examples of things that were explored were:

- Is the supply chain for retrofit trusted by consumers? If so, why?

- How has this trust been gained?

- Do supply chain members advise the consumer on further measures they can take to improve the energy efficiency of their home?

- What factors lead to successful upselling of further retrofit measures?

Supply chain government interaction

"*RQ5: How do the supply chains interact with central and local government regulation?*"

Examples of things that were explored were:

- Do supply chain members interact with home assessment measures (such as the EPC or equivalent)?

- If so, how?

- How do supply chain members interact with local government regulations such as planning permission?

- How does the supply chain interact with government schemes to promote retrofit loans/grants etc?

- How do supply chains interact internationally with other countries across borders?

Rapid Evidence Assessment questions

We formulated these Research Questions (RQs) as three separate primary REA questions:

- "*What is the evidence of the influence of the supply chain on the success of domestic energy efficiency retrofit?*" This would address RQ1.

- "*How do supply chains for domestic energy efficiency retrofit operate in different countries?*" Primary question which would address RQ2, with secondary questions addressing RQ4 ("*How do consumers interact with the domestic energy efficiency retrofit supply chain?*") and RQ5 ("*How do the supply chains interact with central and local government regulation?*")

- "*How do members of the domestic energy efficiency retrofit supply chain upskill in different countries?*" This would address RQ3.

Phase 1: Search strategy, methods and scope

Definition of search keywords

Keywords for the literature search were developed based on the research questions and taking into account BEIS's suggestions at the inception meeting. Search terms for the different REA questions were developed using the PICO (Population, Intervention, Comparator, and Outcome) model, as suggested in the Defra NERC guide to scoping reviews and rapid evidence assessments[2], and are shown in Table A.

---

[2] Collins, A.M., Coughlin, D., Miller, J., Kirk, S. 2015. The Production of Quick Scoping Reviews and Rapid Evidence Assessments: A How to Guide.

Table A: Search terms

Population	Intervention	Comparison	Outcome		
Residential buildings, retrofit supply chain	**Energy Efficiency renovation**	**Different countries**	**REAQ1 Cost, consumer satisfaction, installation rates**	**REAQ2 means of operation**	**REAQ3 increasing skill**
Residential OR Domestic OR Home AND suppl* OR logistic* OR warehouse* OR trade OR deliver* OR install* OR wholesale* OR construct* OR consorti*	Energy efficien* OR Energy performance OR Low-energy OR Low-carbon OR zero-energy AND renovat* OR retrofit* OR refurbish* OR measures OR insulat* OR airtight OR ventilat* OR water AND heat* OR fabric OR space condition* OR control OR build OR construct*	Europe EU Belgium France Germany Italy Netherlands Switzerland Japan USA Canada Australia New Zealand	Customer satisf* OR cost OR cost reduc*OR install rat*OR market penetrat* OR trust*OR uptake OR effect* OR quality *OR energy sav*OR assess* OR impact OR comfort* OR health* OR warmth OR innovat*	Manufacture* OR sell* OR install*OR partner*OR advise OR upsell*OR extra OR add* OR home assess* OR EPC OR scheme* OR loan OR grant OR subsidy OR permi* OR cross border OR practi* OR model OR co-ordinat* OR off-site OR standardisation OR standardization OR "modular-build"	Train* OR skill OR course* OR aware* OR availab* OR specialis* OR expert* OR new AND technique* new AND skill OR educat* OR VET[3] OR quality mark* OR accreditat

Both the keywords and the search locations were further developed in an iterative process of trialling and refining until the results returned from the search were optimised to provide a comprehensive overview of the available evidence. Relevant literature already known to the review team was used to validate the selected search terms. In addition, forward and backward citation searches were undertaken on relevant papers. The three primary questions were the main focus during the evidence search and screening process; however, information that was

---

[3] Vocational Education and Training.

relevant to the secondary questions (bulleted questions above) were also recorded during the data extraction phase.

Search strings were a combination of the terms for each PICO component. An example search string for REA question 1 was:

"residential OR domestic OR home AND suppl* OR logistic* OR warehouse* OR deliver* OR install* OR wholesale* OR construct* AND "energy efficien*" AND renovat* OR retrofit* OR refurbish* OR insulat* OR measure OR ventilat* OR water AND heat* OR fabric OR "space condition*" OR control AND "Customer satis*" OR cost OR "cost reduc*" OR "install rat*" OR "market penetrat*"OR trust* OR uptake OR effect* OR quality OR "energy sav*" OR assess* OR impact OR comfort* OR health* OR warmth OR innovat*"

Inclusion and exclusion criteria

Inclusion and exclusion criteria for evidence was determined by the research team, in conjunction with BEIS, based on the PICO components of the primary research questions and the initial trialling and refining of search terms. The criteria are shown in table B.

Table B: Inclusion and exclusion criteria

Inclusion and exclusion criteria for REA	How implemented in the REA
Exclusion criteria	
Not to include studies on non-domestic properties	Using search terms (see table A)
Geographic regions where the climate, economy or build type are not transferable to the UK. Specifically: • African countries • Asian countries (excluding Japan) • Russia	Using search terms (NOT) or manually during data selection
Inclusion criteria	
Research published between the year 2000 and current date	Search criteria (>1999)
Must consider the effect of building supply chain	Search criteria (see table A)
Some specific countries thought to be of interest (ie those where the climate, economy and build type are likely to be transferable to the UK).	Search criteria (see table A)

The agreed search strategy was followed throughout the evidence assessment. However, where changes to the strategy protocol were deemed necessary due to unexpected results identified during the evidence assessment, BEIS was consulted and any changes that were made were recorded.

Sources of Evidence

Evidence was sought from the following sources:

- Peer-reviewed literature was sought using the database platforms Web of Science and Scopus. These enable multiple journal databases to be searched simultaneously using the identified search strings.

- The use of internet search engine "Google" (using identified search strings) was supplemented by specific searches of relevant institution websites (e.g. the Intelligent Energy Europe project database, CORDIS, US DoE Better Buildings, BPIE). Searches were made of the European Council for an Energy Efficient Economy (eceee) and American Council for an Energy Efficient Economy (aceee) conference paper databases. In addition, key contacts from the team's networks were asked for their suggestions for key pieces of grey literature that should be reviewed.
  It was intended to use the specialist grey literature search site Open Grey (http://www.opengrey.eu/); however this was not found to include papers on this topic.

Evidence search and search record

The agreed information search protocol was implemented to conduct the evidence search in a systematic and transparent manner. A record of searches was maintained. The search terms, the date, the database, the number of hits and any date limits for each search was tabulated. Details of individual pieces of evidence identified separately (e.g. from interviewees or from individual websites) were also tabulated in a separate spreadsheet with the publication name, date, and source location (including a hyperlink). After the completion of the individual search strings, results from each search were combined to create a full list of evidence (with duplicates removed). Reference managing software, Endnote, was used to aid this process.

Screening search results

The selected inclusion and exclusion criteria were then used to identify the most relevant evidence amongst the search results. Evidence was evaluated in two stages:

- **First stage:** Using the title of the evidence, the evidence was considered against the inclusion/exclusion criteria. A rating of "clearly relevant", "clearly not relevant" or "uncertain" was applied. Full text was obtained for evidence evaluated as "clearly relevant" or "uncertain".

- **Second stage:** The abstract (or executive summary or first paragraph) of the full text was then read and evaluated against the inclusion/exclusion criteria. Those evaluated as meeting the inclusion criteria were selected, noted and used at the extracting evidence stage.

The ratings of the evidence at the second stage were recorded in an evaluation record spreadsheet. Likewise, whether the evidence was subsequently included was recorded. In order to reduce bias and increase consistency and objectivity, at the start of each stage a second member of the research team independently screened a sub-section (~5%) of the evidence. The evaluations of each team member were then compared.

Inconsistencies between evaluations were discussed to ensure that the inclusion/exclusion criteria had been applied consistently and with minimal bias. This process was also recorded.

Extracting the evidence

The selected evidence was read in full to extract the information critical to answering the research questions. See Table C for a list of information that was extracted. All evidence read at the full text stage was presented to BEIS in an Excel file with its extracted data and critical appraisal (see below). This activity formed the systematic map or database, again provided to BEIS.

Table C: Data extraction form

Citation details	
Author(s)	
Year of publication	
Title of paper	
Title of publication (e.g. book, journal, report)	
Vol., Issue, Pages	
Nature of study	
The population studied	
Countries of intervention	
Details of the retrofit/intervention	
Outcomes measured	

Specific evidence for REA Question 1:

Evidence of the influence of the supply chain on the success of domestic energy efficiency retrofit	
Evidence relating to secondary questions:	
• What is the cost of retrofit, how does this compare with the cost of general home improvements, and how has this influenced uptake?	
• How skilled is the retrofit supply chain?	
• Does upskilling have an impact on the uptake of energy efficiency retrofit?	

Specific evidence for REA Question 2:

Evidence of how supply chains for domestic energy efficiency retrofit operate	
Evidence relating to secondary questions:	
• What stakeholders operate within the retrofit supply chain?	
• How do different members of the supply chain interact with each other?	
• How do retrofit supply chains identify their market?	
• How are retrofit services advertised and sold?	
• Is the supply chain for retrofit trusted by consumers? If so, why? How has this trust been gained?	
• What factors lead to successful upselling of further retrofit measures?	
• How do supply chain members interact with home assessment measures (such as the EPC or equivalent)?	
• How do supply chain members interact with local government regulations (such as planning permission)?	
• How does the supply chain interact with government schemes to promote retrofit loans/grants etc?	
• How do supply chains interact across borders?	

Specific evidence for REA Question 3:

Evidence of how supply chains for domestic energy efficiency retrofit train	
Evidence relating to secondary questions:	
• Is retrofit part of a wider suite of skills or do the suppliers specialise?	

• Is training usually undertaken on courses, or is it done peer to peer?	
• How frequently do members of the supply chain train in new methods?	
• How aware are the supply chain of new techniques?	
• How is awareness of new techniques gained and spread?	

Critical appraisal of the evidence

To ensure the most relevant and high quality evidence was given greater weighting in the synthesis, the evidence was subject to an appraisal. The appraisal took into account the following:

- **Relevance:** Each piece of evidence was appraised for its relevance to the primary research question. The relevance criteria were derived from the Defra/NERC guide. A numerical value of between 1 and 3 was allocated for each criterion, with 1 representing lower and 3 representing higher relevance. An overall, summary score using the same 1 to 3 scale was then given based on the evidence's performance on all the criteria[4]. See below for the list of relevance criteria.

- **Robustness:** Each evidence type (e.g. experiment, review etc.) had its own criteria. During the extraction phase, each piece of evidence was coded for its type and how well it meet the robustness criteria for its type, scored from 1 (few criteria met) to 3 (all/most criteria met).
  [Note, if no information is provided in the evidence for one of the criterion, then a 1 will be awarded to the evidence on that criterion. However if the study appears highly relevant then, in a few isolated cases the author may be contacted and asked to supply the missing detail.]

  An overall, summary score was using the same 1 to 3 scale was then given based on the evidence's performance on all the criteria[5]. See below for a list of the different robustness criteria.

- **Combination:** The numerical values for relevance and robustness was multiplied for each article to give a combined score (1 = weak evidence and 9 = strong evidence). At this stage, very low scoring evidence was excluded (in collaboration with the review team) and recorded..

---

[4] This was a judgement made by each reviewer. It was based on the scores for each criterion but was not the mean, as some criteria (eg relevance to intervention and relevance to REA) were regarded as more significant than others. The assignment of the overall score was part of the review by a second member of the research team.

[5] As for relevance this was a judgement made by each reviewer. It was based on the scores for each criterion but was not the mean, as some criteria (eg source and quality of data) were regarded as more significant than others. The assignment of the overall score was part of the review by a second member of the research team.

Limitation - assigning confidence to evidence

It was intended to assign a confidence class to descriptions of what the evidence indicated during the synthesis phase, using the scores from the critical assessment. However the evidence was too sparse and fragmented for this to be possible; effectively all evidence was low confidence, so this step was not performed.

Phase 1: Relevance assessment criteria

REA question 1

Table D: Relevance of the selected articles

Criteria	Low (1)	Medium (2)	High (3)
The relevance of the intervention assessed*	Energy efficiency retrofit in buildings	Energy efficiency retrofit in buildings including domestic buildings specifically	Energy efficiency retrofit in domestic buildings only
The relevance of the evidence to the REA question	No mention of supply chain	Mentions supply chain in association with results but not as cause and effect	Specifically addresses effect of supply chain on success of retrofit
Relevance of the outcome measurement*	Describes success only in vague terms	Lists specific measures for success (eg low costs)	Provides data for specific measures of success
Evidence provided	No description of mechanism for supply chains influencing success	Indirect evidence of effect of supply chains (association)	Direct evidence for effect of supply chains

*From the Defra NERC guide to scoping reviews and rapid evidence assessments.

REA question 2

Table E: Relevance of the selected articles

Criteria	Low (1)	Medium (2)	High (3)
The relevance of the intervention assessed*	Energy efficiency retrofit in buildings	Energy efficiency retrofit in buildings including domestic buildings specifically	Energy efficiency retrofit in domestic buildings only

The relevance of the evidence to the REA question*	Little detail on supply chains (who they are and how they interact)	Detail on some aspects of the supply chains	Detail on all aspects of supply chains
The relevance of the description	No or little information on interaction with local and national government policy and/or how the market operates.	Some information on interaction with local and national government policy and/or how the market operates.	Detailed information on interaction with local and national government policy and/or how the market operates.

*From the Defra NERC guide to scoping reviews and rapid evidence assessments.

REA question 3

Table F: Relevance of the selected articles

Criteria	Low (1)	Medium (2)	High (3)
The relevance of the intervention assessed*	Energy efficiency retrofit in buildings	Energy efficiency retrofit in buildings including domestic buildings specifically	Energy efficiency retrofit in domestic buildings only
The relevance of the evidence to the REA question*	Little detail on how supply chains upskill	Detail on some aspects of how supply chains upskill	Detail on all aspects of supply chain upskill
The relevance of the description	No or little information on how supply chain skills are measured	Some information on how supply chain skills are measured.	Detailed information on how supply chain skills are measured.

*From the Defra NERC guide to scoping reviews and rapid evidence assessments.

Phase 1: Robustness assessment form

NB not all criteria applied to all REA questions. For example, evidence relating to REAQ2 and REAQ3 was largely descriptive so the first question, "Are the question(s) and hypothesis/hypotheses addressed by the study clearly identified?" was not generally relevant.

'General' papers

	Criteria	Score	Comments
General	Are the question(s) and hypothesis/hypotheses addressed by the study clearly identified?		
	Are related existing research and theories acknowledged?		
	Are sources of funding and vested interests declared?		
Methodology	Is the source of the data clear and well described?		
	Is the data well described?		
	What is the quality of the data, how representative is it? (eg national statistics, data from a trade association). Are limitations of the data discussed?		
	Are assumptions made clearly described?		
	Were outcome variables/measures reliable? I.e. were outcome variables/measurements objective, was there any indication that measures had been validated or subjected to another QA processes?		
	Were any analytical methods used appropriate?		
Analysis	Were the estimates of effect size given or calculable?		
	Was the precision of the intervention effects given or calculable? I.e. Were confidence intervals and or p-values for the effect estimates given or calculable?		
	Overall how well was bias minimised by the study and how relevant is it to the evidence review? I.e. how well are the criteria above met?		
Summary	Overall how well was bias minimised by the study and how relevant is it to the evidence review? I.e. how well are the criteria above met?		

Qualitative studies (e.g. interviews, expert elicitation etc.)

	Criteria	Score	Comments
General	Was the aim of the interview/elicitation clearly stated?		
	Are sources of funding and vested interests are declared?		
Methodology	Was the consultation method tested to ensure suitability?		
	Are the questions asked clearly identified?		
	Are the experts/interviewees asked clearly identified?		
	Are the experts/interviewees the most suitable and representative? i.e. was the size of the group suitable for the diversity of opinions		
	Were minority opinions stated?		
	Were the conclusions based on the information gained from the experts/interviewees?		
Synthesis	Were the range and diversity of opinions clearly stated?		

Reviews

	Criteria	Score	Comments
General	Is the question/topic addressed by the review clearly identified?		
	Are sources of funding and any vested interests declared?		
Methodology	Was a search strategy outlining key words and sources to be searched identified a priori and used consistently?		
	Was publication bias mitigated through the identification of grey/unpublished literature		

	Criteria	Score	Comments
	Is there a clear rationale for the inclusion of studies and is this applied consistently		
	Has the robustness and relevancy of the information been critically appraised?		
Synthesis	Has information from the review synthesised information in a way that minimised bias		
	Do the conclusions relate to the information found by the review		

Synthesis of the REA evidence

All the selected evidence was reviewed and used to answer the research questions (with greater weight given to the most relevant and robust evidence) and to report findings on the adequacy of the evidence base. A thematic analysis was conducted, using themes that emerged from the literature reviewed. This synthesis resulted in a technical report.

Phase 2: deeper analysis

The published evidence drawn together in Phase 1 had gaps and was insufficient on its own to answer the research questions. As expected, further, more detailed research, was needed.

Selection of focus - schemes, services and concepts

While initially we considered that we would engage with stakeholders from particular countries, the findings from phase 1 meant that we instead focussed on the specifics of success of individual schemes, services and concepts. These offered examples of good practice that covered the project areas of interest and enabled the team to undertake in-depth study to determine whether they could be replicated in the UK domestic retrofit market.

Factors taken into consideration when selecting the schemes, services and concepts for further study included:

- The degree of uptake of measures amongst the able to pay market.

- Opportunities for retrofit in existing service markets.

- Energy savings achieved overall or per dwelling.

- Other benefits achieved overall or per dwelling (e.g. improved health and well-being).

- Growth in supply chains.

- Innovations in processes, business models and technology.

- How transferable the experience may be to the UK, such as:

- o Whether the policy landscape of property ownership is similar (e.g. tax arrangements for income, and property, and building regulation requirements).

- o How similar the housing stock is and the ownership model to that in the UK? (rented vs owner occupier, single family dwellings vs blocks of flats, type of energy efficiency measures applied).

- o Models and roles of local, regional and national government and their agencies.

- Wider policy context (e.g. including urban planning, vocational education and training).

Collection of evidence – expert interviews

Following a phase 2 inception meeting with BEIS in January, the project team compiled a list of key stakeholders to engage. These contacts were identified as being familiar with the literature and policy documents relevant to that country or stakeholders who work on the schemes, services or concepts identified as being of interest (factors listed above). This list of stakeholders was drawn from the findings of the REA, complemented with additional suggestions from the research team.

The key questions we were looking to answer within this stage of the research is why certain elements of the energy efficiency supply chain work as well as they do. This involved addressing questions such as:

- How is 'success' for energy efficiency retrofit defined? Is this quality of work, scale of activity or both?

- What aspects of the supply chain are particularly effective at delivering success in energy performance terms (for example, the level of skills or the way in which the supply chain interacts with customers)?

- What is the policy context within which the supply chain operates, and how does this affect success (for example, are there incentives for improved energy efficiency)?

- What is the regulatory and energy market context, and how does this affect success (for example, is there a regulatory requirement for, or a nascent market in, rewarding customers for the system benefits of improved energy efficiency)?

- Does the housing market influence levels of energy efficiency retrofit (for example, is there a price premium for higher energy efficiency)?

Topic Guide for stakeholder interviews

The interviews were semi-structured using the topic guide designed around these key questions – presented in table G below. below. This was based on the findings of phase 1 and research team experience.

Table G: topic guide

Question
Please can you tell me about your background and experience? How did you get interested in housing retrofit?
What were the policy / economic / social factors that supported the development of this [scheme]?
What has been the result of the [scheme] to date?
Which stakeholders have been involved in the [scheme]?
How is the supply chain encouraged to take part in [scheme]?
In [scheme], how do manufacturers and distributors work with one another and with installers / general builders?
Are smaller companies involved in delivering [x scheme]? If so, how were they initially engaged? How is their commitment / interest maintained? *Definition of 'small' – micro enterprise e.g. less than 10 employees.*
For more complex initiatives (multiple measures etc) Do companies in the supply chain have any concerns about working on more complex projects? How are these overcome?
For more complex initiatives (involving consortia) How are new consortia formed, and what skills mix do they include?
What are the main barriers (if any) to the delivery of quality solutions for householders? How are these overcome?
Was additional training needed to ensure that [x scheme] had a large enough competent supply chain? If so, how was this designed and delivered?
How is the quality of the result and the level of customer satisfaction measured? At what point in the process is this done?
Could / should the current level of activity under [x scheme] be increased? How could this happen?
'Is there anything else you would like to mention that you think is important to future success of these types of schemes?

Stakeholder recruitment and consent

Stakeholders were invited to be involved via an email which included an overview of the project and the specific project/scheme/experience we were interested in talking to them about. A consent form was attached which had to be completed before the interview took place. This asked whether the stakeholder agreed to take part in the research, whether they gave permission for the interview to be recorded and whether they were prepared to be identified in the published report by name and/or organisation. The consent form and interviewers also made it clear that stakeholders were free not to answer any question that they would prefer not to. Stakeholders were sent the questions from the topic guide before the interview.

While we expected to conduct 20 telephone interviews, the final total was 13 (with 14 interviewees). This was due to a lack of stakeholders willing and available to participate in the research within the limited timescale of the project. These are listed below.

Summary information on stakeholders interviewed

Organisation	Project (P) /Scheme (S)
Anonymous	'Success- Families'(P)
BetterHome	BetterHome (S)
University of Westminster	Vocational Education and training for Low Energy Construction (VET4LEC) (P)
House2Home Retrofit Ltd	House2Home Retrofit Ltd (S)
ROCKWOOL Group	BetterHome (S)
London South Bank University	Review of US 'Better Building Neighbourhood Programme' (P)
Tipperary Energy Agency	SuperHomes Ireland (S)
Passive House Institute	Passiv Haus (S)
TU Delft	COHERENO (P)
Passive House Institute	Passiv Haus (S)
Energiesprong	Energiesprong (S)
Irish Green Building Council	Irish retrofit scheme (S)
BPIE	Turnkey Retrofit (P)

Collating the interviews findings

Interviewers provided an overview in a standard format for the scheme, where this was relevant (appendix B in main report) and structured the findings from each interview around the

questions from the topic guide (see above), linking these to the original Research Questions posed by BEIS. The main themes used were:

- Context –how did the scheme come about and policy, economic and social factors that supported the development of the scheme.

- Engaging/building the supply chain and how the supply chain operates within the scheme.

- How to deliver quality? How were consumers supported? How has training helped close skills gaps and ensure quality?

- How to deliver scale? Taking the scheme from niche to mainstream.

Collection of evidence – further analysis of written evidence

In addition to interviews, the team also reviewed additional grey and white literature, suggested by or provided by the interviewees. This helped to provide a complete picture of activity as possible, including the context in which the supply chains operate.

Synthesis of the evidence

Following the conclusion of the interviews and reviews of additional literature, the findings of the phase 2 research were synthesised and considered alongside the findings from phase 1 and BEIS's research questions. The synthesis themes were the same ones listed above for the interview analysis.

The results were written up as the findings and conclusions in the main project report. These were revised and refined in response to comments from BEIS and the external reviewer.