COUNTRY REPORT ON THE ENERGY EFFICIENCY SERVICES MARKET AND QUALITY

United Kingdom

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QualitEE Project

This document has been developed as part of the "QualitEE – Quality Certification Frameworks for Energy Efficiency Services" project supported by the EU's Horizon 2020 programme.

The QualitEE consortium comprises 12 partner organisations covering 18 European countries, an expert advisory board, including the European standards body CEN/CENELEC, and 59 supporters from major financial institutions, government bodies, trade associations and certification bodies.

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Definitions and glossary

Term	Definition
Client	means any natural or legal person to whom an energy service provider delivers energy service
Energy Efficiency Directive (EED)	means Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency
energy efficiency improvement*	means increase in energy efficiency as a result of technological, behavioural and/or economic changes
energy efficiency*	means the ratio of output of performance, service, goods or energy, to input of energy
energy efficiency service (EES)**	means an agreed task or tasks designed to lead to an energy efficiency improvement and other agreed performance criteria
energy efficiency improvement*	means an increase in energy efficiency as a result of technological, behavioural and/or economic changes
energy management system*	means a set of interrelated or interacting elements of a plan which sets an energy efficiency objective and a strategy to achieve that objective
energy performance contracting* (EPC)	means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings
energy supply contracting*** (ESC)	means a contractual arrangement for the efficient supply of energy. ESC is contracted and measured in Megawatt hours (MWh) delivered
energy savings*	means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption
energy service*	the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings
energy service provider*	means a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises
energy*	means all forms of energy products, combustible fuels, heat, renewable energy, electricity, or any other form of energy, as defined

	in Article 2(d) of Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics
EPC provider	means an energy service provider who delivers energy services in the form of Energy Performance Contracting
ESC provider	means an energy service provider who delivers energy services in the form of Energy Supply Contracting
energy service project facilitator (facilitator)	means an advisory company working on behalf of the client to procure and/or implement an energy service project
Public Procurement Framework	means a standard procurement route for Energy Performance Contracting for use by public sector organisations in the UK that avoids the need to go to full public tender through the Official Journal of the EU. The framework owner offers a standard project development process, contract template and a panel of pre-procured services providers from which one can be selected through a mini-competition process. The framework owners often offer facilitation services and expertise to clients through dedicated project development / support units. Access to the framework and facilitation is often heavily subsidised via European technical assistance grants or claimed back through services fees to reduce barriers to entry.
Integrated Energy-Contracting (IEC)	means a combination of energy efficiency measures with energy supply contracting typically with short term 'operational verification' rather than ongoing Measurement & Verification
Savings	means energy savings and/or related financial savings; the financial savings include the costs of energy provision and can also include other operational costs, such as the costs of maintenance and workforce
The International Performance Measurement and Verification Protocol (IPMVP)	is the widely referenced framework for "measuring" energy or water savings, which is available at www.evo-world.org

Notes:
*Definitions according to the Energy Efficiency Directive
**Definition according the European standard EN 15900:2010
***Definition is a simplified version of IEA DSM Task Force 16 definition

1 EXECUTIVE SUMMARY

The objective of this report is to compile evidence to inform the development of European & national quality criteria and the implementation of quality assurance schemes for energy efficiency services (EES). This report has been developed as part of the "QualitEE – Quality Certification Frameworks for Energy Efficiency Services" project supported by the EU's Horizon 2020 programme. The QualitEE project aims to increase investment in EES and improve trust in service providers.

Information has been collected through a market survey as well as literature review. An analysis has been conducted and conclusions formed to be presented in this report as well as in the online database on the QualitEE project website.

This report aims to improve the market knowledge of stakeholders so that they can make better informed decisions based on evidence. The barriers and success factors for energy efficiency services, their quality determinants and as well as the related legal, political and institutional framework have been mapped. Lessons learned from existing certification frameworks will serve to establish strategies for the implementation of national quality assurance schemes.

Chapter 3 outlines the political, legal and regulatory framework for energy efficiency and energy services in the UK for which the Department for Business, Energy and Industrial Strategy is the key Government body. It has taken over the role of the former Department of Energy and Climate Change, which fully translated Article 18 (relating to Energy Services) of the European Energy Efficiency Directive into UK law. This research finds that the actions relating to information and awareness, such as the provision of a model contract for energy performance contracting, have been implemented, although in some cases they are now out of date. On the other hand, an action to "encourage the development of quality labels, including the development of quality labels by the trade associations to which energy service providers belong" has seen no significant progress in terms of energy services in the non-domestic sector. The National Energy Efficiency Action Plan, published in 2014, refers to the Green Deal Quality Mark satisfying this requirement, but the Government's Green Deal scheme has since been scrapped. The European Code of Conduct for Energy Performance Contracting has taken an important first step towards defining quality benchmarks, however it is found that this tool is mainly used by service providers for promotional activities, and although it has provided valuable information for clients, it lacks the enforcement procedures required to drive quality improvement. The attention to EU initiatives has understandably suffered in the wake of the UK's referendum on membership of the Union, and the Government has focussed attention on a new *Clean Growth Strategy* to set the tone to 2030. This encouragingly sets a renewed focus on energy efficiency and identifies energy services as an area for development, although the policy framework is notably light on detail. This provides a good opportunity for influence for projects such as QualitEE as the Government consults on specific policy actions to deliver against its aims. The research also identifies that the UK has a rich tapestry of funding schemes, technical assistance programmes and regulation to encourage energy efficiency although the landscape is found to be continually changing.

Chapter 4 outlines the state of play in relation to the UK Energy Performance Contracting market, using a strong survey dataset covering 16 out of the 30 active service providers currently operating in the market, as well as 10 key project facilitators. This research finds that the UK EPC market is experiencing growth in 2016. This growth is largely attributed to strong uptake in the public sector, which has been driven by the success of several public procurement frameworks that offer standardised project development processes, procurement routes and contracts, as well as subsidised facilitation services. Typical Energy Performance Contracting projects are found to have a capital outlay of 1-5 million Euros, a contract length of 5-10 years, use a guaranteed savings model and are paid for using the client's internal funds or debt arrangements. The market is found to have aligned in the use of specified measurement and verification processes for reconciling performance, which are generally expected to be based on the International Performance Measurement and Verification Protocol, and there is an established market for independent measurement and verification services. Complexity, lack of information and lack of trust remain the top barriers for business in the sector (also reported in 2013 and 2015 in surveys conducted by the *Transparense* project) although lack of information has consistently reduced in significance over the period 2013-17, whilst lack of trust has shown an opposite trend. This suggests that information dissemination activities such as the publication of the Government's model contract for EPC and the European Code of Conduct for EPC, both in 2015, have had a positive effect, but the lack of enforcement of best practices has led to a more informed market becoming increasingly sceptical about the quality of services offered by UK service providers. Raising affordable finance was found to be a more significant barrier in the UK than elsewhere in Europe although the range of finance options was found to be comprehensive and their availability to be good. When asked about EPC quality, UK respondents particularly emphasised the importance of contractual transparency, communication and implementation of measures above their European counterparts, whilst also highly ranking technical / economic opportunity analysis (energy auditing), measurement and verification and practical achievement of the projected savings. UK respondents again highlighted communication and contractual issues as the main areas for quality improvement, alongside measurement and verification. The research highlights that there is no central trade association representing energy performance contracting providers and facilitators, with the majority being represented mainly by the Energy Services and Technology Association (ESTA) and the Association for Decentralised Energy (ADE). It is however noted that ESTA's Energy Performance Contracting Group (EPCg) has convened supply side stakeholders at three recent conferences aiming to bring a focus to the sector and co-ordinate communication with policymakers.

Chapter 5 examines the current situation of the UK Energy Supply Contracting market. Unlike Energy Performance Contracting, which is now a well-established term in the UK, the term 'Energy Supply Contracting' is not well recognised by local stakeholders and the scope of the market is not well defined. This is exemplified by the fact that only one provider and facilitator completed questions on energy supply contracting in the survey, despite the fact that others that responded to the survey are known to offer energy supply contracts. The research finds that there are several market segments that could be part of the Energy Supply Contracting market; including single site individual technology (Combined Heat & Power, Biomass, Solar

Photovoltaic) projects, which typically fall in the under 1m€ bracket, energy centre refurbishments 1-5m€, and district energy 5+m€. Due to the segmentation the survey gave no consistent finding on market size and a surprising result that the market was considered to be stagnant when, in contrast, a source from external literature (Manders 2017) identified that the value of district energy tenders awarded has increased from £40m to £340m between 2013-16. Projects were found to be more focussed in the private sector than EPC and use supplier arranged finance options or project financing. Sourcing viable finance for energy supply contracting was seen to be 'easy' and finance affordability is not an issue. Similarly, to energy performance contracting, lack of trust and customer demand were highlighted as key barriers. When asked about quality, UK respondents agreed with European counterparts on the most important aspects; Implementation of technical measures, communication between provider & client, operation & maintenance, preliminary technical-economical analysis / energy audit, with the latter two in most need of improvement.

Chapter 6 reaffirms the value of promoting energy efficiency services as a key delivery model for energy efficiency. Survey respondents highlighted the attractiveness of energy savings guarantees and the opportunity to reduce exposure to risk, as well as satisfying the need to outsource personnel and expertise as internal teams become more constrained by limited budgets and pressures to reduce costs. The promise of access to substantial third party finance is also a key benefit to energy services and offers the opportunity to open up vital energy efficiency actions that do not fall within payback thresholds required for limited internal capital funds or debt arrangements. In this respect many clients are looking for the opportunity to take energy services contracts off their balance sheet however, changing finance regulations and guidance is leading to hesitation in accessing this desired benefit. Considering these drivers alongside the identified barriers, a set of recommendations to support energy efficiency services market development are outlined as follows:

- Action 1: Set a long-term, coherent governmental policy programme to encourage uptake of energy efficiency and energy services
- Action 2: Continued Government leadership and development of the use of energy efficiency services for public buildings
- Action 3: Replicate the benefits of Public Procurement Frameworks and trusted intermediaries for energy efficiency for the private sector.
- Action 4: Implement a Quality Assurance Scheme for energy efficiency services building on the European Code of Conduct for Energy Performance Contracting
- Action 5: Provide training for clients and financial institutions, particularly in respect or key enabling factors for energy efficiency services (such as robust baseline data and metering), procurement, contract negotiation and management, as well as recognising the key quality aspects of good energy efficiency services
- Action 6: Organise a high number of workshops and seminars on energy efficiency services to develop demand and build confidence
- Action 7: Promote best practices in energy efficiency services
- Action 8: Consolidate Trade Association activities related to energy efficiency services

- Action 9: Promote the use of sound and rigorous measurement and verification techniques. Whilst the research finds the market has focussed in terms of the best practice approaches for measurement and verification, the application of these techniques is still wildly variable and open to bias – particularly from service providers – if not expertly verified.
- Action 10: Provide clarity over financing for EES and cases in which off balance sheet treatment can be achieved.

As action 4 (relating to the development of a quality assurance scheme for energy efficiency services) is a focus of the QualitEE project, Chapter 7 provides further detail in this respect. It identifies that the key roles for quality assurance include;

- A standardisation body that is responsible for the setting of standards and verification procedures
- An accreditation body that accredits certification bodies to perform audits against the standards and issue certification based on satisfactory results.
- Certification bodies that perform auditing and issue certification relating to the standards.
- Certified objects being the organisations, products, services or processes that are subject to certification.

Whilst these roles fall into a specified national framework for British (BS), European (EN) and International (ISO) standards, these quality assurance roles are found to fall into several other bespoke frameworks led by Government, Trade Associations and Private Companies. The research briefly touches on existing quality assurance schemes in the energy sector; looking at ISO50001, the Combined Heat and Power Quality Assurance Scheme (CHPQA), the Microgeneration Certification Scheme and the Automated Meter Reading Service Providers Code of Practice for Gas Meters (ASPCoP). Existing schemes for energy efficiency projects and services are also reviewed; including Heat Trust, the draft Energy Performance Contracting Code of Practice for the UK and the Investor Ready Energy Efficiency Certification Scheme (developed by the Investor Confidence Project Europe). The survey results offer compelling evidence that a quality assurance scheme would lead to increased trust, which is expected in turn to lead to increased customer demand, finance affordability and reduce transaction time. It is recognised however that a balance needs to be struck between sufficient detail and minimal cost, as there are concerns that additional cost will be detrimental to the investment case for energy efficiency services. The survey also strongly identifies that the Government / public institutions should play some part in the quality assurance scheme to ensure credibility. UK respondents have strong concerns relating to market confusion and there being too many different assurance schemes. In particular the Investor Confidence Project (ICP) Europe is well established in the UK market. It offers a standard documentation process for energy efficiency projects that is independently quality assured and awarded “Investor Ready Energy Efficiency” certification. There are key differences between QualitEE and ICP Europe: QualitEE focusses on energy efficiency services, that have specific aspects of quality beyond energy efficiency projects in general, such as energy saving guarantees. QualitEE also aims to take a national approach to quality assurance. However, the interface and market appearance between ICP Europe and QualitEE should be carefully managed in the UK to avoid confusion or the perception of duplication. A dialogue between the projects has already been established.

2 INTRODUCTION

2.1 Objective of the report

The objective of this report is to compile evidence to inform the development of European and national quality criteria and the implementation of quality assurance schemes for Energy Efficiency Services (EES). The report has been developed as part of the "QualitEE – Quality Certification Frameworks for Energy Efficiency Services" project supported by the EU's Horizon 2020 programme. The QualitEE project aims to increase investment in EES and improve trust in service providers.

Information has been collected through a market survey in the form of an online questionnaire and personal interviews. In addition, a literature review has been conducted in existing local and national publications and documents. An analysis has been conducted and conclusions formed to be presented in this report as well as in the online database on the QualitEE project website.

This report aims to improve the market knowledge of stakeholders so that they can make better informed decisions based on evidence. The barriers and success factors for energy efficiency services, their quality determinants and as well as the related legal, political and institutional framework have been mapped. Lessons learned from existing certification frameworks will serve to establish strategies for the implementation of national quality assurance schemes.

2.2 Scope of the report and definitions

2.2.1 Energy Efficiency Services (EES)

The European standard EN 15900:2010 defines EES as an agreed task or tasks designed to lead to an energy efficiency improvement[1] and other agreed performance criteria. EES shall include an energy audit (identification and selection of actions, e.g. according to EN 16247) as well as the implementation of actions and the measurement and verification (M&V, e.g. according to IPMVP) of energy savings. A documented description of the proposed or agreed framework for the actions and the follow-up procedure shall also be provided – often referred to as an Investment Grade Proposal. The improvement of energy efficiency shall be measured and verified over a contractually defined period of time through contractually agreed methods (Amann S., Leutgöb K. et al. 2015).

[1] According to the EED “energy efficiency improvement" means "an increase in energy efficiency as a result of technological, behavioural and/or economic changes".

This report focuses on the following key types of energy efficiency services:

- Energy Performance Contracting (EPC)
- Energy Supply Contracting (ESC)

These are overarching terms that are – in some cases - referred to in the UK by several other names:

- Contract Energy Management (CEM)
- Energy Savings Performance Contract (ESPC)
- Energy Services Agreement (ESA)
- Managed Energy Services Agreement (MESA)
- Power Purchase Agreement (PPA)
- Heat Supply Agreement
- Guaranteed Energy Savings Contract
- Gain share contract
- Design, Build, Own, Operate, Transfer (DBOOT)
- Chauffage

2.2.2 Energy Performance Contracting (EPC)

According to the Energy Efficiency Directive, "EPC means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings."

The energy efficiency measures as above may also be based on low or no up-front investment. EPC may also include additional services related to efficient energy supply.

Within the report, the focus will be on EPC projects where the above mentioned "contractually agreed level of energy efficiency improvement" is **guaranteed** by the EPC provider. The **guarantee of energy efficiency improvement** is the commitment of the service provider to achieve a quantified energy efficiency improvement (EN 15900:2010).

This is in line with the EED, Annex XIII of which lists guaranteed savings among the minimum items to be included in energy performance contracts with the public sector or in the associated tender specifications. Moreover, in Article 18 of the EED, Member States are required to promote the energy services market and access for SMEs to this market by, among other things, disseminating clear and easily accessible information on available energy service contracts and clauses that should be included in such contracts to **guarantee energy savings** as well as final customers' rights.

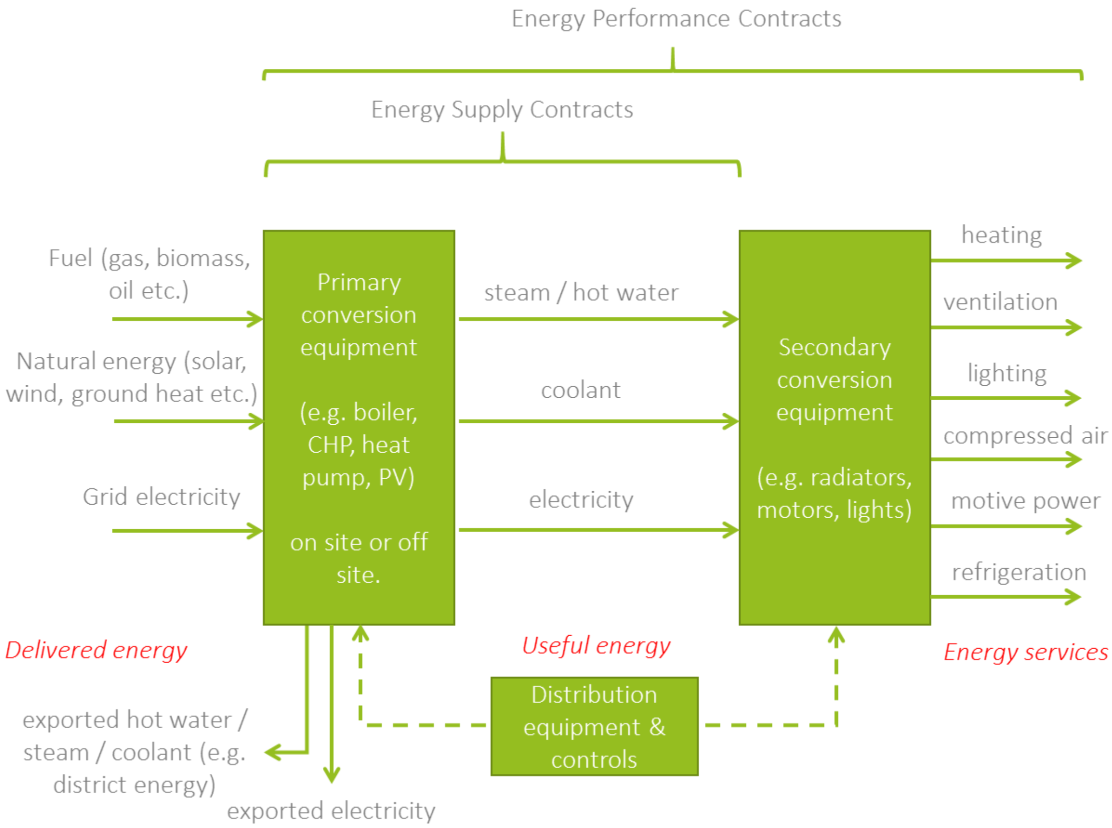
The European Code of Conduct for EPC (2014) defines that the EPC provider assumes the **contractually agreed performance risks of the project** throughout the duration of the EPC contract. These include the risks of not achieving contractually agreed savings as well as design risks, implementation risks and risks related to the operation of installed measures. If an EPC project fails to achieve performance specified in the contract, the EPC provider is contractually obligated to compensate savings shortfalls that occurred over the life of the contract. The excess savings should be shared in a fair manner according to the methodology defined in the contract.

2.2.3 Energy Supply Contracting (ESC)

"ESC means a contractual arrangement for the efficient supply of (useful[2]) energy. ESC is contracted and measured in Megawatt hours (MWh) delivered". This definition is a simplified version of the IEA DSM Task Force 16 definition.

Based on the author's experience and research the term 'Energy Supply Contracting' is not widely used in the UK. This is perhaps due to the potential for confusion with contracts for the supply of gas and electricity from the national grid from energy retailers on the energy commodity market.

Figure 1 Comparison of the scope of Energy Performance Contracts and Energy Supply Contracts (adapted from Nolden, Sorrell 2016)



2 See Figure 1

It is therefore important to provide further definition to what is meant by Energy Supply Contracting in the context of this research: The author's interpretation of ESC in the context of this research is that it represents a **direct** contract between the owner and/or operator of primary energy conversion equipment and a user of useful energy output from this equipment paid for based on MWh delivered. In this situation the user is often aiming to reduce the costs – or in some cases gain a greater level of certainty over future costs (i.e. reduce risk) - related to the generation of useful energy. The costs they are looking to avoid may include those for capital equipment replacement, raw fuel, operation & maintenance and personnel costs. The equipment may be located on the user's site or remotely. There may be several users of the useful energy from the equipment, as is the case with district energy. Typically, the equipment will be local to the user, although there may be cases where the equipment is further afield (solar farms that offer power purchase agreements for instance).

Nolden, Sorrell (2016) offer the following definition "Energy supply contracts (ESCs) primarily focus upon the delivery of 'useful energy streams' (e.g. steam, hot water and electricity) at a unit cost (£/kWh) below an agreed baseline". Whilst some ESCs may offer to guarantee that energy rates (£/kWh) will be below market rate or total costs will be below an agreed baseline, it is not – in the author's experience - a mandatory feature of an ESC, as it is with an EPC.

2.2.4 Market actors

The main actors operating on the EES markets are the EES providers, clients and project facilitators.

Within the QualitEE project, we use the EED's definition of energy service provider:

- "An **'energy service provider'** means a natural or legal person who delivers energy services[3] or other energy efficiency improvement measures in a final customer's facility or premises."

We use the commonly used term "ESCO" as an equivalent of energy service provider. We also use the above-listed definitions to define the following terms:

- "An **'EPC provider'** means an energy service provider who delivers energy services in the form of EPC."
- "An **'ESC provider'** means an energy service provider who delivers energy services in the form of ESC."
- "A **'Client'** means any natural or legal person to whom an energy service provider delivers energy service."

[3] According to the EED: "An 'energy service' means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings."

- "An energy service project **'Facilitator'** means an advisory company working on behalf of the client to procure and/or implement an energy service." In the QualitEE project we use the shorter term "facilitator" to denote an energy service project facilitator.

2.3 Sources of data and methodology

2.3.1 Sources of data

The contents of this report are based on two main sources:

- the results of an EES survey conducted in the UK and across a further 14 European countries;
- personal interviews of the UK's main financial institutions and clients acting within the EES market; and
- a literature review (publications and studies, legislative documents, official statistics and databases) and the market knowledge of the authors based on EEVS' extensive experience of supporting EES projects.

2.3.2 Survey and interviews

To collect the data used in this document, the market actors have been approached in the following manner:

- an online questionnaire was distributed to the country's most relevant EES providers and facilitators;
- personal semi-structured interviews have been conducted with financial institutions and client organisations implementing EES projects.

The market and quality survey focused on energy efficiency services gave the stakeholders an opportunity to provide their input and steer the development of quality assurance. The surveys and interviews contained questions about the EES market, barriers and success factors, EES quality determinants, minimum financial information requirements for financial institutions and certification frameworks, as well as EES-related legal, political and institutional frameworks. The answers were then analysed and the results are presented in this report in an aggregated form.

There were 27 respondents to the online survey in the **United Kingdom**:

- 17 representatives of ESCOs, where 16 of them operate on the EPC market only, and 1 operates on the ESC market only.
- 10 representatives of EES facilitators, 9 of them operating on the EPC market only and 1 operating on both the EPC and ESC markets.

Throughout this study the results from the online survey in the UK are compared with the results from the online survey across **All Countries** that responded. In total, there were 188 respondents to the online survey across **All Countries**:

- Respondents operate in 15 European Countries; Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Greece, Italy, Latvia, the Netherlands, Portugal, Slovakia, Slovenia, Spain and the UK.
- Respondents include 109 representatives of ESCOs, where 53 of them operate on the EPC market only, and 11 operate on the ESC market only and 45 on both the EPC and ESC markets.
- Respondents include 79 representatives of EES facilitators, where 37 of them operate on the EPC market only, and 17 operate on the ESC market only and 25 on both the EPC and ESC markets

Note - Full results from the QualitEE project's survey across 15 European countries - and trend analysis via comparison with previous surveys conducted in 2013 and 2015 by the Transparense project - can be explored through an interactive online navigation tool on the project website. (https://qualitee.eu/market-research/).

In addition, there were 7 personal interviews conducted in the **United Kingdom** covering:

- 3 representatives of finance houses that arrange credit for EES projects
- 4 EES clients.

2.3.3 Literature and other sources of data

Apart from the surveys, the reports build on research from local and national literature (legislative documents, publications and studies, official statistics and databases) and the market knowledge of the authors.

The key sources of information were up-to-date national sources, such as:

- Publications by the Department for Business, Energy and Industrial Strategy (BEIS) and the former Department of Energy and Climate Change.
- Academic papers, and particularly publications from Nolden, Sorrell and Polzin.
- Papers from policy think tanks such as the Committee on Climate Change and Policy Exchange.
- Information from the websites of energy services providers, facilitators and trade associations.

The report also builds on the data and information gathered primarily by the *Transparense* project. In addition, information from the Status Report on the Energy Service Companies Market in Europe by JRC was used.

3 LEGAL AND REGULATORY FRAMEWORKS

3.1 Key governmental institutions

The key Governmental institution responsible for energy efficiency policy in the UK is the **Department for Business, Energy and Industrial Strategy (BEIS)**. The department was established in July 2016 following Theresa May's appointment as Prime Minster in the wake of the UK's referendum on membership of the EU. It took over the activities of the former Department for Energy and Climate Change (DECC), which previously held responsibility for the UK implementation of the European Union (2012) Energy Efficiency Directive (EED).

Now that the UK is preparing to leave the European Union in March 2019, BEIS published its *Clean Growth Strategy* in late 2017, which offered a new focus on energy efficiency and set a vision for low carbon policies to 2030.

Other Government bodies relevant to energy efficiency services:

- **Her Majesty's Treasury (HMT) and Her Majesty's Revenue & Customs (HMRC)** – involved in the setting and collection of energy taxes e.g. the Climate Change Levy.
- **The Office of Gas and Electricity Markets (OfGEM)** – regulator protecting the interests of energy consumers. Responsible for renewable Feed in Tariffs (FIT) and the Renewable Heat Incentive (RHI) often used by energy service providers to improve the business case for energy efficiency services.
- **The Environment Agency** – administrator for the UK's transposition of Article 8 of the EED; the Energy Savings Opportunity Scheme (ESOS). Regulates the accreditation of ESOS lead assessors i.e. energy auditors qualified to 'sign-off' ESOS submissions.

Government bodies that have established energy performance contracting promotion, procurement and support schemes for the public sector:

- **The Greater London Authority** – established the RE:FIT scheme, and leads its use in London.
- **Local Partnerships** – leads RE:FIT in the rest of England & Wales, the latter in partnership with the Welsh Assembly Government.
- **The Crown Commercial Service** – Government procurement body that has procured the RE:FIT framework on behalf of the above.
- **Scottish Government** – leads the Non-domestic energy efficiency framework (NDEEF)
- **The Department of Health** – co-created the Carbon & Energy Fund (CEF), which is mainly used by the National Health Service (NHS).

Government bodies that are involved with standards and certification (see chapter 7.1.1):

- **UK Accreditation Service (UKAS**) – sits under BEIS and accredits certification bodies.
- **British Standards Institute (BSI)** – also sits under BEIS and acts as UK's National Standards Body.

3.2 Implementation of the EU Energy Efficiency Directive

Directive 2012/27/EU on energy efficiency (EED) establishes a common framework of measures for the promotion of energy efficiency within the EU in order to ensure the achievement of its 2020 20% headline target on energy efficiency.

Article 18 of the EED also imposes obligations on Member States to support the energy services market. In the UK, all obligations have been transposed as follows:

- The **Energy Efficiency (Encouragement, Assessment and Information) Regulations 2014** (HM Government 2014a) transposes Articles 18(1), 18(2)(a) and 18(2)(b) and has resulted in the following actions:
    - Publication of a model EPC contract, contract guidance note, and EPC best practices guide, which highlights "clauses that should be included in such contracts to guarantee energy savings and final customers rights" (DECC 2015a)
    - Providing guides to financing energy efficiency in the public sector (DECC 2015b) and private sector.
    - A register of energy service providers - last updated July 2017 - (BEIS 2017a)
    - A review of the current and future development potential of the energy services market, which includes a list of available energy services contract types. Contained in Annex C of the UK NEEAP - National Energy Efficiency Action Plan (DECC 2014a)
    - All documents are hosted on the Government's gov.uk website
- Article 18(2)(c) and 18(3) relating to the handling of complaints and prevention of competitive distortions are covered by the Energy Ombudsman, OfGEM, the Competition and Markets Authority and the Competition Act (1998).
- Article 18(2)(d) did not require transposition. The UK has a strong history of economic liberalism and there is no restriction on market intermediaries promoting energy services.

Whilst Article 18 has been fully translated into law and several required actions implemented, there remains a notable outstanding activity - relevant to the QualitEE project - from the Energy Efficiency (Encouragement, Assessment and Information) Regulations 2014:

- 8(1)(c) 'encourage the development of quality labels, including the development of quality labels by the trade associations to which energy service providers belong'. The NEEAP refers to the Green Deal Quality Mark, but the Government's Green Deal scheme has since been scrapped.

It is not clear at this point to what extent the implementation of the EED in will be maintained after the UK leaves the European Union however, the *Clean Growth Strategy (BEIS 2017b)* offers an encouraging statement "The Government will work with stakeholders to improve the market for energy services, building confidence across commercial and industrial customers."

3.3 National strategy documents

3.3.1 National Energy Efficiency Action Plan

In relation to energy services the UK NEEAP (DECC 2014a) simply restates the goals set out in Article 18 of the EED and their transposition into UK law as outlined in chapter 3.2 specifically;

- **Promotion of the Energy Services Market** – covering the provision of a model EPC contract, best practices, financing guides and a list of available energy services contract types
- **Information about markets and providers** – covering a review of the market contained in Annex C of the NEEAP and a list of energy services providers. The pre-existing Green Deal Quality Mark is highlighted in respect of the requirement for the Government to establish quality labels to support energy services, although this is now redundant, as the Green Deal scheme has been scrapped
- **Supporting the proper functioning of the market** – covering the bodies and legislation already in place to support market regulation and the handling of complaints

The NEEAP also contains a summary of identified barriers to energy efficiency uptake from the previously published in the *Energy Efficiency Strategy* (DECC 2012) namely; embryonic markets, [lack of] information, misaligned financial incentives and undervaluing energy efficiency, although no specific action to tackle these barriers is outlined.

The latest update and annual report to the NEEAP (BEIS 2017c) is notably light in content compared to other EU countries. It highlights that the UK is marginally off course to meet its 2020 energy efficiency target; projecting 132.2 million tonnes of oil equivalent (mtoe) for final energy consumption compared to a target of 129.2. As the target represents an 18% reduction on 2007 levels, the projection gives a reduction of 16%, and the shortfall in savings is not considerable. This is explained in the annual report to be due to strong GDP growth counteracting energy saving activity.

In this update only two actions are covered in relation to energy services and the requirements of Article 18 namely; an update of the list of energy services providers and an update to the qualitative review of the energy services market, which is included within the same document. The review refers to external market studies by the *Transparense* project, provides a link to the model contract, and highlights recent market support activities from the Green Investment Bank (which was set up by the Government and recently privatised) and from trade associations; the Energy Services and Technology Association's Energy Performance Contracting Group and the Energy Managers Association, which acts as the UK administrator of the European Code of Conduct for EPC.

3.3.2 The Clean Growth Strategy

It is perhaps unsurprising that the UK Government has thinned down its update and annual report relating to the NEEAP, considering it was published after the UK triggered Article 50 that formally signalled - in March 2017 - the UK's intent to leave the European Union.

There has been some speculation as to what extent the UK will retain EU derived energy efficiency legislation after Brexit. Whilst a key campaign hook for Brexit was the opportunity to cut EU 'red tape', most non-domestic energy efficiency consumers and suppliers indicate that it should be 'retained entirely' (EEVS/Bloomberg New Energy Finance 2016).

Nonetheless, BEIS has chosen to set the tone towards 2030 by publishing its *Clean Growth Strategy* alongside its flagship *Industrial Strategy (BEIS 2017d)* in 2017, which no doubt supersedes the NEEAP (that was only valid until 2020 anyway). The following summarises key points from the *Clean Growth Strategy (CGS)* relevant to energy efficiency services:

- Sets an ambition for businesses and industry to improve energy efficiency by 20% by 2030. The renewed focus on energy efficiency has been welcomed by the energy efficiency sector although many feel this target is 'not ambitious enough' (EEVS/Bloomberg New Energy Finance 2018)
- Proposes to introduce a voluntary public sector target of a 30 per cent reduction in carbon emissions by 2020-21 (against 2009/10 baseline) for the wider public sector.
- Sets a commitment to "work with stakeholders to improve the market for energy services, building confidence across commercial and industrial customers". Whilst this lacking in detail at this stage it is understood that BEIS is currently undertaking extensive market research and consultation to understand how best to support this market.
- Highlights proposals to reform of energy taxation and company energy and carbon reporting, alongside strengthening of ESOS (the mandatory energy auditing scheme resulting from the UK transposition of article 8 of the EED), all aimed at putting energy efficiency higher up on the priority list for businesses from a financial, regulatory and reputational standpoint.

Whilst the CGS sets ambitions, many of the proposals still need to go through consultation during 2018, and the Government's independent advisors; the Committee on Climate Change, believe urgent action is required to firm up these proposals and develop further policies to close the remaining 'emissions gap' in meeting the UK's fourth and fifth carbon budgets (CCC 2018). [Note: the 'carbon budgets' have been set as a roadmap to meet the UK's Climate Change Act target to reduce 1990 emissions by 80% by 2050]

This consultation period provides a good opportunity for the QualitEE project to engage with Government in terms of quality assurance for energy efficiency services, which will support aims set out in the CGS.

3.4 Standardisation for energy efficiency services

3.4.1 Model documents

The Government (the former DECC) published a model EPC contract on its gov.uk website in 2015 (DECC 2015a). This is based on the contract used by the RE:FIT scheme at the time, although the RE:FIT scheme has since revised the contract they use.

The model EPC contract covers two contractual stages known as 'call-off contracts'.

- Call-off contract Phase 1 - covers the development of an Investment Grade Proposal (IGP) by the service provider. The IGP is defined as a 'detailed proposal that should include comprehensive coverage of the Energy Conservation Measures (ECMs) to be installed, capital costs, savings (including financial and tonnes of CO2), payback period and the measurement & verification (M&V) plan. The IGP should also detail how and when the Service Provider proposes to install the identified ECMs.'
- Call-off contract Phase 2 - covers the energy performance contract under which the service provider implements the ECMs, operation & maintenance and M&V services outlined in the IGP. The term of the contract and the savings guarantee are aligned to the payback period for the project. The savings guarantee is reconciled annually and debits for underperformance can be paid to the client at the end of the year or accrued. Overperformance in subsequent years can be set against accrued debits or the service provider can request full or part reimbursement of previously paid debits.

Whilst this model contract has provided useful guidance it certainly has not provided a standardised contract that is the 'norm' for EPC in the UK.

A number of other public procurement frameworks (other than RE:FIT) have developed their own template contracts (although none of these are publicly available) with various nuances, for example;

- The Carbon and Energy Fund (CEF) uses a highly detailed contract focussed on 15+ year terms usually revolving around a major combined heat and power (CHP) project. Unlike the model contract, savings are shared over a guaranteed minimum level. Also, the measurement & verification procedure is often strictly defined within the contract rather than relying on the service provider's proposal.
- The Non-Domestic Energy Efficiency Framework (NDEEF) has set out two main contracting options depending on the scope of services to be offered;

  i. design and build

  ii. design, build, finance and maintain

  In design and build contracts the service provider is paid in two milestone payments – one upon satisfactory commissioning of services, and the second (usually around 15% of the total contract value) upon achieving the guaranteed savings in the first 12 months (as confirmed through measurement & verification reporting).

In design, build, finance and maintain contracts payments are made regularly over a longer term, although deductions may be made if the energy conservation services fail to meet required standards or where the guaranteed savings are not met.

The Framework was launched in March 2016 and only the design and build model has been used to date.

The Framework provides highly detailed specifications and template documents relating to each aspect of the contract schedules (i.e. Investment Grade Audit, Measurement & Verification Plan etc.). Measurement & Verification specifications are based on the IPMVP and M&V activities must be led by an independent M&V professional with the CMVP qualification.

Where a public procurement framework is not used it is often the case that energy services providers offer their own template EPC contracts. Alternatively, the client will engage legal professionals and/or energy performance contracting expert consultants to develop a bespoke contract.

3.4.2 Guide to Energy Performance Contracting Best Practices

The UK Government decided to go beyond the requirements of Article 18 of the EED and produce a guidance document to inform clients of best practices for EPC.

The guidance document highlights key benefits of EPC and then walks the user through the typical EPC process from project with key considerations at each stage;

Stage 1 – Identify Requirements, Resources and Funding Approach

Stage 2 – Tender Phase

Stage 3 – Full Investment Grade Proposals

Stage 4 – Install Energy Conservation Measures

Stage 5 – Service Delivery / Monitor Performance

Emphasis is put on the following points;

- The importance of providing good quality baseline consumption data (2 years is recommended), as well as key information relating to planned investment (outside of EPC) or building changes, known building issues and recent events that may have affected the baseline data.
- The importance of Measurement & Verification, highlighting the International Performance Measurement & Verification Protocol (IPMVP) as a common framework, and when and how independent/third party M&V support should be used. In line with the IPMVP, the guidance document notes that it is of critical importance that an acceptable M&V Plan is produced before the implementation contract is signed.

3.5 European Code of Conduct for EPC

The European Code of Conduct for EPC defines the basic values and principles that are considered fundamental for the successful preparation and implementation of EPC projects. The Code of Conduct has been developed within the Intelligent Energy Europe project *Transparense* in cooperation with EPC providers, clients and European ESCO associations, among others. The two organisations representing ESCOs at the European level – the European Association of Energy Service Companies (eu.esco) and the European Federation of Intelligent Energy Efficiency Services (EFIEES) – endorse the European Code of Conduct for EPC and support its use when implementing EPC projects and continue in administering and maintaining the Code of Conduct. By the end of October 2017, the Code of Conduct had 234 signatories across Europe. This includes 148 EPC providers, 13 national associations (with 160 members in total), two European associations of ESCOs and 70 facilitators and other signatories. The European administrators organise regular conference calls with national administrators to exchange information about regulatory developments and new projects.

It is expected that the European Code of Conduct for EPC will serve as a harmonised European quality standard of EPC projects, raise potential clients' confidence in the business model and thus lead to higher demand for EPC projects.

The list of the Code signatories is available online and promoted within eu.esco and EFIEES activities (press releases, articles, national and international events). EPC providers who become signatories of the EPC Code undertake to conduct EPC projects in compliance with the EPC Code of Conduct. It is a voluntary commitment of the EPC providers and is not legally binding.

The Code has vast potential to support EPC market development, which can be exploited. For example, it has been used as a discussion guideline between client and EPC provider, guidance for the preparation of tender dossiers and contracts, and as a marketing tool. Within the QualitEE project, it is being used as a starting point for developing an energy service quality assurance scheme.

In the UK the Energy Managers Association (EMA) acts as the national administrator for the Code. The document is hosted on the EMA website along with a list of existing UK signatories and application forms for new signatories.

UK signatories include 10 EPC providers, trade associations the EMA and ESTA (Energy Services and Technology Association), 3 private EPC facilitator organisations and two of the major public procurement frameworks for EPC; RE:FIT and Essentia.

In general, the Code is used by EPC providers as a promotional tool; these companies highlight their signatory status in marketing literature[4], PR activities and websites. There is little evidence to suggest that the Code is incorporated in tender procedures or contract agreements. This may be because the principles from the Code are already enshrined within

[4] https://sseenterprise.co.uk/media/1425/sse-enterprise-energy-performance-contract-epc-brochure.pdf

most tender procedures and contract agreements for EPC in the UK. Certainly, the two pilot projects for the Code in the UK reported that pre-existing tender procedures and contract agreements complied 'fully' or 'almost fully' with all principles in the code (Garnier, Keegan 2015). This suggests that a more detailed and enforceable quality standard is required in the UK.

3.6 Support schemes

The UK has a rich tapestry of support and financing schemes relating to energy efficiency services. The following highlights several of the well-known schemes but should not be considered as a comprehensive list.

3.6.1 Public Procurement Frameworks

Public procurement frameworks for energy performance contracting are seen to have been key to recent public sector dominance of EPC activity in the UK (Nolden, Sorrell 2015). The framework bodies promote the EPC concept to public organisations; provide project development support and technical assistance; standardised OJEU compliant procurement processes with a panel of pre-qualified service providers; standard contract templates and specifications; and financing solutions. The framework services are often subsidised or paid back through savings following project implementation:

- RE:FIT – used primarily by local authorities (municipalities), but also by some public hospitals (NHS) and higher education institutions.
  - RE:FIT London
  - RE:FIT England
  - RE:FIT Cymru (Wales)
- NDEEF - Non-domestic energy efficiency framework (Scotland) – used primarily by local authorities to date
- The Carbon & Energy Fund (CEF) – used primarily by public hospitals (NHS) to date
- Essentia Trading – used primarily by public hospitals (NHS) to date

3.6.2 Technical assistance schemes

- Heat Networks Delivery Unit
- Resource Efficient Scotland
- Invest NI (Northern Ireland) Sustainable Development Support Programme

3.6.3 Non-domestic energy efficiency funds

- Salix Finance
- London Energy Efficiency Fund (LEEF)
- Mayor's Energy Efficiency Fund (MEEF) – yet to be launched
- The Green Investment Group (previously the Green Investment Bank set up by the UK Government, and now privatised through sale to Macquarie Group)
- Several funds that have been established in partnership with the former Green Investment Bank:
  - SDCL Group - £100m UK Energy Efficiency Investments Fund
  - Equitix – £100m Energy savings investments fund
  - De Lage Landen - DLL
  - Aviva - £100m REaLM fund
  - Societe General
- The Carbon Trust Green Business Fund
- Carbon Trust interest free loans for energy efficiency in Wales and Northern Ireland
- Resource Efficient Scotland SME Loan
- Scotland's Energy Efficiency Programme (SEEP) Pathfinder Fund for pilot projects
- European Energy Efficiency Fund (EEEF)
- Industrial Energy Efficiency Accelerator
- Heat Networks Investment Project (HNIP)

3.6.4 Fiscal incentive schemes

- Enhanced Capital Allowances scheme for energy saving technologies
- Feed-in-tariffs for renewable electricity generation
- Non-domestic Renewable Heat Incentive for renewable heat generation
- Combined Heat and Power Quality Assurance (CHPQA) Scheme
- Climate Change Agreements

3.6.5 Local Authority support schemes

- Mobilising Local Energy Investment (Cambridgeshire) – MLEI
- West Yorkshire Combined Authority Energy Accelerator (proposed)

- Midlands energy performance contracting framework (proposed)
- The above highlight selected examples; for more comprehensive detail on Local Authority Support schemes see UK:100 (2017).

3.6.6 Regulatory schemes

- Business energy efficiency taxation and greenhouse gas (GHG) reporting.
    - Climate Change Levy (CCL) – tax added per kWh of energy consumed based on the carbon content of the energy.
    - Carbon Reduction Commitment Energy Efficiency Scheme – tax on carbon emissions for organisations that use greater than 6GWh per annum (in the respective compliance period) through settled half hourly electricity meters. Due to close in 2019 and tax to be collected through an increase to the CCL. The replacement of the GHG reporting function of the scheme is going through public consultation (Streamlined Energy and Carbon Reporting Consultation).
- Energy Savings Opportunity Scheme (ESOS) - represents the UK implementation of Article 8 of the EU Energy Efficiency Directive (EED). This mandates large private sector undertakings to perform comprehensive Energy Audits and identify opportunities for energy saving every four years. A framework for qualified 'Lead Energy Assessors' capable to 'sign off' compliance submissions has been established to ensure quality. ISO50001 is a route to compliance and submissions to the scheme are fairly light in terms of data although an 'evidence pack' must be held in case of audit by the scheme administrators (the Environment Agency – see chapter 3.1).
- Energy Performance Certificates – energy efficiency rating scheme for buildings offering a rating between A (best performing) and G (worst performing) **based on a model of building performance**. Valid for 10 years, these must be available when selling or renting property and on display if a building has a floor area over 500 square meters and is regularly visited by members of the public.
- Display Energy Certificates (DEC) – energy efficiency rating scheme for buildings offering a rating between A (best performing) and G (worst performing) **based on recorded building energy consumption.** Buildings must have a DEC where they have a floor area over 250 square metres, are at least partially occupied by a public authority and are regularly visited by members of the public. They must be on display and are valid for 1 year for buildings over 1000 square metres or 10 years for those between 250-1000 square metres.
- Minimum Energy Efficiency Standard for commercial buildings (MEES) – from April 2018 landlords will not be able to grant a new lease or tenancy on a property with an Energy Performance Certificate rating of F or G. From April 2023 such buildings cannot continue to be let.

4 ENERGY PERFORMANCE CONTRACTING MARKET

4.1 EPC market actors

4.1.1 EPC Providers

Whilst it is difficult to state definitively how many companies provide EPC on the UK market the list of 28 companies appointed to the public procurement frameworks (see 3.6.1) gives a good starting point (Table 1). Our research highlights 18 further EPC providers (Table 2). For some providers on this list, whilst they may promote EPC as a service, there is no evidence they have entered into an EPC contract yet. Thus, we conservatively conclude that there are at least 30 active EPC providers (i.e. those that have entered into at least one EPC) in the UK.

These companies rarely focus purely on EPC provision, and in the majority EPC is used as a tool to leverage a company's core business activities. EPC providers have been segmented as follows:

- Specialist ESCOs – companies that focus on the provision of energy services, which often have typical energy consulting (e.g. energy auditing, measurement & verification etc.) and project management skills 'in house', whilst technology provision, construction and maintenance is outsourced to sub-contractors.
- Technology providers – companies that manufacture or distribute energy efficient technologies such as lighting, building management systems / controls, boilers, combined heat and power, switchgear etc.
- Facilities Management (FM) Services providers – companies that run long term outsourcing contracts providing personnel and management for services from general property management through to specialist energy management.
- Construction – companies that implement construction projects; new buildings, civil engineering, retrofits etc.
- Mechanical & Electrical (M&E) services providers – companies that specialise in the design and installation of mechanical and electrical services
- Utilities – companies that retail energy to consumers on the national electricity and gas grids
- Finance – organisations that specialise in sourcing and managing third party investment for energy efficiency, which have set up dedicated project development teams, or partner with other energy services providers, to proactively generate investible projects

Table 1: EPC providers on public procurement frameworks

EPC Provider	NDEEF	Essentia	CEF	RE:FIT	Active?[5]	Type
Alternative Heat	✓					Tech
Ameresco	✓	✓	✓	✓	✓	Specialist
Bilfinger			✓			FM
Blackbourne	✓					M&E
Bouygues			✓	✓	✓	FM/Construction
Breathe Energy		✓	✓	✓	✓	Specialist
British Gas	✓			✓	✓	Utility
Cofely / Engie	✓	✓	✓	✓	✓	FM/Utility
Cynergin	✓	✓	✓	✓	✓	Specialist
Doosan Babcock			✓			Tech
E.On / Matrix Controls	✓			✓	✓	Utility//Tech
EDF		✓	✓	✓	✓	Utility
Ener-G		✓	✓		✓	Tech
Everwarm	✓				✓	Construction
FES-FM	✓					FM
Herbert T Forrest		✓		✓	✓	Construction
Imtech		✓	✓		✓	FM/M&E
ISS				✓		FM
Kier			✓	✓	✓	FM/Construction
Larkfleet (Asset+)				✓	✓	Specialist
Mitie			✓		✓	FM
Prima Vera – Zephyro				✓		Specialist
Robertson Group	✓			✓	✓	FM/Construction
Skanska					✓	FM/Construction
SSE	✓		✓	✓	✓	Utility
Veolia			✓		✓	FM
VITAL Energi	✓	✓	✓	✓	✓	Specialist
Ylem EPC		✓				Tech

Table 2: Other identified EPC or guaranteed savings contract providers

EPC Provider	Type	EPC Provider	Type
Anesco	Specialist	FES Lighting	Finance
Self Energy	Specialist	Energyworks	Finance
Honeywell	Tech	Elegen Efficiency	Finance
Siemens	Tech	Philips Lighting	Tech (Lighting)*
Schneider Electric	Tech	Auralight	Tech (Lighting)*
iESCO	Tech (VO)*	ABB drive save	Tech (VSD)*
Wilson Power	Tech (VO)*	Clarke Controls	Tech (Controls)
Powerstar	Tech (VO)*	TDS Electrical	Tech (Lighting)*
Chalmor	Tech (Controls)	Lockheed Martin	Various

*VO-Voltage Optimisation, VSD-Variable Speed Drives. These organisations appear to EPC focused on a limited range of technology so it could be questioned whether they are truly offering full EPC based on a comprehensive energy audit.

[5] Denotes those companies, which have signed at least one EPC contract based on our research and market knowledge.

4.1.2 EPC Facilitators

In this report an EPC facilitator is defined as an organisation that supports any aspect of the EPC but is neither the contractually obligated client or EPC provider. Facilitators may be appointed by either party to the contract. From our analysis, facilitators in the UK EPC market can be segmented by skills, and one facilitator organisation may offer more than one of the skills, as follows:

Table 3: EPC facilitation skills

Facilitator skills	Examples [note – organisations listed may offer more skills than just the one they are listed under]
Project development & management	Turner & Townsend, Mott Macdonald, GEP Environmental
Commercial / Procurement	Ecovate, Roger Simpson Jones, Hermetica Black
Energy consultancy	Carbon Trust, Verco, Carbon Credentials, Sustain, NIFES, TEAM EAA
Insurance	PIB Insurance, Parhelion
Legal / Contractual	Bird & Bird, Bevan Brittan, Pinsent Masons, CMS Cameron McKenna, DAC Beechcroft, Trowers & Hamlins
Measurement & Verification	EEVS Insight, iVEES, C3 resources
Finance fund managers	Amber Infrastructure, SDCL, Equitix, Green Investment Group, Salix Finance

The public procurement frameworks for EPC typically aim to offer many of these skills to clients in a 'one stop shop' through a project development or support unit, and these act as key facilitators in the public sector EPC market. In some cases, the public procurement framework owner will appoint a private company to manage the project development unit (e.g. Turner & Townsend for RE:FIT London, GEP Environmental for RE:FIT Cymru and Mott Macdonald for NDEEF) or the owner will provide the services 'in house', appointing sub contracted specialists where required.

4.1.3 EPC Clients

Key clients for EPC are public sector organisations; well over 50% of respondents to the QualitEE survey reported that typical projects were in public municipalities, hospitals or education institutions, while less than 20% reported working regularly with private offices, retail, leisure or industry (Figure 17).

Public sector organisations tend to have several factors in their favour for EPC; they are property owner/occupiers (avoiding issues relating to split incentives), can accommodate long contract lengths, have a low credit risk and have access to standardised project development / contracting routes and subsidised support through the public procurement frameworks.

The private rented sector comprising major property owners / landlords and businesses that lease space from them, suffer from split incentives and relatively short / overlapping lease periods. As a result, the uptake of EPC in these situations is relatively minimal.

An area which appears to be generating new business for EPC in the private sector is where companies are disposed to enter into comprehensive facilities management outsourcing contracts, and an energy performance contracting element may be a feature.

4.1.4 Relevant Trade Associations

In the UK, the following trade associations are relevant to the EPC industry;

- The Energy Services and Technology Association (ESTA) – has a membership mainly consisting of energy services providers, energy efficiency technology and metering providers and energy consultancies, many of which provide technical facilitation services for EPC. ESTA's Contract Energy Management group was relaunched as the Energy Performance Contracting group (EPCg) in 2014. This group has, since 2016, led a series of high profile events (hosted by Macquarie Group, Siemens Financial Services and CMS Cameron McKenna) that have brought together the wider EPC industry (providers, facilitators and finance) with policy makers aiming to create a central focus for the industry that can drive market development. The group has also established regular meetings with BEIS to represent member's interests in respect of political activity that affects the energy services industry. Seven of the companies highlighted in Table 1 & Table 2 are members of ESTA, and 15 further members could be identified as facilitators to the EPC industry (see analysis appended in chapter 9.1.1).
- The Energy Managers Association (EMA) – focusses on representing the interests of professional energy managers rather than services or technology suppliers. The EMA has operated a special interest group of EPC providers (Garnier 2015). The association supported the development of the European Code of Conduct for EPC, and acts as UK Code administrators.
- The Association for Decentralised Energy (ADE) – previously the Combined Heat and Power Association, the ADE has a membership focussed on providers of CHP and district heating services. Through member interests and recent merger with the Association for the Conservation of Energy, the ADE also represents demand side energy services [i.e. energy efficiency]. While the group does not have a special interest group dedicated to EPC, 12 of the companies highlighted in Table 1 & Table 2 are members of the ADE, and 12 further members could be identified as facilitators to the EPC industry. (see analysis appended in chapter 9.1.2).

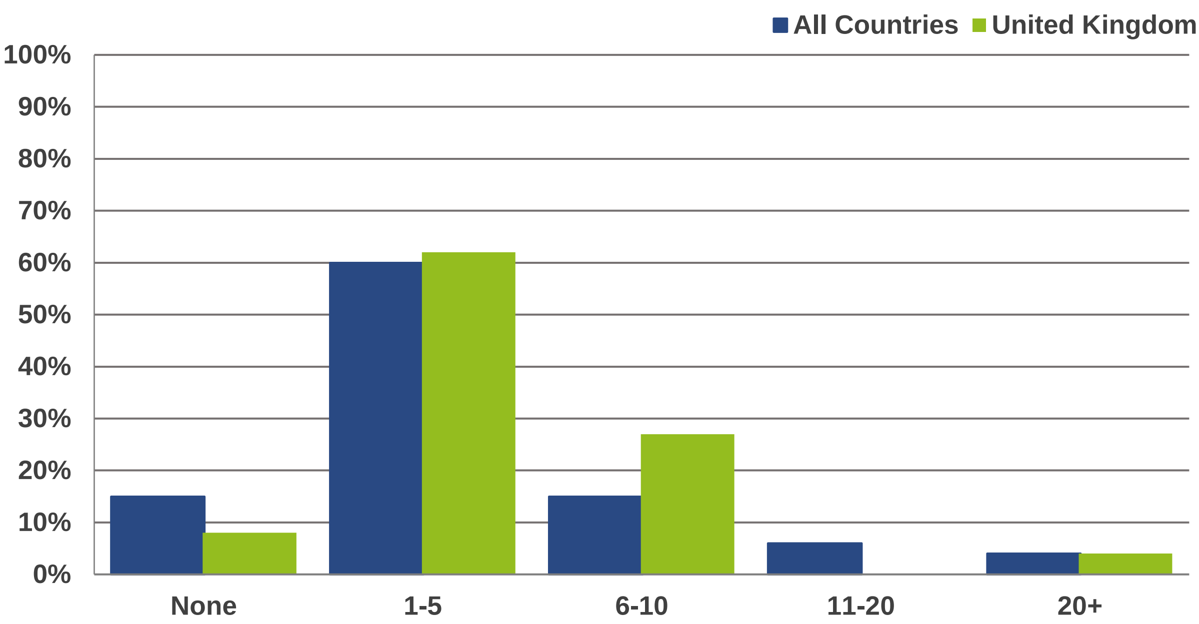
4.2 EPC market developments

- The energy services market in the UK can be traced back to the 1960 when the 'Contract Energy Management' model was introduced. This model, still widespread in the UK today, is often characterised by 'taking over the boiler house', where an outsourced company assumes various functions (typically operation & maintenance, but also utility procurement, capital efficiency investments etc.) for operating onsite heat / steam generation assets, typically for Industrial and NHS clients. The EPC model itself was introduced in the 1980s and enjoyed varying success until the global financial crisis in 2008 restricted investment (Nolden, Sorrell 2016).
- In 2009 the Greater London Authority developed the Building Energy Efficiency Programme (Jennings 2010), the precursor to RE:FIT, which was the first public procurement framework for EPC in the UK. This sparked something of a public sector revival of the EPC model and BEEP / RE:FIT was followed by the establishment of the Carbon & Energy Fund in 2011, the Essentia EPC framework in 2014 and the Non-domestic energy efficiency framework (NDEEF) in 2016. Unlike in previous studies (Bertoldi 2010) the term Energy Performance Contracting is now well established in the UK.
- 50% of UK respondents to the QualitEE project's survey believe that the local market for EPC has experienced 'slight growth' in the last 12 months, whilst only 8% indicated 'major growth'. This is more cautious than the 'major growth' picture painted by Bertoldi et al (2017), and the 38% of UK respondents in the QualitEE survey that reported **their own orders** had experienced 'major growth'. A decline in orders was witnessed by 16% of UK respondents, slightly higher than the 14% reported over All Countries in the QualitEE survey. When considered alongside a lower number reporting 'Little Change' (U.K. – 23%, All Countries – 37%) this indicates a UK market in flux with new entrants and some organisations withdrawing.
- The survey reported that typical EPC contracts in the UK are held with public sector clients, have a capital outlay of 1-5 million Euros, a contract length of 5-10 years and use a guaranteed savings model.
- As the majority of EPC providers reported becoming involved in 1-5 contracts in the last 12 months, with 30+ active EPC providers (see chapter 4.1.1) this suggests the market is signing 30+ EPC contracts per year and generating at least 30 million Euros. In the QualitEE survey, opinion was split on market size with the median value from the results estimated to be 108.3 million Euros. This approximately agrees with the 100 million Euro market value estimated by Bertoldi et al (2017).
- Although there is a full range of financing options in the use for EPC, investments are typically paid using the client's own funds or debt arrangements.
- The UK EPC market has clearly aligned in the use of specified M&V processes for reconciling performance, generally expected to be based on the IPMVP, and there is an established market for independent M&V services.
- 'Complexity of the concept / lack of information' and 'lack of trust in the ESCO industry' remain the top two barriers for EPC business (also reported in 2013 and

2015 in surveys conducted by the *Transparense* project) although lack of information has consistently reduced in significance over the period 2013-17, whilst lack of trust has shown an opposite trend. This suggests that information dissemination activities such as the publication of the Government's model contract for EPC and the European Code of Conduct for EPC, both in 2015, have had a positive effect, but the lack of enforcement of best practices has led to a more informed market becoming increasingly sceptical about the quality of services offered by UK EPC providers.

- 'Raising affordable finance' was found to be a more significant barrier in the UK than elsewhere in Europe.
- When asked about EPC quality, UK respondents particularly emphasised the importance of contractual transparency, communication and implementation of measures above their European counterparts, whilst also highly ranking technical / economic opportunity analysis (energy auditing), M&V and practical achievement of the projected savings.
- UK respondents again highlighted communication and contractual issues as the main areas for quality improvement, alongside M&V, signalling that these should be key aspects of a quality assurance scheme for EPC in the UK.
- The following pages provide full detail and charts relating to the conclusions drawn above.

Figure 2 How many EPC projects (that have reached Contract Signature) has your organisation initiated / become involved with in the last 12 months? (Percentage share of responses by providers and facilitators Sept 2017)



The majority (62%) of UK respondents - EPC providers and facilitators – became involved in between 1 - 5 EPC projects in the last year, which is consistent with the results across All Countries in the survey, although it is worth noting that UK projects tend to have higher overall value (Figure 6). Eight% of respondents did not become involved with any new projects in the last 12 months.

Figure 3 Timeseries (2015, 2017) How many EPC projects has your organisation initiated / become involved with in the last 12 months? (UK respondents only)

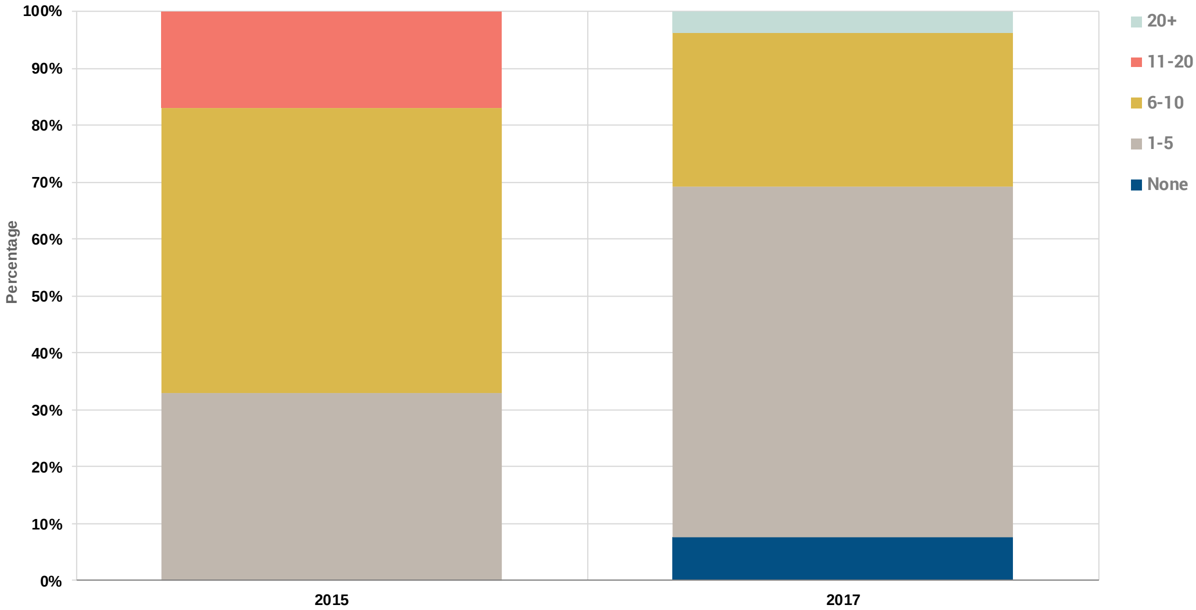
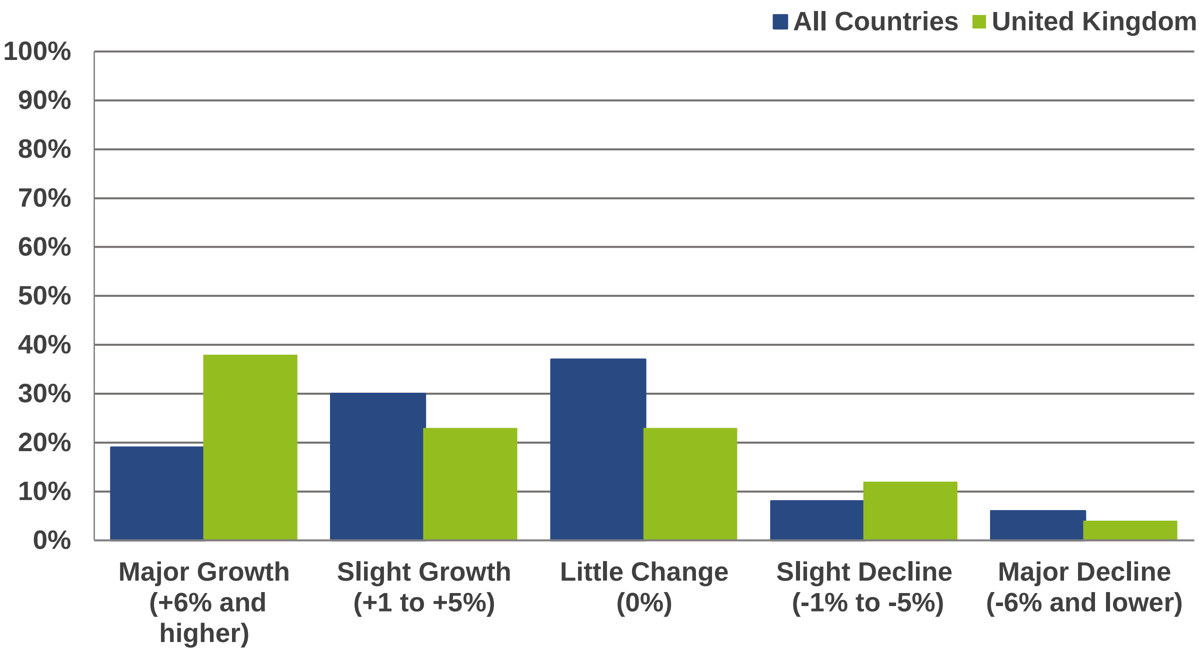


Figure 4 In the last 12 months your EPC orders have seen (Percentage share of responses by providers and facilitators Sept 2017)



UK respondents reported a more positive picture of EPC orders over the last 12 months than seen across All Countries in the survey. The majority (61%) experienced growth, and 'Major Growth' was most selected (38%), which aligns with the findings of Bertoldi et al. (2017), who report that the UK has experienced 'Major Growth' in EPC in the period 2013-16. A decline in orders was witnessed by 16% of UK respondents, slightly higher than the 14% reported over the All Countries dataset. When considered alongside a lower number reporting 'Little Change' (UK – 23%, All Countries – 37%) this indicates a market in flux with a high level of new entrants and some organisations withdrawing.

A comparison with results from previous surveys, conducted as part of the *Transparense* project, shows a positive growth trajectory with the percentage of respondents reporting 'Major Growth' increasing consistently from 20% (2013) to 38% (2017).

Figure 5 Timeseries (2013, 2015, 2017) - In the last 12 months your EPC orders have seen (UK respondents only)

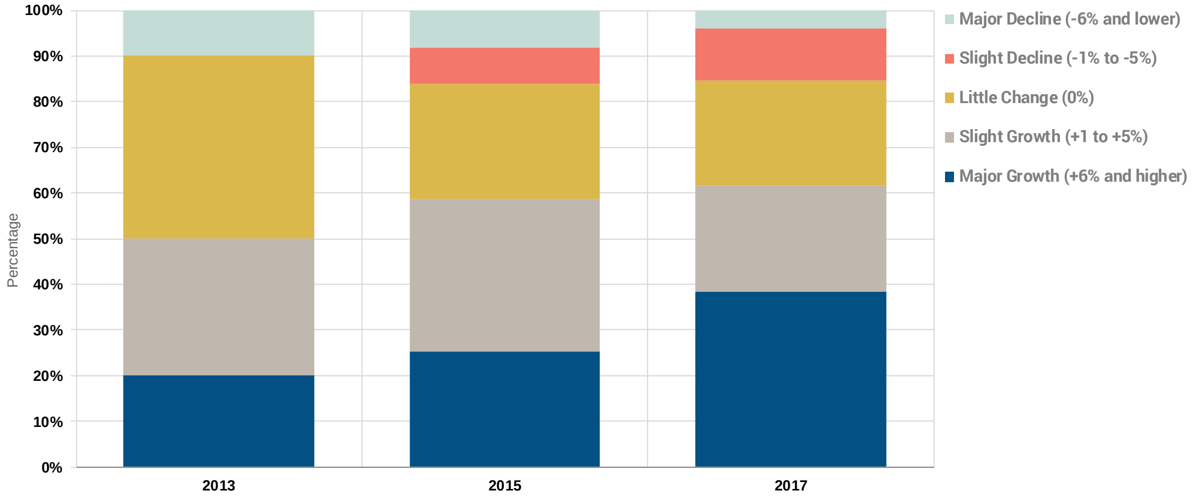
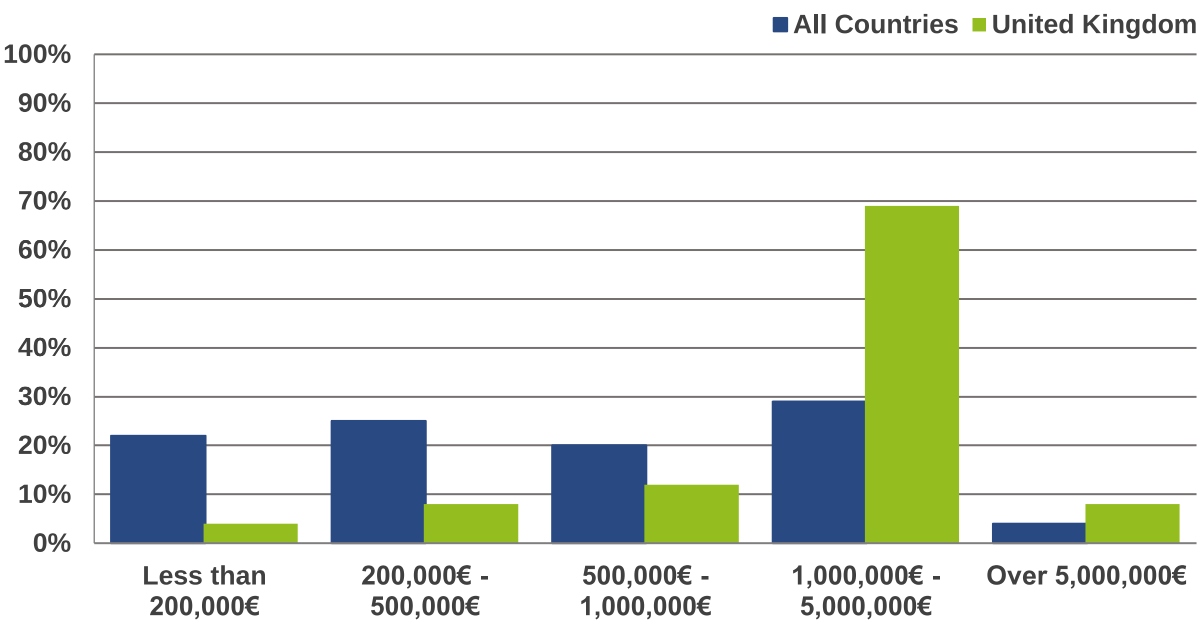


Figure 6 What is the most common overall value (investment outlay) of the EPC projects you are involved in? (Percentage share of responses by providers and facilitators Sept 2017)



EPC providers and facilitators in the UK are mainly involved in higher value EPC projects worth at least 1,000,000 EUR or more (77%), considerably higher than reported across All Countries (33%). Interestingly however, over the period 2013-17 the number of respondents reporting that the most common overall value as 'Over 5,000,000€' has reduced consistently from 22% (2013) to 8% (2017).

Figure 7 Timeseries (2013, 2015, 2017) - What is the most common overall value (investment outlay) of the EPC projects you are involved in? (UK respondents only)

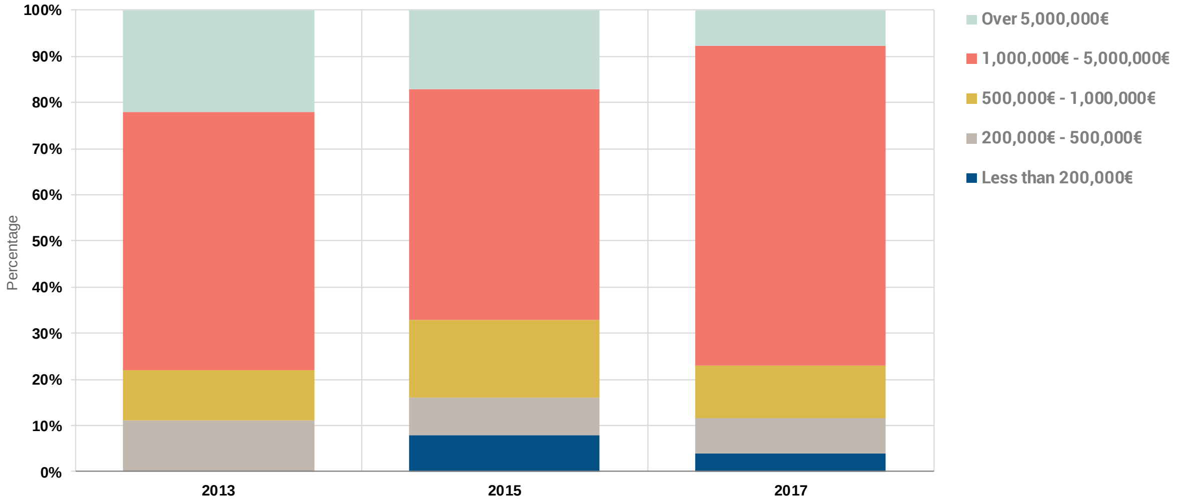
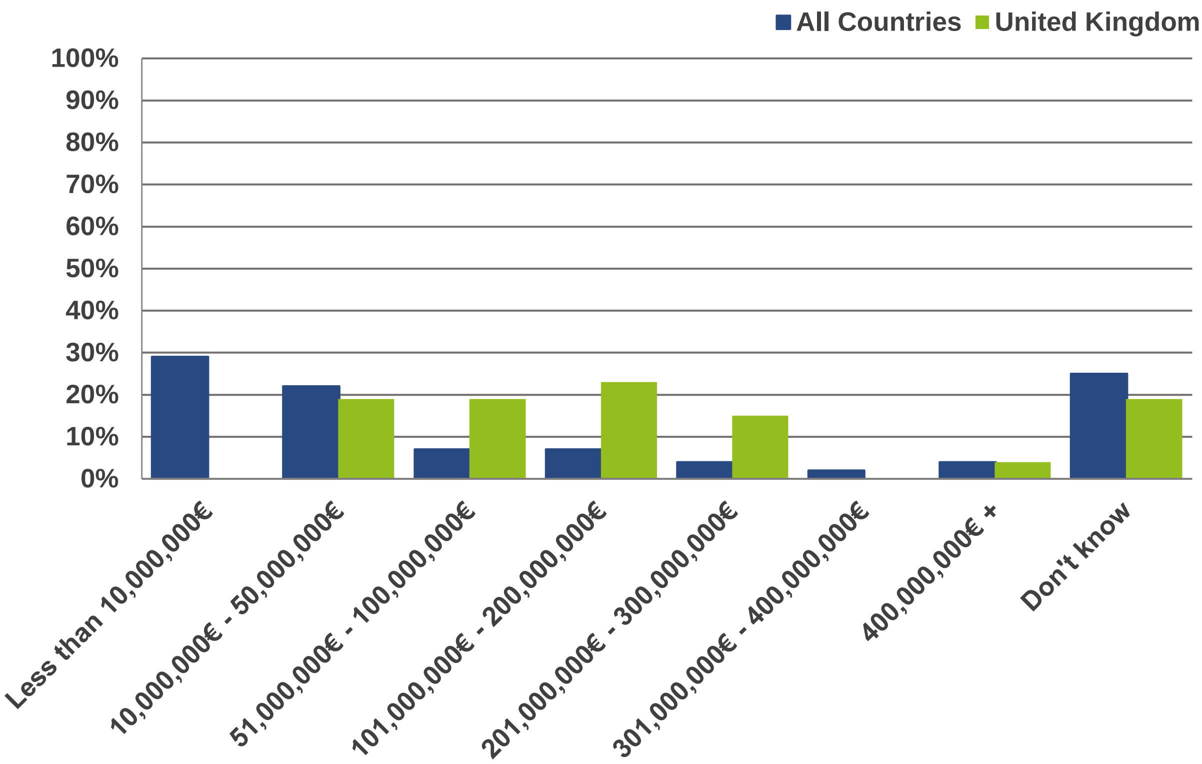


Figure 8 How much revenue do you think the EPC market in your country generated in 2016? (Percentage share of responses by providers and facilitators Sept 2017)



In the UK, opinion is split in terms of the amount of revenue the EPC market generated in 2016, with half of respondents estimating the EPC market revenues below 50mEuro. Large proportion of respondents (19%) were not willing to speculate, which may be expected considering the lack of definitive sources for this information (Sorrell 2015).

Bertoldi (2017) offers an estimate of 100m€ for annual revenue.

For comparison; analysis of the achievements of public procurement frameworks (Keegan 2016) indicates £390m capital outlay between 2009-16 (Table 4) which equates to £56m per annum evenly spread over 7 years (mid 2009 to mid 2016), although it would be reasonable to expect a growth trajectory. Assuming a compound growth trajectory of 5% through the period and an exchange rate of 1.25€/£ the revenue in 2016 is estimated as 80m€ just for EPC projects procured through the public procurement frameworks.

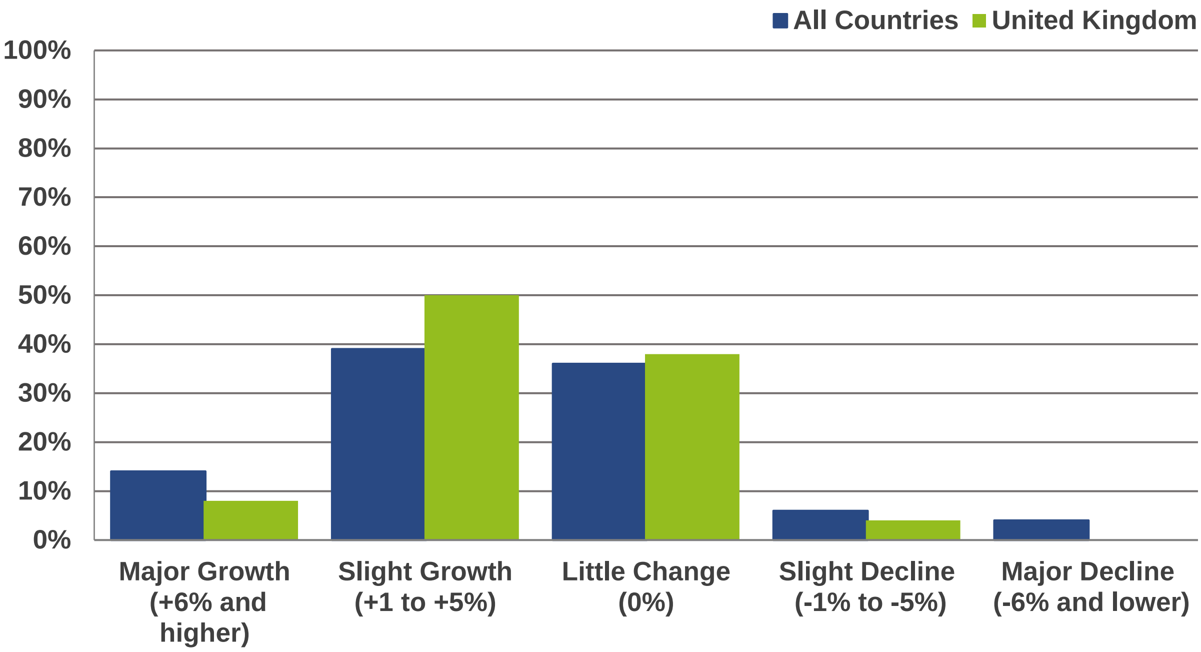
Also, the author's estimate of the median value from the survey responses yields 108.3 m€.

These sources indicate that a ball park, if perhaps conservative, estimate for UK EPC market revenue in 2016 is in the region of 100m€. It should be noted however, that the split opinion observed in the QualitEE project's survey results strongly suggest that there is a lack of comprehensive and reliable information, and a detailed 'bottom up' study is required to provide a more reliable estimate.

Table 4: Capital outlay of projects from public procurement frameworks based on interviews and publicly available information up to June 2016 (Keegan 2016)

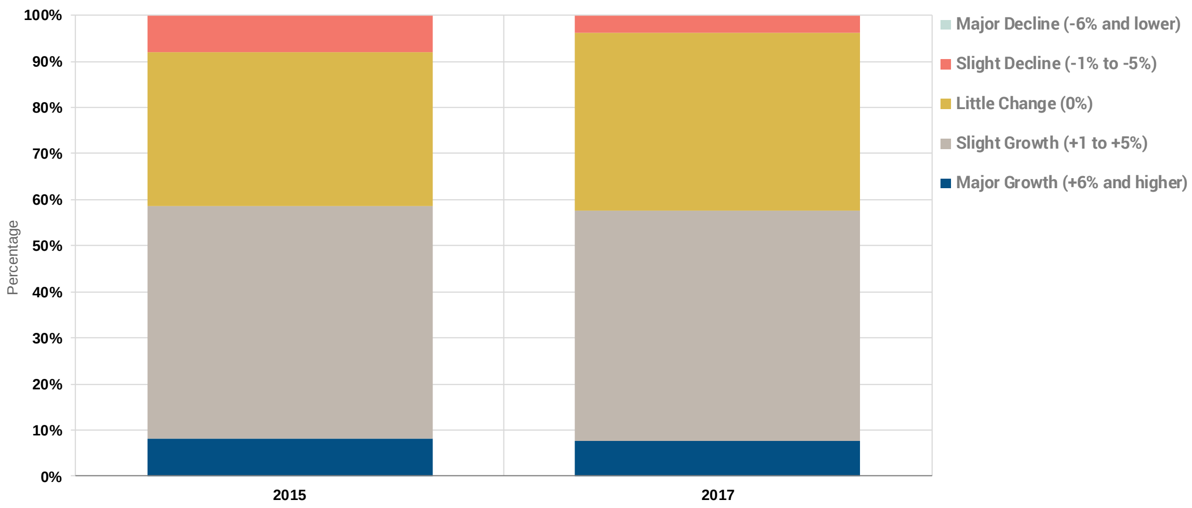
Framework	Operational	£ Placed to date	£ Projected
RE:FIT	Since 2009	£165m	£50m (near term)
RE:FIT Cymru	Since 2016	£0m	£40m (3years)
CEF	Since 2011	£134m	£241m (unknown)
Essentia	Since 2012	£80m	£10m (6-18months)
Ecovate/Ecofund	Unknown	£11m	Unknown
NDEE	Since 2016	£0m	£50m (4years)
TOTAL		£390m	£391m

Figure 9 Over the last 12 months, the EPC market in your country has seen: (Percentage share of responses by providers and facilitators Sept 2017)



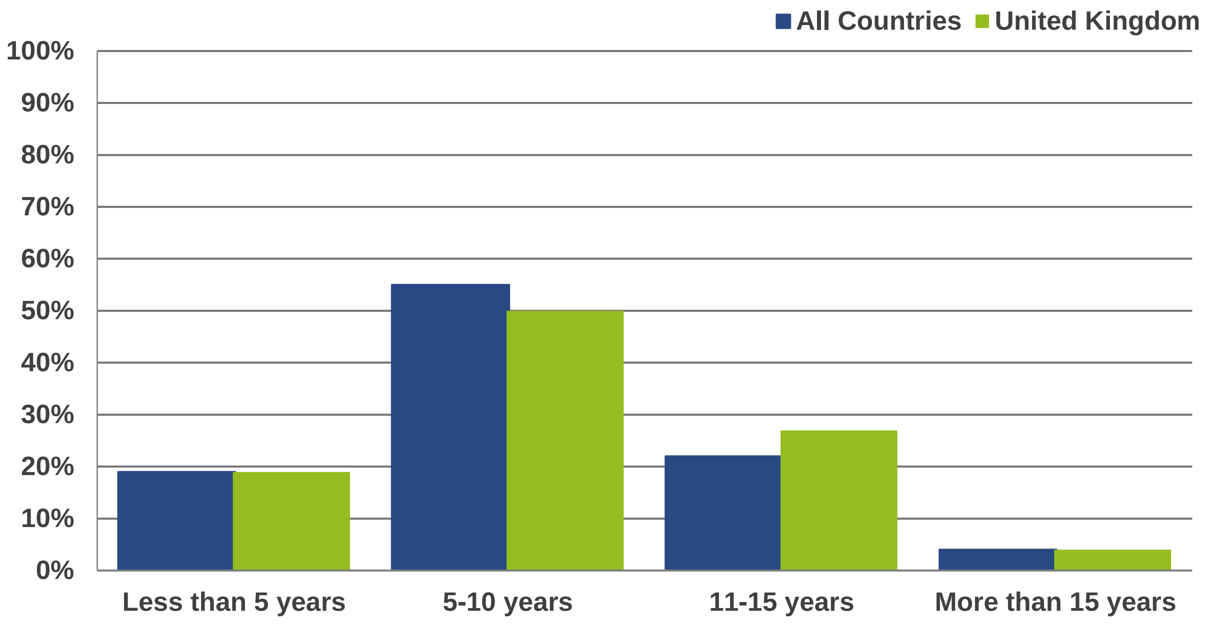
Compared to their own situation in terms of order growth over the last 12 months, respondents were more cautious when describing the EPC market as a whole. Only 8% felt the market was experiencing major growth, compared to 38% that reported their own orders had experienced major growth. The picture is still overall a positive one with the majority (58%) indicating market growth, somewhat more optimistic than reported across All Countries in the survey (49%). The outlook has not changed considerably since 2015 although those indicating a decline reduced from 8% to 4%.

Figure 10 Timeseries (2013, 2015, 2017) - Over the last 12 months, the EPC market in your country has seen (UK respondents only):



4.3 EPC business models

Figure 11 What is the most common duration of the Energy Performance Contracts you are involved in? (Percentage share of responses by providers and facilitators Sept 2017)



The dominant contract length for EPC in the UK was reported to be 5-10 years in 2017. This may be explained by considering that some of the main sectors using EPC (Figure 17), municipalities and education, often use interest free loans from Salix Finance, which sets a payback requirement of <5 years in general, and <8 years specifically for Schools and Colleges. It is perhaps surprising that the other main sector, public hospitals (NHS), has not driven more responses in the 11+ year categories, considering one of the most commonly used procurement routes – the Carbon and Energy Fund (CEF) – sets contracts between 15 - 30 years[6]. However, this may be explained as only three of the successful CEF service providers responded to the survey. The 2017 UK picture is very similar to that across All Countries in the survey, with perhaps a slight weighting towards longer contracts. In contrast, in previous surveys (2013 & 2015) the 11+ year categories were selected by the majority perhaps highlighting a recent shift towards more projects in municipality and education sectors (Figure 18).

[6] https://www.carbonandenergyfund.net/track-record/

Figure 12 Timeseries (2013, 2015, 2017) - What is the most common duration of the Energy Performance Contracts you are involved in? (UK respondents only)

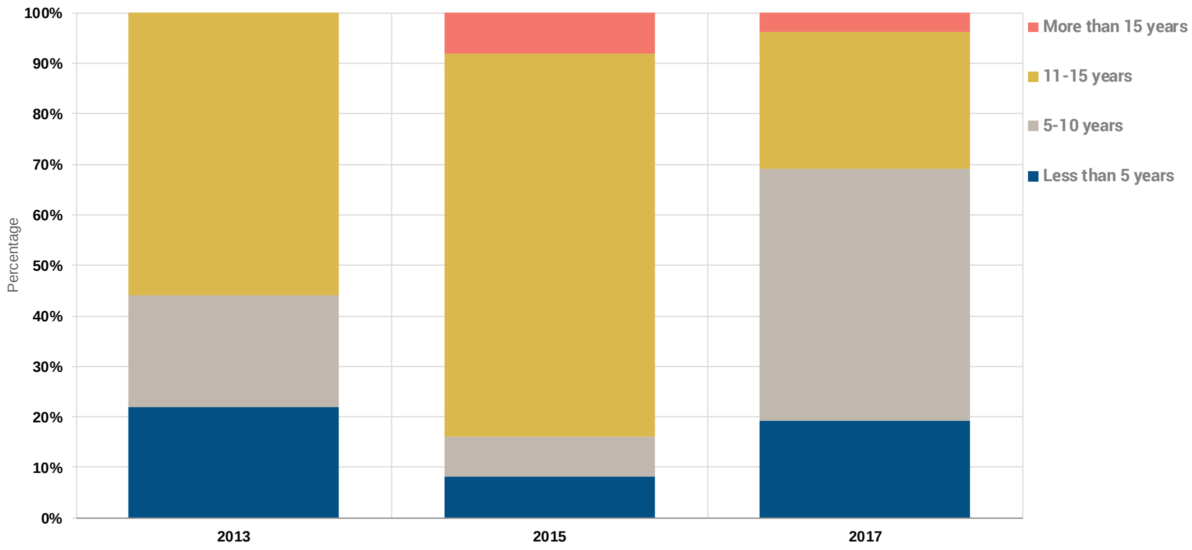
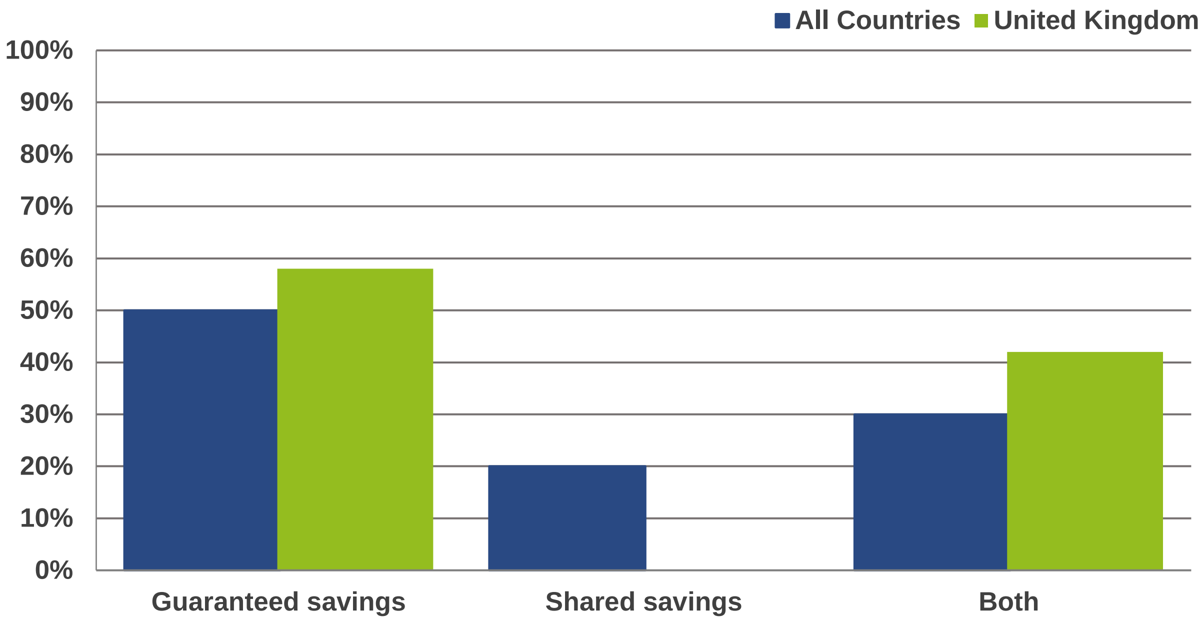


Figure 13 What type of energy savings model is offered in the EPC projects you are involved in? (Percentage share of responses by providers and facilitators Sept 2017)



Note: in a shared savings model, the client pays the ESCO a pre-determined percentage of its achieved cost savings from the project

Respondents in the UK indicate that guaranteed savings models are prevalent, with no providers or facilitators purely focusing on shared savings or 'gain share' contracts. The most widely used procurement routes for public bodies – RE:FIT, CEF, Essentia and the Scottish Non-Domestic Energy Efficiency Framework – all have a guaranteed savings element. In CEF projects, a hybrid model is adopted where the service provider must meet a minimum guaranteed savings level, but takes a share in any savings achieved above this threshold.

Looking at responses from 2013, 2015 and 2017 indicates a shift from combination models to more projects using the pure guaranteed savings model.

Figure 14 Timeseries (2013, 2015, 2017) - What type of energy savings model is offered in the EPC projects you are involved in? (UK respondents only)

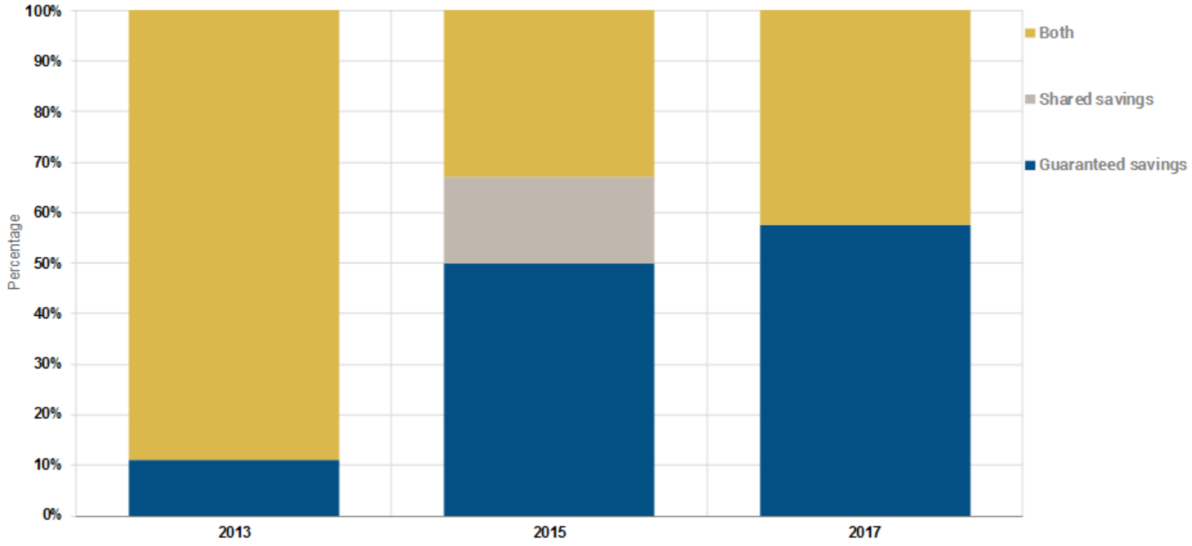
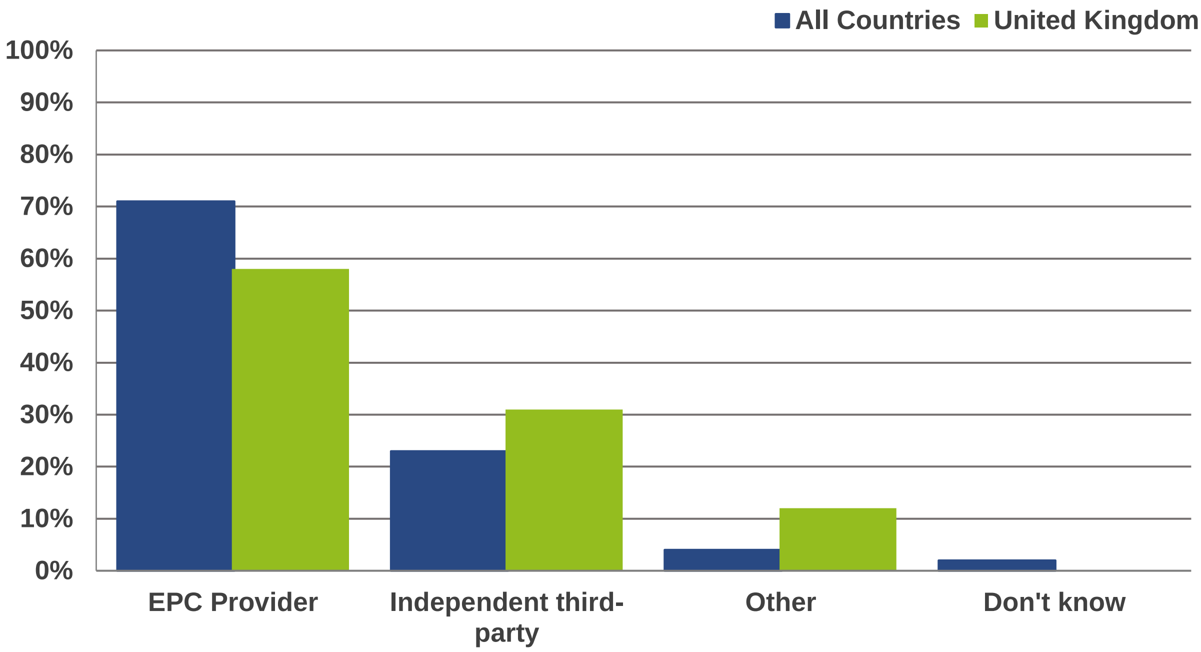
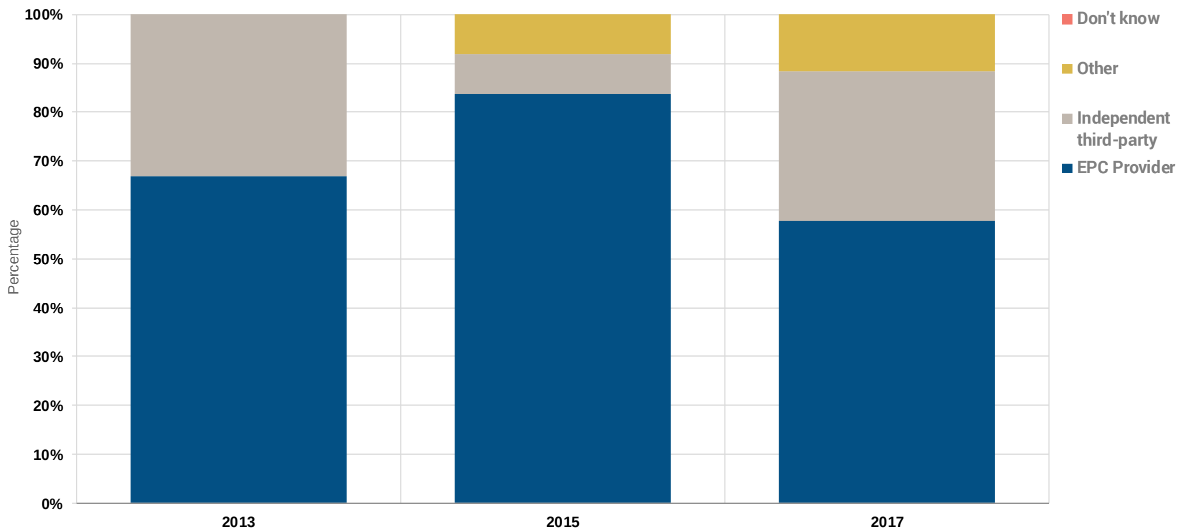


Figure 15 Who typically delivers the energy savings performance analysis in the EPC projects you are involved with? (Percentage share of responses by providers and facilitators Sept 2017)



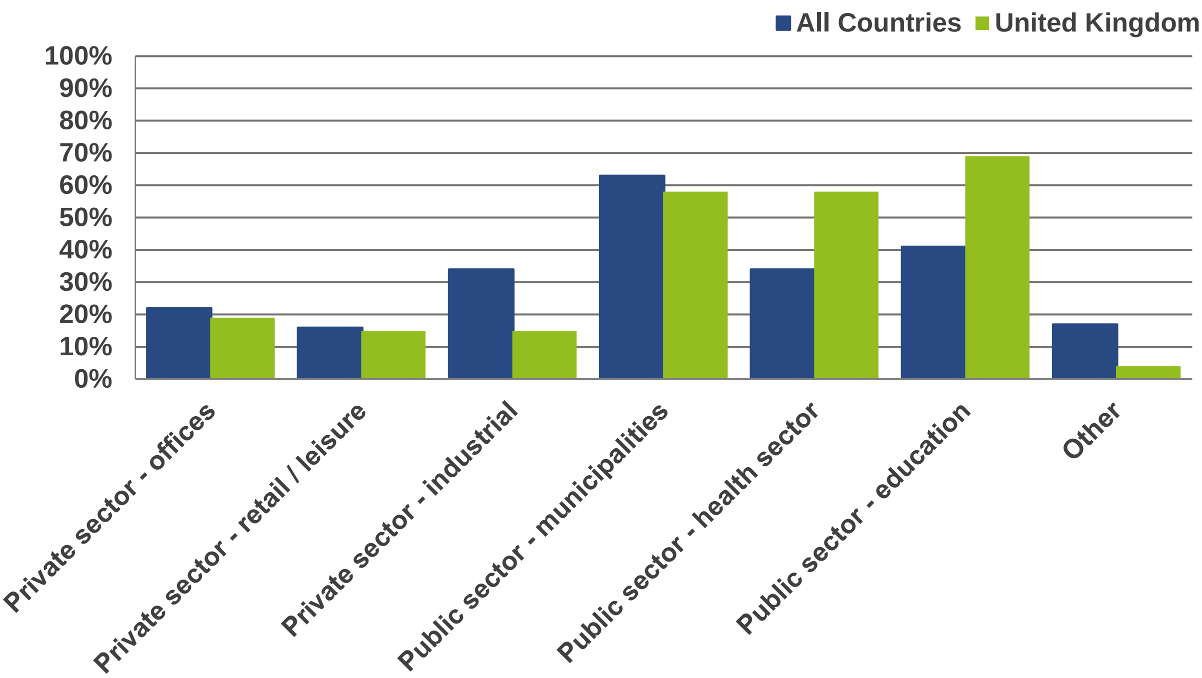
Whilst the majority of UK respondents highlighted that the EPC provider is typically responsible for energy savings performance analysis (often referred to as measurement & verification or M&V), which is similar to the situation across All Countries, a greater emphasis on performance analysis by independent third parties was reported in the UK than is the norm across All Countries. A buoyant market for independent M&V has developed in the UK with at least 10 companies offering these services. These companies are either tasked with carrying out performance analysis independently or auditing / verifying the analysis from the EPC provider.

Figure 16 Timeseries (2013, 2015, 2017) - Who typically delivers the energy savings performance analysis in the EPC projects you are involved with? (UK respondents only)



4.4 EPC market sectors

Figure 17 Which sectors do your EPC clients generally come from? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



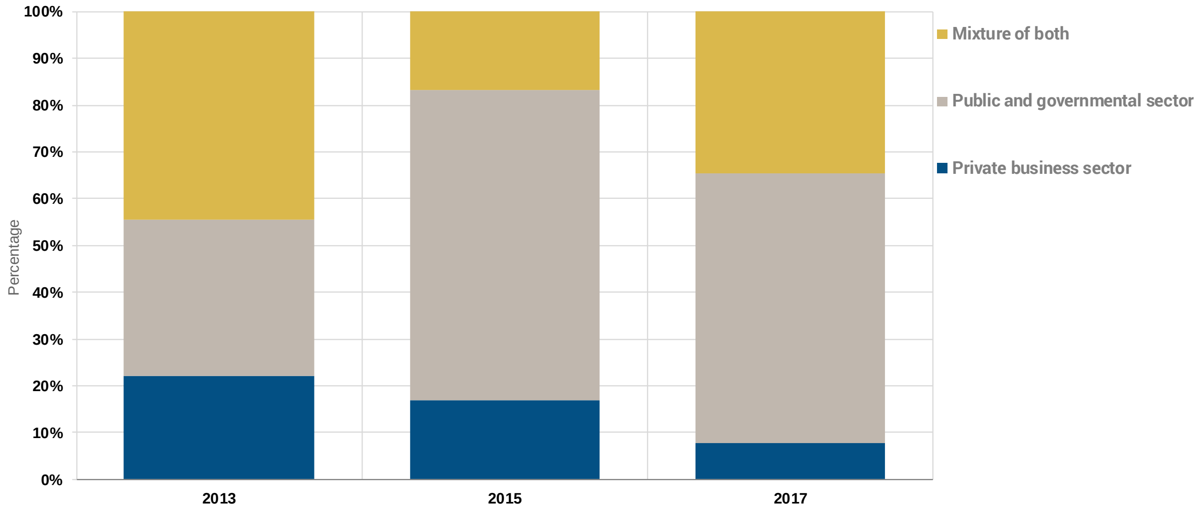
The uptake of EPC in the UK is largely focused on the public sector, as is the case in Europe. Successful public procurement frameworks (chapter 3.6.1) have been a driving factor in expanding these sectors (Nolden, Sorrell, Polzin 2016) – RE:FIT and the Scottish Non-Domestic Energy Efficiency Framework ("NDEEF") which are particularly used by municipalities and education, and the Carbon & Energy Fund ("CEF") and Essentia used by public hospitals (i.e. the National Health Service "NHS"). The public procurement frameworks provide a standardised procurement route (including a panel of pre-qualified service providers), contractual framework, and project development process facilitated by an intermediary (or facilitator) body. Fees for using the framework and intermediary services are often heavily subsidised – RE:FIT & NDEEF – or only levied once the contract is in operation and generating cost savings – CEF – which reduces barriers relating to transaction costs.

Only 15% of EPC provider and facilitator respondents in the UK are working with Industrial clients, compared to 34% across Europe. Energy efficiency in industry is a priority for the UK Government, which has committed to developing an "Industrial Energy Efficiency Scheme" in their 2017 *Clean Growth Strategy* and *Industrial Strategy* papers and is progressing a £9.2m industrial energy efficiency accelerator[7] programme to 'kick-start' the market.

[7] https://www.carbontrust.com/client-services/programmes/industrial-energy-efficiency-accelerator/

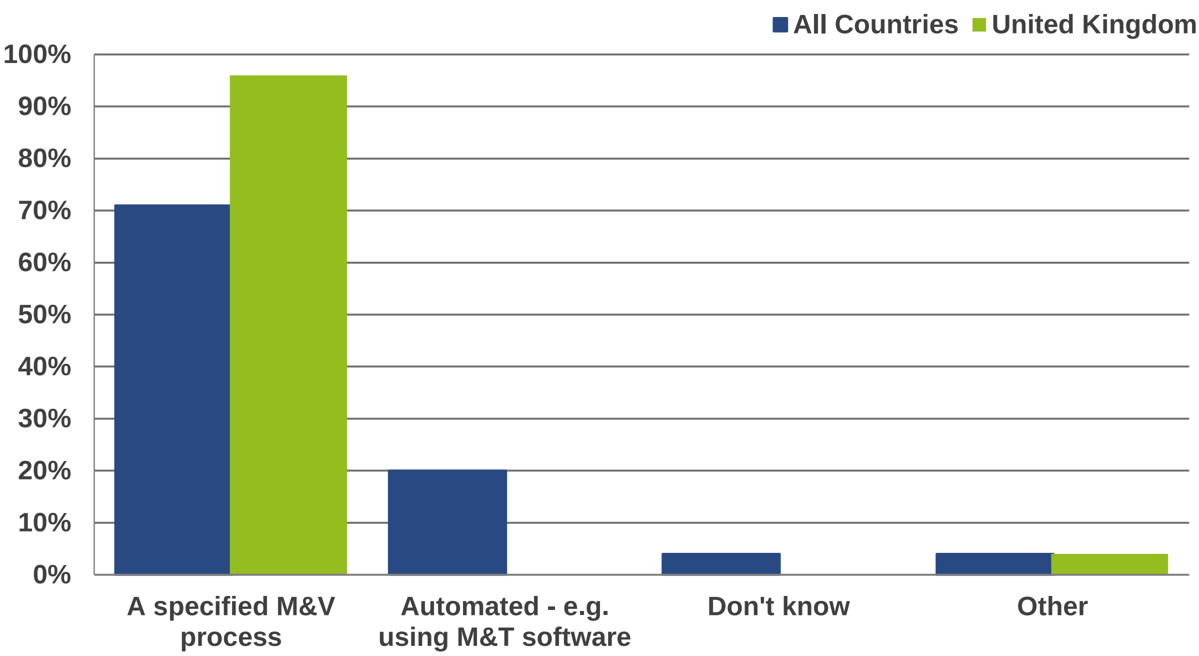
Over the last 4 years EPC activity in the private sector appears to have become a smaller part of the EPC business mix for UK providers and facilitators; 66% reported working with "private business sector" or a "mixture of both" in 2013, reducing to 34% in 2015 and 46% in 2017, with these results perhaps due to the considerable expansion of public sector demand in this period.

Figure 18 Timeseries (2013, 2015, 2017) - Which sectors do your EPC clients generally come from? (UK respondents only)



4.5 EPC measurement & verification

Figure 19 How is the energy saving performance of the EPC projects you are involved with typically measured and quantified? (Percentage share of responses by providers and facilitators Sept 2017)

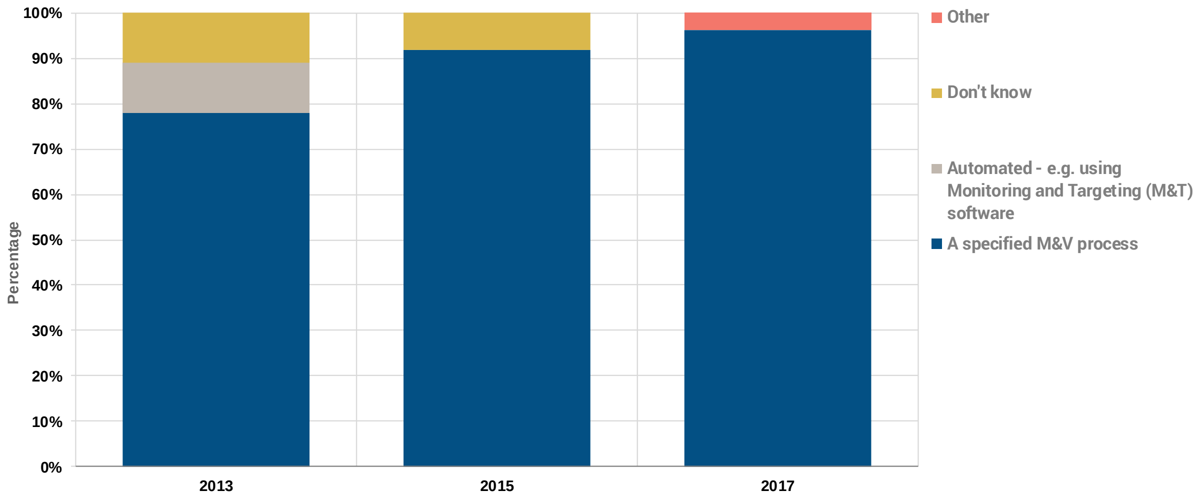


Almost all UK respondents reported that a "specified M&V process" is typical in the EPC projects they work on. The International Performance Measurement & Verification Protocol

(IPMVP) commonly forms the basis for the M&V approach in EPC projects within the UK (DECC 2015a). The UK has over 200 CMVPs -Certified M&V Professionals[8], which is one of the highest numbers for a country in Europe behind only Spain and France (see full analysis appended in chapter 9.1.3), and many EPC providers have one or more CMVPs in-house. The IPMVP guides that an M&V Plan, specifying the M&V process to be used in detail, must be established prior to commencement of the contract. Whilst the IPMVP provides a methodical framework, its application in practice is often wildly variable, and a number of the public procurement frameworks – for instance RE:FIT and NDEEF – have developed detailed M&V specifications, based on IPMVP, to drive best practices. Also, within the IPMVP framework, the EPC provider can select approaches and assumptions which are favourable to them in terms of risk, and has led to the established market for independent M&V consultancy and M&V training. By upskilling or using expert consultancy, clients are better placed to challenge M&V Plans and reporting from their EPC providers.

[8] http://portal.aeecenter.org/custom/cpdirectory/index.cfm accessed 21st January 2018

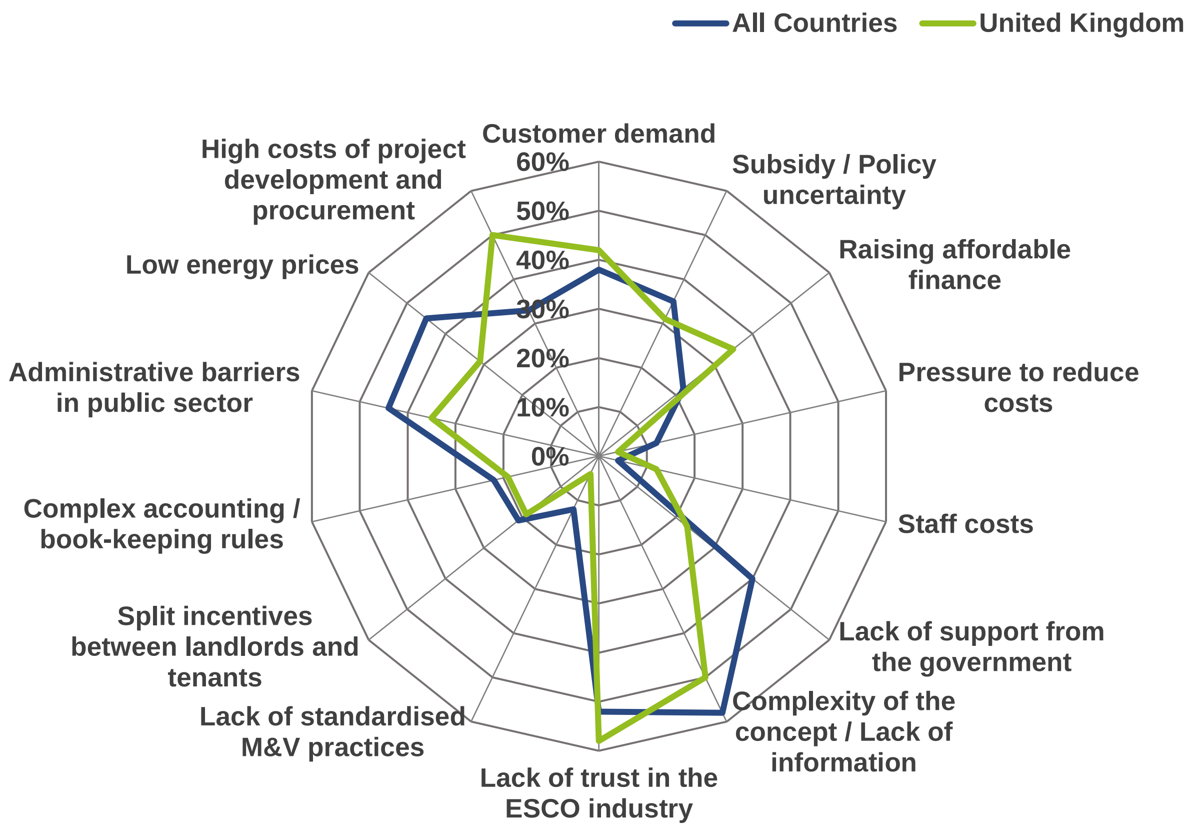
Figure 20 Timeseries (2013, 2015, 2017) - How is the energy saving performance of the EPC projects you are involved with typically measured and quantified? (UK respondents only)



Analysis of responses to this question over time shows the market consolidating on a specified M&V process as standard for EPC, the percentage of respondents selecting ‘don’t know’ reducing from 11% in 2013, 8% in 2015 to zero in 2017, showing better market awareness of practices for M&V.

4.6 EPC market barriers

Figure 21 What are the main barriers to EPC business based on the activities of the last 12 months? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)

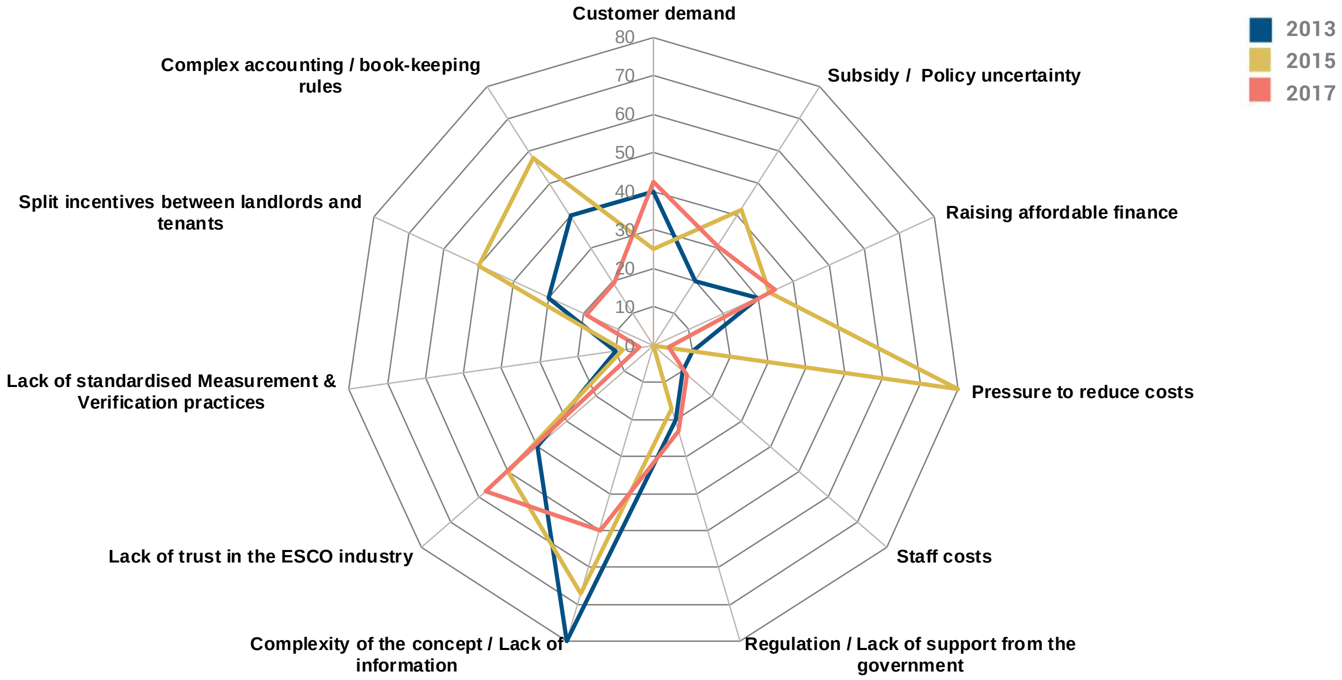


UK EPC providers and facilitators selected 'Lack of trust in the ESCO industry' and 'Complexity of the concept / Lack of information' as the top two barriers to EPC business, matching their European counterparts.

Whilst the view across All Countries in the survey was that 'Low energy prices' was the third ranking barrier, UK respondents selected 'High costs of project development and procurement', despite the availability of standardised procurement routes and subsidised facilitation in the public sector. Whilst both issues address negative impact on the commercial investment case, the concern in the UK is that high transaction costs for EPC make the model less attractive than alternative approaches to implementing energy efficiency improvements.

Notably, 'raising affordable finance' was selected by UK respondents in more cases (35%) than across All Countries (22%).

Figure 22 Timeseries (2013, 2015, 2017) - What are the main barriers to EPC business based on the activities of the last 12 months? (UK respondents only)



Two clear trends observed in responses to this question over the period 2013-17 are that the significance of 'complexity of the concept / lack of information' has reduced considerably (80% - 2013, 67% - 2015, 50% - 2017), where 'lack of trust in the ESCO industry' has consistently increased and leapfrogged the latter (40% - 2013, 50% - 2015, 58% - 2017) becoming the most cited barrier. This suggests that information dissemination activities such as the publication of the Government's model contract for EPC and the European Code of Conduct for EPC, both in 2015, have had a positive effect but the lack of enforcement of best practices has led to a more informed market becoming increasingly sceptical about the quality of services offered by UK EPC providers.

4.6.1 Regulatory and administrative barriers

There are no UK laws and / or regulations that specifically prohibit EPC business, apart from accounting rules that can restrict the off-balance sheet treatment of EPCs in some circumstances, and which are discussed in more depth in chapter 4.6.3. Indeed, the survey results were fairly clear that 'Lack of [regulatory] support from Government' is not a main barrier to EPC business, as it was only cited by 23% of respondents, which is considerably lower than across All Countries in the survey (40%).

In contrast however, 'lack of trust in the ESCO industry' was the most cited barrier (58%) amongst UK respondents. A lack of regulation may be contributing to this trust issue and whilst the Government could not be accused of a lack of information to the market regarding EPCs - having fully implemented the information provision aspects of Article 18 in the EED (see chapter 3.2) - no specific Government progress has been made in terms of enforcement. The market has started to respond to the issue with initiatives such as the European Code of Conduct for EPC (see chapter 3.5), and the Investor Confidence Project Europe, which provides a scheme for standardised documentation, independent quality assurance and certification for energy efficiency projects. However, this survey result shows there is still work to be done to improve client trust.

The overwhelming majority of EPC projects have a value over the OJEU thresholds for the European public contracts directive, requiring public authorities to go through a full tender process published in the European Journal. This can present a considerable administrative burden for public authorities. However, in the UK this barrier can be avoided by using one of the public procurement frameworks where suppliers are pre-qualified through an OJEU compliant tendering process by the framework owner, and public authorities using the framework are only required to complete a 'mini-competition' process. This is reflected in the survey results where 'administrative barriers in the public sector' were only identified as a main barrier by 35% of respondents, compared to 44% across Europe. On the other hand, the public procurement frameworks, create a structural barrier to entry for EPC providers; as the frameworks are typically established on a 2 or 3 year basis, new entrants may need to wait some while until they can bid to take part.

4.6.2 Structural barriers

As identified previously by Garnier (2015) the fact that there are several associations representing the EPC industry, and none of them solely focussed on energy services, results in insufficient market cohesion to agree best practices, lobby Government for EPC specific interests or to act as a 'one stop shop' for consumers to access information. The ESTA EPC group has been proactive in arranging EPC industry focussed events and communicating with Government, although it does not currently have a membership that could be described as sufficiently representative of the active provider or facilitator organisations on the EPC market.

Structural barriers were clearly of concern to survey respondents; 42% highlighted 'customer demand' as a main barrier, and when paired with the 50% that selected 'High costs of project development and procurement' it suggests that the high costs of customer acquisition – i.e. high marketing / business development costs, as well as long project development and negotiation phases, with a risk of not eventually going into contract - are likely to be affecting profitability for EPC providers, and set a high cost barrier for SMEs to enter the market. High transaction costs are perhaps mitigated for public sector projects through subsidies and standardised processes offered through the public procurement frameworks, but this will certainly be a major issue for private sector clients. As reported in qualitative interviews carried out as part of this research, long project development times also represent a challenge, as project personnel often change within the project development timeframe.

Just behind lack of trust, 50% of respondents selected "complexity of the concept / lack of information" as a main barrier suggesting that clients still find the EPC market difficult to navigate. Considering the wealth of introductory information available from the Government resulting from implementation of Article 18, it may be that this information is not being effectively communicated, or there are several contradictory or fragmented sources that lead to confusion – i.e. there is no definitive 'this is the way it is done', rather a wide range of options. Also, the amount of publicly available performance information is low and delayed – many of the case studies available have been published before the projects were fully operational and subject to M&V reporting. With projects often taking between 6 months and 2 years to transition from procurement to operation there is often a lack of follow up. As a result, clients find it difficult to establish a view of track record, particularly in respect of energy savings performance, and an EPC provider can operate on the market for some time before poor performance leads to the market assigning them a poor reputation.

Complexity is also a major issue; projects can contain large number of different energy efficiency improvement measures and a similarly extensive portfolio of facilities subject to the implementations. There are often several parties involved beyond just the provider and client and the whole process requires excellent project management, communication and information management. Over long contract terms poorly arranged change monitoring and management procedures – often relating to adjustments in the M&V process – can lead to uncertainty and ultimately dispute between the parties.

While 'split incentives between landlords and tenants' was relatively low ranked in terms of barriers in this survey it remains a material issue and the authors have found very few case studies for energy performance contracts in the private rented sector, the only one being for a whole building leaseholder with a long lease term[9]. Increased penetration of 'Green Leases' however, may facilitate a change in the situation (Janda, Bright 2016).

4.6.3 Financial barriers

Whilst not the highest-ranking barrier, 35% mentioned 'raising affordable finance' and it remains an area of concern in the UK more than across All Countries in the survey. The fact that there are several dedicated energy efficiency funds offered in the UK (see chapter 3.6.3) suggests that finance availability is not the issue. Equally, it appears a wide range of finance options are available and 46% of UK respondents see obtaining 'viable' finance as 'easy', more so that counterparts across Europe. This suggests that finance affordability is the key issue, therefore steps are required to reduce high due diligence costs and to facilitate bundling into large funds such that the most cost-effective finance can be accessed.

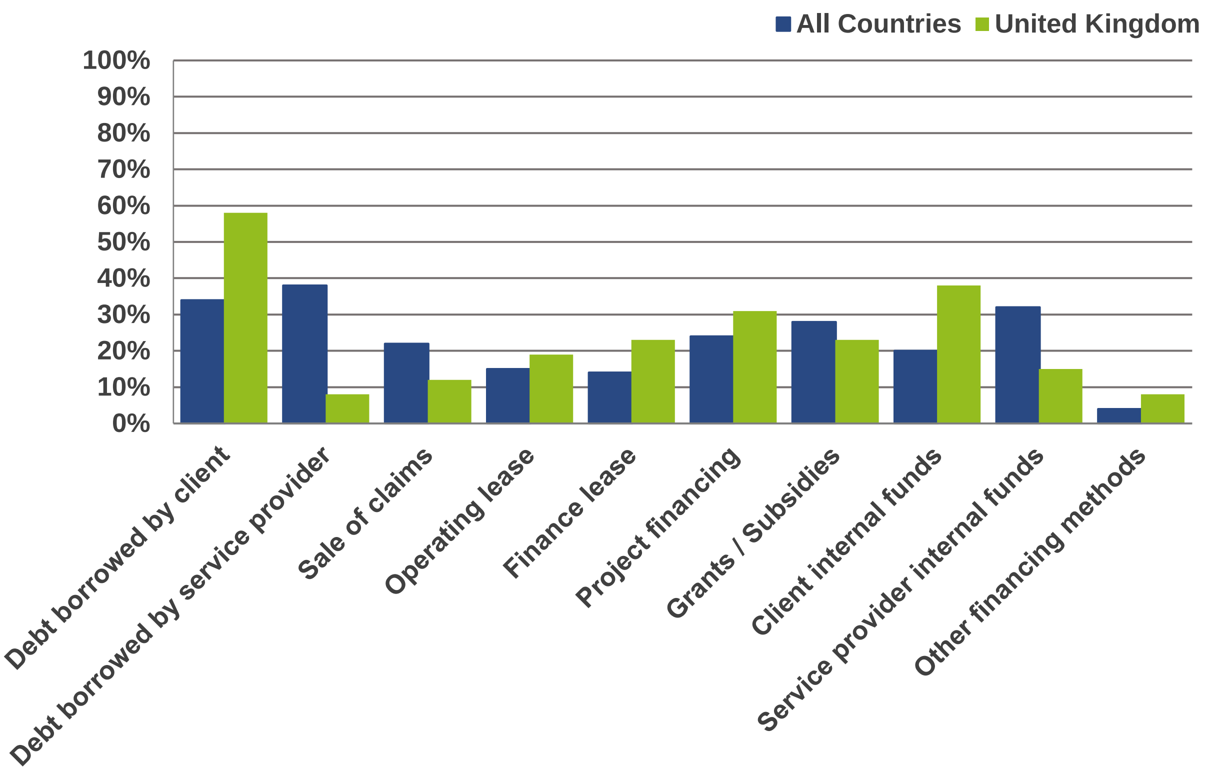
In many situations a key benefit that clients are looking for from the EPC model is the opportunity to keep any investments off their balance sheet. Whilst Eurostat has recently clarified the accounting treatment of EPCs (Eurostat 2017), there are indications that the forthcoming IFRS16 regulations may limit the cases where investments can be off-balance sheet. For example, the Scottish Government has vetoed off-balance sheet EPC contracting forms (Pye 2016), and as the NHS in Scotland has limited internal funds and cannot take on

[9] https://www.struttandparker.com/download_file/view_inline/276936

debt, no EPC contracts can be taken forward. Only 19% of respondents marked 'Complex accounting / book-keeping rules' as a main barrier, perhaps due to the prevalence of client funds and client debt as finance options (Figure 23).

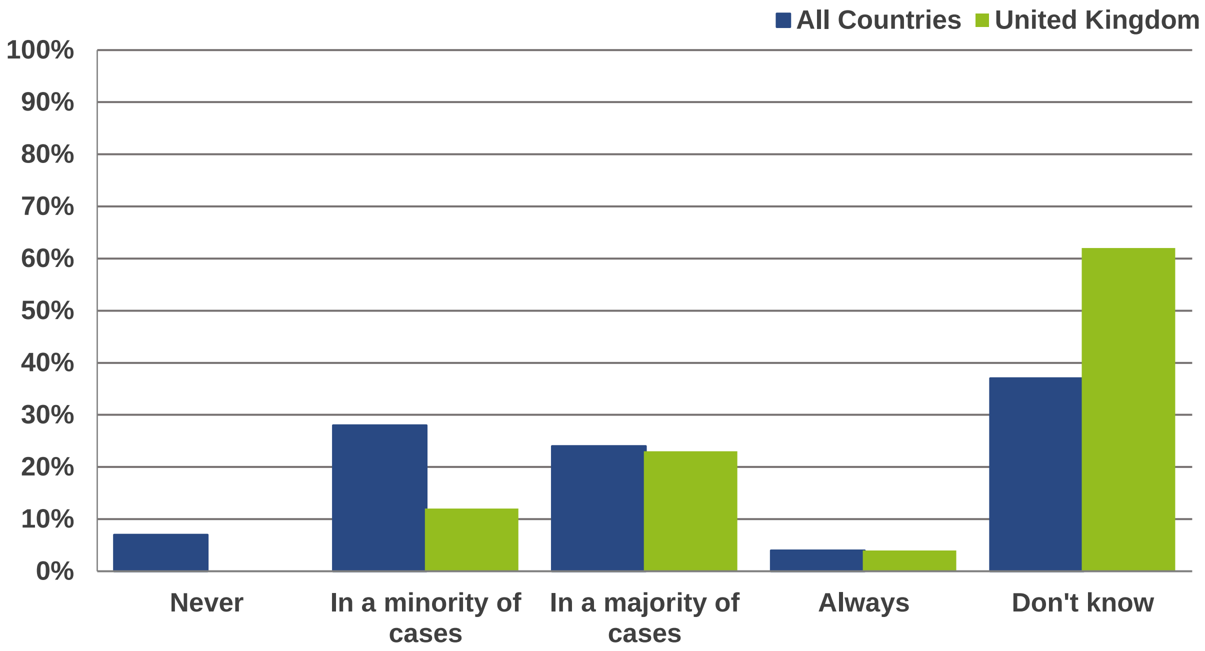
4.7 EPC financing

Figure 23 How are the EPC projects you are involved with financed? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



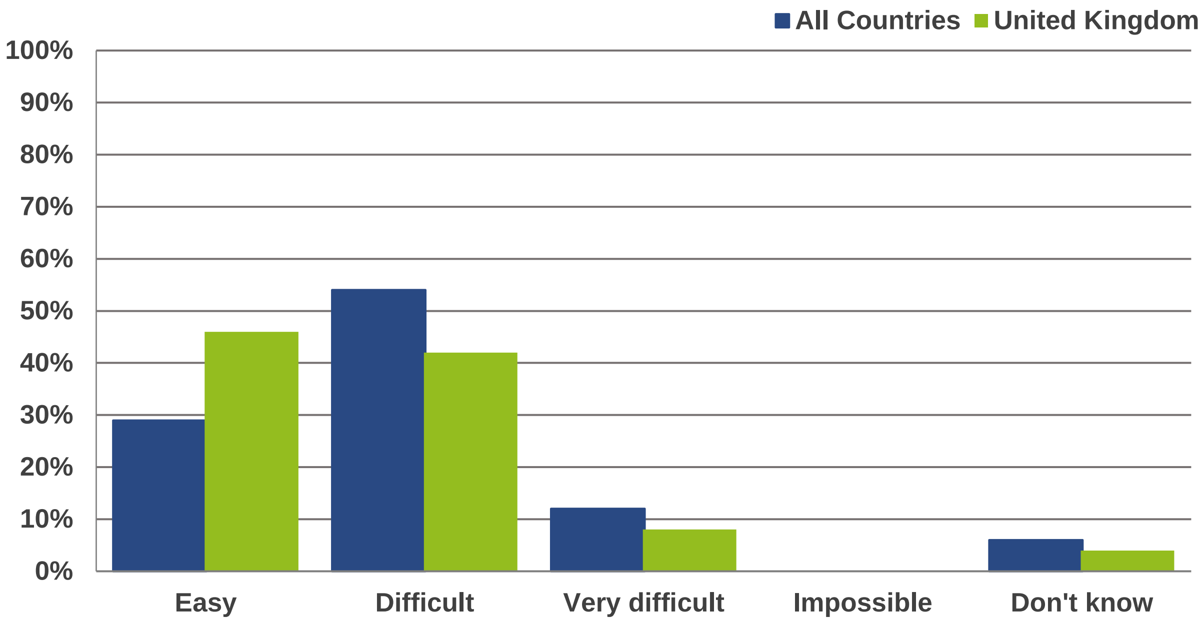
Whilst a full range of financing options for EPC appears to be in use within the UK, the most common EPC financing approaches are reported to stem from the client, either using their own funds or their own debt arrangements. In stark contrast, supplier arranged debt finance, which was most commonly selected across All Countries (by 38% of respondents), was least cited in the UK. The prevalence of client internal funds as a funding source for EPCs reinforces the point that raising affordable finance is a particular barrier in the UK (Figure 21) and is likely to be restricting energy efficiency investment to projects with short paybacks; the results of the Building Energy Efficiency Survey (Department for Business, Energy & Industrial Strategy 2016) reported that "For major capital expenditure measures low capital availability was perceived to be the key barrier. Linked to this was also the issue that in many cases measures were not sufficiently profitable to meet internal investment requirements."

Figure 24 From your experiences, is the sale of claims (sale of receivables) accepted as the main collateral for EPC projects? (Percentage share of responses by providers and facilitators Sept 2017)



Sale of claims – where EPC service payments are sold by the service provider to investors on financial markets - was only selected by 12% of UK EPC service providers as a financing option for projects they have been involved in (Figure 23), and its significance to EPC in the UK appears somewhat lower than in other European countries. Most respondents had no experience on which to judge whether sale of claims is a feasible option however, those that did were generally positive. The low experience with sale of claims in the UK may be driven by the fact that a high proportion of public sector EPC investments are paid to the service provider upfront upon commissioning of energy efficiency improvement measures.

Figure 25 Do you consider that obtaining viable finance for an EPC project is easy? (Percentage share of responses by providers and facilitators Sept 2017)



Despite UK respondents highlighting 'raising affordable finance' as a more significant barrier to EPC business than European counterparts (Figure 21), obtaining 'viable' finance was seen as 'easy' by a greater proportion (46% UK to 29% All Countries). Considering that clients using internal funds for EPC is common in the UK, this suggests that the availability of finance deals is not an issue but it is particularly the cost of finance that is deterring clients from using it.

4.7.1 ESCO financing

- Asset finance (leasing) – is widely used in the UK EPC market and contracts often revolve around major assets such as combined heat and power (CHP) units to secure the finance (WSBF 2014). Two of three financial institutions interviewed as part of this research indicated their deals typically revolved around this model, and in 'the majority of cases' the finance was arranged by the service provider. This presents issues for energy efficiency measures such as lighting and building fabric improvements, for which the value reduces to zero upon installation due to the difficulty of removal and resale. Eurostat (2017) recently clarified that the EPC provider can be considered the economic owner for non-removable assets where they are subject to performance guarantees, taking the EPC project off the client's balance sheet. However, according to the interviews it does not appear that financial institutions are willing to accept the performance risk without a recoverable asset to secure the funding against.
- Whilst respondents to the survey indicated that the Sale of Claims was often accepted as the main collateral in an EPC, it is not widely used, and interviews with financial institutions highlighted that in the asset finance model the future receivables were payable irrespective of performance, and secured against the asset.

- Only 15% of respondents to the survey indicated that **EPC providers' own internal funds** were used in projects, suggesting limited use of this model.

4.7.2 Client financing

- A financial institution that was interviewed, which manages a public fund, highlighted that all the EPC projects they had funded to date had used **debt arranged by the client.** Respondents to the survey indicated this was the most widely used funding method for EPC. This result is likely to be driven by the public sector dominance of EPC activity, and the public sector's access to low or zero interest loans from Salix Finance and the Public Works Loans Board. The public sector also regularly benefits from **grants and subsidies** – for example, in 2017 the Scottish Funding Council arranged £4.5 million grant funding for implementing EPC projects at further education colleges as part of the College Energy Efficiency Pathfinder (Scottish Funding Council 2017).
- Despite the availability of loans and grants more UK survey respondents (38%) than their European counterparts (20%) highlighted the use of client internal funds for EPC projects. Considering that finance affordability has been raised as a material barrier (Figure 21), it could be concluded that in some cases client organisations do not consider that using external finance is of sufficient value in light of costs and complexity, when internal funds are available.

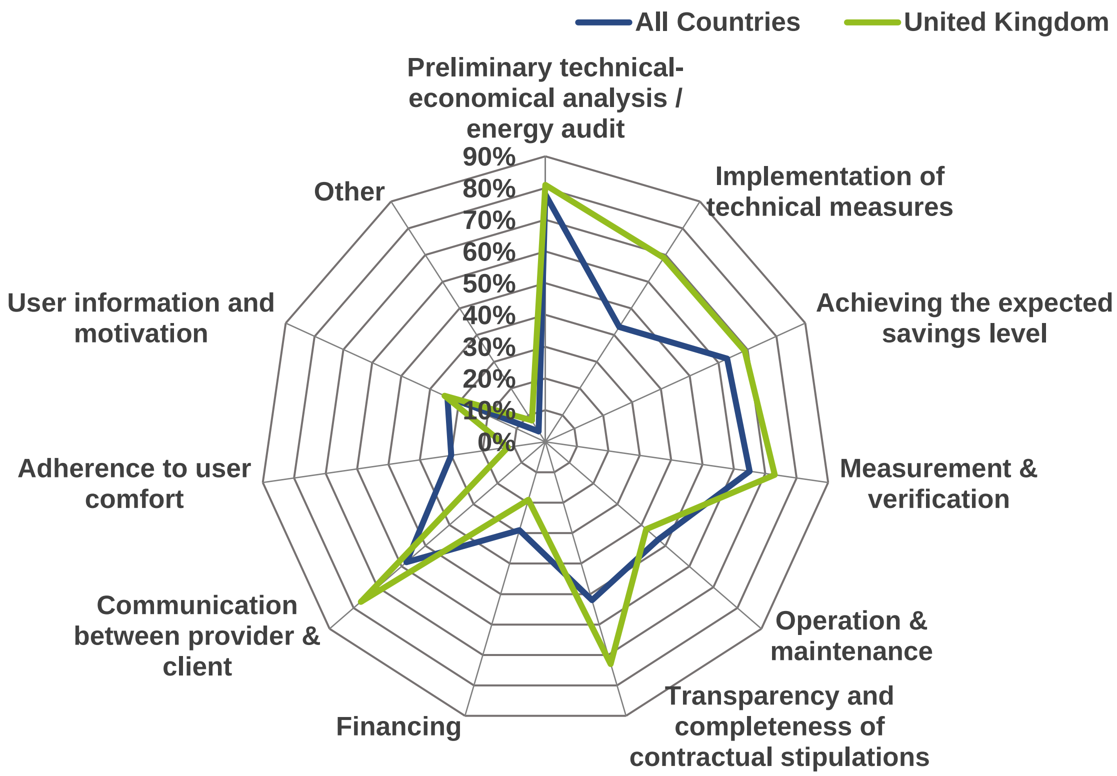
4.7.3 Project financing

- Behind only client internal funds and client debt, 31% of UK respondents highlighted **'project finance'** as a widespread funding method for EPC. Project finance bases its collateral on a project's cash flow expectations, not on individuals or institutions' creditworthiness. Whilst none of the financial institutions interviewed indicated use of this funding method, there are examples of project financing in the UK market using special purpose vehicles (SPVs) such as Citi Bank's CCHP project funded through SDCL's UK Energy Efficiency Investments Fund[10].
- The use of the **Private Finance Initiative (PFI)** – which is off-balance sheet similar to project finance - has been widespread for public hospitals and education institutions in the UK. Previously seen as prohibitive to EPC due to complexities around which party bears the risks, projects in this category – that extend the existing PFI and finance arrangements to incorporate an EPC – are starting to emerge with examples including Kings College London (Higher Education)[11], Barts Hospital[12] and Darent Valley Hospital[13].

[10] https://www.walkermorris.co.uk/publications/brief-january-2015/a-uk-energy-first-as-walker-morris-team-advises-on-data-centre-power-project/
[11] https://www.lcmb.co.uk/kings-college-london-gaining-energy-savings-from-pfi-contracts/
[12] http://www.sdcl-ib.com/sustainable-development-capital-announces-landmark-energy-efficiency-deal-for-st-bartholomews-hospital-in-london/
[13] https://www.carbonandenergyfund.net/nhs-carbon-footprint-declines/

4.8 EPC quality determinants

Figure 26 What are the most important determinants of quality in EPC projects? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)

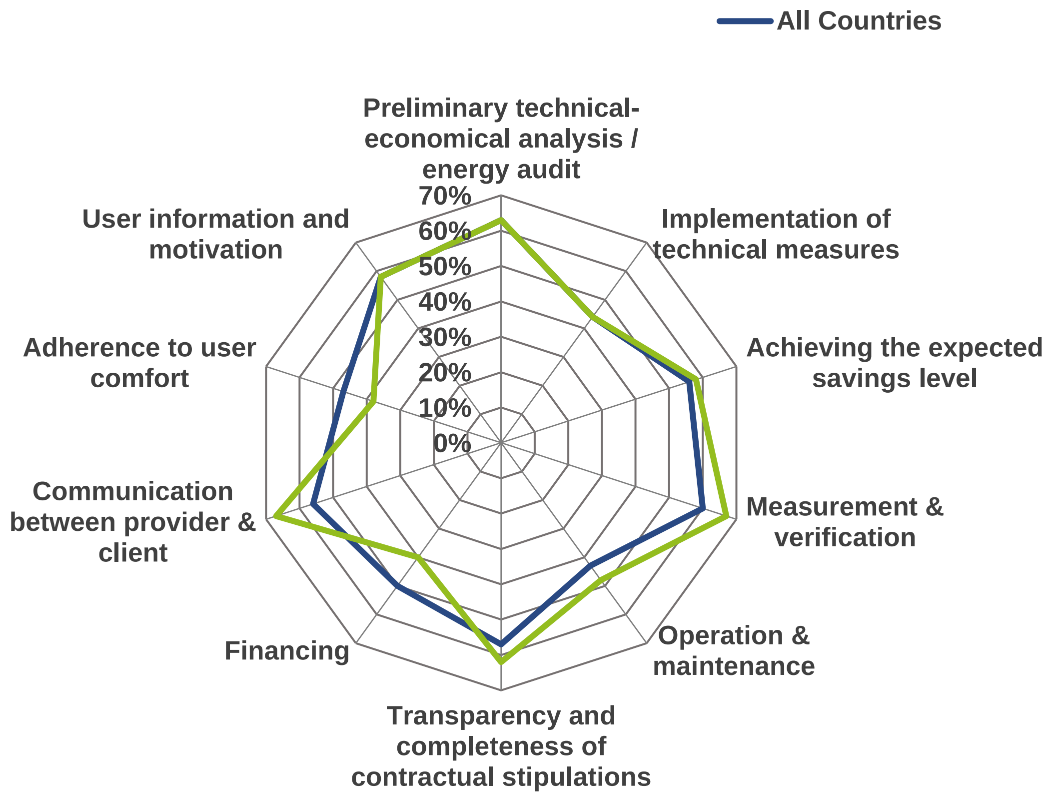


There was broad agreement amongst respondents that the most important determinants of quality in EPC projects are (over 69% selected these, where the remaining options were selected by less than 42%):

- Preliminary technical-economical analysis / energy audit (81%)
- Communication between provider & client (77%)
- Measurement & verification (73%)
- Transparency and completeness of contractual stipulations (73%)
- Implementation of technical measures (69%)
- Achieving the expected savings level (69%)

Compared to the All Countries dataset, greater importance was given to communication and contractual stipulation, as was the implementation of measures, the latter of which is perhaps surprising considering the wide availability of standards for construction and commissioning.

Figure 27 In which areas are quality improvement most needed in EPC project preparation and implementation? (Indicator based on rating scale as described in the note below - Sept 2017)



Note: respondents were asked to rank each determinant using the following options 'not needed', 'needed', 'strongly needed' and 'don't know'. An indicator was created by assigning a weighting of 0%, 50% & 100% to 'not needed', 'needed' & 'strongly needed' respectively and dividing by the number of responses. Where 'don't know' was selected this was excluded from the calculation of the indicator.

UK respondents had very similar views to European counterparts on where most quality improvement is needed for EPC. Communication and contractual issues were again assigned a higher level of importance, alongside M&V, signalling that these should be key aspects of a quality assurance scheme for EPC in the UK.

5 ENERGY SUPPLY CONTRACTING MARKET

5.1 ESC market actors

As the term "Energy Supply Contracting" is not a widely used umbrella term in the UK to refer to services described in the definition (chapter 2.2.3) there is no centralised association covering all types of ESC on offer to the UK market. The following sub chapters offer a view of different market segments using ESC models and the trade associations they participate in.

5.1.1 Heating / Cooling, CHP and district energy providers

Organisations offering ESC based on chilled water / heat / steam generation, combined (cooling) heat and power, energy centre management, and district energy are represented by two associations; the Association for Decentralised Energy (ADE) as described in chapter 4.1.4 and the UK District Energy Association. The service provider members can be segmented as below:

Table 5: Segmentation of Heating / Cooling, CHP and district energy providers

Segment	Typical activities	Typical client base	Key players
Major Facilities Management Companies	Funding, development and operation of energy centres and district heating networks.	Hospitals, Large Industrial, Universities, Housing Associations, Community Groups and Local Authorities	Cofely/ENGIE, Veolia, Vital Energi, Centrica/ENER-G, E.On
Major district heating system owners – Large Industrial, Universities, Housing Associations, Community Groups and Local Authorities	Act as the ESCO. Often outsource technical services to FM companies as above.	Housing, businesses, industry and public buildings local to the district heating system	The Boots Company, Bloomsbury Heat and Power Consortium, Imperial College London, City West Homes, Camden Council
Specialist technology providers or ESCOs focused on CHP	Funding, development and operation of CHP systems. Also manufacture of CHP systems in some cases	Hospitals, Leisure Centres, Hotels, Industrial, Universities, Housing Associations and Local Authorities	Eurosite Power, Basepower, Clarke Energy, Finning (UK)

5.1.2 Biomass and energy from waste supply contracting

Whilst the projects highlighted in the previous sub-chapter mainly focus on the conversion of traditional fuels such as natural gas and fuel oil there is also a buoyant market for energy from waste and biomass heat and power supply contracts. The Green Investment Group have a dedicated funding stream to this area and analysis of investments[14] highlights the following project developers, technology, construction and service providers:

1. Constructions industrielles de la Méditerranée S.A. (CNIM)
2. WTI
3. FCC Environment
4. Hitachi Zosen Inova (HZI)
5. Future Biogas Limited
6. Thöni
7. Clarke Energy
8. Wheelabrator Technologies Inc (WTI)
9. Stream Bioenergy Limited
10. Williams Industrial Services
11. RiverRidge Energy Limited
12. Bouygues Energies and Services
13. Estover Energy
14. BWSC
15. AssetGen Partners
16. Biomass Power Limited
17. AmeyCespa
18. Interserve Group

Brief internet research also highlights a few smaller players marketing biomass generated heat as a supply contract (ESCO) – for example:

- Aggregated Micro Power - https://www.ampplc.co.uk/
- HW Energy - http://www.hwenergy.co.uk/biomass-products-and-services/escos/
- Forest Fuels - https://www.forestfuels.co.uk/our-products/fully-funded-escos/
- JL Phillips - http://www.jlphillips.co.uk/finance-options/

5.1.3 Innovative heat pump supply contracts

An innovative partnership between **Scottish Water Horizons** and **Sharc** technology is utilising waste heat from sewage using heat pump technology to provide heat supply contracts. Hailing

[14] http://greeninvestmentgroup.com/our-investments/all-investments/?sector=waste-and-bioenergy#main

from Canada, the technology is relatively new to the UK and one case study for Borders College (a further education institute) in Scotland is publicly available[15].

5.1.4 Renewable energy supply contracts (power purchase agreements)

Energy supply contracting also extends to the provision of electricity from renewable energy technologies such as Solar PV and Wind, which is often in the form of a corporate **power purchase agreement.** This can fall under the definition of ESC where a price is offered that is guaranteed to be lower than grid supply rates (e.g. as described by EVO Energy[16]). The ESC provider in these cases will develop projects on a client's site or a remote site (i.e. solar farms and wind farms) but in both cases, owns and operates the assets (and leases the land where required).

ESC providers in this space are often referred to as 'project developers' and with the explosion in renewables projects since the introduction of subsidies (feed-in-tariffs) in 2010, there are now many developers in the market. For solar energy, the top 20 developers only represent a fraction of the total market (Solar Media[17]).

The central trade association for renewable energy, covering solar, wind, biomass and energy from waste is the Renewable Energy Association, which has a dedicated biomass subsidiary – the Wood Heat Association. As a strong part of the renewables sector, solar PV and solar thermal providers have a dedicated body; the Solar Trade Association. The ADE also has an energy from waste interest group.

5.1.5 ESC facilitators

A similar set of skills and private sector facilitator organisations to the EPC market (see chapter 4.1.2) is expected for energy supply contracting. Indeed, the ADE membership contains several organisations that could be considered as facilitators of ESC including consultancies, financial institutions and legal firms.

The Government and the public sector have established several project facilitation and funding schemes to support various parts of the energy supply contracting industry. For example:

- The Government's Heat Networks Delivery Unit and Heat Networks Investment Project (£320 million)
- The Greater London Authority's Decentralised Energy Enabling Project (DEEP)
- The London Community Energy Fund

[15] http://www.borderscollege.ac.uk/news-and-events/sharc-energy-systems-helps-borders-college-win-prestigious-industry-award/
[16] https://www.evoenergy.co.uk/services/power-purchase-agreement/
[17] https://www.solarpowerportal.co.uk/blogs/exclusive_top_20_uk_solar_project_developers_revealed

5.2 ESC market developments

- Energy supply contracting in the UK traces back to the invention of Contract Energy Management models (see chapter 4.2) and early uses of district heating in the 1960s[18].
- The Contract Energy Management concept has been widely used in hospitals and industry, although many hospitals have recently moved to the EPC model promoted by the Carbon and Energy Fund framework since 2011.
- District heating did not develop significantly in the UK when compared to other European countries. In 2014 the UK had only 2% of properties connected to heat networks compared to over 60% in Denmark[19]. The UK Government established the Heat Networks Delivery Unit in 2013 and since then it has provided £14m project development support to over 200 projects[20].
- Supply contracting ESCO models, heat supply and power purchase agreements for renewable energy have grown in line with the explosion in renewable energy development triggered by the introduction of subsidy schemes; the feed in tariff in 2010, and the renewable heat incentive in 2011. The current feed in tariff scheme is due to close in April 2019[21].
- Further conclusions refer to the results of the QualitEE survey and it should be noted that there were only two UK respondents (one ESC provider and one ESC facilitator) to questions relating to Energy Supply Contracting. Therefore, the results should be treated with some caution and where possible references to wider sources of information are used to corroborate the conclusions drawn.
- Market and order growth across Europe and the UK is reported to be stagnant, and most ESC providers and facilitators indicated becoming involved in 1-5 projects in the last 12 months.
- Project size is expected to be driven by the scope of the project using an energy supply contracting model. Small single site individual technology (CHP, Biomass, Solar PV) projects may typically fall in the under 1m€ bracket, energy centre refurbishments 1+m€, and district energy 5+m€.
- Key client sectors as identified in chapter 5.1.1 include Hospitals, Industrial, Leisure Centres, Hotels, Universities, Housing Associations, Community Groups and Local Authorities. Unlike the EPC market, UK respondents indicated more focus on private sector clients for ESC.
- Opinion is split on UK ESC market size – one respondent selected 10m Euros, and the other selected 400m+ Euros, expected to be due to the lack of definitive information available and issues with defining the scope of the ESC market.

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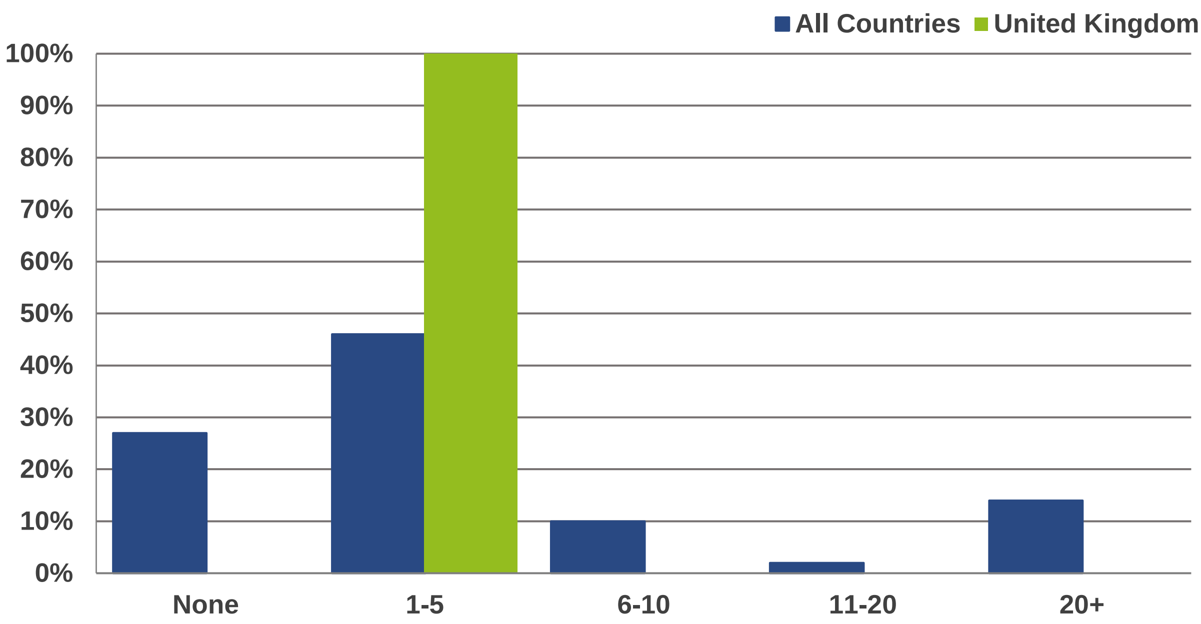
[18] http://www.mibec.co.uk/history-of-district-heating/
[19] https://www.theguardian.com/big-energy-debate/2014/aug/20/denmark-district-heating-uk-energy-security
[20] https://www.gov.uk/guidance/heat-networks-delivery-unit
[21] http://www.energylivenews.com/2017/11/29/feed-in-tariff-scheme-to-close-in-april-2019/

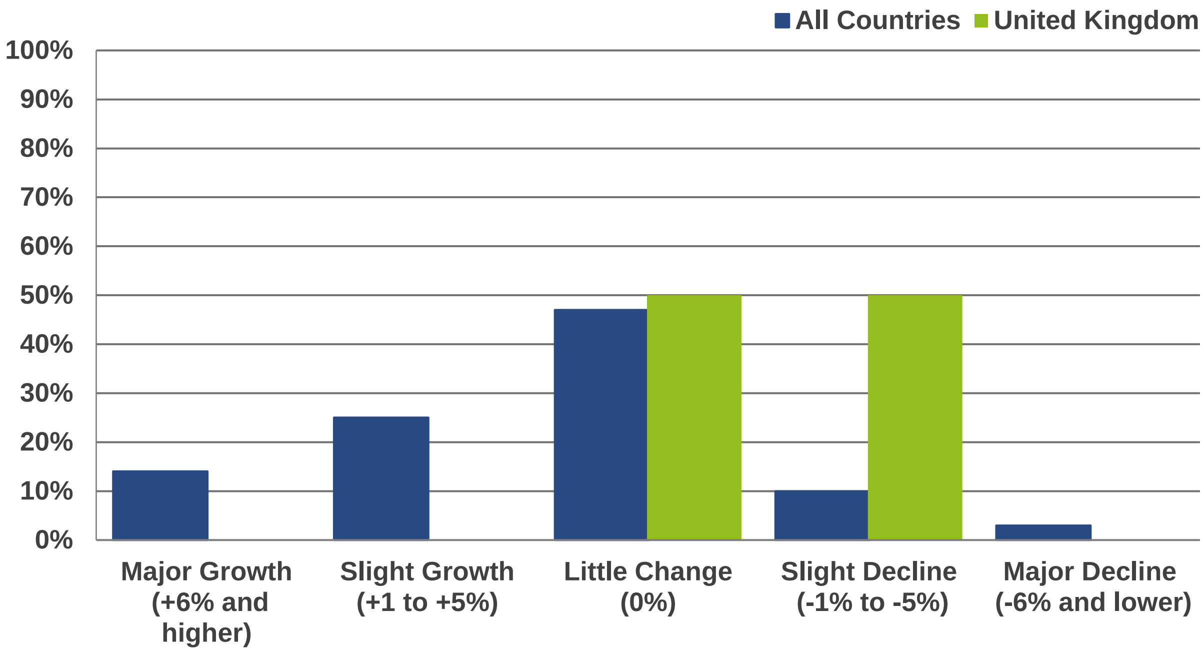
- UK respondents agreed with the view across Europe that the main barriers to ESC business are; lack of trust in the ESCO industry, lack of support from the Government and customer demand.
- UK finance for ESC was found to be more focussed on supplier arranged options and project financing. Sourcing viable finance for ESC was seen to be 'easy' in the UK.
- When asked about ESC quality, UK respondents again agreed with European counterparts on the most important aspects; Implementation of technical measures, communication between provider & client, operation & maintenance, preliminary technical-economical analysis / energy audit, with the latter two in most need of improvement.
- The following pages provide full detail and charts relating to the conclusions drawn above.

Figure 28 How many ESC projects (that have reached contract signature) has your organisation initiated / become involved with in the last 12 months? (Percentage share of responses by providers and facilitators Sept 2017)



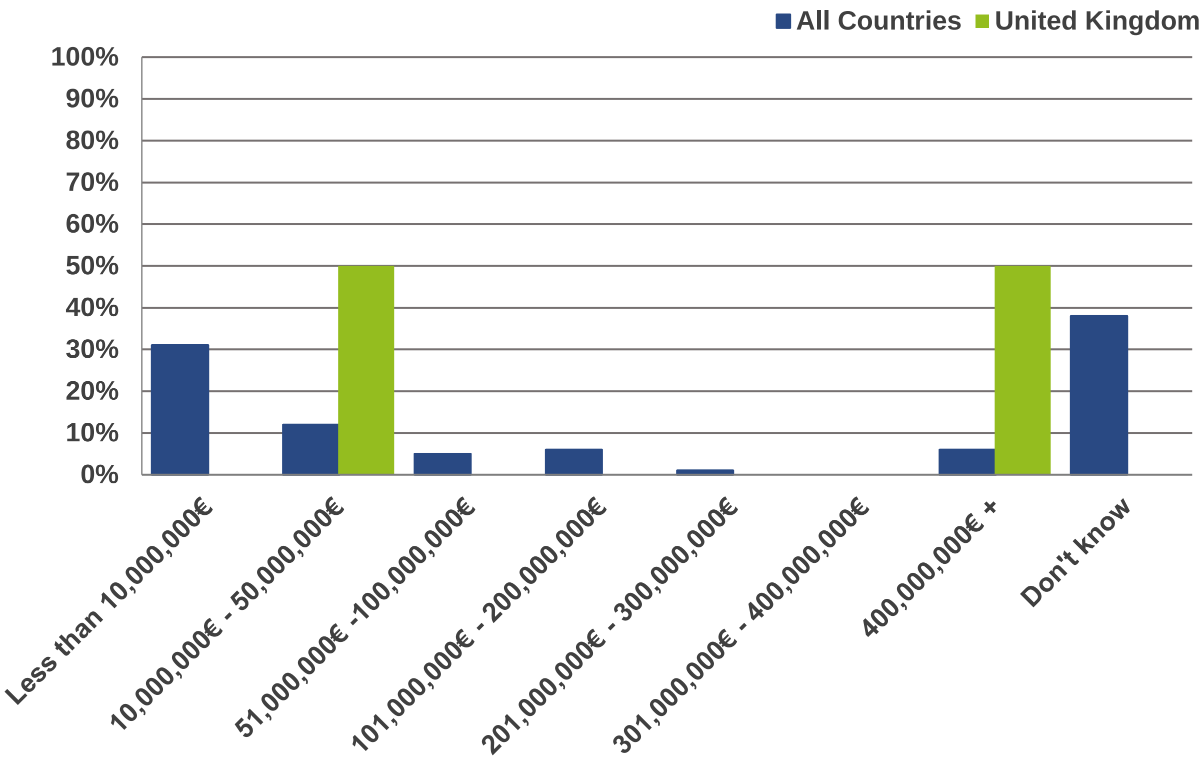
As was the case across All Countries, UK respondents became involved in 1-5 ESC projects in the last 12 months.

Figure 29 In the last 12 months your ESC orders have seen: (Percentage share of responses by providers and facilitators Sept 2017)



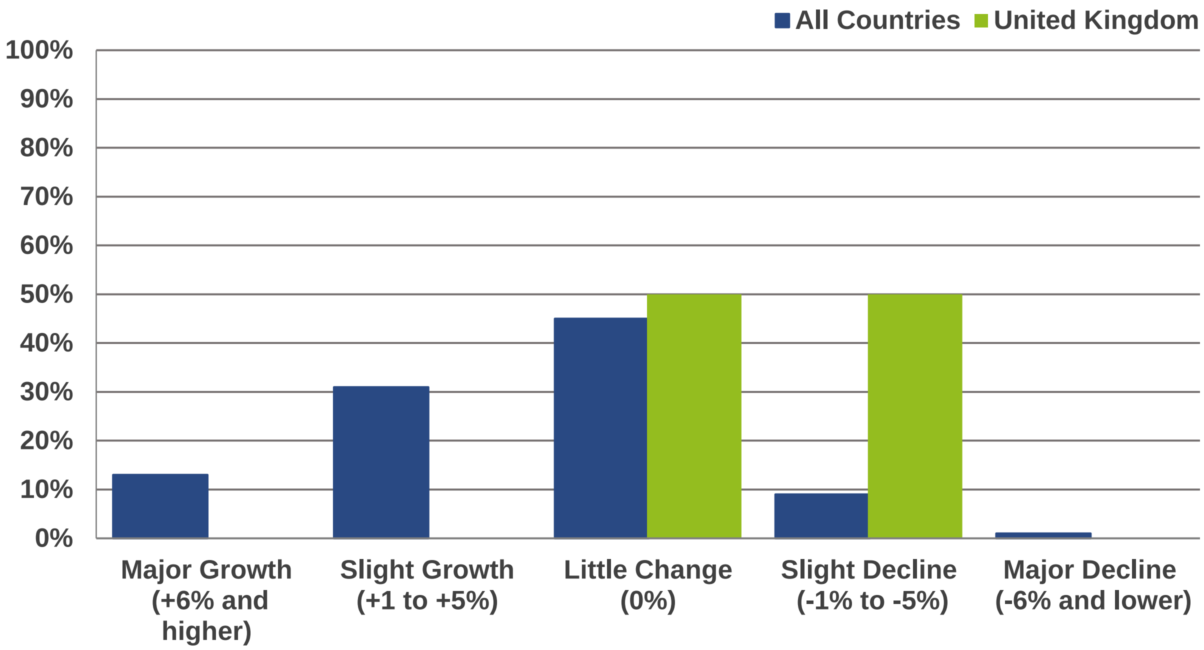
By some margin 'little change' was the most selected option to describe the trajectory of ESC orders from respondents across All Countries in the survey. This picture of market stagnation was shared by UK respondents.

Figure 30 How much revenue do you think the ESC market in your country generated in 2016? (Percentage share of responses by providers and facilitators Sept 2017)



Opinion is split in terms of the market size for ESC in the UK and unfortunately these results provide no useful guide to the overall revenues generated. This suggests that there is a lack of reputable information on the subject available to ESC providers and facilitators but also that there may be an issue in what is understood by the energy supply contracting market by UK stakeholders. As discussed in chapter 5.1 energy supply contracting models could apply energy centre developments through to major heat supply agreements from district heating and major power purchase agreements for renewable energy. The respondent's view of what comprises the UK ESC market will have a significant impact on their response. In this case the respondent that selected 10-50m Euros offers single technology single site installations, and the respondent that selected 400m+ Euros is a facilitator with involvement in district energy. A source highlighting the value of public tenders awarded for district heating quotes a figure of over £340m in 2016 (Manders 2017).

Figure 31 Over the last 12 months, the market for ESC in your country has seen: (Percentage share of responses by providers and facilitators Sept 2017)



When asked to assess overall market growth, UK respondents expected that it matched their own fortunes in terms of order growth (Figure 29). This was also similar on a European level, again suggesting a relatively stagnant market.

Once again, it depends what scope of ESC the respondent has in mind. Public contracts awarded for district heating show ‘substantial growth’ over the period 2013-16 from £40m to £340m (Manders 2017).

5.3 ESC business models

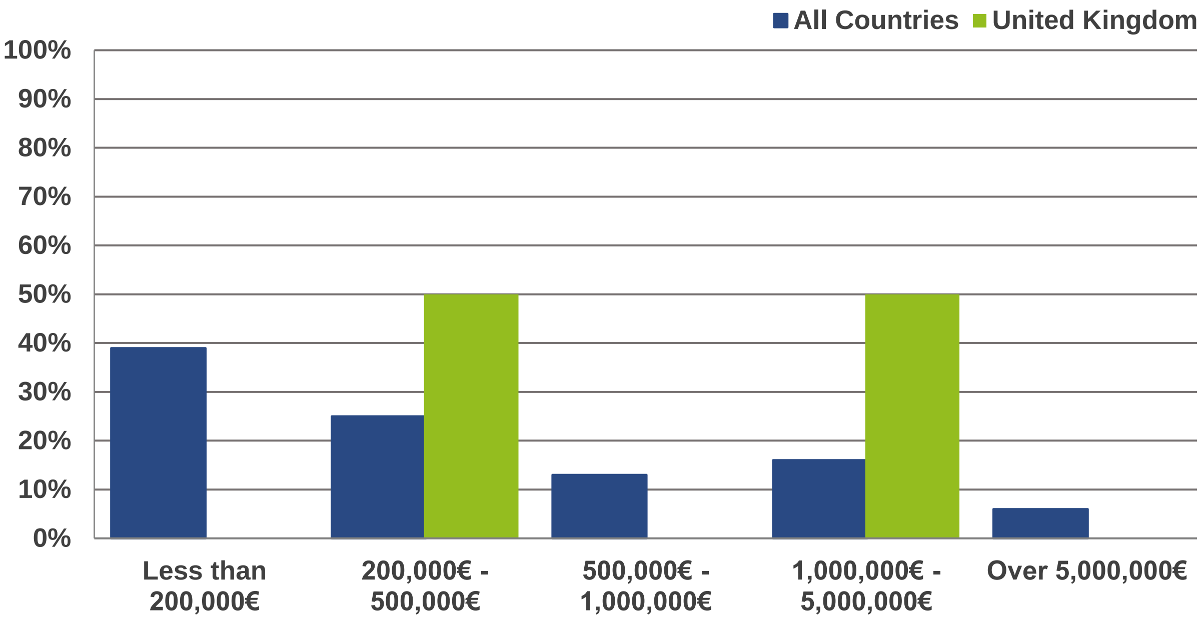
A common business model for energy supply contracting in the UK – particularly in respect of energy centre development – is **DBOOT (Design-Build-Own-Operate-Transfer).** To take a common example; when a public hospital is looking to complete a major energy efficient overhaul of their boiler house, a service provider will design, build and fund the scheme, and then operate the scheme over a long-term contract, buying raw energy inputs and providing operational personnel, until they have recouped the capital investment, at which point they may transfer the assets into the ownership of the hospital. The hospital will enter a long-term energy supply contract with the aim that the cost of useful energy output (typically heat or steam), maintenance and operational personnel will be lower than their previous arrangement ('baseline') or an agreed counterfactual. The hospital is usually committed to a minimum purchase of energy, and the service provider will have performance metrics around service availability and the quality of heat output. A similar model may apply to on-site Solar PV or CHP projects, and often the deal may include a guarantee that the energy supply rate (p/kWh) is a fixed percentage below the client's own utility tariff or 'market rates'. Depending on which energy supplies are included in the contract they may be referred to as energy services agreements, heat supply agreements or power purchase agreements (these are common but a wider range of names for these similar types of agreement are available on the market).

In the case of **offsite renewables and district heating** there may be more than one client to the scheme and the individual contracts between the scheme owner and the client usually fall into two brackets:

- **Corporate Power Purchase Agreements** – often used for solar PV and a p/kWh rate can be offered which is lower than the client's utility electricity rate. The client may be committed to a minimum consumption.
- **Heat Supply Agreements** – often used to refer to connections to district heating networks. The aim is for the unit rate (e.g. p/kWh) for the supply of heat to be lower than what the client would pay to fuel, operate and maintain their own heating systems. Depending on the significance of the client to the scheme economics (i.e. a large user) the client may be required to commit to a minimum consumption, and the service provider committed to a minimum quality of heat provided, and service availability.

Chauffage is another model referred to in the Government's information relating to available energy service contract types in the UK (DECC 2014a). This model comprises a service provider completely taking over the site's energy services facilities and utility bills, making efficiency improvements, and being paid a service fee an agreed amount less than previous energy, maintenance and operational costs. According to the definition in chapter 2.2.3 this may not qualify as ESC as the service is not paid based on MWh of energy consumed.

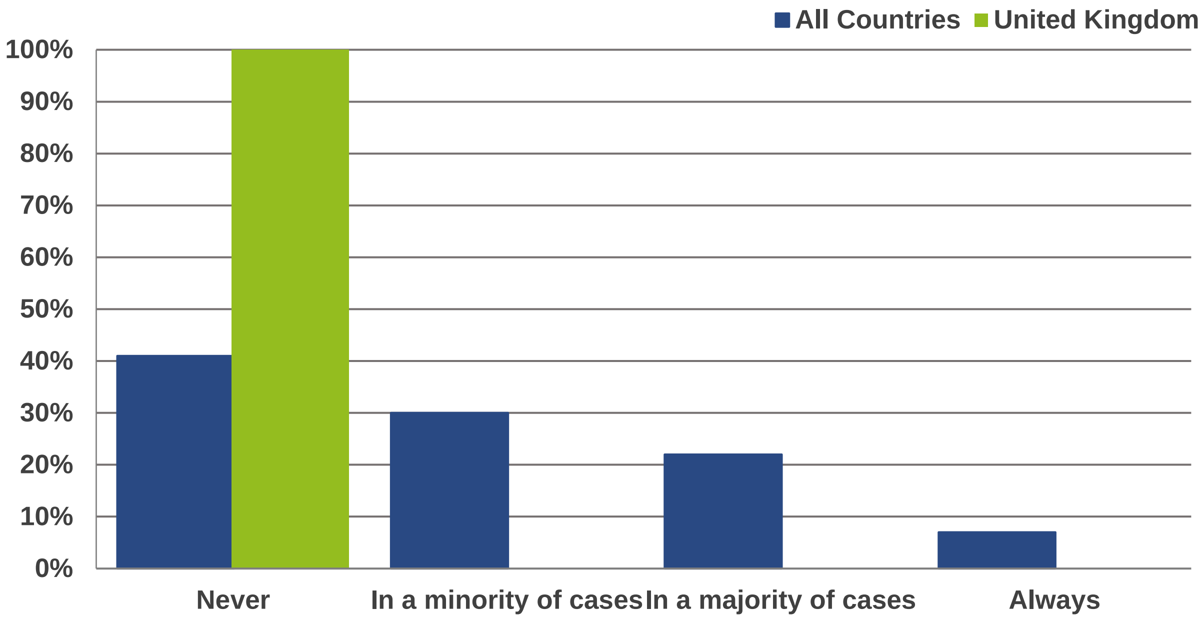
Figure 32 What is the most common overall value (investment outlay) of the ESC projects you are involved in? (Percentage share of responses by providers and facilitators Sept 2017)



The view across All Countries in the survey is that ESC projects tend to have a lower value than EPC projects, the majority of respondents selecting categories under 500,000 € for ESC, where the majority of responses for the same question asked in relation to EPC were in over 500,000 € categories (Figure 6).

For context the UK respondent that selected 200,000 – 500,000 Euros offers single technology single site ESC. The other respondent selecting 1-5m Euros is a facilitator with experience of district energy. Similarly, a financial institution interviewed that had completed 7 district heating projects selected the larger project size bracket 5m+ Euros, and a model case study for research into district heating by the Energy Technologies Institute had a capital value of £63million (ETI / AECOM 2017). Interviews with a client and a financial instruction relating to holistic energy centre projects selected 1-5m Euros and 5m Euros. This shows that the ESC market is segmented by different types of project and so concluding a typical project size is potentially misleading.

Figure 33 In the ESC projects you are involved in, were payments per unit of energy delivered in combination with payments per unit of energy saved (from installed energy efficiency measures)? (Percentage share of responses by providers and facilitators Sept 2017)

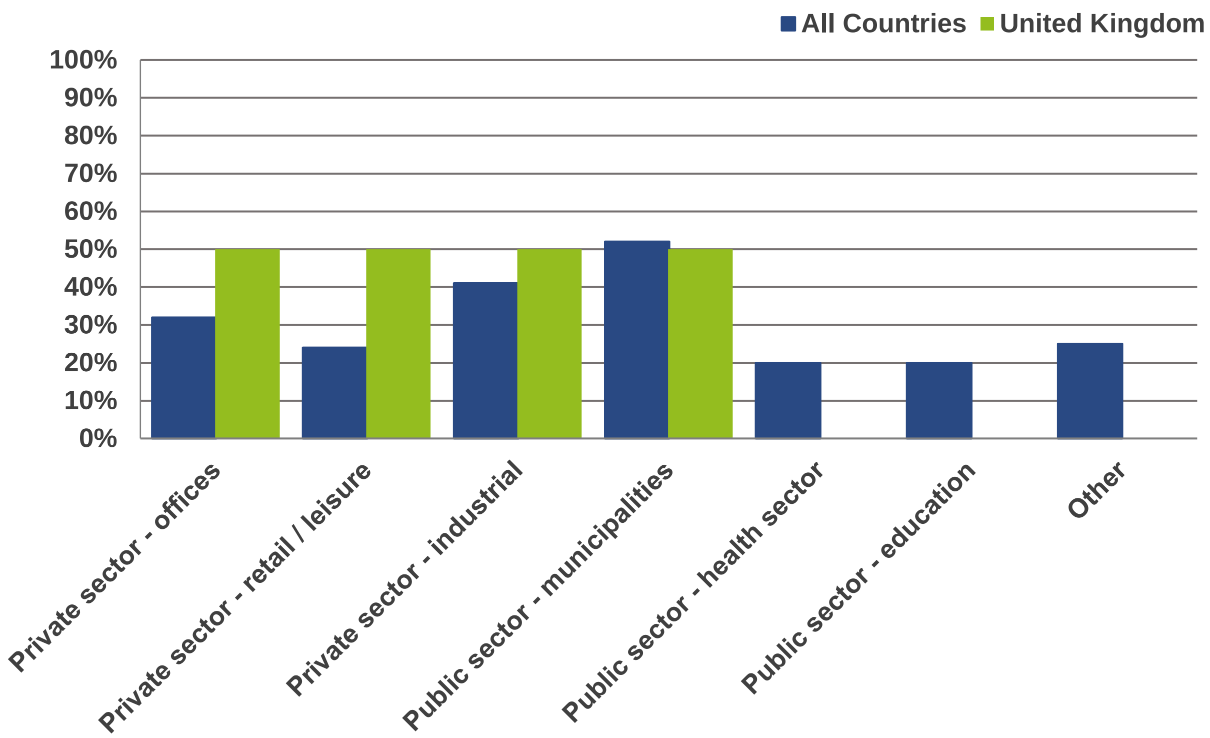


UK respondents clearly stated that is not typical for payments for energy delivered from generation equipment to be combined with payments per unit of energy saved from energy efficiency under the bracket of ESC. In the author's experience, this is likely to be the case as UK stakeholders would generally describe this model as EPC.

One financial institution interviewed did highlight that there is a future intention in one of their projects to increase the p/kWh rate of the supply contract to pay for energy efficiency measures.

5.4 ESC market sectors

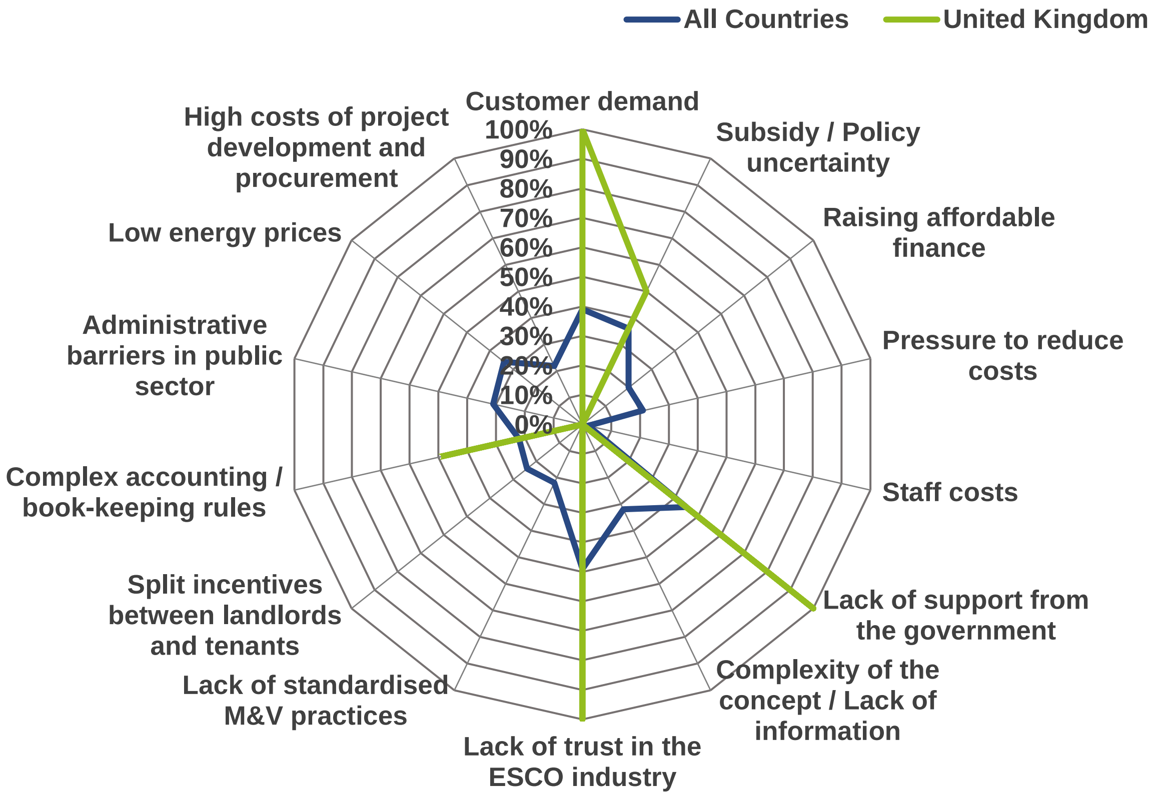
Figure 34 Which sectors do your ESC clients generally come from? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



In contrast to the market for EPC, the ESC market appears to have greater focus on the private sector both in the UK and across Europe, although municipalities are still a strong customer base in both cases.

5.5 ESC market barriers

Figure 35 What are the main barriers to the ESC business based on the activities of the last 12 months? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



The two respondents from the UK agreed on three barriers to ESC business; Customer demand, Lack of support from the government and Lack of trust in the ESCO industry. These were also selected across All Countries in the survey as the top three barriers.

5.5.1 Regulatory and administrative barriers

UK respondents clearly indicated regulation / lack of support from the Government and subsidy / policy uncertainty as key barriers to ESC business. There is fairly extensive regulation relating to energy supply contracting projects for instance:

- Planning regulations – have a large impact on heat networks, renewable energy installations and combined heat and power
- Metering and energy billing regulations – particularly relevant to heat networks with the Government's recently introduced Heat Network (Metering and Billing) Regulations 2014 (HM Government 2014b).

- **Energy networks regulations** – relating to any scheme that connects to the national electricity grid to allow safe interface and to facilitate effective management of grid balancing.
- **Renewable energy subsidies** – the feed in tariffs and renewable heat incentive that have a major impact on project economics
- **Carbon taxation** – such as the climate change levy applied per kWh of supplied electricity or fuel or the Carbon Reduction Commitment Energy Efficiency Scheme. Similarly to subsidies, carbon tax exemption schemes can benefit project economics.

In light of the above, a brief literature review has identified the following concerns relating to regulation and policy:

- Policy uncertainty relating to renewable energy subsidies and carbon taxation is a major concern to ESCs containing renewable energy technologies[22].
- Some carbon saving benefits of district heating networks are not recognised under the current regulatory and subsidy framework (Frontier Economics 2015).
- Concern that planning regulations do not sufficiently encourage heat networks (Frontier Economics 2015).
- Lack of regulation leading to inconsistent pricing of heat from district energy (DECC 2013)
- Lack of generally accepted contract mechanisms, although standard contracts are not seen to be a viable solution (DECC 2013)

The latter two may be contributing to the 'lack of trust in the ESCO industry' identified by the UK respondents in the survey. It is expected that this is likely to be focused in the area of heat networks and heat supply agreements; the Government signposts two private sector initiatives "Heat Trust" and the "CIBSE code of practice for heat networks", both of which were only introduced in 2015 by the ADE and are perhaps yet to have a marked effect. In contrast, Government led quality assurance is relatively well established for renewables and CHP; by the Microgeneration Certification Scheme and CHP Quality Assurance Scheme respectively.

5.5.2 Structural barriers

- As this research highlights there is a disparate range of activities that could be considered as Energy Supply Contracting and while the various activities have relatively strong unifying associations, the lack of definition around ESC and standardisation of contracting models is likely to be prohibitive.
- Customer demand was highlighted as a key barrier by UK survey respondents and may be a factor of the lack of consumer protection identified in the previous sub-chapter.
- Added to this, public sector customer hesitation may have resulted from current poor public opinion relating to Public Private Partnerships exemplified by DBOOT energy

[22] https://www.lexology.com/library/detail.aspx?g=ccac7e31-6cdc-41c5-a318-c2a35748c3e

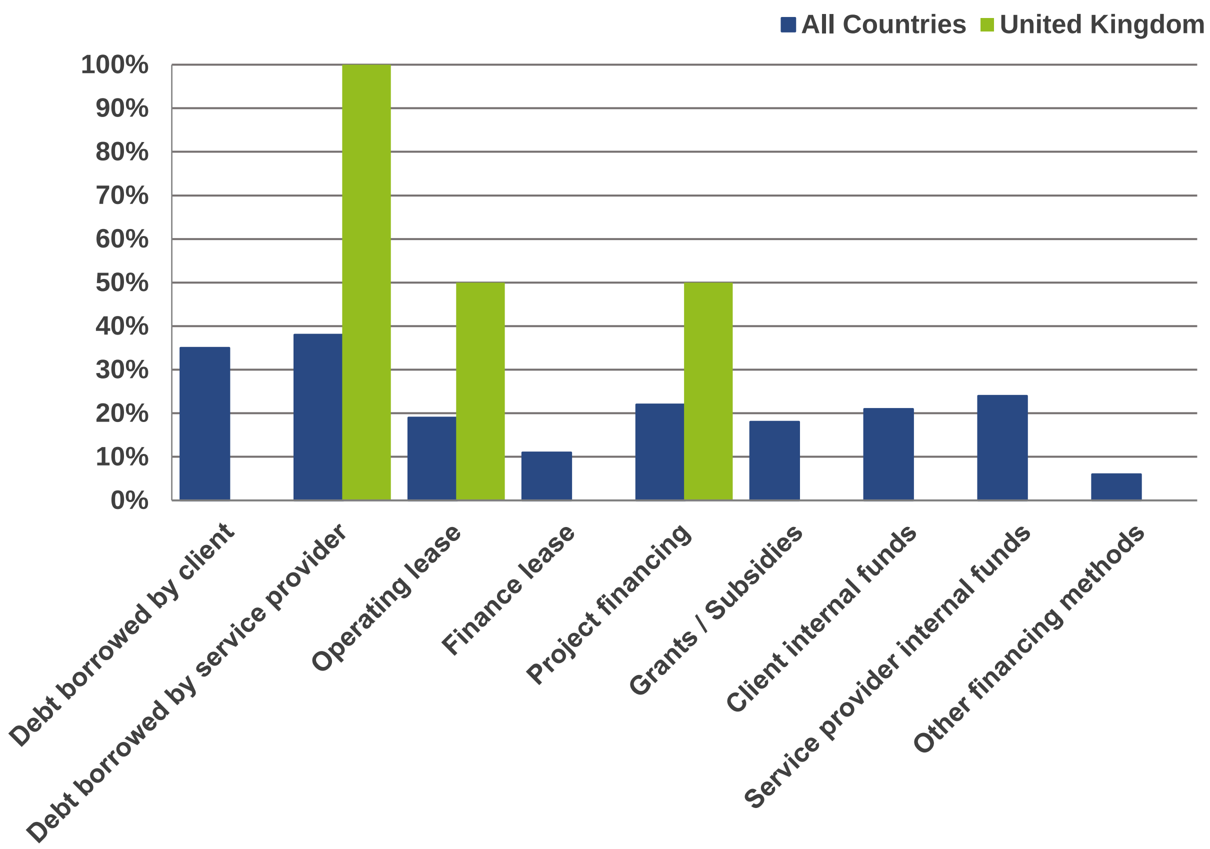
supply contracting models (particularly the NHS). Concerns have recently peaked with the collapse of major PPP contractor to the public sector – Carillion.

5.5.3 Financial barriers

- Whilst financing of energy supply contracts has not been registered as an issue in the survey the impact of IFRS 16 bringing operating leases on to the balance sheet of the client should be considered.

5.6 ESC financing

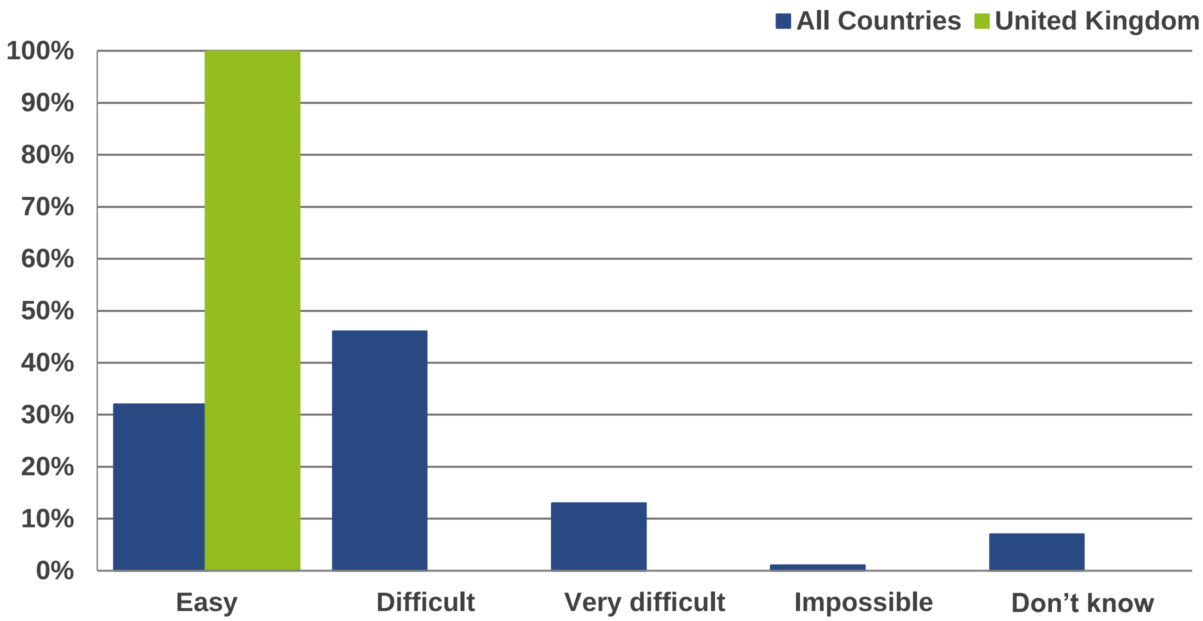
Figure 36 How are the ESC projects you are involved with financed? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



The survey results indicated that financing for ESC in the UK is firmly placed on the service provider or in a project financing model, in contrast to EPC where client funds or debt are a leading source of finance (Figure 23). This differs to the general picture across All Countries in the survey where a similar balance of funding options is experienced for both ESC and EPC. Conceptually, the idea of paying for a kWh of generated and measured energy under an ESC is well understood as operational expenditure (OPEX), and lends itself to project finance, leasing or service provider funding. In contrast, for energy efficiency measures procured through an EPC, the mindset in the UK still appears to revolve around paying for the equipment or service that causes the improvement in energy efficiency, which favours a capital expenditure (CAPEX) approach through client internal funds or client debt.

Financial institutions interviewed as part of the process highlighted use of project financing via special purpose vehicles and structuring of service providers' internal funds in the ESC projects they had worked on.

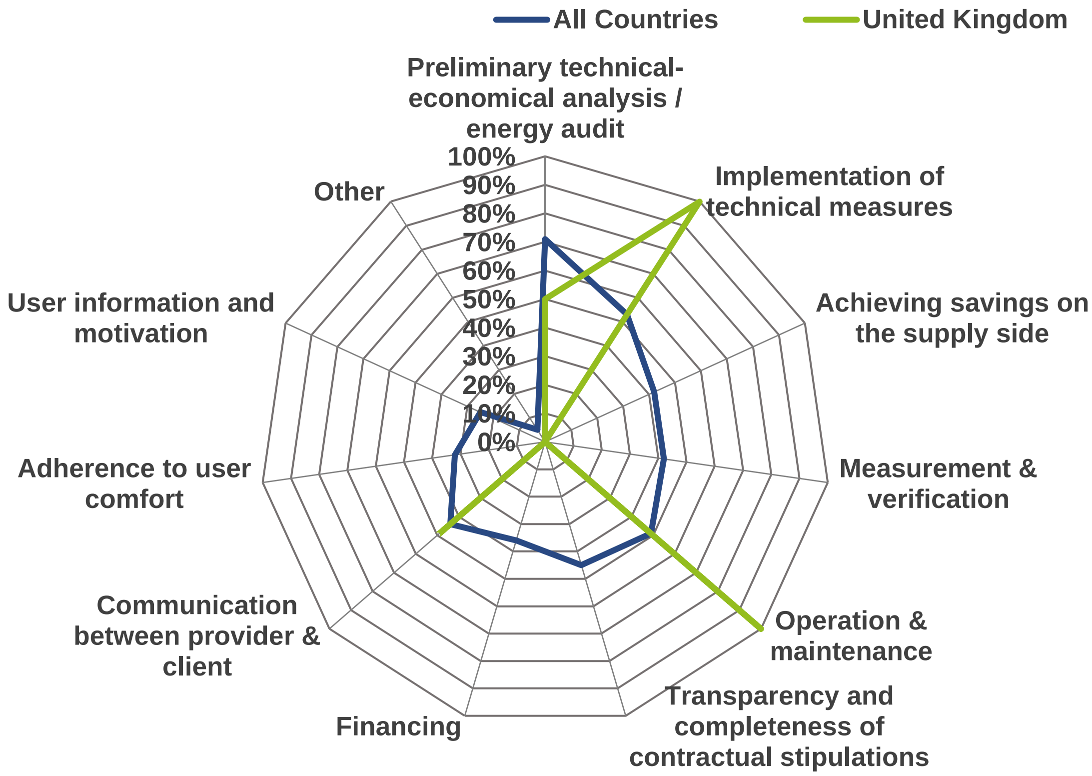
Figure 37 Overall, do you consider that obtaining viable finance for an ESC project is: (Percentage share of responses by providers and facilitators Sept 2017)



UK respondents report that obtaining viable finance for ESC projects is easy, where European counterparts are less confident. The generation of energy in an energy supply contract will largely revolve around a major asset such as a combined heat and power unit, boiler or solar PV installation. Asset financing is very well developed in the UK, which may explain the results observed.

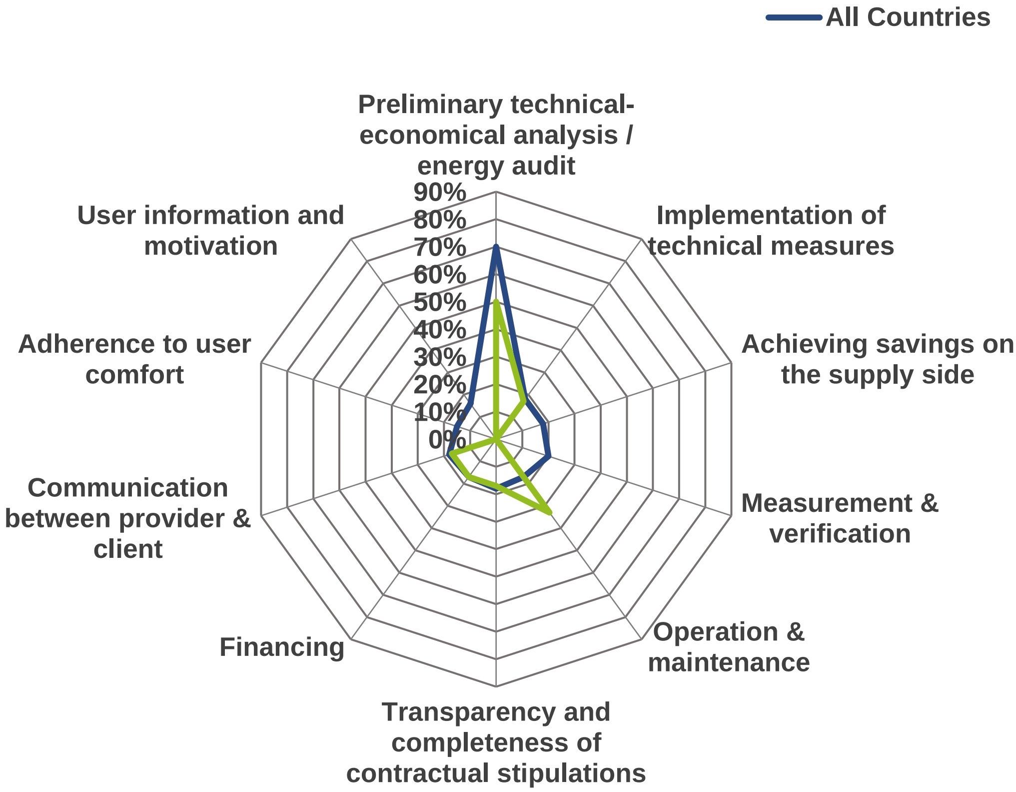
5.7 ESC quality determinants

Figure 38 In your opinion what are the most important determinants of quality in ESC projects? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



The UK respondents agreed that implementation and operation & maintenance were of critical importance to the quality of ESC projects, while respondents across All Countries put more weight on the preliminary technical-economical analysis / energy audit. Nonetheless, both groups agreed that these three aspects were the most important.

Figure 39 In which areas are quality improvement most needed in ESC project preparation and implementation? (Percentage share of responses by providers and facilitators Sept 2017)



Note: respondents were asked to rank each determinant using the following options 'not needed', 'needed', 'strongly needed' and 'don't know'. An indicator was created by assigning a weighting of 0%, 50% & 100% to 'not needed', 'needed' & 'strongly needed' respectively and dividing by the number of responses. Where 'don't know' was selected this was excluded from the calculation of the indicator.

In respect of where quality improvement is most needed the clear focus from respondents in the UK and across Europe was on the preliminary technical-economical analysis / energy audit. Of note from UK respondents was the higher emphasis put on operation & maintenance than their European counterparts.

UK respondents did not recognise four of the quality determinant options in terms of importance or necessity for improvement, which is expected to be for the following reasons:

- Achieving savings on the supply side – this will depend on how what model is used for the ESC. In cases where the service provider guarantees that the cost per kWh is a certain percentage below alternative energy supply options (usually grid values) then the client has limited risk of not achieving cost savings.
- Measurement & verification – the standards for kWh measurement of electricity, heat and steam are well defined by renewables and CHP incentive schemes. Whilst the £ price per MWh may be recalculated through the contract according to market rates or an estimate of the counterfactual costs for energy, operations and maintenance

this would not classically be referred to as measurement & verification, which is perhaps another reason why this was not recognised by UK respondents. However, in the view of the author, verification of these calculations is critical to the transparency and quality of an energy supply contract.

- Adherence to user comfort – the service provider is purely providing energy. The control of that energy input to generate desired environmental conditions is not their responsibility.
- User information and motivation – as the service provider usually has full control over the energy generation / conversion assets, and their operations and maintenance, the client has limited effect on their performance.

6 RECOMMENDATIONS TO SUPPORT MARKET DEVELOPMENT

This chapter considers the key drivers and success factors for energy efficiency services in the UK – drawing on the survey results and wider examples of practices that have assisted market development. Considering these along with what is required to overcome the barriers described earlier, we propose a set of recommendations for actions to drive further development of the UK energy efficiency services market.

The survey results, interviews and literature (Polzin et al 2016, Nolden, Sorrell 2016, Garnier 2013) are consistent in highlighting key drivers of EES to be:

- Energy savings guarantees – 77% of UK respondents highlighted this as a key driver for EPC, along with all four clients interviewed. This relates ability to transfer exposure to technical, performance and financial risks to those that have more capacity to evaluate and manage them. It is therefore critical that guarantees have value and deliver on this promise of risk transfer. 'Lack of trust in the ESCO industry', that was strongly identified as a key barrier in the survey, indicates uncertainty from clients as to whether they are truly receiving these benefits. It also indicates a scepticism that ESCOs are willing to take on these risks, and are therefore finding contractual means to reduce their exposure. One Client interviewed highlighted that 'they could not tell whether the EPC delivered the savings as the M&V was poorly specified'. Being sceptical; in a guaranteed savings situation – and particularly where the provider is paid the majority of the contract fee upfront – one might consider if a provider has any financial incentive to provide accurate M&V if it can only result in a financial penalty. Uncertainty may lead to the 'benefit of the doubt' leaning in their favour, particularly when it may be difficult or costly for the Client to prove otherwise. Polzin et al (2016) and the European Commission (2017) highlight a lack of specific skills for procurement, contract risk evaluation and management of long term outsourcing contracts. So, whilst the benefit of outsourcing technical expertise can be achieved by EES, clients must have 'muscular' procurement and contract governance skills to ensure they truly achieve the desired risk transfer.
- Pressure to reduce costs – 81% of UK respondents highlighted this as a key driver for EPC, along with all four clients interviewed. Whilst this can relate to a pressure to reduce energy costs, the opportunity to outsource personnel, operational and maintenance activities is perhaps more pertinent to energy efficiency services. Clients interviewed highlighted reduced internal personnel resource and time as a key driver – particularly the time to invest in finding and analysing new energy saving opportunities. This corroborates the results of the survey, which highlighted that the energy audit and technical / economic analysis is a key determinant of value and quality for EES.
- Limited budgets in public sector – 58% of UK respondents highlighted this as a key driver for EPC, along with one of the clients interviewed. Energy efficiency measures can be highly capital intensive and so the opportunity to bring in external finance is attractive when budgets are constrained. Also, the ability to generate a return on

investment from energy efficiency can help organisations to clear 'backlog maintenance' issues that would otherwise be seen as pure maintenance costs. However significant this is as a driver it appears that UK clients are not all that successful in embracing the opportunity for using external finance linked to the project or service provider, with the majority of projects using client internal funds or debt.

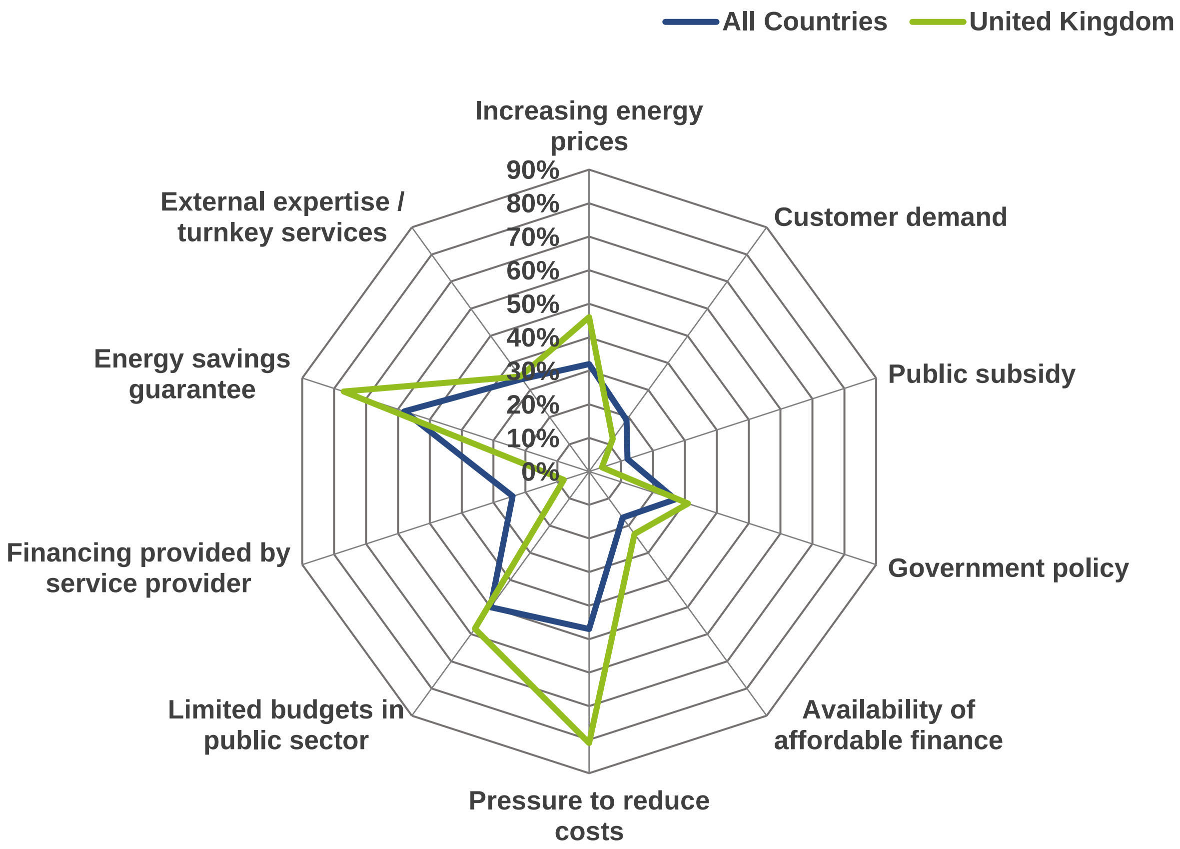
- Increasing energy prices – this was particularly highlighted for supply contracting and is expected to relate to the protection that supply contracts and power purchase agreements can provide from energy price volatility.
- External expertise / turnkey services - 35% of UK respondents highlighted this as a key driver for EPC, along with one of the clients interviewed. For ESC; although it was not selected by UK respondents at all this was ranked second in importance across All Countries in the survey. Certainly, with the complexity of technical and economic analysis for complex systems such as heat networks, combined heat and power and renewables, this would be expected to be a key driver.

As discussed extensively in this document and in literature (Nolden, Sorrell 2016 and European Commission 2017) the role of project development assistance and aggregation via the public procurement frameworks has been instrumental to considerable growth of public sector energy performance contracting. The standardised process and subsidised expert support through intermediary organisations (often known as 'project development units') significantly reduce the transaction costs associated with establishing and energy service contract, which is seen as a major barrier (ranked third in significance in the survey). Interestingly, Polzin et al 2016 find that it is the 'standard contracts' offered by established intermediaries that are the most significant driver to uptake of EPC. Garnier (2013) highlights, however, that growth in the EPC market is linked to a certain amount of flexibility, and therefore creating a single standard contract for the whole market should not be considered as a 'silver bullet' to driving uptake.

Public procurement frameworks also combat the customer demand and lack of information barriers; with targets for project development and investment they have dedicated resource for business development and marketing of EPC, with the added advantage of appearing impartial and 'on the same side' as the clients they are targeting as they are generally embedded or closely linked to public sector organisations.

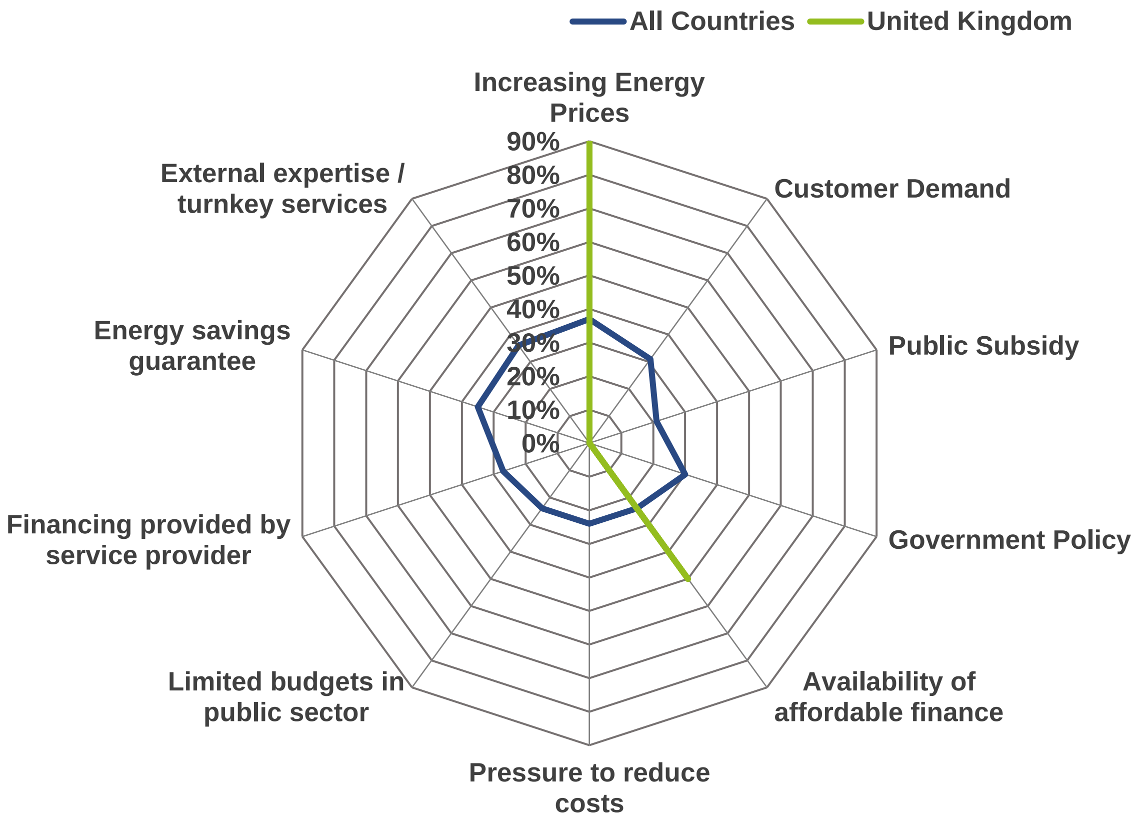
The following pages provide charts and analysis relating to the survey results highlighted above.

Figure 40 What are the main drivers of the EPC business based on the activities of the last 12 months? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



Similarly, to the view across All Countries in the survey, UK respondents identified the Energy savings guarantee, Pressure to reduce costs and Limited budgets in public sector as drivers for EPC business. It could be argued that only the Energy savings guarantee is specific to EPC, whilst pressure to reduce costs could apply to other approaches for the implementation of energy efficiency improvements, and limited budgets in the public sector could apply to other financing mechanisms for energy efficiency. The UK emphasis on the pressure to reduce costs is perhaps understandable considering the recent tightening of public budgets and the increased financial strain on businesses that rely on imported products and services as the pound has weakened following the Brexit vote.

Figure 41 What are the main drivers of the ESC business based on the activities of the last 12 months? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



Respondents across All Countries in the survey put similar weight on the various options relating to drivers of ESC business and the UK respondents agreed that increasing energy prices were a significant driver. Particularly in terms of electricity costs, energy supply contracts can benefit from incentives that allow them to avoid or offset the non-commodity charges relating to energy and environmental policies that are driving the increase in energy costs in the UK.

Table 6 below summarises the market barriers identified in chapters 4.6 & 5.5.

Table 6: Overview of key EES market barriers

	Market barrier	EES affected
1	Lack of customer demand	EPC, ESC
2	Lack of trust in the ESCO Industry	ESC, ESC
3	Complexity of the concept / contracts and lack of information	EPC
4	High transaction costs	EPC
5	Raising affordable finance	EPC
6	Lack of support from the Government	ESC
7	Lack of skills and tools to negotiate and manage contracts	EPC, ESC

Table 7: Overview of actions to overcome market barriers

	Response to barriers	Actions	Who should act	Target groups	Description
1	1	Set a long-term, coherent governmental policy programme	Central Government	EES customers	This is essential for the sector as a whole. The impetus must come from the government.
2	1,2	Continued Government leadership and development of the use of EES for public buildings	Central Government Local Authorities Public Organisations	Central Government Local Authorities Public Organisations EES Customers	By its visibility, government can lead on the EES front, developing the market and standardisation by sharing lessons learnt and tools that clients can use to effectively manage contracts.
3	1,2,3,4,5,6,7	Replicate the benefits of Public Procurement Frameworks (PPFs) and trusted intermediaries for EES for the private sector.	Central Government Associations EES Facilitators	EES customers EES providers	The PPFs have been successful in promoting the EPC model in the public sector. Similar subsidised project development assistance could reduce barriers to uptake of EES in the private sector.
4	2,3,5,7	Implement a Quality Assurance Scheme for EES building on the European Code of Conduct for EPC	Public Bodies Associations Certification Bodies	EES customers EES providers Standardisation Bodies Certification Bodies	Standardise best practice for EES, reduce complexity for customers and financial institutions thereby reducing transaction costs and time. Ensure quality and increase trust in the ESCO industry.
5	3,4,5,7	Training for clients and financial institutions	Associations EES Facilitators	EES customers Financial Institutions	Ensure clients and financial institutions are well prepared to negotiate and manage EES contracts to achieve success.
6	3	Organisation of a high number of workshops and seminars on EES	Central Government Associations	EES Providers EES Facilitators EES Consumers	Information and networking is a key to reach decision makers and potential clients, and for the industry to share best practices and form consortia of skills required to deliver high quality projects (technical, legal, finance, procurement etc.).

	Response to barriers	Actions	Who should act	Target groups	Description
7	1,2,3	Promotion of best practices in EES	Central Government Associations EES Providers EES Facilitators	EES Consumers	Effective method for increasing consumer confidence and know how.
8	2,3	Consolidation of Trade Association activities related to EES	Trade Associations	EES Providers EES Facilitators EES Consumers Policymakers	Centralisation of the activities of trade associations to agree best practices, provide a 'one stop shop' for consumer information and to effectively lobby Government.
9	2,3	Promote the use of sound and rigorous M&V techniques	Central Government ESCO Associations	EES providers EES customers EES facilitators	Rigorous use of M&V is crucial for credibility of the EPC model
10	1,5	Provide clarity over financing for EES and cases in which off balance sheet treatment can be achieved.	Financial Institutions Central Government	EES Providers EES Facilitators EES Consumers	

The following sets out the rationale and detail for the recommendations summarised in Table 7.

6.1.1 Government policy, regulation and standardisation

Action 1. Set a long-term, coherent governmental policy programme

According to the results of the Survey a key concern for both EPC and ESC is "customer demand". The Government's *Clean Growth Strategy* has been welcomed for its renewed focus on energy efficiency, however there is a critical need to firm up policies (CCC 2018). Therefore, the first recommendation is for Government to set a long-term, coherent policy programme to promote uptake of energy efficiency in general, and specifically for energy efficiency services.

a. **To promote uptake of energy efficiency in general**

   Formalise targets for energy efficiency; the 30% public sector carbon reduction target by 2020/21 and the 20% energy efficiency target for business and industry set out in the *Clean Growth Strategy* should be formalised to send a clear signal to organisations.

   Improve the scope and effectiveness of ESOS; the Energy Savings Opportunity Scheme (ESOS) represents the UK implementation of Article 8 of the EU Energy Efficiency Directive (EED). This mandates large private sector undertakings to perform comprehensive Energy Audits and identify opportunities for energy saving every four years. A framework for qualified 'Lead Energy Assessors' capable to 'sign off' compliance submissions has been established to ensure quality. ISO50001 is a route to compliance and submissions to the scheme are fairly light in terms of data although an 'evidence pack' must be held in case of audit. There is no requirement for organisations to implement recommendations and is largely perceived as compliance activity first and foremost rather than as an energy saving opportunity (BEIS 2017e). Enforcement of compliance is currently seen as poor. This leads to the following recommendations (adapted from Policy Exchange 2017):

   - Correct the missed opportunity to use ESOS to centrally collect vital performance information to quantify the financial, environmental and energy benefits of energy efficiency actions. Sharing open data will improve consumer confidence similar to the positive influence of initiatives such as the De-risking energy efficiency (DEEP) platform (European Commission 2017).
   - Tighten up enforcement and penalties
   - Consider extending the scope of the scheme to the public sector and organisations that fall under the compliance threshold
   - Mandate organisations to implement energy saving opportunities with a payback of less than 5 years as exemplified in the Netherlands (Van Willingen 2015)

   Raise the reputational importance of energy efficiency; energy bills often represent a small portion of overall operational cost (Nolden, Sorrell 2016). To encourage focus on energy efficiency the Government's action in relation to Streamlined Energy and Carbon Reporting (Clean Growth Strategy BEIS 2017b) should mandate energy and energy efficiency reporting on statutory company reports to increase reputational drivers for acting on energy efficiency opportunities.

Maintain incentives for renewables and develop fiscal incentives for energy efficiency; as reported earlier, feed-in-tariffs and renewable heat incentive have been significant drivers in the uptake of renewable technologies. These should be maintained and similar incentives for energy efficiency developed as indicated strongly by energy efficiency stakeholders (EEVS/Bloomberg New Energy Finance 2018). Policies such as the Electricity Demand Reduction pilot (DECC 2014b) – which aims to provide subsidy to vital energy efficiency projects that can reduce peak electricity demand - should be revisited.

Set a long term trajectory for MEES and improve Energy Performance Certificates to better;

Whilst split incentives and short tenancies mean it is unlikely that energy efficiency services in their current format will be a key tool in the private rented sector the Government's Minimum Energy Efficiency Standard (MEES) – which makes it illegal to rent a building with an Energy Performance Certificate of less than E - provide a good tool to incentivise landlords to improve the building stock in principle. To strengthen this policy, the following actions are recommended;

- Set a clear trajectory for the minimum standard to be ratcheted up to avoid landlords doing the minimum to achieve a rating of E.
- Extend the policy to cover sale of buildings
- Improve the Energy Performance Certificate to reflect real world building performance (EEVS/Bloomberg New Energy Finance 2018). Plenty of sources highlight the 'performance gap' between modelled performance on Energy Performance Certificates and actual performance (Imam et al 2017), and this issue should be addressed to improve credibility and better recognise effective energy performance improvement actions. By achieving better accuracy for Energy Performance Certificates and also refocussing on Display Energy Certificates for public buildings – which are based on actual energy consumption rather than modelling – a further data source on building performance to incentivise action and build consumer confidence can be achieved.
- Improve enforcement and reduce exemptions (EEVS/Bloomberg New Energy Finance 2018)
- Link business rates to Energy Performance Certificate ratings to drive demand for higher efficiency buildings

Further to this, the Government should reconsider pay-as-you-save models to tackle the split incentive issue. The Green Deal's aim to link energy efficiency to the energy bill was good in principle but was bogged down in complexity. Schemes such as PACE in the US have achieved success through perseverance, and this could go a long way to enhancing the uptake of energy efficiency in the SME sector.

b. **To promote uptake of energy efficiency services**

   In its *Clean Growth Strategy,* the Government has committed to "work with stakeholders to improve the market for energy services, building confidence across commercial and industrial customers". This must be quickly fleshed out into specific policies. The following (Actions 2-10) offers a view to potential actions the Government could participate in to promote the uptake of energy efficiency services.

Action 2. Continued Government leadership and development of the use of EES for public buildings

The *Clean Growth Strategy* proposed a 30% by 2020/21 carbon reduction target for the public sector is welcomed and the trajectory should be extended to demonstrate leadership against the binding targets in the Climate Change Act.

As highlighted in this research the Government and the public sector has driven the uptake of EES, particularly for EPC through successful public procurement frameworks and associated facilitation / promotion programmes such as RE:FIT, CEF, NDEEF and Essentia.

It is therefore recommended that the Government and public sector continue to **support and promote**, and where necessary to reach a wider set of public sector buildings, **replicate**, the **public procurement frameworks for EPC**. These frameworks proactively increase visibility of EPC, reduce administrative barriers and transaction costs, and provide a strong base of business for the market to develop. As aggregators working on multiple projects, the framework owners and facilitation bodies are in a unique position to learn lessons, share best practices and facilitate access to finance, as well as driving standardisation and quality improvement in EES providers.

Action 3. Replicate the benefits of Public Procurement Frameworks and trusted intermediaries for EES

Further to Action 2 it is recommended that the Government considers which aspects of the public procurement frameworks it could offer beyond the public sector. This research has identified that subsidised project development assistance can reduce transaction costs (seen as a major barrier in the survey) and reduce administrative barriers. Policy Exchange (2017) highlight the success of the Heat Networks Delivery Unit (HNDU) and recommends the creation of a similar Energy Efficiency Delivery Unit (EEDU) that can offer "expertise, certification and development finance to both public and private institutions where the qualifying criteria are achieved."

Action 4. Implement a Quality Assurance Scheme for EES

The survey has shown that "lack of trust in the ESCO industry" is a key barrier to business for both EPC and ESC in the UK, and in the case of EPC concern has grown steadily over surveys in 2013, 15 & 17 to become the barrier considered by most respondents as significant.

The European Code of Conduct for Energy Performance Contracting was established by the *Transparense* project in 2014. Signed by 17 UK organisations, the code defines the basic values and principles that are considered fundamental for EPC projects and represents an important first step to increasing transparency and trust for these services.

However, the code does not provide the assessment criteria or verification procedures that are required to enforce the quality of EPC. It was also highlighted in the UK – as a developed market for EPC – that the Code lacked sufficient detail and efforts were initiated to establish a more comprehensive Code of Practice for EPC in the UK (as discussed in chapter 7.1.3).

It is therefore recommended that these efforts are reinvigorated and a national quality assurance scheme for EES implemented. Figure 44 & Figure 45 offer compelling evidence from the survey that a quality assurance scheme would lead to increased trust, which would surely lead to increased customer demand, finance affordability and reduce transaction time. It is recognised however (Figure 46 & Figure 50), that a balance needs to be struck between sufficient detail and minimal cost, as there are concerns that additional cost will be detrimental to the investment case. The survey also strongly identifies that the Government / public institutions should play some part in the quality assurance scheme to ensure credibility (Figure 48).

Quality assurance and certification of energy efficiency services is discussed further in chapter 7 of this document.

6.1.2 Information dissemination, education and networking

The survey results also indicated that "lack of information" and "complexity of the concept" were still key barriers, which indicates that further information dissemination and education activities are needed.

Action 5. Training for clients and financial institutions

Where previous focus has been on training current or prospective EPC providers (Garnier 2013) it is recommended that more focus is put on upskilling current and prospective clients of EES, as well as financial institutions that are offering funding to EES. Raising awareness and expertise in these areas will improve consumer and investor confidence relating to EES thereby tackling several barriers; lack of information and trust, finance affordability and high transaction costs.

As research has recognised (Polzin et al 2016); focused technical training on how to develop innovative energy efficiency solutions is not what is required here, as this is a key benefit of energy efficiency services that clients are looking to the service provider for. In fact, increased internal technical knowledge in client organisations has been found to reduce the propensity to use EES.

Instead, clients and financial institutions need to be educated in terms of the following;

- Key enabling factors for EES (such as robust baseline data and metering)
- Procurement
- Contract negotiation and management
- Recognising the key quality aspects of good energy efficiency services

It is recognised that clients and financial institutions will not always have internal capacity to develop all of the skills, and may require expert insight to balance negotiations with providers. Therefore, it is also recommended that the market for independent and expert facilitation services is developed.

Action 6. Organisation of a high number of workshops and seminars on EES

To date there has been strong activity in terms of workshops, presentations and seminars to raise awareness of EES from providers, facilitators, the public procurement frameworks, trade associations and European research projects such as *Transparense* and the *Investor Confidence Project*. It is recommended that this activity is sustained and offers a comprehensive view from all corners and skills in the industry; EES providers and facilitators, financial institutions, legal experts and Governmental representatives.

Action 7. Promotion of best practices in EES

The UK Government has implemented its responsibilities under Article 18 of the EED in respect of publishing a review of the energy services market, model EPC contract, best practice guidelines and a register of energy services providers (more detail in chapter 3.2).

Much of the guidance was published in 2014/15 and has only had 'light touch' updates since. For instance, in terms of EES, the list of energy services providers only refers to the RE:FIT framework. This only highlights 16 EPC providers, which is less than half those identified in this research (chapter 4.1.1).

It is therefore recommended that the guidance is updated and expanded to include practical case studies and signposting to initiatives such as the European Code of Conduct for EPC.

Best practice guidance is recommended to contain the following:
- list the most common types of contracts along with example for each type;
- give advice on the role of each stakeholder;
- provide financing advice / solutions along with practical examples;
- recommend the use of independent facilitators;
- give a step-by-step account of a best practice EPC;
- list the typical pitfalls to avoid in order to run a successful EPC project.

Action 8. Consolidation of Trade Association activities related to EES

As this research has identified there are several areas of industry - coming from various different angles and represented by several different trade associations – that offer their business in the form of energy efficiency services. It is recommended that the industry centralises its trade association activities for EES such as networking, information dissemination, best practice development (i.e. codes of practice) and lobbying. As the associations are relatively well established in their various areas this could be done by a cross association working group for instance. Energy efficiency services require skills from several different professions - energy and environment, procurement, legal, engineering, financial and commercial – to achieve success. We therefore suggest that regular networking and cross fertilisation of these actors is critical to the industry. The ESTA Energy Performance Contracting group has had some success in bringing these actors together by arranging three well attended industry forums, and it is recommended that this type of activity should be expanded.

Action 9. Promote the use of sound and rigorous M&V techniques

The Survey highlighted that a 'lack of standardisation of M&V practices' is not seen as an issue by the industry, which is expected, considering that the International Performance Measurement & Verification Protocol (IPMVP) has good levels of awareness. However, interviews with clients identified that poor specification and execution of M&V on projects has led to uncertainty of outcomes, poor customer satisfaction and in the worst-case; disputes. Part of the issue relates to an imbalance of expertise between the provider and client, where the client is not confident to critique M&V activities performed by the provider, or does not have sufficient awareness or a reference 'norm' to know whether the provider's M&V proposals are adequate.

The public procurement frameworks have recognised this issue and have started to offer detailed specifications and contractual requirements as to what is expected from M&V rather than just signposting the IPMVP. Similarly in the US, which is often considered a leading market for energy services, detailed guidelines have been developed for energy performance contracting programmes (e.g. Department of Energy FEMP M&V Guidelines – DoE 2016). Despite the availability of detailed guidance, the diverse nature of EES means there is still a fair amount of flexibility and decision making to be made by the professional carrying out M&V activities on a specific project. To drive improvement, it is recommended that M&V activities are truly 'verified' by a suitably qualified party to ensure guidelines have been properly followed and any decision making - within the flexibility - made fairly to all parties to an EES Contract. For instance, where M&V plans are proposed by the EES provider, the client should have suitable qualification to 'verify' the plans, or should seek independent and specialist support (as outlined in best practice guidance DECC 2015a).

6.1.3 Financial instruments

Action 10. Provide clarity over financing for EES and cases in which off balance sheet treatment can be achieved.

This research, amongst others (Policy Exchange 2017, EEVS/Bloomberg New Energy Finance 2018), highlight that UK EES clients are not fully embracing the benefits of pay-as-you-save models that are project financed or financed by service providers. As noted for Scottish public hospitals, this off-balance sheet financing could be key to unlocking a stalemate in energy efficiency investment. Policy Exchange (2017) also highlight that off-balance sheet finance has the potential to release the long tail of energy efficiency opportunities and 'deep retrofits' that are beyond the 3 year payback threshold required of internal capital and client borrowing.

Uncertainty around complex accounting rules and the upcoming impact of IFRS16 – which aims to bring all operating leases onto the balance sheet from 2019 – are held culprit for organisations not realising the benefits of off-balance sheet funding. Therefore, it is recommended that the Government convenes roundtables and workshops to fully understand the issues and uses outcomes to provide clarity through guidance documents and potentially advisory services linked to Actions 2 and 3.

7 CERTIFICATION OF ENERGY EFFICIENCY SERVICES

7.1.1 General framework for certification of products and services

The UK framework for standardisation and certification comprises the following actors:

- **The British Standards Institute (BSI)** – which acts as the UK National Standards Body. It has a Government assigned role and funding from BEIS to set British Standards and represent the UK with international and European standards bodies; ISO, IEC, CEN/CENELEC and ETSI[23].
- **The UK Accreditation Service (UKAS)** – which acts as the sole National Accreditation Body. It has a Government assigned role and funding from BEIS to accredit the competence and integrity of Certification Bodies operating in the UK. In relation to this research UKAS accredits certification bodies to ISO/IEC 17065 in respect of bodies certifying products, processes and services and ISO/IEC 17021-1 for bodies providing audit and certification of management systems.
- **Certification Bodies –** organisations accredited by UKAS that offer auditing and certification of objects to standards such as ISO 50001 (Energy Management Systems). A list of UK certification bodies for ISO 50001 is available on the UKAS website[24]
- **Certified Objects –** organisations, systems, products, processes and services which are the subject of certification.

While this is the standard framework for British, European and International standards, there are several other certification frameworks led by Government, Trade Associations, Private Companies and Not-for-profit organisations, which use their own standards.

Central to all certification frameworks is a common (written) standard and the principle that the organisation auditing the object should be completely independent from it and impartial. In most cases the auditing / certification body, or individual will be accredited.

7.1.2 Certification of products and services in the energy sector

The following give examples of certification of products, services and management systems in the energy sector

- **ISO 50001 (energy management systems) –** international standard for energy management systems that promotes energy efficiency within organisations. Certification Bodies are accredited by UKAS.
- **CHPQA –** the Combined Heat and Power Quality Assurance Scheme. Led by the Government (Department for Business, Energy and Industrial Strategy), which has

[23] https://www.bsigroup.com/en-GB/about-bsi/uk-national-standards-body/UK-National-Standards-Body/
[24] https://www.ukas.com/list-all-organisations-category/?org_type&org_cat=267&cpage=1

developed the Good Quality CHP standard and a certification system. The scheme, which is managed by a private company appointed by BEIS, assesses the quality of CHP installations in terms of efficiency and metering quality. BEIS and the private company act as the sole certification body. Certification offers access to fiscal benefits such as exemption in the climate change levy.

- Microgeneration Certification Scheme – Government initiated scheme to regulate the quality of renewable energy products and installers, and facilitate access to renewable subsidies; the feed in tariff and renewable heat incentive. Standards are drawn up by market stakeholders and certification bodies are accredited by UKAS.
- ASPCoP - Automated Meter Reading Service Providers Code of Practice for Gas Meters. Voluntary labelling scheme established by the Energy Services and Technology Association (ESTA). Members of ASPCoP set the Code of Practice (i.e. standard). Random audits are carried out.

7.1.3 Certification of energy efficiency services

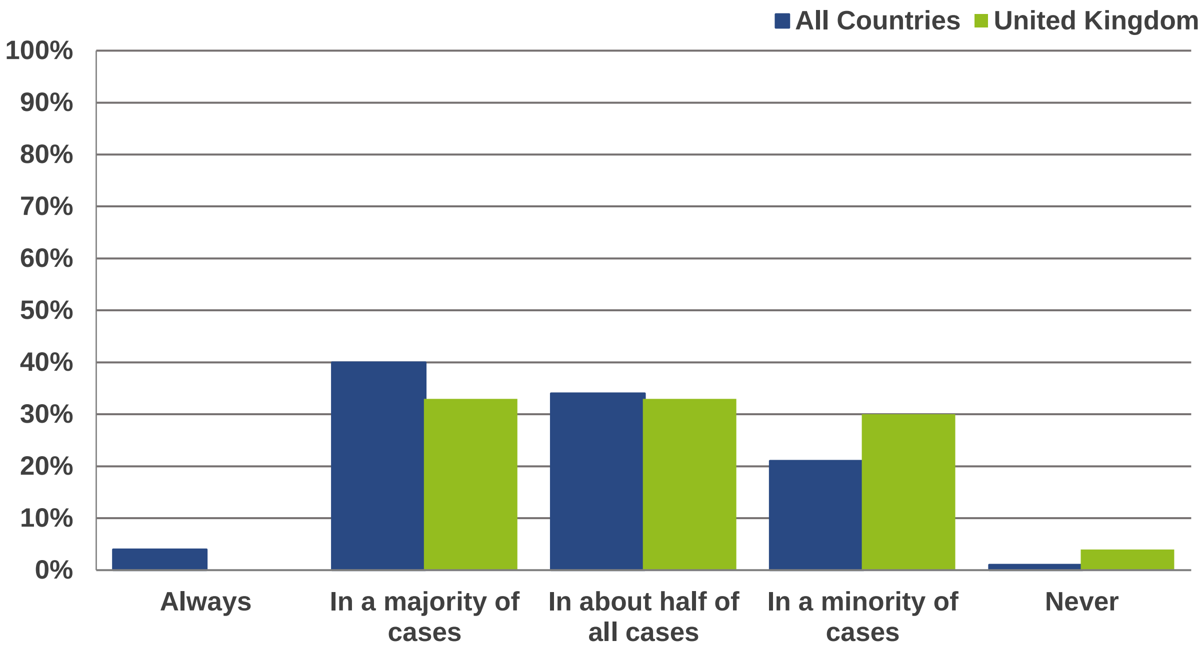
The following highlights initiatives relating to the certification of energy efficiency services in the UK.

- Heat Trust – a voluntary scheme aimed at protection of consumers using heat supply agreements from heat networks. Set up by the Association for Decentralised Energy in 2015 it is a voluntary scheme with its own rules (i.e. standard) overseen by the independent and impartial Heat Trust Committee. Registered participants (operating companies) and sites (the heat networks) must apply and meet minimum standards, and then can use the Heat Trust Trademark. Independent audits are conducted by external auditors to ensure compliance.
- EPC Code of Practice for the UK (draft) – a detailed draft code of practice for Energy Performance Contracting led by the Energy Managers Association and a strategy board including major EPC providers and facilitators. Last draft seen in March 2014 prior to market testing and no certification framework was established. The EMA has since become UK administrator of the European Code of Conduct for EPC.
- Investor Ready Energy Efficiency (Investor Confidence Project Europe) – originally established by the Environmental Defense Fund in the US, the Investor Confidence Project (ICP) provides standardised protocols for the documentation of building and single technology energy efficiency projects (with further protocols for industry, district heating and street lighting in development) based on a coordination of existing standards. The scheme ‘credentials’ (i.e. accredits) project developers and quality assurance providers through an internally managed application and training programme. Energy efficiency projects can apply for Investor Ready Energy Efficiency Certification where project documentation must be developed by a credentialed project developer and positively reviewed by a credentialed quality assurance provider. The scheme aims at encouraging financial institutions to invest in energy efficiency at more favourable rates, but is also used to build client confidence. ICP Europe has been subject to two Horizon 2020 grants and several pilot projects have

been IREE certified in the UK including a Carbon and Energy Fund project at Aintree University Hospitals.

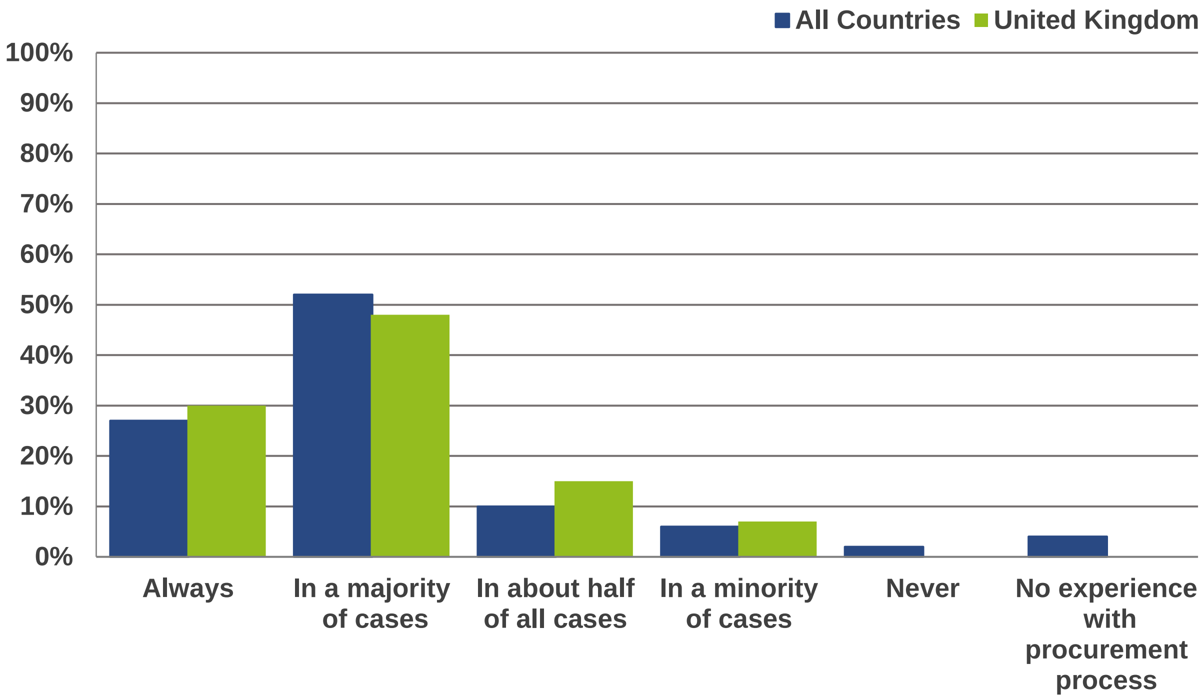
The following pages highlight responses to the QualitEE survey relating to the development of a quality assurance scheme for energy efficiency services.

Figure 42 In your experience, is there a lack of trust in EPC/ESC service providers? (Percentage share of responses by providers and facilitators Sept 2017)



Responses indicate that there is marginally greater trust in EPC/ESC service providers in the UK than across All Countries in the survey. Still, 33% of UK respondents identified a lack of trust in a majority of cases which highlights that the issue is far from resolved.

Figure 43 From your experiences, do well defined procurement specifications increase the quality level of EPC/ESC services? (Percentage share of responses by providers and facilitators Sept 2017)

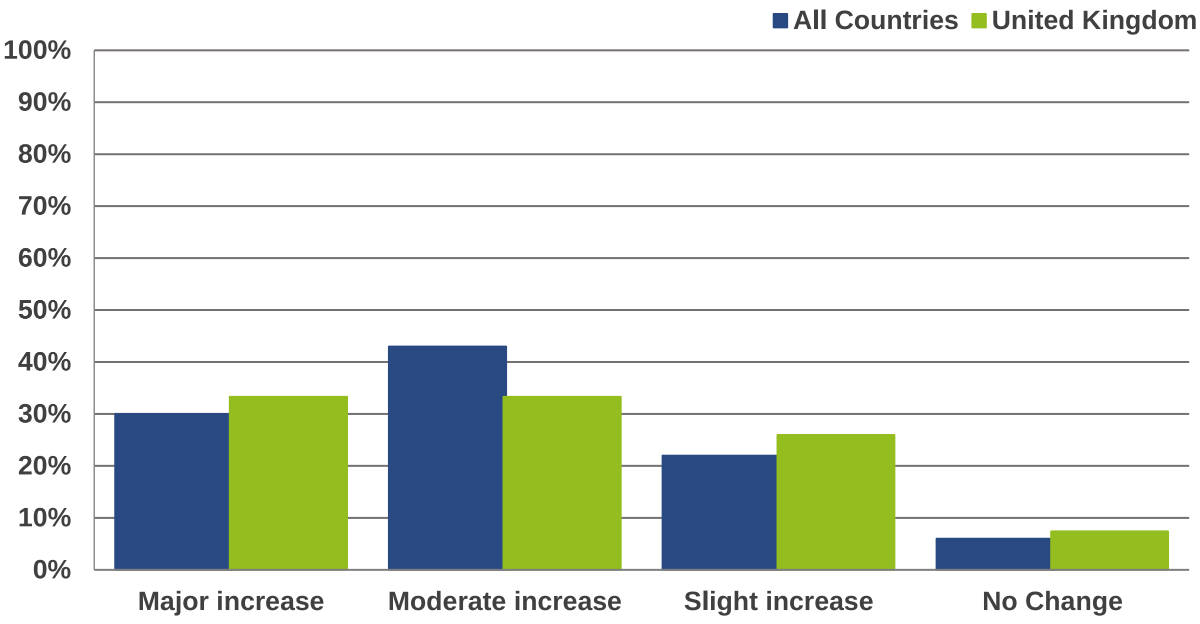


Similarly, to the view across All Countries in the survey, UK respondents clearly supported the idea that well-defined procurement specifications increase the quality level of services; 78% selected either 'always' or 'in a majority of cases'.

Interviews with energy services providers carried out by the authors highlighted a concern with the quality of project development and specification by clients prior to procurement. The following were identified to be of critical importance, and in need of improvement, in terms of ensuring projects are attractive for providers to bid on:

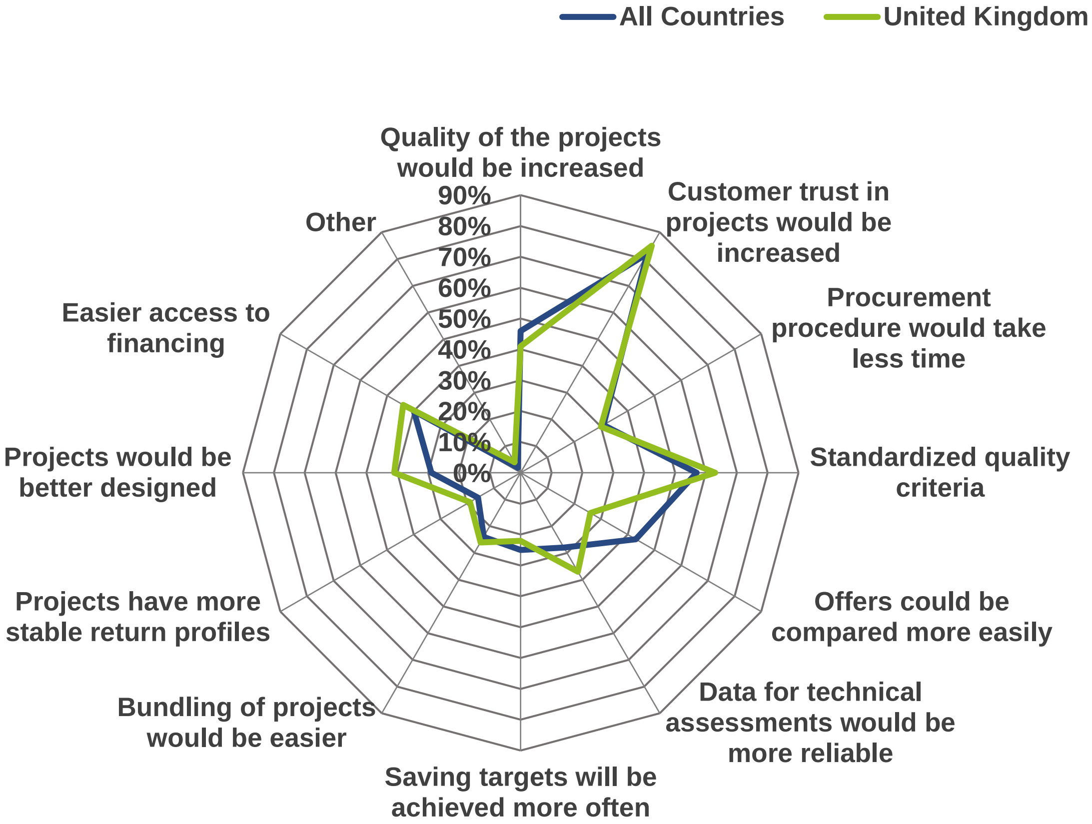
- Availability of sufficiently granular metering and historical meter data to set accurate baselines and to form the basis for M&V.
- 'Buy-in' for the project in concept, and willingness to sign off on finance from senior management.
- Clear and reasonable timescales

Figure 44 To what extent would a quality assurance scheme increase client trust in EPC/ESC services and providers? (Percentage share of responses by providers and facilitators Sept 2017)



Most respondents in the UK (67%) and across All Countries (73%) in the survey felt that a quality assurance scheme would result in a ‘moderate’ or ‘major’ increase in trust in energy efficiency services and their providers.

Figure 45 In your opinion, what would be the added value of a quality assurance scheme like this? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)

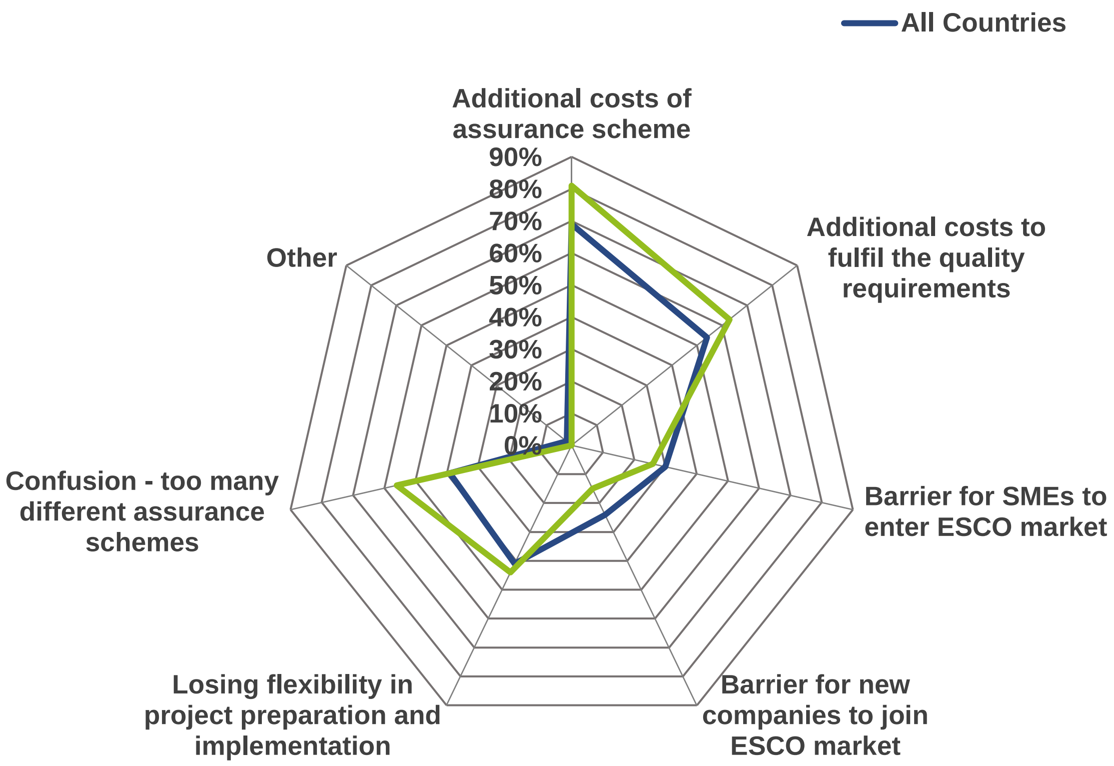


The majority of respondents in the UK and across All Countries in the survey agreed that the main benefits of quality assurance scheme would be an increase in customer trust and standardised quality criteria providing a benchmark for quality in the industry. Considering the latter, it is perhaps surprising that UK respondents did not recognise the benefits to the client in the ease of comparing offers as much as their counterparts across All Countries in the survey. This may be as service providers at this point see adherence to standardised quality criteria or a quality label as a sales tool to distinguish from the competition rather than a procurement tool for clients.

A good number of UK respondents also identified the benefit of easier access to funding (44%) and several benefits relating to the technical design and final quality of services.

Neither respondents from the UK or across All Countries in the survey strongly recognised benefits to the ease of bundling smaller projects. As this was set as a desirable outcome of the QualitEE project in the project development stage it would be useful to understand this result in more detail during the consultation stages of the project.

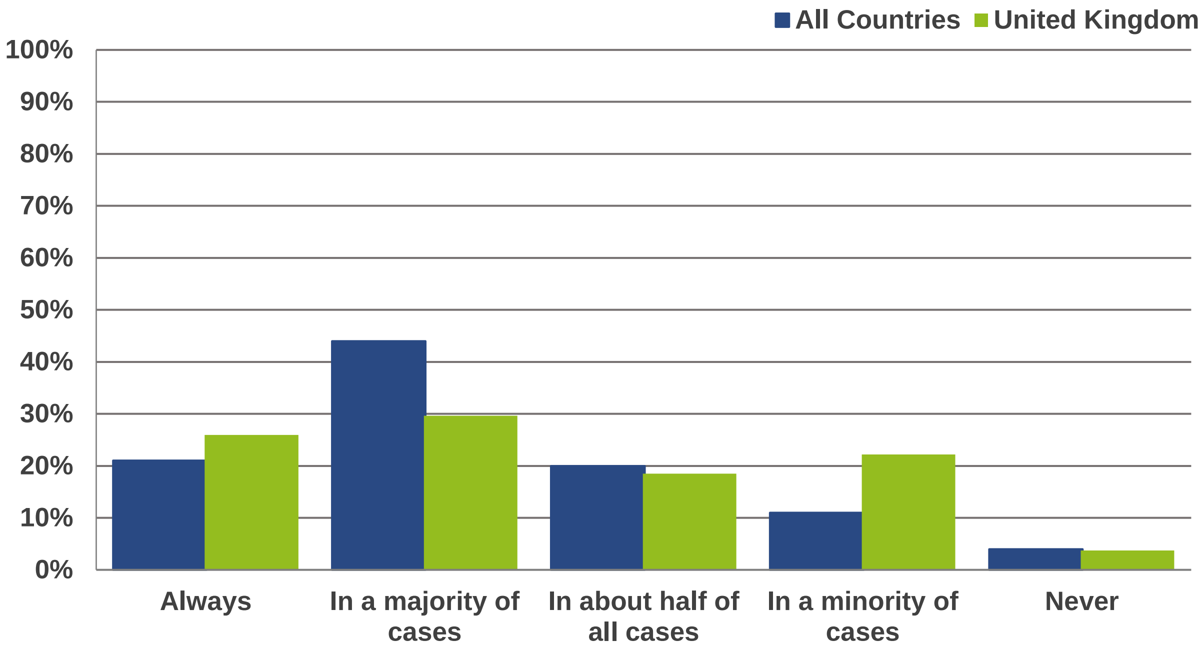
Figure 46 In your opinion, what drawbacks or barriers may be created by a quality assurance scheme like this? (Respondents may have selected multiple answers. The chart shows the proportion of respondents selecting each answer out of overall respondents to the question. Results therefore do not sum to 100%. Sept 2017)



Both UK respondents and their European counterparts across All Countries identified additional costs as the main drawbacks to a quality assurance scheme.

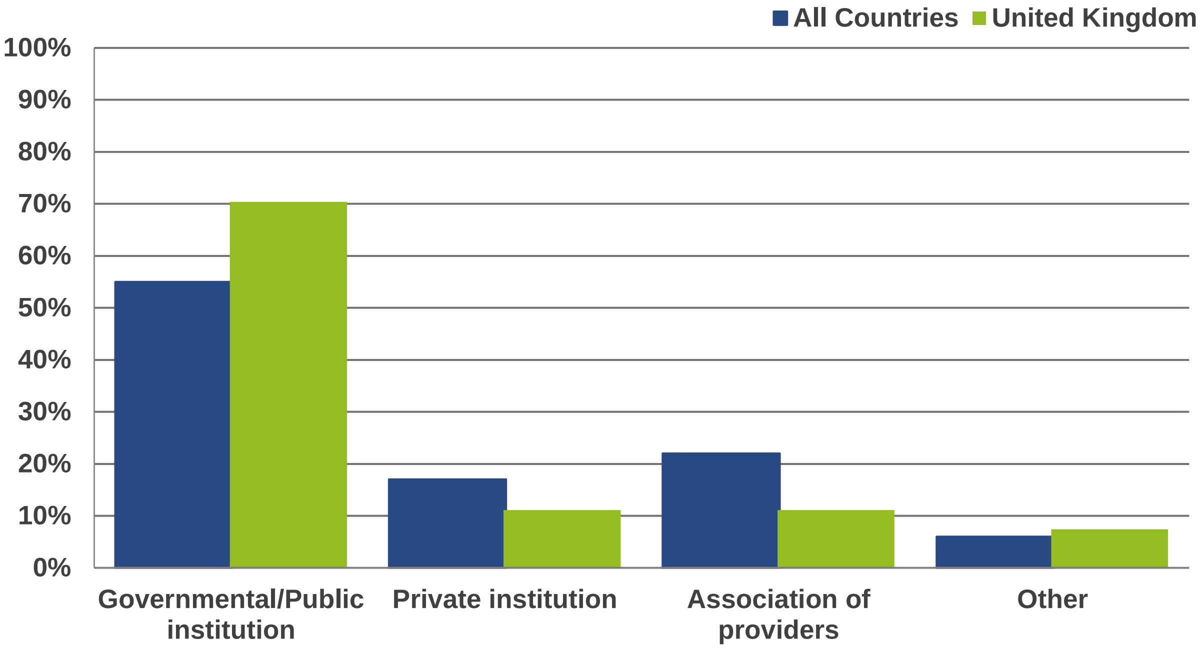
UK respondents also have strong concerns relating to market confusion and there being too many different assurance schemes. In particular the Investor Confidence Project (ICP) Europe is well established in the UK market. It offers a standard documentation process for energy efficiency projects that is independently quality assured and awarded "Investor Ready Energy Efficiency" certification. There are key differences between QualitEE and ICP Europe: QualitEE focusses on energy efficiency services, that have specific aspects of quality beyond energy efficiency projects in general, such as energy saving guarantees. QualitEE also aims to take a national approach to quality assurance. However, the interface and market appearance between ICP Europe and QualitEE should be carefully managed in the UK to avoid confusion or the perception of duplication. A dialogue between the projects has already been established.

Figure 47 Would you prefer implementing a project, which is subject to quality assurance over a project without quality assurance? (Percentage share of responses by providers and facilitators Sept 2017)



Although UK respondents were less strong than European counterparts in indicating a preference to implementing projects subject to quality assurance, most (56%) still stated a preference in the majority or all cases.

Figure 48 Which would be the most respected body to issue a quality assurance label or certification for EPC/ESC services in your country? (Percentage share of responses by providers and facilitators Sept 2017)



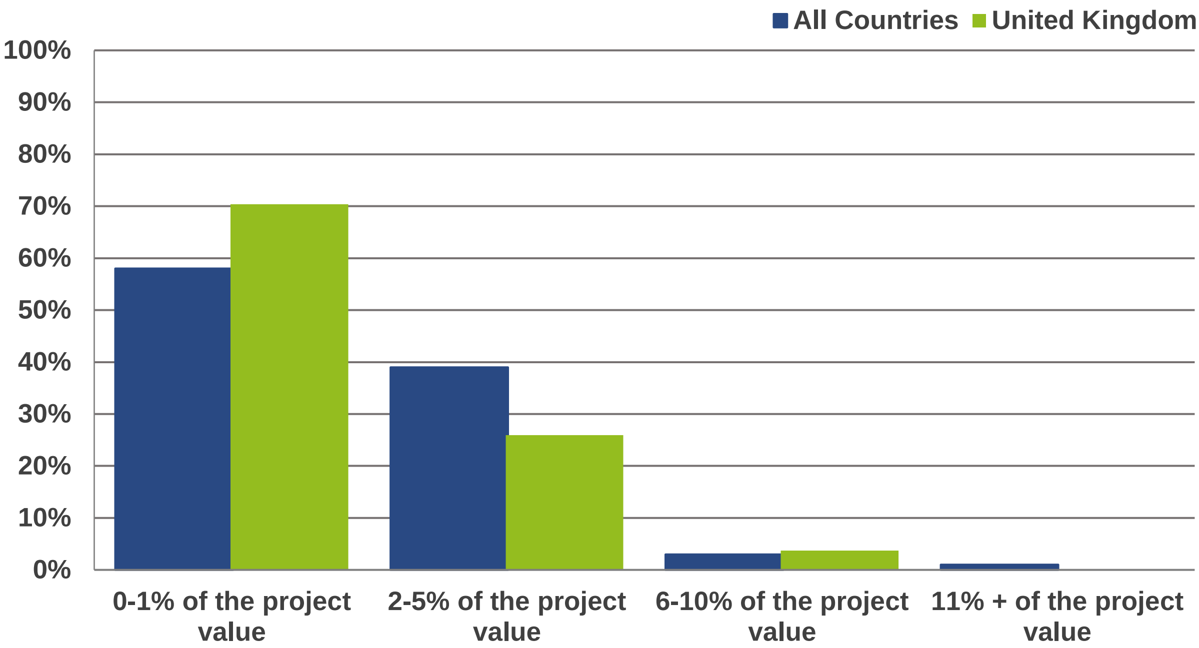
Both respondents in the UK (70%) and across All Countries in the survey(55%) clearly identified Governmental/Public institutions as being the most respected bodies to issue quality assurance certification for energy efficiency services. UK support for Private institutions or Associations of providers to issue certification was low (11% in each case), and feedback from interviews with EES clients in particular suggested they would not trust Associations of providers due to their vested interest in supporting their members.

Figure 49 Who should pay for the quality assurance of EPC/ESC projects? (Percentage share of responses by providers and facilitators Sept 2017)

The majority of respondents in the UK (59%) and across All Countries in the survey (53%) agreed that the cost for quality assurance should be met by the client. UK respondents selecting the 'other' category clarified that ultimately the project would carry the cost burden of quality assurance regardless of which party settles the bill. As a matter of principle, perhaps the result indicates that the client should at least be aware of the cost of quality assurance rather than it being a hidden cost from the provider. It is also important to consider which party is paying for quality assurance in terms of the psychology of the quality assurance provider as they may bias their approach based on who is paying them. In this sense, the project or the client and provider equally appointing the quality assurance provider would be fairer and more objective.

One respondent suggested that the Government should pay for quality assurance. This is not an outlandish suggestion and is already a model that is used for the UK CHPQA scheme. In this scheme the Government is able to collect valuable performance information for CHP and drive a minimum performance standard to meet European requirements, whilst applicants to the scheme benefit from fiscal incentives. The Government's Clean Growth Strategy (BEIS 2017b) makes a policy statement that "The Government will work with stakeholders to improve the market for energy services, building confidence across commercial and industrial customers." so it is possible that a Government backed quality assurance scheme could go some way to achieving this target.

Figure 50 What would be a viable fee level for external quality assurance per EPC/ESC project? (Percentage share of responses by providers and facilitators Sept 2017)



The clear message from respondents across All Countries in the survey and to some greater extent UK respondents is that the fees for quality assurance should be as small as possible. Over 70% of UK respondents felt that fees should not exceed 1% of the project value. Considering the findings of the Building Energy Efficiency Survey (BEIS 2016), which highlight that in many cases energy efficiency is not sufficiently profitable to meet internal investment requirements, any material increase in project costs is likely to have a detrimental effect on project uptake.

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9 APPENDICES

9.1.1 Analysis of Energy Services and Technology Association (ESTA) Members

Member List	EPC Provider?	EPC Facilitator?
ABB Limited	Yes	
Advanced DataCentre Systems Ltd		
Armstrong Integrated Limited		
Arthur McKay & Co Ltd		
Assistlink Limited		
British Gas Business	Yes	
Carbon 2018 Limited		
Carbon Change Ltd		
Carbon Decoded Limited		
Carlo Gavazzi UK Limited		
CBRE Corporate Outsourcing Ltd		Yes
Chalmor Limited	Yes	
ClearCost Energy (GB) Limited		
Clover Controls Limited		
CMR Consultants		
CP Electronics		
DANLERS		
Diehl Metering		
digitalenergy		
DP Consulting Limited		
EEVS Insight Limited		Yes
Elcomponent Limited		
Endress + Hauser Limited		
Energen Limited		
Energy & Technical Services Limited		
Energy Assets Limited		
Energy Metering Technology Limited		
Energy Renewals Ltd		
ENGIE	Yes	
Enistic Ltd		
Envantage Ltd		
eSight Energy Ltd		
Essential Control Ltd		
Eticom Ltd		
Ex-Or by Honeywell		
Exoteric Metering Ltd		
Faros Engineering Ltd		
Green Energy Consulting		
Honeywell Control Systems Limited	Yes	
Ignite Energy Ltd		
Inspired Efficiency Ltd		Yes
Iskraemeco (UK) Limited		
IVEES® Independent Verifiers of Energy Efficiency Savings		Yes
JRP Solutions Limited		Yes

Member List	EPC Provider?	EPC Facilitator?
LCG Energy		
Local Partnerships		Yes
Martin R Fry & Associates		
Meter Provida Ltd		
Micronics Limited		
MWA Technology Limited		
Native-Hue Limited		Yes
ND Metering Solutions		
NetThings Limited		
Next Controls Ltd		
ON5 Company Ltd		
Optima Energy Systems Limited		
PA Energy		
Pick Everard		Yes
Power Quality Expert Limited		
Rayleigh Instruments Limited		
Salix Finance		Yes
SavaWatt Controls		
Schneider Electric Limited	Yes	
Self Energy Ltd	Yes	
Setsquare Energy Solutions Ltd		
SHM Communications Limited		
Sinergy Meters		
SmarterDM		
SMS Plc		Yes
Socomec U.K. Limited		
Stark		
STC Energy Management Limited		
Stuart Jackson Associates Limited		
Swan Energy Ltd		Yes
Switch2 Energy Limited		
Sycous Limited		
Synapsys Solutions Limited		
TATA Consultancy Services – iON Energy		
TEAM (Energy Auditing Agency Ltd)		Yes
Technolog Ltd		
The Discovery Mill Limited		
The Energy Brokers Limited		
The Green Consultancy Ltd		Yes
Touchstone Energy Management Services		
Trend Control Systems Ltd		
TT Utilities Limited		
Utilitywise plc		
Vector Sales & Marketing Limited		
Verco Advisory Services Ltd		Yes
Vesma.com		Yes
Virtus Consult		
WPD Smart Metering Ltd		
TOTAL	**7**	**15**

Source: https://estaenergy.org.uk/members/ accessed March 2018

9.1.2 Analysis of Association for Decentralised Energy (ADE) Members

Member List	EPC Provider?	EPC Facilitator?	ESC Provider?
2G Energy Ltd			
AECOM Limited		Yes	
Ameresco	Yes		
AMP Energy Services			
Arup		Yes	
Atkins Ltd		Yes	
BasePower Limited			Yes
Baxi Group Ltd			
Bloomsbury Heat and Power Consortium			Yes
Bosch Commercial and Industrial Heating			Yes
Bristol City Council			
British Gas Heat Networks	Yes		Yes
British Sugar plc			
Brugg Pipe Systems			
Calor Gas Ltd			
Camden Council			
Cargill PLC			
Centrax Gas Turbines			
Centrica plc			
Challoch Energy BVBA			
City of London Corporation			
City West Homes			
Clancy Docwra Ltd			
Clarke Energy Ltd			
Cooper Östlund			
CPV Ltd			
Cranfield University			
Cynergin Projects Limited	Yes		
Danfoss Ltd			
Delta Energy & Environment			
E.ON Sustainable Energy – Consultancy Services			
E.ON UK CHP Ltd	Yes		Yes
EDF Energy (Energy Services)	Yes		Yes
Edina UK Limited			
Endeco Technologies			
ENER-G (a Centrica Company)	Yes		Yes
Energetik			
EnergyPool			
EnerNOC			
Eneteq Services			
ENGIE (Cofely)	Yes		Yes
EnviroEnergy Ltd			
ESB			
Estover Energy			
Eurosite Power Limited			Yes

Member List	EPC Provider?	EPC Facilitator?	ESC Provider?
ExxonMobil Power and Gas Services, Inc			
FairHeat			
Finning (UK) Ltd			
Flexitricity			
Genesis Housing Association			
Glasgow Caledonian University			
Grant Thornton UK LLP		Yes	
Greater London Authority			
Greater Manchester Combined Authority			
Green Investment Group		Yes	
Grep 1 Ltd			
Guinness Partnership			
Guru Systems Limited			
Heat Networks - Sustainability by Sweden			
HermeticaBlack Limited		Yes	
Imperial College London			
Inventa Partners Ltd			
Kiwi Power			
Leeds City Council			
Limejump			
Lockheed Martin	Yes		
London Borough of Islington			
London Legacy Development Corporation			
Lux Nova Partners			
Marubeni Europower Limited			
Metropolitan			
MTU UK Ltd			
MVV Environment Services Ltd			
Nabarro			
Neas Energy Ltd			
Newcastle City Council			
nPower Business Solutions			Yes
Open Energi			
Opra Turbines			
Origami Energy			
Osborne Clarke			
P3P Partners			
PeakGen			
Peter Brotherhood Ltd			
Pinnacle Power Ltd			
Pinsent Masons LLP		Yes	
Pöyry Energy Ltd			
PX Limited			
Ramboll		Yes	
Reactive Technologies Ltd			
Red Engineering Design			
Rehau Ltd			
REstore			
Ricardo-AEA plc		Yes	
Royal Danish Embassy			

Member List	EPC Provider?	EPC Facilitator?	ESC Provider?
RWE			Yes
Salix Finance		Yes	
SAV			
Secure Meters (UK) Ltd			
SELCHP Waste to Energy Facility			
SembCorp Utilities (UK) Limited			
Shetland Heat Energy and Power Ltd			
Siemens Energy	Yes		Yes
SmartestEnergy Limited			
Spirotech			
SSE plc	Yes		
Suez UK			
Sustain Ltd			
SWEP International AB			
Switch2 Energy Limited			
Tata Chemicals Europe Limited			
Tempus Energy			
The Boots Company			
The Carbon Trust		Yes	
TrentENERGY			
Turbomach AS			
University of Birmingham			
University of Dundee			
University of Edinburgh			
University of Leeds			
University of Warwick			
Vattenfall			
Veolia	Yes		Yes
Veolia ES Sheffield Ltd			
Viessmann Ltd			
Viridor Limited			
Vital Energi Utilities Ltd	Yes		Yes
VPI Immingham LLP			
VRM Tech			
Wakefield Acoustics Ltd			
Welsh Power			
West Sussex County Council			
Woking Borough Council			Yes
WSP		Yes	
Total	**12**	**12**	**15**

Source: https://www.theade.co.uk/members/all accessed January 2018

9.1.3 Analysis of Certified Measurement & Verification Professionals in Europe

Country	Number of CMVPs
Andorra	1
Austria	53
Belgium	61
Croatia	21
Cyprus	2
Czech Republic	3
France	204
Germany	13
Greece	2
Ireland	14
Italy	129
Luxembourg	1
Netherlands	4
Poland	1
Portugal	98
Spain	493
Sweden	1
United Kingdom	203

Source: http://portal.aeecenter.org/custom/cpdirectory/index.cfm accessed January 2018