



Department for
Business, Energy
& Industrial Strategy

THE NON-DOMESTIC ENERGY EFFICIENCY SERVICES MARKET: ANNEXES

Research Paper No. 16 2018

Prepared for BEIS by:



and



May 2018

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Annex 1: The UK's Energy Efficiency in Context

Energy Consumption and Energy Efficiency in the UK

The UK has an ambitious goal of reducing greenhouse gas emissions by 80% compared to 1990 levels by 2050.

At present, the UK has a large mixed economy, with a low energy intensity relative to its status as a developed nation. In 2015, the UK had the world's fifth largest economy by nominal GDP, but was only the 14th largest user of energy¹. This relatively low energy intensity derives from:

- Reductions in energy-intensive industry, particularly iron, steel and minerals.
- A large uplift from the financial services sector, at around 7.2% of UK output².
- UK power station efficiency rising from 36% to 43% between 1990 and 2010³.
- The UK's low energy use per unit of Gross Value Added in several sectors.

While the UK has undergone very major structural changes in its economy, energy productivity has usually also improved significantly. Improvements in energy productivity have resulted due to changes in the fuel mix, the effects on the quality of energy management driven by the government's energy efficiency programmes, and from ongoing improvements in the efficiency of equipment that consumes energy.

According to the European Commission⁴, in 2016, the UK achieved Europe's third largest decrease in primary energy consumption and the fourth largest decrease in final energy consumption from 2014 to 2013. Industrial reductions in energy relative

¹ Data from The World Factbook - Central Intelligence Agency and national government websites.

² Total tax contribution of UK financial services, Tenth Edition, City of London Corporation with PWC, November 2017.

³ United Kingdom Energy Efficiency Report, ABB, February 2013.

⁴ 2016 assessment of the progress made by Member States in 2014 towards the national energy efficiency targets for 2020 and towards the implementation of the Energy Efficiency Directive 2012/27/EU, European Commission, COM(2017) 56 final, 2017.

to GVA were the second only to Italy amongst the larger Western European nations (France, Italy, Germany, Belgium, Spain and the Netherlands), while for the services sector the UK's improvement was second only to that of the Netherlands.

On the global stage, according to the ACEE's 2016 energy efficiency scorecard report, the UK ranked 5th, performing well on industrial energy efficiency.

These historic achievements notwithstanding, the UK still has an ambitious goal of reducing greenhouse gas emissions by 80% compared to 1990 levels by 2050. Emissions data for 2015 indicates that the UK had achieved a 38% reduction in total greenhouse gas emissions compared to 1990 levels.

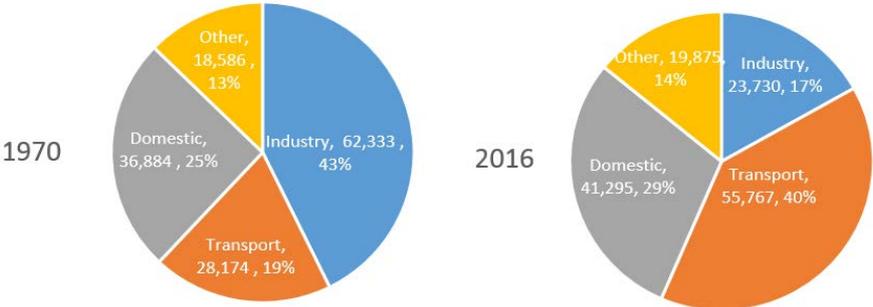
A proven approach for cost effectively delivering a large fraction of these carbon savings is to improve energy efficiency in the non-domestic sector. In common with other nations, despite good historical performance on improving national energy efficiency, the UK has a significant unrealised potential to make savings. Overall, non-domestic energy (excluding transport) currently accounts for 31% of UK final energy consumption. The 2016 BEIS report, Building Energy Efficiency Survey, (BEES)⁵, showed that a significant volume of this energy is consumed in buildings, and that many efficiency opportunities remain to be implemented.

Previous UK government programmes to stimulate efficiency in this sector have been successful, such as The Energy Efficiency Best Practice Programme (1989-2002), and The Carbon Trust (2001- present). However, these programmes can be a funding burden on government and now that expertise has been nurtured in the UK, it is appropriate for a private sector delivery model to take over.

Data from BEIS shown in Figure 5 shows that non-transport and non-domestic energy represented 31% of UK consumption in 2016, a significant difference from the 1970 breakdown.

⁵ Building Energy Efficiency Survey 2014-15: Overarching report, BEIS, November 2016.

Figure 1: UK final energy consumptions in 1970 and 2016: ktoe⁶⁷ and percentages.



Of this 31% of UK delivered energy, around half is buildings related, and building decarbonisation through energy efficiency is therefore critical for supporting UK energy efficiency goals. This concentration of consumption in buildings is significant, as building technologies are generic and can be improved using the same technical approaches in all sectors. Buildings consumption is split between various sectors and organisation sizes as shown below, showing the significant volume of energy that is contained within sectors that have significant consumption buildings.

⁶ ktoe: kilotonnes of oil equivalent energy.
⁷ Energy Consumption in the UK, Table 1.01 & 1.03, BEIS, July 2017.

Table 1: UK final buildings energy consumption in 2014-15 by sector in GWh⁷.

Sector	GWh Large*	GWh SME*	Total GWh/year*
Retail	14,780	12,310	27,340
Office	16,890	10,130	27,620
Hospitality	6,460	10,210	16,980
Industrial	8,070	17,630	25,740
Storage	8,020	5,080	13,110
Health	15,780		17,380
Education	9,970	4,570	15,030
Emergency	3,770	450	4,240
Military	1,840		1,840
Community, arts and leisure	340	2,090	11,790
Total England and Wales	85,910	62,480	161,060

*Totals do not sum due to lack of response or where the respondent was not asked.

In terms of the distribution of bill sizes, an idea can be gained from consumption data for power meters (from 2011) published by OFGEM⁸ and pricing data (for 2016) from BEIS⁹ and shown in the figure following. This shows that while consumption is

⁸ Small and Medium Business Consumers experience of the energy market and their use of energy, Lawrence and Reiman, Harris Interactive, Ofgem March 2011.

⁹ Prices of fuels purchased by non-domestic consumers in the UK, Dec 21 2017, BEIS.

concentrated in larger meters, there is a considerable proportion contained in smaller bills. Around 35% is in annual bills of less than £107,000, and around 14% in bills of less than £11,700. Scale factors mean that these smaller bill payers will often find it difficult to internally resource the skills required to manage properly their energy.

Figure 2: Distribution of UK non-domestic power consumption across different size ranges of annual bill.



Will Future Energy Prices Drive Interest in Energy Efficiency?

Future UK energy prices depend strongly on the supply-demand balance, the mix of generation technologies, and the price of imported fuels and electricity. These are difficult to predict with any degree of certainty, although a number of observations can be made:

In the long term, UK growth will be unlikely to differ greatly from that in other developed economies and will be at the lower end of 1.5 - 2%^{10,11,12}, meaning that overall demand growth will not be significant.

The best available indications are that international supply of natural gas will continue to be abundant¹³, and future UK energy users will be unlikely to be exposed to strong

¹⁰ IMF, World Economic Outlook, October 2017.
¹¹ OECD, United Kingdom - Economic forecast summary (November 2017).
¹² The Economy Forecast, Office for Budgetary Responsibility, November 2017.
¹³ BP Energy Outlook, 2017 Edition. BP PLC.

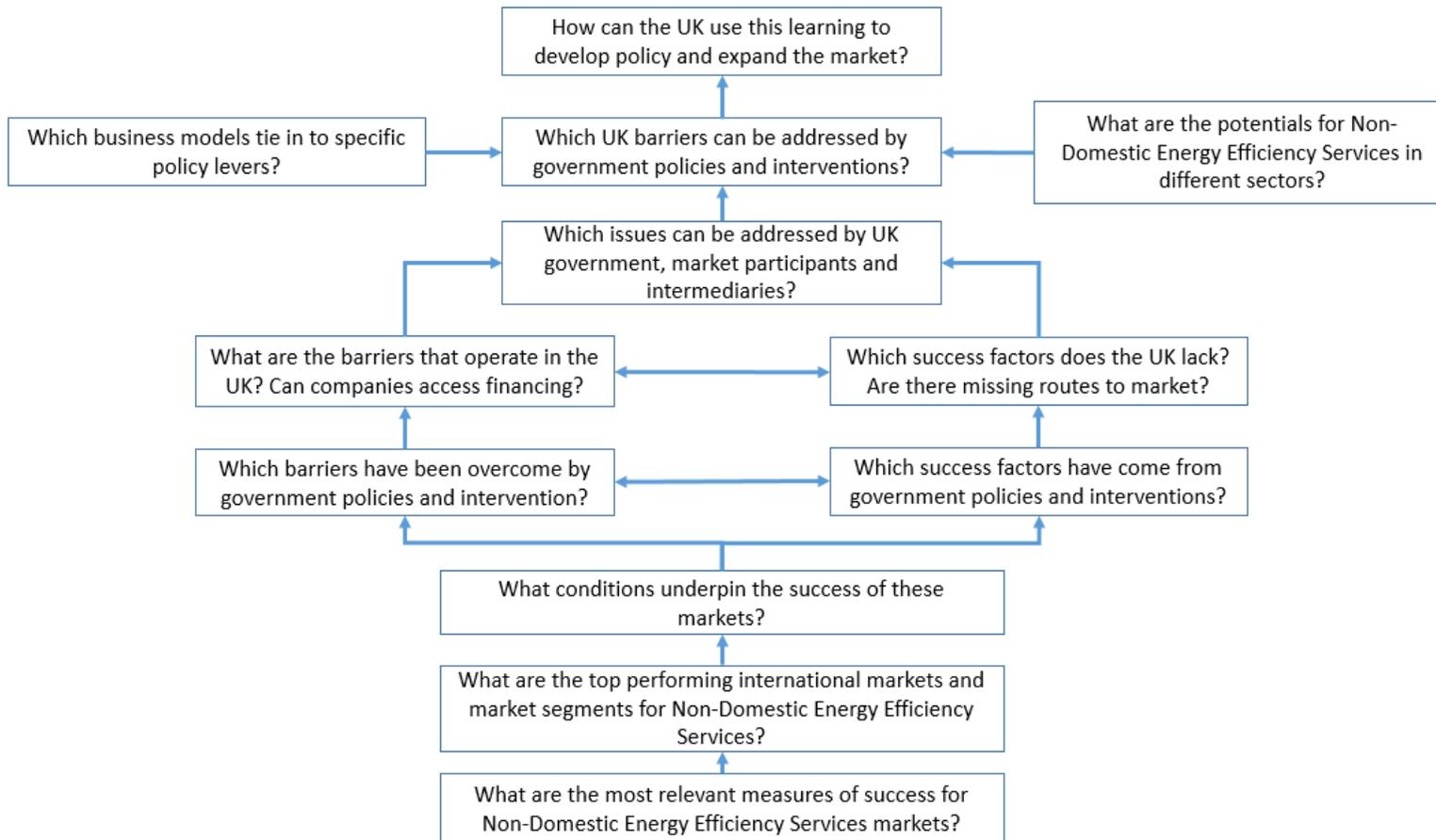
gas price inflation, and this, combined with the rapid reductions in cost for new renewable power will tend to keep wholesale prices for fossil fuel power under control.

This implies that other drivers may need to be reinforced to ensure that the UK delivers its energy and carbon targets.

Annex 2: Study Methodology

The logical framework developed to answer the questions posed by BEIS was as shown on the following page:

Figure 3: Logical structure followed to provide the answers required for this study.



According to this structure, three main research activities were pursued, followed by a synthesis stage. The findings from each stage were used to inform the direction of work in subsequent stages. The stages were, in order:

- A desk-based review of markets for energy efficiency services around the world identified how different nations had overcome barriers to develop successful energy efficiency services sectors. This investigation depended on the availability of existing reviews and on accessing data from a wide range of sources. The international review developed a picture of the priority issues that need to be addressed in developing a successful market, with case studies of individual nations and of key topics.
- A series of 45 semi-structured telephone interviews to explore in more detail the view of stakeholders on the UK market, the barriers they face and to both test and gather ideas for improvement. The interview guides were developed using the findings from the international review.
- Two workshops (one face-to-face and one online), were used to discuss issues directly with market stakeholders. The topics for discussion during the workshops were developed from the findings of the international review and the deeper insights developed from the telephone interviews. The workshops were facilitated by IPA Advisory and Databuild to ensure that all issues of interest were discussed.
- A final synthesis process, which combined the results of the previous stages with additional research to develop overall conclusions and policy recommendations.

Recruitment Script: ESCOs

Good morning/afternoon. My name is X and I am calling from an organisation called Databuild on behalf of the Department of Business Energy and Industrial Strategy (BEIS).

BEIS wants to understand more about UK energy services companies and the infrastructure around them. The aim is to establish the potential for increase in energy efficiency activity through the uptake such services by the public, commercial and industrial sectors, so the interview will be primarily about energy efficiency as opposed to renewable energy.

To achieve this, we are speaking to selected organisations who are active in the energy services value chain. The results of our study will be used to inform policy making in this area, so this is an opportunity for your organisation to feed into BEIS decision making.

Please can I speak to someone who works on / oversees company marketing and growth strategy e.g. a sales director or equivalent.

If they can, arrange the best time to call back and note that we will send a confirmation e-mail with our credentials (establish their e-mail address and the best direct dial telephone number to contact them on).

If they are not the best individual, ask if they can pass you on to the best person with whom to hold the discussion.

If they refuse outright, attempt to obtain a reason for their refusal.

If asked; ideally 45 minutes should be set aside. Responses can be anonymized.

If asked; we can send an email outlining the research and can share a BEIS address for confirmation of the research: registeredenergyserviceproviders@beis.gov.uk

Interview Script: ESCOs

Good morning/afternoon., this is X from Databuild calling for the interview that we arranged regarding the BEIS study on the UK energy efficiency services market. Are you still able to go ahead with the discussion?

Thanks for making the time available; I should just confirm that we will keep any information that you share with us confidential and store it securely, in accordance with the Data Protection Act. Neither you nor your organisation will be identifiable in our report to BEIS, unless otherwise agreed with you.

Before we go any further, some house-keeping:

- Are you are happy for me to record this interview? The recording will not be shared outside the research team.
- Can we attribute your answers to your organisation?
- Can we match data mentioned in this interview to other data sources?

ESCOs Questioning Script

1. First, I would like to ask some questions regarding your and your organization's profile and your views on the energy services market:
 - (a) *Could you please briefly describe your role and responsibilities in providing energy services? Just to clarify, by "Energy services" we mean providing clients with for example, procurement advice, energy surveys, energy efficiency assessments, implementation plans, project management, procurement and installation of equipment, maintenance and management of infrastructure. (DQ1, DQ3, DQ7).
 - (b) *What types business / organisation do you work with? (DQ1, DQ3, DQ7).
 - (c) *What energy service(s) does your organisation offer? [Examples of types of support if needed: energy auditing, project planning and design, sourcing of finance, supply and installation of equipment, management of delivery, ongoing management and maintenance. supply of power and heat and provide technical services that span

survey, design and installation, energy procurement, energy supply (power generation or heat), energy efficiency, renewable energy systems, facilities management etc.] (DQ1, DQ3, DQ7).

- (d) *To what extent does your organisation work outside of the energy services sector? (DQ1, DQ2, DQ3, DQ6, DQ7).
- (e) *What sorts of contracts do you have with customers that specifically relate to energy services? [e.g. stand-alone consultancy contracts, design and build with performance guarantees (guaranteed savings contracts), or longer term shared savings / Energy Performance Contracts.] Do they operate Energy Supply Contracts or Energy Efficiency Performance Contracts or a mix? Are their energy services integrated with other services, such as facilities management? If they do, what proportion of an FM contract covers the energy side? (DQ1, DQ2, DQ7).

Note. If they ask for explanation of our terminology, these definitions will be useful, although there is overlap between some of the terms:

A consultancy contract will provide just advice on energy consumption, how it can be better managed and options for installing new equipment and processes to save it.

In an energy supply contract the ESCO installs and operates equipment that supplies power, heat, steam, compressed air, cooling etc. into a site.

In an energy efficiency performance contract the equipment uses energy more efficiently on the demand side of the client's operations.

In a design and build (guaranteed savings) contract the client pays the ESCO to design, procure and install energy-producing or energy using equipment, and a portion of the payment is an incentive based on whether the equipment delivers the efficiency improvements that the ESCO agreed in the contract.

In a shared savings / energy performance contract / energy efficiency performance contract the ESCO designs, procures installs, maintains

and possibly operates equipment that is financed off the client's balance sheet. Finance may come from the ESCO, the equipment supplier or a finance company, with retention of title to the equipment. The client pays for the installation out of energy savings over a contract period, with the quantities being governed by a contract that incentivizes the ESCO to achieve the most cost-effective solution.

- (f) *How are the projects you carry out for clients financed? i.e. by the client themselves, on your (ESCO's) balance sheet, on the balance sheets of equipment suppliers, by a specialist project finance company, through a special purpose vehicle, other? Prompt to ask how they manage and transfer risk between the parties for the different contract types. (DQ1, DQ6).
- (g) *If you are seeking to grow your business in the energy efficiency and energy services field, what ways / strategies are you pursuing? [this might be in terms of sector / support type or other]. (DQ4)
- (h) Can you estimate the scale (and proportion comprising energy services if they do other things) of your business overall? [in terms of number of projects, number of customers, resource and revenue; reassure that we are looking for an estimate or even an order of magnitude here, not a precise figure] (DQ1, DQ7).
- (i) Can this be broken down (even roughly) into particular services, contract types and / or customer groups? (DQ1, DQ7)
- (j) Do you have a feel for the current market size in terms of overall UK revenues for:
 - (i) All energy services – including supply of power, heat and compressed air for the industrial, commercial and public sectors? (DQ1, DQ7)
 - (ii) Energy efficiency services in particular for the business, commercial and public sectors? (DQ1, DQ7)

- (iii) Energy efficiency performance contracts / shared savings contracts in particular for these sectors? (DQ1, DQ7)
 - (k) Do you perceive your organisation to be relatively large, medium or small compared to others in your sector? (DQ1, DQ7).
 - (l) *What in your view is driving the market for energy efficiency services? Test the following:
 - (i) Public sector frameworks, carbon reduction commitments in the public sector? (DQ1, DQ2, DQ3)
 - (ii) Availability of public funds for investment (in the public sector)? (DQ1, DQ2, DQ3)
 - (iii) Business (i.e. customer) interest in carbon reduction and or cost saving? (DQ1, DQ2, DQ3)
 - (iv) Innovation in technology, such as smart metering and controls? (DQ1, DQ2, DQ3)
 - (v) Innovation in financing of energy efficiency projects? (DQ1, DQ2, DQ3)
 - (vi) Any other factors? (DQ1, DQ2, DQ3)
 - (m) And are there any factors driving innovation in technology, management or financing of energy efficiency services? [e.g. higher demand for efficient technology, increased maturity of the market, regulatory changes (such as increased data reporting requirements), metering technology enabling organisations to develop new services, such as peak lopping and monetising reduced system load?] (DQ1, DQ2, DQ3, DQ9)
2. Based upon that, I'd now like to ask a few detailed questions about marketing and the challenges of winning business.
- (a) What are your main routes to market? [e.g. telemarketing, direct approaches from customers, referrals from existing clients and use of intermediaries and frameworks etc.] (DQ1, DQ2)

- (b) Which seem to have been most effective and what is the evidence for this? (DQ4)
- (c) *What are the most significant barriers your company has faced in winning business? [we want to gain an understanding of: severity, how / why it affects them, what they try to do to mitigate it. Perhaps think of an example project that didn't come to fruition]. If they do not mention the following, prompt to check on their views on these barriers: (DQ3, DQ4)
 - (i) EE being a low priority for the client?
 - (ii) Low awareness of energy services / the ESCO solution?
 - (iii) Split incentives between energy users and asset owners?
 - (iv) High transaction costs damaging project viability? (the costs involved in developing and negotiating the contract, monitoring the savings etc.
 - (v) Lack of client trust in your proposed solutions and benefits?
 - (vi) Lack of legislation or standards defining your business model, leading to poor client trust and an increased burden in selling the concept.
 - (vii) Poor access to finance or costly finance for viable projects.
 - (viii) Finding opportunities with at the right scale and with well-defined risks and returns.
- (d) Do these differ between different sectors, technologies and projects? If so, how? (DQ3, DQ4)
- (e) *Have you had projects fall by the wayside while in development? If so, what are the main reasons and is there any stage at which they are most likely to stall? (DQ3, DQ4)

- (f) How do these compare to the wider sector? What are your perceptions of the types of challenge being encountered by others? (DQ3, DQ4)
 - (g) Have any government policies helped you win energy services / or EPC business? If so, which ones and how? If they do not mention them, prompt for: (DQ1)
 - (i) Public sector frameworks such as Re:fit, the Carbon and Energy Fund, Essentia and Ecovate?
 - (ii) Carbon Reduction Commitment (CRC)
 - (iii) Energy Savings Opportunity Scheme (ESOS)
 - (iv) The EU Emissions Trading Scheme?
 - (v) Enhanced Capital Allowances scheme?
 - (vi) Feed-in Tariffs or the Renewable Heat Incentive scheme?
3. My final section covers what you would like to see improved in the UK energy services market and future energy service market prospects.
- (a) *Are there any particular things that either the sector, customer decision makers or government could improve? (DQ5)
 - (b) *Which of the following would support the market for efficiency services? For each it will be necessary to establish how this benefit might be brought about in their view): (DQ5, DQ9)
 - (i) More visible political support for the ESCO/EPC market.
 - (ii) More support to overcome financial hurdles.
 - (iii) Access to more bankable projects, in other words growing the number of opportunities that potential clients bring forward, the quality of those opportunities and improvements to the geographic clustering.
 - (iv) More widespread trust in the quality of the ESCO solution.

- (v) Access to standardised contracts and quality accreditation schemes.
 - (vi) Availability of innovative contractual mechanisms, such as recovery of investment via energy bills or business rates?
 - (c) *For each viewed as helpful:* how might these impact public, commercial and industrial sectors differently? (DQ5, DQ7, DQ8)
 - (d) *[if they select more than one option in 3b]* What is the most useful?
 - (e) What have been your organisation's recent experiences of market growth, from 2014-2016? % growth per annum. (DQ8)
 - (f) Which areas – in your organisation and the sector more generally - are seeing growth? If they do not mention them ask for the sectors (commercial, industrial and public sector and the technologies, such as lighting, HVAC, motors and drives, process heat, CHP etc. (DQ8)
 - (g) *What are your expectations of future growth in the energy efficiency services market? Prompt for a percentage estimate and a timeframe. (DQ8).
4. Closing questions:
- (a) Are there any key customers, finance companies or companies similar to you that we could talk to about their experiences? Also any customers who did not make it through the process / didn't end up taking on support? (DQ1, DQ3)
 - (b) If upon reviewing my notes there is anything we need to clarify, is it okay to get back to you?
 - (c) Thank them for their time and close.

Key research issues that this questioning script seeks to answer:

Master questions for the interview research phase are as follows:

MQ1: “What are the barriers that operate in the UK?”

MQ2: “Which success factors does the UK lack?”

MQ3: “Are there missing routes to market?”

MQ4: “Can companies access finance?”

MQ5: “How large is the UK market and what is its potential?”

MQ6: “What is the role of innovation in the market?”

These master questions have been broken down into detailed questions, (DQ1-9), which are then answered by script questions (S1-S4) as so as to provide data to feed the synthesis of answers to the master questions as follows:

Master Questions	Detailed Questions	Script Questions			
		SQ1	SQ2	SQ3	SQ4
MQ1, MQ2, MQ3, MQ4.	DQ1: How does the UK energy efficiency services market function?	X	X		X
MQ1, MQ2, MQ3, MQ4	DQ2: What is driving the UK market for energy services?	X	X		

MQ1	DQ3: What barriers are perceived by energy efficiency services companies in the UK and for which client types and technologies do these barriers operate?	X	X		X
MQ1	DQ4: How do UK energy efficiency services companies address barriers at present?	X	X		
MQ1	DQ5: What do service providers see as the priority changes to the market that could assist them in overcoming barriers?			X	
MQ5	DQ6: What forms of contractual / financial relationships are found in the UK market?	X			
MQ5	DQ7: What is the size of the UK energy efficiency services market?	X		X	

MQ1, MQ5	DQ8: Is the UK energy efficiency services market growing and expected to grow?			X	
MQ6	DQ9: How does innovation interact with the market?	X		X	

Recruitment Script: Financiers

Good morning/afternoon. My name is X and I am calling from an organisation called Databuild on behalf of the Department of Business Energy and Industrial Strategy (BEIS).

BEIS wants to understand more about UK energy services companies and the infrastructure around them. The aim is to establish the potential for increase in energy efficiency activity through the uptake such services by the public, commercial and industrial sectors, so the interview will be primarily about energy efficiency as opposed to renewable energy.

To achieve this, we are speaking to selected organisations who are active in the energy services value chain. The results of our study will be used to inform policy making in this area, so this is an opportunity for your organisation to feed into BEIS decision making.

Please can I speak to someone who works with / would work with energy service companies and understands the sector – possibly your director or manager responsible for the area of energy services or your business development director for the area. *Just to clarify, by “Energy services” we mean companies who provide clients with for example, energy procurement advice, energy surveys, energy efficiency assessments, energy implementation plans, energy project management, procurement and installation of equipment, maintenance and management of infrastructure and financing.*

If they can, arrange the best time to call back and note that we will send a confirmation e-mail with our credentials (establish their e-mail address and the best direct dial telephone number to contact them on).

If they are not the best individual, ask if they can pass you on to the best person with whom to hold the discussion.

If they refuse outright, attempt to obtain a reason for their refusal.

If asked; ideally 30-40 minutes should be set aside. Responses can be anonymized.

If asked; we can send an email outlining the research and can share a BEIS address for confirmation of the research: registeredenergyserviceproviders@beis.gov.uk

Interview Script: Financiers

Good morning/afternoon., this is X from Databuild calling for the interview that we arranged regarding the BEIS study on the UK energy efficiency services market. Are you still able to go ahead with the discussion?

Thanks for making the time available; I should just confirm that we will keep any information that you share with us confidential and store it securely, in accordance with the Data Protection Act. Neither you nor your organisation will be identifiable in our report to BEIS, unless otherwise agreed with you.

Before we go any further, some house-keeping:

- Are you are happy for me to record this interview? The recording will not be shared outside the research team.
- Can we attribute your answers to your organisation?
- Can we match data mentioned in this interview to other data sources?

Financier Questioning Script

1. First, I would like to ask some questions regarding your and your organization's profile and your views on the energy services market:
 - (a) What are the drivers for your investing in energy services? (DQ1, DQ3).
 - (b) How does your organisation support energy service companies / energy efficiency action? (DQ1, DQ3).
 - (c) *What types business / organisation do you work with? Do you have close relationships with individual ESCOs or funds that are structured around particular areas of the energy services business? (DQ1, DQ3, DQ7).
 - (d) Could you please briefly describe your role and responsibilities in supporting energy services? Do you have specialist skills for working on energy services and energy efficiency projects? If so, please describe. (DQ1, DQ3, DQ7).

- (e) *What sorts of finance do you provide (e.g. loans to companies to purchase energy supply or energy efficient equipment, or support purchases that are off the host site's balance sheet through instruments such as operating leases)? Does this differ by client type (e.g. public / private)? (DQ1, DQ3, DQ6, DQ7).
 - (f) *What sorts of contracts do you participate in that specifically relate to energy services and energy efficiency projects? [*e.g. guaranteed savings contracts, shared savings / Energy Performance Contracts.*] Prompt to ask how they manage / transfer risk between the parties for the different contract types and what M&V standards they use. (DQ1, DQ2, DQ3, DQ7).
 - (g) *What is your typical target rate of return for the finance you provide? Does it vary between project type, sector and project duration?
 - (h) *Do you generally achieve your rates of return in practice? (DQ1, DQ3).
 - (i) *Do you have a feel for the size of the overall UK market for all energy services in terms of revenues? Do you have a feel for the market size for energy-efficiency projects in particular? (DQ7). Do you think it will grow, and if so by how much?
 - (j) Are you aiming to grow your support to energy services companies? If you are seeking to grow your business in the energy services supporting field, what ways / strategies are you pursuing? [this might be in terms of developing new fund raising mechanisms, structures, quality standards or other]. (DQ1, DQ3, DQ7).
2. Based upon that, I'd now like to ask a few detailed questions about marketing and barriers.
- (a) *Are there barriers to growth that you see? If they do not mention the following, prompt to check on their views on these barriers: (DQ1, DQ3).
 - (i) EE being a low priority for the client?

- (ii) Low awareness of energy services / the ESCO solution?
 - (iii) Split incentives between energy users and asset owners?
 - (iv) High transaction costs damaging project viability? (the costs involved in developing and negotiating the contract, monitoring the savings etc.
 - (v) Lack of client trust in proposed energy efficiency service solutions and benefits?
 - (vi) Lack of legislation or standards defining the energy services business model, leading to poor client trust and an increased burden in selling the concept?
 - (vii) Finding opportunities with suitable scale and well-defined risks and returns.
- (b) *Are there steps that the market / energy service companies should be taking to overcome these barriers? (DQ1, DQ3, DQ4).
- (c) *Do these steps differ between different sectors, technologies and projects? If so, how? (DQ1, DQ3, DQ4).
- (d) *Do you see projects / ESCOs apply to you for finance that are not successful? If so, what are the main reasons for this? (DQ1, DQ3, DQ4).
- (e) *What are the main routes by which projects are brought to you and which do you find most useful? [*e.g. telemarketing, direct approaches from customers, referrals from existing clients and use of intermediaries and frameworks etc.*] Which seem to have been most effective and what is the evidence for this? (DQ1, DQ2, DQ3).
- (f) Have any government policies or schemes helped drive the market or helped you win energy services business? If so, which ones and how? If they do not mention them, prompt for: (DQ1, DQ2, DQ3).
- (i) Public sector frameworks such as Re:fit, the Carbon and Energy Fund, Essentia and Ecovate?

- (ii) Carbon Reduction Commitment (CRC)
 - (iii) Energy Savings Opportunity Scheme (ESOS)
 - (iv) The EU Emissions Trading Scheme?
 - (v) Enhanced Capital Allowances scheme?
 - (vi) Feed-in Tariffs or the Renewable Heat Incentive scheme?
3. My final section covers what you would like to see improved in the UK energy services market and future energy service market prospects.
- (a) *Are there any particular things that either the sector, customer decision makers or government could improve? Prompt to check on their views on the following (for each, it will be necessary to establish how this benefit might be brought about in their view): (DQ3, DQ5, DQ6, DQ9).
 - (i) More visible political support for the ESCO/EPC market.
 - (ii) More support to overcome financial hurdles.
 - (iii) Access to more bankable projects, in other words growing the number of opportunities that potential clients bring forward, the quality of those opportunities and improvements to the geographic clustering.
 - (iv) More widespread trust in the quality of the ESCO solution.
 - (v) Access to standardised contracts and quality accreditation schemes.
 - (vi) Availability of innovative contractual mechanisms, such as recovery of investment via energy bills or business rates?
 - (b) *For each viewed as helpful:* how might these impact public, commercial and industrial sectors differently? (DQ5, DQ7, DQ8).
 - (c) *[if multiple options selected on 3a] Which would be most useful?

- (d) What has been your organisation's recent experience of growth in the ESCO market, from 2014-2016? % growth per annum. (DQ7, DQ8). (they may note that they have grown/shrunk/stayed the same, in contrast to the rest of the market having grown/shrunk/stayed the same).
- (e) Which areas in the energy services market are seeing growth? If they do not mention them ask for the sectors (commercial, industrial and public sector and the technologies, such as lighting, HVAC, motors and drives, process heat, CHP etc. (DQ7, DQ8).
- (f) *What are your expectations of future growth in the energy efficiency services market? Prompt for a percentage estimate and a timeframe. (DQ7, DQ8).

4. Closing questions:

- (a) Are there any key customers or companies similar to you that we could talk to about their experiences? Also any customers who did not make it through the process / didn't end up taking on support?
- (b) If upon reviewing my notes there is anything we need to clarify, is it okay to get back to you?
- (c) Thank them for their time and close.

Key research issues that this questioning script seeks to answer:

Master questions for the interview research phase are as follows:

MQ1: “What are the barriers that operate in the UK?”

MQ2: “Which success factors does the UK lack?”

MQ3: “Are there missing routes to market?”

MQ4: “Can companies access finance?”

MQ5: “How large is the UK market and what is its potential?”

MQ6: “What is the role of innovation in the market?”

These master questions have been broken down into detailed questions, (DQ1-9), which are then answered by script questions (S1-S4) as so as to provide data to feed the synthesis of answers to the master questions as follows:

Master Questions	Detailed Questions	Script Questions			
		SQ1	SQ2	SQ3	SQ4
MQ1, MQ2, MQ3, MQ4.	DQ1: How does the UK energy efficiency services market function?	X	X		-
MQ1, MQ2, MQ3, MQ4	DQ2: What is driving the UK market for energy services?	X	X		-

MQ1	DQ3: What barriers are perceived by energy efficiency services companies in the UK and for which client types and technologies do these barriers operate?	X	X	X	-
MQ1	DQ4: How do UK energy efficiency services companies address barriers at present?		X		-
MQ1	DQ5: What do service providers see as the priority changes to the market that could assist them in overcoming barriers?			X	-
MQ5	DQ6: What forms of contractual / financial relationships are found in the UK market?	X		X	-
MQ5	DQ7: What is the size of the UK energy efficiency services market?	X		X	-

MQ1, MQ5	DQ8: Is the UK energy efficiency services market growing and expected to grow?			X	-
MQ6	DQ9: How does innovation interact with the market?			X	-

Recruitment Script: ESCO Clients

Good morning/afternoon. My name is X and I am calling from an organisation called Databuild on behalf of the Department of Business Energy and Industrial Strategy (BEIS).

BEIS wants to understand more about UK energy services companies and the infrastructure around them. The aim is to establish the potential for increase in energy efficiency activity through the uptake such services by the public, commercial and industrial sectors, so the interview will be primarily about energy efficiency as opposed to renewable energy.

To achieve this, we are speaking to selected organisations who are or have been customers – or potential customers - in the energy services market. The results of our study will be used to inform policy making in this area, so this is an opportunity for your organisation to feed into BEIS decision making.

Please can I speak to someone who does / would manage the relationship with energy services companies?

If they can, arrange the best time to call back and note that we will send a confirmation e-mail with our credentials (establish their e-mail address and the best direct dial telephone number to contact them on).

If they are not the best individual, ask if they can pass you on to the best person with whom to hold the discussion.

If they refuse outright, attempt to obtain a reason for their refusal.

If asked; ideally 20-30 minutes should be set aside. Responses can be anonymized.

Interview Script: ESCO Clients

Good morning/afternoon., this is X from Databuild calling for the interview that we arranged regarding the BEIS study on the UK energy efficiency services market. Are you still able to go ahead with the discussion?

Thanks for making the time available; I should just confirm that we will keep any information that you share with us confidential and store it securely, in accordance with the Data Protection Act. Neither you nor your organisation will be identifiable in our report to BEIS, unless otherwise agreed with you.

Before we go any further, some house-keeping:

- Are you are happy for me to record this interview? The recording will not be shared outside the research team.
- Can we attribute your answers to your organisation?
- Can we match data mentioned in this interview to other data sources?

Host Site Questioning Script

1. First, I would like to ask some questions regarding your and your organization's profile and your views on the energy services market:
 - (a) We understand that you have considered or gone ahead with an energy services contract. How did you find out about and establish contact with the service company? (DQ1).
 - (b) Could you please describe your role and responsibilities for decision making on energy issues in your organisation? (DQ1).
 - (c) Can you explain a little about your organisation, for example the sector it works in - public, private commercial, manufacturing, retail etc. *Prompt to see if you can get annual revenue (budget for public sector), number of employees, number of sites.* (DQ1).
 - (d) Can you tell us about the energy-using activities that your company carries out? For example, is your work office-based, healthcare, light manufacturing, warehouse, catering, chemicals, etc. What uses most

of your energy? (prompt for HVAC, lighting, engineering equipment, high temperature processes etc.) (DQ1).

2. If they have actually gone ahead with an energy services contract, question as follows. If their project did not go ahead, proceed straight to question 3.
 - (a) Was this an energy or utility supply contract (steam, power, heat, compressed air etc.) or was it to improve energy efficiency or manage demand? Was it a consultancy contract, shared savings contract or an energy performance contract? (DQ1, DQ6).
 - (b) What was their main motivation for taking an energy services approach to implement their project? If they do not mention them, prompt for: (DQ1, DQ2, DQ7).
 - (i) Better quality of implementation compared to in-house.
 - (ii) Cost savings.
 - (iii) Access to third party finance.
 - (iv) Reduction of process risk.
 - (v) Improvement in quality of service/staff comfort/H&S.
 - (vi) Innovation.
 - (vii) Other?
 - (c) How was the project funded, for example using your own organisation's funds, funded on the energy service company's balance sheet, or with project finance from a third party? Were any innovative mechanisms used to fund the project, for example green bonds? (DQ6)
 - (d) Did any government policies or initiatives help or motivate you to take the project forward, possibly with information, introduction to contractors, incentives or other support? If so, which ones and how? If they do not mention them, prompt for: (DQ5)

- (i) Public sector procurement frameworks such as Re:fit, the Carbon and Energy Fund, Essentia and Ecovate?
 - (ii) CRC? (Carbon Reduction Commitment)
 - (iii) ESOS? (Energy Savings Opportunities Scheme)
 - (iv) The EU Emissions Trading Scheme?
 - (v) Enhanced Capital Allowances scheme?
 - (vi) Feed-in Tariffs or the Renewable Heat Incentive scheme?
 - (vii) Salix zero interest loan for public sector
- (e) What were the most significant barriers you faced in taking the contract forward and how were they solved? If they do not mention them, prompt for: (DQ3, DQ4).
- (i) Insufficient energy savings to make worthwhile
 - (ii) The time needed to develop sufficient knowledge of the process?
 - (iii) Difficulty in explaining and selling the concept to other stakeholders in the organisation?
 - (iv) Unfamiliarity with aspects of the technologies offered?
 - (v) Concern at the lack of government guidelines or endorsements of the process?
 - (vi) Difficulty in defining risks and returns?
 - (vii) Scale of the project or payback period? (for example was the scale too small for the service company, or was the payback unattractive?)
 - (viii) Access to finance and funding issues, such as split incentives between the holders of budgets for capital investment and operating costs?

- (ix) High transaction costs damaging project viability? (namely costs to develop the project, the associated contracts and to procure the services).
 - (x) Legal, corporate policy or treasury issues?
 - (xi) Other?
 - (f) Did the project deliver the cost and energy savings expected? (DQ1, DQ3, DQ4).
 - (g) Have there been any ongoing problems with administering the contractual processes and for proving performance and payments? (DQ1, DQ3, DQ4).
 - (h) Have they had other energy services projects fall by the wayside while in development? If so: (DQ1, DQ3, DQ4)
 - (i) Why did the project fail and at what stage?
 - (ii) What sort of project was it (energy supply or energy efficiency, and what was its size, financing route etc.)
 - (iii) Did they eventually implement the project through a route other than via an energy services company?
 - (i) Go to Q4.
3. For those that have considered a project but not taken it forward with an energy services company: (DQ1, DQ3).
- (a) Why not? At what stage did they abandon it?
 - (b) What sort of project was it (energy supply or energy efficiency, and what was its size, financing route etc.)
 - (c) Did they eventually implement the project through a route other than via an energy services company?
 - (d) Was it successful?

4. My final section covers what you would like to see improved in the UK energy services market.
- (a) Are there any particular things that either the energy services sector, intermediaries/facilitators, government or decision makers in companies could improve? (If asked explain that by intermediaries and facilitators are usually framework contracts and consultants). (DQ5)
 - (b) Prompt to check on their views on the following (for each, it will be necessary to establish how this benefit might be brought about in their view): (DQ5).
 - (i) More visible political support for the ESCO/EPC market.
 - (ii) More support to overcome financial hurdles.
 - (iii) More materials to help build trust in the quality of the ESCO solution for example case studies
 - (iv) Access to standardised contracts and approved scheme templates.
 - (v) Quality accreditation and benchmarking schemes.
 - (vi) Availability of innovative contractual mechanisms, such as recovery of investment via energy bills or business rates?
 - (vii) Access to more service providers to improve the competitiveness of tenders.
 - (viii) Access to intermediaries and facilitators to smooth the procurement process and improve confidence amongst decision makers?
 - (ix) Schemes whereby they could join together with similar projects to help reduce transaction costs?
 - (x) other

5. Closing questions:
 - (a) If upon reviewing my notes there is anything we need to clarify, is it okay to get back to you?
 - (b) Thank them for their time and close.

Key research issues that this questioning script seeks to answer:

Master questions for the interview research phase are as follows:

MQ1: “What are the barriers that operate in the UK?”

MQ2: “Which success factors does the UK lack?”

MQ3: “Are there missing routes to market?”

MQ4: “Can companies access finance?”

MQ5: “How large is the UK market and what is its potential?”

MQ6: “What is the role of innovation in the market?”

These master questions have been broken down into detailed questions, (DQ1-9), which are then answered by script questions (S1-S4) as so as to provide data to feed the synthesis of answers to the master questions as follows:

Master Questions	Detailed Questions	Script Questions				
		SQ1	SQ2	SQ3	SQ4	SQ5
MQ1, MQ2, MQ3, MQ4.	DQ1: How does the UK energy efficiency services market function?	X	X	X		-
MQ1, MQ2, MQ3, MQ4	DQ2: What is driving the UK market for energy services?		X			-

MQ1	DQ3: What barriers are perceived by customers of energy efficiency services companies in the UK and for which technologies do these barriers operate?		X	X		-
MQ1	DQ4: How do UK energy efficiency services companies address barriers at present?		X			-
MQ1	DQ5: What do customers see as the priority changes to the market that could assist them in overcoming barriers?		X		X	-
MQ5	DQ6: What forms of contractual / financial relationships are found in the UK market?		X			-
MQ6	DQ7: How does innovation interact with the market?		X			-

Annex 3: International Review

International Case Study Selection Methodologies

The review of international policies and market features is described here to illustrate the level of detail required for developing national rankings. The review was performed through an iterative process, in which the two best-known markets, the USA and Germany, were first examined and key items of legislation and market features were identified. These legislative and market features were then searched for amongst each of the other nations to record whether they had those features. If in studying a nation some further new legislative or market feature was found, this feature was then searched for in all the other nations of the study, including those previously examined.

This snowball research process enabled us to build a comprehensive and consistent picture of all the nations in the list. The sources consulted were extremely wide-ranging and included international studies, the relevant ministries of the nations concerned, executive agencies and non-governmental organisations.

The results are shown in Table 14. In this table “Y” means that a measure was seen to be present in the market, while “N” means that the measure was definitely not present. If a cell is left blank this means that no data could be found on the presence or absence of the measure, which most likely implies that it is absent in that market.

Table 2: Summary table of national rankings.

Nation	Strong National Energy Targets?	Government Subsidy for NDEE?	Tax Credits for EE?	Strong Trade Bodies?	Active Intermediaries?	Policies Targeting ESCO Solutions?	Standard Contracts Common?	EPC Quality Schemes?	EPC Contractor Quality Registration?	Energy Users Networks?	Energy Users Survey Obligation	Supplier Obligations?	Strong Facilitation Available?	EPC Public Procurement Standards	Government Handbook for EPCs?	Strong EPC Private Sector Base?	Many Case Studies Available?	Government Fin. Support for EPC?	Mature EPC Market?	Government Loans or Guarantees?	Private Performance Insurance?	Innovative Financing?	Strong National Policy Focus on EPCs?	Strong Trust in EPC Solution?	No Municipal Debt Issues?	No Restrictive Public Finance Rules?	No Major Issues with Split Incentives	No. Ys	No. Ns
USA	Y		Y	Y	Y				N			Y	Y			Y	Y		Y	N	Y	Y	Y	Y	Y			15	2
Finland	Y	Y	N	N	Y	Y			Y		Y	Y			Y	Y	Y	Y	Y			Y	Y	Y	Y	Y		14	2
Germany	Y	Y	Y	Y	Y	N	N	N	N	Y		N	Y			Y		Y	Y	Y		Y	Y	N		N		13	7
UK	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	Y	Y			Y				Y		N		Y	Y	N	12	8
Ireland	Y	Y	Y	N	N	Y	Y	N	N	Y		Y	Y	N	Y	N	N	Y	N				Y		N	Y		12	9
Italy	Y	Y	Y	Y		N		N	Y		Y	Y			N	N			Y	Y		Y	N	N	N			9	7
Denmark	Y	Y	N	Y		Y	Y	N	N	N		Y	Y	Y		N			Y								N	9	6
Canada	Y	Y	N	Y	Y	Y			Y			Y	Y			N	N			Y			N	N				9	5
Australia	Y			Y		Y	Y		Y		N	Y			Y	N	N			Y		Y	N					9	4
Czech	Y			Y		N	Y					N	Y			Y	N		Y	Y		Y	N	N	N	N	N	8	8
Belgium	Y	Y	Y	Y	Y				N		Y	N	N	N	N	Y	N	Y	N	N		N	N	N	N	Y		8	13
Chinese	Y			Y	N	Y					Y	N	Y		N		Y	Y	N	Y			N					8	5
Austria	Y	Y		Y	Y	Y	N	Y	N	N		Y					N							N	N			7	6
France	Y	Y	Y	Y	N	Y	Y	N	N	N	Y	Y				N			Y			Y		Y	Y	N		12	6
China	Y	Y	N	N	N	N	N	N	Y	N		N						Y	N	N		N	Y		Y	Y		7	11
Singapore	Y	Y		Y					Y																			4	0

Table 3: Summary table of national rankings.

EPC Market Size	Normalised Market size	Positive Market Factors (Average Scores)	Positive Market Factors (High Rankings)	Addressing EU Market Barriers (Average Scores)	Addressing EU Market Barriers (High Rankings)	World Market Growth 2012	EU Market Growth 2015	World Market Growth 2017	Global Positive Policies & Market Features
All World Data	All world data	EU Nations only	EU nations only	EU nations only	EU nations only	All world data	EU nations only	All world data	All world data
China	France	Austria	Finland	Finland	Finland	Denmark	Norway	China	Germany
USA	Germany	Finland	Austria	Ireland	Cyprus	Ireland	Slovenia	USA	Finland
Germany	China	France	Czech	Belgium	Ireland	Spain	Czech	Netherlands	USA
Canada	Singapore	Ireland	Russia	Switzerland	Belgium	China	Belgium		France
Japan	Taiwan	Czech Republic		Austria	Switzerland	USA	Denmark		Ireland
France	Slovak Rep.	Portugal		Sweden	Austria				UK
	USA			Cyprus	Denmark				
	Canada			Czech Rep.	Lithuania				
	Denmark			Poland					
				Spain					
				Norway					

Topic-Based Case Study Selection Methodologies

The only consistent review of the UK's market in comparison with international exemplars is was carried out in 2012 by the Joint Research Centre of the European Commission and covered the EU and neighbouring nations. Assessment of this information identified several ESCO market barriers and enablers where the UK was seen to be lagging behind. The age of this study, combined with recent UK action on the topics meant that this review was used to develop initial points that would be then subjected to review in telephone interviews and workshops. These initial topic areas were as follows:

Table 4: Barriers and Enablers for Workshop Discussion.

UK Barriers and enablers that needed improvement in 2012
Barrier 1: Split incentives.
Barrier 2: Legislation for defining ESCOs and EPCs.
Barrier 3: High transaction costs.
Barrier 4: Lack of trust.
Enabler 1: Availability of finance.
Enabler 2: Restrictive factors in the private sector
Enabler 3: Information and demonstration case studies.
Enabler 4: Improvement of trust.

Results of interviews and workshops

The initial topic areas were first discussed in scripted telephone interviews, then tested in a face-to-face workshop at BEIS offices. The key issues that emerged were then further refined and discussed in an online workshop.

Following these stages of discussion, the final views on barriers and enablers are given in the table following, including three supplementary enablers that were raised during the workshops:

- Enabler 5 Lack of salience of energy efficiency.
- Enabler 6: Improved industrial process knowledge.
- Enabler 7: Lack of client decision making capability.

Table 5: Outcomes of Workshop Discussions on Barriers and Enablers,

Issue	Workshop and interview discussions	Conclusion
Barrier 1: Split incentives.	<p>Split incentives were brought up in interviews by many respondents when prompted. They were also cited as problematic during the workshops. Although there was acknowledgement that the UK’s forthcoming MEES scheme for commercial rented property would help to address landlord-tenant split incentives, it was acknowledged that in isolation the scheme might drive compliance rather than adoption of the best efficiency solution for all stakeholders. This might be overcome by helping tenants to better understand the operating cost implications of different EPC ratings. In addition a roadmap for tightening the compliance standards would help asset owners to invest for the long term.</p>	<p>This remains a key issue and international case studies reveal how other nations have used labelling standards and tenant awareness to drive property refurbishment.</p>
Barrier 2: Lack of legislation for defining ESCOs and EPCs.	<p>Many interviewees identified that a lack of official definitions for ESCOs and EPCs impacted on trust in the concepts. They felt that some form of official guidance would help to build confidence amongst clients.</p>	<p>While this was felt not to be a headline case study topic, it is strongly linked to the issue of high transaction costs in Point 3 and quality systems and trust that is brought up in Point 4.</p>

Issue	Workshop and interview discussions	Conclusion
Barrier 3: High transaction costs.	<p>High transaction costs were also cited frequently in interviews when prompted. In the workshop they were identified as damaging the viability of projects, particularly for SMEs. Consultants have frequently cited template contracts as being a solution to this problem, but the workshops felt that any one-size-fits-all template solution would be inappropriate. A better solution would be guidance to assist stakeholders to more efficiently modify their standard contracts. In addition, over time, an increased volume of contracts would naturally develop a library of time saving generic contract terms. Similar guidance for business cases would also assist - The Investor Confidence project was cited as an example, while the EU's QualitEE initiative seeks to develop harmonised quality standards on which the industry could rely.</p>	<p>Provision of better guidance to assist in business case standardisation and contractual formulation, and a learning-by-doing approach were recommended as the best solutions for the UK. While UK examples are available, it is not clear whether these are not widely known of or lack the right content to have an impact.</p>
Barrier 4: Lack of trust.	<p>Lack of trust was cited as an issue when prompted by many interviewees. There were mixed responses during the workshops. One highly experienced practitioner did not recognise it as a problem, while several ESCOs mentioned the lack of credibility of ESOS reports as having damaged trust. The poor or at least mismatched skills of some ESOS auditors was strongly cited as having damaged the credibility of energy efficiency as a business proposition. Two workshop attendees also criticised the quality of insight and advice that they had seen from ESCOs, who did not properly understand solutions or the interactions between them. Even the quality of some ESCOs within existing public sector frameworks was raised as an issue that could damage trust.</p>	<p>Trust appears to be a major issue – not necessarily at the stage when serious proposals are being put forward, but rather at the stage when a company is considering whether it should call in consultants and ESCOs. Improving the quality checking of ESCOs on frameworks is a very important theme, and measures for building trust should figure prominently in any case studies.</p>

Issue	Workshop and interview discussions	Conclusion
<p>Enabler 1: Availability of finance.</p>	<p>Although availability of finance was raised as an unprompted issue during interviews, there was no mention of it during the workshops except when prompted. The conclusion is that in the UK, although finance is difficult to get, it is available for good quality projects. Workshop attendees agreed that availability of low cost finance would be beneficial, especially as a means for driving compliance with schemes such as ESOS.</p>	<p>While finance does not appear to be a strong UK case study topic, it can be used as a tool to drive better compliance with schemes such as ESOS or MEES and international examples should be mentioned.</p>
<p>Enabler 2: Restrictive factors in the private sector</p>	<p>Restrictive factors in the private sector include lack of awareness of the ESCO solution, split incentives between stakeholders, organisational inertia and especially the issue of faulty corporate decision-making processes. These were cited unprompted in interviews, sometimes directly or via closely aligned issues.</p>	<p>Solutions to faulty corporate decision-making processes were held to be a strong case study topic, if examples can show how corporate decision making can be improved. Split incentives were seen as less important, but the lack of a complete solution in the MEES scheme for the property sector indicates that this should not be ignored in case studies. Better use of tangible performance data and green leases should be mentioned as case study solutions.</p>

Issue	Workshop and interview discussions	Conclusion
<p>Enabler 3: Information and demonstration case studies.</p>	<p>The benefit that information and case studies can bring was not raised directly during interviews, but was alluded to in terms of the importance of raising awareness of the ESCO solution, and of improving trust in the veracity of energy savings claims. This issue was also referred to during workshops, and the availability of benchmarking information to spur corporate awareness was mentioned. The removal of information and benchmarking resources that were formerly available through UK energy efficiency best practice programmes was cited as a major loss to the sector.</p>	<p>The general view was that more information would help to overcome barriers to decision making, and that case studies of how this was done elsewhere might be useful.</p>
<p>Enabler 4: Trust.</p>	<p>Trust was frequently cited during interviews as an important issue in selling ESCO solutions, and the workshops also emphasised that building trust was important.</p>	<p>See view on Point 4</p>
<p>Enabler 5 Lack of salience of energy efficiency.</p>	<p>A low priority on energy efficiency was cited by interviewees as the most important barrier they faced. It was also frequently mentioned in the workshops. Workshop attendees mentioned the lack of credibility of ESOS audits being a contributory factor. In addition, although the cost reduction driver was assessed as being strong, they also acknowledged that businesses often have other priorities. Attendees felt that ESCOs could do more to sell the attendant benefits of quality, throughput and H&S that come with improved energy efficiency processes, as these are strong drivers for companies. In addition, practical local case studies from local peer group networks were felt to be a potentially useful approach to build confidence of SMEs and precipitate action.</p>	<p>Raising the ability of ESCOs to develop value-added wrappers for their services would address this issue, although international case studies on this topic are rare. The local energy saving club/network approach was thought to be a case study that should be presented, particularly as peer group examples are powerful motivators.</p>

Issue	Workshop and interview discussions	Conclusion
<p>Enabler 6: Improved industrial process knowledge</p>	<p>The workshops specifically identified that manufacturing process experts are often still disconnected from energy efficiency experts, leading to sub-optimal solutions in industry. The two technical areas need to be more strongly harmonised to deliver the energy productivity transformation that is needed. Former UK programmes addressed this issue, but the materials developed are now behind paywalls and many are out of date.</p>	<p>The US Energy Star programme is a good case study on the use of more detailed technical information that penetrates into commercial and industrial processes.</p>
<p>Enabler 7: Lack of client decision making capability</p>	<p>The workshops strongly indicated that decision making capacity is a strong differentiator between companies, rather than their precise business sectors. In particular scale and corporate governance dictate whether they have sufficient resources to understand efficiency issues properly, or whether they topple over into top-heavy decision making processes that impede action. In particular, SMEs have significant aggregate potential, but are often below the “Sweet spot” for decision making, and need more support.</p>	<p>Energy clubs, local networks and intermediary services were felt to be useful case studies that could show how this barrier could be overcome.</p>

Proposals for case studies

Based on the results of the workshops, issues were considered in terms of how they overlapped and whether or not international case study examples were available. The following case study titles, together with sub-topics were agreed:

Incentivisation of the market

Topics to be covered:

- Building energy labelling, energy awareness for tenants and green leases to overcome split incentives. (Barrier 1, Enabler 3)
- Using financial incentives and penalties, possibly via energy supplier obligation schemes, to overcome the salience barrier for energy efficiency. (Enabler 1, Enabler 5)

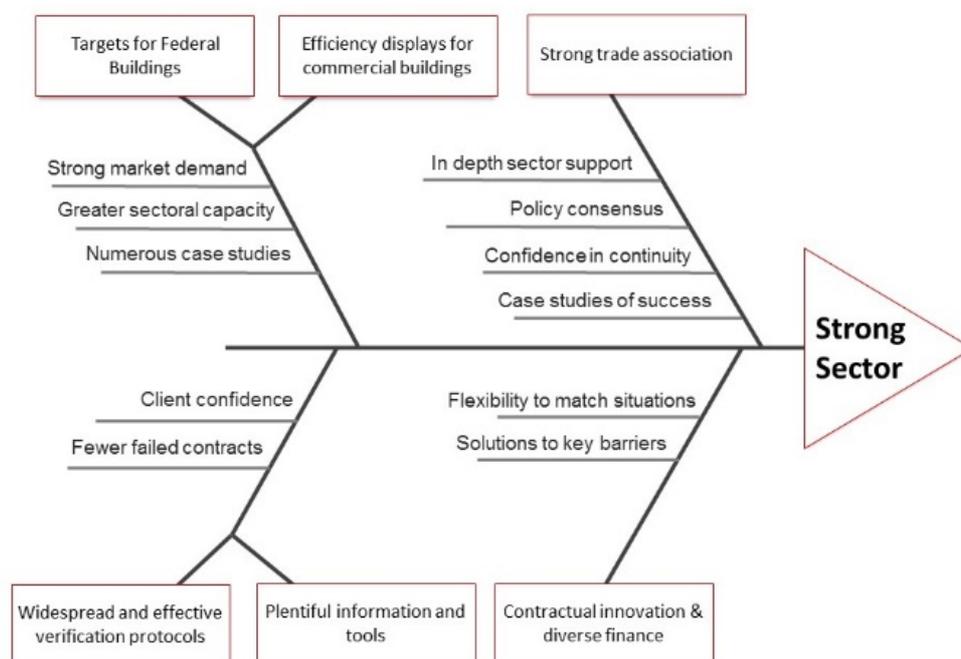
Aggregation and standardisation

Topics to be covered:

- The value of official guidance on ESCOs, EPCs and contractual terms. (Barrier 2, Barrier 3, Enabler 2, Enabler 7)
- Using quality schemes in an energy performance context. (Barrier 4, Enabler 4)
- Improving energy efficiency skills amongst industry and process knowledge amongst energy efficiency services providers. (Enabler 6, Enabler 7)
- Deploying local energy efficiency networks and large energy user networks for helping companies and especially SMEs to gain confidence in energy efficiency. (Enabler 3, Enabler 5, Enabler 7)

International and Topic-Based Case Studies

Energy Efficiency Services in the USA



The US market for energy services, and energy efficiency services in particular, is the largest in the OECD, second only to that of China globally. The USA has developed many of the energy efficiency service methodologies and contractual mechanisms that are now accepted around the world. The market has grown steadily and healthily, and over the long term has proven relatively resilient to economic downturns. It has been strongly driven by energy efficiency targets adopted for federal buildings, and is underpinned by capacity for innovation in the development of buildings systems, such as for HVAC.

The shape of the US market

In 2016 Lawrence Berkeley National Laboratory estimated that there were 47 dedicated energy efficiency service providers across the US. Of the overall energy services sector revenue, nearly 75% is for energy performance projects. 8% of the overall services market is located in the commercial and industrial sectors. While projects in the private sector rose from \$277m in 2008 to \$409m in 2014, they stayed in the range of 7-8% of the overall market, which grew by 40%¹⁴.

Data from 2011¹⁵ and 2014¹⁶ showed overall market growth significantly lower than projections, with revenues steady at \$5.3bn, but the small to medium sized players

¹⁴https://www.naesco.org/data/industryreports/LBNLrevised_market_potential_final_25apr2017.pdf

¹⁵<https://aceee.org/files/proceedings/2014/data/papers/3-319.pdf>

¹⁶https://www.naesco.org/data/industryreports/esco_recent_market_trends_30sep2016.pdf

increasing market share. The lack of headline growth may reflect both changes to reporting by corporations with efficiency services divisions, as well as growth in provision of energy efficiency services by businesses for whom it is not a core focus. The most recent data from Navigant indicates that the US market has grown to almost \$8bn in 2017¹⁷.

Public sector edicts driving the market

The market for Federal building retrofits is driven by the 2011 and 2015 Presidential Executive Orders that mandated surveys of Federal buildings and implementation of energy conservation measures that pay back in less than 10 years¹⁸. Federal agencies are required to develop annual plans to sign up target values of energy performance contracts.

The commercial property market is also being stimulated by benchmarking and transparency policies in 15 US cities, one county and two states that require asset owners to disclose the actual energy consumption of buildings¹⁹. Reporting may be transactional (on rental or sale), or annual, such as in Seattle's Energy Benchmarking Programme. Surveys have shown consistent uplifts in occupancy, rental values and asset values for more efficient buildings²⁰.

Facets of market maturity

The market, (which is mainly public sector), has seen a slight reduction in Design and Build contracts (where no performance guarantee is given), in favour of contracts where performance is incentivised²¹. This indicates that clients are happy to trust in the integrity of the performance incentivisation process. US energy efficiency service providers have identified that there is some erosion of their revenues by conventional mechanical and electrical engineering contractors for whom performance contracting is not historically a core business. These contractors now appear comfortable in managing the risks of not only guaranteeing performance, but also running the necessary monitoring and verification processes. This shows that in a mature market the traditional definition of an energy efficiency services provider can become blurred, as formerly specialist disciplines become mainstream.

¹⁷ Navigant ESCO Market Overview, 2017.

¹⁸ <https://obamawhitehouse.archives.gov/the-press-office/2015/03/19/executive-order-planning-federal-sustainability-next-decade>

¹⁹ <https://www.energy.gov/eere/slsc/state-and-local-energy-benchmarking-and-disclosure-policy>

²⁰ <http://www.abettercity.org/docs/06.2012%20-%20Benchmarking%20report%20-%20Final.pdf>

²¹ <https://emp.lbl.gov/sites/all/files/lbnl-5447e.pdf>

Holistic business cases common

Building non-energy benefits into business cases is common in the US, capturing avoided O&M, capex and reduced water consumption²². This has grown in importance, as reductions in energy prices and volatility mean that projects need other income streams to maintain viability. In some cases, dependent on the sector, the main motivation may be improvement in facilities and reduction of maintenance backlogs, rather than energy savings²³.

Innovation in contractual models

Innovation is helping to reduce risk premiums in finance and to solve the problem of split incentives. Many US States now allow finance repayments through utility bills and four states have allowed innovative “Tariffed On Bill” schemes, based on the “Pay As You Save” template (PAYS[®])²⁴. This has been most widely implemented by co-operative utilities, allowing them to recover efficiency investments via special tariffs that are linked to metering points and which can pass between successive tenants and solve the split incentives barrier. These schemes are most often applied to households, but commercial properties are also eligible. Because customers with poor credit ratings tend to prioritise paying utility bills, recovering investments via bills can boost their credit ratings and improve access to lower cost finance to unlock opportunities

The Commercial Property Assessed Clean Energy programme (C-PACE) was developed to overcome the barrier that is raised when efficiency savings are split in time by changes in ownership or tenancy for commercial properties²⁵. Finance is recovered via an uplift in local taxes on the property, with the finance being secured on the asset so as to access private finance with a lower risk premium. Although successful, it faces barriers associated with the complexity and the learning curve that local authorities must manage in developing processes, and, of the 33 States with legislation, only 20 currently have active programmes²⁶.

Diverse funding routes available

Industrial and commercial clients tend to fund projects themselves, while the public sector uses external finance more often. 30% of large efficiency projects use Federal funds in some form or other, sometimes for reducing risks or subsidising interest payments to bond holders, such as in Qualified Energy Conservation

²²<https://emp.lbl.gov/sites/all/files/incorp-nonenergy-benefits-aceee.pdf>

²³<https://oaktrust.library.tamu.edu/bitstream/handle/1969.1/5193/ESL-IC-01-07-05.pdf?sequence=4&isAllowed=y>

²⁴<https://aceee.org/sector/state-policy/toolkit/on-bill-financing>

²⁵<http://www.cpace.com/>

²⁶<http://pacenation.us/pace-programs/>

Bonds²⁷. Some energy efficiency services providers have developed portfolios of projects and subsequently securitised the cash flows and sold them on to recover investment. The mature US municipal bonds market²⁸ is a large source of finance, and commercial loans and equipment leases are also frequently used, depending on sectoral preferences²⁹.

Support for decision making on efficiency

A number of useful tools are available from The Energy Star[®] programme and the Federal Energy Management Program (FEMP) to assist organisations to track and analyse consumption, and develop energy efficiency performance contracts. Assistance includes the “Energy Savings Performance Contract Energy Sales Agreement Toolkit”³⁰ and the “Energy Star Portfolio Manager”³¹ for benchmarking commercial buildings energy performance.

Another source of assistance is the Energy Efficiency Institute in Vermont, which assists adopters of the PAYS scheme with template forms.

Trust in the energy efficiency solution

Stakeholders in the US collaborated to develop the International Performance Measurement and Verification Protocol (IPMVP[®])³² to provide standards for measuring efficiency savings and to verify performance to run contractual mechanisms. The protocol has built confidence in the processes needed to develop and run successful energy performance contracts and is now a de facto global standard.

Strong industry association

The US energy services industry association, NAESCO has seven full time staff and assists the sector through accreditation, training, and development of supporting frameworks. NAESCO has played a strong role in developing a public policy consensus on the benefits to the nation of the services approach to delivering energy efficiency³³.

²⁷https://www.energy.gov/sites/prod/files/2014/06/f16/QECB_memo_12-13-13.pdf

²⁸http://www.mapc.org/wp-content/uploads/2017/10/Regional_ESCO_II-DLTA_Report.pdf

²⁹<https://emp.lbl.gov/sites/all/files/lbnl-5447e.pdf>

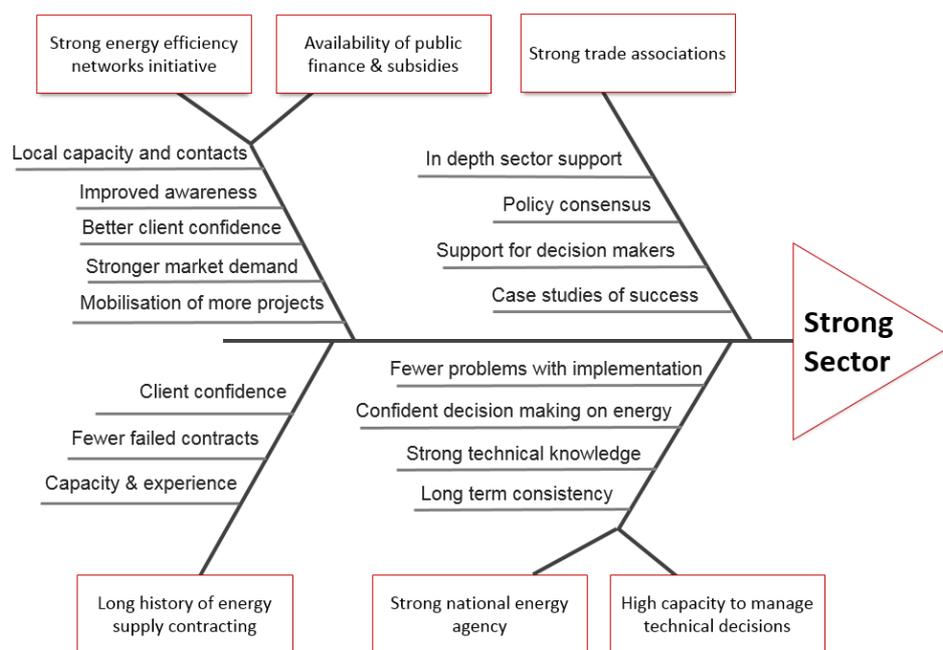
³⁰<https://www.energy.gov/eere/femp/downloads/energy-savings-performance-contract-energy-sales-agreement-toolkit>

³¹<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

³²<https://evo-world.org/en/products-services-mainmenu-en/protocols/ipmvp>

³³<http://www.naesco.org/>

Energy Efficiency Services in Germany



Germany is one of the largest markets for energy services in the European Union and globally. The largest volume of contracts in Germany is for energy supply services, but the development of the energy performance contracting market is somewhat uneven across regions. The reasons for the good development of energy services in general probably lie in a combination of strong foundations, with well-engaged government institutions, a good legal framework, strong trade associations, and facilitation of the market by the national energy agency, DENA. It is recognised that the vital “Mittelstand” SME sector, while it has made efficiency savings, still has a significant number of opportunities to implement. In answer, the government has now deployed a wide range of measures to promote energy efficiency and service models. Subsidised energy audits for SMEs and financial support for SMEs engaging with energy services companies is now available. Low cost finance is available from the government’s KfW bank, and an innovative scheme allows companies to bid for energy efficiency investment funds. A large programme of local energy efficiency networks is being rolled out, with good savings already being registered by larger companies. This programme has strong participation from SMEs.

The shape of the German market

In 2015 the European Commission’s Joint Research Centre estimated that there were around 500 energy services providers in Germany, of which around 7-10

consistently offered energy efficiency services³⁴. The overall energy supply services sector was estimated to be around €9.8bn in 2017³⁵, with possibly around €750m coming from energy efficiency services across all user sectors in 2012-13³⁶. In 2017, Navigant estimated that in 2017 the energy efficiency services market had grown to \$1.5bn. While Germany's approach is mainly to promote and fund energy efficiency improvements in general, it does have some policies that are specifically aimed at supporting access to ENERGY SERVICES PROVIDER services amongst SMEs.

A range of targeted assistance

The “Deutschland Macht's Effizient” promotes knowledge on energy efficiency across all sectors, supported with €19bn of efficiency incentives³⁷. It promotes the use of energy services, and also acts as an umbrella brand for the promotion of existing efficiency-related schemes that include:

- The 2008 SME Energy Consulting Programme that provides subsidies of up to 80% for energy audits at SMEs and matches them up with energy efficiency loans from the KfW bank.
- The 2013 SME Initiative for Energy Reforms and Climate Protection that assists SMEs to align themselves with Germany's energy transition, providing advice and guidance on efficient, low carbon energy. The scheme includes training for company energy champions and support for SMEs to collaborate with students of energy issues.
- The “Energy-Related Urban Renewal - Grants for Integrated District Concepts and Renovation Managers” programme that started in 2014 and offers grants for renovation managers to work with asset owners to develop integrated district refurbishment plans that improve energy efficiency, particularly for supply of heat.
- The 2012 (redesigned in 2016) programme “Investment Grants for the Use of Highly Efficient Cross-Sectoral Technologies” that assists SMEs to improve efficiency in equipment such as motors and drives, compressed air systems and heating plant.
- The Energy Efficiency Incentive Programme (Anreizprogramm Energieeffizienz - “APEE”) that started in 2016 and specifically targets modernisation of heating systems to include renewable energy.

³⁴ Energy Services Companies in the EU, Boza-Kiss et al, JRC 106624.

³⁵ (Bundesministerium für Wirtschaft und Energie, NEEAP 2017)

³⁶ Monitoring the energy efficiency service market in Germany, Offermann et al, Prognos AG, 2013.

³⁷ <https://www.deutschland-machts-effizient.de/KAENEF/Navigaton/DE/Home/home.html>

- Direct support for SMEs that are interested in energy contracting. A €2,000 grant is available to support companies in learning about the potential of energy services, while a €7,500 grant is available to support implementation advice from an ENERGY SERVICES PROVIDER.
- The 2017 “STEP up!” Programme that allows organisations to submit electricity efficiency schemes into the bidding process, with funds being awarded to the proposals that offer the highest savings per unit of investment³⁸.

Well-resourced industry representation

Energy services in Germany are represented by several organisations, including the Federation for Cogeneneration (Bundesverband für Kraft-Wärme-Kopplung – “B.KWK”)³⁹ and the Association for Heat Delivery, (Verband für Wärmelieferung – “VfW”)⁴⁰. VfW operates a dedicated website for energy performance contracting “energiecontracting.de” which amongst other services gives advice and acts as an intermediary by providing access to customer enquiries and tenders.

Long-term visibility and transparency

In 2011, the government started work on its energy refurbishment roadmap (“Energetischer Sanierungs- fahrplan Bundesliegenschaften”) to deliver 20% heating savings by 2020 for federal government properties⁴¹. This roadmap appears to have been delayed at the federal level, and has since been emerging on a state-by-state basis, giving the industry visibility of the future shape of public procurement of energy efficiency services.

In 2017, the revised General Administrative Provisions for the Procurement of Energy Efficient Products and Services (Allgemeine Verwaltungsvorschrift zur Beschaffung energieeffizienter Produkte und Dienstleistungen (AVV-EnEff)) placed requirements on government, state and municipal procurements to take into account lifetime energy consumption, and to adopt federal minimum efficiency standards for certain categories of goods⁴².

Guidelines and support to grow confidence in technical solutions and energy performance contracts

Several federal and local government documents provide useful guidance on energy performance contracting. One of the best known are the 2012 guidelines for energy

³⁸<https://www.deutschland-machts-effizient.de/KAENEFF/Redaktion/DE/Foerderprogramme/C-step-up.html>

³⁹<http://www.bkww.de/startseite/>

⁴⁰<https://www.energiecontracting.de/>

⁴¹http://www.bundesbaublatt.de/artikel/bbb_Sanierungsfahrplan_Bundesliegenschaften_1441756.html

⁴²http://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_18012017_IB3.htm

performance contracting in public buildings issued by the Hessian Ministry for the Environment, Climate Protection, Rural Development and Consumer Protection⁴³.

In 2017, in order to support the drive for refurbishment, the government released the “Tailored modernisation roadmap”, an approach that gives owners clarity of energy efficiency renovation options for specific types of buildings⁴⁴. While this does not specifically target the energy service delivery model, it helps owners to develop the portfolios of projects that are likely to have the scale that is suitable for outsourced delivery.

Mandatory energy audits for large organisations

The 2015 Law on Energy Services and other energy efficiency measures (Gesetz über Energie-dienstleistungen und andere Energie-effizienz- maßnahmen⁴⁵) requires large commercial organisations to carry out energy audits every four years, raising awareness of opportunities for energy savings at board level.

Access to affordable finance and guarantees

The government’s KfW Förderbank (KfW promotional Bank) provides loans to residential and municipal energy saving projects and its Energy Turnaround Financing Initiative supports efficient generation⁴⁶. The Energy Efficiency Programme covers end use in production facilities and processes, waste heat recovery, energy efficient construction, refurbishment, renewable energy and storage, giving loans of up to €25m over 20 years. Loans have interest rates from 1%, and include up to three interest-free years, dependent on the term of the loan⁴⁷.

The government is also working with 16 regional banks to set up an SME loan guarantee programme for smaller technology-specific energy performance projects that are ideally suited to SME energy services providers and clients.

Powerful local efficiency networks

In 2015, the German Energy Agency, DENA, started to sponsor local efficiency networks in partnership with 21 Industrial Associations⁴⁸. The goal is to establish 500 networks by 2020. Each will contain 8-15 companies who will exchange information and best practice on energy efficiency, develop voluntary targets and assist each other with action. The network organisation will provide consultants to

⁴³https://www.energieland.hessen.de/pdf/Contracting-Leitfaden_2012.pdf

⁴⁴<http://www.zukunft-haus.info/bauen-sanieren/nichtwohngebaueude/dena-angebote/sanierungsfahrplaene.html>

⁴⁵<https://www.gesetze-im-internet.de/edl-g/BJNR148310010.html>

⁴⁶<https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/index-2.html>

⁴⁷<https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/index-2.html>

⁴⁸https://ipeec.org/upload/publication_related_language/pdf/155.pdf

assist members with funding applications and to moderate meetings. As well as providing members with advice on grants, subsidies and funding options that they can access, the networks will potentially act as a new channel to market for energy efficiency service providers. Results so far indicate that large companies are saving around 10% of energy, that there is good participation from SMEs and that satisfaction levels are high⁴⁹.

Energy performance contracting portal and contractor registration lists

The German Energy Agency, DENA, runs a comprehensive central website for energy contracting, covering all aspects of performance contracting, including detailed template contracts, explanatory documentation and access to advice⁵⁰. There are case studies of successful projects for many sectors. The site also gives access to the federal website that contains lists of registered experts in energy efficiency⁵¹. Experts must submit credentials, be qualified to issue buildings energy performance certificates, have successfully developed a low energy building project and must give evidence of training for a basic registration. They must undergo regular re-training to maintain their position on the list⁵².

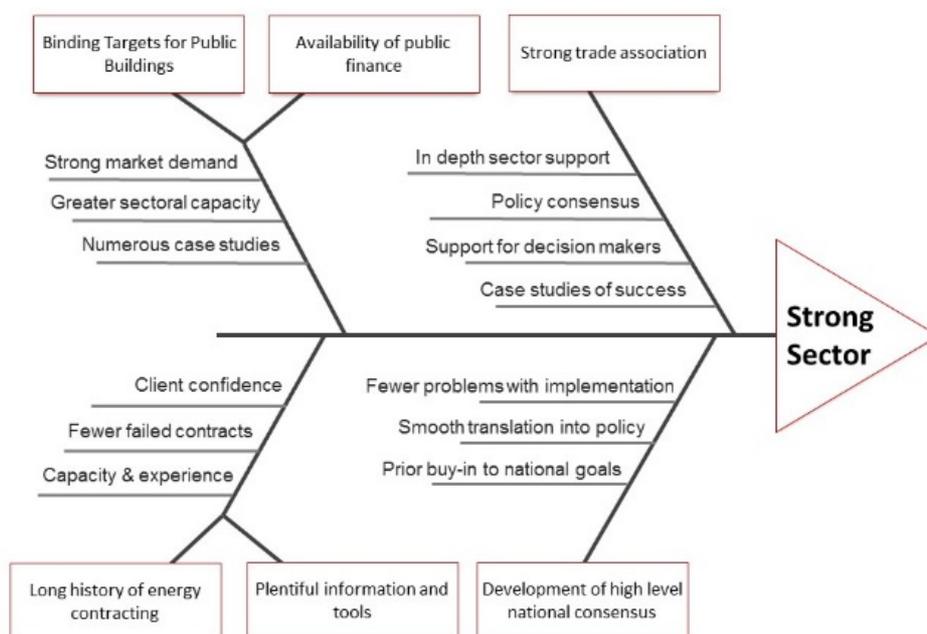
⁴⁹http://www.effizienznetzwerke.org/wp-content/uploads/2018/03/BR_IEEN_Erfolgsgeschichten.pdf

⁵⁰<https://www.kompetenzzentrum-contracting.de/umsetzungshilfen/dena-publikationen/leitfaden-energiespar-contracting/>

⁵¹<https://www.energie-effizienz-experten.de/fuer-experten/weitere-informationen/>

⁵²<https://www.energie-effizienz-experten.de/fuer-experten/weitere-informationen/>

Energy Efficiency Services in France



France has one of the largest markets for energy services in the European Union and the world. It has a history of energy services going back over 150 years, and long familiarity with the services concept has helped to develop a strong sector. Two strong industry associations look after the interests of the energy supply services and efficiency services sectors. While the largest volume of contracts by far is in the energy supply sector, energy efficiency services contracts are a rapidly growing component of the market. France's main tool for delivering energy savings has been a flexible and successful white certificates scheme based on energy supplier obligations. The public sector in France was previously inhibited from taking on energy performance contracts due to legal restrictions. These are now being solved with new public-private partnership laws.

The shape of the French market

France played a pioneering role in energy supply contracting from the 19th century onwards, developing the "Chauffage" concept, whereby an ESCO takes on responsibility for supplying an energy stream at an agreed lower cost than some agreed benchmark. This long experience has resulted in France being the base for several of the world's largest ESCOs. In 2016, the European Commission's Joint Research Centre estimated that there were 350 ESCOs in France, of which 10

offered energy efficiency services⁵³. The main bulk of the market consists of energy supply service contracts. The energy services sector was estimated to be around €12bn in 2013, of which around €814m was related to energy efficiency in the residential, public sector, industrial and agricultural sectors⁵⁴. However, a larger volume of work, of around €1,892m also contributes strongly to energy efficiency through real estate analysis, engineering studies and metering services. In 2017, Navigant estimated that the French EPC market had a volume of \$507m⁵⁵.

Strong regulation driven by consultation

Between 2007 and 2012, France developed a multi-stakeholder dialogue under the banner of the “Grenelle Environment Forum”⁵⁶. This helped to develop a consensus between business, labour unions, the public sector and society from which a series of laws for environmental improvement could be constructed. Firstly, Grenelle I in 2009 set up general commitments to the 268 points raised by the forum, and then Grenelle II in 2010 defined these in more detail. These have then assisted in consolidating and building on existing energy efficiency measures. The earliest acts in France tended to target specific issues, while the later examples are strategic and long-range in nature. Examples include:

- The 2005 Energy Policy Act⁵⁷, setting up amongst other things a comprehensive and flexible energy supplier obligation scheme.
- The 2012 Building Regulations (Regulations Thermique)⁵⁸, setting energy efficiency standards for renovation of post 1948 non-residential buildings and their systems components.
- The 2013 Obligation and Charter for the Energy Efficiency of Tertiary Buildings, requiring that publicly accessible buildings should publish plans for refurbishment prior to 2020⁵⁹.
- The 2015 act for Energy Transition for Green Growth, covering medium and long range targets in energy, sustainable transport and the circular economy⁶⁰.

⁵³<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC106624/kjna28716enn.pdf>

⁵⁴<http://www.ademe.fr/sites/default/files/assets/documents/overview-and-analysis-of-the-french-service-market-english-french-2014.pdf>

⁵⁵ ESCO market report, Navigant, 2017.

⁵⁶<https://www.connaissancedesenergies.org/fiche-pedagogique/grenelle-environnement>

⁵⁷<http://www.lse.ac.uk/GranthamInstitute/law/energy-policy-framework-pope-no-2005-781/>

⁵⁸<http://www.gbpn.org/databases-tools/bc-detail-pages/france>

⁵⁹https://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_en_france.pdf

⁶⁰<http://www.gouvernement.fr/en/energy-transition>

- A 2017 announcement of a government fund of €9bn for thermal insulation of public buildings and low income housing⁶¹.

Capacity and industry representation

The association which represents energy services in the broadest sense in France is The Federation Des Service Energie Environnement (FEDENE)⁶². It is well resourced, with 16 full time employees serving 500 members with combined revenues of over €11bn. In 2005 the French Energy-Efficiency Services Club (“Club des services d’efficacité énergétique” – CLUBS2E)⁶³, was founded by ADEME (the government agency for the environment and energy management) in order to bring together five associations from across the energy efficiency value chain to collaborate and develop the energy efficiency services market. As well as promoting services, the club provides supporting information to help stakeholders to understand and trust energy efficiency contracting.

Flexible energy efficiency obligations.

France started its Energy Efficiency Obligation Scheme under the Energy Policy Act of 2005, obliging all energy suppliers (including vehicle fuel suppliers) above certain thresholds to submit white certificates (Certificats d’Économies d’Énergie), proving that they have delivered or contributed to energy savings⁶⁴. The scheme is France’s main tool for delivering EU energy savings obligations, and contains considerable flexibility in how obligated parties can obtain certificates for compliance. Obligated parties can generate their own certificates, or can purchase them through the secondary market. The scheme allows obligated parties to group themselves into “Collective structures” for more efficient operations, and for engagement with ESCOs⁶⁵.

Certificates can be generated not only by obligated suppliers, but also by “Eligible parties”, who include public sector organisations, the national housing authority (ANAH) and social landlords. Both obligated and eligible organisations can deploy measures in their own facilities, in customers’ premises, and through contributions to energy saving programmes. Customers of obligated parties can be residential, commercial, public, industrial or agricultural, and any efficiency improvement can be employed. Energy suppliers usually provide incentives to support implementation of measures, such as low interest loans, rebates, direct subsidies for technologies, or installer bonuses.

⁶¹<http://www.gouvernement.fr/en/the-big-investment-plan-2018-2022>

⁶²<http://www.fedene.fr/>

⁶³<http://www.alpheeis.fr/ressources/fichiers/4c5c8d0d392d.pdf>

⁶⁴http://atee.fr/sites/default/files/part_6-2017_snapshot_of_eeos_in_europe.pdf

⁶⁵https://ipeec.org/upload/publication_related_language/pdf/142.pdf

A novel aspect of the scheme is the incentivisation (via bonus certificates) for measures that are installed within environmental or energy management systems, so as to promote all-round effectiveness in the pursuit of efficiency.

The scheme was introduced with a carefully constructed series of phases, with lenient targets in the first phase to allow the system to bed-in, then a transitional phase to provide a breathing space between the first and second phases. During this transitional phase, certificates could still be generated, providing a buffer against the tighter targets set during the second phase. There is also flexibility in duration, with the second phase being extended so as to accommodate the requirements of the EU's Energy Efficiency Directive.

Most measures are "Standard measures" and are converted into savings certificates via "Deemed" savings methodologies, but "Special operations" measures can be developed through an approved methodology. This latter scheme is most suited to industrial operations and presently accounts for only a small minority (3%) of savings.

Applications for certificates must meet various quality, monitoring and verification requirements, including performance tests, proof of qualified installation, and a minimum savings volume per submission. Over the lifetime of a measure, savings are discounted by an annual 4%⁶⁶.

Results show that the scheme has been very successful in delivering cost effectively against its targets, although some scheme redesign has been required between Phases 1 and 2 in order to reduce administrative costs.

Modification of public sector restrictions

The public sector ESCO market was previously inhibited by restrictions which prevented ESCOs from owning or operating equipment located within the public sector premises. In addition, traditional public sector procurement required each phase of a contract to be tendered separately, damaging the sustainability of the ESCO business model. These issues were addressed by a new government order^{67,68} which allowed public-private partnership agreements to be set up, with various enabling measures to assist ESCOs, including inclusion of operational savings in revenue streams, stage payments and performance-based incentives. A

⁶⁶<http://enspol.eu/sites/default/files/results/D2.1.1%20Report%20on%20existing%20and%20planned%20EEOs%20in%20the%20EU%20-%20Part%20I%20Evaluation%20of%20existing%20schemes.pdf>

⁶⁷<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000438720&categorieLien=cid>

⁶⁸<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000020949548>

task force is overseeing the development of the PPP market in France^{69,70}, although as of yet there is no information on how this is working for energy services.

Availability of low cost SME finance

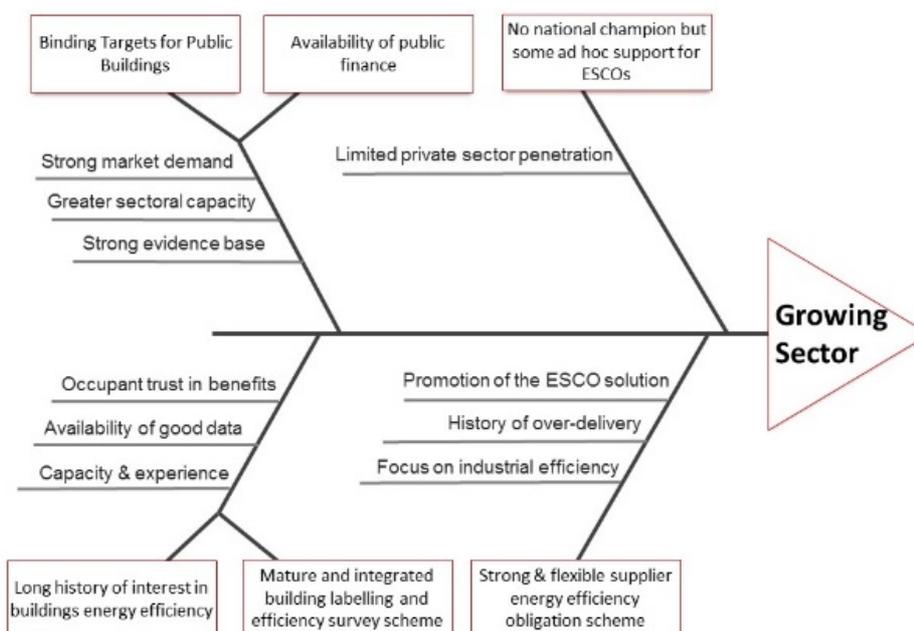
Low cost finance from Banque Publique d'Investissement (Bpifrance) is available to SMEs, of up to €3M over seven years, to finance investment in greener production or eco-friendly products. Cash is provided to match commercial funds from other lenders. Smaller 100% loans are also available to SMEs under similar terms specifically for energy efficient systems such as lighting and heating.⁷¹

⁶⁹http://www.measures-odyssee-mure.eu/public/mure_pdf/general/FRA16.PDF

⁷⁰<https://www.economie.gouv.fr/ppp/v/mission-dappui>

⁷¹http://www.minambiente.it/sites/default/files/archivio_immagini/Galletti/G7/2_G7_env_unep_mobilizing_sustainable_finance_smes.pdf

Energy Efficiency Services in Denmark



Denmark is one of the newer markets for energy services in the European Union. For many years it was small, but since 2006 has grown steadily under the influence of various packages of government support. There is no legal framework that specifically targets energy services, but there is a strong national interest in energy efficiency and a network of voluntary commitments at a municipal level. Public sector projects are a major component of the market, and the lack of in-house expertise has required the use of external service providers in many cases. The municipal sector experience has then provided case studies that have encouraged private sector adoption of the energy services concept. The sector has drawn strongly on international experience to develop its service offerings and, for example, links are provided on Danish government websites to UK and German efficiency advisers. Most projects in Denmark are for energy efficiency, rather than energy supply. Projects have evolved over a number of years, along with the maturity of the techniques available, and while fewer projects are now being delivered, they are individually larger.

The shape of the Danish market

The Danish market has grown rapidly since 2006, and there are signs that the market has peaked in terms of the number of energy services providers, with a large number of start-ups now condensing down. In 2013, there were between 15 and 20 energy services providers in Denmark, with most of them acting as specialist

suppliers to eight customer-facing services companies. In 2016, around ten service providers offered energy performance contracts⁷².

Municipal buildings dominate the market

Almost all Danish municipalities are actively pursuing energy efficiency programmes, with around 70% using internal resources for implementation, with 30% opting to procure energy services⁷³. The main reason for employing external energy services providers was to mobilise savings more rapidly than would be the case with internal resources alone. There are some indications that implementation with internal resources appeared to be driven by a desire amongst energy managers to keep knowledge and resource in-house. However, the municipalities who pursued internal solutions were generally larger and had more significant internal resource anyway. Detailed research carried out on projects showed that projects delivered by energy services providers were larger projects, completed more quickly and gave larger savings per square metre than those implemented with internal resources.

All municipalities finance projects themselves using low cost government loans⁷⁴, and use guaranteed savings and a gain-share bonus in order to reward over-performance. Between 2009 and 2012, municipal finance restrictions were lifted for energy efficiency projects, though these have subsequently been reinstated.

Between 2011 and 2013, municipalities banded together in “ESCOmmuner” to share their experiences and promote the energy services solution. This initiative is no longer active, although elements of the information-sharing website are still on line⁷⁵.

Increasing project size and complexity

Over time, projects have increased in both size and the length of the payback period. While the initial projects were around €5-6M and with paybacks of 5-8 years, later ones have been closer to €20m investments, paying back over 20 years. These later projects offer energy savings of between 20 and 30% and tend to include a wide range of measures. 75% of energy services providers offered behavioural change in their projects, and in some cases also included water efficiency measures.

Limited energy services legislation

Denmark does not have any legislation that specifically targets the energy services solution, although the buildings energy labelling scheme and the supplier’s energy efficiency obligation scheme are strong drivers of interest.

⁷²<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC106624/kjna28716enn.pdf>

⁷³www.transparence.eu

⁷⁴<https://sparenergi.dk/offentlig/bygninger/esco/oekonomi-og-finansiering>

⁷⁵<https://escommuner.middelfart.dk/>

Building energy labelling scheme

Denmark developed a building energy labelling system in 1998, before the EU's Energy Performance in Buildings Directive rendered it mandatory. This system applies to residences, public buildings and buildings used for trade and services, and relies on a theoretical calculation of building energy consumption. This does not match the approach of similar systems in Australia (NABERS) and the USA (Benchmarking and Disclosure), which give prospective tenants more tangible information on potential energy running costs. The rating scheme does however contain three sub categories for the "A" rating position, reflecting the ambition to deliver high levels of efficiency.

The regulations have been regularly reviewed⁷⁶. There is currently no minimum standard for performance, of existing buildings, although from 2007, any building that changed use had to achieve at least a "B" rating, and any certificate that shows measures with paybacks of less than 10 years or savings greater than 5% will only be valid for seven rather than 10 years.

Apart from the visible rating, the scheme delivers its benefits through the data that it provides on efficiency and the energy efficiency recommendations that accompany the rating certificate. A QA scheme monitors the effectiveness of ratings consultants, while a statistical unit compiles analysis of the ratings levels and efficiency measures proposed for different buildings categories. As well as guiding reform of building regulations, this data is then used to set targets for public buildings.

Targets for government buildings.

In 2011, all Danish ministries were required to reduce their energy use by 10% compared to 2006, and the present target is for a 14% saving in 2020 compared to the 2006 baseline.

Refurbishment strategy and building regulations.

In 2014, the government published a strategy to drive refurbishment of all existing buildings to deliver EU targets. The strategy pulls together all initiatives, including building regulations, labelling, performance information and advice.

Buildings undergoing refurbishment beyond the 25% threshold specified by the EU directive must meet a range of detailed performance criteria for renovating components, so long as they meet an economic viability threshold of paying back in less than 75% of the expected lifetime of the measure. For any component that is

⁷⁶<https://www.epbd-ca.eu/outcomes/2011-2015/CA3-2016-National-DENMARK-web.pdf>

completely replaced, the new performance standard is mandatory regardless of the financial feasibility test.

Supplier energy efficiency obligations

Denmark's energy efficiency obligation scheme started formally in 2006⁷⁷, but was based on earlier voluntary efforts that suppliers offered to their customers in the 1990s. The obligation applies to industrial and commercial customers, as well as to households. The scheme has been regularly revised to tighten targets, and suppliers have managed to significantly over-deliver. The Danish sector has had particular success in delivering industrial energy efficiency projects, and in fact has found them more tractable compared with building refurbishment projects due to the many other factors that complicate decision making for buildings⁷⁸.

The energy services solution is encouraged by the scheme by the fact that outside of their regulated distribution area or normal energy category, suppliers must deliver via an energy service provider. The Danish system does have omissions related to transparency and cost effectiveness. While independent monitoring and verification of programmes is required, there is limited public disclosure and transparency. Only total savings and total costs are reported, and consumers cannot see the impact of the investment costs passed on in bills. This may enable implementation cost inefficiencies that are common to all suppliers to pass undetected. Penalties for faulty reporting are light. The good workings of the system appears to be underpinned by the professionalism of suppliers and their long experience of such programmes.

Compulsory energy audits for large enterprises and registration of auditors

Large companies must undergo energy efficiency audits to fulfil Denmark's obligation to comply with EU Energy Efficiency Directive. Under the Energy Vision scheme (Energisyn), audits must be regularly repeated and must be carried out by a government-registered auditor. Auditors must submit documentation showing various proofs of experience and capability⁷⁹. There is no obligation for companies to implement measures⁸⁰. Evaluation has shown issues with variable quality of reports, and that good savings remain to be implemented by Danish companies⁸¹. There is no information on the uptake of measures or whether energy services approaches have benefited from the survey programme. Lists of companies that have complied with requirements are posted publicly⁸².

⁷⁷<https://stateofgreen.com/files/fact-sheet---danish-energy-efficiency>

⁷⁸<https://www.iaee.org> - Energy Efficiency Obligation Schemes in the EU - Lessons Learned from Denmark

⁷⁹<http://energisyonskonsulent.dk/bliv-konsulent/>

⁸⁰https://ens.dk/sites/ens.dk/files/Energibesparelser/rapport_-_spoergeundersogelse_energisynd.pdf

⁸¹https://ens.dk/sites/ens.dk/files/Energibesparelser/status_energisynd_2017_rapport_2.pdf

⁸²<https://ens.dk/sites/ens.dk/files/Energibesparelser/positivlisten.pdf>

Voluntary municipal agreements

69 and out Denmark's 98 municipalities have taken on voluntary commitments with the Danish Organisation for Nature Conservation to reduce greenhouse gases by 2-3% annually. There is no data available on the effectiveness of these agreements, or the extent to which energy services companies have benefited from market growth attributable to them⁸³.

National engagement but no dedicated national champion

Denmark does not have a dedicated energy services industry association, but a generally high national capability for managing energy issues has made supporting information available, although not on a coordinated basis. Energy services guidelines have been issued by the Danish Chambers of Commerce in collaboration with the Association for Building Automation⁸⁴.

⁸³<http://www.ecocouncil.dk/en/releases-3/98-energy-and-climate/1556-ee-targets-in-place-in-denmark>

⁸⁴<http://www.transparensen.eu/download-library/epc-market>

Incentivisation of the market

Incentivisation of energy efficiency activities in general is very important for increasing the size of the market that could be addressed by energy efficiency services companies. This case study presents examples of approaches to incentivising adoption of non-domestic energy efficiency projects. While the term “Incentive” frequently brings to mind measures such as tax reduction, low cost loans or grant support, we have also identified other approaches that generate incentives to act. These include using energy supplier obligations to create flexible yet stable conditions for delivery of savings, such as in Denmark, France and Italy, or soft loans, such as those for SMEs in Germany. One very successful approach for the commercial rented property sector has been to ensure that likely actual energy costs for prospective tenants are clearly presented, as with Australia’s NABERS scheme and “Benchmarking and disclosure” regulations in parts of the USA.

Most incentive measures do not target a particular method for implementing efficiency measures, and allow organisations to choose an approach that best suits their circumstances. However, some measures, such as the USA’s efficiency requirements for Federal buildings or some elements of Denmark’s supplier obligation scheme, do require the use of energy efficiency service providers to deliver savings.

Examples have been chosen because they have been recognised as being successful at improving demand for energy efficiency or for actual ESCO services. However, it is often difficult to find formal assessments that attribute specific energy services market outcomes to the measures.

Industry agreements

In Belgium, responsibility for energy efficiency is devolved to regional governments, who have used voluntary agreements with trade associations that represent several hundred industry sites. Achievements against energy saving commitments are tied to protection of companies from CO₂ and energy regulations and the availability of tax incentives. The start of the agreements in 1999 coincided with the start of a steady decline in industrial energy consumption⁸⁵.

Natural Resources Canada is developing Energy Star benchmarks to allow members of the voluntary Canadian Industry Program for Energy Conservation to not only register themselves as “Leaders”, but also compare performance and display certificates⁸⁶.

⁸⁵ Belgium Energy Efficiency Report, ABB, April 2012

⁸⁶<https://www.nrcan.gc.ca/energy/efficiency/industry/cipec/20341>

In Finland, energy efficiency agreements have been in place since the late 1990s and are the principal tool for delivering Finland's EU energy efficiency obligations. They apply to business, communities and municipalities and are linked to subsidies available for energy efficiency audits and for installation of the latest energy saving technologies⁸⁷. The annual reporting system for the scheme is integrated with national reporting and planning systems. Continuity of energy saving efforts is specifically identified as a key theme in Finland's approach and the nation feels that its scheme has been very successful, saving medium-sized companies 9.6% of their 2016 consumption against the 2008 baseline⁸⁸.

Obligations to plan and implement measures

In the European Union, the Energy Efficiency Directive mandates energy audits on larger organisations. In Flanders, Belgium, industrial companies that use more than 0.5 petajoules (PJ) per annum must develop energy reduction plans and implement all measures with post tax internal rates of return (IRR) greater than 15% within four years of plan approval⁸⁹.

In Italy, all enterprises classified as "Large" under the standard EU definition had to conduct an energy audit by the end of 2015 and submit reports signed by the managing director to ENEA (the national agency for new technologies)⁹⁰.

Russia also has legislation in place for mandatory energy efficiency audits for certain classes of company and those who spend over 10 million Roubles per annum on energy⁹¹. However, there are signs that it has run into problems associated with lack of capacity to carry out the very large number of surveys to a suitable level of quality⁹².

Public sector driving the ESCO market

The market for US Federal building retrofits is driven by the Presidential Memorandum of 2011 and the 2015 Presidential Executive Order that mandated surveys of Federal buildings and implementation of energy conservation measures that pay back in less than 10 years⁹³. Federal agencies are required to develop

⁸⁷https://www.motiva.fi/files/1348/Finland_Energy_Efficiency_Agreements_2008-2016.pdf

⁸⁸http://www.measures-odyssee-mure.eu/public/mure_pdf/industry/FIN14.PDF

⁸⁹<http://www.spice3.eu/DE/news/646-belgium-chemical-industry-efficient-use-of-energy-as-part-of-sector%E2%80%99s-dna>

⁹⁰<http://guarantee-project.eu/it/wp-content/uploads/sites/13/2013/10/2016-09Market-Report-ITr07s.pdf>

⁹¹<https://www.iea.org/policiesandmeasures/pams/russia/name-30188-en.php>

⁹²http://teknologiateollisuus.fi/sites/default/files/file_attachments/elinkeinopolitiikka_kestava_kehitys_julkaisut_engiatehokkuus_venajalla.pdf

⁹³<https://www.fedcenter.gov/programs/eo13693/>

annual plans to sign up target values of energy performance contracts, and by 2011, 21.4% of US ESCO revenues were for projects in Federal buildings⁹⁴.

Informative building energy labelling

Energy efficiency programmes have raised awareness of the financial benefits so that actors discover that they have an incentive to take action. In property rental transactions it is important that prospective tenants understand the energy costs of properties prior to rental commitments, so that the efficiency incentive can operate. The National Australian Built Environment Rating System⁹⁵ (NABERS) uses verified information, such as from bills, to develop a six star benchmark for each one of energy, water, waste and indoor quality. For energy, the rating certificate gives prospective tenants tangible information on potential energy running costs, covering CO2 emissions, energy consumption and the quality of the lighting system. A research study has shown a good correlation between the rating and building value, with a 9% premium being associated with a five star score⁹⁶.

The US commercial property market is also being stimulated by what are referred to as “Benchmarking and transparency policies”⁹⁷ in 15 US cities, one county and two states that require asset owners to disclose the actual energy consumption of buildings. Reporting may be transactional (on rental or sale), or annual, such as in Seattle’s Energy Benchmarking Programme. Surveys have shown good energy savings, consistent uplifts in occupancy, rental values and asset values for more efficient buildings⁹⁸.

Denmark’s building energy labelling system applies to residences, public buildings and buildings used for trade and services⁹⁹. Similarly, to most of those in the EU, it relies on a theoretical calculation of energy consumption. The scheme contains three sub categories for the “A” rating position and the regulations have been regularly reviewed¹⁰⁰. There is currently no minimum standard for performance, but any building that changes use must exceed a “B” rating. Any certificate that shows measures with paybacks of less than 10 years or savings greater than 5% will only be valid for seven rather than 10 years.

Certificates also provide data energy efficiency recommendations.

⁹⁴https://energy.gov/sites/prod/files/2014/05/f15/esco_industry_report.pdf

⁹⁵<https://nabers.gov.au/public/WebPages/ContentStandard.aspx?module=21&template=2&id=210&include=Dashboard.htm>

⁹⁶https://3-api.cdn.aspedia.net/sites/default/files/uploaded-content/website-content/building_better_returns.pdf

⁹⁷https://emp.lbl.gov/sites/default/files/lbnl_benchmarking_final_050417_0.pdf

⁹⁸http://www.imt.org/uploads/resources/files/PCC_Benefits_of_Benchmarking.pdf

⁹⁹<http://www.gbpn.org/databases-tools/rp-detail-pages/denmark#Building%20Assessment>

¹⁰⁰<https://ens.dk/ansvarsomraader/energimaerkning-af-bygninger/det-viser-energimaerket>

France's 2013 Obligation and Charter for the Energy Efficiency of Tertiary Buildings, requiring that publicly accessible buildings should publish plans for refurbishment prior to 2020.

EU nations are mandated to have buildings ratings systems under the Energy Performance in Buildings Directive, and there is a split between those nations that have opted to require only the display of theoretical energy performance, and those that include the display of operational energy consumption.

Russia, India, Japan and South Korea also have building energy-rating systems, but these are voluntary. Japan and South Korea display both asset performance calculations and operational energy use, while Russia gives asset calculations only and India gives operational consumption only.

Energy supplier obligations

A key measure in France's 2005 Energy Policy Act¹⁰¹, was an energy supplier obligation scheme, obliging all energy suppliers (including vehicle fuel suppliers) above certain thresholds to submit white certificates, proving that they have delivered or contributed to energy savings. The scheme is France's main tool for delivering EU energy savings obligations, and contains considerable flexibility in how obligated parties can obtain certificates for compliance. Most measures use "Deemed" savings methodologies. The "Special operations" measures class best suits industrial projects and accounts for 3% of savings.

Results show that the scheme has been very successful in delivering cost effectively against its targets, although some scheme redesign has been required to reduce administrative costs.

Austria has a similar scheme, but no details are accessible other than from international reviews¹⁰².

Denmark's energy efficiency obligation applies to industrial and commercial customers, as well as to households. The scheme has been regularly revised to tighten targets, and suppliers have managed to significantly over-deliver¹⁰³. The Danish sector has had particular success in delivering industrial energy efficiency projects, and has found them more tractable compared with building refurbishment projects, due to simpler decision making processes.

¹⁰¹<http://www.lse.ac.uk/GranthamInstitute/law/energy-policy-framework-pope-no-2005-781/>

¹⁰²https://www.e-control.at/en/home_de

<http://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-austria.pdf>

¹⁰³[http://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU\(2016\)587326_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU(2016)587326_EN.pdf)

The ESCO solution is encouraged by the scheme by the fact that outside of their regulated distribution area or normal energy category, suppliers must use an energy service provider for project delivery.

Italy's obligation scheme on suppliers also allows white certificates to be sold to obligated suppliers by parties that include obligated suppliers themselves, ESCOs, companies who have an energy manager and companies certified to ISO50001¹⁰⁴. 96% of the white certificates in the scheme are traded, and 78% of the entities in the trading system are ESCOs. The scheme has been strongly embraced by industry, who generated 64% of certificates in 2015.

Targeting SMEs

Germany's 2008 SME Energy Consulting Programme subsidises audits by up to 80% for SMEs¹⁰⁵ and matches them up with energy efficiency loans from the KfW bank¹⁰⁶. The programme "Investment Grants for the Use of Highly Efficient Cross-Sectoral Technologies" assists SMEs to improve efficiency in equipment such as motors and drives, compressed air systems and heating plant¹⁰⁵.

SMEs can also access a €2,000 grant¹⁰⁷ for learning about the potential of energy services, while a €7,500 grant is available to support implementation advice from an ESCO.

The German Federal Government is working with 16 regional banks to set up an SME loan guarantee programme for smaller technology-specific EPC projects that are ideally suited to SME ESCOs and clients¹⁰⁸.

Provision of financial support

The German government's KfW Förderbank (KfW promotional Bank) provides loans to residential and municipal energy saving projects. The Energy Efficiency Programme covers end use in production facilities and processes, waste heat recovery, energy efficient construction, refurbishment, renewable energy and storage, giving loans of up to €25m over 20 years¹⁰⁹.

¹⁰⁴<http://enspol.eu/sites/default/files/The%20Italian%20White%20Certificate%20Scheme%2C%20Alberto%20Pel%20a%20%E2%80%93%20GSE.pdf>

¹⁰⁵<https://www.bmwi.de/Redaktion/EN/Artikel/Energy/energy-consulting-and-funding-for-companies.html>

¹⁰⁶<http://www.deutschland-machts-effizient.de/KAENEF/Redaktion/DE/Foerderprogramme/C-bauen-sanieren-unternehmen-kfw-276-277-278.html>

¹⁰⁷<http://www.deutschland-machts-effizient.de/KAENEF/Redaktion/DE/Foerderprogramme/C-D-bafa-beratung-energiespar-contracting.html>

¹⁰⁸http://guarantee-project.eu/de/wp-content/uploads/sites/2/2016/12/guarantEE_Market_Report_Germany.pdf

¹⁰⁹<https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/index-2.html>

An energy audit programme is supported by income from government auction of CO2 under the EU Emissions Trading Scheme (and Federal funds since the CO2 price collapse)¹¹⁰.

The 2017 “STEP up!” Programme that allows organisations to submit electricity efficiency schemes into a bidding process, with funds being awarded to the proposals that offer the highest savings per unit of investment.

¹¹⁰<https://aceee.org/files/proceedings/2015/data/papers/6-48.pdf>

Aggregation and standardisation

Aggregating energy efficiency projects and helping to standardise project development activities is very important for both reducing transaction costs and building market momentum. The Energy Efficiency Learning Networks model developed in Switzerland has been heavily adopted in Germany and is an effective tool for building the confidence in energy efficiency as an option for businesses, and in developing local networks that could potentially aggregate projects to reduce transaction costs. Evidence from Germany suggests that this approach is successful. Quality standards for both service providers and to guide the monitoring of energy performance data are important, and the USA has played a pivotal role in developing methodologies and guidance for interested parties. Standardisation of energy efficiency services projects and contracts is closely linked to quality improvement, but can be difficult, as operational and legal circumstances can differ between clients, and many organisations have pre-existing contractual forms with which they are already comfortable. However, it appears to be accepted by most stakeholders that guidance and examples are useful either to move the market towards standardisation, or to help with customisation of existing contracts to accommodate energy performance. One approach to standardisation has been to use publicly run procurement frameworks, which can improve quality, aggregate projects and drive the adoption of standard terms and methodologies.

While this case study presents examples from around the world, in most cases it has proven difficult to find formal assessments that attribute market outcomes to specific measures.

The power of energy efficiency networks

Learning Energy Efficiency Networks were a concept originated in Switzerland in the 1980's¹¹¹, where it was linked to relief from both a large carbon tax and from local energy efficiency regulations¹¹². It continues to this day and has a large SME participation rate. It has now been adopted on a large scale in Germany in 2014/2015, when the German Energy Agency, DENA, started to sponsor the setting up of local efficiency networks in partnership with 21 Industrial Associations. The goal is to establish 500 self-financing networks by 2020, each with 8-15 companies who will exchange information and best practice on energy efficiency, develop voluntary targets and collaborate. The network organisation will provide consultancy and advice on grants, subsidies and funding options that members can access.

¹¹¹<https://aceee.org/files/proceedings/2015/data/papers/6-48.pdf>

¹¹²<http://www.isi.fraunhofer.de/isi-en/service/presseinfos/2015/press-release-27-2015-annual-conference-learning-energy-efficiency-networks.php>

Results indicate that new energy efficiency innovation is being stimulated, while the pilot demonstrated savings of 10% at larger companies and strong evidence of satisfaction amongst the membership¹¹³.

Austria has seen success in the Mechatronics Cluster run by the Lower Austrian Business Agency and supported by the European Regional Development Fund¹¹⁴. The cluster assisted 80 local businesses in the mechatronic sector to implement energy management systems, while also networking them in to international energy saving projects. A focus was the integration of energy savings and process innovation. The cluster has also established an energy efficiency research group at the University of Vienna.

Ireland established its Large Industry Energy Network in the 1990s, targeting companies spending over €1m on energy or who are or are aiming to become ISO50001 certified¹¹⁵. The network requires members to plan, review and report on energy use and savings and members access assistance from SEAI and from partner organisations.

Maintaining quality to build trust

There are a number of codes of practice and quality schemes around the world that apply to energy services companies. There does not appear to be any evidence that they have driven market uptake in isolation, but appear to be accepted as essential to the growth of a healthy market. One study that references several schemes was presented by Transparens in 2015¹¹⁶. While market actors see quality certification as a good thing, potential barriers to entry are also raised and should be considered¹¹⁷.

In Italy, to be certified as an ESCO, an organisation must meet a national quality standard based on the European standard for energy efficiency services, EN 15900¹¹⁸. In particular, the ESCO must be able to demonstrate that it has implemented at least one EPC.

Since 1996 the USA trade body the “National Association of Energy Services Companies”, (NAESCO), has offered a range of accreditations suited to different categories of energy service company, so long as they are a member of NAESCO¹¹⁹.

¹¹³https://ipeec.org/upload/publication_related_language/pdf/155.pdf

¹¹⁴http://ec.europa.eu/regional_policy/en/projects/austria/connecting-local-businesses-into-the-global-energy-efficiency-network-with-the-mechatronics-cluster

¹¹⁵ <https://www.seai.ie/energy-in-business/lien/>

¹¹⁶ Quality Certification for EPC services, Sochor & Szomolányiová, Transparens, 2015.

¹¹⁷ https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/eurocontract_qacs_and_networks_for_escos_en.pdf

¹¹⁸<http://guarantee-project.eu/it/wp-content/uploads/sites/13/2013/10/2016-09Market-Report-ITr07s.pdf>

¹¹⁹http://naesco.org/data/sites/1/media/naesco-accreditation_brochure.pdf

Accreditation varies according to whether they offer efficiency, supply and/or turnkey installation services. The accreditation examines technical and business competences, and requires a commitment to ethical practices. It does not offer either guarantees of actual performance or of the financial viability of the ESCO.

Finland's energy agency, Motiva, maintains a database of energy service providers who have companies that have submitted satisfactory audits and those ESCOs who have registered their projects. While not mandatory, the presence of an ESCO's projects on the register is expected to confer a de facto quality stamp.

Dubai's Energy Service Provider accreditation system is run the Regulatory and Supervisory Bureau (RSB), and is mandatory for ESCOs to participate in work tendered by the super ESCO "Etihad ESCO". It requires staff to have certain levels of accredited skills and for the ESCO to have prior experience of successful project delivery. Singapore's ESCO accreditation scheme is voluntary but is run by the Government's National Environment Agency¹²⁰. The scheme covers both organisation track record and staff qualifications and currently 19 organisations are accredited. No information is available on the impact of the scheme on the market, but several major international corporations are members.

The German federal government runs a website that contains lists of registered experts in energy efficiency¹²¹. Buildings experts must submit credentials, be qualified to issue buildings energy performance certificates, have successfully developed a low energy building project and must give evidence of training for a basic registration¹²². They must undergo regular re-training to maintain their position on the list¹²³. Experts in SME energy efficiency must have over three years of experience, as well as relevant qualifications. The overall list contains over 1000 experts on non-residential buildings and energy consulting for SMEs, and can be searched to find local experts.

South Africa's ESCO registration is also voluntary and is run by the government, but with support from the German government¹²⁴. It is intended to act as a means for tracking and mentoring the development of ESCOs and has a rigorous series of criteria with a 70% mandatory pass rate for both the organisation and staff. It is

¹²⁰http://www.e2singapore.gov.sg/Programmes/ESCO_Accreditation_Scheme.aspx

¹²¹<https://www.energie-effizienz-experten.de/fuer-experten/weitere-informationen/>

¹²²<https://www.energie-effizienz-experten.de/fuer-experten/weitere-informationen/>

¹²³<https://www.energie-effizienz-experten.de/fuer-experten/weitere-informationen/>

¹²⁴<http://www.sanediesco.org.za/>

expected to act as a national conduit for customers to find suitable service providers. It has been operating since 2016, so no market outcomes are yet available.

Australia's accreditation scheme is run by the non-profit Energy Efficiency Council, a membership organisation that brings together service providers and some local governments¹²⁵. The accreditation is extremely detailed and is followed up as part of a maintenance requirement over time¹²⁶.

A pioneering programme was developed in Graz, Austria, where the "Thermoprofit" scheme provided support and quality standards to support the development of an ESCO market.

Improved data quality to build trust in the energy efficiency solution

Stakeholders in the US, developed the International Performance Measurement and Verification Protocol (IPMVP[®]) to provide standards for measuring efficiency savings and verifying performance as part of energy performance contracts. Use of IPMVP is one of the industry best practices that is required to be accredited by the National Association of Energy Services Companies (NAESCO). The protocol has built confidence in the processes needed to develop and run successful energy performance contracts and is now a de facto global standard¹²⁷.

Measurement and new technology driving innovation

In the Pay for Performance contracts, (P4P), actual performance data is used, to identify real savings, rather than basing calculations on pre-existing models. This opens up possibilities for including deeper savings in performance contracts, including those from changes in behaviour and from positive impacts on network demand. The larger savings bring a greater proportion of projects into financial viability, either through better margins or a reduction in the risks of under-performance¹²⁸¹²⁹. Up to now, P4P has been inhibited by the costs of the necessary M&V processes, but as new technology reduces the cost of gathering and analysing the necessary data this may change. The lower gathering cost and richness of the data may make it easier to aggregate low risk portfolios of different assets, enabling the development of new business models and financing routes.

¹²⁵ <http://www.eec.org.au/membership/overview#/members>

¹²⁶ <http://www.efficiencycertification.org.au/applying-for-certification/register-for-certification>

¹²⁷ For example IPMVP[®] accreditation is required for staff in the Dubai RSB energy services company accreditation system: <https://www.rsbdubai.gov.ae/esco/application-forms/>

¹²⁸ Energy Efficiency Procurement and Markets Report, New York Public Service Commission, May 2017.

¹²⁹ <https://www.nrdc.org/sites/default/files/pay-for-performance-efficiency-report.pdf>

The value of standard contract terms and guidance

The Energy Efficiency and Renewable Energy Agency in the USA has developed detailed model documents to assist ESCOs and clients to develop their projects¹³⁰. These materials provide templates and detailed guidance for every stage in the development and operation of an energy performance contract, including pre-contract agreements, audit plans, checklists, reports and monitoring and verification plans. A high-level guide also exists in the State of Wisconsin to assist state agencies and energy services companies to develop projects¹³¹. The Energy Efficiency Council of Australia distributes guidelines on best practice in EPC contracts, helping businesses to decide whether the approach is best for them, and if so how to take it forward successfully¹³². It is accompanied by another best practice guide on Measurement and Verification (M&V) and a New South Wales governmental publication on operational M&V.

Natural Resources Canada has developed a comprehensive guide to energy performance contracting in federal buildings, covering all aspects of performance contracts, although giving only a high-level overview of many of the necessary stages¹³³

Common tools for planning savings

The US Energy Star[®] programme and the Federal Energy Management Program (FEMP) has developed tools to assist organisations to track and analyse consumption, and develop energy efficiency performance contracts. Assistance includes the “Energy Savings Performance Contract Energy Sales Agreement Toolkit¹³⁴” and the “Energy Star Portfolio Manager¹³⁵” for benchmarking commercial buildings energy performance. The latter has also been adopted by Natural Resources Canada and tailored to meet regional requirements.

Targeted local facilitation

Facilitation is seen as being an important aspect of developing a market for energy efficiency and performance contracting. In many cases, while there is limited numerical evidence of the value of the approach, positive anecdotes are common. The EU’s 2014-2017 “Streetlight-EPC” project set up regional facilitation centres in nine different EU nations to target and nurture ESCOs and EPCs based on street

¹³⁰ <https://energy.gov/eere/slsc/model-documents-energy-savings-performance-contract-project>

¹³¹ https://www.uwm.edu/Documents/sustainability/performance_contracting.PDF

¹³² <http://www.eec.org.au/uploads/images/NEEC/Information%20Tools%20and%20Resources/Best%20Practice%20guide%20to%20EPC.pdf>

¹³³ https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/oeefiles/pdf/communities-government/buildings/federal/pdf/12-0419%20-%20EPC_e.pdf

¹³⁴ <https://energy.gov/eere/femp/downloads/energy-savings-performance-contract-energy-sales-agreement-toolkit>

¹³⁵ <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

lighting. Street lighting was chosen due to the need to replace most of the EU's population of lamps over the next few years. The project used local contractors for facilitation, and gained pre-commitments from the local municipalities to the concept. The project has 63 projects either delivered or in an advanced state of preparation, 47 of which used EPCs. It stimulated the setting up of 12 new ESCOs and encouraged eight further companies to start offering EPCs. The project used events, bilateral meetings with financiers, a project checking service and an FAQ facility to educate interested parties¹³⁶.

Procurement frameworks have been an important part of delivering energy savings in Berlin. The "Energieagentur" programme and company was set up in 1992 as a public-private partnership¹³⁷ and sets up partnerships with ESCOs to refurbish public buildings and cooperatively owned buildings¹³⁸, and the Berlin model is also used in Leipzig and Vienna¹³⁹.

Austria's Contracting Campaign for Federal Buildings ran a framework for contracting in which ESCOs serviced the needs of government buildings, with performance guarantees and penalties in place and aiming to save up to 10% of energy¹⁴⁰.

Sustainable Energy Agency Ireland (SEAI) has set up a National Energy Services Framework to assist companies to engage with energy services contracts¹⁴¹. The public sector, communities and large businesses can also enter into partnership with SEAI to receive more targeted assistance in return for formal management commitment to energy efficiency.

Denmark ran a local authority network called "ESCOmmuner" between 2011 and 2013, which enabled municipalities to swap experiences of the ESCO solution. The network is no longer active, having achieved the goal of publicising how EPCs could work in Denmark. There are four main facilitators for EPCs in Denmark, all consultancies in energy and the built environment, who commonly support municipalities with advice during EPC tendering processes¹⁴².

¹³⁶ www.streetlight-epc.eu

¹³⁷ <http://www.berliner-e-agentur.de/en/facts>

¹³⁸ <http://www.berliner-e-agentur.de/en/press/stable-economic-growth-through-decentralized-efficient-and-environmentally-friendly-energy-pro>

¹³⁹ <http://www.berliner-e-agentur.de/en/consulting-information/energy-saving-partnerships-berlin>

¹⁴⁰ <https://www.bmdw.gv.at/Tourismus/energieeinsparungen/Seiten/Bundescontracting.aspx>

¹⁴¹ <https://www.seai.ie/energy-in-business/energy-contracting/>

¹⁴² <https://books.google.ae/books?id=D9rTCwAAQBAJ&pg=PT15&lpg=PT15&dq=escommuner&source=bl&ots=8C-ggRpRx6&sig=DNLZ2AauOEI9LQhKbZpAt8ZjB8c&hl=en&sa=X&ved=0ahUKEwi8ldzRI-nYAhUFRQKHcLEClcQ6AEIaDAN#v=onepage&q=escommuner&f=false>

State-sponsored Super ESCOs

India's Energy Efficiency Services Ltd (EESL) is a state-sponsored Joint Venture set up under the Ministry of power and combining interests of four public power sector stakeholders, covering finance, generation, transmission and distribution. The organisation offers pay-as-you-save installations of energy efficient equipment and a wide range of other energy efficiency-related services. It currently delivers better business cases through aggregation of procurement, establishment of qualified supplier lists and through engagement with owners of multiple buildings. It is currently running a large building retrofit programme for the public and private sectors, and concentrates on efficient lighting, AC units and fans. Future development will enable it to improve central HVAC systems, energy audits and building energy management systems¹⁴³.

Dubai Electricity and Water Authority's Etihad ESCO was set up in 2013 to deliver financed turnkey ESCO solutions in Dubai, and is intended to kick-start the market for energy services in the Emirate¹⁴⁴. The organisation mobilises state and private finance to deliver projects through a framework tendering service. It aggregates demand through operating under state sponsorship and interacting with senior decision makers in organisations that control significant numbers of buildings. At present most projects concentrate on energy efficiency, but it is likely that water efficiency measures will be incorporated into a combined offering with energy efficiency to strengthen business cases.

¹⁴³<https://www.eeslindia.org/>

¹⁴⁴<http://www.etihadesco.ae/about-etihad-esco/>

Annex 4: Estimates of UK Market Size

Non-domestic buildings have a significant energy footprint in the UK and because of their common technologies and issues, offer a good starting point for estimating the potential size of the UK's energy efficiency services market. The BEIS report "Buildings Energy Efficiency Survey" ¹⁴⁵ showed that for England and Wales, building-related measures with a 3-year payback have the potential to save 14% of buildings consumption, totalling over 22,000GWh per annum and worth £1.3bn. Going beyond the three year payback threshold to include the technically viable abatement potential, (which includes measures that are not yet financially viable), would save up to 39% of buildings energy consumption.

The total investment figures necessary to deliver these energy efficiency measures for England and Wales are given in column two of the table following, where columns three to six show how these investments could be spread over different implementation periods of 5, 10, 15 and 20 years.

If approximately adjusted to include the potential for Scotland, they would increase by around 12-13%.

If these investments were delivered solely by service providers, they could act as estimates for the potential annual revenues of the UK energy efficiency services sector.

¹⁴⁵ Building Energy Efficiency Survey 2014-15: Overarching report, BEIS, November 2016.

Table 6: Ranges of investment to deliver efficiency savings in UK non-domestic buildings.

Bound	Total Investment	Spread over five years	Spread over 10 years	Spread over 15 years
Lower bound (Three year payback measures)	£1.95bn	£390m	£195m	£130m
Upper bound (Technically feasible measures)	£28.39bn	£5.68bn	£2.84bn	£1.89bn

It is likely that technological progress will allow the “All technically feasible” measures to become more financially viable over time, and the total that could be sensibly invested in efficiency would tend towards the higher figure. While the periods over which particular levels of total investments would take place are arbitrary, and the cost reductions in the technology would reduce totals, there is clearly a large long term market potential based on just these figures.

The main chapter “UK Energy Services Market Review” compares these figures with market growth necessary to meet the non-domestic buildings elements of the UK’s 2011 Low Carbon Plan. The 15 year time horizon between 2017 and the end of the fifth carbon budget in 2032 dictated the choice of 15 years as the longest investment timescale.

No recent publicly-available surveys have taken place to ascertain the current size of the UK market, however there is reasonable data available on the volume of contracts funded within public sector EPC frameworks, such as RE:FIT, the Carbon and Energy Fund, Ecovate and Essentia. We also included information from the London Energy Efficiency Fund (LEEF). Data was sourced from a survey by the University of Sussex¹⁴⁶ and was augmented with information from ESTA¹⁴⁷ and from our own research. These totals were then adjusted to take account of inflation since the start of the periods over which they were investing funds, using Retail Price Index inflation figures from the Office of National Statistics. The resulting market totals were then

¹⁴⁶ The UK market for energy services contracts in 2014-2015, Nolden and Sorrell, Energy Efficiency (2016 9:1405-1420).

¹⁴⁷ Presentation by Nick Keegan, Vice Chair, ESTA, 2016

adjusted to take account of recent UK market growth stated by the telephone respondents consulted during this survey.

The total adjusted public sector figure for 2017 was then adjusted to take account of EPCs being run in the private sector, based on the case of the USA¹⁴⁸ which has around 8.45% of overall non-domestic ESCO industry revenues in the private sector as opposed to the public sector (Federal, state, municipal, healthcare, and education). Applying this uplift to the UK public sector total for 2017 gives a total identifiable UK EPC volume of £161m.

By way of comparison, the energy services suppliers questioned during telephone interview phase of this research were asked to estimate their annual revenues were for energy efficiency services. Of the 15 ESCOs in the study, nine were able to give turnover information, and the median value given was £20m. Grossing this up into the total number of UK companies who are either ESCOs or who offer Energy Performance Contracts, gave an estimate for the current UK market size of £118m.

Navigant, in a recent commercially available report that was based on direct research of UK ESCOs indicated that the UK energy services sector has an annual revenue of £349m.

There are considerable uncertainties associated with all of these estimates:

- The sample of ESCOs who estimated market size and market growth for this study was limited, and may lead to significant errors.
- There may have been confusion amongst the respondents in terms of whether they were describing energy efficiency revenues – despite careful briefing. In some cases, they may have been describing revenues from delivery of equipment that was not delivered under energy efficiency performance contracts, but rather as part of normal procurement processes.
- The figures for the totals invested in the public sector frameworks used in this analysis are the best available, but would require confirmation directly from the frameworks themselves.

¹⁴⁸ US Energy Service Company (ESCO) Industry: Recent Market Trends, Stuart et al, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-1006343, 2016.

- There may be confusion between the money invested directly by funds, (such as Salix and LEEF), and that which is provided by those funds but channelled through public procurement frameworks, leading to the potential for double counting.
- The timespans over which the frameworks let contracts may not be clear, and the rate of contract awards may be non-linear, as expertise and momentum is built up, significantly under-estimating recent investment profiles.
- The ratio between public sector and private sector EPC work is based on figures from a different market – that of the USA. The UK may have a greater or lesser level of energy performance contract uptake compared to the USA.

Research reports consistently report that the UK market for energy efficiency services is growing steadily and has done so for over five years. One private communication with an overseas services company elicited the comment that they saw the UK's public sector procurement frameworks as very important in this. Respondents in this study also generally agreed that the UK market for energy efficiency services would continue to grow. This feeling was strongest amongst service providers themselves. They see this growth being driven by increased energy costs, the availability of cheaper forms of efficient technologies and an increased awareness of issues surrounding energy security and grid capacity.

Out of 15 ESCOs interviewed, 10 gave information on market growth, while out of the five consultancies interviewed, two gave figures. Two out of six equipment suppliers interviewed were able to give information (although two refusals were on confidentiality grounds). Financiers, as a group, were the least certain of precise growth figures, with only two out of seven interviewees giving numerical answers.

When asked about the client sectors in which they worked, responses varied depending on who their customers were. For example, one financier said there was growth in the industrial and commercial sectors rather than public. Another said there was growth in the public sector but less so in the commercial sector because there is not enough appetite for energy efficiency. One explanation could be that those in the commercial sector tend to be less energy intensive compared to public and industrial sector organisations. Some ESCOs reported that there is growth within the public sector due to budget cuts and energy is one of the areas clients are looking to make savings. Therefore, they are turning to specialists to assist with this.

Most respondents suggested that they had experienced recent market growth (in each of the past three years), that would be anywhere from 5 per cent to 132 per cent per annum. The median historic growth cited was 15% per annum.

For future market growth, expectations ranged from 2.5% to 22.5% per annum, with the median future cited for all respondents of 10% per annum. This can be compared with the figure given by Navigant in their recent study, which was for a compound annual growth rate of 6.7% between 2017 and 2026.

Annex 5: Client sectors

ESCOs, consultancies and equipment suppliers were asked to identify the sectors from which their current clients came, and the result are given in Table 19.

Table 7: Sectors mentioned by interviewees (private sector in light blue/bold).

Sector	Mentioned as customers by ESCOs	Mentioned as customers of other respondent groups (consultancies, facilitators, financiers and equipment suppliers)	Sectors represented amongst customer interviewees
Retail	7	6	1
Universities	3	1	
Health	3	2	
Leisure	2	3	
SMEs	2	1	
Hospitality	2	2	
Education	2	2	
Property	2	3	2
Care homes	1	1	
Mixed developments	1		
Airports	1		
Rail stations	1		
Finance	1	1	1
Manufacturing	1	2	

Sector	Mentioned as customers by ESCOs	Mentioned as customers of other respondent groups (consultancies, facilitators, financiers and equipment suppliers)	Sectors represented amongst customer interviewees
Blue light	1		1
Offices	1		
Local authorities		4	2
Membership organisations		1	
Transportation		2	
Prisons		1	
TV/cable/broadband			1
Water			1

Annex 6: Energy Services Market Segmentation

Segmenting Energy Services Customers.

The findings from telephone interviews indicated that there was no strong pattern to the sectors targeted by energy efficiency services companies. In order to explore this further the ESCOs at the workshops were asked for their opinions on any readily identifiable segments into which energy efficiency clients could be divided.

Workshop attendees felt that the main criterion for dividing potential clients in the UK is whether or not they have access to public sector EPC frameworks. This access, combined with the government's ability to influence the public sector through policies such as carbon targets and the availability of government finance makes the public sector a relatively homogenous target segment for ESCOs.

For private sector organisations who are excluded from use of public procurement frameworks, the key differentiators are related to how important energy costs are to them and the willingness and capacity of individual organisations to take effective decisions on energy efficiency investments. The view of the workshop was that private sector organisations can be divided up according to:

- The financial materiality of energy consumption.
- Exposure to direct or indirect legislative pressure on energy consumption.
- Exposure to influence on energy or carbon by activist stakeholders.
- Capacity to make rational decisions concerning energy efficiency business proposals.

Each of these points is discussed in more detail below:

The financial materiality of energy consumption

Relative energy intensity of organisations is crucial, as energy efficiency improvements will have an important impact on the bottom line. As a consequence large

manufacturing sites were specifically mentioned as target clients for ESCOs. The absolute size of an energy-using organisation is also important, as this provides the overhead to support energy management expertise, and improves the decision making capacity for energy efficiency. Increased scale also brings a greater absolute size of the energy bill and increases management interest in efficiency savings.

However businesses with low energy intensities, with many small sites that contained similar, simple energy use technologies were also felt to have good market potential. This would particularly be the case if the businesses were subject to significant cost competition. Retail businesses were mentioned as being one such homogenous group targeted by the energy services sector. This was confirmed by the strong representation of retail clients amongst the organisations surveyed by telephone.

One attendee at the workshops also commented, to general agreement, that there is a “Sweet spot” of size where energy services offerings are particularly attractive to a potential client because:

As organisation size increases, energy costs reach a level that focuses management attention, at the same time that management has sufficient sophistication, driven by scale, to identify that energy services are a viable solution. If scale is such that the organisation is still too small to implement energy efficiency using internal resources, then it sits in that “Sweet spot”.

However, other attendees indicated that they also have very large clients, who merely wish to outsource energy efficiency as it is not core business for them.

Exposure to legislative pressure

All discussions recorded disappointment at the market impact of the ESOS scheme, which had failed to push awareness of energy efficiency opportunities into the boardroom of all companies. A lack of legislative pressure to implement identified measures was one problem, while poor quality and credibility of ESOS audits was another.

The Minimum Energy Efficiency Standards were felt to be making a difference amongst commercial landlords, but there was also agreement that the legislation could be modified to drive progress more quickly.

Influence from stakeholders on energy efficiency

Large corporations that are exposed to pressure from shareholders and pressure groups have a strong motivation to improve energy and carbon efficiency.

The ability of the organisation to take energy-related decisions

The scale of an organisation increases both the financial materiality of energy costs and the availability of management resources that enables them to take rational decisions on efficiency. Respondents in general felt that the smaller a client was, the less of a focus energy efficiency was and the fewer technologies would suit their circumstances. However, LED lights were illustrated as an example of how a new technology could become a suitable option for even small companies.

- Organisations with access to energy services procurement frameworks: Access to public sector frameworks was the most important customer criterion for most of the ESCOs, due to the material benefits that frameworks offer to clients, including access to and cost of finance, as improving trust in the ESCO solution and reduction in transaction costs. They felt that within the overall group that had access to frameworks, minor differences in behaviour could be detected between customers in healthcare, education, municipal and government buildings.
- The commercial property market: This sector is now more cohesive in terms of its response to energy efficiency due to the impact of the forthcoming Minimum Energy Efficiency Standards regulations for rented properties. This new regulation makes commercial property owners a clearly targetable group, due to their requirement to register levels of efficiency and to prove compliance with minimum standards. The rented property sector has a major influence on energy efficiency for the occupants of buildings, who then themselves cover an extremely wide range of activities. Examples range across rented office space, retail units and light industrial units.
- Retail sector: While the retail sector is frequently impacted by the decisions of the property owners from whom they rent space, they have low business margins and have commonality across types of operations, their effective cost-based decision-making processes and business models. They will also have good visibility of energy improvement issues through their engagement with property owners subject to the Minimum Energy Efficiency Standards. They are consequently an easily targetable segment.

- Large single site manufacturers: Workshop attendees felt that this group was a distinct and targetable group due to their generally large energy bills, the concentration of energy onto one or few sites, and the concentration of energy consumption into relatively few large pieces of equipment. These characteristics are combined with more effective management decision-making processes, and this sector is a good subject for influencing.
- All other organisations: ESCOs felt that in the same way that they defined large single-site manufacturers as being a sensible target group, all other commercial organisations should be considered as a single group. In the discussion earlier it was highlighted that many organisations are very similar in how they consume energy, and that generally energy represents only a small component of their core business. While they differ in their business focus, they are relatively homogeneous in their lack of understanding of the business opportunity from energy efficiency. The ESCOs felt that many organisations ignore the fact that energy savings are a low risk and attractive business proposition. They highlighted that the capacity of an organisation to understand energy as a business issue is the key differentiator. Management decision making is a common skill set in all these organisations, and improving the status of energy efficiency within this process is a clearly identifiable activity that can be influenced. This is particularly important for SMEs, where the combination of a lack of decision-making resources and a strong focus on core business issues other than energy is particularly acute.

Segmenting Energy Services Providers

On the supply side of the market, the workshop attendees felt that the ESCO sector would be more appropriately influenced as a single segment in itself, rather than attempting to subdivide it. This was suggested because of the flexibility and rapidity with which the sector evolves its activities and service offerings. They felt that any beneficial regulations and interventions would apply to all ESCOs, regardless of their current business approaches and service offerings. Attendees identified that the key priorities are to increase the salience of energy efficiency to potential customers and stimulate demand, and to improve the quality and cost-effectiveness of ESCO offerings so as to underpin that demand with market confidence.

While many facilities management, (FM), companies offer ESCO and EPC-type services, the ESCOs at the workshop felt that they were an identifiable and targetable group that offered a route to the general population of potential ESCO clients. FM companies need to buy-in to the full potential of the energy services solution in order for them to use it more fully for their clients. It was felt that there was more potential for adoption of energy services offering by FM providers. The benefit that addressing the FM sector gives is that they are highly effective at integrating activities to deliver measures cost effectively, and that influencing relatively few providers offers a high degree of influence over a very large number of managed sites.

The position of finance providers within the sector is more difficult to place. An initially strong interest in providing finance has diminished due to the demotivating effects of proposal costs being sunk, only for the end clients to opt for self-financing of projects. In these situations, the commitment of finance providers was in effect used as a badge of quality. It was felt that the sector would react quickly and innovatively to any market developments that would increase the scale and quality of opportunities coming forward.

Annex 7: Barriers and Drivers

Overview of UK Market Drivers

Interviewees cited UK market drivers as shown in Table 20. Note that “Yes” means that the respondent agreed that the driver was an issue, “Partly” that the driver had some relevance”, and “No” meant that they felt that the driver was not relevant.

Table 8: Market drivers cited by all interviewees (Prompted questions are marked).

Driver	Yes	Partly	No
Public policies, incentives and CO2 emissions regulations	23	3	2
Business interest in cost reduction (Prompted)	20	2	0
Public sector frameworks, carbon reduction commitments in the public sector (Prompted)	12	1	1
Innovation in technology (Prompted)	9	9	3
Energy prices	9	0	0
Availability of public funds (Prompted)	5	3	4
Innovation in finance (Prompted)	5	1	6
Corporate Social Responsibility	5	0	0
Resilience of supply	3	1	0
Business interest in carbon reduction (Prompted)	2	2	3
Consultants and companies selling services being more innovative in their approach	1	0	0
ISO standard programmes	1	0	0
Professional bodies e.g. ESTA, IET	1	0	0
Compliance	1	0	0

Perceptions of market drivers did change slightly between respondent groups, but were more consistent than was the case for market barriers.

- Public policies and policy-related issues such as incentives, emissions regulations, frameworks, availability of public funds and public sector carbon reduction commitments, were strong drivers for all groups.
- Business interest in cost reduction and in energy prices were also cited as strong drivers by all groups.
- Equipment suppliers referenced innovation in technology as being a relatively strong driver for them. While some ESCOs felt that it was moderately strong, others felt that it was of lesser importance and two felt that it was not a driver at all. Consultants also shared the view that innovation in technology was a relatively weak driver. For innovation, workshop attendees tended to agree that it was the reduced cost of technical innovation that was driving uptake of new technologies, rather than any market appetite for innovation. The concern was also expressed that some ESCOs appear to not have the expertise to manage innovative or complex projects.
- Financiers cited innovation in contractual mechanisms as an important driver. Feed in Tariffs and Renewable Heat Incentive were mentioned by three financiers as helping them to drive the market, but only one financier mentioned Enhanced Capital Allowances.

Building on the insights gained from the telephone interviews, more detailed discussions during workshops agreed with most of these points. The workshops agreed that public sector frameworks were the most important market driver at present, while the main drivers for individual private sector energy projects are energy unit prices, total billed energy cost and monetary savings. Carbon has declined greatly as a driver of the market, except for larger corporates who are exposed to activist stakeholders. These organisations appear to be redesigning their approach to carbon in response to the Paris Accords.

Workshop participants particularly felt that felt that ESOS Phase 1 had failed to drive the market by bringing energy efficiency onto the main board agenda, because once the audit report was completed, there was often no further action. Several participants felt very strongly that the government should strengthen the driver by obligating companies to undertake energy efficiency projects identified under ESOS.

Workshop attendees strongly agreed that if tighter procurement standards were set for government building occupancy, goods and services, this would give valuable stimulus to the ESCO sector, and would create case studies and confidence in efficiency proposals.

In addition, there was also agreement that the clarity of signals to the market is important. For rental properties, the Minimum Energy Efficiency Standards Scheme, (MEES) is having an effect, especially on larger landlords, but relies on energy performance certificates that currently do not present prospective tenants with clear information on the cost implications of occupying buildings with different efficiencies. This may significantly dilute the ability of MEES to raise market demand for efficient buildings above that for merely compliant ones.

One attendee noted that the UK lacks an energy supplier obligation targeted at commercial savings. This scheme has been very successful in France, and while the possibility was welcomed in the discussion, the issue of high setup costs was raised. The possibility of a small pilot scheme to develop the concept for a phased roll out was mentioned as a potential solution to this problem.

When client interviewees were asked why they had adopted an energy service approach to delivering savings, their responses varied. The most frequently cited was that they wished to gain access to the skills, expertise and experience of ESCOs, as one customer explained: “Our primary aim isn’t to be an energy efficiency related organisation, so what we needed to do was find expertise elsewhere.”

Other frequently cited motivations included:

- Two respondents mentioned access to additional resource to deliver energy efficiency.
- Two respondents mentioned the fact that the energy service company had a detailed understanding of the respondent’s type of business as well as general expertise in energy efficiency.
- Two respondents mentioned access to an attractive financial model, specifically:
 - Guaranteed savings offers low risk.

- Flexibility in funding options offered, as they do not want external capital investment.
- One respondent mentioned the importance of making another party, i.e. the consultant, accountable.

Overview of Main UK Market Barriers

The barriers cited during telephone interviews with ESCOs, consultancies, equipment suppliers and financiers are given below in Table 21.

Table 9: Barriers cited by all interviewees.

Barriers	Yes	Partly	No
EE low priority (Prompted)	19	3	1
Lack of client trust in your proposed solution and benefits (Prompted)	17	1	3
Low awareness of energy services/ESCO (Prompted)	12	3	6
Split incentives (Prompted)	11	3	7
High transaction costs (Prompted)	10	3	4
Lack of legislation or standardisation in business models/contracts (Prompted)	9	0	4
Customer desire/requirement for a short term payback	8	0	0
Poor access to/ costly finance (including threshold for projects being too high) (Prompted)	7	5	3
Lack of internal buy in from finance /senior management in client company	7	0	0
Lack of understanding of/expertise in EE and/or technology	5	0	0
Lack of capability of energy managers to sell projects internally at a senior level	5	0	0
Poor quality energy auditors/consultants contributing to a lack of trust	5	0	0
Difficulties with public sector procurement/processes	4	0	0

Barriers	Yes	Partly	No
Finding opportunities at the right scale and with well-defined risks and returns (Prompted)	3	0	9
Customer not happy to take on level of risk involved/ concern about potential issues in delivery	3	0	0
Possible future change of ownership/personnel/ceasing of operations at client company	3	0	0
Lack of clarity/certainty on government policy (e.g. due to Brexit)	3	0	0
Customer experienced specific individual issues in previous projects	3	0	0
Low energy prices	3	0	0
Complexity/technical difficulty of energy efficiency - myriad of potential options	3	0	0

Perceptions of barriers differed slightly between the types of respondent. In summary the similarities and differences were:

- Market participants on the selling side of energy efficiency tended to cite the same barriers, especially a low client priority on energy efficiency, a lack of client trust in proposed solutions, and split incentives.
- ESCOs and consultancies mentioned lack of legislation and standardisation as barriers to clients understanding and trusting their offerings.
- High transaction costs were cited as a barrier by ESCOs and financiers. These parties would experience the impact that these costs would have on the likelihood of a contract achieving closure. Customers specifically mentioned monitoring and verification costs as an issue, as they would experience these during the operational phase of a contract.
- Financiers felt that the complexity of energy efficiency was a problem, and mentioned the issue of finding opportunities of sufficient scale to be viable.
- Equipment suppliers identified lack of trust as the most severe barrier followed by costly finance and the thresholds for project returns being too high. They also mentioned that poor quality of energy auditors and consultants contributed to this.

- Customers mentioned lack of trust as their main issue, and that this was underpinned by previous poor experiences. They also mentioned a concern that ESCOs tend to cherry pick the easiest projects, which tied in with the lack of trust. They cited lack of internal buy-in from management as being the second most severe barrier that they face. They also mentioned the cost and complexity of monitoring savings as part of performance guarantees.

Most respondents interviewed for this study have had projects that have fallen by the wayside. ESCOs reported that this is the norm and reasons for projects not proceeding vary. Some of the reasons cited by ESCOs included:

- Change in personnel / ownership.
- Lack of budget.
- Long paybacks.
- Procurement within the public sector.

Specific comments from ESCOs included:

- “In the last five years 20 per cent of projects started have not proceeded. The main reason was the loss of the project sponsor on the client side. The second reason would be client resource and ability to manage this type of project amongst everything else that they have.”
- “Private sector projects can fail because people don’t want to invest, don’t have the budget then, they get sold etc. Some public sector projects have to go back to procurement and someone else wins the follow on work.”
- “One example is where a client changed their strategy on their portfolio. So, they were not going to be using a building in the intended way, which meant the project was no longer relevant.”

Where consultancies have had projects cease, this has been because:

- The customer did not “get consent from higher authority... ..their day jobs get involved so it languishes on the desk and doesn’t make it to the surface. It’s only when the pip starts squeaking from energy costs that you will get more people motivated.”

- Not having the buy-in from the finance team can result in a project not going ahead. Once a project goes to a CFO for sign off, they will turn around and say they will finance it themselves: “Your cost of capital is greater than mine. Why should I have you pay for it?”
- One consultancy reported that they had an externally funded project that did not go ahead, which was all down to ‘sheer complexity.’ The consultancy said they think the standards and procedures were not established. Projects usually stall if, in hindsight, the route data was incorrect when calculating savings, i.e. errors with poor data. But this is not a common problem.

Annex 8: Selection of Policy Options

Policies were developed out of the drivers, barriers and enablers suggested during interviews and workshops, and refined based on the international review of best practice.

They were then assessed for:

- Their likely impact to raise general interest and activity on energy efficiency amongst organisations.
- Their likely impact to increase business for energy efficiency services companies.
- Whether other nations are already implementing similar interventions.
- Whether there is objective evidence available on whether the measure will be successful.

Results are given in Table 22:

Table 10: Policy and intervention options and high-level rationales.

Intervention Options	Other nations implementing similar interventions	Evidence of success?	Views in workshops and from other sources
Promotion of standard contract terms, methods & guidance	USA, Canada, Australia	No	<p>Links to quality of service companies.</p> <p>Reduces transaction costs.</p> <p>Improve knowledge of service solution.</p> <p>Mentioned in workshops but with caveats on limitations</p>
Innovative cost recovery	USA	Anecdotal	<p>Mechanism to address split incentives</p> <p>Support for innovative approaches</p> <p>Felt to be a valuable approach in workshops.</p>
Stronger government adoption of EPCs	USA, France	Yes	<p>Accelerate public adoption of energy services</p> <p>Improve knowledge of cost reduction from energy efficiency and energy services (via capacity building and case studies)</p> <p>Strongly advocated in workshops</p>

Intervention Options	Other nations implementing similar interventions	Evidence of success?	Views in workshops and from other sources
<p>Stronger public procurement standards for supplier’s energy efficiency</p>	<p>None</p>	<p>No</p>	<p>Make environmental improvements more monetisable (by giving extra points for achievements in public procurement processes)</p> <p>Increase the salience of energy efficiency to business</p> <p>Improve training and understanding of energy efficiency amongst the client base</p> <p>Strongly advocated in workshops</p>
<p>National registry for Energy services companies</p>	<p>Italy, USA, Finland, Singapore, South Africa, Australia, Austria (Graz)</p>	<p>Anecdotal</p>	<p>Improve quality of energy efficiency service suppliers</p> <p>Reduce transaction costs (through reduced due diligence for procurement)</p> <p>Improve knowledge of cost reduction from energy efficiency and energy services</p> <p>Strongly advocated in workshops</p>

Intervention Options	Other nations implementing similar interventions	Evidence of success?	Views in workshops and from other sources
Energy efficiency networks	Switzerland, Germany, France, Ireland	Yes	<p>Increase awareness amongst clients and develop new routes to access service companies</p> <p>Workshops felt that energy efficiency networks would help to raise awareness of energy efficiency</p>
Private sector procurement frameworks	EU “Streetlight EPC” project in nine nations, Ireland, Denmark, Dubai “Etihad ESCO”, India (EESL)	Anecdotal	<p>Reduce transaction costs (through mentoring, quality standards for service providers, aggregation, confidence improvement for financiers and standardised contractual forms).</p> <p>Mentioned in workshops as being potentially valuable.</p>
Compulsory implementation of ESOS measures	Belgium (Flanders), Italy, Russia, France (White certificate scheme), Denmark (White certificate scheme)	Anecdotal	<p>Strengthen regulations and incentives.</p> <p>Increase salience of energy efficiency to business.</p> <p>Provide motivation to address split incentives.</p> <p>Frequently mentioned in workshops.</p>

Intervention Options	Other nations implementing similar interventions	Evidence of success?	Views in workshops and from other sources
<p>Modifications to the Minimum Energy Efficiency Standards</p>	<p>Australia, USA, Denmark, France, Japan, Korea</p>	<p>Yes</p>	<p>Improve salience of energy efficiency to businesses.</p> <p>Provide motivation to address split incentives (MEES already provides the mechanism).</p> <p>Develop longer-term policy roadmaps.</p> <p>Importance of making actual building performance available to prospective tenants is particularly mentioned in international reviews</p>

Overview of Policy and Intervention Options

The individual policy options are described in more detail below.

Option 1: Promotion of standardised ESCO contract terms, methods and guidance.

The government should develop a library of standard terms and processes to assist Energy services companies and clients in understanding how to adopt EPCs.

The terms and processes should be designed so as to be suitable for insertion into the existing forms of contract with which companies are familiar, and should have guidance that will assist companies in using the standard terms to develop formats that suit their specific requirements. The terms and guidance should also be suitable for assisting companies to understand the terms that have been proposed to them by Energy services companies.

Suitable terms and guidance should help companies to reduce transaction costs in setting up contracts that they are comfortable with, and assist others in understanding the implications of energy services agreements presented to them.

Option 2: National registry for energy services companies.

A national registry for energy services companies could be set up, modelled on similar systems used overseas, providing some form of quality assurance for potential clients.

Such a system would improve the level of trust that commercial organisations would have for the energy services approach to implementing efficiency measures.

Option 3: Energy efficiency networks to boost demand for improved energy efficiency.

Develop UK energy efficiency networks similar to those that have proven successful in Germany, Switzerland and Ireland, possibly also drawing on previous experience of waste minimisation clubs in the UK. Networks would link companies together and provide them with centrally designed approaches to saving energy. Providing energy services companies with access to the networks and providing independent advisory support in developing EPCs could be a core element of the approach.

Option 4: Private sector procurement frameworks.

The public procurement frameworks operating in the UK have proven to be very successful. If similar versions could be run for the private sector, they would help in providing access to good quality Energy services companies for commercial and industrial concerns.

While exact replicas of the existing public sector frameworks would not be possible, one way of delivering some of the benefits would be by providing private companies with access to the performance and delivery records of ESCOs on the existing frameworks. Alternatively, private sector companies could benefit from access to the facilitation services provided by the existing frameworks. Alternatively, private sector facilitation facilities could be kick-started to provide a service similar to the one provided by private consultancies in Denmark.

Option 5: Innovative cost recovery processes.

The UK could set up a legislative framework that allows energy services companies to recover EPC investment costs via property taxes or from energy bills.

Allowing the recovery of finance to be attached to a building asset would further assist in overcoming the split incentive between property owners and tenants.

Option 6: Stronger government adoption of energy service offerings.

The government should drive the adoption of EPCs across the public sector, achieving the same positive stimulus on the market as the Executive Order for Federal buildings in the USA. Potential measures include requiring more concrete and public energy efficiency planning, tighter targets driven by cost-effectiveness of surveyed measures, or targets for adoption of externally financed EPCs.

Option 7: Stronger public procurement standards for energy efficiency.

Procurement standards for the supply of goods and services to the public sector should be strengthened, requiring measures such as companies above a certain size to have an energy management plan or even a track record of implementing energy efficiency measures.

The standards could be carefully designed and provided with guidance and training support to enable standards to be tightened over time. A progressive and well-supported process would lead to painless and cost-effective improvements in energy management capacity in progressively smaller organisations in government supply chains.

Option 8: Compulsory implementation of ESOS measures.

A requirement for companies, possibly above a certain size, to implement all ESOS measures that deliver returns above a minimum threshold.

This intervention is extremely popular amongst ESCOs, who are disillusioned with the ESOS scheme. It has the advantage of compelling companies to implement only those measures that they should be pursuing anyway. However, there is a risk of being seen to force companies to take action that may be inappropriate to their

particular circumstances. This could be solved by placing the obligation onto energy suppliers through expanding existing energy efficiency obligations from the domestic sector to the commercial sector. This would then allow innovation to develop processes for supplying efficiency savings from companies who are willing to engage.

Option 9: Modifications to the Minimum Energy Efficiency Standards.

The Minimum Energy Efficiency Standards for commercial rented property could be accompanied by a roadmap showing tightened minimum performance thresholds over time. This would make it more likely for landlords to enter into deep retrofit of buildings so as to future proof them and prevent any requirement to revisit a property that would otherwise have been only partially improved under the current standards.

In addition, the existing rating system could be modified to provide prospective tenants with actual energy performance data in order to make the operating cost implications of less efficient properties more material during decision-making. This modification would bring the UK into line with international best practice.

Detailed analysis of policy options

In consultation with BEIS, the following policy options from the long list were selected for analysis in greater depth:

Option 1 – Promotion of standardised ESCO contract terms, methods and guidance.

Option 2 – National registry for energy services companies.

Option 3 – Energy efficiency networks to boost demand for improved energy efficiency.

Option 4 – Private sector procurement frameworks for providing support during procurement

These are analysed in the following sections of the document, using six dimensions for characterising each option as follows:

Table 11: Analytical framework for detailed study of policy options.

Analytical dimension	Explanation	Measurement metrics
Effectiveness	What will be the positive impacts of the policy on the problem?	H/M/L: H = highly positive impact on energy efficiency in general and energy efficiency services specifically
Unintended effects	What are the indirect or negative impacts of the policy?	H/M/L: H = highly negative impacts on stakeholders or those outside of the energy services marketplace.
Equity	Will the impacts of the policy change between different population groups?	H/M/L: H = highly equitable, implying an even spread of impacts between different groups within the target market.
Cost	What will be the cost of the policy?	H/M/L: H = high costs to implement.
Feasibility	What is the technical feasibility of the policy?	H/M/L: H = highly feasible to implement the intervention.
Acceptability	Will the various stakeholders concerned find the policy to be acceptable?	H/M/L: H = highly likely that all non-governmental stakeholders will find the intervention acceptable.

Individual policy options are summarised and assessed in the sections that follow.

Option 1 – Promotion of standardised ESCO contract terms, methods and guidance.

Proposal

Suitable terms and guidance should help companies to reduce transaction costs in setting up contracts that they are comfortable with, and assist others in understanding the implications of energy services agreements presented to them.

Guidance will explain how companies can engage with an energy services company and how to develop contractual frameworks based on energy efficiency performance. The guidance should assist companies to understand the terms that have been proposed to them by energy services companies.

The terms and processes should be designed so as to be suitable for insertion into a company's existing forms of contract, and should be accompanied with detailed guidance that will assist companies in adapting the standard terms to suit their specific requirements.

Stakeholders suggest that this intervention is best led by government, with the support of industry representatives from both the services and the customer sides, as government will be seen as an honest broker to maintain impartiality. The documentation would also require periodic checking to ensure that relevance was being maintained and any arising updating.

Pros

- Standard contracts have been cited by several Energy services companies as being beneficial for helping to reduce transaction costs.
- Standard approved terms can give clients confidence that they are not likely to be disadvantaged.

Cons

- Standard terms can be applied to one type of asset across one type of client, but as circumstances differ between clients, they can be difficult to use as a one-size-fits all template.
- Some Energy services companies see specialist contract terms as key intellectual property and a differentiator, so standard terms may struggle in competition.

Observations

Several respondents to the study indicated that as market volume and experience grows, contract formats for every circumstance will be developed, generating a library of suitable specialised templates.

Analysis

Table 12: Analysis for promotion of a library of standard terms, methods and contractual guidance.

Analytical dimension	Impact	Comments
Effectiveness	Medium	Libraries of guidance are common around the world. Stakeholders stated that improving detailed knowledge of how energy performance contracting works is likely to have a medium/high positive impact on uptake of energy services.
Unintended effects	Low	To a certain extent, some energy services companies see their specialised contract terms as key intellectual property and this library will undermine that advantage. However any real advantage with pre-existing formats will be in specialist situations, such as where multiple parameters are need to adjust for energy intensity, while this policy would generate materials that were immediately useful in more general cases.
Equity	High	It is unlikely that benefits from this policy will be unfairly distributed. They help to remove information asymmetry between energy services companies and their clients.
Cost	Low	There are significant volumes of pre-existing material for which the UK Government could probably obtain free permission to use as a basis for this library. For example the materials developed by the Energy Efficiency and Renewable Energy Agency in the USA ¹⁴⁹ . This would keep the costs to develop the material relatively low. Distribution would be electronic. Total costs likely to be in the range of £70,000-£100,000 to use technical and legal consulting services to collect, consult on, subject to legal checks and place on the government and stakeholder websites ¹⁵⁰ .
Feasibility	High	The approach of providing guidance and legal materials is highly feasible, as it has been proven elsewhere.

¹⁴⁹ <https://energy.gov/eere/slsc/model-documents-energy-savings-performance-contract-project>

¹⁵⁰ Assumption based on requirement for approximately 90 days of consulting time to gather, consult, draft and finalise materials.

Analytical dimension	Impact	Comments
Acceptability	High	The policy would be highly acceptable to stakeholders. ESCOs see this as an important factor for building trust and would not see any disadvantage from spreading knowledge of contractual best practice.

Option 2– National registry for energy services companies.

Proposal

A national registry for energy services companies could be set up, modelled on similar systems used overseas, providing some form of quality assurance for potential clients. The system would check that service providers or projects achieve set quality standards, which can reference possession of staff credentials or can reference quality guidelines such as those recommended by the QualitEE programme¹⁵¹.

Such a system would improve the level of trust of commercial organisations in the energy services approach to implementing efficiency measures.

One option for this scheme would be to certify ESCOs. This can be done privately, as is the case for the US ESCO trade association, NAESCO's accredited providers in the USA¹⁵², or by a regulator, as with the Regulatory and Supervisory Bureau in Dubai¹⁵³. Alternatively, the projects themselves can be certified, as is the case for the Investor Confidence Project¹⁵⁴ or the UK's Combined Heat and Power Quality Assurance scheme. This would allow service providers entering the market to more easily start building a track record with their initial projects. These projects are usually implemented at a site with whom the proponents have an existing relationship. Such a scheme could be developed as an outgrowth of the CHPQA scheme, limiting the risks and resources needed to set it up.

These scheme would probably be best administered or at least overseen by a government agency due to the importance of independence.

Pros

- Even a voluntary national registry of Energy services companies which, for membership, requires certain standards to be met, would become a de facto quality standard.

¹⁵¹https://qualitee.eu/wp-content/uploads/QualitEE_3.1_Guidelines_V1.2_180124.pdf

¹⁵²<http://www.naesco.org/accreditation>

¹⁵³<https://www.rsbdubai.gov.ae/esco-accreditation/>

¹⁵⁴<http://www.eepformance.org/>

- The requirement for energy services companies to adhere to codes of conduct would be a useful quality market for prospective customers.
- A qualification structure that tightens over time could assist in moving new Energy services companies forward in the development of their capabilities.

Cons

- The proofs of achievement that Energy services companies would have to demonstrate to get on a formal list could act as a barrier to entry, unless the levels were carefully constructed. The list could also promote the growth of incumbent energy services companies at the expense of new entrants. New entrants would be perceived as being more risky choices, irrespective of their underlying quality.
- There would be a cost to administer the system, which, if it were set too high could also act a barrier to entry.
- There might be difficulty in obtaining agreement on the proofs that energy services companies would need to demonstrate to get on the list.

Analysis

Table 13: Analysis for development of a national registry for energy services companies.

Analytical dimension	Impact	Comments
Effectiveness	High/medium	Strong anecdotal evidence suggests that the impact of this policy would tend to be high ¹⁵⁵ . All stakeholder groups have commented that quality standards must be improved to protect the reputation and progress of the market. ESCOs complained about poor quality providers in the marketplace who are damaging the credibility of the industry.
Unintended effects	Medium/Low	If incorrectly implemented, the policy could create barriers to entry by setting high costs for qualification, or could limit the growth of newer or smaller players by highlighting their lack of experience.

¹⁵⁵ "Being an accredited member of NAESCO gives us an important edge when competing for major projects. Customers feel more comfortable knowing that our organization possesses the rigorous standards required of accredited companies. John W. Mahoney, OpTerra Energy Services

Analytical dimension	Impact	Comments
Equity	Medium	The policy could raise barriers to new entrants if the qualification requirements are costly to acquire.
Cost	Medium	The administration of the system could be moderately costly, requiring for example two days of effort to certify a service provider or half a day to certify an individual project (based on documentation). If a simple voluntary project register is suitable, this would probably have the same order of costs as the CHPQA scheme.
Feasibility	High	Formal registers and quality schemes for energy services providers already exist in many nations. A project-based scheme would be less onerous for smaller market players, but could potentially demand significantly more administrative resource due to the volume of energy services contracts.
Acceptability	Medium/High	The policy appears to be broadly acceptable to stakeholders who have been consulted as part of this study. However, unless this proposal is presented effectively, many organisations may react negatively to the potential for further administrative burdens.

Option 3 – Energy efficiency networks to boost demand for improved energy efficiency.

Proposal

Develop UK energy efficiency networks similar to those that have proven successful in Germany¹⁵⁶, Switzerland¹⁵⁷ and Ireland, possibly also drawing on previous experience of waste minimisation clubs in the UK. Networks would link companies together and provide them with centrally designed approaches to saving energy. Providing energy services companies with access to the networks and providing independent advisory support in developing EPCs could be a core element of the approach.

¹⁵⁶ https://ipeec.org/upload/publication_related_language/pdf/155.pdf

¹⁵⁷ <https://books.google.ae/books?id=D9rTCwAAQBAJ&pg=PT15&lpq=PT15&dq=escommuner&source=bl&ots=8C-ggRpRx6&sig=DNLZ2AauOEI9LQhKbZpAt8ZjB8c&hl=en&sa=X&ved=0ahUKEwi8ldzRl-nYAhUFRQKHcLEClcQ6AEIaDAN#v=onepage&q=escommuner&f=false>

While the concept would benefit from having central design and specification of high level approaches and materials, it is amenable to being implemented by adding on to existing activities of local organisations such as Local Enterprise Partnerships or Chambers of Commerce.

Pros

Energy efficiency networks:

- Are a proven approach for engaging industry and commerce with energy efficiency.
- Are usually locally driven and are effective at improving energy efficiency awareness amongst SMEs, who do not have to travel long distances to meetings.
- Provide a means for large companies to mentor SMEs and their local supply chain, developing both reduced costs and positive case studies of corporate social responsibility.
- Provide opportunities for aggregating local energy services opportunities into larger work packages that are more attractive to potential funders.

Cons

- There is no direct evidence available that local networks assist SMEs to save energy, although there is no reason why they would not learn savings measures alongside their larger peers. Networks in Germany have 26% of their membership as small businesses¹⁵⁸.
- Energy efficiency networks are resource intensive and require seedcorn funding to get them started. SME members may need continual subsidy to maintain their involvement
- A central secretariat and PMO to coordinate the network at a high level and deliver economies of scale, although delivery could be at a local level. The PMO and the whole pilot network will require funding from government in the early stages to promote uptake until the concept is proven in the UK.

¹⁵⁸ <http://www.effizienznetzwerke.org/wp-content/uploads/2017/07/Ergebnisse-Umfrage-2016-gesamt-1.pdf>

Analysis

Table 14: Analysis for energy efficiency networks to boost demand for efficiency.

Analytical dimension	Impact	Comments
Effectiveness	High	The local club partnership approach to driving engagement with energy efficiency is proven around the world and historical evidence indicates that it worked well in the UK. Results from Germany indicate that larger companies in the partnerships can quite quickly save 10% on their energy bills.
Unintended effects	Low	No unintended consequences of this policy are perceived at present.
Equity	High	<p>There may be problems in gaining access to a local group within a reasonable distance for companies in less densely populated areas of the UK. This might be addressed through electronic access or targeted subsidies available for travel beyond a certain distance.</p> <p>The approach will boost the knowledge of companies concerning energy efficiency and will then allow them to take the right approach to implementation that suits their circumstances, including use of energy service providers.</p>

Analytical dimension	Impact	Comments
Cost	High/Medium	The savings partnerships models demonstrated in Switzerland and Germany are intended to be self-financing after the start-up phase. The cost to set up a large programme across the nation might be high, but could be controlled through a process of phased rollouts and progressions to self-financing basis. Costs for the set-up of a small rollout programme are likely to be of the order of £200k to address several clubs, starting with experienced energy practitioners and using general approaches to energy management. Over time, subscription fees could take over the ongoing running costs, (consultant facilitation etc.), but ongoing capital investment would be needed to develop more sophisticated specialist materials to address progressively complex issues and develop deeper, sector-specific issues. The German network appears to have annual costs of between €1,000 and €5,000 per member. Annual running costs for a full national programme would most likely be in the range of several £5-10M, with the majority coming from subscription fees, and unlocking significant energy savings ¹⁵⁹ .
Feasibility	High	The approach is proven and has been used previously in the UK.
Acceptability	High	The approach would be acceptable to all stakeholders, as it would provide a stimulation for energy efficiency in general, and provide a new route to market for local energy services companies.

Option 4 – Private sector frameworks for providing support during procurement of energy performance contracts

Overview

The public procurement frameworks operating in the UK, e.g. Re:fit , Carbon and Energy Fund, are viewed as being very successful¹⁶⁰. If the private sector had access to similar

¹⁵⁹ Each network club costing £3,000 for each of 15 members and 100 clubs nationwide.

¹⁶⁰ Based on views of stakeholders in this study who indicated importance of public sector frameworks and from a discussion with an overseas respondent who mentioned the success of UK frameworks.

facilitation services, it would help them in engaging with good quality energy services companies. The framework approach combines several elements in a one-stop-shop that improves confidence amongst potential clients. One way of going about this would be to allow private sector companies access to elements of the existing UK public sector procurement frameworks.

- An approved qualified list of suppliers.
- A quality monitoring function.
- Standardised terms and conditions.
- Support and advice through the EPC process.

Alternatively, private sector facilitation facilities could be kick-started to provide a service similar to the one provided by private consultancies in Denmark¹⁶¹. While in the Danish model these consultancies advise public sector organisations on EPC arrangements, this could be replicated for private sector clients.

Government would be the most appropriate lead for this in mobilising the expertise that has been built up in the existing public sector frameworks. This could either be extended in the public sector, or outsourced to private sector contractors and paid for by subscriptions.

Pros

Private sector frameworks can:

- Reduce the transaction costs for starting ESCO relationships and generating EPCs.
- Develop populations of standard contract terms that can assist in reducing transaction costs.
- Provide a means to apply quality standards to Energy services companies, reducing the inhibitory impact on the market from poor performers.

Cons

Frameworks will:

- Require government funding to run their secretariat and PMO, similar to existing public sector frameworks, at least in the early stages.

¹⁶¹ ¹⁶¹ <https://books.google.ae/books?id=D9rTCwAAQBAJ&pg=PT15&lpg=PT15&dq=escommuner&source=bl&ots=8C-ggRpRx6&sig=DNLZ2AauOEI9LQhKbZpAt8ZjB8c&hl=en&sa=X&ved=0ahUKEwi8ldzRI-nYAhUFRQKHcLEcIcQ6AEIaDAN#v=onepage&q=escommuner&f=false>

- Quality systems will have to be more stringent relative to those of existing public sector frameworks, due to the significant impacts on private sector companies from EPCs that fail.

Analysis

Table 15: Analysis for private sector procurement frameworks for providing support.

Analytical dimension	Impact	Comments
Effectiveness	High/medium	Existing public sector frameworks in the UK, and the experience of the public sector in Denmark (served by private sector facilitators) has shown that having guidance has been valuable to public sector clients as they set up energy services contracts. The same benefits will be found by private sector organisations. No private sector frameworks appear to exist at this stage, but it is found that aspects of their functions are performed by separate actors.
Unintended effects	Low	There are no unintended consequences for this policy perceived at this point.
Equity	High/medium	If thresholds for access to the support are based on the scale and cost-effectiveness of a particular contract (driven by the financial impact of transaction costs), this might be interpreted as discriminating against smaller energy users. However, this policy helps to reduce transaction costs, so should be effective at reducing minimum project size thresholds.
Cost	Medium	While a set-up phase would be required, the scheme could ultimately be self-financed by fees charged to users. Provision of facilitation services could be moderately costly in the set-up phases, although costs would reduce over time as advisory processes become streamlined. The knowledge built up in existing frameworks could also be mobilised to reduce costs, for example re-using advisory materials and lists of qualified contractors. The cost to set up a regional pilot is likely to be in the range of a few £100k if the pilot approach is based within existing frameworks, and phased rollout could control peak costs.

Analytical dimension	Impact	Comments
Feasibility	High/medium	The approach is feasible, having been demonstrated in public sector programmes. The issue of access (to control time wasting) and the feasibility of long term self-financing might require careful planning to manage.
Acceptability	High/medium	The approach would probably be acceptable to all parties, depending on how local facilitators are chosen, and how access to the initially limited levels of resources as the schemes expands out of the pilot period is managed.

Annex 9: Limitations of the Study

The following limitations apply to the conclusions that this study presents:

- Quality of reference material on international markets.

There is a large volume of material available on the international energy services market, but much of it is out of date in this fast-moving area. In addition, many studies tend to be focused on particular regions, and international comparisons on a consistent basis are therefore difficult.

- Blurred distinctions between categories of energy services.

Many energy services companies offer a range of services, from installation of energy supply equipment through to energy efficiency upgrades and provision of consultancy advice. In addition, clients may install new, efficient technology for a range of reasons other than just energy savings, including natural replacement and health and safety. Understanding the proportion of the market which is relevant to this study, namely replacement to save energy is difficult, as it places a significant time burden for explanations to interviewees.

- Incomplete recruitment database for energy services companies.

It is difficult to establish with certainty a full list of energy efficiency services suppliers in the UK, as a one-off recruitment campaign is likely to miss some, such as smaller players or those for whom energy services are integrated behind other offerings.

- Small sample size for telephone interviews.

Development of accurate figures requires larger population samples.

- Sample bias in recruitment for depth discussions in workshops.

The recruitment for the workshops tended to be from those organisations who had willingly engaged on the telephone interviews. This may have led to over-reinforcement of certain views, and a failure to capture others. This is driven by the small sample size and the limited number of attendees that can be accommodated in two workshops.

- Limited data on market size from public procurement frameworks.

Public funds are an important component of energy efficiency services markets around the world, and the UK's public procurement frameworks such as Re:fit and those of the National Health Service represent a large market volume. This study

relied on publicly-available figures, and limited data was available from UK public sector frameworks.

- Commercial confidentiality limiting the openness of respondents.

In a substantial number of cases respondents were not able to provide answers due to considerations of commercial confidentiality. Reasons for this can include not wishing to release information that may enable key relationships to be identified, or it may be that a provider does not wish to disturb a key client in this contractually sensitive area. Clients may also not wish to be identified, in case questions are raised by stakeholders as to why they could not deliver savings projects themselves.

- Application of inappropriate international assumptions to the UK case.

One of the calculations used in this study relied on extrapolating the UK's private sector energy efficiency services volume based on the relative volumes found in the USA, for which figures are available. The UK and the USA do have different approaches to business, as this may mean that any such extrapolation is inapplicable.

- A lack of reliable sources on UK levels of energy services activity in industrial operations.

No information could be gleaned on the level of activity in industrial energy services, although anecdotal information suggests that the UK has significant activity in this area. Market estimates are therefore based only on buildings efficiency and the full market potential is significantly larger.

- Consultees were from within the main energy efficiency services sector only.

Consultees to this study were from the mainstream ESCO sector, and adjacent sectors such as mainstream (not yet active in energy services) facilities management companies, engineering equipment services companies or industrial companies were not included. This could lead to a lack of the broadest possible insight into some issues, such as the process for adopting energy services offerings by new providers or reasons why services contracts may be turned down by potential clients.



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