D2.4 Country Report on Identified Barriers and Success Factors for EPC Project Implementation

GERMANY

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Transparense project

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Report on identified barriers and success factors for EPC implementation in Germany

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Abbreviations

EPC:	Energy Performance Contracting
ESC:	Energy Supply Contracting
ESCO:	Energy Service Company
EED:	Energy Efficiency Directive
EESI:	European Energy Service Initiative, IEE Project from 2009-2012
BEA:	Berlin Energy Agency
M&V:	Measurement and Verification
SME:	Small & Medium Enterprise

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1 Summary

The present report aims at providing an overview of the existing EPC market in Germany with additional information gathered from a survey carried out in autumn 2013. The report focuses on identified barriers and success factors for the implementation of EPC projects.

It can be stated, that the overall composition of the German EPC market has not changed much in the last 5-10 years - which can be seen as competitive with around 500 ESCOs. But only around 10-20 ESCO companies can be identified that are strictly focused on EPC. One success factor is certainly that Energy agencies and other facilitators play a crucial role in the German market, helping municipalities in conducting public procurement for ESCO services successfully. A broad acceptance of ESCO associations within the industry also support EPC in respect of exchanging and distributing EPC knowledge. 'Increasing energy prices' and 'pressure to reduce costs' were identified as the main drivers of the EPC business in Germany – followed by the assumption of the ESCOs that the national policy has an important impact.

Observed barriers to the implementation of EPC, predominantly in the public sector, can divided into the following categories: regulatory and administrative barriers, structural barriers and financial barriers. The relevance of the barriers is different between the federal states in Germany - there are some EPC-hot-spots in Berlin, Baden-Wuerttemberg or North Rhine-Westphalia and federal states with almost no experience (e.g. Saarland, Thuringia or Mecklenburg-Western Pomerania). Besides these issues, ESCO's identified mainly the complexity of the concept and the lack of trust in the ESCO industry as barriers for the market.

The report is building on the data and information gathered by two other similar projects, the European Energy Service Initiative[1] (EESI) and the ChangeBest project[2]. It is also intended as a continuation on the work of the European Commission's Joint Research Centre – Institute for Energy, and more particularly on its 2010 Status Report on Energy Service Companies Market in Europe[3].

[1] http://www.european-energy-service-initiative.net/eu/toolbox/national-reports.html
[2] http://www.changebest.eu/index.php?option=com_content&view=article&id=43&Itemid=10&lang=en
[3] http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/escos-market-in-europe_status-report-2010.pdf

2 Introduction

2.1 Methodology

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

- the results of a nation-wide EPC survey which was sent to the country's main actors within the EPC market
- the market knowledge of the authors, as well as research from local / national literature (publications and studies, legislation documents, official statistics and databases)

The first step in collecting the data used in this document was to distribute a survey focused on Energy Performance Contracting (EPC) to the country's most relevant energy services companies and finance houses. The survey contained questions around four main areas:

- Existing ESCOs and national EPC market
- EPC models
- Financing models
- Policy initiatives.

The answers were then analysed and the results are presented in this report in aggregated form.

The survey was sent to six financial institutes and seven ESCOs. Responses were obtained for 8 of them (7x from ESCOs, 2x from financial institutes). Due to this limited participation of ESCOs and Banks, the survey results cannot be considered representative but nevertheless provides relevant information. The report does not rely only on the survey responses, but also on the information gathered by the authors through previous direct meetings, phone conversations or emails in order to present a thorough and up-to-date picture of the state of the EPC market in Germany.

2.2 What is Energy Performance Contracting

Energy performance contracting (EPC) is when an energy service company (ESCO) is engaged to improve the energy efficiency of a facility, with the guaranteed energy savings paying for the capital investment required to implement improvements. Under a performance contract for energy saving, the ESCO examines a facility, evaluates the level of energy savings that could be achieved, and then offers to implement the project and guarantee those savings over an agreed term.

A typical EPC project is delivered by an Energy Service Company (ESCO) and consists of the following elements:

- **Turnkey Service** – The ESCO provides all of the services required to design and implement a comprehensive project at the customer facility, from the initial energy audit through long-term Measurement and Verification (M&V) of project savings.
- **Comprehensive Measures** – The ESCO tailors a comprehensive set of measures to fit the needs of a particular facility, include energy efficiency and in addition, can include renewables, distributed generation and water conservation.
- **Project financing** – The ESCO arranges for long-term project financing that is provided by a third-party financing company, typically in the form of a bank loan.
- **Project Savings Guarantee** – The ESCO provides a guarantee that the savings produced by the project will be sufficient to cover the cost of project financing for the life of the project.

Energy Performance Contracting allows facility owners and managers to upgrade ageing and inefficient assets while recovering capital required for the upgrade directly from the energy savings guaranteed by the ESCO. The ESCO takes the technical risk and guarantees the savings.

The ESCO is usually paid a management fee out of these savings (if there are no savings, there is no payment) and is usually obligated to repay savings shortfalls over the life of the contract. At the end of the specific contract period the full benefits of the cost savings revert to the facility owner.

The methodology of Energy Performance Contracting differs from traditional contracting, which is invariably price-driven. Performance contracting is results-driven: ensuring quality of performance. ESCOs search for efficiencies and performance reliability to deliver contractual guarantees.

2.3 Definition of EPC and EPC provider

While there is a vast number of definitions of EPC within Europe, within Transparense project we use the EU wide definition provided by the Energy Efficiency Directive[4] (EED):

"'energy performance contracting' means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service)

[4] Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC was approved on 25 October 2012.

in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings;".

At the same time, within Transparense project, the focus will be given to the EPC projects, where the above mentioned"contractually agreed level of energy efficiency improvement" is **guaranteed** by the EPC provider[5]. This is in line with the EED, as in its Annex XIII, guaranteed savings[6] are listed among the minimum items to be included in energy performance contracts with the public sector or in the associated tender specifications. Moreover, in the article 18 of EED, Member States are required to promote the energy services market and access for SMEs to this market by, inter alia**,** disseminating clear and easily accessible information on available energy service contracts and clauses that should be included in such contracts to **guarantee energy savings** and final customers' rights.

Further, within the Transparense, we define the companies providing EPC as follows:

" **'EPC provider'** means a natural or legal person who delivers energy services in the form of Energy Performance Contracting (EPC) in a final customer's facility or premises"

Such definition respects the fact that EPC is only one type of energy services, and is in line with the definition of the energy services provider specified in the EED (for its definition see the glossary at the end of the report). Within the Transparense texts, we use the commonly used term "ESCO" as equivalent of the energy service provider.

3 The EPC market in Germany: an introduction

Germany is Europe's largest and most mature energy service company (ESCO) market. Between 250 and 500 companies are offering energy services – with some 10 to 15% of market share on Energy Performance Contracting (EPC) (Marino et al 2010).

The overall composition of the market has not changed much in the last 5-10 years. It is a competitive market: approximately 50% of the ESCOs do energy services as their core business. The other 50% are energy utilities that do energy services as a supplementary activity to energy supply.

Around 10-20 companies can be identified that are strictly focused on EPC (JRC Survey 2012). Large ESCOs with focus on EPC business are listed in table 1 below (selection).

[5] Guarantee of energy efficiency improvement is defined by EN 15900:2010 as "commitment of the service provider to achieve a quantified energy efficiency improvement".
[6] Annex XIII of the EED lists the minimum item as: „Guaranteed savings to be achieved by implementing the measures of the contract."

GROUP 1: ESCOs active throughout Germany with a continuous EPC track record	GROUP 2: ESCOs with sporadic project implementation & new providers of EPC
Siemens AG, Building Technologies Division	HSG Wolfferts GmbH
WISAG Energiemanagement GmbH & Co. KG	Honeywell Building Solutions GmbH
HOCHTIEF Energy Management GmbH	Proenergy Contracting GmbH & Co. KG
YIT Germany GmbH	Dalkia Energie Service GmbH
MVV AG / MVV Energiedienstleistungen GmbH	Kofler Energies AG
Evonik New Energies GmbH	Sauter FM GmbH
Cofely Deutschland GmbH	Imtech Contracting GmbH & Co KG
Vattenfall Europe Sales GmbH	GETEC AG

Source: BEA 2012

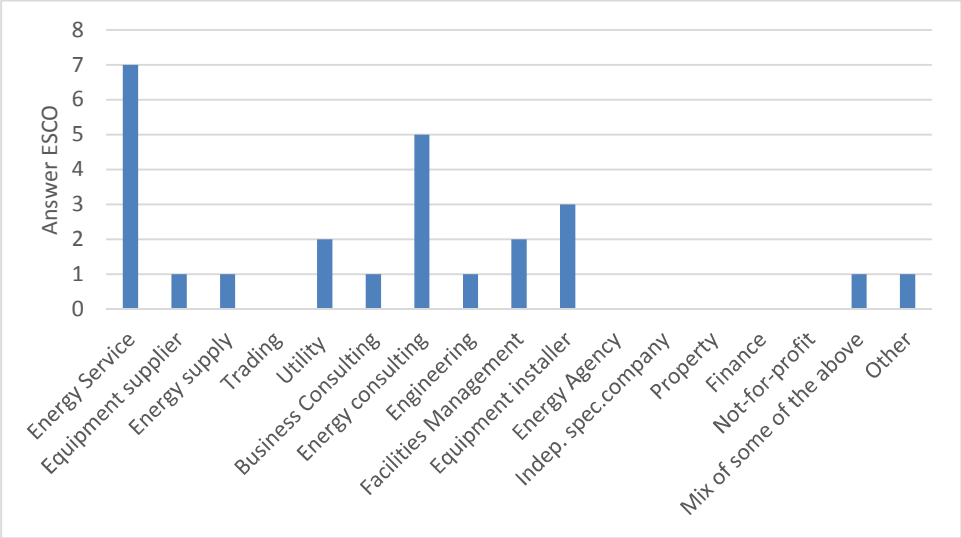
Table 1 Large ESCOs with focus on EPC in Germany

More than 300 EPC agreements have been concluded since the mid '90s – with high-tech and complex individual buildings like hospitals, as well as building pools of up to 100 separate buildings.

Energy agencies and other facilitators play a crucial role in the German market. Energy agencies help municipalities in conducting public procurement for ESCO services (e.g. project development, assistance in the tendering procedure and other project management tasks). ESCO associations include VfW (Association for Heat Supply), ESCO Forum (ZVEI national association for electrical and electronics industry) and VDMA (national association for machinery and industrial equipment manufacturers, subgroup for Building Automation). The broad acceptance of ESCO associations in Germany is also shown in the survey carried out within the Transparense Project – only one ESCOs answered that it isn't a member of associations.

Four of the ESCOs taking part in the survey answered on how many EPC projects were started in the last 24 months "6-10", only two stated ">20" projects and one ESCO "1-5". Just one of these ESCOs offers EPC to customers outside of the German market. The structure of the main activities of the ESCOs participating in the survey shows, that next to EPC services, consulting is their second largest activity (see fig. 1 below).

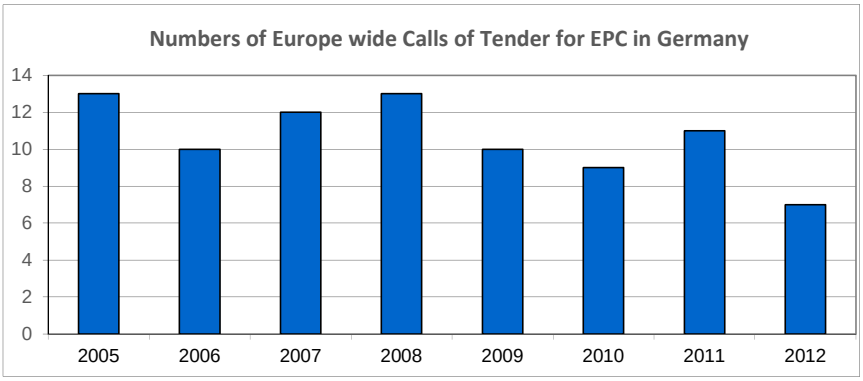
Figure 1 Category with the main activities of ESCO



Source: Transparense Survey, BEA 2013 (n= 7)

The EPC market volume in Germany is currently estimated between € 60 and 150 million (results from the analysis of the calls of tenders from the Supplement to the Official Journal of the European Union). Based on a survey carried out by BEA lately, the number of public EPC call for tenders (and hence a part of the total market) has been stable in the past 7 years (Europe-wide tenders[7]) – see figure 2 below – which indicates a stagnating market. This is also reflected by the given answers of ESCOs in the survey who see their EPC orders constant resp. a slightly increasing.

Figure 2 Development of Europe-wide calls of tender for EPC in Germany



Source: BEA 2012

With an assumption of 10%/year of slight growth, the EPC market volume might rise to € 290 million in 2020. The development is foreseen to be driven mainly through the public and the hospital sector.

[7] http://ted.europa.eu/TED/main/HomePage.do

Most of the calls (see fig. 2) were for mixed building pools which are in general public buildings for administration, schools, kindergartens etc. Another important costumer group were hospitals which have in average the highest energy cost baseline.

Own calculations of BEA have shown, that the highest economical energy saving potential exists within the residential sector (56 TWh) which is difficult to be addressed by EPC. The saving potential for public buildings seems to be rather low (7 TWh) compared to the residential sector. Nevertheless, the public sector remains the most favourable customer group for EPC in Germany. However, there is a lack of publicly available information on the implementation of EPC in industry and the assumption is that hardly any EPC project were realized in this sector at all.

4 Legislative framework

The main German policy targets on energy savings are defined in the "Energy Concept of the Federal Government" which was published in 2010 (BMWi & BMU 2010). It includes energy and CO_2 reduction targets as well the share of renewable energy sources by 2020 up to 2050. One of the targets among others is the reduction of the total primary energy supply compared with 1990 by 20 % until 2020 and by 50 % until 2050.

One of the movers of the market in recent years was the Energy Service Directive (2006/32/EC) because of the expectations raised by utilities that offering ESCO services would become obligatory, and later the subsequent obligations under the Energy Efficiency Directive (2012/27/EU).

Besides, the German government has established several **acts, programs and regulations** in the last decade. The most important for EPC are:

- Renewable Energies Heat Act (EEWärmeG): obligation to use renewable energy sources for heat supply in new buildings;
- Renewable Energy Sources Act (EEG): priority for feeding-in electricity from renewable sources into the grid; guaranteed feed-in tariffs over a duration between 15 and 20 years;
- Ecological Tax Reform: reform on existing taxes for fossil fuels as well as introduction of new taxes, e.g., Electricity Tax Act (Stromsteuergesetz - StromStG): regulation of taxes for electricity and exceptions;
- Energy Saving Act (Energieeinsparungsgesetz - EnEG): does not contain any regulations directly affecting the citizen but empowers the Federal Government to legislate ordinances (such as the EnEV, see below)
- Energy Saving Ordinance (Energieeinsparverordnung – EnEV): regulates amongst others the building code for new buildings and the refurbishment standard for existing buildings
- Energy Efficiency Fund: grants for the use of highly efficient cross-sectional technologies in SMEs (since 1st of October 2012)
- SME Energy Consulting (Energieberatung Mittelstand) by KfW: grants of up to 80 % of energy auditing costs for SMEs
- Market Incentive Program[8] to promote renewable energy sources in the heating market (€ 150 million in 2012): investment incentives for biomass heating systems, heating pumps, geothermal installations, solar thermal installations, local heating grids;
- Combined Heat and Power Act: priority for feeding-in electricity from CHP-plants into the grid, guaranteed bonuses for generated CHP electricity;

[8] http://www.bmu.de/service/publikationen/downloads/details/artikel/foerderrichtlinien-zum-marktanreizprogramm/

- KfW Building Restoration Program (€ 1,5 billion in 2013): reduced interest rates for building modernisation, support of different measures: insulation, modernisation of heating distribution, installation of renewable energy facilities;
- National Climate Protection Initiative (altogether € 900 million from 2008 till 2011): financial support through many programs focused on municipalities, social and cultural buildings, small CHP facilities, cooling devices in commercial enterprises and many single projects for different user groups.

Even though several subsidy programs are in place, an assessment carried out by BEA indicates that they currently play only a minor role for EPC in Germany. Typically, these instruments are limited to leveraging e.g. CHP generation premiums (CHP Act), feed-in-tariff systems (RES Act, especially CHP on the base of bio-methane) and investment grants for small CHP facilities. The analysis has shown that some programs are suitable for the use in EPC and some are not: the 'Small CHP Program', the 'Market Incentive Program for Renewable Energy Sources' and also the 'KfW Program for Municipalities' are applicable in EPC. Furthermore, there is no distinction between ESCOs and other applicants in the EEG and the KWK-G, so both programs are usable in EPC, too.
The main problem in many other programs is that ESCOs are not allowed to perform the application for the program themselves - while they actually pay for the implementation of measures. Currently there is no program in Germany which directly supports the development of EPC projects.

Next to the governmental regulations, there are a number of **quality standards** which have been crucial in the development of the German market, for instance:

- DIN EN 15900: Guidelines of energy efficiency services (03/2009)
- ISO 50001: Energy Management systems - Requirements with guidance for use (04/2012)
- VDMA 24198: Terms and services of Energy Performance Contracting (2000)
- DIN 8930-5: Definition of different types of contracting (11/2003)

Also, relevant **manuals and guidelines** have been published in Germany (see below a list of the latest since 2010):

- Verband für Wärmelieferung e.V (04/2012).: Leitfaden für die Ausschreibung von Energieliefer-Contracting
  (engl.: Association of Heat Supply (04/2012): Guidelines for the procurement of energy supply contracting)
- Dena (2010): Leitfaden Energieliefer-Contracting, Arbeitshilfe für die Vorbereitung und Vergabe von Energieliefer-Contracting
  (engl.: German Energy Agency, DENA (2010): Guidelines for the procurement of energy supply contracting)

- Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz (2012) Leitfaden für Energiespar-Contracting in öffentlichen Liegenschaften (engl.: Hessian Ministry for Environment, Rural Development and Consumer Protection (2012): Guidelines for energy performance contracting in public buildings)
- Contracting Initiative Bayern: Leitfaden für Energiespar- und Energieliefer-Contracting, Oberste Baubehörde im Bayerischen Staatsministerium, Stand 03/13 (engl.: Contracting Initiative Bavaria: Guideline Energy Performance - and Energy Supply Contracting, 03/2013)

During the European Energy Service Initiative (EESI) project, a set of EPC instruments and standards (which have already been applied with sustainable success in projects) are provided for download on the following EESI website:http://www.european-energy-service-initiative.net/eu/toolbox/standard-documents.html.

5 Identified Barriers

A number of barriers hamper the development of the EPC market. A general overview about the main barriers is given in the publishable report from the European Energy Service Initiative (EESI) project. Observed barriers to the implementation of EPC, predominantly in the public sector, can divided into the following categories:

- Regulatory and administrative barriers
- Structural barriers
- Financial barriers

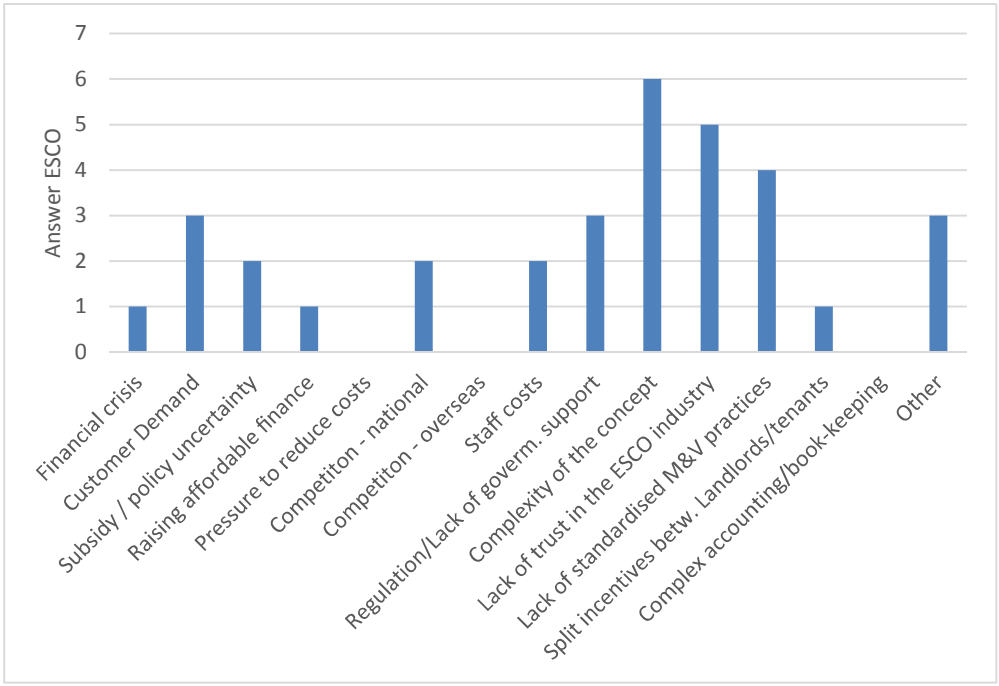
The barriers are not limited to Germany, rather they can be considered as barriers in all member states of the European Union. The relevance of the barriers is different between the federal states in Germany - there are some EPC-hot-spots in Berlin, Baden-Wuerttemberg or North Rhine-Westphalia and federal states with almost no experience (e.g. Saarland, Thuringia or Mecklenburg-Western Pomerania).

Within the ESCO survey, the main barriers identified (see figure 3) are:

- Complexity of the concept,
- Lack of trust in the ESCO industry.

Especially the lack of legal clarity and trust has led to a high perception of risk among public decision makers, financing institutions and ESCOs.

Figure 3 Identified main barriers to the EPC business



Source: Transparense Survey, BEA 2013 (n=7)

5.1 Regulatory and administrative barriers

5.1.1 General regulatory barriers

The lack of clarification in the legal framework and governmental support is an identified issue for implementing EPC in Germany. The national energy legislative framework is incomplete and only limitedly supportive for EPC (see chapter 4). Existing relevant legal frameworks, regulating public procurement, public finance and subsidy programs etc., are not directly addressing EPC projects, causing different interpretations and therefore imposing barriers to straightforward implementation of these projects.

5.1.2 Regulatory and administrative barriers in the public sector

EPC is a complex model and the preparation of an EPC tender as well the selection of the best bid needs specific knowledge. Estimations of BEA show that around 50 % of public authorities use external consulting for EPC implementation, the others have established own departments with special know-how on EPC. However, the high complexity of EPC efforts leads to high transaction costs which hamper the market development.

EPC projects in the public sector are subject to public procurement and therefore need to follow public procurement rules. Public procurement acts seek to make good use of public funds by taking advantage of competition in the relevant market and to ensure fair competition for suppliers. EPC projects for all publicly funded institutions whose value exceeds the threshold value (exclusive of value added tax) set in national procurement rules must be publicly tendered. Unfortunately, the public procurement legislation hinders the development of the EPC market, being very extensive, detailed, not flexible in terms of new business models and non-supportive. Procurement rules and evaluation criteria in the public tendering process remain a barrier for EPC projects development due to the following issues:

- Responsibility and competency for energy efficiency public procurement is fragmented and shared between central and regional/local governments, causing ambivalent information and slowing down EPC projects implementation;
- Lack of experience, information and qualification on the public sector side in the area of procurement of long-term energy services;
- Reluctance of local authorities to initiate necessary approval processes for launching the EPC tendering due to missing policy acceptance of EPC;
- Tendering regulations requiring the applicants to have experience in all relevant project specific sectors, hindering the entry of new actors and consortia;
- Procurement guidelines often strictly demanding a precise and complete ex-ante analysis of all measures to be performed, resulting in relatively low degree of flexibility for gradual refinement of the project concept through on-going

negotiations between the ESCO and the customer in order to develop the best solution;

- Procurement decisions often focused on assets rather than energy services and based only on the "the lowest price" assessment criteria and not on "the most economically advantageous tender" criteria;
- Missing specific indicators for energy efficiency public procurement to monitor progress in terms of energy savings achieved and cost-effectiveness of services provided.

5.2 Structural barriers

Energy end-users have limited information and technical, economic, financial and legal knowledge on EPC, resulting in low awareness and priority, notably at decision making level. Decision makers can hardly grasp what EPC entails, and hence are not in a position to judge the benefits of outsourcing energy efficiency services for their institutions/enterprises. Lack of a sufficient level of understanding (and/or trust) in the EPC concept and its financial benefits is immanent to policy decision makers, resulting in the perception that energy efficiency and renewable energy investments are complicated and risky. ESCOs usually inform and educate customers but this to some extent makes the customers dependent on ESCOs. This dependence may lead to a caution to embark on EPC projects in terms of mistrust concerning the range of energy savings and revenue mode. Information on bad experiences with EPC in the past led some customers to the perception of high technical and business risks, too.

On the other hand, some potential customers have unrealistic expectations of energy and cost savings potentials and are disappointed when they face ESCO proposals not meeting these expectations. Many customers cannot foresee the efforts needed and the amount of transaction costs which may arise during EPC project preparation and implementation. The complexity of contracting is often misjudged. The integration of experienced consultants and project developers as neutral EPC project facilitators can help to avoid these problems and to reduce uncertainties by providing quality information and expert knowledge.

The EPC market development is demand side driven. The information and knowledge shortfall is especially problematic in the public sector, considered to be a key trigger for the successful ESCO market development. The EPC customers are not 'educated'. Taylor-made EPC training sessions as well as customer information offers are needed to strengthen demand-side competence on EPC. Providing standardized tools and documents are a step in the right direction, but these are not continuously used.

All that leads to lower numbers of requests for EPC proposals put on the market. Often these requests are not as ambitious in terms of energy and cost savings, as they could be.

Therefore, EPC market facilitators are needed to underpin EPC market development by provision of information on EPC, performing awareness campaigns, disseminating information on financial instruments, tendering procedures and legal aspects of contracting, making available model contracts, and training of customers, policy makers, ESCOs and financing institutions.

5.3 Financial barriers

With more projects being realised, financing of energy services has become increasingly burdensome for ESCOs as well as their customers: Market partners reach their credit line limits; credit liabilities burden balance sheets. In addition, international accounting guidelines and Basel III regulations cast their shadows. Basel III has an impact especially on smaller ESCOs, because their credit wishes will more likely have worse conditions where an increased need for asset backed securities arises.

Therefore, financial barriers can be on the demand side (customer side), the supply side (provider/ESCO side) as well as at the financial institution side:

On the **customer side** problems arise because EPC energy efficiency measures and renewable energy technologies often suffer from long payback times (5 to 15 years are standard payback times in the ESCO industry) and relatively low internal rates of return. Another barrier is strong competition between EPC investments and core business related investments, with payback times of 3-5 years, resulting in low priority of EPC investments. Investment assessments (also within tenders) are often based on investment costs rather than on an integrated approach comprising life-cycle costs (investment, operation, and maintenance). This hampers EPC projects because they are usually based on capital intensive upfront investments enabling lower operating energy costs.

At the **provider side** it is an observed trend that for many new EPC projects ESCOs provide for upfront investment costs placed on the asset side of their balance sheets, for instance as financial fixed assets. This is influencing the credit risk rating of ESCOs and limiting their capacity to implement new projects. Smaller ESCOs without support of a larger parent company and without appropriate credit ratings are especially vulnerable, being not in a position to attract third-party financing.

There is a high risk perception at **financial institutions** regarding EPC due to a lack of experience and know-how in this field. It is difficult to define assets as collateral for EPC (e.g. new heating pipework in a building could not simply be removed and sold in the case of a credit default). New accounting regulations increase uncertainties and risk perception.

Commercial banks are interested in the business that can be generated in the field of energy services but there are still caution and barriers:

- Project Size: for many banks projects below an investment volume of three million Euros are too small to allow for good conditions.
- Financial strength of the ESCO: a small ESCO with less collateral acceptable to a bank will have larger overall capital costs, thus overall project costs will increase. If the value of the guaranteed savings were included and ranked higher in the due diligence this would improve the outlook on conditions for smaller companies.
- Creditworthiness of the building owner: In this respect there are no problems with public owners in Germany because of their commonly high and in many cases even AAA-rating
- Project risks and risk mitigation instruments.

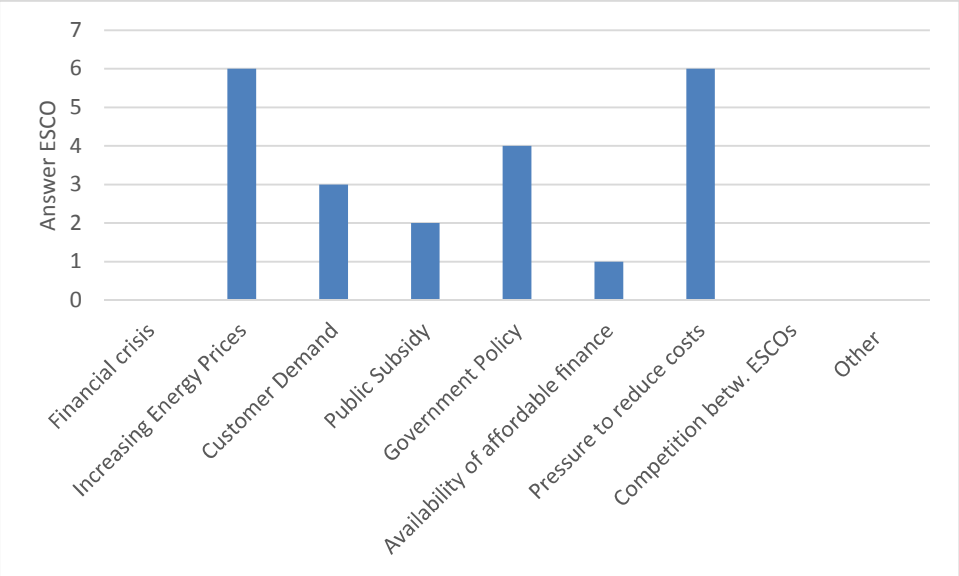
Banks were also very reluctant to participate in the Transparense questionnaire: either because they don't fund EPC projects or no direct representative within the organisation is specialized on EPC business (nobody felt responsible). Only two organisations (out of six) completed the survey. The main identified barriers to the EPC business are:

- Lack of support from the government
- Lack of standardised Measurement & Verification practices
- Complex procurement rules.

6 Success factors

In the conducted survey, ESCOs mentioned the following two main drivers of the EPC business in Germany (see figure below): 'Increasing energy prices' and 'pressure to reduce costs' – followed by the assumption that the national policy has an important impact.

Figure 4 Main drivers of the EPC business in Germany



Source: Transparense Survey, BEA 2013 (n=7)

In several interviews with ESCOs carried out by BEA in the past, the following trends were identified which might lead towards a positive market development in the future:

- An increase in the implementation of extensive measures on the building envelope could affect the ESCO market by further involvement of planners and construction companies.
- Turn-key solutions for industries with short return of investment (ROI).
- Intense direct sales activities and more direct acquisition of projects by ESCOs (instead of reacting to public call of tender).
- Stronger ESCO focus on the private sector.
- Increasingly holistic consideration of energy procurement, energy consumption, energy taxes and savings will enhance ESCO products and services.

Besides, the EPC market is developing towards new ideas such as "Advanced EPC" (develop and promote EPC models including new contract constructions, additional services or specific objectives as quality-based products).

This aims to open up EPC to more customers groups by meeting their specific requirements. The European project EESI (http://www.european-energy-service-initiative.net) contributed to the cross-national establishment of such "Advanced EPC" with the following models:

1) *"EPC plus"* extends the service of the ESCO to comprehensive structural measures on the building shell like insulation or window replacement. These services are usually not part of the classical EPC because of too long pay-back periods. The contractual arrangement contains special regulation on financing. Usually the customer has to pay a share of the investment through a grant or by combination of EPC with subsidy programs. EPC plus is very suitable in buildings with high needs for renovation.

The combination of both structural renovation and energetic optimization leads to high energy savings up to 50%. Until now no EPC plus projects were implemented in Germany, even though many building owners have shown a high interest for such a model.

2) Within *"EPC light"* energy savings are mainly achieved through organizational measures with low or no investments in technical equipment. The ESCO acts as external energy manager taking over the responsibility to operate and optimize the energy related installations (heat boilers, building automation, lighting control).

Since pay-back of high investments on hardware is not necessary in EPC light, the contract duration is short (2-3 years). In this model the energy saving is still guaranteed by the ESCO. This model is very interesting for customers with low capacities or no resources for sustainable energy management. A first EPC light pilot project was developed in Berlin.

3) *"Green EPC"* an advanced EPC model with special focus on reduction of greenhouse gas emissions via integration of renewable energies. In Germany several green EPC project examples were implemented.

6.1 Successful regulatory models

As mentioned before some barriers hamper the use of subsidy programmes in EPC, such as: ESCOs cannot apply directly to programs or incentives or these are limited only to SMEs; application is expected to start before EPC contract is signed (which is in conflict to the required tender procedures) and programs often require report on expenditure of funds by building/plant owner (ownership / payment split between ESCO and building owner).

Some programs are applicable if the building owner is the applicant and pays the complete amount of eligible costs. However, this may lead to higher administration and coordination costs of ESCOs and the building owners.

A good solution was found for the application rules for the Small CHP Program and the Market Incentive Program for Renewable Energy Sources. In both programs it is not relevant

who is paying for the measure. It is only important that the measure is implemented on behalf of the building owner.

6.2 Successful structural models

Best practice examples such as the 'Energy Saving Partnerships' in Berlin have outlined the advantages of EPC for more than 15 years. This partnership - developed by the Berliner Energieagentur and Berlin Senate Department for Urban Development - is a model for efficient energy saving contracting. The aim is to tap the potential for saving energy in a pool of buildings made up of different properties (e.g. town halls, schools, day nurseries and other public buildings). 25 energy saving partnerships with 1,300 public buildings and more than 500 properties were launched successfully – with an average of 25% guaranteed energy savings and approx. 70t/a CO_2-reduction. The model has already proven to be a success in other German cities, such as Leipzig.

However, the public building sector as a role-model for necessary deep renovation is just at the beginning of its mission and ESCOs have a short track record in deep renovation. Deep renovation EPC pilot projects in the public sector are scarce, however, they are essential to increase awareness and knowledge of EPC, establish standard procedures as well as trust in ESCOs among other potential customers.

6.3 Successful financing models

Generally, the following financing models are possible in EPC: forfeiting, credit financing, (partial) funding from own capital, building cost subsidy or full funding by the customer. In practice, mainly forfeiting and funding from own capital apply for Germany.

The uptake of EPC in the public sector is mainly based on the fact that customers have a lack of the necessary investment capital (or access to that capital) for energy efficiency upgrades in the building stock. Among the requirements for ESCOs to win a tender was - and in most cases still is - therefore the ability to organise the financing for the project, thus making the ESCO the debtor.

The commonly used instrument today for re-financing (hardware costs) by the ESCO is factoring (in Europe: forfeiting). Forfeiting is the, in the case of EPC, long-term sale of (future) receivables: when a bank loans money through a forfeiting mechanism, the bank wires Euros to the ESCO at the time of completion of the project set-up, i.e. when the equipment has been installed The customer makes periodic fixed payments to the bank. For this, the customer signs an agreement on the amounts to be paid directly to the bank or financial institution.

For the ESCO this may mean that the amount of security that it has to provide to the customer is increased. The normal practice could be for example to ask for 5% of the total savings guaranteed over the contract period to be backed by a bank guarantee. If forfeiting is applied, this amount increases to 10% as an additional security for the customer. Since forfeiting is an instrument to re-finance the ESCOs hardware costs in a fast way, it is today commonly used.

From a debtor's perspective, it is desirable to base any debt service on the project cash flow as opposed to basing it on the customer's creditworthiness alone. Debt should be repayable from future project income, the energy cost savings in the case of EPC. The savings generated are however, not always acknowledged as cash flow and therefore collateral. This is an issue that needs further to be worked on with regard to commercial banks.

Among the suggestions for a future role of the financial sector is that loans need to be more specifically available for e.g. energy efficiency projects also by commercial banks. One focus needs to be also on smaller projects and their financing conditions. The set-up of energy funds for support of transaction costs or as a security backup could also be considered.

Definitions and glossary

Term	Definition
energy efficiency (EE)	means the ratio of output of performance, service, goods or energy, to input of energy (as defined by EED)
energy efficiency improvement	means increase in energy efficiency as a result of technological, behavioural and/or economic changes (as defined in EN 15900:2010)
energy management system	means a set of interrelated or interacting elements of a plan which sets an energy efficiency objective and a strategy to achieve that objective (as defined by EED)
energy savings	means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption (as defined by EED)
final energy consumption	means all energy supplied to industry, transport, households, services and agriculture. It excludes deliveries to the energy transformation sector and the energy industries themselves (as defined by EED)
guarantee of energy efficiency improvement	means commitment of the service provider to achieve a quantified energy efficiency improvement (as defined in EN 15900:2010)
energy performance contracting (EPC)	means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings (as defined by EED)
EPC provider	means a natural or legal person who delivers energy services in the form of Energy Performance Contracting (EPC) in a final customer's facility or premises

energy service provider /energy service company (ESCO)	means a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises (as defined by EED)
energy service (ES)	the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings (as defined by EED)

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