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REPORT

on status quo of EPC markets in Germany

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Conditions of EPC implementation

Potential of EPC implementation in Germany

Germany has a growing market for Energy Services and is one of the pioneers for developing the European market for Energy Performance Contracting (EPC). There are already high market standards and consistent market volume and growth for both primary types of contracting – Energy Performance Contracting and Energy Supply Contracting. There is an immense economic usable potential with about 1.4 million buildings or objects for Contracting.

In recent years, the German EPC market has become a significant business for several energy service companies – ESCOs, also called "contractors" in Germany. Of the 500 existing vendors for Energy Contracting services about two thirds are ESCOs and utilities. Some of the most important and well known large ESCOs and many medium and small ESCOs are operating in Germany.

The share of EPC contracts is about 15 % of all Contracting contracts. There were more than 300 EPC agreements reached since the mid-90s – with high-tech and complex individual buildings like hospitals, as well as building pools of up to 100 separate buildings mostly within the public building sector which remains the most favorable customer group for EPC. As little as 10% of the EPC potential in the public sector is currently opened up. In view of the annual total energy costs for public buildings of almost €4 billion (€3.58 billion in 2005) with an annual saving potential of more than about €300 million. This figure is related to an estimated saving potential of 30 % energy costs in around 20,000 public buildings until 2016 with actual suitable framework conditions (such as building size, age, property conditions etc)[1].

In the course of a research project for the Federal Environmental Agency2 market players (contractors as well as customers) were interviewed and expected a positive market development. Calculations made show that around €3.9 billion annual energy costs could be tapped through contracting services in all customer groups. Around 22 % of these i.e. €840 million could be saved alone through EPC services annually.

The following table 1 shows the shares for the different customer groups.

1 Assumptions from Deutsche Energieagentur: Contracting-Potenzial in offentlichen Liegenschaften. Marktstudie zur Potenzialbewertung in Liegenschaften des Bundes, der Lander und Kommunen (2007)

2 Berliner Energieagentur GmbH: Der Markt des Energiespar-Contracting in Deutschland. Status quo, Potenziale und Trends (October 2007)

Table 1: Potential energy cost savings and CO2 savings in different customer groups

	Savings (million€/a)	CO2-equivalent (t/a)
Public sector	210	1.141.026
Hospital	360	1.956.044
Industry	140	778.841
Street lighting	130	739.200
Total	**840**	**4.615.111**

Source: BEA, 2007

It is expected that the EPC market grows +7 % annually on average. The public sector as well as the market for EPC in hospitals is expected to grow stronger i.e. with +10 %. In industry and business, growth rates are assumed to reach an annual increase of +5 %. The other tertiary sector is not expected to increase by more than +2 % per year. An increase in projects in Germany will first and foremost take place in the regional hot-spots i.e. Baden-Wuerttemberg, Bavaria, Berlin, Bremen and Hesse. This will have a role model effect on surrounding regions.

Existing Energy Efficiency Documents for Germany

In Germany several guidelines for energy performance contracting exist, i.e.:

- 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)*

- UBA (2000): Energiespar-Contracting als Beitrag zu Klimaschutz und Kostensenkung – Ratgeber für Energiespar-Contracting in öffentlichen Liegenschaften
  (*engl.: Federal Environmental Agency (2000): Energy Performance Contracting as a contribution to climate protection and cost reduction - Guide to Energy Performance Contracting in public buildings)*

- UBA (2002): Contracting für kommunale Sportstätten – Strategien zu Klimaschutz und Kostensenkung – Leitfaden
  (*engl.: Federal Environmental Agency (2002: Contracting for municipal sports facilities - strategies for climate change and reducing costs – Guideline)*

- Deutsche Energie-Agentur (2003): Leitfaden Energiespar-Contracting – Arbeitshilfen für die Vorbereitung und Durchführung von Energiespar-Contracting in Bundesliegenschaften
  (*engl.: German Energy Agency (2003): Contracting for municipal sports facilities - strategies for climate change and reducing costs – Guideline)*

- Deutsche Energie-Agentur (2008): Contracting-Lotse für Kommunen
  (*engl.: German Energy Agency (2008): Contracting pilot for municipalities)*

- EnergieAgentur.NRW (2001): Contracting-Ratgeber "Contracting in Kommunen – und es funktioniert doch!"
  (*engl.: Energy Agency North Rhine-Westphalia (2001): Contracting Guidebook "Contracting for local authorities - and it works!")*

Potential target groups and buildings for EPC implementation

The customer groups for energy services including EPC projects can generally be classified into five main customer groups as shown in Table 2.

Table 2: Ranking of EPC customer groups

	EPC	EDC	Others*
Municipalities, Public Buildings	+++	+	++
Hospitals, medical facilities	+++	++	+
Industry	+	++	+++
Commerce, Trade, Services	+	+++	++
Social Housing Companies	-	+++	++
Shares of the total Contracting market	~15%	~80%	~5%

Source: BEA 2007 (*others: Operation Contracting etc.)

Public sector

The EPC focus is mainly on public buildings, which can be explained by suitable conditions in public buildings regarding constant energy use and possibilities for central energy management installations. There is also the fact that market development has been pushed considerably by energy agencies and comparable institutions that are in close connection to public administrations. The increasing financing problems for own investments by public budget and the reformatory efforts of the public administration are bringing an additional necessity for advanced private energy services by private companies.

For the implementation of EPC a minimum energy cost baseline in Germany of approximately about € 200,000 is required. Small buildings are in general not suited for EPC. However, they can be part of a building pool together with larger buildings, because the economic feasibility of small energy efficiency measures often improves in combination with the modernisation of larger facilities.

A research study for the Federal Environmental Agency on existing EPC projects showed that around 75 % of EPC projects have been implemented in the public sector. There are around 200,000 public buildings in Germany. Most of these buildings are office buildings for administration, school buildings and sport facilities.

A good overview about the energy consumption in public buildings in Germany is given in the study from the German Energy Agency (see table below):

Table 3: Public buildings and their energy consumption in Germany in 2005

	Number of buildings	Energy consumption in GWh	Energy costs in M€
Total potential	186,200	58,200	3,580
Federal buildings	4,200	9,700	580
Buildings of the States (Laender)	6,400	11,400	750
Buildings of municipalities	175,600	37,100	2,250

Source: dena 2007

As table 3 indicates, about 60% of the energy consumption in public buildings is located in municipalities. These buildings are mainly for administration, education (schools, Kindergartens) and sports activities (sports centres). In total, the general education schools are responsible for almost 50% of the energy consumption in municipalities.

The main part of the energy use (~90 %) and the energy costs (~80 %) is related to room heating. The remaining energy is mainly used for lighting. Approximately 4 TWh of electricity are for example used for public street lighting. Within this sector there is another comprehensive saving potential of between 30 and 50 %. EPC could save another 1.2 TWh electricity in street lighting (approx. 700,000 tons CO2).

Private sector (Industry, Commercial, Housing)

The industry sector is completely different to other sectors. It is characterised by different production processes and equipments resulting in varying demand on usable energy supply. Besides heat and electricity, which are covered in the classical EPC model, other transformed energies, e.g. steam, cooling, process heat or compressed air play an important role and offer many possibilities for implementing energy efficiency measures.

Some ESCOs satisfy this demand by combining energy supply contracting with additional saving elements, which are implemented as full services. Nevertheless, information on the use of EPC related products in the industry sector is typically not published. In general, industrial companies try to achieve a reduction of the contract duration by providing own financial resources to the EPC projects.

BEA calculated that the total economical saving potential in the industry sector applicable to EPC varies strongly between 23 - 462 GWh savings (what is corresponding to a market volume of approx. € 22-293 million).

Buildings of the commercial and trade sector are comparable to large residential buildings. The units are rented by different clients with the impact, that user changes might appear very often. The technical saving potentials are huge. However, there are also different possibilities for EPC. ESCOs estimate the current EPC market volume in this sector on about € 10 million per year.

The general legal framework for realisation of EPC in residential buildings is currently not very supportive. Following the German Law, the ESCO needs an agreement of each tenant to implement measures. To reach the minimum size to implement EPC economically the number of necessary agreements is high. Due to this structural problem it appears that no EPC-projects have been implemented yet, even though there is a huge energy saving potential.

Attitude of the local/regional authorities to EPC

A general assessment of local and regional authorities' attitude towards the implementation of EPC projects can't be given as there is a strong dependence on personal awareness, competence, knowhow and interest within the level of decision makers.

Nevertheless (and as already mentioned above) there are some success stories in the federal states of Baden-Wuerttemberg, Bavaria, Berlin, Bremen and Hesse. These are regional hot-spots for the implementation of EPC either because of a regional active facilitator (e.g. Berliner Energieagentur GmbH or the Klimaschutz- und Energieagentur GmbH3) or because of running EPC projects which have already been successfully implemented in the past. Especially the last factor, effectively running projects, gives very often the impulse for other mayors or high level decision makers.

Further adaptation of customer needs as well as standardization, simplification, transparency and flexibility are the core challenges to bring energy performance contracting closer to the local and regional authorities in Germany. More details about legislative and regulatory barriers which also have influence to the regional authorities are given in the following chapter.

Barriers in EPC implementation

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 (http://www.european-energy-service-initiative.net). Observed barriers to the implementation of EPC, predominantly in the public sector, can divide into the following categories:

- Legislative and regulatory barriers
- Awareness and knowledge barriers
- Financial barriers

[3] http://www.kea-bw.de

These 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 among 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-Vorpommern).

Legislative and regulatory barriers

The national energy legislative framework in Germany is incomplete and only limitedly supportive for EPC. 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.

There is a lack of secondary and tertiary legislation and the corresponding practical guidance for practitioners, removing EPC constraints and clearly providing information that EPC is allowed, and introducing all related procedures needed. Accounting rules, especially in terms of operational and financial lease are in some Member States considered unsuitable for EPC models. The lack of legal clarity has led to a high perception of risk among public decision makers, financing institutions and ESCOs. EPC procurement procedures, contracts, public budget financing legislation and accounting are perceived very sophisticated, too.

Energy performance contracting 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 a 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.

Awareness and knowledge barriers

Energy end-users have limited information and technical, economic, financial and legal knowledge on EPC, resulting in low awareness and priority of energy savings realisation, 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 specifically. Lack of a sufficient level of understanding the energy saving potentials and 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.

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 uncertainties providing quality information and expert knowledge.

Financial barriers

Financial barriers can be at the demand side (customer side), the supply side (provider/ESCO side), financial institution side as well as policy maker side.

At 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). That hampers EPC projects because they are usually based on capital intensive upfront investments enabling lower operating energy costs. Customers often face the lack of internal capital and have constrained operational budgets. Lack of access to finance on acceptable terms due to perceived high EPC project risks and lower proportion of collateral asset value due to high portion of 'soft' costs (project design and development) are the most common financial barriers on the customer side.

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 position to attract third-party financing.

Position of the EPC implementation

Existence of basic instruments for EPC

In Germany several basic instruments: manuals, standard documents, guidelines. etc for energy performance contracting exist (see an overview below):

Latest relevant manuals (publication since 2010[4]):

- Verband für Wärmelieferung e.V (04/2012).: Leitfaden für die Ausschreibung von Energieliefer-Contracting
  (engl.: Association of Heat Supply Association (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)

Relevant quality standards:

- DIN EN 15900: Guidelines of energy efficiency services (03/2009)
- DIN EN 16001: Requirements of energy management systems (08/2009)
- VDMA 24198: Terms and services of Energy Performance Contracting, explains the stages of project development and gives criteria for the assessment of EPC services (2000)
- DIN 8930-5: Definition of different types of contracting (11/2003)
- Environmental Label "Blue Angel“: Energy Services with guaranteed Energy Saving Contracts (Energy Performance Contracting) - RAL-UZ 170, January 2012

Besides the above mentioned standards, 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 during) are provided for download on the following EESI website: http://www.european-energy-service-initiative.net/eu/toolbox/standard-documents.html.

4 For more please also see chapter “Existing Energy Efficiency Documents for Germany” within this document

Existence of ESCOs (Energy Services Companies)

Scope of ESCO experiences

The market for Energy Services in Germany is a competitive market with around 500 ESCOs. Some of the most important and well known large ESCOs, a lot of medium and small ESCOs and other vendors are operating in Germany. ESCOs in Germany have different business background: such as utilities, energy service companies, energy agencies, heating installers, plant engineering and regional supply companies. The ability to compete between several hundred ESCOs is given in Germany. Nevertheless, financing issues (e.g. Basel II) have an impact especially on smaller ESCOs as there is an increased need for asset backed securities which is harder to achieve for these groups.
Most ESCOs offer Energy Delivery Contracting, some of these ESCOs offer additional integrated building services like Facility Management (EPC is included) and some of ESCOs are specialized only for EPC (about 10 – 20). Large ESCOs with focus on EPC business are listed below in table 4.

Table 3: Large ESCOs with focus on EPC in Germany (selection)

GROUP 1: ESCOs active throughout Germany with a continuous EPC track record	GROUP 2: ESCOs with sporadic, regional project implementation, and new providers of EPC
Siemens AG, Industry Sector, Building Technologies Division	HSG Wolfferts Gebäude- und Energiemanagement 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
Johnson Controls Systems & Service GmbH	several „Stadtwerke“ (municipal utilities)
Evonik New Energies GmbH	Sauter FM GmbH
Cofely Deutschland GmbH	Imtech Contracting GmbH & Co KG
Vattenfall Europe Sales GmbH	GETEC AG

Source: BEA 2012

Surrounding the ESCOs there are several consulting companies (energy agencies, planners) mainly assisting the public clients of EPC. Their services are project development, assistance in the tendering procedure and other project management tasks for EPC. Estimations of the 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.

ESCO associations or other institutions

Below, the list of associations is given which shows how they are (partly or mainly) involved with EPC services and some other general information are given.

- **ZVEI – Zentralverband Elektrotechnik- und Elektronikindustrie e. V.**
  Within the German Association of Energy Technology (ZVEI) exist an "ESCO Forum" which represents a working group of the leading energy providers and contracting companies. Core competence of the member companies are designing and implementing energy efficient power solutions for industrial, commercial, public and housing industry. The member companies in the "ESCO Forum" have plans with a total capacity of 10 GW (thermal) and more than 1.5 gigawatt (electric) under contract.
  For more information: www.esco-forum.org

- **AGFW, Energieeffizienzverband für Wärme, Kälte und KWK e. V.**
  The Energy efficiency association for heating, cooling and cogeneration (AGFW e.V.) deals mainly with the fundamental technical and economic development of heat production, distribution and customer but is also engaged in EPC. Options for cheaper and more environmentally friendly production and distribution of heating of all sizes are examined and the AGFW e.V. deals with the response of energy policy and legal issues and acts as an interface between the technical infrastructure and municipal planning with special reference to effects of demographic change and the national climate adaptation strategy. Development of standards across the entire process chain of heat and cold supply by consensus of all stakeholders is also provided by the AGFW e.V. (a small EPC code of conduct is presented and available on the website "http://www.agfw.de/wirtschaft-und-markt/energiedienstleistungen/verhaltenskodex-fuer-contractoren/). Besides: since 2004 the AGFW documents the query results to energy performance contracting.
  For more information: www.agfw.de

- **Arbeitsgemeinschaft für sparsame Energie- und Wasserverwendung (ASEW)**
  Over 270 mostly local energy and water utilities in Germany belong to the Association for economical energy and water use (ASEW). The ASEW promotes sustainable practices in utilities and their customers – so there is a EPC interface. Especially the support of ASEW towards public utilities with sustainable yield optimization helps to promote EPC services and gives inputs like customized products and for optimized services. Knowledge tansfer e.g. through education and training of municipal utility employees, working groups and information platforms are also part of the ASEW work.
  For more information: www.asew.de

- **B.KWK Bundesverband Kraft-Wärme-Kopplung e. V.**
  The association of combined heat and power eV (B.KWK e.V.) is an organization which promotes the CHP principle, regardless of the type and size of equipment, the operation environment and the energy sources used. The objective is to increase efficiency of energy conversion to conserve resources and reduce environmental and climate-damaging emissions. Its goals are articular the dialogue with all social groups and institutions, elimination of information asymmetries, promoting exchanges of information and experience between the members (network) and giving advice and assistance to interested persons, institutions etc. The B.KWK e.V. implements information days, workshops and congresses (also on EPC related issues and topics). Also the associations have a close cooperation with other national and international

organizations.
For more information: www.bkwk.de

- **VfW – Verband für Wärmelieferung e. V.**
  The mission of the Heat Supply Association (VfW e.V.) is to support the dissemination of energy contracting, heating, cooling, compressed air and electricity. Companies are trained and qualified for energy supply services (to ensure compliance with professional standards and to advise the companies in the areas which are important for implementation of the concepts). The VfW e.V. can be seen as a special organization for energy services (including EPC services).
  For more information: www.energiecontracting.de

Ability to compete

As for all ECSOs applicable, in Germany the public procurement is regulated by the procurement law. The concrete refinement of procedures is given in the so-called "Verdingungsordnungen" VOB (Contract procedures for building works) and resp. VOL (official contract terms for the awarding of construction contracts).
The award of public contracts is currently being

- the "open method" in public procurement above the EU thresholds* at which all interested entities may submit a tender notice of which the contracting authority then selects the most economical offer (the corresponding method in public procurement below the EU thresholds, the public tender).
- The "restricted procedure" above the EU thresholds*, in which (after a Europe-wide notice) interested companies are requested to express their interest of participation (with a limited number of at least 5), the contracting authority then will chooses among the companies to tender form.

In public contracts interested companies have a right that public authorities comply fully with the procurement rules (§ 97 para 7, GWB**). This includes in particular the duty of the principal giving information to the bidder about who received the order (§ 13 VgV).

*The thresholds above which is the EC procurement law applies mandatory are € 5.2 million for buildings; for supplies and services €137,000 (for the federal ministries) resp. € 211 000 for other federal agencies. Below these thresholds, the public procedures varies slightly between Germany's various Länder.

** Act against Restraints of Competition (GWB)

Financing and banking sector in relation to EPC projects

In Germany, the uptake of EPC in the public sector is mainly founded on the fact that customers lacked 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 making the ESCO the debtor. With more projects taken off ground, 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 II regulations cast their shadows. As already mentioned, Basel II 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. The equipment installed cannot in all cases be used as a collateral by the ESCO. The German Civil Code, for example, stipulates that equipment which is connected to a building passes into ownership of the building owner immediately when it is installed.

The commonly used instrument today for re-financing (hardware costs) by the ESCO is factoring (in Europe: forfeiting). Forfeiting is the in 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 refinance the ESCOs hardware costs fast, it is today commonly used. But also full or partial financing by clients are preferred by ESCOs.

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

- Project Size: for many banks projects below an investment volume of three million Euros is too small to provide 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.

Existence of programs for support of EPC

The main German policy targets on energy savings are defined in the "Energy Concept of the Federal Government" which was published in 2010. It includes energy and CO2 reduction targets as well the

share of renewable energy sources by 2020 up to 2050, among others reduction of total primary energy supply compared with 1990 by 20 % until 2020 and by 50 % until 2050.

The implementation of the Energy Efficiency Directive of European Union in a German Energy Saving Regulation is still under negotiation. However, the German government has established a lot of acts, support programs and regulations in the last decade. The most important 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 consulting costs for SMEs
- BAfA Energy Efficiency Consulting: grants up to 80 % for private households
- Market Incentive Program to promote renewable energy sources in the heating market (€ 150 million): 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;
- KfW Building Restoration Program (€ 1,5 billion): 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.

Some of these programs and subsidies 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 for 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 application rules for investment grants in the Market Incentive Program for Renewable Energy Sources have been changed in 2012, but there is no experience on the effect of these changes available yet. The main problem in many other programs is that ESCOs are not allowed to perform the application for the program while they actually pay for the implementation of measures. This means, if the building owner is the applicant for the subsidy program he is not able to provide the report on expenditure of funds. Theoretically it is possible to get a funding if all invoices from subcontractors are addressed to the building owner and not to the ESCO. In general, this leads to a high administration costs and to problems with the general guarantee for products and services.

Most of the programs are focused on grants to make investments in certain technologies more attractive. However, another important barrier for the implementation of EPC is the high level of transaction costs for the project development. Since there is currently no program in Germany which supports directly the development of EPC projects, this could be an area of potential future focus.

EPC projects

Realized and prospective projects

There were more than 300 EPC agreements (estimation BEA) concluded since the mid 90's in Germany – with high-tech and complex individual buildings like hospitals, as well as building pools of up to 100 separate buildings. As of the number of EPC agreements is high and public data are hardly available of all of these mentioned 300 projects, the list below shows the EPC projects overview realized in Berlin (as per 05/2013).

Name of the Project	Cost-baseline (€/a)	Baseline-consum-ption (MWh/a)	Duration (years)	Guaranteed Investment (€)	Guaranteed savings (in % , in €)	CO_2-savings (t/a)	Guaranteed budgetary discharge (€/a)
Pool 1	3.948.526 €	74.810	12,75	3.118.880 €	20% 789.705 €	8.300	297.719 €
Pool 2	5.476.100 €	100.990	12,75	3.530.414 €	25% 1.369.025 €	5.400	508.102 €
Pool 3	2.699.279 €	52.540	12	1.561.997 €	15,7% 423.787 €	3.000	196.637
Pool 4, Pankow	2.074.988 €	49.512	14	1.771.339 €	24,2% 502.147 €	2.500	147.325 €
Pool 5, Hellersdorf	1.478.027 €	27.476	14	2.291.866 €	23,6% 348.519 €	1.100	99.328 €
Pool 6, Spandau	671.165 €	17.121	14	598.241 €	22,0% 147.656 €	1.000	26.873 €
Pool 8, University	956.178 €	18.031	8	1.029.000 €	23,4% 224.000 €	1.643	14.560
Pool 9, Friedrichs-hain	1.090.529 €	21.952	10	939.243 €	19,7% 214.507 €	925	37.753 €

Pool 10 University applied Science	928.165 €	19.153	10	552.195 €	22,5% 208.837 €	1.353	41.767 €
Pool 11, Steglitz-Zehlendorf	1.285.102 €	37.140	12	920.325 €	22,0% 282.722 €	2.773	31.099 €
Pool 12 BBB	4.871.293 €	57.141 Energy 637.270 $m^3/a\ H_2O$	10	7.925.683 €	33,5% 1.633.832 €	4.938	326.766 €
Pool 13 Techn. University	1.110.030 €	23.024 Energy 50.003 $m^3/a\ H_2O$	12	1.660.535 €	24,6% 273.482 €	3.045	60.536 €
Pool 14 Kreuzberg	1.452.875 €	26.192 Energy 43.499 $m^3/a\ H_2O$	10	1.492.200 €	29% 421.400 €	2.543	85.100 €
Pool 15 University	862.442 €	17.408	10	1.085.240 €	27,6% 238.500 €	1.180	41.000 €
Pool 16 Recreation Centre	682.248 €	10.954 Energy 48.924 $m^3\ H_2O$	10	737.150 €	26,0% 177.657 €	1.467	28.425 €
Pool 17 Jail Tegel	1.817.812 €	33.912 Energy 192.643 $m^3\ H_2O$	12	2.732.200 €	33,3% 606.000 €	4.686	162.000 €
Pool 18 Mitte	3.812.219 €	85.493	12	5.514.800 €	29,9 % 1.139.853 €	7.932	227.971 €
Pool 19 Steglitz-Zehlendorf II	1.841.827 €	44.976	14	2.936.000 €	29,4 % 541.681 €	3.973	51.179 €
Pool 20 Jail Moabit	1.283.097 €	17.151 Energy 130.104 $m^3\ H_2O$	12	1.610.000 €	35,0 % 449.084 €	1.818	116.762 €
Pool 21 Court Moabit	731.659 €	14.220	12	1.118.574 €	23,6 % 172.452 €	908	40.734 €

Pool 22 Vivantes Humboldt-Hospital	1.560.912 €	24.548	12	1.362.698 €	22,7 % 354.171 €	3.146	130.242 €
Pool 23 German Opera	651.270 €	10.298	12	1.620.000 €	35,8 % 233.155 €	1.085	14.992 €
Pool 24 BIM	2.065.508 €	28.995	10	2.412.311 €	21,0 % 433.757 €	2.208	-20.820 €
Pool 25 Steglitz-Zehlendorf III	727.462 €	14.063	14	670.000 €	21,5 % 156.404 €	951	15.640 €
Pool 26 Vivantes Wencke Hospital	808.359 €	14.993	12	2.443.857 €	39,6 % 320.000 €	1.789	26.500 €
Follow up Contract Pool 10	1.348.878 €	16.748	10	1.398.892 €	19,1 % 257.636 €	1.082	10.048 €
Sum (in € resp. % or t/a)	**46.235.950**	**858.842**	**11,67**	**53.033.640**	**25,8 % 11.919.970**	**70.745**	**2.718.239**

Source: BEA 2013

Prospective projects

Most EPC projects are publicly tendered. Since 2005 altogether 85 calls of tender for EPC project were published in the Supplement to the Official Journal of the European Union. The published energy cost baseline for 75 EPC projects was about € 69.5 million (in 10 cases an energy cost baseline is missing).

The results from an analysis of the calls of tenders (undertaken by BEA, 2013) from the Supplement to the Official Journal of the European Union are shown in the figure below.

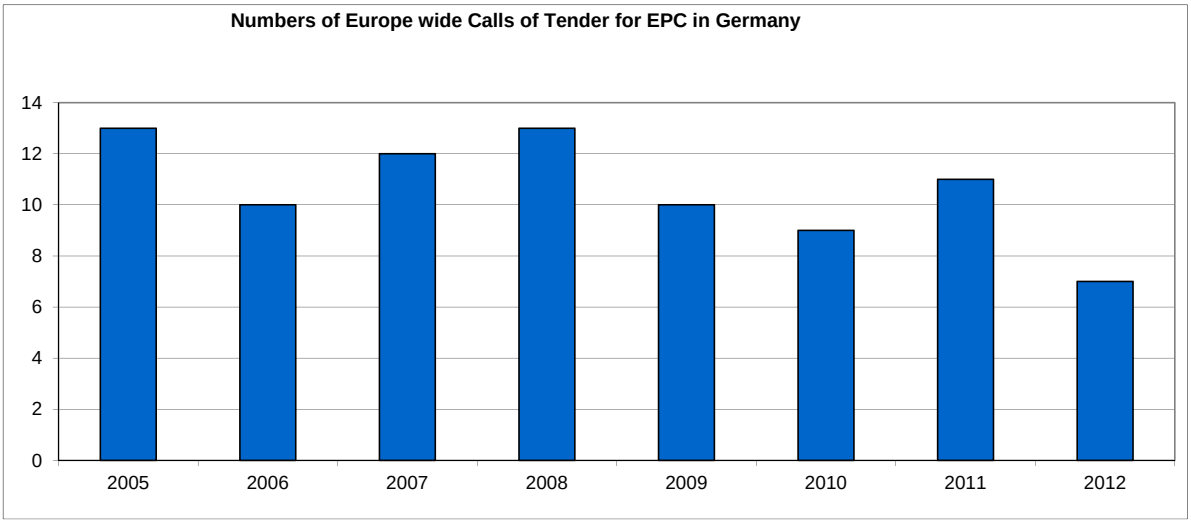

Fig. 1: Development of Europe wide calls of tender for EPC in Germany
Source: http://ted.europa.eu/TED/main/HomePage.do

There has been a trend of decreasing/stable numbers of calls of tender in Germany in the last 4 years (with 2011 as exception). In a similar time horizon the average energy cost baseline has increased with an exception in the year 2011. The reason for that is that, besides rising energy costs in the last years, in two call of tenders no energy cost baseline were mentioned.
On the base of an average energy cost baseline of € 15 million it can be assumed, that EPC leads to total investments of € 22.5 million per year (hardware costs, based on experiences of BEA). Finally, the EPC market volume for public buildings and hospitals is about € 31.5 million if taking into account that additionally about 40 % of the hardware investment is necessary for financing, service and maintenance issues.

Although the number of public EPC tenders has been decreasing in the past 7 years, there are expectations among ESCOs and other market experts that a yearly growth rate of approximately 10% is achievable. With this assumption the EPC market volume might rise to € 120 resp. 290 million in 2020 in Germany. The development is foreseen to be driven mainly through the public and the hospital sector.