Energy Performance Contracting
in commercial office buildings

To get insight in the expected effects of Energy Performance Contracting at an early stage

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Design & Construction Management
Delft University of Technology
J.J. (Jan) Schuurman
1503464

1st mentor: ir. A.J. (Alijd) van Doorn
2nd mentor: ing P. (Peter) de Jong
Colofon

Personalia
Name: J.J. (Jan) Schuurman
Student number: 1503464
Postal address: Oosteinde 45, 2611VB Delft
E-mail address: janschuurman12@hotmail.com

University
Institution: Delft University of Technology
Department: Master Real Estate & Housing
Graduation lab: Design & Construction Management
Postal address: Julianalaan 134, 2628BL Delft
Phone: +31 15 2785159
E-mail address: reh-bk@tudelft.nl
Website: www.re-h.bk.tudelft.nl
First mentor: ir. A.J. (Alijd) van Doorn
Second mentor: ing. P. (Peter) de Jong
External Examiner: drs. C.P. (Kees) Dol

Graduation Company
Company name: Maarsen Groep
Company mentor: ir. A.F.L. (Ton) Boon MRE, Senior Developer
Postal address: Buitenveldertselaan 106, 1081AB Amsterdam
Phone: +31 (0)20 540 7444
E-mail address: info@maarsengroep.nl
Preface

In order to accomplish the Master’s degree at the TU Delft, this graduation research is conducted. This report describes the findings of a research in the area of Design and Construction Management of the master Real Estate & Housing. For this research I did an internship at the development company Maarsen Groep.

This report comprises the research towards a relatively new phenomenon in the Netherlands: Energy Performance Contracting with Energy Service Companies involved. Energy Service Companies are companies that provide energy services to final energy users. Despite the existence of different successful EPC projects, there is still not sufficient research done about the chances in the Dutch market due to ambiguity of the terms EPC and ESCO and the potential it entails in order to make the commercial real estate market more energy efficient.

In conjunction with my experienced supervisors Alijd van Doorn and Peter de Jong, working at the TU Delft, as well as experience from the field from companies involved in ESCO projects, this research can be seen as a new foundation to make performance contracting accessible towards all interested parties.

By means of this writing I would like to thank both my graduation supervisors, Alijd van Doorn and Peter de Jong for the inspiration and comprehensive counselling and feedback, my tutor at Maarsen Groep, Ton Boon and also my fellow students and friends for the support.

Jan Schuurman
January 2015
Management Summary

Introduction
Since the last few years sustainability is a hot topic in both the Netherlands and the rest of the world. Buildings cause 40% of the total CO2 emission (Fang et al., 2012). It is of social importance to reduce this CO2 emission. Besides, energy from oil, gas and other fossil fuels will become scarcer and more expensive. This causes the need to find other energy sources (Eichholtz et al., 2009).

Existing organizations involved in ESCOs and performance contracting are detached from the community and other parties in my experience. The gap between companies that are willing to involve and have the knowledge, and the ‘uninformed’ client becomes larger when the quality and effectiveness of these organizations will not be reviewed. This report therefore tries to provoke discussion about how to improve the performance contracting market in new ways.

In the Netherlands several studies are done to the potential of the Dutch ESCO market. In most of the researches ESCOs are considered as the success story to create sustainable buildings. Most of the studies focus on the use of ESCOs as a goal instead of a means. ESCO is an umbrella term so it is hard to say how ESCOs can be successful, because ESCO projects include many different business cases which are hard to compare. Creating one single strategy for successful ESCO projects seems to be impossible.

Problem analysis
Research shows that the biggest absolute amount of energy savings can be realised in the built environment (Harmelink et al., 2010), as the energy use in this sector is 30% of the total fossil energy use in the Netherlands (de Haan and Benner, 2005) and the awareness is growing that the built environment is an important source of greenhouse gasses and a major consumer of energy and raw materials (Eichholtz et. al., 2009). Existing buildings use approximately 25% more energy than new buildings (Glaser & Partners, 2010), this sector is therefore of specific interest.

A relatively new way of achieving energy reductions is by applying Energy Service Contracts or using Energy Performance Contracts.

Energy Service Companies are companies that provide energy services to final energy users, accepting some degree of financial risk in doing so. The remuneration of ESCOs is done on the basis of a guaranteed energy saving, which must be measured with the energy consumption under normal conditions and the energy consumption after applying the measures. The guarantees are included in the Energy Performance Contract. ESCOs shift the focus from selling units of energy towards the desired benefits derived from the use of energy.

Energy Performance Contracting (EPC) is a way of contracting where the energy efficiency investments are paid for over time by the value of energy savings achieved Savings are guaranteed by an Energy Service Company (ESCO), which results in no investment to the building owner and no risk of investment costs (SEAI, 2013).

However, this way of contracting is not known well by developers / investors and the expected effects of implementing an energy performance contract are not made clear at an early stage. This withholds building owners from using these types of contracts (Oeveren, 2013). Therefore, the following problem statement is derived.
There is a lack of insight in the expected effects of using Energy Performance Contracting to building owners, which withhold them to implement this way of contracting in their building projects. If the expected effects can be assessed at an early stage, there will be more willingness in using EPCs which results in an easier way to improve the energy efficiency of the buildings. Therefore, the following question is to be answered:

“How can the expected effects of the use of energy performance contracting in commercial office buildings be made clear to the owner at an early stage?”

Methodology
In order to answer this question, a model is created which contains different aspects of using energy performance contracting. Those aspects are:
1. WHY should we use Energy Performance Contracting?
2. WHO is suitable for an EPC project?
3. WHERE can an EPC project be applied?
4. HOW does an EPC project look like?
5. WHAT is the most suitable EPC contract for my organization and project?

The goal of this model is to give users and owners of commercial office buildings insight in the possibilities to involve energy performance contracting in their projects. This model should be an accessible information source for involved parties to get familiar with performance contracting. Another goal is to provoke discussion about this topic and to review the functioning quality of existing foundations and organizations involved with EPCs or ESCOs.

This decision-supporting model is made for owners of commercial office buildings who are interested in improving the energy efficiency of their portfolio. It is an easy accessible way to become familiar with Energy Performance Contracting. Energy Performance Contracting is a broad based term for all types of partnerships where guarantees are involved. EPCs can differ from simple to very comprehensive contracting models.

Findings
The most suitable organization culture for an EPC project needs ‘The Adhocracy Culture’, which is described as: A dynamic, entrepreneurial, and creative place to work. People stick their necks out and take risks. The leaders are considered to be innovators and risk takers. The leaders are considered to be innovators and risk takers. The glue that holds the organization together is commitment to experimentation and innovation. The emphasis is on being on the leading edge. The organization’s long-term emphasis is on growth and acquiring new resources. Success means gaining unique and new products or services. Being a product or service leader is important. The organization encourages individual initiative and freedom.

A project is suitable when the energy bill is of sufficient size (>300,000 euros per year). The human impact should be reduced due to uncertainty about the savings. Used installations should be very reliable as the whole business plan is based on these savings. The tenant cannot be disregarded from the partnership. Moreover, the contract duration with the tenant must be as least as long as the duration of the EPC contract, otherwise no financial funds will be obtained. Transaction costs of contract must be calculated and clear in order to check whether the project is still feasible.
Different services from intensive to simple can be realised by Energy Performance Contracting projects. As an ESCO is used when the client doesn’t has the resources to do it by himself or does not want to do it. However, it is not that easy as supposed by organizations involved. The different services demand for different revenue models and collaborations. The aspects of these collaborations depend on the financing institution, the technical institution and the attitude of the owner. An owner/user should realise that large savings involve more complex constructions as being linked of an Special Purpose Vehicle, and that there are several liabilities involved. Due to practice examples, it became more clear that as owner of real estate you should have clear for yourself what service level you want, but also what partnership do you want and what is your preferred payback period and what (transaction) costs are acceptable to you to realise an ESCO partnership.

**Recommendation**

It can be concluded that this research is a very good literature based source of information for organization interested in Energy Performance Contracting, but in order to create a well-functioning supporting model, the model in this research can be used as starting point and should be tested very well to develop a model that is ready for practice.
Introduction
1. Introduction

1.1 Relevance
The last few years sustainability is a hot topic in both the Netherlands and the rest of the world. Buildings cause 40% of the total CO2 emission (Fang et al., 2012). It is of social importance to reduce this CO2 emission. Besides, energy from oil, gas and other fossil fuels will become scarcer and more expensive. This causes the need to find other energy sources (Eichholtz et al., 2009).

Societal relevance
There is a need to new cooperation models and new revenue models in sustainability improvements. There is also a problem on the front side, which is an organizational and cultural problem. This is partly caused by out-dated legislation.

Parties should be flexible to start new partnerships. Actors should be willing to share information and being transparent. Also the new models as Energy Performance Contracting should be showed to the market parties and the benefits for each organization should be made clear. It is important that awareness is created about the effective functioning of these new models (Boot, 2014).

According to Jan Al, director BAM Techniek (Al, 2014) the most important aspect is the integration of the client with the other actors of the EPC project. This means that for a client there should be created a more accessible way to take part of these projects.

From Niels Dijkman, ABN Amro (Dijkman, 2014), all actors should ‘speak the same language’. What he means is that every actor should be on the same knowledge level within a project. There is a need in making clear in small steps how collaboration models are divided and how each actor is part of the group. He also thinks that sustainability should become ‘big business’ in order to create wide support.

Existing organizations involved in ESCOs and performance contracting are detached from the community and other parties in my experience. The gap between companies that are willing to involve and have the knowledge, and the ‘uninformed’ client becomes larger when the quality and effectiveness of these organizations will not be reviewed. This report therefore tries to provoke discussion about how to improve the performance contracting market in new ways.

Scientific relevance
In the Netherlands several studies are done to the potential of the Dutch ESCO market. Builddesk (2011) did research commissioned by RVO.nl about the barriers, de Boer (2011) studied if ‘ESCOs can become successful in the Netherlands.’ RVO wrote two whitepapers about ESCOs to improve public understanding of the term. Recently, van Oeveren (2014) conducted research to ‘What needs to change in the Netherlands to develop more and better ESCO projects’.

In most of the researches ESCOs are considered as the success story to create sustainable buildings. Most of the studies focus on the use of ESCOs as a goal instead of a means. ESCO is an umbrella term so it is hard to say how ESCOs can be successful, because ESCO projects include many different business cases which are hard to compare. Creating one single strategy for successful ESCO projects seems to be impossible.

Another important thing is that the demand side is as important (if not more important) than the supply side (ESCOs). In the conducted studies, little research is done to the demand side of energy services. The reason for this is that ESCOs are mainly seen as a technique that is a successful solution
for energy savings (Builddesk, 2011). However, little research is done to which components or parts in the supply of energy services are missing by building owners or managers. To improve the amount of ESCOs and ESCO projects in the Netherlands, it is also important for the ESCOs to know what kind of service they should offer and which measures are needed. Research to the match of demand and supply of energy services and the role of Energy Service Companies is needed to get insight in the way an Energy Service Company can create added value to the inefficient existing building stock.

**Personal motivation**

During my bachelor’s degree in Architecture, sustainability always was a focus point during the design projects. My passion for sustainability and energy efficient buildings arose. However, I always had the gut feeling that sustainability, in the way we designed it, was not feasible because of the costs involved. This resulted in a – from my perspective – infeasible projects.

As a result of studying Real Estate & Housing, I explored the financial side of building development. I always had the ambition to combine those design projects with the sustainability ambitions into a feasible – and preferably – profitable way.

With this report I want to bridge the gap to sustainability upgrades and investments. By implementing successful Energy Service Company business models or other types of models into the Netherlands for the government, I want to create an incubator and an eye opener for the rest of the Netherlands to transform their buildings into a sustainable portfolio. In this way we can catch up again with the rest of Europe and get closer to the title of most sustainable country in the world.

**1.2 Problem Analysis**

This chapter provides background information about the importance of energy and sustainable energy, the use of energy in the Netherlands and the targets made by the European Union and the Netherlands. A strategy identifies the three steps of energy efficient design and there will be explained how energy guarantees can play a role in improving sustainability in real estate. From this context the problem statement is established.

Since the industrial revolution at the end of the 19th century, all developed countries became dependant on energy. In the beginning, the availability of energy and the costs of energy were not an issue; coal, oil and gas were abundantly available at a low price. This all came to a change with the oil crisis in the 1970s which initiated an interest in energy conservation. At the same time, the rapport of the Club of Rome in 1972 raised questions about the limits of growth and the effect of economic growth on the climate. The 70’s were therefore a starting point for world-wide experimenting with energy efficiency. However, the falling oil prices in the mid-1980s precluded further developments (Lindgren Soroye and Nilsson, 2010). Nowadays, the long-run effects of rising energy prices, a growing awareness of sustainability and climate change concerns, geo-political issues and the current effect of deteriorated financial circumstances of companies and governments have elevated the quest for a transition to a renewable energy system (Builddesk, 2011)

**Energy use in the Netherlands**

According to Statistics Netherlands (CBS) in the Netherlands we used in 2009 4000PJ (peta Joule) energy. That is 31,6 cubical metres greenhouse gas (van Baal, 2011), which comes down on approximately 50 billion euros per year (3000 euros per person per person). The main part is generated from fossil fuels; this results in several disadvantages as climate change and the fact that natural resources run out.
The Dutch government stated that in 2020 the emission should be less than 20% in the Netherlands. The Dutch government also states that 14% of the energy must be derived from renewable sources (e.g. wind or biomass). According to the ‘Energieakkoord’ this must be 16% in 2023 (Rijksoverheid, 2011).

Europe 2020
To reduce energy consumption the European Union made a EU Action and Energy use package (Europe 2020) with all EU members. Europe 2020 is a 10-year strategy proposed by the European Commission on 3 March 2010 for advancement of the economy of the European Union (European Commission Energy, 2011). This pact includes the following headlines:

- To reduce greenhouse gas emissions by at least 20% compared to 1990 levels
- Increase the share of renewable energy in final energy consumption to 20%
- Achieve a 20% increase in energy efficiency.

In 2050 Europe wants to become a society with low CO2 emissions. An excess of CO2 emission is an important cause of the global warming and hence the climate change. The European union aims to 80-95% less CO2 emission in 2050 (compared to 1990).

Trias Energetica; A strategy for energy-efficient design
The Trias Energetica is a three-stage strategy for energy-efficient design. The three steps of the Trias Energetica are basic rules of thumb in the sustainable design of buildings. These three steps are (TriasEnergetica, 2011):

1. Reduce the demand for energy by avoiding waste and implementing energy-saving measures
2. Use sustainable sources of energy instead of finite fossils fuels
3. Produce- and use fossil energy as efficiently as possible

Reducing energy demand is the best and most efficient way of tackling the energy and climate issue. The energy demands that is left should be satisfied by producing in a sustainable manner, which is step two. In case it is not possible to replace ‘grey’ energy by ‘green’ energy, one should target at efficient energy use as is depicted in step three (see figure)

![Trias Energetica Diagram](image)

Figure 1 Trias Energetica (TriasEnergetica, 2011)
Research shows that the biggest absolute amount of energy savings can be realised in the built environment (Harmelink et al., 2010), as the energy use in this sector is 30% of the total fossil energy use in the Netherlands (de Haan and Benner, 2005) and the awareness is growing that the built environment is an important source of greenhouse gases and a major consumer of energy and raw materials (Eichholtz et. al., 2009). Existing buildings use approximately 25% more energy than new buildings (Glaser & Partners, 2010), this sector is therefore of specific interest. In order to tackle the energy demand problem, the European Union and the Dutch government have already implemented several environmental policies.

**ESC/EPC: A new way of achieving energy reductions**

A relatively new way of achieving energy reductions is by applying Energy Service Contracts or using Energy Performance Contracts. These are contracts that guarantee a certain amount of energy savings or the supply of a certain amount of sustainable energy. Looking only at the existing stock of houses and buildings in the Netherlands, estimates say energy savings up to 200 peta joule (PJ), or 6% of the total Dutch energy consumption, can be achieved (RIVM, 2009).

This new demand for energy efficiency creates an opportunity for companies that are specialised in achieving energy reductions by means of Energy Performance Contracts (EPCs). An Energy Service Company (ESCO) is an organisation that supplies EPCs and that provide energy services to final energy users and guarantees energy savings.

In the US, the first Energy Service Companies arose in the 1970’s (Goldman et al., 2005) and in Europe in the late 80’s (de Haan and Benner, 2005). At the moment, ESCO activities in Europe are especially concentrated in Germany, France, the UK, Belgium, Hungary, Italy and Austria (de Boer, 2011). Literature has shown that the ESCO market in the Netherlands is not significant yet, but growing. Looking globally, the ESCO market is mostly active in public building sector (Berliner Energieagentur GmbH, 2008). According to different research, the public sector is the best sector to start in an upcoming ESCO market (van Oeveren, 2014 de Boer 2011).

**How to create successful ESCO projects?**

As ESCOs includes different variables (like service level, revenue models, financing models, process and risk involvement) it is important to research which components or parts of an ESCO can be used to create added value (and a Unique Selling Point (USP)). It is important to start from the demand side and to find out in what way (a certain type of ESCO, or where an ESCO is part of) the demand of energy services can be met.

**1.3 Problem statement**

Enhancing the energy efficiency and overall sustainability of commercial office buildings can create a budget relief in utility expenses for tenants and owners, reduce CO2 emissions and air pollution, alleviate strain on the electric power system, improve the health and productivity of occupants, improve the company image and create local high-quality job opportunities (Beyl and Schinnerl, 2005).

Energy Performance Contracting (EPC) is a way of contracting where the energy efficiency investments are paid for over time by the value of energy savings achieved Savings are guaranteed by an Energy Service Company (ESCO), which results in no investment to the building owner and no risk of investment costs (SEAI, 2013).
However, this way of contracting is not known well by developers / investors and the expected effects of implementing an energy performance contract are not made clear at an early stage. This withholds building owners from using these types of contracts (Oeveren, 2013). Therefore, the following problem statement is derived.

There is a lack of insight in the expected effects of using Energy Performance Contracting to building owners, which withhold them to implement this way of contracting in their building projects. If the expected effects can be assessed at an early stage, there will be more willingness in using EPCs which results in an easier way to improve the energy efficiency of the buildings.

Therefore, the following question is to be answered:

**Main research question**

How can the expected effects of the use of energy performance contracting in commercial office buildings be made clear to the owner at an early stage?
Sub-research questions

**WHAT DO WE NEED TO KNOW?**

**EXPECTED EFFECTS**
- Considerations for using Energy Performance Contracting:
  - Savings potential for stakeholders?
  - Capital needed and how to provide?
  - Risk involved?
- Contract types?
- Financing options?

**COMMERCIAL OFFICE BUILDINGS**
- Energy system of a commercial building?
- How do the (sub) systems influence energy savings and cost savings?

**MAKE CLEAR / GIVE INSIGHT**
- How to make clear by using a model?
- How to test the model?

**REAL ESTATE OWNER**
- Relevant stakeholders?
- Stakeholders requirements (KPIs)?

**EARLY STAGE**
- Current process of Energy Performance Contracting?
- What should change in process of Energy Performance Contracting?
Theoretical background:

1. WHY should we use Energy Performance Contracting?
Explanation what EPC projects involve, their implementation in the world and the Netherlands and the main barriers that the success of EPC encountered.
   • Literature

Decision Supporting Model design:

2. WHO is suitable for an EPC project?
The profile of the organizational culture for starting an Energy Performance Contracting project
   • Literature, culture analysis based on the Organizational Culture Assessment Instrument (Cameron and Quinn, 2006)
   • Interviews with Financial and Technical organizations
   • Expert meeting (Nyenrode Business University, 2014)

3. WHERE can an EPC project be applied?
The preconditions for a project to be suitable for Energy Performance Contracting
   • Literature
   • Interviews with Financial and Technical organizations

4. HOW does an EPC project look like?
The services and contracting types that are possible within Energy Performance Contracting
   • Literature
   • Interviews with Financial and Technical organizations

5. WHAT is the most suitable EPC contract for my organization and project?
Specifications and differences between the contracting types and measurements involved.
   • Literature
1.4 Final result and target group
A model in which the building owner of commercial office buildings can put in its requirements with regard to the desired performances of the building. An Energy Performance Contract type can be selected and the model’s output are the expected energy savings and cost savings, the capital needed and the risks involved. On the basis of this output data it is made clear to the building owner whether this contract choice results in a viable project.

1.5 Research Organisation
Scientific domains
- Design & Construction Management
- Building Economics / Building Management

Mentors
1st mentor: ir. A.J. (Aljd) van Doorn
2nd mentor: ing. P. (Peter) de Jong

Graduation Company
Company name: Maarsen Groep
Company mentor: ir. A.F.L. (Ton) Boon MRE, Senior Developer
1.6 Research Design

Figure 3 Research Design (own illustration)
Theoretical Framework
2. Energy Service Companies

2.1 What is an Energy Service Company (ESCO)?
This chapter provides an answer to the question: What is an Energy Service Company?
Energy Service Company (ESCO) is a term used in many ways in different definitions. Below a selection of important definitions is given. Based on these definitions, the definition for this research is formulated.

Agenschap NL, 2012
“An ESCO is an Energy Service Company. It is a company that guarantees certain energy savings to a building owner by applying various measures. The Energy Performance Contract has a key role. In this contract, the agreements between ESCO and client about (among other things) the saving targets are written down. If the saving targets are not met, then the risk is for the ESCO. However, if more energy is saved, the profit can be divided between ESCO and client. Besides, the Energy Performance Contract includes (if relevant) provisions on the quality targets of the indoor environment and about the maintenance of the facilities.” (AgenschapNL, 2012).

The most important aspects of this definition are:

1. ESCOs accept a certain degree of financial risk
2. Energy Performance Contract explains how the profit or loss are divided among parties and how the quality is guaranteed

De Boer, 2011
“Companies providing energy services to final energy users, including, but not necessarily, the supply and installation of energy-efficient equipment, building refurbishment, maintenance and operation, facility management and the supply of energy (including heat), accepting some degree of financial risk in doing so.”

ESCOs provide energy solutions by:
• Guaranteeing the energy savings and/or the provision of the same level of energy service at a lower cost by implementing an energy efficiency project
• Being remunerated, at least partially, based on the energy savings achieved
• Pre-financing or assisting in arranging financing for the implementation of the energy project by providing a savings guarantee (de Boer, 2011)

The most important aspects of this definition are:
**ESCOs provide Energy Services**

1. ESCOs provide Energy Services which can include:
   - supply an installation of equipment
   - building refurbishment
   - maintenance & operation
   - management
   - supply of energy

2. ESCOs accept a certain degree of financial risk

3. Remuneration based (at least partly) on achieved savings

4. (pre-) financing for the energy services by providing a savings guarantee

5. **ESCO shift focus** from selling units towards desired benefits derived from the use of energy

6. **ESCOS accept energy efficiency improvements** and the meeting of the other agreed performance criteria

Grazer EnergieAgentur, 2010

The ESCO concept shifts the focus away from selling units of final energy, like fuel oil, gas or electricity, towards the desired benefits and services derived from the use of the energy, e.g. the lowest cost of keeping a room warm, air-conditioned or lit (Grazer EnergieAgentur, 2010).

The most important aspects of this definition are:

7. **Remuneration** based (at least partly) on achieved savings

8. **Difference** in energy consumption under normal conditions and after applying energy saving measures

Builddesk, 2010

ESCOs are companies that provide energy services, combined with installations and building management. This type of service can be an important contribution to improving the energy performance in buildings, for example by using a performance contract. The provider takes a
financial risk, by investing in energy savings with a guaranteed result. The organisation is independent (for example from suppliers of installations).

Important aspects of ESCOs according to Builddesk (2010):

1. ESCOs provide Energy Services which can include:
   - supply an installation of equipment
   - building refurbishment
   - maintenance & operation
   - management
   - supply of energy

2. ESCOs accept a certain degree of financial risk

3. Remuneration based (at least partly) on achieved savings

4. The organisation is independent (e.g. from suppliers or installers)

The definition of ESCOs that is used in this research

The definition is based on the selection of the most common parts mentioned in the literature to create a broad-based definition. It comprises the most important features of an ESCO. This definition can be used as the basis of the research to energy service companies.

Energy Service Companies are companies that provide energy services to final energy users, including, but not necessarily, the supply and installation of energy-efficient equipment, building refurbishment, maintenance and operation, facility management and the supply of energy (including heat), accepting some degree of financial risk in doing so. The remuneration of ESCOs is done on the basis of a guaranteed energy saving, which must be measured with the energy consumption under normal conditions and the energy consumption after applying the measures. The guarantees are included in the Energy Performance Contract. ESCOs shift the focus from selling units of energy towards the desired benefits derived from the use of energy.

Energy Performance Contract explains how the profit or loss are divided among parties and how the quality is guaranteed.

ESCO shift focus from selling units towards desired benefits derived from the use of energy.

Difference in energy consumption under normal conditions and after applying energy saving measures.
2.2 What is the status of the worldwide ESCO industry compared to the Netherlands?

This chapter provides an overview of the status of the American and European ESCO market. The European ESCO market is of interest because the European countries are most similar to the Netherlands and therefore, lessons that can be learned from the European ESCO market are most likely to fit the Dutch market as well. The American market is of interest because it is the oldest and therefore most mature ESCO market.

ESCO market in USA

In the United States, Energy Service Companies are mostly active in the federal market (real estate owned by the government) and in the MUSH market (real estate owned by municipal agencies (state or local) like universities and colleges, schools and hospitals).

According to Satchwell et al. (2010) the size of the US ESCO market in 2008 was about $4,1 milliard (mld) with a:

- MUSH market share of 69%
- Federal market share of 15%
- Private offices, retail and industrial real estate market share of 7%
- Residential market share of 9%

The federal market share has increased compared to 2006. It is expected that ‘lead by example’ programmes established by central and local governments and the continued support for performance contracting programmes will continue to support ESCO market growth in this sector. Hopper et al. (2005) estimated the total 2008 US ESCO market revenues to be around $5,5 mld, based on the 2006 revenues of 3,6 mld and the market conditions that were applicable at that moment in time.

The key market drivers are a need for new equipment and compliance with legislation. Although it was probably important early in the industry’s development, the ESCO industry’s reliance on financial incentives is declining. The US government has implemented several ESCO-market stimulating policies over the last 15 years (de Boer, 2011).

Some states offer subsidies to ESCO projects paid for by additional fees on the public utility tariff. Other states use local property tax revenue for energy efficiency retrofit programmes, issue bonds to pay for the debt or use appropriations. All these governmental actions have substantially contributed to the major growth of the US ESCO industry (Hopper et al., 2005).

On average, ESCOs implement energy saving measures that lead to a savings rate of 15-20% of the utility bill. 72% of the projects reported greater savings than were initially guaranteed by the ESCO, 19% encountered savings shortfalls. In 9% of the cases, projects savings were fully stipulated.

The average payback period of the installed measures is 5-15 years and the average contract term is somewhat longer than that (Hopper et al., 2005).

European ESCO Market

Germany, France, Italy, the UK and Spain accommodate the largest ESCO industries and according to the European Commission DG Joint Research Centre (Bertoldi et al., 2006). Their joint ESCO revenue in 2009 was around €8,8 milliard. Countries with a strong ESCO market growth during the 2007-2010 period are Denmark, Sweden and Romania. The most important reasons for this growth are changes
towards a more favourable legislative framework focused on energy conservation, increased activity in the refurbishment of public buildings, financial incentives for refurbishment, modernisation of private real estate and stronger environmental awareness. Some other countries experienced a decreasing market growth, mainly due to the economic crisis and the corresponding consequences. The market leaders are described below.

**Germany**

Germany has Europe's largest and most mature ESCO market which can be attributed to governmental vision and support (de Boer 2011). The German policy package includes both technical and financial support, non-governmental programmes and favourable conditions such as energy taxes. The implementation of a large number of municipal projects had a strong demonstration effect. Compared to the decentralised Netherlands, Germany has a more top-down regulated structure, meaning that German municipalities can act as large launching customer. Next to this, the existence of a various number of competing energy service providers on the market, such as municipal utilities, manufacturers of building automation & control systems and independent players as energy agencies, has contributed to the development of the ESCO market (European Commission DG Joint Research Centre, 2010). According to the Berliner EnergieAgentur GmbH (2008), the key reasons for ESCO successes in Germany are the large (public) building stock with the necessity to renovate, a lack of capital for energy refurbishments in the public sector, successful pilot projects, quality labels for ESCOs and their services, and local support through energy agencies. The most influential market players are energy suppliers with a share of 66% and building equipment & control manufacturers with a market share of 26%. Most projects involve public and private commercial buildings, only a small part of the projects involve residential buildings and industry. The most commonly used business model is ESC although the popularity of EPC models is rising; in 2008 EPC projects accounted for around 15% of the total market revenue of €2 milliard. GS is the predominantly used contract type followed by Shared Savings model. The German experience with the ESCO market has led to standardised procedures and contract models, providing more confidence in the ESCO industry. In Germany, like in the US, the recent financial crisis has led to problems with the financing of new projects; customers and ESCOs face stricter conditions, and bigger projects that require higher investments and contracts with terms longer than 10 years have difficulties in finding funding (European Commission DG Joint Research Centre, 2010).

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<td>• The key reasons for ESCO successes in Germany are the large (public) building stock with the necessity to renovate, a lack of capital for energy refurbishments in the public sector, successful pilot projects, quality labels for ESCOs and their services, and local support through energy agencies.</td>
</tr>
<tr>
<td>• The German experience with the ESCO market has led to standardised procedures and contract models, providing more confidence in the ESCO industry.</td>
</tr>
<tr>
<td>• Compared to the decentralised Netherlands, Germany has a more top-down-regulated structure, meaning that German municipalities can act as large launching customer.</td>
</tr>
<tr>
<td>• The existence of a various number of competing energy service providers on the market, has contributed to the development of the ESCO market</td>
</tr>
</tbody>
</table>
France

After Germany, France accommodates the largest European energy service market (de Boer, 2011). Most projects take place in the public sector, but in recent years an increasing activity has been seen in the industrial and residential sectors. The market is dominated by ten large companies, but energy suppliers, big technical service companies and equipment suppliers are now also entering. For most market actors, energy service provision is predominantly supplementary to their main business activity. Because the French energy service industry is not heavily relying on government policies or subsidies and because the ESCOs are not short on capital, the financial crisis has not had a significant impact on the market; there was only a slowdown in demand in the private sector. This, however, does not mean that the French government is not stimulating the ESCO market. They have implemented a wide range of policies like grants, subsidies and funding for state owned buildings (European Commission DG Joint Research Centre, 2010). Because the French ESCO market is mainly dominated by large, financially strong companies, a large part of the projects’ investment needs is covered by ESCO equity. In 2009, 60% of the projects were ESCO financed, 10% were customer financed and 30% were third-party financed (European Commission DG Joint Research Centre, 2010).

<table>
<thead>
<tr>
<th>ESCO market in France</th>
</tr>
</thead>
<tbody>
<tr>
<td>• After Germany, France accommodates the largest European energy service market (de Boer).</td>
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</tr>
</tbody>
</table>

United Kingdom

The United Kingdom has a growing ESCO market, but the definition of their energy services is less clear. Whilst there are many companies offering some kind of service relating to energy, few have sold this by means of EPCs (Bloomberg New Energy Finance, 2011). ESCOs used to target mostly industrial real estate, but the fastest market growth is achieved in the commercial sector and the public and residential building sector. Most projects are financed through third-party financing. The major players are subsidiaries of large international manufacturers of building automation & control systems and utilities providing facility management services. These companies account for approximately 80% of the market and most of them are also active on the German, French and Dutch market. Because the market is dominated by large actors, smaller ESCO organisations find it difficult to position themselves. For many of the companies, energy services are a key service offered together with a wider spectrum of other services (European Commission DG Joint Research Centre, 2010). The strongest driver for the development of the ESCO market is implemented government policy. In the UK, a special cap-and-trade scheme called Carbon Reduction Commitment (CRC) was introduced in 2010. This scheme gives the largest incentive for companies to reduce their energy use and by that reduce their CO2 emission. Other drivers are the security and reliability of supply, rising and volatile energy prices leading to cost uncertainty as well as sustainability becoming a ‘moral obligation’ for large companies. EU environmental policy and targets also influence the development of the UK ESCO market, together with the Clinton Climate Initiative (European Commission DG Joint Research Centre, 2010). Although volatile energy prices can be a driver for the market, it is also the
largest barrier for British ESCOs, next to organisational and cultural issue (Bloomberg New Energy Finance, 2011). Prior to the 2008 global economic crises, access to private finance for projects was relatively easy. Since then, ESCOs have been relying on zero-interest loans from government funded non-profit organisations. These companies offer interest free funding to accelerate investments in energy efficiency technologies across the British public sector (Carbon Trust, 2011, Bloomberg New Energy Finance, 2011).

ESCO Market in the United Kingdom

• The major players are subsidiaries of large international manufacturers of building automation & control systems.
• These companies account for approximately 80% of the market and most of them are also active on the German, French and Dutch market.
• Because the market is dominated by large actors, smaller ESCO organisations find it difficult to position themselves.
• For many of the companies, energy services are a key service offered together with a wider spectrum of other services (European Commission DG Joint Research Centre, 2010).
• ESCOs used to target mostly industrial real estate, but the fastest market growth is achieved in the commercial sector and the public and residential building sector.
• Most projects are financed through third-party financing.
• Other drivers are the security and reliability of supply, rising and volatile energy prices leading to cost uncertainty as well as sustainability becoming a ‘moral obligation’ for large companies.
Belgium

Even though Belgium does not accommodate one of the largest ESCO markets in Europe (in absolute amounts), it is an interesting country to look at. In 2005, the Belgian government set up a state-owned ESCO called Fedesco. This company is bringing about retrofit projects in federal public buildings in cooperation with the ‘Federale Regie der Gebouwen’; an organisation that manages all federal state-owned buildings, comparable to the Dutch Rijksgebouwendienst. The organisation helps arranging the (pre-)financing of ESCO projects by guaranteeing the future energy savings cash flow and has set up a debt fund for this purpose. Due to this measure, most projects are third-party financed (European Commission DG Joint Research Centre, 2010). Because the ESCO industry and the involved financial institutions had the opportunity to build up a track record through the Fedesco projects, financial institutions are now more willing to participate in ESCO projects focussed on the private sector. Public financial incentives like regional subsidies and federal tax reductions for energy efficiency projects are also used to stimulate the ESCO market. The federal ESCO mostly uses EPC contracts (Fedesco, 2011). The Belgian government stimulates the ESCO market not only by setting up a federal ESCO with a debt fund, it also tries to match demand and supply by creating a competence centre for energy efficiency services. The knowledge-centre’s main task is to take away the mistrust form the clients, inform the market about EPC contracts and promote a regulatory ESCO framework (European Commission DG Joint Research Centre, 2010).

ESCO market in Belgium

- The Belgian government set up a state-owned ESCO called Fedesco. This company is bringing about retrofit projects in federal public buildings in cooperation with the ‘Federale Regie der Gebouwen’; an organisation that manages all federal state-owned buildings, comparable to the Dutch Rijksgebouwendienst.
- Public financial incentives like regional subsidies and federal tax reductions for energy efficiency projects are used to stimulate the ESCO market.
- The Belgian government tries to match demand and supply by creating a competence centre for energy efficiency services.

Conclusion

The United States has the most developed ESCo market in the world. The US ESCO history reaches back to 1970, when the oil crisis caused the rise of the oil price. The concept of ESCOs gradually spread to Europe and the rest of the world (Bertoldi et al., 2006). England, Germany and France can be seen as the ‘Premier League’ of the European ESCO market. In Germany, the authorities given technical and political support to the development of the ESCO market, the government realised this through research development programs, incentive programs and to function as a role model. In England, the market has grown without direct government support. The support given in England is done by informing potential customers about the ESCO formula. The ESCO market in Belgium is not that big as in the other countries, however it includes an interesting ESCO market because of the federal ESCO policy.
What is the status of the Dutch ESCO industry?

Although the Netherlands has a strong tradition in energy efficiency policy, until 2005 there was hardly any ESCO activity on the Dutch market. Recently, the Dutch ESCO market has begun developing, but the market is still in an early stage and the size cannot be compared to countries like Germany and the UK. In the Netherlands, around 25 independent companies and 25 subsidiaries of larger organisations deploy energy services as their core business (van Oeveren, 2014, Change Best, 2009).

Despite the observation of the European Commission DG Joint Research Centre (2010) that the Dutch ESCO market is growing slow but steady, the Grazer EnergieAgentur (2010) detects a trend in the Netherlands that businesses go back to their core activities. Foreign branch operations are divested and technical service companies focus on their main business. The unfolding of ESCO activities does not match with this development (de Boer, 2011).

Dutch ESCO Market potential

In the Netherlands, on average, existing buildings consume 25% more energy than new buildings. Three quarters of the total cost of life arises after the building has been built and on average the energy savings potential in existing buildings is 20-50% (Glaser & Partners, 2010).

De Boer (2011) did a research about the potential of ESCOs in different Dutch market segments. She concluded that in general, energy intensive real estate is of interest to ESCOs because they represent large saving potentials. Offices and schools are most likely to offer ESCOs the best business opportunities together with municipal real estate, hospitals and swimming pools. These sectors offer great energy savings potentials and benefit most from other features offered by ESCOs, like removing the split-incentive barrier and pre-financing the upfront investment need. Other real estate sectors, like convention centres and warehouses, are not that interesting to the ESCO industry because of low energy saving potentials or difficulties to identify energy savings. Public real estate which is managed by the RGD is very interesting to ESCOs.

Dutch public real estate sector

The Rijksgebouwendienst (RGD), part of the Ministry of the Interior, manages the largest real estate portfolio of the Netherlands. In total, seven million square meters of floor area is managed, of which 70% is owned by the RGD. Dutch municipalities also possess real estate which has to be upgraded in order to comply with environmental and climate targets. Because many municipalities currently phase budget costs, they are interested in private parties covering the upfront investment costs of energy efficiency projects. Local governments are therefore a very interesting target for the energy service industry (de Boer, 2011).

ESCO potential of public sector

Van Oeveren (2014) states that the public sector offers many opportunities for Energy savings that can be realised by ESCOs. Reasons for these opportunities are:

• In most cases the public sector is using a building for a long term with a homogeneous function. Because of this there is often data available about its energy consumption.
• By combining these buildings there is a big opportunity for the implementation of ESCOs
• The public sector can act as an example for the commercial real estate market
• It gives the Netherlands the chance to adjust the financial support and legislation.

Conclusion

Research of Energi Centrum Nederland by Menkveld (2013) demonstrates that ESCOs can be used as a means to improve energy efficiency in the Dutch real estate. De Boer (2011) says that energy intensive real estate is of interest to ESCOs because they represent large potentials. Offices, schools
and municipal real estate are most likely to offer ESCO’s best business opportunities. She also states that Public real estate which is managed by the Rijksgebouwendienst (RGB) is very interesting to ESCOs because the RGD has the policy to make its real estate more energy efficient, and because the RGD is directly funded by the Ministry of Finance, they are not in need of companies offering to take care of the upfront investment costs associated with upgrades. Van Oeveren (2014) states that the public real estate sector offers many opportunities for Energy savings that can be realised by ESCOs. The public real estate is mostly used for a long term, these buildings can be pooled together which increases the saving potential, they can work as a launching customer for the rest of the Netherlands and it gives the potential to adapt Dutch legislation and subsidies to stimulate energy efficiency improvements.

2.3 What are the main barriers of using ESCOs in the Netherlands?
Empirical research from Fang et al. (2012) demonstrated that the use of ESCOs reduce the energy consumption. The study was conducted with data from 97 countries from 1981 to 2007 and uses also multiple findings of other studies that have been done in recent years. The effect of an ESCO on energy savings increases over time, and in the long term this could amount to a saving of 20%. This allows countries to develop ESCOs in order to achieve their goals set by Governmental institutions.

However, there are also negative sides to the use of ESCOs. From case study research among Dutch ESCO cases a SWOT analysis is applied. The main results of this analyse are:

Strengths
The strength of the analysed ESCO projects are:
- Trust between involved parties
- Collaboration by dealing with mutual goals and transparency
- Elaborate on existing relationships
- Clear objectives and involvement of the client
- Personal factors and leadership are crucial

The first three strengths that are conducted from the cases are all related to the cooperation between the parties. These strengths can form a hypothesis; for a successful cooperation between involved actors in an ESCO project, a collaboration is needed that is based on trust. This trust can be created by elaborating on existing relationships, by transparency and by creating mutual goals.

Weaknesses
Weaknesses of analysed ESCO projects are:
- Transaction costs create a barrier as they comprise a large part of the total costs
- Decision-making is complex due to administrative tiers
- Broad scope and the size of the project blurs objectives
- Building trust takes time and effort
- Change takes time and effort
- Miscommunication and knowledge loss by administrative tiers

Based on literature analysis and interviews to the context, the following key opportunities and threats are pointed out (van Oeveren, 2014).
Opportunities

Opportunities for development of ESCO projects in the Dutch market:
- Government as launching customer
- Developing the technique of energy savings measures
- Sustainability objectives of organizations
- Savings potential of buildings
- Development and certification and accreditation
- Knowledge sharing, sharing examples and process support of ESCO projects in order to stimulate the ESCO market

Threats
- Legislation on procurement
- Lack of awareness: parties are not aware of their savings potential and the possibilities that are available to address this.
- Lack of confidence in providers; Clients think that they are being scammed.
- Stubborn attitude of the Dutch, Dutch people think they do things better by themselves
- Business plans and rent terms are often focused on the short term

Conclusion
There are 5 main problems of implementation of ESCOs in the Dutch real estate market, these problems are pointed out below (van Oeveren, 2014).
- **Lack of awareness**: by lack of knowledge, only several parties are willing to start an ESCO project. This is also caused by the lack of (successful) examples. Besides the lack of awareness there is also a problem with different conceptions on the definition of ESCOs, which leads to confusion.
- **Lack of trust** in the supplying actor. This comes along with the ignorance of ESCOs. ESCOs are often part of parent companies that are harmed by their reputation and thus gaining trust. This may also explain why the focus is on the legal side of the projects.
- **Legislation**: There is a lack of legislation towards existing buildings. The energy requirements for existing buildings are not as developed as new buildings. This leads to a lack of incentive for building owners to invest in sustainability. On the other hand, there is too much regulations for existing buildings. There is a lot of regulations for procurement. There is still much uncertainty about how the projects should be procured: as a service or as work. And especially the municipalities see this as a reason to abandon ESCO projects.
- **Complexity and split incentive**: ESCO projects are often considered as complex. Due to different investments and interests among actors, split incentive are easily created. Complexity is enhanced by the new way of collaborating, which needs a change in culture.
- **Change**: ESCO projects require a change in both the providing and the contracting company. Change is needed in organization culture, the processes and the employees. Especially the change in employees is often underestimated. The process of change starts with awareness. Parties should be convinced of the benefit and necessity of the change. It is important that one or more persons pursue the same goal and vision for change, who can transfer them to the rest of the employees.
3. The Decision-Supporting Model

3.1 Disclaimer
The goal of this model is to give users and owners of commercial office buildings insight in the possibilities to involve energy performance contracting in their projects. This model should be an accessible information source for involved parties to get familiar with performance contracting. Another goal is to provoke discussion about this topic and to review the functioning quality of existing foundations and organizations involved with EPCs or ESCOs.

3.2 Model introduction
This decision-supporting model is made for owners of commercial office buildings who are interested in improving the energy efficiency of their portfolio. It is an easy accessible way to become familiar with Energy Performance Contracting. Energy Performance Contracting is a broad based term for all types of partnerships where guarantees are involved. EPCs can differ from simple to very comprehensive contracting models.

Due to the combination of the growing Energy Service Company (ESCO) market and the success of these companies in other countries as the United States, Germany and Belgium, this model is mainly focused on the Energy Performance Contracts where ESCOs are involved. The most common ESCO models are Shared Savings, Guaranteed Savings and First Out (SEAI, 2013). If it turns out that these models are not the most suitable for either the owner or the project, there can be found information about other Energy Performance Contracting options, which are also described in this report.
1. Suitability of the organization for using EPC?
   ... 

YES \rightarrow

2. Suitability of the project for using EPC?
   - Savings: OK?
   - Capital: OK?
   - Risk: OK?
   - Viability (Financial): OK?

YES \rightarrow Project suitable for EPC? [YES = 3 / NO = quit]

NO \rightarrow

3. Which services and service level are desired by the owner?
   - Level 1: Operating practices
     - O ...
     - V ...
   - Level 2: Maintenance
     - O ...
     - O ...
   - Level 3: Controls
     - V ...
     - V ...
   - Level 4: Equipment investments
     - O ...
     - V ...

4. Contract variables (Scorecard principle)
   - Savings potential to achieve and accompanying risk
   - Supply of own capital
   - Size and duration of the contract
   - Complexity of procurement process
   - Level of Emphasis on the M&V of savings

Customer | ESCO / TPF
---|---

Figure 4 Decision-Supporting model part 1/2 (own illustration)
**Scorecard results suitable for Energy Performance Contract?**
[YES = specify contract model (5)]
[NO = show which Energy product and service model suits best]

5. Contract model specified

- Who provides capital? [ESCO or Third Party Financier]
- Should realised savings be guaranteed or shared with the ESCO? [Guaranteed or Shared]
- Who retains ownership over the assets? [ESCO or owner]

**RESULTS**

**Select contract type for EPC project that suits most according to the results**

- Shared Savings Contract
- Guaranteed Savings Contract
- Variable Contract Term

**Explain what the selected contract means according to this project**

**Other energy products & service models**

- Integrated Energy Contract (EPC + ESC)
- (Local) Energy Supply Contract (ESC)
- Equipment lease / Supplier credit (Performance guarantee + payments matched to savings)
- Energy Project Design (Performance payment or guarantee)
- Facilities / Maintenance management service (performance based payments)
- Energy Management Service

Figure 5 Decision-Supportive Model part 2/2 (own illustration)
3.3 Model components

The EPC decision model includes different components. This model is based on the decision tree model, which means that you can only continue the process whether you meet the requirements of the specific step in this model. These decisions consist of the answers ‘yes’ and ‘no’. To keep the decisions and their consequences as transparent and insightful as possible, there is no computational model involved. A computational model will tent to a so-called ‘black box’, wherein the relations between steps and decisions are unknown for the user. Therefore, a tree model is used where the user can decide whether he thinks he meets the requirements to go to the next step.

![Decision model part I](image)

**Figure 6 Decision model part I (own illustration)**

1: WHO? Profile of the organization

The first step of the model includes the description of important factors the owner should dispose of. An organization profile is outlined based on the point of view of different experts in this field. Starting an performance based partnership is for the most owners / investors a new way of working, that is yet unknown and demands a different approach to work on a project. In most cases it needs a long-term partnership with ESCOs and a third party financer. To get insight in what it means for an owner to start an EPC partnership, this part gives an outline what will change in the way of working for the owner. When the owner thinks the profile of the company matches this profile, you can go on to the next step. The profile of the organization can be found on page 41.

2: WHERE? Suitability of the project for using Energy Performance Contracting

According to existing research, there are four key considerations to evaluate the suitability of a project for Energy Performance Contracting. These considerations are made visible in the model below.

![Figure 7](image)

**Figure 7 (SEAI, 2013)**
In order to identify the suitability of the project, these key considerations will be used to communicate the factors that involve an EPC project. The owner can monitor whether he meets the key considerations of an EPC project, and if not, if this can be changed to make an EPC project possible. In this way the owner gets a quick insight in what has to be changed in his way of developing the project to suit an Energy Performance Contracting Project. He can also decide to quit the consideration of using EPC for his company at an early stage, without spending money and a lot of time.

The key considerations in brief:
The project has to be **viable** in its own right: the savings have to be sufficient to recover the original capital cost and investment return over a number of years.

This is the first step. If the project is viable, one must consider how the **capital** will be supplied to finance the works, how the **savings** will be distributed and how the various **risks** will be allocated.

An comprehensive description of the key considerations of using Energy Performance Contracting projects can be found on page 50.
### 3&4: HOW? Which services and service level are desired by the owner?

If it is decided that both the organization’s profile and the specific project is suitable for using Energy Performance Contracting, The owner can go on to specify which type of EPC suits best for his company and project. If not, the owner now knows what should change in his organization culture and / or way of project development.

The owner can now use the checkbox to decide which services are desired. In this way a overview is given and can be analyzed which level of services fits best for this project. The different service levels are (Bloomberg New Energy Finance, 2011, Mora Associates, 2010, de Haan and Benner, 2005):

- Level 1: Operating Practices
- Level 2: Maintenance
- Level 3: Controls
- Level 4: Equipment investments

Whether an ESCO will be involved is not directly related to the most suitable service level. In fact an ESCO project is not obliged to involve equipment investments, as long as the investment can be paid back by the energy savings. This could also mean that for example investing in controls leads to energy savings.

<table>
<thead>
<tr>
<th>Level</th>
<th>Customer</th>
<th>ESCO / TPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings potential to achieve and accompanying risk</td>
<td>10-20 years, €1 mio+</td>
<td></td>
</tr>
<tr>
<td>Supply of own capital</td>
<td>10-20 years, €1 mio+</td>
<td></td>
</tr>
<tr>
<td>Size and duration of the contract</td>
<td>Negotiated tender</td>
<td></td>
</tr>
<tr>
<td>Complexity of procurement process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Emphasis on the M&amp;W of savings</td>
<td>IPMVP</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 7 Decision model part II (own illustration)](image)
Together with part 2B of the decision model, where the contract variables will be specified, insight will be given in which EPC type suits best to the owner.

4: Contract variables

In step 4 together with 3 the contract can be specified. Step 4 involves the most important contract variables. A scorecard principle is designed to give the owner the opportunity to show his preferences according to each of these variables.

The variables that are used are based on existing literature of Energy Performance Contracting and based on the evaluation of different EPC contracts.

The variables are:

- **Supply of own capital.** Do you want to supply the capital or do you want to spend nothing on these Energy Efficiency investments?
- **Size and duration of the contract.** For how long do you want to have a contracted partnership and what is the budget for the contract? (Only months, and about 1000 euros, or up to 10-20 years and more than 1 million euros)
- **Complexity of procurement process.** Do you bother a complex procurement process? Do you want it as easy and cheap as possible, for example only 3 quotes, or should it be a negotiated tender?
- **Level of emphasis on Measurement & Verification of savings.** Do you agree a comprehensive check of savings during the entire contract time by International Performance Measurement and Verification Protocol (IPMPV), or do you only allow simple checks in your buildings.
- **Saving potential to achieve.** How much saving potential do you want to achieve?

An comprehensive description of the service levels of Energy Performance Contracting projects and contract variables can be found on page 54.

---

Figure 8 Decision model part III (own illustration)
5 WHAT? Contract model specifications

After specifying what the preferences of the owner are according to services and contracting variables, it can be determined whether this project is suitable for an Energy Performance Contract together with an ESCO. If this is the case, the owner continues to this step. If not, the owner will get advise on other energy products & service models.

A decision has to be made which contract type is the most suitable for an owner of commercial real estate. This selection will result in a choice between Shared Savings, Guaranteed Savings or First Out (variable contract term). To know which contract suits best, the following decisions have to be made by the owner:

- Who provides capital (ESCO or Third Party Financer?)
- Should realised savings be guaranteed or shared with the ESCO? (Guaranteed savings or shared savings?)
- Who retains ownership over the assets? (ESCO or owner?)

A comprehensive description of these decisions can be found on page 61.

The other energy service products and models include (starting from the most integrated to the most simple form):

- Integrated Energy Contract (EPC+ESC)
- (Local) Energy Supply Contract (ESC)
  --- EPC including ESCO ---
- Equipment lease / Supplier credit (Performance guarantee + payments matched to savings)
- Energy Project Design (Performance payment or guarantee)
- Facilities / Maintenance management service (performance based payments)
- Energy Management Service

If the owner is interested in one of these other products and models, a description about these contracting models can be found on page 61.

Select contract type for EPC project that suits most according to the results

![Select contract type for EPC project that suits most according to the results](image)

Explain what the selected contract means according to this project

Figure 9 Decision model part IV (own illustration)
Most appropriate EPC contract type
When the owner has clarified his decisions about the ESCO contract specifications, A comprehensive description of the most suited contract is written down in the report. This can either be Shared Savings, Guaranteed Savings or Variable Contract term (First Out). Along with:

- basic conditions
- relation to other actors
- recommendations about who to contact
- recommendations about what the next steps are to continue with Energy Performance Contracting.

Conclusion
This decision model will give insight at an early stage, without spending more time and money than necessary. One of the most important advantages of using this model is that the owner does not have to gather all parties that involve an EPC and / or ESCO project, before really understanding what this partnership involves and what its revenues are. As stated before, this model is not a calculation or computational model where the output will be a calculation of the expected investments and revenues. The goal is to give insight at an early stage what the expected effects are of using Energy Performance Contracting models for your organization and projects.
4. Organizational culture

Starting an Energy Performance Contract partnership acquires a certain type of culture an organization should fit in. To determine what the preferred culture is, several meetings with experts have taken place. From these meetings, characteristics of organizational culture are derived. These characteristics are tested with the four different types of cultures that are described by Cameron and Quinn (2006).

From the experts the following characteristics came up (for a comprehensive description, see the transcript in the appendix):

Findings from the expert meeting in Nyenrode Business University (Boot, 2014):
- It is all about being flexible as an organization
- Openness is needed towards new models of collaboration
- Willingness to share information and to be transparent
- Awareness is needed of the successful effect of new models

Findings from the interview with ABN Amro (Lucas Klooster, Sustainable Business Developer Corporate Banking, 2014). The following aspects a client should have:
- A strong vision
- Leadership
- Curiosity
- Open to the future (renewal)
- Being open to other parties
- Willing to share information

Findings from the interview with Unica (Jan-Maarten Elias, Director):
- Client must be willing to start a long-term contract (about 10 years) to realise large cost-savings
- Do not interfere too much with energy retrofit measurements.
- Accept that other people earn money on your energy bill
- As a user, you should find it interesting to be engaged with sustainability
- Creditworthiness of the customer; having a good reputation to insure a long-term existence of your organization
- Willing to sign Letter of Intent in which you say: We have confidence in this long-term cooperation
- Willing to invest in innovations (about 2000 euros for an Energy Profile Analysis to create a energy use baseline)

Based on these characteristics an organization should contain, an assessment is done by means of the Organizational Culture Assessment Instrument (OCAI) (Cameron and Quinn, 2006).

4.1 What is the Organizational Culture Assessment Instrument?
The purpose of the Organizational Culture Assessment Instrument is to assess six key dimensions of organizational culture. In completing the instrument, you will be providing a picture of the fundamental assumptions on which your organization operates and the values that characterize it. Its
intent is to help identify the organization’s current culture. The same instrument helps identify the culture that organization members think should be developed to match the future demands of the environment and the opportunities to be faced by the company.

The OCAI consists of six items. These items are: Dominant Characteristics, Organizational Leadership, Management of Employees, Organizational Glue, Strategic Emphases and Criteria of Success. Each item has four alternatives. Divide 100 points among these four alternatives, depending on the extent to which each alternative is similar to your own organization. Give a higher number of points to the alternative that is most similar to your organization.

4.2 Scoring & Plotting the OCAI
Scoring the OCAI is very easy. It requires simple arithmetic calculations. The first step is to add together all A responses in the “Now” column and divide by 6. That is, compute an average score for the A alternatives in the “Now” column. Next, add together all B responses and divide by 6. Repeat this computation for the C and D alternatives.

The responses on the six items helped highlight aspects of the organization’s culture that identify its general culture type. To construct an organizational culture profile, the next steps should be followed:

1. Plot the average scores for each alternative (A, B, C, and D) on the organizational culture profile form in figure 12. The A alternative score represents the clan culture. Plot that number on the diagonal line extending upward in the top left quadrant on the form. The B alternative represents the adhocracy culture. Plot that number on the diagonal line extending upward in the upper right quadrant on the form. The C alternative represents the market culture. Plot that number on the diagonal line extending downward in the bottom right quadrant on the form. The D alternative represents the hierarchy culture. Plot that number on the diagonal line extending downward in the bottom left quadrant on the form.
2. Connect the points in each quadrant to form a four-sided figure. You will have produced some sort of kite like shape. This profile creates a picture of your organization’s culture as it exists right now.
3. The same steps can be done for the preferred culture. However, in this report only the preferred culture is shaped. A client can compare its culture with the preferred culture for an Energy Performance Contract.

It is also useful to plot the scores for each of the individual (six) questions / attributes of culture contained in the items in the OCAI. This permits you to determine the extent to which each cultural attribute reflects the same dominant culture type.

4.3 Plotting the preferred organizational culture of an Energy Performance Contracting project.
Based on the characteristics an organization should contain, the 100 points are divided among the four alternative of the six items.
The scores can be found in figure 10.
Figure 10 Scorecard OCAI (based on Cameron and Quinn, 2011)

The results are put in a list where both the sum and average is calculated. This is shown in figure 11.
<table>
<thead>
<tr>
<th>Now Scores</th>
<th>Preferred Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>20 A</td>
</tr>
<tr>
<td>2A</td>
<td>10 A</td>
</tr>
<tr>
<td>3A</td>
<td>30 A</td>
</tr>
<tr>
<td>4A</td>
<td>35 A</td>
</tr>
<tr>
<td>5A</td>
<td>35 A</td>
</tr>
<tr>
<td>6A</td>
<td>10 A</td>
</tr>
<tr>
<td>1B</td>
<td>50 B</td>
</tr>
<tr>
<td>2B</td>
<td>50 B</td>
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<tr>
<td>3B</td>
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<tr>
<td>4B</td>
<td>45 B</td>
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<tr>
<td>5B</td>
<td>35 B</td>
</tr>
<tr>
<td>6B</td>
<td>25 B</td>
</tr>
<tr>
<td>1C</td>
<td>20 C</td>
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<td>5D</td>
<td>15 D</td>
</tr>
<tr>
<td>6D</td>
<td>50 D</td>
</tr>
</tbody>
</table>

Sum (total of A Responses) = 140
Average (sum divided by 6) = 23.3

Sum (total of B Responses) = 255
Average (sum divided by 6) = 42.5

Sum (total of C Responses) = 85
Average (sum divided by 6) = 14.2

Sum (total of D Responses) = 120
Average (sum divided by 6) = 20.0

Figure 11 Results scorecard OCAI (based on Cameron and Quinn, 2011)

By plotting the average results, a kite-shaped model is created, see figure 12.
The Clan Culture
An organization that focuses on internal maintenance with flexibility, concern for people, and sensitivity to customers.

The Adhocracy Culture
An organization that focuses on external positioning with a high degree of flexibility and individuality.

Flexibility and Discretion

The Hierarchy Culture
An organization that focuses on internal maintenance with a need for stability and control.

The Market Culture
An organization that focuses on external positioning with a need for stability and control.

Figure 12 Plotted score into model (based on Cameron and Quinn, 2011)

The plot can also be made for the six individual attributes, in order to have a closer look to what this culture is related to a specific topic. This is done in figure 13.
Interpreting the Culture Profiles

Having drawn a picture of your overall culture profile as well as the profiles of each of the six culture attributes, you can now interpret these profiles from several different perspectives.

At least six comparison standards are available:
- **Type** of culture that dominates your organization
  The quadrant in which scores are the highest indicates the culture that tends to be emphasized most in your organization

- **Discrepancies** between your current and your preferred future culture
  By observing the areas of greatest discrepancy between the preferred future culture (EPC Culture) and the current culture (culture of owner) on the profiles, a road map for change can be determined. Be especially sensitive to differences of more than 10 points.
  Due to the needed input of data of current culture which will be provided by the owner, this comparison standard cannot be used yet.

- **Strength** of the culture type that dominates your organization
  The strength of the culture is determined by the number of points awarded to a specific culture type. The higher the score, the stronger or more dominant is that particular culture. Strong cultures are associated with homogeneity of effort, clear focus, and higher performance in environments where unity and common vision are required.

- **Congruence** of the culture profiles generated on different attributes and by different individuals in your organization
  Cultural congruence means that various aspects of an organization’s culture are aligned. Thus, the same culture types are emphasized in various parts of the organization. In such an organization, each of the individual plots would look similar. Congruent cultures are more typical of high-performing organizations than incongruent cultures. Having all aspects of the organization clear about and focused on the same values and sharing the same assumptions simply eliminates many of the complications, disconnects, and obstacles that can get in the way of effective performance.

- **Comparison** of your organization’s culture profile with the average culture profiles of almost one thousand organizations as rated by approximately fourteen thousands of their managers.
  o In this report this will not be used as an comparison standard.

- **Trends**, in the literature several trends have emerged that seem to be typical.
  o In this report this will not be used as an comparison standard.

### 4.4 Conclusion

On the basis of the comparison standards Type, strength and congruence the needed organizational culture will be determined.

Organizational culture TYPE
As the organizational culture type is determined by the quadrant in which scores are the highest, the organizational culture type is The Adhocracy Culture (42,5 points). The second best is with 23,3 points The Clan Culture.

The Adhocracy Culture is described as:

**The Adhocracy Culture**
“A dynamic, entrepreneurial, and creative place to work. People stick their necks out and take risks. The leaders are considered to be innovators and risk takers. The glue that holds the organization together is commitment to experimentation and innovation. The emphasis is on being on the leading edge. The organization’s long-term emphasis is on growth and acquiring new resources. Success means gaining unique and new products or services. Being a product or service leader is important. The organization encourages individual initiative and freedom. (Cameron and Quinn, 2006)”
As the OCAI is based on The Competing Values Framework, the determined values can also be used to describe the culture.

Organizational Culture STRENGTH
As the organizational culture strength is determined by the number of points awarded to a specific type. In this case this is to the Adhocracy Culture. The number of points that is awarded to this culture is 42.5. In the literature an average plot is made, based on more than one thousand organizations (Cameron and Quinn, 2006). this plot includes a maximum amount of points of 32. This means that our plot has more than 10 points more than the maximum amount of the average company. This means that the culture that is preferred for using Energy Performance Contracts is a strong culture.

Organizational Culture CONGRUENCE
The congruence can be determined by comparing the plots of the different attributes. When looking to our plots in Figure 13, the congruence can be evaluated. The things that can be noticed are:
- The adhocracy culture is in all plots quite strong.
- Hierarchy is in general very weak, except for the attributes ‘Organizational Leader’ and ‘Criteria for success’.
- There is not a real strong ‘Strategic Emphasis’
- In all plots there is no emphasis on Market Culture.

The fact that the adhocracy culture is quite strong in general means that there can be a focus on the same values and sharing the same assumptions, which lead to eliminations of many complications. However, the hierarchy aspect in success means that the success criteria are based on efficiency. Dependable delivery, smooth scheduling and low-cost production are critical. This can be explained by the fact that the EPC project demands a new culture, a combination of innovative, risk taking and transparent, but combined with the success criteria mentioned above, as the result of EPC contracting demands a clear business case and a efficient and trustable way of return on investment by implementing energy retrofits.

The strategic emphasis is missing. This can be explained by the fact that the strategy of the company must be combined with other companies to form a partnership. This means that the strategy is defined by the partnership instead of the owner itself.

The lack of emphasis on Market Culture is an important aspect. By focusing too much on the market, the saving potential and result of a sustainable building will be less than focusing on a great end-product (in this case a well defined business case).

If an owner wants to provide insight into its own organizational culture, he can do the test and drawing the result in the graph.
- First fill in the scorecard based in Figure 10
- By calculating the averages, plot these into the graph with another pen colour
- The actual organization culture can be compared by the EPC-preferred organization culture by checking whether or not his plot looks similar to the preferred one.

Does your plot look the same as the preferred plot? Than your organizational culture seems to be ready to start an energy performance-contracting project.
When your plot does not match with the preferred plot, in this way the needs for change are visualized clearly. Use the tools as described (type, discrepancies, congruencies, comparison and trends) to understand which steps should be taken to fit into an organizational culture suitable for Energy Performance Contracting.
5. Preconditions for a project to be suitable for Energy Performance Contracting

There are four key considerations to evaluate the suitability of a project for Energy Performance Contracting. In order to identify the suitability of the project, these key considerations will be used to communicate the factors that involve an EPC project. These considerations are combined with the most important key considerations that came up from the interviews with both the financial side (Lucas Klooster from ABN AMRO) as the technical side (Jan-Maarten Elias from UNICA). The owner can monitor whether he meets the key considerations of an EPC project, and if not, if this can be changed to make an EPC project possible. In this way the owner gets a quick insight in what is needed to suit an Energy Performance Contracting Project. He can also decide to quit the consideration of using EPC for his company at an early stage, without spending money and a lot of time.

5.1 Key Considerations from a technical perspective (Elias, 2014):

• The duration of the contract with the tenant must be at least as long as the duration of the ESCO Contract, which is at least 5 years, depending on the investment to be recovered.
• ‘Building lease’ (Recht van Opstal) must be possible when implementing energy retrofits. Legally, the place where the retrofits are located must belong to the special purpose vehicle (SPV), in order to guarantee that when the client is bankrupt, the financing institution will become owner of the installations. (for an extensive explanation, see the interview transcript with Unica in the appendix).
• The project should have a certain size. Energy bill must be at least 300.000-400.000 euros per year, to realise sufficient savings.
• The current climate installations and techniques used to facilitate energy. When these installations are e.g. too old, the risk of keep using it is too high to base a guaranteed contract on it. This results in a complete replacement of installations, which involves larger investment costs.
• The technical state of the building. How many interventions are needed to get sufficient savings potential. This depends partly on e.g. isolation type.
• The measurement and verification must be done for one year, to create a baseline. In this way the savings potential will be analysed (costs: +/- 2000euros)
• Engage the tenant in the story. The tenant should have the feeling that it’s ‘cool’ to be engaged in sustainability. They can say: ‘we are established in a sustainable building’, and they can write it down in e.g. their annual reports, etc. The most appropriate user is an owner & user (eigenaar & gebruiker in 1), as in this situation you are not depended of an external tenant.

5.2 Key Considerations from a financial perspective (Klooster, 2014):

• The human impact should be reduced. The energy savings depends on the behaviour of the tenant (user). If a tenant is e.g. cooling and heating at the same time, saving targets will not be achieved.
• Insight must be possible to the energy use in order to measure and verification the use during the full contract term.
• The scope of the saving potential is important. ABN used to work with utility bills larger than 500,000 euros, however, since the last years this slightly decreased.

• The installations must be trustable to base a guaranteed contract on this. The risk factor is most of the time more important than the sustainability targets itself. Sustainability is a resulting benefit of implementing energy retrofits, due to the mitigated risk of breaking down.

• Installation companies involved should be big enough and should have proven themselves about what results they can deliver and what their experience is with these kinds of projects. This is also related to mitigating risk.

• The business case must be right. The project must be viable. The business case should be a clear story, otherwise it is hard to get the funds together.

5.3 Literature based Key Considerations for Energy Performance Contracting (SEAI, 2014):
When evaluating the suitability of a project or group of energy savings opportunities, for energy performance contracting there are four key considerations determined by the Sustainable Energy Authority of Ireland (2013), as illustrated below.

![Figure 14 Key Considerations for EPCs (SEAI, 2013)](image)

Viable
• The savings generally have to be sufficient to recover the original capital cost and investment return over a number of years (3 to 20 years).
• The project must be of sufficient scale to justify the transaction cost and attract finance

Capital
• What finance source(s) will be used? Own funds of customer, by the ESCO or by a third party.
• A multi-year contract is required so they can recover their investment with interest. The cost of this capital is critical.
Risk

- Risk that equipment will not perform as was expected
- Projected savings will not materialise because the underlying assumptions in predicting savings were incorrect
- Credit risk, the risk that the customer can’t or won’t pay at some point in the future (this will affect the cost of capital.
- Energy price risk. If energy prices change, so does the value of the savings. As the customer is already inherently exposed to fluctuations in energy prices and has most to gain if energy prices fall, this risk is typically borne by the customer. (This can be done by agreeing a fixed energy price, or an energy price floor, at which savings are valued).

Savings

- Value of savings
- How those savings are allocate amongst the different parties. Generally the higher the savings, and the greater the proportion of savings that are allocated to the ESCO or financier, the shorter the contract term.
- Contract life is determined by the length of time needed for the savings to repay all the costs of the project (capital, project management, financing costs, etc).
- It may be extended if the customer wishes the repayment terms to be lower by spreading them over a longer period of time; or where the client wishes the ESCO to guarantee the savings for a longer period of time. Usually a premium for this is used (SEAI, 2013).

The capital cost of a project, the annual cost savings it will deliver and the number of years for which savings accrue (project life) will determine the size of the overall project return (i.e. its viability or Internal Rate of Return). How this return is distributed is determined by who supplies the capital, and how the risks and savings are allocated.

5.4 Conclusion

To determine whether a project is suitable for using performance contracting in order to realize sustainable or energy efficiency ambitions, both experts and literature show that this consideration includes different point of views. The technical point of view involves potential energy savings, the characteristics of the installations and their savings capacity, the technical status of the building and reliability of techniques used. The financial point of view involves the contractual agreements, payback period, risk division and cost savings.

Based on the sources used in this chapter, the most important key considerations are visualized by combining the existing diagram with the written aspects emerged from this research. In this way insight is provided into the most important considerations per division (savings, capital, risk and viability) on the basis of the expert interviews and literature.
Most important Key Considerations when using EPC

- **Project size**: Energy bill must be at least 300,000-400,000 euros per year (ABN: > 500,000)
- **Duration of the contract**: The contract with the tenant must be at least as long as the duration of the ESCO Contract (> 5 years)
- **‘Building lease’ (Recht van Opstal)**: Must be possible when implementing energy retrofits.
- **Finance source**: Must be clear (own funds, customer, ESCO or third party)
- **Transaction costs**: Must be calculated and incorporated in the business case
- **Energy price risk**
- **Reliability of installation companies**: must be confirmed in order to mitigate risk.
- **The installations** must be reliable in order to mitigate risk of breaking down.

---

Project must be of sufficient scale to justify transaction costs and attract finance

**Financially Viable Project**

- **Insight in M&V**: Must be possible during the full contract term.
- **The business case** must be right, otherwise it is hard to get the funds together.
- **1 year of M&V to create a baseline**: (costs: 2000 euros)

Figure 15 Combined visualization of own findings into model of SEAI, 2013)
### 6. Service levels of Energy Performance Contracting

#### 6.1 Which services in ESCO projects can be distinguished?

An ESCO project can provide different services. It is important to know which services can be distinguished in ESCO projects.

The term ‘energy services’ is variously interpreted and is more an umbrella term that can describe a variety of activities targeted at capturing revenue from organisations’ energy expenditures. This includes the provision of efficiency retrofits, distributed generation, energy management, energy procurement and energy consultancy. The services can be categorised into four basic pools (Bloomberg New Energy Finance, 2011, Mora Associates, 2010, de Haan and Benner, 2005).

| Analytical services:                                                                                   |
| o Consulting: energy and/or carbon audits often accompanied by a series of strategy recommendations concerning the design and implementation of the energy savings project |
| o Certification/compliance: the provision of certain certificates or an assessment of an organisation’s energy or carbon footprint |
| Demand-focussed services:                                                                                   |
| o Efficiency retrofit: implementation of efficiency upgrades                                           |
| o Energy conservation: implementation of energy saving technologies                                      |
| Supply-focussed services:                                                                                   |
| o Energy procurement: energy infrastructure outsourcing                                                  |
| o Energy supply management: power generation and energy supply, particularly from onsite assets           |
| Managerial services:                                                                                      |
| o Risk management                                                                                          |
| o Monitoring of the achieved energy savings                                                              |
| o Maintenance and control of the installed equipment                                                      |
| o Measurement and verification (M&V) of the savings over the financing term                               |

**Energy Services** is an umbrella term that can describe a variety of activities targeted at capturing revenue from organisations’ energy expenditures. This includes the provision of efficiency retrofits, distributed generation, energy management, energy procurement and energy consultancy.
Difference between supply and performance based contracts

In general, an ESCO finances or helps (pre-) financing the acquisition of energy saving appliances, energy producing appliances and/or building refurbishments for an energy end-user: the customer. The details of the agreement between the customer, the ESCO and possibly a third-party are anchored in a contract. ESCOs provide either useful energy and/or energy savings to the end user (Grazer EnergieAgentur, 2010).

There are two main types of energy contracts. When the ESCO is only implementing energy efficiency measures that lead to energy savings, the contract is known as Energy Performance Contracting (EPC). With EPC, the focus is on reducing final energy consumption through demand-side energy efficiency measures. The business model is based on delivering savings compared to a predefined baseline.

When the ESCO is implementing energy supplying appliances with superior conversion efficiencies, like a Combined Heat and Power (CHP) plant or a heat pump, we talk about Energy Supply Contracting (ESC), also known as Contract Energy Management (European Commission, 2005).

The biggest disadvantage of EPC contracts is that beforehand a cost or energy baseline has to be determined, and during the term of the contract the effective savings have to be measured. As a consequence, overhead costs of EPC projects are relatively high, resulting in a certain required minimum energy cost baseline in order for projects to be profitable Institute for building efficiency, 2010).

Because Energy Performance Contracting is more generally known than Energy Supply Contracting, sometimes EPC is also used in cases where the ESCO is not (just) looking at the energy demand-side, but (also) at the supply-side.

In an Energy Performance Contract agreements are made about (Institute for building efficiency, 2010):

- The reduction of the energy use in buildings
- Reduction of exploitation costs
- The investments that should be made in the first phase and how the return of investment will be realised.
The difference between EPC and ESC is represented in the figure below:

![Diagram showing EPC vs ESC](image)

Figure 16 ESC vs EPC (Petersen, 2010)

An EPC overcomes the need for upfront capital investment. Rather, it guarantees future savings in energy demand to finance practical, engineered plant improvements. It is an innovative way of bringing about change and reducing risk - of overcoming a lack of in-house technical skills, resources and budget.

An EPC enables an organisation to:

- Reduce the financial risks associated with energy consumption
- Utilise ESCO design, implementation and finance resources to improve the energy efficiency of buildings
- Conduct a detailed energy audit to identify where and how much energy demand can be reduced
- Realise guaranteed cost savings. Energy savings are guaranteed by the ESCO. In the unlikely event of the agreed savings not being delivered, the ESCO makes up the difference. Usually, any additional saving above that guaranteed is left to the customer to keep but shared savings model as described in the diagram below can also be employed.

AgentschapNL (2013) published a guide to the performance contract model, named ‘Leidraad prestatie contracten’. Herein a roadmap is mentioned for establishing the requirements of the contract. This roadmap can be found in the appendix.

The roadmap clearly shows that the establishment of a ‘baseline’ is important for the contract. Also user agreements are included in the energy performance contract.
6.2 ESCO/EPC Services in practice

What we can learn from the vision of experts and their experience in practice with ESCO projects is that the service levels as stated above are not always as separated as the literature states. It can also be concluded that service levels involve a complete different type of partnership. This is mainly caused by the shift of service the contract guarantee is based on.

To elaborate on the service levels used in practice, the most important collaborations are drawn based on the use of both the financial as technical institutions.

Financial services and their partnerships
One of the most important findings of the financial experts was that for projects smaller than 1,000,000 euros of investment needed, the financing institutions (banks) are not that willing to finance in sustainable projects as seem to be according to related organizations. The financial institution is only willing to give a loan, when (Klooster, 2014):

- Business Case must be clear
- Story of the client is essential
- All risks must be mitigated by insuring both the client and installation company have a good reputation based on achievements in the past in this field.

(A comprehensive declaration of these aspects can be found in the ABN interview transcript)

The contracting model can be drawn as follows:

![Diagram of the contracting model](own illustration)

Applicable when user takes initiative to start ESCO project (> €100,000 investment projects)

Figure 16 (own illustration)

The most important conclusion is that when a client wants to be entitled to a loan, his business case must be perfectly clear and calculated. Also the client must look for an installation company by itself, and make agreements about what services will be implemented. This is the regular way of obtaining financing sources from a bank for energy efficiency improvements.

Larger projects
For larger projects, and then we are talking about projects of several millions of investment needed,
The bank takes a assertive attitude towards its clients. When the bank notices a large energy bill, the bank offers an Energy Prestation Analysis by paying an installation company for this service. In this way the efficiency energy and cost savings will be made clear, and the bank can decide, in consultation with its client, to start investing in improving the energy systems.

Because of the size of the project, which contains many buildings (e.g. The Heineken breweries), a Special Purpose Vehicle (SPV) is made. An SPV is a legal entity (usually a limited company of some type (BV), or a limited partnership) created to fulfill narrow, specific or temporary objectives. SPVs are typically used by companies to isolate the firm from financial risk. This is illustrated below:

![Diagram of a Special Purpose Vehicle (SPV) with financial structures](image)

Applicable when using the ABN-product 'Energie Besparings Krediet' (EBP)
(> several millions investment projects)

Figure 17 (own illustration)

This SPV is financed by both the bank (95%) and an installation company (5%). In this way the installation company is involved in the success of the project by being part of the investors. At the bottom of the illustration the client (owner and user) are connected to the SPV. Due to the fact that this partnership depends on the willing of the client according to their retrofits they obtain, these boxes are left blank.
Technical services and their partnerships (larger projects)
The technical (installation) service companies use a different approach towards starting a partnership. The most important aspect is that – for large projects (>€300,000 annually energy bill) they provide their own financial recourses. Partly from their holding company (Unica Holding), and partly from the ASN Bank. This is possible due to a longterm relationship with this bank. In this way the bank knows the experience and quality of the installation company and also their success rate. But the most important is that Unica offers the bank every time almost the same business case with risks, payback periods and contract models. This speeds up the contracting process and leads to less transaction costs. This collaboration is illustrated below:

 Due to the standardization of the contract and the liabilities of the client, there are standard documents made that insure the bank to lead no risk. For example, when the user or installation company goes bankrupt, the installations will become ownership of the ASN Bank, due to the building lease rights ‘Recht van Opstal’, which determines that the space where the installation is established, is ownership of the investor (ASN Bank).
For Unica starting an SPV is more familiar and another important fact is that they use specific instalations types. For this partnership they use:
- Thermal storage installation (WKO)
- Biomass installation
Standard contracts and conditions are made for these services, so transaction costs are kept relatively low.
Small investments of technical services

A very state of the art invention is the Climate Control Box (CCB). This box controls the heat, cold, ventilation and other climate aspects in retail shops to keep the temperature 19 degrees celcius in the whole area. According to research 19 degrees is the optimal temperature for retailers.

This service is a very accessible installation. It only costs 5000 euros which will be invested by the installation company (Unica in this case), and the payback period is 0,5-2 years, depending on the realised savings. To realise this short payback period, the annually energy bill has to be at least 30.000euros. See image below for the visualization (for more details, see the interview transcript with Unica in the appendix):

![Diagram](image.png)

Applicable with small investments with short payback period (projects with > €30.000 annually energy bill)

6.3 Conclusion

Different services from intensive to simple can be realised by Energy Performance Contracting projects. As an ESCO is used when the client doesn’t has the resources to do it by himself or does not want to do it. However, it is not that easy as supposed by organizations involved. The different services demand for different revenue models and collaborations. The aspects of these collaborations depend on the financing institution, the technical institution and the attitude of the owner. An owner/user should realise that large savings involve more complex constructions as being linked of an Special Purpose Vehicle, and that there are several liabilities involved. Due to practice examples, it became more clear that as owner of real estate you should have clear for yourself what service level you want, but also what partnership do you want and what is your preferred payback period and what (transaction) costs are acceptable to you to realise an ESCO partnership.
7. Result: Contract selection
When the owner has clarified his decisions about the ESCO contract specifications, a range of EPC contracts can be selected. This chapter elaborates on the different contracting types. In this way the owner get insight in the specifications of the different ways of starting an EPC project. The two most common structures are: Shared Savings (SS) and Guaranteed Savings (GS), but also First Out and Chauffage model are options.

7.1 Shared Savings model (SS)
The SS structure is comparable to the ESCO financing structure but in this case the ESCO borrows the financial resources necessary for project implementation.
The ESCO and the customer share the savings resulting from the project in proportions as specified in the shared-savings contract. The ESCO makes debt service payments from its share of the savings: if the ESCO’s share of the actual savings is less than the debt-service payments, the ESCO covers the difference, and if there is a surplus, it keeps the profits. The ESCOs’ remuneration thus fully depends on the level of energy savings. Because the customer has no financial obligations during the term of the contract, its share of the savings is all benefit (Satchwell et al., 2010).
An advantage of the SS concept in developing markets is that customers assume no financial risk, which they like or even demand. The downturn of this structure is that it limits long-term market growth and competition between ESCOs and between financing institutions because small and/or new ESCOs with no previous experience in borrowing and few own resources are unlikely to enter the market if such agreements dominate.

Figure 20 Shared Savings model (de Haan and Benner, 2005)
The figure above shows a simplification of the SS model. Initially, the client has a certain level of energy costs. When the ESCO starts implementing energy savings measures, the energy costs will gradually become less, until all measures have been implemented (shown in the figure as a direct cost cut, representing a direct implementation of all the measures). The ESCO and the customer share the savings in proportions specified in the shared-savings contract; This is represented by the upper dashed line between the customer savings part and the ESCO remuneration savings part. So, a pre-defined ratio of the achieved savings will serve as remuneration for the ESCO and the remainder will go to the customer. When the contract between the ESCO and the customer ends, the latter will benefit from the energy cost reduction with respect to the initial situation. The final energy costs,
and thus also the total savings, depend on the amount of savings achieved, represented by the lower dashed line between the final energy costs and the savings (de Boer, 2011)

**Fig. 5 Cash Flow in Shared Savings Contract**

Figure 21 Shared Savings revenue structure (Okay et al., 2008)

### 7.2 Guaranteed Savings model (GS)

In a GS contract, the ESCO typically guarantees a minimum level of (financial or energy) savings to the customer, who is responsible for making debt-service payments to a third-party financial institution. If there is a shortfall in savings, the ESCO reimburses the customer. If savings exceed the ESCO’s guarantee, the excess is usually split between the ESCO and the customer.

The GS structure is comparable to customer financing with the difference that the customer does not use its own capital but borrows money from a third-party. In this structure, the arrangement between the customer and the financial institution is being backed by an energy savings guarantee, issued by the ESCO, with the purpose to demonstrate the financial institute that the project for which the customer borrows money will generate a positive cash flow (Okay et al., 2008).
The ESCO’s remuneration is a fixed amount, meaning it does not depend on the actually achieved energy savings but on the level of guaranteed savings. The customer benefits from the energy savings, thus in this structure the customer assumes financing risk.

**Fig. 6 Cash Flow in Guaranteed Savings Contract**

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**7.3 Chauffage model**

Chauffage is a contract type where an ESCO takes over the complete responsibility for the provision of an agreed set of energy services. The remuneration of the ESCO is normally based on the client’s existing energy bill minus a certain level (percentage) of the savings. Thus, the client is guaranteed an immediate saving compared to its current bill and the profit of the ESCO is directly depending on the level of savings they achieve. This is the reason why Chauffage contracts give a strong incentive to provide services in an efficient manner.

**Fig. 24 Chauffage model (de Haan and Benner, 2005)**

**7.4 First Out model**

First Out is a contract type in which the ESCO is paid 100% of the energy savings until the project costs, including a pre-defined amount of ESCO profit, are fully paid. The exact duration of the contract thus depends on the level of achieved savings; the greater the savings, the shorter the...
contract. After the contract has ended, the customer benefits from the achieved energy savings (de Boer, 2011).

Figure 25 First Out model (de Haan and Benner, 2005)

7.5 Build-Own-Operate-Transfer (BOOT)

Another contract model is Build-Own-Operate-Transfer (BOOT). A BOOT model involves an ESCO in designing, building, financing, owning and operating the equipment for a defined period of time and then transferring this ownership to the client. In this case a Special Purpose Vehicle (SPV) is set up and this SPV is financed. BOOT contracts are often used in Public-Private Partnerships (PPP) and are comparable to Design, Build, Finance, Maintain and Operate (DBFMO) contracts. They are generally applied in projects concerning the construction of new buildings and therefore no energy saving targets are determined (de Boer, 2011)

An overview of the ESCO contracts and their characteristics is given in the table below.

<table>
<thead>
<tr>
<th>Contract model</th>
<th>Investment made by</th>
<th>Remuneration from savings go to</th>
<th>Duration of contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guaranteed Savings (GS)</td>
<td>Customer (possible in TPF structure)</td>
<td>Customer. The ESCO is remunerated with a pre-defined fixed amount, depending on the level of guaranteed savings</td>
<td>Fixed. The initial investment has to be recovered within the term of the contract</td>
</tr>
<tr>
<td>Shared Savings (SS)</td>
<td>ESCO (possible in TPF structure)</td>
<td>ESCO and the client, in pre-defined ratio. Remuneration of the ESCO fully depends on the level of energy savings achieved</td>
<td>Fixed</td>
</tr>
<tr>
<td>Chauffage</td>
<td>ESCO (possible in TPF structure)</td>
<td>ESCO. The customer pays a pre-defined percentage (90-95%) of the 'old', base-line energy bill to the ESCO</td>
<td>Fixed</td>
</tr>
<tr>
<td>First out</td>
<td>ESCO (possible in TPF structure)</td>
<td>ESCO. The customer pays the 'old', base-line energy bill to the ESCO until the investment + pre-defined amount of profit is remunerated</td>
<td>Variable. The contract ends when the initial investment + pre-defined amount of profit is recovered</td>
</tr>
<tr>
<td>BOOT</td>
<td>ESCO/SPV</td>
<td>Customer</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

Figure 26 Characteristics of different ESCO contracts (de Boer, 2011)
Conclusions & Recommendations
8. Conclusions and Recommendations

8.1 Answering the sub-research questions

1. Energy Service Companies
   1.1. What is an Energy Service Company (ESCO) and what is its relevance into Energy Performance Contracting?

Energy Service Companies are companies that provide energy services to final energy users, including, but not necessarily, the supply and installation of energy-efficient equipment, building refurbishment, maintenance and operation, facility management and the supply of energy (including heat), accepting some degree of financial risk in doing so. The remuneration of ESCOs is done on the basis of a guaranteed energy saving, which must be measured with the energy consumption under normal conditions and the energy consumption after applying the measures. The guarantees are included in the Energy Performance Contract. ESCOs shift the focus from selling units of energy towards the desired benefits derived from the use of energy.

1.2. What is the status of the worldwide ESCO industry compared to the Netherlands?

The United States has the most developed ESCo market in the world. The US ESCO history reaches back to 1970, when the oil crisis caused the rise of the oil price. The concept of ESCOs gradually spread to Europe and the rest of the world (Bertoldi et al., 2006).

England, Germany and France can be seen as the ‘Premier League’ of the European ESCO market. In Germany the authorities given technical and political support to the development of the ESCO market, the government realised this through research development programs, incentive programs and to function as a role model. In England, the market has grown without direct government support. The support given in England is done by informing potential customers about the ESCO formula.

The ESCO market in Belgium is not that big as in the other countries, however it includes an interesting ESCO market because of the federal ESCO policy. Research of Energie Centrum Nederland by Menkveld (2013) demonstrates that ESCOs can be used as a means to improve energy efficiency in the Dutch real estate. De Boer (2011) says that energy intensive real estate is of interest to ESCOs because they represent large potentials. Offices, schools and municipal real estate are most likely to offer ESCO’s best business opportunities. She also states that Public real estate which is managed by the Rijksgebouwendienst (RGB) is very interesting to ESCOs because the RGD has the policy to make its real estate more energy efficient, and because the RGD is directly funded by the Ministry of Finance, they are not in need of companies offering to take care of the upfront investment costs associated with upgrades.

1.3. What are the main barriers of using ESCOs in the Netherlands?

There are 5 main problems of implementation of ESCOs in the Dutch real estate market, these problems are pointed out below (van Oeveren, 2014).

- Lack of knowledge
- Lack of trust in other parties involved
- Legislation
- Complexity of the project and split incentive
- Change in organizational culture

DECISION SUPPORTING MODEL DESIGN
2. **WHO is suitable for an EPC project?**

The profile of the organizational culture for starting an Energy Performance Contracting project

As the organizational culture type is determined by the quadrant in which scores are the highest, the organizational culture type is The Adhocracy Culture (42,5 points). The second best is with 23,3 points The Clan Culture. The Adhocracy Culture is described as: A dynamic, entrepreneurial, and creative place to work. People stick their necks out and take risks. The leaders are considered to be innovators and risk takers. The glue that holds the organization together is commitment to experimentation and innovation. The emphasis is on being on the leading edge. The organization’s long-term emphasis is on growth and acquiring new resources. Success means gaining unique and new products or services. Being a product or service leader is important. The organization encourages individual initiative and freedom.

3. **WHERE can an EPC project be applied?**

The preconditions for a project to be suitable for Energy Performance Contracting

Based on the sources used in this chapter, the most important key considerations are visualized by combining the existing diagram with the written aspects emerged from this research. In this way insight is provided into the most important considerations per division (savings, capital, risk and viability) on the basis of the expert interviews and literature.

<ILLUSTRATOR KEY CONSIDERATIONS>

4. **HOW does an EPC project look like?**

The services and contracting types that are possible within Energy Performance Contracting

Different services from intensive to simple can be realised by Energy Performance Contracting projects. As an ESCO is used when the client doesn’t has the resources to do it by himself or does not want to do it. However, it is not that easy as supposed by organizations involved. The different services demand for different revenue models and collaborations. The aspects of these collaborations depend on the financing institution, the technical institution and the attitude of the owner. An owner/user should realise that large savings involve more complex constructions as being linked of an Special Purpose Vehicle, and that there are several liabilities involved. Due to practice examples, it became more clear that as owner of real estate you should have clear for yourself what service level you want, but also what partnership do you want and what is your preferred payback period and what (transaction) costs are acceptable to you to realise an ESCO partnership.

5. **WHAT is the most suitable EPC contract for my organization and project?**

Specifications and differences between the contracting types and measurements involved.

When the owner has clarified his decisions about the ESCO contract specifications, a range of EPC contracts can be selected. The contracting models depend on:

- **Supply of own capital.** Do you want to supply the capital or do you want to spend nothing on these Energy Efficiency investments?
- **Size and duration of the contract.** For how long do you want to have a contracted partnership and what is the budget for the contract? (Only months, and about 1000 euros, or up to 10-20 years and more than 1 million euros)
- **Complexity of procurement process.** Do you bother a complex procurement process? Do you want it as easy and cheap as possible, for example only 3 quotes, or should it be a negotiated tender?
- **Level of emphasis on Measurement & Verification of savings.** Do you agree a comprehensive check of savings during the entire contract time by International
Performance Measurement and Verification Protocol (IPMPV), or do you only allow simple checks in your buildings.

- **Saving potential to achieve.** How much saving potential do you want to achieve? In this chapter the different options of contracting is elaborated. In this way the owner get insight in the specifications of the different ways of starting an EPC project. The two most common structures are: Shared Savings (SS) and Guaranteed Savings (GS), but also First Out and Chauffage model are options.

### 8.2 Answering the main-research question

How can the expected effects of the use of energy performance contracting in commercial office buildings be made clear to the owner at an early stage? The expected effects of the use of energy performance contracting can be made clear by using this decision-supporting model. This model identifies the possibilities of EPC projects, give insight in the organization culture that is preferred, shows the suitability of projects for EPC and states the different contracting models. In this way the model can be used to bridge the gap of knowledge for users that are interested in using energy efficiency measurements in order to making their real estate portfolio sustainable by Energy Performance Contracting.

### 8.3 Recommendations for Practice

**Recommendations for real estate owners**

- Unless you have a perfect Business Case: Collaborate with experienced installation companies instead of Financial institutions to start EPC
- Think not only about preferred service level but also collaboration model
- Allow other organizations to M&V your real estate performance
- Secure that your culture corresponds with Adhocracy Culture

**Recommendations for energy installation companies**

- Share more and clear information about your products (make a catalogue)
- Make standard products for smaller projects
- Start a collaboration with a bank to standardize energy investments

**Recommendations for financial institutions focusing on sustainability**

- Try to collaborate with installation companies as they possess all technical knowledge
- Choose to focus on a specific size and link contract models to them

### 8.4 Recommendations for further research

Due to the fact that this research is mainly a theoretical based research, in order to gather all information about EPCs and making a first step in decision-supporting modelling of EPC projects, there is much more research to be done in this field.

One of the focus points of my research is to start with creating a model. However, important to know is that before starting developing a model you don’t know yet what should be included and how comprehensive it should be. In my research this model is created, and divided in different aspects. Each aspect is based on a scientific background. However what is missing, is the testing part of the research. I was intended to test this model with case studies, but unfortunately due to health issues I was not able to do this part of my research any more. So one recommendation is to take this model as starting point, and start testing the completeness and validity of this model.
Another important missing part is the transaction costs influence in EPC contracting. Transaction costs are actually the crucial factor in order to determine whether a project is feasible. If the transaction costs are out of proportion in comparison to the cost saving potential, developing an energy performance contract would only lead to costs instead of savings.

It is also important to mention that due to the research, it came clear that the tenant (user) cannot be excluded from an EPC project. Despite different organizations say that using ESCOs is a solution for the split incentive, in practice only contracts are created when the tenant contract is at least as long as the performance contract. So in further research the focus can either be on: specializing the model by focusing on owners/users (same entity), and developing a model for for example the government. Or a new research that is fully focused on commercial real estate owners and their sustainable ambitions, to develop an alternative of EPC, as this research made clear that EPC (in its current status) is not ready for the commercial office market.

It can be concluded that this research is a very good literature based source of information for organization interested in Energy Performance Contracting, but in order to create a well-functioning supporting model, the model in this research can be used as starting point and should be tested very well to develop a model that is ready for practice.
9. Reflection

The relationship between research and design

The research and design can’t be seen as two static elements. During the whole process both aspects changed and influenced each other. What I can say about the ‘design’ of the research, is that the initial design I was supposed to use changed because of the change in focus of research. After my second sounding (P2) the topic changed a lot, which involved also another way of designing my research.

For me the way of doing research was one of the most important learning targets. Doing research is a complex process and demands a special way of treatment. It took me a while until I found out how my research must be designed. Also the iterative design process of adapting research questions, research methods, the goal and the final result lead to the fact that I had to adapt all aspects of my research a lot of times in order to improve the whole report. I normally work in the way of dividing a project or task into different subtasks, and then I start with one subtask and go to the other when the first one is done. However, when researching this chronological way of completing tasks is not the way to come to a great result. The iterative process sometimes annoyed me, but after realising that the new design is way better then it was before, encouraged me time over time to improve and assess my own findings and way of working.

Besides the fact that the research has a great societal relevance and value, this whole process was a great exercise for me in learning how to do research, which will definitely be useful in the rest of my carrier.

The relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object)

The initial theme of the subject of the studio is: Design and Construction Management; Integrated procurement: managing sustainability. Due to the focus on sustainability and incorporating this at an early stage of the development process, I was placed in this studio. Of course, in the beginning the subject of the research is vague so it takes time to find out what the framework of my research would be. This process took actually a lot of time for me, which is partly caused by the fact that my research area ‘Energy Service Companies’ and the way of contracting it involves: ‘Energy Performance Contracting’ is a quite new research area. Due to a lot of literature study my view on this topic and the research gaps that my report could bridge became clear. This lead to the focus on EPC instead of ESCO, as, I found out that ESCO is a means instead of a goal. Which is in my opinion one of the largest problems by current organizations that only focus on ESCOs. ESCOs are only one way of performance contracting, and even one of the most complex ways.

As you can imagine, research on this topic needs a really in-depth approach. So it is logical that my tutors do not know all the details about this topic and it isn’t necessary, but it took myself already half a year until I got on the right knowledge level about this topic.

In conclusion, basically my subject fits well in my studio, however, due to the fact that this topic is that specific and in-depth, the discrepancy between the actual studio topic and my subject became larger. In my opinion is the focus of the studio not the most important thing, but more the tutors you work with and I was lucky to have two tutors specialized in different topics and approaches which gave me a wide view on both methods of research and the actual content of the topic.

The relationship between the project and the wider social context

This project is based on a problem that arose from the market. There are several organizations created in order to incubate the process of using ESCOs in the Netherlands. A research of van
Oeveren (2013) about why the Dutch ESCO market is not successful yet also gives multiple recommendations for improving the Dutch ESCO market. But then I got the question: WHY do we want ESCOs. Do we really want ESCOs or do we want sustainable and more energy efficient buildings? The real focus of the research took me a lot of time, to find the real need of this market. I found out that ESCOs is just one way in order to use a Energy Performance Contract. This changed my focus towards EPCs. I found also that organizations on the ‘backside’ all say that they are ready for EPCs and ESCO projects but that it is unknown to the user. This gave me the inspiration to make a decision-supporting model for users to get more insight in the EPC and ESCO market and to find out whether or not this is suitable for his organizational culture and also projects. The relationship with the project and the wider context can be drawn as the bridged gap of accessible information that can be understood by every user who is not familiar with any way of energy efficiency measures.
Literature

BERLINER ENERGIEAGENTUR GMBH 2008. International experiences with the development of the ESCO markets.


RIJKSOVERHEID 2011. Wat is de energiepresttiecoefficient (EPC)?


Appendix
Appendix I: INTERVIEW DESIGN AND TRANSCRIPT

Interview design
Afnemer: Jan Schuurman

Mijn afstudeerscriptie gaat over het vooraf inzichtelijk maken van consequenties bij het toepassen van een Energy Performance Contract voor een ontwikkelaar / gebouweigenaar, om op deze manier het gebruik van ESCO's en EPC's voor gebouweigenaren toegankelijker te maken en de drempel te verkleinen. Ik maak een model waarbij de eigenaar kan inzien wat voor zijn organisatie en projecten het meest geschikte EPC model is en wat de functie van een ESCO hierin speelt.

Om de geschiktheid (of profiel) van de organisatie en het project te schetsen vraag ik me af wat vanuit de technische / financiën stakeholder gevraagd / verwacht wordt om een succesvol ESCO project te beginnen (EPC contract aan te gaan).

KLANTPROFIEL

1. Welke aspecten in de bedrijfscultuur van de klant (eigenaar / investeerder) moeten aanwezig zijn om open te staan voor een ESCO contract?

2. Welke informatie moet u aangeleverd krijgen vanuit de klant of eigenaar om tot het besluit te komen dat er een samenwerking inzit?

PROJECTEIGENSCHAPPEN

3. Wanneer is een project geschikt voor een ESCO constructie en gaat u over tot dit gesprek? (mbt besparingspotentieel, kapitaal en risico?)

SERVICES

4. Maakt u gebruik van verschillende service levels, en wat houden deze levels in? (zoals advies geven, onderhoud, controle, installatie investeringen)

5. Wie bepaalt deze services, wordt dat vanuit de klant gevraagd of kijkt u zelf wat het beste geschikt is in een project?

6. Wat is het verdienmodel bij de services die u levert naast installatie investeringen, is dat ook een ESCO te noemen i.v.m. het gebruik van garanties?

CONTRACT

7. Contractvariabelen
   a. Wat zijn de belangrijkste contractvariabelen die bepalen wat voor ESCO project geschikt kan zijn (besparingspotentieel, inbreng van eigen kapitaal, grootte en omvang van het contract, intensiteit van M&V van de besparingen)?

   b. Is het zo dat u hierbij specifieke eisen stelt of kunt u bij verschil in deze variabelen verschillende contracten aanbieden?
c. Heeft u standaardvormen van de onderhouds- en prestatiecontracten en wat zijn de belangrijkste afspraken die daarin vastgelegd staan?

d. (Vanaf wanneer) zijn er transactiekosten verbonden voor het opstellen van een contract?

VERDIENMODEL

8. Er zijn verschillende verdienmodellen bij ESCO's, zoals guaranteed savings, shared savings en first out.
   a. Past u alleen 1 verdienmodel toe, laat u deze beslissing over aan de klant of laat u deze keuze helemaal over aan de ESCO en de klant?

   b. Waar heeft u zelf de beste ervaring mee en waarom?

   c. Hoe wordt de financiering geregeld, moet dit vanuit de klant komen of maken jullie samen een business case om vervolgens naar de bank te gaan?

PROCES

9. Hoe ziet de volgorde van dit proces eruit bij het starten van een ESCO project?

NIEUWBOUW

10. Er wordt bij een ESCO vooral gepraat over efficiënter en energiezuiniger maken van bestaande gebouwen.
   a. Zou een ESCO ook voor een nieuwbouwproject kunnen werken op een manier dat de beheerder geen eigenaar is van de installaties maar deze wel terugbetaald wordt door de besparing die t.o.v. een nullijn zou plaatsvinden?

   b. Wat zijn belangrijke aspecten die moeten worden vastgelegd?

   c. Wat is uw ervaring met het toepassen van een ESCO op commerciële kantoorgebouwen? Is het haalbaar voor 1 gebouw of moet dit een pool zijn?

--- Bedankt voor uw tijd en input! ---