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Energy Service Companies and Energy Performance Contracting: is there a need to renew the business model? Insights from a Delphi study

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ABSTRACT

Energy Service Companies have faced strong expectations to capitalise on large but untapped energy-efficiency opportunities, but have fallen short in terms of diffusion. This paper focuses on the viability of a business model based on Energy Performance Contracting. Following a two-round Delphi study conducted in Finland, we analyse the insights provided by the experts through the Hamel business model framework. The main aim is to increase understanding of the model that Energy Service Companies use, and to identify the main factors that hinder their business development. The findings suggest that rather little is known about these companies and their service offerings. The uncertainty surrounding the business affects the customers' readiness to invest their time and resources in the projects. One of the key development needs for the business is thus to put a strong emphasis on both the visible and the invisible benefits.

1. Introduction

Interest in improving energy efficiency (EE) has been increasing since the first oil crisis (e.g., Brown, 2001; Lovins, 1976; Okay and Akman, 2010). Efficiency has improved over the years, but there is still great potential for further energy savings in most sectors (Deng et al., 2012; European Commission, 2009; Wesselink et al., 2010; Worrell et al., 2009).

Despite the heavy expectations placed on Energy Service Companies (ESCOs) to exploit untapped EE opportunities, progress has been limited. The key objective of this paper is to enhance understanding of the ESCO business model that is based on Energy Performance Contracting (EPC). We identify the main factors that hinder the development of ESCO business, and analyse the potential need for renewal. By way of theoretical background we refer to the literature on business models. Both academics and practitioners contend that the best performing firms in the new dynamic environment are those that are able to capitalise on major changes and adjust their business models accordingly (Casadesus-Masanell and Ricart, 2010; Demil and Lecocq, 2010). Business models have thus become a useful unit of analysis through which to understand a company and its focal parts (Amit and Zott, 2001; Hamel, 2000; Stähler, 2002). The aim here is thus to analyse ESCOs and the viability of their business models. In order to achieve this, we conducted a two-round online Delphi study among Finnish energy experts, and analysed the data through Hamel's (2000) business model framework. The focus is not restricted to any specific end-use market, the idea being to provide a comprehensive, structured view on ESCOs as providers of EPC. To our current knowledge, this is the first attempt to apply the business-model concept within the ESCO business. The findings reported in this paper could encourage managers of ESCOs to shape and modify their business models and thus to contribute to the market development. In a wider context, given that energy efficiency is a fundamental feature of Sustainable Energy (see Peura, 2013), such development in the ESCO industry could, in turn, promote successful interaction between society and the environment (see e.g., Enevoldsen et al., 2007). This has also been referred to as "*the decoupling of economic growth from [the] consumption of energy and other resources*" (Fiorito, 2013, p.467).

The rest of the paper is organised as follows. The next section gives some background information about energy services and ESCOs. Then the focus shifts to business models, with a brief presentation of the Hamel framework. Section 4 gives an overview of the research design, and Section 5 presents the results. Section 6 discusses the main findings and Section 7 concludes the paper.

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Table 1
Key concepts (see Bertoldi and Rezessy, 2005; Bertoldi et al., 2006; Goldman et al., 2005; Mayer et al., 2010; Okay and Akman, 2010; Sorrell, 2005, 2007; Vine, 2005).

Energy service contracting	
Energy Performance Contracting (EPC)	- An external organisation implements a project to deliver energy efficiency, or a renewable energy project. - The approach is based on the transfer of risks from the client to the external organisation, and the payment is based on the performance of the project.
Energy Supply Contracting (ESC)	- Refers to the efficient supply of heating, electricity and other forms of useful energy. - ESC providers generally do not bear similar project performance risk that characterises EPC.
Energy service suppliers	
Energy Service Provider Company (ESPC)	- Operates on a "design and build" or "turnkey" principle; compensation is mainly based on the predefined fee. - E.g., consulting, construction, architectural and engineering firms.
Energy Service Company (ESCO)	- Offers similar services as ESPCs but also EPC; compensation is linked to the amount of energy saved (in physical or monetary terms) or renewable energy produced. - Services typically include energy audits, installation, the operation and maintenance of equipment, measuring, monitoring and verifying the project's energy savings, and sometimes also fuel and electricity purchasing. - May provide or arrange financing.

2. Energy services and ESCOs

2.1. Key definitions

Despite a rather a long history, *energy services* are still characterised by definitional confusion, the variety and complexity of the offerings and the diversity of suppliers. Bertoldi et al. (2006) define energy services as various activities such as energy audits, energy management, project design and implementation, maintenance and operation, the monitoring and evaluation of savings, and energy and equipment supply: this overlaps with the European Union (2006) definition. In line with Bertoldi et al. (2006), we define energy services in this study as services provided through activities such as project implementation.

Energy Service Contracting is an umbrella term for diverse contractual relationships between energy-service providers and clients (see Table 1), and involves the outsourcing of one or more energy-related service to a third party. This contrasts with the conventional service model according to which an energy user makes a separate contract with a service provider for each energy commodity, and for the supply and maintenance of all energy conversion, distribution and control equipment. The terms employed in connection with Energy Service Contracts include, for example, *Energy Performance Contracting* and *Energy Savings Performance Contracting*, *Facility Contracting*, *Chauffage* and *Contract Energy Management*. The performance aspect is the main distinguishing element between both *Energy Performance Contracting (EPC)* and *Energy Supply Contracting (ESC)*, and "design and build" projects (Bertoldi et al., 2006; Mayer et al., 2010; Sorrell, 2005). In conventional "design and build" projects the contractor is paid on completion of the project, is rarely involved in operating the equipment and has no incentive to improve energy efficiency subsequent to the termination of the project (Sorrell, 2005). We use EPC in this paper to emphasise the performance aspect of the Energy Service Contract.

Providers of energy services fall into two main groups based on the remuneration principle: *Energy Service Provider Companies (ESPCs)* and *Energy Service Companies (ESCOs)* (see Table 1) (Bertoldi and Rezessy, 2005; Goldman et al., 2005; Vine, 2005). ESCOs are understood in this study as providers of EPC.

2.2. ESCOs in brief

The ESCO concept as understood today was introduced in North America at the beginning of the 1980s (Okay and Akman, 2010). Nowadays it has spread to most industrialised countries, to many economies in transition, and to the largest developing countries (Ürge-Vorsatz et al., 2007).

There are variations in the ways ESCOs operate, but the key difference involves whether or not they provide financing for the project they are developing (Taylor et al., 2008). The choice of financing depends on various factors, notably the creditor's knowledge of project financing, the credit ratings of the ESCO and the client, and public procurement and accounting rules (Sorrell, 2007). There are basically three different financing options: *ESCO Financing*, *Third Party Financing (TPF)* and *Customer Financing*. The first refers to the use of the ESCO's funds, either its own capital or leasing arrangements. TPF refers to debt financing that is organised by the ESCO or the client. Customer financing involves the use of the customer's funds covered by an energy-savings guarantee provided by the ESCO (Bertoldi et al., 2006).

There are two basic ESCO contract models, Shared Savings and Guaranteed Savings (see Table 2), the distinguishing feature being the source of finance. In the *Shared Savings* model the ESCO

Table 2
ESCO contract models (Bertoldi and Rezessy, 2005; Bertoldi et al., 2006; Hansen, 2003; Okay and Akman, 2010; Poole and Stoner, 2003; Taylor et al., 2008).

	Shared savings contract (SSC)	Guaranteed savings contract (GSC)
Principle	Performance is related to the percentage of energy cost savings. Cost savings split for a pre-determined time in accordance with a pre-arranged percentage, based on the cost of the project, the length of the contract and the risks taken by the ESCO and the client.	Performance is related to the level of energy saved. The value of energy saved is guaranteed to cover the client's annual debt obligations.
Financing	ESCO Financing and/or TPF (through ESCO)	Client Financing and/or TPF (through the client)
Risk taking	Client	Client
• Business	ESCO (and client)	ESCO
• Performance	ESCO and/or financial institution	Client and/or financial institution
• Credit		
Advantages	Good introductory model in developing ESCO markets. The customer has no financial risks and is only obliged to pay a percentage of the actual savings to ESCO over a specified time period. This obligation is not considered a debt and does not appear on the customer's balance sheet.	Fosters the growth and viability of newly established ESCOs that have limited resources and a credit history.
Disadvantages	ESCOs may become overly indebted, and may have difficulties in obtaining financing at a reasonable price and in contracting additional debt for subsequent projects.	It is challenging to function properly in countries with an undeveloped banking structure, insufficient technical expertise and a poor understanding of EE projects.