

# Value Delivery Barriers in Energy Services

## Abstract

Buildings account for ca. 40% of the total energy use in Europe. Energy management and energy efficiency issues are gaining more and more interest in the building sector. However, buildings still use more energy than necessary. The purpose of this study is to understand how the customers of energy management services perceive the value of energy management. The aim is to find out what are the strengths and the weaknesses in energy management service delivery. The study was conducted with a qualitative interview method. The results present three categories of characteristics that represent energy management service delivery: information, split incentive problem and professional skill. The weaknesses of energy management service delivery show as challenges in information flow, lack of information, split incentive problem, key-personnel turnover and full utilization of energy management expertise. The strengths of energy management service delivery show in the high appreciation of the professional skill of the service provider.

## I. Introduction

Since the first oil crisis, there has been a growing interest in energy management and energy efficiency issues in the building sector. There is a large number of technologies that could reduce energy consumption in buildings (Levine et al. 2007), and also behavioral and managerial changes could result in more efficient energy use. However, it has been stated that buildings consume more energy than necessary (Levine et al. 2007), even 25% is avoidable waste energy (Bordass 1993). So even when there are known ways to improve building energy efficiency, why are these improvements not utilized to the greatest extent?

Buildings are at the central position in the climate change mitigation, as buildings account for ca. 40% of the total energy consumption and the consequent carbon dioxide emission in the developed countries (UNEP 2007). Sustainability and environmental performance have become strategic guidelines for many real estate operators, including buildings owners, facility management and service companies, and building occupants. Increasing energy efficiency is one of the key energy-related steps in addressing climate change (Rosen 2009) and it has been recognized in the building sector as well. The building sector offers the largest potential for energy efficiency in Europe: the saving potential is over 20% of the present energy consumption, which could be achieved by applying more ambitious standards to new and existing buildings (UNEP 2007).

Facility management and related services have been linked to environmental performance of buildings, it has been suggested that facility management is central in championing green operations (Hodges 2005; Roper & Beard 2006). Also, it has been suggested that buildings operators have underestimated potential in contributing to energy efficiency in buildings (Aune et al. 2009). The goal for real estate business is to create added value for property users and owners (RAKLI 2001). The goal for energy management is to improve an organization's energy performance (Carbon Trust 2011) or direct and control the energy use of an entity (CEN 2010). The value of energy management services from the point of view of the customer is central in this study.

The purpose of this study is to understand how the customers of energy management services perceive the value of sophisticated energy management. The aim is to find out what are the strengths and the weaknesses in energy management service delivery.

## **II. Research Design**

This study was performed in connection to a larger research project of value stream management in real estate business (Forsman 2011). The research project started by identifying which service processes should be provided for the customers, after that the effectiveness of energy management service processes was assessed. In this study, the data from the first phase is utilized.

### **The Customers of Energy Management**

The customers in the study are a Finnish retail company and its retailers. The retail company group (hereafter referred as Group) is a listed trading sector company. It manages retail store chains, and produces services for retail store chains' purchasing, logistics, network development and data management. The company's operations include food, home and specialty goods, building and home improvement, and car and machinery trades. The principles of sustainable development and responsible operating practices are a central part of the Groups and its chains' daily activities. The trading sector is required to take responsibility for product safety and healthiness, and for the environmental and social impact of business operations. The size of the properties vary between 200-20000 sq m, the age and use of the properties vary also.

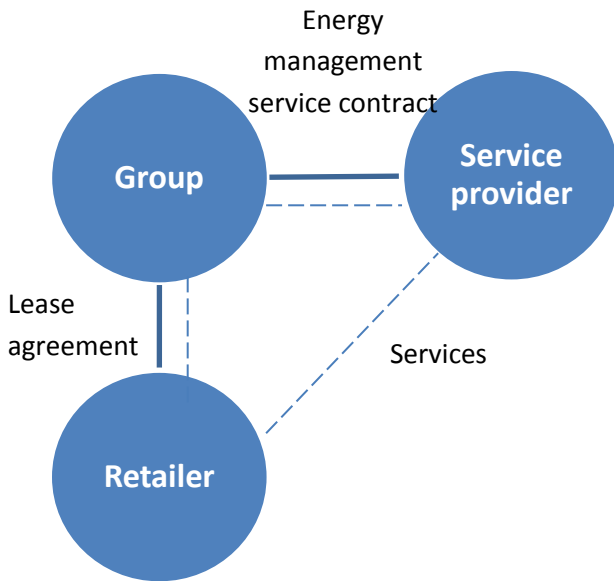
### **Sophisticated Energy Management Service**

The energy management service is provided for the Groups buildings in the Helsinki Metropolitan Area (HMA) by a commercial facility services and management company. The service agreement is formed between the service provider and the Group. The Group then provides the service for its retailers as a supporting service. The Group also has its own energy- and other building specialty experts who supervise the service delivery.

The energy management service which is studied includes various different services and specialties. It is a combination of an alarm center, help desk, remote building control centre, energy consumption monitoring, energy management experts and technical services. On-site maintenance is also a central part of it. A vital part of the whole energy management service is the remote building control centre which is operated from a central location in Finland to buildings around the nation. The centre provides continuous and regular energy consumption monitoring and optimization of indoor conditions of the building.

### **The Research Setting**

Figure 1 illustrates the research setting. The retailers have signed a lease agreement with the Group. Usually the Group is responsible for the heating of premises and property-electricity (e.g. ventilation, safety lights). The retailer pays for the metered consumption of end-user electricity (e.g. lighting and refrigeration). The basic maintenance service (e.g. outdoor maintenance) is included in the lease. The retailer is responsible for the maintenance of their own equipment, e.g. refrigeration equipment. In figure 1 the continuous line represents contractual relations and dash line represents information flow.



**Figure 1 Energy management service relationship. Continuous line refers to contractual relations and the dash line information flow**

### Data collection and Analysis

In order to find out the weaknesses and strengths in energy management service delivery process, eight semi-structured interviews with the Group and its retailers were conducted. The first part of the interviews consisted of grounding question of the interviewees' background and their role in energy relating matters. The second part of the interview focused on the energy management service and how it is perceived by the customers. The customers were asked for example to describe the energy management service and how it responds to their needs, how well they know the energy costs, how cooperation and communication with the service provider and other shareholders work, how problem situations are handled, and how they perceive the expertise of the service provider. Each interview lasted approximately one hour.

The interviewees consisted of four Group representatives who are responsible for energy related issues at the strategic level. The other four interviews were conducted with independent chain store retailers who are responsible for the operational management of their retail stores. They make the final decisions regarding end-user energy related issues, excluding the decisions that are made by the Group.

After the data collection the interviews were recorded and transcribed. Manual coding approach was then applied for analysis of the interviews and in forming initial categories from the transcribed notes (Robson 2002). The interview transcriptions were searched for repetitive themes which were marked with different colors. The initial themes were then searched for signs of strengths and weaknesses of the service delivery, which were listed. Then the listed strengths and weaknesses were rearranged in a new way in order to identify the central categories of energy management service delivery.

### III. Results and Key Findings

#### Interview Findings

##### *Importance of energy services*

All of the interviewees mentioned that the energy costs are significant in their field. Five out of eight thought that the role of energy management is important. Especially the Group representatives thought highly of the remote building control centre, three out of four said that it is taken for granted that all buildings will be connected to it if at all feasible. Half of the interviewees also felt that the energy costs will continue to grow, and as such even more attention to energy management is needed. Only one retailer said that water costs are also significant.

What is also noteworthy is that both Group and Retailer representatives acknowledged the fact, that the buildings and technologies can also be a weakness in energy management issues. It is much more difficult to implement new technologies to older buildings and stores in old buildings' footings. Also, bigger stores are prioritized higher than small stores in efficiency measures.

##### *Strengths and weaknesses in energy management service*

Analysis of the interviews entailed the use of illustrative data, i.e., excerpts from the interviews, which were used to perceive the service delivery strengths. The interview excerpts were searched for positive and negative quotes and profound lacks in the service as well as development suggestions and the value regarding energy management service delivery. The initial categories were then divided in to two categories; challenges and strengths, as can be seen in the following table 1, which presents the interview results. The first column shows the specific issue that arose from the interviews, the second is marked as S (strength) or C (challenge) and the following columns represent the interviewees. 'G' stands for a group representative and 'R' the independent shopkeeper. The strengths are also presented in *italic* and the challenges in regular font.

**Table 1 Challenges and *strengths* of energy management service delivery**

Issue	Interviewee	Strength / Challenge									
			G 1	G 2	G 3	G 4	R 1	R 2	R 3	R 4	
Problems if the other party pays for an improvement and the other gets the benefits		C		X	X			X		X	
High turnover of key personnel		C	X	X				X			X
A feeling that there is no energy management service at all		C								X	X
No energy management reports delivered		C						X		X	X
<i>Reports already at quite a good level</i>		S	X	X		X			X		
Energy reporting needs improvement		C	X	X	X	X	X	X	X	X	X
- Energy consumption break down		C	X			X	X	X			
- Equipment level consumption		C	X			X	X	X			X
- Prepared analysis from the data		C		X	X	X	X				X
- Prepared comparison of the consumption		C								X	X
More action and improvement suggestions needed		C		X	X	X	X	X	X	X	X
More information of cost based benefits needed		C			X	X					
<i>Fault and quality defect deviations handling</i>		S	X	X	X	X	X	X	X	X	X
<i>Cooperation with the service provider</i>		S	X	X	X	X		X	X	X	X
<i>Service providers' expertise in energy</i>		S	X	X	X	X	X	X	X		
Full utilization of the service provider expertise is lacking		C		X		X					
<i>Costs of energy management compared to the benefits</i>			X		X	X	- <sup>1</sup>	-	-	-	-

\*G=Group representative, R=Retailer

What can be seen from the results is that the Group representatives receive monthly energy reports from the service provider but the retailers do not. Somewhere along the way is an information break. Also, half of the retailers do not even know about the energy management or remote building control centre service. All of the respondents feel the need to improve the energy reporting, some more than others. The need could be assembled as a need for more detailed, equipment-specific and prepared analysis of the consumption data, reasons for consumption increase and monthly as well as yearly comparisons in the consumption. Most of the interviewees wish for more energy efficiency action and improvement suggestions, a few also wish for more cost-benefit analysis of them.

The strengths of the service are contradictionally also in the energy reporting. Most of the Group representatives and the one retailer who receives reports felt that they are already quite good. Faults and quality defect deviations are handled well by the service provider. Cooperation and the energy-expertise of the service provider are at a good level, but some feel that the whole service provider company benefits could be better utilized. The ones that did not feel that the energy expertise is good are the ones that feel that there is no energy management service at all.

<sup>1</sup> Retailers were not asked the question regarding costs of energy management as they receive this service automatically from the Group.

## Key Findings

The previous results were categorized once more to represent the central issues regarding energy management service delivery. Each of the issues in table 1 were divided in to the following three categories:

- Information issues
- Split incentive issues
- Service provider professional skill issues

### **Information**

Regarding challenges, what shows most clearly from the results, are issues relating to information. One type of information challenge is a *break in the information flow* (Group representatives receive reports but most Retailers do not, some Retailers do not even know of the existence of the energy management service or remote building control). Second type of information challenge is a *lack of information* in certain areas (energy reports are missing energy consumption break down data, equipment level consumption data, prepared analysis of the data and consumption comparisons). Time and resources of the Group and Retailers affect this challenge as well, they do not have time to familiarize with the data, they need completed and condensed information based on which they can make decisions. There is also a lack in cost based benefits of the service. Reports include consumption data or saved energy amounts in kilowatt-hours, not in euros. Savings in euros would be more concrete for the customers.

One specific matter, namely action and improvement suggestions, seems to belong to two categories. On the other hand, some already receive suggestions but would like even more of them and more completed analysis and the suggestions should be more condensed and further prepared. It could be analyzed that this indicates a challenge in the service provider expertise, if the suggestions are found lacking. On the other hand two retailers have not gotten any suggestions at all, so there is a lack in the information.

### **Split incentive problem**

Half of the Group representatives and retailers brought up the issue that there is a problem if the other party pays for an improvement and the other gets the benefits. The following table 2 presents the issues by showing interview excerpts.

**Table 2 Interview excerpts regarding split incentive problem**

<b>Interviewee</b>	<b>Issue</b>
G 2	<i>Occasionally problems, for example when the retailer adds lighting, which lessens the heating need, in which case the Group saves in heating expenses. Refund requests.</i>
G 3	<i>Interest contradictions, for example if something does not bring benefits to the retailer, are they interested in doing something about it?</i>
R 1	<i>Problem is that the Group would need to pay for the cooling installation, but the retailer would get the benefits. The Group does not care about the amount of the retailers' wastage.</i>
R 3	<i>I don't care about the energy consumed by the property, if I save energy; it does not reduce MY rent! Also, the other way round, the Group and the service provider do not care about the size of my energy bill.</i>

In literature this problem has been called a split incentive, or misplaced incentive, problem. This is particularly seen in residential buildings in land-lord - tenant relationship, where the tenant pays for the energy bills and the land-lord is responsible for providing the equipment and usually choosing the least expensive ones rather than the most efficient ones (Golove & Eto 1996). Split incentives mean that the benefits of more efficient technologies accrue someone other than the person who is paying for them.

#### ***Service provider professional skill***

The strengths of the energy management service are found in this category. In general, the cooperation and professional skills of the service provider are good. Also, fault situations and quality defects within the buildings are handled professionally and the customers are satisfied with their handling. Service providers' expertise and professional skill in energy efficiency issues is stated as being at a good level. However, the challenge seems to be in utilizing the full potential of their skills. The service provider should use more of their specialty skills and highlight their benefits more. The know-how is good, but they do not exploit it enough, for example the remote building control center does not show to all of the retailers.

The high turnover of service providers' key-personnel was recognized as a major problem by half or the interviewees. It takes time to familiarize with the buildings and their operations for new personnel. Employee turnover is a much studied phenomenon (e.g. Shaw et al. 1998; Kevin M. Morrell 2004) and it has been found to cause various difficulties for the organization, e.g. replacement, recruitment and selection costs, as well as the costs of learning (Dess & Shaw 2001). In this study, the challenges resulting from key personnel turnover for the services' buyer and end-user are recognized.

As discussed in the information category, action and improvement suggestions could be partly a challenge in the service provider professional skill. Sometimes improvement suggestions need more completed analysis, and this could be achieved in developing the service providers' methods and skills.

#### **IV. Discussion and Conclusions**

The aim of this study was to gain understanding in how the value of energy management is perceived by its customers. Also the purpose was to find out the strengths and weaknesses of energy management service delivery. The results present three categories of energy management characteristics that stood out in the interviews; information, split incentive problem and professional skill. The weaknesses of energy management service delivery showed as challenges in information flow, lack of information, split incentive problem, key-personnel turnover and full utilization of energy management expertise. The strengths of energy management delivery are the high appreciation of the professional skill of the service provider.

There is a rich literature regarding energy efficiency barriers in buildings (e.g. Levine et al. 2007; Jaffe & Stavins 1994; Golove & Eto 1996; UNEP 2007; Carlsmith et al. 1990; Sutherland 1991). Lack of information (or mis-information) and split incentive (or misplaced incentives) are recognized in several studies as market failures. Information about energy-efficiency options has been often found incomplete, unavailable, expensive and difficult to obtain or trust (Levine et al. 2007). Break in information flow and lack of information as well as split incentive problem were recognized as challenges in energy management service delivery in this study, indicating that energy management service is affected by similar barriers.

It has been suggested that retailers are already addressing the issue of green retail space (Thompson 2007), and this study supports the claim. It was found that energy management is held in high regard, even though it could be said that the energy costs are the driving force for the retail company to improve the

environmental performance of their buildings. However, the professional skill is highly valued in energy management service delivery.

The results of this study add to the knowledge of barriers to energy efficiency improvements, in particular the results indicate that split incentive problem is present also in commercial buildings, or particularly retail buildings, when previous study has indicated that most of the literature regarding split incentives seem to focus on residential buildings (Golove & Eto 1996).

Reliability of the research may be affected by the number of interviewees, as they represented a minority of the Group personnel and Retailers. Also, any generalization of the results is strictly analytical. Future research could follow-up on the energy management service, and record how the service is developed based on these results and how the value is perceived.

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