Facilities management innovation in public-private collaborations: Danish ESCO projects

Nardelli, Giulia; Jensen, Jesper Ole; Nielsen, Susanne Balslev

Published in:
Journal of Facilities Management

Link to article, DOI:
10.1108/JFM-04-2014-0012

Publication date:
2015

Document Version
Peer reviewed version

Emerald Journal of Facilities Management

Facilities management innovation in public-private collaborations: Danish ESCO projects

Journal:	*Journal of Facilities Management*
Manuscript ID:	JFM-04-2014-0012.R1
Manuscript Type:	Research Paper
Keywords:	FM innovation, Energy optimisation, ESCO, Public FM, FM roles, Sustainable FM

Facilities management innovation in public-private collaborations: Danish ESCO projects

Introduction

As in many other developed countries, many local governments in Denmark have committed themselves to the national climate agenda, which implies fixed objectives of CO_2 reduction while at the same time being required to address a huge maintenance backlog in municipal buildings. Public buildings' energy consumption accounts for a large share of overall national energy use, meaning that local governments are expected to comply with the national objectives of CO_2-reduction, despite their struggle to operate within tight budgets. In addition, local governments have to meet general public expectations of well-renovated buildings. This implies that an upgrade in building stock will help local governments to reduce energy consumption, thus conforming to the national climate agenda and satisfying local citizens' general expectations.

Facilities Management (FM) units of local governments play a crucial role in creating solutions to face these daunting challenges, because within local public institutions, they are in charge of managing the building stock and its energy consumption. ESCO collaborations, among others, represent a novel, cost-neutral opportunity to energy-renovate public building stock through a collaboration between a public institution and a private party, i.e., the Energy Service Company (ESCO) (Jensen et al. 2013).

According to the EU Directive on Energy End-Use Efficiency and Energy Services (European Parliament & Council of the European Union 2006) an energy service company (ESCO) is defined as "a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises and accepts some degree of financial risk in doing so. The payment for the service delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria". An ESCO company provides a package that consists of technology, project management, education and building monitoring pursuant to a long-term contract and assumes the eventual risks of not reaching the promised energy savings, thereby guaranteeing the client a particular amount of energy savings (Jensen et al. 2013).

Scholars of the public sector have highlighted the need for a new form of innovation in local and national institutions based on collaboration between various public and private parties. Closed processes do not seem to allow public entities to solve the many emergent and persistent challenges that might be overcome through the cooperation of public and private actors (Bommert 2010; Sorensen & Torfing 2012). ESCO projects can be associated with such collaborative innovations in the public sector because they are based on a public-private collaboration and allow public entities—i.e., local governments—to solve the emergent challenge of energy renovation with limited resources and high expectations. A partnership between a local government and a private ESCO provides the public institution with the necessary resources to locally implement energy renovations on its building stock, which contribute to its compliance with national climate agreements. Moreover, compared to more traditional in-house energy reduction projects, in which minor solutions are implemented step by step, an ESCO offers an innovative approach to

energy optimisation. ESCO collaborations are based on (1) output-based contracts; (2) the guarantee that a defined amount of cost savings will be reached within a specific number of years; (3) a long-term collaboration between public and private parties; and (4) short-term refurbishment and immediate, consequential savings (Jensen et al. 2013).

Although ESCO collaborations have been recognised to offer significant benefits to local governments that must conduct energy renovations under conditions of limited resources and high expectations, they also carry some disadvantages compared to the traditional in-house approach (Jensen et al. 2013). First, ESCO collaborations involve transaction costs, including tendering, contract management and negotiations on baseline adjustment and costs that tend to increase with the complexity of the ESCO contract. They require higher degrees of coordination between energy retrofitting and building maintenance compared to in-house models, which are therefore considered by public FM managers as easier to handle. In addition, municipalities' internal FM units usually have limited experience with long-term collaborations, and local governments' knowledge of the functioning of an ESCO model is still lacking. Other issues are the in-house FM organisation's reluctance to accept a partnership with an external, private party, the fear of "losing control" of the energy renovation and seeing learning retained by the ESCO provider, and the uncertainty of managing changes in the future building portfolio (e.g., if the municipality decides to sell the building while the ESCO contract is still running).

The purpose of this paper is to analyse public-private collaborations in light of innovation theories to investigate how partnerships between public and private parties can result in FM innovations that can tackle the energy renovation challenges that affect local governments. The paper uses examples from Danish ESCOs to analyse these issues.

Despite increasing academic interest in the issue of collaborative innovation in the public sector, the focus has been on when and how multi-actor, intra-organisational collaborations can enhance public innovation (Bommert 2010; Sorensen & Torfing 2012). Although existing research on collaborative innovation in the public sector can certainly support an in-depth understanding of ESCO collaborations, we believe that such public-private partnerships require a dedicated research effort. However, we argue that ESCO collaborations have the potential to spark different types of innovation compared to what has previously been described in the existing literature on FM innovation. Scholars of FM innovation either tend to emphasise the private sector or fail to differentiate between the characteristics of FM innovation in the private and public sectors. Furthermore, previous research views the FM provider as the sole analytical unit and studies how FM can innovate within organisational boundaries.

In contrast, our research is dedicated to collaboration between public and private organisations, and aims at understanding how local governments' internal FM units navigate their interactions with internal stakeholders and the private ESCO to innovate throughout the ESCO collaboration. Here, the word "navigate" is intended to describe the process of interpreting a complicated landscape to decide which direction to follow by taking a basic structure (in this case, the structure of the public sector) for granted. Therefore, this study's research question is as follows:

How do internal FM units navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating throughout ESCO collaborations?

By investigating the navigation and management of public-private collaborations such as ESCO projects, we aim at offering valuable insight to internal FM units of local governments on how to deal with innovation processes when heterogeneous parties are involved.

Theoretical background and analytical framework

Setting the stage: ESCO collaborations as innovation processes

FM is defined as a set of services that includes a wide range of support tasks and activities at the strategic, tactical and operational levels, whose interplay is crucial to create value for the stakeholders (Jensen 2008). Adopting this definition of FM makes it possible to analyse innovation processes within the context of FM by using theories on innovation in services. Services, including FM, are characterised by perishability, intangibility, variability, inseparability and non-ownership (den Hertog 2010; Jong et al. 2003). Due to services' inner features, innovation in this industry has often been found to be non-technological and primarily to involve small changes and improvements in processes and procedures (Jong et al. 2003). To understand how service innovation works, it is thus crucial to distinguish innovation's process from its outcome. Innovation processes correspond to the unfolding of the decision-making that leads to outcomes responsive to the following three criteria (Sundbo 1997). First, innovation is an idea that is developed and carried into practice. Second, innovation provides a benefit to its developer, which usually is derived from the added value perceived by the customer. Finally, innovation must be reproducible, which means that needs to be applied more than once (Sundbo 1997).

We argue that ESCO collaboration can be characterised as FM innovation processes in the public sector, because they result in outcomes, such as new processes for energy monitoring and new practices of cooperation between intra- and inter-organisational actors, which reflect the abovementioned criteria for innovation. Such outcomes are ideas, often generated by the ESCO provider, which are developed and put into practice and which provide various benefits to the different parties who contribute to their development. The ESCO provider gains financial remuneration based on its success in reducing energy consumption within the pre-determined time frame, while the public institution achieves positive political attention from the guaranty of energy savings and from the visibility of savings from Day 1. Furthermore, the internal FM unit benefits from the outcome of an ESCO collaboration, because it can operate with much more capacity and speed in reducing energy consumption, it can be trained and thus learn how to manage energy reductions once the contract has expired and it can focus on operations and output instead of verification and monitoring. Finally, the desired outcomes of ESCO collaboration are specified in each contract on an ad hoc basis, but the internal FM unit and/or local governments can reproduce them in new contracts with external parties.

Innovation in FM

The field of FM services is increasingly recognised as a professional service sector and a scientific discipline. It has been argued that to further develop FM as a discipline, a research focus on innovation might be critical, whether it is pursued in-house or in collaboration with the outsourced partners (Mudrak et al. 2005). Similarly, Noor and Pitt (2009) suggest empowering the FM unit with a role in the organisation's innovation agenda, because this could be a way to position FM within the organisation itself and thus gain more visibility and strategic awareness. More specifically, they stress that FM should not limit itself to building management, but instead transform itself from a business support tool to a business change tool (Noor & Pitt 2009; Tay & Ooi 2001).

Despite the recognition of strategic capacity building and innovation as an independent option for FM, the collaborative dimension of FM innovation is a hitherto undiscovered research field. Existing research on FM innovation can be characterised as 1) not explicitly focusing on public-sector FM innovation; 2) often not noting the eventual differences between private and public sector FM; and 3) not presenting any explicit cases of facilitated collaboration with other actors in which FM adopts an independent, agenda-setting leadership role. Instead, FM innovation research appears to be largely aligned with FM strategy research, therefore taking an inward perspective. The FM innovator's playground is the organisation's internal dynamic, which expects FM to act as a business support tool. One way of transforming FM into a business change tool (Noor & Pitt 2009) could be by enhancing innovation processes through collaboration among diverse parties. We therefore aim to increase the understanding of innovation processes within FM in public-private collaborations by analysing ESCO collaborations through the framework presented in the next paragraph.

The analytical framework: the FM value chain and the role of the internal FM unit

Following the definition of FM as a set of support services, FM involves a heterogeneous range of stakeholders from both the supply and demand sides of service provision (Coenen et al. 2013). To investigate how public-private partnerships such as ESCO collaborations unfold and produce FM innovations, we developed an analytical framework based on (1) the complex relationship between supply and demand in FM services (Coenen et al. 2013) and (2) the roles that internal FM units play within organisations (Kaya et al. 2004). As stressed by recent FM literature (Coenen et al. 2013; Jensen et al. 2012), innovation is an important part of the activities carried out by FM internal and external providers to add value, which is why we apply Coenen et al. (2013) and Kaya et al.'s (2004) frameworks, originally developed for FM activities in general, to FM innovation in the public sector. Because we recognise the importance of a facilitating party for public collaborative innovation (Ansell & Gash 2012; Bommert 2010; Sorensen & Torfing 2012), the analytical framework aims to outline how an internal FM unit navigates the innovation processes that are associated with ESCO collaborations and manages the collaboration of different, intra- and inter-organisational actors.

Coenen et al. (2013) highlight how external and internal providers on the supply side address not only one homogeneous set of customers but also three different

stakeholders—i.e., the client, the customer, and the end users. In ESCO collaborations, for instance, the roles of the different stakeholders are distributed among private and public actors. On the supply side of an ESCO collaboration, the roles of the external and internal providers are played by the private ESCO and the internal FM unit, respectively. Similarly, three primary stakeholders with different needs and expectations have been outlined on the demand side: (1) client; (2) customer; and (3) end users (Coenen et al. 2013). On the demand side, the client ordering the service is typically the local government to which the FM unit belongs and that is represented and managed by political actors from the local and national community. The FM unit is the customer, responsible for dealing with the outsourced provider and managing the collaboration to negotiate and achieve its energy optimisation objectives. Finally, the end users are the actual actors who benefit from the outcome of the collaboration, i.e., the civil servants, schoolteachers, students, etc. who work and receive public services in the facilities involved in the ESCO project.

Several authors have argued that FM units often lack recognition within organisations. On the contrary, FM units are seen as routine functionaries that should share responsibility to helping the organisation to reach its strategic goals (Kaya et al. 2004). In addition, FM units often have problems demonstrating their results. To demonstrate their strategic value, FM units might increase their integration within their organisations (e.g., through increased collaboration with other in-house units); increasingly, FM units contribute to business outcomes (Kaya et al. 2004). This goal can be achieved by playing the roles of translator, processor and demonstrator. As a translator, the FM unit should be able to translate business needs into a strategy that defines the various project activities to be implemented. This implies that the FM unit also fulfils the processor role, i.e., that it implements and operates the projects that contribute to business needs, and the demonstrator role, i.e., that it demonstrates its contribution to the business strategy.

Figure 1 proposes an adaptation of Kaya et al. (2004) to the characteristics of the FM value chain in the public sector in an attempt to visualise the analytical framework that we use in this paper. The public sector must ensure public innovation that better responds to the needs of its citizens (Bommert 2010). This requirement must be combined with the FM units' needs to ensure that (1) civil servants (and other public end users) can work properly and (2) public buildings are well maintained. Therefore, the FM unit usually acts as a translator to design FM management in line with the policy and strategy of the local government that it serves, as a processor to ensure that FM management is actually implemented, and as a demonstrator to show the obtained results and provided services.

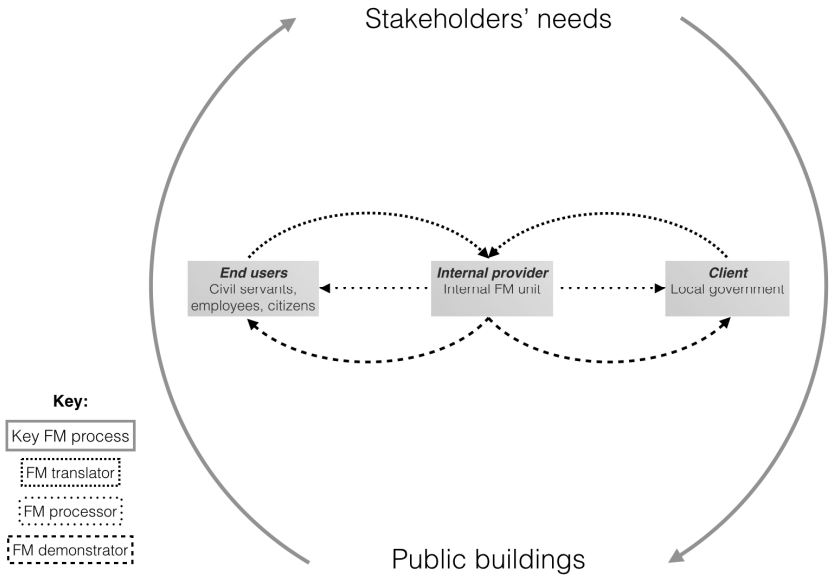

Figure 1: The analytical framework—the traditional FM unit role within the public sector. Source: adapted from Kaya et al. (2004).

Therefore, in Figure 1 we highlight how a local government's FM unit usually acts as translator, processor and demonstrator to ensure the appropriate management of public buildings to satisfy the needs of all of its stakeholders. These stakeholders include the local government, all end users—e.g., civil servants, teachers and students who work and receive the public services in the targeted facilities—and the community as a whole. Kaya et al. (2004) do not include the external provider in their figure, which is why we also leave it out of our adaptation—although we are aware that the external provider(s) often collaborates with the internal provider, i.e., the FM unit of the local government, to ensure that the latter can carry out its function as FM processor. In the analysis reported below, we examine the data in the light of this analytical framework with the aim of understanding how internal FM units navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating throughout the course of public-private partnerships, such as ESCO collaborations.

Methodology

To explore Danish municipalities' experiences with ESCO collaborations and the related potential effects for innovation, this study adopted a qualitative research methodology. First, we reviewed popular and scientific publications, which we complemented with participation in diverse conferences and workshops on the topic to gain a general view of ESCO projects in Danish municipalities. On the basis of that overview, we then selected the 10 cases set forth below.

The empirical basis for this study consists of the first 10 ESCO collaborations implemented in Denmark, which we studied for the period between 2008 and 2012. We carried out 15 in-depth qualitative interviews with 18 leading civil servants in municipalities involved in ESCO projects. These interviews were then complemented with comparative interviews with representatives of local governments, which were implementing traditional in-house energy renovation projects, and also with private

ESCO actors (one provider and one consultant). The purpose of the comparative interviews was to explore the perceived disadvantages of ESCO collaborations compared to in-house strategies. Therefore, we interviewed a representative of the leading ESCO company in Denmark. Such leading company had been in dialogue with most Danish municipalities. In addition, we interviewed an experienced Danish consultant. The consultant was selected as specialist on ESCO projects, whom, at the time of the interview, was working on a report on the potentials for energy renovation in public buildings. All interviews were prepared through comprehensive research on municipal ESCO initiatives, were based on a semi-structured interview guide (Appendix 1) and were carried out through a mixture of face-to-face and telephone interviews. The focus of the interviews was the interviewees' experiences with ESCO collaborations and their motivations related to such collaborations, with particular emphasis on managing the different actors during innovation processes.

To research motivation, we asked about the origin of the idea of introducing an ESCO collaboration, who came up with the idea and why the interviewee considered it to be a good idea compared to what they had done in the past. We researched the interviewees' experiences with ESCO by asking about the studied project, its characteristics, its organisation and their experiences. To explore their learning process, we included questions such as the following: "What are you most proud of?" "Have there been surprises along the way that you have learned from, or things you would do differently, if you had the chance?" In addition to the interviews, the study included a survey of existing ESCO collaborations in Denmark along with and international literature studies of ESCO experiences.

Finally, a literature search was carried out to identify theories on innovation to interpret the empirical findings. Priority was given to the service innovation literature, given the adopted definition of FM as a combination of support services.

As the focus of the paper is to better describe the intermediary role of FM units of local institutions through public-private collaborations, we have investigated the experiences from the first 10 Danish ESCO projects. The research is qualitative due to the explorative nature of the study. In fact, existing literature on FM innovation has so far emphasised the private sector. Therefore, this study offers valuable insights on FM innovation beyond the boundaries of the private sector, and, more specifically, on FM innovation processes that are implemented through the collaboration between public and private parties. The main limitation of this research is that it is based on limited number of projects, which are largely varied in terms of scale (including, e.g., space, investment, savings, time). Nonetheless, at the time of the empirical investigation, this set of projects was the best available source for data collection on ESCO collaborations and FM innovation (Jensen et al., 2012), which is why we selected it for our study.

Research findings

The ESCO collaborations that we investigated are characterised by different scopes and innovation outcomes/improvements. Table 1 summarises the main characteristics of the ESCO collaborations in the municipalities that we investigated.

Table 1: Characteristics of 10 ESCO-projects in selected municipalities

TABLE 1 TO BE INSERTED HERE

Our cases show different types of decisions, initiators and motivations. In general, the objective of ESCO collaborations is to reduce energy use and costs, in both the short and the long term. Nonetheless, this is a difficult target to measure, calculate and verify with precision, especially in the long term. The challenge of evaluating the outcomes of ESCO collaborations emerged as shared across all cases that we included in this study, and influenced the relationships between stakeholders and the decision-making dynamics. From our 10 case studies, it is clear that the central decision-makers in ESCO contracting (referring to the stakeholder groups outlined in Figure 1) are the client (local government), the internal FM unit and the ESCO provider. It should be noted that the term "ESCO" is generally used in a Danish context, although in practice it is referred to as "Energy Performance Contracting" (EPC) with financing from the client, i.e., there is no third-party financing.

The primary motivations for municipalities to engage in ESCO contracting are a combination of the factors listed below (Jensen et al. 2013):

1. The mandatory energy labelling of municipal buildings (see references to municipalities in table);
2. Voluntary agreements for climate-related reductions (see references to municipalities in table). Our interviews indicate that "Climate Municipality" and "Curb-cutter" deals present large challenges for municipalities, but that there is also political acceptance of the pursuit of energy savings;
3. Attractive financing mechanisms for energy reductions;
4. Solving limitations of personnel and finance capacity in municipalities; and
5. Reducing maintenance backlogs.

Looking at the decision-making processes behind the municipalities reveals various patterns related to ESCO-contracts that illustrate the importance of linking FM management to clients' overall strategic goals. However, the analysis also helps to expand the understanding of roles played by the various actors involved and to develop a model of FM roles in FM innovation within ESCO projects, which we present at the end of this analysis section. In the following paragraph, we depict the decision-making process that drives ESCO collaborations and related innovations and then introduce the FM roles played by the FM unit of local government within the context of an innovation process.

Decision-making process related to entering into an ESCO contract

In the majority of municipalities, the FM unit is the driver in the ESCO contracting arrangement. In several cases, FM staff members have started the process of reducing a municipal building's energy usage due to either the mandatory energy labelling of public buildings or political ambitions related to the pursuit of climate goals. This process typically has made those individuals aware of the challenges of obtaining an overview of the building stock, the use of the buildings, the energy consumption, etc.,

along with the limitations of the energy label in managing these challenges. Our informants from the municipal FM units often refer to challenges in completing the energy optimisation of the building stock and then becoming aware of the ESCO opportunity from consultants, professional magazines, conversations with colleagues, etc. In parallel, some of the leading ESCO providers have been active in promoting ESCO contracting to municipalities, arranging meetings with mayors, directors and FM staff. One ESCO provider claims to have had at least one meeting—and often several meetings—with each of the 98 municipalities in Denmark to explain how an ESCO contract works, along with its benefits for the municipality. In some cases, FM staffers have called an ESCO company to request a closer discussion, eventually leading to a contract.

"We could save 2% within a few years using our own municipal finances. But after that it would become difficult. Two percent per year is actually very ambitious… but then one of our consultants mentioned ESCO as an opportunity" (officer, municipality of Halsnæs).

"We started energy labelling four years ago … and discovered that its benefits were not so high. … at the same time we started to explore the potential of the ESCO concept" (officer, municipality of Høje Taastrup).

Often, political ambitions are a first driver to start the process, but according to FM staff, political goals are often diffuse and are not always accompanied by a genuine political will or overall strategy to pursue those goals, as illustrated by the quotation below:

"If you had politicians that were really engaged, then you were already rolling, and you just needed to go on, instead of starting from scratch. But in our case it is better with an ESCO project, then you can see what you get for your money" (officer, municipality of Kerteminde).

There are fewer examples of municipalities where the city council has taken the initiative for ESCO contracting. Conflicts with the FM unit or within the FM unit might arise and lead to other types of initiatives. As an example, the Aarhus municipality had an ambition for a large-scale ESCO project, but it met severe resistance from local FM personnel, which resulted in a new energy-optimisation model that combined elements from the ESCO model but was based on an in-house implementation. In other municipalities, suggestions from the FM unit to start an ESCO project were opposed by the city council, for instance, in the municipality of Vejen, where an ESCO project was rejected by the city council and an internal energy-optimisation programme was set up instead.

The interaction and communication between an FM department and local politicians is often both complex and un-explicit, making it difficult to determine the precise origin of an initiative and how the decision-making procedure took place. The FM unit and relevant political representatives can form local alliances for or against ESCO, but ESCO suppliers might discuss the issue with individuals at other political levels in the city council, resulting in new political alliances. There are several examples in which ESCO suppliers, through meeting with politicians, have managed to change those politicians' attitudes towards an ESCO project and convincing administrative officers to enter into an ESCO contract rather than continuing with an ongoing in-house energy optimisation project.

Political decisions about an ESCO are often based on presentations about the ESCO concept from FM units, which may have knowledge and understanding about the concept that is of variable quality, whereas discussions with an ESCO provider might provide other views on the issue of ESCO contracting.

Typically, the decision about whether to engage in ESCO contracting involves a comparison of ESCO contracting to an in-house effort. The ESCO provider will argue that the benefit of ESCO contracting is its guaranteed savings, resulting in an investment that is "safe". From a political and administrative point of view, the ESCO contract is a powerful tool to document actual savings and to ensure that goals are met. This can be more problematic with in-house projects, in which a rigorous base-line correction is not carried out and the achieved savings therefore can be difficult to verify. This, however, also depends on the degree to which an FM unit must convince politicians of its achieved results.

In the cases involving FM officers as initiators, communication with politicians about formulating the ESCO project as part of a general municipal agenda has been a crucial point. In several municipalities, politicians have been actively involved in promoting ESCO contracting as a part of those municipalities' on-going policies. Energy savings and improvements in public buildings, as a type of public service provision, is now a central element of many municipal policies. Our case studies demonstrate that the ESCO contracts are often communicated as a part of an overall municipal strategy and its core elements, e.g., climate policy, the networking municipality, green growth, and service provision (for youngsters, families, the elderly, etc.). In some ways, the ESCO project changes the FM unit from a provider (with the municipality as its client) into a client (with the ESCO company as its provider), creating room for reflection about the FM unit's future identity. In several municipalities, the ESCO collaboration leads to discussions about the role of the FM, e.g., about the FM's core role and which competences the FM unit should maintain, such as energy retrofitting.

"...[W]e should teach the children, secure the roads, ensure the welfare of the elderly—but it is not necessarily our primary goal to be a building-maintainer, and definitely not with respect to energy optimisation" (officer, municipality of Gribskov).

FM roles in FM innovation during ESCO collaborations

The translator role. The findings presented above suggest huge differences between FM in public buildings and FM in private buildings. First, as stated by Kaya et al. (2004), the role of the FM as translator is to link the company's business model to the workplace environment—whereas in the municipal FM, the FM's role is to provide the framework (buildings, services, facilities) for core municipal welfare services. Therefore, the FM unit's role as translator (Kaya et al. 2004) in a municipal context is somehow different from the translator role in a private company. The translator role in a municipal FM involved in ESCO contracting goes both ways to a much larger extent, not only translating the business strategy into measures for the FM process but also translating the FM unit's initiatives (e.g., ESCO-contracting) into the municipality's business goals or policy goals.

Another main issue is the relationship to the end users, including the buildings' users and operational staff. They need information about the retrofitting project and their

needs and suggestions for the renovation should be heard, which is to say that the FM unit also acts as translator for the end users. The degree of user involvement in Danish ESCO projects is extremely varied. Some projects have limited user involvement, focusing mainly on "regulating" end users' habits and practices to achieve energy savings, whereas other projects have more active user involvement, through both early involvement in project design and involvement throughout the operational phase, e.g., through programs that teach about sustainability and energy issues. In addition, user involvement might be a central issue with respect to in-house projects on energy retrofitting, but ESCO projects often focus more closely on how user habits influence buildings' energy use in the operation stage and thus, also raise the relevance of involving the end user.

A related issue is how to motivate end users to save energy, which soon leads to economic and organisational considerations, e.g., how energy is paid for and how the buildings are operated. In many municipalities, ESCO contracting often takes place in reorganised central FM units, who own or are responsible for operating a municipality's entire building stock, whereas previously, single municipal departments owned and operated their buildings. In such cases, an ESCO collaboration that includes all municipal buildings would be extremely complex. This illustrates that the organisational conditions for applying innovative concepts such as ESCO contracting are extremely important. ESCO consultants are very aware of this issue, and have urged municipalities to rethink their internal organisations when entering into ESCO contracts:

"… [I]f you do not reserve resources for organisational issues, then you're running a bad business" (ESCO consultant).

Our interviews also show that ESCO collaboration often provides challenges with respect to communicating with end users, especially in the design and building stages. As a contractor, it is typically the ESCO provider that informs the end users about the program, the timetable, etc., but a municipality might find it strange to be excluded from the dialogue with the end users, particularly when the end users see the municipality as the responsible party in the event of problems. The FM unit's role as processor includes many challenges in an ESCO project, but this is also a place where the most important learning takes place in relation to systematically mapping the building stock, optimising energy usage in building operations, engaging in user relations, etc.

The processor role. Second, as a processor, the FM unit collaborates with the ESCO provider in carrying out the energy optimisation of the municipal buildings. This includes numerous tasks, including negotiations and communication with the ESCO provider and communication with the end users. Long-term collaboration with an external partner is unusual for most municipalities, but so is the contract-based partnership, where on the one hand, the two parties collaborate on reaching their defined goals, but on the other hand, the two parties are also clients and providers that must negotiate on various issues, for instance, the baseline that defines whether energy savings have actually been accomplished in comparison to other FM buildings and users during the same period. The ESCO literature traditionally refers to these tasks as transaction costs (Marino et al. 2011; Sorrell 2007), which might be time-consuming, but also provide the involved FM unit an opportunity for learning.

Building a trust-based relationship and reducing the asymmetry between the client and the ESCO provider are two ways to reduce transaction costs, as described by Backlund and Eidenskog (2012).

The demonstrator role. Finally, the FM unit initiates its role as demonstrator in the decision making process—e.g., making promises, setting goals, aspiring to achievements, etc.—related to how the ESCO project will support municipal strategy. Due to the ESCO concept's strong focus on documenting its achieved results, the FM has a favourable position for demonstrating actual results. However, the FM also runs the risk of not achieving results—although the ESCO contract includes guarantees for reaching certain results, this is defined from a baseline, and if other factors influence the baseline, then the results will change accordingly. As an example, the ESCO project in Gribskov municipality set a guaranteed goal of a 17% reduction in energy costs. After the first two years, however, energy prices had risen almost accordingly, resulting in no actual economic savings (although in the case of no energy savings, energy costs would have risen). Explaining this result and other baseline-related issues to the politicians is part of the demonstrator role. However, softer outcomes are also important to demonstrate, e.g., increased user satisfaction, improved learning environments, organisational benefits, spinoffs to other areas, etc.

A proposed model of FM roles in innovation processes during public-private partnerships

In summary, the data that we collected and analysed in this study suggests that public entities' FM units play multiple roles in relation to their different stakeholders, whom they address while innovating during public-private partnerships. We therefore propose a model that describes the three roles that public entities' FM units play during innovation processes that are carried out through public-private partnerships, such as ESCO collaborations. In the model by Kaya et al. (2004), the focus of the internal FM unit is on transforming the satisfaction of stakeholders (i.e., client organisations and their employees, i.e., FM end users) into business needs, which are tackled through workplace management (Kaya et al. 2004). Thus, their model is characterised as sequential and each FM role as mono-directional, with the FM unit acting first as translator, than as processor and finally, as demonstrator, which recalls the usual roles of public entities' FM units during FM innovation, as we visualised in Figure 1.

When a public-private partnership such as an ESCO-collaboration is initiated, however, an external party, i.e., the ESCO company, enters into the dynamics of innovation, which changes the nature of the roles played by the FM unit during innovation processes. In fact, the process overlaps and the roles of the FM unit intertwine with those played by the other stakeholders in the innovation process, as visualised in Figure 2.

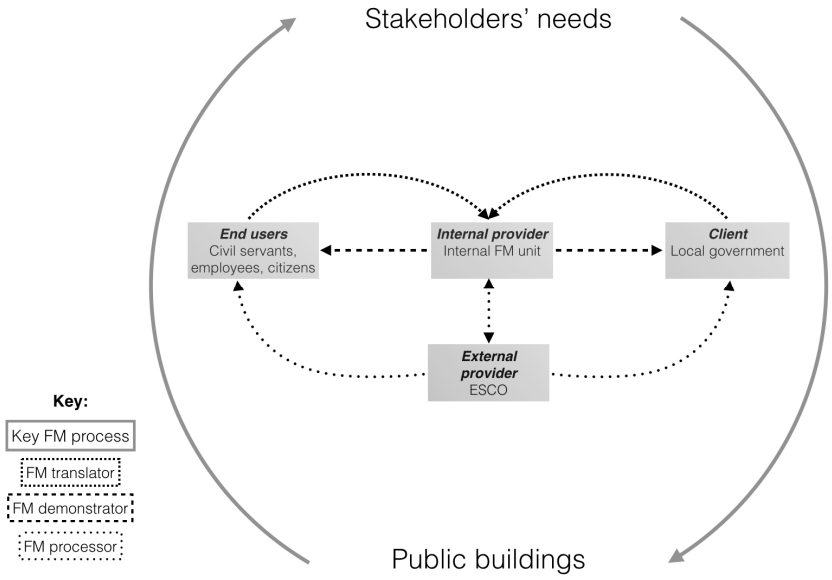

Figure 2: FM innovation processes and FM roles within ESCO collaborations—a visualisation of the proposed model

We argue that during ESCO collaborations, and public-private partnerships in general, stakeholder needs are taken into consideration to guide innovation processes, e.g., energy renovation for managing public buildings, whose outcomes in turn, aim to satisfy stakeholder expectations. When presenting the analytical framework, we have stressed that Kaya et al. (2004) have chosen not to include external provider(s) in their model, and so we did. However, the data suggest that whereas ESCO companies are external provider like those that traditionally (i.e., when there is no public-private partnership such as ESCO in place) have interacted with FM units, they play a different role in the innovation processes that are implemented by means of ESCO collaborations. In fact, in such circumstances, it is the ESCO company that bears the risk of the innovation process and operates as a processor instead of the FM unit, rather than supporting that FM unit, as in the traditional setting presented above.

In other words, the FM unit (1) coordinates between clients and end users by acting as translator and demonstrator; (2) collaborates with the ESCO company to implement energy renovation (FM processor). As mentioned above, the internal FM unit that translates the business strategy into measures for the FM innovation process. However, the client organisation—i.e., the public entity (the local government, in the case of ESCO collaboration)—also needs to translate the FM unit's initiatives into the municipality's policy goals. Similarly, end users might be able to influence the outcome of the innovation process by integrating, i.e., translating, the goals and objectives of the FM innovation process into their routines to benefit from the innovation outcomes. This implies that when an ESCO collaboration is initiated, it is important to gain a different and more complete awareness of the end users, their behaviour and their needs and expectations.

Conversely, both the FM unit and the ESCO provider play the role of FM processor during the innovation process. The former entity acts as the processor in setting the stage and makes sure that the ESCO company processes actual FM innovation outcomes in serving the client, negotiating with the customer (i.e., that same FM

unit), and providing the innovated services to the end users. Finally, the FM unit acts as the demonstrator to document the outcome(s) of the innovation to clients and end users (including the community and society).

Discussion and conclusions

The purpose of this paper is to understand how local governments' internal FM units navigate interactions with their internal stakeholders and external private parties related to innovation throughout the course of public-private partnerships. In the public sector, ESCO collaborations are characterised in and of themselves as innovation processes, because they result in outcomes, such as new processes for energy monitoring and new practices of cooperation between intra- and inter-organisational actors, which are ideas—often from the ESCO provider—that are developed and put into practice and provide various benefits to the different parties that cooperate in the development.

We have used an analytical framework based on the existing literature on FM and service innovation to deductively examine how internal FM units navigate innovation processes when they are involved in public-private partnerships such as ESCO collaborations. The literature on FM innovation is still developing, and this study is the first to specifically emphasise the public sector, thereby contributing to a wider understanding of innovation within the FM industry, which is necessary to further develop FM as a discipline (Mudrak et al. 2005). More specifically, this study confirms and extends to the public sector the results of Noor and Pitt (2009) and Tay and Ooi (2001), who have spotted the potential of the FM unit for the innovation agenda of the organisation that it serves. However, our findings suggest how FM units' roles of translator, processor and demonstrator, which they play during the innovation processes of public-private collaboration, are specific to the characteristics of the public sector and related stakeholders. However, by mediating and managing relationships among public and private stakeholders, FM units have the ability to actively contribute to the innovation strategies of the public entities that they serve—in addition to simply supporting end users' daily routines—in a manner similar to their private equivalents.

By analysing 10 ESCO collaborations in Denmark, this paper proposes a model of FM roles in public collaborative innovation processes such as ESCO collaborations. In the model, the three roles that Kaya et al. (2004) have attributed to FM units of private entities (FM translators, FM processors and FM demonstrators) are used to understand how internal FM units of local governments navigate and manage the collaboration of different, intra- and inter-organisational actors to develop and implement innovation outcomes. The model highlights the overlapping and multi-dimensional nature of the relationships between internal FM units and internal and external stakeholders during FM innovation processes by pointing out how internal FM units (1) coordinate between clients and end users by acting as translators and demonstrators; and (2) collaborate with ESCO companies to implement energy renovation (FM processor).

This paper contributes to the literature on FM innovation by (1) exploring FM innovation in the public sector, whereas existing research tends to focus on private entities; and, most importantly, (2) depicting the coordinating role of local governments' internal FM units, in cases of public-private collaborative innovation.

Internal FM units involved in public-private collaborations such as ESCO need to mediate between internal and external stakeholders, keeping in mind the public's interests. This mediation significantly distinguishes internal FM units of public entities from internal FM units of private entities, which facilitate the balance between the strategy, goals and objectives of their client organisations and those of the external providers, while ensuring that the end users can handle their core businesses without distractions.

This work also has practical implications. We offer an insight into the roles and experiences from the first Danish ESCO projects, which aims at informing and inspiring FM units when engaging with FM innovation aimed at energy saving. In fact, the study shows how internal FM units that are involved in public-private collaborations might act towards their intra- and inter-organisational stakeholders to manage public innovation processes: they should first and foremost consider the needs of all of their stakeholders, including the public. It is not only FM units that should clarify what different stakeholders expect from an ESCO collaboration; they also must (1) translate those expectations into actual goals and objectives; (2) process those expectations together with the ESCO company; and (3) demonstrate the fulfilment of those expectations to all stakeholders throughout the process, not just when concluding the collaboration.

Although this study's data were collected in Denmark, the results might also be applied to other countries where private-public collaborations such as ESCO projects drive public innovation. Nevertheless, the Danish market does have specific features, which need to be outlined to evaluate the applicability of our results to other context. First, in Denmark ESCO projects are often highly politically profiled, and represent an integrant part of the municipalities' climate agenda. More specifically, as in other countries, the EU Directive on the Energy Performance of Buildings has been a main driver for governments to encourage the development of energy services (Bertoldi et al. 2007). However, the development of the ESCO market in Denmark has in practice been a combination of legal framework and incentives, market development on the supply side and the municipalities' own ambitions on the demand side. In contrast, other countries experienced a less political development of the ESCO market, which emphasised the efficiency potential of ESCO collaborations (Jensen et al., 2012). This implies that our model embeds the role of decision making as influenced by politics, whose relevancy for navigation and management of innovation might vary depending on the specific context. Second, few standardisation efforts have been carried out at the national level. This has created heterogeneity in the approaches that local institutions have adopted to implemented ESCO collaborations. In turn, this implies that internal FM units, as well as local governments and ESCO companies do not have a single model to guide their interactions when innovation throughout public-private collaborations. Therefore, the intermediary role of the internal FM unit is amplified as compared to other contexts, such as Sweden, in which dynamics of interaction are more standardised (Jensen et al., 2012).

Finally, this study is not free of limitations. First, the data were collected from a limited sample of ESCO collaborations in Denmark. To increase the external validity of the study, therefore, future research should investigate collaborative innovation in ESCO (and other forms of private-public) collaborations outside of Denmark. Second, the ESCO collaborations were studied in their initial stages of development, which

implies that further investigations should be conducted to understand further developments in such public-private collaborations and their impact on public innovation.

References

Ansell, C. & Gash, A., 2012. Stewards, Mediators, and Catalysts: Toward a Model of Collaborative Leadership. *The Innovation Journal: The Public Sector Innovation Journal*, 17(1).

Backlund, S. & Eidenskog, M., 2012. Energy service collaborations—it is a question of trust. *Energy Efficiency*.

Bertoldi, P., Boza-Kiss, B., & Rezessy, S. (2007), *Latest Development of Energy Service Companies across Europe – A European ESCO Update*. European Commission – Institute for Environment and Sustainability, Italy.

Bommert, B., 2010. Collaborative innovation in the public sector. *International Public Management Review*, 11(1), pp.15–33.

Coenen, C., Alexander, K. & Kok, H., 2013. Facility management value dimensions from a demand perspective. *Journal of Facilities Management*, 11(4), pp.339–353.

European Parliament & Council of the European Union, 2006. EUR-Lex-32006L0032. *Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC*.

Den Hertog, P., 2010. *Managing service innovation: Firm-level capabilities and policy options*. Faculteit Economie en Bedrijfskunde.

Jensen, J.O., Nielsen, S.B. & Hansen, J.R., 2013. Greening Public Buildings: ESCO-Contracting in Danish Municipalities. *Energies*, Special Issue on Energy Efficient Buildings and Green Buildings (6), pp.2407–2427.

Jensen, J.O, Nielsen, S.B. & Hansen, J.R., 2012, ESCO Activities in Denmark. in Langlois, P. & Hansen S. (eds), *World ESCO Outlook 2012.* Taylor & Francis.

Jensen, P.A., 2008. *Facilities management for students and practitioners*, Technical University of Denmark, Centre for Facilities Management.

Jensen, P.A. et al., 2012. In search for the added value of FM: what we know and what we need to learn. *Facilities*, 30(5/6), pp.199–217.

Jong, J.P.J. De et al., 2003. *Innovation in service firms explored: what , how and why?*, Zoetermeer.

Kaya, S. et al., 2004. Raising facilities management's profile in organisations: Developing a world-class framework. *Journal of Facilities Management*, 3(1), pp.65–82.

Marino, A. et al., 2011. A snapshot of the European energy service market in 2010 and policy recommendations to foster a further market development. *Energy Policy*, 39(10), pp.6190–6198.

Mudrak, T., Wagenberg, A. Van & Wubben, E., 2005. Innovation process and innovativeness of facility management organizations. *Facilities*, 23(3/4), pp.103–118.

Noor, M.N.M. & Pitt, M., 2009. A critical review on innovation in facilities management service delivery. *Facilities*, 27(5/6), pp.211–228.

Sorensen, E. & Torfing, J., 2012. Introduction - Collaborative Innovation in the Public Sector. *The Innovation Journal: The Public Sector Innovation Journal*, 17(1), pp.1–14.

Sorrell, S., 2007. The economics of energy service contracts. *Energy Policy*, 35(1), pp.507–521.

Sundbo, J., 1997. Management of Innovation in Services. *The Service Industries Journal*, 17(3), pp.432–455.

Tay, L. & Ooi, J.T.L., 2001. Facilities management: a "Jack of all trades"? *Facilities*, 19(10), pp.357–363.

Appendix 1

Interview guide for in-depth interviews

Background, objectives and status:

- Please describe the ESCO project in your municipality: purpose, stages, partners, status, organization, types of buildings and the organization for building operation.
- How did you arrive at the decision that you wanted to engage in an ESCO project?
- Concerning the motivation to start an ESCO collaboration, who did the initiative come from (e.g., politicians or management of the FM unit)?
- What considerations lay behind it? What advantages/disadvantages did you consider?
- What were the conditions of the municipal buildings that were the object of the energy renovation?
- Had you carried out any energy saving measures before you initiated the ESCO collaboration?
- How did you set the energy saving goals (e.g., based on building standards, effective installations)?
- What did you consider when deciding upon initiating an ESCO collaboration? How were the more reluctant actors convinced?
- What impact did the energy strategy set by the government in 2008/09 play on the decision making?
- Are there other municipal plans and commitments that interact with ESCO initiative?
- How was the tendering process organized?

Contract and cooperation:

- How is the contract constructed?
- Why was the specific partner selected?
- Are there any special requirements on the management of the ESCO collaboration embedded in the contract? If yes, how? Did anyone assist you in negotiating the contract?
- How is the ESCO collaboration anchored in the municipality? Who has responsibilities on the contract? Which parties internal to the local institution are involved in the ESCO project?
- How have users of municipal buildings (including the operating staff) been involved in the decision-making on the ESCO project? How are they involved in its implementation?
- Is all the contact with users left to the ESCO company?
- Does the contract include requirements for training and education of operational staff?

Experience and learning:

- How did you experience the ESCO project process so far?
- Which barriers and drivers have you encountered?
- What has been the best experience? What are you most proud of? And on what issues do you feel that it could have been done better?
- How is the ESCO project effecting your facilities management/property management in terms of, e.g., organization roles and tasks, new ways of thinking, implemented energy solutions, learning and so on?
- Has the ESCO collaboration lead to different relationships with users and other administrations?
- Can you apply the learning from the ESCO project to other contexts?

Opportunities and Perspectives:

- Which are the future opportunities, if any, for ESCO collaborations in the municipality?
- In your perspective do you think that your experiences might be relevant to other public or private building owners (e.g., in case of other types of public buildings and/or property owners, such as commercial, residential)?

Biographical Details:

Giulia Nardelli is a Ph.D. candidate researching innovation processes in services by drawing specifically on the FM context. Her
current research interest lies in the intersection between innovation theories, process studies and stakeholder management.

Jesper Ole Jensen is a PhD and senior researcher at the Danish Building Research Institute, Aalborg University, with a main research interest in approaches to achieve sustainable buildings and cities.

Susanne Balslev Nielsen is associate professor and deputy in the Danish Centre for Facilities Management – Realdania Research. Her research interest lies in processes of integrating sustainability in facilities management.

Table 1: Characteristics of 10 ESCO-projects in selected municipalities

Municipality contract period	Number of buildings Floor area	Investment, in €/m2	Guaranteed savings, in %	Improvements
Kalundborg 2009-2021	10 buildings 20,000 m^2	89	21%	Technical system and installations.
Middelfart 2008-2015	100 buildings 190,000 m^2	31	20%	Installations and indoor environment in all municipal buildings and re-insulation of a few buildings. Energy labelling of all buildings.
Copenhagen 2009-2018	27 buildings 68,000 m^2	24	20%	Energy savings and energy labelling of properties in the nursing facility "De Gamles By".
Gribskov 2009-2016	100 buildings 190,000 m^2	32	17%	Energy savings through better management of and technical improvements to buildings.
Vallensbæk 2009-2019	40 buildings 114,000 m^2	78	31%	Technical systems and building envelope for municipal buildings. Energy labelling
Kerteminde 2009-2019	60 buildings 117,000 m^2	51	17%	Installations, steering and building envelope.
Høje Taastrup 2009-2023	270 buildings (total), 270,000 m^2	38	14%	Installations, building improvements, renewable energy.
Halsnæs 2009-2021	120 buildings, 130,000 m^2	69	30%	Installations and building envelope, along with incentives for users to save energy.
Greve 2009-2016	12 schools 110,000 m^2	22	19%	Better heat regulation, ventilation and lighting in schools and kindergartens.
Sorø 2009-2022	68 buildings 140,000 m^2	65	22%	Energy systems and building envelope for all municipal buildings.