

Analysis of framework conditions of energy performance contracting (EPC) in Switzerland

Contracting the Gap: Energy Efficiency
Investments and Transaction Costs

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Glossary

ACT	Cleantech Agentur Schweiz (Energy Agency)
BBL	Bundesamt für Bauten und Logistik
EnAW	Energieagentur der Wirtschaft (Energy Agency)
EPC	Energy Performance Contracting
ESCO	Energy Service Company
IFRS	International Financial Reporting Standards
K	Kilo / Thousand
M	Million
MuKEn/MoPEC	Mustervorschriften der Kantone im Energiebereich / model regulation for energy by the cantons
SFOE	Swiss Federal Office of Energy
SME	Small and Midsize Enterprises
Swiss GAAP FER	Swiss Financial Reporting Standard
VAT	Value added tax



Overview

This paper is part of a research project entitled “Contracting the Gap: Energy Efficiency Investments and Transaction Costs”, which aims at analyzing the deployment and the potential roles of energy contracting in Switzerland, specifically the market for Energy Performance Contracting (EPC).

EPC consists of outsourcing the design, the structure, and sometimes the financing (depending on the financial interests of the client) of an energy-efficiency project to a contractor called an Energy Service Company (ESCO). Generally with a long term contract, the ESCO provides its client with a reduction in energy costs in exchange for a fixed fee or part of the savings achieved. Through a performance guarantee or by sharing the savings achieved, the ESCO bears a significant part of the performance risk. As a result, EPC can be considered as a promising market-based instrument to induce energy efficiency investments in both private and public buildings. Yet, the EPC market is only emerging in Switzerland.

The focus of this study is on the impacts on the energy efficiency gap and related transaction costs. The results will be used to provide sound empirical evidence to guide politics towards designing successful energy strategies. The project is divided into four parts, where the present paper represents part 2.

1. A comprehensive literature review (Klinke et al. (2016)) first examines in detail the definition of EPC, as well as energy service contracting in general. It explores the literature on the potentials of several types of contract in reducing the barriers to developing both renewable energy and energy efficiency. It also provides a comprehensive summary of the important literature stock, consisting of surveys, expert interviews and market analyses at the international level and reports general trends in foreign EPC markets. Even if such literature does not exist for the Swiss market, the review highlights its main differences with respect to more developed markets.
2. Based on the literature review, the present paper attempts to analyze the framework conditions, as well as drivers and barriers of the EPC market in Switzerland. This analysis is based on the perspective of the supply side and other stakeholders on the current market situation.
3. The third part of the project focuses on the demand side. Based on a survey dedicated to potential EPC clients, we explore to what extent and through which mechanisms these contracts induce investment and reduce barriers to energy efficiency and renewable technologies.
4. Finally, a choice experiment is conducted among potential ESCOs in Switzerland. By analyzing the business decisions of these companies in different legal and policy frameworks, the objective is to understand interactions between EPC and other policy instruments and mechanisms that could further promote the EPC market.





1 Introduction

Switzerland's building sector satisfies a priori many of the prerequisites of a successful market for Energy Service Companies (ESCO) implementing energy performance contracting (EPC): strong financial institutions, a significant number of credit-worthy private and public companies with budgetary constraints, an increasing need for building renovation and finally, the policy context of ambitious energy efficiency and CO₂-reduction objectives.

However, the real situation seems to differ from this initial assumption. Although a limited but growing interest seems to exist on the supply side, the concept remains unknown to many potential clients, including public entities. Until very recently, EPC calls for tender were almost nonexistent in Switzerland (Klinke et al. (2016)). As a result, the Swiss EPC market is still in its infancy, lagging behind neighboring countries, such as Germany or Austria.

Despite this apparent paradox, the Swiss EPC sector has finally been initiated by a few recent contracts held by different ESCOs and some public calls for tender expected for 2016. Moreover, an association for EPC (swissesco) was founded by interested parties in 2015 with the main goal of developing the Swiss market. However, this has occurred with a certain delay after the first trials promoted by the 'Energie2000'¹ initiative in the 1990s.

The present study is a first attempt to explain the Swiss EPC market's delay, by analyzing in details the framework conditions, as well as the barriers and drivers of the EPC market, using expert interviews.

The paper is organized as follows. The adopted methodology for analyzing the current situation is described in chapter 2. Chapter 3 provides the underlying value proposition based on the business model concepts developed by Teece (2010), and an analysis of the organizational structure for EPC. Chapter 4 presents an analysis of actors. The framework conditions, including market drivers and barriers with potential solutions are presented in chapters 5 and 6. The current involvement of the public sector and current or future regulations that could have an impact on the EPC market are presented in chapter 7, followed by concluding remarks in chapter 8.

¹ Energie2000 is now called EnergieSchweiz/SuisseEnergie. More information on this initiative is provided in Table 4. Erreur ! Source du renvoi introuvable.



2 Methodology

The analysis of the framework conditions for EPC in Switzerland includes a review of the legal and financial environment, the market conditions and, among others, a comparative analysis of EPC actors and stakeholders active in similar businesses. The literature based analysis is complemented by observations and lessons from interviews with experts who are familiar with the Swiss boundary conditions and the market environment.

In section 2.1, the interviews' target groups used to gather the relevant information on the Swiss EPC market are specified, followed by a description of the interview structure (section 2.2).

2.1 *Target Groups for interviews*

The identification of target groups with a possible interest in EPC in Switzerland is based on an analysis of market players in foreign countries, as well as information provided in the initial interviews with active EPC suppliers and important stakeholders in the Swiss market.

Four different service sectors were identified for the interviews:

- technology suppliers and utilities, including those already active in EPC provision as well as those with no EPC activities
- financing institutions potentially interested in Swiss EPC projects
- cantonal public authorities
- legal experts specialized in specific legal issues related to EPC framework

A pre-defined set of questions has been assigned to each target group as described in section 2.2.

2.2 *General structure of interviews*

For each target group, a questionnaire was prepared focusing on specific aspects of EPC (see appendix 10.2 to 10.5). With technology suppliers and utilities, the following topics were discussed:

- available know how and current interest in EPC within the company
- potential business model set up for EPC within the company
- potential barriers hindering the deployment of EPC in Switzerland
- potentials for the development of EPC and perceived expected market volumes



After evaluating the general interest and possible activities related to EPC within the company, we investigated whether specific market research has been conducted to evaluate the expected market size and/or whether there were special events triggering the decision to develop the business further.

Based on the answers provided, the actual or potential business model was discussed with questions identifying the value proposition of the firm, its delivery mechanism and the way it captures the value through EPC (see for instance Teece (2010) for more on these concepts).

Subsequent questions focused on the industry competition and the business model environment to better understand the opportunities, risks, hurdles, and barriers of EPC. The interviews were then concluded with questions related to the expected potentials and future developments of the market.

For companies which have not yet been active in EPC, the interviews were more structured towards the implementation of their business model and potential innovations in this domain, either towards EPC provision or other kind of energy services.

Finally, depending on their legal or regulatory grounds, the market barriers perceived by the actors were discussed with legal experts and public authorities.



3 Value proposition and organizational structure

In order to fully understand the position of companies willing to provide EPC in Switzerland, or of those interested to supply it in the near future, it is important to explore the business model they intend to implement. In the context of an emerging EPC market, these business models are likely to be based on the suppliers' own perception as well as preliminary experience they could gather, either in foreign markets or with the few contracts they implemented in Switzerland. Other companies have led market studies and comparative analyses with foreign markets in order to build their business model proposition.

In the following subsections we first develop the interviewees' point of view regarding the value proposition they offer to their client. Then through an analysis of the organizational structure, we identify the delivery mechanism through which this value is optimally conveyed to the customer.

3.1 *Value proposition*

The value proposition provides an overview of the customer's needs which are satisfied through EPC. In other words, it makes sense for the supplier to define what is finally delivered to the customer and how it solves its client's problem (Osterwalder et al. (2015)). For active ESCOs in Switzerland and some who are interested in entering the market, the value proposition relies on the technical aspects brought through EPC. The answers ranged from selling technical knowledge towards optimizing technical parameters of equipment, or selling equipment with higher efficiency, complemented with a permanent monitoring system and performance measurement.

Therefore, the main value proposed to the client is an improved equipment and machinery efficiency combined with a reduced energy bill at the end of the year. However, there are other aspects of EPC which could interest the clients, but are promoted only by a few suppliers or rarely recognized as the principal component of their business model. These benefits include among others, a higher level of comfort or system reliability, performance guarantees, or additional financial services.

After determining how EPC is presented as a value added, we must explore the organizational structure the ESCOs implement for an appropriate structure of key activities, resources and partners in order to capture this value. This is done in the following subsection.



3.2 *Organizational structure*

According to different interview partners and the general understanding of EPC, the organizational structure for EPC can be split into four main key activities:

1. Audit (collection of information)
2. Optimization proposal
3. Financing
4. Implementation of measures
5. Performance Guarantee (operation and maintenance, measurement and verification)

After a general agreement to investigate the EPC potentials in a project during an initial meeting between the supplier and a potential client, the next steps in the EPC organizational structure usually start with an energy performance audit. As part of this process, all available information is collected on the current state of the energy appliances and the energy consumption is measured for a specific period of time. The procedure ranges from reading energy bills and orders to installing sensors and meters to survey specific energy flows in sub-processes of the production process; from average values to 15 minute intervals. Based on the measurements, the overall energy demand is calculated and the demand flows are specified. The measurement period is usually accompanied by detailed exchanges between the EPC supplier and the operations manager of the energy appliances together with the owner. These inputs are important for the supplier to understand the usage profile of the appliances as well as the operation modes and specialties.

Based on the measured data, the supplier offers specific optimization steps to realize the full energy demand reduction potential. This can simply involve an improvement of the technical equipment and/or suggestions for process changes, but can also include building automation systems and occasionally, though less frequently, an improvement of the building envelope.

The implementation of the agreed optimization measures is carried out by the ESCO and potential sub-suppliers. More technical realization can include the installation of intelligent control instruments and sensors, heat exchangers, the replacement of pumps, boilers or other equipment needed to provide heating or cooling within the building.

The difference between the organizational structure of a normal renovation project and an EPC project lies in the prolongation of the value chain towards financing (activity 3) and performance guarantee (activity 5). The ESCO can therefore secure the financing of the project. In addition, the contract may provide a guarantee for a pre-defined level of energy savings or remunerate the ESCO according to the energy savings achieved. To be able to guarantee the success of the project, the ESCO needs to control the operation and maintenance



of the equipment installed and run proper valuation and verification measurements during the contract period.

After having described the key activities of an EPC project, we asked the experts to determine which resources and partners have to be deployed for an appropriate implementation. It was of particular concern to determine which activities were important to keep in-house and which ones could be externalized.

Whilst there is no general consensus among the EPC experts on which activities can be externalized, two generalities can be identified using their responses. First, the only activity that cannot be completely outsourced is the audit. While some ESCOs externalize part of the analysis, they still have a control over it since they keep access to the information collected and verify the conclusions of the audit. Therefore, this first activity is crucial for the success of the EPC projects. Intuitively, the importance of this phase relies on the fact that the ESCO cannot provide any financing or performance guarantee, without controlling the ex-ante analysis of energy savings potentials. This in turn points toward an important difference between EPC and conventional renovation projects. In EPC, the optimization measures proposed are carefully analyzed in order to implement the most effective combination of energy efficiency measures in order to maximize the energy savings achieved.

Second, the only activity that the ESCOs would unanimously be ready to outsource is the financing part. However, finding appropriate partnerships with financial institutions seem to be difficult in some cases. It appears that financial institutions will be key partners for the deployment of the market. Facility managers have also been cited as very important both during the negotiation phase and during the operating phase, including operation, maintenance, measurement and verification.

Other firms, called facilitators, have a role to play in the future to support the clients, especially in the first two activities, i.e. audit and optimization proposal. A description of these key partners, together with other stakeholders of the EPC market, is provided in the next chapter.



4 Analysis of actors

In this chapter we analyze the actors and their role in the suppliers' description of business model. We are exploring the interests of potential suppliers in providing EPC as well as their clients target groups. The role of other important stakeholders is also analyzed.

The demand-side point of view regarding EPC will be developed in a subsequent paper². However, the EPC benefits for the clients as perceived by suppliers are presented in section 5 of the present paper.

4.1 ESCOs

As seen in foreign markets as well as with potential or active ESCOs in Switzerland, a large panel of firms can be active in the EPC market. They can be investors, technical equipment builders or installers, energy suppliers and utilities, engineering consulting firms, builders or entrepreneurs. In Switzerland today, to our knowledge, only 4 ESCOs have implemented EPC projects, with a total of around 10-15 contracts signed. There are however, a much larger number of companies in the set of potentially interested actors including those willing to become ESCOs, facilitators, ESCO suppliers, investors or other stakeholders. The companies involved in the swissesco association provide a relatively good lower estimate³ of the number of interested firms.

4.1.1 Reasoning for ESCOs to provide EPC

When new business models are introduced, one is always interested in their viability. Companies would invest in new business models only if there are valuable arguments such as financial gains or an improved client base. From the conducted interviews we can observe that EPC is provided for the following reasons:

- Increasing market volume for equipment and maintenance portfolio
- Binding clients in the long term
- Stabilizing cash flow on annual basis
- Covering client's needs
- Keeping control on business processes, resources, inventions
- Preserving competitive advantage

As can be seen from the answers, there are two approaches in arguing for the new business model.

² This will be the 3rd paper of the overall research project (see the overview at the beginning of this paper).

³ This should be considered as a lower bound, because we know at least 5 active or interested ESCOs who are not members of the association yet.



The first one focuses on the supplier's side, striving for increased market shares in the business of the firm, or trying to secure market shares by long-term contracts. A successful company can increase the revenues in general and stabilize the cash flow by accounting for predictable annual revenues over a long period.

Other suppliers are taking the client's point of view and try to identify their needs which can be covered by EPC services. Although this approach seems to be promising, only few insights could be gained during the interviews on the effective value proposition. We expect that with the planned interrogation of the clients in the course of this research project, further insights will be gained on this perspective. Section 7.4 describes whether and how current or future policy measures influence the decision as to provide EPC or not.

4.1.2 Reasoning for ESCOs favoring no participation in EPC markets

Some of the interviewees did not show a concrete interest in providing EPC for the following reasons:

- Legal hurdles too high
- Small market volume
- Large up-front investment for the ESCO willing to provide EPC in terms of technical knowledge and risk appraisal expertise
- Financial and reputational risks if guarantees cannot be met

One of the most important reasons not to provide EPC seems to be the perception of the legal framework in which those contracts need to be handled (see also chapter 6 and more specifically 6.3). Depending on the company culture and experience with such framework conditions, the risk perception will vary and with it, the strategic decision on how to proceed with the EPC business model.

Also on the strategic level, the unclear market potential is a far more relevant topic for the decision making body to investigate further. As far as we have seen, no reliable estimates exist on the potential EPC market size in Switzerland. Therefore, business development specialists have to argue on weak grounds to convince the decision making body to agree on the likely business plan. Furthermore, the number of pilot projects is negligible thus failing to provide a sufficient experience to support the business decision.

Other reasons such as financial and reputational risks can be handled on a relatively low scale and therefore should not be considered relevant for the strategic decision.

4.2 *Client target groups*

The clients typically targeted by suppliers or potential suppliers are characterized by the following aspects:



- Centralized, large energy consumption
- Refurbishment or optimization needs for existing infrastructure and operations (either because of legal requirements, inefficient operations or desuetude)
- Limited financial resources for non-core-activity investments
- Professional risk perception and technical handling
- Interest in (or no reluctance towards) long term partnerships

Currently, EPC is not a standard product widely known in the market. Moreover, it probably entails high transaction costs. Therefore, the client target groups are large energy consumers with a centralized office or production site. With those potential clients, the transaction costs are reasonably low compared with the overall investment allowing a positive return on investment for both parties. In addition, large enterprises are usually more experienced in terms of risk assessment and operation of technical structures. This allows reduced transaction costs by keeping the negotiation process short.

Public owners, though usually less familiar with technical specification and management, are still an interesting EPC target. This is because they are usually of significant size with large energy savings potentials and often lack the financial resources required for energy efficiency investments. Furthermore, they represent creditworthy entities, which can accept relatively long payback time.

On the clients side it is also important to understand the timeline of EPC from the beginning. Currently, with low energy prices the payback time is long. Therefore, one has to accept that EPC contracts will last for approximately 5 to 10 years at minimum. Together with the financial limitations this does not favor EPC in terms of financial risk assessment. Therefore, a profound understanding of the clients' market situation seems crucial.

To strengthen the focus on large customers even further, one can state that EPC is not likely to be a solution for small energy consumers. Indeed, there is currently a consensus among suppliers that audit and negotiation costs are incompressible due to the risks borne by the ESCO during the contractual period. As a result, energy saving potentials in small consumers' buildings are not sufficient to offset the incurred transaction costs hence, compromising the viability of EPC in this market segment. However, potential adaptations of EPC to small consumers have been mentioned, such as solutions where only one technology is used. An example of this is in lighting, where standard contracts and small audits are sufficient. But this would come at the cost of foregoing potentially interesting comprehensive refurbishments, only because the client is of small size.

There might be other ways to work around costly audits for small energy customers by accepting standardized evaluation methods. Since the financial volume is smaller, the risk perception could be appeased and therefore more general audits might be accepted by both parties. However, this needs a common understanding and certain trust in the partnership. ESCOs might also be



reluctant to standardize the evaluation methods such as audits without reducing at the same time the performance guarantees.

When discussing smaller consumers with cantonal energy authorities, it also appeared to them that instruments other than contracting would be necessary to induce investments in energy efficiency in that market segment. For instance, the idea of cheap and simple automatisms has been raised, such as annual visits by an energy expert for advice and monitoring, as in the chimney-sweeping model. Instruments such as credits at zero interest rates could also be a potential solution.

4.3 *Facility managers*

Facility managers already employed by the client could play a crucial role in the EPC business model. Their daily work on site in close contact with the building's technical equipment brings a valuable understanding of the technical conditions of the infrastructure. In addition, they are familiar with the daily operation including special situations under which the energy demand might deviate significantly from the normal conditions.

On the other hand, it is also recognized that facility managers may be reluctant to the fact that external actors (i.e. ESCOs) intervene on the facility and manage the operation during the contractual period. This explains why a close collaboration with these actors is crucial for ESCOs. This has been recognized by the respondents active in EPC, who clearly see facility managers as key actors for the success of these projects, not only in the operation phase of the contract but also in the preliminary steps of negotiation, audit and design.

4.4 *Facilitators*

In the current environment, facilitators can help to spread the word and recommend EPC to potential clients. Facilitators can be engineering firms or consulting firms that work as a third party in the negotiations between the client and the ESCO⁴. Since the business model is not yet known to the customers they need an independent partner to explain the opportunities and risks entailed in EPC projects. Their consultancy can even be extended after the signature of the contract, to support the client in the control of installation, operation, maintenance, measure and verification lead by the ESCO. Facilitators usually have a good understanding of both parties. On one side, they are in close contact with potential clients and are familiar with their needs and intentions. On the other side, they know the suppliers and can bring expert advice on the equipment and technical solutions.

⁴ See Bleyl et al. (2013), for more on the definition and role of facilitators.



4.5 *Engineering consulting firms*

Engineering consulting firms and large energy customers are already working closely together in the field of energy efficiency. These firms have gained a lot of experience regarding the planning and implementation of such measures. Therefore, it would be a small step to expand the consulting services in the direction of EPC where guarantees and long term contracts are involved. These firms could either work as ESCOs or as facilitators. In the latter case, by having engineering consulting firms as EPC promoters, barriers relating to lack of information or legal requirements during the selection process (see chapter 7) could be reduced.

4.6 *Public authorities*

Public authorities have a role in the EPC market as potential clients, energy agencies and also appear as regulators, defining the boundary conditions of the market. This is described in more detail in chapter 7.

4.7 *Financial institutions*

In the Swiss EPC market, financial institutions may have a smaller role to play than in other foreign markets, at least in the preliminary steps of the market deployment. As put forward by some interviewees, many potential Swiss clients already have sufficient access to financial resources to invest in energy efficiency projects. On the other hand, when the client is not willing to finance the installation, as in the shared-savings EPC scheme⁵, almost all of the active ESCOs are currently financing the projects internally. Of course, this may no longer be the case for new entrants, such as small local entrepreneurs or when the EPC market will be more mature, bringing large ESCOs to their financing constraints. Therefore, seeking investment funds for EPC projects or bank partnerships will probably be an important step in the further development of the market.

Several investment funds, from Credit Suisse, UBS or SUSI partners, can be cited as solutions to finance some of the EPC projects (BFE (2014a)). This, however, does not guarantee that all EPC projects will be readily financed. Indeed, the financial institutions we contacted are ready to invest only in large EPC projects with a minimum of 10 years horizon. Most of the ongoing EPC projects in Switzerland are too small to satisfy these criteria. Potential solutions to a lack of financing, from contractual and organizational mechanisms to public institutions' support are developed in section 6.2.1.

⁵ See Klinke et al. (2015) for a description of the different EPC schemes



4.8 *swissesco*

swissesco is an association promoting the EPC market in Switzerland. Founded in autumn 2015, it is supported by the SFOE and other active players in the EPC market. The main goal of the association is to disseminate information about EPC as well as references and standards for an efficient application of the model. This includes a manual on how to collaborate within- and how to design an EPC project⁶. The members are represented by stakeholders, such as ESCOs, utilities, engineering and consulting firms, academic research institutes or facilitators. The 2016 agenda of the association focuses primarily on guidelines for public entities to implement EPC. Active players are indeed convinced that the deployment of the business is crucially determined by the implication of public owners as clients, in order to show examples of the viability of the model. These guidelines will include references about appropriate public tendering processes applied to EPC, for projects submitted to the law on public markets, as well as public accounting advice.

4.9 *Research institutes*

swissesco also intends to constitute a comprehensive database of courses, research, and project information related to the Swiss EPC market. At its instigation, several groups of research, which were either already active in research dedicated to EPC or interested in it, could meet and share their knowledge. They include, for instance, the universities of Geneva and Neuchâtel, the HES-SO Valais, and TEP Energy. These research groups can play an active role in the EPC market deployment. They can investigate different theoretical and practical aspects of the business model and project implementations. This leads to a better understanding of the framework conditions, helping to overcome certain market barriers (see chapter 6).

Some courses related to energy management or buildings management are also offered at the University of Geneva and at the ZHAW, which can teach future ESCOs employees the practical and technical skills necessary for the implementation of successful EPC projects.

⁶ The manual should be finalized in autumn 2016 by swissesco.



5 Driving factors – benefits for the clients

Several ESCOs have emphasized that an important driving factor for the client to opt for EPC has been the financing solution brought by this model. However, this driver has mainly been observed abroad and to a lesser extent in Switzerland. In general, these clients have available resources to invest, but only on their core business, while energy represents only a small business part with low priority. However, the fact that EPC is attractive due to the investors' credit constraints on energy is not a consensus among the market players. As already mentioned, several actors have even explained the apparent delay of the Swiss ESCO market by the sufficient availability of financing for investments into energy efficiency measures. This would imply that the credit constraint is not a sufficient explanation to the energy efficiency gap⁷ in Switzerland. This point needs further research and the next module of this research project, dedicated to the EPC demand-side, is intended to provide some answers.

The second important advantage of EPC is that it is offered as a turnkey solution for large energy consumers that are subject to legal obligations. In most Swiss cantons⁸, a cantonal law forces large energy consumers⁹ to choose between 3 options of energy efficiency improvement plans. In most cases, a company can either contract a universal convention of objectives, a cantonal convention of objectives, or an analysis of energy consumption. In each case, the consumer must reach specific objectives of energy savings in a pre-determined period of time. For consumers who want an attestation of reduction of CO₂ emissions to reduce their CO₂ tax levy, or those who can apply for a CO₂ tax exemption¹⁰ and/or who can apply to a reimbursement of the supplement on electricity network transmission costs¹¹, they can do so only if they opt for the universal convention of objectives. In this context, energy performance contracting may be seen as an outsourced solution to make sure for these large consumers to meet the legal requirements. This, however, requires that the ESCO be accredited by one of the two Swiss organizations (EnAW or ACT) in order to supply solutions in the context of the universal conventions of objectives.

⁷ For a review on the energy efficiency gap, see Klinke et al. (2016), section 3.3.

⁸ Except (for now) the cantons Jura, Valais, Lucerne and Zug.

⁹ With more than 0.5 GWh electricity consumption per year and/or more than 5 GWh heating consumption per year

¹⁰ Exemption applies if CO₂ emissions are greater than 100 tons in a preceding year or if at least 60% of CO₂ emissions come from one of the activities listed in appendix 7 of CO₂ order ("ordonnance"). Condition: the consumer engages in a universal convention of objectives. (OFEV 2013)

¹¹ Total reimbursement applies if electric costs are at least equal to 10% of the gross value added (partial reimbursement if electric costs are between 5-10%). Conditions: reimbursement is at least 20'000CHF per year and that the consumer engages in a universal convention of objectives. (OFEN 2015)



However, as we will see in the subsequent section 6.4.2, accreditation is sometimes not so easily obtained.

In the case of public buildings, even when they do not reach the size of large energy consumers submitted to the aforementioned legal obligations, EPC can be seen as an interesting instrument to fulfill their duty of exemplarity in terms of energy efficiency and CO₂ emissions.

A further advantage of EPC, for both public and private clients, is to have a single interlocutor taking all the responsibility during both realization and exploitation phases. Lack of human resources has also appeared to be an important driving factor. And finally, trust and provider-client relationship seems to be a sine qua non condition for EPC to be successful.

In all these cases, experience has shown that energy savings do not represent the most important driving factor for the client. This is probably due to the fact that energy costs often represent only a small share of the overall cost structure. In order to convince the client, ESCOs should rather present other advantages, such as production system reliability, comfort or turnkey solutions. As a result, energy savings should only be presented as the "icing on the cake". The challenge for the ESCO is then to discover ex ante, what the client values the most.



6 Market Barriers

In addition to a review of the legal and financial environment for EPC in Switzerland, the interviews allowed us to identify several barriers on the markets mentioned by suppliers, potential suppliers, authorities and other stakeholders (see Figure 1). These barriers concern private large consumers, public large consumers, or both. They will be explained and detailed in the following sections, which include also potential solutions.

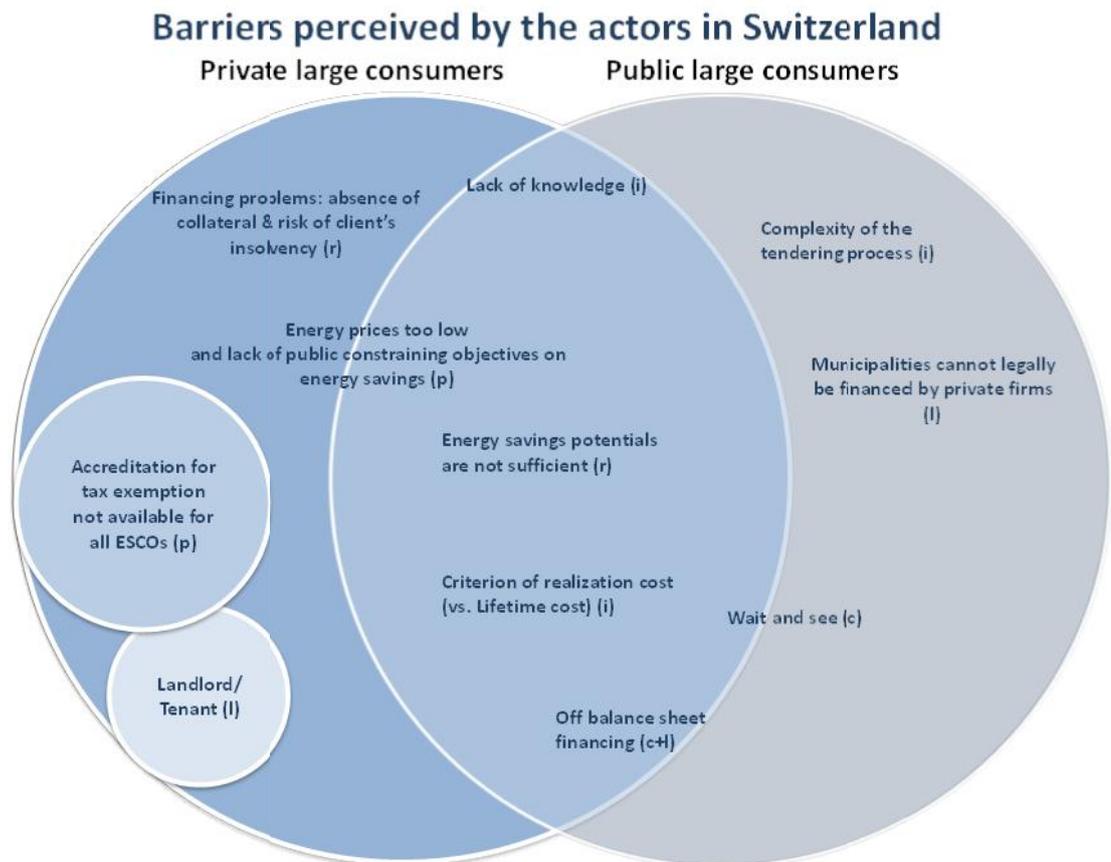


Figure 1: Summary of perceived barriers: information barriers (i), barriers related to risks for the ESCO (r), political barriers (p), legal barriers (l), cultural and behavioral barriers (c).



6.1 *Information barriers*

6.1.1 Lack of knowledge

Lack of knowledge was the problem that has been mentioned the most by the potential suppliers and current actors in the EPC market. "The problem with the energy performance contracting market in Switzerland is that we first need to explain the business model, before even trying to sell it." This sentence, stressed by J.-M. Zraggen, EPC expert from an active Swiss ESCO, summarizes well the situation.

How to improve the situation:

Not only the business model needs to be explained but also the terms and conditions of the contracts need to be specified in general terms (model contracts), so potential private and public clients get a better understanding of their role and contribution.

Additionally, a neutral organization that can inform about advantages and shortcomings of EPC would help to overcome this information barrier and reduce the current information asymmetry between suppliers and potential clients.

The situation may improve in the near future since the Swiss Federal Office of Energy (SFOE) has organized some information meetings for public entities about EPC, which can, in turn, inform smaller public institutions or large energy consumers in their region. Additionally, the association for participants of the ESCO market such as ESCO service companies, facilitators, investors, research institutes (swissesco) was founded recently with federal support and is starting its activities. It is likely to play a central role in the dissemination of information and model contracts.

6.1.2 Complexity of tendering processes

A second important constraint is the lack of knowledge of potential public clients on how to perform a proper tendering process for EPC. This concerns any public entity or any institution in charge of public tasks willing to sign an energy performance contract with a private entity, involving a significant amount of investment¹². These contracts are indeed subject to the law on public markets since they involve a pecuniary nature, through which the public entity acquires the services of a private entity, providing the means to execute its public tasks, in return for a payment of a price or any other kind of remuneration. As such, it

¹² see Table 1 for the investments thresholds



corresponds entirely to the definition¹³ set by the law on public markets (Poltier (2014)).

This implies that specific public tendering procedures open to national or even international competition must be implemented depending on the scope of application the public entity is submitted to.

Table 1 provides an overview of the procedures of public tendering that can be applied for each type of market and each public entity level. For instance, a municipality willing to acquire a service from a private firm is allowed to use a simple direct agreement (“gré à gré”), that is, without going through a public tendering process, if the total amount the municipality will invest in is below 150'000 CHF. However, if the investment is between 150'000-250'000 CHF, it will have to proceed at least on “invitation”. In this kind of procedure, the municipality invites bidders (if possible at least 3) to present an offer. This procedure does not require a publication of a call for tender. If the size of the investment reaches an amount higher than 250'000 CHF, the municipality can choose between an open procedure, i.e. a standard public tendering process or a selective procedure, where the municipality publishes a call for tender where candidates apply to participate to the bid. The adjudicator then selects ex ante the candidates who can present a quote. Finally, if the investment is above 350'000 CHF, open or selective procedures must even be open to international competition¹⁴.

¹³ The definition of a public market is not set in the legal texts (cf. federal law on public market or inter-cantonal agreement on public market). However, this absence of definition had to be very rapidly filled by the Swiss Federal Court, which set a first definition: “We are in the situation of a public market when a public collectivity, who intervenes on the free market as a “demander” (“Nachfrager”), acquires from a private firm, on payment of a price, the necessary means it needs in order to execute its public tasks.” (ATF 125 I 209 (212)). The international agreements on public markets (Swiss-European Commission), allows also identifying the essential elements of a public market, i.e. a contract, with a pecuniary nature.

¹⁴ This call for tenders will therefore be open to the firms in foreign countries having similar commitments than Switzerland at the World Trade Organization.



Table 1: Public tendering procedures (I = must be submitted to competition on international public market)¹⁵

	Supply						Service						Construction							
													Structural work				Finishing work			
Threshold values (excl. VAT)	<100 K	100 K-230 K	230 K-250 K	250 K-350 K	350 K-700 K	>700K	<150K	150 K-230 K	230 K-250 K	250 K-350 K	350 K-700 K	>700K	<300K	300 K-500 K	500 K-8.7 M	>8.7M	<150K	150K-250K	250K-8.7M	>8.7M
Cantonal & municipal levels (based on Inter-cantonal Agreement on Public Markets 1994)																				
Direct agreement																				
By invitation																				
Open				I	I						I	I			I					I
Selective				I	I						I	I			I					I
Federal Level (based on International Agreement on Public Markets of the World Trade Organization 1994, rev. 2014)																				
Direct agreement		16						16							16				16	
By invitation		17						17							17				17	
Open			I	I	I	I			I	I	I	I			I					I
Selective			I	I	I	I			I	I	I	I			I					I
Sectors of water, energy, transports, postal (e.g. CFF/SBB, Post, Swisscom for service deliveries related with public tasks) (based on Federal Law on Public Markets 1994)																				
Direct agreement					16						16				16				16	
By invitation					17						17				17				17	
Open						I						I				I				I
Selective						I						I				I				I

¹⁵ Summary table based on information gathered in Poltier (2014). Some exceptions can exist depending on which scope of application the contracting authority is submitted (can depend on inter-cantonal, cantonal or municipal laws for decentralized public entities at cantonal/municipal levels). (cf. Poltier (2014), pp. 143-144)

¹⁶ The federal council can extend the requirement to use by invitation, open or selective procedures below these thresholds (cf. Art. 2 III International Agreement on Public Markets of the WTO)

¹⁷ The federal council can extend the requirement to use open or selective procedures below these thresholds (cf. Art. 2 III International Agreement on Public Markets of the WTO)



One should note that Table 1 is a simplification of the legal framework. Indeed, while the inter-cantonal agreement has been signed by all cantons, they are free to set smaller threshold values than the one defined in this agreement. The details regarding each procedure may also vary depending on the canton¹⁸. These cantonal and even municipal specificities may explain some of the difficulties for EPC to break through the public market in Switzerland. However, public tenders are commonly used in Switzerland at all authority levels.

Subsections 'a' and 'b' describe why EPC is more complicated to define than any standard public market. Section 'c' will highlight some guidelines to overcome certain shortcomings in the tendering procedure.

a) ***EPC, a combination of service, construction and supply***

The first difficulty related to a public tender for an EPC project, as opposed to any other kind of public market, exists because it involves a combination of construction, service and even possibly supply ("furniture")¹⁹. So it is unclear under which scope of application the contract falls. In such a case, the market type with the highest value of investment should prevail in the determination of threshold values. The problem is that the size of the project in each market type, i.e. the total amount the public entity will pay to the ESCO respectively for service, construction or supply, can be difficult to estimate ex ante, especially in the case of shared-savings performance contracts where the payments are not fixed²⁰.

b) ***EPC public market definition: The problem of the "pre-implication"***

A second dimension lies in the description and definition of the public market before the public tendering is published. The scope of the project and the requirement specifications represent a crucial phase in the success of an energy performance contract. Without any public tendering process, each potential supplier of a client would lead a preliminary audit in order to detect the energy efficiency potentials in the building and base its offer on this analysis. In a tendering procedure, however, the preliminary audit, its results and recommendations must be published with the call for tender in order to satisfy the transparency principle (Poltier (2014)). In most cases, however, the public authority is unlikely to have the technical knowledge to lead itself this

¹⁸ For instance, a procedure by invitation in canton Vaud requires an invitation to at least one offer external to the municipality.

¹⁹ This could be the case for instance in comprehensive contracts, at the frontier between energy supply contracting and energy performance contracting, as is the case in integrated energy contracts (IEC) (see Bleyl (2011)), which include the provision of energy services, and thus include supply (furniture).

²⁰ See Poltier (2014), pp. 138-142, for more information on the way the value of public markets should be estimated.



preliminary analysis. Therefore, it will likely have recourse to an external private firm, which could typically be a facilitator or an ESCO.

But, in the latter case, the question is to know whether the ESCO leading the preliminary audit is authorized to take part of the following bidding procedure, or whether this “pre-implication” gives to it a competitive advantage which justifies its exclusion from the bidding process. Unfortunately, the answer may be slightly different depending on the law the public market is subject to, and again some cantonal specificities may appear. In general, however, the advantaged firm is allowed to participate under certain conditions (Poltier (2014)). It often implies that the analysis of the firm, as well as all the data and information it had in its possession to lead the analysis, must be transparently transmitted to the other bidders. The deadline for the submission of bids must also be adapted so that the other competitors can catch up. More critically, the adjudicator should also verify that the requirement specifications are not defined in a manner that provides the pre-implicated firm with an advantage, by requiring for instance some technical expertise or equipment that only this firm has, excluding ex ante, any other competitor.

Another problem, related to the necessity of externalizing the first phase of the tendering procedure, exists in the case of big public markets, involving buildings of very large structures. In these cases, this preliminary study can imply a consequent and expensive work which could reach the threshold values, requiring another public tender for this phase as well. As a result, the transaction cost increase considerably.

Finally, it is worth mentioning that this phase is crucial as the law on public market does not permit major modification of the project once the public tendering has been implemented and the adjudication submitted. As a result, if it appears ex post that the needs of the public entity have changed or have been incorrectly evaluated so that an important modification would be needed in the contract, the adjudication must be revoked. Moreover, if new competitors would participate after the project is changed the whole tendering process must be reinitiated.

c) *Guidelines*

How to improve the situation:

In order to deal with the specificity of a tendering process applied to EPC, public entities will need some guidelines. These could take the form of a standard document describing the appropriate procedures. However, as argued below, these should be sufficiently flexible. In addition, we argue that the involvement of facilitators will be indispensable in order to overcome this problem.

In response to the complexity public authorities are facing when envisaging an EPC, swissesco association plans to provide the potential public clients with



guidelines and examples of public tendering procedure documents. While providing useful insights for potential clients and possibly reduced transaction costs, it is important that these documents shall not be too rigid and allow the client to keep a degree of flexibility, allowing the implementation of innovative solutions as well as to simplify the procedure when the client is allowed to do so.

Indeed, the threshold values determining the required procedures have been chosen by the legislator in order to account for the entailed transaction costs. In the case of small investment amounts, it would be very constraining and inappropriate for public entities to enter into an expensive and complicated tendering procedure. For large investments, however, the importance of competition and its potential benefits in terms of reducing prices and increasing quality of bids are more likely to outweigh the transaction costs of a public tendering procedure. As illustrated in Table 1, a public entity can always decide to choose a procedure open to competition even if the size of the market would not require it. But in this case, the authority must be aware that it must satisfy the legal standards of this procedure, and as such, may be subject to potential appeals.

This is why the choice of tendering procedure, its entailed transaction costs and legal requirements, must be properly evaluated case-by-case and the example documents should not be too rigid. The guidelines should also permit to account for cantonal and even municipal specificities as aforementioned.

In this context, facilitators may even be more important and valuable than guidelines, in order to advise the client and set up tailor-made tendering procedures, satisfying corresponding legal requirements. They can also play an important role in the definition and design of the public market. This implies that the facilitator must have the technical expertise to do so, as well as the knowledge of specific legal frameworks. Not only engineers should step in, but jurists are needed.

At the end, the central issue for the public entities interested in EPC is to implement a tendering process which is irreproachable enough to sufficiently reduce the risk of appeal. First, the smallest consequence of an appeal can be a delay of the project implementation through a suspensive effect. Second, if the appeal is accepted and the contract has already been signed, the appellant may go through a second lawsuit. If the latter is accepted, it can lead the public entity to pay indemnities to the aggrieved bidder²¹. Finally, if the contract is not yet signed, an accepted appeal can lead to revoking the adjudication and force the public entity to restart, at least, the phase of the procedure where the infringement has been committed. This means that if at the very beginning of a tendering process, a wrong procedure has been chosen due to a misspecification

²¹ These indemnities are however capped at the amount corresponding to the costs of elaborating the offer and the appeal. The revocation of the contract invoking its nullity due to its violation of the law on public markets has not yet been used in the jurisprudence.



of the value of the market it would lead to reinstate the complete tendering process.

6.1.3 Risk of legal dispute

Another information barrier lies in the risk of legal dispute. This relates to the lack of knowledge and understanding of energy savings measurement and verification processes. It is less a problem for the client to accept the precise measurement of energy consumption after the energy efficiency measures have been installed, but rather to understand how the baseline energy consumption is computed, i.e. what would be the consumption if the contract would not have been signed. To do so, there exists a unified and internationally recognized protocol, i.e. the International Performance Measurement and Verification protocol (IPMVP), used by many ESCOs. However, the protocol is not yet known by the Swiss potential clients. Currently this results in a risk of legal dispute in the contract's exploitation phase.

How to improve the situation:

The risk of a legal dispute will be mitigated in the future when a more mature market has established and sufficient explanation is provided by the ESCOs on measure and verification procedures.

Additionally, clauses of renegotiations of the measurement protocol can also be included in the contract to increase flexibility ex post.

6.1.4 Criterion of realization cost

The last information barrier mentioned is linked to the clients' decision criteria that can be misleading in the sense that they do not properly account for the costs and savings incurred during the entire lifetime of the installation. For clients, up-front realization cost is often more decisive than overall costs including operation and energy costs during the installation's lifetime. This problem relates not only to EPC, but to energy efficiency investments in general. Indeed, the underestimation of future energy cost savings can be an explanation to what is termed the energy efficiency gap²².

²² For more on this, read Klinke et al. (2016), section 3.3.



How to improve the situation:

In this context, EPC may even be seen as a solution to this problem, especially when the ESCO finances the installation, because it allows significantly reduced realization costs, and at the same time decreased credit constraints, by spreading the payment of the installation during its entire lifetime. Turning this barrier into an advantage for clients opting for EPC will be a matter of information dissemination.

6.2 *Barriers related to risk for the ESCO*

While the information barriers concern potential clients, barriers concerning the ESCO's are described in the following.

6.2.1 Financing risks

The present section describes the difficulties linked to credit access or financing risks for EPC projects. Because these projects include energy efficiency improvements, their return is mainly determined by their ability to bring energy savings, which comes with a significant risk, as described in this section. Yet another financing barrier, which concerns only public potential clients, lies in the fact that it might be legally problematic for a private firm to finance a retrofit project in a public building. This second barrier, related to the legal framework, will be described in section 6.3.1.

When the ESCO or a third-party investor finances a performance contract, it bears a significant risk for two main reasons:

1. Any energy efficiency investment provides energy savings that are difficult to capture and communicate as well as uncertain ex ante. This includes any technological risks as well as the risk linked to a change in the final user's behavior, in the building or in the process occupation.

In the case the expected energy savings are not achieved, the ESCO will not be able to achieve the expected profit or the ESCO will even risk a financial loss. Depending on the project size and the experience of the ESCO to provide adequate service, the risks can be mitigated.



How to improve the situation:

One solution to lower the risk of the ESCO financing a single project would be to pool several projects, such as in a "Super ESCO" organization, as has been done in several developing countries, such as China or India, in order to leverage enough public and commercial financing (Limaye & Limaye (2011)). However, this mechanism may not be the most appropriate approach in the Swiss context, characterized by very heterogeneous EPC suppliers in terms of financial needs. Indeed, it may be difficult for small ESCOs to convince larger ones with sufficient financial resources that aggregating the projects is necessary²³.

Another solution would be for the ESCOs to provide the financial institutions with comprehensive tools which compute the technical and economic risk related to each project allowing them to lead a proper evaluation.

2. Further, financial risks are related to the credit rating of the client and the future prospects of its business development. The investor carries the risk of losses in case the client becomes insolvent during the operation phase or if the client decides to move and the new building owner is not ready to take over the contract. This is due to the fact that performance contracts often involve installations or measures of energy efficiency, whose property cannot be transferred to the investor in case of insolvency. A significant part of the work provided by the ESCO is also in the form of services, such as detailed audits, monitoring, measure and verification. As a result, a large part of the investment cannot be covered by collaterals owned by the investor.

²³ As a matter of fact, this kind of solution had been raised 20 years ago in Switzerland in order to develop the energy supply contracting market. This finally failed because large energy companies did not need any financial support and could develop the market without having any coordinated organization across all energy contracting providers. As a result, several small firms who were interested in providing energy supply contracting finally left the market as they were lacking financial resources.



How to improve the situation:

In order to mitigate the risks of client's default or relocation, contractual clauses may be included in order to protect the investor. For instance, a contractual clause can require from the client to pay an indemnity to the ESCO, in the case he moves out of the building during the operation phase and cannot convince the new building owner to take over the contract with the ESCO. Alternatively, ESCOs could build together a guarantee fund in order to mitigate the risk of clients' defaults.

Additionally, the financing institution has the option to opt for real estate liens which are described in more detail in section 6.2.1a)

However, these financial risks can hardly explain the delay of the Swiss EPC market development since this risk also exists abroad. Moreover, some interviewed financial institutions did not perceive this risk as hampering their investment in energy efficiency. The fact that an ESCO is guaranteeing the savings, provided it is a big and experienced ESCO, was sufficient for them to reduce the perceived performance risk. Yet, this does not guarantee that all EPC projects will be financed easily. This is due to a possible mismatch between financial institutions requirements and currently implemented EPC projects (see section 4.7)

Other solutions to induce energy efficiency investments are currently explored to receive facilitated access to credit as foreseen in some cantons (e.g. canton Fribourg). Under such a scheme, the cantonal bank proposes credit at a low interest rate for large energy consumers' energy efficiency projects and the canton guarantees to reimburse the bank in case the client goes bankrupt. This kind of mechanism, still under consultation, could be a promising instrument to promote the ESCO market and more generally energy efficiency investments.

a) *Real estate liens for risk mitigation (excursion)*

Regarding the second risk described that the investor becomes insolvent or relocates, other risk mitigation strategies exist in the law such as the registration of mortgage notes or mortgages. Table 2 summarizes advantages and shortcomings for ESCOs or other creditors to opt for one of these two kinds of real estate liens when financing EPC, as compared to having no such security. Real estate liens allow the ESCO or the investor to guarantee the receivable by the building's value. The lien gives the right to the creditor to make the debtor sell the building, in order to get the payment of the guaranteed receivable (Steinauer (2012)). However, the building may already be encumbered with one or several mortgages. And the reimbursement priority in case of the debtor's bankruptcy depends on the rank of the lien, which will probably get a lower



priority than existing liens, unless the ESCO or the investor can benefit from an empty case with higher priority²⁴. As a result, the real estate lien security is not absolute and the degree of coverage will depend on the rank the creditor can negotiate on and, finally, on the building's value at the time of sale.

Nevertheless, it is worth mentioning that even if the guarantee through a real estate lien is not absolute, a creditor with a lien will always be reimbursed in priority over other creditors. As a result, contracting a lien is always safer for the creditor in case the client gets bankrupt.

Table 2: Creditor's advantages and shortcomings of real estate liens

	Advantages	Shortcomings
Real estate liens (mortgage note or mortgage)	<ul style="list-style-type: none"> • Receivable guaranteed by the building's value • Creditors with liens have priority of reimbursement over other creditors • In case of relocation of the client, additional incentive for the new owner to take over the contract 	<ul style="list-style-type: none"> • Still some risk: degree of coverage depend on building's value and on priority rank of the lien • Inscription to land registry increases transaction costs • Reluctance of the client • May be complicated to implement for an existing building with condominium ownership (e.g. floor ownership)

Real estate liens may also present an advantage in case the clients relocate and a new owner takes over the building. When the client sells the building, it affects neither the debt, nor the liens affected to the building (Steinauer (2012)). As a result, if the initial client leaves without reimbursing the debt, either the new owner takes over the debt or the building will still guarantee the debt of the initial client. Thus, if the new owner does not want her building to guarantee someone else's debt, she will have an incentive to take over the debt and probably the energy performance contract with it.

However, real estate liens also come associated with some costs. We mentioned in the literature review (Klinke et al. (2016)) that a reason why energy performance contracting was not suitable for all energy consumers is that transaction costs for these contracts are subsequent. Requiring a real estate lien may increase them even more significantly. The client may also be reluctant to

²⁴ Unless it is specified otherwise in the contract, the reimbursement priority system used by default in Switzerland is called the fixed cases system. The building's value is divided in shares. The rank of each share defines the reimbursement's priority. The rank is determined by the contract, and once a lien is deregistered, its corresponding case stays empty. The debtor can use it as she so wish. The liens' contracts may however define another reimbursement's priority system as well as agree that the creditor can benefit from future empty cases with higher reimbursement's priority. In case several liens benefit from the latter agreement, the date of the lien's registration determines the priority to benefit from empty cases. It is also worth mentioning that some specific legal direct real estate liens may legally benefit from the highest priority ranks, regardless of their registration date (Steinauer (2012)).



contract an additional mortgage, especially for energy efficiency measures in the building. Indeed, a company may prefer to keep empty cases for core business future credit needs.

Real estate liens may also appear to be inappropriate for existing buildings with condominium ownership, i.e. for instance commercial, residential or office buildings with co-ownership. In these cases, an energy performance contract, and its potential real estate lien, would certainly encompass the whole building. However, if one or several shares of co-ownerships are already encumbered with liens, in principle the building's basis can no longer be mortgaged *ex post*. The only exception to this would be that the new mortgage on the building's basis can get a priority rank over all liens on co-ownership shares. But such a priority would require the agreement of all existing creditors guaranteed by a lien on a co-ownership share (Steinauer (2012)). This requirement could also significantly increase transaction costs.

Finally, it is worth noting that in principle public buildings, i.e. that serve a goal of public services, cannot be encumbered with real estate liens (art. 10 LPcom (1947)²⁵). This also concerns all administrative buildings of the confederation. In general, it is also the case of cantonal and municipal administrative buildings, unless the cantonal law emitted some authorizations.

If the ESCO or the investor decides that the advantages of real estate liens outweigh the shortcomings, he must then decide which kind of lien he will propose to the client, i.e. either a mortgage note or a mortgage, any other kind of real estate liens being prohibited in Switzerland (Steinauer (2012)). Advantages and shortcomings of the mortgage note over the mortgage are presented in Table 3. The main difference between the two concepts resides in the fact that a mortgage implies a real estate lien which is distinct from the guaranteed receivable. This means that the mortgage can for instance be created for a future or even an eventual receivable. In the latter case, the mortgage will materialize only when the guaranteed receivable appears.

Table 3: Mortgage note vs. mortgage.

	Advantages over mortgage	Shortcomings with respect to mortgage
Mortgage note	<ul style="list-style-type: none">• Can mobilize the soil value	<ul style="list-style-type: none">• Inappropriate to guarantee receivables with an amount that can vary

²⁵ LPcom, 1947. Loi fédérale du 4 décembre 1947 réglant la poursuite pour dettes contre les communes et autres collectivités de droit public cantonal (RS 282.11)



The mortgage note, on the other hand, includes at the same time the receivable and the real estate in an inseparable manner. This inseparability presents the advantage of mobilizing the soil value in a note. That is, the investor or the ESCO could sell both the receivable and the lien to a third party relatively simply, i.e. to another investor for instance.

However, the mortgage note can include neither condition nor counter performance ("contre-prestation"). As a consequence, this kind of lien is rather inappropriate when the amount of receivable can vary (Steinauer (2012)). In the energy performance contracting context, such an amount can vary for instance when a contractual clause specifies that some additional costs can be imputed to the client under certain conditions (e.g. if the client reduces its business activity or if these additional costs are a consequence of bad management from the client). This would also happen if once the amortization of the capital financed by the ESCO is completed, the parties agreed to share the energy savings during the remaining contractual period. In these two examples, it would be impossible to specify *ex ante* the precise amount the client will owe the ESCO. When it is the case, a mortgage would be more appropriate. Indeed, a mortgage can be registered for an undetermined receivable. The two parties must then agree on the fixed amount representing the maximum of the real estate guarantee. This is called the maximal mortgage.

6.2.2 Lack of energy savings potentials

The second risk concerns potential new entrant ESCOs. Even for engineering firms or utilities which already possess a profound technical knowledge on audits, new technologies, and measures of energy efficiency, they need reasonable investment in terms of multidisciplinary knowledge, especially in the domain of contractual arrangements and legal prescriptions and measure and verification processes before entering the EPC market. As a result, a firm considering an entry into the market must be certain of the economic potentials of the market, and for EPC, these are equal to the energy savings potentials. Several potential actors claimed, however, that assets and machinery parks in Switzerland are in most cases in good condition due to existing legislation. Consequently, energy savings would rather be limited compared to the investment size and potentials for EPC market would not be as promising as they initially seemed.



How to improve the situation:

There is a lack of consensus among actors or potential actors over the claim of insufficient energy savings potentials among large private and public energy consumers in Switzerland. This would need further research.

On the other side, training programs on energy and building management, such as those proposed at the University of Geneva and at the ZHAW can provide assistance to help interested companies to enter the ESCO market at reasonable costs.

6.3 *Legal barriers against EPC*

In the following, the most important legal regulations are discussed which are closely related to financial and accounting aspects limiting the deployment of EPC in Switzerland.

6.3.1 **Private financing on public buildings**

A first barrier that appears in the Swiss legal context lies in the fact that it is not always clear whether and under which conditions a private firm can legally finance a retrofit project in a public building. This was the case for instance in canton Geneva, where some municipalities were interested in EPC, but the entire project was halted in an initial negotiation phase because of this potential legal issue. In most cases, financing energy efficiency projects through private funds are possible, but must be approved by legislative or executive municipal instances. In certain large municipalities, such as cities, financing options should additionally be approved by cantonal executive councils. These requirements depend on the cantonal laws on municipalities, which can differ considerably from one canton to another.

How to improve the situation:

Facilitators with appropriate legal experience can be important actors in assisting the municipalities which are not familiar with the details and various possibilities of private financing.

6.3.2 **Off-balance sheet financing**

Several actors have emphasized that an important driving factor of EPC abroad is the accounting benefit it can bring when the ESCO finances the project, for instance in case of "shared-savings" contracts. Indeed, because this kind of contract implies that the investment is financed through the energy savings



achieved, it should be possible to account for it into the books as an operational expenditure (opex), as opposed to a capital expenditure (capex) and thus use off-balance sheet financing.

This has been presented as a clear advantage particularly for public entities, because it allows them to avoid impact on the public degree of debt or public expenditure, provided that no credit is indeed accounted (“10 Argumente” (2010), Berger et. al (2012)). Off-balance sheet accounting can also be an advantage for private clients from an income tax perspective, as well as to keep debt to equity (D/E) and leverage ratios low.

However, it is not perfectly clear whether this kind of accounting procedure is legally allowed in Switzerland. This should be explored in further research in order to determine whether it can really be used as a driving factor for the Swiss EPC market.

In the following two subsections we introduce the conditions under which private clients (subsection a) and public clients (subsection b) can use off-balance sheet financing.

a) *Accounting EPC for private clients*

From the perspective of private clients, accounting procedures depend on the accounting standard the firm is submitted to (e.g. International Financial reporting Standards (IFRS), IFRS for SMEs, SWISS GAAP FER, etc.) and on the financing scheme. Figure 2 presents an overview of the accounting possibilities depending on these elements.

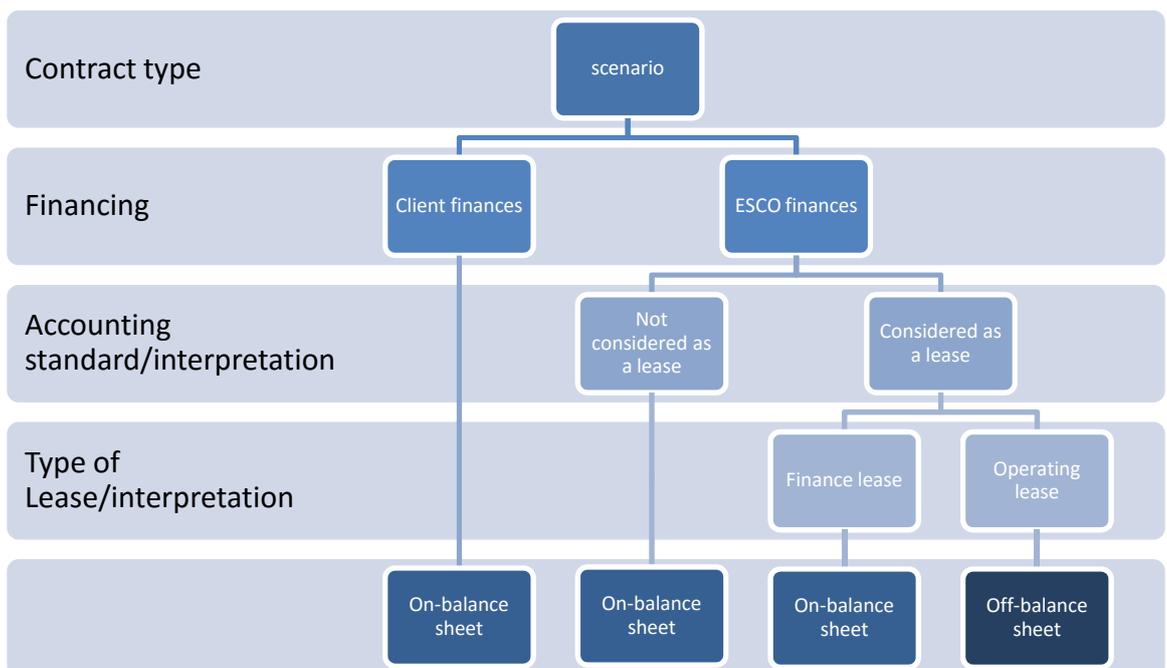


Figure 2: In-balance or Off-balance sheet financing for private clients



Off-balance sheet financing cannot be used if the client finances herself the installation. In this case, because the installation represents a tangible asset owned by the client, it must be accounted for in her balance sheet. It is more complex when the ESCO finances the installation. First, one should determine whether the EPC should be considered as a lease contract. On the one hand, this may depend on the standard the firm is submitted to, since the defined scope of the standard on leases varies between the IFRS, the IFRS for SMEs and the SWISS GAAP FER²⁶. On the other hand, whether or not EPC should be accounted as a lease is subject to the interpretation of the definition of a lease. In the international standards, "A lease is an agreement whereby the lessor conveys to the lessee in return for a payment or a series of payments, the right to use an asset" (IAS 17 (2003)). As can be seen on the webpage "Leases project summary" (2015), this definition has been subject to recent discussion. Recommendations such as IFRIC 4 (2004) provide additional guidance to determine whether a contract contains a lease. This illustrates well the complexity of interpretation of the standards, even at the international level. Additionally, it is worth mentioning that it is the substance of the contract which matters, regardless of the form of contract. This means that the contract must not have the legal form of a leasing contract to be considered as such in accounting. As a result, and quite surprisingly, the question does not depend on the ownership of the asset²⁷.

An EPC project typically transfers the right to the client to use an asset, installed by the ESCO, in return for a payment. As such, it can be considered as a lease. But the details underlying the definition are more complex than that, as described in IFRIC 4 (2004): A contract should be considered as a lease if two conditions are met:

1. The execution of the agreement depends on the use of one or several specific assets
2. The agreement conveys the right to use an asset, i.e. one of the 3 following conditions is satisfied:
 - a. The client has the possibility or the right to exploit the asset while obtaining or controlling more than an insignificant part of the production or utility of the asset.

²⁶ See IFRS (2015) for which kind of firm is submitted to which standard. This profile can be subject to changes from time to time. See PWC (2011), pp. 83 and ss. or more recent version for more information on the differences in the scope of Leases' standards.

²⁷ When EPC projects are financed by the ESCO, both ownership schemes are seen: sometimes the ESCO directly transfers the ownership to the client. This is the case particularly when (1) the ESCO wants to avoid the transaction costs and complexity linked to easements needed to keep ownership and when (2) transferring the ownership is unavoidable because of the energy-efficiency measures implemented, such as envelope retrofitting, where easement are not allowed. In other cases, when it is possible, the ESCO keeps the ownership during the whole contract duration, by the mean of an easement, and the client buys the installation at the end of the contract at its residual value.



- b. The client has the possibility of the right to control the physical access to the asset in order to obtain or control more than an insignificant part of the production or utility of the asset.
- c. It is not probable that one party, other than the client, will take more than an insignificant part of the production or utility of the asset during the contract and the payment of the client is not fixed by produced unit.

As a result, if the accountant scrupulously follows these recommendations, there are at least two examples of EPC which should not be accounted as a lease.

First, when the ESCO finances the EPC and that only a certain quantity of energy savings is specified, but no specific asset is determined in the contract, i.e. the ESCO has the right and the possibility to use any asset in order to meet these energy savings, then the contract should not be considered as a lease, as condition (1) is not satisfied.

Second, in the case where the ESCO finances the project and is 100% repaid by the energy savings achieved during the whole contract duration²⁸, and that the ESCO controls fully the exploitation of the installation, then none of conditions 2a, 2b or 2c are met.

Beyond these specific instances, if the contract's agreement substance leads to conclude to a lease contract, the accountant must determine whether it is a finance lease or an operation lease. As can be seen in Figure 2, this is what makes the complete difference and may allow accounting for EPC off-balance sheet. In this case again, the international standards' definition may be subject to interpretation.

At first sight, when considering the general difference between these two kinds of lease, EPC would rather be determined as an operating lease²⁹. Indeed, IAS 17.12 (2003) states that if the contract does not transfer the quasi-totality of the risks and advantages onto the client, the contract should be classified as an operating lease, and as such, off-balance sheet is allowed. As a result, with regard to this sentence, any EPC contract that can be considered as a lease should be an operating lease because some of the risks are born by the ESCO, either because it provides the client with a guarantee on the energy savings achieved or because it shares the energy savings with them. In the latter case, the advantages of the installations are also taken partly by the ESCO, supporting further the classification as an operating lease.

However, considering EPC as an operating lease may be contradicted by several elements, which, taken individually or jointly, should lead to the conclusion that

²⁸ This can be used by the client as a mechanism to reduce the contract's length to its minimum.

²⁹ The following development explains the details of the International Financial Reporting Standards (IFRS). Some small differences may occur in case of IFRS for SMEs or SWISS GAAP FER. See PWC (2011), pp. 83 and ss. or more recent version for more information on this.



EPC must be classified rather as a finance lease (17.10 (2003)). The elements which are likely to be satisfied in EPC contracts are cited here:

1. The contract transfers the ownership of the asset to the client at the end of the contract
2. At the beginning of the contract, the actualized value of the payments to the ESCO is at least as high as the value of the asset installed
3. The assets are so specific that only the client can use them without greatly modifying them
4. If the client can terminate the contract, the losses borne by the ESCO related to the termination are at the expense of the client

To summarize, whether an EPC, financed by the ESCO, can indeed present the advantage for off-balance sheet accounting is subject to interpretation and depends on the details of the agreement between the ESCO and the client.

How to improve the situation:

The client will probably need the advice of accounting experts to resolve the issue on a case by case basis if the procedure cannot be standardized by legal means. Regardless, the preceding development has shown that it would be wrong from the ESCOs' perspective to systematically present EPC as a way to account for investments in energy efficiency measures off-balance sheet.

b) *Accounting EPC for public clients*

In the context of public clients, the accounting practices in terms of leases are even more complex to determine. Reporting in details how EPC should be accounted for in each public jurisdiction is out of the scope of this study. It is worth mentioning, however, that the number of different public accounting standards at each cantonal level is likely to be reduced in the near future, since all cantons agreed to harmonize their accounting procedures according to a standardized model (MCH2 (2014)), which they should be implementing within the next 10 years. Several details could lead one to conclude that the MCH2 treats the lease contracts similarly to the IFRS procedure detailed in the preceding section. For instance, this model also recommends considering the substance over the form of the contract in order to establish whether it contains a lease. Second, a finance lease contract is also defined as transferring to the client the quasi-totality of the risks and advantages. And finally, as in the IFRS, if the accountant can conclude that it is rather an operating lease, then off-balance sheet accounting is required (CSPCP (2010)).

In any case, even when off-balance sheet would be allowed with regard to the accounting requirements, it is possible that additional requirements, such as an approval from the executive organ of the canton or municipality, may exist for off-balance sheet accounting. This is because it would require allocating part of



the expenditures account for investments' purpose. And in some cases, as in the canton Vaud, this approval has to be reconfirmed every year, again considerably increasing the transaction costs.

This leads to the conclusion that, in Switzerland, perhaps in contrast to other countries, off-balance sheet accounting can hardly be shown as a systematic advantage of EPC for public clients.

6.3.3 Transfer retrofit costs onto the tenants to overcome the split incentives barrier

The difficulty for landlords to transfer the costs of energy-efficiency measures implementation onto the tenants can result in split incentives and subsequently to underinvestment in energy efficiency. As we have already mentioned in the literature review (Klinke et al. (2016)), this explains why this legal barrier is often used to explain a significant part of the energy efficiency gap³⁰. As a result, it is not surprising that ESCOs are also confronted with this problem when trying to implement an EPC project in a building containing some tenants.

At first sight however, when exploring the legal framework in Switzerland, this barrier does not really seem binding. Indeed, in theory, it appears that the landlord could transfer 100% of the energy efficiency measures costs onto the tenants. The Swiss obligation code first states that: "in general, the rents are not abusive when they are justified by a raise in costs or by some value added from the landlord" (art. 269a, let. b, Code des obligations (CO)). This value added is determined notably as the following energy improvements (art. 14, al.2. OBLF-VMWG (1990)):

- "The measures to reduce the energy losses of the building envelope"
- "The measures for a rational energy use"
- "The measures to reduce the emissions of the technical installations"
- "The measures to use renewable energy"
- "The replacement of high-energy consuming appliances with low-energy consuming appliances".

In practice, however, the application of the obligation code and the order is more complex. First, a 100% transfer of the costs may not be allowed since the law mentions "value added". Hence, for instance, if the landlord replaces old windows with double-glazing windows, they cannot transfer the total cost of these new windows since the value added is only the difference between the double-glazing and the old windows. As a result, the computations of this "value added" are subject to interpretation and the landlord is not protected from refusal by the tenants once the energy efficiency measures have already been implemented.

³⁰ See for instance Gillingham & Palmer (2013)



Moreover, some cantons may be more restrictive in the way the costs of energy efficiency measures can be transferred onto the tenants. This is the case in Geneva, where rents are already high and the law on demolitions, transformation and retrofit of residential houses (LDTR (1996), art. 9, al. 6) gives a precise limit over which the landlord cannot transfer the costs onto the tenants.

To conclude, whether the ESCOs can actually help the landlords to invest in energy efficiency measures will probably depend on their ability to advise these actors on how and under which conditions they have the possibility to transfer the costs onto the tenants.

6.4 *Political barriers*

In the following, we introduce how the energy policy currently lead by the Swiss authorities is perceived by the ESCOs as affecting the EPC market deployment.

6.4.1 **Lack of legally constraining objectives on energy savings**

Currently, large energy consumers are obliged to improve their energy efficiency³¹ and with this a political defined threshold is set. For such companies, EPC can be a tool to satisfy these requirements, under certain conditions (see the following subsection). For all other energy consumers the need for energy efficiency measures is lower since not only the legally constraining objectives are lacking but also low energy prices are decreasing the pressure to act.

One can see this segregation between large consumers and all others as a lack of legally binding constraining objectives on energy savings, which can therefore be perceived as a barrier to both energy efficiency and EPC for a part of the market. In response to this, interviewed cantonal authorities have pointed to the fact that policy on large private consumers is already ambitious, with the aforementioned legal requirements (cf. section 7.2).

³¹ The thresholds for large consumer definition are established at an energy demand for electricity above 0.5 GWh per year and or a heat demand of above 5 GWh per year.



How to improve the situation:

A potential approach to increase the market deployment through energy efficiency obligations could be to lower the legal threshold of defined large consumers. The cantonal authorities interviewed emphasized that in order to do so they would first have to make sure the supply side is sufficient to respond to this increase in demand.

Another possibility is to support the realization of EPC projects within public buildings. Indeed, large public energy consumers are an interesting target for EPC, and the latter could add external incentives to public institutions in order to increase energy efficiency in their buildings.

Regarding low energy prices, cantonal authorities are powerless. However, at the federal level the new constitutional article (131.a) currently in consultation could increase general incentives by replacing subsidy schemes starting in 2025 with an incentive system based on fuel and electricity taxes.

6.4.2 Accreditation for CO₂-tax exemption, tax reduction and/or reimbursement

The second barrier mentioned at the political level concerns the ESCOs, which want to target large private energy consumers subject to cantonal requirements. As mentioned in section 5, ESCOs must be accredited by the Energy Agency of the Swiss private sector (EnAW) or ACT, in order to supply solutions to the consumers willing to contract a universal convention of objectives. However, this may represent a barrier to potential entrant ESCOs if they cannot acquire the accreditation easily. Indeed, without such a certification, they consequently lose an important EPC advantage for this segment of clients.



How to improve the situation:

As a response to this problem, some cantonal authorities have claimed that they could eventually support potential entrant ESCOs in order to secure an accreditation.

Another solution has been found by another actor, who could certify its own monitoring tool at the federal level, in order to certify the list of actions of its clients to satisfy to the universal convention of objectives. This implies that the system is not rigid and that ESCOs may independently find a solution at the federal level. However, the implemented measures still have to be followed by the monitoring system from EnAW or ACT in order to be certified. However, the ESCOs often cannot rely on external expertise. Therefore, two parallel measure and verification processes need to be implemented for the clients who want to adopt both a universal convention of objectives and an EPC. As a conclusion, this system persists as a barrier and more specifically as a barrier to entry of the Swiss EPC market.

6.5 *Behavioral and cultural barriers*

A general “wait and see” attitude, specific to general Swiss habits, has also been mentioned by the actors as a potential problem in the Swiss market, especially from the public authorities³². This is probably an important difference with respect to other countries such as Germany, where public-private facilitators, such as the Berliner Energieagentur or the DENA have been more proactive in promoting the EPC market. However, public authorities are currently stepping in, especially the Swiss Federal Office of Energy (SFOE) that organized some information meeting for public entities about EPC. Potential involvement from cantonal authorities, which is described in section 7.2, is also likely to change in the near future.

³² see A. Huterer (2012) for more details on the real options decision pathway for building retrofit



7 Government's involvement

The public authorities have different roles to play in the context of EPC. On the one hand, public authorities are defining the legal framework under which the EPC market takes place (see sections 6.3 and 6.4). On the other hand, the public sector is a potential client for EPC since he owns and manages buildings with often large energy consumption. Furthermore, the authorities can act as energy agencies facilitating EPC.

It is not sufficient to consider only the different roles of the public sector. The different competences at each administration's levels are relevant to understand the current situation of EPC in Switzerland. The national and cantonal authorities share the decisions regarding the energy law, but the cantonal level is of higher relevance for EPC since the cantons define the building regulation framework. On the national and municipal level, authorities have fewer possibilities to define the legal framework. Yet, they can act as potential clients and as participant in energy agencies.

In section 7.1 we describe the already existing policy instruments regarding energy efficiency with a potential impact on the EPC market demand. A summary of the involvement of different public entities regarding EPC is provided in sections 7.2 and 7.3. Section 7.4 presents the energy policy measures and other policies influencing the supply-side of the EPC market.

7.1 *Existing policy instruments on energy efficiency and their relation to EPC*

At the federal and cantonal level, many policy instruments exist to promote energy efficiency and CO₂ emission reductions. These policies, can indirectly promote the EPC market by inducing investment requirements in these domains. The investors can see EPC as a solution to benefit from these instruments or to meet the legal requirements.

Table 4 provides a non-exhaustive overview of the policies currently existing³³. In addition to these policy instruments, many measures have also been taken at cantonal or even at municipal levels to promote energy efficiency, either financially or by the means of minimal requirements, standards, and information campaigns. It has to be mentioned that some of these policy instruments are designed to support efficiency measures which are not fully economic viable while EPC is an instrument which is targeting economic solutions.

³³ see BFE (2014a) and EnDK (2015) for more details on these instruments and BFE (2014a) for an overview of the international policy framework.



Table 4: Existing policy instruments for energy efficiency.

Name	Description	Targets	Organizational level	Relation to EPC
Duty of exemplarity	Public entities are legally required to set an example in terms of the energy efficiency and CO ₂ emissions of their buildings.	Federal and cantonal public buildings as well as entities under the federal jurisdiction: EPFL/ETH, Post, SBB/CFF, Skyguide and Swisscom	Federal and Cantonal	EPC can be used as a tool to meet the requirements
KliK (Foundation for climate protection and CO ₂ compensation)	Foundation which accomplishes for oil companies their duty in terms of CO ₂ emissions compensations. These compensations include financial support and quality guarantees for building automation investments	Public and private: Offices, hotels, restaurants, schools, conference halls, hospitals, shopping centers, multi-family houses	Federal	EPC often includes building automation technologies
Action plan "Energy Efficiency"	Elaborated in 2008, it includes 15 measures to reduce fossil fuel and electricity consumptions and to develop best practices strategies. It has closely contributed to the development of some of the following measures (e.g. MoPEC, Building Program, CECB), to the promotion of R&D and formation in energy efficiency and to the implementation of minimal standards	Public and private buildings. Also targets mobility, electrical appliances, lighting and industrial processes	Federal	EPC indirectly promoted (e.g. via a benefit from R&D and formation in energy efficiency)
ProKilowatt	Provides financial support to projects or programs that promote energy efficiency and which are selected via a call for proposals	Public and Private buildings	Federal	EPC as possible support tool to improve energy efficiency



<p>EnergieSchweiz/ SuisseEnergie (See EnergieSchweiz (2013))</p>	<p>Implements information campaigns, formation and advices in the domain of energy efficiency and renewable energy. It also contributes financially to the development of global projects, the diffusion of new technologies and to the collaboration between federal, cantonal, municipal and private actors.</p>	<p>Public and Private buildings. Also targets industry and services, mobility and electrical appliances</p>	<p>Federal</p>	<p>Indirect via induced investments in energy efficiency and direct via support to swissesco</p>
<p>Model of Cantonal energy code (MuKEEn/MoPEC)</p>	<p>Prescribes measurable minimal requirements, objectives and legal requirements on buildings that the cantons can apply, whilst granting them flexibility in their energy policy. It describes the common denominator to all cantons energy strategies and objectives and includes prescriptions regarding the following measures (e.g. subsidies, large energy consumers, CECB)</p>	<p>Public and private buildings</p>	<p>Cantonal</p>	<p>EPC could be included as tool to achieve energy efficiency targets</p>
<p>Large energy consumers (see also sections 5 and 6.4.2)</p>	<p>Large energy consumers are required to take reasonable actions to analyze and/or optimize their energy consumption. In many cantons, these consumers can choose between 3 options: 1) universal convention of objectives (UCO) 2) cantonal convention of objectives (CCO) 3) Energy Consumption analysis (ECA)</p>	<p>Private or public large energy consumers (>5 GWh of annual heating consumption or >0.5 GWh of annual electricity consumption)</p>	<p>Cantonal for CCO or ECA Federal for UCO (energy agency for the economy (EnAW) or Swiss cleantech agency (act))</p>	<p>EPC as a turnkey solution (when the ESCO is certified)</p>



Building Program (Gebäudeprogramm / Programme Bâtiments)	Subsidy scheme promoting energy efficiency measures in buildings. Financed through the CO ₂ tax and cantonal funds	Private buildings (insulation refurbishment projects, renewable energy, heat recovery and energy optimization of technical installations)	Federal and Cantonal	Indirectly via induced investments in energy efficiency
Cantonal energy certificate for buildings (GEAK/CECB)	This certificate allows determining the energy label (from A to G) of a building, based on its energy needs. Some cantons provide subsidies for refurbishment projects which lead to a gain of level(s) in the energy label.	Private and public buildings	Cantonal	Indirectly via induced investments in energy efficiency
Minergie	Represents an energy label for buildings with high quality insulation and ventilation. Some cantons provide some financial supports to reach the standard of the label.	Private and public buildings	Cantonal (initially), now Federal and Cantonal	limited (often used in new buildings and more rarely to old buildings retrofitted as in EPC)



7.2 *Cantonal involvement*

7.2.1 Cantons acting as regulators

1. In certain cantons, such as Vaud, EPC is explicitly mentioned in the law. Indeed, large residential consumers can use EPC as one of the several possibilities to meet cantonal requirements for large consumers³⁴. Other cantons may follow the lead of Vaud. However, this does not concern non-residential large consumers who can choose between three options (cf. sections 0 and 6.4.2) and where EPC is not a sufficient condition to meet legal requirements.
2. Additionally, cantons can improve the legal framework for EPC by removing some of the aforementioned barriers (see sections 6.3 and 6.4)

7.2.2 Cantons acting as energy agency

1. Some cantons could envisage the introduction of financial support to EPC by subsidizing pre-studies or audits. Some cantons, such as Vaud, already provide subsidies for energy analysis and pre-studies for large consumers.
2. Cantonal authorities are also open to the possibility of providing information sessions to large private and public energy consumers about EPC. Informing large private energy consumers is easy for cantonal authorities, who are already in contact with them regarding the canton's legal requirements. Websites and brochures could also be part of the information campaign.
3. Moreover, the cantonal energy offices would be inclined to inform building services of the canton or municipalities about EPC and the advantages of such contracts.

7.2.3 **Conditions**

According to the cantonal authorities interviewed, all these potential actions will materialize only if certain conditions are met.

First, cantonal energy office directors need to be better informed about advantages and shortcomings of EPC by a neutral party.

Secondly, before informing the demand side, some cantonal authorities want to make sure the supply side is sufficiently developed to allow for adequate competition and significant examples required to validate the business model. Finally, in order to further inform other public entities, such as municipalities, the cantons must be informed about potential legal, accounting, or tendering

³⁴ Règlement d'application de la loi sur l'énergie (RLVLEne Art. 50e), Conseil d'Etat du canton de Vaud, version 1 du 02.07.2014, entrée en vigueur le 01.02.2015



requirements for public buildings. As a result, in a first step, cantonal authorities must probably be informed regarding all these issues. This role could be partly played by the SFOE.

7.3 Swiss Federal Office of Energy (SFOE)

7.3.1 National authorities acting as clients

The SFOE, in collaboration with BBL, is currently considering the implementation of a pilot EPC project on a public building to be shown as an example.

7.3.2 National authorities acting as energy agency

- The SFOE provides financial and staff support to the association swissesco in its first 4 years of operation
- The SFOE is also considering several measures, including the target to define unified methods of measurement and verification, staff training, and facilitated access to financing.
- SFOE is currently supporting different studies and actions which aim to reduce information barriers described in section 6.1.

Overall, public authorities, at both the federal and cantonal levels, are ready to step in to help foster the emerging Swiss EPC market.

7.4 Policy measures influencing the supply-side of the EPC market

Interviewees were asked whether any policy measures, such as the liberalization of the electricity market for large consumers, or other future potential regulations, had or could have any influence in the interest to provide EPC. None of the utilities interviewed considered the electricity market liberalization as a trigger to provide EPC. As a matter of fact, only one actor mentioned it as having played a potential role in their decision to enter the EPC market, in order to retain their clients, but only as a conjunction to other more important factors, such as a general willingness within the firm to promote sustainability using market instruments.

The new constitutional article (131.a) currently in consultation has also been mentioned as a factor that could increase general interest in providing EPC. The suppliers will indeed have to respond to a demand increase for energy efficiency solutions, triggered by the system based on fuel and electricity taxes implemented in this new law.

Rather speculative but also mentioned, the so-called "Lex Weber" might have an impact on the EPC provision in some cantons. Entered into force in January 2016, this constitutional article prohibits the construction of secondary



residences in municipalities, which have already reached a 20% share. In some highly impacted cantons, such as in Valais, this law provokes an important slow-down in the construction sector and particularly affects the business of small local entrepreneurs. According to Prof. Stéphane Genoud (HES-SO Valais), this is likely to give a forced incentive to these actors to retarget the construction sector towards energy refurbishment of existing buildings, and to possibly involve themselves in EPC projects, either as ESCOs, in a consortium of small entrepreneurs, or as suppliers of the ESCOs.



8 Conclusion

In this report we analyzed the framework conditions for the EPC market in Switzerland. Our study indicates a growing interest and suggests an active start from the first actors who have recognized the potential of this business model. However, various barriers exist and prevent EPC from reaching its full potential within the country. In particular, it is the combination of several barriers which currently increases the transaction costs in such way that the involved parties opt for less binding energy services, namely without guaranteed or shared savings.

More specifically, the design of guidelines for public tendering is expected to play an important role in the EPC market deployment in Switzerland. EPC with public entities has indeed been a trigger in the EPC markets abroad (Klinke et al. (2016)) and the complexity of public tendering procedures applied to EPC seems to be its most binding constraint. Our analysis concludes that the success of these guidelines depends on their ability to strike the appropriate balance between the rigor required by the law and the flexibility required to prevent unnecessary transaction costs and allow for innovative measures. Our study also shows that it is important to devise some guidelines as to how the costs of EPC projects can be legally transferred to the tenants accounting for cantonal specificities. This, however, may be less of an immediate priority since rented buildings may not be the initial EPC target.

This study also presents several contractual mechanisms or other instruments that could be used to reduce potential financing barriers to EPC. Our findings show that it is not advisable for Swiss ESCOs to systematically present EPC as an off-balance-sheet financing solution for energy efficiency projects. In Switzerland, using the off-balance-sheet argument does not appear as a winning argument for EPC. In fact, the question requires further research on comparing different possibilities by accounting experts.

Our analysis emphasizes that the facilitators are important players in supporting customers, especially public clients, to implement EPC projects. Their technical and legal experiences are crucial for negotiations before the contract is signed. They could also provide valuable assistance with public tendering procedures and legal requirements at the cantonal or municipal level that determine how and under which conditions a private party can invest in a public building.

Finally, a single persisting barrier is the difficulty for some entrant ESCOs to be accredited to allow large energy consumers to apply for tax exemption. This may be the only barrier requiring a change in the regulatory framework from public authorities.

To overcome the barriers, the public administration has a role to play, not only by reducing the lack of information from the consumer's perspective (e.g. by supporting the activities of swissesco), but also on the legal framework (e.g. by



clarifying the conditions of a transfer of retrofit costs onto the tenants) as well as a client (e.g. with the planned project of BBL and SFOE). The public sector acting as one of the potential clients can play this additional role for facilitating the market growth and simultaneously benefiting from reduced energy bills. Although this process might be time consuming, it gives the interested parties the necessary feedback and support to further develop the business.



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10 Appendix

10.1 Interviewees

Role	Company/institution	Date
Experts active in EPC		
Energy Efficiency Specialist	Services Industriels de Genève (SIG)	May 2015
Energy Efficiency Specialist	Schneider-Electric	May 2015
Energy Efficiency Specialist	Alpiq InTec	July 2015
Energy Efficiency Specialist	Siemens Building Technologies	July 2015
Utilities		
Contracting specialist	Elektrizitätswerke des Kantons Zürich (EKZ)	June 2015
Energy Efficiency specialist	Groupe E	July 2015
Contracting specialist	ewb	August 2015
Public authorities		
Section energy and emissions, head of section	Energy Service Canton Neuchâtel	June 2015
Engineers	Energy Direction Canton Vaud	July 2015
Financial institutions		
Financial Investor	SUSI Partner	July 2015
Legal Experts		
Ordinary professor of private law & lawyer specialist of building and real- estate law	University of Neuchâtel	July 2015
Dr. lawyer specialist of administrative and public law	University of Neuchâtel	September 2015



10.2 Interview with experts active in Switzerland

Information gathered before the interview:

- a) Motivation(s) of the firm to supply EPC? (What EPC brings to your firm in general (vision, strategy)?)
- b) For how long have you been supplying EPC in Switzerland?
- c) How many contracts have you signed in Switzerland?
- d) How large is the EPC sector in your firm? (% of turnover, % of employees, etc.)
- e) Is your firm public or private?

EPC and the firm

1. Has any event (a public policy decision; a market development such as energy prices or a new technology) contributed in the choice of your firm to supply EPC?
2. Which market research did you undertake to evaluate the Swiss market for EPC? Did you rely on external consultants?

Target segment: clients

3. Who are your clients? (who are you primarily targeting, types of your effective clients, number, public-private: number of each-preference-advantages, size of energy consumption: average-minimum)

Business Model: (questions useful to understand existing BM)

VALUE PROPOSITION

4. How is EPC a solution to the customer problem? (Deep truth of what consumers really value in EPC)
What is the size of the "value pie": How many potential clients do you estimate in Switzerland (public and/or private)? What amount of energy savings do you think this represents?
5. What are you selling to your clients? (One answer possible: e.g. technology, knowhow, organization, risk-sharing (technological risks, financial risks). Energy savings cannot be an answer since it is the result) (this question aims at understanding what is the initial motivation of the firm to supply EPC.)

DELIVERY MECHANISM

6. EPC involves several vertical activities, such as financing, technology (choice, production and installation), O&M (Operation&Maintenance) and M&V (Measurement&Verification), as well as horizontal activities (complementary), such as supply contracting and facilitation.
 - a. Which activities are important to own/control in-house? Why?
 - b. Who performs the activities you are not controlling?
 - c. Do you use facilitators? How and in what activity?
 - d. Do you prefer dealing with an onsite building technical manager (from client)? If yes, how important is their contribution?

CAPTURE VALUE

7. What can we do to entice customer to pay for this service/How should the service be presented as a solution?



- a. How do you choose the types of services provided? (Audits types, technologies implemented, staff training, follow up, etc.)
- b. Customers can generally finance EPC out of their projected savings. How do you convince them of this fact?
- c. How do you convince the customer of your contribution (why do they do the project with an ESCO, why not themselves?)
- d. How do you choose the pricing strategy? (Guaranteed savings (average?), shared savings (average?), other to be mentioned, contract duration)? How do you calculate / forecast energy demand in the building?
- e. What are you doing to reduce risk of dispute and legal problems? (IPMVP (International performance measurement and verification protocol by EVO (efficiency valuation organization)), standardization, etc.) What are the main dispute topics? Why?
- f. What do you think about costly audits and is there a way to avoid them and choose a simple M&V approach?
- g. What are co-benefits of the EPC as a service? Customer retention (depending on contract duration)? Selling other services? IS EPC by itself profitable as business?

INDUSTRY COMPETITION/FACTORS

8. Industry competition:

- a. Do competitive offerings to EPC exist in Switzerland? (How are they superior to your offering?)
- b. How many actors are providing EPC in Switzerland? (competitors) (How is your offering superior to the one of your competitors?)
- c. In order to keep a competitive advantage, would you rather differentiate the services offered or would you be willing to change your business model (e.g. customers target, revenue schemes (free service?), activities organization, avoid M&V as in IEC)?
- d. What is the market size for EPC? Who are the relevant players in the market?
- e. Are there model contracts available across the industry?

9. Business Model environment:

- a. Has a dominant design of business model for EPC emerged yet in Switzerland?
- b. How do you see your Business Model evolve?
- c. What are the barriers that the company is confronted with (specific at the client, general in terms of legal, economic, regulation, fostering instruments etc.)?
- d. EPC market in Switzerland seems to be lagging behind other countries, such as Germany. How would you explain this difference?
- e. What are the success factors (if any tangible)? Type of clients, personal relationship, appealing economic offer, trust, intrinsic motivation of the client etc.

Future of EPC in Switzerland

10. What should be the public policy-makers priority to reduce barriers to the EPC market according to you?



11. And if the solution was elsewhere? Do you think you could change your business model in order to overcome some barriers existing in Switzerland? In which sector could you change your BM? (e.g. customers target, revenue schemes (free service?), activities organization)
- a. Do you plan to modify your business model in the future or at least explore alternatives?
 - b. Do you rather plan to propose new/other services or products?



10.3 Interview with Utilities

Information gathered before the interview:

- a) Is your firm public or private?
- b) Which energy is your firm providing? (Electricity, gas, etc.)
- c) In which cantons is your firm providing energy?

VALUE PROPOSITION

1. Does your firm propose any services to its clients to improve the energy efficiency of its clients, or reduce or manage the energy demand of its clients?
 - a. If yes, what are these services?
 - b. If no, is your firm interested in improving the energy efficiency, reduce or manage the energy demand of its client in the future? Why?
2. Is your firm providing energy service contracting? ESC (Energy Supply Contracting) or EPC (energy performance contracting)?
 - a. If providing EPC, ask the same questions as for experts active in EPC

BUSINESS MODEL EVOLUTION

- b. If no, have you already heard about EPC? Description of the EPC if has not heard about? Are there any other energy services that your firm is providing which are related to EPC?
- c. If yes: where?

Interest in EPC:

- d. Are you planning to diversify the product portfolio of the company, by providing for instance EPC to your clients?
 - i. If yes, did you undertake some market research already? Did you prepare board requests for funding? What are the reasons for such decision? How are you setting up the new business model (strategy, targets, client group)? When are you going to offer such services? How many resources are you investing (personal, finance, other) to start this new business? Who is the driver of the new business model (the business unit or the executive board)? Do you think external facilitators could be useful? If yes, is it in legal issues or financing or marketing?
 - ii. If not, what were the reasons for such decision? Did you undertake any market studies or research to estimate the market volume for EPC? Did you rely on consultants to undertake such research? Do you think your firm could be interested in providing EPC in the future?
 - iii. Is your firm planning to provide other kind of services to their clients?

INDUSTRY EXTERNAL FACTORS/IMPACT OF POLICIES

3. IF provide ESC (on reseller level or customer level): What were the principal motivation(s) of your firm to supply ESC? (What ESC brings to your firm regarding turnover and profit?) IF provide ESC: Did any public policy contributed to your firm's decision to supply ESC?



4. Non-utility ESCOs and other intermediaries seem to dominate the EPC market in the future. Do you think this would be a competitive pressure on your company / branch? If yes, how will utilities respond?
5. Does the liberalization of the electricity market for big electricity customers have changed the strategies of your firm? If so, in which way?
6. Is your firm anticipating the potential liberalization of the electricity market to all consumers by changing its strategies? If so, in which way?
7. What other policies might influence the kind of services you are offering to your clients? How?



10.4 Interview with public authorities

Public energy strategy: Information gathered before the interview:

1. What are you doing to promote energy efficiency in existing buildings? (In addition to the programs already existing at the federal level, such as tax exemption, subsidy, others?)
2. What are the programs, used by the canton, to increase the incitation of big consumers/firms to increase energy efficiency?

Role of EPC

3. Have you heard about EPC?
If not, description of EPC
- Who would you contact to get more information on EPC? Would there be a budget for such information request?
-If yes, is EPC already part of some cantonal programs to promote energy efficiency? Which program? In which way?
4. Could you see EPC as a complement to the programs implemented at the cantonal level to promote energy efficiency? A complement to which programs? In which way?
-if not, why?
5. Do you think EPC could replace some programs? Which programs? In which way?
-If not why?

Barriers to EPC: should the government step in?

EPC market seems to be lagging as compared to some other countries such as Germany. Some Swiss experts think this is caused by:

1-lack of knowledge 2-no standardization of contract and tendering processes 3-Cultural/behavioral barriers 4-lack of public constraining objectives on energy savings 5-low energy prices 6-landlord-tenant split incentives 7-Legal issues for public collectivities to use EPC (exploitation and investments counts separated) 8-Accreditation for tax exemption not available for certain ESCOs (EnAW)

6. Do you think that cantonal authorities should step in to remove some of these barriers?
If yes, which ones? How?
If not, why?
7. Do you think the canton could inform the big consumers about the existence of EPC?
How?
8. How do you deal with part L of the base module from the new MuKEn/MoPEC, regarding the possibility to include EPC as part of an agreement with large scale consumers? (How do you check the performance of such agreements? Is it enough that large scale consumer present key performance indicators or "list of actions" towards the authority or are additional actions needed?)



9. Do you think the canton could inform the municipalities about the tendering processes in order to implement EPC? Which difficulties might exist in the tendering process? How could such difficulties be reduced or eliminated?
10. Do you think the cantonal objectives in terms of energy are sufficient to increase energy savings in existing buildings? Could you do more? (e.g. small obligation for retrofit)
11. Do you think you could incite big consumer to save more energy (by increasing building standards, for instance) or by other means?
12. Do you think the canton could do something to help the landlords to transfer the costs of energy savings measures on the tenants who benefit from these savings?
13. Do you think that cantonal authorities should consider EPC in order to improve energy efficiency in cantonal public buildings?
If not, why?
If yes, what are the barriers that the topic has not been addressed so far?
-Have you heard about the problem of different accounts (operating and investments)? How could this problem be solved, so that cantons could use EPC for their buildings?
-Can a private firm invest in public cantonal buildings?
14. Do you think municipalities should consider these EPC in order to improve energy efficiency in public buildings managed by municipalities?
-If yes, how could you (the canton) help the municipalities to consider EPC?
- What would be a reasonable contract duration for the authorities to sign?
-Have you heard about this problem of different accounts (operation and investments)? How could we solve this problem, so that municipalities could use EPC for their buildings?
-Can a private firm invest in public municipal buildings?
-if not, why?
15. Are accreditations for subsidies or tax exemptions limited to certain actors? Could the ESCOs be certified so that they can help their clients to get subsidies or tax exemptions through EPC? How are tax exemptions handled (legal/tax authority/rental law)?
16. EPC often involves a pre-study (audit) before the contract is signed. This can be used by the client to make a qualified selection of the ESCO. But these audits may be costly. Do you think the canton or the confederation should help the big consumers and/or the municipalities to pay these pre-studies?

Because of the important negotiation costs, EPC is suitable only for large energy consumers. But we also need to reduce energy consumption to small but numerous energy consumers.

17. Do you think we should rather help the ESCOs to target these small consumers or should we use other instruments for these small energy consumers?



10.5 Interview with financial institutions

Characteristic of the firm:

1. Is your firm public or private?
2. In your firm, have you any investment fund dedicated to investments related to energy?
If yes, in which form?
3. In your firm, have you any investment fund dedicated to investments in energy efficiency?
If yes, in which form?

Energy Contracting:

4. Have you heard about EPC?
-If not, description of EPC
-If yes, has your firm already financed EPC Projects? How did your firm analyze the EPC market (market survey), which information are you relying on? How did it analyze the specific projects it has financed? (Technical due diligence, legal due diligence, financial due diligence, others (in-house or with external consultants)?

If already financed EPC projects

- a. What were the principal motivation(s) of your firm to finance EPC? (What EPC brings to your firm?)
- b. Did any public policy contributed to your firm's decision to supply EPC?
- c. For how long have you been supplying EPC in Switzerland?
- d. How many projects have you financed?
- e. Are there any conditions required for you to finance an EPC project (size, ESCO, type of contract, etc.)?
- f. Which type of contract does your company prefer to invest in?
- g. What is your feedback on these projects?
- h. Is it valuable to invest in these projects?

Some experts have argued that financing is sometimes hard to find for EPC because 1) the return (energy savings) is uncertain and depends on many factors (ESCO behavior, Client behavior, external factors) and 2) there are no tangible pledges to guarantee the initial amount invested

- a. Are these two difficulties representing an important barrier for your firm when investing in EPC?
- b. Are you taking any measure to counter these two problems?
- c. Are there any other difficulties/risks you may face when financing EPC?
- d. According to you, how many financial institutions are currently supporting EPC activities in Switzerland?
- e. Do you think this number will grow in a near future?
- f. Why aren't there more financial institutions interested in investing in these projects according to you?

Future of EPC:

- a. Do you plan to continue financing EPC as you do now? Or will you increase the amounts dedicated to this business?



- b. Did public policies or could they influence your decision to invest in EPC or energy?
 - a. If so, how?
- c. Do you predict a potential of expansion for EPC projects in Switzerland? Which kind of expansion?
 - a. If yes why? If no why?
- d. In general, do you think energy projects (energy renewable, energy efficiency, energy savings) will represent an interesting sector to invest in in the following years?
 - a. If yes why? If no why?

Don't finance any EPC project

- a. Which advantages you could find in investing in EPC?
- b. Which disadvantages you could find in investing in EPC? Which were the key parameters for your decision, not to invest in EPC?

Some experts have argued that financing is sometimes hard to find for EPC because 1) the return (energy savings) is uncertain and depends on many factors (ESCO behavior, Client behavior, external factors) and 2) there are no tangible pledges to guarantee the initial amount invested

- a. Are these difficulties representing a serious barrier for your firm to invest in EPC?
- b. Could you think about a way to overcome/reduce these barriers?
- c. Do you think your firm could be interested in financing EPC in the future?
 - a. If yes, why and when? If not, why?
- d. Is your firm planning to finance other kind of energy-related projects?
 - a. If yes, why and when? If not, why?
- e. Did public policies or could they influence your decision to invest in EPC or energy?
 - a. If so, how?
- f. In general, do you think energy projects (energy renewable, energy efficiency, energy savings) will represent an interesting sector to invest in in the following years?
 - a. If yes why? If not, why?