Barriers to energy service contracting and the role of standardised measurement and verification schemes as a tool to remove them

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1. SYNOPSIS

Based on empirical findings the paper questions the role of standardised measurement and verification schemes as a means to stimulate markets for performance contracting.

2. ABSTRACT

Inspired by the US-DOE initiative of the "International Performance Measurement and Verification Protocol (IPMVP)" the paper presents an empirical study undertaken in North Rhine-Westphalia that investigated the prospects of standardised measurement and verification schemes (M&V) as a mean to stimulate markets for performance contracting. It presents an empirical analysis of crucial barriers to third party financing. The study is based on in-depth interviews with 30 market actors, both Escos and customers (public authorities, housing companies, hospitals) and discusses critically the role of M&V. The findings indicate that aspects related to M&V are not perceived as the most relevant hurdle to enter energy service contracts. Much more important, market actors demand assistance with regard to the quality of the technical solution and they seek solutions to overcome bureaucratic hurdles in public administrations. In addition, many customers simply lack the minimum expertise to engage themselves in energy service markets. From this perspective, activities aiming at an empowerment of customers appear to be a more urgent field for action than standardised frameworks for M&V.

3. INTRODUCTION

Third-party financing schemes have increasingly gained relevance as a means to overcome financial bottlenecks, manager time constraints and knowledge deficits which hinder investments into energy efficiency equipment. Most of these projects can be distinguished into the two basic approaches of energy supply contracting and (energy efficiency) performance contracting (Tab. 1), but of course in practice a great variety of contractual specifications and adaptations to the specific context can be found.

Due to the involvement of external experts in the planning, financing and installation of measures, in both cases third-party financing schemes offer new possibilities to implement measures that would otherwise not be taken by the client him/herself.

In order to stimulate further growth of these energy service markets it is necessary:

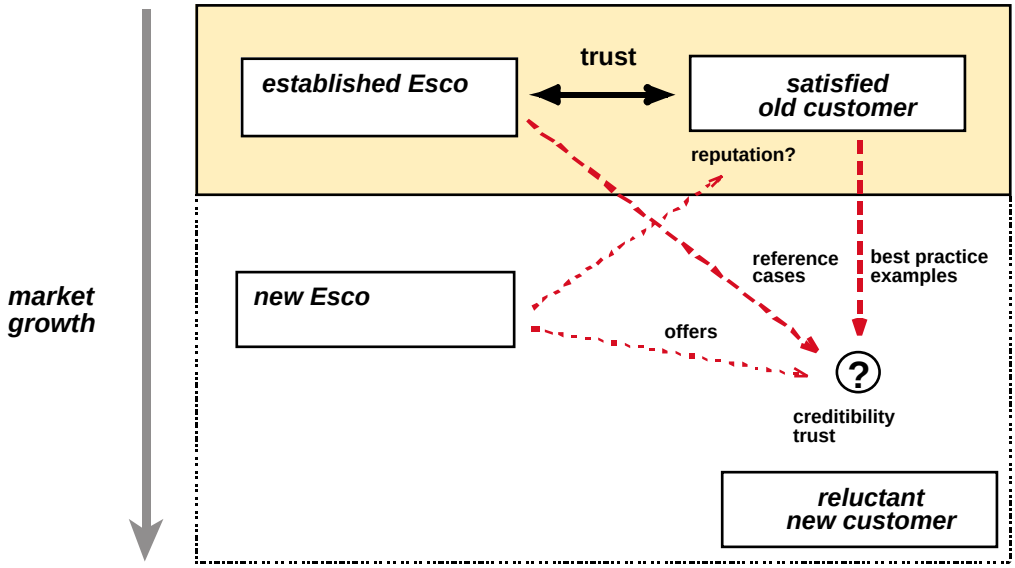
- to address new customer segments which have still remained reluctant to engage in the field of innovative energy services, and
- to generate additional opportunities for new suppliers and energy service companies (Escos) in order to extent the variety of solutions and to stimulate productive competition between the Escos.

Table 1: The two basic approaches of third party financing schemes

	energy supply contracting	(energy efficiency) performance contracting
application	investments, replacements and/or enlargement of energy supply infrastructures	investments in the rational use of energy (energy saving measures)
nature of the energy service	financing, planning, installation, operation and maintenance of supply equipment such as boilers, heating systems, HVAC, CHP units, etc.	financing, planning, installation, operation of energy saving equipment
mode of financing	payment for useful energy supply (heat, electricity, cold), often combination of fixed (peak load based) and variable (consumption based) charge	remuneration of the performance contractor through participation in energy costs saving resulting from efficiency measures

Experiences made during the last years indicate, however, that a self-maintaining market growth cannot yet be expected. Dedicated energy policy intervention is still needed to exploit the untapped opportunities for economically and ecologically attractive energy service packages, for example by providing basic information on energy services through energy agencies, guidelines and handbooks. As a new issue, increasing attention is now given to the fact that mutual trust and confidence between clients, Escos and banking institutions is a key to further market growth, too (Fig. 1). A transparent quantification and evaluation of the service package seemingly plays an important role to open up new market segments, especially with regard to customers without own experience and/or who have been made feel insecure by ambivalent reports on other projects. Hence, a sound measurement and verification (M&V) of energy saving measures, i.e. the proper documentation of the initial baseline, the envisaged measures as well as the convincing proof of results appear to be mandatory preconditions for energy service projects. Moreover, empirical evidence underlines the positive effects of M&V on the technical and economic performance of projects, for example because regular monitoring measurements help to detect deficient operation and maintenance of devices (Kats *et al*. 1997).

Figure 1. Trust and confidence as preconditions for further growth in energy service markets



4. THE INTERNATIONAL PERFORMANCE MEASUREMENT AND VERIFICATION PROTOCOL

Acknowledging the crucial role of M&V as a methodological foundation of working energy service markets, in the year 1997 a US-DOE initiative resulted in the publication of the "International Performance Measurement and Verification Protocol (IPMVP)" (IPMVP 1997). The initiative built on former work under the lead of the US Department of Energy and it aimed at developing together with industry a consensus approach to measuring and verifying energy efficiency investments. The 1997 version of the protocol contained methodologies that were compiled by a committee of industry experts and involved hundreds of interested parties, mainly from North America. It was intended to provide industry consensus guidelines that would increase reliability and level of savings, cut efficiency investment costs and provide standardisation required to secure lower transaction costs of financing. The protocol gives an overview of current best practice techniques available for verifying aspects of third-party financed energy and water efficiency projects. Building operators to assess and improve facility performance may also use it. In order to allow an adaptation of the methodological approach to the size and nature of project, four major M&V options are defined which differ with regard to accuracy, measurement effort and costs (Tab. 2). End of the year 2000 a new version of the IPMVP was published.

Table 2. Overview of the four M&V Options of the IPMVP (IPMVP 1997, 43)

M&V Option	how savings are calculated	costs
Option A: focuses on physical assessment of equipment changes to ensure the installation is to specification. Key performance factors are determined with spot or short-tem measurements; operational factors (e.g. operation hours) are stipulated based on analysis of historical data or spot/short-term measurements. performance factors and proper operation are measured or checked annually	engineering calculations using spot or short-term measurements, computer simulations, and/or historical data	depend on no. of measurement points; approx. 1-5% of project construction costs
Option B: Savings are determined after project completion by short-term or continuous measurements taken throughout the term of the contract at the device or system level. Both performance and operation factors are monitored	engineering calculations using metered data	depend on no. and type of systems measured and the term of analysis/metering; typically 3-10% of project construction costs
Option C: After project completion, savings are determined at the whole building or facility level using current data and historical utility meter/sub-meter data.	analysis of utility meter/sub-meter data using techniques from simple comparison to multivariate regression analysis	depend of no. and complexity of parameters in analysis, Typically 1-10% of project construction costs
Option D: Savings are determined through simulation of facility components and/or the whole facility	calibrated energy simulation/modelling; calibrated with hourly or monthly utility billing data and/or end-use metering	depend on no. and complexity of systems evaluated, typically 3-10% of project construction costs

Inspired by the activities under the IPMVP, the standing working group "Energy Services" of the "Landesinitiative Zukunftsenergien" of North Rhine-Westphalia (LIZE) commissioned a study on the role of standardised measurement and verification schemes as a means to stimulate markets for performance contracting. The work, which was finished in the second half of 2000, aimed at providing insights into the nature of third-party financing projects and clarifying the role of a formalised protocol which goes beyond current practices of data gathering, monitoring and evaluation. In this study, the focus was on M&V as the ex-ante assessment of changes in energy consumption due to contracting projects which serve as the quantitative foundation for the remuneration of the Escos. The more holistic approach of the new 2000 version of the IPMVP could not be taken into account. The study addressed the following guiding questions:

- Is there a need to improve the methodological foundations of energy service contracts?
- Can standardised guidelines for the measurement and verification of energy savings make an additional contribution to the expansion of energy service markets? Are these tools of high priority?
- What kind of support and assistance can be given to new customers to make them ready to initiate and to handle energy service projects?

5. FINDINGS FROM AN EMPIRICAL INVESTIGATION OF ENERGY SERVICE PROJECTS IN NORTH RINE-WESTPHALIA

In order to gain insights into the relevance of M&V as a means to stimulate energy service markets in North Rhine Westphalia, an explorative study was conducted within the target groups of housing companies, hospitals, public administrations and related Escos. It was the objective to investigate the practical experiences of both market sides in the field of building orientated energy services. The sample covered customers with experience with contracting as well as institutions who considered to enter a contract but finally rejected the idea ("no clients", see Tab. 3). Especially the latter could give interesting insights why energy efficiency performance contracts could not be initiated. Although the study initially aimed at putting emphasis on the case of performance contracting it became evident that in most cases a strict categorisation of measures into the two basic approaches was hardly possible. Even if projects were initially labelled as performance contracting projects for the majority of projects it turned out that the focus of action was on an upgrade of the energy system including new heating systems and/or installation of CHP plants. Moreover, in some cases the contractor's responsibility was limited to implement the new heating system while related energy saving measures were realised by the client him/herself.

Table 3. Overview of interview partners

	client	no client	total
housing companies	3	1	4
hospitals	1	5	6
public institutions	2	3	5
administration buildings in industry		2	2
	established actor	new market actor	
large Esco	1	2	3
small Esco		3	3
consultant			1
financial institutions			2
engineering association			1

Given the limited scope of the empirical basis, the study does not provide a statistically representative picture of the energy service market in NRW but serves as an explorative exercise. Through the open character of the interviews it points out decisive features of energy supply and performance contracting projects and helps to detect new variables of relevance. Interestingly, although the group covered a quite heterogeneous sample, most interviews revealed a rather homogenous perception of reality among the various practitioners. Hence the findings described below can be understood as a description of a common understanding in this sample of problems, barriers and driving forces. In addition, the findings are supported by other research work undertaken in the field (Kristof *et al*. 1998, Kristof, Wagner 2000, MBW 1999, InterSEE 1998, ISI/IfP/WI 1997,1999).

Does the aspect of measurement and verification of energy savings represent a major problem for third-party financing projects?

No problems with data generation

The generation and analysis of energy related data did not represent a significant problem to the project partners. Usually, projects were calculated on a full cost basis including all energy, capital and operation costs. Exceptions, however, could be found with regard to personal costs when reductions in personal capacity were deliberately not included into the project definition in order not to provoke resistance by internal staff. This is especially true for public authorities were staff is traditionally well organised.

Other, non-monetary aspects such as improved indoor air quality, better work conditions or environmental aspects were usually not considered as crucial parameters for profitability calculations. Depending on the culture of the customer, these soft factors are added on the top of the argumentation in favour of an energy saving measure or not. Whether better methods for quantification will increase the influence of so far hidden benefits during investment decisions cannot be determined. Considering the complexity of non-monetary impacts it was commonly expected that a sound assessment will hardly be possible.

(Annual) utility bills were normally used as the database for third-party financing projects, and in most cases sub-metered data at the equipment or system level was not possible. Accordingly, the customers rarely had a profound knowledge on the structure of their energy consumption before the contracting project. Only in exceptional cases, detailed energy management devices could be found and it appears that the quality of data – before and after the project - is strongly related to the prevailing "efficiency culture" of the client. In all cases, however, arrangements in the sense of a M&V plan have been taken that specified - at least in a basic manner - the data requirements for quantification of energy savings.

Apart from more complex projects new (sub-) metering equipment was hardly installed unless the customer explicitly demanded it. Due to the general cost reduction trends in the field of electronics, however, most interview partners expect the cost for metering and measurement devices to become negligible, so that in the near future this aspect will no longer represent a significant obstacle to M&V. It was evident, that most companies considered M&V cost as the initial set-up cost and did not take into account the operation, maintenance, calibration, and analysis of the data that is collected from the monitoring equipment.

Summing up it seems that the data framework does not create major problems. Customers as well as non-customers were satisfied with the current practice of data handling and the calculations made by the Escos were usually accepted as the foundation of negotiations and payments.

Positive experience with current practice of risk-sharing

Most risk-sharing agreements followed the common rule that the contractor promises a fixed saving. Hence, losses resulting from underperformance are fully covered by the Esco whereas additional savings due to overperformance are usually shared between the service provider and the customers. Both parties expressed satisfaction with these arrangements and, so far, the co-operation between them was usually characterised as a constructive partnership. However, it has to be taken into account that most projects have been completed just recently so that long-term experience and the ultimate proof in cases of trouble is still missing. But both sides appeared confident that in the future possible problems and disturbances will be settled in an atmosphere of mutual trust and common interest in the project's success.

In this context, detailed specifications of rules how to handle unforeseen changes in building, equipment or operation conditions are not required because construction measures that affect energy consumption are easily identifiable. These influences on energy consumption and the performance of the project can be tracked and included into new baseline calculations.

The influence of changing operation conditions is ambiguous and depends on the nature of the contract. In the case of energy supply contracts (e.g. heat supply service for housing companies) changes in consumption are directly covered through the variable element of the contracting fee. Problems occur only in the case of dramatic reductions in energy consumption lead to an insufficient degree of utilisation for the boiler or CHP module. For the most part, however, these significant changes in consumption require comprehensive construction measures that in turn can be identified and calculated in the beforehand.

In the case of performance contracting the situation is more difficult. When the Escos' payments are tied with the performance of measures, there will be numerous instances when differences would arise between the two parties. Especially slight and hidden changes in energy consumption, e.g. through a gradual growth of the energy consuming stock of medical equipment in hospitals, office appliances, etc., can deteriorate electricity saving targets without being noticed. For the same token user behaviour can affect energy consumption in a significant but hardly controllable manner. Even if there is the theoretical chance to control user behaviour by intelligent facility management technology, the practitioners report enormous problems to get control over the daily behaviour of staff. Information, motivation and qualification measures, therefore, are perceived as very important complements of technical measures of third-party financing schemes. This is one of the reasons why sometimes Escos are held responsible for the performance of the equipment (chiller output, for example) and the organisation is responsible for operational parameters on which Escos have no control at all.

Taking this into account it appears to be imperative that the contract is as detailed as possible and puts down on paper whatever situations the two parties can visualise. In reality, however, the interview partners see little chances to specify and quantify these impacts through M&V in the beforehand. The attempt to anticipate relevant problems ex-ante was judged to be impossible and the related legal arrangements would blow up the complexity of contracting projects. Without a certain pragmatism and flexibility, so the common perception, projects will die before they are even started so that a formalised approach is rejected.

As another aspect, it was mentioned that more important than an ex-post verification of savings, problems occur with regard to the co-ordination of actions and responsibilities during the phase of technical realisation. This concerns primarily the interface between the energy equipment covered by the service contract (boilers, lighting, HVAC, etc.) and the peripheral infrastructure. Especially when the customer has no clear picture of the status of his/her energy system, a modular exchange of equipment often reveals unknown difficulties. In these cases, when the customer is not able to fulfil his/her share of duties or is late in carrying out measures agreed on – typically the case in municipal administration – the energy service contract cannot be realised in time. Although this represents a potential threat to the profitability of the project, both sides do not see any chance to mitigate the problem by more specified ex-ante agreements and detailed arrangements how to proceed in the various cases. Starting from a pragmatic level of pre-defined arrangements the general attitude can be characterised as a joint "trial and error" with focus on flexibility and ongoing communication between both parties that allows a re-negotiation of baselines if necessary.

Little demand for methodological support in the field of M&V

All in all it can summarised that – contrary to the spirit of the IPMVP initiative – in the observed German cases the demand for methodological support in the field of M&V was low. Rather than having specified rules and procedures on monitoring and quantification of saving at the hand, both parties consider the elaboration of the technical concept itself as the critical stage of the project. Once the technical concept has been accepted and the contract been concluded the implementation of the energy service is not seen as a major barrier. The difficulties can be found at a much earlier stage when the project as such is discussed. Rather than the quantitative data set the technical quality of analysis and planning appears to be the most important factor for success.

For example, new customers feel insecure with regard to the question whether the energy analysis really revealed all potential savings, whether the proposed measures represent the optimal solution and what the compatibility of the suggested devices with other equipment and future technical progress are.

Thus, customers perceive their limited ability to assess and to compare the technical concepts suggested by the Escos as the most pressing obstacle. In this regard, more detailed guidelines for a specification of baselines and monitoring of energy savings will hardly mitigate the basic problem of asymmetric knowledge and insufficient competence on the demand-side.

Minor effects on reducing the transaction costs of energy service contracts

As mentioned, both customers and Escos consider the technical planning to be the most important element of third-party financing projects. Accordingly, the phases of technical analysis of the existing energy system, the technical preparation of projects as well as the negotiations on alternatives and technical options represent the most time consuming part of the project.

This includes the communication with users and the staff working in the facility, which often have to be convinced of the advantages of the new solution under consideration. Especially in public administrations and schools, the acceptance of staff, the teacher's assembly, etc. are mandatory preconditions for a successful implementation of the project.

In this context, especially the Escos blamed their customers to create unnecessary delays and costs due to vague and unspecified objectives and insufficient preparation of the project. Obviously among the customers there is the need for a more profound pre-discussion of alternatives, targets, expectations, etc. which could serve as cornerstones for negotiation with service suppliers. Especially in the case of municipalities it can be observed, that third-party financing is sometimes celebrated as a "golden solution" for any kind of energy related problem without thinking the concept with all its chances and risks to the end.

To come to a clear understanding of targets, a sound knowledge of the energetic use pattern and load profile of the facility and the availability of related data is a basic precondition. Therefore, third-party financing projects require minimum information and at least some expertise on the customer's side before an Esco can be contacted. In many cases, customers involve additional experts such as consultants which support the client in generating the needed starting point, e.g. through an energy concept, and to specify the call for tender. These consultants serve as door openers and help prepare the customer for the first time for energy service contracts.

This support, however, creates a new dilemma for technically incompetent customers: on the one hand they need the help of external consultants to identify and to define third party financing projects which they can not do on their own but on the other hand they can hardly judge the quality of this advice which they pay for. It is a kind of vicious circle: who controls the consultant who should supervise the Esco?

In this context it has to be emphasised that the problem is less the reliability of data and calculations made by the Esco but the qualitative aspects of the technical hardware to be installed. Customers are not only interested that a certain energy saving performance is achieved but are concerned about how this target is realised and how the equipment will perform after the end of the service contract.

In order to clarify these doubts, many customers expressed the urgent need for an independent and affordable support through an evaluation of their individual plans and projects. They are looking for neutral institutions that could check the technical concepts and verify the proposed contracts. Moreover, these institutions should preferably engage in visits and discussions on the spot, e.g. in order to gain acceptance of staff.

The particular problem of public authorities

Besides typical characteristics of public administrations such as the usual split of competencies, long decision procedures and highly bureaucratic rules for public procurement in Germany are perceived as an additional barrier to energy services in this customer group. Whereas the procurement guidelines strictly demand a precise and complete ex-ante analysis of all measures, costs and risks before the first offer of the Esco can be made, in practice this task has to be delegated to the Esco in order to benefit from the special expertise of the service. Moreover, due to unforeseeable technical difficulties projects always require a certain flexibility and a gradual refinement of the concept during the stages of planning and realisation. Normally, this is handled through ongoing negotiations between the Esco and the client in order to develop the best solution. Public authorities, however, are forbidden to deviate from an agreement once made which limits the scope for a search for better solutions.

Thus, municipalities are confronted with the problem to reconcile rigid guidelines for public procurement with a dynamic, flexible approach of co-operation with energy service contractors. A solution compatible with the guidelines would be a precise ex-ante preparation of the project through the authority itself in order to make an exact specification of the call for tender - but the difficulties to do this internally are exactly the motivation for the involvement of an Esco.

In addition, many municipalities are still inexperienced in the field of such co-operative arrangements and the actors in charge lack confidence how to proceed best during this kind of projects. They miss a "common practice" approach to follow that would give sufficient certainty not to violate rules and guidelines. Although there is evidence that even under the existing rules there is room for interpretation which makes an integration of TPF into public procurement possible (Baur, Matthey 1997), many civil servants hesitate to try this out and to take the perceived risk.

In this context of public procurement, standardised guidelines for M&V could possibly make a useful contribution to create a frameset of reference and to strengthen the argument against supervising authorities.

6. CONCLUSION: THE DEMAND AND SUPPLY SIDE OF ENERGY SERVICE MARKETS DO NOT MEET YET

It can be concluded that energy efficiency was a subject of high priority for all actors interviewed. Both sides consider energy supply and (energy efficiency) performance contracting as useful approaches to realise profitable projects. Notwithstanding the existing positive examples, however, the interviews revealed typical barriers to a further growth of energy service markets. A standardised framework for M&V was seen to make presumably a useful contribution but it appears not to hit the crucial problems.

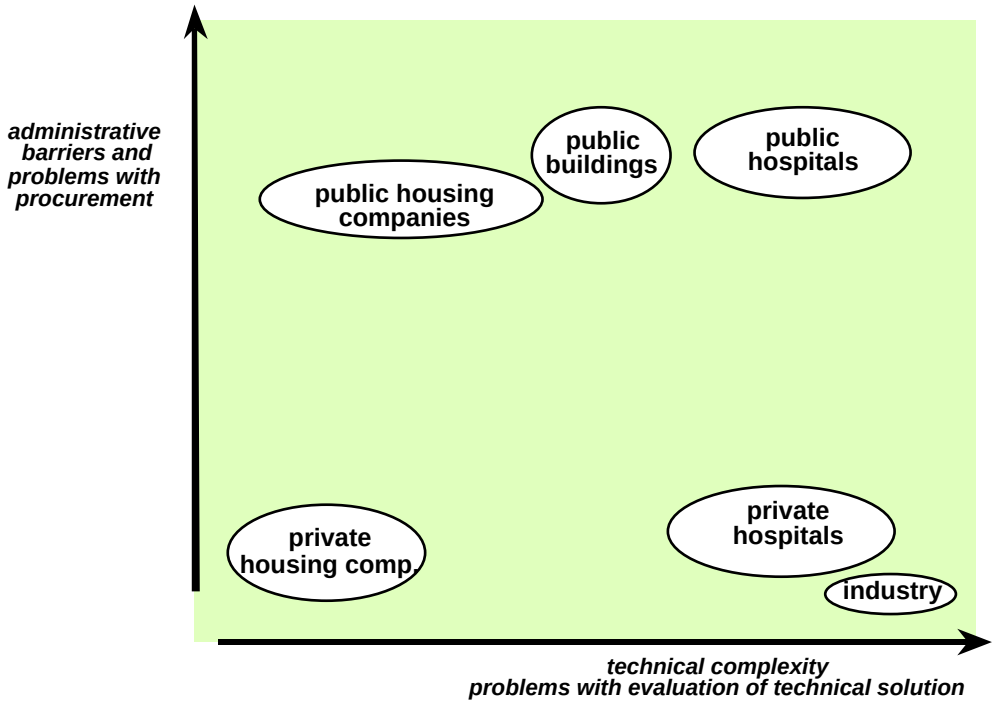
It has to be noted that the limited empirical basis of the study and its bias towards energy supply contracting prevents the derivation of general conclusions on the role of M&V standards in performance contracting markets. However, the empirical findings indicate that there are different categories of obstacles with varying priority. Whereas the quantitative framework of energy and cost data seemingly causes less conflicts and misunderstandings than expected it appears that many projects fail before aspects of M&V become relevant.

Among others, energy service projects are hindered by two major problems:

- The technical complexity of energy saving measures and intelligent facility management imposes great challenges to average customers, e.g. when comparing the offers and identifying appropriate technical solutions. Especially in cases when internal expertise for such assessment is not available, external support by consultants plays an important role during the specification and preparation of the project. However, in both cases – with or without consultant – the customer is confronted with the problem that he/she has to judge an external proposal. In any case there is a demand for pragmatic aid in commissioning, comparing, selecting and controlling of technical planning services.
- The administrative barriers to the procurement of energy services are of special relevance in public institutions such as hospitals, municipal administrations, schools, public housing companies, etc. Independent of the technical character of the project the service nature of third-party financing schemes does not easily fit into usual administrative routines. A common practice of performance contracting in public institutions is still lacking and projects in this group are characterised by delays and high transaction costs.

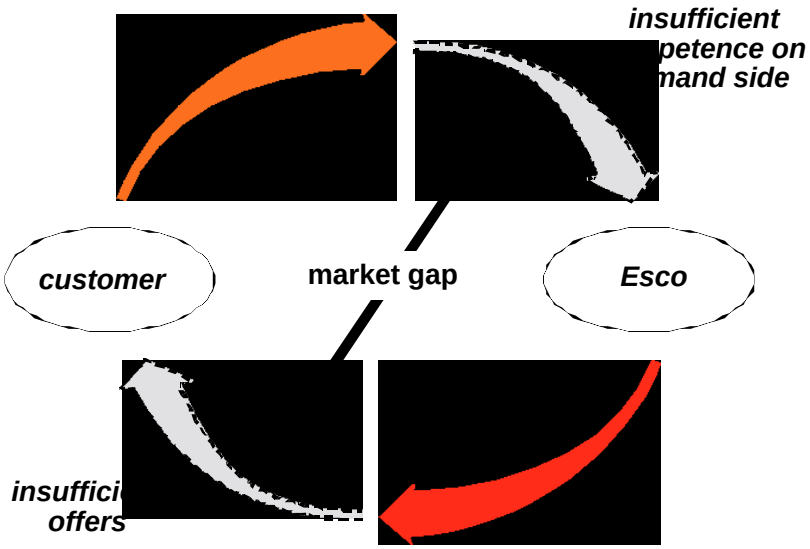
Classifying the market by these two aspects a rough segmentation can be derived (Fig. 2).

Figure 2. Segmentation of energy service markets



The different profiles suggest various priorities for stimulation of energy service markets that can serve as starting points for policy intervention. But it is common to all these groups that the customers are often not able to initiate, manage and control the project by themselves. In other words: the basic skills to participate in the market, i.e. defining a need, expressing a demand, calling for offers, comparing and selecting a suitable supplier and so on, are not yet available. In addition, energy service suppliers obviously do no succeed in making appropriate offers that suit the customers in their particular situation. For these reasons the demand and the supply side of the energy service market do not yet meet each other automatically (Fig. 3). As a precondition for further growth of energy service markets, therefore, the ability of customers to play an active role in the market has to be strengthened.

Figure 3. The gap between the demand and supply side of energy service markets



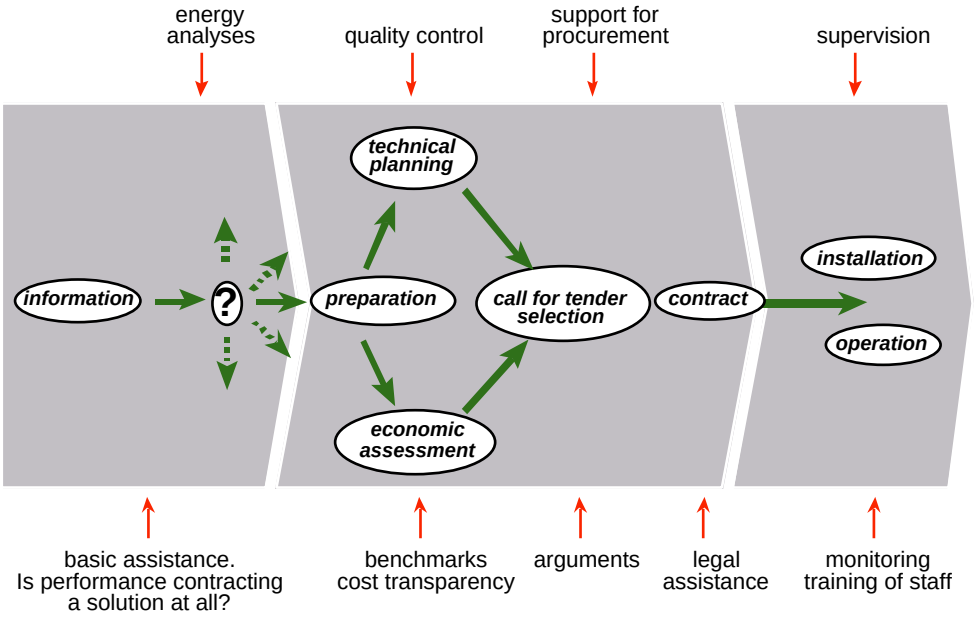
7. EMPOWERMENT OF CUSTOMERS: THE KEY TO EXPANDING ENERGY SERVICES MARKETS

Some of the problems and aspects related to insufficient competence on the demand-side are already addressed by existing information material such as guidelines, handbooks, etc. Within the interviews, however, it became evident that the general type of information provided by handbooks is not sufficient to generate a satisfying solution within an individual project. Even the best guidelines remain ineffective if they are only copied without proper adaptation to the specific context. A transfer of generic solutions to the peculiar case is unavoidable but this adaptation is exactly the major problem for inexperienced customers. In this regard, the impact of standardised schemes for M&V can be questioned, too, because customers do not have sufficient competence to translate the protocol to their problem nor to build up a working project management that could apply the scheme.

For these reasons, tools and support are needed which increase the customers' ability to take and to keep the lead during the project. Such instruments should provide assistance throughout the whole course of the activity (Fig. 4), i.e. they should help

- to identify the needed preparatory tasks of the client and to generate the necessary database as the foundation for the co-operation with external actors;
- to specify the call for tender;
- to select and to control the external consultants and other assisting partners during the project;
- to clarify legal aspects and to elaborate appropriate contractual agreements;
- to provide arguments for justifying the projects towards users, staff, top management, superior control institutions, etc.

Figure 4. Assistance during the whole course of energy service projects



One possibility to provide this assistance would be an individual coaching of projects through independent institutions like public energy agencies. Quite understandable, many customers expressed their preference to such intense support but it has to be carefully investigated what the related programme costs will be.
In addition to public financed agencies, therefore, other options have to be found to support projects. The challenge is to design a comprehensive toolkit which reconciles various, sometime conflicting demands for easy understandable information with a high degree of specification. Information has to be made available to many different real cases without blowing up the amount of information.

Due to the limitations of conventional printed handbooks, for example, new ways have to be found to organise the access to relevant information. In this regard, the new opportunities offered by electronic media need to be considered. It appears promising to create an electronic internet-based toolkit which provides a value added to already existing material.

Initially it was intended to develop such tool as the consecutive stage of the study but unfortunately the study's steering committee, the working group "Energy services" and the involved Ministry of Economics of North Rhine-Westphalia have not yet reach consensus whether and how to engage into this direction. The idea is still pending and less advanced as planned. However, even at this crude stage several features and design principle can be derived from the empirical findings:

- The tool should provide a easy understandable guide through the various stages of a third-party financing project that takes the user by the hand and allows an orientation what to do next ("virtual project coach"). This feature could provide comments on the pros and cons of the available options in order to avoid misunderstandings or incorrect implementations of suggestions made.

- As mentioned the various user groups differ with regard to their problem characteristics and organisational abilities. The tool should foresee distinctions and bifurcations in order to direct the user rapidly to the information of high relevance without overcharging him/her with material of lower importance. Designed as an interactive feedback process this would force the user to clarify his/her intentions and to specify his/her expectations while using the tool. In this regard, the instrument could be used by consultants, energy agencies, too, in order to facilitate the consultancy process.

- Structured by technical and organisational aspects, the material needs to be provided with varying degrees of detail. Several layers of increasing precision can be linked which can satisfy both the new user looking for first, rough hints a well as the advanced client searching for the very last technical detail. Through such a design, the tool can be linked to other existing material such as the abundant stock of technical norms and standardisation. The user could get access to relevant information without being forced to examine all

engineering guidelines him/herself. The same holds for existing procedures and rules of financing institutions or legal issues.

Moreover, in order to decrease the uncertainty and risk aversion of users, the tool should provide a documentation of applicable cases through a growing stock of examples (not only successful best practice cases). By following the updated list the users can get a sense of activities elsewhere so that in the long-term a best practices document might evolve. As already mentioned, such a networking of public actors might lower their reluctance and increase the readiness to jump into the cold water of energy service markets.

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