THIRD PARTY FINANCING

Achieving its potential

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Energy Charter Secretariat

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Preface

Difficult access to finance is an important barrier for investing in energy efficiency. This is recognised by the Energy Charter Protocol on Energy Efficiency and related Environmental Aspects (PEEREA), which requests the identification of appropriate financing mechanisms for energy efficiency.

The concept of Third Party Financing (TPF) is increasingly being promoted as an important vehicle for financing energy efficiency and renewable energy projects. TPF solutions often combine both technical and financial instruments securing that the most suitable technical solutions are backed up with the necessary financial resources to implement the projects successfully.

This study on TPF of energy efficiency clearly demonstrates the relevance of TPF schemes and of Energy Services Companies (ESCOs) for getting energy efficiency projects off the ground. The Energy Charter Secretariat initiated the study in order to stimulate dialogue and exchange of experience between the participating countries in the Energy Charter process on the effectiveness of alternative ways of implementing TPF projects. By publishing this study we endeavour to disseminate the results of the study and the resulting policy recommendations to a wider audience.

This study was funded with the support of the Swedish Ministry of Industry, Employment and Communication and benefited of active consultations in its development with the Swedish Energy Agency. The study was discussed in the Energy Charter Working Group on Energy Efficiency and Related Environmental Aspects, where delegates gave useful inputs. Mr. Ian Brown consultant for the Energy Charter Secretariat was the main author, while Tudor Constantinescu from the Energy Charter Secretariat secured the overall co-ordination of the project. The study is made publicly available under my authority as Secretary General of the Energy Charter Secretariat.

Dr. Ria Kemper
Secretary General

Executive Summary

Introduction

Difficult access to financing remains an important barrier to improved energy efficiency, and the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) clearly addresses the need to identify appropriate financing mechanisms and innovative solutions for improved energy efficiency.

For several years the concept of third party financing (TPF) has been promoted as an innovative technique for financing both energy efficiency and renewable energy projects but delivered only limited results to date in economies in transition. The present report is written against this background.

TPF/Energy Performance Contracting – from theory to practice

Third Party Financing (TPF), Energy Performance Contracting (EPC), and *Contract Energy Management (CEM)*, are all terms used to cover a wide variety of contracting and financing techniques for energy efficiency and renewable energy projects. The terms used, and the financial and contractual approaches they imply, may differ but the essence of each of these approaches is similar. Energy efficiency projects generate incremental cost savings as opposed to incremental revenues from the sale of outputs. The energy cost savings can be turned into incremental cash flows to the lender or energy Service Company based on the commitment of the energy user, and in some cases a utility, to pay for the savings.

The essence of third party financing is that some part of the contract is based on the energy service company's performance in achieving energy savings. Contracting based on performance does not necessarily have to be undertaken by an energy service company, but in practice, energy service companies have been the pioneers and major users of performance contracting for energy efficiency projects.

Performance contracting through an energy service company transfers the technology and management risks away from the end-user to the energy service company. A fundamental difference between traditional contracting (detailed technical specification, price offers) and performance contracting is that traditional contracting is price driven. The emphasis in traditional contracting is on achieving *the lowest price for a known specification*. In performance contracting, the emphasis, by contrast, is on *results* i.e. on the outputs rather than the inputs.

Another key difference between performance contracting and traditional contracting is the provision of this package of services from a single supplier – the energy service company – as opposed to contracting the engineering design from one company, supply and commissioning from another, and/or maintenance from a third.

The approach does have disadvantages however, including the loss of flexibility that comes from signing a contract with a single supplier for a lengthy period of time (up to 10 years). Small projects may be excluded unless they can be 'bundled' together to make a package of sufficient size to justify an energy performance contracting arrangement. Also energy performance contracting may not fit into existing procurement rules based on the lowest cost for a fixed package of goods and services. Energy users may face internal hurdles to the negotiation and agreement on an EPC contract.

While there has been little or no recent systematic quantitative analysis of the scope of the energy performance contracting market it is clear that in certain countries of the EU the market for energy services has become well established with a number of companies competing for business; in others the market exists but the supply side (number of energy service companies) is limited so that full market competition is not established; and in others the concept is not well known or established, though a few 'pilot projects' have been undertaken. Around five EU Member States fall into the first category, seven in the second category, and only three in the third category.

Projects have been undertaken primarily in sectors of industry (especially cogeneration investments), and public and commercial buildings. Few or no projects have been undertaken in the housing sector in Western Europe (although such projects have been undertaken through energy performance contracting in North America and in Central and Eastern Europe).

Concerning the public sector, EU Member States are required (based on the EU Council Directive 93/76) to 'draw up and implement programmes to promote third party financing in the public sector'. The objective of the Directive was in particular the removal of legislative or regulatory barriers to the use of energy performance contracting to improve energy efficiency in public buildings. Implementation of this Directive by the Member States has however been patchy.

Superficially, energy performance contracting would seem to have many advantages in economies in transition, including the market opportunity presented by the need to replace or renovate heating infrastructure (district heating and building boilers), the shortage of domestic debt finance, the higher perceived risk of energy efficiency projects, and the higher energy intensity of transition economies as compared to Western Europe.

While the approach of energy performance contracting is known in almost all transition economy countries, only in a very small number of countries can the approach be considered to be successful. However, the fact that the approach has not lived up to its promise does not mean that it has totally failed in transition economies. There are good examples (case studies) of the use of the approach in transition economies in all sectors: the industrial sector (notably in the Ukraine), the public sector buildings, (Hungary and the Czech Republic being the best developed markets), district heating, and even multi-family housing (Poland).

In order to succeed the approach needs several boundary conditions, which are also boundary conditions for the implementation of energy efficiency projects financed by energy users through traditional contracting, to be met:

- Economic pricing of energy is crucial. Prices should be at market level and subsidies/cross subsidies be removed.
- Billing must be based on measured consumption (including billing for heat and hot water).
- There must be a legal framework and a policy (and culture) of payment for energy consumption, and this payment should be in cash, and in full.
- There should be no serious legal or regulatory obstacles to the use of energy performance contracting in the country concerned.
- In the public sector, energy users must have some financial incentive to enter into energy performance contracts, i.e. they must be able to retain at least a share of the energy savings for other uses.

Barriers to energy efficiency/energy performance contracting

There are numerous barriers to energy efficiency, including lack of information, split incentives, access to capital, and the perceived risk of energy efficiency investments. Energy performance contracting can help to reduce some of these barriers. In particular the approach can help to address the following problems:

- Energy service companies generally accept longer payback periods than companies or institutions implementing projects through traditional procurement and self-funding;
- In both the public sector and in small and medium sized companies, energy service companies can help to overcome the barriers of lack of capital, lack of know-how (on energy efficiency) and lack of manpower to implement and operate energy efficiency investment projects;

- Performance guarantees given by energy service companies transfer the technical risk to the energy service company, and so reduce the perceived risk factor for energy users.

There are however numerous market impediments to the use of energy performance contracting, including the following:

- Scepticism of energy users: many potential clients do not believe that a win-win scenario can be possible and are afraid that savings potentials identified by energy service companies reflect poorly on those historically in charge;

- Control: this is especially the case in the public sector, where many energy users are unwilling to involve an outside private sector company in the operation of the facility or building;

- Energy costs: regulations and subsidies still result in energy costs that are not fully cost reflective, or involve cross subsidies between customer classes (e.g. from industrial to residential), and also may not allow an energy service company to retain the benefits of any cost reductions they make through efficiency improvements;

- Fear of job losses: outsourcing of services in general and energy services in particular is often associated with the loss of jobs, and therefore some energy managers are wary of involving outsiders and outsourcing services.

Role of different actors in promoting energy performance contracting

Governments and energy efficiency agencies have an important role to play in developing the market potential for energy performance contracting. Energy performance contracting is a market-based instrument, and if energy markets were perfect, no government intervention would be required. However, the market barriers mentioned above justify government intervention in order to develop this approach to improved energy efficiency.

Developing the supply of energy services

Governments and energy efficiency agencies (national, regional and local) can act to develop the supply of energy services by building the capability of energy service companies. Many training courses have been already held (often funded by donors) in the CEECs to train energy service companies. However, such efforts to develop the supply side will be fruitless unless actions are also taken to encourage demand for energy performance contracting.

Risk management tools (partial guarantees) have been developed (e.g. by the IFC in Hungary) in order to reduce the risk profile of energy performance contracts, and hence to assist projects to have access to commercial lending at market interest rates.

International Financial Institutions (EBRD, World Bank, IFC, EIB) have played an important role in developing the supply side of the energy services industry. EBRD support for energy service companies in Central and Eastern Europe has been both consistent and substantial. The EBRD are currently providing finance for 11 private sector energy service companies, all of which are funded under multi-project loan facilities with major sponsors, and one state owned energy Service Company in the Ukraine. In addition one energy service company is being financed indirectly through the Energy Efficiency and Emissions Reduction Fund (EETEK) in Hungary. These energy service companies are operating in seven countries: Hungary, Poland, Czech Republic, Slovakia, Lithuania, Romania, and the Ukraine.

However due to the impediments and barriers to energy performance contracting, the general lesson from the EBRD's experience with the financing of energy service companies in the region is that market penetration of energy service companies remains modest, and most of the EBRD financed energy service companies have under-performed as compared to their business plans (with the notable exceptions of UkrEsco in the Ukraine and energy service companies in Hungary).

Promoting demand for energy performance contracting

Governments and energy efficiency agencies (at the national, regional and local level) in the EU Member States have acted to promote energy performance contracting with varying degrees of effort and success (from considerable efforts and much success to none at all). In Central and Eastern Europe similarly varied degrees of effort have been made to develop the demand side of the energy services equation.

Transaction costs are high for energy performance contracting arrangements due to the complexity of the design, tendering, evaluation, and contract negotiation phases. Standardisation in the form of model approaches to design and tendering (especially useful in the public sector where public procurement rules apply), and model contracts, can help to reduce the transaction costs for energy users and for energy service companies. However model contracts can only work if they are (a) accepted by both parties, and (b) seen as a starting point to structure the project rather than as a straitjacket in which it has to fit.

Much work has been done in the EU Member States on developing standardised approaches (in terms of project design, tendering and model contracts) but with some notable exceptions (Austria and Germany in particular) the dissemination of these materials has been very poor and their impact thus sub-optimal. Relatively little work has been done in terms of developing standardised approaches in the CEECs, and even less in terms of the active marketing and dissemination (promoting acceptance by both sides) of such standardised approaches.

Some agencies have gone further and have actively intervened to help energy users in the design, tendering, tender evaluation and contracting phases. It appears that such assistance is particularly useful in developing the market for public sector institutions, where the knowledge of how to approach an energy performance contract, how to evaluate offers, and so on, is most lacking.

The role of industry associations in North America and to a lesser extent in Europe in promoting the wider use of energy performance contracting should be noted. In the United States and in Canada the ESCO industry associations have performed the dual roles of accreditation of energy service companies (thereby helping to build confidence among users in the concept) and lobbying to remove administrative or regulatory barriers to the concept.

Conclusions and recommendations

The report makes a number of recommendations for the wider market penetration of energy performance contracting as a tool to encourage investment in energy efficiency and renewable energy

- Capacity building on the supply side should be continued, and more work is needed to train energy service companies in some countries.

- More work is needed to help to remove barriers to the demand for energy performance contracting. Governments (at the national, regional and local levels) should use the approach in their own buildings, and should develop pilot/demonstration projects that should be both big enough and well disseminated enough to have a real impact on the market.

  Standardisation of approaches (to project preparation, tendering and tender evaluation, and model contract modules) should be developed in order to reduce transaction costs for both energy service companies and energy users. The development of such standardised approaches could be a core activity of energy efficiency agencies.

- Legal and regulatory impediments should be removed:

  - Tariff setting methodologies (e.g. for district heating) which can even discourage investment in energy efficiency should be reviewed and changed;

  - Discrepancies in VAT rates between energy supply and energy efficiency services contracts, which discriminate against energy efficiency performance contracting are a barrier to the use of energy performance contracting and should be removed;

  - Similarly, funding mechanisms for public institutions should be adapted to give institutions an incentive to invest in energy efficiency.

- Innovative practices in relation to energy performance contracting from the EU Member States should be better disseminated in the PEEREA contracting countries.
- Industry associations (whether national or regional) could help the energy services industry to develop. Consideration should be given as to how such associations could be formed.

Section 1: Introduction to the Study

Financing remains an important problem in addressing the barriers to improved energy efficiency. Subsidised energy prices (particularly for the residential sector), lack of awareness by financial institutions of the cost effectiveness of energy efficiency projects, and the small scale of energy efficiency projects when compared to supply side projects are all reasons why energy efficiency projects are difficult to finance. Against the background the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) clearly addresses the need to identify appropriate financing mechanisms and innovative solutions for energy efficiency.

For several years the concept of third party financing (TPF) has been promoted as an innovative technique for financing both energy efficiency and renewable energy projects. The approach has been described as both a technical instrument (by providing a package of technical services from a single supplier) and a financial instrument (by transferring financial risk from the energy user through the provision of performance guarantees for the energy efficiency investment, and potentially by providing the necessary investment capital) and thus helping to overcome financing barriers.

The concept of third party financing to fund energy efficiency investments began in North America in the 1980's, and has since been adopted, though rather less successfully, in Western Europe and to a much lesser extent, Central and Eastern Europe. Both the European Commission primarily in EU Member States but also in Central and Eastern Europe, and the EBRD in Central and Eastern Europe have been notably active in promoting third party financing as an innovative mechanism to help overcome market barriers. The EBRD have financed (with both debt and equity participation) the establishment of 11 energy service companies (ESCOs) in Hungary, Poland, the Czech Republic, Slovakia, Romania, and the Ukraine.

However, despite this support, the overall progress in terms of market penetration of these energy service companies and their impact in overcoming the barriers to energy efficiency can best be described as modest.

The Energy Charter Secretariat has among its objectives the provision of support to the PEEREA Working Group in becoming a forum for dialogue and exchange of information among the participating countries. Horizontal issues identified by the Working Group as work priorities include Third Party Financing, in line with the provisions of PEEREA [Article 6, (1)]. The Working Group on Energy Efficiency and Related Environmental Aspects hosted a panel discussion on aspects related to TPF at its June 2001 meeting. This panel discussion highlighted both good examples from EU Member States and Central and Eastern European countries, and also some of the barriers and obstacles (and the reality that to date the up-take of energy performance contracting has been much less than planned or forecast) that are explored in more detail in this report.

This report is written therefore against the background of examining the potential of an approach to overcoming barriers to energy efficiency that has been promoted with much promise but has delivered only limited results in reality. In particular the report has the following specific objectives:

- To explore and analyse the effectiveness of various ways of implementing energy performance contracting used in energy efficiency projects;
- To reflect on the relevance of energy performance contracting schemes and energy service companies in carrying out energy efficiency projects from both a Governmental and industry perspective;
- To disseminate information on removal of barriers and best practices on the use of energy performance contracting within an East-West forum;
- To help build a common understanding among members of the PEEREA Group which may lead to domestic and bilateral action towards removal of the barriers to energy performance contracting and hence improved energy efficiency.

This report sets out the modus operandi for the development and implementation of third party financing projects, and examines experience with the use of energy performance contracting. This includes examination with the help of illustration from case studies of the experience in relation to the use of third party financing in both EU Member States and in transition economies (both positive and negative experiences. It also examines the application of energy performance contracting for the financing of renewable energy projects. The report further highlights the barriers both to energy efficiency in general and to energy performance contracting in particular, and whether energy performance contracting can help to improve energy efficiency if barriers are reduced or removed.

The final section of the report reviews the role of government and industry in encouraging the use of energy performance contracting and the relevance of TPF from the point of view of the different actors (Government/financial sector/energy efficiency industry), and discusses the policy implications for transition economies, including consideration for EU candidate countries of the *Acquis communautaire* in this regard.

Conclusions are drawn from the study and recommendations given for actions which could assist in improving the penetration of energy performance contracting in the countries of Central and Eastern Europe. While primarily focussed on the policy actions for which national administrations are responsible, recommendations are also made for the actions which other actors (the energy services industry, local and regional governments, international financial institutions) could take which would also assist to remove barriers to the wider use of the approach of energy performance contracting.

Section 2: Introduction to TPF/energy performance contracting

2.1 Introduction to energy performance contracting

Third Party Financing (TPF), Energy Performance Contracting (EPC), and *Contract Energy Management (CEM)*, are all terms used to cover a wide variety of contracting and financing techniques for energy efficiency and renewable energy projects. The terminology used may confuse the reader, but the essence of each of these approaches is similar.

Energy efficiency projects generate incremental cost savings as opposed to incremental revenues from the sale of outputs. The energy cost savings can be turned into incremental cash flows to the lender or energy service company based on the commitment of the energy user (and in some cases, a utility) to pay for the savings.

The essence of third party financing is that some part of the contract is based on the energy service company's performance in achieving energy savings. Contracting based on performance does not necessarily have to be undertaken by an energy service company, but in practice, energy service companies have been the pioneers and major users of performance contracting for energy efficiency projects.

An energy service company ('ESCO') is a company which accepts some degree of risk for the achievement of improved energy efficiency in a user's facility, and whose payment for the services delivered is based (either in whole or at least in part) on the achievement of those energy efficiency improvements.

The services of an energy services company differ from those of energy supply contracting in several key aspects: in the delivery of a package of energy efficiency services (which may include energy supply but are not limited to energy supply; in the use of the 'stream of income' produced by the energy savings to pay for the cost of the energy efficiency goods and services; and in the acceptance of the risk for the achievement of the energy savings. Due also to the potential conflict of interests between selling and saving energy, ESCOs are often separated from mother utility companies.

Several contract and financing structures can be used for third party financing and are described in this chapter.

For this report the term ‘energy performance contracting’ will be principally used, since ‘third party financing’ while used and known in many countries, implies that this approach is primarily a *financing* approach, but in fact the essence of the approach is the *performance based* delivery of a package of energy efficiency (or renewable energy project) services. A definition of energy performance contracting could therefore be:

> *‘An approach under which an external organisation (energy service company) implements a project to deliver energy efficiency, or a renewable energy project, using the stream of income from the cost savings or the renewable energy produced to repay the costs of the project, including the costs of the investment, based on the transfer of technical risks to the energy service company (to greater or less extent) based on performance guarantees given by the energy service company.’*

Performance contracting represents one of the ways to address several of the most frequently mentioned barriers to investment. Performance contracting through an energy service company transfers the technology and management risks away from the end-user to the energy service company. For energy users reluctant to invest in energy efficiency, a performance contract can be a powerful incentive to implement a project. A fundamental difference between traditional contracting (detailed technical specification, price offers) and performance contracting is that traditional contracting is price driven. The emphasis in traditional contracting is on achieving *the lowest price for a known specification*. In performance contracting, the emphasis, by contrast, is on *results* (i.e. on the outputs rather than the inputs). The energy service company is required to give performance guarantees to meet the terms of the contract, i.e. will examine the project from the point of view of the maximum results that can be achieved, and as importantly will continue to have a contractual interest in ensuring that the savings are achieved throughout the life of the project.

An energy service company’s services typically include:

- Initial walk through energy audit to examine the scale and scope of the savings potential;
- Detailed energy audit in order to provide the basis for project planning;
- Establishment of a baseline energy use (either for one process, or for a building, or group of buildings);
- Detailed project design (here consultation with the customer is required);
- Undertaking turnkey supply, installation and commissioning of the equipment or plant;
- Training the customer’s maintenance and operations personnel;

- Maintaining the equipment during the life of the contract (and services could include operating the plant);
- Conducting monitoring to calculate the actual savings (as compared to the baseline energy consumption).

Another key difference between performance contracting and traditional contracting is the provision of this package of services from a single supplier – the energy service company – as opposed to contracting the engineering design from one company, supply and commissioning from another, and/or maintenance from a third. The key to a performance contract is that the energy service company is committed to ensuring the success of the project over the whole life of the project.

Other factors which characterise performance contracting are:

- Energy users may not be required to make an up front capital investment if the energy service company provides the direct financing, or if the project is structured as an operating lease;
- If the energy user does borrow the funds, the loan agreement can be structured so that the guaranteed stream of income from the energy savings is at least equal to the loan repayments, i.e. that the project has at least a positive cash flow;
- The payments to the energy service company are contingent, to different degrees depending on the terms of the contract, on the actual level of energy savings achieved;
- Technical and financial risks are transferred from the energy user to the energy service company.

2.1.1 Advantages of energy performance contracting

There are numerous advantages to energy performance contracting (and to energy efficiency in general), including:

- Reduced operating costs through the improved energy efficiency;
- Improved comfort levels in a building or improved operating/working conditions in a factory;
- Outsourcing of non-core activities;
- Having a single supplier of services and equipment for an energy efficiency project;
- Potential financing for the project (potential access to capital);
- Access to the technical expertise (and experience) of the energy service company;

- Guaranteed performance (technical guarantees and financial guarantees);
- Accountability over the lifetime of the contract;
- Environmental benefits from reduced energy consumption.

To examine these in more detail, why should energy users consider energy performance contracting.

a. Technical Risk

The principal function of the energy service company is to take over and control the technical risk of an energy efficiency project (transferring this risk from the energy user, where it would be under a traditional contracting approach). This involves the energy service company taking over three aspects of the technical risk: the risk that the equipment will perform as designed; the risk that the project will remain within the budget even if there are technical difficulties in implementation, and; the risk that the equipment may not be maintained or operated properly.

b. Project Financing

An energy saving project is an opportunity to generate a stream of income – the income from the energy cost savings. While most energy efficiency projects are funded as capital investments, energy performance contracting projects can be funded out of operating rather than capital expenditures. This can be a key issue for public sector energy users, for whom capital investments may be strictly limited. If the financing for a energy performance contracting project is structured as an operating lease then the project becomes self funded, rather than a debt. Whether the energy service company provides the actual financing (or rather the bank of the energy service company lends to the energy service company rather than to the energy user) depends on the terms of the contract and the wishes of the two parties. This issue is discussed in more detail in the following section.

In addition using energy performance contracting might bring forward the implementation of an energy efficiency project. If the energy user (and this is particularly true in the national or local government buildings sector) has to wait several years for the funds to become available through the capital investment budget, the savings that would be delivered during those years are lost opportunities. Using energy performance contracting can bring forward the implementation of a project, and hence the delivery of the energy savings.

c. Guaranteed Savings

An energy performance-contracting contract involves a guarantee that the savings will be achieved. This is normally structured in a way that the energy savings will at least equal the loan repayments (or lease payments if the project is structured as an operating lease) so that the project has a net positive cash flow. This may be important to energy users who are sceptical of the ability of energy efficiency projects to actually deliver the energy savings estimated through an energy audit.

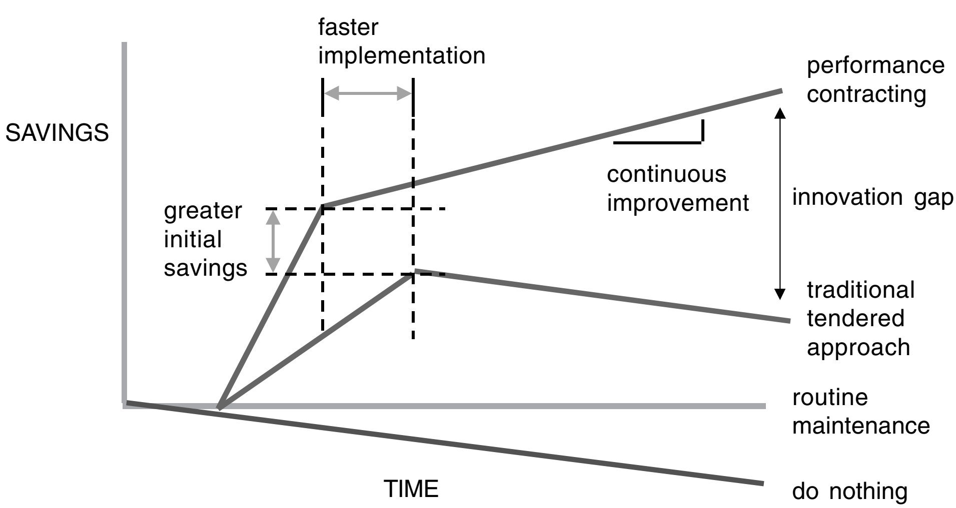
d. Technical Expertise

The principal activity of an energy service company is the development and management of energy efficiency projects. Therefore using an energy service company through an energy performance contracting arrangement brings their technical expertise and technical experience (i.e. theoretical knowledge together with practical experience of actually operating projects and delivering savings) to the project. In addition there is strong evidence that involving an energy service company in the operation of a project (whether through maintenance and monitoring of savings or through direct control of the operation of the plant) means that savings are maintained or even increased during the length of a contract.

Savings can increase through continuous improvement and continuous opportunities for operational efficiencies. Where an energy service company is not involved, savings often decline after the initial investment due to lack of maintenance or lack of attention to the detailed operational savings. Experience suggests that this is one of the most important advantages to using energy performance contracting and involving an energy service company in the energy efficiency project.

These advantages are shown in the following Figure (Figure 2.1) below:

Figure 2.1. Advantages of energy performance contracting[1]



[1] Source: Best Practice Guide to Energy Performance Contracting: AEPCA for the Australian Department of Industry, Science, and Resources, 2000.

e. Package of Services

As noted above, an energy service company delivers a package of services which would normally have to be bought in from different companies: the energy audit; the supervision of installation and commissioning of the plant or equipment; the training of the plant operators or maintenance personnel; the supervision of operation, and the monitoring and evaluation of the savings and efficiency improvements. There are important benefits to the energy user if these services are bought from a single supplier under a 'turnkey' energy performance-contracting contract. In theory this offers savings in management time for energy users, it should be pointed out that such savings are likely to be outweighed by the time involved in negotiating and contracting a energy performance contracting project due to the unfamiliarity of energy users with this approach, and the contractual complexity of an energy performance contracting agreement.

f. Environmental Benefits

The environmental benefits from an energy performance-contracting project are also those from a traditionally contracted energy efficiency project: reduced energy consumption means reduced greenhouse gas emissions and reduced air pollution (either directly from burning fuels at the site, or indirectly from reducing consumption of electricity generated in fossil fuel fired power plants). Energy efficiency projects can also bring other environmental benefits from reduced water consumption, reduced use of chemicals, or reduced solid waste. The advantage of using energy performance contracting is that these environmental benefits can be more easily measured (through the necessary monitoring and measurement process which is an inherent part of any energy performance contracting project) and reported.

2.1.2 Disadvantages of energy performance contracting

Energy performance contracting has considerable advantages, as set out above. The approach also has drawbacks, and it is not a universal panacea for all energy users in all situations. The principal disadvantages of the approach are as follows:

a. Loss of Flexibility

Energy performance contracting contracts are lengthy contracts – typically 5-10 years in duration. There is a clear loss of flexibility involved in signing a contract with a single contractor for a lengthy time period (an obvious corollary of the benefits of using a single contractor for the entire project). If the energy user is unhappy with the performance of the energy service company, it may be difficult to switch suppliers in mid-contract, and for an energy performance contracting project to work a good working relationship must be established between the energy service company and the energy user.

The importance of a good working relationship is particularly highlighted by the linking of payments to the level of performance produced by the project (this performance guarantee is the essence of an energy performance contracting arrangement). If savings do not match the planned and forecast levels, disagreements on the cause can arise –whether it is the performance of the energy saving investment (which is the responsibility of the energy service company), or changes in the use of the building or industrial plant (which are the responsibility of the energy user). Contract clauses that cover such potential difficulties are only part of the answer – a working partnership which helps to resolve potential difficulties is much more effective than resorting to lawyers.

b. Small projects may be excluded

An important question is the minimum project size which can be supported by an energy performance contracting arrangement. Performance contracts are complex turnkey arrangements which involve both services (energy audits, design, commissioning, training, monitoring, and even operation) and investment in plant and equipment. In a typical energy performance contract 30-40% of the total value is made up of services (thus 60–70% is investment). Therefore the threshold of economic viability for energy service companies might exclude small projects. While no hard and fast figures can be given for minimum project size, an annual energy consumption of less than 100 000 Euros is likely to be an indication of the typical minimum under which energy performance contracting is feasible.

c. Unfamiliarity with the approach

A further potential disadvantage to the use of performance contracting is the very novelty of this approach. While energy performance contracting can help energy users either to bring forward investments, or to make those investments at all, the approach may not fit into existing procurement rules which are based on lowest cost of a fixed package of goods and services. Energy users should be aware that they may face internal hurdles (any energy performance contracting project needs a project 'champion' to succeed) to the negotiation and agreement of an EPC contract, and much internal education may be required to overcome misunderstandings to this approach.

2.2 Contracting/Financing approaches

There are two broad options for financing: energy user financing with an energy saving guarantee, or energy service company financing (either energy service company own financing, or debt finance).

2.2.1 Energy Service Company Financing/Third Party Financing

a. Energy Service Company Financing

Energy service company financing is the least common form of financing, where the energy service company itself provides the financing from its own capital (thus the energy service company is taking the financial risk of the project). This form of financing has been used only by very small energy service companies for small projects, or by energy service companies who are subsidiaries of larger financial institutions, using in-group funding (which is arguably third party financing, only within a group of companies).

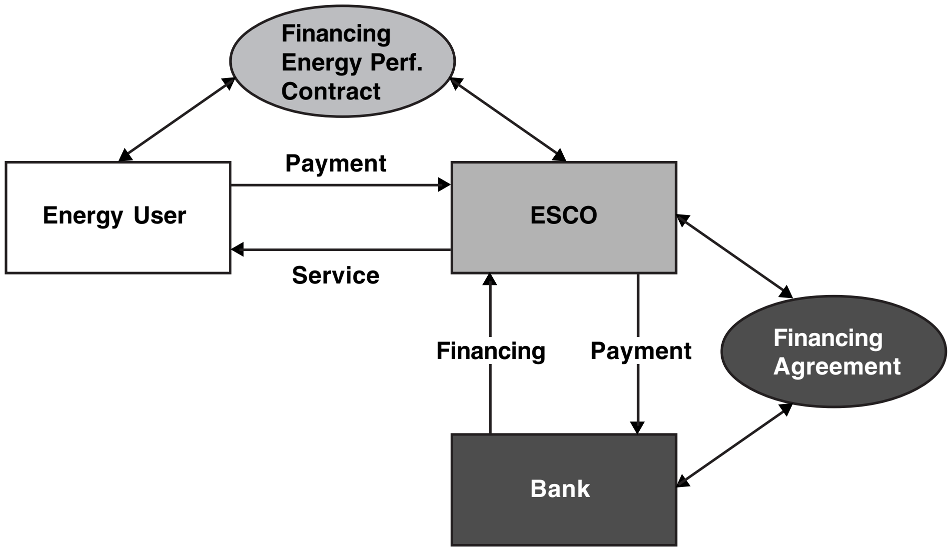
b. Third Party Financing

Third party financing involves the energy service company borrowing the project investment funds from a financial institution (bank) or acting as the intermediary for an operating lease. Such financing can have several advantages over user financing (on balance sheet financing):

- While such financing might be more expensive (have a higher interest rate) than financing taken directly by the energy user, often the term of the financing (the duration of the loan or lease) might be longer than available to the energy user;
- A single point of contact for a project (i.e. the energy service company) can have time advantages through faster negotiation of the financing since there is no need to educate the energy user's own financial institution on the energy efficiency project, which may be unfamiliar to them;
- There may be tax advantages to the energy user to the ownership of the equipment being on the balance sheet of the energy service company until the contract is fully paid off;
- Public sector energy users are often restricted in terms of the amount of debt they can take on (this is especially true for municipalities) and the availability of 'off balance sheet' debt through a third party financing arrangement could be the only way to gain short or even medium term access to funding for energy efficiency projects.

The contractual relationships under such a financing arrangement are shown in the following diagram:

Figure 2.2. Energy Service Company Financing/Third Party Financing



There are several contractual arrangements possible for structuring a third party financing (or energy service company financing) arrangement. The principal types of contracts are as follows:

- *Shared Savings*

  A shared savings contract is a contract in which the savings (as calculated from the baseline energy consumption set out in the contract) are split according to a fix pre-arranged percentage (e.g. if the split of savings is expressed as a pair of percentages totalling 100%, then 80% of the savings would be for the energy service company, and 20% for the energy user; These figures are purely illustrative.) There is no 'typical' split of savings since it depends entirely on the cost of the project, the length of the contract, and the risks being taken by the energy service company and energy user.

  The split of savings can be constant throughout the term of the contract, or it can vary, with a higher percentage of savings being paid to the energy service company in the early years of the contract, with a shift to a higher percentage of savings been retained by the energy user in the later years of the contract period. Under this contractual arrangement the ownership of the equipment is normally held by the energy service company until the end of the contract, when ownership is transferred either at no cost or for a nominal charge. Variations on the fixed term (e.g. seven years) fixed percentage form of shared savings contracts are contracts which include a ceiling and a floor on energy prices.

A further variation on this form of contract is a shared savings contract (which in its pure form is a full performance contract – no savings means no income for the energy service company) with an element of guaranteed savings, so that a certain percentage of energy savings could be guaranteed with the remainder of the savings being shared between the two parties (part guaranteed savings, part shared savings).

Such a contractual arrangement is totally dependent on the accuracy of the baseline consumption, and also on the accuracy of the monitoring and verification of the savings achieved throughout the term of the contract.

- *Contract Energy Management*

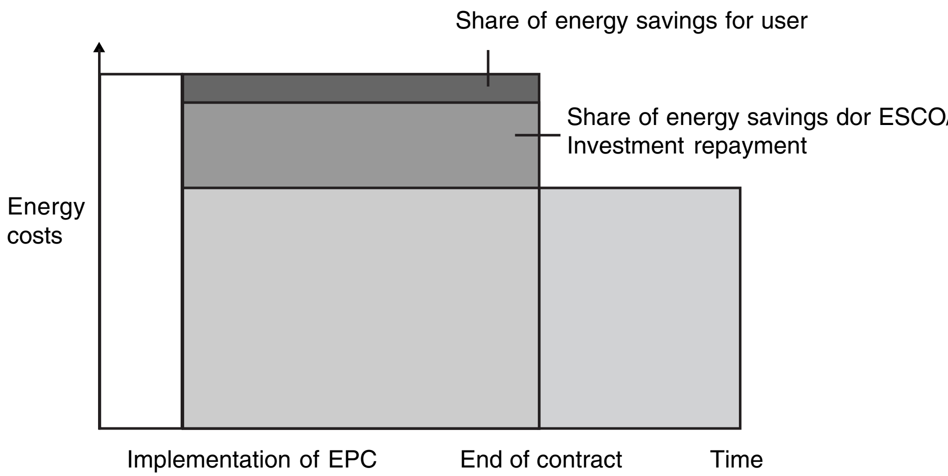
  Under this contract approach the energy service company takes over responsibility for the energy use, with a guaranteed percentage of energy savings being given to the energy user. For example the energy service company might guarantee the user a saving of 5% over the baseline energy consumption cost, and the energy user then contracts to pay the energy service company at the level of 95% of the pre-contract consumption. The energy service company will make the agreed investments in the energy efficiency project, and the difference between the new lower consumption and the contracted figure is the income of the energy service company to repay capital and project development costs, and to fund the ongoing maintenance and monitoring costs throughout the term of the contract.

  Such contracts can also include an element of shared savings, in order to provide an incentive for the energy user. Under such a variation all savings up to an agreed figure, say 30% savings, would be the income of the energy service company (apart from the guaranteed savings element), but that savings achieved beyond this figure (calculated as the figure necessary for the energy service company to be repaid the project costs plus a return on capital) would be shared in proportions negotiated between the two parties. Commonly the higher proportion of these 'additional' savings will be paid to the energy user in order to provide them with the maximum encouragement to achieve the targeted energy savings.

  Payment under such a contract is made monthly, based on an annual charge divided into equal payments. This figure is reconciled at year-end with any additional payments or repayments made. The payment to the energy service company, while based on previous energy costs, would be indexed both to the energy costs and to the utilisation (e.g. to production levels or the production mix, or to building occupancy levels and duration of use of a building).

This contracting arrangement (and shared savings which are similar from the point of view that the achieved savings are split between the two parties, although on a different contractual basis) can be illustrated in the following diagram:

Figure 2.3. Contracting arrangements with shared savings/contract energy management



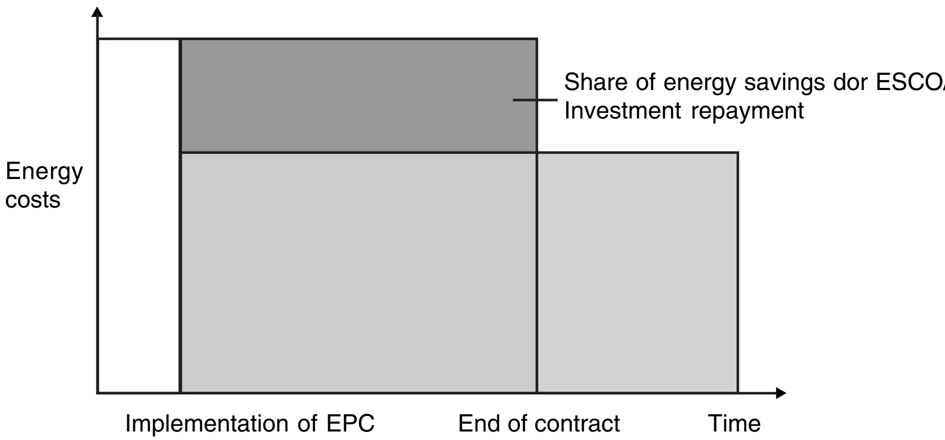
- *'First Out'*

  This approach (which was used extensively in Canada and by some energy service companies in Western Europe) involves the energy service company being paid 100% of the energy savings until the project costs (including the realisation of the energy service company's profit) are fully paid. Such a contract would have a maximum time duration but the exact length of the contract in practice will depend on the level of energy savings actually achieved: the greater the level of savings achieved, the shorter the length of the contract.

  Under such a contractual arrangement the energy service company will be required to set out in advance to the energy user all the project costs (including the required profit margin of the energy service company) and the financing charges. As the contract progresses, the energy service company would be repaid all of the achieved savings until these costs are repaid. The equipment would normally be owned by the energy service company with ownership being transferred at the end of the contract. The energy service company assumes the risk that the project costs are not fully repaid at the end of the maximum contract period. Such an arrangement is highly contingent on the accuracy of the agreed baseline energy consumption (as with shared savings) and upon continuing accurate verification of savings achieved from this baseline consumption.

This approach can be illustrated in the following figure:

Figure 2.4. 'First Out' contracting approach



2.2.2 Guaranteed energy saving lease or guaranteed energy user financing

A lease is very similar to conventional debt in that the energy user takes on a commitment for fixed payments for a specific time period.

2.2.3 Energy user financing/guaranteed savings

In some countries this is the most commonly used form of financing for energy performance contracts. It is typically the cheapest (i.e. has the lowest interest rate) and can be easier to negotiate. The company's bank (or the public authority's bank) may be familiar with the company or public authority's financial position and can quickly take a decision on whether or not to grant a loan.

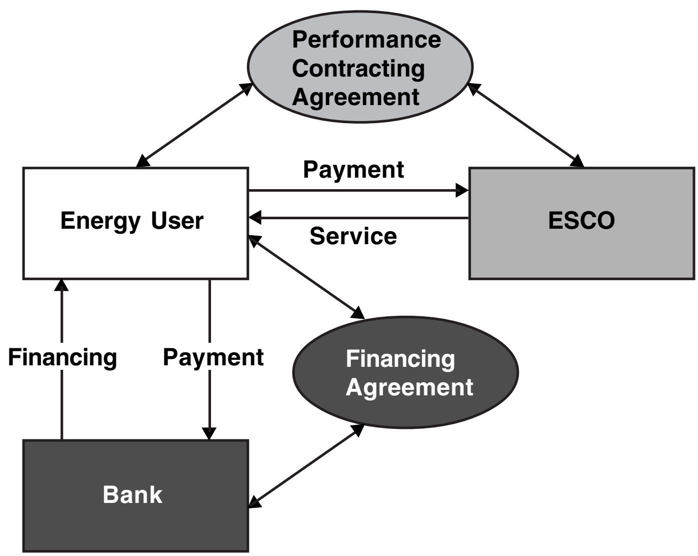
Such a loan can be made between the energy user and the financial institution, with a performance guarantee (savings guarantee) agreement between the user and the energy service company on the performance of the project (as shown in Figure X below). Such a guarantee could be that the level of the energy savings achieved will not be less than the debt repayments: i.e. that the cash flow of the project will be positive; or could be for a certain level of savings. Payments will be defined in advance with a reconciliation (which could be annual). If the savings achieved have been less than the debt payments, the guarantee would be called and the energy service company would be required to refund the difference. As with other types of contractual arrangements, the performance of the contact will be compared to the baseline energy consumption in order to determine the total savings.

Such an arrangement can also be made under a leasing agreement (operating lease or financing lease) with a guarantee element being made by the energy service company.

Such contractual arrangements, whether energy user debt or lease, have the advantage that the total payments are known in advance, but can lead to a situation where the energy service company is motivated only to achieve the minimum level of savings which are guaranteed.

The contractual relationships in such a financing arrangement are shown in the following figure:

Figure 2.5. User financing/guaranteed energy savings



2.3 'Life-cycle' of an energy performance contracting project

2.3.1 Assess the need for performance contracting

The question of assessing the need for performance contracting has two aspects: firstly does the energy user require performance contracting, and secondly, is the building or buildings, or industrial facility, or part of the production process, likely to be suitable for this approach.

Taking the first aspect first, as has been mentioned above, a TPF arrangement is in essence an outsourcing contract for a package of energy services. TPF arrangements are different from the standard lowest cost form of contracting for a fixed package of investments (requiring the involvement of the energy service company in the operation of the plant or building) and it is important that energy users have a full understanding of what is involved at the outset, and particularly of any potential legal or institutional problems. Experience in both Western Europe and Central and Eastern Europe is that for energy users in the public sector (national or local governments or state agencies/institutions) gaining approval for decisions can be slow and full of difficulties. It is crucially important that key decision makers (whether the project is in the public or private sector) back the project otherwise successful contract agreement and project implementation (which is the actual goal) may never be achieved.

Thus energy users should examine standard contracts or review the literature on third party financing/energy performance contracting.

The second aspect: is the building(s) or industrial facility (or part of facility) likely to be of interest to an energy service company? A building or an industrial facility is likely to be of interest to an energy service company if the economic potential for improved energy efficiency is high enough to justify the project overheads and realise sufficient cash flow to both cover the project overheads (financing costs for the investment together with the project preparation, design, engineering and maintenance costs) and to provide a profit for the energy service company and the energy user (cost savings).

There is no hard and fast rule on the minimum size of a project. Some energy service companies in Austria are reported as offering performance contracting arrangements for buildings whose energy consumption is a minimum of 20,000 euro per year[2], although experience elsewhere in the EU suggests a much higher figure (60,000– 100,000 euro annual energy costs as a minimum). If several buildings are combined ('packaged') into a single contract, then lower annual energy costs for individual buildings can be managed.

Does the necessary economic potential for energy efficiency exist for the building(s) or facility in question? If an energy audit (even a preliminary or 'walk through' energy audit) has been carried out, users will be aware of the potential for energy saving. If no such audit has been carried out energy users can either commission a preliminary energy audit, or use other simple indicators (has any investment been made in energy efficiency improvements in the last five years) or benchmarks of potential (does the building or facility have high specific consumption compared to the average for this type of building per m^2, or industry average) to indicate likely economic potential.

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2 Energy Performance Contracting: Guidelines for Success. EVA, Vienna, April 2000. p.5.

A further aspect of the decision whether to undertake a TPF arrangement is for energy users to take into account the need for staff resources. It should be emphasised that performance contracting is not less time consuming for energy users than conventional contracting approaches, and studies on the barriers to energy efficiency in both buildings and industry have repeatedly shown that lack of both engineering or plant maintenance staff time and lack of management (decision making level) time are serious barriers to energy efficiency projects. Energy users must have (or must be able to hire) the necessary staff resources, including an experienced project manager to both develop (negotiate with energy service companies) and implement (commissioning and operation) the project. Energy users will need the following expertise:

- Technical and engineering expertise – in order to prepare background material on the building or industrial facility; to develop detailed specifications; to evaluation proposals; and to oversee implementation from the client's side;
- Financial expertise – to propose and examine the financial arrangements;
- Legal expertise – to negotiate and review the contract with the energy service company, and to provide legal input during the operation of the contract if required.

If energy users (a) are motivated to undertake third party financing for a building or industrial facility and (b) believe that there is sufficient economic potential for energy efficiency, then setting detailed objectives and requirements from the project and selecting the energy service company are the next phases in the TPF process.

2.3.2 Setting objectives/priorities for the project

Energy users must define the detailed scope of the project and define their requirements and objectives. Should the project cover an entire industrial facility or only one part (or one process)? In a large site will the project cover all the buildings (e.g. in a university campus) or not? Among the issues to be considered when setting the objectives and priorities for the project:

a. Duration of the contract

The longer the period of the contract, the longer the period available for the amortisation of the investment costs and the related project overheads, the more complete the package of energy saving measures (including some longer payback measures) can be. However here there is a trade-off between the length of the contract and the time when the full savings are available to the energy user. Is the objective of the project minimum length (to realise the full share of the savings as soon as possible) or maximum investment (in which case the length of the project and hence time before the full share of the savings are realised by the energy user will be much longer)?

b. Standards of service

Energy users should lay down standards of comfort and service which the energy service company will be required to meet. Typically such standards should be set for maximum and minimum indoor temperatures, lighting hours and lighting intensity, hot water temperatures, permissible downtime, and rate of air exchange.

In addition the need of some energy users to have the ability to over-ride building controls in the event of a breakdown (e.g. in a hospital) should be examined and made explicit.

c. Investment cost

As mentioned above, the energy users must have a clear concept of the objective of the project in terms of energy savings. A suitable project for TPF is a project where there is a sufficient economic potential for energy efficiency improvements. However there may be measures which the client wishes to include which are not fully economic, and even if a longer duration contract is considered, could not be funded through the TPF arrangement. In this situation energy users should be prepared to contribute to the project costs.

d. Maintenance requirements

Energy users should define their maintenance requirements. Normally the energy service company will expect to maintain any equipment installed (since maintenance is a crucial aspect of maintaining or even increasing the level of savings) and to instruct/train on-site operators and maintenance personnel in the day to day operation of the equipment, unless the energy service company takes over the full responsibility for day to day operation ('full outsourcing'). Energy users must decide whether they want the energy service company to take over all maintenance of energy using equipment, and/or full operation of the energy consuming plant (e.g. the heating and ventilating plant). In assessing the operations and maintenance needs from the project the energy users should look both at the capability of the in-house personnel, and any staff or union agreements which might be relevant to the ability of the energy user to outsource maintenance or operations services.

The life cycle of an energy performance contract is shown in Figure 2.6.

2.3.3 Contracting procedure

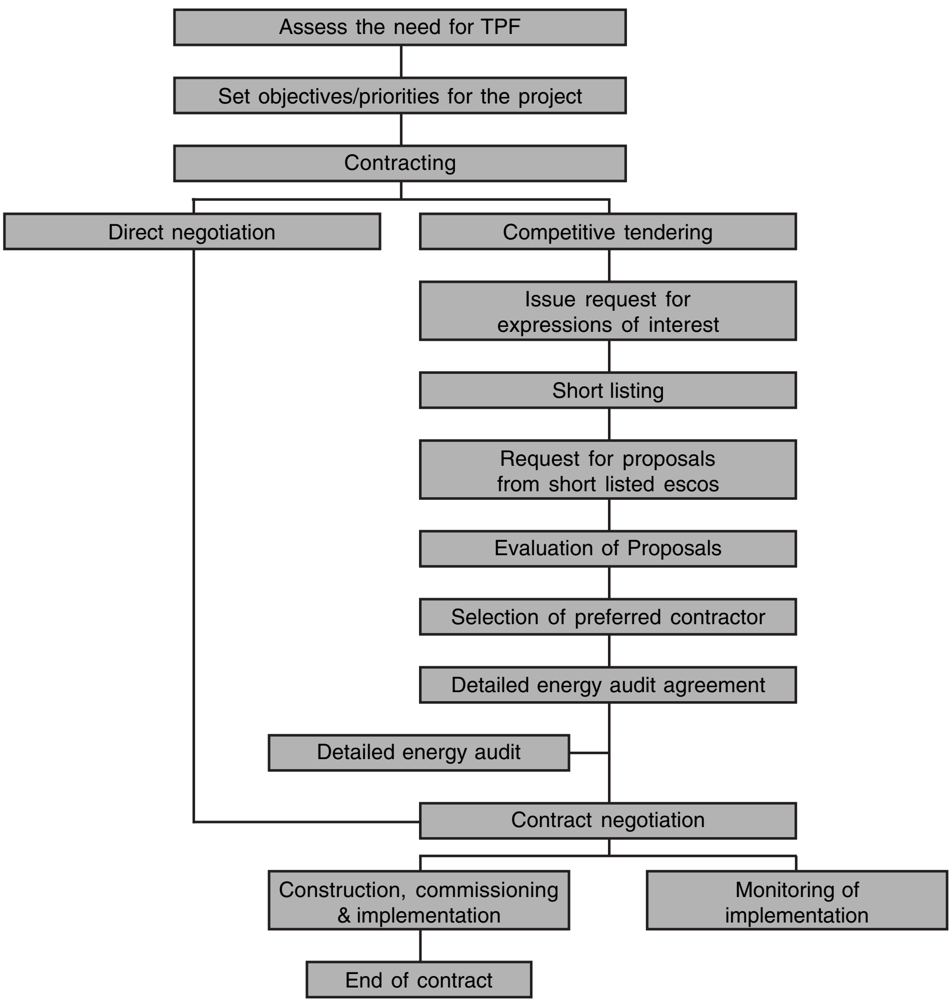
The steps the energy user takes to obtain proposals from energy service companies will differ depending on how they wish to approach the procurement process, and how they are allowed to, if they are in the public sector and must obey public procurement rules. The broad options available are as follows:

a. Direct Negotiations

Under this approach the energy user simply selects an energy service company (which could be certified if a national certification scheme exists) and asks it prepare a proposal based on the information provided by the energy user (historical energy data, details and drawings of the building or facility) and on a simple preliminary energy audit. On this basis the energy service company can form a judgement if an economically viable project exists, and can proceed to a detailed offer and negotiations with the energy user.

Direct negotiations with a single energy service company is the quickest and least costly way to contract a TPF agreement, but this option is usually not open to public sector energy users who must use a competitive route to contracting.

Figure 2.6. Life-cycle of an energy performance contract



b. Competitive contracting

The difficulties of using public sector procurement rules which are usually based on the concept of least cost price for a fixed package of goods and services, with performance contracting which is based on a different philosophy of maximisation of results rather than minimisation of purchase cost, are discussed further in Section 6. However the requirements for transparency and competition which are behind public procurement rules can be met for performance contracting, and there is much experience both in Western Europe (and North America) and in Central and Eastern Europe in carrying out a competitive process for tendering for energy performance contracting.

For public sector energy users this process usually entails the following two procedures:

Step 1: Issue request for expressions of interest

The objective of this step is identifying suitable energy service companies and advertising the project and requesting expressions of interest from qualified energy service companies. This is the normal way to proceed. The information given in the request for expressions of interest should include:

- The principal objectives of the projects;
- The broad scope of the work required;
- Requirements for financing (if any).

The information requested should include:

- List of capabilities and experience (reference projects);
- Methodologies for performance contracting;
- Financing options.

Based on the evaluation of the responses received, a short list of energy service companies should be drawn up. Some energy service companies may be eliminated because they do not offer performance contracting, or they have no experience in the specific field of the project (e.g. for a lighting project experience in heating and ventilating will not be relevant or useful).

Step 2: Requests for Proposals

The second stage of the competitive process, once the short list is established, is to proceed to full Requests for Proposals (RFPs). The RFP is the mechanism for selecting the energy service company with whom final contract negotiations will take place. The information both given and received is similar to that in the expression of interest stage, but much more detailed. The information typically given by the energy user includes:

- List of buildings or industrial facilities under consideration;
- Proposed phases of implementation and timetable for implementation;
- Contract duration (if a maximum applies);
- Maintenance and operational requirements;
- Standard format for proposals and selection criteria;
- Funding restrictions or requirements;
- Any required contract provisions and required standards of service.

Much of the detail of the energy service company's proposal can only be concluded after the detailed engineering audit is carried out, which can only be done when a preliminary contract has been signed between the selected energy service company and the energy user. However, based on the information provided by the user and by a simple 'walk through energy audit' the energy service company should be able provide the following information, which is sufficient to allow an informed judgement to be made on the choice of contractor:

- Technical aspects of the proposal
  - (i) The cost of the detailed energy audit
  - (ii) Estimated annual energy savings (within a range, e.g. plus or minus 20%), minimum savings, and Net Present Value (NPV) and/or Internal Rate of Return (IRR) criteria
  - (iii) Broad guideline of the recommended energy saving measures
  - (iv) Proposals for operations and maintenance, and training, and upgrade issues
  - (v) Site conditions
  - (vi) Project management

- Financial aspects of the proposal
  - (i) Method of measuring the savings
  - (ii) Method of determining payments and term of payments
  - (iii) Length of contract
  - (iv) Ownership of equipment
  - (v) Estimated cost of proposed energy saving measures
  - (vi) Financing options
  - (vii) Purchase options
  - (viii) Performance guarantees
  - (ix) Insurance
- Background and qualifications
  - (i) Description of the energy service company and its capabilities
  - (ii) Relevant experience
  - (iii) Project references
  - (iv) Financial information (balance sheet, profit and loss statements, etc)

Energy users may also ask for information on additional energy saving opportunities beyond those identified in the RFP documents.

Step 3: Evaluation of Proposals

It should be noted that a RFP is not a detailed technical specification for a supplies or works tender: it does not request fixed price for a set specification. Rather it requests proposals from energy service companies as to how they will carry out the project, how they structure their fees, what performance guarantees are provided, and estimates of the value of the costs and savings.The main focus of the evaluation should be on the basic methodology for guaranteeing the savings (the performance guarantee), the proposed energy saving measures, and the benefit derived from working with that energy service company.

The RFP should describe the evaluation process in order to ensure that energy service companies provide all the necessary information. The evaluation typically involves weighting scores for the key criteria (based on the objectives for the project), and should involve evaluation of both the quantitative and qualitative aspects of the proposal. However as proposals can vary considerably in their approach, it is important to ensure that a conventional 'weighted' scoring system does not bias the result ("are you comparing apples with apples or apples with pears"). Since the final cost estimates cannot be made until after the detailed energy audit, energy users are mainly evaluating the overall approach and the 'fit' of the energy service company with themselves.

An energy service contract implies a long-term financial relationship between the energy service company and the energy user, and the financial stability of the contractor is a major consideration when evaluating the detailed responses to the RFP. The user should examine carefully the information given on the financial condition of the energy service company and its ability to support the performance guarantees it gives. In addition a long-term relationship requires a good 'fit' between the two partners, and there should be a sound basis for believing that a partnership approach can be built between the energy service company and the energy user if the project is to be ultimately successful.

Step 4: Detailed Energy Audit Agreement

Based on the energy service company selected through the RFP process, the energy user would proceed to sign an agreement to carry out a detailed energy audit. A detailed energy audit is a relatively high cost procedure (especially for a multi-building site, or for a complex industrial facility) and can involve several man months of work. Such an agreement typically has the following clauses:

- If the detailed energy audit confirms the energy saving projections in the RFP proposal (i.e. if it confirms that an economic potential exists for a TPF project) and the energy user decides not to proceed with the project, then the energy user must pay for the cost of the detailed energy audit;
- If the detailed energy audit does not confirm the minimum level of savings specified in the RFP, and the energy service company decides not to proceed, then the cost of the audit is the risk of the energy service company;
- If the audit confirms the savings predicted, and a contract agreement is reached, then the cost of the audit can be included in the overall project costs and can be amortised over the duration of the project.

Step 5: Contract Negotiation

Following the conclusion of the detailed energy audit and the submission of the final proposals of the energy service company for project implementation the final negotiations should establish the detailed project scope, the agreement on the baseline energy consumption, the guaranteed savings, the project timetable, and the exact costs of the full project. The method of monitoring the savings and the financing arrangements should also be finalised and agreed.

In order to assist energy users in this phase, the EU financed the preparation of model contracts (with an explanatory guide) for industry and buildings, originally in five countries: France, Germany, Italy, Spain, and the UK in 1987. This was later expanded to cover the other member states (EU – 10) in 1992. However the dissemination of this material appears to have been poor, and both the contract and the guidebook have been very little disseminated (or known) and therefore little used.

Step 6: Implementing and managing the contract

When the contract is signed, the task of the energy user is to oversee the contract implementation. This will require:

- *Finalisation by the energy service company of the design, equipment procurement, and construction.*

  The final engineering design will be made, with confirmation of the specification of the scope of works, followed by procurement and construction. At this stage the final timetable should be prepared and agreed. All construction site activities should be co-ordinated with energy users and requirements or restrictions notified and agreed (e.g. planned shutdowns, holiday periods, critical periods of operation when construction cannot take place).

- *Commissioning of the project by the energy service company.*

  The commissioning of the equipment is normally performed by the energy service company but the energy user's operations and maintenance personnel normally take part in the commissioning (which, it should be noted, is more a process than an event). During this phase it is the responsibility of energy users to ensure that the equipment delivered and installed does in fact match the specifications set out in the contract.

  The commissioning phase is also normally the phase during which training (if foreseen in the project) is given to the energy users maintenance and operations staff.

- *Managing the savings period.*

  When the construction and commissioning phase is complete (and the certificate of acceptance has been signed by the energy user) the management of the savings starts. This phase involves measurement and verification of the savings, and maintenance (and further improvements if identified and agreed). The measurement and verification of the savings is normally carried out by the ESCO according to the terms as set out in the contract. Savings reconciliation will normally be performed at a minimum once per year. This reconciliation will identify any payment which should be made by the energy user (if savings exceed the minimum amount and a cost sharing arrangement has been made for the additional savings) or by the ESCO (if savings fall below the minimum amount specified in the contract).

Step 7: End of the Contract

The situation at the end of the contract will depend on the contract provisions: commonly the ownership of the equipment lies with the energy service company during the term of the contract, and is transferred to the energy user at the end of the contract either without charge or is sold for a nominal fee (this depends on the tax provisions of the country concerned). Alternative options are either for a new contract to be negotiated (with a new investment programme) or for a new contract (with a much reduced payment) to cover the continuing maintenance and/or operations activities.

2.4 Energy Performance Contracting in Industry

The experience with energy performance contracting in both the EU Member States and in a number of CEECs is given in more detail in Sections 3 and 4 of this report. However an issue which should be mentioned here is the important differences between the application of energy performance contracting in industry and in the building sector. The key differences are:

Energy demand in buildings (residential or service buildings) depends on climate (degree days) and the degree of usage of the building (hours of use of a school, number of classrooms in use etc). These are factors which are possible to measure, in which case the effect of an energy efficiency investment can be measured (with greater or lesser difficulty depending on the complexity of the building and its pattern of use). In industry however energy demand depends on many more factors, and most importantly it depends on the production process, and on such factors as the production mix. Measuring energy efficiency gains from a particular investment can therefore be difficult, if not impossible in certain cases.

This does not imply that energy performance contracting cannot be used in industry, but it does imply that the application of the approach is likely to be possible in a more narrow situation than in the case of buildings, where the complete renovation of a building or number of buildings is possible. In industry (as the case studies in Sections 3 and 4 show) energy performance contracting can work where the effects of the investment can be isolated in the sense that it is possible to define interfaces between different parts of the energy system (e.g. the compressed air system) or where the project involves energy supply system (e.g. installation of a cogeneration plant) where the energy supply is sold to the industrial user. The case of the public sector energy service company UkrEsco in the Ukraine (see Section 7.5 for more details) demonstrates what energy performance contracting can succeed in the industrial sector in economies in transition.

A recent EU SAVE programme funded project 'Third party financing of energy efficiency: structuring of pilot projects in Poland, Austria, Norway, and Spain'[3] undertook an analysis of the market for energy performance contracting in industry in the countries concerned, together with the selection and development of pilot projects in the industrial sector. Within the scope of the project a market analysis was undertaken of the conditions both favouring, and acting as barriers (a SWOT analysis) to the use of energy performance contracting in industry. The results of this analysis were as follows:

In order to succeed, an energy performance contract in industry would need the following (generic) conditions (i.e. boundary conditions for any industry)

- A positive experience with regard to outsourcing of services, and a positive attitude to the idea of outsourcing 'non-core' services;
- Few internal personnel resources dedicated to the energy system;
- An obvious 'energy problem' which requires a solution (such as an old boiler which requires replacement), and for which investment funds are not available;
- Parts of the energy system can be identified which are not critical for production;
- The energy supply and use chain can be separated into different elements;
- Energy costs are of medium or high importance in terms of overall costs (and hence profits);
- Energy related data exists on a sufficiently disaggregated level;
- The enterprise must have an energy problem that they want to solve with no technical risk (i.e. transferring the technical risk to the energy service company);

[3] 'Third Party Financing of Energy Efficiency in Industry, Structuring of Pilot Projects in Poland, Austria, Norway, and Spain'. Final Report. EVA, Vienna. December 2000.

- There may be a legal requirement for investments which have an energy efficiency effect (e.g. new emissions laws, or lighting regulations);
- Support for the approach by decision makers (this is a key, and in multinational companies the energy performance contract should be treated as an operating cost and not as an investment).

The SAVE project also identified a number of barriers or criteria which would present problems for an energy performance contract, as follows:

- The Company is under restructuring or privatisation, creating an uncertain investment climate (this is a major problem in many CEECs);
- The company has a large and well trained maintenance staff;
- Energy costs are a small proportion of total costs;
- The energy production process is complex, and it is difficult to separate data on energy use in different parts of the process;
- The company has a low credit rating;
- There is a high level of confidentiality in the production process and the company is very reluctant to have outsiders involved in the production process (this is true in certain industries such as pharmaceuticals, but especially in SMEs).

Investment in industrial facilities is inherently more risky for energy service companies due to the risk of bankruptcy or factory closure (very real risks) as compared to investment in public sector buildings, where, while a building may change its use or degree of occupation, the institution itself will clearly continue to operate schools, hospitals, and office buildings. Options to reduce the risk of investing in the industrial sector include shortening the payback period and hence the contract through increasing the energy service company fee to greater than that achieved by the savings. This mean that the credit risk to the energy service company remains, but the ESCO is exposed to the risk for a shorter period. However, such an approach is less likely to be attractive to the industrial enterprise than a longer contract with a net positive cash flow throughout the contract period.

A second approach to reducing the risk of investment in industrial facilities is that of investment in horizontal technologies (such as packaged cogeneration) which can have an application in other companies and situations if a company goes bankrupt or a factory is closed. However, the potential for such ‘mobile’ investments is clearly more limited than for more site specific packages of energy efficiency improvements.

The conclusion of the SAVE project was that EPF cannot be used as a blanket solution for all energy related problems in the industrial sector, but rather it is an approach that can only be used in industry under certain specific circumstances.

2.5 Energy Performance Contracting in the Public Sector

The experience of energy performance contracting in Central and Eastern Europe (see Section 4) is that public sector buildings (national, regional, and local) and district heating systems (usually municipally owned) have proved a more fruitful market sector for energy performance contracting than industry. This is related to the risk of investment in energy efficiency as follows:

- Ownership of the building or district heating sector is normally clear and predictable;
- The risk of bankruptcy is much less than in industry;
- Changes in use of buildings can occur, but the risk of closure of a public facility is normally lower than a factory closure.

However there are also obstacles and barriers to the use of this approach in the public sector:

- Not all public sector buildings are owned by the national, regional or local authorities. Some buildings or facilities can be leased from private owners. For example, in Greece only 34% of public buildings are owned by the State, while 66% are rented from private owners, who are legally responsible for the maintenance of the building (and for energy efficiency investments) but who do not pay the energy bills. This landlord/tenant barrier is also a significant barrier to energy efficiency in the commercial buildings sector.
- Public authorities often have no incentive to reduce energy costs (if there is not a special regulation in this respect), if the authority or department is not allowed to use the saved funds for other purposes. If a budget for energy costs is reduced in the following year due to achieved savings (as often happens), there is no incentive to enter into the complex process of tendering for, and negotiating, an energy performance contract.
- It is noted above that industrial energy managers frequently lack the knowledge and skills of financial engineering required both to evaluate an energy service company offer, and to convince their higher management of the merits of such an approach. This situation is even more acute in the public sector, where there is often a serious lack of competence related to energy management in general, and the complex commercial and financial proposal of an energy performance contract in particular.

Section 3: Energy Performance Contracting in EU Member States

3.1 Introduction

There has been little or no systematic analysis of the scope of the energy performance contracting market in the EU Member States. What is clear from a review of the experiences with TPF in different EU Member States is that in certain countries the market for energy services has become well established, with a number of energy service companies competing for business (for example where the market is well developed enough to support a dedicated trade association); others where the concept exists but the supply side of the market (i.e. the number of active energy service companies) is less well developed; countries where the concept of third party financing is still at the 'pilot project stage' i.e. where it is not well know or established, though exists on a small scale.

What can be said is that a majority of the EU Member States fall either into the first or the second category, with only a small number in the third category. There are no Member States where the concept of TPF could be said to be unknown, or not existing. In 1998 a league table of the market for TPF in the Member States was proposed, with the three categories set out above. The countries were considered to be in the three categories as follows[4]:

Level of development of the market for TPF	EU Member State
First level (most developed markets with competition between ESCOs, and good acceptance of the concept).	Belgium, France, Netherlands, Spain, UK
Second level (ESCOs exist, but full market competition is not yet established.)	Denmark, Germany, Finland, Ireland, Luxembourg, Portugal
Third level. Only limited 'pilot projects' have been implemented, and small number of energy service companies.	Austria, Greece, Italy, Sweden.

Since this classification was made in 1998, Austria has certainly moved into at least the second category (and maybe into the first category) while in Greece there have been some encouraging developments with the use of performance contracting in the public sector.

4 The potential for Energy Service Companies in the European Union, Dr. John Butson, Conference paper, September 1998 (Improving electricity efficiency in commercial buildings).

The purpose of this section is not to give a quantitative survey of the use of energy performance contracting in Western Europe, but rather to show the impact of EU wide legislation (SAVE Directive 76/73) and to give some examples (in Annex 1) where successful projects have been implemented, and to draw some lessons in terms of which sectors have been penetrated more successfully with performance contracting, and which less, and why, can be drawn. In addition preliminary conclusions will be drawn on the policy measures which have encouraged the greater uptake of energy performance contracting in some EU Member States.

The case studies in Annex 1 have been chosen to give an illustration of the different sectors where TPF has been used in the EU Member States, and of the different approaches to financing and contracting. In particular the case studies chosen from Austria, Germany, and from Spain indicate the important role national and local energy efficiency agencies have played in the Member States in order to develop the market for energy performance contracting.

3.2 Acquis Communautaire/TPF Directive

Member States of the European Union are required to “draw up and implement programmes to promote third party financing in the public sector”, according to Council Directive 93/76 [Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE).] Accession countries are also to be required to implement this Directive. Although energy performance contracting (or ‘third party financing’ to use the terminology of the Directive) is a market-based instrument the existence of legal and administrative barriers that prevent the use of the approach in the public sector (notably public procurement rules, or even outright bans) prompted the adoption of this Directive.

The Directive does not dictate to the Member States *how* they should promote the use of energy performance contracting in the public sector, but rather it leaves the Member States free to decide themselves what barriers there are, and how they should be removed. It is the end result (barrier removal) rather than the exact means that is the objective of this Directive.

The Directive states that ‘programmes’ can be in the form of laws, regulations, economic and administrative instruments, information, education and voluntary agreements. Further, the Directive states that the scope of the programmes drawn up and implemented must be determined by analysing potential improvements in energy efficiency, cost-effectiveness, technical feasibility and environmental impact.

> The definition of Third Party Financing in the Directive is *“the overall provision of auditing, installation, operation, maintenance and financing services for an energy efficiency investment, with recovery of the cost of these services being contingent, either wholly or in part, on the level of energy savings”.*

A summary of the principal actions taken by public administrations in the different EU Member States to comply with this Directive are as follows:

Austria: There are now at least 26 companies offering TPF services in the country. The Austrian Ministry of Environment started implementing a TPF scheme in 1998. One project in Vienna, started in May 1998, involves 50 federal schools. Several Länder have also developed programmes for the public sector.

In December 1998, the Austrian Energy Agency, E.V.A., published guidelines for implementing TPF. The guidelines address potential customers, consultants and TPF suppliers. In December 1998, the Austrian Society for Environment and Technology, OGUT, published a guideline for the implementation of TPF in municipalities.

Belgium: Third-party financing is authorised to be used in public sector buildings in all three regions (Flanders, Brussels, and Wallonia). The Brussels-Capital region has budgetary provisions for the development of energy performance contracts for public institutions (belonging to the Brussels regional government). In Flanders, municipalities can use municipally owned energy distributors for energy performance contracting. In Wallonia, promotion of energy performance contracting is undertaken through the general energy efficiency policy and the energy efficiency in buildings programme of the regional government.

Denmark: State institutions cannot use loans to finance energy savings projects and since energy performance contracting is classified as a loan by the Danish State, there is no possibility for Ministries or state agencies to access third-party financing. The Ministry of Finance believe that if the project is worthwhile, then it can be financed internally without using external sources. The state sector can however promote energy efficiency projects through subsidies, energy management programmes, data reporting and preparing energy plans. For regional and local authorities, energy performance contracting is considered a form of borrowing funds for energy savings projects and there is a government regulation that permits those levels of government to access loans. Municipalities have had the opportunity to access such financing mechanisms through Article 2(I)(7) of Interior Ministry Order No. 343 of 5 May 1994.

Finland: The Decision on Energy Conservation 1995 asked the Ministry of Trade and Industry, the ministry responsible for energy, to prepare the introduction of a TPF scheme. The Ministry tasked the energy agency, MOTIVA, to study the models of operation and basic pre-conditions outside Finland. From the study, guidelines were prepared and a pilot project started in late 1998 to test the system. The model contract financed by SAVE is being used.

France: France produced an administrative circular, dated February 13, 1991 that, for the purposes of reducing the energy bills of public buildings, allowed the financing of equipment by leasing, thus allowing for third-party financing.

Germany: Studies have shown that there are no major obstacles to the use of third-party financing in the public sector. Several measures were put into place, including: education and explanation to unions; publications; demonstrations; a change of Article 7 of the Federal Budget Regulations to assess how much governmental duties and public requirements can be carried out by the private sector and on a decentralised basis; seminars and conferences; and projects in many of the Länder. Guidelines have been developed for TPF in the Federal Government. Some Länder also have TPF guidelines.

Greece: Energy management and energy performance contracting measures in public buildings are provided by a joint Ministerial Decision of August 1998 (21475/19.8.98) and by Circulars of the Ministry of Interior and Public Administration in 1997 on the implementation of its energy management programme. The development of two 'pools' of pilot projects, one of Ministry buildings in Athens, and the second of regional government (prefecture) buildings in Northern Greece are intended to act as demonstration projects for the use of energy performance contracting in the public sector.

Ireland: In 1999, the Department of Finance was preparing a draft circular for comment to support the concept of third-party financing in the public sector. The intention is for projects to be chosen and structured to ensure that energy savings achieved cover, as a minimum, all costs incurred in delivering third-party financing. The Irish Energy Centre and the Electricity Supply Board (ESB) are exploring options for developing a third-party financing system, for all sectors including the public sector.

Italy: A significant number of energy audits have been undertaken in tertiary sector buildings (particularly in the health sector but also in schools and hotels) on the basis of an agreement between ENEA and the Ministry of Industry. These audits are seen as a necessary first step in the development of energy efficiency projects, which could involve energy performance contracting.

Luxembourg: There are no known barriers to hinder the use of TPF in the public sector. For TPF projects for local authorities, funds are transferred directly to the contractor.

Netherlands: There are no major barriers identified to hinder the use of third-party financing in the public sector. The Netherlands originally adapted a model contract for TPF funded under the SAVE programme. In the past, NOVEM also prepared several information booklets. There has been little interest shown in using third-party financing in the public sector

Portugal: Analysis undertaken in a SAVE project led to the development of a model contract. TPF firms can receive grants or subsidies, for energy efficiency projects, under the SIURE programme.

Spain: The voluntary agreement for the improvement of energy efficiency in hospitals administered by INSALUD, signed 15 February 1996 by the General Secretary of Energy and Mineral Resources (SGERM) and the National Institute of Health, laid down a plan to promote the rational use of energy within the public hospital system. The Institute for the Diversification of Energy Savings (IDAE), the energy agency participating in the realisation of this programme, was delegated by SGERM to develop a plan for cogeneration in 95 public hospitals, to be financed by TPF.

Sweden: In 1996, the Government began an information campaign to promote TPF. The government asked the National Energy Administration (STEM) to recommend the direction that should be taken in the future. To aid the process, a model contract was developed through the SAVE programme.

United Kingdom: Promotion of TPF in the public sector effectively started in November 1992 with the introduction of the Private Finance Initiative (PFI). This scheme brings private sector investment, management, skills and innovation into the provision of public services. Contracts for energy services involving capital investments are included in this initiative. Revised guidelines, "Energy Services in the Public Sector: a Working Guide" were published in December 1996 to help promote public-private partnerships. Modifications to the programme were made by the current government after 1997.

Table 3.1. Summary of Third-party Financing Promotion in the Public Sector[5]

Member State	Measures	Date	Remarks
Austria	Information, Administrative instruments	**1998**	Various projects and schemes, both Federal and Provincial; Guidelines for municipalities.
Belgium	Administrative instruments		TPF is authorised in all regions. Promotion in all regions.
Denmark	Administrative instruments	**1994**	Used by Municipalities. Not allowed at national level. Financial support in government operations, although not directly related to TPF. Special tax on government operations to encourage energy efficiency.
Finland	Administrative instruments, pilot projects	**1995**	Guidelines prepared; SAVE pilot project started in 1998.
France	Administrative instruments	**1991**	Government circular allowing TPF.
Germany	Information, demonstrations, Administrative instruments	**1994**	No major obstacles other than information needs. Various means by government to promote TPF. Guidelines prepared in federal government.
Greece	Regulation	**1998**	Min. Decision of August 1998. Specifications being prepared.
Ireland	Administrative instrument	planned	Preparing draft circular.

5 Source: Study on the Application Of Council Directive 93/76/EEC of 13 September 1993 'To Limit Carbon Dioxide Emissions By Improving Energy Efficiency (SAVE)', Final Report, February 2000.

Member State	Measures	Date	Remarks
Italy	Voluntary agreements	Completed	Energy audits of building implemented by ENEA. A total of 3,300 audits carried out mainly in hotels, schools, hospitals.
Luxembourg	Financial	**1996**	Financial support through 1996 action programme for energy efficiency in communities.
Netherlands	No programme		No major barriers. Following development of model contract and information programme, there is little interest.
Portugal	Financial		Financial support available through SIURE programme.
Spain	Administrative instruments	**1996**	Agreement with hospitals to promote rational use of energy using TPF. IDAE acts as energy service company. There are still other barriers for other state institutions.
Sweden	Information, education	**1996, planned**	Promotion of TPF. Development of model contract. Study underway to determine future programme.
United Kingdom	Administrative instruments	**1992**, **1996**	Promotion started through Private Financial Initiative. Revised guidelines issued in 1996.

Section 4: TPF in CEECs

4.1 Introduction

Superficially at least, energy performance contracting would seem to have many advantages in economies in transition and be relatively more attractive in such economies than in Western Europe (or North America) for several reasons:

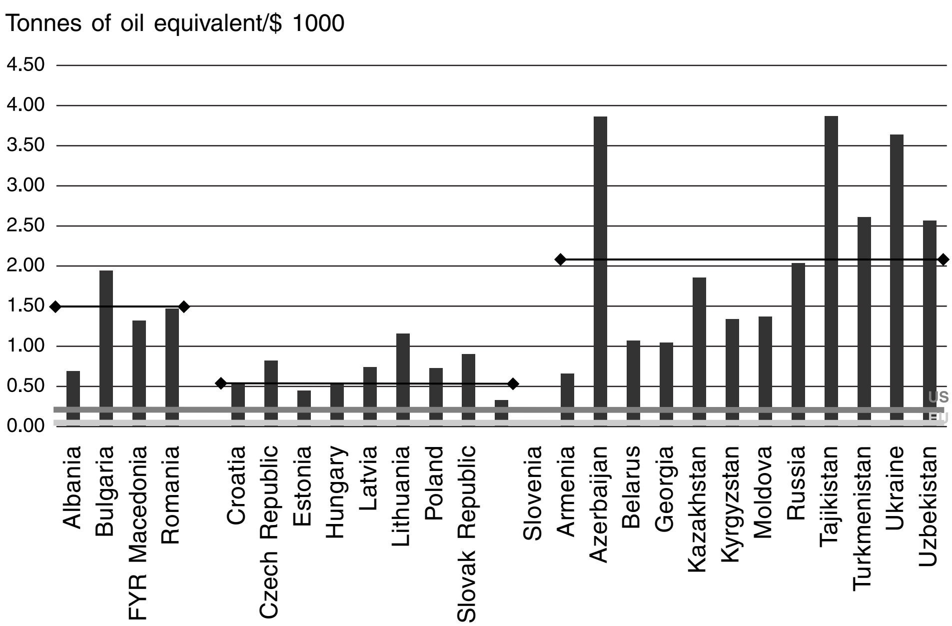
- The less well developed energy efficiency services industries implie more difficulty in finding the services needed for a conventionally contracted project (energy auditing, design and commissioning, advice on monitoring and implementation) than for an energy performance contract.
- In a region of ageing infrastructure which is in need of renewal or renovation, building and industrial energy users are frequently more interested in finding funds to replace worn out or outdated equipment than in improving energy efficiency. However, the fact that infrastructure such as boilers and heating equipment is being replaced or renovated presents a market opportunity for energy performance contracting.
- There was (certainly in the early to mid 1990s) a shortage of finance for investment (and high real interest rates for loans from domestic banks) in both the public and the private sector, a shortage of finance which persists in a number of economies in transition.
- Energy service companies assume the technical risk of success of an energy efficiency investment, and the perceived risk of energy efficiency projects was believed to be higher by energy users in economies in transition than in Western Europe where many years of energy efficiency programmes (and energy efficiency technology development and demonstration projects) have increased awareness of both the benefits and real technical risks of energy efficiency investments.
- Energy intensity is considerably higher in Central and Eastern Europe than in Western Europe (due both to non-cost reflective energy prices and to the structure of the centrally planned economies).

These reasons all imply that energy performance contracting should have (or have had) much potential in the CEECs. Certainly in the early 1990s it was believed by both donors and by IFIs (the EBRD has given substantial support to the creation and development of energy service companies in the transition countries, as will be described more fully in this section) that the approach held much promise, and much effort (and donor funding) was devoted to developing the concept.

Both the EU Phare and TACIS programmes and USAID, together with other bilateral assistance programmes (notably the Netherlands Government assistance) have funded projects intended to build the capacity necessary for an energy efficiency services industry to become established in the countries of Central and Eastern Europe. Actions funded have included training for energy auditors, training for energy service companies (including an EU Phare funded project for the twinning of energy service companies in Western Europe with small-start up energy service companies in Central and Eastern Europe) and several dedicated energy efficiency funds, which although not focussed only on energy performance contracting, have certainly included EPC/TPF projects within their objectives for support. Such dedicated energy efficiency funds were established in Hungary, the Czech Republic, Lithuania, and Slovenia.

However despite the many similarities between the countries in transition (high energy intensity and distorted energy pricing) there are also important differences, which should be borne in mind in any assessment of the progress achieved to date, and the potential, for energy performance contracting. In the first place the energy intensity of the economies in transition can be viewed as falling into two broad groups (at different levels) as shown in Figure 4.1 below:

Figure 4.1. Energy Intensity (1999) in transition economies.

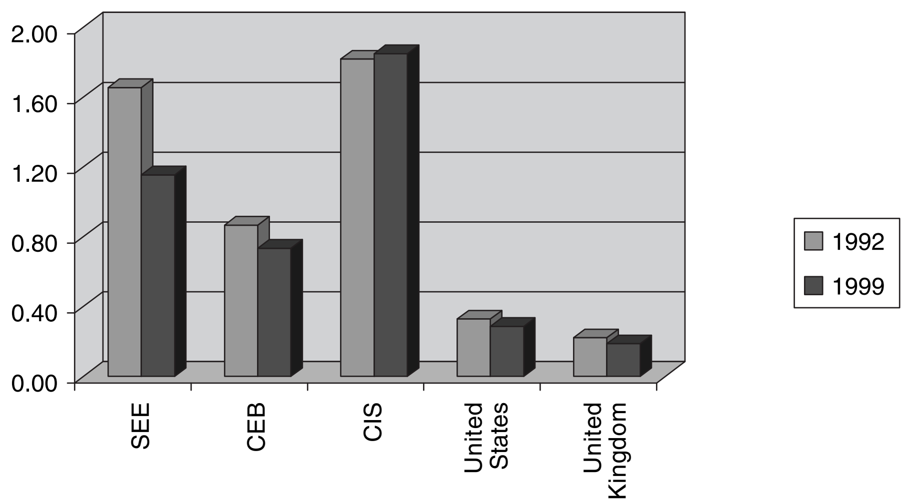


Source: [6] EBRD Transition report 2001, Improving efficiency in energy conversion and use

6 Source: EBRD Transition report 2000, Improving efficiency in energy conversion and use.

As can be seen from this chart there are three broad groups of countries: Central Europe and the Baltics (with the lowest intensity), the countries of South Eastern Europe (with a much higher level of energy intensity) and the CIS countries, with the highest level of energy intensity. However this chart presents a static view of the situation (based on 1999 figures). Further information can be gained from reviewing the changes in average energy intensity for each of these three groups of countries, and by comparison with the UK and the USA.

Figure 4.2. Changes in energy intensity



Source:[7] EBRD Transition report 2001, Improving efficiency in energy conversion and use

As can be seen there are differences between the three groups of countries. In the countries of Central and Eastern Europe and the Baltics, from 1992 to 1999 there was a continuous fall in energy intensity, while in South Eastern Europe there was also a decrease in intensity, despite a temporary reversal in the mid 1990s when reforms slowed in both Romania and Bulgaria. In the CIS, by contrast, energy intensity increased during most of the 1990s (in the case of the Ukraine, energy intensity increased by 40% from 1992 to 1998, and in the case of Russia by 4%). Part of this increase is caused by the lack of energy efficiency measures and part by the shift in economic activity from the recorded to the unrecorded economy ('black economy').

[7] Source: EBRD Transition report 2001, Improving efficiency in energy conversion and use

Other important differences in terms of the potential for energy performance contracting are the substantial differences in terms of progress towards pricing reform, and the differences in cash collections and commercial losses. In Central Europe, the cross subsidy from industrial to residential prices has been ended, and good progress has been made towards achieving cost reflective prices (also in some CIS countries, such as Armenia and Georgia). In 2000 the average industrial electricity price in the Czech Republic was 4.3 US cents/kWh, and in Hungary it was 4.5 US cents/kWh, but in Russia industrial prices were 1.8 US cents/kWh (while residential prices were only 0.9 US cents/kWh. The countries with the highest ratio of price/LRMC (long run marginal cost) and the countries of Central Eastern Europe and the Baltics.

Cash collections (the percentage of energy bills paid in cash) are clearly a vital factor for energy performance contracting. If billed energy is not paid, then there is no cash flow to justify investment in energy efficiency improvements, or to repay debt taken out for such investments. In Western Europe and the United States, cash collections are nearly 100%, and commercial losses close to zero. In the CIS cash collection averages only 50% and commercial losses average 20%[8]. Cash collections are particularly low for industrial consumers (this is true also in South Eastern Europe) and therefore the potential and incentive for energy performance contracting in this sector is correspondingly lower. In South Eastern Europe cash collections average 65%, and commercial losses average 20%. In Central Eastern Europe and the Baltics low cash collections and commercial losses are much less of a problem, and the limited scale of the problem that existed has been considerably reduced during the 1990s through industrial restructuring.

While for the public sector systematic data on cash payment of energy bills does not exist, there is anecdotal evidence that in countries where cash collections are a problem, public sector energy users are part of this problem.

The objective of this section is to examine the experience with the market development and use of energy performance contracting in economies in transition. In particular the section will examine the experience with market development in four countries in particular (Czech Republic, Hungary, Poland and Romania) and will draw some conclusions on the factors behind the success of the approach in some sectors, and some countries, and its relative failure, or lack of success in penetrating the market, in other sectors and other countries. In particular the policy implications will be examined: are there markets where performance contracting has succeeded (or failed), due to policy intervention (or lack of action)? The linkage between progress in improving energy efficiency in general, and energy performance contracting in particular, and the wider question of progress in energy sector reforms (restructuring, pricing) is also important. Case studies in the Annex 2 illustrate the experiences in the countries covered in this section.

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8 Source: EBRD Transition report 2001, Improving efficiency in energy conversion and use p.96

4.2 Czech Republic

4.2.1 Energy policy background

A 'State Programme to Support Energy Savings and Use of Renewable Sources of Energy' was an annual programme first set up in 1991 by the Ministry of Industry and Trade which was implemented firstly by the Ministry, and from 1996 onwards through the Czech Energy Agency, a state agency founded by the Ministry of Industry in order to promote energy efficiency and the wider use of renewables, and to implement energy efficiency programmes. The 'State Programme' provided 1 525 M CZK from 1991 to 1995, and 1 226 M CZK from 1996 to 1999. Because of budget constraints the budget was reduced to 224 million CZK in 2000. This funding was used as grant support for projects relating to production, distribution and consumption of energy, the wider use of renewables and CHP, and education and public awareness campaigns. Funds are allocated within each year, and projects must be started within the budget year, and must be fully completed within 18 months.

A major development of the policy background for energy efficiency and renewable energy occurred in 2000 with the development and passage of the Energy Management Act (Act on Energy Management of the Czech Republic No 406/2000) which was approved by the Parliament in November 2000, and become operational from the beginning of January 2001. This framework law provides the basis for Czech energy efficiency policy and programmes, and includes the following important requirements:

- An important development (for the market for energy performance contracting) is the inclusion of a requirement for mandatory energy audits in state owned buildings (state schools, hospitals, and office buildings of ministries and state agencies), or in the buildings of institutions funded by the State (e.g. universities) with an annual energy consumption over 1500 GJ. Energy audits are mandatory for private building owners with an annual consumption over 35,000 GJ (where the energy supply is through a network) or greater than 700 GJ/year for individually supplied buildings (i.e. with own boiler).

- Further, the energy management act imposes an obligation on the institutions and building owners who have undertaken the (mandatory) energy audits to implement all low cost energy efficiency measures identified through the audit. However, as discussed further below, while the existence of the obligation to undertake energy audits is widespread within the Czech public sector, the funding to undertake such audits is very limited (it is intended that organisations and institutions should fund the audits from their own budget funds). This law, and indeed that lack of funding available for audits by budgetary institutions provides a major stimulus to the market for energy performance contracting.

- Energy audits are mandatory for industrial companies which consume 35,000 GJ per year (835 toe). However audits proposed by the Czech Energy Agency in industry have been criticised[9] as being 'energy flow' oriented rather than focussing on cost effective energy efficiency measures

- The Law also mandates special exams for certified energy auditors.

- In addition to the requirement for energy audits, the State Programme provides grants for cities undertaking model energy concepts, which typically focus on the improvement of energy efficiency and the expansion of the use of renewable energy. In 1999 energy concepts were prepared for the cities of Prague, Tabor, Bechyne, and Nymburk. In 2000 grants were given for up to 50% of the cost of an energy concept (up to a maximum of 500,000 CZK per project) and in all 24 projects were selected (with a total subsidy of 4.92 million CZK).

4.2.2 Financing for energy service companies

The barrier of lack of financing for energy efficiency projects was recognised in the Czech Republic (as in other countries of the region) and in order to help address this problem the EU Phare programme allocated funding of 4.5 million euro to establish an energy efficiency fund. This fund, which was developed in co-operation with the energy efficiency NGO SEVEn (which was contracted to develop the methodology for the management and administration of the fund) is managed by a Czech bank, the CSOB. The Phare funds are used together with commercial bank debt from the administrating bank to provide soft loans for energy efficiency projects (with funds blended on a 50/50 basis). The fund has a maximum duration of 10 years, and is targeted at small to medium sized investment projects. The fund has been successful at disbursement (and projects financed through energy performance contracts have benefited from the fund) but the allocated capital has been lent, leaving a limited ability (at present) to on-lend funds based on the returned capital and interest from ongoing projects (the 'revolving funds').

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9 IEA Energy Efficiency Update August 2001. International Energy Agency, Paris.

4.2.3 Demand for energy performance contracting/experience to date

The first energy service company to be established in the Czech Republic was set up in 1992, a subsidiary of a United States energy service company, Energy Performance Services (EPS). Among the energy service companies active on the market today are EPS (since taken over by the German utility MVV, and now named EPS-MVV), Siemens (formerly Landis and Stefa), KSUE (also established in 1992), Dalkia (EdF/Vivendi Environment) and a number of smaller companies who are partially involved in energy performance contracting. In 1997 the energy efficiency NGO SEVEn conducted a detailed study of the market as it was then for energy performance contracting, and up to 1997 nine projects had been implemented, five were in the construction phase, and 11 were under negotiation (see Table 4.1).[10] Although the number of projects which have been implemented and are presently under negotiation have changed (and increased) the structure of the Czech market for energy performance contracting that was already apparent in 1997 has changed little in its broad scope. Schools, hospitals, and industry remain the principal market. However within these end use sectors, several Czech energy service companies focus on market niches such as building insulation or replacement of boilers.

The breakdown of projects up to 1997 by end use sector was as follows (including projects under negotiation, projects signed, and projects under implementation)

Table 4.1. Energy performance contracting in Czech Republic (up 1997)

Energy end use sector	No. of projects
Schools	9
Hospitals and clinics	5
Industry	8
Residential and private commercial buildings	2
District heating systems	1

a. Industry

While the energy intensity of Czech industry has improved in the 1990s, further progress remains to be achieved in order to reach EU average energy intensity in the industrial sector. The potential for energy efficiency and for energy performance contracting is considered to be high in industry, but particularly for projects relating to energy supply investments. Many smaller projects are carried out by the companies themselves. One barrier to energy performance in the industrial sector is that since the risks are higher than in the public sector (risks of the future operation of the industry, and the future intensity of use) consequently the rewards required by the energy service companies are higher. Many industrial energy users are unwilling to 'share the profits' of an energy efficiency project.

[10] Tapping the potential for energy efficiency: the role of ESCOs in the Czech Republic, Ukraine, and Russia. Meredydd Evans, PNNL. Conference paper, ACEEE 2000 summer study.

b. Public Sector Buildings

There are three levels of government managing institutions in the Czech republic: the state, which manages universities, the largest hospitals, and government buildings (Ministries, the police, army buildings and facilities); regional governments, which run medium sized hospitals, middle schools, colleges and high schools, and their own buildings; and municipal government, which manages elementary and nursery schools, clinics and local health facilities.

The requirements of the Energy Management Act for energy audits have created an important demand not only for energy audits, but for energy service contracting approaches. Many public institutions which are required by law to undertake an energy audit lack the necessary funds not just for the investments which the audit will identify as being cost effective, but for the cost of the detailed energy audit itself. Arranging an energy performance contract in which the cost of the audit is covered by the performance contract is one way in which to meet the legal obligation for energy auditing, and the passage of this law has provided an important stimulus to the market for energy performance contracting in the Czech Republic.

There are however, several important barriers to the use of energy performance contracting in the public sector in the Czech Republic. The first of these is the lack of a long term planning horizon for expenditures. Not unusually for the public sector, it is very difficult for Czech public sector entities to enter into multi-year commitments. Energy service companies have requested a commitment (in the contract) for the continued operation of the facility (school, university or hospital) and also a commitment of the level of use, but State institutions in the Czech Republic cannot make such a legally binding commitment for future years.

The second difficulty relates to the public tendering act which still has no special provisions for third party financing, and leaves each individual institution which negotiates an energy performance contract to deal with the contractual and legal issues on its own. This lack of clarity in the public tendering treatment of energy performance contracting is considered to be a barrier to the wider use of the approach in the public sector. The public tendering requires open public tender for all projects with a value greater than 228,000 euro, a minimum of 5 bids for projects between 76,000 euro and 228,000 euro, and 3 bids for projects less than 76,000 euro.

The problem with the public tendering law is less with the tendering procedure (though this is not ideally suited to energy performance contracting) than with the lack of any written procedure for the evaluation of offers from energy service companies. As has been noted above, evaluating offers from energy service companies is very different from evaluating offers for traditional contracting (lowest price for a fixed package of services) and local and regional authorities (regional authorities have only recently been created: previously county governments were the level of government between national and municipal) have little or no experience in evaluating performance contracts. Each local or regional government that has been involved in an energy performance contract has learned through experience, but this ‘ad hoc’ method of learning is slow and the benefits of the learning curve for one authority are not made available for other authorities.

Schools are normally small projects, which are individually too small to justify the transaction costs of an energy performance contract. This can be overcome by ‘packaging’ the schools into groups, but this requires the active intervention of the necessary authorities (municipal or regional).

In the case of hospitals, a barrier to the use of energy performance contracting is that hospitals are frequently managed by managers who are also doctors, and since a performance contract requires payments to be made to the energy service company (even though these payments are not more than the savings achieved), medical staff are frequently reluctant to consider ‘payments for energy savings’. A further barrier (for energy service companies) is that payments to hospitals are frequently late or irregular causing major cash flow problems and irregular and late payments to the energy service company, and a number of projects which have been implemented in hospitals in the Czech Republic have suffered from this problem.

c. District Heating

District heating is an important part of the energy system of the Czech Republic, accounting for around 20% of final energy consumption in the residential sector, 12% in the service sector (primarily institutional buildings) and 14% of industrial final consumption. The market share of district heating in the residential sector is approximately 35%.

District heating systems are operated in around 50 cities and towns, with the system being fully privatised in 1992-1994 (through the voucher privatisation method) although a small number of units belonging to the military, and major institutions (large hospitals, universities) remained in state ownership. A number of heat producers and district heating companies have been bought by foreign owners, with US, France, the UK, and Germany all investing in district heating systems. From January 2001 the regulation of the district-heating sector is governed by the new Energy Act, with the following principal provisions:

- Heat generation, production, transportation, transmission and distribution is subject to licensing for a fixed period of time (minimum 25 years).
- The construction of new heating plants with a capacity of greater than 30 MWt must be authorised by the Ministry of Industry and Trade, and plants below this capacity must be authorised by the regional authorities. The criteria for approval in both cases includes the use of domestic (and local) energy sources, energy efficiency, and the financial status (solvency) of the investor.
- Pricing and licensing are the responsibility of a newly created Energy Regulatory Office.

- ❍ Heat energy generators or distributors must supply heating to any customer who asks for it if the supply is foreseen in the zoning energy management plan.
- ❍ Regional governments are required to prepare 'Zoning Energy Management Plans' which should contain:
  - An analysis of the trends in energy demand in the zone;
  - An Analysis of the possible sources of energy and means of utilisation;
  - An evaluation of the potential use of renewable energy sources;
  - An Evaluation of the potential for improved energy efficiency;
  - Drafting of an energy management plan for the zone.

In common with other countries of the region, the need for investment in the district-heating sector is considerable, with rehabilitation and modernisation required in production, distribution, and end-use. However the regulatory framework in the Czech Republic presents a major barrier to the use of energy performance contracting in distribution and end use: cost plus tariff setting methodologies provide no incentive (in fact a disincentive) to any efficiency improvements by district heating distributors.

4.3 Hungary

4.3.1 Energy policy background

Energy efficiency has been recognised as a priority of energy policy since the first post communist energy policy concept approved by the Parliament in April 1993. One of the strategic objectives of this policy was "increased demand side energy efficiency". The energy policy concept also included an objective to increase the share of renewable energy sources up to 35 PJ, a doubling of the then share of renewables of around 3% of total primary energy supply.

The implementation of this broad concept was elaborated through the 'National Energy Savings and Energy Efficiency Improvement Programme' adopted by the government in 1995, and an Energy Saving Action Plan adopted in 1996. The 1996 action plan consisted of 4 main sets of measures:

- ❍ Improved penetration of renewables;
- ❍ Improved end use energy efficiency;
- ❍ Energy efficiency labelling;
- ❍ Education, information, and encouragement of technology innovation.

This 1996 action plan was strengthened in 1999 with the publication and adoption of a new 'Energy Saving Strategy and Action Programme' (of October 1999), which set the broad goals of energy efficiency policy and an action programme (with concrete targets) which started in June 2000 up to 2010, including the following main targets:

- Increasing energy efficiency by 3.5% per year;
- Achieved energy savings by the end of the programme (2010) amounting to 75PJ per year;
- Achieving CO_2 emission reductions of 5 MT per year, and SO2 emission reductions of 50 Kt per year, by 2010;
- Providing financial support of billion HUF in 2000, and 5 billion HUF each year in 2001 and 2002;
- Increasing energy production from renewables from 28 PJ to 50 PJ in 2010.

Also of relevance for the development of the market for energy performance contracting has been the overall progress made in energy sector reform, with the privatisation of gas and electricity distribution in 1995 (although not in a fully liberalised regime, but based instead on the single buyer model). An autonomous energy regulator (the Hungarian Energy Office) was established in conjunction with the privatisation, and the revised energy policy set out in 1999 (approved by the Parliament in July 1999) which set out the broad principles of energy policy reform in line with the requirements of the *Acquis communautaire*.

The most important factors relating to Hungarian energy efficiency policy have been:

- A long term political support for the principle of improving energy efficiency (even if the actual programmes to support this principle have been very limited).
- Strong donor support in terms of capacity building (the creation of the Energy Centre, the national energy efficiency agency was originally supported by the EU in 1992) and in terms of programme and project support, and support from environmental NGOs at the local level.
- The support given through the several dedicated energy efficiency funds (described in more detail below) had an important weight behind the development of an energy efficiency supply industry, and behind the uptake of energy efficiency measures, in both industry and (particularly) the public sector.
- Price reform: the single most important factor behind the improvement in energy intensity and progress in improving energy efficiency was the gradual adjustment of energy prices to cost reflective levels. Cross subsidies from industrial to residential prices have been ended, and since 1997 prices for electricity and natural gas are calculated (in theory) according to a pricing methodology set by the Hungarian Energy Office.

4.3.2 Background to the development of energy services

The energy efficiency industry in Hungary is both more established (in terms of longevity) and more solidly based (in terms of competition and maturity of the market) than in most other transition economies. There are several explanatory factors behind this established energy efficiency industry:

a. Institutional Background

As noted above, Hungary's first energy conservation programmes were started and promoted in the 1980s, and the Hungarian Energy Efficiency Office (Energiahatekonsagi Iroda) was established as a subsidiary of the State Energy Inspectorate in the early 1980s. An energy conservation law passed in the 1980s required all industrial energy users and all municipalities to appoint an energy manager; for all major industrial energy users to undertake an energy audit, and to submit to the State Energy Inspectorate a plan for energy use rationalisation. While this law was 'command and control' oriented, and focussed more on reducing consumption than improving energy efficiency, it (a) established the basis for the later introduction of more market oriented energy efficiency policies, and (b) was little different from the 'command and control' energy efficiency policies implemented in a number of OECD countries in the 1980s (the Hungarian energy conservation law of the 1980s was modelled on the Japanese energy conservation law with similar requirements).

While the activities of the first 'Energy Efficiency Office' were limited, and focussed primarily on the industrial sector the office nevertheless made an important contribution in that the promotion of more market based energy efficiency policies from the early 1990's onwards were not starting from a zero knowledge base.

b. Energy Efficiency Expertise

In parallel with the legal and institutional developments in energy conservation in the 1980s, a technical expertise in both buildings and industrial energy efficiency was developed through the power-engineering institute EGI, which established a specialist unit for energy efficiency, and within the Hungarian Building Research Institute for both institutional and residential buildings. This technical expertise (and particularly the expertise developed within EGI) was an important factor behind the more rapid development of an energy efficiency industry in Hungary in the 1990s. Again, the necessary analysis, design, and monitoring experience (i.e. energy efficiency services) was already established, and a sound technical knowledge base was already built up in the 1980s.

c. Early introduction of energy performance contracting

The concept of energy performance contracting received an early start in Hungary, with the first Hungarian energy service company being established in 1989. This company (Credilux) was a lighting energy service company, co-owned by the (then state owned) lighting manufacturer Tungsram, a lighting installation contractor, a light manufacturer, and a (state-owned) bank. Although undercapitalised (US$275,000), Credilux played a very important role in terms of introducing the concept of energy performance contracting for lighting efficiency improvements (primarily public lighting). The company implemented 10 projects in it first year, with an average investment of US$30,000 per investment. This relatively small individual project size was possible due to the technically straightforward nature of the investment made in the replacement of mercury vapour (and in some cases even incandescent) street lighting with high pressure sodium lamps. Payback times were sometimes under 2.5 years.

Several of the projects implemented by this energy service company in the early 1990s were funded through the German Coal Aid Revolving Fund (described in more detail below).

d. Existence of dedicated energy efficiency funding

The existence of financial barriers to improved energy efficiency was recognised at an early stage, and the first dedicated fund for energy efficiency projects was established in 1991 (the so called 'German Coal Aid Fund') which was established with a capital of 30 million DM donated by the German Government (in the form of a coal support facility). The original target of the fund was to provide finance to the private sector to support energy efficiency investments and to reduce environmental pollution. The fund works as a revolving fund, with interest rates set at approximately 50% of the prime rate of the National Bank (reflecting the need of the early 1990s to reduce the very high real interest rate). This fund served as an early source of funds for energy service companies (the first Hungarian energy service company Crediliux obtained loans from this fund) and further established a credible, transparent source of financing for energy efficiency projects. The existence of this fund, together with the public awareness effect of the fund (which further developed and reinforced the credibility of energy efficiency investments) had a catalytic effect on the development of the market for energy performance contracting.

e. IFI involvement and inward investment from western energy service companies

Both the markets prospects and the availability of finance (both debt and equity) from the EBRD for energy service companies in the region, including in Hungary, has a strong catalytic effect in expanding the market for energy efficiency services and in the establishment on the market of a number of foreign owned energy service companies including Honeywell, Dalkia (whose subsidiary in Hungary is Prometheus, originally a state-owned boiler maintenance company), and Landis and Gyr (now Siemens). The experiences of some of these energy service companies is explored in more detail in Section 4.3.4.

4.3.3 Financing of energy efficiency projects

One characteristic of the Hungarian market has been the wide availability of financing for energy efficiency in general, and for energy performance contracting in particular. Several dedicated energy efficiency-financing mechanisms have been established, including the German Coal Aid Fund mentioned above:

a. German Coal Aid Revolving Fund

The German Coal Aid Revolving Fund, as mentioned above, was the first dedicated energy efficiency fund to be established in Hungary (in 1991). From 1991 to 2000 the fund provided loans for around 50 projects per year, with average loan size of 50 million HUF. The fund provides loans of up to 80% of the total project cost, at an interest rate of around 50% of the base rate (with a maximum loan size of 80 million HUF). The financial administration of the fund is managed by ABN AMRO Bank (formerly the State owned Hungarian Credit Bank) and the application process and technical approval is managed by the Energy Centre. With broad eligibility criteria and few restrictions in terms of sectors to be served (public sector or private, including energy service companies) the fund is well known, popular with energy users, and consistently over-subscribed.

b. Energy Saving Credit Programme

This fund was established under the framework of the 1995 Energy Efficiency Action Plan (and was in fact the principal action of this plan) as a soft loan facility (with a subsidy element) with of 1.7 billion HUF, of which 1.1 billion HUF has been loan funds. The programme provides an interest rate subsidy of 50% of normal commercial bank debt (through the programme funding). The programme was first aimed at the modernisation of energy use in municipally owned institutional buildings (including among others schools and hospitals). One criterion for eligibility is that at least half of the total cost reductions achieved by a project must be achieved by a reduction of the energy costs. In addition the eligibility criteria include a minimum (specific) saving in primary energy use, thus excluding simple fuel switching projects. This programme was extended in 1998 to include funding for modernisation of district heating systems.

c. Phare Revolving Fund (Energy Efficiency Co-Financing Scheme)

The Energy Efficiency Co-financing Scheme (EEFS) is a “soft loan” credit scheme that was established within the framework of the Phare programme for Hungary. Its basic objective is to improve the efficiency with which consumers use energy. The EEFS aims to achieve one of the major goals of the Hungarian energy policy, namely to reduce energy intensity, which is much higher than in developed countries.

The EEFS started operation at the end of year 1998 with an EU Phare grant fund component of 5.0 million euro. The credit scheme is operated by two Hungarian banks, which provide loans for implementing energy efficiency investments by energy users. The overall duration of the EEFS is ten years. The loans under the EEFS are preferential loans as the Phare component of individual loans (maximum 25% of the total project cost) is interest free. The non-Phare component of the loans is provided by the banks, which may use IFI money as well. The non-Phare component of the loan is granted at a commercial rate of interest resulting in a preferential blended overall interest rate.

By the end of 2001 80 loan applications for energy efficiency loans were approved with a total of over 37.6 million euro project cost. The total of the EEFS loans committed is above 23.6 million euro of which nearly 6.3 million euro was requested as the Phare contribution.

Among the energy efficiency investments the two main groups are improvement of public lighting and upgrading of heat energy supply of sites. Implementation or increasing the capacity of combined heat and power generation were also funded, together with increased use of renewable energy and energy from waste projects.

The actual volume of fuel/purchased heat, and power savings (including cogenerated power produced) are about 580 TJ/a (~13 800 TOE/a) and 99 000 MWh/a, respectively The power saving equals 356.4 TJ/a if calculated with its thermal equivalent but saves about 990 TJ/a of fuel (i.e. about 23 600 TOE/a for the Hungarian power plant system.

The savings in energy costs are estimated to be 7.2 million euro (for approved projects), while total cost savings have been estimated at over 10.3 million euro. This means that the average simple payback time of projects financed through the EEFS is anticipated to be 3.63 years.

d. Hungarian Energy Efficiency Co-financing Programme (HEECP)

This programme was launched in 1997 by the IFC with US$ 5 million of funding from the Global Environment Facility (GEF). The funds from the first round of the programme (considered a pilot phase) provided a guarantee fund of US$ 4 million, since expanded by an additional US$ 4 million (with further funding for administration, and technical assistance for applicants).

Under the guarantee programme, participating local financial institutions agree on ‘Guarantee Facility Agreements’ with the IFC fund administration, under which partial credit guarantees are provided for energy efficiency projects of 50% in the first phase, and 35% in the second phase. The objective of the project is to overcome financial barriers due to the high perceived credit risk of energy efficiency projects and the high transaction costs of small energy efficiency projects. The technical assistance component of the project provides small grants for the marketing of the loan guarantees and for project identification, development and investment preparation.

Credit guarantees have been so far provided to 15 energy efficiency projects with a total investment of approximately US$ 3.7 million. Projects supported have included a number of projects implemented by energy service companies, and the development of the market for energy performance contracting is a specific objective of the HEECP.

4.3.4 District Heating/Local Government

As in other former socialist countries of the region, energy efficiency remains low due to the historical legacy of an economy which was biased towards heavy energy intensive (and energy inefficient) industry, and a building stock which was constructed without attention to energy consumption. Lowest capital cost of construction rather than the lifetime cost of operation was the overriding design criteria for buildings and district heating systems built from 1945-1989. In addition energy costs under the socialist economy did not reflect market based economic costs, leading to a widespread and well-entrenched culture of energy inefficiency (it is a truism that the 'thermostat' in Hungarian apartments is the window).

As noted above, while good progress has been made in raising energy costs to market levels, and there has been a related improvement in the energy intensity of industry, in the sectors of public sector buildings and in district heating poor energy efficiency remains the norm.

There are 3,100 municipalities in Hungary (self-governments in literal translation), of which only 23 are considered to be major urban areas. More than 2,900 of the total number of self-governments are villages.

Municipalities face three acute problems relating to energy use: inefficient district heating systems; the poor energy efficiency of institutional buildings; and outdated and inefficient street lighting, for which municipalities pay the costs, but for which the responsibility for maintenance and the ownership lies with the electricity distribution companies (the barrier of split responsibilities)

Municipalities are owners of the district heating networks (either heat generation and distribution, or distribution alone where the heat is supplied from a major CHP generating station). In Hungary 650,000 apartments (housing 2 million people, 20% of the population) are supplied with heat and hot water from district heating. District heating suffers from considerable inefficiencies in heat generation, heat transmission, and in end use. Individual heat metering at the apartment level is minimal, and considerable investment is required in the modernisation of district heating systems.

The city of Nyiregyhaza in Eastern Hungary provides an illustrative case study of the use of energy performance contracting to improve end-use energy efficiency in district-heated housing. The district heating system of Nyiregyhaza supplies 15,500 apartments and 716 institutional buildings with energy consumption of 1,060 TJ per year. The secondary distribution system uses a two-pipe system for 34% of buildings, a one-pipe system with bypass lines in 50% of buildings, and a one-pipe system without bypass in 16% of buildings.

Under the Nyitas project the district heating company planned (from 1996 onwards) the progressive partial refurbishment of the secondary distribution system in order to improve energy efficiency, comprising the following measures:

- Infrared survey of the thermal condition of buildings;
- Advising on the maintenance of the insulation panel;
- Temperature regulation through the installation of DDC controllers (regulation based on external temperature);
- Hydraulic adjustment for optimal operation;
- Installation of main heat meters in every staircase of apartment buildings;
- Installation of evaporative heat cost allocators on each radiator.

The project was financed partly by the contribution of consumers (with a charge of 1600 HUF per radiator), partly through the capital expenditure of the municipal district heating company, and partly through energy performance contracting. The energy performance contract involved the following investment: in the renewal of 11 heating centres with distribution to 728 apartments. The energy efficiency measures installed through the TPF contract were:

- Replacement of valves and pumps;
- Installation of DDC temperature controllers;
- Variable flow control;
- Replacement of the domestic hot water systems;
- Installation of individual heat cost allocators (evaporative);
- Installation of thermostatic radiator valves;
- Installation of heat meters (at the level of each staircase);
- Hydraulic adjustment.

The project has achieved (based on heating bills for 2001) energy savings of 25%.

Concerning institutional buildings, the municipal sector is very heterogeneous, with many different levels of energy efficiency awareness among different communities. Many municipalities do not have an energy manager, and many lack the technical and financial capacity to identify and implement energy efficiency improvements. The awareness of the benefits of energy efficiency measures is a necessary first step to create demand for energy efficiency services and therefore it is important to raise awareness among the less-informed communities.

However, even in cases where the potential clients (e.g. municipalities, hospitals and other public institutions) are aware of the possibility of improving energy efficiency, there is little demand for energy audits or energy efficiency projects. This stems in part from scarce resources, a lack of experience in energy efficiency projects, higher priorities of other investments, and a lack of flexibility in making funding decisions for multi-year projects.

Based on this background the Energy Efficiency Action Programme (and also a UNDP/GEF funded project for improving energy efficiency in the municipal sector) will establish a national standard for energy audits/feasibility studies and the development of a programme of certification for energy auditors. In addition contingent funding will be provided for energy audits and feasibility studies. These two strategies should help to realise the overall objective by building demand (persuading municipalities to undertake audits and then feasibility studies) and by building confidence in the industry and in the product to be delivered (what constitutes an energy audit?) with the objective of stimulating the market for energy service companies.

Important steps have been taken in Hungary in relation to the way in which public institutions are funded to allow performance contracting to be realised in public buildings (though this has not been, it must be said, the primary motivation for these revisions in public funding). The scarcity of funds for investment (which could be used to reduce energy expenditures) but the continuing funding of ongoing (inefficient) energy operating costs is a well-known aspect of public funding in all countries. If reduced energy bills (through an energy efficiency project) lead immediately to a reduced energy budget, institutions have no incentive to become involved in the time consuming, and (for a budgetary authority) unorthodox procedures of an energy performance contract.

This is a major barrier to the use of energy performance contracting in the public sector in all countries. However changes that have been made in Hungary in the method of funding of both hospitals and prisons have given both these groups of public institutions an important incentive to invest in energy efficiency. Hospitals are funded on the basis of a payment from the Ministry of Health per bed or per patient, with a global payment for all services, including medical costs and other overheads, of which energy costs are an important element.

However the relative lack of funding for investment funds (together with their lack of in-house expertise in energy efficiency projects) provides a significant market opportunity for energy service companies to offer investment financed through energy performance contracts. Reductions in energy costs translate immediately into savings which can used in other areas (e.g. medical costs).

In the case of prisons, the prison service was previously given a global budget, with responsibility for cost control at the centre. Individual prisons were neither motivated nor rewarded for energy cost savings. This budgetary system has been changed to a system under which each prison receives a block budget, thus giving the prisons a similar incentive to invest in energy efficiency through energy performance contracting. Since this change in the budgeting of funding for prisons, 32 prisons in Hungary have contracted to improve energy efficiency through energy performance contracting arrangements (with Prometheus).

This budgetary approach has been extended to army facilities, and a number of energy performance contracts have already been signed with army facilities to improve energy efficiency.

Concerning district heating the present subsidies provided under the Energy Efficiency Action Programme provide an important stimulus to investment in both distribution and end use energy efficiency improvements in the sector. In addition the present rules requiring the single buyer to buy power generated from renewables or cogeneration provides an incentive to investment in CHP systems for district heating.

It should be noted however that the forthcoming market liberalisation introduces an element of uncertainty as to whether the regulation requiring this purchase (at an advantageous price) will continue in force after the partial market opening in 2003.

4.3.5 Problems/barriers to the use of energy performance contracting

The tax treatment of energy efficiency services invoiced through an energy performance contract are unfavourable when compared to energy supply. An energy efficiency investment project would pay VAT at the rate of 25%, but energy supplies pay VAT at the lower rate of 12%. Although energy services contracts can be structured as energy supply contracts, in which the energy service company takes on the contractual obligation for the supply of energy to the end user, such contracts are problematic for the transfer of the ownership of the investment at the end of the contract period.

As noted above, the present rules requiring the single buyer to buy power generated from renewables and CHP plant (at an advantageous price) may not continue after market opening/liberalisation of the power market. This element of uncertainty is a barrier to investment in both CHP and renewables, which requires a clear and predicable price for the power in order to structure the financing arrangements and the contract terms.

4.4 Poland

4.4.1 Energy policy background

The Polish Energy Law of 1997 (amended in May 2000) provides the legal basis for the liberalisation of the Polish energy market, and the conditions for (subject to license) energy production, transmission, distribution, and trade. The Law introduces third party access and sets the general framework for a gradual market opening (within the context of compliance with the EU Electricity and Gas single market directives).

The Energy Law includes a public service obligation for transmission and distribution companies; requires accounting separation for energy production, transmission and distribution, and requires energy transmission and distribution companies to prepare (least cost) development plans, and to co-ordinate these plans with the plans of the provinces and municipalities. Municipalities are required, under the Energy Law, to prepare an energy supply plan for their territory.

The Law also established an independent energy regulator, the Energy Regulatory Authority. Concerning energy efficiency and renewable energy, the Law includes the following provisions:

- An obligation on the government to impose on energy companies dealing with trade, transmission, and distribution of power and heat, to purchase energy from renewable energy sources and from cogeneration;
- The option to include in tariffs for gas, electricity and heat, the cost of projects and services to reduce energy end use consumption (i.e. to improve energy efficiency) and to develop alternative 'non-conventional' energy sources;
- The development plans of both energy enterprises and municipalities must include measures for 'rationalising the consumption of fuels and energy by consumers';
- The Law imposes on the Energy Regulatory Authority the duty to publish information with a view to improve energy efficiency and fuel utilisation.

Based on provisions in the Energy Law the Ministry of Economy prepared the 'Assumptions for Poland's Energy Policy to 2020', which were adopted in February 2000. These 'assumptions' define the basic elements of Polish energy policy, and set the main goals and strategic directions, a forecast of energy demand, and the programme of activities for the fulfilment of the energy policy. This includes a chapter on the 'strategy for the improvement of energy efficiency'. This strategy concentrates on three types of instruments:

- Direct regulation (legal standards);

- Market stimulation (economic and fiscal measures);
- Supporting instruments (information, education, and research and development).

Among the measures which are of most direct relevance for the market for energy performance contracting (for energy efficiency and renewable energy) the following measures are proposed:

a. Direct regulation (legal standards)

- The Minister of Economy (in co-operation with other competent ministers) will identify and remove legal barriers to the modernisation of energy systems (district heating and power production) in state owned or local government owned utilities by energy service company financed investments. The Minister of Economy will issue regulations allowing financing of energy efficiency investments from the achieved energy savings (i.e. energy performance contracting) and the operation and maintenance of equipment by energy service companies, and will elaborate legal, financial and organisational instruments to enable energy efficiency investments to be made in entities financed by central or local governments.
- The Minister of Economy will review the Energy Law with respect to the development of renewable energy use, namely the implementation of the obligation to purchase energy from renewable resources (i.e. does it work in practice).
- The Minister of Economy, together with the Energy Regulatory Authority, will determine government policy on the rational use of energy, combined heat and power, and renewable energy.

b. Support (information, education, research and development)

- The Minister of Economy together with the Minister of Interior and the Energy Regulatory Authority will organise training on a national basis for local governments on the application of the provisions of the Energy Law, and the implementation of the national energy policy.

4.4.2 Energy Performance Contracting in Industry

Numerous energy audits and studies have confirmed a considerable potential for improved energy efficiency in industry in Poland. The 'Master Plan study for Energy Conservation in Poland' undertaken over the period 1997–1999 by the Japan International Co-operation Agency (JICA) working with KAPE examined energy intensive industry, and concluded that the overall energy intensity of Polish industry is 1.5–2.5 times higher than in the EU or Japan. Even if the target simple payback level was set at 3 years, the study identified a savings potential of between 13 and 28%.

However, the barriers to energy performance contracting noted under the SAVE financed project for third party financing pilot projects in industry in Poland (see Section 2.4) are significant, and in particular the barrier that if an industry is in the process of major restructuring, energy efficiency investments by outside parties has a low priority for management, and such enterprises present a high risk for energy service companies and for lenders.

4.4.3 District Heating

The district-heating network in Poland comprises around 400 individual networks, including the Warsaw network, one of the largest in Europe. Of the urban population 70% are supplied with heating through district heating and 50% are supplied also by domestic hot water, delivering a total of around 490 PJ of heat per year, of which approximately 170 PJ is produced by (and also used by) industrial enterprises. District heating in Poland accounts for around 40% of total primary energy demand.

The greatest barrier to the use of energy performance contracting has been the methodology for calculating district heating tariffs.

Responsibility for tariff setting (including for district heating tariffs) was transferred to the Energy Regulatory Authority at the beginning of 1998. The Government set a three-year period (1999 to end 2001) for energy prices to reach full cost recovery levels, although actual implementation of price increases for reasons of macro-economic policy (control of inflation) have not yet reached this level. The biggest barrier to energy efficiency investments in the district heating sector (and disincentive to the use of energy performance contracting to finance efficiency improvements) has been the tariff setting methodology based on an annual (maximum one per year) tariff increase based on the costs actually incurred in the previous year ("justified costs"). With inflation running at approximately 10% and tariff increases approved based on the previous year's costs, but with a considerable time lag, the methodology does not encourage investments in energy input cost saving. There is a considerable time gap between increases in costs and increases in tariffs.

Further the methodology is based on input costs plus a fee for operation. Under such a methodology district heating companies have no incentive to reduce input costs – indeed they have a perverse incentive to increase costs. This methodology means that district heating operators have no incentive for savings and no incentive to make investments which generate savings. The methodology does not recognise that investors must realise a profit on their investments. Tariffs focus on unit costs of heat sold, and not global costs, so that investments which would result in a (small) increase in unit tariffs (if investment costs are included in tariffs) but would result in a global decrease in energy costs as less units were consumed in buildings due to efficiency investments are not allowed or not reimbursed under this methodology.

4.4.4 Barriers to the use of energy performance contracting

There are numerous problems and barriers to the use of energy performance contracting in the buildings sector in Poland, including:

- *Size of projects*

  Many projects are individually too small to justify the transaction costs of an energy performance contract, thus 'packing' of schools or other buildings would be required.

- *Financial barriers*

  Issuance of debt is highly regulated for public institutions/authorities and often capped.

- *Procurement procedures*

  Procurement procedures are often complex and very lengthy (in duration and in time input to respond to). Also public authorities have a very strong 'price focussed' 'lowest price bid' mentality for public procurement. It is very difficult for public authorities to understand that the 'cheapest' offer may not be the best value for an energy performance contract based investment project. A further barrier in the public sector is the lack of accountability. Often no single individual is accountable for a project as a whole, and therefore (and this relates to the difficulty of negotiating a contract) it is very difficult and time consuming for energy service companies to reach an agreement.

- *Regulatory barriers*

  - It is often difficult for public institutions to move any savings made on the operating budget onto the capital expenditure budget (to be used for further capital expenditures);

  - Ownership of buildings (residential buildings) can be unclear and confused.

4.4.5 Energy service companies in Poland

Energy service companies active in Poland include Dalkia/Vivendi, Honeywell Polska, Siemens, Business Energy Ecology Ltd, and the Krakow district heating company (MPEC) which has established a subsidiary energy service company (described in detail in Section 4.4.6 below).

a. Dalkia/Vivendi

The Polish operation of Dalkia/Vivendi has operations in district heating, and building energy management (fuel provision, maintenance services and repairs). However, as noted above the tariff setting mechanism for district heating in Poland has provided a disincentive to investment in energy efficiency investments, i.e. in investments which reduce energy costs for district heating operators. Dalkia operates a number of district heating systems in Poland, but due to the perverse incentives of the tariff setting methodology, has had no incentive to invest in energy cost saving in these systems.

b. Business Energy Ecology Ltd

Business Energy Ecology Ltd is a small energy service company which has implemented energy performance contracts in municipal street lighting. Street lighting represents a considerable expenditure for regional and municipal governments. In 1998 municipal governments spent a total of US$172 million on street lighting. Considerable potential has been identified for energy savings due to replacement of inefficient mercury vapour by high-pressure sodium lamps and also related maintenance savings due to the longer life of the high-pressure sodium lamps. The energy savings due to the replacement of lamps with modern technology lamps are 40- 70%, while maintenance costs can be reduced by up to 50%.

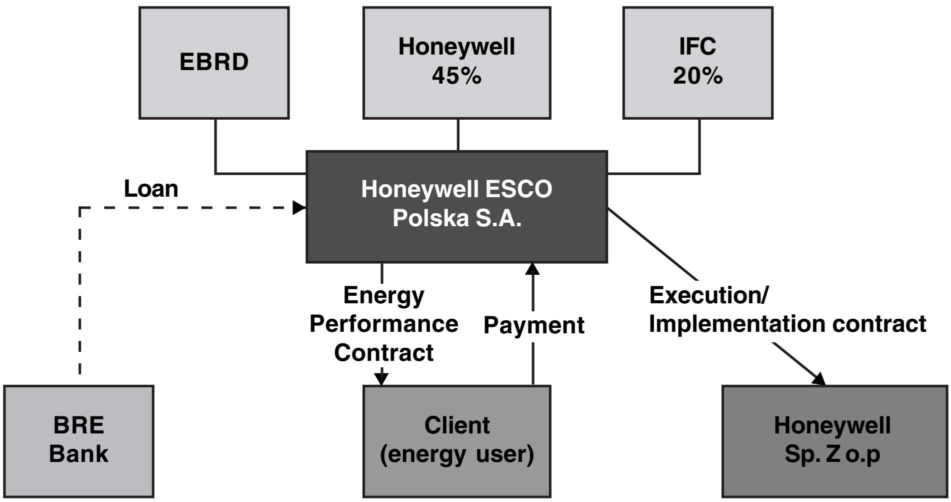
A case study in the municipality (Gmina) of Rewal illustrates the benefits of energy performance contracting in street lighting. The principal details of the project were:

- Replacement of mercury vapour for high pressure sodium lamps;
- Number of lamps before the energy saving project: 1202 (load 313 kW);
- Number of lamps after the investment: 1247 (load 114.2). The number of lamps was increased in order to improve the lighting quality in the municipality, but even with this increase in the number of lamps the electricity demand for lighting was considerably reduced;
- The tariff was changed to a more economical and suitable tariff;
- Total investment cost: 1,040,000 PLN;
- Annual savings produced by the project;
  - Energy cost savings: 190,000 PLN/795 MWh;
  - Maintenance cost savings: 38,000 PLN.

c. Honeywell Polska

Honeywell Polska was established at the end of 1997 with a capital of US$5 million, and a multi-project facility loan from the EBRD of US$25 million. The structure of the ownership and the financing of individual projects is shown on the following diagram:

Figure 4.3. Ownership structure and contractual relations/Honeywell ESCO Polska SA



The focus of the marketing efforts of the Honeywell ESCO are (in descending order of market potential) on the market sectors of municipalities (heating plants/ cogeneration, district heating networks, schools, and municipal buildings), military housing, hospitals and health care facilities, housing co-operatives, and industry.

4.5 Romania

4.5.1 Energy policy background

The broad guidelines for energy policy in Romania were most recently set out in the "National Medium-term Strategy for Energy Development of Romania 2001-2004", approved by the Government in July 2001 (Government Decision no. 647/2001). The main objective of this strategy is "the creation of efficient energy markets, whose development could be ensured in a durable way, in high quality and security conditions of the energy supply, observing the EU energy and environmental protection standards." The focus of this policy is the continuation of the restructuring of energy suppliers (gas, electricity and district heating) in line with the requirements of the *Acquis communautaire* (and in particular to ensure compliance with the Electricity and Gas Single Market Directives).

The 'National Medium Term Energy Strategy' forecasts a reduction in energy intensity of approximately 3% per year during the period 2001–2004, which would equate to an increase in final energy consumption of 2.5% per year during the same period. The Strategy explicitly mentions the importance of energy efficiency as an element within the overall strategy, particularly in the medium and long term. The Strategy should also be read in conjunction with the Energy Efficiency Law 199/2000 (passed in November 2000) and the Amendments to this Law, Ordinance 78./2001 (passed in August 2001) which is the primary legislation which establishes the Romanian energy efficiency policy.

This Law sets out the principles to be applied in the development of energy efficiency policies. Such policies should be based on the principles of a competitive energy market, environmental protection, and cooperation between energy producers and suppliers, energy consumers, and public authorities. The Law sets out the role of the Romanian Agency for Energy Conservation (ARCE) as the primary agency for the implementation of energy efficiency policies and programmes.

The Law contains the following stipulations:

- All industrial and commercial energy users (the Law says 'economic agents') with an annual consumption of greater than 1000 toe and all municipalities with a population of greater than 20,000 inhabitants are obliged to develop energy efficiency programmes which must include:

  (i) Short term no cost and low cost energy efficiency measures which do not involve major investments; and

  (ii) Long-term measures for 3 up to 6 years, including an investment programme for which feasibility studies must be developed.

  ARCE (for private sector energy users) and the Ministry of Public Works, Transport and Housing (for municipalities, together with ARCE) are given the responsibility of advising consumers (free).

- Consumers with a consumption of greater than 200 toe must have an energy audit of their facility or building completed every two years.

- The Ministry of Industry and Resources, based on the proposals of ARCE, will issue technical regulations for energy efficiency, for devices, equipment and tools with a high energy consumption.

- The Ministry of Public Works, Transport and Housing, after consultation with ARCE, will issue technical regulations concerning energy efficiency in buildings, and will also grant energy certificates for buildings.

- Producers and importers of devices, tools and equipment for which technical regulations on energy efficiency have been developed, may not offer them on the market unless they have observed those technical regulations. In addition producers/importers are obliged to carry out tests to confirm the consumption of the devices, and the compliance with the regulations must be certified, based on testing by approved 'competent bodies'.

This Law is primary legislation, and the detailed norms to apply the Law are still under development (for example, what is the definition of 'high consumption' for devices which must be certified, and what devices are included within the scope of the Law). Nevertheless it is clear that this Law, and in particular the stipulation for the development of 'long term measures' could potentially (if the Law is enforced) provide an important stimulus to the market for energy efficiency investments in general and for energy performance contracting in particular.

Financing of the energy efficiency measures required under the Law

The Energy Efficiency Law also gives the *possibility* of financial and fiscal incentives for energy efficiency measures, as follows:

- Access to the 'Special Fund for the Development of the Energy System'.
- The 'Special Fund for the Development of the Energy System' was set up in 1994 under the control of the Ministry of Industry and Resources, financed through a levy (in fact a share of the development tax) on electricity tariffs and thermal energy, levied on industrial and institutional/commercial users (i.e. excluding the household sector). From 1994 onwards the Fund was used exclusively to finance investments in the power generation sector, although improving energy efficiency and implementing renewable energy and fuel substitution projects were always included within the categories of projects eligible for funding.
- Since 1999 around US$5 million was been granted for energy efficiency related investments as co-financing (with a maximum co-financing of 30% of the project value). Most of the projects supported to date have been in the municipal district heating sector. A small number of projects have been supported in industry, and an energy efficiency testing laboratory for electrical appliances was also supported
- An exemption from profit tax for profits reinvested in energy efficiency investments.
- Subsidies on interest rates for bank loans for energy efficiency projects.
- Exemption from customs taxes for imported energy efficiency equipment.
- Exemption of 50% of the profit tax for five years for energy service companies.

It should be noted however that the interest rate subsidies for bank loans have not been initiated to date, and experience with other previous financial incentives are that exemptions from customs taxes are hard to realise in practice.

4.5.2 Housing Sector

The housing building stock in Romania is approximately 8 million dwelling units. Multi family dwellings make up 39% of the total, mostly in urban areas, while in rural areas single-family dwellings (56% of the total housing stock) predominate.

As in other countries of the region, the housing sector (and in particular the multi-family housing sector) has a considerable potential for improved energy efficiency, in particular through weatherisation and the introduction of individual metering and controls for heating and hot water use in individual apartments (i.e. through the installation of thermostatic radiator valves and heat cost allocators or meters). Government policy for improving energy efficiency in the housing sector is set out in Government Ordinance 29/2000, which is the legal basis for policy in the sector. This ordinance (which is separate from, and additional to the Energy Efficiency Law 29/2000 and its amendment), has the following important provisions:

- The government must adopt national programmes for the thermal rehabilitation of buildings. This should include necessary studies, the up-dating of technical regulations (if required) and the development of demonstration projects).
- Energy certificates should be developed for existing buildings, together with standards for energy auditing and the certification of energy auditors.

The Ordinance states that the thermal rehabilitation programme will be financed from municipal and county level government budgets, contributions from housing owners, and using energy service companies and funding from heat suppliers. Fiscal incentives are that building owners are exempt from taxes for the preparation of energy certificates and construction permits for thermal rehabilitation.

The detailed norms (secondary legislation) required to elaborate detailed programmes for the implementation of this Ordinance are in the stage of preparation.

4.5.3 Industrial Sector

Although industrial energy consumption has fallen from the peak of 1989 (when it accounted for 67% of total energy use due to artificially depressed residential demand) industry is still the most important energy consumer in Romania. Many studies have estimated that the potential for economically viable savings in industry (ranging from no-cost to low-cost and to high-cost measures) is high (even up to 50% in some sectors).

There are however numerous barriers to use of energy performance contracting in the Romanian industrial sector:

- Energy efficiency projects (cost saving investments) are perceived as being more risky than investments in production capacity.

- As in other countries in the region, while the energy efficiency community, and energy service companies, are well aware of the potential for energy efficiency improvements, most enterprise managements are less well aware (or not aware at all). Further, loans for energy performance contract financed energy efficiency investments involve not only the actual cost of the equipment, but substantial design and installation costs which cannot be include in the asset value of the equipment purchased in order to provide the necessary collateral for the loan (i.e. the collateral from the assets installed through an energy efficiency investment are less than the amount of the loan which must also cover the substantial non-equipment costs). In addition for energy service companies there is a danger that energy users facing cash-flow difficulties (which is many industrial energy users in Romania) will give a lower priority to payments to an energy service company than to payments for production related raw materials or other production inputs.
- Lack of financial expertise among technical staff of energy users.
- A general barrier to energy efficiency improvements and a particular barrier to energy performance contracting (which is unfamiliar and can be complex in the financing arrangements) is the lack of financial understanding among plant engineers/energy managers. Energy managers/technical staff have difficulty in convincing general management concerning the financial benefits of energy efficiency investments. These difficulties are compounded with energy performance contracting where there is a widespread lack of understanding in Romanian industry concerning 'financial engineering'.

4.5.4 Public and Institutional Buildings

Numerous studies of the potential for energy saving in public sector buildings (together with pilot projects for energy efficiency investments) have been made (funded by donors including the EU Phare programme and bilateral government funding) have been made in Romania. Unsurprisingly, all have identified a considerable potential for cost effective energy efficiency improvements: in hospital, in schools, in old peoples' homes, and in municipal office buildings.

However barriers to investment in public sector buildings through energy performance contracting include an unrealistic attitude on the part of some local governments towards the profit needs of the private sector (having no savings is often seen as being preferable to "giving away" savings to a private company in the view of some municipalities), and problems with the funding of public sector institutions (in education and in the health sector). While these public sector institutions are good credit risks from the point of view of security of operation (though individual schools or health facilities can of course be closed or their operations reduced) but they often face the problem of late payment by central and local government, and hence themselves delay payments (including potentially the payments for energy services).

4.5.5 District Heating

District heating accounts for a significant percentage of the heating and hot water in urban dwellings in Romania. District heating networks are owned by municipalities, with most including heat production (from heat only boilers), but some systems (notably in larger towns and cities) were primarily distributors of heat, with the heat being supplied either by industrial plants or (and predominantly) by the thermal power generator, Termoelectrica. This situation has changed somewhat in early 2002 through the transfer of 15 large (uneconomic) cogeneration plants from the ownership of Termolectrica to the municipalities (i.e. to the ownership of the heat distribution networks).

As in other cities there are major problems of inefficiency in all stages of the district heating cycle: heat generation, distribution, and final end use in dwellings. In addition decreasing subsidies for district heating have led to substantial increases in real prices in recent years, leading both to an increase in individual apartments cutting off from the district heating system, and an increase in late payments and non payments.

Improvements to the supply side (both production and secondary distribution) have been made in a number of cities, including the installation of pre-insulated pipes and refurbishment of heating substations allowing variable speed flow control. An EBRD loan financed such improvements in five cities (Buzau, Fagaras, Oltenita, Pascani, and Ploiesti) while EIB funding has been used for similar supply side improvements in the southern part of the Bucharest district heating system (the largest in Romania).

A substantial potential for improved efficiency (and improved affordability) exists through the introduction of individual control (thermostatic radiator valves) and heat cost allocators. A pilot project (funded by 5 million euro of EU Phare Programme funds) will be implemented in 5 or 6 cities in 2002-3 to demonstrate the energy savings from these measures, and in Sibiu a project is currently underway to convert the vertical rising system of heat distribution to a horizontal apartment level distribution system, allowing both control and apartment level heat metering. This project in Sibiu (where part of the heating network is run by a joint venture with the Dutch utility Nuon (Nuonsib srl) is being financed by the Dutch bilateral grant aid programme.

In this sector, as in other countries, the present methodology for tariff setting for district heating (which is at present administered the Electricity and Heat Regulatory Authority ANRE) is based on a cost plus formula which does not offer heat distributors (as opposed to systems where the district heating company is responsible both for heat generation and heat distribution) any incentive to invest in energy cost saving investments. The energy service company Dalkia/Vivendi, which is present in Romania as in other countries of the region, operates (on a concession basis) the district heating distribution networks in the Romanian cities of Ploiesti, Alba Iulia, Tuclea, and Sinaia, but heat generation is present only in Tulcea, i.e. the only city where Dalkia has any incentive to invest in efficiency improvements is that city.

In addition household prices are still subsidised, with a national reference price being set by the regulator, and the difference between national prices and the justified national costs (based on the analysis of the regulator) being paid from national and local budgets as a subsidy.

4.5.6 The Romanian Fund for Energy Efficiency (FREE)

The Romanian Fund for Energy Efficiency (FREE) has been established as an independent foundation which will be the implementing agency for a Global Environment Facility (GEF) project of US$10 million, with the World Bank as the executing agency for the project. The overall objective of the project is to reduce greenhouse gas emissions in Romania through the development of a sustainable market based financial mechanism to support the development and implementation of (cost effective) energy efficiency investments.

The Fund is being started with US$8 million for investment, and US$2 million for technical assistance, to be used for the preparation of projects, transactions costs for the fund, and the overheads and fund management fees. The fund is, as noted above, intended to be commercially oriented, and profit making. The fund will be a revolving debt facility with an expected programme life of 8 years. The GEF financing is intended to leverage co-financing from other commercial sources, most especially Romanian domestic bank debt.

One of the most important barriers to improving energy efficiency in Romania is the lack of commercial bank credit for energy efficiency investments. Romanian banks consider the costs and risks of lending for energy efficiency projects too high. This conclusion is borne out by the failure of an EBRD/EU Phare funded energy efficiency dedicated credit line, which was initiated in 1995/1996 but failed to be established due to a lack of interest and lack of commitment to the project by the Romanian bank partner in the scheme. The funds were withdrawn by the EBRD and the EU Phare programme (and the Phare funds reallocated) in 1998.

The rationale behind the FREE project is that if a number of profitable energy efficiency projects can be realised at commercial lending rates (i.e. without subsidies) then lenders should be convinced that the risks are manageable and the costs of entry into the area of lending for energy efficiency are low (and will be returned in profitable loans). In addition the project is intended to develop the institutional capacity for the provision of finance for energy efficiency and the specialised expertise for technical appraisal of projects in one institution (making it much easier for borrowers to access).

A further barrier to improved energy efficiency in Romania, the lack of information and poor ability of enterprises (and public sector institutions) to prepare projects and applications for financing, is the subject of a second GEF funded project in Romania being implemented through UNDP (although this project has faced many problems in the development and start up phase and has yet to start implementation). This project is intended to provide information, training, and technical assistance to enterprises to identify and prepare commercially viable energy efficiency projects.

a. Services of the Fund

The fund is planned to offer commercial loans which would include:

- Financing for up to 80% of the capital cost of approved energy efficiency projects;
- Cash flow (from the energy efficiency project) based loans would be made directly to energy users;
- Cash flow (from the energy efficiency project) based loans could be made to energy service companies on a project by project basis;
- "Performance" loans could be given where the Fund enters into partnership with a consortium of suppliers of energy efficiency services and offers a package of services including financing (i.e. forms an energy service company consortium);
- Loans will be of medium term (2 – 3 years maximum initially), with the primary target market being projects with a payback under 3 years, and capital investments in the range of US$50,000 to US$500,000;
- Smaller projects would be limited to very simple projects with a fast payback and a straightforward loan application process.

In addition to the GEF funding of US8 million for investment, US$2 million is to be allocated to technical assistance for project preparation, the fund management fees, the overhead costs of the operation of the fund, and other transactions costs (including consultants).

The fund may invest equity in companies (including energy service companies) but this is thought to be unlikely at the early stages of operation. Clients will be required to contribute at least 20% of the total project costs from their own funds.

The financing from the fund is pegged to the US$, and the loan funds are revolving (repaid interest and principal will be lent on, allowing recycling of the GEF funds).

b. Eligibility criteria of projects

Eligible projects must have at least 50% of the project benefits coming from energy savings rather than from production or capacity improvement (in order to qualify as an energy efficiency project). The energy savings from the equipment installation should be relatively easy to estimate and measure, and the technologies should be proven (the fund is not designed to demonstrate new or unproven technologies).

The focus of the fund's lending is initially on the industrial sector, but commercial buildings (a growing sector in Romania) and later municipal and public buildings/ services (including municipal water supply and waste water treatment, public lighting, and schools and hospitals). The public sector is not the initial focus of the Fund activities because although the potential for energy efficiency in this sector is known, it was felt that this sector is currently a poor credit risk. However, the funding (and hence creditworthiness) of the public sector is anticipated to improve in the future.

Concerning the industrial sector, as part of the preparation for the project an estimate was made of the potential for commercially viable energy efficiency investments (in the industrial sector in Romania). This analysis (of less than 3 years payback investments) derived an estimate of a potential investment of more than US$200 million and estimated annual energy cost savings of US$82 million.

The potential investments by industrial sector and technology are shown below:

Figure 4.4. Potential investments in energy efficiency in the Romanian industrial sector (by sector)

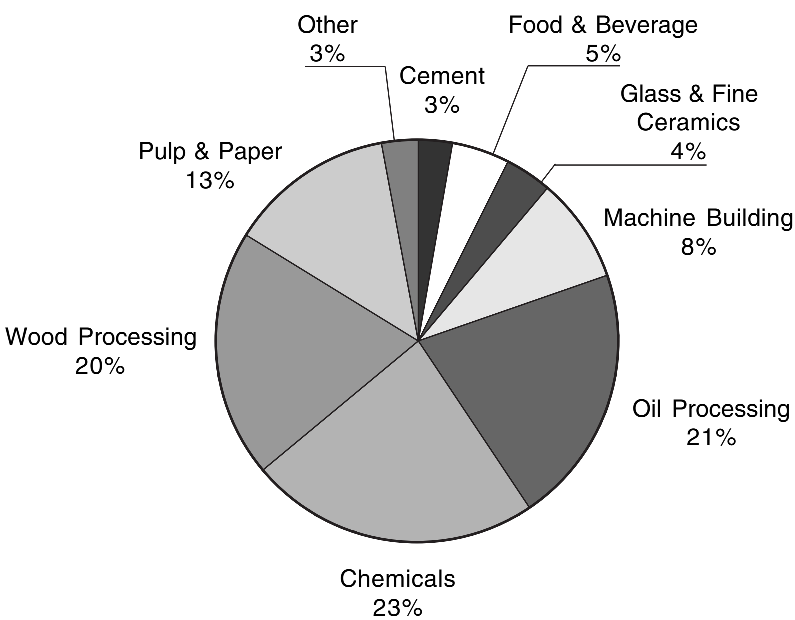
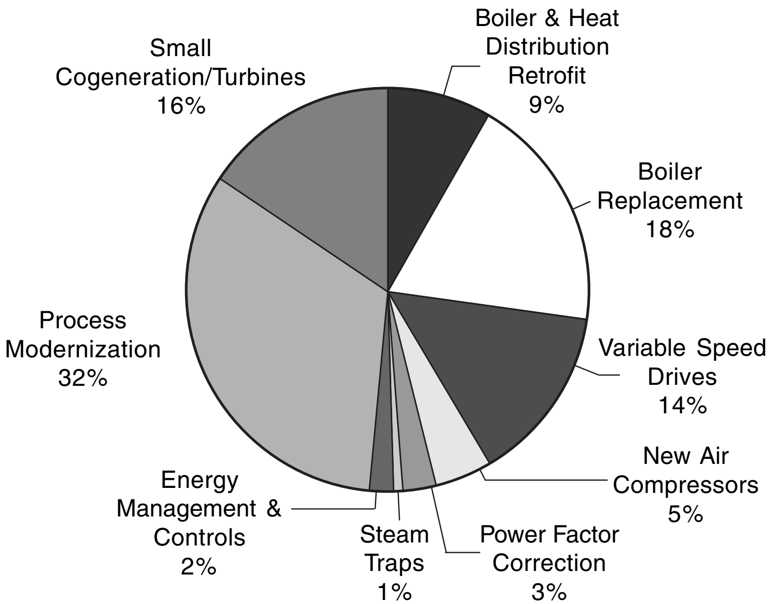


Figure 4.5. Potential investments in energy efficiency in the Romanian industrial sector (by technology)



4.5.7 Energy Service companies

Few energy service companies are active in Romania, despite the high potential for energy efficiency improvements. As noted above in Section 4.4.5, Dalkia/Vivendi is present in Romania as the concession operator of a number of district heating distribution systems, though in contrast to the operations of Dalkia in neighbouring Hungary, very little investment is made in energy efficiency (i.e. in energy performance contracting).

Energy Serv SA is a Romanian energy service company operating primarily in the industrial sector. The company is specialised in improving efficiency of steam boilers and process heat operations and the development of cogeneration, primarily in process industry, though also in light industry and in power generation.

While other companies such as lighting installation contractors have financed small projects through energy performance contracting arrangements, the lack of access to finance for such companies has restricted their activities to a small number of (small) projects.

Energy performance contracting faces a number of barriers in Romania, including:

- The Foreign Investment Law has been suspended due to budgetary difficulties, which means that import tax and VAT exemptions are not applied. It is also the case that the VAT and customs exemptions granted under the Energy Efficiency Law may be difficult to realise in practice.

- Foreign exchange losses from currency fluctuations are not recognised in Romanian Accounting Standards (RAS). This can cause difficulties for major investment projects which might be financed by an energy service company using imported equipment.
- There are frequent changes in legislation (this is not a problem only confined to Romania but is also a problem in other economies in transition) and different pieces of legislation can conflict with each other.
- There are also frequent changes in accounting rules which affect the planning of investment decisions. This causes particular difficulties for energy performance contracting, which is an investment oriented activity.
- Commercial loans from domestic banks in Romania are (generally) not available for terms of longer than 3 years, which means that energy efficiency investments funded through commercial debt must have a net trading margin for an energy performance contract of greater than 30%, and a discounted payback of less than 3 years. This is sub-optimal from the point of view of achieving the potential for energy efficiency and means that only the shortest payback measures ("the cream") can be financed. A comprehensive package of efficiency improvements would not be undertaken, and indeed the financing of only the shortest payback measures would mean that the longer payback measures may never be undertaken.In Romania longer term debt (or longer term leasing contracts) carry a very substantial risk margin which substantially increases financing costs (which works against longer term energy efficiency projects). While a seven year lease in the Czech Republic can cost a 1.9% real interest rate margin over a four year lease (3.2% for a four year lease vs. 5.1% for a seven year lease) in Romania a short term lease will be more expensive (e.g. 7.4%) and a seven year lease considerably more expensive (e.g. 12.2%).
- Energy users in Romania often focus on the share of the savings being paid to the energy service company rather than on the benefits they will gain through an energy performance contract. Despite the fact that energy users may be offered a share of savings immediately there have been examples of energy users rejecting energy performance contracts (which include financing) on the grounds that the energy service company is 'making too much from the project'.

Section 5: TPF for renewable energy projects

Third Party Financing is and can be used for renewable energy projects and there are several examples of its use in CEECs. There are no significant differences in the application of third party financing between energy efficiency projects and renewable energy projects. Costs can be saved by reduced energy consumption (for example, by a biomass boiler) or by selling the power or heat that is generated.

The EU's 1997 White Paper on Renewables makes only one reference to third party financing and renewables[11] which says that EU Member States may need to provide favourable tax treatment for third party financing of renewable energies. ALTENER, the EU's non-technical renewable energy programme, has promoted innovative financing schemes such as third party financing through funding various projects. The 1996 evaluation of ALTENER stated that the projects related to third party financing were of great value, particularly to those countries that had not yet introduced this approach in relation to financing of renewable energy projects.. The 2001-2002 work programme for SAVE and ALTENER calls for greater integration of the two programmes, including a call for proposals related to integrating socio-economic actions such as performance contracting and third party financing.

The EU Atlas Project outlined five principal market barriers affecting the deployment of renewable energy technologies.[12] The principal barriers were:

- The low prices of conventional energies, which do not include the costs of environmental externalities, tend to make renewable energy technologies appear uncompetitive.
- The inconsistent pricing structures and low buy-back rates offered by the electricity utilities to independent power producers and the levying of VAT on renewables components tend to discourage potential investors in renewables.
- Most renewable energy technologies are, in a market context, comparative newcomers, and so prevailing institutional, political and regulatory structures, (and the electricity supply infrastructure), have not been designed to encourage their deployment. This "newness" also accounts for the relative weakness of the renewables lobby as compared to the strength of the lobby for conventional energy technologies.

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11 Communication from the Commission, Energy for the Future: Renewable Sources of Energy, White Paper for a Community Strategy and Action Plan, COM(97)599 final, p. 16.

12 EC, Energy Technology, the Next Steps, Summary Findings from the ATLAS Project, Brussels, December 1997, pp.18-19.

- Lack of familiarity and experience among the electricity supply industry, financiers, planners and the public contributes to a perception of renewables as expensive, high-risk investments or as having unacceptable local environmental impacts.

- The remoteness of some renewable sources from areas of high energy demand constrains their use.

Third party financing can help address some of these barriers because the energy service companies can provide both the technical know-how and the innovative financing. They can also help to address some of the institutional barriers, such as negotiations with utilities. However, as long as renewable energy technologies are seen as financially uncompetitive, the potential deployment is severely hampered and it will be hard to attract private companies to provide the full range of energy services including third party financing.

An example of the benefits for market penetration of renewable energies by third party financing can be found in Spain where an integrated approach to the use of third party financing was linked to meeting the country's stated renewable energy and energy savings targets. This included subsidies to make the projects more financially viable. In Spain, the national energy agency, IDAE, targets public bodies such as local councils, irrigation associations and water boards; potential users of the renewable energy projects and potential project developers; and individual projects where financing is desirable as a result of their particular characteristics.

The criteria used in selecting projects are:

- they must be related to the energy field;

- they must be financially profitable projects, and

- they must provide for integrated solutions.

The third party financing process for renewables is similar to that for energy efficiency projects. IDAE have categorised the process as having the following stages:

1. Project identification

2. Technical, financial and economic studies

3. Contract and financing negotiations and contract signature

4. Construction stage

5. Operational stage

6. End of contract: (ending of the energy service company's involvement in accordance with the contract terms and conditions)

IDAE believe that there are many benefits to the use of third party financing for renewable energy projects for the final owner. These benefits (which are similar to the benefits of third party financing for energy efficiency projects) include:

- Final owners do not incur financial or technical risks during the development and operation;
- The owner is not involved in financing and can use his financial resources for other investments/operations;
- Owners share in the profits from the operation of the investment when the plant starts operating (and generating revenue);
- Owners are responsible only for operation and maintenance costs;
- When the investment plus energy service company overhead (and profit) has been repaid, the ownership of the plant/equipment is transferred to the owner.

Since 1988, IDAE had participated in several renewables projects, covering the full range from small hydropower to biomass and wind power. It continues to use third party financing as part of a range of financing options. Third party financing is used primarily for hydroelectric and solar energy projects, while participation in joint-stock companies is used for the implementation of wind and biomass power projects, (according to its most recent annual report[13]). There are currently four on-going hydroelectric projects financed by IDAE as third party financing contracts. The largest project for 25.4 MW started in 2000. The other three projects range in size from 0.43 MW to 8.83 MW.

Throughout the 1990s, IDAE brought into operation 14 hydroelectric power plants with a total installed power of 36.1 MW. Eleven of those plants, with a total installed power of 24.08 MW, were financed through third party financing. The other three were through joint-stock companies in which joint public/private companies are established in order to 'project finance' specific renewable energy projects. This approach is usually only possible for larger projects in which the transaction costs of establishing the special purpose company, and of negotiating project financing, are justified.

13 IDAE, Annual Report 2000, Madrid, 2001.

More recently, in the United Kingdom there is a move towards the creation of energy service companies that focus on sustainable energy systems. One is a public/private joint venture between the borough of Woking and Thameswey Energy Limited called Thameswey Limited which was created in 1999[14]. Thameswey provides energy services to both municipalities, public bodies and the private sector, even outside the borough boundaries. One of its projects was an integrated CHP and photovoltaics system. The first project for domestic use was an 81.5 kWp photovoltaics roof and a 30 kW CHP system to provide a reverse winter/summer electricity profile, with the potential to achieve 100% sustainability in electricity. Similar integrated systems are also being built. Thameswey accepts the risk in its various projects, since the customers are no longer responsible for boilers and conventional chillers. The company provides the "green" energy plant, taking into account the customer's capital cost of replacement or new plant, maintenance costs, consultancy fees, inflation and financing costs.

This energy service company shows that energy services can cross the boundaries between energy efficiency and renewable energy in order to provide a packaged of sustainable energy services. How much energy service companies will evolve into this form of company will depend on policies related to promoting renewable energy and sustainable energy systems.

[14] See "Woking: Energy services, DG and fuel cells for the new millennium," Cogeneration and On-Site Power Production, Volume 3, Issue 3, May-June 2002, pp.39-44.

Section 6: Barriers and barrier removal

6.1 Introduction

There are many barriers to achieving the economic potential for energy efficiency, as noted throughout this report, Energy performance contracting is an approach that has the potential to assist in reducing some of these barriers. However an analysis of the value or contribution that energy performance contracting can make requires closer analysis of the nature, and strength of the barriers to improved energy efficiency. The principal barriers have to be viewed in two ways. First, there are barriers affecting all end-use sectors that the use of energy performance contracting can address. Second, there are specific barriers to the use of energy performance contracting that hinder the use of this approach as an instrument in its own right.

There have been many descriptions and analyses of the barriers to improved energy efficiency (over many years) and they have been categorised in various ways. Most recently, there has been an EU-funded study that provides a useful categorisation for the purposes of this report and which includes an analysis of the ability of energy service companies to overcome the identified barriers[15]. This study will provide the basis of the discussion in this chapter.

6.2 The principal barriers

There are three principal categories of barriers: economic, behavioural and organisational. Within those categories, there are several specific barriers, as described below.

6.2.1 Economic barriers

Within the category of economic barriers, there are two sub-categories: non-market failure and market failure. The EU barriers study states that there are market barriers that are *not* market failures that may prevent investment in energy efficiency even though there is rational behaviour. For example, there may be hidden costs such as management time that are ignored in assessing the economic potential, yet for the company involved represents a real concern. *Market failures* refer to those market barriers that justify public policy intervention in order to improve economic efficiency.

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15 Steve Sorrel et al., Barriers to Energy Efficiency in Public and Private Organisations (Barriers), SPRU, Environment and Energy, University of Sussex, September 2000.

a. Market Failure Economic Barriers:

- Imperfect Information

  - The lack of good information to consumers as well as the energy service sector, architects, distributors and decision-makers means that cost-effective opportunities for energy efficiency investments are missed. Energy efficient technologies cover a wide spectrum and it is difficult to learn about their attributes, including quality, often even after purchase.

  Sources of information include distributors, utilities and governments via newspapers, internet, and points of sale. Sometimes information can be conflicting and confuse consumers. The credibility and reliability of information is essential (if it is going to stimulate action).

  A review of government energy efficiency programmes in the European Union shows there have been major efforts to improve the quality of information and the information flow concerning energy efficiency techniques and technologies. According to most analysts, there is still a great need for more information on cost-effective opportunities such as: how improved energy efficiency can contribute to reducing greenhouse gas emissions, the impact of new emerging technologies and innovative financing approaches (such as energy performance contracting).

- *Split Incentives*

  Opportunities can also be lost when the benefits of energy efficiency measures do not go to the investor. This is the case in many rental agreements where tenants pay for energy but not the costs of investment in any energy saving equipment. In such a case there is no incentive for the owner to pay for the new investment. Separately, individual departments of an organisation may not be accountable for energy use and therefore have no incentive to undertake energy efficiency measures.

- Governments and industry have established energy management strategies, in order to overcome this barrier: introducing departmental charging for energy costs, where possible; integrating energy management into purchasing procedures; and integrating energy efficiency into new construction and major refurbishment can all help. Energy performance contracted investments can help if these other energy management practices are implemented because it reduce the need for up-front capital on the part of the differing parties.

- *Adverse Selection*

  Suppliers know more about the energy performance of a specific good than do purchasers. It is often difficult to obtain relevant information that will affect purchase decisions. This leads consumers to rely on other criteria, including lowest cost, to make their decisions. This can reduce the market for energy efficient products unless there are minimum efficiency standards.

- Energy service companies providing energy performance contracting services have access to more up-to-date and relevant information in the wider range of energy-efficient products and thus can ensure investment in more energy-efficient products (thus reducing the impact of the adverse selection).

- *Principal-agent relationships*

  In many instances, a person or an agent acts on behalf of a second. This can be, for example, a contractor building a home or factory that will be sold on or rented to the later energy user and it can happen within companies or institutions (where the purchasing department is separated from the users of the equipment or services). The main characteristic is asymmetric information where the agent has considerably more detailed information than the principal, with the principal seeking more assurances by requiring more stringent investment criteria to ensure that only high value projects are undertaken.

  This can lead to cost-effective energy efficiency measures being dropped. However, without some form of investment criteria, the construction company may undertake actions that would be different than preferred by the principal, in order to maximise profits through lowering initial costs. The issue is finding the right balance between the two views. Energy service companies, because of their experience in the marketplace, are well placed to find that right balance.

b. Non Market Failure Economic Barriers

- *Heterogeneity*

  Specific technologies do not all have the same cost effectiveness for all consumers. This can distort sector-wide analyses of cost effectiveness.

- *Hidden Costs*

  Often company overheads, disruption or inconvenience of activities (this is especially true in industry, but also in institutions such as a hospital or school), training needs, and the costs associated with information analysis are not included when studies on economic potential are undertaken. These hidden costs understandably vary according to the energy user. Energy performance contracting does not remove all these costs (indeed it has its own costs relating to study and analysis of the approach) but it can reduce them with energy service companies often giving (financial) guarantees against any disruption to services or operations.

- *Access to Capital*

  Many companies and individuals have insufficient funds readily available or access to funds through borrowing, to undertake energy efficiency actions. In the public sector (national governments as well as regional and local governments) rules and restrictions often make it difficult to borrow for investment projects, and investments related to energy efficiency often have a low priority within the capital budget decision making process as compared to the core activities, whether that is manufacturing in industry, or public services (health, education). In industry numerous studies have repeatedly shown that there is a bias against cost saving investments in favour of capacity increasing or manufacturing technology related investments.

  Availability of capital was a major constraint to consumers in the past when energy efficiency measures were less well known. This is less a concern today in EU countries (in the industrial sector at least, although restrictions remain in the public sector). In economies in transition lack of access to investment funding remains a problem (particularly in the district heating and public buildings sectors). Although financial institutions have more experience with energy efficiency projects than they had 10 years ago, and are (generally speaking) more willing to provide financing, this is not the case in all transition economies. There are also problems with financing because many energy efficiency investments are relatively small and thus of little or no interest to banks as a market sector, due to high transaction costs relative to the total cost of the investments.

  Innovative financing, such as energy performance contracting, can be effective in providing the necessary capital, often for projects that are deemed too small for financial institutions. However this requires 'project pooling' where projects that are individually too small to justify an energy performance contracting arrangement are pooled to make a viable package. Examples of this approach are the Berlin city public buildings pools (see Section 3.5 for details), and the pooling of schools in Vienna (Section 3.7).

- *Risk*

  According to the EU barriers study, short paybacks required for energy efficiency investments may represent a rational response to risk. Often energy efficiency investments represent real or perceived higher technical or financial risks and the business climate often encourages short time horizons. Energy service companies will often accept longer paybacks than energy users, since they are more familiar with the technologies and thus have a different perception of risk.

6.2.2 *Behavioural barriers*

- *Bounded Rationality*

  The EU barriers study presents a barrier not normally discussed by other analysts. Constraints on time, attention and the ability to process information leads consumers to make decisions based on less precise, often rule-of-thumb, information. Even with good information or available incentives, decisions can be sub-optimal. However, this does not mean that the consumer are acting irrationally.

- *Form of Information*

  It is not enough for energy users to be informed about energy efficiency techniques and technologies for them to be persuaded to change their behaviour and take actions to improve energy efficiency. It is also important to consider how the information is presented, and when it is presented. According to the EU barriers study, information must often be specific, personalised, simple and available close to the time of making decisions.

  Each end-use sector has its own requirements for information and skills, both technical and general. There are particular problems for small and medium sized companies in obtaining standardised information. There are also problems in the residential sector because of the great diversity of building types, heating and lighting systems and so on.

  Energy service companies providing energy performance contracting services can tailor the information needed by its prospective clients in order to ensure more appropriate information for decision-making.

- *Credibility and Trust*

  Sources of information include distributors, utilities and governments via newspapers, internet, and points of sale. Sometimes information can be conflicting and confuse consumers. The credibility and reliability of information is essential if energy users are to take action to make investments in energy efficiency projects.

  There has traditionally been scepticism about predictions of the benefits of new technology by energy users. Some sceptics are concerned that new energy efficiency or renewable energy technologies will not perform as promised (either in terms of output or savings and/or in terms or reliability).

Consumers are understandably wary of new products, not just energy-using equipment, and often look for assurance that the products they buy will achieve the promised results. Energy technology demonstration projects, grant programmes (subsidising part of the cost of new technologies) and a variety of other measures have been used (most especially in the EU Member States) to gain experience to show that innovative energy efficiency or renewable energy technologies perform as promised by manufacturers and developers.

Energy service companies who offer performance guarantees are acting to transfer the technical risk from energy users (will it work as promised?) to themselves. However, energy users must believe that the energy service companies are themselves credible and capable of living up to their guarantees. This requires energy service companies to have a track record of reference projects, and is itself a barrier to start up energy service companies.

Despite significant progress, the confidence problem in relation to energy efficiency and renewable energy remains a problem. Solutions depend on the maturity of the market, which can be assisted by advice given by energy efficiency agencies or other institutions.

- *Inertia*

  It is simplest to avoid changing habits or actions. This is particularly true when energy prices, are stable. While this has been more or less the situation in the EU member states (although falling electricity prices in some markets, notably Germany, as a result of liberalisation have not encouraged energy efficiency investments), it is not the case in transition countries, which have seen substantial increases in real energy prices, and most notably in power and heat pricing.

  Nevertheless, despite rising prices, there is often a reluctance to move from known practice. The past history of overheating in many apartments heated by district heating in Central and Eastern Europe has led to an expectation of high indoor temperatures that rapidly rising heating prices are only very slowly changing.

- *Values and Culture*

  Many consumers are motivated to undertake energy efficiency measures because of the clear environmental benefits, for example. Thus, an energy user's values can often give energy efficiency a higher priority. As the EU barriers study states, "Efficiency improvements are most likely to be successful if 'championed' by a key individual within the organisation (whether in industry or the public sector). This is especially true of energy performance contracting which has to overcome higher barriers of lack of familiarity than even 'conventional' energy efficiency projects.

6.2.3 Organisational barriers

In both industry and the public sector energy management has a low status and poor access to decision making (especially relating to investment decisions and budgeting). This has affected the take up of cost-effective energy efficiency measures in both the EU Member States and in the CEECs. Energy service companies cannot remove this barrier, but by directly targeting senior management they may help to break down organisational barriers.

6.2.4 The role of energy performance contracting in addressing barriers

The preceding discussion gives some strong indications of the benefits of energy performance contracting. The EU barriers study summarises some of the major benefits of energy service companies in addressing these barriers. The study developed case studies in Germany and Ireland[16] in various sectors. In Germany the main benefits of energy performance contracting in overcoming barriers to energy efficiency were seen to be:

- Energy service companies generally accept longer payback periods than companies or institutions who are implementing projects through traditional procurement and self-funding. The case study of Berlin (see Section 3.5) was an example of projects financed through energy performance contracting with contracts of 10 years and longer. The maximum payback that most energy users would accept for internally financed projects is 3 years in the industrial sector.
- In the public sector, there is low financial risk, a sufficiently large project volume, and fairly homogenous technologies which facilitate customer focussing strategies.
- Especially in smaller companies, energy service companies may help overcome the barriers lack of capital, lack of know-how and lack of manpower.
- The increasing tendency of companies to concentrate on their core business and outsource non-core functions provides energy service companies with business opportunities.

6.3 Specific Barriers to the Use of Third Party Financing

Third party financing has the potential to reduce several barriers to improve energy efficiency (as shown above). However, this approach itself faces a number of barriers to its wider use. The barriers study identified several barriers to the use of energy performance contracting. The barriers in Germany (but which have a much wider relevance) were found to be:

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16 The United Kingdom was also part of this study, but the report was prepared before the analysis of the UK situation was completed.

- Outsourcing or privatisation of specific areas is often associated with the loss of jobs (maintenance or operations staff are most at risk of being replaced by the personnel of the contractor, and can be a source of strong resistance to any performance contracting arrangement that involves 'outsiders' in the operations and maintenance of plant or equipment.
- Energy service companies suffer from a lack of credibility and trust by industrial energy users.
- Many companies lack information and knowledge about energy efficiency in general and energy performance contracting in particular.
- Falling electricity prices and increased uncertainty in liberalised energy markets may dissuade companies from entering into long-term contracts.
- Large industrial customers generally have sufficient know-how to operate the energy equipment, and have sufficient capital to finance an investment.
- In the industrial sector companies want to keep control over the production process (especially breweries), or prefer to own all their equipment (especially SMEs).
- In smaller companies and/or companies where energy costs are only a small percentage of total operating costs, the contract volume is not large enough to justify an energy performance contracting arrangement (especially in the mechanical engineering sector), or the financial risk for energy service companies is prohibitive.
- Savings potentials identified by energy service companies reflects poorly on those historically in charge (i.e. the energy manager). The importance of this factor should not be underestimated – energy managers are frequently very defensive on this issue and can act to block an energy performance contracting arrangement at an early stage if they feel 'threatened'.
- A common perception of energy managers and in-house engineering and maintenance staff) is that outside energy service companies do not know (and cannot learn) their needs as well as in-house staff do.

In Ireland, there were also a number of barriers identified that are hindering the development of energy performance contracting. These include:

- Potential clients do not trust energy service companies who are perceived to be uninterested in the achieving the full potential for energy efficiency, but who were believed to be interested in the shortest payback measures ('cream skimming').

- The companies who would benefit most from energy performance contracting are SMEs, who are those least likely to develop or implement energy efficiency projects using outside energy service companies.
- Difficulties in negotiating and agreeing energy performance contracts.
- Uncertainty as to price and performance (lack of confidence by energy users that they can fully and accurately quantify the price and performance requirements and guarantees from an energy performance contract).
- Low and uncertain potential profitability due to low or variable energy prices.
- The uncertainty surrounding electricity and gas deregulation was impeding the development of the market for energy services.

6.4 Addressing the barriers

How these specific barriers to the use of energy performance contracting can be addressed is the subject of the following chapter, which examines the role which different actors can play in encouraging the wider take up of this approach in the PEEREA contracting countries.

However, the EU barriers study provided several recommendations for policy actions, and based on the specific barriers set out above for Ireland, proposed the following measures to respond to these barriers:

Barrier	Policy
Potential clients do not trust energy service companies who are perceived to be uninterested in exploiting the full energy efficiency potential, but rather were interested only in the shortest payback measures.	Certification and evidence of track record. Performance of energy service company's clients illustrated by sectoral benchmarks.
Small size of client companies (i.e. SMEs) which would benefit most from energy service companies, but these companies are the ones least likely to develop an energy performance contract project.	Trade associations or process-user groups could organise schemes for engaging energy service companies, (assisted by grant aid to help cover the project development/transaction costs).
Difficulties in negotiating and agreeing energy performance contracts.	Investigate current examples of model contracts with a view of establishing model contracts for Irish conditions.
Uncertainty as to price and performance	Certification, model contracts and tax policies
Low and uncertain potential profitability due to low or variable energy prices	Impose a tax according to the polluting damage of fuels.

Section 7: Role of different actors in promoting a wider use of energy performance contracting

7.1 Introduction

This section will build upon the conclusions of section 6.3 with an analysis and discussion of the role of both the present and the potential roles of the different actors concerning the promotion of energy performance contracting.

7.2 Role of Governments/Energy Efficiency Agencies

Governments, national, regional, and local, and energy efficiency agencies (also at the national, regional and local level) have an important role to play in reducing barriers to the use of TPF. This role should involve both direct removal of administrative and legal barriers (which, as noted above, is required under the terms of the 'SAVE' directive for the EU Member States) and also the active encouragement of the approach within the context of the national (and regional and local) strategies for improving energy efficiency.

Such assistance can be categorised under two broad headings: assistance to stimulate the supply of energy services, and assistance to stimulate the demand for those services.

7.2.1 Supply of energy services

Energy performance contracting needs a supply of well trained energy service companies with a solid engineering expertise in either industrial or buildings energy efficiency technologies and management techniques (or both). Much of the work of the EBRD in promoting energy services in the CEECs has concentrated on developing energy service companies (the supply side of the equation). In addition to these efforts (which are described both in Section 4 and in Section 7.6.1 below) this could be encouraged in the following ways:

a. Developing the capability of the energy services industry

Training courses for local energy service companies either alone or in combination with 'twinning' with existing energy service companies from North America or the EU Member States has been undertaken in several countries of Central and Eastern Europe (including among others the Czech Republic, Slovakia, Hungary, Poland, Romania). At best such support from donors can help to develop a local capacity for energy services. However it should be noted that training local energy service companies will not be (and has not been) effective if it is undertaken in isolation of other supportive measures.

Without any action to also encourage demand (by national and local governments) and/or in combination with energy prices that still do not reflect market prices, then training on the supply side will not have a sustainable capacity building effect. There have been cases in several countries where donor funded efforts to build capacity on the supply side have proved at best only partially successful due to the lack of action on the demand side and hence the dilution of the capacity built due to attrition over time (trained energy auditors/engineers leave the industry for other jobs and are not replaced if there is no demand for energy efficiency services)

b. Developing tools to reduce the credit risk of EPC projects for ESCOs.

Risk management is an important element in energy performance contracting. The essence of the approach is the shifting of technical (and depending on the contractual arrangements, also potentially financial) risks from the energy user to the energy service company. The availability of credit guarantees for energy performance contracts (as, for example, offered by the IFC under the HEECP project in Hungary) can be a factor in reducing the credit risk profile of energy performance contracts, and hence in assisting such projects to have access to commercial lending at market interest rates.

7.2.2 Demand for energy services

As has already been discussed several times through this report, the unfamiliarity of energy users with TPF, coupled with the complexity of the contractual arrangements, are barriers to the demand for energy services. Based on experience in EU Member States (and other international experience including the United States, Canada, and Australia) and experience in the countries of Central and Eastern Europe, the following actions can assist in promoting the demand for energy services:

a. Promotion and marketing

Relatively few of the potential users of energy performance contracting have heard of this approach (with some notable exceptions) and even fewer understand what is 'energy performance contracting' or 'third party financing' and what these terms mean. Based on the experience of energy efficiency agencies in the EU is that the marketing efforts of energy service companies need to be complemented by promotion and marketing by energy efficiency institutions (whether independent agencies or ministries). Such marketing efforts should include several elements:

- *Demonstration projects*

  Demonstration projects of the concept of energy performance contracting have been implemented in a number of Member States (including Austria, Germany, Spain, UK) (which have demonstrated the approach, rather than energy efficiency or renewable energy technology). Several lessons can be drawn from these demonstration efforts.

Firstly, demonstration projects can make a significant impact in terms of increasing awareness of the technique and reducing the 'how do we do this' barrier. Secondly, in order to be effective, demonstration projects must be of a sufficient size to be visible. A third lesson (which applies to all demonstration projects) is that the demonstration must be properly disseminated. Finally, if demonstration projects do not exist in a sector or even in a country, dissemination of information on projects in other sectors or even other countries will have some beneficial effect. In the absence of any demonstration projects in Europe, many of the early case studies of energy performance contracting used to promote awareness of the feasibility (and complexity) of the approach in the EU Member States came from North America. These case studies were very valuable as demonstrations.

❍ *Information*

Disseminating information on the approach and on successful case studies carries more credibility if it comes from public authorities (national, regional, or local energy efficiency agencies) than if it comes from energy service companies. Naturally, energy users believe successful case studies that are reported by public authorities and particularly if endorsed by energy users (whether in the industrial sector or the public sector) more than 'successful' case studies reported by energy service companies.

The efforts of IDAE (the national energy efficiency agency in Spain) and ICAEN (the regional energy efficiency agency in Catalonia) to disseminate energy performance contracting for cogeneration technologies (and also renewable energy) show how a major and sustained effort at disseminating the approach can achieve real results in terms of market development. By the use of all available means (including newsletters, websites, conferences and seminars,) they succeeded to disseminate the results of the demonstration projects, which assisted in the development of the market.

A SAVE II funded EU project'The Best Practice of Energy Services', is a useful model for energy performance contracting for public sector buildings. This project involved the following steps:

❍ Identification of best practice in the use of energy performance contracting in public buildings (in four countries participating in the project – Austria, Finland, Germany, and Greece).

❍ Analysis of the replication potential of these best practice projects and the preparation of regionally adjusted dissemination and marketing strategies.

❍ The development and production of a 'standard' dissemination package and the formation of regional networks for dissemination (including regional networks of energy service companies) and the testing and development of quality standards.

- The development of training tools, an internet platform, and the training of SAVE energy efficiency agencies.

b. Reducing transaction costs (standardisation)

As noted many times in this report, the barrier of lack of familiarity and understanding of the approach of energy performance contracting (and the complexity of the contracting process for public sector energy users) is a very serious barrier to its use. Local officials are uncertain how to put together tender materials, how to evaluate the offers received, and what should the contract cover? Energy managers are unskilled in financial engineering and lack understanding of the financial implications of the contracts. This lack of knowledge increases the transaction costs for both energy users and energy service companies due to the high learning curve enterprises and institutions must climb to complete a single energy performance contracting arrangement.

Standardisation can help to lower the up-front transactions costs for both parties, and assisting such standardisation can be an important role for national, regional, and even local energy efficiency agencies. Standard approaches can include:

- A standard process for project design;
- Standard procedures for tendering (this is most especially applicable in the public sector, where there is the need to comply with public procurement rules and procedures);
- Standard modules/approaches of model contracts.

Standard procedures for tendering in the public sector (which comply with the relevant national public procurement rules) have been developed in a number of countries, including in North America, some EU Member States (e.g. Austria and Germany) and in Australia. Such procedures, when linked to model contracts, can help to both decrease the time taken to develop and implement a project, and decrease the cost of project development.

Model contracts have been prepared for EU Member States (in fact several 'model' contracts have been prepared at different times) but two words of caution should be made in relation to the application of model contracts. Firstly, it should be recognised that no single 'model' contract can be applied to every situation. Such contracts should rather be seen as modules which can provide a good basis for the negotiations between the energy service company and the energy user. Model contracts that have been prepared with very clear explanatory guides help energy users to understand the meaning of clauses in the contract, and help them to understand what to look for and what are the implications of conditions or clauses in the contract.

The second point to make in relation to model contracts is that such standardised approaches can ***only*** be useful if they are widely disseminated and if they are accepted by energy service companies ***and*** by energy users. There have been several examples of publicly funded contract guides and model contracts being prepared in EU Member States that are either poorly disseminated or indeed not disseminated at all (which means they serve no useful purpose in terms of developing the market).

Reducing these barriers requires considerable effort by all parties (national energy efficiency agencies, regional and local energy efficiency agencies).

General information (what energy performance contracting is, how it works) is however, often not enough to persuade either enterprise management or public sector officials to start an energy performance contract project. There is a lack of know how of staff concerned with energy use (plant engineers) on financial engineering, and as Chapter 6 has demonstrated, there is a lack of time to devote to learning new approaches. This is a serious barrier to energy performance contracting. In this context one approach which is worthy of wider consideration is an approach, applied in Austria and Germany for public (energy efficiency agency) financing for an expert in energy performance contracting who would support the energy user in preparing and implementing a project. Such an expert would

- Develop the project design;
- Assist in the tendering stage (choice of energy service company);
- Provide support in the contract negotiation phase;
- If requested, provide support in the monitoring of implementation.

Such a service, if even partly financed from public funding, can significantly reduce the barriers to energy performance contracting. Examples of such support for the development of projects can be seen in the cases of Berlin (Berlin Energieagentur), Vienna (EVA), or at the local level, Graz (Graz Energieagentur).

An EU SAVE Programme funded project which is in the start up phase 'Clearing House for Third Party Financing in Eastern Europe' under the coordination of the Berlin Energieagentur has the potential to transfer some of this expertise in relation reducing transaction costs. In each participating country a basic investigation into the boundary conditions for energy performance contracting will be prepared, and country report drafted. A common strategy will then be developed for the introduction of energy performance contracting schemes, based on the existing experience of introducing third party financing in Slovenia (with special emphasis on the use of the approach in the public sector). As a common working platform an internet based 'meeting point' will be established where potential projects, model contracts, and legal obligations (and other relevant information for potential contractors) will be placed. 'Virtual' consultancy services will be performed where experts in Berlin and Vienna will be available to energy users such as municipalities and also to energy service companies to assist in the actual application of energy performance contracting to particular projects.

c. Use of energy performance contracting in own buildings

National governments are among the largest owners and operators of buildings, including the defence estate, prisons, police stations, health and education facilities, and the ministry office buildings. One of the most important lessons of North American experience in the use of energy performance contracting is that the market for the approach was built based on demand from federal, state and local governments (but most especially federal and state governments) for their own building stock. Using energy performance contracting to improve the energy efficiency of this building stock makes a major contribution to the development of the market. The use of energy performance contracting for federal schools in Vienna (see Section 3.7) is an example of the use of the approach by central governments in the EU Member States, while the use of energy performance contracting to improve prisons or defence buildings in Hungary are examples in Central Europe. These examples have an important effect in terms of demonstrating to local governments the applicability of the approach.

d. Removal of legal and administrative barriers

The existence of legislative and administrative barriers (most especially in the form of public procurement laws) has been mentioned throughout this report as a barrier to the use of energy performance contracting. However, the importance of this barrier should not be overstated. There are examples where public procurement laws do not simplify or make easier the contracting of energy performance contracting (e.g. Czech Republic or Hungary) and where the traditional 'lowest cost bid' public procurement laws remain in place. These laws certainly do not make it easier to use energy performance contracting, but they do not represent an insuperable barrier. Rather the financial motivation of national or local authorities in terms of their budget arrangements would seem to be a more important barrier.

If institutions are 'rewarded' by entering into an energy performance contract (which involves considerable complication and perceived 'risk taking' by public authorities) by having their operating budgets for energy expenditures cut, then clearly there is no incentive at all. Ministries, agencies, or other institutions ***must*** have a financial incentive in terms of retaining a share of the achieved savings if energy performance contracting is to be successful. The success achieved in terms of energy performance contracting in the public sector in Hungary is due in large part to the financial incentives that ministries and institutions have in terms of retained savings more than any other single factor.

e. Project development

The role of some energy efficiency agencies in the EU Member States has gone beyond dissemination of good practice or providing 'hand holding' support for energy users, to one of actual investment in projects, on a public-private partnership basis (acting to encourage private sector investment in energy performance contracts).

In Catalonia the regional energy efficiency agency ICAEN has created several public companies - EFIENSA, and EISSA, as a joint venture with the public health authority of Catalonia for investments in public health facilities. Each of these companies has been established with the express purpose of investing (under a public-private partnership basis) in projects implemented through energy performance contracting, ICAEN through these subsidiary public companies participates in projects with its own capital as a minority shareholder in special purpose vehicle companies established to develop energy efficiency and renewable energy projects. The purpose of this funding is to act as a catalyst for private funding. The experience of ICAEN is that even a small minority stake by the public sector companies (EFIENSA or EISSA) is enough to catalyse private sector investors and project developers. EFIENSA has invested (as minority shareholder) in cogeneration, wind farms, small-scale hydro, and forestry biomass projects.

7.3 Joint Implementation and Carbon Credits

While not limited to energy performance contracts, carbon credits are one instrument which could assist in the market penetration of energy service companies and promote investment in both energy efficiency and renewable energy projects in Central and Eastern Europe.

Based on the instruments created through the Kyoto Protocol (Joint Implementation) for the reduction of greenhouses gases during the period 2008 to 2012 by 5.2% as compared to 1990 the Netherlands, which has a target of reduced emissions of 6%, is using Joint Implementation as a means to achieve the CO_2 reduction target. JI is a mechanism through which an investor achieves a measurable CO_2 reduction in another country, after which the reductions can be bought (by the Netherlands for example).

The Netherlands (through its programme implementation agency Senter) buys carbon credits from investments in Central and Eastern Europe in renewable energy, energy efficiency, fuel switching, and waste management, through a programme of the Ministry of Economic Affairs of the Netherlands, ERUPT. Under this programme if the host country approves, carbon credits from the period 2008-2012 can be bought for prices (per tonne of CO_2 saved) of 2-5 euro (although higher prices have been paid for early projects). To qualify, projects must deliver at least 500,000 tonnes of CO_2e. This implies that projects would need to be of the following minimum size:

- 30–40 MW for cogeneration;
- 60–80 MW for renewable energy (power only);
- 200,000 tonnes municipal waste per year for landfill gas extraction.

Projects must be approved by the host government, and in order to assist this process the Netherlands government has made framework agreements (Memoranda of Understanding) with a number of countries, including (to date) Bulgaria, Croatia, Romania, and Slovakia, although projects under which the Dutch have agreed to buy carbon credits include also projects in the Czech Republic and Poland. Projects approved to date have included a project for the development of biomass in the Czech Republic, wind power in Poland, a municipal district heating cogeneration project in Romania, and the completion of a partially built hydro-electric power plant also in Romania.

Joint Implementation will not itself provide the financing for a project but it can provide the margin contribution which will make a project feasible. For example in the case of the municipal district heating cogeneration project in Targoviste, Romania, the financial feasibility study on the project showed that the revenues from the sale of carbon credits were a crucial factor in the economics of the project.

7.4 Role of International Financial Institutions

7.4.1 EBRD

EBRD support for energy service companies in Central and Eastern Europe has been both consistent and substantial. EBRD is currently providing finance for 11 private sector energy service companies, all of which are funded under multi-project loan facilities with major sponsors, and one State owned energy service company in the Ukraine (see Case Study in Annex 2). In addition one energy service company is being financed indirectly through the Energy Efficiency and Emissions Reduction Fund (EETEK) in Hungary. These energy service companies are operating in 7 countries: Hungary, Poland, Czech Republic, Slovakia, Lithuania, Romania, and the Ukraine.

However due to the impediments and barriers to energy performance contracting, the general lesson from the EBRD's experience with the financing of energy service companies in the region is that market penetration of energy service companies remains modest, and most of the EBRD financed energy service companies have under-performed as compared to their business plans (with the notable exceptions of UkrEsco in the Ukraine and energy service companies in Hungary). Also few international players have entered the market apart from those now being financed through EBRD loans, and it does not appear that this situation is likely to change. The principal market impediments/barriers which the EBRD see as being the explanatory factors behind the disappointing market progress are as follows:

- *Scepticism of energy users*: many potential clients do not believe that a win-win scenario can be possible.
- *Control*: this is especially the case in the public sector, where many energy users are unwilling to involve an outside private sector company in the operation of the facility or building.

- *Profit*: local governments in Central and Eastern Europe frequently object to allowing the private sector to make a profit, and have unrealistic expectations or understanding of the risks which energy service companies are taking on under an energy performance contract, and do not understand that accepting risks requires some compensation.

- *Energy costs*: regulations and subsidies still result in energy costs that are not fully cost reflective, or involve cross subsidies between customer classes (e.g. from industrial to residential), and also may not allow an energy service company to retain the benefits of any cost reductions they make through efficiency improvements (e.g. district heating tariffs in Poland).

- *Products*: the standard offers of energy service companies may not fit the needs of energy users, particularly in the public sector.

a. EBRD Dedicated ESCO for public sector entities

- *Overview of the concept*

  The EBRD are proposing a concept to help to address the poor take up of energy performance contracting in the public sector in Central and Eastern Europe. From the energy service company's point of view, marketing and developing projects is both time and capital intensive. Unless there is some reasonable likelihood that a contract will be awarded at the end of the contract negotiation procedure, energy service companies will not devote the time and financial resources needed to market to the public sector.

  Secondly, public sector entities are always concerned to have the most competitive procurement procedure, which is normally based on the 'fixed specification/lowest bid offer' approach, and for energy performance contracting is often complex, time consuming, and expensive for all parties (this is true also in the EU Member States. Several of the case studies set out in Section 3 highlight the very long procurement procedures of public authorities, and their high cost).

  Thirdly, most public sector entities have no experience with private sector investment in the public sector (or private sector involvement in their operation) in general, and no experience with the even more specialised field of energy performance contracting in particular.

  For these reasons the EBRD has proposed a concept under which a private sector energy service company would set up a newly created 'special purpose vehicle' energy service company which would be selected through open international tendering to implement energy efficiency measures through energy performance contracts in public sector facilities and buildings.

The energy service company would be selected based first on a pre-qualification process so that only companies with a proven track record would be invited to submit full proposals. The government/or Ministry at the national level, or municipality at the local level, would enter into a ‘global’ energy performance contract with the special purpose public sector energy service company for a period of at least 10 years, with a provision for an extension through re-tendering. The draft energy performance contract would be part of the tender documents.

The EBRD would help to prepare and mobilise grant funding for studies to identify the potential projects, conduct sample energy audits, and prepare the tender documents for the tender to contract the energy service company.

All public service energy service company bidders would have to agree to meet minimum performance targets which would be specified in the tender. The successful energy service company would be selected on criteria which would include the highest present value of the savings from the baseline (of the potential projects identified through the preliminary studies) energy consumption, which should be indexed to market based prices rather than to potentially subsidised local energy prices. Avoided maintenance and capital expenditure costs would be evaluated separately.

The energy service company would have to guarantee the completion of the proposed investment programme, the level of service to the buildings or facilities, the level of energy savings to be achieved, and the technical performance of the equipment to be installed for an agreed time period.

The selected public service energy service company would then proceed to undertake the detailed energy audits, and installation of the measures in the selected projects (which would be specified in the tender documents), i.e. in the individual schools, hospitals or other public buildings of the national or local government.

Payments to the energy service company would be made directly by the ministry or municipality concerned, and not by the individual institutions (i.e. not by individual schools or colleges). This should avoid the uncertainty of the timing of payment if the funds flow through the individual institutions (note for example the problems of late payments and/or partial payments reported by energy service companies in the Czech Republic from hospitals who are themselves receiving their budget funding with long delays).

The benefits of this approach for the public authorities are the normal advantages of energy performance contracting (reduced energy consumption and hence reduced public expenditure, off-budget financing, and the demonstration effect) plus in addition the advantage of considerably simplified and reduced transactions costs through the contracting under a single ‘global’ energy performance contract approach.

For the energy service companies this approach has the advantage that much of the project development risk (and cost) is removed. Instead of negotiating for two years with individual schools and hospitals (potentially without any result) the energy service company that is selected has a guaranteed volume of projects to implement, and has a much higher likelihood of being paid for its services.

- *Framework conditions for potential public service energy service company clients*

  In order for this concept to work, and to be attractive to both the government (national or local) and also to private investors, a number of conditions must either exist or be under development, as follows:

- Economic pricing of energy is crucial. If energy prices (electricity, gas, or heat) are not set at market levels and/or if there is cross subsidisation between classes of consumers (usually from industrial to residential/ institutional) then the economic incentive (and economic basis) for energy efficiency investments is reduced.

- Billing must be based on measured consumption (including billing for heat and hot water) and not on calculations based on volume or surface area x the number of inhabitants of each flat. The regulatory framework in the country concerned must allow the consumer to be billed on the basis of metered consumption.

- There must be a legal framework and a policy (and culture) of payment for energy consumption, and this payment should be in cash, and in full. Regardless of the reason (e.g. publicly owned energy suppliers who do not enforce payment discipline, or the offsetting of payments to the utility against receivables) if governments (national or local) do not pay in full their energy bills, then neither the government nor the energy service company have the necessary financial incentive to establish the energy performance contract.

- There must be a critical mass of potential investments in energy efficiency if the concept is to be economic. The EBRD has calculated that the Ministry of local government should have annual energy expenditures of at least 12 million euro for the establishment of the public service energy service company to be economically feasible.

- There must be an acceptance of private sector involvement, and also an acceptance that the private sector seeks to make a profit.

- There should be no legal or regulatory obstacle to the use of energy performance contracting in the country concerned.

- *Potential Public Service Energy Service Companies*

The criteria for the public service energy service company (which could be a consortium of companies) include the following requirements:

- High level technical expertise in the field of energy services;
- Financial resources that enable the sponsoring energy service company to invest equity into the 'special purpose vehicle' public service entity and to assume the financial risk of operating in the country concerned;
- The sponsoring energy service company must have operating experience in the countries where the EBRD operates.

Financing

- Although the owners of the public service energy service company would be expected to invest (cash) equity, most of the project funding would be in debt.
- The EBRD would lend funds to the public service energy service company, and would consider financing up to 50% of a project's overall cost. Despite this, additional funding would be required. Among these additional sources of finance are the equity investment from the energy service company sponsor(s), internally generated cash, loans from commercial banks (whether local to the country concerned or international) grants from donors, and also even in part, potentially from the sale of greenhouse gas emissions reductions ('carbon credits').
- The terms of the EBRD loan would be finalised after the tender for the energy service company, but would include a term for the loan of maximum 10 years, with a potential grace period of up to 2 years.

This approach is under discussion with a number of Ministries and Municipalities in Central and Eastern Europe, including in Poland, the Czech Republic, and in Hungary.

7.4.2 World Bank

An approach of the World Bank to support the development of energy service companies in the region is illustrated by the Krakow energy efficiency project to establish an energy service company subsidiary of the municipal district heating enterprise in Krakow, Poland. This approach is described in detail in Section 4.3.

The World Bank initiated (and GEF funded) project in Romania for the establishment of a dedicated energy efficiency fund (FREE) (described in detail in Section 4.5.6) is an example of the approach of the World Bank to the development of energy efficiency projects, and by extension, energy performance contracting in economies in transition.

7.5 Role of the energy services industry/professional associations

7.5.1 Developing industry representation

Experiences in North America, Europe, and in some CEECs has shown the value of building an effective energy services industry representative body. In the United States the National Association of Energy Service Companies (NAESCO) and in Canada there is an equivalent (CAESCO). In the UK the energy services industry is organised through a sub-group of an existing larger trade association (ESTA – CEM group) and in Hungary the Hungarian Energy Efficiency Business Council - META includes energy service companies among its members. These industry associations (and especially where they are dedicated energy service industry associations) have shown how a well-organised industry lobby organisation can assist the development of the industry as a whole. Industry associations can play the following key roles:

- Professional associations can provide information on legal or regulatory issues in order to help the energy service companies to market their services;
- Associations can provide information on market opportunities by publicising requests for expressions of interest or requests for proposals;
- Associations can lobby national and local authorities for the removal of legislative and administrative barriers to energy performance contracting.

7.5.2 Providing accreditation

Industry associations can provide accreditation services for energy service companies through a quality control standard which members are required to meet. This can help small companies to market themselves (using the quality label of an accredited energy service company), and can help to build the confidence of energy users in the quality of the services being offered by energy service companies. One of the key uncertainties in the development of energy services is the quality of the services being offered – without standards or accreditation services, energy users simply do not know if an energy service company is competent to assume the technical risk of an energy efficiency project.

Section 8: Conclusions and recommendations

8.1 Conclusions

1. Although the concept of energy performance contracting (the provision of a package of technical services from a single supplier and the transfer of financial risk from the energy user through the provision of performance guarantees for the energy efficiency investment, and potentially by providing the necessary investment capital) is straightforward, preparing a project (tendering, evaluating offers, and negotiating and reaching agreement on the contract) is complex. This is especially the case in the public sector where public procurement rules (which are normally based on the concept of lowest price bid for a fixed package of predetermined equipment) are not easily compatible with the procurement of a package of energy services in which the greatest investment (and hence cost) may be the most beneficial offer.

2. The approach of energy performance contracting is not uniformly successful in the EU Member States. In some countries the market for energy services is well developed, while in other countries the market is practically non-existent (one or two pilot projects at the most). In the economies in transition the approach is known in almost all countries, but only in a very small number of countries can the approach be considered to be successful.

   However, the fact that the approach has not lived up to its promise does not mean that it has totally failed in transition economies. Chapter 4 give examples of the use of the approach both in the EU and CEECs in all sectors: the industrial sector, the public sector (public sector buildings), district heating, and renewables.

3. In order to succeed the approach needs several boundary conditions to be met (which are also boundary conditions for the implementation of energy efficiency projects financed by energy users through traditional contracting). These conditions are:

   - Economic pricing of energy is crucial. If energy prices (electricity, gas, or heat) are not set at market levels and/or if there is cross subsidisation between classes of consumers (usually from industrial to residential/ institutional) then the economic incentive (and economic basis) for energy efficiency investments is reduced.

   - Billing must be based on measured consumption (including billing for heat and hot water) and not on calculations based on volume or surface area x the number of inhabitants of each flat. The regulatory framework in the country concerned must allow the consumer to be billed on the basis of metered consumption.

- There must be a legal framework and a policy (and culture) of payment for energy consumption, and this payment should be in cash, and in full. Regardless of the reason (e.g. publicly owned energy suppliers who do not enforce payment discipline, or the offsetting of payments to the utility against receivables) if energy users do not pay in full their energy bills, then neither energy users or energy service companies would have any financial incentive for an energy performance contract.

- There should be no serious legal or regulatory obstacles to the use of energy performance contracting in the country concerned.

- In the public sector, energy users must have some financial incentive to enter into energy performance contracts, i.e. they must be able to retain at least a share of the energy savings for other uses. Reduced energy bills that translate into equally reduced energy budgets in the next year will not motivate energy users to enter into energy efficiency.

4. There are numerous barriers to energy efficiency, including lack of information, split incentives, access to capital, and the perceived risk of energy efficiency investments. Energy performance contracting can help to reduce the barriers to energy efficiency. In particular the approach can help to address the following problems:

   - Energy service companies generally accept longer payback periods than companies or institutions who are implementing projects through traditional procurement and self funding.

   - In both the public sector and in small and medium sized companies, energy service companies can help to overcome the barriers of lack of capital, lack of know-how (on energy efficiency) and lack of manpower to implement and operate energy efficiency investment projects.

   - Performance guarantees given by energy service companies transfer the technical risk to the energy service company, and so reduce the perceived risk factor for energy users.

6. There are however numerous market impediments to the use of energy performance contracting, including the following:

   - *Scepticism of energy users*: many potential clients do not believe that a win-win scenario can be possible and are afraid that savings potentials identified by energy service companies reflect poorly on those historically in charge.

   - *Control*: this is especially the case in the public sector, where many energy users are unwilling to involve an outside private sector company in the operation of the facility or building.

- *Profit and risk*: a right balance between risks and compensation is required and neither Governments nor ESCOs should have unrealistic expectations.

- *Energy costs*: regulations and subsidies still result in energy costs that are not fully cost reflective, or involve cross subsidies between customer classes (e.g. from industrial to residential), and also may not allow an energy service company to retain the benefits of any cost reductions they make through efficiency improvements.

- *Fear of job losses*. Outsourcing of energy services is often associated with the loss of jobs, and therefore is not favoured by energy managers.

- *Liberalisation*: falling electricity prices and increased uncertainty in liberalised energy markets may act to dissuade companies from entering into long term contracts related to energy management.

7. Governments and energy efficiency agencies have an important role to play in developing the market potential for energy performance contracting. Energy performance contracting is a market-based instrument, and if energy markets were perfect, no government intervention would be required. However, the market barriers mentioned above justify government intervention in order to develop this approach to improved energy efficiency.

8. Governments and energy efficiency agencies (national, regional and local) can act to develop the supply of energy services by building the capability of energy service companies. Many training courses have been already held (often funded by donors) in the CEECs to train energy service companies. However, such efforts to develop the supply side will be fruitless unless actions are also taken to encourage a demand for energy performance contracting.

   Risk management tools (partial guarantees) have been developed (e.g. in Hungary) in order to reduce the risk profile of energy performance contracts, and hence to assist projects to have access to commercial lending at market interest rates.

9. International Financial Institutions (EBRD, the World Bank, IFC) have played an important role in developing the supply side of the energy services industry. EBRD support for energy service companies in Central and Eastern Europe has been both consistent and substantial. The EBRD is currently providing finance for 11 private sector energy service companies, all of which are funded under multi-project loan facilities with major sponsors, and one State owned energy service company in the Ukraine. In addition one energy service company is being financed indirectly through the Energy Efficiency and Emissions Reduction Fund (EETEK) in Hungary. These energy service companies are operating in 7 countries: Hungary, Poland, Czech Republic, Slovakia, Lithuania, Romania, and the Ukraine.

However due to the impediments and barriers to energy performance contracting, the general lesson from the EBRD's experience with the financing of energy service companies in the region is that market penetration of energy service companies remains modest, and most of the EBRD financed energy service companies have under-performed as compared to their business plans (with the notable exceptions of UkrEsco in the Ukraine and energy service companies in Hungary).

10. Governments and energy efficiency agencies (also at the national, regional and local level) in the EU Member States have acted to promote energy performance contracting with varying degrees of effort (from considerable efforts to none at all). In Central and Eastern Europe similarly varied degrees of effort have been made to develop the demand side of the energy services equation. Actions that governments and energy efficiency agencies could take (based on international experience in North America, the EU Member States, CEECs, and Australia), include the following:

- *Promotion and marketing*: Demonstration projects can make a big impact in terms of promotion, but they must be visible (big projects) and effort must be made to disseminate the results. In addition the source of the information on case studies must come from a credible source (energy efficiency agencies) and not (only) from energy service companies (or not only). In addition it should be noted that different sectors are not uniform: the different energy end use sectors of public administration buildings, schools, hospitals, commercial buildings, industry, district heating networks and residential buildings all require different approaches and different policy actions.

- *Reducing transaction costs*: Transaction costs are high for energy performance contracting arrangements due to the complexity of the design, tendering, evaluation, and contract negotiation phases. Standardisation in the form of model approaches to design and tendering (especially useful in the public sector where public procurement rules apply), and model contracts, can help to reduce the transaction costs for energy users and for energy service companies. However model contracts can only work if they are (a) accepted by both parties, and (b) seen as a starting point to structure the project rather than as a straitjacket in which it has to fit.

- Much work has been done in the EU Member States on developing standardised approaches (in terms of project design, tendering and model contracts) but with some notable exceptions (Austria and Germany in particular) the dissemination of these materials has been very poor and their impact thus sub-optimal. Relatively little work has been done in terms of developing standardised approaches in the CEECs, and even less in terms of the active marketing and dissemination (promoting acceptance by both sides) of such standardised approaches.

- *Project development assistance*: Some agencies have gone further and have actively intervened to help energy users in the design, tendering, tender evaluation and contracting phases. It appears that such assistance is particularly useful in developing the market for public sector institutions, where the knowledge of how to approach an energy performance contract, how to evaluate offers, and so on, is most lacking.

- *Governments (again at the national, regional and local levels) can use the approach in their own buildings* (this is related to the point above concerning the value of demonstration projects) and can act to remove legislative and administrative barriers to the approach, most especially in the public sector, as required by the EU Directive 93/76. Implementation of this Directive by the Member States has been patchy, and in some cases the letter of the Directive may be followed, but not its spirit (which was intended to push governments to encourage the use of the approach in the public sector).

11. The role of industry associations in North America and to a lesser extent in Europe in promoting the wider use of energy performance contracting should be noted. In the United States and in Canada the ESCO industry associations have performed the dual roles of accreditation of energy service companies (thereby helping to build confidence among users in the concept) and lobbying to remove administrative or regulatory barriers to the concept. The only energy efficiency industry (which is not specifically an energy services industry association, but has members who are energy service companies) in Central and Eastern Europe is the Energy Efficiency Business Council in Hungary (META). A more effective organisation by the nascent energy efficiency industry in Central and Eastern Europe would help to expand the market for the approach.

8.2 Recommendations

1. Capability building (helping to support the development of an energy services supply industry) has been the focus of both donor financed efforts (Phare, TACIS, USAID) and IFI financing provided to energy service companies (EBRD and World Bank). This support has succeeded in encouraging the creation of energy service companies active across the countries of Central and Eastern Europe and the CIS. However, while much work has been done in terms of training energy service companies (and financing them) this is an activity which requires continued support in some countries where the supply of energy services remains weak or even non-existent.

2. The efforts of donors and IFIs to develop the supply of energy service companies has not been (with some notable exceptions) matched by similar efforts by national and regional governments to encourage the demand for the approach, and particularly to encourage demand in public sector buildings and public services (district heating and water supply). This is an important contributory factor behind

the somewhat disappointing results achieved (again, this is not uniform, since some countries have shown good results in terms of market penetration of the approach) in many countries of the region.

3. This means that governments (supported by energy efficiency agencies) should use the approach in their own buildings and facilities, and should promote and disseminate such demonstration projects, which can have an important effect in terms of developing the market (especially in the public sector, where there is a culture of risk aversity). In order to be successful as demonstrations however, such pilot projects should be both big projects, and should be properly disseminated.

4. The complexity of the project development, tendering, tender evaluation, and contract negotiation phases of energy performance contracting impose high transaction costs which are a significant barrier to be both energy service companies and energy users. These transaction costs can be reduced by standardisation of approaches: for project design, for tendering procedures (and how to evaluate proposals), and model contracts (or contract modules).

   The preparation and dissemination of such standardised approaches has been a core activity of several energy efficiency agencies in the EU Member States (with a good record of success in both reducing transaction costs and encouraging a greater market penetration of energy performance contracting). Energy efficiency agencies in the PEEREA contracting countries could likewise achieve better market penetration of the approach through similar efforts at promoting standardisation in order to reduce transaction costs.

5. Governments and regulatory agencies should act to remove legal and regulatory impediments to the approach, including tariff setting methodologies that actively discourage investment in energy efficiency.The price regulation of district heating based on unit price is a major barrier to improved energy efficiency by district heating distributors who have no financial incentive (indeed a strong disincentive) to invest in energy efficiency measures that reduce unit sales.

   Discrepancies in VAT rates between energy supply and energy efficiency services contracts, which discriminate against energy efficiency performance contracting are a barrier to the use of energy performance contracting and should be removed.

   Similarly, funding mechanisms for public institutions should be adapted to give institutions an incentive to invest in energy efficiency (this a point that relates to energy efficiency in general and not just to energy performance contracting). A school or college or hospital which (with much management time and effort) succeed to negotiate and implement an energy performance contract only to have any energy cost savings directly reduced from the funding given for the energy operating expenditures will have little to no incentive to start the process of an energy performance contract. Funding for public institutions should be given so that the institutions have a direct interest to benefit from energy cost savings (in general terms) and thus by extension from energy performance contracting.

6. There are numerous examples of innovative practice in relation to the use of energy performance contracting in the EU Member States. The case studies given in Section Three of the City of Berlin ‘packaging’ of groups of buildings, or the Graz local Energy Agency and the ‘Thermoprofit’ branding exercise, are excellent examples of innovative public sector initiatives aimed at expanding the use of energy performance contracting. These examples should be better disseminated (and their application studied) in the PEEREA contracting countries.

   Energy agencies or energy efficiency NGOs can also play an important role as facilitators of the energy performance contracting process. They can help to bring together the two parties (and particularly public sector energy users) and can assist in ‘facilitating the process’, increasing the confidence of energy users in the contracts, or acting to ‘bundle’ groups of buildings in order to create a viable unit for an energy performance contract.

7. The role of industry associations in North America and to a lesser extent in Europe in promoting the wider use of energy performance contracting should be noted. In the United States and in Canada the ESCO industry associations have performed the dual roles of accreditation of energy service companies (thereby helping to build confidence among users in the concept) and lobbying to remove administrative or regulatory barriers to the concept. The only energy efficiency industry (which is not specifically an energy services industry association, but has members who are energy service companies) in Central and Eastern Europe is the ‘Energy Efficiency Business Council’ in Hungary. A more effective organisation by the (nascent) energy services industry in Central and Eastern Europe would help to expand the market for the approach.

Annex 1 Case Studies – EU Member States

Case Study: Austria/Graz Energy Agency

The example of the work of the Graz Energy Agency provides a very interesting case study both of an innovative approach to the development of the market for energy services and the role that a local energy agency can play in the promotion of energy performance contracting at the local level. The principal barriers to the use of energy performance contracting in Graz were (and these are no different to the barriers in other cities):

- The unknown nature of the approach of energy performance contracting;
- The lack of confidence of energy users in this approach;
- The lack of know how in terms of tendering and contracting procedures;
- Extra organisational work as compared to conventional contracting;
- Lack of knowledge as to whether the best offers have been received;
- Some legal uncertainties (for the public sector energy users).

In order to address these familiar barriers, the Graz Energy Agency has developed a programme they call the 'Thermoprofit' Programme, which attempts to encourage the development of the supply side (increase the number of active energy service companies), and the demand side (increase the demand for and use of energy performance contracting) at the same time. The principal elements of the programme are:

a. The creation of a network of qualified energy service companies

In order to participate in the programme energy service companies were required to offer a total package of services, including planning, implementation and project management, maintenance and operations, and financing. In addition they are required to provide guarantees for energy and cost savings, and the observance of the standards of service (indoor temperatures, lighting levels and duration, etc) set out by each energy user.

The advantages for the energy service companies are the joint marketing campaigns, based on the Thermoprofit 'brand' name (with information events, public relations, documentation of reference projects); the quality accreditation that is a part of the programme; and the access to market information and legal assistance from the local energy centre. The quality certification of an energy service company takes place every two years, and is based on the fulfilment of certain conditions and the observance of quality standards in developing and implementing projects. The award (or removal) of the certificates is given by an independent committee rather than by the local energy agency itself (for reasons of impartiality and transparency). This certification allows the Energy Agency to give energy users an assurance of quality, which is considered to be an important aspect of the overall market development in the medium term in order to overcome the barrier of lack of trust of energy users in energy service companies.

A further advantage is that project development costs are reduced by the standard procedures and bidding documents, and the use of model contracts.

b. Information and marketing initiative

Information and marketing activities are directed at both public and private building owners (the programme is focussed on buildings rather than industrial energy use): municipalities, public authorities and institutions at the national and regional level, and building management companies and property owners. Information events and workshops explaining the concept have been organised for (in the first instance) public sector building owners and users.

c. Providing technical assistance and project management for energy users

Building owners are provided with independent information and advice on the energy performance contracting process in relation to technical, legal, and economic questions. In addition the Graz Energy Agency organise the project management on behalf of local institutions: i.e. assist with the preparation of bidding documents, and the two stage tendering procedure. The development of a project is based on the following steps:

Responsibility	Project Phase
Energy agency	❍ **Data collection and preliminary energy analysis** ◗ data collection and evaluation ◗ preliminary energy analysis ❍ estimation of energy saving potentials and investment costs
Energy Agency and building owner	❍ **Project development** ❍ project management, project implementation plan ❍ Development of the financing model, performance guarantee requirements and other objectives of the project. ❍ Check financing options and possible subsidies ❍ Determine bidding procedure and evaluation criteria ❍ Comparison between energy performance contracting ('Thermoprofit' model) and conventional project implementation. ❍ Provide a written report to the building owner for their decision
Building owner	**Decision on whether to proceed by the building owner**
Energy Agency	**Pre-selection of qualified energy service companies** ❍ Preparing project information ❍ Advertising and informing potential bidders (energy service companies) ❍ Evaluation of submissions by energy service companies ❍ Recommendation (by the Energy Agency) of qualified energy service companies to the building owner.
Energy Agency	**Preparation of bidding documents** ❍ Deciding on the performance requirements ❍ Preparation of the draft contract ❍ Preparation of all bidding documents
	Call for Bids
ESCOs Energy Agency	❍ Preparation of offers ❍ Providing information (clarification) as necessary during the bidding process
Energy agency/ ESCO/Building owner	**Bid evaluation and contract negotiation** ❍ Evaluation and assessment of bids ❍ Negotiation of bids and the draft contract with 3 short listed energy service companies ❍ Revision of bids by energy service companies ❍ Final assessment of bid and preparation of recommendation report
	Contract signature
ESCO/Building owner	**Project implementation** (works and investments, commissioning and operation.
Energy Agency	**Documentation** ❍ Proposals for effective project supervision and control (for the building owner) ❍ Documentation of the project (dissemination of results and replication)

Assistance in establishing favourable framework conditions

As has been noted elsewhere, public procurement rules and energy performance contracting are not always fully compatible, and even where public procurement rules do not prevent the approach, uncertainties can exist. One role of the local energy agency is to work with local and regional governments to ensure that such legislative and regulatory barriers to contracting for energy performance contracting are firstly clarified and understood, and secondly, removed.

This case study provides an excellent example both of the important contribution which local energy efficiency agencies can make to develop the local market for energy efficiency services, and an example of the use of 'branding' and marketing of a programme to help to build confidence among energy users and hence stimulate the demand for energy services.

Case Study: Austria/Vienna Schools

a. Background

The experience concerning the implementation of energy efficiency measures in schools and colleges belonging to the Federal (national) government in Vienna has been one of delayed investments in energy efficiency in favour of more urgent investments in repairs, and a consistent under-investment in maintenance. Added to these problems (familiar to public sector energy users in all countries) caused by insufficient investment and operational budgets, was the problem of split responsibilities. The federal schools have been transferred into the ownership of a Federal Real Estate Company (BIG), but they are operated by the Ministry of Education and Science under tenancy agreements. This causes the additional landlord/tenant problem in relation to responsibility for investments. The real estate company is responsible for the upkeep of the boilers, the building façade, and the roof. The municipality of Vienna (the next authority down from the Ministry) decides which measures are the responsibility of the tenant (the school) and the necessary funding is included in the budget of the school. Funding for energy costs, or lighting maintenance costs, for example, are transferred to each individual school by the municipality.

Against this complex institutional background, the building owner (the federal real estate company) suggested that the energy efficiency of the schools could be improved through the use of energy performance contracting, based on the 'pool of buildings' approach pioneered by the City of Berlin. The technical and organisational management of the demonstration project was given to the Austrian National Energy Efficiency Agency, EVA and with advice from the Berlin Energy Agency and the public consulting company (Kommunalconsult Berlin) involved in the Berlin public buildings demonstration project.

b. Project Design

Clarification of the objectives of the project was considered to be an important preparatory step: for example the goals of a quick payback project (and a short contract) are in contradiction with the goal of achieving the maximum potential for energy efficiency in a school. The overall objectives of the project were:

- To achieve a sustainable reduction of electricity and heat costs through energy efficiency investments;

- To improve maintenance and operations in order to minimise interruptions in service;
- To increase the awareness of the building users (the school authorities and students) concerning energy efficiency;
- To achieve positive environmental effects.

One condition of the tenders was that if the energy source was changed, this could not increase the environmental emissions from the existing baseline levels.

Two pools of schools were formed for contracting purposes. This approach was considered to have several advantages over the alternative of contracting with individual schools:

- Projects which are individually too small can be implemented if pooled;
- Putting schools into a pool allows an average of the energy efficiency potential to be achieved across the pool as a whole – thus some schools where the payback is much longer can be included with schools where very short payback energy saving opportunities are available;
- Forming two broadly similar pools of buildings gives the advantages of competition in the contracting of each pool, and also allows comparison of experiences and results during the implementation (saving) phase of each contract.

The schools were chosen on the basis of specific energy indicators (consumption per square metre), information on planned or performed renovations or improvements, the planned utilisation of the school (i.e. whether it will continue in a similar use and level of utilisation during the contract period) and the condition of the buildings and installed energy facilities.

Based on these criteria, and on the interest to participate by the schools themselves (which was also a requirement for participation) two pools of schools were formed, as follows:

Vienna federal schools project			
(Based on 1996 baseline data)	**Units**	**Pool 1**	**Pool 2**
Number of schools		22	24
Electricity consumption	MWh	4 600	5 600
Electricity costs	euro	0.66	0.77
Heat consumption	MWh	30 400	29 400
Heating costs	euro	1.24	1.03

The tendering was launched in April 1998 based on an EU wide open tender approach (in conformity with EU public procurement rules) inviting energy service companies to submit expressions of interest in the projects. Based on pre-set criteria, a short list of companies was compiled, and in July 1998 the short listed companies were invited to submit detailed tender offers. The offers were evaluated, and negotiations were entered into with the selected companies for each of the two pools. Pool 1 was contracted to 'Wiener Beratungs und Planungsgesellschaft Okoplan' which Pool 2 was contract to a consortium of Siemens and Energiecomfort, a subsidiary of the city utility company, the Wiener Stadtwerke.

c. Results

In the case of Pool 1 the contractors guaranteed an annual decrease in energy costs of 24.3%, and for Pool 2 a decrease of 21.1 %. During the contract period the schools will benefit from receiving part of the energy savings achieved: 20% of the savings will be retained by the schools concerned, in order to provide them with a motivation for continuing participation in maintaining savings.

Case Study: Germany/Berlin Buildings Pool

a. Background

In 1994 the City of Berlin developed an energy plan with the objective of promoting the rational use of energy, cogeneration, improved energy efficiency, and the wider use of renewable energy in order to reduce CO_2 emissions. The energy plan was based on a reduction of CO_2 emissions of 25% per capita by 2010 (based on 1990 baseline figures of 33 Mt. CO_2 emissions.

The greatest potential for energy saving and hence emissions reductions was found to be in the building sector, and the City of Berlin is a major building owner and operator, with around 10 million m^2 of public buildings under its ownership, and with annual energy costs of approximately 200 M euro. At the time of the drafting of the energy plan it was estimated that the potential for reducing energy consumption in the city's public buildings was 25%. A study estimated that the investment required to achieve this potential would be around 500 million euro. Due to financial restrictions, and the clear inability of the city to finance such a level of investment in energy efficiency, the city concluded that a 'public-private partnership' using energy performance contracting was the best way to realise the energy efficiency potential in the city owned buildings. In order to develop this project (which was quite new to the city) the city government contracted with the Berlin Energy Agency and a city owned consulting company, KommunalConsult, to provide management assistance in the development and implementation of this pilot programme. One of the early conclusions on the project design was that gathering groups of city owned buildings into a pool (as opposed to letting individual contracts for individual buildings) would be the most efficient way to contract energy performance contracts.

Combining different buildings into a pool has several advantages over contracting for individual buildings, as follows:

- Many of the individual buildings would have insufficient energy consumption to support the substantial transaction costs of an energy performance contract.
- Some individual buildings could be included in the pool which, taken as individual projects, would have an economic energy efficiency potential which was insufficient for a stand alone project, but which when 'pooled' with buildings with a much higher potential, allowed an economic overall project to still be achieved.
- A pool of buildings should be large enough to present a mix of usage and savings potentials thus spreading the risk for the energy service company (a 'portfolio of buildings').
- Overall costs of project preparation, tendering and contracting are lower for a pool of buildings than for individual contracts (for the same number of buildings).

In addition the objective of the project was to achieve the maximum economic energy efficiency potential from the city buildings, rather than to limit the scope of the energy saving measures to one particular area or technology (e.g. only lighting efficiency improvements, or heating refurbishments). The city viewed the differences between the single buildings and the pool approach (and different applications of projects undertaken in single buildings or in the pool approach) as follows:

Single building vs. pool of buildings

	Single building or measure	**Pool of buildings approach**
Duties of the contractor	Replacement or optimisation of technical installations	Systematic development of the energy saving potential of the buildings
Measures to be covered	Limited (could be single measure)	Extensive, covering all cost effective measures across the building pool
Minimum energy costs	75,000 euro p.a.	250,000 euro p.a.
Contract basis	Guaranteed energy savings contract	
Contract duration	Approx 5 – 8 years	Approx 10 – 15 years
Applications	E.g. Refurbishment of lighting systems	Complete facility

b. Project organisation/experience

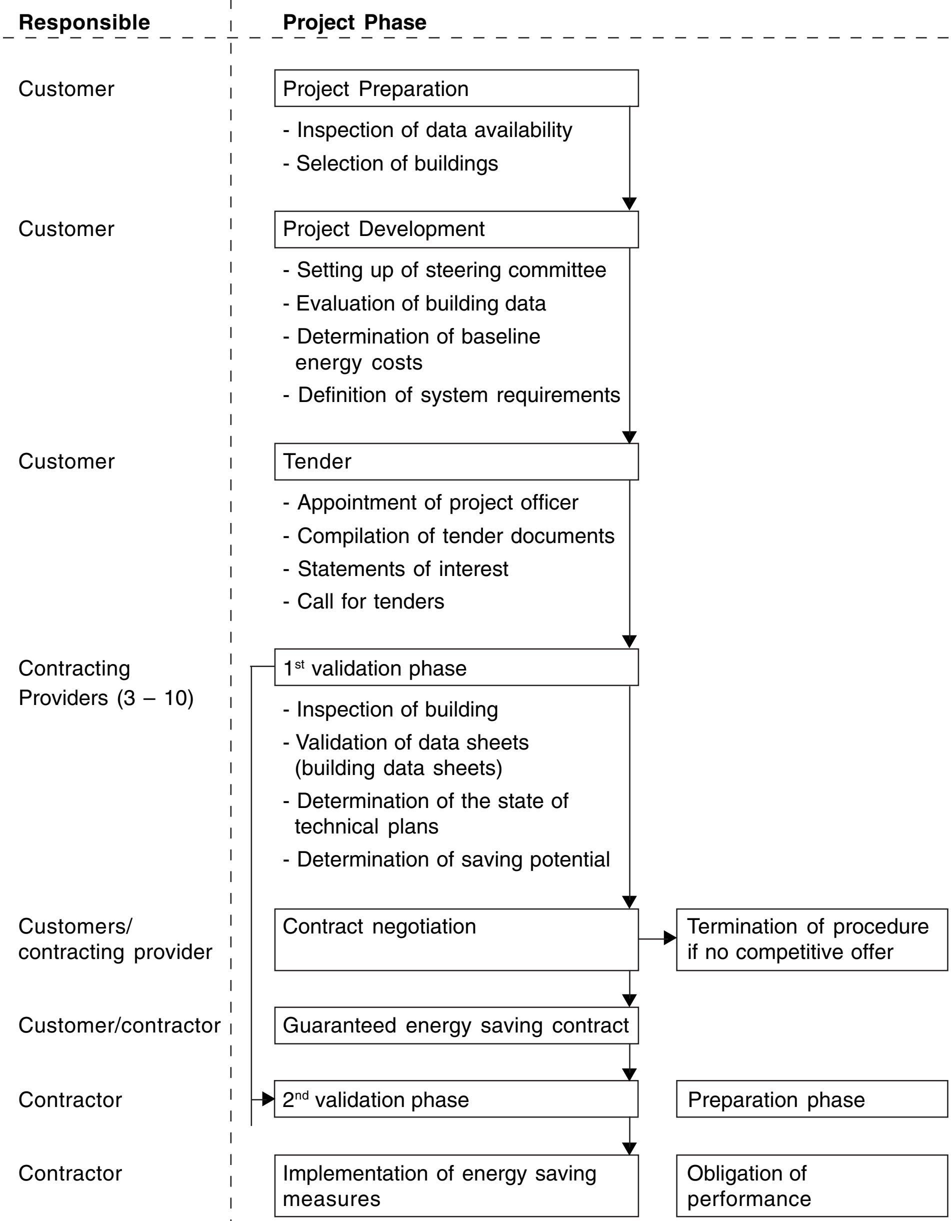
Based on the arguments noted above, the city developed four pools buildings (with 30 – 55 buildings per pool). The requirements for the inclusion of individual buildings into the pool were:

- Buildings must have above average energy consumption and energy costs;
- Buildings must have an energy assessment or survey with specific energy values;
- The buildings should continue in the same use (and at least at the same level of utilisation) over a long term planning horizon.

Buildings which met these criteria included schools, swimming pools and leisure centres, and museums. The experience with this project was that collecting the necessary information about the buildings to be included in the pool was both difficult and time consuming. Different departments of the city administration held different parts of the necessary data (e.g. utilisation, floor space, energy costs, energy consumption) and no database of all the necessary information existed at the start of the project (although based on the experience of developing this project, just such a database was established in 1998).

When the four pools were established, the city organised a bidding competition for energy service company (or consortium). The phases in the project development are shown on the following diagram.

Phases of project development



One of the more difficult issues during the development of the project was to decide on the he share of responsibilities between the public authority and the energy service company. In addition no model contract existed, and the contract had to be developed with the assistance of both external and in-house legal expertise. The split of responsibilities and duties which was agreed was as follows:

Split of responsibilities

	Public Authority	**Energy service company**
Compiling basis building data	■	
Selection of buildings	■	
Setting minimum energy savings target	■	
Organising call for tender	■	
Initial (walk through) analysis of the energy use and energy efficiency potential in the buildings		■
Preliminary definition of energy efficiency measures		■
Calculation of energy saving guarantees		■
Evaluation of bids (including evaluation of energy saving guarantees)	■	
Contract negotiation	■	■
Final contract conclusion/agreement	■	■
Detailed energy audit and analysis and detailed project planning (for each building in the pool)		■
Financing of the works/investments		■
Implementation and ongoing maintenance		■
Energy savings and energy cost reductions	■	■
Guarantee liability		■
Controlling conformity with the contract conditions	■	■

It will be noted that achieving energy savings and energy cost reductions is shown as a shared responsibility. This might be thought of as the energy service company's responsibility, but it should be noted that building users have an important responsibility for the savings that can actually be achieved in these public buildings.

Based on the (single phase) bidding procedure set out in Figure 3.1, the tender offers were evaluated based on criteria which had an important weight for the experience and financial strength of each bidder (important bearing in mind the long term nature of each contract) and the their experience in performance contracting, building and facility management, and project management. An important element for the city was the inclusion of small and medium sized enterprises into each contract (working under the principal bidders). Each call for tender (for each of the four pools) led to more that 25 companies or consortia making offers. The evaluation criteria were:

- Share of saved energy costs for the City (the tender stipulated a minimum of 6% guaranteed energy cost savings for the city);
- The total amount of savings;
- The length of the contract;
- The amount and the structure of investments;
- Environmental benefits;
- Guarantees of maintenance and repair;
- The proposals for the motivation and education of users.

Following the evaluations, negotiations were entered into with the 'preferred bidders' and these negotiations were both long and difficult.

The results of the evaluation, and the actual contracts which were signed, are as follows:

Results of the tendering for building pools

	Pool 1	**Pool 2**	**Pool 3**	**Pool 4**
Contractor	Siemens (Landis and Stefa)/ Bewag (city energy utility)	ESB Energiespar und Betrieberges	Siemens (Landis and Stefa)/Bewag	Johnson Controls JCI
Baseline energy consumption	4.4. M euro	4.9 M euro	3.25 M euro	2.4 M euro
Total energy savings	20%	30%	15.7%	24.2%
Guaranteed savings for the City of Berlin	9%	11.25%	6.28%	7.1%
Investments	3.55 M euro	3.8 M euro	1.75 M euro	2 M euro
Contract duration	10 yrs	10 yrs	12 yrs	16 yrs
Number of buildings in the pool	39	42	37	55

source the spread of energy savings for single building in the pools was from 6 – 60%.

The most important lessons to be drawn from the implementation of these projects to date are:

- The baseline energy consumption must be very accurately defined;
- Systematic monitoring and control of the implementation is a key factor in the success of the projects;
- The measures to be installed, the investments to be made, and the expected outcomes must all be clearly defined;
- Co-operation is needed not only with the decision makers in the public authority, but also (and in fact especially) with the caretakers, boiler operators, and users of the buildings concerned;
- The energy service company must provide a service team for each of the different categories of energy users within the pool;

Positive lessons drawn from this pilot project are that the approach is suitable not only for public buildings but also for housing, and that through the experience of this project both the project development and contract negotiations phases are now much shorter. A 'standard' contract exists which can be used in other projects, not only in Berlin but in other German states.

Case Study: Spain/IDAE promotion of cogeneration through TPF/EPC

In the case of Spain the case study chosen is not one particular project but the example of the promotion of a particular technology, cogeneration, through the use of third party financing by the National Energy Efficiency Agency, IDAE. This illustrates several interesting elements: the use of a national energy efficiency agency as an energy service company to develop the market for an energy efficiency technology, and its subsequent take up by commercial energy service companies.

IDAE, the national agency for energy efficiency and renewable energy, undertook a survey of the market potential for cogeneration in Spain in the industrial sector in 1986, and concluded that the potential was 585 MWe with a maximum payback of 3.5 years (with a total estimated market of 102 installations). On the basis of this estimation of the market potential IDAE prepared a market development plan for cogeneration, with the following main elements:

- Offering technical advice services to industries in order to prepare cogeneration projects;
- Dissemination cogeneration technologies through conferences, seminars, publications and other means;
- Providing a financial investment in cogeneration projects through third party financing.

The development of cogeneration in Spain was aided by the existence (from 1986 onwards) of a favourable legislative climate for the use of cogeneration, but also by the construction of the gas pipeline network, and by the technological advances in the adaptation of aero-derivative gas turbines and engines for cogeneration.

The IDAE strategy for the development of the market is to act as the ‘first investor’ in projects. Once private sector investors enter the market in significant numbers (i.e. when critical mass is reached) then IDAE either moves on to promote different technologies, or the same technologies but in end use sectors were the risk is higher, and hence where private sector investors are reluctant to invest (or will invest only in the very shortest payback projects). IDAE acts as investor in a number of energy service or energy investment companies: once the new company has consolidated its position in the market , IDAE withdraw their position.

IDAE Cogeneration projects (financed through third party financing):

Sector	No of plants	Power (MW)	Total investment (M euro)
Industry			
Food and beverage	7	68.975	50.37
Car manufacturing	3	55.860	43.45
Ceramic tiles	9	36.057	20.72
Ceramics	1	5.200	1.64
Wood processing	1	6.500	3.79
Paper	9	97.110	55.67
Chemicals	1	1.130	1.57
Textiles	2	18.570	13.65
Buildings			
Hospitals	3	4.040	2.70
Hotels	3	4.040	2.73
Commercial/Institutional	3	3.072	3.26
Total	42	302.554	199.54

The original estimate of market potential made in 1986 proved to be a considerable underestimate: by the beginning of 2000 the installed capacity for cogeneration had reached over 3.900 MW with a total of 630 installations. Cogeneration accounts for 8% of installed capacity in the national grid and 14% of electricity generation. According to IDAE, the savings in primary energy which have been achieved through this development of the market for cogeneration amount to some 3 million toe.

Case Study UK: Industrial cogeneration

a. Background

The United Biscuits factory in Manchester manufactures biscuits and snacks (and is owned by United Biscuits), and operates 24 hours a day, 6 days a week. Energy use within the factory is in the form of steam for process and space heating, direct gas heating, and electricity. The average electricity load was 3.5 MW and steam demand varied from 2 tonnes/hour in summer to 5 tonnes/hour in winter.

In 1991 a UK energy service company (Inenco) signed an energy performance contract with United Biscuits covering a comprehensive range of energy efficiency measures, of which the investment in the cogeneration plan was the major element. Under the project the energy service company owned and supervised the operation of the plant, supply electricity and steam to the factory under contract, at prices determined by an agreed formula. The project involved replacing two ageing boilers with an aero derivative gas turbine, and a composite boiler comprising a fired section and a waste heat sector to recover the heat from the turbine exhaust gases. The plant was commissioned and entered operation in April 1992, and supplies all of the steam needs and 25% of electrical load.

Other energy saving measures included improved oven combustion equipment, replacement of heating and lighting, improved air compressor control, improved heating and ventilating control, and the installation of an energy management system.

b. Energy performance contract terms

Under the terms of the energy performance contract (known as a 'contract energy management' agreement in the UK) the energy service company is responsible for the maintenance and for overseeing the operation of the cogeneration plant. The day-to-day operation is the responsibility of the boiler operators of the factory. The factory pays the energy service company a fee to cover financing and maintenance, based on the cost savings achieved from the agreed baseline. The contract is for 11 years, after which the ownership of the equipment is transferred to United Biscuits. The calculation of energy cost saving is based on the electricity cost saving minus the additional cost of gas used by the CHP system relative to conventional boiler plant plus maintenance and labour cost savings.

c. Results

The energy costs of the previous combination of purchased power and boilers for steam and heating (for the equivalent power use and heating/steam use) was £415,000, while the costs of operation of the CHP unit which directly replaced this combination was (in the first year of operation) £248,000, giving savings of £167,000 per year. The payback of the project (based on a capital investment of £700,000) was 4.3 years.

This project demonstrated both the viability of the technology (base load generating small scale gas turbine cogeneration units) and energy performance contracting for both financing and operation of the technology. From the point of view of the energy user this arrangement provided them with a modern utility plant, without capital expenditure.

Case Study: UK/Industrial compressed air energy performance contract

a. Background

The case study of the installation of a new compressed air plant in the Gloucester (UK) plant of Rhone Poulenc illustrates (a) that longer term investments are possible to be financed with energy performance contracting in the industrial sector, and (b) the advantages in improved energy management which the involvement of an energy service company can bring.

The Rhone Poulenc factory in Gloucester in the UK manufactures chemicals, for which a reliable supply of compressed air is essential (compressed air is used for process aeration and controls). Compressed air was supplied through a single centrally located compressor plant which consisted of three old machines. New plant was installed with a range of compressor sizes in order to minimise part load operation when the site demand for compressed air varied.

b. Energy performance contract terms

The main provisions of the contract with the energy service company (AHS Emstar) were:

- The energy service company financed the capital investment required;
- The energy service company provide the maintenance for the compressed air plant, with Rhone Poulenc paying a fixed charge for this service. The cost of maintenance is similar to the cost of maintaining the original compressors, but the services provided are more comprehensive, including guarantees of supply and quality of compressed air;
- Rhone Poulenc pay a fixed charge for 1000 m3 of compressed air supplied by the energy service company, giving the energy user an important incentive to minimise air leakages;
- The energy service company (AHS Emstar) cover the variable operating costs of the plant from the sale of compressed air, with the company's profit coming from its share of the energy savings as compared to the baseline consumption of the old plant.

c. Results

As noted above, these contract terms gave the energy user an incentive to reduce leaks of air, and as a result they started a leakage reduction programme (repairing leaks) which reduced demand for compressed air by an additional 4%.

The total electricity consumption for the new air compressor plant was 538,000 kWh/year, as compared to a baseline consumption (calculated on the basis of air being treated to the same standard) of 870,000 kWh/year, representing savings of 38%. Including the savings through reduced leakages, the total savings are around UKL 10,000 per year. The contract period is 10 years and the initial capital investment was UKL 100,000. From the point of view of the energy user the costs of supplying compressed air have decreased (due to its share of the savings) and the quality of the services and maintenance has improved, thus illustrating the advantages of energy performance contracting.[17]

Case Study: UK/Hemel Hempstead General Hospital

a. Background

Due the rationalisation of services between two hospitals, and the concentration of accident and emergency services at Hemel Hempstead hospital (in Southern England) expansion was required at the hospital to meet this new demand, and the existing 35 year old boiler plant was both inefficient and unable to cope with the greater demand from the development of the hospital.

Energy performance contracting was chosen for this investment because:

- UK Government policy is that hospitals should contract out non core (i.e. non medical) services;
- Technical and financial risk was transferred to the Esco;
- The cost was lower than the cost of traditional contracting;
- It avoided the use of the existing (limited) capital expenditure budget of the hospital.

The competitive tendering procedure used was a two stage procedure, with firstly submission of expressions of interest, and short listing, and then invitations to tender to the short listed firms (equivalent to the RFP stage as described in Section 2).

[17] Supplying compressed air by contract energy management. Energy Efficiency Best Practice Programme, UK Department of the Environment. March 1997.

The request for expressions of interest from energy service companies was published in the Official Journal of the European Communities (since the project was of a sufficient size that this is a requirement, as in the preceding cases study of schools in Vienna) and nine companies submitted expressions of interest. Five companies were short listed, based on their qualifications and experience., financial strength, and the quality of their submissions. Two companies actually submitted tenders and one company (ESUKL, a subsidiary of Midlands Electricity, the privatised electricity distributor) was selected.

However the contracting and negotiating process (with the selected contractor) was very long and very time-consuming taking altogether two years to complete. In addition to the staff time of the hospital staff, legal advisers were hired, and their costs amounted to 50 – 80,000 euro. The staff of the health authority provided financial advice. The issues that were responsible for most of the time during the negotiations were:

- Quantifying the value for money from the contract (quantifying all the financial benefits);
- Determining which risks would be transferred to the energy service company;
- Establishing that the project met public rules (set by the Ministry of Finance) for the use of private capital in state facilities;
- Agreeing the accounting treatment of the contract and the energy performance contracting arrangement;
- The provisions for the end of the contract: what happened to the plant at the end of the contract.

b. Energy performance contract terms

Transfer of risk is mentioned above as one issue which took up much time in negotiations. The transfer of risk from the energy user to the energy service company is an important part of any energy performance contract, and the basic principle used was that each side should accept the risks they are best able to manage and control. The hospital was fully aware that transferring risks to the energy service company had a cost (the energy service company should expect to be reimbursed for those risks) but the objective was to maximise the overall value from the project for the hospital. Risks which were taken by the energy service company were:

- Construction cost overruns: the energy service company was responsible for any construction costs higher than budgeted;
- Construction time overruns – the contract dictated a deadline for construction, and the energy service company was responsible for any delays in meeting this deadline;

- Technical risks: that the equipment would perform as efficiently as expected, and with the planned steam and heat output;
- Plant repairs and maintenance were transferred fully to the energy service company, giving the energy service company both an incentive to maintain the equipment properly, and the risk of increased costs due to higher than expected maintenance or repair needs;
- Legislation: any changes in environmental legislation (emissions) requiring changes in the heating plant was taken over by the energy service company;
- Insurance: the energy service company was responsible for the insurance of the plant and the boiler house building.

The hospital was responsible for the risk of a fall in demand for steam and heat (i.e. the outputs) through the payment of a fixed monthly charge which covered the fixed costs of the project.

The uninterrupted supply of heat and steam throughout the construction process was an important requirement for the hospital. Additionally the hospital required a guarantee from the parent company of the energy service company, that the parent company would meet the obligations of the energy service company in case the energy service company failed to do so (e.g. if the energy service company was closed).

The project was somewhat unusual in that the hospital was looking for private investment for an investment in order to increase energy production to meet the increased demand from the expansion of the hospital. The financial arrangement of the contract gave the energy service company a significant incentive to generate energy efficiently. All the fixed costs of the project (investment and operation) are recovered from the first 100 lbs of steam monthly, and the price for the remaining sales to the hospital are at the marginal cost of gas and water treatment. Under such an arrangement it is crucial for the energy service company to maintain operating efficiency, or it will lose money. Also under such an arrangement the energy service company has no financial incentive for increased demand for energy over and above the baseline output.

The contract has a duration of 10 years, at the end of which (according to the provisions of the contract) the energy service company can either sell the boiler and plant to the hospital for a nominal fee (150 euro) or can remove the boiler (at the cost of the energy service company) if and when the hospital has an alternative heating system installed. In practice this is highly unlikely either that the energy service company or the hospital would want the boiler removed and replaced.

c. Results

The new boiler plant provided 25% greater steam output that the previous plant (to meet the increased demand from the hospital expansion) but despite this the annual running costs are at the same level (120,000 euro per year). Energy cost per square metre was reduced by 12%, and carbon emissions per square metre by 33% (due to the much lower emissions from the new boiler plant). The hospital believed that the energy service contact has proved advantageous through the transfer of responsibility for risk of equipment failure (technical risk of operation), and cost savings (without the need for investment from limited capital investment budget). The negotiating period (and cost of negotiation) was considered to be high due to the fact that this was the first time the hospital had gone through such a process.

Annex 2 Case Studies – CEECs

Case Study: Czech Republic - Bulovka Hospital

A well-publicised energy performance contract was signed in 1995 for the Bulovka teaching hospital by the Czech subsidiary of a US energy service company EPS CZ. The hospital is group of buildings (16 separate buildings in all) with a total floor area of 80,000 m2 and 1640 beds, and an annual energy bill of between US$ 2.5 million and US$ 3 million. The contract negotiated with EPS covered the following measures:

- *Switching the existing central steam boiler plant to district heating for space heating and hot water*

  The existing fuel oil fired boiler was used to produce steam for heating, hot water, and steam needs. The space heating and hot water were switched to the district heating network, and the fuel oil boiler was replaced by a gas fired boiler producing steam only for sterilisation and laundry needs.

- *Installation of a new energy management control system*

  A remotely controlled energy management system was installed, which also monitors the consumption of each building within the hospital.

- *Installation of a new air handling heat recovery system*

  Prior to the project the ventilation system used only external air as input, venting waste air directly to the outside. A heat recovery system was installed to pre-heat incoming air from the heat recovered from waste air

  The project involved a total investment of US$ 2.7 million. Annual savings were projected to be US$ 700,000 with an average simple payback of 4 years. One aspect of the project which is noteworthy was the financing arrangements. The project was funded by a 100% project based loan, which was borrowed by the hospital, but guaranteed based on the corporate guarantee of the supplier of the energy management system, Landis and Gyr (now Siemens). Between the energy service company EPS and the hospital there was an energy performance guarantee agreement.

Case Study: Motol Hospital, Czech Republic

The largest hospital in the Czech Republic, the Motol teaching hospital in Prague is currently the subject of a tender procedure for energy performance contracting. This was the first tender in the Czech Republic in which the tender documents requested energy services to reduce costs, and not for a predetermined technical solution. The energy efficiency centre SEVEn (an NGO) are advising the hospital in the tender preparation and contracting phases. However one company has complained to the Czech Office for the Protection of Competition that the public procurement rules were not followed. This appeal case is being regarded as a test case, and the ruling of the Office for the Protection of Competition is likely to be a precedent that will clarify the operation of the public tendering rules for energy performance contracting for other projects, and hence provide remove some uncertainty (and hence barriers) for other projects.

Case Study: Basic School in Litvinov, Czech Republic

The basic school in Litvinov presents an interesting case study because the size of the project is below that commonly held to be the minimum for an economic energy performance contracting project. The energy service company involved, KSUE, has specialised in small scale energy performance contracts in public buildings. The project was also one of the first to be implemented in the country, with the contract being signed in 1992. The investment made through the project was US$ 18,500, and the contract comprised the following measures:

- Energy auditing of the school;
- Central regulation of the school heating system;
- Installation of TRVs on radiators;
- Measurement of the district heat supply (heat meter);
- Installation of water saving taps;
- Detailed monitoring;
- Education of caretakers and service personnel;
- Renegotiation of the contract with the local district heating company;
- Maintenance.

Modernisation of the heating system in the Moravian Fire-Clay and Plywood Factory, Velke Opatovice.

The objective of this project was to modernise the heating system in a fire-clay and plywood factory in Velke Opatovice. The project involved an investment of approximately US$ 600,000 US$, and was eligible for a subsidy of US$ 82,000 from the Czech Energy Agency through the 'State Programme for Energy Savings. The measures installed were:

- Installation of waste gas exchangers installed in three existing furnaces;
- Installation of a new contract hot water source boiler to replace the existing steam boiler, including a new distribution system and delivery stations;
- Modernisation of the compressed air production;
- Installation of frequency converters for some electrical drives.

Case Study: Hungary

Siemens

Summary data of the experience of Siemens Building Automation (formerly Landis and Stefa) in Hungary:

- Since 1998 Siemens have implemented 18 projects, with a total installed capacity of approximately 100 MW;
- Over 20 million euro has been invested;
- Total savings achieved are 138 M kWh/year, equivalent to 4 million euro,
- CO_2 savings of over 39,000 tonnes/year.

Prometheus

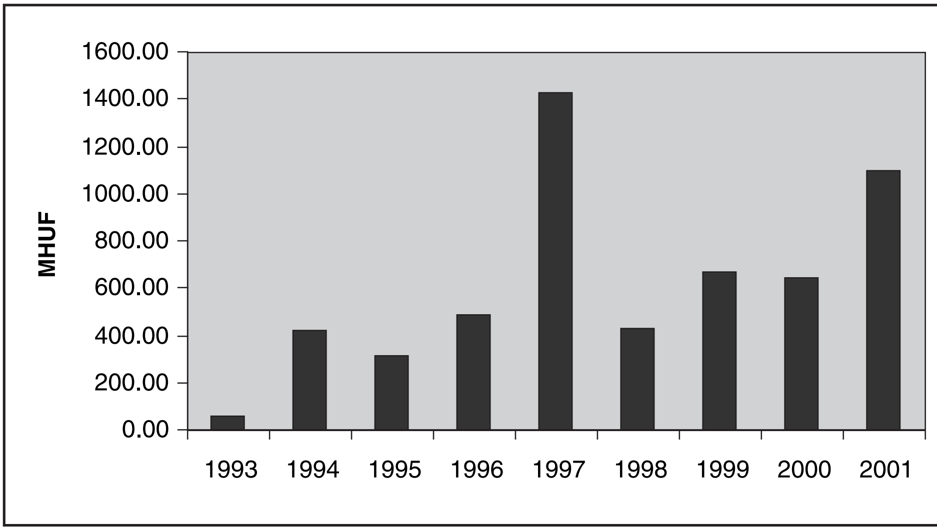
Prometheus was established as a state-owned boiler plant installation, operating, and maintenance company more than 30 years ago. The company was privatised in 1993 to the Dalkia Group (EdF/Vivendi Environment) and has around 2000 contracts for the operation and maintenance of boiler plant. The company had revenues of 33.7 million euro in 2000.

The portfolio of contracts presently under operation is as follows:

District heating:	31%
Hospitals:	11%
Local authority buildings (institutional buildings):	21%
Central government buildings:	36%
Industry:	1%

The volume of investments made through third party financing contracts, and the trend in these investments is shown in the following chart:

Value of investments of signed contracts for Prometheus



The case study of the Hungarian railways (MAV) is illustrative of the use of energy performance contracting for public sector facilities in Hungary.

The Hungarian railways had heating systems which were in poor technical condition and had reached the end of their working life, with high operating costs, high energy losses in both production and distribution, and high emissions. At the same time the MAV recognised both their lack of expertise in boiler operation and maintenance, and their lack of investment funds for renovation. Therefore they decided in 1996 to tender for the renovation (and further operation) of new boiler installations for 6 railway stations: the Nyugati (Western railway station) in Budapest, the Keleti (Eastern) station in Budapest, and the cities of Szolnok, Hatvan, Gyor, and Szekesfehervar. Prometheus won two of the six tenders, for the stations of Nyugati (Budapest) and Hatvan.

The contract for the Nyugati railway station was signed in 1997, with the following main features:

- 20 year contract period;
- Complete system renovation in three states with total investment of 1 billion HUF;

- 100% project financing with an average payback of 10 years (hence the long contract period);
- Taking over the operation of the heating systems for the railway, a hospital and a polyclinic (with 6 boilers, 22.5 MW installed capacity, and 29 heating centres).

The renovation and investment was made over three years. In year 1 approximately 50% of the total investment was made, with the boiler houses and heat distribution pipes being replaced. In the second year around 30% of the investment was made, with investment in the heating centres, fuel storage, and heat exchangers. In the third year of the contract the final phase of the investment (20%) was completed with the installation of remote control systems.

Case study: Poland Krakow Energy Efficiency Project

The city of Krakow has around 750,000 inhabitants (of which around 100,000 are students). Around 70% of all residential and 50% of all commercial buildings are connected to the district-heating network. Detailed case studies of energy efficiency retrofits of buildings (and particularly large residential buildings) in Krakow has shown that there is a substantial potential for energy efficiency improvements which would give attractive financial returns if they were not burdened by high 'risk premiums' as energy efficiency projects are, and if they could attract long term financing (which is not available for energy efficiency projects from local banks). As a result of this 'financing gap' many viable energy efficiency projects are not implemented in Poland. Also low awareness of energy efficiency, risk perception, and inconvenience are all additional barriers.

Against this background the World Bank has developed, together with the municipal district heating enterprise for Krakow (MPEC) a project for a World Bank loan with two main elements: (a) a project for the further modernisation of the district heating system, and (b) a project to use a recently created energy service company subsidiary of the district heating company to deliver energy services, arrange project financing, and repay investments from the energy cost savings which the ESCO guarantees.

The energy service company was established in Krakow in April 2000 with five staff. The energy service company staff are responsible for sales and marketing, billing and collections, monitoring and reporting, and overall monitoring of the implementation of projects, while other services are outsourced. Procurement and disbursement are conducted by the district heating company (under a fee arrangement) and energy auditing and technical supervision of project implementation, including maintenance and operation, are outsourced to consulting engineers.

This project is intended to address the following barriers:

- *Difficulties in arranging finance*

  In common with other countries of the region, Polish building owners face difficulties in raising finance for energy efficiency investments. An informal survey with senior managers of banks in Krakow resulted in the following observations[18]:

  - Banks expressed interest in energy efficiency loans but only a small number of projects (for municipal street lighting) had been financed;

  - The typical maximum term of a commercial loan is 2-3 years. Such a short term for loans means that only the most short payback energy efficiency measures could be financed, leaving other efficiency potential un-addressed. Longer term loans are essential if more comprehensive energy efficiency improvements are to be made;

  - Polish banks were not familiar with analysing the financial aspects of energy efficiency projects, and thus were even less willing to lend for energy efficiency investments than for investments there were more familiar with.

- *Inadequate information*

  Only a small group of people (the energy efficiency 'community' in Poland – i.e. including the National Energy Efficiency Agency, the energy efficiency foundation NAPE, and others) are aware of the potential for energy efficiency technologies, building owners, occupiers, and banks lacked information on the financing aspects of energy efficiency, and had no information about the ability to use energy savings to finance energy efficiency investments.

- *Lack of belief in energy savings/distrust of energy performance contracting*

  Both building owners and banks lack trust that energy efficiency projects can deliver the promised savings, and working with an energy service company is a new way of working which involves giving up control, which may be strongly resisted. Basically, both building owners and banks fear that entering into an energy performance contracting is risky for them.

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[18] Poland Krakow Energy Efficiency Project. Project Appraisal Document, Page 9, Report 20969-POL. World Bank. 2001.

- *High transaction costs*

  Energy efficiency projects are individually relatively small, and energy performance contracting is (as has been pointed out elsewhere in this report, including in Section 2) a complex procedure with a large number of steps between the first analysis of the potential for energy efficiency to contract signature and to the implementation of the investment project. Especially where the benefits in energy savings are considered small (see the point above) energy users are reluctant to incur the costs in time and money of contracting for energy services (developing information on the facility, launching the request for qualification, evaluation, short listing, request for proposals, evaluation, negotiation, etc.).

  This problem is compounded by the limited experience with energy performance contracting (this is a 'chicken and egg' situation). Lack of experience means high transaction costs which is a high barrier which means no experience is gained to lower the transaction costs and the height of this barrier.

- *Institutional constraints*

  The limited number of energy service companies active in Poland implies that some building owners are concerned that there is insufficient competition. Also the institutional capacity to help overcome the barriers listed above is not fully in place, despite the efforts of the national energy efficiency agency (KAPE) and the energy efficiency foundation (FEWE).

Market characteristics

Many of the factors that have prevented energy service companies from achieving better penetration of the market for energy efficiency improvements are related to internal barriers within energy users to using this approach. In order for energy service companies to succeed, they need to overcome the barriers of the consumers to using an approach that does not easily fit with traditional procurement methods. The potential market for energy service company services in the Krakow region was examined as part of the preparation for the World Bank project, and the sectors were evaluated in terms of the number and area of buildings, concentration of ownership, and other factors related to the market for energy performance contracting. This is shown in the following table:

Market characteristics for energy performance contracting in Krakow

	Energy users supplied by Krakow municipal district heating company			**Public/private sector**				
	No of buildings	**Owners**	**Ownership concentration**[1]		**Energy intensity**	**Owner's ease of decision making**	**Credit worthiness**	**Need for renovation of heating systems**
Municipal buildings	1,413	1	High	Public	Medium	Low	High	Medium
Education	528(364)	145(15)	High(64%)	Public(100%)	Medium	Low-Medium	Medium-High	Medium
Hospitals and clinics	125(40)	49(5)	Medium(32%)	Public100%	Medium	Medium	High	Medium
Housing (cooperatives)	2,243(1,571)	103(30)	High(70%)	Private 70% Public 30%	Low-Medium	High	Medium	Medium-High
Commercial buildings	974	454	Low	Private 100%	Medium	High	Low-Medium	Medium

[1] Figures in brackets indicate the degree of ownership concentration (e.g. 15 individual authorities/municipalities control 364 buildings, which represents 64% of the total number of educational buildings).

Energy Service company market size estimate

Based on the market characteristics shown in Table 4.2, an estimate of the market size for the district heating utility ESCO was made (by combining these eligibility factors with the amount of space and the approximate investment need per m^2). The potential sales of the energy service company were estimated to be US$24 million over 6 years, with most of the sales coming from the public sector (all sales in the early years). The public sector was considered to be both credit worthy and offering a high concentration of ownership (though experience with public sector energy performance contracts in the Czech Republic has been that while the public sector is credit worthy in the sense that it cannot go bankrupt, payments may be made late due to budgetary problems or late payments from central authorities to local authorities, or from local authorities to local institutions).

It is certainly the case that the credit worthiness of private sector housing cooperatives is low (and thus the potential for energy performance contracting in this sector is lower) while public authorities are attractive for energy service companies *if* (and this is an important *if*) they can allocate part of the current operating budgets to pay for savings, and if they can borrow funds on the strength of taxation income, without requiring the energy service company to carry the debt on its balance sheet.

The estimated market size of the Krakow district heating company ESCO is shown in the following table:

Market size estimate

Market segment	World Bank supported activity			
	Potential ESCO market penetration of total market	Potential ESCO investment	6 years sales	% of the total ESCO potential in the Krakow region
		Million US$		
Municipal buildings	20%	14	9	61%
Education	50%	24	8	33%
Hospitals and clinics	56%	10	6	58%
Housing cooperatives	20%	36	1	3%
Commercial buildings	20%	23	0	1%
TOTAL		107	24	22%

A noteworthy point of justification for this project was the view that an energy service company created as a subsidiary of the municipal district heating company would have a significantly higher chance of early market penetration due to the existing contact with customers of the utility, and the greater credibility of a utility owned energy service company than an ESCO which had to build an awareness with consumers from scratch.

The energy service company planned to use customer payment records of the district heating company in order to select potential clients with a good payment record. In addition it was considered that it may be possible to include energy service company fees (share of savings) with the heating invoices of the district heating company, although this may not be possible due to VAT and regulatory issues. Certainly such a form of billing would be criticised as constituting an unfair advantage by the utility subsidiary energy service company as compared to private sector energy service companies competing with it in the market.

Financing of the energy service company

The utility energy service company is being financed through a World Bank loan of approximately US$8 million, with US$3 million being contributed as capital by the municipal district heating company. Additional funds would be commercial debt. The base case assumed that the municipal energy service company would carry 100% of the debt on its own balance sheet in the first 2 years of operation, i.e. that the energy service company itself would be the borrower and would finance the investment projects, but that in later years consumers would be more willing to borrow directly, thus reducing the percentage of investments that are carried on the balance sheet of the energy service company. Thus in the early years the World Bank funding can provide the necessary investment capital with the assumption that Polish Banks will increasingly lend for energy efficiency investments when experience and credibility are established.

As part of the preparation of the project a number of banks (Polish and foreign) were interviewed. Foreign banks were only interested in lending an aggregate credit facility of minimum US$5-10 million, while Polish banks expressed interest in lending for individual projects, but would require, in addition to the usual collateral requirements, a guarantee of the loans from the municipal district heating company. In addition local banks do not normally offer loans of more than 2-3 years, and not of the 7-10 years required for some energy efficiency projects. The highest amount of co-financing considered possible from local bank funding was 70% of project costs.

The energy service company has been established as a fully owned subsidiary of the municipal district heating company. Of note is that as part of the project preparation (of the Krakow Energy Efficiency Project) a search for possible private sector investment in this ESCO was undertaken (under funding from a Japanese grant) but no investors were identified who were willing to invest before the energy service company has proved that it can be both successful and profitable.

In addition to the investment funding, technical assistance is being provided through a US$300,000 component of the World Bank loan, in order to provide consulting support to the energy service company relating to business strategy, energy auditing, measurement and verification of savings, and legal aspects of energy performance contracting.

Interestingly the borrower of the World Bank funds to be used for the investments by the energy service company is the district heating utility. The district heating company uses the World Bank loans funds to procure the equipment and works for the energy service company, with the energy service company repaying its district heating company parent for these costs as it is itself repaid by the clients: i.e. the energy service company will repay the district heating company with the same repayment schedule as the clients repay the energy service company from the achieved savings. A six month time lag in payments from the energy service company to the utility were planned in order to minimise the consequences of late payments by clients of the energy service company. The average length of the energy service company financing to the energy users is seven years. In effect the district heating utility has created a 'revolving fund' to provide investment funding for the energy users through the district heating company.

The World Bank loan funds are to be used only for the cost of equipment, materials, and installation works (i.e. investment costs directly related to the project). These loan funds cannot be used for the energy service company's overheads or profit margin. The typical split of costs for an energy performance contract arrangement is 55% for equipment and materials, 25% for installation, commissioning and operation, and 20% for the energy service company overhead and profit margin.

Eligibility criteria of energy service company clients/projects

The eligibility criteria for the clients of the energy service company are as follows:

- Clients must be creditworthy with a good record of payments for district heating;
- Clients must have no record of previous defaults on debts;
- The savings in utility costs must at least equal the costs of the energy efficiency project (including the investment cost and the related project overheads);
- Projects must have a payback period of not more than 10 years to be paid from the energy savings of the project. If projects have a payback of longer than 10 years, the period longer than 10 years would have to be financed by the building owner;
- Projects must have a minimum capital investment (not including the energy service company margin and overhead) of US$50,000.

There are no restrictions on the size of the energy users, or on the ownership (public or private).

Case Study: Ukraine Public Sector Energy Service Company

UkrEsco was established as a State owned energy service company (under the ownership of State Property Fund, with the shareholders rights of ownership exercised by the State Committee for Energy Conservation on behalf of the State Property Fund) with access to loan funds of US$20 million from EBRD (secured by a sovereign guarantee from the Ukrainian Government), and 6 million euro in grant funds from the EU TACIS programme, of which 3 million euro have been used to fund a project management unit run by a Belgian energy service company (Econoler) and Nexant (consulting company), and 3 million euro to for grant finance for the investments to be implemented by UkrEsco. This has supported the projects by providing a grant of approximately 11% of the investment cost of each project (providing 1 euro of support for each $10 of project costs)

In all other countries of the region EBRD funding is used to finance private sector energy service companies, and indeed with the explicit aim of developing the private sector supply of energy services. In the case of the Ukraine a public sector energy service company was financed because no private sector company was seen to be willing to take the risk of entering the market. EBRD believed that by realising a wide range of energy efficiency investments (in industry) the project would serve to establish the viability of energy performance contracting on a commercial basis in the Ukraine, and thus acting as a catalyst (and a demonstration project) for private sector investment to enter the market at a later date).

The loan funds from the EBRD have been used by UkrEsco to invest in energy saving projects in the industrial sector, Repayments have been covered by the income from these energy performance contracts, which are priced at a level that will provide for repayments and a profit margin. This has allowed UkrEsco to increase the resources available to invest in the future, and to build up a limited buffer in the case of any particular project running into difficulties.

The 'Project Manager' (funded by TACIS funds) had the following objectives:

- To ensure the successful launch of the operations of UkrEsco through implementation of energy performance contracting in the Ukraine, and to demonstrate the economic benefit of energy service companies.
- To hire and provide training for Ukrainian staff.
- To facilitate the eventual transfer of UkrEsco into the private sector (with the introduction of local and/or foreign investors)

The project manager has been responsible for the identification and development of individual projects, and has operated independently of any government institution. Projects are presented for approval to the UkrEsco board by the project manager, who must approve the project. These are conditionalities for the disbursement of the EBRD loan funds (which require that the project manager also approves each project proposed for funding).

The principal operational tasks of UkrEsco are as follows:

- *Project identification*

  The energy service company is responsible for the identification of potential projects. Before the start of the project technical assistance funding was used to develop an initial pipeline of projects. The success of the Project Manager and the local staff of UkrEsco in identifying projects is demonstrated by the number of projects already implemented.

- *Energy auditing*

  The Project Manager is required to take charge of the necessary energy audits to assess the forecast energy savings. This is used to agree the baseline energy consumption based on historical energy data adjusted for necessary factors (e.g. production rates, production mix).

- *Technical assessment*

  Once the baseline consumption is agreed that Project Manager draws up a technical assessment of the quantity of energy savings that can be realised and a detailed specification of the installation required to implement the investment

- *Procurement*

  UkrEsco purchases and installs the equipment based on the technical specification. The Project Manager is responsible for selecting appropriate equipment and for quality control of the goods, works, and services to be procured (and for ensuring that these are in full conformity with the EBRD's procurement policies and rules)

- *Client due diligence*

  UkrEsco has to carry the commercial risk of a client failing to meet its obligations under an energy performance contract. Therefore the Project Manager conducts a thorough due diligence on each client. This includes analysis of the record of the client in paying energy bills, the commitment of the management of the company to the project, an assessment of the technical risk, cashflow analysis, and a review of the financial and commercial prospects of the project and the client

- *Financial analysis*

  A detailed financial analysis is performed on each proposal, that analysing the sensitivity of the key assumptions in the project (i.e. analysing the impact of variations in the actual level of energy savings or production levels of the enterprise)

- *Project implementation*

  As in all energy performance contracts, UkrEsco (and the Project Manager in the first period of operation) is responsible for the design, installation, commissioning, and where required the operation of the investments specified under each contract.

- *Accounting and financial management*

  UkrEsco (assisted by the Project Manager) has set up the necessary accounting and financial management system that includes: contracts with suppliers; payment of suppliers invoices; issuing and following up invoices to clients; and cash management.

- *Monitoring and reporting*

  The energy performance contracts signed between UkrEsco and the energy users are made on the basis of realised energy savings. Procedures have been established to monitor the actually achieved savings from each project and to take measures necessary to correct any shortfall in savings.

Rigorous commercial procedures have been applied by the project manager to ensure that the projects proposed meet the minimum commercial and financial criteria necessary, including demonstration of the proposed client's track record of payment of energy bills; due diligence on the clients; assessment of the technical risk (risk of energy savings being achieved); financial and economic analysis of each project to demonstrate that realised cash savings will meet the required levels; and preparation of collateral or other necessary security to cover the investment to be made by UkrEsco (and funded by the EBRD loan).

The financing of the project manager was designed to provide a strong performance incentive, with a base fee plus a success fee related to the signing and implementation of energy performance contracts amounting to 20% of the total fee. The project manager was also required to provide a guarantee of its performance by providing a performance bond in case of any non-performance liabilities.

The initial start up period was longer than initially anticipated. However, the first energy performance contract was signed in April 2000 for the Gostomel glass factory, with a project value of approximately US$195,000. Since then the development of further projects has proceeded at the planned speed, with a total value of contracts signed of US$8.78 million. Six projects in the state of implementation (where investments have been made and paybacks are now in course) with a total project cost of US$2.88 million .A further 6 projects have been signed and are in the equipment procurement or equipment installation/commissioning phase with a total project cost of US$ 5.9 million.

The largest contract signed to date is the installation of a cogeneration unit with a project value of US$ 2 million, and the smallest US$ 186,000 with an average project value of US$ 558,000. Industrial branches where projects have been signed include glass making, farming, dairy industry, engineering, animal foodstocks, and a tannery.

This impressive result demonstrates that (contrary to some opinions in energy efficiency agencies and in some energy service companies) that (a) energy performance contracting is indeed feasible on a commercial basis in the industrial sector, and (b) this can be viably achieved even in economies in transition where there are known difficulties with payments of energy bills by the industrial sector.

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