



Performance Contracting

Summary Report

**Task X within the
IEA DSM Implementing Agreement**

International Energy Agency (IEA) DSM Implementing Agreement
/Swedish Energy Agency

Performance Contracting

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Stockholm, Sweden, 2003

The material in this report may be used if reference is made to the source.

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Also, visit the Task X website: <http://dsm.iea.org/NewDSM/Work/Tasks/10/task10.asp>

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PREFACE

IEA Demand-Side Management Programme

The International Energy Agency (IEA) was established in 1974 as an autonomous agency within the framework of the Economic Cooperation and Development (OECD) to carry out a comprehensive programme of energy cooperation among its 26 Member countries and the Commission of the European Communities.

An important part of the Agency's programme involves collaboration in the research, development and demonstration of new energy technologies to reduce excessive reliance on imported oil, increase long-term energy security and reduce greenhouse gas emissions. The IEA's R&D activities are headed by the Committee on Energy Research and Technology (CERT) and supported by a small Secretariat staff, headquartered in Paris. In addition, three Working Parties are charged with monitoring the various collaborative energy agreements, identifying new areas for cooperation and advising the CERT on policy matters.

Collaborative programmes in the various energy technology areas are conducted under Implementing Agreements, which are signed by contracting parties (government agencies or entities designated by them). There are currently 40 Implementing Agreements covering fossil fuel technologies, renewable energy technologies, efficient energy end-use technologies, nuclear fusion science and technology and energy technology information centres.

The Demand-Side Management Programme is a new collaboration. Since 1993, the 17 Member countries and the European Commission have been working to clarify and promote opportunities for DSM.

Australia	France	Spain
Austria	Greece	Sweden
Belgium	Italy	United Kingdom
Canada	Japan	United States
Denmark	Korea	
European Commission	Netherlands	
Finland	Norway	

A total of 10 Tasks have been initiated, 5 of which have been completed. Each Task is managed by an Operating Agent from one of the participating countries. Overall control of the programme rests with an Executive Committee comprised of one representative from each contracting party to the Implementing Agreement. In addition, a number of special ad hoc activities--conferences and workshops--have been organised. The Tasks of the IEA Demand-Side Management Programme, both current and completed, are as follows:

Tasks:

Task I	International Database on Demand-Side Management
Task II*	Communications Technologies for Demand-Side Management
Task III*	Cooperative Procurement of Innovative Technologies for Demand-Side Management
Task IV*	Development of Improved Methods for Integrating Demand-Side Management
Task V*	Investigation of Techniques for Implementation of Demand-Side Management Technology in the Marketplace
Task VI*	DSM and Energy Efficiency in Changing Electricity Business Environments
Task VII	International Collaboration on Market Transformation
Task VIII	Demand Side Bidding in a Competitive Electricity Market
Task IX	The Role of Municipalities in a Liberalised System
Task X	Performance Contracting

* completed Task

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Also, visit the IEA DSM web site at <<http://dsm.iea.org>>.

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The Appendices are not attached to the printed version of the Summary Report. They are available at the website (see below) where all the Country Reports have also been uploaded.

Task X Website: <http://dsm.iea.org/NewDSM/Work/Tasks/10/task10.asp>

PERFORMANCE CONTRACTING – SUMMARY REPORT

ABSTRACT

Energy performance contracting (EPC) is a wide variety of mechanisms, which, by rationally using the knowledge of energy professionals, opens up opportunities for property owners to install more energy-efficient equipment and systems in their buildings without tying up their own capital. Projects performed give examples of energy savings in buildings of 20 to 40 per cent even if some of the savings could be reached also with other energy-efficiency activities. Estimates indicate that the market in some countries could be up to ten times larger than at present. Greater use of these mechanisms could substantially contribute to lowering emissions of greenhouse gases and reducing the risks of a climate change. EPC includes financing alternatives to lower the financial burden for the property owner and, at the same time, reduce the yearly operational costs for energy (alternatively giving more services at the same cost, or using more environmentally friendly sources within the same cost). Better performance is guaranteed by the contractor – the energy service company (ESCO).

In this report, the eight countries participating in Task X of the IEA DSM Agreement - Finland, France, Italy, Japan, The Netherlands, Norway, Sweden and the United States - have identified problems and opportunities and suggest a number of concrete actions in order to facilitate the greater use of energy performance contracting and related mechanisms (see Figure 9, "Introduction and diffusion of EPC: Problems – Actions – Results"). The most important actions are: raising the general credibility of EPC through aimed information, demonstration projects, accreditation of ESCOs, special performance guarantees and EPC process and procurement guidelines. These actions will enlarge the market for all stakeholders working within this area, and EPC will offer an interesting alternative for facility owners.

ACKNOWLEDGEMENTS

Task X "Performance Contracting" is one of the tasks within the International Energy Agency (IEA) Demand-Side Management (DSM) Implementing Agreement. Eight countries are participating in Task X. This is a summary of the different Country Reports, which have been produced by the Task X Experts. Most countries have had contacts with national groups of stakeholders, which have included property owners, energy service companies, utilities and government officials.

The ongoing Task work has been presented at many national events in the participating countries, at an IEA/CTI workshop in Budapest, at CIB conferences and at international Energy Conferences.

We want to thank all the experts, representatives of different stakeholders and other organisations and persons who have contributed to this report. We also want to thank all the organisations and their respective Government organisations contributing funding, including Motiva (Finland), ADEME (France), CESI/SFR (Italy), NEDO and HPTCJ

(Japan), Novem (The Netherlands), NVE and ENOVA (Norway), Swedish Energy Agency (Sweden) and NAESCO (United States). Finally, we wish to express our thanks to the IEA Secretariat and many organisations and companies for their major input.

The whole report, which consists of a summary including the actions suggested, and the different national reports, should be seen as an anthology with different authors. The Country Reports have been influenced by experience from earlier projects, the current situation and future plans within the participating countries. This means that the structure of the reports varies somewhat from country to country, but this also adds more national and local flavour. It illustrates that there is not one precise model for using performance contracts. Alternative solutions are suggested, and they have always to be adapted to the current national situation.

1 EXECUTIVE SUMMARY

Energy performance contracting (EPC) is a wide variety of mechanisms, which, by rationally using the knowledge of energy professionals, opens up opportunities for property owners to install more energy-efficient equipment and systems in their buildings without tying up their own capital. Projects performed give examples of energy savings in buildings by 20 to 40 per cent even if some of the savings could be reached also with other energy-efficiency activities. Estimates indicate that the market in some countries could be up to ten times larger than at present. Greater use of these mechanisms could substantially contribute to lowering emissions of greenhouse gases and reducing the risks of a climate change. EPC includes financing alternatives to lower the financial burden for the property owner and, at the same time, reduce the yearly operational costs for energy (alternatively giving more services at the same cost, or using more environmentally friendly sources within the same cost). Better performance is guaranteed by the contractor – the energy service company (ESCO).

The objectives of the Task are to facilitate the greater use of performance contracts between professional building owners and all types of companies offering these services. There have been problems to introduce and increase the diffusion of the EPC concept. ESCOs have met hesitation from prospective clients, and policy makers have been slow in launching EPC marketing programmes

In this report, the eight countries participating in Task X of the IEA DSM Agreement – Finland, France, Italy, Japan, The Netherlands, Norway, Sweden and the United States – have identified many problems and barriers but also many good examples and large opportunities. After having summarised the situation in the individual countries, the findings are summarised in this report and suggestions of a number of concrete actions are given in order to facilitate the greater use of energy performance contracting and related mechanisms (see Figure 9, “Introduction and diffusion of EPC: Problems – Actions – Results”). The most important actions are: raising the general credibility of EPC through aimed information, demonstration projects, accreditation of ESCOs, special performance guarantees and process and procurement guidelines. These actions will enlarge the market for all stakeholders working within this area, and EPC will offer an interesting alternative for facility owners.

Savings in energy use are used to pay for upgrading equipment and/or investing in new efficient systems, and the remaining savings are shared between the facility owner and the ESCO under the terms of the agreement. Different alternative solutions are presented. The ESCO takes the project performance risk by guaranteeing a specified level of energy savings and/or energy services. The ESCO may also take the responsibility for the financing of the project, either totally or partly, or offer different financing arrangements for the facility owner. In line with many recent EU SAVE reports, Third Party Financing (TPF) is treated in this report as being the same mechanism as EPC.

The participating countries represent very different energy situations. Some countries are still very dependent on fossil fuel, resulting in large CO₂ emissions *per se*. Liberalisation and deregulation of the energy market have proceeded at different speed

in the Task X participating countries, and experience in EPC-related fields differs. The countries have identified EPC solutions that exist in their country. With the help of national reference groups, which include stakeholders in this area, the national experts have presented different ways of initiating projects through facility owners, government and ESCOs, and have pointed out combinations of obtaining energy savings and offering services and alternative procedures for implementation. A more international market will open new business opportunities. The main barriers and issues for enlarging the market have been identified, including clarification of procurement rules and contract arrangements, guarantees and securities, financing alternatives, and measurement and verification. Experience from countries with EPC programmes and a mature market has been combined with findings in countries with emerging markets when formulating the actions suggested. Substantial activities in the information and educational fields have been proposed in order to create credibility and a positive environment for using the performance contracting mechanism. Incentives and clarifications regarding regulations, accreditation of companies involved in performance contracting and also the measurement and verification process have been suggested, together with model projects in the current Country Plans.

2 READING ADVICE

All the Country Reports elaborate on the EPC issues in accordance with an agreed-on structure. Nevertheless, they deal with the issues in somewhat different ways, which reflect the current situation concerning EPC and ESCOs in the individual countries. The ambition has not been to co-ordinate the individual Country Reports in too much detail. Comparisons between countries are found in this Summary Report, which also includes some illustrations and tables. A list of illustrations on page 37 gives an overview of background, some findings and suggested actions. Case studies of national projects have been supplied in the different Country Reports. An overview of all of the case studies can be found in Appendix 1 to the Summary Report (on the website).

The Summary Report with appendices and all the Country Reports are uploaded to the Task X website: <http://dsm.iea.org/NewDSM/Work/Tasks/10/task10.asp>. The Summary Report will also be printed in a black and white version, which is planned to be ready during the summer of 2003.

3 INTRODUCTION AND RATIONALE

Within the Demand-Side Management (DSM) Implementing Agreement of the International Energy Agency (IEA), collaborative work has started within Task X "Performance Contracting" with eight countries participating – Finland, France, Italy, Japan, The Netherlands, Norway, Sweden and the United States.

The Country Reports and this Summary Report are results of the two-year project within Task X. This report gives a summary of the findings of the Country Reports, which have been produced by the national experts, and the joint discussions in the group of experts. A structure of the content was agreed upon at the beginning of the work. For

this work, most of the countries have established a reference group which included representatives of different stakeholders.

- The objectives of the Task are to facilitate the greater use of performance contracts between professional building owners and all types of companies offering these services.

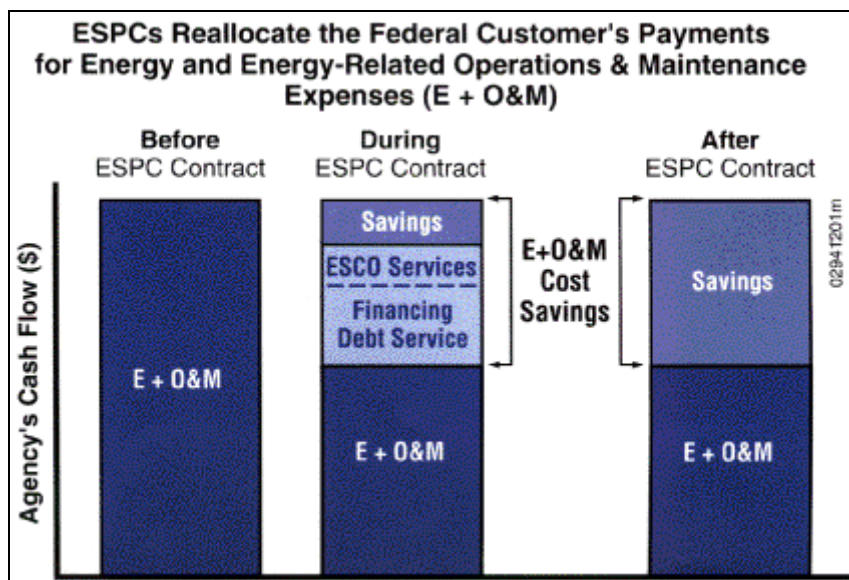
With the deregulation of the energy markets, more international trade will develop. With the joint multinational IEA project, varying energy and institutional situations have been compared as a background for suggested actions to increase the use of and expand the international market for EPC.

After introducing the objectives and the EPC concept, this report first presents methodology, limitations and some definitions. Then some information is provided about the varying energy situations in the participating countries and their contributions to the CO₂ emissions. In the following chapters, the different types of ESCOs and services are presented, and the key elements in the EPC-process are pointed out. The problems, barriers and opportunities identified are presented and the potential market is indicated in very approximate figures.

Government policy mechanisms, already introduced or planned, are presented, process, procurement and contract contents are suggested, and finally a summary of findings is given in Figure 9 (problems, short-term actions and long-term results). An account is given of the European Union actions planned for the future.

Energy service contracting, or *energy performance contracting (EPC)*, is an established range of mechanisms for promoting the installation of energy-efficient building equipment and systems. Facility owners and energy service contractors, or ESCOs, enter into agreements to perform retrofit installations of equipment that can save money on building operations. The savings in energy bills due to the more efficient equipment are shared between the facility owner and the ESCO under the terms of the agreement. Most importantly, the ESCO can take on the project's performance risk by guaranteeing a specified level of energy savings. The ESCO's compensation can then be directly tied to achieving these savings. The financing can either be by the ESCO, by the suppliers of the system or components, by financial institutions, or by an outside party – or in different combinations. The situation before, during and after an *EPC contract arrangement* is illustrated in [Figure 1](#). The cost of energy (E) + operation (O) and maintenance (M) is illustrated *before* a contract, *during* a contract, where the total savings are used for financing and debt service of the new equipment and the remainder shared by the owner and the ESCO, and *after* the contract when the total savings go to the owner. EPC is a mechanism that introduces “*payment in relation to performance*” (see also Chapter 6 Definitions and Acronyms). Leasing arrangements can also be considered. Different problems and barriers have slowed the introduction and wider spread of this method.

Figure 1. Illustration of cash flow for EPC (or ESPC) contract
(Source: FEMP, 2001)



There may be different motives for choosing a performance contract or other ESCO financial arrangements:

- For some facility owners and users, the main reason can be lack of investment capital.
- For others, it is simply a very economical business strategy. We pay only when we see value-added functions, such as reduced energy bills.
- For the ESCOs, it can be a good business argument and a way of connecting with customers and starting new business relations.
- For some companies and government organisations, it can be a very efficient way of inspiring innovations, giving incentives and facilitating the introduction of more efficient solutions.

4 ADMINISTRATIVE INFORMATION, METHODOLOGY AND LIMITATIONS

The project is organised with a group of national experts, who work together under the co-ordination of an Operating Agent, or project manager. Each participating country has a National Co-ordinator and has organised groups with representatives of different stakeholders, such as facility owners, different ESCO companies, energy suppliers, consultants, financiers, and government officials. The Task work is divided into steps, or subtasks.

The countries participating in Task X have contributed with Country Reports on the situation in their country from their perspectives regarding establishment and utilisation of the performance contracting industry. Countries with mature performance contracting industries can provide information on existing model contracts, problems/barriers, case

studies and market size. Countries with an interest in EPC, but so far with limited experience, contribute information about barriers to the process.

In the various countries, reference groups have been organised including as many stakeholders as possible. Comments received from these stakeholders and from interviews held, together with analysis of some existing written material, have then formed the background for the Country Reports.

The participating countries have compared the results of their research into the performance contracting industry, and the findings and suggestions are summarised in the Summary Report.

The countries have developed individual *Country Plans* or *Action Tools for National Activities* to increase the viability of performance contracting in their countries. These plans will be followed up by identified cases and demonstration projects. The *lessons learned* will be summarised in the Final Management Report.

Different stakeholders, financiers, legal specialists, and people specialised in benchmarking, measurement and verification issues have been approached during the work.

There are, of course, important *limitations* for this report, as it is based to a large extent on experience and the current situation in the *participating* countries. The situation in general is very different in each of the countries. Some have long experience of performance contracting work - the United States, for instance - while others have limited experience from working with performance contracting. The degree of deregulation and privatisation of the energy market also varies between the countries (see Chapter 5), and this has a great influence on the actions suggested. Important influence on the work has also been received from some countries that are not formally participating in Task X: Austria, Germany and the United Kingdom for instance, as well as from the EU SAVE Programme.

5 GENERAL ENERGY CONTEXT

This chapter includes basic information about the energy situation in the participating countries, based on IEA material. More detailed information is given in the different Country Reports.

The total primary energy supply and total generated electricity are illustrated for the eight participating countries.

Diagram 1. Total primary energy supply 2000 (by fuel in %). (Source: IEA)

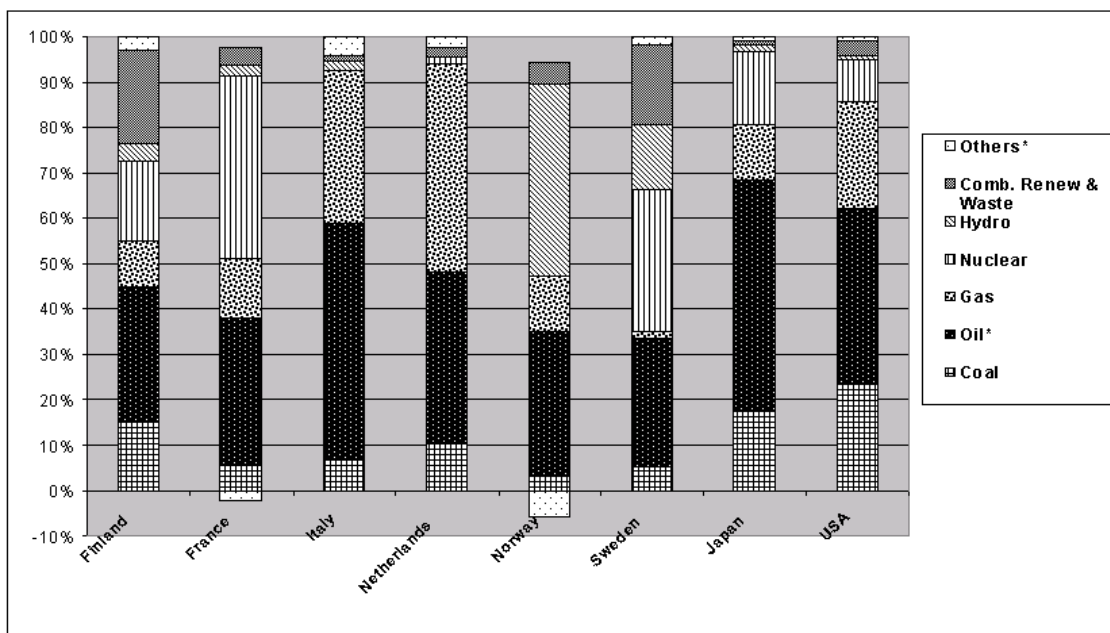
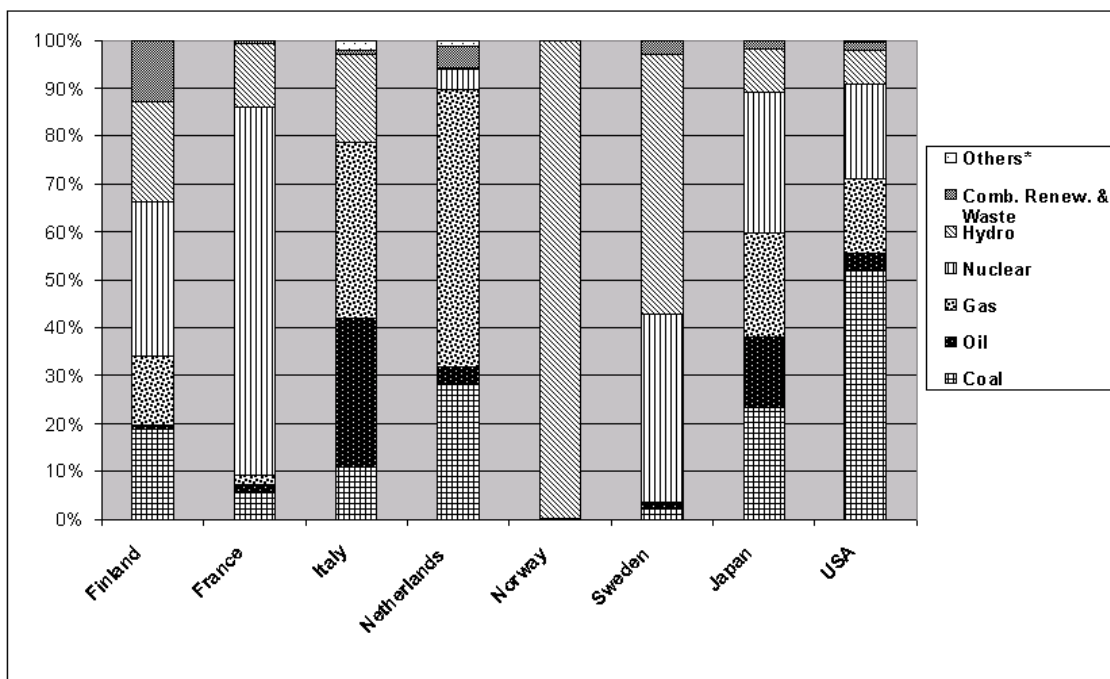


Diagram 2. Total generated electricity 2000 (by fuel in %). (Source: IEA)

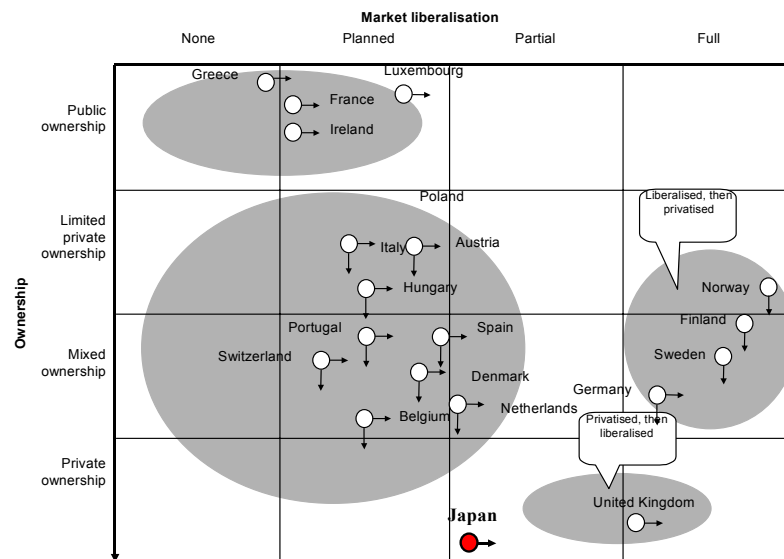


The different national reports include some differences as to figures and years that should be noted.

The current energy situation is very different in the participating countries, with some countries very dependent on oil and gas and others on hydro or nuclear power. The *deregulation and privatisation* situation and ongoing movements in 2000 are illustrated

in Figure 2. Very little deregulation had taken place in some countries (Greece), and far-reaching deregulation in others (Finland, Norway, Sweden, and the UK). In the United States, the liberalisation differs widely between the States, which is the reason why the United States has not been included in the illustration.

Figure 2. Market liberalisation with the status of deregulation and privatisation of electric power in some countries around the year 2000.
(Source: Country Report Japan, based on material from VTT, Finland.)



Privatisation is certainly at different stages in the countries. It started very early in Japan, where private organisations were given certain regions to work in, which then in practice created a regulated monopoly situation for private companies. The deregulation development is proceeding in accordance with the European Directives, and a general trend on the world market. Unexpected effects should also be taken into consideration, as for example the situation in some of the States in the United States, especially California, with the lack of investment in the energy sector escalating a crisis and, for some time, creating a shortage of electricity. This has slowed down the deregulation process in the United States.

Deregulation, relative energy and electricity prices, business culture and legislative framework and the earlier mentioned variation in energy sources form different situations for the participating countries. The countries find however the EPC concept interesting also with these varying situations, regions and business cultures. The new important factor is the concern for increased risks of a climate change caused by CO₂ emissions.

From the 1992 Earth Summit, scientific evidence has increased that anthropogenic greenhouse gases, mostly carbon dioxide from energy use, are altering the Earth's climate. The Intergovernmental Panel on Climate Change reports that unless we lower our emissions of these gases, the rise in concentrations will lead to an unprecedented increase in global temperatures of about 1.4 - 5.8 °C by the year 2100. The concern for

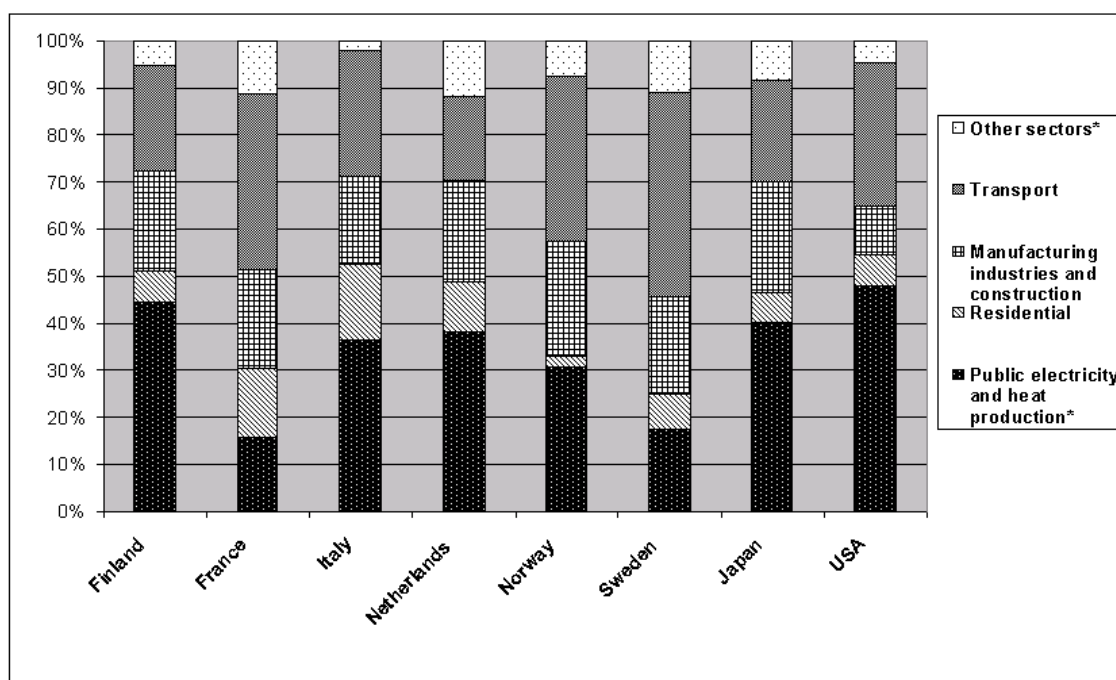
this was expressed at the Kyoto international COP meeting. Many details for important provisions were however left blank in the Kyoto Protocol, to be filled in during the coming years 1998 to 2001. At the Bonn meeting, the “COP6”, an agreement emerged among all parties, except the United States.

The Protocol from Bonn contains three novel instruments, “Flexibility Mechanisms” – or “flex mechs” –, which are:

- Emission Trading.
- Joint Implementation (JI). One country with a target may receive an emission credit for performing an emission-cutting project in another such country.
- The Clean Development Mechanism (CDM); similar to JI but for projects undertaken in developing countries.

Diagram 3 indicates that, in most countries, the CO₂ emissions from energy production for electricity and heating and from residential buildings make up 40-50 per cent of the total CO₂ emissions (France and Sweden approx. 30 per cent).

Diagram 3. Total emissions of greenhouse gases 2000 (by sector in % of tonnes of CO₂ equivalent). (Source IEA)



These international agreements will come into force after ratification also by Russia anticipated in 2003. Mechanisms, such as energy performance contracting, available on an international market, may gradually play an increasing role together with installations of bio-energy, DH-systems with renewables, etc.

It is our understanding that many new mechanisms are essential for speeding up the introduction and penetration of more efficient and environment-friendly solutions. EPC can play an important role in many countries also with very different energy situations. In the United States, many actions have already been introduced, as for example the

DoE/FEMP Programme, State Programmes in California and New York State, for example, and the formation of NAESCO. Some initiatives at the European level are mentioned in Chapter 11.

6 DEFINITIONS AND ACRONYMS

A number of definitions have been given in the Country Reports. Some examples are:

Energy Performance Contracting (EPC) is a contractual agreement for the obligations of owner and ESCO, where refurbishment of energy equipment and systems in buildings is paid for in relation to actual performance.

An *Energy Service Company (ESCO)* is defined as a company engaged in developing, installing and financing comprehensive, performance-based facility improvement projects, typically 7-10 years in duration, centred around improving the energy efficiency and reducing maintenance costs for facilities owned or operated by customers (NAESCO, 1997). The cost savings achieved as a result of the energy efficiency measures installed are used to pay for the project. Performance requirements distinguish ESCOs from consulting engineers specialising in efficiency improvements. The latter are typically paid a fee for technical advice, and do not assume the risk. Their recommendations are intended to yield actual cost savings or energy consumption reductions.

Energy savings performance contract (ESPC) means a contract between the host facility and the ESCO for a performance-based energy efficiency retrofit. (FEMP, 2001).

The *performance criteria* will mainly refer to the use of energy, including resulting costs and change of energy source, but could also include other aspects, such as better indoor air quality or offer of services. The development towards including services other than energy has been stressed in our work and is also pointed out as important in the conclusions from an EU conference about SAVE work (Lambert, 1999).

TPF refers in this report to *Third Party Financing*.

Studies of different material in Europe lead to the conclusion that TPF and EPC are used very much with the same meaning (Leutgöb et al, 2000). This is also the case in a document from the World Energy Efficiency Association (WEEA, 1999).

There are different traditions in North America and Europe regarding the similarities and differences between TPF and EPC. "Third party" has a different meaning in a Canadian definition (Langlois, 2001), where it means some party other than the owner or ESCO organisation, a banker or financier, for example. In an European Union context, "Third Party" refers to the ESCO, the first party being the owner and the second party the user.

Within the framework of *procurement rules*, different *General Conditions for Contracts* and *measurement and verification*, there are also a number of important definitions not described here.

BAFO means **best and final offer**.

ESG means **energy savings guarantee**.

PQD means **pre-qualification documentation**.

7 ESCO OPERATION AND SERVICES

7.1 *Types of ESCOs*

There are different types of ESCOs. Most countries mention ESCOs with a background in engineering and design, equipment, energy supply, facility management and maintenance, monitoring and financing. The ESCO companies may have financial capabilities to a greater or lesser extent, and also have a variable interest in taking on the financial risks.

A special type of arrangement with similarities to ESCOs is presented in the paper "Public Internal Performance Contracting (PICO) – A new instrument to cut energy bills" by Stefan Thomas and Wolfgang Irrek (Thomas, S. & Irrek W., 2001). What is specific with this alternative is that the role of the ESCO is taken by a *unit of the public authority* itself, which may be the technical department of a municipality. It acts like an ESCO, delivers the financial and technical service, and the remuneration takes place through cross-payments of budgets between the units of the public administration. However, the report does not discuss the advantages of a *real market situation and competition* – inspiring innovation. It would be a step on the way to go to more privatisation and competition with internal "competitions" before outsourcing of activities.

7.2 *Services and products offered*

Many different types of services and products are offered by ESCOs. Figure 3 illustrates the fundamental elements and most frequent and additional services.

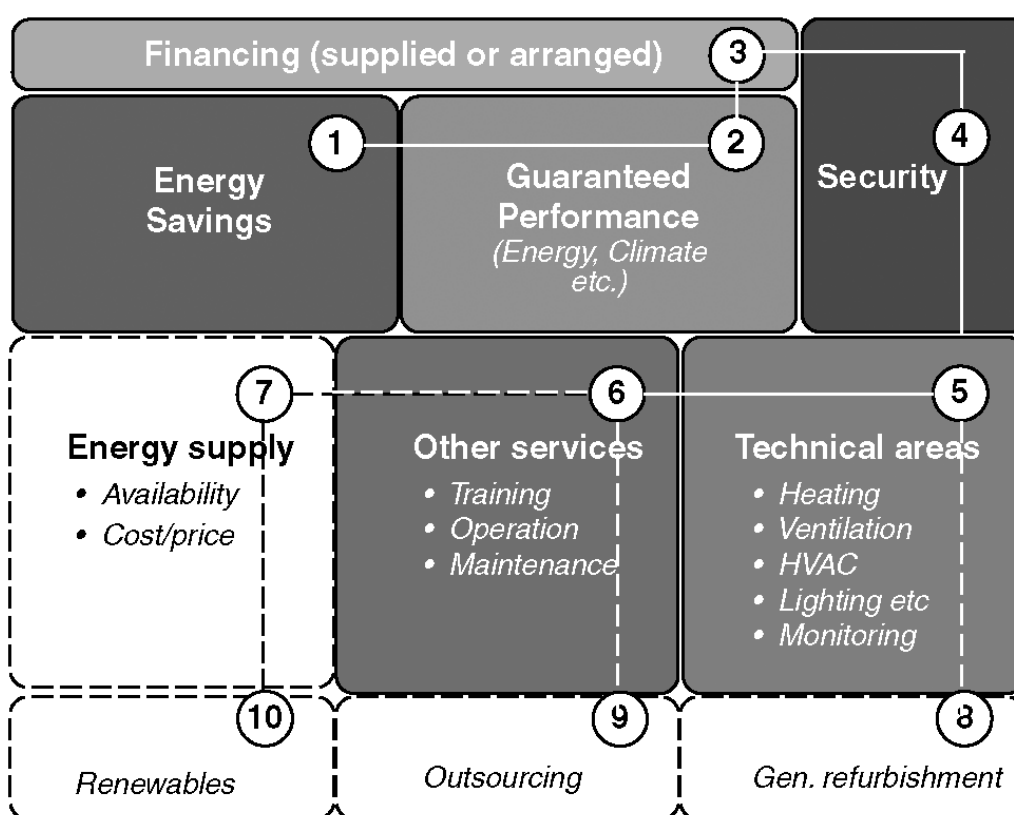
Normally, an ESCO contract should include some *fundamental elements* (Items 1-4 in Figure 3):

- *Energy savings* that are *guaranteed*, resulting in more favourable costs than without the EPC project.
- *Financial arrangement* - by the ESCO or mediated.
- A *security* solution.

The most *frequent services* (Items 5-6 in Figure 3) offered are:

- Technical consultation and detailed design.
- Upgrading of some parts in the facilities, such as lighting, control systems, HVAC, installation of new monitoring systems.
- Management of engineering and construction.
- Monitoring during the commissioning and contracted period for operation and maintenance
- Minimum advice about financing or, in some markets, most often financing completely or to some extent.

Figure 3. Fundamental elements and most frequent and additional services in Energy Performance Contracting.



The Country Reports mention many examples of *additional services* (Items 7-10 in Figure 3), such as:

- Supply of electricity, heating, and cooling (full delivery assistance with tendering).
- Refurbishment in general of buildings.
- Training, operation and maintenance service.
- Installation and operation of renewable energy systems, for example solar systems, with guaranteed results in delivered kWh/year.
- Outsourcing.

7.3 *EPC process*

Initiation of project

The initiative for suggesting or considering an EPC process and contract can be taken by different organisations, such as

- Government, or local government organisations and public energy agencies
- Facility owners
- ESCOs

Principles

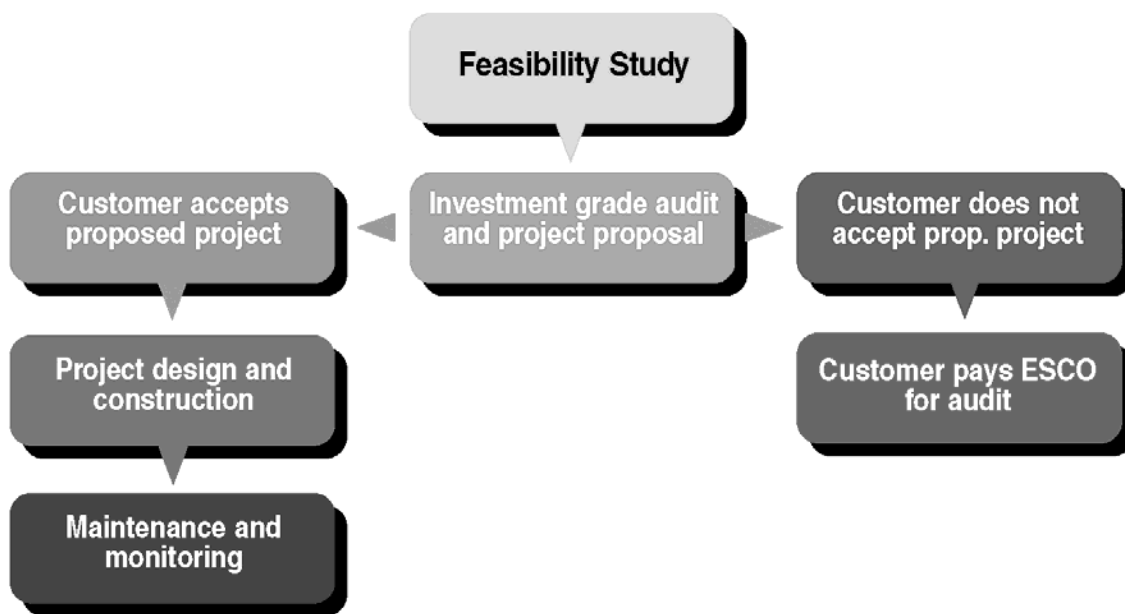
In principle, the process starts in most cases with an introductory study based on the building owner's actual needs, the current energy situation in one or more buildings, and an invitation to one or several ESCOs to submit tenders or proposals.

The EPC process may then be carried out according to different alternatives. The process may start with an *introductory study* of some kind at the beginning, called *feasibility study* (USA), *preliminary analysis* (Norway), or *energy audit* (Finland) – sometimes subsidised by government money. There is a principal difference between situations where the audit is completely produced by the owner (through a consulting company) or by an ESCO. In Finland, a large number of audits have been carried out within a general government programme. These audits could form a starting point.

Some EPC projects can, as in France, grow up from ongoing Operation Contracts, which can inspire activities in order to reduce the use and cost of energy and lead to an EPC contractual arrangement.

The ESCO may be reluctant to assume responsibility for a facility, where most of the preparation work (the energy audit) has been done by another party than the ESCO. The solution, which will be further discussed later, could be that an introductory part of the energy audit is made under the responsibility of the building owner by a consultant. The ESCO must then make some confirmatory checks for its proposal in order to be prepared to provide a full performance guarantee.

**Figure 4. Example of EPC process – the NAESCO model.
(Source: US Country Report.)**



In the *United States*, the different steps to illustrate the process for a public organisation are:

- Feasibility study
- Investment grade audit
- Project design and construction
- Maintenance and monitoring (typically in the categories of equipment).

A draft process for further development is suggested in Chapter 10.

7.4 *Size of ESCO industry in different countries*

The number of ESCOs in different countries varies from very few, in a couple of countries, to hundreds, as in the United States.

The size of the industry and market potential has been estimated in various earlier reports and also in some of the Country Reports. A very rough overview is given in [Appendix 2](#) (on the website). The material should be treated with great care but indicates that the market potential is very large – only a few per cent of the opportunities have been utilised so far.

The annual increase in the USA from 1990 to 2000 has been 24 per cent. A cautious estimate would indicate that the market could increase by ten times or more in countries where EPC solutions are just starting (Lambert, 1999; Leutgöb et al, 2000; Country Report Japan; NAESCO Database, Task X Documentation from Expert Meetings 2001-2002). The resulting energy savings would eventually have been realised through other

energy-efficiency activities. It is very hard to make an exact calculation. The most important thing is that EPC is leading to new activities. Market penetration of the EPC mechanism would result in very important energy savings, leading to a total CO₂ reduction for Europe, Japan and the United States by 2015 in the magnitude of at least 100 Mt per year (estimation from ECCP, 2001).

7.5 Contract arrangements

Many agreements are strongly tailored to the needs and expectations of the single client, and many of them are confidential. The Federal Energy Management Program, FEMP, in the USA has developed a full set of guidelines and model contracts.

There are two different important aspects about the process, which influence the structure of the process and the contract arrangements – whether a *competition* is arranged at the beginning (a legal requirement for public organisations), and the *distribution of different risks* between the parties.

Four conceptual solutions for the risks are often used:

- Shared savings, where the ESCO offers the financing and takes both the performance and the credit risk, see [Figure 5](#).
- Guaranteed savings, where the ESCO takes the performance risk and the customer is responsible for the financing, see [Figure 6](#).
- First out, where all energy cost savings are used to pay interests and amortisation of the loans until full repayment.
- Contracts for energy management, "chauffage" (heating) contracts.

One important principle formulated in the French report is a "contract of results" instead of a "contract of means". By putting the responsibility for aggregating a number of functions, also the financing, on one firm, the risk coverage is better. For example, a French HVAC operator implements in this case the means considered necessary until the contracted result is reached. The guarantee of results is the most original feature of EPC and TPF arrangements in the sense that investments in buildings are only paid back in proportion to the savings obtained. Whatever the performance of facilities and equipment installed, the guarantee of results ensures a net decrease of running costs for the customer.

The principle difference between including also the financing in the ESCO contract or arranging the financing in a separate contract is shown in the figures below.

Figure 5. Shared Savings. (Source: US Country Report.)

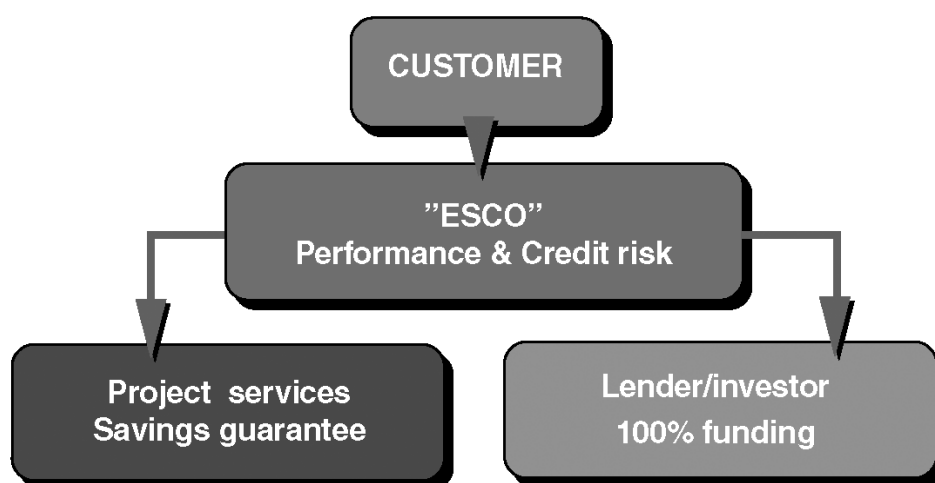
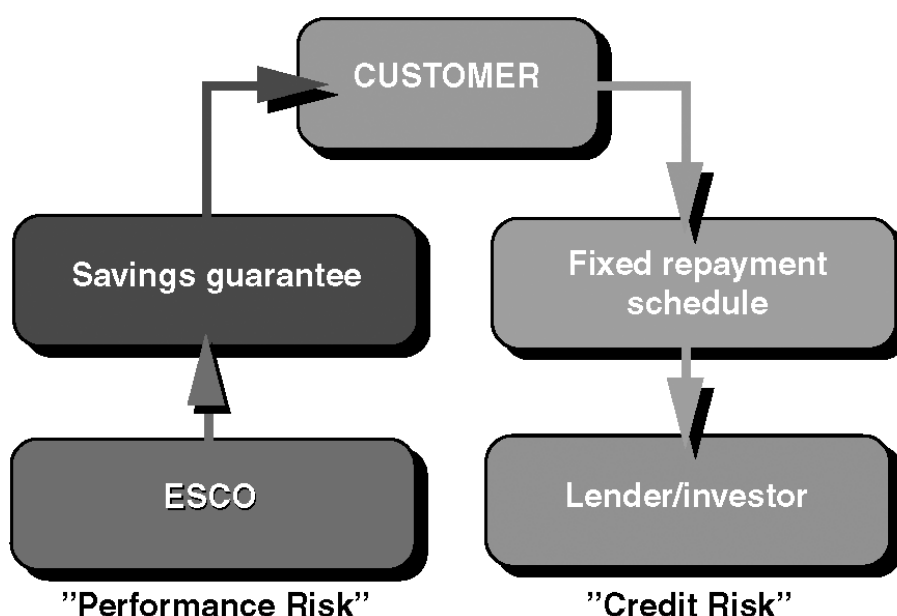


Figure 6. Guaranteed Savings. (Source: US Country Report.)



There are also differences in respect of contracts with public entities and contracts with industry.

In some countries, the different *guarantees* offered are divided into the following groups:

- Cost reduction via energy saving
- Cost reduction via guaranteed energy price
- Cost reduction via continuous use of the cheapest energy source
- Equal cost including more services and/or more environmentally friendly energy sources.

A company may finance a project in one of three fundamental ways: Self-financing; Debt-financing; and Third-party financing.

Different solutions for financing from sources outside the company are closely described in the US report, as for example own equity, bonds, bank loans, ESCO financing and many different leasing solutions such as capital lease, operating lease and municipal lease. The main party in EPC/TPF is an energy service company. However, the ESCO does not usually finance the project out of its own equity. Rather, it obtains funding for the investment from a third party, such as a bank or a leasing company.

The recent trend in the United States is towards an increase of “guaranteed savings” contracts with the financing in a separate agreement. This is however not the case in Europe, where the increase of EPC activities will be very much dependent on how the guarantee is combined with the financing and the security for the fulfilment of the obligations.

One special arrangement is the “repay from savings” contract, where instead of fixed payments from the customer to repay the loan, the repayment schedule depends on the level of savings. The more the savings, the quicker the repayment.

The above-mentioned “chauffage” contracts provide a structure in which services by themselves – such as “indoor temperature in buildings” – are sold to the users. For example, a contractor might offer lighting from a specified type of fixture on a dollars-per-hundred-hours-of-usage basis, or heating, hot water or cooling paid per delivered quantity/quality. These projects are typically very long, 15 to 20 years. The contractor provides all the associated maintenance and operations support, regulated by a contract. This contract is used when a customer wishes to outsource facility services and investments.

The rapid increase of CHP (combined heat and power) activities in France was the result of the removal of some barriers and the encouragement to show CHP not as a mere financial realisation, but as a means for savings of primary energy.

For the developing countries and countries in transition, the European Bank for Reconstruction and Development, EBRD, the World Bank, the International Finance Corporation and the Global Environment Facility within the World Bank (Thailand) can offer different financing solutions (NAESCO, 2002).

Different contract models for financing are shown in Table 1.

Table 1. Examples of models for contracts and financing

Contract	Years	Savings sharing		Financing responsibility	
		Owner	ESCO	Owner	ESCO
Shared savings - First out	Year 1 - 4	0 %	100 %	0 %	100 %
	Year 5 - 8	100 %	0%		
Shared savings	Year 1 – 8	80%	20%	0 %	100 %
		50 %	¹⁾ 50 %		
	Year 9 -	100 %	0 %		
Guaranteed savings	Variable 4 – 15 years	80 %	20 %	100 %	0 % Only mediated
		50 %	¹⁾ 50 %		
Mixed models	Variable over years and type of projects	70 %	30 %	50 %	50 %
		30 %	70 %		
Repay from savings	Variable length	Above a minimum saving for the owner. The remainder will be used for repaying loans and shortening the contract period.			
Guarantees and security	Variable conditions				
¹⁾ After the minimum savings stipulated to go to the owner.					

8 BARRIERS AND OPPORTUNITIES

8.1 *Barriers*

The introduction of EPC solutions is progressing very slowly on the new markets. Those contractors that have started to work find that it is a very long process to reach a final contract. The participating countries have identified some *important barriers* in their reports, which can be summarised as follows:

- Slow movement from buyers
- Lack of understanding of the opportunities
- Lack of information
- Time-consuming work for raising interest in general and for formulation of contracts
- Cost-consuming work for establishing a baseline, formulating the exact conditions for existing use and changes and the details for measurement and verification including historical energy data
- Lack of public recognition – positive attitude and culture
- Lack of generally accepted procedures for EPC projects
- Procurement rules (absence of bidding system)
- Lack of General Contract Conditions
- Lack of technical experts
- Lack of suitable financial institutions with a knowledge of EPC
- Different responsibilities for investment and operation
- Low energy prices
- Tendering process which may be costly

Difficulties in finding and organising data on energy consumption and expenditure may also slow down the work. Energy Audits produced by others than ESCOs can raise some hesitation. Profits that are seen by an ESCO as too low in relation to the envisaged risks, when the audit has been carried out by another organisation, can be a barrier.

It is important that energy audits and feasibility studies are realistic. It is also very important to come to good agreements with the customers' management, to go in and take over some of the responsibility for their facility management. There is some unwillingness, in some cases, to see a supplier of equipment as a partner. The distribution of different risks and consequences tends to be important. At present, it is not customary to finance small projects as EPC projects. Long-term contracts can be a psychological hurdle, with very complicated procedures that require frequent transfers of duties when users change, which may be disliked in some countries. The cost of verification and measurement has to be in proportion to the total cost. It is very important to come up with good guidelines for measuring and verification methods. There are official standards for performance contracting processes in some of the countries, which also can be in line with the EU rules for public procurement. Project initiation and procurement methods often take a very long time from the original idea to an actual start.

Further examples of barriers mentioned in the reports are given below.

Barriers for using ESCO services:

- Lack of motivation and uncertainty of budget cover
- Impossibility of having an independent expenditure budget
- Limited time available to the organisation's energy manager
- No incentive to make improvements
- Concern for own personnel and opposition from employees against the ESCO concept
- Building owners have to show how their own personnel can be involved and see a positive development of their situation
- Problems to enter into multiyear agreements
- No incentive to make improvements
- Roles overlapping between the energy manager and other outside energy operators
- No guidelines to support the decision-making process for public organisations.

Barriers from the ESCO's viewpoint:

- Insufficient knowledge of the specific problem
- Too low expected profits compared with the envisaged risks
- Legal barriers with bureaucratic difficulties in public administrations' tenders
- The country already has a comparatively efficient use of energy
- Problems to weigh and compare prices and performance qualities between bids
- An ESCO submits an offer to a customer and finds that the customer then invites competitors to submit tenders based on the information in a slightly revised offer
- Consultants, or occasionally ESCOs, with a limited knowledge, offer a 5 per cent saving, when more than 20 per cent is possible
- The quality of energy consultants varies considerably
- Lack of financial security given by the customer
- The buyer lacks technical resources.

8.2 Opportunities

General advantages:

- Real projects show the energy savings potential, often between 20-40 per cent. Case studies have shown occasional energy savings up to 50 per cent. About 1,600 cases in the US NAESCO database point at average savings of 23 per cent of the total electricity bills and of 47 per cent for lighting-only projects.
- A great potential also for energy savings in many public buildings, especially in municipality buildings. But the problem is that operating and investment budgets are not co-ordinated.
- The ESCO can contribute financial solutions when there is a lack of necessary funds in the building owner's organisation, and the ESCO can also offer outsourcing of energy services.
- Considerable margins for energy and cost savings in many cases.
- A clear demand for more efficient heating and air conditioning in the service and office sectors.

Advantages for the end-user:

- More rapid implementation
- Transfer of management responsibility to ESCO
- Better quality and reliability
- Savings in energy and cost
- Improvement of indoor conditions
- Outsourcing of non-core business activities
- Bringing plants up to standard

Advantages for the ESCO:

- Profit
- Growth and diversification
- Synergy with other own activities
- Legal incentives

Market Segments:

The potential by market segments has been indicated by the countries and in earlier reports, and is included in [Table 2](#). There is a great potential for energy savings in many public buildings, especially in municipality buildings. Some Country Reports also show that the largest total energy savings potential may be easier to achieve in office buildings than in industry or residential buildings, because of a larger amount of similar projects. However, the findings are very country-specific. Stressing other advantages besides energy has been mentioned – for example: better outdoor-air quality and reduced climate risks, better indoor air quality and working conditions.

Some residential markets (mainly apartment buildings) seem to be attractive to some ESCOs. Some outsourcing projects are based on customers' desire be relieved of the responsibility for operating equipment, such as compressed air chillers etc.

Table 2. Overview of market segments for EPC

	<i>Fin- land</i>	<i>France</i>	<i>Italy</i>	<i>Japan</i>	<i>Nether- lands</i>	<i>Nor- way</i>	<i>Swe- den</i>	<i>USA</i>
<i>Promising market segments:</i>								
- Service sector:								
- public	X	X	X	X		X	X	X
- private				X	X	X	X	X
- Commercial		X	X	X		X	X	X
- Residential apartment buildings					X	X	X	
- Process industry	X	X		X			X	X
- Other industry	X		X			X	X	
Existing Standard Contracts	X	X	X	X			X	X

9 GOVERNMENT POLICY

Table 3 provides a summary of different policy measures mentioned in the Country Reports. Information about EU initiatives in this area is also included.

In *Finland*, subsidised energy audits for buildings are an important action. About 5,000 such energy audits have been carried out. Tax incentives have not been used, but a 10 per cent subsidy on implementation costs is available.

In *France*, the SOFERGIE firms have initiated certain measures to implement energy efficiency programmes. They specialise in the financing of investments generating energy conservation. A large programme for CHP (Combined Heat & Power) introduction has been very successful. A new national programme for energy conservation, FIDEME, has been launched. The French agency ADEME, the Caisse des Dépôts et Consignation and the Dutch bank ABN-AMRO are involved in this programme.

In *Italy*, the activity with compulsory *Energy Managers* has been in use for some time. A new energy policy was introduced in 1998, which includes the *implementation of EU Directives 96/92/EEC* on the internal electricity market:

- Carbon tax;
- Objectives for reduction of greenhouse gas emissions;
- Decree on energy savings and renewable sources in the electricity distribution sector; *and*
- Reinforcement of the energy conservation standards and a mechanism to promote ESCO and TPF arrangements.

Table 3. Overview of national government EPC programmes & policies

	<i>Fin-land</i>	<i>France</i>	<i>Italy</i>	<i>Japan</i>	<i>Nether-lands</i>	<i>Nor-way</i>	<i>Swe-den</i>	<i>USA</i>	<i>EU</i>
<i>Government programmes & policies:</i>									
- Procurement adaptation								X	X
- Public buying	X	X	X	X		X	X	X	
- Work out standard contracts	X	X	X				X	X	X
- Energy audits	X	X		X	X	X			
- Energy agency or equal facilitating	X			X	X	X	X	X	
- Compulsory regulations			X						X
- Financial mechanisms		X		X	X		X		
- Subsidies	X	X	X	X	X				
- Tax benefits			X						
- M & V								X	X
- Changes in laws			X	X	X			X	
- Information	X	X	X	X	X	X	X	X	X

Different models of subsidies are introduced or considered in *Japan*. These subsidies, which can be about one third of the cost, are or promoting the introduction of high-efficiency energy systems in houses and buildings and for local energy conservation efforts.

In *The Netherlands*, Novem has been operating a large and ambitious Energy Efficiency and Environment programme for a number of years. Many initiatives have been taken in efficient equipment labelling.

In *Norway*, the energy taxes were doubled between 1997 and 2001, but then somewhat lowered again. Investment subsidies and trade with energy certificates are being considered, and the new energy organisation ENOVA SF has been established.

In *Sweden*, the use of standard contracts and demonstration projects is being discussed within the Swedish Energy Agency. The possibility of providing a government guarantee for EPC activities is also being investigated.

In the *United States*, there are a number of federal initiatives, and state programmes have been introduced in the form of clarification of procurement rules, and actions to enable government and state organisations to enter into long-term contracts up to 25 years. Within the FEMP programme, many actions have been taken with guidelines etc. in order to facilitate the use of EPC contracts. Other federal programmes of interest include programmes run by the Army Corps of Engineers, the "Energy Star" and "Rebuild America" schemes. Many states have established a Systems Benefit Charge (SBC), and at least four states have developed standard performance contract documents.

An EU Directive for the Energy Performance of Buildings has been adopted in the *European Parliament and Council* and it came into effect as of January 4th, 2003. The Directive includes measurements of energy, methodology, minimum standards and energy certificates. Member governments are in the process of developing and stimulating the use of performance contracting, including the provision of government information.

10 PROCESS, PROCUREMENT AND CONTRACT SUGGESTIONS

Many of the countries have suggested that more standardised contractual documents be developed. The Scandinavian countries often use generally accepted model contracts. Some countries already employ a lot of standard documents.

In the USA, the trend is from "shared savings" towards "guaranteed savings", not including the financing risks of the ESCOs. The financing alternatives are described in the US report.

Some contracts include complicated measurement and verification, while at the other end of the scale there are contracts that are closer to "gentlemen's agreements". The cost

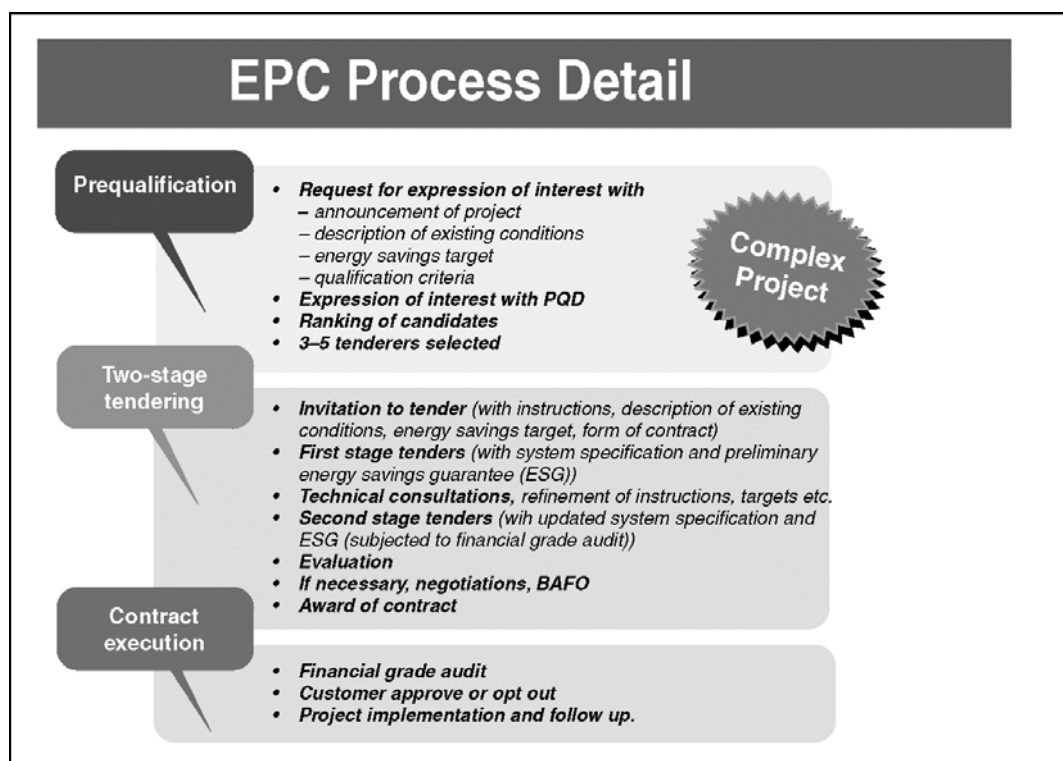
of measurement and verification is estimated at between 3 and 6 per cent of the total cost.

A special legal study performed for the benefit of Task X (see [Appendix 3](#)) concludes that EPC certainly is a process where public entities need to open up competition among potential suppliers, first of all in their own economic interest, and, secondly, due to national procurement legislation. For the majority of industrialised countries, such national rules reflect undertakings of the country concerned in the context of a regional integration scheme, such as the European Union, coupled with other international obligations, stemming, for instance, from adherence to the WTO Government Procurement Agreement. This explains why EPC in the public sector, as distinct from procurement by private owners, will need to be carried out in a climate of transparency and fair competition among all eligible suppliers.

The study points, in the first place, to a need for public sector owners to avoid conflict-of-interest situations. In the case consultants have been involved in project identification and preliminary studies, the public building owner and the consultants should consider if a situation of conflict of interests exists, in which case the consultants should abstain from taking an interest in subsequent bidding for the main energy performance contract.

Another observation made in the study is that, in the case of complex projects, the process of public procurement would need to go forward in stages, once the preliminary studies have indicated the potential for energy savings. First, interested firms should go through a pre-qualification exercise, aimed at restricting competition for the main contract to a limited number of qualified bidders. Such a restriction is desirable in order to encourage the selected bidders to take on the cost and effort of following through in preparing a full-scale tender. Then, a two-stage tendering procedure would follow, in which the selected bidders would submit, in the first stage, unpriced technical tenders, involving an outline proposal to meet the energy savings target. Then, after review by the owner and any amendments to the technical specifications, priced bids for the main contract would be requested and submitted. The contract would then be awarded to the bidder making the best proposal based on a combination of price and performance criteria. Finally, a braking mechanism would be included in the main contract itself, allowing both parties to opt out of the contract if the ESCO, after preparing a detailed design of the project - referred to as a “financial grade audit” - concludes that no viable project can be defined. The contract could include a clause assuring the ESCO of compensation in case either party decides to opt out.

Figure 7. Suggested Procurement Process



The list of steps included in the suggested procurement process is contained in [Figure 7](#), and a graphic illustration is made in [Figure 8A](#). (For abbreviations see Chapter 6.)

Members of the Task X team commented that a procurement procedure of the kind outlined would obviously entail considerable transaction costs, and that simplified procedures should be elaborated in order to be applied in less complex projects. The legal study anticipates that simplifications are indeed possible in those cases where the preliminary study identifies, with some degree of precision, the potential for energy savings and the investment in goods and services required. In such cases, the process can be concentrated, in line with the illustration in [Figure 8B](#), so as to conform to a regular restricted tendering procedure, still coupled with an energy savings guarantee in the contract with the winning ESCO. A procedure used by some ESCOs includes a step with a “Letter of Intent” before a final contract. In order to reduce the transaction cost, bundling of several small projects in one contract is a practical solution. Further work with alternative EPC-processes for different types of projects is suggested to be fulfilled in collaboration with different stakeholders during a continuation of the IEA Task X.

Figure 8A. Suggested EPC process – Complex project

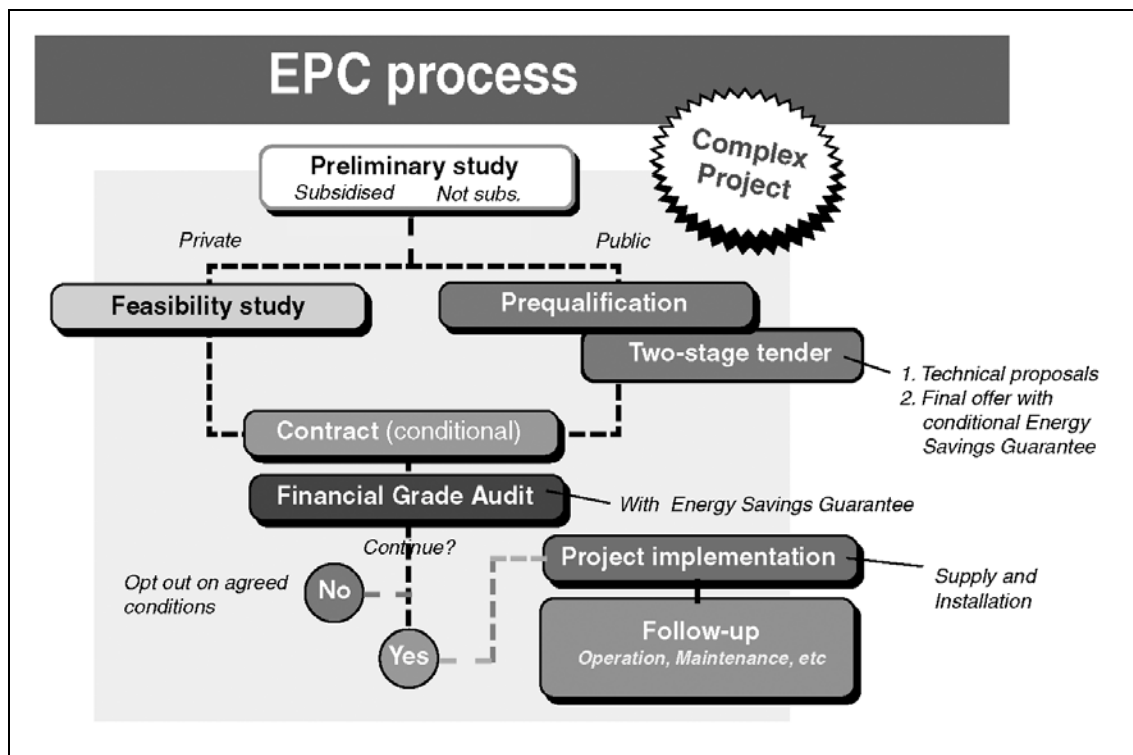
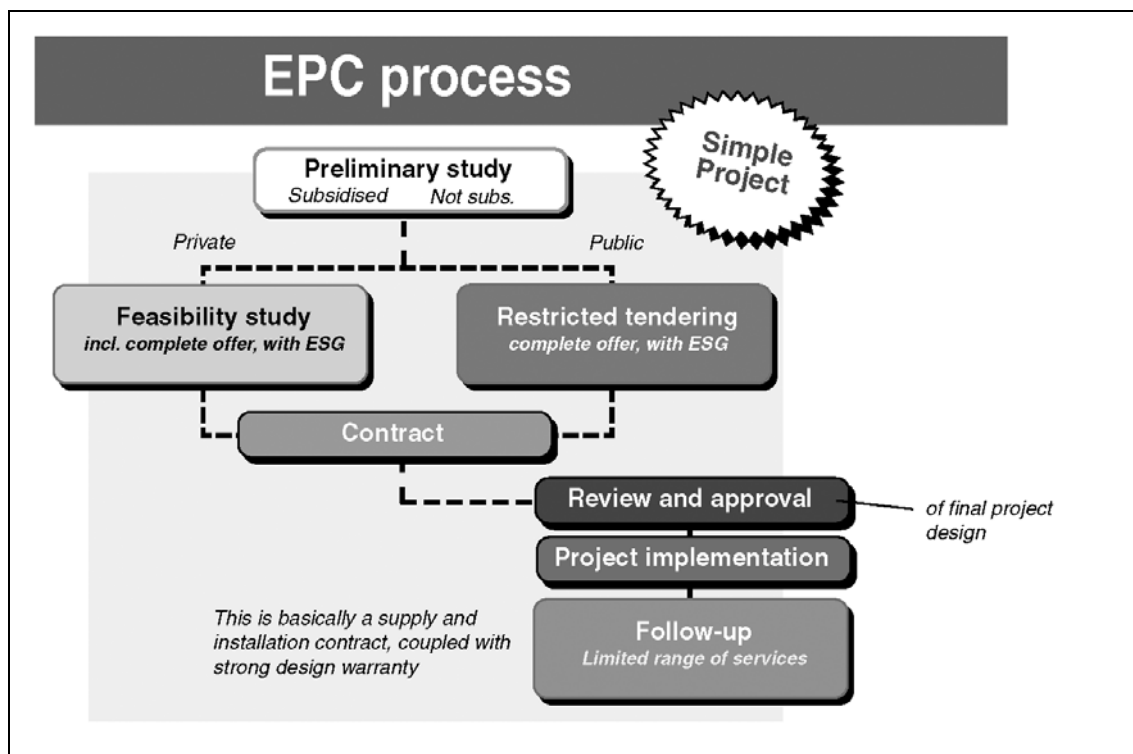


Figure 8B. Suggested EPC process – Simple project



The main contents in a model EPC contract are drafted in Table 4. It incorporates input from studies of FEMP, NAESCO, and EU SAVE material (FEMP, 2001; NAESCO, 1997; Graz Energy Agency, 2002 b).

Table 4. Important parts in EPC contracts - Suggestion

1. Introduction	Purpose Type of contract "Shared Savings" or "Guaranteed Savings"
2. Included RFP (Request for Proposal) and proposal documents	
3. Reference to General Contract Conditions	National, international
4. Energy-savings measures	
5. Financial grade audit	
6. Promise of guarantee	<i>1. Performance:</i> - Energy savings: Electricity, heating, cooling, etc. - Other criteria: Air quality, etc. <i>2. Operation, maintenance</i> <i>3. Investment volume</i>
7. Options/Other services	Training Outsourcing Energy supply
8. Time schedule	Completion date Length of contract Years after take over Inspection
9. Payments	Different levels and percentage sharing in relation to savings
10. Securities	For implementation, repair, performance, insurance
11. Measurements & verification	Baseline – Adjustments – Weather – Occupancy – How? – By whom?
12. Conditions	Responsibility for pre-audit in case of non-proceeding after detailed engineering
13. Others	Law – Language – Disputes – Cancellation – Force majeure

Contacts about public procurement have been initiated with different legal bodies, including the European Commission DG Market. The work on procurement and process is planned to continue during a new subtask of Task X.

11 CONCLUSIONS AND ACTIONS

Based on the barriers identified, cases and lessons learned submitted in the Country Reports and studies of recent findings from the EU projects mentioned, actions have been suggested.

The previously-mentioned EC SAVE Study suggested the development of guidelines for public organisations in their decision-making process. Pilot projects would contribute valuable experience for formulation of benchmarks and management advice.

The process and contract contents have also been outlined (Leutgöb *et al*, 2000).

Some conclusions and recommendations were also presented at a workshop arranged by IEA and the Climate Technology Initiative (CTI) in November 2001 (IEA/CTI, 2001).

An overview, Figure 9, shows problems, short-term actions and long-term results. The problems and actions relate to the areas: Credibility and Trust, Process and Procurement, Contracts, Financing, Measurement and Verification, and Market. The role of public organisations is crucial for raising credibility, establishing procedures for procurement and contracts and for initiating a major increase of the market.

As earlier mentioned in this report, a whole range of activities have taken place in the USA during a number of years. The Federal Energy Management Programme (FEMP) includes many supporting guidelines for EPC and has been followed by similar material at the State level. The EPC market has also increased since 1990 by 24 per cent per year as an average. In Japan, an ambitious programme has been launched with many policy measures, such as credibility raising, economic incentives and pilot projects. An association of ESCOs has been formed.

Figure 9. Introduction and diffusion of EPC: Problems – Actions – Results

Problems	Short term actions	Long term results
1. Credibility and Trust	Information SAVE, Best Practice Creation of networks Demo projects World EPC Conference "Success stories"	World EPC network established "ISO 18000" Energy management Accreditation Intern. ESCO Association
2. Process & Procurement	Network of skills created Energy Agency, FEMP Clarification of rules Guidelines Alt. with energy audits and feasibility study Prequalification & two-stage tender Conditional Award of Contract	Different alternatives for initiation of EPC-projects accepted by all stakeholders Both Owner, Energy Agency and EPC-initiated
3. Contracts	Public Property Owners establish national standards as FEMP in USA EC, WTO	"FIDIC" Energy perform. contract conditions finalised Manuals (web & printed) for EPC-projects generally available
4. Financing	Bank awareness Local government allowed to enter multiyearcontracts EBRD & World Bank National economic incentives Government guarantees Warrantee formulations Insurance arrangements	White and Green Certificates Trading an accepted mechanism for Climate Actions EPC Performance Bonds established
5. Measurement & Verification	Analysis of existing protocols Pilot projects Simple benchmark-alternatives Yearly measuring	Simplified benchmarking and repeated measuring routines established
6. Market <i>Only limited in most countries but increased interest</i>	Start of breakthrough for EPC in many OECD-countries Public bodies launch EPC comp. – both large projects & parts of smaller	EPC-solutions have penetrated OECD.countries and are increasing in transition & developing countries

The European Commission has taken action in the communication on the implementation of the first phase of the European Climate Change Programme with initiatives and proposals for directives, such as:

- Proposal for a Framework Directive on Establishing Eco-Design Requirements for Energy-Using Products.
- Proposal for a Directive on Linking Project-Based Mechanisms Including JI and CDM to EC Emissions Trading Scheme.
- Proposal for a Directive for Cogeneration.
- Initiatives on Increased Energy-Efficient Public Procurement.
- Proposal for a Directive on the Promotion by Energy Suppliers of End-Use Efficiency (Demand Management / Energy Services including new services and programmes, Energy Audits, EPC, TPF and other market-based financial initiatives).
- Decision for a Programme for Intelligent Energy Europe (continuation of SAVE, ALTENER, etc).

Further, the EC has suggested

- Proposal for a new Directive on Public Procurement including a “Competitive Dialogue”.

This report has given an account of the problems and opportunities with EPC and pointed out important actions in order to spread the use of EPC on to new markets.

Specifications in terms of performance criteria will encourage contractors to develop and introduce more efficient solutions, which will contribute to realising the climate and environment goals. The EPC mechanism will be of special interest for organisations, obliged by law to comply with energy saving targets, since it will allow them to outsource energy services to specialists, ESCOs, with mutual advantages. This is the case in Italy, where recent legislation compels electricity and gas distributors to perform energy efficiency measures which are associated with tradable energy efficiency certificates and which can be outsourced to ESCOs. Through this mechanism, ESCOs find an additional chance for incentives and co-financing (and further drives for their operation). Finally, property-owners will have the opportunity to refurbish their facilities without spending investment capital.

It is now important for all parties to implement the suggested actions in order to create conditions for a major breakthrough for EPC arrangements.

A suggested continuation of Task X Performance Contracting would see some areas being further studied in depth.

As the energy market will be more international, it is important that similar actions will take place in many countries. Further collaboration between countries will contribute to lower the transaction costs and facilitate increased use of EPC.

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The Appendices listed are not included in the printed report. They are available in “Appendices to Summary Report” uploaded to the “Library” section of the Task X website: <http://dsm.iea.org/NewDSM/Work/Tasks/10/task10.asp>

Appendix 1. *Examples of Country Case Studies - Overviews.*

Appendix 2. *Estimated EPC Market Potential.*

Appendix 3. *Energy Savings Performance Contracts (ESPC) and Public Procurement Regulations, memorandum by Gösta Westring, Stockholm, 19 February 2002, revised 13 May 2002.*

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