



Policy Paper

Promoting Solar Thermal Energy Service Companies

Intelligent Energy  Europe

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1 Introduction

The goal of the European Commission for solar thermal technology, as expressed in the "White Paper" is to reach 100 millions m² of collectors by 2010. With the actual rate of market development it is not realistic to reach the above target.

It is well known and agreed by experts that the development of Solar Thermal Energy Service Companies (ST-ESCOs) would result in a substantial growth of solar thermal plants in Europe.

The objective of the project "Development of Pilot Solar Thermal Energy Service Companies (ST-ESCOs) with High Replication Potential" is to promote Solar Heat Services and the creation and development of ST-ESCOs. By doing this, the project will contribute to accelerating the growth of the solar thermal market in Europe.

The project's ambition is to develop and promote the sector of ST-ESCOs by the following means: Elaborate a market and framework conditions analysis, identification of the potential, know-how-transfer from successful experiences, inform stakeholders, preparation of detailed, real cases of ST-ESCOs agreements, providing valuable tools for ST-ESCOs (guide with financial, technical and contractual aspects and a software package), elaboration and propagation of concrete suggestions for necessary ST-ESCOs support measures both at EC and National levels and to disseminate the results.

A part of this project is this "policy paper" which is addressed to European Commission and National governmental officers working on this subject and creating the framework conditions for the ST-ESCOs market.

The aim of this paper is to develop strategies and propose measures and instruments at EC level as well as at national level to better develop the market for Solar Thermal Energy Service Companies.

We hope to be able to provide some relevant input to the ongoing discussions on how to best encourage the greater use of renewable energy for heating and cooling purposes. And we would be pleased to receive any comments or reaction on this paper.

The ST-ESCOs Project Team

2 Executive Summary

The development of **Solar Thermal Energy Service Companies (ST-ESCOs)** results in a substantial growth of (large-scale) solar thermal plants in Europe.

A '**Solar Heat Service' (SHS)** provides an integrated package of goods and services needed to set up and operate a solar thermal plant on a turn-key basis. Solar Thermal Energy Service Companies (ST-ESCOs) sell the solar energy and not the solar plant. Solar Heat Services help to overcome obstacles in the implementation of large-scale solar systems and thus accelerate the market.

ST-ESCOs offer a lot of **benefits for the customers**:

- a comprehensive service-package (one face to the customer)
- guarantees for the solar yield and limits for the energy costs
- no investment risk for the customer – ST-ESCO bears prefinancing of solar plant
- no problems with operation and maintenance of the plant (responsibility of ESCO)
- High quality installation, operation and maintenance as ST-ESCO has an economic incentive to maximise solar yield
- contribution to climate protection and sustainable development

Besides promoting solar thermal energy as such to increase the demand for solar energy, the following **measures and strategies** will specifically develop the market for Solar Heat Services (SHS) and ST-ESCOs:

1. Information and awareness raising programmes to consumers
2. Support for project initiation (Tools like checklists, calculation tools, model contracts; free or subsidised advice for customers)
3. Training of solar industry, planners, installers, energy agencies, local banks, consultants on ESCO models and training of existing ESCOs on solar thermal
4. Integration of solar thermal plants into district heating networks
5. Quality standards and certification schemes for ST-ESCOs
6. Financial instruments and appropriate subsidy schemes to support ST-ESCOs development
7. Removing legal and administrative barriers in Member States and establishing appropriate legislation and regulation
8. Further development of White Certificate schemes to include renewable options on the demand side
9. Include solar thermal in the implementation procedures for the energy efficiency and energy services directive

On **European level** some important issues regarding SHS and St-ESCOs are already covered by the **Energy End-use Efficiency and Energy Services Directive** (EEESD), adopted in April 2006. Member States should quickly adopt and implement it with appropriate instruments, which are also in favour for Solar Heat Services and ST-ESCOs.

However, some amendments and a further development of the Directive for the greater use of renewables and SHS should be examined in the areas: (a) Integration of renewables into energy services; (b) Quality standards and certification schemes for ST-ESCOs; (c) White (or energy efficiency) certificates; (d) Financial instruments.

In addition, the Commission should clearly include and promote solar thermal and especially ST-ESCO models within the **planned legislation** to encourage the use of **renewable energy for heating and cooling**.

Contributions to information and awareness raising activities and to the replication of good practice can be done through the **IEE2 programme**, within **ManagEnergy** and the **Sustainable Energy Europe campaign**.

On **Member States level** appropriate measures and instruments are of special importance to stimulate the market for SHS and ST-ESCOs. Depending on the prevailing conditions in each country there is a different focus on the above formulated measures. In some countries e.g. the removal of legal and administrative barriers is more important than in other countries; however, information and awareness campaigns and the dissemination of good practice are relevant for all the countries.

3 Basic Situation

Solar thermal technologies are, among other renewable energies, a central part of the European Unions energy strategy since the late nineties. As expressed in the White Paper: Energy for the future - renewable sources of energy [COM(97) 599 final] and in the Green Paper on security of energy supply (2000) the goal is to reach 100 million m² of solar collectors by 2010 in the European Union (EU 15).

Solar energy contributes significantly to the main pillars of Europe's energy policy, which are to enhance the security of supply through reducing the share of fossil energy imports, to combat climate change through CO₂ free energy and to make Europe's economy more competitive. Especially the rising oil and energy prices over the past few years make it even more attractive to implement solar energy systems.

The solar thermal potential from an economical and technical point of view has been estimated to be about 6% of EU final energy consumption. Only about 1% of the potential has been reached according to Sun in Action II [ESTIF, 2003]. Therefore a huge potential exists.

Solar thermal applications in Europe have been basically limited to the residential sector (that is, in any case, far from being saturated). They are mostly small to medium size systems. In Austria, for example, about 15% of all single family houses have a solar system compared to only 1% in multi-family houses. Solar plants have also not yet penetrated the services and industry sectors as well as the public sector.

There exists a huge potential especially for large-scale solar plants (from hundreds to thousands of m²) which is untapped!

Besides in large real estates, large-scale solar systems can also be implemented to feed heat into district heating networks, to provide the energy for seasonal storages or for cooling purposes. However, they are very rarely encountered although they offer numerous advantages (as through the economy of scale).

Main barriers for installation of large solar thermal systems are:

- The initial investment for a solar installation is high and the customer often has a lack of capital to realise solar thermal systems for himself.
- The end-users have a lack of confidence in the reliability, durability and energy output of solar plants.
- Planners, installers and end-users lack know-how in building, operating and maintaining large solar systems.
- There have been some bad examples in the past concerning design and solar output of solar plants.
- Electricity and energy prices are in general still cheap.

It is well known and agreed by experts that the development of Solar Thermal Energy Service Companies (ST-ESCOs), respective the implementation of energy service models, would result in a substantial growth of solar thermal plants in Europe. It is the sector of large-scale solar plants, which is most suitable for ESCO models.

Therefore the promotion of ESCO models for solar thermal energy can be seen as a great opportunity and offers a lot of **benefits for the customers:**

- The customer gets a whole service-package from the ESCO (one face to the customer).
- The Customer receives comprehensive guarantees for the solar yield, energy costs and maintenance.
- No more investment risk for the end-user – the ESCO bears the prefinancing of the solar plant and the customer has to bear no or only a low investment.
- The customer has no problems with operation and maintenance of the plant (the ESCO runs the plant and is responsible for O&M).
- The quality of the installation as well as the correct operation, management and maintenance is ensured since it is the benefit of the ESCO to build and run the solar plant in such a way to maximize the solar yield.
- Solar Thermal Energy Services make a contribution to climate protection.

Solar Heat Services (SHS)

A “**Solar Heat Service**” provides the integrated supply of goods and services needed to set up and operate a system utilizing only or prominently solar thermal energy, frequently on a turn-key basis. **Solar Thermal Energy Service Companies (ST-ESCOs)** are companies providing those type of energy services. They sell the solar energy and not the solar plant.

A contract for the supply of goods and services is considered to be a “solar heat service” contract when comprising and fulfilling the following minimum requirements:

1. Responsibility of the plant: carrying out the plant’s operation and maintenance
2. Supply of the solar system (purchase and management of the technical material and the necessary services for the maintenance);
3. Measurement and recording of the energy produced and distributed;
4. Economic value of the bill linked to objective parameters (as the solar thermal energy or energy supplied by integrated boiler);
5. Energetic diagnosis of the building-plant system (before realization or the over-taking of an existing thermal plant);
6. Report of all the interventions carried out;
7. Delivery of the whole planning documentation and instruction manual for the maintenance and management of the plant
8. Guarranties between the customer (minimum consumption) and the ESCO (quarranty of supply)

It should be noted, that a solar heat service can also be part of a more comprehensive ESCO project like the complete renewal of the heating system or the renovation of buildings including measures on the demand side (e.g. controls, efficient lighting, thermal insulation).

4 Strategies

Strategies to develop the market for Solar Heat Services and ST-ESCOs must be seen in a broader context:

- a) On one hand it is essential **to promote solar thermal energy as such** in order to increase the demand especially for large-scale solar systems.
- b) On the other hand **barriers for energy services and ESCOs must be removed** and those services be made better known.

The integration of those two policies will result in a promising development of ST-ESCOs on European markets.

Existing ESCOs will integrate solar thermal energy in their portfolio. And companies in the solar thermal sector (installers, planners, suppliers etc.) will develop ESCO type services to better implement large-scale solar systems.

Concerning the promotion of solar thermal energy in general (and being part of a policy to foster renewables in a broader sense), only some references should be made:

- There exists a proposal from EREC (European Renewable Energy Council) for a European Directive to promote renewable heating and cooling: 25% of the EU heating & cooling supply by renewables in 2020. [EREC 2005]
- The European Commission has recently developed a biomass action plan [COM(2005) 628]. A more general Action Plan for renewables is considered within the Commission. Solar thermal should be an important part in it.
- Several member states have implemented instruments and programmes to promote solar thermal energy through
 - Regulation: some cities and regions have made solar thermal compulsory for certain cases ("solar ordinances")
 - Subsidy programmes: grants or subsidised loans for the investments
 - Action programmes: more comprehensive programmes including information and awareness raising activities, qualification and training etc. (e.g. the programme "solar:heat" within the Austrian climate action programme climate:active)

The focus in this paper is on the market development of solar thermal based energy services and ESCOs.

A demand for solar systems is a necessary condition for the development of the ST-ESCOs market. And it is important to realise, that ESCO models cannot make solar plants cost-effective, if they are not. However, Solar Heat Services will help to overcome other obstacles in the implementation of large-scale solar systems (see above).

Although many studies and attempts have been made in the past there are practically no ST-ESCOs especially in the Mediterranean countries, apart from a few exceptions.

Based on the findings in the country analyses (see chapter 6) the main **barriers**¹, standing in the way for a broader use of Solar Heat Services (SHS), are:

- Lack of information, knowledge and understanding of SHS on all levels
- Limited access to financing for potential ST-ESCOs
- Legal and regulatory obstacles
- Long paybacks and commitment to a contract for the end-user
- Administrative hurdles such as complicated procurement procedures in the public sector with high preparation costs

To overcome these barriers the **main strategies to promote Solar Heat Services and ST-ESCOs** are:

1. Information and awareness raising programmes to consumers

In order to overcome lack of information and awareness of the end-users, information and dissemination activities – particularly through presentation of **realised, positive model projects** – are important. It must be better known that Solar Heat Services exist and work. This is especially true for persons responsible for the technical performance of large buildings (energy managers and financial officers) and utilities.

2. Support for project initiation

As customers often don't know how to start with a ST-ESCOs project, the provision of **tools and support for project development and implementation** will be of great help: checklist for the procedure, calculation tool (as e.g. developed in this project), model contracts, etc.

It can be seen from the ESCO market development in other countries that support of customers by energy agencies and other experts and facilitators are of great value, as the customer often is not an expert in energy or ESCO matters. Therefore **free or subsidised advice** should be offered to the customer in order to give more confidence and reduce the transaction costs of project development.

3. Training

Based on the principal technical and economical feasibility, an appropriate financing and implementation scheme must be developed. This is the point where Solar Heat Services and ST-ESCOs come into place.

This means, that **those offering or proposing, construct and maintain solar solutions must be educated** so that they can provide qualified information and advice on SHS and ST-ESCOs as well as quality plants: **solar industry, planners, installers, energy agencies and other organisations providing advice.**

1 For a discussion on barriers for a broader use of ESCO models in general see also Bertoldi/Rezessy, 2005 and IEA-DSM Task X, 2003.

Existing ESCOs, which might not yet offer solar solutions, are another channel for offering Solar Heat Services. For those the **qualification on solar thermal technology** is essential.

In some countries there are not yet enough ESCOs on the market offering Solar Heat Services. Experiences with ESCO development in other countries show that companies will develop that type of services if there is a demand from the customers. Nevertheless, various existing **business development aid programmes** can support the development of ST-ESCOs.

4. Integration of solar thermal plants into district heating networks

The integration of solar thermal energy into existing district heating networks is an interesting option, where district heating networks also operate in the summer months, e.g. for providing energy for hot water. Eventually, this can be combined with seasonal storages.

For this field of solar thermal application ST-ESCOs can provide valuable contributions: They can build and operate the solar thermal plant and deliver the solar thermal energy into the district heating network. They will get a remuneration based on the actual amount of kWh delivered. This can be combined with subsidy schemes as described below.

Examples exist e.g. in the City of Graz (AUT) where a 1.400 m² collector field was installed on the roof of a sports stadium and the solar heat gained is fed into the city-wide district heating network. Additional projects are in preparation.

Further **research** is needed to optimise these applications and they should be **disseminated, be made better known and replicated**.

5. Quality standards and certification schemes of ST-ESCOs

ST-ESCO models can be a rather complex matter and uncertainty can be observed among potential customers. It is important to ensure that ESCOs provide a qualified and reliable service and clear rules are necessary in order to better define the services and the minimum requirements of an ESCO.²

The introduction of **quality standards, certification and/or accreditation schemes of ST-ESCOs** will help to achieve better acceptance and trust in these services and therefore support a rapid and prosperous development of the market for SHS.

6. Financial instruments to support ST-ESCOs Development

² The ESCO's certification is perceived as a necessity at European level, since the work of the Comité Européen de Normalisation/Comité Européen de Normalisation Electrotechnique (CEN/CENELEC) Bureau Joint Technique/Work Group (BT/JWG) "Energy management", which involved for a couple of years experts of over 9 members states. The group recommended to CEN/CENELEC (as a high priority) the definition of the standards (31-3-05).

Limited access to financing opportunities and the management of financial risks can be an obstacle for companies evolving into this field, especially for new ESCOs.

A lack of culture for project financing can be observed, where the cash flow generated by the project is evaluated. Due to the limited understanding of ESCO models by financial institutions ST-ESCO projects are perceived to be more risky, resulting in higher interest rates and shorter debt terms.

The main problem is not the lack of funds, but rather the gap between established methods of "asset based" lending and the special finance models for ST-ESCO projects requiring "cash-flow based" lending.

In addition, even large-scale solar thermal plants are rather small projects for banks, so they do not attract financial institutions. They are not interested enough to invest time and resources to learn how to finance that type of projects.

Therefore the **access to funds and/or to mitigate the risks through public fund** should be improved. In addition, **communication with financial institutions** about ESCO models should be reinforced.

7. Removing legal and administrative barriers currently existing

Legal and administrative obstacles, reported from the countries, are:

- subsidies for renewables can only be claimed by the end-users (not by ESCOs)
- question of the ownership of the solar plant if fixed to a building
- in the public sector it is sometimes not possible to pay a contracting rate including investments instead of energy (public budgeting regulations)
- difficulties for Public Private Partnership (PPP) models in general
- public procurement regulations difficult and complicated for energy services
- decision making process in multi-family houses

Especially in the public sector in some countries, rules and regulations sometimes do not allow or complicate the application of ST-ESCOs (e.g. complicated tendering procedures, not taking into account the specifics of energy services as a 'one-stop-shop' concept). And there is a lack of clear rules on how ESCO type projects are treated within the framework of public budgeting regulations.

It is very important for the further development of St-ESCOs and the ESCO business as a whole that these **legal and administrative barriers are reviewed and removed**.

8. Further development of White Certificate schemes to include renewable options on the demand side

The introduction of white certificates e.g. in Italy has given a strong boost to the creation and development of an energy efficiency market. The mechanism foresees the compulsoriness (for gas and electric distributors) to reach a minimum level of energy saved and the sale of the certificates on the market (that represent the certified energy savings obtained).

However, at the moment the white certificates are not very suitable for solar thermal installations. In particular, for a solar plant the low "energy efficiency profitability" (saved energy for expense sustained) makes the economic evaluation for white certificates for solar systems not significant.

For solar thermal applications it would be necessary to have a long enough duration of the white certificates (as is the case of other energy saving measures e.g. thermal insulation of the building envelop).

A white (or whatever colour) certificates scheme, which includes solar thermal applications in an appropriate way would support the market development of ST-ESCOs. In an ESCO type project the actual (fossil) energy saved is always exactly known as the remuneration of the ESCO is bound to the savings and in most cases the savings are even guaranteed.

The white certificates can also represent an important feature for the realisation of a solar plant, in particular from the point of view of a bank. The certificates are a certain earning for the ST-ESCO, and so a reduction of the risk. They also represent an official certification that the project can reach a minimum level of energy saved and therefore revenue from the project. This increases the securities for the financing institution.

The existing and eventually EU wide planned **White Certificate schemes could be further developed** to include solar thermal plants and other renewables on the demand side suitable into these schemes.

9. Include solar thermal in the implementation procedures for the Energy Efficiency and Energy Services Directive

Member States should **quickly adopt and implement the Directive** with appropriate instruments, which are also in favour for Solar Heat Services and ST-ESCOs. However, some **amendments and a further development** of the Directive for the greater use of renewables and SHS should be examined (see following chapter).

In addition, the Commission should clearly include and promote solar thermal and especially ST-ESCO models within the **planned legislation** to encourage the use of **renewable energy for heating and cooling**. (see also following chapter).

5 Instruments to Promote Solar Heat Services and ST-ESCOs

5.1 Possible solutions on EU level

In general, the European Commission, DG TREN, can act through developing proposals for new directives and strategic papers, ensuring the correct implementation of existing directives with accompanying measures and developing them further, developing action plans and agreeing with member states to jointly implement them, using the programme Intelligent Energy Europe and carrying out dissemination activities.

1. Community legislation on renewable heating and cooling

There are plans to work out a proposal for **Community legislation to encourage the use of renewable energy for heating and cooling** [cf. e.g. in the EC Biomass Action Plan, Com(2005) 628].³

In addition, the Commission plans to examine how the **Directive on Energy Performance of Buildings** could be amended to increase incentives for the use of renewable energy.

The Commission should include and promote solar thermal and especially solar thermal ESCO models within this planned legislation.

2. Energy End-Use Efficiency and Energy Services Directive

The **Energy End-use Efficiency and Energy Services Directive (EEESD)** from April 5th 2006 states among other topics that Member States should:

- ensure the availability of appropriate qualification, accreditation and/or certification schemes for providers of energy services
- amend national legislation and regulations, that unnecessarily impede the use of financial instruments for energy savings
- provide funds to target end-use sectors with higher transaction costs and higher risks, with grants, loans, financial guarantees and/or other types of financing that guarantee results
- make model contracts for financial instruments available to purchasers of energy services in the public and private sectors
- publish guidelines on energy efficiency and energy savings as a possible assessment criterion in competitive tendering for public contracts

3 And see also the proposal from EREC (European Renewable Energy Council) for a European Directive to promote renewable heating and cooling: 25% of the EU heating & cooling supply by renewables in 2020.

- repeal or amend national legislation and regulations, that impede or restrict the use of financial instruments for energy savings in the market for energy services
- establish funds for energy efficiency, which shall include financial instruments for energy savings

The Directive contains ingredients needed for the promotion of energy efficiency and the growth of the ESCOs sector in general. It is now up to each member state to find the right transposition.

The Commission can encourage, motivate and support Member States to quickly adopt and implement appropriate instruments for energy services, which are also in favour for Solar Heat Services and ST-ESCOs (see also chapter 5.2, Possible solutions on member states level).

Important issues regarding SHS and St-ESCOs could be taken into account already within the existing legal framework and during the implementation process in the Member States. However, some amendments for the greater use of renewables and SHS should be examined (such as Solar Ordinance).

Important issues in this context are (cf. also chapter 4, Strategies):

(a) Integration of renewables into energy services

It should be examined how the instruments to promote energy services can be further developed so that incentives increase for the greater incorporation of solar energy and other renewables (on the demand side) into the energy service concept.

(b) Quality standards and certification schemes for ST-ESCOs

Article 8 of the EEESD demands high quality energy services saying: "With a view to achieving a high level of technical competence, objectivity and reliability, Member States shall ensure, where they deem it necessary, the availability of appropriate qualification, accreditation and/or certification schemes for providers of energy services, energy audits and energy efficiency improvement measures . . ."

In the framework of the Intelligent Energy Europe project "Eurocontract" (1/05-12/07), which main objective is to develop the market for energy performance contracting in Europe, an effort is made to define a set of qualifications for ESCOs, as well as a system to assure the quality of the services. In some regions, voluntary certification schemes exist, like the Thermoprofit scheme in Graz (Austria), the BEST standards in Berlin or the eco level for energy service suppliers in Austria.

The Commission can coordinate and support those activities, which at the moment are voluntary and in the responsibility of the Member States.

However, a **Union wide harmonised certification/accreditation scheme and a set of quality standards** would be of benefit for the development of the common market of energy services in Europe. In particular, this system should also be made **appropriate for SHS and ST-ESCOs**.

(c) White (or energy efficiency) certificates

Article 4.5 of the EEESD states that after the first three years of application of this Directive the Commission will examine whether it is appropriate to come forward with a proposal on the European wide introduction of white certificates.

As described in 4. Strategies, a (white) certification scheme that includes (large) solar thermal plants in a suitable way could support the market development of SHS and ST-ESCOs considerably.

Therefore Member States, planning to introduce such a certificates scheme, as well as the European Commission should take solar thermal plants as a measure that can be well combined with other efficiency measures into consideration. The conditions and schemes must be designed in an appropriate way (e.g. the duration of the certificates) to enable also solar heat services.

(d) Financial instruments

Due to the rather small size of SHS projects, financing is mainly a business for local and regional financing institutions. They should be educated and provide the financial means for ST-ESCOs.

Article 11 of the Directive encourages Member States to create funds to subsidise energy efficiency measures including financial instruments for energy savings. And it says that " . . . the funds may provide for grants, loans, financial guarantees and/or other types of financing that guarantee results", which would be in favour for ESCOs and therefore also for ST-ESCOs.

As the EEESD focuses on energy efficiency it would be important to make clear that **also Solar Heat Services** that guarantee a certain amount of energy savings **are included and eligible for these financial instruments**.

The Commission could promote such solutions and contribute through intensive exchange of information and experiences. This should lead to adequate instruments on the national level and to replication of good practice.

3. Research and dissemination of good practice

As described above, the integration of solar thermal energy into existing district heating networks can be, among others, an interesting option, especially for the development of the ST-ESCOs market.

European programmes can support further research needed to optimise these applications and the dissemination and replication of these systems. This can be done through **EC research programmes** and the **Intelligent Energy Europe** programme, which should fund projects in this field.

4. Information and awareness raising activities

As said, information and dissemination programmes to consumers, educating the solar industry and energy advice organisations and supporting tools for project de-

velopment are important ingredients for an enhanced market development of ST-ESCOs.

On the European level, the integration of information on energy services and ESCOs into campaigns, network building, and platforms for know-how transfer etc. could play a vital role for making Solar Heat Services and ESCO models better known. The IEE project "ST-ESCOs" is contributing substantially to these information and dissemination activities. This is, however, not enough and further activities are necessary.

The Commission could finance further projects and campaigns to promote large-scale solar plants and ST-ESCOs and replicate good practice. This can be done through the **IEE2 programme**.

These topics should also be included and strengthened within **ManagEnergy** and the Sustainable Energy Europe **campaign**.

5.2 Possible solutions on member states level

Depending on the prevailing conditions in each country there are different solutions. But obviously some of the solutions might help in all countries. The national governments can act mainly through the following elements and activities, which summarise the above mentioned strategies from the points of view of the Member States (referring to 4. Strategies) and add some additional information:

1. Removing legal and administrative barriers and creating favourable conditions

In chapter 4, Strategies, the main legal and administrative barriers coming from the country analyses are already mentioned. The **removal of these barriers** currently existing – according to the specific situation in the country - and creating favourable conditions for energy services and ESCOs is one important task for the Member States.

In the Energy End-use Efficiency and Energy Services Directive it is already stated, that national legislation and regulations, that impede or restrict the use of financial instruments for energy savings, should be amended. The governments and national bodies should ensure that these steps are taken also in favour of SHS and ST-ESCOs.

In some countries the formulation and adoption of **new legislation** or amendments of existing legislation concerning ESCO models and Public Private Partnerships are recommended.

Creating favourable conditions for SHS and ST-ESCOs also means including binding regulations like '**solar ordinances**' or any other regulation promoting large-scale solar systems.

Concerning **public procurement**, the Directive 2004/17/EC “coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors” and Directive 2004/18/EC “on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts” permit the use of energy efficiency and environmental criteria in public procurement. This must be implemented into national regulation concerning public procurement and into the daily practice.

2. Implementing the EEES Directive

The Member States should **quickly adopt and implement** the Energy End-use Efficiency and Energy Services Directive (EEESD) with appropriate instruments, which are also in favour for Solar Heat Services and ST-ESCOs.

3. Financial instruments to support ST-ESCOs Development

Member States should establish **financial instruments** to improve the access to funds for ST-ESCOs and/or to mitigate the risks for banks as well as creating financial incentives like subsidy schemes or tax reductions. (See separate chapter 5.3 below for details on 2 possible financial instruments).

As said, financing of SHS projects is mainly a business for local and regional financing institutions. **Training the personnel of local banks** in financing ESCO type projects is expected to have a positive impact on the provision of commercially viable and sustainable project financing. It can potentially bridge the gap between the traditional asset-based corporate lending and the cash-flow based project financing to ST-ESCOs.

Funding feasibility studies, energy audits and the preparation of financing applications would increase the provision of more secure information for banks and decrease the amount of equity capital required. This will help to make more projects “bankable”.

Subsidy schemes: Grants or subsidies are still necessary for solar thermal systems in many cases, at least to develop a prosperous market. Existing or new subsidy schemes for (large-scale) solar thermal plants should be designed in a way that is also appropriate for ST-ESCOs. ESCOs should be able to apply for subsidies, as well.

Existing subsidy schemes could also be further developed so that there is remuneration for the actual solar kWh produced or purchased. This would in turn push the market for ST-ESCOs.

4. Information, advice and support for consumers

Financing and carrying out **information and awareness raising campaigns**, providing advice and support for consumers are important elements for the market development of ST-ESCOs.

These activities may include the **development of tools** for project initiation and development (checklists, calculation tools, model contracts etc.) as well as **free or subsidised advice for potential customers**.

5. Training, quality standards and certification schemes for ST-ESCOs

On the 'supply side' the **training** of the solar industry, planners, installers, energy agencies, consultants and existing ESCOs is very important.

The development and setting of **quality standards** as well as of **certification or accreditation schemes** for ST-ESCOs (cf. 4 and 5.1 above) are voluntary and the responsibility of the Member States at the moment. Taking into account already existing examples and projects on the European level, the Member States could develop their own schemes, although it would make much sense to do this in a harmonised way on European level.

In addition, support for developing ESCOs could be given through various **business development aid programmes** in the Member States.

These activities should preferably be bundled within **comprehensive action programmes** either for solar thermal energy or in a broader scope to promote ESCOs and energy services.

5.3 Financial instruments to support ST-ESCO development

Suitable financial instruments could help to overcome barriers, namely the limited and sometimes difficult access to financing opportunities for ESCOs.⁴ This is especially true for new ESCOs on the market and for the new Member States.

Financing of SHS projects and ST-ESCOs is, due to the size of the projects, mainly a business for local and regional banks. Know-how, capacities and incentives are necessary on this level (see also above).

Financial instruments can support ST-ESCOs through

- establishing suitable funds or making access to existing funds easier in order to establish financing opportunities for ST-ESCOs;
- reducing the risks for banks providing financing through public liabilities;
- subsidy funds that are in favour of Solar Heat Services.

Sources of debt and equity financing need to be located and several financing sources are possible: private banks and lending institutions, venture capital firms, equity funds, strategic partnerships (e.g. utilities, engineering firms and equipment manufacturers).

⁴ See also Bertoldi/Rezessy, 2005

Encouraging and assisting existing leasing companies to offer solar thermal plants in cooperation with an ESCO is another option.

Two proposals for the creation of supporting financial instruments are suggested below:

(A) Creation of a Liability Fund

Especially in the start up phase of ESCOs the main problem is often the access to finance for their projects.

Usually, the guarantees requested for a loan are those typical of merchant banks: company's capital, turnover, properties, external guarantor, etc. It is not the project, which is evaluated with its cash flow generation. So for new enterprises it is hard to obtain prime rate loans. In particular, for an ST-ESCO this problem is more significant for the higher investment costs (compared to other conventional technologies) and the long-term economic benefits (> 7 years).

The creation of a liability fund dedicated to ST-ESCOs can be an interesting solution. This means that there is no direct funding of the projects out of this fund, but a deposit available for the partial cover of the guarantees required for the bank loan. The total amount, deposited for the entire duration of the loan, is decreasing in the time due to the payments by the ESCO. The money is not spent nor utilized in any way, but simply locked until the complete restitution of the debit.

Public authorities from several levels could be the responsible bodies for this fund: Municipalities, Provinces, Regions, Ministries or specific public financing institutions can be involved, depending on their strategies. The direct involvement of public authorities can also be useful to catalyze other economic resources (e.g. from foundations, banks and financial institutes, trade associations etc.) and to cooperate with subsidy programmes.

For the operation of the fund the creation of a specific structure can be useful to:

- Define precise standards to achieve the guarantees out of the fund;
- Verify the economic reliability of the projects;
- Verify the technical reliability at design level;
- Verify the realization of the projects as designed and monitor its management.

This instrument could be a significant tool to support the development of innovative technologies or systems:

- No money will be spent: through an appropriate evaluation of the projects that will gain the fund, all the amount will remain in the fund and be available for new projects;
- No market distortion will be created: the ESCOs do not receive money "for free", they will work in the market but without "extra fees" constituted by high interest rate for the loans;

- The creation of a structure for the evaluation of the projects can also simplify the decision procedures for banks and other financing institutes.

A first effort for such a fund has started in the Tuscany Region (IT). A fund of 2 Million Euros has been dedicated to a liability fund for the development of energy production from renewable sources and energy efficiency projects (Regional Decree n. 2179, 15/05/2005). In this case both, the allocation of the fund and the control of the technical standards, are in charge of the Region. The financial management is in charge of Fidi Toscana, a mixed public/private financial institute.

It provides the financial guarantee for, at least, 80 % of the loan at a fixed price of 0.5% of the total (una tantum). It foresees a generation of investments of about 25 Million Euros only in 2006. It has also been estimated that an increase of the fund up to 6 Million Euros could generate investments with a multiplying factor of 20.

(B) Subsidies for solar thermal energy instead of investments

Considering conventional solar thermal plants (not prototype or innovative systems), subsidy schemes could be designed to support the solar thermal output of a plant instead of subsidising purely the investment.

Subsidising the investment (e.g. through a direct grant from public funds) does not take into account the efficiency of the plant and if the plant achieves its promised solar output and therefore desired benefit. Giving subsidies per kWh solar output of a solar system would provide an incentive to run the plant as efficient as possible and to maximise the solar output through high quality operation and maintenance.

This can be reached in two different ways:

- Remuneration for the kWh produced by a solar thermal plant;
- Remuneration for each kWh bought from a solar source.

The first one would like to be a solar thermal application of incentive programmes already known among European countries for photovoltaic (PV) technology (e.g. the Italian "Conto Energia"), which has reached a great success. It consists in the remuneration of every kWh produced from solar thermal plant for a pre-determined time. Its great power is due to the direct relationship between the solar plant efficiency and the remuneration profits.

The second option is more focused towards the development of heat services, in particular solar thermal heat services. In this form, the customer will get the remuneration while acquiring green energy. The possibility to gain money for buying thermal energy coming from solar can be a good reason for companies to develop solar heat services. In this form it can be a strong instrument for the ST-ESCOs development.

The amount of the subsidy will of course depend on regional conditions, like the amount available for the subsidy scheme, the local energy prices, the strategic value given to this kind of action etc. Just to give a general indication, a value of 10-20% of the energy price produced by conventional technology can be a sufficient incentive.

In addition, this type of subsidy scheme could also be appropriate for feeding solar energy into existing district heating networks. The district heating company gets remuneration for each kWh bought from a solar thermal energy service company (ST-ESCO).

Both forms can have an important impact on ST-ESCOs economic evaluation. On one hand they provide extra money from a public institution, making the system more economically. On the other hand, the fact that an institution believes in the technology and is ready to give money for it, is an indirect economic/technical guarantee and helpful when applying for a loan.

It's important to highlight that the long term and the certainty of these facilities must be ensured in order to get the benefits on the market. Otherwise they will only create a distortion in the market and the image of solar thermal energy services.

(C) Favourite V.A.T. status for solar thermal energy

In cases as for example in Hellas there is a favourite V.A.T status for energy sources such as electricity and natural gas for social and environmental reasons where V.A.T for these sources is 9% on the contrary of the general V.A.T status which is 19%. In the past the basic argument not including on the favourable V.A.T status RES plants was that these are products and not services or resources. With the ST-ESCO scheme the ESCO sells the solar energy and not the plant itself. Thus, based on the same social and environmental reasons the V.A.T that is going to be applied for these services should be 9%. This will give an extra benefit or equal taxation status for RES as it is for the electricity and natural gas.

6 Country Specific Situation, Barriers and Solutions

The current situation in Austria, Greece, Italy and Spain is described below. Then barriers are analysed and possible solutions to overcome them are presented. These country evaluations form the basis for the proposals formulated in the previous chapters.

6.1 Situation, barriers and solutions in Hellas

6.1.1 Current situation in Hellas

Following the Kyoto world summit, Hellas has undertaken the commitment that the CO₂ level in 2010 will not exceed the respective values of 1995 by more than 25 %. This is an ambitious target, taken into account the fact that energy demand in Hellas is increasing, which is partly due to the increased development rate of the National Economy.

In 1995, the Ministry of Environment, Urban Planning and Public Works (MEUPPW) prepared an Action Plan, entitled "Energy 2001", aiming at promoting the use of renewable energy sources (RES), as well as the application of energy efficiency technologies, in the building sector. The Action Plan was carried out in order to define specific measures for the reduction of greenhouse gas emissions (namely of CH₄, CO₂, N₂O, CO, NO_x and non-methane volatile compounds) in the building sector, in accordance with the National Action Plan for the abatement of CO₂ and other greenhouse gases. These measures focused on five (5) broad fields, namely:

- a. interventions in existing residential buildings
- b. interventions in public buildings and buildings of the broader public sector
- c. interventions in traditional (old) buildings and urban settlements
- d. implementation of the bio-climatic design principles in new buildings and urban settlements
- e. energy installations, amongst others those of active solar systems for hot water production.

As a result of that further laws and circulars have been issued in order to achieve the aforementioned targets. These are:

1. Law 3017/2002 "*Ratification of the Kyoto Protocol to the Framework-convention on climate change*", the Greek Parliament set an official basis of the country's commitment for actions against the aggravation of the "greenhouse effect".

2. Two Circulars of the Ministry for Public Administration (1997) and the Joint Ministerial Decision (JMD) 21475/4707 on the reduction of CO₂ emissions via improved building energy efficiency (1998), which have introduced the TPF/EPC option in the public building sector within a mandatory, well defined energy management procedure with energy auditing, monitoring and targeting actions.
3. The implementation of OPC 2000-2006 Actions 2.1.1 (design, promotion and support activities) and 2.1.4 (public sector part) of the OPE 2000-2006, as detailed in the OPC Programming Supplement, which foresees the design and application of a special financial support scheme for the performance of energy investments (RUE/CHP/RES) in the public sector via the mechanism of TPF/EPC provided from private ESCOs
4. Decision 2000/2002 provides an updated Licensing Code of installation and operating permits of RES plants.
5. There exists a detailed legal framework for the liberalization of the energy market (Law 2773/1999 and Law 3175/2003) but, unfortunately, refers only to the electricity production.

6.1.2 Legislative and bureaucratic barriers in Hellas

In principal the lack of information for industry and customers about ESCOs is also prevailing in Greece. Furthermore electricity and energy prices are still cheap.

Regarding the implementation of Solar Heat Services and the establishment of the ESCOs market in Hellas the following barriers have been identified:

Public Sector

1. The existing public accounting system does not permit to a public institution to pay "alternative" energy bills like those for the reimbursement of outsourced energy efficiency or solar thermal energy including the investments (EPC, SHS).
2. Up to the very recent issue of the Law 3389 on Public Private Partnerships (PPPs), it was not allowed for a private body to use/operate-manage the building energy services infrastructure of public establishments. This includes multi-year concession contracting regarding the installation, operation and maintenance of leased/outsourced energy efficient equipment in buildings. It is expected that the new PPP framework will provide a field to boost and specify, through further implementing acts and administrative mandates, SHS projects and the ESCOs business activity.

With the mentioned Law, Public Authorities are set free to cooperate ("Partnership Contracts") with Private Bodies for the construction of works or the provision of services in areas of their jurisdiction. In Partnership Contracts the Private Bodies contract with Public Bodies via incorporated companies of special purpose ("Special Purpose Companies"). Shareholders of such companies may only be the Private Bodies and the company must be located in Hellas. The Law applies to the construction of hospitals,

schools, even road networks and also to the provision of services, including energy services. The Law for PPPs conforms to the Community Legislation on public contracts and concessions. This means that the principles of transparency, equality of treatment, proportionality and mutual recognition are encompassed within it.

An innovative award procedure, designed principally to meet the specific features of the award of "particularly complex contracts", and thereby certain forms of PPPs is designated as "competitive dialogue". It allows the public authorities to hold discussions with the applicant businesses in order to identify the solutions best suited to their needs. The public partner concentrates primarily on defining the objectives to be attained in terms of public interest, quality of services provided and pricing policy, and it takes responsibility for monitoring compliance with these objectives.

A special secretariat for the PPPs is created, which coordinates and monitors the procedures and assures the aforementioned principles are followed. Among the jurisdictions of the secretariat is the standardization of the procedures, documents and the validation of candidates or of the need of a partnership. It is necessary for each project to assess whether the partnership option offers real value added compared with other options. Such work concerning a typical procedure was done for the SAVE project SA/202/98 GR "Promotion of TPF in public buildings with emphasis in hospitals".

Even though the definition of TPF scheme is not mentioned, within the Law the possibility to fund the end-user via an energy service company or another third party is described. In the PPP law the way to validate a candidate, in means of financial adequacy, technical and business ability, is described extensively. The contents of a Partnership Contract and also the risk distribution (public and private partner) are well described. The precise risk distribution is determined case by case, according to the respective ability of the parties concerned to assess, control and cope with this risk.

It is the private partner's responsibility to fund the project. Nonetheless, public funds (excluded from taxation!) - in some cases rather substantial - may be added to the private funds. Sometimes the contribution of the Public Authority could be in the form of physical assets, by means of concession of landed property (partially or completely), concession of titles of landed properties and the cession of rights for the exploitation of projects. In these cases the concession of rights expires with the expiration of the contracts. In the contract the way this exchange takes place must be thoroughly described. The issuances demanded for the design, construction, funding, operation, utilization and the provision of services issue to the Special Purpose Company.

Private Sector

The main existing problem for the realisation of ESCO projects, such as SHS in the private sector is associated to the secured provision and the allocation to proper market actors of capital subsidies for the development of energy investments or the initiation of novel energy business/services within foreseen state aid schemes (e.g. laws for business development, operational programmes for regional/sectoral development).

Up to date, even though the TPF scheme and the ESCO concept have been taken into account in facilitating the financial opportunities of a potential energy project investor; such an investor should be identical to the end-energy user. In turn, this investor is eligible to apply for a state-aid grant and/or a loan on the basis of minimum proven

own capital share. The TPF option from another commercial agent, i.e. the ESCO, under a separate bi-lateral contract with the investor, is perceived as a direct contribution to the investor's own capital thus improving the image of the investors against project financial support sources (grants, bank loans).

Furthermore, contracts between end-user investors (clients) and ESCOs (integrated service providers) should provide end dates up to the end of reference subsidy programmes, usually of a few years – not realistic for the proper time frame of successful SHS projects. As a result of that ESCOs and end-users would have to follow alternative routes in order to realise ESCO projects. The basic idea that overcomes this barrier is that ESCO contracts have been transformed simply to Loan contracts where the ownership of the project passes to the end-user from the beginning of the project and the subsequent integrated energy service repayments are linked to the guaranteed solar energy supply.

An alternative should be the future financial support of ESCO project proposals, that means to handle the ESCO and not the final energy-user as the project investor in association with the decoupling of the time – and allocated subsidy restrictions for project hardware application from the SHS duration and repayment terms.

6.1.3 Possible solutions in Hellas

The development of the ST-ESCO market is highly dependent on the overcoming of existing barriers and the development of the solar thermal market. The initiatives for the market development are:

1. legislative/institutional
2. financing
3. information/dissemination/education
4. technological, qualitative and efficiency development / improvement

As far as the **institutional** initiatives are concerned, the quick adoption of the European directive on end-use energy efficiency and energy services covers in a great extent the range of the parameters concerning the creation and development of ESCOs. Furthermore, there is a concentration on energy efficiency and the production of thermal and electric energy from RES. In Hellas, with the passing of the PPP law, the legal void for the implementation of the TPF, ESCO schemes is covered in a great extent, as far as the public sector is concerned, despite the fact that the law is not targeting the energy sector in particular.

In the past an attempt was made for the adoption of a draft law that dealt with the TPF, ESCO schemes and their implementation in the private sector. This draft law is considered essential, possibly in composition with the harmonization of the national legislation with the directive on end-use energy efficiency, to become a law so that the ESCOs can develop in the private sector as well.

Further, initiatives such as the Solar Ordinance would boost solar thermal market and consequently the ST-ESCO market.

Short term future interventions to enhance the existing **legal** framework, in order to boost the application of ST-ESCOs should include:

- The institution of provisions related to the thermal energy produced by RES (RES-H) through the amendment of the existing legal framework for the liberalization of the energy market. This basically means that there should be additional provisions for RES heat, similar to the ones instituted for RES electricity, including the concept of thermal energy production and services based on the ESCO concept.
- The restructuring/transformation of a past draft (2001) for a law on "Third Party Financing (TPF) of Investments for Energy Saving, Cogeneration & Independent Generation of Electrical or/and Thermal Energy from RES", which aimed at instituting the TPF mechanism and primarily the framework for ESCOs operation in Hellas.
- Focus should be given to the performance of private sector energy investments, including the provision of capital subsidy opportunities from the EU Structural Funds, or from other financial aid sources. A new institutional regulation, possibly outside a strict legal consolidation of ESCO business, should provide clear guiding solutions to overcome barriers (described in the previous chapter 6.1.2.) that today freeze the application of outsourced and guaranteed energy performance contracting in both the public and the private sectors.
- Recently, some legislative procedures have facilitated the natural gas installations in multifamily buildings (obligatory installation of the infrastructure necessary for the use of natural gas equipment). Similar legislative procedures could be created to facilitate also ST-ESCOs agreements.

Finally, it is of equal importance the determination and institution of all aspects related with the development and setting of **quality standards** as well as of **certification or accreditation schemes** for ST-ESCOs. This could be within the framework of the EES Directive.

In Hellas the **financing opportunities** for ST-ESCOs projects are not well set.

Development Law:

- A project concerning energy savings or the production of solar thermal energy can be funded by public money but only the end-user can benefit because he is the one that owes the installation. Also, a minimum investment must be exceeded, in order to get funding (small company investment > € 100.000). The costs of a solar thermal installation can barely overcome the amount of € 60.000. Obviously, the subsequent national subsidy packages should include ESCOs among the beneficiaries. CRES will exercise pressure to the responsible bodies in order to achieve this aim.
- To receive funding further development plans should be made. If an ESCO produces electric (but not thermal) energy from RES funding is also possible. The funding of RES heat systems is system based and there are no provisions similar to electricity production (funding of green electricity per kWh).

Several issues, indirectly related to the development of the solar thermal market, have to be dealt with. Among the most important are:

- VAT status (19%) for renewables compared to the 9% status that has been applied for electricity and natural gas. Obviously, the solution in this case is to have a similar VAT status both on RES and electricity and natural gas.
- Billing of water consumption for the case of central systems, particularly for the case of the residential sector (multi-storey buildings), where billing of independent (single family/household) water consumption is almost 50% cheaper compared to a common (central) consumption. This is an obstacle and billing of water consumption in both cases should be dealt with in a similar manner.

As for any other EE and RES case the development of the ESCOs and particularly ST-ESCOs market needs to be supported with **informational, dissemination and educational initiatives**, since there is great unawareness and diffidence both on the end-user and ESCO developers.

Acts like the ST-ESCOs project for the support/briefing of all the relevant stakeholders (end-users, ESCOs) in different ways (tools, etc) will boost the market.

6.2 Situation, barriers and solutions in Austria

6.2.1 Current situation in Austria

In order to attain the ambitious goal to reduce emissions of the six "Kyoto greenhouse gases" by 13 % by the target period 2008 to 2012 as compared to the 1990 values, the Austrian parliament adopted an "Austrian Climate Strategy 2008/2012" (www.accc.gv.at/englisch/e-strategie.htm), combining the efforts on the part of the Federal Government and the Laender into a co-ordinated strategy. The Climate Strategy is the basis for different specific programmes within the climate protection initiative "climate:active" ("klima:aktiv": see www.klimaaktiv.at) of the Austrian government. This initiative includes action programmes for solar thermal energy (solar:waerme), but also for promoting ESCO schemes in e.g. service buildings (eco:facility) and in governmental buildings (www.bundesgebaudecontracting.at).

In Austria the legal framework conditions for Third Party Financing (TPF) projects are the same as for every other legal contract. Austria can already rely on a considerable amount of experiences and ESCOs. Several projects delivering Solar Heat Services or integrating solar heat services in more comprehensive projects have been realised.

The law for public procurement is the dominating legal framework for Third Party Financing (TPF) or Energy Performance Contracting (EPC), and thus for ST-ESCOs in the public sector. In principle, the regulations for awarding contracts do not provide any major obstructions for the use of energy services by public clients. There are certain areas, however, which might cause problems for the client or the ESCO and therefore needs careful project development.

In case of a private purchaser, the project in question can be negotiated and awarded without the obligation to observe the provisions of the law of public procurement.

The general legal framework for ESCO contracts can be assessed as "predominantly positive" even if frequently the phenomenon of legal uncertainty occurs among clients or project developers.

Key success factors in the Austrian market:

Based on the analysis in the report of the International Energy Agency's (IEA) Demand Side Management programme "Task X: Performance Contracting (12/2001 – 03/2004) [IEA-DSM Task X, 2003], the key success factors relevant for Solar Heat Services are:

Energy Agencies are successful mediators on the ESCO market. They provide consultancy, practical support and a broad technical background to customers (building owners and managers), thus acting as a neutral advisor. They supply standard materials and guidelines.

Energy Agencies can also take over the role of a neutral project controller and advisor in conflict situations. They take over monitoring and project evaluation (if the customer has no personnel resources to do so). They communicate experiences and disseminate success stories and best practice projects. The experience in Austria shows, that the availability of ESCO-independent neutral advice through energy agencies reduces the entrance barrier of customers considerably.

The crucial capability of ESCOs and especially **ST-ESCOs** is their **technical know-how**. Although third party financing is an important motivation for many customers, financing is not the key business of ESCOs. They offer financing of the investment as an added value and as a marketing instrument, but usually ESCOs do not earn money on financing.

Well-functioning competitive markets need **standards**. The existence of one (or several) approved **model contracts** and quality standards help the customers to understand the service, to compare and evaluate services, and to trust the service providers. A solid legal basis diminishes the risks for the customer, who thus receives a guaranteed service package and a guaranteed result.

This will also help to reduce the **transaction costs** of an energy service (TPF) project, which are still high and a problem which has to be solved. Through standardisation and more effective procedures for project initiation and preparation an even larger market can be reached.

6.2.2 Legislative and bureaucratic barriers in Austria

The **legal and regulative situation** in Austria allows ST-ESCO projects without any major obstructions. However, there are some “problem areas”, which might be considerable barriers for establishing Solar Heat Service projects for clients:

- Public sector: classifying ESCO projects into defined categories of orders within the public procurement regulation and finding the right tendering procedure for ESCO projects (especially for the functional description of targets and services for an energy service contract)
- Question of ownership of the solar plant, if mounted onto the roof of a different owner. In Austria and also in other countries, the legal conditions define to convert all objects firmly fixed to a building (e.g. the solar collectors fixed on the roof) to the owner of the property. This would make it impossible to implement a ST-ESCOs project with the solar plant remaining in the ESCOs property.

Since the necessary model contracts and standards have already been developed, other legal questions are usually of minor importance. The existing contracts and tender materials usually need only adaptation to the specific project conditions.

In the private sector factors like cost efficiency, savings, guaranteed solar results are important to convince customers and point out the advantages.

There are some **economical barriers** based in the following aspects:

- The installation of a solar thermal plant needs comparably long contract duration or an additional budget. Sectors other than the public sector want to be more flexible and do not want to sign contracts with duration of more than 5 years.
- Sectors other than the public sector bear the risk of bankruptcy of the client for the ESCO – in this case access to cheap credits for a comparably high investment becomes more and more difficult.

A few years ago it was not possible for ST-ESCOs to get the subsidies for solar plants, which were meant for building owners. This is now resolved for residential as well as non-residential buildings (as there are different subsidy schemes).

Usually, it does not seem that financing is a problem for ST-ESCOs on the Austrian market.

There are minor **technical barriers**, such as difficulties in putting together the necessary solid data basis. It is indispensable, that the customer (building owner) – very often assisted by energy agencies – prepares the basic data on the building (energy consumption and costs, state of the building). In practice, this is a time and money consuming process, especially with comprehensive refurbishment projects that also include the installation of a solar plant.

The most important barriers are **human!**

- Building owners and managers lack know-how and understanding of energy services.
- The operational staff that needs to be directly involved in the preparation and implementation of the energy service project is very often afraid of outsourcing, which is perceived as a threat of losing job and position - especially if it is a comprehensive project including the operation and maintenance of the whole building services. A general mistrust in a third party can be observed frequently.⁵

6.2.3 Possible solutions in Austria

In general, developing the market and improving the conditions for large-scale solar thermal plants will also support the development of the ST-ESCOs market.

- **Solar systems** can be made **obligatory** for new or certain types of buildings ('solar ordinances'). In the Region Styria this has just become partly reality through the subsidy schemes for residential houses. Every new residential house applying for a general grant from the regional government (almost all) must have a solar plant with a defined quality level on its roof. Such legislation will also boost the market for ST-ESCOs.
- As **feeding solar energy into district heating networks** is an interesting option for ST-ESCOs, feed-in tariffs for solar thermal energy should be defined.
- **Subsidy schemes:** Grants for solar plants in residential buildings are incumbent on the provinces (for non-residential buildings there exists a national grant scheme). New decrees for housing grants could lead to substantial improvements for energy-saving and renewable energy measures. The restructuring of funds for building renovations would be particularly promising. Changes of this kind in the grant guidelines for the "residential building" segment are expected in the medium-term.
- **New segments of application and innovative systems** (solar cooling, industrial heat etc.), which cannot be covered by the residential building subsidy schemes, require corresponding funds (for example for demo projects and the subsequent market launch).
- **Research:** On behalf of the Federal Ministry for Traffic, Innovations and Technology the programme „Energy Systems of the Future“ is, among others, carried out within the framework research programme „Austrian technologies for sustainable development“. Within these programmes solar energy can be taken into account as one of many other technologies. **Research tenders explicitly directed at solar energy** could provide the necessary innovation impetus into new segments of ap-

⁵ See also: Energy performance contracting: Success in Austria and Germany – dead end for Europe? ECEEE Summer Study 2003, Seefeldt, 2003

plication (large scale solar systems, solar cooling, industrial heat, etc.) in combination with SHS and ST-ESCOs.

- The **ownership structure** of the building bearing the collectors must be checked to allow for the solar plant remaining the property of the solar company. It should be made clear and common understanding that a solar plant is in principle still detachable and therefore the ESCO can remain the owner of the plant.
- **Professional support for clients** in developing SHS projects and for carrying out the tender process (contracts, tender material). This is of special importance for those real estates falling under the public procurement regulation (classifying ESCO projects into defined categories of orders, finding the right tendering procedure for ESCO projects etc.).
- **Information and awareness raising activities** towards building owners and managers to reinforce understanding of energy services.

6.3 Situation, barriers and solutions in Italy

6.3.1 Current situation in Italy

Having ratified the **Kyoto protocol**, Italy committed to the reduction of greenhouse gases emissions by 6.5% with respect to the 1990's level by the end of 2010. The main legislative acts for the implementation of the Kyoto protocol in Italy are:

- CIPE6 resolution n° 137/1998: approval of the "Guidelines for national policies and measures for the reduction of greenhouse gasses emissions".
- Law 120/02: ratification and fulfilment of the Kyoto protocol to the United Nation Convention on climate change.
- CIPE resolution 123/02: revision of the guidelines for national policies and measures for the reduction of greenhouse gasses emissions. Energy efficiency and solar thermal energy are promoted among the rest.
- Law by decree (DL) 273/04: urgent dispositions for the application of 2003/87/CE directive, in matter of greenhouse gasses emission's credits exchange inside the European Community.
- **Energy Efficiency Decrees** (DM 20/7/04): they have formalised a framework (also known as energy saving certificates or white certificates mechanism) for promoting energy efficiency and renewable sources in final uses. The Decrees impose to electricity and natural gas distributors to totalise energy savings in the measure

6 Commissione Interministeriale per la programmazione economica.

of 2% of the distributed energy, directly (through the implementation of an efficiency project) or indirectly (through the purchase of certificates) achieved. For Solar Thermal applications, white certificates can be claimed on the basis of the installed square meters and the climatic zone.

- D.lgs 192/05, transposition of European Directive EC/02/91 (**Energy performance of buildings**). The law states provisions on building energy labelling, energetic consumptions limits for buildings, use of renewable energy. In particular, the use of solar thermal energy is made compulsory for new public buildings in the measure of the 50% of the DHW consumption. For private buildings, construction criteria must comply with solar thermal plants installation requirements in order to ease its possible future integration in the building structure.

In addition, some municipalities have introduced the so-called "**Solar Ordinances**", i.e. local building regulations which impose solar thermal domestic hot water as mandatory in all new private buildings.

For **public procurement**, the legal framework is essentially given by the decree 157/95 and its subsequent modifications, including decree 65/00, transposition of EC/92/50 on public procurement, which regulates the tendering for service contracts. The most important provision related to ESCOs contacting is the limitation imposed on the incidence of the capital investment over the total contract value, which must be inferior to 50%.

Concerning the private sector, the **heat service contract** is an important issue, introduced with the DPR 412/93 (and subsequent modifications and integration). The ministerial memorandum 273/98 of Finance Ministry and the 103/E/98 resolution defined:

- the heat service contract technical and legal requirements
- the VAT rate reduction to the 10% (instead of 20%) for the heat for domestic uses sold through the "heat service" contract

6.3.2 Legislative and bureaucratic barriers in Italy

At the moment, the most critical aspects are:

- The most relevant barrier in Italy is the absence of long term financial incentive programmes, national or regional, open to the solar thermal ESCO market. The incentives have been so far limited and discontinuous: no long-term financial incentives for solar thermal technologies are present, and there is a lack of national coordination. Some regional subsidies exist but they are mostly intended for the final user and the national incentive programme is open to gas distributing ESCO only.
- Therefore, this kind of incentives was not sufficient to assure a stable market growth but, on the contrary, it created a distortion in the solar thermal market and in the technology perception by the customer. The final consequence was that there has not been a real industry development. Furthermore, ESCOs should be included among the subjects which could benefit from the public incentives.

- Moreover, in the field of public procurement, administrations face the problem of establishing suitable selection criteria in the tendering for solar heat service contracts. The absence of a clear regulation about the “solar” heat service contract in this field, together with a general lack of knowledge or misperception of the solar thermal technology, has discouraged so far public administrations in undertaking investments in solar heat.

6.3.3 Possible solutions in Italy

Dissemination campaigns

The creation and the development of an ST-ESCO market are strictly related to the confidence with solar thermal technologies. Up to now there is a lack of experience and know-how about the technology, in particular about large-scale plants. It means a high perception of the risks for both technical and financial actors. Also end users, driven by lack of awareness (or misinformation), do not have a correct perception about the real entity of energetic production (together with the emissions reduction) and economic savings. So information campaigns and realization of demonstrative projects are necessary to overcome prevailing cultural barriers, to increase awareness and consciousness about solar thermal systems and clearly define the main points regarding solar systems.

In particular, information campaigns should treat:

- available technology and systems,
- fields of application,
- reliability,
- economic and environmental benefit.

In order to reach significant results, they should be addressed to any possible actor: end users, banks and financial institutes, industrial actors, public administrations.

Research

In Italy the expenditure for Research and Development is at a very low level. The R&D intensity (R&D expenditure as % of GDP) has been, in the last years (2001-2003 data), around 1.11 to 1.14 %; while the EU25 value is around 1.90% (Eurostat News Release – 156/2005). The annual growth rate (1.3%) is lower than the inflation rate!

The development of the solar thermal sector is related to R&D activities. Long term programmes have been abandoned since the 80's, and (due to their structural failure) they haven't been re-proposed. In the current situation there are all the conditions for a rapid expansion of the solar thermal market. For its mature development, Italy must provide high level research programmes, which can strongly push the industrial sector and the innovative application of solar thermal plants. European examples are many (just for example, the German Solarthermie2000) and their results are very important, in a long term vision of the sector.

The Italian energetic dependency from external supply is, up to now, a very important problem. The lack of investment in R&D in sectors that can improve the local energetic production is not the right way to face the problem. Without serious interventions in these areas, the risk is a future technological dependency also in the solar thermal sector; not a good perspective at energetic, industrial end economical level.

ESCO's certification

Concerning specific ESCOs aspects, the ESCO's certification is perceived as a necessity. At National level, the decrees for energetic efficiency (DM 20/7/04 and relative norm of second level) have given a wide diffusion to the acronym ESCO, but they haven't defined what should be an ESCO (apart from "integrated services for the realization and the successive eventual management of interventions", resolution 103/03 of the Authority of Electrical Energy and Gas). Up to November '05 the Authority list counted about 400 ESCOs. Recently a new standard (the audit and certification of obtained energy savings) has been added that reduced the number to "only" 56 ESCOs (June '06). But the definition remains quite wide and vague; at the moment just few ESCOs can supply (for example) Energy Performance Contracts, Third Party Financing and integrated energy services. In such situation there is the necessity to characterize sure criteria in order to define what an ESCO is and what are the minimum services required, in order to create confidence among the customers and the financial institutions. At Italian level, the UNI-CEI Energy Management Group is now working.

"Solar Ordinances"

Regarding the so-called "Solar Ordinances" already described, many actions should be carried out in Italy, which could be summarized as follows:

- motivating some Regions, which have adopted a very vague law (e.g. Region Lazio) to pass application laws, which could assure the actual implementation of the solar regulations;
- development of technical guidelines at national level for the actual application of the Solar Ordinances (in collaboration with the main stakeholders, including of course the building associations), stating for instance the minimum requested solar fraction depending on the hot water consumption and on the climatic zone; these guidelines should not neglect the issues of visual impact and permitting;
- top-down approach for the spreading of "Solar Ordinances"; the inputs should come from Regions or even at national level, including solar thermal in the national building code, as happened in Spain.

Subsidies

Subsidies should be an important and structural measure to make the diffusion of good practices and the growth of the solar industrial sector easier. It's very important that the measure (or measures) chosen will be:

- active for a medium/long period (in order to attract investors along years and not only for short and limited periods) and insert in wider programmes (environmental, industrial, research, etc.);
- not complex criteria to calculate the solar contribution should be preferred: this will assure a wider participation to the scheme by the final users and also a faster (and therefore cheaper) assessment of the requests;
- specific financing schemes should be developed for high potential sectors, where the costs of conventional energy are lower than in the residential sector, sometimes because of special tax reduction (e.g. industry, large commercial, hotels, park protected areas, etc.);
- coordination at national level is necessary. Even if the development of the single measure can be carried out by local administrations (mainly regions), the criteria to achieve the fund, the bureaucratic procedures and, possibly, the target should be decided at national level.

Specific subsidies for ST-ESCOs can be really useful, above all in the start up phase of the market. They can be in the form of:

- a) Direct financing of the plant; for instance, expressing the incentive in Euros/m² installed or as a fixed percentage on the total amount;
- b) Financing the heat production; exploiting the existing (certified) heat meters, it's easy to apply a special remuneration for any produced kWh_{th};
- c) Indirect financing of the investment, through a guarantee fund for investment in solar thermal ESCOs or a tax reduction of 40-50% on the investment cost.

Definition of a "Solar Heat Service"

A clear definition of what is a "Solar Heat Service", providing minimum requirements for that type of services would be an important step. The relevant legislation and regulation in the public sector as well as the list of accredited ESCOs should then rely on this specific definition. It can be formulated as follows:

Definition: "Solar Heat Service" is the contractual act regulating the supply of goods and services needed to set up and operate a system which provides the thermal energy for space heating, dehumidification or cooling, the domestic hot water or the heat required for industrial processes, utilizing only or prominently solar energy. That permanent process must run accordingly to safety, environment and energy efficiency laws, and is oriented to the diffusion of solar thermal energy.

Purpose: the "Solar Heat Service" should be the list of the minimum required services for a correct ST-ESCOs' project. On one hand it can be a guarantee for the customer and for the ST-ESCO qualification. On the other hand can be the pre-condition to achieve specific benefits dedicated to ST-ESCOs contracts (e.g.: for the customer the VAT reduction from 20% to 4%, applied to the whole contract amount; for the ESCO subsidies on the produced kWh_{th})

Qualifying points: a contract for goods and services supply is a "Solar Heat Service" contract when comprises and fulfils the following minimum requirements:

1. Explicit and binding reference to the "Solar energy service contract".

One article of the contract, e.g. Art.1, must indicate for extended that it is a "solar energy service contract"

2. The enterprise will assume the responsibility *of the plant*.

Through the attribution of the role of Third Responsible⁷ to the enterprise, this takes the responsibility of the operation and the maintenance of the plant. The contractor just have only to monitor the solar thermal energy generated by the system; any action apt to maintain in function and in perfect conditions the system is in the responsibility of the service supplier.

3. The supply of the solar system is in charge of the enterprise.

It includes the purchase and management of the technical material, the necessary services for maintenance and management of the solar system, the fuel for the integration system, in case of boiler integration. The enterprise supplies, under its own responsibility, the complete and working system, and carries out all the authorization, testing and normative obligation connected with the realization. The enterprise moreover supplies a complete maintenance and management service of the plant. The enterprise transfers to itself the supply deed (in the case of integration fuels grid connected) and/or acquires the fuels (oil, biomass etc.) for systems not grid connected.

4. Measurement and recording of the supply.

The enterprise takes care of measurement and recording of the thermal energy supplied. Such thermal energy must be divided in energy from solar source and integration. This division must be operated through separated measurements, executed with suitable heat meters, complying with the enforced National and European standards and provided with calibration certificate. The enterprise must also guarantee the correct installation and the reliability of the meters.

5. Measurement and recording of the thermal heat-energy must be done according to the International System unit: Joule or Watt-hour (or their multiples).

The contractor acquires from the supplier thermal energy from solar source or integration. Such energy, that can be monetized with different burdens, is the result of the service carried out by the enterprise (and is necessary that it is quantified in coherent energetic units, from which the reference to the International System). The meters and recorders, discussed in the previous point, become therefore fundamental; that explains and justifies the demand of the calibration certificate the requirements of suitability and reliability guarantee.

⁷ A complete definition of the "Third Responsible" refers to the article 1 codicil 1, letter o of the Italian DPR 412/93

6. Economic value of the rate linked to objective parameters, as the solar thermal energy and energy supplied by integration boiler, and/or outcomes of energetic diagnosis on the considered building-plant system.

The rate of the contract must be connected, in all or part, to the thermal energy produced. The rate, defined at the moment of the contract signature, must also be linked to the results of the energetic diagnosis⁸ of the building and existing plant.

7. Compulsoriness of the energetic diagnosis of the building and heat plant.

In the contract must be required an energetic diagnosis of the building and the heat plant, executed by the enterprise, before the realization and/or the taken in charge of the existing plant. Having provided a fitting of the rate to the outcomes of the diagnosis process, it turns out that such operation is necessary before the realization of the system and it is strongly suggested it's updating. A verification clause of real system results in comparison with the results of the energetic diagnosis should also be useful.

8. Obligation of the report on the "booklet of solar system"⁹ of any interventions on the heating system carried out by the enterprise.

By the experience of the "heat service contract", it is to define a "booklet of solar system", supplied to the customer at the beginning of operation of the system. In this booklet are written all the maintenance operations executed. In such booklet it is to be provided a separate section for the recording of energetic data, for example those related to thermal energies (solar and integration) measured and recorded as stated in points 4 and 5. The booklet of the system, the complete and adequate documentation of the all the interventions, becomes on one hand a test document of the implementation and corrected execution of the interventions, finalized to the improvement of the process; on the other hand an evaluation instrument, in the time, of the reaching of the contractual duties. So it must be available for contractor and supervisory bodies. A schematic functional scheme of the system is enclosed too.

9. It is provided the delivery of the planning documentation, and an instruction manual for maintenance and management of the plant.

⁸ Since it is attended that such contract will be used, above all in the beginning phase, for the realization of new systems, it is necessary to preview a modality of preventive planning appraisal, generically defined "energetic diagnosis".

⁹ similar to the booklet of traditional thermal system, explained in the Italian legislation in the DPR 412/93

6.4 Situation, barriers and solutions in Spain

6.4.1 Current situation in Spain

Following the commitment acquired in the Kyoto summit and the growth of energy consume, which is reducing the contribution of renewable energies from, for example, 7% in 2003 to 6,5% in 2004, the Spanish government promoted the development of the Plan of Renewables Energies 2000-2010 (PFEERR). The plan's aim is to develop the market of renewables to assure a contribution of 12% of total primary energy in 2012.

According to the mentioned plan, in the horizon of the year 2010 an installed surface of 4.800.000 m² of solar thermal collectors should be achieved. At the end of year 2005 Spain had a total installed surface of approximately 800.000 m². In the year 2005 an amount of 106.800 m² solar collectors had been installed (23,3% market growth – source: ASIT).

Due to the insufficient growth and in order to reach the aims for the year 2010, the Central Administration decided to review the Plan of Promotion of the Renewable Energies (PFEERR 2000 –2010). In 2005 a new plan (PER) was approved by the government where new guidelines were included to assure that the aims will be reached.

The expectations seem to be favourable because there are many initiatives in this technology. Public administrations are promoting several initiatives related with studies and the construction of new solar plants. For instance, I.D.A.E. designed a model of Solar Order per Municipality that, after adaptation to each case, has been adopted by the main Spanish cities like Madrid, Barcelona, Sevilla etc. This model includes types of buildings where this ordinance must be achieved and requirements for solar installations, maintenance and landscape protection.

Apart from the above, some municipalities are adopting other kind of actions like:

- a) bonus on taxes referred to buildings, installations and civil works, etc,
- b) bonus on taxes for real estates
- c) dissemination and information campaigns about the advantages of solar thermal energy
- d) third part financing for industrial projects with solar thermal energy

The National government approved the "Código Técnico de la Edificación – CTE" last March, which is a national regulation for save energy in buildings by incorporating a percentage of solar thermal energy depending of the region (normally 60% of energy demand). This new regulation will be compulsory in case of new building and refurbishment of buildings with more than 1000 m² useful area or with more than 25% renovated facade. Now this code is sharing regulatory space with the old regulation but will be the only one after 1st October 2006.

The CTE regulation is the transposition of the Directive on Energy performance in buildings savings.

6.4.2 Legislative and bureaucratic Barriers in Spain

The general legal framework for contract awarding by public clients can be assessed as "predominantly positive". At first, the regulations for awarding contracts do not provide any obstructions for the use of energy services by public clients. Regulation concerning prevention of legionella bacteria in tanks, tubing and collector must be seriously carried out. Furthermore, each year inspections are achieved by public administration to the most important and risky installations.

In Spain the legal framework conditions for contracting projects are the same as for every other legal contract. However, difficulties appear when applying for the contract.

The law of public procurement regulates the award of contracts by contracting authorities on the basis of a "model approach". The law for "Contracting and procurement in Public Administrations" is compulsory.

For Municipalities, if the annual quantity is lower than 30.000 Euro, then the contract processing is easier, with a reduction of publicity and concurrency costs. In this case, the contract may be renewed every year, making feasible to sign a medium-long term agreement between Municipality and ST-ESCOs Company. There is no experience for public administration in preparing the technical and administrative requirements needed to request some offers. In case of the annual payment is higher than 30.000 Euro, contracting norms must be revised to be adequate for ST-ESCOs.

In case of a private purchaser, the project in question can be negotiated and awarded without the obligation to observe the provisions of the law of public procurement. The measures taken in connection with a more efficient supply and utilisation of energy are various and diverse. This results in a variety of different implementation "models" and consequently leads to a range of different goods and services offered. All these aspects determine the type and number of the parties involved, the required contracts and the types thereof, the financing terms, etc...

Laws allow the ST-ESCO to be established physically in the property of the customer. Conditions for going into the property of customer, responsibilities for maintenance and reparation of each type of installation related to the solar energy plant have to be reflected correctly in the contract. Beside this, the conditions for interrupting or ending the relationship are an important aspect to be taken into account when designing the contract.

Bureaucratic barriers are probably more important when it is decided to achieve this kind of project. The reason is not that regulation is very difficult to carry out but probably that public administration is too slow. The regulations as there is danger of legionella are normally rigorously inspected.

The most important barriers for ST-ESCOs projects in Spain are the fact that companies are not aware that this kind of project have a good profitability if technical and financial aspects are correctly studied and also that customers are not aware that a good energy management is an advantage against competitors. On the other hand, assurance companies should be trained for dealing with this kind of projects. At the moment ST-ESCOs projects are seen by this companies in the same way as photovoltaic plants.

In Spain subsidies to promote solar thermal installations are granted only one time and year by company. Companies with the main business of ST-ESCOs installations should be able to obtain these subsidies more than one time by year if the activities as ST-ESCO are correctly certified.

6.4.3 Possible solutions in Spain

As general solutions to boost a better growth of solar thermal economy the following ones are proposed:

The new code CTE used in designing new efficient buildings will allow to accelerate the growth of installed solar thermal plants due to the installation will be compulsory. The effect of new code will be appreciated in energetic statistics in 2008-2010. Local governments are responsible for the application.

Users must be aware that a good energy management may be competitive. Local energy agencies must present profitable cases and assess companies in the way of how to do a good energy management.

The ST-ESCOs must know the profitability of this kind of project. In Spain solar photovoltaic energy is very popular due to the fact that it provides an excellent cash-flow and can be paid off in 8-9 years. A good way to make solar thermal energy interesting is to compare it with photovoltaic. Some studies with the actual approved payment to photovoltaic show that profitability in case of solar thermal energy is similar or higher. The business of selling photovoltaic electricity is more usual than selling thermal energy so that it's better accepted.

Some companies related to solar thermal energy are interested to make their product in the south part of Spain. Government must motivate this kind of project in order to make solar energy well-known in Spain, stimulate companies to research, reduce costs due to reduction in transports and large scale productions.

All companies who want to invest in renewable energies can get back 10% of the investment when doing the tax account. Then the costs to be taken into account are 90% of the main investment.

The way of getting subsidies have to be revised by public administration in order to make the development of this kind of company possible by obtaining more than one subsidy each year.

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