Contract No XVII / 4.1031 / Z / 98-297

Completing the Market for Least-Cost Energy Services

Strengthening Energy Efficiency in the Changing European Electricity and Gas Markets

A Study under the SAVE Programme

Project Final Report – September 2000

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Executive Summary

Restructuring and liberalisation on the supply side of the electricity and gas markets have been accelerated by two EU Directives. However, this study finds that competition is not complete before full economic and environmental efficiency has been achieved by including the* efficient use *of electricity and gas, e.g., through Demand-Side Management (DSM). The study proposes to complete the internal electricity and gas markets by an EU Directive on DSM. This Directive would set a harmonised target for DSM to the Member States, but leave them freedom how to achieve this target in co-operation with their electricity and gas supply industries. Several possible routes for national DSM policy, adapted to the restructured and liberalised energy markets, are provided in the study.

Following the European Parliament and Council Directives 96/92/EC and 98/30/EC on common rules for the internal market in electricity and natural gas (IEM and IGM Directives), most EU Member States have restructured and liberalised their markets for these grid-connected energies. It can be expected that within a number of years, more competition on the **supply side of energy** will have been introduced.

However, the harmonisation of market conditions created by the IEM and IGM Directives does not extend to increased energy-efficiency on the **demand side**, i.e. in the final use of electricity and gas. Demand-side energy efficiency is offering large potentials for both economic and environmental improvement.

Therefore, under the framework of the SAVE programme, the European Commission (DG TREN) has granted financial support to this study group. The target was to examine the prospects and possibilities of energy companies contributing to increased energy efficiency through **adapted forms of** Demand-Side Management (DSM) and Integrated Resource Planning (IRP) in the Internal energy market (electricity and gas). The study also analysed how **adequate policy** could stimulate the uptake of DSM and IRP adapted to the new restructured and liberalised environment.

Research Actions Taken

In order to build such adaptations on empirical foundations, the study group undertook an **extensive survey** of the present and emerging electricity and gas market structures, of current and planned DSM and IRP activities in the EU, and of the current and planned use of mechanisms to remove barriers for/ to stimulate DSM and IRP in the EU. Based on this survey, a few "typical" market structures with their specific DSM/IRP conditions and incentives/disincentives were identified. For these basic market types, a set of six 'families' of policy mechanisms for support to DSM and IRP, which are compatible to the liberalised markets, were identified and analysed with seven common sets of criteria.

Eight workshops were held – one in each participating country – to present the preliminary findings and consult the expertise of practitioners from, e.g., governments, regulation authorities, the energy supply industry, customer associations, environmental NGOs, trade unions, scientific institutions, and consulting companies. The comments from these workshops were included in the development of a **comprehensive and consistent policy to remove barriers and to stimulate adapted DSM and IRP in liberalised electricity and gas markets**. This policy embraces both EU and the participating states levels and gives due consideration to subsidiarity issues.

Conceptual Issues

A point of departure for this study was the well-known fact: What customers really need is not energy, but genuine **energy services**, i.e. the physical amenity provided by energy-using equipment, for example cooking, illumination, thermal comfort, food refrigeration, transportation or product manufacturing. The provision of such genuine energy services thus requires a combination of energy-using equipment, energy, and energy-related services (e.g. advice on efficient equipment, energy performance contracting, and billing).

Hence, full economic and environmental efficiency can only be achieved by including the efficient use of electricity and gas into the competition, and developing a European Internal Market for genuine energy services in the above sense. And hence, the electricity and gas supply industries need to develop further to become industries for providing genuine **energy services**: combining efficiency on the energy supply side and efficiency in the final use of energy, to achieve the economic and environmental optimum and to address the transition to sustainable energy systems.

The complementary element to efficiency on the energy supply side is thus DSM. DSM can have a number of different objectives. In order to stress the objectives of economic and environmental improvement, we have defined the term Energy Efficiency DSM (**EE-DSM**), meaning DSM activi-

ties by energy companies or "energy service companies" which reduce the total costs of genuine energy services, and reduce primary energy consumption as a proxy for environmental improvement. EE-DSM can thus be end-use energy efficiency, fuel switching and load management which fulfil these conditions. If the customers pay the costs of the EE-DSM activity directly to the provider, we speak of an EE-DSM *service*; otherwise we call it an EE-DSM *programme*.

IRP has been developed as a method of business planning, seeking the integrated optimum of efficiency on the supply and demand sides of electricity and gas.

Results

With respect to the adaptedness and prospects of EE-DSM and IRP in the liberalised markets, the study finds:

The combination of unbundling, and competition in wholesale and retail supply, renders **IRP** as a method of planning for matching demand forecasts and supply capacities less useful and feasible for most energy companies. For network operators, or for suppliers to non-eligible customers, an adapted form of IRP is still feasible.

However, the **methods** developed under the IRP framework for integrated assessment of the cost-effectiveness of supply-side and demand-side options can still be used to analyse the most cost-effective options to provide to the customers the (genuine) energy services needed.

Liberalisation on the *supply* side of energy will not reduce most of the barriers, which exist on the *demand* side for a more efficient use of energy, e.g. lack of knowledge among end-users and providers of end-use technology, split incentives, high implicit rates of return, lack of funding, etc. Support to end users for energy efficiency is needed from market and policy.

Energy companies should, besides other actors, **continue to play a role in implementing energy efficiency**. They should become providers of genuine energy services at least cost and least environmental damage. Involving the energy supply industry can also bring considerable synergies to many instruments for promoting energy efficiency, such as incentives, standards, labels, co-operative procurement and other market transformation programmes. E.g., the customer contact that distribution and/or supply companies have can help to reduce the transaction costs and accelerate market transformation.

The crucial question is then: **Do the benefits that energy companies receive from DSM activities in liberalised markets match with the benefits to society?**

There are a number of situations, in which DSM can be **inherently profitable** for energy companies. Examples are: avoiding transmission and distribution system capacity upgrades in certain geographical areas, avoiding new generation capacity, or costly peak power purchase; selling DSM services to customers or market agents; increasing customer loyalty or the number of new customers; adding value to a business where margins are otherwise very low; or fuel switching towards the energy type offered by the company.

However, the empirical evidence so far suggests that such considerations have not yet lead energy companies to much EE-DSM in the liberalised EU energy markets, except to some EE-DSM services for large customers, and some efficient heating services in the gas market. Furthermore, there is the danger that liberalisation of the retail energy markets across Europe may undermine policy mechanisms that individual countries have adopted unilaterally. Therefore, **policy mechanisms are needed**, which create a **supportive framework** enabling energy companies to implement more EE-DSM, and are compatible with competition in the liberalised electricity and gas supply market.

As a guiding principle for policy on the national level, the empirical analysis showed that DSM has been most effective where **a combination of** an agreed or mandated, quantified target for energy savings, a channel or an allowance for raising funding, and for avoiding net losses, and a standardised and mandatory scheme for cost-benefit evaluation of the DSM has been created (e.g., in Denmark, the Netherlands, the UK, or the USA). The analysis of the mechanisms allowed us to identify **useful combinations of policy mechanisms** to create a supportive framework **for EE-DSM**. These combinations are presented in the table. They helped us to identify suitable policy mixes for **each of the eight participating countries**.

Main mechanism for creating a quantitative target	Main mechanism for raising funding
Level of **Dedicated Funds** to finance EE and EE-DSM	**Dedicated Funds** to finance EE and EE-DSM, from special levy or from taxes, administration by independent body or by energy companies
Obligations or **Negotiated Agreements** to implement EE-DSM	**Price regulation**, limited to monopoly segments*, to target EE-DSM programme **cost recovery**; Direct revenues from EE-DSM services
Common components of each combination: • **Price regulation**, limited to monopoly segments*, to **avoid** artificial incentives for increased sales • Other **legal and technical support** for EE-DSM services and programmes • **Requirement to report** on DSM results, using common evaluation methods	

* Distribution and transmission networks; supply to non-eligible customers

Recommendations

For policy action **at the EU level**, we conclude from our analysis that the best way to support a coherent development of EE-DSM services and programmes would be to **complete and harmonise** the EU Internal Markets for Electricity and Gas by **a Directive on EE-DSM**. This Directive should set a substantial, harmonised quantitative target for EE-DSM **to the Member States**, but leave it up to them by which policy mechanisms that create a supportive framework for EE-DSM by the Electricity and Gas Supply Industry the Member States wish to achieve this target. In this way, the **subsidiarity** principle is strengthened, allowing an implementation of DSM services and programmes adapted to the national electricity and gas markets and regulatory frameworks. We put forward the following **proposal for the contents of an EU Directive on EE-DSM**.

1. The Directive should address the creation, **by the Member States, of a supportive framework for EE-DSM** activities by electricity and natural gas transmission network, distribution network, and supply companies; and by independent ESCOs.

2. The Directive should **require the Member States to achieve a certain minimum level of energy efficiency improvement through EE-DSM programmes**. The minimum level recommended by the study group, based on empirical results, is to reach with **each year's EE-DSM programmes an additional saving, compared to the baseline** for the specific end-use technologies or customers targeted, **of 1 % per year**, of the consumption in each Member State in the previous year, expressed in TWh/year per Member State, to be additionally saved within each consecutive year. This target applies to the electricity and gas sector separately and to each Member State;
   and
   (ii) a certain minimum level of **investment** for **EE-DSM programmes**; the minimum level for each Member State which is recommended by the study group, based on empirical results, is 2 % of the total net revenue in that Member State from electricity and natural gas sales to final customers, i.e. net of taxes and levies. This target applies to the electricity and natural gas sector separately. The sum of the investments should be cost-effective. This EE-DSM programme investment must be additional to energy efficiency activities financed from the state budget at present.
   Complementary to this, the Member States shall support the development of a market for **EE-DSM services**. The Member States may achieve half of the savings target through encouraging EE-DSM services, if they can prove - through standardised bottom-up evaluation methods - that these services really achieve the savings. The investment target would then be reduced proportionate to the share of the savings target achieved by EE-DSM services. The limit to the contribution of EE-DSM services shall be revised after 5 years, based on the experiences with achieving and monitoring the savings from EE-DSM services.

3. The Directive should **leave it up to the Member States how** they achieve the quantified target (i.e., using which specific mix of EE-DSM supportive mechanisms), but give a **non-exclusive list** of some important EE-DSM supportive mechanisms (e.g., those analysed in this study);

4. The Directive should **require the Member States, where** price regulation of the remaining monopoly segments exists, to **align the development of revenues** over time more closely to the development of the relevant cost drivers in the price regulation.

5. The Directive should **require the Member States** to **report,** on an annual basis, to the European Commission on the amount of energy saved, and the cost-effectiveness of the EE-DSM implemented. The Member States would be required to use standardised bottom-up evaluation methods for monitoring the energy savings and cost-effectiveness of the EE-DSM implemented and for their reporting to the European Commission.

1 Overview of the Study and this Report

1.1 Introduction and Background

Following the European Parliament and Council Directives 96/92/EC and 98/30/EC concerning common rules for the internal market in electricity and natural gas (IEM and IGM Directives), most EU Member States have restructured and liberalised their markets for these two grid-connected energies. The European Council has, at the meeting in Lisbon in March 2000, called on the European Commission to examine and prepare initiatives for accelerating the opening of the markets for supply of electricity and gas to end-users. So it can be expected that within a number of years, the introduction of more competition on the **supply side of energy** will have been completed.

The supply side comprises the functions generation/wholesale, transmission network service, distribution network service, and retail supply (see Insert 3 in Chapter 3.1 for definitions). Competition is usually introduced at the wholesale and retail supply levels, while the transmission and distribution network functions are still considered 'natural' monopolies. The degree of competition at the generation/wholesale level varies considerably among member countries and might have higher effects - in terms of increased economic efficiency on the supply side of energy - than competition at the retail supply level. The latter, on the other hand, is the one, which has more impact on the possibility for energy companies to perform Demand Side Management activities.

However, the harmonisation of market conditions created by the IEM and IGM Directives neither extends to environmental priorities in electricity generation, e.g. concerning the market conditions for electricity from renewable energies and from cogeneration of heat and power (CHP), nor to increased energy efficiency on the **demand side**, i.e. in the final use of electricity and gas. Demand-Side energy efficiency is offering large potentials for both economic and environmental improvement. Therefore, the electricity and gas supply industries of today should develop further to become industries providing genuine (physical) energy services, which combine efficient energy supply and efficient final use of energy to achieve the economic and environmental optimum (see Insert 2 in Chapter 2.2 for definitions). The European Commission, in its communication of 26 April 2000 on an Action Plan to Improve Energy Efficiency in the European Community, has identified "energy services offered by utilities and SMEs" as one key area meriting policy support. Furthermore, the Commission's communication on EU policies and measures to reduce greenhouse gas emissions: Towards a European Climate Change Programme (ECCP) (Document COM (2000) 88 final) lists "Energy efficiency in the electricity and gas supply industries" as one of the proposed common and co-ordinated policies and measures on climate change.

Hence, the IEM and IGM Directives need to be complemented by a Directive or similarly effective initiative harmonising the conditions for the competition between efficient energy supply and efficient final use of energy. However, while a complementary Directive to secure an increase in the use of renewable energies is underway, the proposed complementary Directive on Rational Planning Techniques, which aimed particularly at improving the

framework for energy efficiency, is stalled in the European Council. A major critique concerning this proposed Directive was that it was no longer adapted to the restructured electricity and gas markets, which the IEM and IGM Directives had created.

Therefore, under the framework of the SAVE programme, the European Commission (DG XVII, now DG TREN) has granted financial support to a study group for examination of the prospects and possibilities of Integrated Resource Planning (IRP) and Demand-Side Management (DSM) in the Internal liberalised energy market (electricity and gas). The title of the SAVE contract for this study is "IRP in a Changing Market".

However, in the course of this study, we did not intend to examine whether IRP and DSM as developed in the area of franchise monopolies still fit to the liberalised electricity and gas markets. We neither followed the often-heard opinion that DSM and IRP are not at all useful in the liberalised electricity and gas markets. Rather, we intended to look at whether, and how, adapted forms of DSM and IRP can be useful, and for which types of energy companies, in the restructured and liberalised electricity and gas markets. And we knew that also a policy support for such adapted DSM and IRP will have to be adapted to the new environment.

Therefore, such adapted DSM and IRP are understood in this study as two possible ways (among others) to stimulate the competition for sustainable, least-cost (genuine) energy services (see Chapter 2.1 for definitions). This competition for genuine energy services completes the competition on the supply side of energy (at which the Directives for the Internal electricity and gas markets aim) by adding the (substitutional) competition between energy-efficient end-use technologies on one side, and energy on the other. There are other ways to stimulate the competition for genuine energy services, but this study focuses on the possible roles energy companies can take, and whether DSM and/or IRP can be instruments of energy companies to be successful in liberalised energy markets, which should be converting themselves to markets for sustainable energy services.

We know that the subjects of IRP and DSM can incorporate a number of conflicting interests. We have attempted as objective a description of the subject as possible, and this includes the description of the existing conflicts of interest. We do not intend to blame neither of the actors involved in DSM and/or IRP for any position or action they take or do not take, and we ask the reader to also take as objective a view as possible. We are happy for any feedback if there are different views of the readers on the issues examined.

1.2 Objectives and Work Programme of the Study

Objectives

The study has had two main objectives:

- To **provide European and National bodies with an analysis of the possibilities and the benefits of adapted DSM and IRP in the Internal liberalised energy market** (electricity and gas). This analysis includes an overview of current and planned DSM and IRP activities in the EU, and of the current and planned use of mechanisms to remove

barriers for/ to stimulate DSM and IRP in the EU. At European level, this analysis is targeted to the European Commission and other bodies like the European Parliament, while at National level it is targeted to policymakers and regulatory agencies. Stakeholders including the electricity and gas supply industries, as well as customer and environment protection organisations can also benefit from this study.

- To **develop recommendations for a consistent policy to remove barriers and to stimulate adapted DSM and IRP in liberalised electricity and gas markets**. These recommendations embrace both EU and the participating states levels and give due consideration to subsidiarity issues, particularly to the different national ways of energy market restructuring. There is not one solution for all countries but a basket of options, which can each be used with more or less intensity in each Member State. This is also reflected in the proposal for EU policy, which the study group developed.

Work Programme

The actions of the study were taken in during the following phases:

Phase 1	Refinement of work programme based on an analysis of basic market concepts
Phase 2	Analysis of changing markets: incentives and disincentives for DSM and IRP provided by different restructuring and liberalisation approaches
Phase 2.1	*National electricity and gas markets and the framework: status and changes*
Phase 2.2	*Comparing types of markets*
Phase 3	Possibilities for DSM and IRP in changing markets
Phase 3.1	*Review of activities and mechanisms on the national level*
Phase 3.2	*Comparing and analysing types of mechanisms*
Phase 4	Conclusions and recommendations
Phase 4.1	*Conclusions and recommendations for EU policy*
Phase 4.2	*Conclusions and recommendations for the energy policy of the participating countries complementary to existing or proposed EU actions*

In Phase 1, the theoretical foundations for the further analysis were laid. The need for, the meaning and the possibilities of an integrated resource planning and for DSM in partly or fully liberalised energy markets were examined. It was explored in theory which role electricity and gas companies and other actors (e.g., private energy service companies) can play to assist their customers in realising energy efficiency, which are the benefits of DSM and IRP for energy companies, and which disincentives or incentives to perform DSM and

IRP the energy companies receive from the market forces and/or from the evolving legal and regulatory system.

In Phases 2.1 and 3.1, the participants of the study undertook an empirical survey both of the present and emerging electricity and gas market structures, and of DSM and IRP activities in their countries. For this purpose, common questionnaires were developed, which were answered by the project partners (see Annex II). Other EU Member States as well as a few other important OECD and CEE countries (Australia, Norway, the USA; the Czech Republic, Hungary, Lithuania, and Poland) were included in this survey but with minor effort. The main aim of the survey was to empirically back the link between (1) the incentives or disincentives, which specific types of electricity and gas market structures, liberalisation, and the corresponding regulation before and after the implementation of the Directives on the Single European markets for electricity and gas exert on the energy companies to do IRP and/or deliver DSM, and (2) the degree to which DSM and IRP are actually used by the energy companies in the examined countries.

Phase 2.2 had the task to develop a few "typical" market structures with their specific DSM/IRP conditions and incentives as the basis for the further analysis.

Furthermore, in Phase 3.1 the existing mechanisms, which the Member States and the other examined states use, or plan to use, to make DSM and/or IRP attractive to energy companies, were collected and assessed.

Finally, Phase 3.2 analysed the appropriateness, for the basic market types developed in Phase 2.2, of existing and possible new mechanisms to foster the competition for sustainable, least-cost (genuine) energy services by making DSM and/or IRP attractive to energy companies.

The draft report for the analysis of mechanisms (Phase 3.2) was first discussed among the Study group and with the European Commission responsible for this study.

Based on the draft report for the analysis of mechanisms (Phase 3.2), a series of workshops in the eight EU Member States represented in the Study group was held in the end of 1999. The workshops served to test the preliminary findings with the expertise of practitioners from relevant actors, namely

- governments
- regulation authorities
- the energy supply industry
- customer associations
- environmental NGOs
- trade unions
- scientific institutions and consulting companies

The results of the workshops were included in finishing the analysis of Phase 3.2 on policy actions and mechanisms which can foster the competition for sustainable, least-cost (genuine) energy services by making DSM and/or IRP (more) attractive to energy companies. This, in turn, formed the basis for the conclusions and recommendations prepared in Phase 4.

1.3 Overview of the Report

After this overview of the study and the report, the report has five chapters and four annexes:

Chapter 2 and Annex I present the results of Phase 1 of the study, which also served as the preparation for the Phases 2 and 3.

Chapter 3 presents the results of Phases 1 and 2 on the implications from changing electricity market structures on IRP and DSM. This is also based on the more detailed results from the country surveys given in Annex II. Chapter 3 and Annex II also display the results on the use of DSM in the EU in the past, present and future.

Chapter 4 and Annex III present the analysis of existing as well as possible future policy mechanisms to remove artificial barriers, and to create a supportive framework for DSM and IRP. More information on policy mechanisms already in use in the individual countries can be found in Annexes II and III.

Chapter 5 makes a short analysis of different legislative options the EU has to stimulate the Member States to create a supportive framework for DSM and IRP.

Chapter 6 presents the study group's proposals for policy action on the EU and national level.

Finally, Annex IV presents the comments from the workshops in the eight countries on the draft proposals for policy action on the national and EU level.

2 Foundations for the Analysis

The purpose of this chapter is to provide a common understanding of the subject, and to lay the foundation and put up questions for the empirical analysis (see chapter 3 and 4 for the results). For this purpose, we have defined some technical terms concerning DSM/IRP (cf. insert 2 in chapter 2.2). Some aspects are treated with more detail in Annex I to this report.

In our analysis of IRP in a changing market, we will focus on

- the electricity (and partially gas) supply industries, because these are tied to using grids which are and will remain the physical basis of the natural monopolies in distribution and in transmission;
- DSM as the major "new" resource of IRP because (1) this is more innovative and generally more cost-effective, has a higher cost reduction potential and/or has higher environmental benefits than alternative (mostly distributed) generation options like CHP and renewables; (2) needs more policy guidance and stimulation than new generation options since DSM reduces kWh sales, and (3) there is already a draft EU legislation on the way to stimulate renewables (and a similar specific legislation for CHP seems more appropriate to us than including it into an IRP and/or DSM legislation).

2.1 What is the Basic Market - Energy or Energy Services?

Implications of different market concepts for economic efficiency

The main target of power and gas sector restructuring in the European Union based on the EU Directives on common rules for an internal electricity/gas market is currently to capture economic efficiencies in energy supply, resulting from direct competition of „producers“ of end-use energy and price setting by market forces. Market-based pricing, if it is not unduly affected by abuses of market power or other influences (such as overcapacities), will lead to prices closer to the long run marginal cost of production. Thus, market-based pricing would begin to address an early rationale for energy efficiency and renewable energy programmes of energy suppliers, which was that regulated prices did not accurately reflect the true marginal cost of production, leading to inefficient production and consumption decisions.

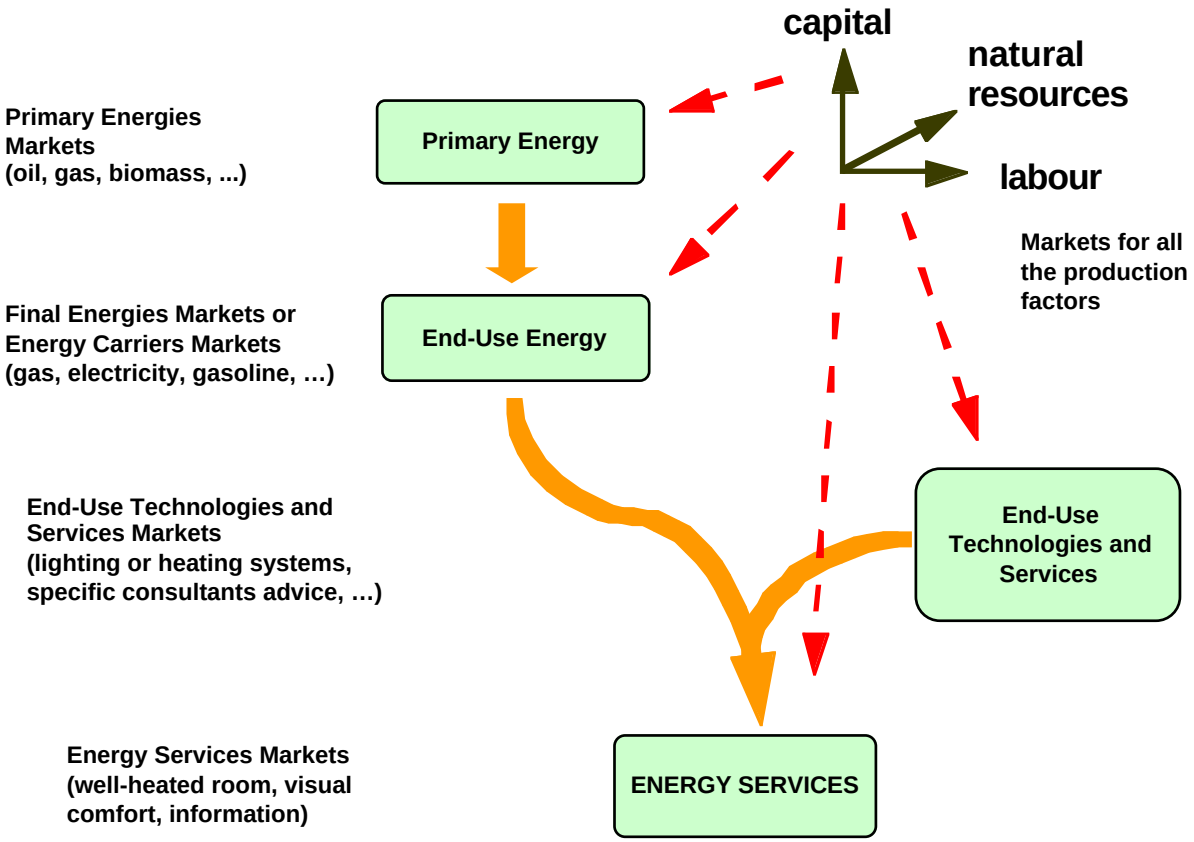
However, the cost-effective supply of end-use energy (e.g. gas, electricity) is only a necessary, not a sufficient condition for an efficient allocation of resources. End-use energy is not the end product, but only an intermediate product. Final consumers in industry, the private and public service, and the residential sector do not benefit directly from end-use energy, e.g. gas or electricity, but from genuine (physical) energy services, e.g. properly lit and heated rooms, „hot pizza and cold beer“. Therefore these genuine energy services, not energy („kilowatthours“) have to be provided with as little damage to health and environment and at the least cost.

We will not use a definition of “energy services” in a broader economic sense. Instead, we will call these **energy-related services,** which are targeted to final customers, e.g., energy efficiency services, advice on

efficient equipment, financing, system services (e.g., keeping frequency and tension constant), measuring and billing. Neither will we use the WTO terminology, which classifies transmission, distribution, and supply as "services" (as opposed to the generation function of electricity, which the WTO classifies as "production"), so these functions of the supply-side of energy could themselves be understood as "energy services". For this study, this is still the provision of **energy**, not of energy services (see Insert 2 in Chapter 2.2 for further definitions).

Genuine energy services, like well-heated rooms, are produced by converting final energy using end-use technologies. This process can become more energy-efficient if energy efficiency technologies and services (e.g., an energy-efficient heating system, targeted consulting) are used. End-use energy, and energy efficiency technologies and services are themselves combinations of the factors capital, labour (human capital, know-how, behaviour) and natural resources (see figure 2-1).

Figure 2-1: The final product: energy services, provided by interdependent markets

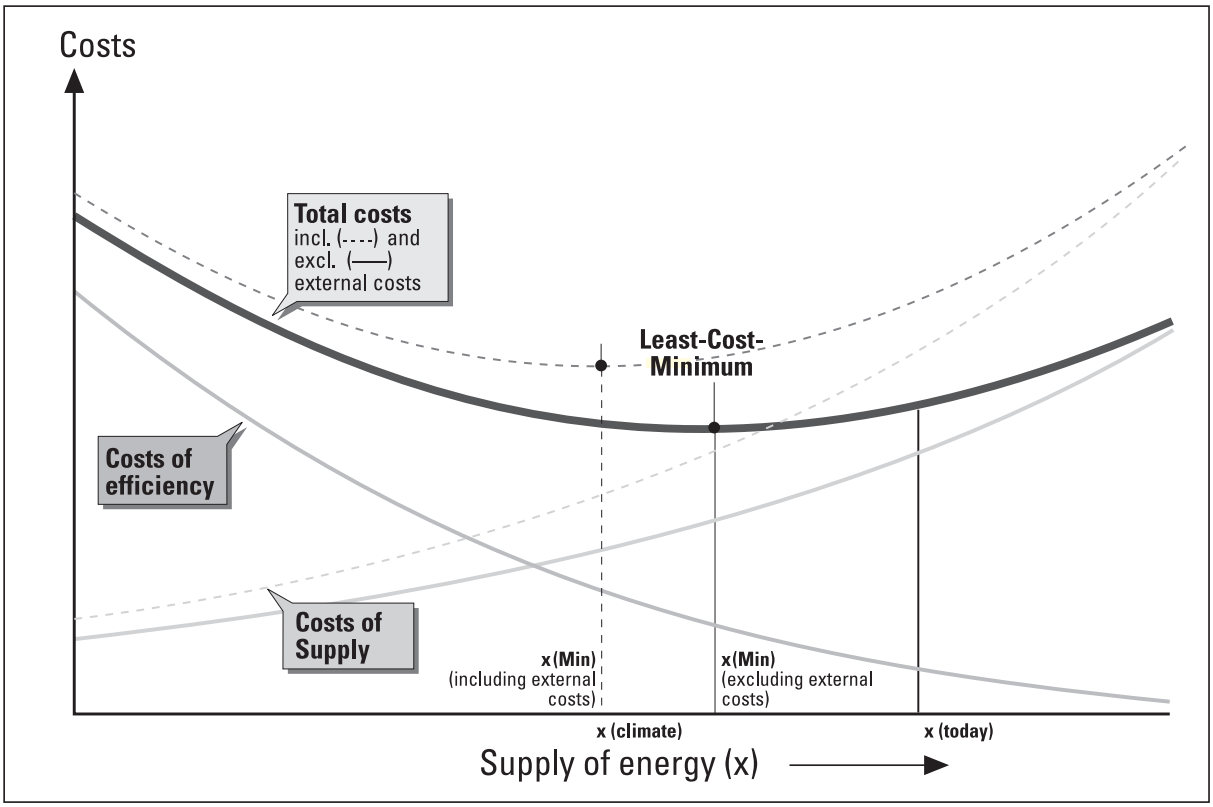


It is not sufficient to limit market reforms to only a part of the market by stopping at end-use energy. This is a clear result of economic theory: Only the optimisation over all stages of the production process of genuine energy services leads to efficient allocation, i.e. to a least-cost provision of genuine energy services. Thus, an integrated consideration of the market for the basic factors of production, the markets for primary, secondary and end-use energy, the market for energy efficiency technologies and services which are used to transform end use energy into genuine energy services, and the market for genuine energy services itself is needed, taking care of the interdependencies of the markets.

Implications for energy efficiency

One interdependence should be stressed because of its importance for energy efficiency: the substitutional relationship (also known as "trade-off") between end-use energy on one hand, and technologies (i.e., capital for investments) and services (i.e., know-how) which are used to transform energy into genuine energy services on the other. This substitutional relationship exists, because a specific demand for genuine energy services can be produced by different combinations of end-use energy and technologies/services, e.g. by a high input of end-use energy and cheap, but energy-wasting technologies, or by often more expensive, but highly energy-efficient technologies and services and a low input of end-use energy.

Figure 2-2: The economic optimum of the total costs as a result of the substitutional competition ("trade-off") between energy supply and energy efficiency



Source: Öko-Institut 1991 (adapted by Wuppertal Institute)

The additional costs of the technologies and services with high energy efficiency have to be compared with the reduced costs for the consumption of end-use energy. The least-cost optimum of the production of energy services (cf. figure 2-2) is reached if **marginal costs of end-use energy supply balance marginal costs of energy efficiency / load management**, i.e. the additional costs of energy efficiency/load-management technologies and services to avoid the use of a unit of end-use energy. Since there is still a large potential for energy efficiency/load-management measures in many fields of application below the marginal costs of end-use energy supply (symbolised by x (today) in figure 2-2), every move into the direction of the least-cost optimum increases energy efficiency and lowers the total costs.

This least-cost concept implies, that it is **low bills for** genuine **energy services** (i.e., low total costs for energy plus amortisation of equipment), **not low prices for end-use energy which count** (cf., e.g., Chapter 2.2 and Insert 1 for more details). This, in turn, has some important consequences for the competition concept to be pursued.

The most simple and well-known example for this trade-off between energy use and energy-efficient technology is the compact fluorescent lamp (CFL) compared to the standard incandescent light bulb. A high quality CFL costs around 10 EUR, i.e. 10 times as much as the incandescent light bulb; but the CFL lasts ten times as long and uses 4 or 5 times less energy. Hence, aggregated over the longer lifetime, the energy service from the CFL is much cheaper than from the incandescent light bulb. There are examples for this trade-off for all end uses of energy (cf. Chapter 3.3).

Implications for the competition concept

The problem is how to reach this least-cost optimum of the production of genuine energy services in practice. Reaching the allocative efficient minimum is typically not the result of a rational choice by an individual, independent decision-maker who possesses complete knowledge of the economy. In contrast, it is a socio-economic process with many different influential actors involved, facing bounded rationality. In this highly complex process, different decision making units (such as firms or households) interact or compete with each others, e.g. generators of electricity interact/compete with suppliers of CFLs, distributors of gas with producers of energy efficient condensing boilers, and suppliers of electricity with households saving energy.

Furthermore, approaching the least-cost optimum is not only a problem of allocating inputs to legal decision making units. It also depends on the interactions of the individuals within the decision making units, on their detailed decisions on how to use the inputs and on the actual performance of the units based on these decisions (problem of X-inefficiency, cf. Leibenstein 1978).

There are also a large number of other market imperfections and barriers on the supply-side and the demand side which hinder the full realisation of the cost-effective potential for end-use energy efficiency (cf. Annex I). While restructuring of the gas and electricity sector may help to reduce some price-induced obstacles to energy efficiency after some time as mentioned at the beginning, they also leave untouched most other barriers to implementation of end-use improvements and may even increase the magnitude of some barriers or introduce new barriers (for a more detailed analysis of these aspects cf. Annex I to this report, IEA 1999, and chapter 3 below).

For example, decreasing energy prices and energy bills because of increased **competition** in generation and wholesale and retail supply of end-use energy (i.e., **on the supply side of energy only**) will reduce the incentives both for final customers and for energy efficiency service providers to invest in increased energy efficiency. Thus, less energy efficiency will be realised, although the potential for cost savings through energy efficiency will still be higher

than the potential cost reductions due to reduced energy prices (Wuppertal Institute/Öko-Institut 1994, IPSEP 1995).

Furthermore, it will be insufficient, if energy companies provide energy-related services, particularly energy efficiency technologies and services, only to be more competitive in the market for end-use energy, e.g. to increase customer loyalty or as a part of canvassing strategies. The focus on end-use energy instead of genuine energy services and the incentive to increase sales of end-use energy will remain untouched.

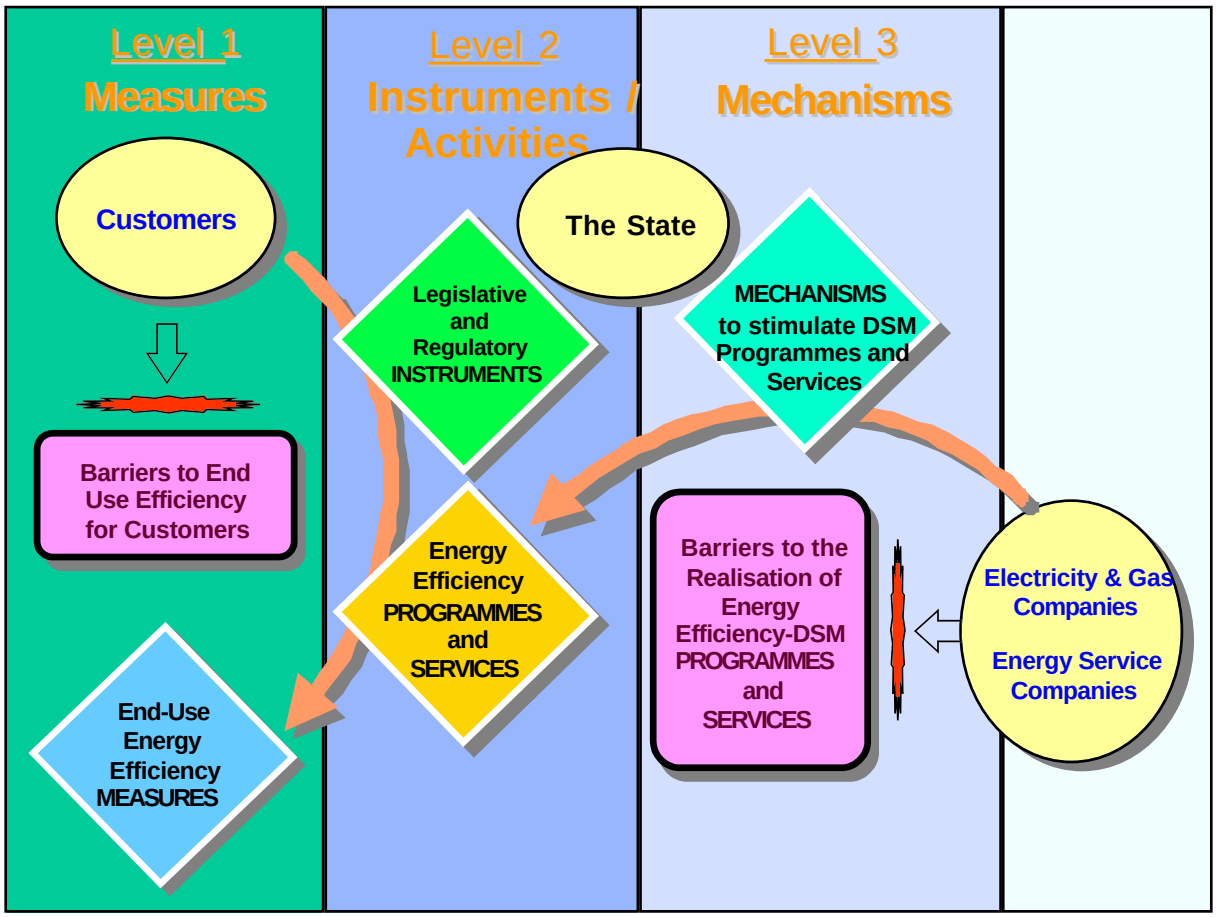
The **main problem** here is that particularly competition in the retail supply function will reduce the incentives for energy companies to engage in energy efficiency activities.

- There is a **disincentive** to invest in energy efficiency which reduces sales to the *own* customers of the energy company, since this reduces the profits connected to the energy sales. The incentive to increase energy sales and thus also external costs becomes overwhelming in competition for retail supply.
- The attractiveness of selling energy efficiency services to the customers of *other* suppliers is reduced by the decreasing energy prices.
- Hence, all existing barriers for demand-side energy efficiency will rather be increased, if competition is successful but restricted to the supply side of energy.

This is not an argument against reducing inefficiencies at the supply side of energy and for returning to the higher prices of the past. To the extent that the new, lower prices reflect the much higher, true long-run costs of the energy system to society (including "external costs") even less than before, this should be remedied, for example, by introducing or increasing energy taxes. However, an increased energy tax, e.g., in a context of an ecological tax reform which reduces other taxes, will be necessary but not sufficient to overcome the barriers to energy efficiency. It improves the profitability of energy efficiency measures, but does not reduce other barriers, which are not linked to energy prices (like, e.g., the „pay-back gap“). Thus, an increased energy tax will not reduce the too high transaction costs to final customers.

Therefore, what is needed for a decisive move into the direction of the least-cost minimum is a policy mix which addresses these interactions, removes barriers and therefore reduces transaction costs for the introduction of cost-efficient technologies to save energy. The following graph shows how energy efficiency programmes and services help customers to overcome demand-side obstacles, but also that energy policy may need to remove disincentives to energy companies to carry out DSM activities. And, of course, policy also has other instruments to assist customers in realising energy efficiency.

Figure 2-3: Barriers for energy efficiency existing on the supply side and demand side, and instruments and mechanisms to overcome them



The most important barrier to energy companies to perform DSM programmes and services will be, if their profits are reduced by the DSM, even if the DSM would be cost-effective for their customers (cf. Chapter 3.3, and Insert 1).

Market reforms, which support what can be called **"substitutional competition"** between end-use energy and energy-efficient technologies and services, are the most important part of such a policy mix. **The guiding question will be how to establish "markets for genuine energy services" within competitive "energy markets"**.

Therefore, crucial questions, which this study has tried to answer, are the following:

- How can genuine energy services be provided in an efficient way despite still predominant "kilowatt-hour" markets? I.e., which framework conditions are needed within liberalised European gas and electricity markets to institutionalise markets for genuine energy services? Particularly:
- Which actors could and should participate in this? Which role could energy companies play in this process,[1] and how can they operate in co-operation with other partners to develop the "market behind the meter"?

- How can the incentive structures be changed so that an energy company will win if it minimises the total costs of genuine energy service for its customers, not only the energy prices?

1 The perspective of our study is from the energy supply industry: how can today's electricity and gas companies develop to become providers of genuine energy services? This does not mean, however, that energy companies should be the only providers of energy services. In fact, as in energy supply a fair competition has to be ensured, a fair competition also has to be ensured, e.g., between distribution/supply companies and other, particularly private, small to medium ESCOs (see definitions in Chapters 2.2 and 3.1) in the markets for energy efficiency products and services, and finally, for the provision of (genuine) energy services.

Furthermore, most important is the establishment of market and regulation framework that eliminates artificial barriers and helps energy companies finance and organise energy efficiency if the latter is cheaper to the customers and to society than energy supply (cf. Chapter 2.2). Therefore, within the EU not only a harmonisation of framework conditions for direct competition between end-use energy producers but also for „substitutional competition“ must be ensured (cf. Chapter 5). However, this does not mean that the energy company itself has to implement every step of the energy service package; in most cases, it will, and should, co-operate with the market partners who can do it best.

2.2 What is IRP / IASDO and DSM?

DSM is any customer-oriented activity of energy companies, ESCOs or organisations related to them, and targeted to end-uses of energy, which reduces the costs of genuine energy services and the energy-related environmental damage (see Insert 2 for a more complete definition). DSM in this sense comprises end-use energy efficiency, load management and fuel switching which fulfil these conditions.

However, the condition to reduce the energy-related environmental damages, risks and the related external costs is likely to be subject to discussions. We therefore propose to use the reduction of primary energy use as a proxy for the reduction of energy-related environmental damages etc. This is justified as long as not 100% of the electricity and heat we use come from renewable energies. Therefore, Energy Efficiency Demand-Side Management **(EE-DSM)** is any customer-oriented activity of energy companies, ESCOs or organisations related to them, which reduces the total costs of genuine energy services and primary energy consumption. EE-DSM in this sense comprises energy efficiency activities, which achieve an overall reduction in end-use energy demand, as well as load-management and fuel switching, as long as they reduce the total costs of genuine energy services and primary energy consumption.

IRP is **both**

1. an innovative concept for the **business planning of energy companies**. As such, IRP seeks the least-cost combination of "traditional" supply options and new, usually distributed resources (particularly DSM, but also cogeneration of heat and power (CHP) and renewable energy sources). With the support of innovative energy policy, this profitable mix from the perspective of the energy company can also approach the least-cost mix (lowest overall costs) for the customers and for society as a whole (figure 2-2).

2. a concept for **energy policy and regulation** for achieving the least-cost optimum for the provision of genuine energy services shown in figure 2-2 for society as a whole. This implies the creation of a political and regulatory framework ("guiding rails") which aims to promote the substitutional competition between energy efficient technologies and energy. Therefore, energy policy needs to give the right incentives to energy companies and new actors to engage in the supply of least-cost genuine energy services. Where appropriate, the companies can use IRP as a business planning concept to determine the optimal resource mix.

IRP as understood in the classical sense means long-term energy planning with the target of technically comparing the complete inventory of resources to the total forecasted demand (load) in an area to achieve the following target:

Meeting the total demand for genuine energy services at least cost.

This traditional IRP process at the macroeconomic level ideally starts with formulating economic, social and environmental goals (e.g. CO_2) and fixing parameters and procedures (e.g. discount rates, planning time horizon). Then an inventory and analysis of demand for genuine (physical) energy services follows. Options to meet this demand for genuine energy services are identified, assessed, selected and combined into an Integrated Resource Plan. A short-term action plan specifies in more detail the various actions sketched in the Integrated Resource Plan. These plans, if prepared by a regulated company, have to be examined by the regulator, and should be discussed by the public. After decisions have been made, the realisation of the plans follows, accompanied by independent monitoring and evaluation.

In reality, the process will rather be a cyclic than a linear one; setbacks, skipping of phases and small cycles within the whole process are possible; furthermore, consecutive IRP processes are interlocked so that the last step of one IRP process forms the base for the first step of the next one.

Annex I displays a more detailed description of the steps of such a full scale IRP, and the actors involved.

However, **this traditional concept of IRP** focused on capacity expansion planning was originally developed when electricity and gas markets consisted of regulated utilities with a franchise monopoly and an obligation to match supply capacities and demand. Hence, this concept **is obsolete** for most types of energy companies **in fully liberalised markets**, as, e.g., a supplier competing with other suppliers for customers cannot plan to meet the overall demand of **all** customers in a given area. But for the **transition** phase, the concept could be used in those countries, which still have non-eligible customers, for the supply to this market segment. And an **adapted** form of it is still possible for transmission and distribution **network** operators.

Yet, it still does make sense in liberalised markets to compare the costs of innovative resource options (DSM, distributed generation[1]) on one side with the costs of (i.e. with the benefits of avoiding) additions to the "traditional" system (new centralised generation, T&D upgrades etc.) on the other when developing energy service packages which achieve the lowest bills for each customer. These energy service packages offered to the customer thus integrate energy-efficient end-use technologies and an appropriate form of energy supply. The target for the energy company actor is:

Meeting the genuine energy service needs of the supplied customers at least cost.

Understood in this sense, IRP would be an instrument for economic efficiency and optimisation at the micro-level which uses the same economic methodology and parameters, especially regarding pay-back times and interest rates, for the analysis and comparison of demand-side and supply-side resource options. This does not need a (long-term) capacity expansion planning. However, it means that an electricity supplier can plan to meet the demand for genuine energy services of **his** customers with a least-cost portfolio of, e.g.

1. buying electricity (from other generators, from the power exchange),
2. producing own electricity in centralised or decentralised plants,
3. selling packages of electricity plus energy efficiency programmes and services,
4. or selling energy efficiency services / equipment only.

This methodology is called **Integrated Assessment of Supply- and Demand-Side Options (IASDO)** for the purpose of this study. It is as useful in liberalised markets as in the former monopoly markets. However, competition changes the possibilities of financing the energy efficiency part in the energy service packages: while EE-DSM services are still possible, the financing of EE-DSM programmes needs the support from policy mechanisms (see Insert 2 for definitions of DSM and EE-DSM services and programmes, and Chapter 4 for mechanisms).

As already stated at the end of Chapter 2.1, offering energy service packages does not mean that the energy company itself has to implement every step of the energy service package; in most cases, it will co-operate with the market partners who can do it best, thus achieving synergies, lowering the transaction costs, and accelerating market transformation.

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1 The integration of distributed energy generation into the power planning perspective means a significant change compared to traditional power expansion planning. Distributed generation should no longer be fought as losses of sales volume but as (significant) contribution to least-cost power supply. This new paradigm is first reluctantly, but now widely accepted regarding distributed generation built and operated by the energy companies themselves for selling power to third parties via the grid, but in many regions distributed generation built and operated by other actors for meeting own loads continues to confront fierce opposition by incumbent generators. Also new investors in the power supply business are often not supportive towards customers that generate themselves part of the electricity required. There have been witnesses of technical, economic and institutional rules and practices that limit a fair access to the grid for distributed generators. In many regions these barriers have proven to be the most oppressing factor to the development of distributed generation opportunities.

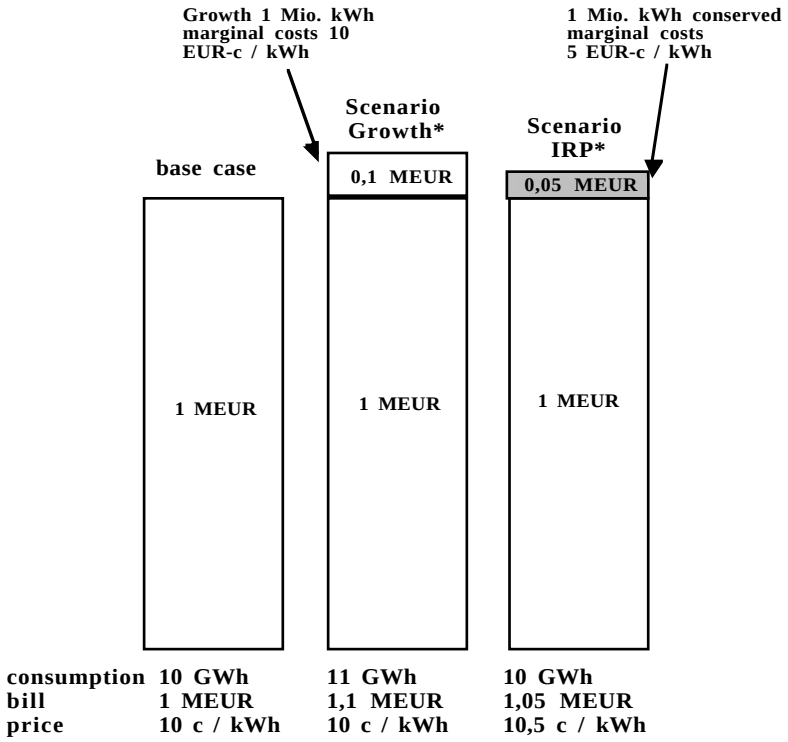
Furthermore, achieving fair competition also in the provision of energy-related services and, finally, of genuine energy services means, e.g., that transparency for the energy company, for other companies, namely small and medium private ESCOs, and for every consumer is improved.

IRP and IASDO both involve a change in the **criterion for economic efficiency**, following the considerations on the basic market concept in chapter 2.1:

It is low bills for genuine energy services, not low energy prices which count.

Insert 1:

The challenge of introducing energy efficiency services and programmes in markets for energy, or why low bills are more important than low prices



** Note that these two scenarios provide the same amount of genuine energy services, although the amount of kiloWatt-hours supplied and consumed differs*

The figure shows how cost-effective DSM reduces the costs of energy services, but may need moderate price increases to be economically feasible for the energy company which implements the DSM programmes.

The figure is **as simple as possible**, e.g., no profits are assumed, and price structure and effects of mechanisms are neglected. Starting from the base case, the demand for energy services increases by 10 %. Traditionally, the energy company will buy or generate 10 %

more power to sell it to the customers ("Scenario Growth"). For simplicity, we assumed that the extra cost for this is the same as the average price. Therefore,

in the "traditional" scenario,

- the total bills of the customers increase by 10 %;
- the average price stays the same as before.

In an IRP context, the energy company will implement EE-DSM programmes to meet the increased demand for energy services with a more efficient use of energy, instead of selling more power. We have assumed that the EE-DSM programmes are cost-effective and cost only half as much as additional power, which is quite often the case in practice. Furthermore, we have assumed that the DSM programmes can keep the energy consumption at the level of the base case. In this scenario,

- the total costs increase by 5 % compared to the base case, where it has to be noted that the amount of energy services provided has increased by 10 %.

Now, what are the effects on the customers and the energy company?

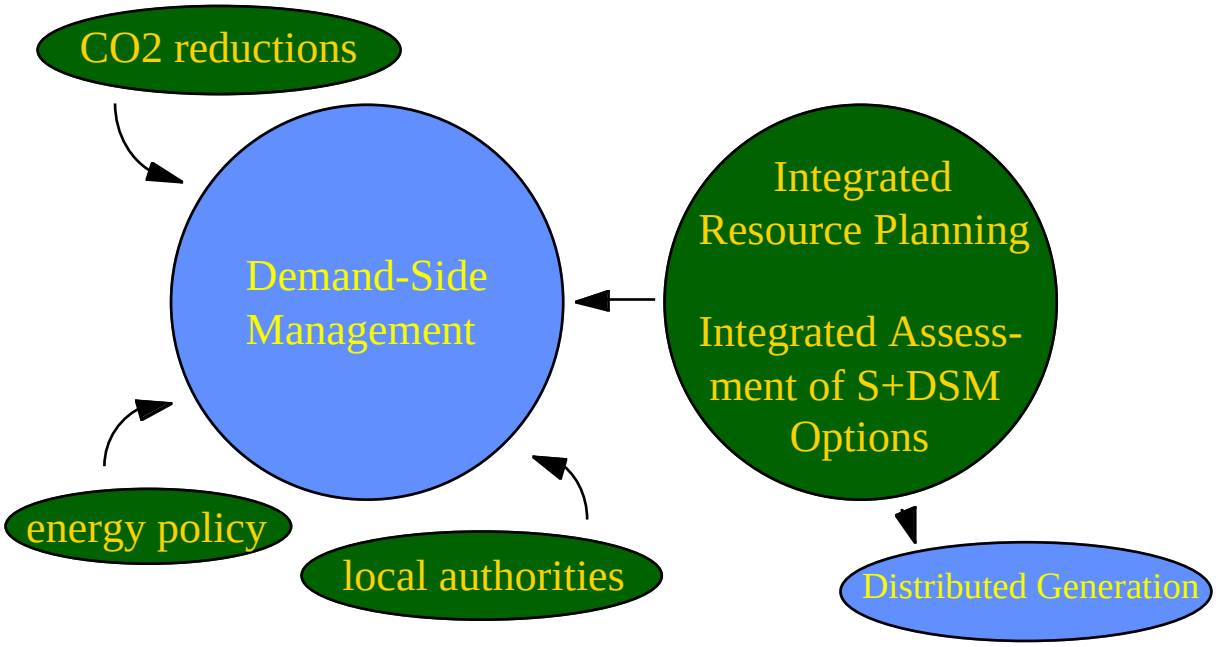
- If the price per kWh stays the same as in the base case, the customers get 10 % more energy services for the same bill. The energy company makes a loss of 0,05 MEUR.
- If the price per kWh is increased by 5 % to pay for the investment in energy efficiency, the customers get 10 % more energy services but their bills increase by 5 % less than in the scenario "Growth", and they consume 10 % less energy than in the scenario "Growth", and the energy company breaks even.

Therefore, comparing the scenario "IRP" with the scenario "Growth", **the customers** pay a little more for the kWh but **have lower bills in the scenario "IRP"**.

This simple example also shows that – both for regulated monopoly companies and for competitive companies – an additional revenue from the EE-DSM is crucial, or the company will lose profits. This additional revenue could either come from a price increase allowed by the regulator, or directly from the customers who benefit, or from another EE-DSM support mechanism in a liberalised market.

The rationale for DSM activities by energy companies can be manifold - it can be based on IRP/IASDO but also on other reasons coming from within an energy company or from the exterior world. IRP as a business planning concept, in turn, is based on the principle of comparing supply-side and demand-side options **on equal economic terms** (CEC 1987, Krause/Eto 1989) using the IASDO methodology. DSM is one option for IRP or IASDO, the others are innovative supply-side resources which can be compared to more "traditional" resources (see figure 2-4).

Figure 2-4: How IRP/IASDO and DSM are related



Insert 2: Definitions for IRP/IASDO and DSM

There is a vast literature on definitions for IRP and DSM. However, we have found that they are sometimes contradictory or do not accurately fit our needs. Therefore, we provide definitions for a few of the most important items for the purposes of this study:

Cost effectiveness - A DSM programme or a non-traditional generation resource (e.g., small-scale CHP) is called cost-effective, if the life-cycle costs of energy conserved or generated by this resource is lower than the long-run marginal costs of the traditional energy system avoided by the new resource. In determining cost-effectiveness of DSM resources, there are different

Cost/benefit perspectives - the costs and benefits of DSM resources are different from the perspectives of the customer who participates, of society, and finally of the energy company itself. The different perspectives are explained in Annex I.

Demand-Side Management (DSM) - For this study, DSM shall be any customer-oriented activity of energy companies (see definitions in Chapter 3.1), ESCOs (see below) or organisations related to them - in an IRP/IASDO context or not - which reduces the total costs of genuine energy services in the definition given below, and the energy-related environmental damages. DSM in this sense comprises energy efficiency activities which achieve an overall reduction in end-use energy demand as well as load-management (load-shifting, peak-shaving) and fuel switching as long as they reduce the total costs of energy services and the energy-related environmental damages, risks and the related external costs. We will only call it DSM if energy companies or ESCOs are involved in the funding and/or

implementation of the activities. There can be other actors promoting end-use energy efficiency, fuel switching or load management with funding from other sources (e.g., a state energy agency running a market transformation programme from tax money), but we will not call this DSM.

Furthermore, there is the distinction between (mostly technology-oriented) activities for which quantification is possible, and hardly measurable (mostly behavioural) activities which can both be part of a DSM plan. The latter can, however, hardly be evaluated as a resource in an IRP/IASDO process.

Energy Efficiency Demand-Side Management (EE-DSM) The condition to reduce the energy-related environmental damages, risks and the related external costs is likely to be subject to discussions. We therefore propose to use the reduction of primary energy use as a proxy for the reduction of energy-related environmental damages etc. This is justified as long as not 100% of the electricity and heat we use come from renewable energies.

EE-DSM shall be any customer-oriented activity of energy companies (see definitions in chapter 3.1), ESCOs (see below) or organisations related to them - in an IRP/IASDO context or not - which reduces the total costs of genuine energy services - in the definition given below - and primary energy consumption. EE-DSM in this sense comprises energy efficiency activities, which achieve an overall reduction in end-use energy demand as well as load-management and fuel switching as long as they reduce the total costs of genuine energy services and primary energy consumption.

DSM programmes - DSM programmes are specific DSM activities (e.g. targeted information, free energy audits, rebates for energy-efficient equipment, direct installation of efficient equipment...) taken by energy companies and ESCOs targeted to energy end-users or market agents (i.e., e.g., manufacturers or retailers of energy-consuming products). In contrast to DSM services, DSM programmes are activities not directly paid for by the customer or market agent who directly benefits. However, the customers will in most cases collectively pay for the bill reductions they get during the following years, through a financing scheme for the DSM programme. DSM programmes, which increase end-use energy efficiency, are called **energy efficiency programmes**. Other DSM programmes can be load management or fuel switching programmes. If they decrease primary energy consumption, all of these will be called **EE-DSM programmes**

DSM services - DSM services are specific DSM activities (e.g., audits directly paid by the customer, third party financing, renting of energy-efficient equipment...) taken by energy companies and ESCOs targeted to energy end-users or market agents (e.g., manufacturer or retailer of energy-consuming products). In contrast to DSM programmes, DSM services are activities, which are directly paid for by the customer or market agent who directly benefits. DSM services, which increase end-use energy efficiency, are called **energy efficiency services.** Other DSM services can be load management or fuel switching services. If they decrease primary energy consumption, all of these will be called **EE-DSM services**.

Distributed generation - When considering a concrete, specific generation unit, it mostly will be simple to agree on its distributed or central (non-distributed) character. Providing a general framework applicable on all feasible occurrences for making such distinctions is more difficult, especially with new entrants coming into the market after restructuring and unbundling. For the purpose of this study, distributed generation includes CHP, renewables and occasional generation (e.g. waste incineration), but not any condensing power (nuclear, fossil fired) or large-scale hydro plants.

End uses - Particular energy services (e.g., washing, cooking food, etc.).

End use technologies - Technologies which convert final energy into (physical) energy services.

(Genuine) Energy Services - The physical amenity provided by energy-using equipment, for example cooking, illumination, thermal comfort, food refrigeration, transportation or product manufacturing (Swisher/Jannuzzi/Redlinger 1997, 208; cf. also Reddy/Williams/Johansson 1997, and Nakicenovic/Grübler/McDonald 1998). For the purposes of this study **this physical definition of energy services is used,** but often with the adjective "genuine" to clearly distinguish it from other definitions of the term "energy services". The provision of genuine energy services usually requires a combination of energy-using equipment, energy, and energy-related services (see next paragraph for definition).

We will not use a definition of "energy services" in a broader economic sense. Instead, we will call these **energy-related services,** which are targeted to final customers, e.g., energy efficiency services, advice on efficient equipment, financing, system services (e.g., keeping frequency and tension constant), measuring and billing. It is possible to sell genuine (physical) energy services in the above sense, e.g., if the energy service of lighting a building (using a package of lighting equipment, maintenance, and electricity) is sold and billed on the basis of EUR/m^2/year, or if domestic refrigeration is billed on a monthly basis, including the rent of the refrigerator, maintenance and electricity. This truly is a provision of (genuine) energy services. All other economic activities, in relation to which energy is still sold and billed on the basis of kWh consumption, are in fact a mix of the provision of energy and/or energy-related services.

Neither will we use the WTO terminology, which classifies transmission, distribution, and supply as "services" (as opposed to the generation function of electricity, which the WTO classifies as "production"), so these functions of the supply-side of energy could themselves be understood as "energy services". For this study, this is still the provision of **energy**, not of energy services.

Energy efficiency - Reduction of the amount of energy required to accomplish a particular amount of (genuine) energy services.

Energy efficiency programmes - see DSM programmes.

Energy efficiency services - see DSM services.

Energy Service Companies (ESCOs) - Usually privately-owned, non-regulated companies which sell energy-related services, e.g. energy efficiency services, to retail customers. However, there might be energy companies (i.e. companies selling energy) that also are ESCOs in the sense of this definition. They are called **Energy Service Utilities (ESU)** for the purpose of this study. The ESU is the "ideal" supplier of genuine energy services at least cost of the future, i.e. a company which offers to the customers optimised (i.e. least-cost and with minimum environmental damage) packages of energy efficiency technologies and services plus the reduced end-use energy needed to fulfil the demand for (genuine) energy services. On the other hand, in a liberalised market, it is possible for privately owned ESCOs to include the provision of energy into their offer, and become ESUs this way.

Integrated Assessment of Supply- and Demand-Side Options (IASDO) - IASDO is a methodology to compare the costs of innovative resource options (DSM, distributed generation) on one side with the costs of (i.e. with the benefits of avoiding) additions to the „traditional“ system (new centralised generation, T&D upgrades etc.) on the other when developing energy service packages (i.e., energy efficiency technologies and services plus the reduced end-use energy needed to fulfil the demand for (genuine) energy services), which achieve the lowest bills for each customers. Demand-side and supply-side options are analysed using the same economic methodology and parameters, especially regarding payback times and interest rates.

Integrated Resource Planning (IRP) - IRP is an instrument of integrated strategic planning of supply-side and demand-side resource options on a specific system level (e.g. energy company business planning, regional or national planning) using the IASDO methodology. In the classical sense IRP means comparing the complete inventory of resources to the total forecasted demand (load) in an area. This traditional concept aims at balancing supply-side options and demand-side measures at the macroeconomic level until marginal costs of traditional or alternative (e.g. cogeneration, renewables) energy supply-side options equal marginal costs of energy efficiency/load-management. But also other goals of IRP are possible, e.g. minimising the amount of natural resources used, minimising the total emissions of resource allocations or maximising the level of employment. For the purposes of this study, **IRP is used synonymously to**

Least-Cost Planning (LCP) - An energy company applying the concept of LCP/IRP changes its business planning to provide the needed genuine energy services at least cost for its customers and for society. The focus is on low bills for genuine energy services, not on low prices for the unit (kWh) of energy (European Parliament 1998, 80), thereby also reducing energy-related environmental damages (e.g. CO_2 emissions, production of nuclear waste). This least-cost principle is common to both LCP/IRP and IASDO. In this sense LCP/IRP/IASDO is an instrument to reach the sustainability targets of European Energy Policy, e.g. climate stabilisation (cf. section 2.1).

Measures - Actual technological or organisational initiatives that change the energy efficiency or load structure of energy services. Most measures are to be initiated, realised and maintained by end-users, but through DSM programmes utilities can contribute to, share in or

take over the implementation of measures. Examples: change light bulbs, tune-up a heating boiler, replace pumps.

Mechanism - A mechanism is anything, which creates a supportive framework for energy companies to perform IRP, use the IASDO methodology and/or implement DSM (e.g. energy efficiency services). Thus, in contrast to programmes and services, mechanisms do not address end-users. Specific types of market structures can be inherently more supportive for implementing DSM, but mechanisms are specific government measures (e.g., a DSM funds with tenders for implementation or incentives given by the price regulation authorities, cf. chapter 4) attempting to overcome disincentives that prevent energy companies from the pursuit of cost-effective DSM activities, and thus also the achievement of European and/or national energy policy goals (cf. IEA 1999 and Figure 2-3).

More detailed lists of definitions on IRP and DSM can be found, e.g., in UNIPEDE 1994; Swisher et al. 1997; and on energy-related services in EC/Eurelectric 2000.

2.3 DSM, IRP and Policy Goals

DSM and IRP (see Chapter 2.2 for definitions) are potentially powerful instruments by which the electricity and gas supply industry can approach the main target derived from Chapter 2.1, i.e., to create a market for genuine energy services in order

to provide the needed genuine energy services at the lowest total costs for the customers and for society, while simultaneously reducing the energy-related environmental impacts.

Ideally, such a market for genuine energy services functions perfectly when the "substitutional competition" is complete, and external costs are internalised. Approaching this target may require the assistance of energy policy to remove disincentives for DSM and IRP by mechanisms which **realign the business interests of the energy companies with the public policy goals**.

DSM and IRP in this ideal sense will also serve to realise other, more general goals of energy policy:

1. to maximise social welfare, due to reduced bills for genuine energy services;
2. to minimise negative ecological impacts of energy supply and consumption, due to the reduced production and distribution of energy needed after energy efficiency measures;
3. to minimise negative social (in particular distributional) effects, due to reduced bills for energy services.

or, in short, to increase the sustainability of the energy supply industry and of the way the energy services demanded by consumers are provided.

DSM and IRP are extremely important for reaching these general goals in countries where the business-as-usual forecasts predict a high increase in electricity and gas consumption, but capital for investments in capacity expansions is scarce, e.g. in developing countries or to a lower extent in some EU Member States. But the same rationale on the contribution of DSM and IRP to these goals is applicable to mature energy systems. Here, the decision alternative is to replace old capacities with costly new capacities or to reduce the total capacity by promoting least-cost DSM activities.

DSM and IRP particularly can serve to maximise social welfare since they

- contribute to the realisation of the cost effective („win-win“) potentials of energy efficiency on the demand and supply side as well as of renewable energies; this will also
- improve the competitiveness of the industry and other branches of the economy in the EU and, most likely,
- contribute to the reduction of unemployment in the EU;
- enhance the reliability of energy supply (e.g., network reliability, availability of energy sources).

A realisation of the „win-win“ potentials for energy efficiency and renewables will also be crucial for the minimisation of negative ecological impacts. DSM and IRP could, however, also

- contribute to the development and market introduction of new energy efficiency or renewable energy technologies which are not yet cost effective but are expected to be so in the future.

While the realisation of "win-win" potentials increases employment, increases the purchasing power of households, and strengthens the competitiveness of business customers, further social (distributional) targets which might be considered in implementing DSM and IRP are to

- minimise cross subsidisation between customer groups and distribute social wealth effects of DSM and IRP fairly between energy companies and their customers, and evenly between customer groups;
- ensure access to energy-efficient and low-cost energy services to all customers.

These social aspects are important as it is often argued against DSM programmes that only participants win. This argument can be countered by the following:

1. Cross subsidisation cannot fully be avoided with any kind of investment, which is financed via the tariffs. This does not only hold true for investments in energy efficiency, but also for investments in power plants or lines, because investments in additional capacity caused by some customers will be financed via the tariffs for the whole customer group or even all customers.

2. In a dynamic analysis over a longer period of time, the „non-participants“ are not a group of customers which is permanently burdened. If DSM programmes are offered for all customer groups and for longer periods, every customer will get a chance to participate. Therefore, for a single customer the positive effects of his/her participation, and the slightly negative effects of a tariff increase will balance towards a reduction of the bill in the lapse of time. Moreover, there will be a significant cost reduction for all customers in total. Only a small minority will still loose money after a number of years. These are customers which might be hindered to take part in DSM programmes because of objective reasons (e.g., because of voluntary anticipation of DSM measures – but then the customer has had the benefits of energy efficiency for a longer time than the participants!). Furthermore, DSM programmes limit the risk of future price increases in general; e.g., because possible future price increases caused by investments in generation, transport or distribution equipment and/or fuel price increases will be dampened to the benefit of every customer.

However, low-income programmes particularly designed for a specific customer group should be funded separately if they are not cost-effective to society.

3 Energy Market Restructuring and its Implications for IRP and DSM

3.1 Basic Market Types in the EU Internal Electricity and Gas Markets

The focus of this study is on demand-side energy efficiency, and on the planning method of IRP/IASDO, which is an economic basis for implementing DSM programmes (and new generation options) instead of the traditional energy supply options. However, as the restructuring of energy markets (see Insert 3 for definitions) is changing the possibilities and incentives for energy companies to implement DSM programmes and to perform IRP , we have to analyse this influence of the changing **energy** markets on the target of creating markets for genuine **energy services**. Therefore, we have to develop a characterisation of restructuring elements and of restructured energy market types, in order to analyse the incentives and disincentives for EE-DSM programmes and services (and thus for IRP/IASDO as the background for EE-DSM programmes and services offered by energy companies) they create.

As the two main features for characterising a basic market type or market structure for a national electricity or gas market we regard

1. the kind and degree of Competition;
2. the Bundling/Unbundling of energy sector functions.

These market types, of course, vary further, e.g., with the following characteristics:

- Concentration
- Ownership
- Regulatory Regime

These characteristics are further described and analysed in Annexes I and II. We also have included their impact on the DSM activities in Chapter 3.3 below. But for the analysis of the appropriateness of DSM support mechanisms, and of IRP in liberalised markets, we have defined three basic market types based on the two characteristics of competition and unbundling.

Insert 3 presents a number of definitions for items regarding the restructuring of and the participants in the electricity and gas markets, before we proceed to define the three basic market types.

Insert 3: Definitions for Market Restructuring

Liberalisation - Introducing or increasing **fair** competition, fair market entrance for „newcomers“ and reducing monopoly power in a market. In order to introduce such fair competition, liberalisation needs re-regulation of the market and deconcentration of market power.

Re-regulation - Restructuring the regulatory framework of a market, thereby improving regulatory power, e.g. by better defined points of attachment for regulatory intervention, building up regulatory power in some areas while reducing it in others. It is needed in the course of liberalisation to ensure fair competition and fulfilment of public service obligations.

Restructuring - Changing the structure of a market considerably, redefining framework conditions, e.g. laws, regulations, taxation. Typical elements of restructuring in the electricity and gas markets include some or all of unbundling, privatisation, liberalisation/re-regulation introducing competition in electricity generation and/or retail supply, or deregulation.

Utility - Conventionally meaning: More or less vertically integrated, public or private or mixed ownership conglomerates which supply, e.g., electricity, gas, district heat, water, or a bus or railway service to the private, public and business consumers in a constituency. Since these companies have been founded to fulfil public goals (e.g., security of supply, environmental targets) they have been called public utilities. Broader meaning: Energy company. Because of the unprecise definition of the term utility, we will only use it sometimes for the integrated energy companies of the traditional energy supply industry, but **not** for discussing restructured electricity and gas markets. For the different types of companies active in restructured electricity and gas markets, we will either use the precise definitions, or, as an overall term:

Energy Company - Every privately-owned, public or mixed-ownership company, which is active in at least some of the businesses of production, transmission, distribution or sale (retail supply) of electricity, gas or district-heat. In this study the term „energy company“ is preferred to avoid speaking of "utilities" associating the conventional meaning of utilities as public service companies. If possible, we will use the more precise definitions for the different types of energy companies:

- **Generator** - an independent company or a part of an integrated energy company, which has the task to generate electricity;
- **Transmission Company** - an independent company or a part of an integrated energy company, which has the task to transport power at the high-voltage (for gas: high-pressure) interconnected systems to either suppliers or to large final customers, typically over longer distances;
- **(Independent) System Operator (ISO or TSO)** – a sometimes independent body which carries out the operation of the transmission network, and particularly the dispatch of the power plants based on objective principles (and not on preferences of the owner of the grid, who may also own power plants);

- **Distribution Company** or **Distributor** - an independent company or a part of an integrated energy company, which has the task to transport power at the medium- and low-voltage (for gas: medium- and low-pressure) interconnected systems to either small suppliers or to small and medium final customers, typically over shorter distances;
- **(Retail) Supplier** or **Supply Company** - an independent company or a part of an integrated energy company, which has the task to sell electricity (gas) to final (retail) customers.

Eligible Customers - Customers inside the territory of an EU member state, which have access to competitive suppliers of electricity and gas according to the national implementation of the IEM and IGM Directives. These Directives require the Member States to allow access at least for large customers (with a threshold of minimum annual consumption of electricity resp. gas for eligible customers, established by the Directives and decreasing over time) and for distribution/supply companies to the extent they sell to eligible customers.

Further lists of definitions for market restructuring/the implementation of the IEM and IGM Directives can be found, e.g., in the Directives themselves and in the guides to the Directives (see, e.g., http://europa.eu.int/en/comm/dg17/elec/memor.htm for the guide to the IEM Directive).

The EU Member States show different combinations of electricity and gas market characteristics for every country. For example, the degree of competition at the generation/wholesale level varies considerably among member countries and might have higher effects - in terms of increased economic efficiency on the supply side of energy - than competition at the retail supply level. The latter, on the other hand, is the one, which has more impact on the possibility for energy companies to perform Demand Side Management activities. Therefore, for the analysis of the impact of energy market restructuring on DSM and IRP, it is possible to define basic market types taking into account two characteristics: the level of retail competition (compared to the minimum required by the IEM Directive, app. 26%) and the unbundling of the distribution and supply activities. Figure 3-1 illustrates the EU Member States' situation regarding the following three market types:

Market type 1: partial retail competition, i.e. a market, which still has non-eligible customers, and hence franchise monopolies for the supply to these customers; in some cases, only the minimum market opening required by the IEM/IGM Directives is implemented. The unbundling of electricity or gas sector functions is of minor importance here.

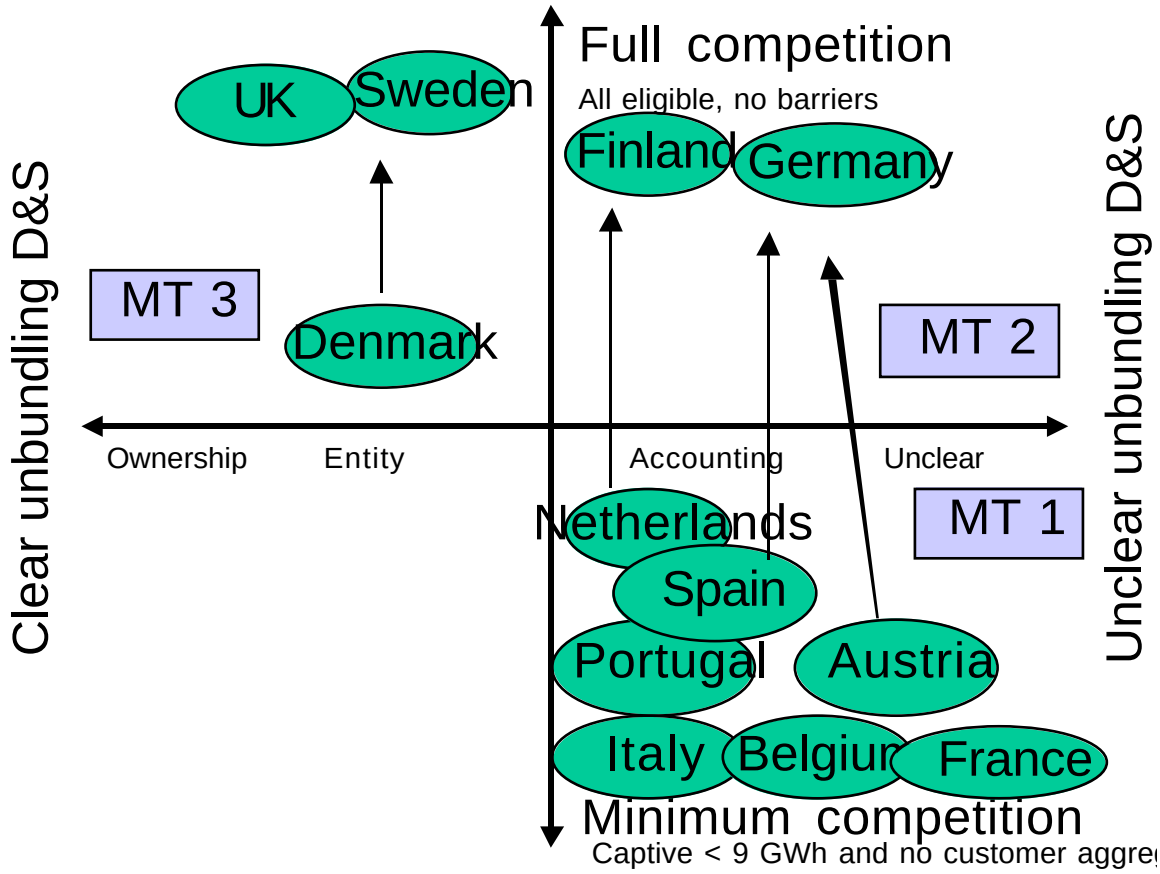
Market type 2: full retail competition, i.e., all customers are eligible customers, but the rules for market access may **not** be very clear, and the distribution network companies and the retail supply companies are not clearly separated.

Market type 3: full retail competition, i.e., all customers are eligible customers, and the rules for market access **are** very clear, and the distribution network companies and the retail supply

companies are clearly separated (i.e. at least by entity). Such separation can have both negative and positive implications for DSM.

Presently, the EU Member States fit into these three basic market types as follows:

Figure 3-1: Basic electricity market types, and EU Member States



3.2 Implications for IRP in Liberalised Markets

3.2.1 IRP Options and Energy Sector Actors in Liberalised Markets

IRP has been developed in a world of regulated and in many cases vertically integrated monopoly utility companies. Now, electricity and gas markets are changing, mainly due to the introduction of **unbundling** between generation, transmission and distribution, and of **competition** in generation and retail supply. Therefore, this chapter has to answer the question:

What are the possibilities for IRP in more or less liberalised electricity and gas markets?

In Chapter 2.2 we have defined two levels of IRP, the full IRP and IASDO. At the micro level IASDO is an instrument for developing the market for energy services using benefit/cost tests. Using the optimal mix of least-cost resources in (long-term) capacity expansion planning is what we have called "classical" IRP.

There are still a number of **possibilities for using the IASDO methodology** in liberalised markets. It could be used by

- **a retail supplier** who could try to provide genuine energy services at least cost, including demand-side energy efficiency. The question for retail suppliers (both in competitive markets and in franchise markets but with regulation schemes without a decoupling of profits from sales) is, however, whether this target is superceded by the basic incentive that increasing energy sales will increase the supplier's profits. Therefore, retail suppliers, which have this basic incentive, are likely to prefer financing schemes (e.g., TPF or leasing), i.e., DSM services, to financial incentive schemes, i.e. DSM programmes. If they still implement DSM programmes, they are tempted to implement small but highly visible schemes, which increase customer loyalty. However, energy efficiency services, for which cost effectiveness can be proved, can help to retain or gain new customers;

- **a distributor** who could try to avoid distribution system capacity upgrades by DSM (load management and energy efficiency). The question for society here is whether the cost-effectiveness of DSM programmes should be calculated only against avoided distribution costs - which would the natural perspective of a pure distributor but sub-optimal from the societal perspective - or against full avoided costs for society, i.e. including generation, transmission, supply. This is a challenge for the regulators, since the distribution system will remain a regulated function of the electricity supply industry. A similar approach could be taken at the transmission system level by the independent system operator (see below);

- **a local distributor/supplier** who obviously integrates the perspectives 1 (supplier) and 2 (distributor) discussed here, but with wider social objectives. Particularly for municipally owned local energy companies, their contribution to achieving the municipality's CO_2 reduction targets is an equally important motivation to perform DSM and energy efficiency programmes. However, it must be economically feasible for the local energy company, and this is an issue of DSM support mechanisms (cf. Chapter 4);

- **a single buyer** who is in a similar position as a distribution/supply company, as the single buyer is either linked to a distribution or a transmission network operator, and is trading electricity. Therefore, the single buyer can as well as the distribution/supply company compare DSM and other distributed resources with the full avoided supply costs of central generation resources;

- **the state** (or the regulator) who could use the IASDO cost benefit tests to assess and implement alternative energy efficiency solutions with or without energy sector involvement, e.g., a levy on the distribution or supply price to create an energy efficiency

funds (like the Public Benefits Charge in California, or similar levies in Denmark, Norway, and the UK), and an independent energy efficiency organisation (like, e.g., the EST in the UK). Such a scheme could also be used to stimulate energy company involvement in IRP/IASDO and DSM by giving any single distributor or supplier the freedom to either pay the levy or to spend the money on own DSM, provided the cost-effectiveness can be proven;

- **the municipalities** (in giving franchises) **or the state** (in giving supply licenses) who can oblige the owners of the franchises or licenses to examine DSM and other distributed resources according to the IASDO cost-benefit methodology, and to implement cost-effective distributed resources.

In a fully liberalised electricity market, this type of IRP may maintain its validity in local/regional contexts where municipal/intercommunal distribution and supply companies continue to look after retail supply. This type of IRP will be truncated somewhat at the generation side because the traditional central power generation options are not under the scope of these companies. However, it is not necessary for an energy company to be fully vertically integrated in order for it to benefit from DSM or from IRP. Under the appropriate regulatory conditions, an electricity distribution/supply company can benefit from DSM in the same way a vertically integrated energy company can. A distribution/supply company can replace electricity purchases with low-cost DSM (or with cost-effective CHP and renewables) in precisely the same way a vertically integrated energy company can use DSM to replace energy and capacity from its own power plants. Some of the planning policies and practices may be different from the ones appropriate for vertically integrated energy companies, but the general approach is the same. However, this frees resources to analyse more in depth the demand side and the decentralised generation options. Moreover, in principle, the disconnection of the distribution and retail supply activities from the central generation function will be beneficial for pursuing energy efficiency more vigorously.[1]

In a market with a segment of non-eligible customers, the IASDO is even more easy to implement for the distribution/supply companies which have the franchise for the supply to the non-eligible customers. However, it depends also for them on the existing incentives from the regulator and the state whether they will be able to implement any DSM (cf. Chapters 3.3 and 4).

There are also actors in liberalised markets for whom this form of IRP/IASDO obviously does not make sense, e.g., a pure generator. However, as soon as a generator sells directly to a customer, this company could add energy efficiency to the service it offers to the customer.

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1 In a vertically integrated monopoly, interests of the generators generally dominate the interests of the retail suppliers. In a traditional regulatory setting, both generators and retail suppliers receive incentives for expanding their sales volume. When energy efficiency is imposed on the monopoly, implementing efficiency measures and DSM activities will be the task of the retail supply departments. This task will not be supported by the generators, especially not in an over-capacity situation. When moreover generators operate in a competitive market, they perceive energy efficiency as a negative development.

Concerning the **use of IRP as a long-term planning instrument**, the prospects are probably more restricted. In a fully liberalised market, individual energy companies are not obliged anymore to secure that future demand will be met by the supply for a specific area. Plant owners will retain or retire a plant on the basis of whether they expect to make profits, not whether the plant is needed to secure supply. Hence, the use of IRP as a long-term planning instrument is, in principle, applicable to actors who still have to care for matching supply and demand in the long run. There are three actors who could, in principle, implement this:

1. **The independent system operator (ISO)**, who is responsible for the operation of the transmission system and for matching supply and demand on a national or regional level. He could be interested in such a long-term planning to ensure his ability for matching demand and supply also in the future, at least costs. The problems with the reliability of supply this summer in California demonstrate why an ISO could be interested in this. Still, this will probably only be in his interest if the ISO is not linked at all to a generator. Even then, regulatory obligations and incentives could be necessary to make the ISO perform IRP.
   When the ISO fills in its prescribed role of an arbiter among on the one hand generators and on the other hand suppliers to final customers and the loads on the transport grid, the ISO takes a crucial position on the whip for balancing the various options of an IRP-plan. But it is not given that this position will be used for the promotion of IRP. First, the ISO should be regulated for this (additional) task. Secondly, the ISO must then have the powers to request sufficient information from the generators and from the end-users (the latter through the service suppliers). Thirdly, it should be decided whether the ISO himself handles the instruments to match supply and demand in the future conform the IRP plan, or whether he must wait for initiatives by policy makers. The former approach loads more responsibility and liability on the ISO, e.g. in working out a full-fledged bidding system for power suppliers and for DSM activities including monitoring of the performances. The latter approach may retard and bias the execution of the IRP.
   DSM resources could be acquired by the ISO in nation-wide competitive tendering schemes; the DSM costs could be recovered via the transmission charges. However, the system boundaries are an important issue in restructured electricity markets. E.g., the EU internal market for electricity has *national* ISOs but the target of a competitive *international* trade for electricity. Therefore, this model in its pure form may only be applied on the level of the EU as a whole, requiring an EU-wide ISO regulation system. However, in practice such an approach is still possible in island electric systems and maybe even on a national level, as long as there are limits in trans-border transmission capacity.

2. **The single buyer**, who is responsible for the uniform operation of the respective grid it is in charge of (e.g. a national, a regional or a local system) and/or for the centralised purchase and sale of electricity in this system, could perform a long-term planning. Being a *single* buyer, he still has the knowledge about the total load and consumption in his system, and can thus, in principle, make a long-term expansion planning not only of the network, but also of the generation capacity. However, the predictability of any generation capacity expansion planning on a regional or national level is, as for the ISO, restricted in

the EU through the target of the IEM Directive to promote the electricity trade across system borders, and the possibility for eligible customers also in the system of the single buyer to purchase electricity from suppliers outside the system of the single buyer.

3. Alternatively, **the state** could perform such a long-term planning, e.g. in a co-operative planning process with the electricity sector, with more emphasis on the target of increasing economic efficiency through DSM, and with wider environmental and social goals, e.g., CO_2 reduction. Again, this may only make full sense for the EU on the EU level where the exports and imports of electricity can be controlled. Both on an EU and a national level, IRP in this respect might be integrated in a wider environmental policy planning process. The Netherlands and Denmark may be examples where this level of planning has been playing a significant role in promoting and realising energy efficiency and renewables in the electricity sector.

However, in some states where there may continue to be a **market segment for non-eligible customers** for a longer time, such a full IRP could be performed for this market segment, because here the area-based demand is predictable for the franchise supplier. It can thus aim to match demand and supply at least costs; although this is restricted on the side of the network capacity which is shared with the eligible customers, this is considered a minor restriction. An **example** for such a country is **Italy** where in fact a so-called "Sole Buyer" has been created to centralise the power purchase for this group of customers.

3.2.2 Conclusions

In liberalised markets, there still is a need for using the IASDO methodology to assess the cost-effectiveness of DSM activities. In markets with a segment for non-eligible customers, even a form of full IRP is possible.

The more important question is, however, whether the **DSM,** which is cost-effective to society and the customers, will also be **attractive to the energy companies**. This is the question we have to ask in Chapters 3.3 and 4.

3.3 Implications for DSM in Liberalised Markets

3.3.1 The Need to Stimulate Energy Efficiency in Liberalised Energy Markets

The rationale for any energy policy action to promote the rational use of energy is that there are a number of market imperfections, barriers, or obstacles for the uptake of cost-effective energy efficiency technologies by the end users.

In **Annex I**, we show in detail that full liberalisation in energy markets, i.e. perfect competition in generation and supply, may give the customers the correct price signals, i.e.

prices equal marginal costs. But apart from this and, maybe partially, the "pay-back gap", none of the important barriers on the demand side is reduced by introducing competition in energy supply. Among the most important of these barriers are (European Parliament 1996; a more detailed description of barriers can be found, e.g., in IEA 1999):

- The disparity of discount rates (the "pay-back gap": energy companies with access to low discount rates build power plants and lines, although they are more expensive than end-use efficiency);
- Lack of information, both with energy users and with suppliers of end use equipment;
- The investor-user-dilemma (also referred to as 'split incentives': owners e.g. of buildings and offices seek to minimise investment costs since they will be paid the energy costs by the users);
- Financing problems, mainly for households, small and medium sized companies, and public entities;
- The rules of public budgeting, making it difficult for public entities to finance energy-efficiency investments from savings in energy costs (and similar rules exist in large companies);
- A perceived risk of new, more efficient technologies;
- Disincentives to suppliers of end-use technologies (e.g., engineers get paid proportional to investment, not to energy efficiency).

Hence, there clearly is still a need for policy action to promote demand side energy efficiency after competition in energy supply has been introduced.

Furthermore, an imperfect competition in electricity generation may worsen some price-induced and supply-side obstacles, even more so if coupled with retail competition. Maybe the worst effect of retail competition is the increased incentive for energy companies to focus on increased kWh sales.

On the other hand, it may be argued that after the „price race to the bottom“ has come to an end (because long-run marginal costs will fix a bottom line, after overcapacities have been removed from the market) competition based on additional value added to the homogenous product „electricity“ will increase. Therefore, the chances to compete with quality and energy efficiency services instead of only cheap electricity could increase (cf. Diamond 1998).

Empirical analysis shows that particularly for big customers there is some evidence that the supply of EE-DSM or other energy-related services increases if the margin (per kWh) in that business field is higher than the margin for selling only cheap kiloWatt-hours. But the problem remains, that

- in absolute terms most revenues and profits are earned from increasing sales as much as possible,

- the positive incentive to invest in end-use energy efficiency is very weak, and
- there is a crucial time factor to integrate more climate protection activities into the investment portfolios of energy companies **now**, not in 10 years or more.

Retail competition, furthermore, can introduce **additional barriers** for energy efficiency, eg

- *customer instability* increases the risk of losing sales if rate-financed energy-efficiency programmes are implemented, although these would reduce customer *bills*;
- this contributes to a more *short-term perspective* on any resources, which favours resources with low capital investment (e.g., gas-fired combined cycle plants without cogeneration) over resources with a higher initial investment but lower running costs (e.g., cogeneration, demand-side energy efficiency). The lower prices which are mostly a result of competition in generation, in turn, contribute to a more *short-term perspective* on the *customer side* as well, reducing the awareness of demand-side energy efficiency options.

This is not an argument against reducing inefficiencies at the supply-side of energy and for returning to the higher prices of the past. To the extent that the new, lower prices reflect the long-run costs of the energy system to society (including "external costs") even less than before, this should be remedied by introducing or increasing energy taxes. However, an increased energy tax, e.g., in a context of an ecological tax reform which reduces other taxes, will be necessary but not sufficient to overcome the barriers to energy efficiency. It increases the incentive, but does not reduce the barriers and transaction costs to final customers.

The **question** is then: Which targeted energy policy instruments are available to promote energy efficiency, and which role should DSM programmes by energy companies - within or without an IRP context - play?

3.3.2 Instruments to Enhance Energy Efficiency

Energy companies are regarded as one important actor to organise and/or finance targeted energy efficiency activities, which can help customers reduce transaction costs. The role energy companies play in stimulation of energy efficiency today depends on the legal, administrative, and economic tradition and situation of a country. Ideally, the energy company integrates the provision of an energy-efficient end-use technology or service and an appropriate form of energy supply into an efficient energy service package offered to the customer. Such an offer should be based on the IASDO principle (cf. Chapter 2.3), which determines the efficient allocation of supply-side and demand-side resources by comparing the resources on a broader "level playing field".

There is, however, room for other actors than energy companies, and for other instruments than energy companies can use in their EE-DSM programmes and services. In order to get a complete picture, we therefore have to present and discuss possibilities.

A brief outline of **important instruments which are targeted to end users or market agents** (e.g, manufacturer or retailer of energy-consuming products) is given in the following

table 3-1 (cf. also, e.g., IEA 1999). They include services and programmes, which can be implemented by state authorities, energy companies or other actors. Therefore, we briefly state for each instrument whether it could be an element of energy companies' EE-DSM packages. This is just an assessment of possibilities for energy companies, and does not at all mean that we rule out these instruments; they can, and should, of course be used, where they are appropriate, by other actors, mainly the state. Finally, we conclude with the reasons why we think energy companies should play a major role in realising end-use energy efficiency.

As it can be seen from this overview, **energy companies** possess various instruments to stimulate energy efficiency. They **can combine various instruments**, e.g., information, professional training, liaising with market partners, and financial incentives to an energy efficiency service package.

Every **DSM package with a quantifiable target and an effect, which can be evaluated,** can be considered a resource for IRP.

Thus, energy company DSM - with or without an IRP background - is one option in a mix of possible actions to overcome the barriers to end-use energy efficiency.

However, most of the instruments discussed in table 3-1 can of course be used by other actors, e.g., state authorities as well, and energy policy could try to stimulate energy efficiency without the assistance of the energy companies.

In our view, however, it is not a question of "Should it be either the energy sector or other actors?". For the development of substitutional competition (cf. Chapter 2.1), for overcoming the barriers, which hinder the development of markets for energy services, it is clearly better to involve **both** energy companies and other market partners as well as the state's own initiatives. It has been stated above (Chapter 2.1) that most important is the concept that **energy companies finance and organise** energy efficiency if this is cheaper to the customers and to society than energy supply (cf. Chapter 2.2). This does not mean that the energy company itself has to implement every step of the energy service package; in most cases, it will, and should, **co-operate with the market partners** who can do it best.

However, there is a number of arguments, which support the view that **energy companies should play a decisive role** in the implementation of energy efficiency through EE-DSM, and thus should receive incentives to do so:

- As the markets of the future must be markets for genuine (physical) energy services, not for energy (cf. Chapter 2.1), the energy companies of today have to develop to providers of genuine energy services at least cost and least environmental damage in order to address the transition to sustainable energy systems. Of course, other actors in the market should supply such services as well. But it does not make sense to develop separate markets for energy on one hand, and for energy efficiency technologies and services on the other.

- In particular, it is easier to promote energy efficiency in co-operation with energy companies, who have incentives to do so, than against pure energy suppliers who can only increase their profits through increased sales.

Table 3-1: Instruments to stimulate energy efficiency, and the role energy companies can play

Instrument	**Role of energy companies**
Non-Fiscal Legislative/Regulatory Instruments	
Minimum efficiency standards	Can assist in creation; synergies with DSM programmes
Price regulation	Have to implement the prices
Economic Instruments	
Taxation	None
Levy and funds for energy efficiency	Collect levy; tender for implementation of energy efficiency programmes; maybe create own funds
Special rates and tariffs	Can create them themselves or implement them if imposed by regulator
Economic incentives to end users or market agents (as part of market transformation activities)	Can implement them
Financing of energy efficiency (e.g., TPF)	Can implement it
RD&D funding	Can be limited part of DSM activities
Funding of organisations promoting EE	Can be used by them, to "outsource" part of their DSM activities
"Social" Instruments	
Energy efficiency labelling	Synergies with information and incentive programmes by energy companies
General motivation, information, mobilisation	Always an important part of DSM
Site-specific customer information and audits	Can implement them
Education and training	Can be part of DSM activities
Negotiated agreements	Can be a party to negotiated agreements, or maybe even an operator of negotiated agreements with market agents
Co-operative procurement	Can support it
Partnerships for technology improvement	Can support them

A more detailed outline of the information in the table is given in **Annex I**.

- Energy efficiency and other eco-efficient services can at least partly counterbalance the reduced turnover and profits of energy companies in a liberalised market. After the "race to the bottom" in energy prices will have ended, energy efficiency services and programmes can be the decisive instrument for increasing customer loyalty and building brand names in an otherwise homogeneous energy market.
  However, during the present phase of pure price competition, the disincentives are high for energy companies to develop energy efficiency services and programmes. Therefore, energy companies must receive positive incentives for the necessary cultural change and the development of energy efficiency services and programmes. The existing experiences and activities, and their improvement and increase must be protected and financed during a transition period of several years.

- To engage for the rational use of their core product, energy, is also part of the product responsibility of energy suppliers.

- Energy company EE-DSM is an instrument of internalising the abatement costs for avoiding damages ("external costs") into the costs of the sector which would otherwise cause the externalities (‘Polluter pays’ principle).

- Without energy company EE-DSM, a number of important possibilities is missed. In particular, distribution and/or supply companies have the contact with their customers, which can help access to them for information, for installation, and for billing in the context of EE-DSM services and programmes. Participation of energy companies in energy efficiency activities can thus reduce the transaction costs and accelerate market transformation.

- It is also more cost-effective for society to use existing infrastructure (e.g., customer information centres) and experience of energy companies, than to let it be broken down during the price competition phase, and then rebuild independent infrastructure and expertise with public funding.

- Participation of energy companies will contribute more ideas to energy efficiency activities. All actors and ideas are needed to realise the potential for energy efficiency.

- In total, accelerated energy efficiency improvements through participation of energy companies will realise the economic and ecological benefits to society faster than without energy company EE-DSM.

- Hence, more employment through energy efficiency will be created with energy company EE-DSM than without it.

Of course, there are also risks associated with an involvement of energy companies in the promotion of energy efficiency.

- One such risk is that electricity companies will try to sell technologies, which will switch from other fuels to electricity, without reducing primary energy consumption or CO_2 emissions.

- Another risk specifically for policy support to energy efficiency programmes is that energy companies will put up DSM programmes with high costs but little effect.

However, these risks can be minimised if there are clear rules of monitoring and evaluation of EE-DSM programmes. This is shown, e.g., by the UK or Danish examples.

Of course, it is up to the Member States to which extent they wish to encourage energy companies to participate in realising the energy efficiency potential, and they can use all the other instruments of energy efficiency policy listed above as well. However, it is not the task of our study to analyse these other instruments in detail.

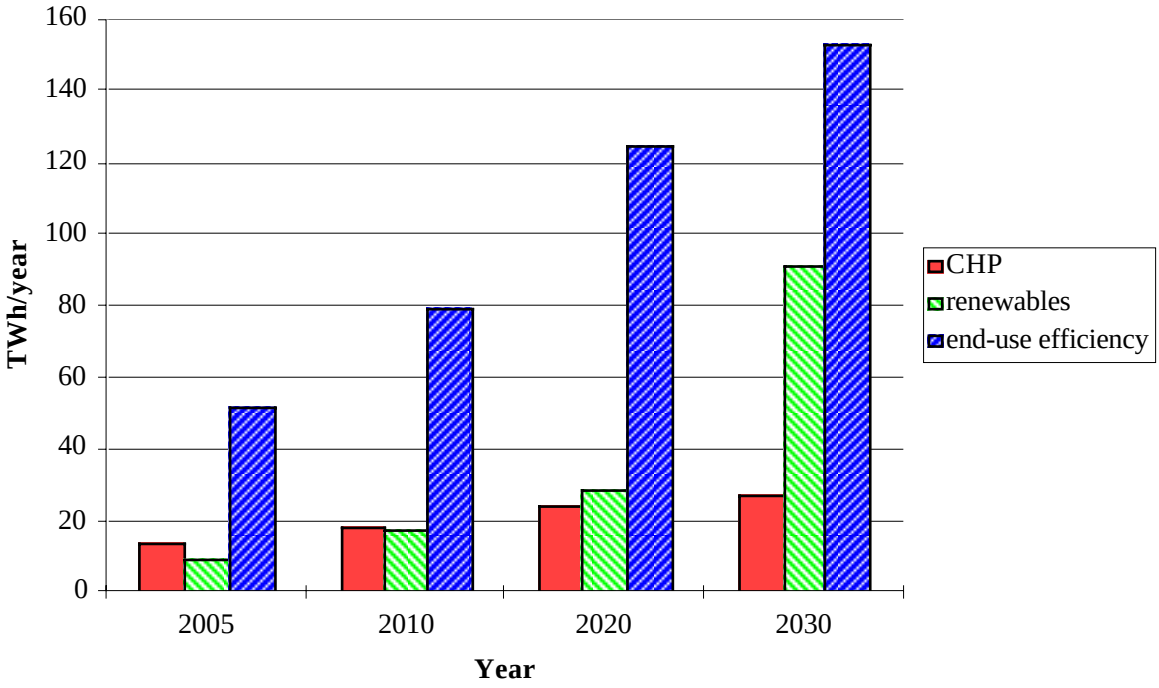
3.3.3 How Big is the Potential for Energy Efficiency, and how Much can be Reached through DSM with the Right Incentives?

With respect to the definition of DSM programmes and services taken in Chapter 2, the most important technical option for the reduction of CO_2 emissions is end-use energy efficiency.

The importance of end-use energy efficiency in relation to two other options, CHP and renewable electricity, is, among other studies, shown by a recent scenario analysis of the Wuppertal Institute for the case of Germany (1998). In this study, a scenario describing the market trend was compared to two scenarios, which achieve the CO_2 reduction goals of the German government (minus 25 % by 2005 compared to 1990) resp. those recommended by the Enquête Commissions on Climate Change of the German Bundestag for 2020 and 2030 (minus 40 and 50 %, respectively). The following figure displays, for the effect of end-use efficiency, the *reduction* in total electricity generation in a scenario that achieves the CO_2 reduction targets, compared to the baseline scenario[1]. For the options of CHP and renewables, the *additional* electricity generation in the CO_2 reduction scenario vs. the baseline scenario is shown.

[1] By the way, the CO_2 reduction scenario includes a gradual close-down of the nuclear power plants as they reach their end of life, whereas the baseline scenario assumes a constant nuclear electricity generation capacity.

Figure 3-2: Contribution of electricity end-use energy efficiency, cogeneration (CHP) and renewable energies to the reduction of CO_2 emissions



Source: Wuppertal Institute 1998. For explanations on figure, please see text above.

As the figure shows, the contribution of end-use energy efficiency to CO_2 reduction during the next three decades can be much higher than that of CHP and renewables. Only after 2020, renewable energy takes the lead in generating *additional* CO_2 reductions.

Similar results have been shown by other Climate protection scenarios, e.g. by the Enquête Commission on Climate Change of the German Bundestag (Enquête 1995).

Thus, the overall potential for cost-effective electricity conservation through end-use energy efficiency is ca. 25 to 30 % (cf. also Wuppertal Institute 1997, Energy Plan of Rome 1996, and Annex I for details).

How much of this potential can be realised through EE-DSM services and programmes?

Most of the practical experiences and comprehensive studies on this stem from the implementation of integrated resource planning (IRP) and DSM before the restructuring and liberalisation of the ESI. Although IRP may not be applicable in competitive electricity markets, DSM still is, with the right market and institutional framework. Hence, these experiences can give a quantitative hint on what can be achieved **with the right signals** from markets and from government support. Therefore, we wish to list some of these experiences here:

- The biggest experiences exist in the **USA**.
  One of the most active utilities, SMUD (Sacramento, CA) spent over 5% of revenues for

cost-effective EE-DSM during the early 1990ies; it planned to reduce forecasted electricity consumption by 10 % between 1993 and 2000 and reached 1.7 % in 1994 alone. SMUD, like many other utilities in the USA, could cover the DSM expenses from saved capacity costs and the tariffs. Now, along with retail supply market liberalisation, almost 20 States in the USA have introduced public benefits charges, so that energy companies like SMUD in these States can continue with EE-DSM programmes (www.ACEEE.org).

- In **Denmark**,
  around 700 GWh/a of electricity was saved between 1994 and 1998 through energy companies' EE-DSM activities, e.g., through free energy efficiency audits for industry and commerce, programmes promoting compact fluorescent lamps (CFLs), rebate programmes for Class A refrigerators and freezers (DEA/energy piano 2000). This saving compares to a total consumption of 32.4 TWh/a. The basis for this success were agreements between utilities and government, the legal obligation to perform IRP, the allowance to fund DSM costs via the tariffs, and the “no-profit-no-loss”-principle of Danish electricity price regulation, which allowed the utilities to recover any net lost revenues from the reduction in kWh sales. For 2000, further savings of over 160 GWh/a are planned, with an investment by the energy companies of ca. 20 MEUR, and 35 MEUR by the customers. The investment by the energy companies thus equals ca. 0.06 cEUR for each kWh sold (ELFOR og Sjaellandssamarbejdet 1999).

- In **the Netherlands**,
  between 1991-97 ca. 600 MEUR were spent, 154.5 PJ (el. + gas) and 14.29 million t CO2 saved, e.g., through rebates for high frequency lighting ballasts, variable speed drives, CFLs, Class A fridges, condensing boilers,..., (cf. DEA/epiano 1999). These programmes were based on negotiated agreements plus the allowance to fund EE-DSM via the tariffs.

- In one programme in **Germany**,
  called "Action Bright NRW", 80 utilities, under an agreement, and with support from the state government of North Rhine-Westphalia increased the number of CFLs in use in the domestic sector by 1.4 million, saving 550 GWh (stretched over ca. 9 years), at costs of 1.6 cEUR/kWh saved (Thomas et al. 1997).

- In the **UK**,
  the activities of the public electricity suppliers (which were then combined distribution and supply companies), under the energy efficiency standards of performance 1 and 2, between 1994 and 1999, achieved lifetime savings of 13.4 TWh, and a net benefit of ca. 500 MEUR, i.e. for every EUR spent by the electricity suppliers, a net benefit of 4.5 EUR (Staniaszek 1999). The DSM costs were covered from the allowance to raise 1 £ per customer per year.

More examples of successful DSM programmes can be found, e.g., in the INDEEP database under the framework of the IEA DSM implementing agreement, Task I.

Which action is suitable for which kind of technology and customers, and how should a successful programme look like?

The energy-efficient technologies that are the target for EE-DSM programmes and services can be roughly separated into two types:

1. There are potentials associated with "masses of standard appliances or units", e.g., CFLs, A-class refrigerators and freezers, technologies to reduce standby consumption; high efficiency electric motors, variable speed drives, high frequency ballasts for fluorescent office lighting. The energy saving from one unit or appliance is here usually too small, to convince each customer of the benefits a leasing or performance contracting service offers, hence there are too high transaction costs for EE-DSM services. Therefore, this is the technology area, in which synergies between legislation (e.g., on labelling and standards) and programmes should be used.

2. There are other potentials associated with "large, complex projects", e.g., compressed air, or cooling plants; large ventilation or lighting retrofits etc. Such projects need know-how to identify energy efficiency measures, and to implement them; and often large investments. This is the market that offers itself with priority for energy efficiency services.

However, it should be noted that EE-DSM services can also benefit from EE-DSM programmes, e.g., their motivation and information campaigns, or any incentives offered to customers. This reconfirms, as we have stated, that we need all actions and actors together.

A successful programme will not just offer one element, like an advice, but with no help for implementation, or an incentive, but with no information on energy efficiency measures and technology suppliers. Instead, it will be a package of services. Ultimately, all good EE-DSM programmes aim to achieve market transformation, so that one day the programme can be ended because the more energy-efficient technology has become the new baseline.

E.g., for energy-efficient refrigerators and freezers, a good practice programme would consist of a combination of

- information to customers on labels and life-cycle costs;
- professional training of retail sales staff on labels and life-cycle costs;
- a cash rebate (e.g., 50 EUR) for the purchase of A-class refrigerators and freezers (maybe paid out to the customer at the retail store, like Stadtwerke Hannover did)
- maybe organising a co-operative purchase of A-class appliances by large buyers / groups of retailers (like in a programme by the Danish Electricity Savings Trust).

Hence, the energy company will be a co-ordinator and financier, working with market partners:

- retailers,

- consultants,
- installation contractors,
- communication agencies,
- local authorities, ...

thus stimulating the market for energy efficiency.

How much could be reached by a comprehensive set of EE-DSM programmes and services to all customer groups?

- Several European IRP studies during the 1990ies - e.g., by the Danish utilities (ELSAM 1994); the Dutch utilities (SEP/Ijsselmij 1994); Stadtwerke Hannover, Germany (1995) - showed: **ca. 4 to 8 %** of the forecast electricity consumption can be saved in a timespan of **7 to 10 years** through cost-effective EE-DSM,

- i.e., **0.5 to 1 % savings per year** compared to the market trend appear feasible, with annual **investments by the energy companies of ca. 1 to 2 % of the revenues** from the electricity business.
  This is confirmed, e.g., by the Danish EE-DSM experiences from 1994 to 1998, and the plans for the year 2000. E.g., for 2000, the planned savings through EE-DSM by the electricity companies alone (160 GWh/a, ELFOR og Sjaellandssamarbejdet 1999) equal ca. 0.5 % of the total consumption (32 TWh/a), while the energy companies' planned investment (0.06 cEUR/sold kWh) is about 1 % of the price per kWh net of taxes. And further savings will be achieved in Denmark through the activities of the Electricity Savings Trust, financed by a 0.08 cEUR/kWh levy on the electricity prices to domestic and public customers, and from the agreements negotiated with industry in turn for reductions in their energy tax.

Comparing these figures to the total potential mentioned above, EE-DSM services and programmes will certainly not be the only way to realise the cost-effective potentials for energy efficiency of 25 to 30 %, but might achieve up to half of them in the medium term (10 to 15 years).

3.3.4 Incentives, Rationales and Disincentives for Energy Companies to Implement Energy Efficiency Activities

A main task of our study is to find out, under which circumstances it can be attractive for energy companies to participate in the task of increasing energy efficiency.

There can be different economic and other incentives, rationales and disincentives for the main energy sector actors, depending on the basic market types. Other than economic incentives or rationales can be, e.g., due to the fulfilment of environmental targets of the local

community which owns the distributor/supplier. They can also be public service obligations imposed by the national governments.

However, the most important question we have to answer here is:

How can DSM be financed in restructured, particularly in competitive markets?

In a fully liberalised market with competition in retail supply of end-use energy it becomes difficult to finance DSM via the retail supply tariffs. However, with DSM activities paid directly by the users who directly benefit (i.e., DSM services as defined in Insert 2), the least-cost optimum of the production of energy services might not be reached, since small and medium customers may not be offered DSM services, and the possibility of market transformation programmes is foregone. Therefore, we have to take a closer look at the economic attractiveness for energy companies to implement energy efficiency activities (this Chapter), and at the factors which have contributed to the DSM successes, even in liberalised markets, which were briefly described above, or which have led the ESI in other countries not to develop significant DSM experiences (Chapter 3.3.5).

A detailed view on the economic attractiveness of DSM for energy companies

As the companies operating in a more competitive energy market will be increasingly driven by economic rationales, it is worth looking at the category of economic attractiveness in more detail.

The strongest economic rationale for an energy company to perform DSM and IRP is the possibility of increased profits. Therefore, the financial impact of energy efficiency activities on the energy companies, which pursuit them, has to be analysed.

For an energy company, the short-run and long-run **financial impacts of a DSM activity have five components**:

C, the direct DSM **costs**, i.e. the costs of realising the DSM activity;

B, the **benefit** of avoided costs for energy supply;

L, the **lost revenues** due to reduced kWh sales (only from DSM for the own customers);

R, additional **revenues** from, e.g.
- payments for energy efficiency services from existing (or new) customers
- revenues for energy sales to customers who were retained or won as new customers due to the offer of energy services (in competitive markets)
- payments for DSM programme implementation from a Dedicated EE&DSM Funds;

P, the effect of a **price** increase (relative to the price trend which may be downwards!) due to specific regulatory mechanisms (e.g., mechanisms M2 and M3 in Chapter 4).

L-B are the **net lost revenues** due to reduced kWh sales as an effect of the DSM for the own customers (i.e. the lost margin that would have been generated by selling instead of saving the kWh).

Therefore, the **basic question we have to analyse** is:

is

$B + R > C + L$ (i.e., the energy company makes a profit out of DSM) or

$B + R < C + L$ (i.e., the energy company faces a loss out of DSM)?

Given a specific market and regulatory framework, any DSM programme or service for which due to a favourable situation based directly on the energy company's business interests

$B + R > C + L$

does not need additional regulatory mechanisms (a P term) or an additional revenue R from another policy mechanism, while all other DSM programmes will need it to yield

$B + R + P \ddagger C + L$.

R may be difficult to calculate in competitive markets. It is particularly difficult to evaluate the benefits of increased long-term customer loyalty. For example, how could it be decided whether a customer could really be held or won because of a specific DSM activity, a set of DSM activities or the improved image of the company through, e.g., DSM activities?

In making these calculations, it also has to be noted that the **avoided costs** B are different for

- different energy companies and
- different DSM technologies which are promoted.

The **lost revenues** L are dependent on the customer class concerned, and on the level and structure of the electricity or gas prices to this customer class. In particular, the higher any fixed charges (EUR/month or EUR/year) are, the lower is the share of variable charges (cEUR/kWh or EUR/kW/year), and hence, the lost revenues. This is a certain dilemma for energy efficiency policy, since on the other hand, a lower share of variable charges will reduce the profitability of energy efficiency measures for the customers!

The following examples may show how the **net lost revenues** L-B differ for the perspectives of different energy companies.

short term view with no need for new capacity

- example **: integrated company** with cost plus regulation (in a liberalised market this type of regulation is very unlikely and only possible for non-eligible customers)

net lost revenues = lost revenues – (avoided) short term marginal costs (fuel expenditures + variable O&M + variable T&D costs: losses).
However, after the next price fixing, the net lost revenues will disappear, since the new price will be the new cost forecast divided by the new demand forecast.

- example**: distribution/supply company buying from the pool**

net lost revenues = lost revenues – (avoided) short term marginal costs (cost of electric energy from the pool + transmission fee + variable O&M + variable D costs: losses)

In this case, how can we give due consideration to price fluctuations in the pool? The net lost revenues will decrease, if for the distribution part of the business, the regulation authority has chosen a regulation, which correctly reflects costs and hence does not tie revenues and profits only the number of kWh distributed.

- example: **distribution/supply company having generation facilities and long term contracts with generators** (reduced price fluctuation risk)

net lost revenues = lost revenues – (avoided) short term marginal costs (cost of electric energy purchase from other generators will be the preferred source to be avoided since it will be based on full costs + transmission fee + variable O&M + variable D costs: losses).
Again, the net lost revenues will reduce, if for the distribution part of the business, the regulation authority has chosen a regulation, which correctly reflects costs and hence does not tie revenues and profits only the number of kWh distributed.

- example: **pure supplier**

net lost revenues = lost revenues – (avoided) short term marginal costs (cost of electric energy purchase from generators + transmission fee + distribution fee)

longer term with need for new capacity

- example: **integrated utility** with cost plus regulation (in a liberalised market this type of regulation is very unlikely and only possible for non-eligible customers)

net lost revenues = lost revenues – (avoided) long term marginal costs (fuel expenditures + capacity costs including reserve + variable O&M + variable T&D costs: losses + avoided T+D upgrades)

The **longer term perspective** is the one taken by the society and used, e.g., in the total resource cost test, which is one important cost-benefit test for DSM programmes, used as a tool to **decide** whether DSM programmes are cost-effective and should be implemented or not from the perspective of society. However, for the **short-term financial impact** of a DSM programme on the energy company, which is examining whether to implement the programme, the short-term perspective on net lost revenues may be more relevant, and thus has to be considered as well, when economic attractiveness of DSM for the energy company has to be analysed.

Results of a quantitative analysis:

The members of the study group have performed a quantitative analysis of some hypothetical DSM programmes and services for electrical energy efficiency, gas energy efficiency, and fuel switching from electricity to gas. As a joint analytical framework, an Excel sheet was developed, but each country filled in country-specific data. Annex II displays some more detailed results. Here, we only want to describe general trends.

Example 1: DSM *programme* by electricity companies for *domestic* customers

- Typically the highest net lost revenues, and overall net loss, are experienced by vertically integrated companies, particularly if the short term perspective is relevant.
- Lower net lost revenues, and overall net loss, are created for distribution/supply companies. If they are franchise companies (Market type 1 from Chapter 3.1), the price regulator can still allow to cover DSM costs C and net lost revenues L-B (example: Denmark, Italy); if the market is fully competitive, another mechanism will be needed.
- An even lower loss was calculated for pure suppliers and, where these actually exist, pure distributors, but the results are still negative, except for Denmark, where the price regulation allows to cover DSM costs C and net lost revenues L-B at least for the distribution business. In the UK, this was also possible in the past, at least implicitly for the net lost revenues due to the specific form of regulation (cf. Chapter 4.2).

Typically, the energy companies are better off if someone else runs (pays) the DSM programme, but still most of them face a net loss due to the net lost revenues.

Example 2: DSM *service* for *large* customers:

- Often a positive economic result is possible, in long-term perspective even for vertically integrated companies.
- Typically the result is better for distribution/supply companies and unbundled distribution or supply than for vertically integrated companies, particularly if the short-term perspective is relevant.

- It is always better for an energy company to do it oneself than to let someone else do it, because then the energy company only has the net lost revenues, but not the profit from the service!

As this analysis has shown, there are situations, in which DSM, particularly DSM services can be attractive to energy companies. An overview of such situations is given in Chapter 4.1. **There are, however, more situations, particularly in a short-run perspective, in which the net effect of a DSM programme and sometimes even a DSM service is negative for the energy company, although the DSM would be highly cost-effective for the customers and society.**

To make this a little more transparent, we have prepared **the same analysis** as for the eight existing markets of the countries participating in this study, **for a hypothetical electricity market** with overcapacities and wholesale competition, i.e. typical for Europe over the next 5 to 10 years.

Four types of electricity companies are considered relevant potential actors for DSM:

§ vertically integrated – maybe only via a holding structure, but the holding still sees the financial impact on the total company;

§ a distribution and supply company;

§ a pure supply company;

§ a pure distribution (network) company.

For these types of companies, the **basic market prices and costs** are estimated as follows (hypothetical values, but based on typical values given for the eight participating countries, and extrapolated to the competitive future):

Table 3-2: Hypothetical cost data for the EU electricity market of 2005

long-run marginal costs of generation	4.5 cEUR/kWh
short-run marginal costs of generation	2.0 cEUR/kWh
wholesale power price	3.0 cEUR/kWh
transmission price to suppliers, all variable	0.6 cEUR/kWh
of this, avoidable in the short run through DSM	*0.06 cEUR/kWh*
distribution price to suppliers for domestic customers, all variable	3.5 cEUR/kWh
of this, avoidable in the short run through DSM	*0.15 cEUR/kWh*
distribution price to suppliers for large customers, all variable	1.2 cEUR/kWh
of this, avoidable in the short run through DSM	*0.06 cEUR/kWh*
Costs of supply to small customers	1.0 cEUR/kWh
Costs of supply to large customers	0.1 cEUR/kWh

The supply price to small customers is estimated to have the following components (fixed payments – like EUR/year -converted to average cEUR/kWh):

Table 3-3: Hypothetical supply prices to domestic customers for the EU electricity market of 2005

Supply price	13.3 cEUR/kWh
of which energy fixed	2.5 cEUR/kWh
of which energy variable	6.2 cEUR/kWh
of which taxes	4.6 cEUR/kWh

Hence, the net margin on supply is, e.g., 0.6 cEUR/kWh for a pure supplier, providing a profitable business: average price 13.3 cEUR/kWh, minus taxes 4.6 cEUR/kWh, minus wholesale power price 3.0 cEUR/kWh, minus transmission 0.6 cEUR/kWh, minus distribution 3.5 cEUR/kWh, minus supply costs 1.0 cEUR/kWh, equals 0.6 cEUR/kWh.

But the margin on an extra kWh sold to one customer is – 0.9 cEUR/kWh, i.e. the pure supplier with this price structure should be interested in energy efficiency: marginal revenue equals energy variable 6.2 cEUR/kWh minus marginal costs 7.1 cEUR/kWh (wholesale power price 3.0 cEUR/kWh, plus transmission 0.6 cEUR/kWh, plus distribution 3.5 cEUR/kWh).

Likewise, for the supply to large customers, prices are estimated as:

Table 3-4: Hypothetical supply prices to large customers for the EU electricity market of 2005

Supply price	5.8 cEUR/kWh
of which energy fixed	0.1 cEUR/kWh
of which energy variable	5.0 cEUR/kWh
of which taxes	0.7 cEUR/kWh

Hence, the net margin on supply is, e.g., 0.2 cEUR/kWh for a pure supplier, providing a profitable business: average price 5.8 cEUR/kWh minus taxes 0.7 cEUR/kWh minus wholesale power price 3.0 cEUR/kWh minus transmission 0.6 cEUR/kWh minus distribution 1.2 cEUR/kWh minus supply costs 0.1 cEUR/kWh.

The margin on an extra kWh sold to one customer is also 0.2 cEUR/kWh, i.e. the pure supplier should not be interested in energy efficiency except it brings additional revenues: marginal revenue equals energy variable 5.0 cEUR/kWh minus marginal costs 4.8 cEUR/kWh (wholesale power price 3.0 cEUR/kWh plus transmission 0.6 cEUR/kWh plus distribution 1.2 cEUR/kWh).

From these input data, the following economic effects on the four relevant types of energy companies result for a **DSM programme to domestic customers**. The DSM programme is estimated to be **highly cost-effective** for society and participating customers, with total costs

of 2 cEUR/kWh, of which the energy company pays 1 cEUR/kWh, while the customers have another 1 cEUR/kWh of extra costs to buy the more energy-efficient technology, and long-run avoided costs for society of 4.7 cEUR/kWh (without avoided external costs). On the other hand, it is estimated that the energy companies will only take into account saved short-run marginal costs, due to the present overcapacity situation.

Table 3-5: Effects of a hypothetical DSM programme for domestic customers

	vertically integrated	distributor/ supplier	pure supplier	pure distributor
DSM costs to energy company	-1.0 cEUR/kWh	-1.0 cEUR/kWh	-1.0 cEUR/kWh	-1.0 cEUR/kWh
Lost marginal revenues	-6.2 cEUR/kWh	-6.2 cEUR/kWh	-6.2 cEUR/kWh	-3.5 cEUR/kWh
Avoided costs (short run)	2.2 cEUR/kWh	3.8 cEUR/kWh	7.1 cEUR/kWh	0.2 cEUR/kWh
Net effect without a DSM support mechanism	-5.0 cEUR/kWh	-3.5 cEUR/kWh	-0.1 cEUR/kWh	-4.4 cEUR/kWh
Net **gain** for society: 2.7 cEUR/kWh (without avoided external costs).				
Net **gain** for the participating customers: ca. 9.0 cEUR/kWh (based on variable part of electricity price and taxes)				

The DSM programme would still be **cost-effective** for three of the energy companies even in the short-run perspective, i.e.: For all of them, except for the pure distribution company, the DSM programme costs of 1.0 cEUR/kWh are lower than the short-term benefits, i.e. the short-run avoided costs.

However, due to the lost marginal revenues, **all companies except the pure supplier will have relevant losses** if they implement the DSM programme. The net effect is calculated in Table 3-5 as -3.5 cEUR/kWh or even more negative. Only for the pure supplier, the net effect is calculated as -0.1 cEUR/kWh, so this can be weighed against the benefits of increased customer loyalty. This result holds, **unless a special situation** is providing higher avoided costs (e.g., avoided network upgrades), an additional revenue (e.g., due to customers won or retained through the improved image created by the programme), **or a policy mechanism** is providing, e.g., a co-funding of DSM costs, or the allowance to increase prices (e.g., through a better alignment of allowed revenues with cost drivers, which is only relevant for regulated monopoly segments).

It is also important to note that even if another actor or authority introduces policy to increase energy efficiency, all companies except the pure suppliers will still loose money (calculate the negative net effect – last column in table 3-5 - less the DSM costs of 1.0 cEUR/kWh), and thus may oppose to such policy for implementing energy efficiency without involving them.

The effects of a **DSM service to large customers** are shown in the following table. We have assumed that the energy company can keep 30 % of the net benefit of the DSM service, i.e. 30 % of the difference between the supply price of 5.8 cEUR/kWh and the DSM costs of 2 cEUR/kWh. The resulting costs of the DSM service for the customer (3.1 cEUR/kWh, which is also the DSM revenue R of the energy company) still are highly cost-effective for the customer, who saves on average 5.7 cEUR/kWh without investing money and other resources.

Table 3-6: Effects of a hypothetical DSM service for large customers

	vertically integrated	distributor/ supplier	pure supplier	pure distributor
DSM costs to energy company	-2.0 cEUR/kWh	-2.0 cEUR/kWh	-2.0 cEUR/kWh	-2.0 cEUR/kWh
Lost marginal revenues	-5.0 cEUR/kWh	-5.0 cEUR/kWh	-5.0 cEUR/kWh	-1.2 cEUR/kWh
Avoided costs (short run)	2.2 cEUR/kWh	3.7 cEUR/kWh	4.8 cEUR/kWh	0.1 cEUR/kWh
Additional revenue from TPF rates	3.1 cEUR/kWh	3.1 cEUR/kWh	3.1 cEUR/kWh	3.1 cEUR/kWh
Net effect without a DSM support mechanism	-1.7 cEUR/kWh	-0.2 cEUR/kWh	0.9 cEUR/kWh	0.0 cEUR/kWh
But: if someone else does the DSM service with your customer:	-2.8 cEUR/kWh	-1.3 cEUR/kWh	-0.2 cEUR/kWh	-1.1 cEUR/kWh
Net **gain** for society: 2.7 cEUR/kWh (without avoided external costs). Net **gain** for the participating customers: ca. 2.6 cEUR/kWh (based on variable part of electricity price and taxes)				

As this table shows, even “commercial” DSM services can produce negative profits for energy companies, if they include the lost marginal revenues in the calculation! They should, however, not try to include these into the payments from the customer, since then they will never be able to compete with independent ESCOs. But the table also shows: it is **better for an energy company to “do it yourself”** than to wait until someone else comes along and does the DSM service with your customer. And: **policy mechanisms** creating a level playing field and a supportive framework **for DSM programmes will also support the development of the DSM services market,** e.g. by avoiding net lost revenues from DSM services in the distribution network business through better alignment of revenues and cost drivers.

3.3.5 Which Factors Have Best Promoted EE-DSM?

The study group has prepared a detailed survey of market characteristics and policy mechanisms to create a level playing field and a supportive framework for EE-DSM used in the eight countries which participate in this study, as well as for most other EU Member States, and a number of other countries.

A main purpose of this exercise was to find out, which electricity/gas market characteristics, which policy action to create a supportive framework for DSM, and which combinations thereof have been most successful in stimulating a high level of DSM, as in countries like Denmark, the Netherlands, or a number of states in the USA. Likewise, which factors have led to the fact that the ESI in other countries developed no or little DSM activity?

In an intensive survey process, the task leaders have made a cross-comparison of the empirical country surveys. Hypotheses for the most important factors were put up and tested. The detailed results are given in **Annex II**. Here, we only wish to present a summary of the hypotheses and the results.

3.3.5.1 Market Characteristics and the Occurrence of EE-DSM

A number of market factors can be hypothesised to be influential on the occurrence of EE-DSM and IRP including:

- *Level of centralisation and integration of the electricity industry*

  Highly vertically integrated electricity companies in theory should be better suited for IRP and EE-DSM given the possibility to weigh supply side and demand side measures on equal terms. On the other hand, vertically integrated electricity companies have a high incentive to utilise their capacities, so this is a disincentive to engage in DSM. A related hypothesis is that local/regional distribution/supply companies in more decentralised systems should have a higher interest and activity in EE-DSM.

  The empirical analysis concludes that **decentralisation** seems helpful for the development of EE-DSM, but needs mechanisms to create a supportive framework for EE-DSM (shown by the post-IEM situation in the Netherlands and Denmark – mechanisms and continuing DSM - vs. Sweden and Germany – stop of DSM programmes due to lack of mechanism). **Vertical integration** seems neither helpful (Italy, France) nor an insurmountable barrier (the USA).

- *Price regulation and the economic framework for DSM*

  A positive framework for EE-DSM from price regulation, or absence of such a framework or of regulation at all, will influence a company's ability to recover costs and determine how profits depend on sales, i.e., whether they are decoupled or not.

It appears that the introduction of mechanisms to create a level playing field for E-DSM through **price regulation** has been easier in countries with a history of price regulation or a perceived need for regulation in the reformed market, such as the UK, Denmark and Italy. The combination of decoupling of profits from kWh sales, and of DSM cost recovery, seems to have been most important for the high level of DSM in Denmark and, in the past, the USA.

- *Level of retail competition*

  Retail competition will lead to less EE-DSM programmes, if no mechanisms are installed to restore the level playing field for EE-DSM. However, retail competition may stimulate DSM services.

  The empirical analysis supports the view that, without additional policy support, retail competition will lead to less DSM programmes, and hence less DSM for small to medium customers, as the market for DSM services for these customers also needs at least an initial support to develop. Only for the larger customers, DSM services may develop without policy support, but the share of energy efficiency in these services is at question.

- *National policy and general attention to energy efficiency and environmental issues*

  A general attention to energy efficiency and environmental issues may be positive for DSM, the lack of such attention negative. It is not clear from this study, to which degree there is any correlation.

  A country with polluting electricity production may pay greater attention to DSM. Evidence is not clear here, but on the other hand it appears that if electricity production is considered clean, a perception partly held in Sweden and France, this reduces the interest for regulatory incentives for DSM programmes.

- *Philosophy behind policy and general utility culture*

  Electricity companies that have been regulated to specialise in the generation, transmission and distribution of electricity are likely to resist DSM more than non-specialised utilities. A trivial example is EdF in France, a company that is by law limited in its activities in order to prevent the monopoly from competing unfairly in other areas.

- *The occurrence of DSM prior to IEM reform*

  A history of EE-DSM activities and mechanisms to make them economically feasible for energy companies, and associated learning should facilitate post-liberalisation continuation with EE-DSM activities and mechanisms.

  This factor seems to have been helpful in some cases, but is difficult to assess given the limited DSM experience in Europe. In the case of Sweden, some programmes were operated in the late 1980s and early 1990s but activities ceased when the closing of the first reactor was postponed through a 1991 agreement and deregulation discussions started. However, experiences gained under monopoly are now considered an asset and

most medium-sized or large suppliers offer DSM services in the industrial and commercial sectors.

In Denmark, a history of IRP and DSM largely driven by regulation, explicit or through agreements between energy companies and the government paved the way for continuation with EE-DSM activities and policy mechanisms to create a supportive framework in the competitive market. In the UK, the Energy Efficiency Standards of Performance that were originally set to the public electricity suppliers (i.e., then integrated distribution and supply companies) for captive customers, have been maintained for the competitive suppliers after full market opening. Around 20 states in the USA, with a history of attention by regulators to removing disincentives to EE-DSM, have also adopted mechanisms to promote EE-DSM in competitive markets. On the other hand, countries with little DSM experiences like Italy or Belgium (Flanders) have included EE-DSM legislation into their implementation of the IEM Directive.

3.3.5.2 Mechanisms Creating a Supportive Framework and the Occurrence of DSM

It is trivial that the existence of policy or regulatory mechanisms, which create a level playing field and a supportive framework for EE-DSM, should lead to the development of some DSM. However, the question is: which DSM mechanisms have been most successful?

Looking at the country studies, we find:

DSM has developed best, where a combination of

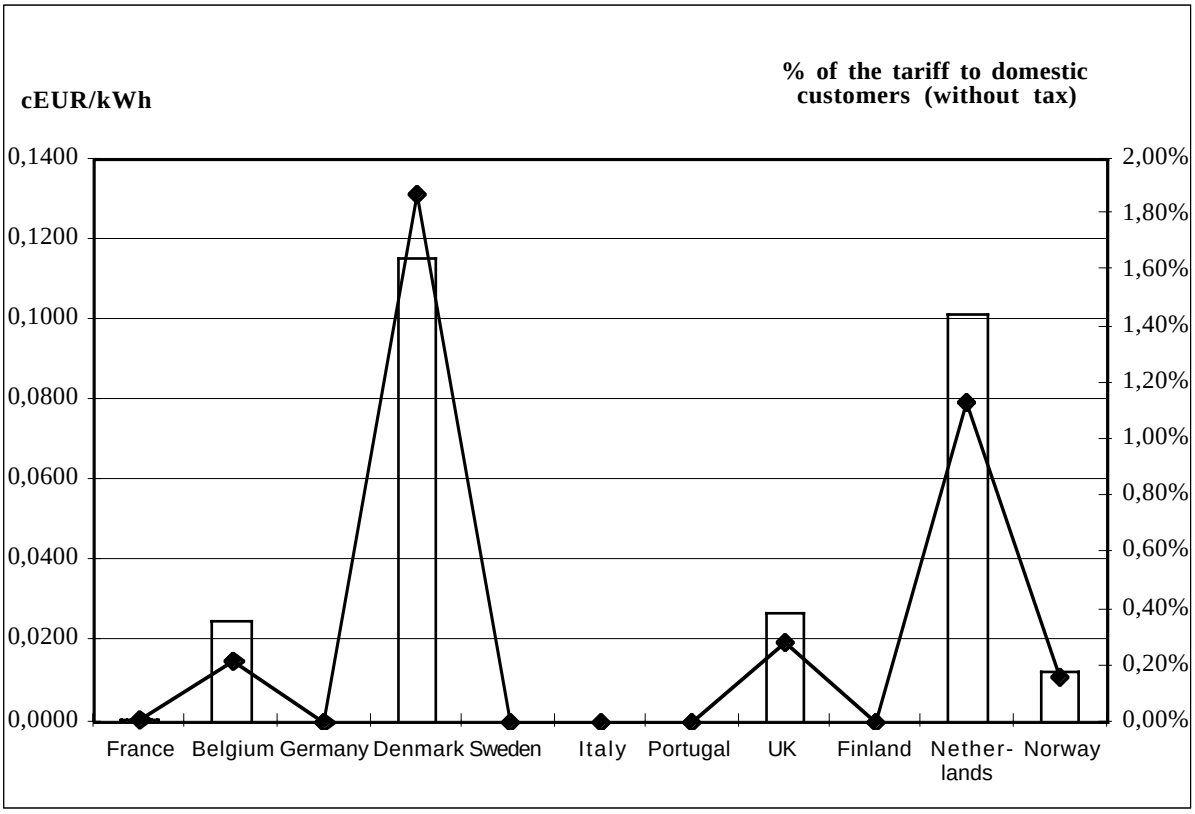
- an agreed, quantified target for energy savings,
- a regulatory framework which eliminates artificial incentives to increase sales when non economic for customers and society
- a channel or an allowance for raising funding (through the tariffs or through a levy), and
- a standardised and mandatory scheme for cost-benefit evaluation of the DSM prior to, and after implementation

have been created (e.g., in Denmark, the Netherlands, or the USA, or in Germany at the local or Länder level). Sometimes the target is imposed by an obligation (e.g., in the UK or the USA). The possibility to recover net lost revenues (like in Denmark or the USA, and partly the UK) is further enhancing the attractiveness of DSM.

Even in countries with little DSM in the past, a funding mechanism and an agreement on a spending or savings target has triggered the DSM (e.g., Belgium or France).

Some examples of such national policy mixes are presented in the next chapter; a detailed evaluation of the experiences in the past is presented in **Annex II**. In this summary report, we only want to present on overview of the relative amounts of investment in DSM programmes in different EU Member States and Norway.

Figure 3-3: Level of Dedicated Funds for DSM or DSM cost allowances in different European Countries



In conclusion, one cannot say that one market type is more favourable that another for the implementation of DSM, or that DSM is less adapted to some market types than others. It depends much more on whether an appropriate mix of policy mechanisms is created, and therefore an integrated view on market characteristics and DSM-related mechanisms is needed. E.g., we have stated before that we consider the degree of (1) retail competition and (2) unbundling of electricity/gas sector functions the most important characteristics with respect to the possibilities for DSM. But they are not so much relevant for the question whether, and how much, DSM is possible at all. Rather, the policy mechanisms chosen to create a level playing field and a supportive framework for EE-DSM have to be adapted to these market characteristics. Which policy mechanisms are available for this purpose in liberalised markets, and for which market types they are best adapted, is the question for the next chapter.

4 Policy Mechanisms to Make EE-DSM and IASDO (More) Attractive for Energy Companies and ESCOs in Restructured and Liberalised Electricity and Gas Markets

4.1 Needs to Remove Barriers to EE-DSM and IASDO and Promote them with Appropriate Policy Mechanisms

Depending on the type of market structure, on which actor in the energy business is concerned, and on the price regulation for the monopoly segments (transmission and distribution, supply to captive customers) there are a number of **situations,** in which DSM is **inherently attractive** to the energy companies in **economic terms.** These are situations where the effect of performing DSM programmes or services would yield for a company B + R > C + L (cf. Chapter 3.3 for the definition of this inequality), without any extrinsic economic incentive from supporting policy. Such situations can be, e.g. :

- a situation, in which transmission and distribution system capacity upgrade investment costs in certain geographical areas can be avoided through targeted DSM activities (a 'regionalised' DSM/IRP) which yields a higher than average B term;
- a situation, in which building new generation capacity can be avoided or deferred (also a higher B term), which, however, does not seem very likely for the EU mainland electricity system for the near future, but maybe for some small isolated systems;
- a situation, in which it is attractive to focus on load management (kW; particularly peak clipping and maybe load shifting fulfil our condition of simultaneously reducing environmental impacts, while valley-filling will in most cases not fulfil it) rather than on energy conservation (kWh) (again, a higher B term): this situation may occur, e.g., where peak load power can be conserved or shifted to times of lower load while the energy company has to pay a high price for purchased peak power, but the lost revenues are based on average costs. Particularly, a co-operative load management where the distributor and/or the supplier gives incentives to customers to reduce or shift their load at *system* peak load times can be highly attractive for distributors and/or suppliers;
- a situation, in which there is a demand for DSM services directly paid by the customer or market agent who benefits; i.e., the energy company focuses on commercial strategies for implementing energy efficiency and other DSM services (e.g., through third-party financing, functional sales etc., maybe also selling energy efficiency services as part of a wider "customised retail energy service" [1]), eventually as a complement to rate-financed

[1] In such a "customised retail energy service", ESCOs and/or distribution companies deliver a complete range of services to the customers (commodity procurement; energy information services, e.g. combined billing, end-use metering; energy management systems; end-use energy services, e.g. chilled water, compressed air, steam; facility management and support), so that energy efficiency is a consequence of broader value-added solutions

energy efficiency programmes; this will raise additional revenue to the energy company, an R term;

- a situation favourable for some DSM activities that can help to increase customer loyalty or the number of new customers in a competitive retail supply market; this will also introduce an additional R term;

- a situation, in which fuel switching towards the energy type offered by the company is likely to bring positive effects for the customer, the environment, and the energy company; e.g., for the pure gas company, fuel switching from electricity to gas is an attractive gas marketing activity (an R term, no L term), particularly if the fuel switching brings a new customer (it could also be an additional gas use, e.g., water heating, for an existing gas customer who already uses gas for, e.g., for space heating); for the conglomerate companies the effect of fuel switching is mixed (besides C, there is an R term, a positive and a negative B term and an L term).

It should be noted that from the point of view of limiting the environmental impact of the energy system, only a part of these activities is relevant, e.g. load management activities which not only deliver a better load shape from the point of view of the energy company (load shifting, valley filling,…) but also reduce emissions (or primary energy consumption) and hence fulfil our definition of DSM (or EE-DSM) activities.

The question is: How much EE-DSM is done because of such situations, in which EE-DSM is inherently economically attractive? If the resulting EE-DSM level is too low (i.e., the allocative efficient minimum of the production of genuine (physical) energy services, cf. figure 2-2 of Chapter 2, is not reached), further **policy mechanisms to create a level playing field and a supportive framework for EE-DSM**, and thus make it economically feasible for energy companies to implement EE-DSM are necessary. If EE-DSM benefited customers and society, but the energy company would face a loss, the company would not implement it. The model calculations in Chapter 3.3.4 have shown that this situation often occurs, where policy and regulation do not make it economically feasible for energy companies to implement EE-DSM, or even create artificial disincentives (e.g., through the practice of price regulation for monopoly segments). This is what we call the creation of a level playing field and a supportive framework for EE-DSM: **to allow the energy company to also benefit, or at least to not make a loss, if it implements EE-DSM that brings net benefits to customers and society**.

The **empirical evidence so far** indeed points to the fact that **too little DSM** is being pursued in liberalised energy markets, in which no supportive framework has been created, except some DSM services for large customers, and some efficient heating services in the gas market. This has been proven, e.g., by a recent study on ‘active energy services’ (EC/Eurelectric 2000).

Such policy mechanisms have to be neutral to and **compatible with supply-side competition** in the liberalised market, i.e. they must not discriminate one player in the electricity or gas supply market against the others. Furthermore, such policy mechanisms **need careful design**

and implementation. As their target is to achieve the goals of society associated with EE-DSM, they should certainly also stimulate EE-DSM services or other EE-DSM activities, which are intrinsically attractive to the energy companies. But any policy mechanisms, which aim to overcome the economic barriers to EE-DSM programmes, e.g., by giving financial supports, should not reward DSM activities that are already economically attractive for the energy companies.

Among the DSM programmes, energy efficiency (EE) programmes are most interesting to society, but often not economically attractive in themselves for the energy companies. . Therefore, many of the mechanisms found by the survey explicitly set targets or obligations in terms of energy saved. They exclude load management activities on the ground of the fact that they often are already in the own interest of the energy company, and hence it would not be advisable to fund them via additional money from ratepayers or general taxation (e.g. Wisconsin PSC, 1997). Similarly, fuel switching towards the energy sold by the company may be attractive for the company but not always for the society, while fuel switching away from the energy sold by the company may be attractive for the society but not always for the energy company.

Therefore, in this chapter we concentrate on **EE-DSM programmes and services**, meaning mainly end-use energy efficiency activities carried out with participation of energy companies, hence DSM targeting end-use energy efficiency. This is because the most interesting DSM activities from the perspective of society are those focused on end-use energy efficiency. But the term EE-DSM may also encompass load management and fuel switching activities, which reduce the overall costs and save primary energy.

Hence, one has to look at policy mechanisms which could allow to achieve the allocative efficiency optimum through direct promotion of EE-DSM activities and through removal of incorrect signals embedded into certain regulation schemes.

In general, the policy mechanisms needed to make EE-DSM attractive for energy companies are mostly financial (i.e., providing an additional term R or P, to yield B (+ R + P) ‡ C + L) but not only financial. At some stage some other conditions are usually as important as finance:

- availability of information (on energy use, on possible improvements, on investment needed),
- existence of a third party (regulatory, e.g. control of the fairness of the process; and/or technical, like research institutions, an energy agency, …),
- expertise, namely existence of independent consultants,
- motivation of actors (for instance preparation of their future business plan),
- political support,
- political decision, strictly speaking.

Furthermore, the following classification of policy mechanisms to support EE-DSM can be considered:

- Mechanisms *to promote the realisation of energy efficiency activities*;
- Mechanisms *to remove the pressure on companies to realise activities to increase consumption when not economic for the customer*;
- Mechanisms *to promote the constitution of a market for genuine energy services*, that is to transform energy companies from energy suppliers into suppliers of genuine (physical) energy services (i.e., integrated suppliers of energy and EE-DSM services, ESUs).

The first type of mechanism puts emphasis on individual activities of energy companies and ESCOs, to specific final uses. The other two types have a global approach to the problem, considering the activity of energy companies as a whole. This possible classification is reflected in the multicriteria analysis of the mechanisms we have performed (cf. chapter 4.3), but not attributed to the mechanisms as such.

The remainder of this chapter deals with **policy mechanisms** to align the business interests of energy companies, respectively of unbundled transmission, distribution, and supply companies, with society's interests (mainly the efficient use of physical resources and the reduction of pollutant emissions) in increasingly competitive energy markets.

4.2 Overview of Policy Mechanisms

We consider 6 "families" of mechanisms, which are described below, together with a few examples:

M1. Schemes with Dedicated Funds or Public Benefit Charges to finance EE-DSM programmes by energy companies, ESCOs and other bodies

M2. Change the ratemaking of monopoly segments to remove pressure to increase sales even when non economic

M3. Actions in ratemaking of monopoly segments targeted at making energy companies neutral or positively affected by performing single EE-DSM programmes

M4. Obligations to perform a certain level of EE-DSM programmes and/or to adopt Integrated Assessment of Supply and Demand Options (IASDO)

M5. Negotiated agreements and other commitments for EE-DSM with the electricity and gas industries

M6. Legal and technical support and quality standards for the development of EE-DSM programmes and services

M1. Schemes with Dedicated Funds or Public Benefit Charges to finance EE-DSM programmes by energy companies, ESCOs and other bodies

This "family" comprises the mechanisms where a certain amount of money is collected on the electricity (and/or gas) market and then it is distributed to promote the development of EE-DSM activities.

To finance the activities, a Dedicated Fund is raised e.g. through a Public Benefit Charge applied on all or certain actors of the electricity system. The type and amount of EE-DSM services and programmes to be funded, and, as a consequence, the amount of the fund, will depend on the specific goals to be reached, as part of the accomplishment of a stated energy efficiency policy.

The following table synthesises the functions and the possible options to fulfil them. Table 4-2 presents the options for other characteristics of the mechanism.

Table 4-1: Functions and possible actors for the design of a Dedicated Fund

Functions	Possible Actors, Pros and Cons
Creation and design	• Legislative authorities • Regulatory authorities • Negotiated agreement between energy companies, regulatory and legislative authorities
Collection of the fund	For the public benefit charge: • if it is levied on the supply price to customers, the supply company is the „natural actor“ since it has the billing contact with the customer. • if it is a „wire charge“, the transmission or distribution companies are the best actors In addition, or as an alternative, the fund can be created through general taxation or through targeted taxation (e.g. carbon tax)
Administration of the funds	• Energy companies with regulatory oversight (Transmission, distribution, supply companies or their association) **Pros:** It would reduce administrative costs. They have direct contact with the customer. It is the solution suggested by Eurelectric. No need for new agency. They have information on consumers' energy use patterns. In some states energy companies already have a considerable experience in delivering EE-DSM to their customers **Cons.** If regulation of transmission and distribution or supply to non-eligible customers is wrongly designed, i.e. giving “artificial incentives” to increase sales, energy companies will receive conflicting signals. Retail suppliers in a liberalised market might see the delivery of energy efficiency to customers as conflicting with their commercial objectives. Some have no tradition and experience in energy efficiency **Other**: Will depend heavily on the tradition and the past performance of the energy companies. Companion measures are needed, like correct price regulation and standards of performance with regulatory oversight • The Government/state through a State Agency that already exists **Pros.** No incompatibilities with the public interest objectives. **Cons.** Possible reluctance in adding new specific objectives or activities to an existing agency. Difficulties in hiring or developing experience rapidly. Energy companies might not co-operate if losses as a consequence of programmes run by the agency are not avoided through correct price regulation • The Regulatory Authority is naturally more concerned about the supervision the of sector’s compliance with public service obligation and competition issues. However, the environmental concerns are most commonly also a stated objective (PSO) for the regulator’s action • The Independent Transmission System Operator (ISO)

	• Non-profit organisation created for the purpose (e.g. UK with the Energy Saving Trust and Denmark with the Electricity Saving Trust) **Pros.** Clarity of objectives and possibility of establishing adequate means ***Con*s.** High start-up costs and high administrative costs. Only feasible if there is a guarantee that the dedicated fund will last long-term
Programme design and implementation of programmes	• Existing government/state agency. Will be better for multiplier- oriented EE programmes like market transformation of efficient products or qualification and training. Same as for administration of the funds. • Energy companies with regulatory oversight (Transmission, distribution, supply companies or their association) **Pros.** Energy companies have direct contact with customers, e.g., have a privileged means of communication through the billing systems, and therefore will better address customer-oriented DSM programmes and energy efficiency services. In some states energy companies have already a considerable experience in delivering EE-DSM to their customers. **Cons.** Strict rules are needed due to conflicts with commercial objectives if regulation has not been set right. If they have poor past performance, their right in using funds should be limited and/or allowed with stricter rules. Strict rules are particularly needed to monitor and verify the actual energy efficiency content of DSM services. • An entrepreneurial organisation that designs and implements DSM programmes created for the purpose like in the UK with the Electricity Saving Trust and Denmark with the Electricity Saving Trust **Pros.** Will be able to address both multiplier- and customer-oriented DSM programmes. Same as for administration of the funds • Energy Service Companies. Strict rules are needed to monitor and verify the actual energy efficiency content of the services • Energy efficiency agencies (local or regional) • Customers' associations

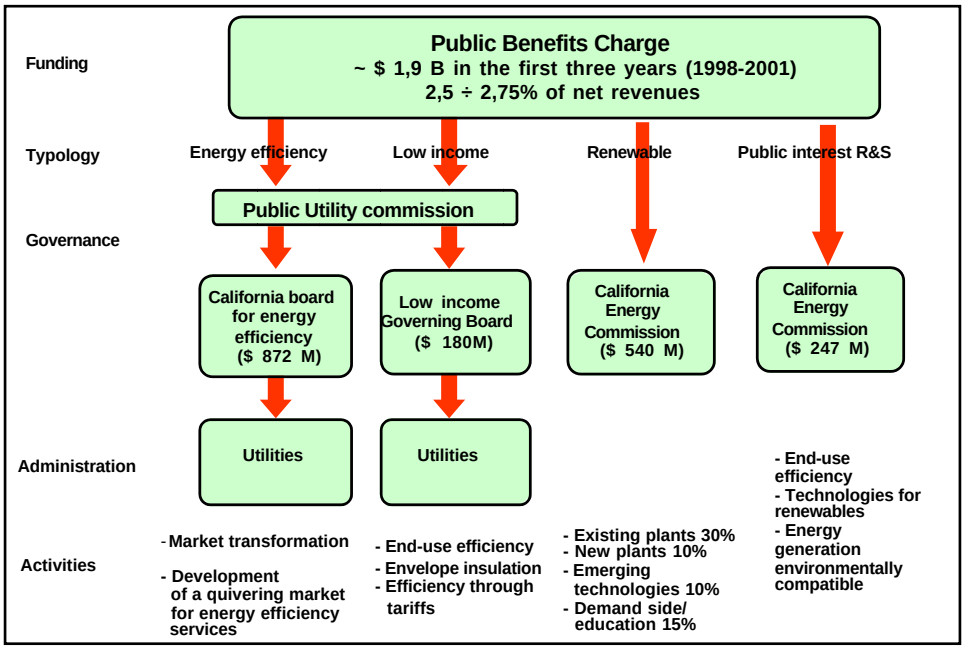
Table 4-2: Characteristics and options for the creation of a dedicated fund

Objective	• Regarding the activity: DSM (Renewable energies and CHP are only referred to when an analogy is relevant) • Market transformation towards a self sustaining market for DSM services • Quantified objectives vs. not quantified
Distribution	• Tendering procedure (i.e., the body administrating the funds calls for tenders for implementation of predesigned standard programmes, or for proposals and implementation of large retrofit projects, e.g. in industry) • Application procedure (i.e., energy companies or other actors can put forward own, innovative programme designs and ask for funding) • Direct use (when administered by energy companies or the body administrating the funds, and used for own programmes)
Type of collection	• Volume based (on kWh) surcharge **Pros.** It is consistent with the efforts to internalise external costs, which are mainly dependent on the amount of energy used. • Fixed charge per user **Cons**. Introduces an important price distortion and would penalise heavily the smaller consumers. Keeps the marginal price of the kWh lower. • From general taxation **Cons**: it removes proportionality to energy consumed, it does not give a signal coherent with the 'polluter pays' principle. The level of the funds dedicated to EE may vary over time and is more endangered from changes in the political majority.

Level of collection	• Whole sale pool • Transmission network • Distribution network • Final customers: selected or all • General taxation

Examples of Experiences

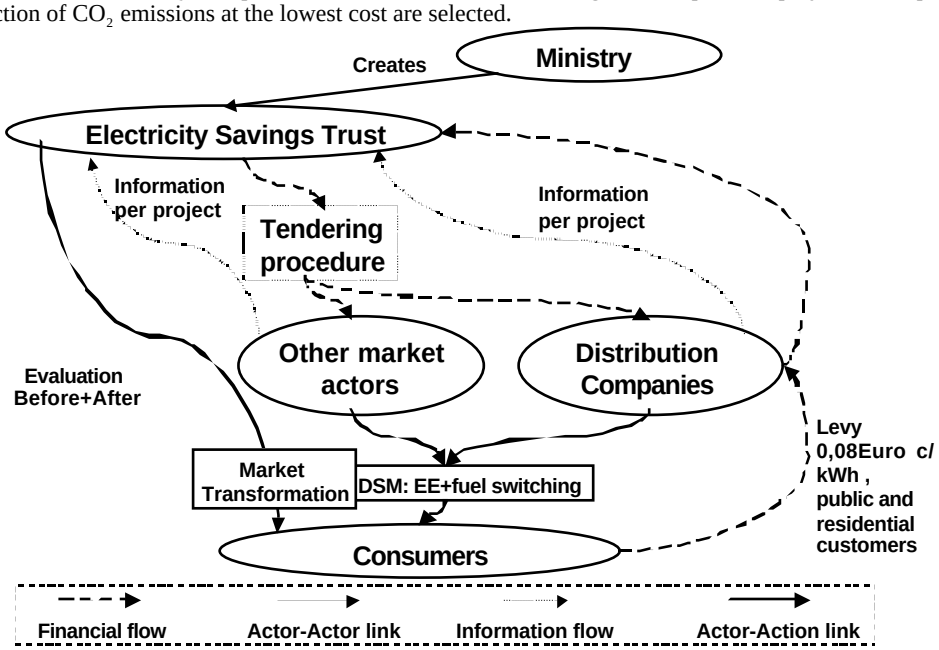
Box n°1. Public benefits programmes in California



In the USA, not only California, but in total 19 States have introduced such systems of Public Goods Charges or Public Benefits Charges to finance, among others, EE-DSM and other market transformation programmes. This means that around 80 % of those States in the USA, which have introduced or are planning to introduce competition in retail supply, have also introduced a dedicated levy and funds system to secure the continuation of EE-DSM (cf. www.ACEEE.org for an overview of these examples). It is important to note for a comparison to Europe that in the USA the structure and regulation of the electricity supply industry, as well as the political environment, are also quite different from State to State. Therefore, the approaches taken for collecting the levy, administrating the funds, and implementing the programmes are quite different between the 19 USA States mentioned. In some of them, like in California, the energy companies administer the funds and manage the programmes, after approval by the regulator (CPUC, cf. Box no 1). Other States have allocated the administration of the funds and the management of the programmes to existing or new energy agencies or independent bodies (www.ACEEE.org).

Box n°2. The Danish Electricity Saving Trust and its funding system

The Electricity Savings Trust was created by the Ministry of Environment and Energy with the objective of reducing CO_2 emissions, by 3 Mtonnes by 2008, which corresponds to 8% of today's emissions. The trust's activities comprise conversion from electric heating to CHP or natural gas, and other market transformation activities. It is a private independent entity with a board of 8 members named by the ministry of environment and energy representing NGOs, municipalities, industry, energy companies and energy conservation expertise. The EST was created in 1997. In 1998, it started to be funded through a volume-based levy of 0,08 ceuro /kWh, collected by distribution companies only on households and public sector (extension is discussed to commercial sector and heating fuels). The total amount is around 90 MDKK per year.
Private companies or electricity companies are invited to tender to design and implement projects. The projects with the highest reduction of CO_2 emissions at the lowest cost are selected.



M2. Change the ratemaking of monopoly segments to remove pressure to increase sales even when non economic

Retail competition increases the incentive for energy suppliers to increase profits through increased energy sales, which certainly is a major problem for DSM. But that incentive also exists for regulated monopolies, where rate-of-return price regulation or price-cap regulation is used, or where the prices are just fixed by the government. The latter was quite common in Europe before the restructuring. To continue with this would countereffect the policy support for DSM.

With restructuring, the monopoly sector, and hence, price regulation, is reduced to the transmission and distribution networks and to the supply to non-eligible (captive) customers. Price regulation for these market segments should try to better align the evolution of revenues and profits with the evolution of cost drivers (e.g., for distribution networks, this can be energy sales, number of served customers, grid length). A reduced weight of energy sales in determining the allowed revenue or maximum average price, typically 25 to 50 %, would also reduce or avoid incentives to increase sales. Such regulation is also called Performance Based

Regulation, since it sets performance targets to the regulated companies instead of carrying out a cost analysis each year, as in purely cost-based regulation schemes.

For the price regulation of the monopoly activity of the electricity or gas sector (T, D, S to captive customers), the earliest schemes of Performance Based Regulation are the so-called Price Cap and Revenue Target. They pose a limit either to one or to the other of two fundamental variables in regulation: the (average) price of energy or the total revenues of the energy company.

Pure Price Caps have been identified as a powerful incentive to Energy Companies to increase sales. Under this regulation larger profits than allowed by the regulator can be obtained when energy sales rise beyond the forecasted level which was used to set prices, since in this case the increase of revenues and profits would be higher than the increase of costs. This effect holds true even when sales are non-economic, that is in case where it is cheaper for the customer and for society to save a unit of energy through the use of better end-use technologies, than generating and distributing it. This "artificial incentive" [1] to increase sales can result in a non optimal allocation of capital between the supply and the demand side, and a unnecessary increase of the National Energy Bill.

On the other side pure Revenue Targets, while avoiding to put energy companies under pressure to increase sales, can lead to price fluctuations when sales level varies under events which are not under control of the energy company.

One main reason for these drawbacks of Price Cap Regulation and Revenue Target regulation is the fact that the formulas and the ways they are revised annually are too simple in either cases. Simplicity is advantageous on one hand but limits on the other hand the extent to which price or revenue evolution can reflect unit or total cost evolution over time.

Many studies and statistical analysis realised in the last years (OFFER 1999, SAVE studies [2]) have investigated the evolution of costs over time for network companies and identified the correlation of these costs with a number of variables beyond the pure volume of sales used in pure price cap regulation (typically energy sales, number of served customers, grid length).

Both on the basis of these analysis and because of the objective of removing the undue incentives to increase sales, a number of Regulators have introduced new regulation schemes which are based on the use of these larger set of variables to determine the evolution of a revenue target over time. These new regulation schemes have been introduced in UK in '94, and in more recent years in Portugal, Norway, New South Wales (Australia) and Italy (only for non domestic captive customers).

In spite of sharing the feature of setting a target (instead of a cap) and linking its evolution to a larger number of variables (beyond inflation index "I" and required productivity increase "X", and eventually sales volume) these new schemes have been presented under old names which no more reflect with accuracy their features. The scheme introduced in UK in '94 continues to be called "price cap" and so does the Italian scheme, while the Norway and New South Wales schemes are presented as "revenue caps".

We will follow here the nomenclature (**Multiple Driver Target schemes**) introduced in another SAVE study (Politecnico et al. 2000) , where these schemes have been analysed, their common features identified, their relationship to pure price and revenue caps shown.

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1 OFFER 1994, Monopoly and Mergers Commission 1994.

2 e.g. (Politecnico et al. 2000).

According to this analysis, the entire family of MDT tariff regulation schemes can be described by the following formula:

$$R_{lim\,t} = R_{lim\,t-1} \quad (1 + I - X + ...) \quad (r + a \quad N_t/N_{t-1} + b \quad S_t/S_{t-1} + g \quad G_t/G_{t-1} + ...)$$

or

$$P_{lim\,t} = (P_{lim\,t-1} \quad S_{t-1}) \quad (1/S_t) \quad (1 + I - X + ...) \quad (r + a \quad N_t/N_{t-1} + b \quad S_t/S_{t-1} + g \quad G_t/G_{t-1} + ...)$$

Where:

N_t, S_t, G_t	are the *Number of Customers*, the *Sales*, the *Grid Length*, for the current time period
N_{t-1}, S_{t-1}, G_{t-1}	are the *Number of Customers*, the *Sales*, the *Grid Length*, for the previous time period
$R_{lim\,t}$, $R_{lim\,t-1}$	are the *Target Revenues* for the current time period and for the previous time period
$P_{lim\,t}$, $P_{lim\,t-1}$	are the *Allowed Maximum Average Price* for the current time period and for the previous time period
I and X	are the *inflation rate* and the *productivity factor* in the regulated sector
r, a, b, g	are *coefficients*, the 'weights' of the cost drivers N, S, G

A crucial element of implementing MDT regulation is the existence of a procedure for reconciling actual revenues with allowed revenues calculated on the basis of the development of the actual cost drivers. Such a procedure corrects any over- or underpayments by the customers during the following regulation year.

The advantages of the introduction of a Multiple Driver Target regulation instead of a Price Cap regulation or rate-of-return regulation emerge clearly from the analysis carried out during the present study and the SAVE study previously mentioned (Politecnico et al. 2000)

- end-use energy efficiency increase (reduction of artificial incentives for energy companies to increase sale, reduction of disincentives to perform energy efficient DSM actions, increase of the range of Demand-side management and particularly Energy efficiency options which are commercially feasible)
- national economic efficiency increase (closer link between revenues and costs evolution, stability or reduction of national energy bill).
- customers bills improvement (reduction of risks of price discrimination between customers categories, stabilisation or decrement of Single Customer Bill)
- higher stability of energy companies' profit in respect of sales fluctuations that are out of their control, higher flexibility for Energy companies in the choice and integration of strategies for increasing profit.

Furthermore, the MDT schemes conserve the incentives to reduce costs and increase economic efficiency included in the Price caps and Revenue Target (through the productivity increase index X), and other incentives by the introduction of suitable performance indexes (for quality, grid losses, …)

The Multiple Driver Target regulation reduces also the risks of obstructionism by energy companies towards energy efficiency actions carried out by different actors (public or private). In fact these actions will not generally modify energy companies profits, as it would be in the case of Price Cap regulation.

In conclusion, Multiple Driver Target schemes can harmonise the pursuing of energy companies economic interests, of cost reduction and of end use energy efficiency.

These positive aspects can have more or less impact depending on the degree of retail liberalisation: for the captive customer market they are more relevant than for the eligible customer market, because in the second situation the MDT regulation cannot be applied for the supplier, but only for the transmission and distribution companies.

Multiple Driver Target schemes are in general simple to understand and realise, since they can be obtained from the Price Cap basic formulas with the introduction of corrective terms. The annual application requires the knowledge of very simple parameters in addition to the requirements of Pure Price cap regulation, like the customers' number (total or divided into different classes) and/or the grid length of the different energy companies.

Rate-of-return or Price-Cap regulations can be corrected also with an Earnings Sharing mechanism. In this case, the regulator sets a maximum and often also a minimum threshold for energy companies earnings: when earnings are too high, prices are reduced; when earnings are too low, prices are increased. Practically a deadband is usually set, in which earnings can fluctuate without any consequence. Outside this deadband, earnings are shared between ratepayers and shareholders.

Earnings sharing mechanisms (if the deadband introduced is properly designed) can reduce the pressure to increase sales even when non economic (although not to the same degree as MDT), because the energy company will not have the possibility to increase its profits freely.

The mitigation of the artificial incentives connected with the Price Cap regulation is provided by the *sharing of the extra-profits* and it does not depend on the presence of customer sharing when profits fail to meet the previsions. So from our point of view what really matters is the presence of an extra-profit sharing**.** A Sliding scale regulation with deadbands not too large and a sharing fraction of the extra-profits of at least 75% can be a proper correction of Price Cap or Rate-of-return schemes.

It can be advisable to introduce a Sliding scale regulation only when the regulatory framework prevents the introduction of a Multiple Driver Target scheme.

Examples of Experiences

Box n°3: England and Wales Distribution/Supply Ratemaking

Following some of the suggestions which came during the tariff revision process, in 1994 the UK Regulator decided to modify the pure price cap formula in place for the distribution-supply companies. "In my August (1994) proposals I changed the form of the control so that, whereas previously revenue had increased proportionately with the number of units sold, it would now increase at half the rate." [1] Even the "Monopoly and Mergers Commission" supported this decision: "We believe that the artificial incentive to sell more electricity could be adequately reduced if the price control formula for Scottish Hydro Electric related parts of the allowed revenues to the forecasted number of customers with the remainder being related to the actual number of units, …" The revised formula gives thus a weight of 50% to the number of customers and a 50% to the number of unit distributed, hence it is a Multiple Driver Target formula, even though written in the form of a Price Cap.
"The form of the control should stimulate the Public Electricity Suppliers (PESs) to achieve efficiency savings, which in due course can be shared with customers. (…) [The new regulation formula] was intended to avoid any *artificial incentive* on the PESs to promote increased sales of electricity. " [2]
The new formula (introduced in 1994 in conjunction with a term which allows the recovery of the costs of DSM programmes, and a term to share between customers and shareholders the benefits of reduced line and transformers losses) has induced, according to some observers, the Electricity companies to drop the emphasis previously given to marketing programmes to expand sales. However it didn't yet succeed in enlarging the realisation of DSM programmes. In fact the Electricity companies are carrying out programmes just slightly above the minimum level set in the Standard of Performances.

Box n°4: Italy Distribution/Supply Ratemaking for captive customers

In December 1999 the Italian Authority for Electricity has set the new tariff for captive customers. All the tariffs for non domestic captive customers must meet a Multiple Driver Target which gives, for the part to cover the distribution costs, a weight of 75% to the number of customers and of 25% to the number of distributed units; the part to cover the supply cost is under a Revenue per Customer Cap, i.e. it is 100% proportional to the number of customers. Also the tariff for domestic customers is set with the same scope, but the electricity companies also have the possibility to offer free tariffs completely unregulated, and then they can skip the cap.
Following this reform, in the February 2000 ENEL (which is the largest distributor and supplier of electricity in Italy) announced discounts for high consumption *domestic customers* through the new unregulated tariffs which will be possible to offer starting from January 2001. This seems to give evidence of the effects of regulation choices: the customer segments where allowed revenues are not linked to the number of customers are likely to be the target of a marketing campaign to increase sales, irrespective of large available cost-effective energy saving potential.

M3. Actions in ratemaking of monopoly segments targeted at making energy companies neutral or positively affected by performing single EE-DSM programmes

When performing an EE-DSM programme, an energy company faces both direct programme costs and net lost revenues due to reduced energy sales from DSM, which under certain regulatory regimes cannot be recovered and hence create extremely strong disincentives to this type of activities.

We discuss here a classification of tariff mechanisms targeted at removing this disincentives. It should be noted that the mechanisms above are not exclusive of each other: e.g. direct costs and net lost revenues can be recovered through a combination of mechanisms 1, 2 and 3, or through an extended version of mechanism 1.

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1 OFFER - Office of Electricity Regulation "The distribution price control: revised proposals July 1995"

2 OFFER - Office of Electricity Regulation "Reviews of Public Electricity Suppliers 1998 to 2000 Price Controls and Competition Consultation Paper"

Recovery of direct costs of an EE-DSM programme within tariffs

Direct costs of a DSM programme include personnel and material costs for the design, planning, implementation, monitoring and evaluation plus the part of the cost (eventually 100%) of the EE devices which is borne by the energy company.

In the case of Cost-Plus/Rate-of-return regulation, there is a need to explicitly include the Energy Efficiency Programmes costs in the acceptable costs to be recovered through tariffs. In the case of Performance Based Regulation (e.g., the MDT regulation described under mechanism M2 above), one should make sure that DSM costs can be covered outside the Revenue / Price cap (by an additional term, often called "Z term"), so that this component is not loaded with the same pressure to reduce costs of those components under the cap.

Recovery of net lost revenues within tariffs

With a Net Lost Revenue Adjustment (NLRA) mechanism, the energy company is allowed to recover within tariffs net revenues missed due to a specific Energy Efficiency DSM Programme. The result of the mechanism is the insensitiveness of energy company profits to the realisation of the specific programmes subject to NLRA, a slight rise in the price of a unit of energy, and a reduction of the national bill due to generation, transmission and distribution costs avoided because of the energy saved by the programmes.

If such a mechanism succeeds in the removal of disincentives to the realisation of specific Energy Efficiency Programmes, however it does not remove the strong incentives to marketing uneconomic sales, when these are present in the main tariff mechanisms, like Cost-Plus/Rate-of-return regulation or pure Price Cap. For this, the introduction of a mechanism from our M2 'family' is needed. Since the effects of market transformation programmes are generally not easy to measure, it may not be practical, or possible, to apply simple lost revenue adjustments to make energy companies' market transformation efforts revenue neutral.

Giving a positive incentive to perform EE-DSM within tariffs

Recovery of direct DSM costs and net lost revenues will only achieve that the regulated energy company performing the DSM does not make an economic loss. However, to make DSM more profitable and attractive for the energy company than expanding capacities and sales, a positive incentive is needed. It is also justified as long as it is lower than the net benefit to society and the customers achieved through the DSM.

Several rate mechanisms have been developed to allow an adequate return on investments on Energy Efficiency Programmes to the Energy Companies, comparable to other alternative investments. These mechanisms can be classified in different groups:

- **Bonus**: consisting in predetermined bonus for each unit of energy saved;
- **Redistribution or Shared Savings**: with this mechanism, energy companies are the recipients of a fraction of total and/or net benefits due to the Energy Efficiency DSM

Programmes. Net benefits cover avoided supply costs of energy minus the cost of the programmes (both incurred by the Company and by customers [1]);

- **Markup**: these are rate increases proportional (where proportionality factor is larger than one) to the costs incurred by the Company related to Energy Efficiency Programmes.
- **Ratebasing**: DSM investments are allowed a higher return on investments than supply side investments (applicable mainly in Rate-of-return regulation).

Transfers to Energy Companies as defined by the above mechanisms are to be collected through tariffs.

Examples of Experiences

Box n°5: DSM costs recovery tariff mechanism in Denmark

In Denmark each distribution network company is allowed to raise tariffs by a quantity able to cover direct costs incurred for the realisation of its EE-DSM programmes. The average rise in tariffs is about 0.06 Euro c /kWh sold (cf. box no. 11).
The mechanism is implemented together with obligations (M4) and a no-profit no-losses mechanism (i.e., NLRA and M2; no profit beyond a normal profit on investments, which is correctly considered as a cost: cost of money).

Box n°6: DSM costs recovery and Shared Savings by tariffs in California

Cost recovery and Shared Savings mechanisms added to ERAM (a M2 type mechanism, which makes energy company profits indifferent to sales reductions due to DSM or external events) generated large investments in cost-effective EE-DSM activities in the late 80's/early 90's.
The Performance-Based Ratemaking plan for San Diego Gas&Electric (SDG&E) (94-98) included favorable DSM rate treatment, consisting of (1) a passthrough of direct costs, (2) a special adjustment to exclude changes in DSM expenditures from the calculation of SDG&E's price performance, (3) a lost revenue adjustment through an ERAM, and (4) a DSM incentive. The company reported a 50% increase in DSM expenditure over the period.

Mechanisms of the type M1 (Dedicated funds described above) and M3 have in practice the same objective: allow the recovery of EE-DSM costs and eventually giving positive incentives; differences can be tracked down to:

- a fundamental characteristic of M1 is that, the total amount of money available is fixed a priori and hence it constitutes a limit to the total volume of activities which can be performed in a certain year. M3 (recovery of costs through tariffs) allows for more flexibility because in general it does not limit the amount collected and spent per year, only that it is spent for cost effective EE-DSM. This means, however, that M3 also does not set a minimum amount of investment in EE-DSM.
- on the other hand, mechanisms of type M3 address directly regulated companies (distribution or retail to captive customers) and only indirectly other kind of actors

1 In a few Shared Saving Plans only the costs met by the Company are considered

(ESCOs, local energy agencies, customers,…), and they are only possible for monopoly segments.

M4. Obligations to perform a certain level of EE-DSM programmes and/or to adopt Integrated Assessment of Supply and Demand Options (IASDO)

It is possible to stimulate the implementation of a certain level of EE-DSM and/or the Integrated Assessment of Supply and Demand Options through an Obligation. This instrument may appear a relatively strong one, but one must consider that the licence to a franchised company is in fact an expression of the obligations of the company towards customers. Different types of obligations can be devised for different actors and to achieve different targets.

Obligation to Energy Companies

Obligations to Energy Companies can regard:

- obligation to **draft an EE-DSM plan** based on the IASDO methods for benefit-cost evaluation
- obligation to **compare generation and T&D investments with EE-DSM activities** as a prerequisite for achieving a permit to build the expansion (this simply transforms a situation of inherent economic attractiveness into an extrinsic mechanism). With restructuring and unbundling it is becoming more complex to perform a full comparison than in the previous era of vertically integrated energy companies; nevertheless it continues to make economic sense for a distribution company to expand the T&D planning process to include localised EE-DSM and distributed generation, in order to minimise the cost of maintaining the reliability of power delivery and serving the needs of customers in a specific area. Many regulators may decide that distribution companies should also have an obligation to minimise customers' energy costs through measures that are within the company's control. Such measures would include implementing additional energy efficiency measures (beyond those economical purely on the basis of avoided T&D costs), and assisting customers in improving power quality.
- obligation to **perform a certain level of EE-DSM** activities can be imposed on distribution or supply companies under the form of a requirement to invest on EE-DSM a certain percentage of revenues, or as a physical saving target,... The obligation can be established in the legislation, or in the licences, or as an extension of public service obligations. It can be undifferentiated or targeted to technologies and customer segments neglected by commercial services market
- obligation to **fuel disclosure** in customer bills, **including** all the resources utilised to meet demand (conventional large sources, renewables, and **energy saved** through EE-DSM programmes).

Obligation to a National supra-energy company institution

In some cases, for supply-side functions where competition is not possible, a National institution like a Single Buyer or an Independent System Operator is provided for. This National body can be addressed with an obligation to draft an EE-DSM plan based on the IASDO methods for benefit-cost evaluation, in order to secure energy supply at lowest cost for customers, using e.g. DSM bidding schemes.

We shall concentrate in the following on the case of an obligation to energy companies to perform a certain level of EE-DSM. The first question to be solved is which of the unbundled segments should carry this obligation. The question is particularly relevant when full retail competition is in place. Most participants in the restructured electricity market have no long-term relationship to the customers, the service area, or to other market actors, such as builders and appliance wholesalers. Generators would be free to sell power anywhere the transmission lines will take it; marketers will be buying and selling across Europe. The distribution company, however, would have an intrinsic interest in the long-term maximisation of local benefits in its distribution area, and would have detailed information on every customer's loads, for billing and T&D-planning purposes.

When considering an obligation to energy companies to perform a certain level of EE-DSM activities, the target might be expressed in different ways (physical units or level of investment), which need to be clearly spelled out and weighted according to their relative advantages and disadvantages.

A target concerning energy efficiency improvements measured in physical units might be formulated as:

1) energy companies are obliged to generate through EE-DSM in the year 2000 **additional** (i.e., additional with respect to previous EE-DSM activities) physical energy savings equal to y % of the sales in the 1999, where energy saved is defined as:

   a) the energy saved in the year 2001 [1] by DSM programmes undertaken in 2000 (this requires also that one specifies separately and explicitly how to consider the lifetime of programmes and measures and the superposition of programmes actuated in different years, in this example the activity actuated in the years previous to 2000) or

   b) the cumulative (during the life span of the installed technology/system, see SoP in Box n°7) savings of the DSM activity undertaken in 2000.

2) Alternatively, energy companies might be asked to generate until the year 2000 **total** physical energy savings equal to y % of the sales in 1999, where the definition of saved energy would be the energy saved during the year 2001 by DSM programmes undertaken

[1] (since part of the activities might not generate savings right at the start or be implemented in the second part of the year)

in 2000, and of programmes undertaken in previous years for which the installed efficient devices are still active.

The policy goal might ultimately be the **total** energy savings in 2000 as a percentage of the expected BAU value in 2000, (e.g. reduce the rate of exponential growth of total consumption), but this might be controversial to define and to measure, given the difficulty of getting to an agreement on the BAU scenario. It should, then, rather be "measured" as the addition of the achieved annual targets (**version 1 a**) from several previous years, because this total annual saving will continue for the lifetime of the measures installed. If version 2 was understood as the total savings accumulated until 2000, it would be unclear what will be the continued annual savings compared to BAU from 2001 on.

A target concerning the level of investments might, e.g., require companies to invest in EE-DSM during the year 2000 x % of total revenues (in all the segments: generation through sale) from the energy sale in 1999. This formulation would be accompanied by a set of criteria, by which to evaluate the cost-effectiveness of the investments (well-established criteria are available from European and USA experience and practice).

A relationship between the two ways of setting targets can be calculated taking into account representative values for the cost of conserved energy and the lifetime of measures.

The two ways of setting targets might be used as alternative to each other, or they might be combined (e.g. (a) not less than a certain amount of physical savings nor less than a certain amount of investments, or (b) a physical savings target for programmes where energy savings can be more readily evaluated, and an investment target for activities where evaluation is more uncertain, like information, training,…).

Examples and experience

Box n°7: Denmark's obligation to perform IRP, now DSM

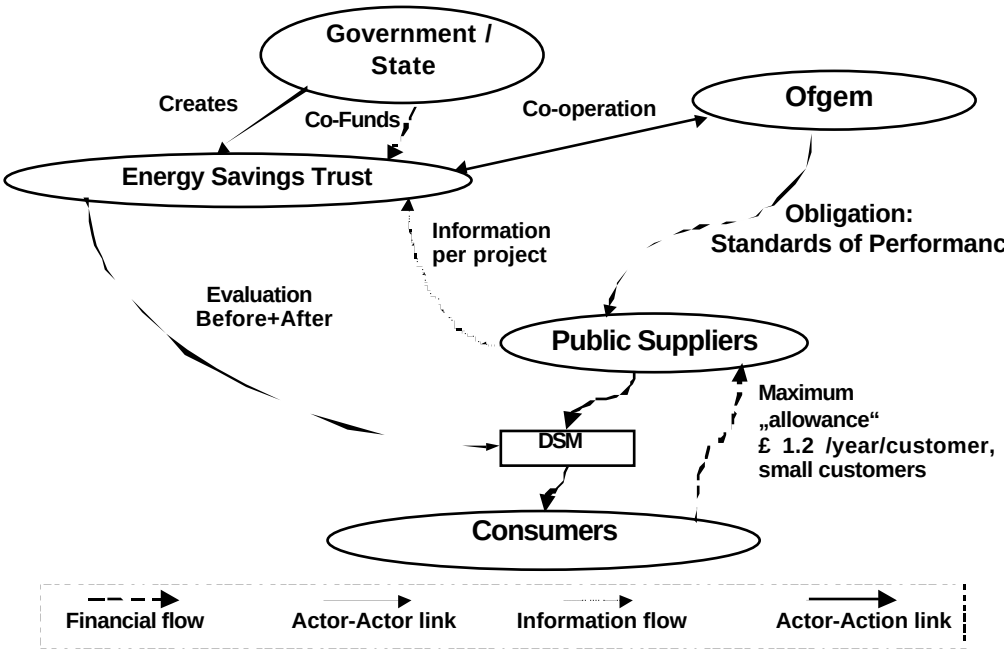
The obligation to perform IRP has been in force in Denmark from 1995 and it is still in place. All electricity companies have an obligation (by law) to participate in the IRP process. Different actors (generators, system operators & distributors) have different tasks, but all reports are co-ordinated. Guidelines for the planning process (and topics to be covered in the reports) are issued by the Minister/DEA. The law requires companies to pursue the implementation of the goals set up in the plans, at least in the case of the distribution companies' DSM programmes. Distribution companies' EE-DSM programme costs are paid for through a slight increase in tariffs (around 0.05 c/kWh on average from all customer classes), and a no-profit no-loss mechanism ensures that energy companies will not see their profits shrink as an effect of their own DSM activities. See also **Box no 11** for more detail and a graph.

Box n°8: Obligation to invest a certain percentage of revenues in EE-DSM in the USA

Obligation to invest a certain percentage of revenues has become a common practice in the USA (California, North West states, NY, …) Wisconsin has set an obligation to invest a certain amount of money/year and to achieve a certain amount of physical savings.

Box n°9: England and Wales EESoP

The Energy Efficiency Standards of Performance were created in 1994 by the electricity regulator and requires Public Electricity Suppliers (PESs) to achieve a specified amount of energy savings. The investment programmes are funded from an allowance of a maximum of £1 per franchise customer per year, included within the PESs overall price control. The principal achievements have been for the two first period of the Standards of Performance (1994-2000), 9.5 TWh of saved energy at a cost of 2.25 cEUR/kWh. The National Audit Office assessed its benefits to the nation as a whole at £390M, with total benefits exceeding total costs in the ratio of 2.9:1.
OFGEM has now put into operation new Standards of Performance for the period 2000-2002 (SOP3) setting "an indicative cost of £1.2 per year for each gas and electricity consumer". This £1.2 per year is used to calculate the savings targets (in GWh) that now apply to the competitive suppliers, which are no longer under price control.



It is important to note that the EESoP is actually a mix of mechanisms, giving Energy Companies both “the duty and the ability” to deliver energy efficiency to customers. The duty consists in the obligation to perform EE-DSM programmes, measured in terms of cumulative energy saved by measures during their lifetime. The ability consists in: a MDT formula (M2 mechanism) to remove artificial incentives to sales and disincentives to DSM, an allowance (M3 mechanism) to recover direct costs, and a tariff incentive to reduce line and transformers losses. The obligation was transferred on unbundled suppliers with the EESoP ‘99-2000.

M5. Negotiated agreements and other commitments for EE-DSM with the electricity and gas industries

This group of mechanisms is composed of voluntary approaches, which means that they are non-legislative and that energy companies are not obliged to adhere. The objective is to reach an agreement or commitment aimed at involving the electricity and gas industry in EE-DSM programmes and services. Three types of voluntary approaches can be distinguished (based on OECD 1999):

- *Negotiated agreement*, between, on one side, the electricity or gas company (and/or possibly their industry association), and, on the other side, a state authority or an agency recognised as responsible by the government. The agreement results from a negotiated or

bargaining process and is usually formalised in a contract between the parties, often not legally binding (meaning that it does not include sanctions and the intervention of courts in the case of non-compliance, but usually the threat of alternative policy undertaken by the government if the agreement fails).

- *Public voluntary agreement.* It is a commitment devised by a state authority in which the individual firms are invited to participate. This type of agreement is also called *optional regulation* and is the one with the highest involvement of public authorities. An example is the Environmental Management and Auditing Schemes (EMAS) that could be expanded to explicitly include EE-DSM objectives;

- *Unilateral commitment*, when an industry branch or firm without any involvement of public authorities decides to engage in a certain commitment. An example of this type of agreements is the Energy Wisdom programme of Eurelectric.

Often, enforcement of Negotiated Agreements is provided by the threat of new legislation, which gives an incentive to companies to reach the agreement and comply with the commitments made. In terms of geographical preference, Negotiated Agreements dominate in European Countries (and Japan), while Public Voluntary Agreements are preferred in the USA. Regarding Environmental policy, the European Commission (CEC 1996) reported more than 300 negotiated agreements and it is argued that this inventory is not exhaustive. Germany and the Netherlands (mostly legally binding) account for more than two thirds of these agreements.

Table 4-3: Negotiated or other types of agreements on EE-DSM and IRP

COUNTRIES	Negotiated or other types of agreements on EE-DSM and IRP
France	A non legally binding Negotiated agreement was made between EDF - Electricité de France, ADEME (state environment and energy management agency) and the Ministry of Industry. Two 3-year programmes were signed for the periods 1993-1996 and 1996-1999, involving around 5 MEuro per year, being 75% funded by EDF and 25% by ADEME. The actions involve: rural electrification; industry; domestic appliances and lighting; building and commercial sector.
Belgium	All efforts in Energy efficiency and DSM are framed in a memorandum of understandings, especially in the Flemish Region, since 1996. The agreement has not contributed to start the programmes but it has contributed to their set up and their control, as well as to ensure the continuation of their implementation.
Germany	A "negotiated commitment" of the electricity and gas utility associations exists to reduce CO2 emissions but it is not specifically on EE-DSM or IRP.
Denmark	Although the Danish energy policy is based on obligations to energy companies, these obligations are agreed beforehand and therefore are in someway a kind of negotiated agreement, that we will call “agreed obligation”. This way of acting has proved to be very effective in getting involved the energy companies in participating in sustainable development activities. See box n°8
Sweden	A negotiated agreement existed, called Eko-Energi but it is in jeopardy because of lack of funding
Finland	Negotiated agreement between the energy companies associations (energy, electricity and district heating). The ministry co-funds some activities like energy audits.
The Netherlands	A legally binding negotiated agreement committing the individual companies and involving also the industry branches. See box n°10

Regarding agreements involving EE-DSM activities, only a few were identified by our empirical surveys, and these do not always correspond to the types of agreements defined above (see table 4-3).

In the area of environmental policy, which accounts for the most interesting experiences and is the closest to EE-DSM, it is recognised that the assessment of the performance of this mechanism still needs to be developed. However, it is possible to draw some conclusions from empirical studies (OECD 1999). Negotiated and public voluntary agreements in environmental policy appear to not have proved their effectiveness, and their ability to reduce administrative and transaction costs are still an open question. The main advantage seems to be "the positive 'soft effects' such as collective learning, generation and diffusion of information and consensus building". Evidence suggests that agreements are particularly appropriate (1) as part of a policy mix or (2) to explore new policy areas in which government intervention is sensitive or as it happened for example in climate change before this issue entered formally in the political agenda. (Glachant 1998).

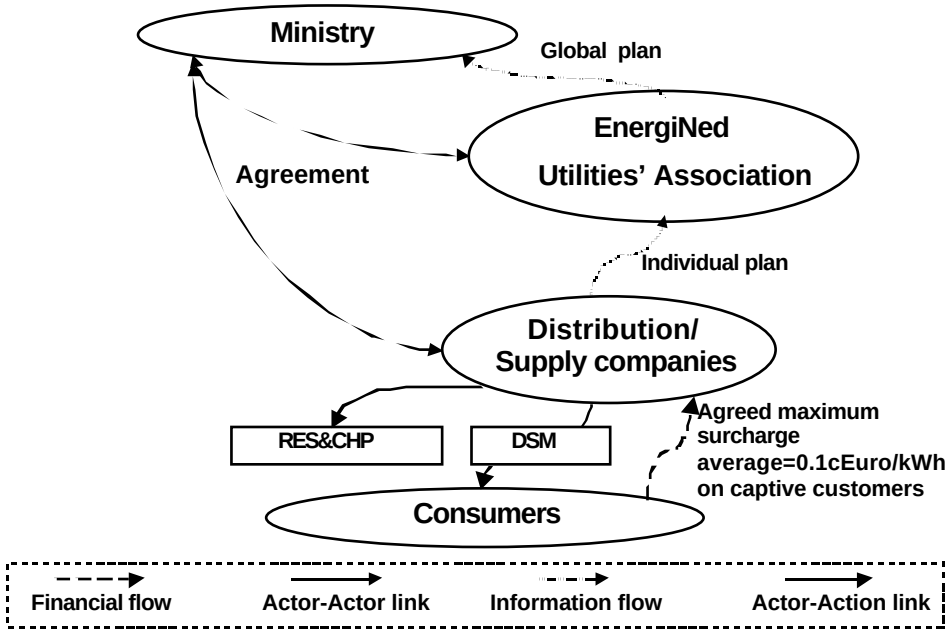
Recommendations for the implementation of negotiated agreements in the area of promotion of EE-DSM include: (1) to combine it with other mechanisms, namely a funding scheme; (2) to define substantial quantitative targets, and a time schedule; (3) to establish links to regulatory requirements and obligations and a credible set of sanctions in case of non-compliance; (4) to demonstrate that a threat to establish an obligation exists; (5) to establish a credible monitoring and reporting scheme to ensure that the objectives are reached, at both the individual firm level and the sector level.

If the activities are carried out by energy companies, there may be, like we have seen in the US and also in the European chemical industry, an integration into their marketing plans. Environmental protection may bring, like green electricity, a new image of the firm and its products.

Examples and experience

Box n°10: The Netherlands – Environmental Action Plan (MAP)

The distribution and supply companies and the government negotiated an agreement for the period 1990-2000 consisting of the possibility of charging an extra levy to the consumers in order to achieve quantified emissions savings. Distribution and supply companies elaborate plans to contribute to reach these objectives that are put together by the energy companies association - EnergiNed - to form the Environmental Action Plan (MAP). With the restructuring of the electricity industry and consequent unbundling of the distribution and supply functions, supply companies were given responsibility to collect and administer the funds. The volumetric extra levy is collected at the supply level and reached a total of 95 MEuro assigned for energy efficiency in 1998, corresponding to 0,10 cEuro/kWh, or 1,5% of the electricity price for domestic consumers. The activities financed were mainly rebate programmes, and achieved savings of 7,4 TWh in 1996 equivalent to 2,5 Mton CO2.



Regarding the future evolution, the Environmental Action Plan will end in the year 2000. A framework for a similar system has been provided in the new electricity act as a "possibility to surcharge in the case of supply to captive customers". However, the suppliers may not want to surcharge the maximum amount they are authorised in order to avoid loosing competitiveness. Despite the expertise developed in the energy companies, the introduction of retail competition and the option taken to have pure distribution companies, energy company DSM activities might be, in the future, reduced to the strict commercial and marketing activities.

M6. Legal and technical support and quality standards for the development of EE-DSM programmes and services

The mechanisms under this family are aimed at supporting the development of a self sustained market for DSM services and the implementation of energy efficiency DSM services and programmes, by providing legal and/or technical definitions and frameworks, particularly in what concerns their energy efficiency content.

Energy Efficiency Services offer is still in its infancy in Europe. DSM services have been rare and their content of energy efficiency is not always proved. They have been especially

offered to large customers. Medium and particularly small customers have a too low energy bill for the energy (service) companies to get interested. Transaction costs are (still) too high when compared to the potential savings. Standardised contracts and procedures can help to reduce these transaction costs. In the UK, OFGEM, the office of regulation of gas and electricity markets, states that “There is little evidence that energy suppliers are seeking actively to market energy services to domestic customers. Suppliers have reported that energy efficiency is not perceived as a strong marketing point and they see more potential in selling other home services”(OFGEM 1999).

The realisation of **Energy Efficiency Demand Side Management Programmes** is frequently prevented by a number of both economic and non-economic barriers [1]. Regulators may be reluctant to finance via ratepayers' money this kind of activities, if they find it difficult to verify the savings and the costs. In many countries, energy companies and their staff lack the experience and the detailed data required to implement and evaluate the programmes. This kind of barriers could be reduced if a set of standardised definitions of allowed costs, of savings and lifetimes, monitoring and evaluation rules could be made available in a centralised way. This would also have the side benefit of making comparisons and statistical analysis of the achievements of the programmes more easy and meaningful at national and EU level.

We classify the Support Mechanisms that constitute this family under **three groups**: **(1) prevailingly "legal"; (2) prevailingly "technical"; (3) others.**

Prevailingly **"Legal"** Supporting Mechanisms

- **L1 -Legal definition** of "Energy Efficiency Services" distinct from more general energy-related services, in order to guarantee customers and regulators about the energy efficiency content of the services offered, which might often include several other items;
- **L2 - Certification programme for ESCOs**, including companies also involved in traditional supply activities (RESCOs). Such a programme would contribute to consumer protection and to increase consumers' confidence on (R)ESCOs and in the services they provide. By certification, we mean both (i) the accreditation of certification entities to certify the qualification of the energy efficiency services providers, but also (ii) the establishment of quality charters or codes for specific services. In all cases there is room for the actors already active in delivering services, like in the other branches of quality or environmental certification.
- **L3 - Promotion of Energy Performance Contracting** by establishing standardised tendering procedures (i) standardised contracts, including the option of a pre-specified payment for kWh saved through a certain typology of measures; (ii) standardised

1 Our mechanism families M1 to M3 aim to overcome the economic barriers that energy companies face for implementing energy efficiency DSM programmes, which are economic for society and the customers

measuring and verification procedures; (iii) contractual terms of reference for individual transactions, like standardised options for the sharing of savings, baseline definitions, …

- **L4 – Modification/Adaptation of procurement rules** in order to remove the barriers that **public administrations/agencies** in most countries face to buy energy efficiency services (e.g. via energy savings performance contracting), and to allow the public adminstrations/agencies to retain at least part of the achieved economic savings within their budget.

- **L5** -Possibility to have a **long term contract** between an ESCO/RESCO and a customer at least as for the repayment of energy efficiency measures installed in the premises of the customer. This is particularly important in competitive markets where a consumer is free to change supplier within short notice [1] .

- **L6 - Extension and adaptation of the rules of fair competition** to the situation where the energy companies enter the market of energy efficiency or other services to their franchised customers. Policy should try to avoid that energy companies compete in an unfair way against ESCOs, e.g. by cross-subsidising energy (efficiency) or other DSM services from their energy business. However, experience shows that such concerns should not be valued too high, since there is more synergy than competition between the energy company model and the ESCOs model as actors for energy efficiency: The realisation of large DSM *programmes* by energy companies in the USA and partly in northern Europe has been the umbrella, under which the operation of ESCOs has started and grown, under contract with energy companies to implement part of the programmes. This also helped the ESCOs to develop their stand-alone business, e.g. in energy performance contracting..

- **L7 -** Development of guidelines for the tendering procedures in activities of DSM bidding and competitive sourcing of DSM resources

Prevailingly **"technical"** supporting mechanisms

- **T1- Development of standardised monitoring and evaluation procedures both for DSM programmes and services**. By monitoring and verification we mean both the evaluation of the design of programmes/projects/contracts (ex ante) and of their results (ex post). The following procedures would be established: (i) assessment (ex-ante evaluation) of the activities to be undertaken with the elimination of ineffective activities; (ii) monitoring and verification of the implementation, including on-site control; (iii) ex-post evaluation and reporting of the activities. Qualification and training courses on, e.g., energy-efficient end-use technologies, energy audits, DSM programme design, implementation, and evaluation, etc. for staff of energy companies, ESCOs and other actors involved on the issue of design and evaluation of EE-DSM programmes/projects would be extremely beneficial.

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1 e.g. 28 days in the UK

- **T2 - Fostering co-operative processes** of the relevant actors in the area of energy efficiency programmes and services (manufacturers, designers and installers, energy companies,…); identify and remove barriers to co-operation.
- **T3 - Create a system (e.g. guarantee fund) for insurance** to energy efficiency services providers. In some energy efficiency services, as energy service performance contracts or third party financing, the contractor takes on the risks associated not only with the performance of the technology he installed, but also with facts out of his control, e.g. bankruptcy of the customer.
- **T4 - Promotion of Energy Performance Contracting (EPC)** by running awareness campaigns, and by disseminating good examples and best practice in EPC. EPC is, in most countries, still an innovative way of financing economic energy efficiency measures. Therefore, many potential customers may be hesitant about the risks, e.g., of the technical performance or the distribution of profits between contractor and client. In order to increase the demand for EPC, public awareness, motivation, and credibility campaigns targeted to the potential customers are helpful.

Other supporting mechanisms

- **O1 - Public administrations/agencies** should give the example in **adapting strict energy efficiency** conscious design and management guidelines. Making public procurement more energy-efficient, including the use of Energy Performance Contracting as a customer, would be one of the means to this objective.
- **O2 - Harmonised definitions allowing VAT reduction** on energy-efficient equipment and services.

4.3 A Multicriteria Analysis of the Clusters of Policy Mechanisms

The following tables present a summary of an analysis of the mechanism families described in chapter 4.2. This analysis has been carried out for each mechanism family using the same set of criteria (C1 to C7). The full multicriteria analysis is laid down in Annex III to this report.

It should be noted that: the order in which the criteria are given does not imply a ranking in importance; sub criteria cannot be evaluated in a quantitative manner and summed up, but they have to be considered as a guide for discussion. For M6 a synthetic judgement is more difficult since it includes a variety of supporting mechanisms. More detailed analysis is provided in Annex III.

Criteria C1 to C7 are listed below and grouped into four logical groups.

- Strength in transforming the markets towards the inclusion of energy efficiency:

  C1. Transforming energy companies to providers of least-cost genuine energy services
  C2. Promotion of EE-DSM programmes and development of markets for EE-DSM services

- Compatibility with legislation and regulatory objectives:

  C3. *Compatibility with IEM legislation at EU and national level and other rules/constraints*
  C4. *Ease of introduction in the legislative and regulatory framework*

- Compatibility with enterprises objectives:

  C5. *Ease of integration in Energy Companies' objectives and practice*
  C6. *Ease of integration in ESCOs' objectives and practice*

- Evaluation and compliance:

  C7. *Ease of evaluation and ensuring compliance*

The assessment of the clusters of policy mechanisms by these criteria is often depending on which type of energy company, and which basic type of electricity/gas market is concerned. Just to remind, in chapter 3.1 we defined three basic market types:

Market type 1: partial retail competition, i.e. a market which still has non-eligible customers, and hence franchise monopolies for the supply to these customers; in some cases, only the minimum market opening required by the IEM/IGM Directives is implemented. The unbundling of electricity or gas sector functions is of minor importance here.

Market type 2: full retail competition, i.e., all customers are eligible customers, but the rules for market access may not be very clear, and the distribution network companies and the retail supply companies are not clearly separated.

Market type 3: full retail competition, i.e., all customers are eligible customers, and the rules for market access are very clear, and the distribution network companies and the retail supply companies are clearly separated (i.e. at least by entity). Such separation can have both negative and positive implications for DSM.

C1: Transforming energy companies to providers of least-cost genuine energy services

These Criteria refer to:

- effectiveness in transforming energy companies to providers of least-cost genuine (physical) energy services (joint offer of energy units and EE services)
- effectiveness in influencing energy consumption and CO_2 emissions evolution trends (global approach)

M1. Dedicated Funds to Finance EE and DSM	LOW / MEDIUM: it does not remove pressure on energy companies to increase sales; it promotes EE-DSM programmes, but it does not remove the incentives to marketing activities to increase sales even when non economic for customers and society, which can be realised by the energy companies in parallel with DSM programmes in other end-uses. The judgement improves with the level of the money distributed. HIGH for monopoly segments if coupled with M2.
M2. Ratemaking to Remove Pressure to Increase Sales (Multiple Driver Target / Revenue Target for monopoly segments)	*Market type 1*: HIGH for *influencing energy sales trends*, because the supply of energy to captive customers in a certain area is the duty of a single distributor/supplier with the correct signal from tariffs. Since the mechanism removes artificial incentives to increase sales, it achieves a global objective of influencing energy and CO_2 evolution trends. LOW to MEDIUM for *transforming energy companies to providers of least-cost energy services*, since it does not provide positive incentives for DSM. *Market type 2*: MEDIUM because there is a full competition in supply but the role of distributors (as parts of distr./supply companies) is still important *Market type 3*: LOW / MEDIUM because there's a full competition in supply and the role of distributors in influencing energy and CO_2 trend through choosing the optimal mix of supply and demand resources is limited by the action of suppliers who have strong incentives to promotes sales The evaluation IMPROVES when going from Multiple Driver Target to Revenue Target or adding some mechanism to directly promote DSM activities (M1 and/or M3)
M3. Ratemaking to Promote EE-DSM Programmes	From MEDIUM to LOW for Market type 1 to 3 (it acts only on regulated energy companies and it does not remove pressure on these companies to increase sales even when not economic, similar to M1). From HIGH to MEDIUM for Market type 1 to 3 if coupled with M2 (it acts only on regulated energy companies)
M4. Obligations to Perform EE-DSM	LOW (for implementing EE-DSM programmes) to MEDIUM (for implementing EE-DSM services) when applied alone (it does not remove pressure on energy companies to increase sales, it does not avoid lost profits due to reduced sales; companies will have an incentive to comply formally but not substantially, so effective monitoring of achievement of energy savings is needed) MEDIUM if it is set to a relevant level and if implemented in conjunction with mechanisms allowing to fund direct DSM costs (M1 and/or M3) and to recover net lost revenues (M2, M3)
M5. Negotiated Agreements to Perform EE-DSM	LOW if adopted alone since it doesn't avoid lost profits due to reduced sales; problems may appear if the number of actors in the market is high and the agreement doesn't involve all of them. Empirical analysis reports rather modest performance so far. POTENTIALLY MEDIUM with companion mechanisms (DSM funding, obligation to report on EE-DSM)
M6. Legal and Technical Support to EE-DSM	LOW/MEDIUM if adopted alone POTENTIALLY HIGH with companion mechanisms (DSM funding, and negotiated agreement or obligation)

C2: Promotion of EE-DSM programmes and Development of markets for EE-DSM services

These criteria refer to:

- Magnitude of contribution in implementing the EE-DSM potential (saving potential addressed; percentage of savings; ability to create self-sustaining effects)
- Kind of approach of the mechanism: single programme or global trend control approach
- Barriers to IRP/EE-DSM addressed by the mechanism
- Effectiveness in the development of efficient, self-sustaining markets for EE-DSM services

M1. Dedicated Funds to Finance EE and DSM	HIGH for *Promotion of DSM programmes* and MEDIUM for *Development of markets for energy efficiency services* (the barriers to services development are not only financial), if the amount of funds used for EE-DSM is adequate, the procedures are simple and some support mechanisms (M6) are introduced. MEDIUM/LOW if the level of funds is low and the procedures are complicated.
M2. Ratemaking to Remove Pressure to Increase Sales (Multiple Driver Target / Revenue Target for monopoly segments)	*Market type 1*: MEDIUM because the supply of energy to captive customers in a certain area is the duty of a single distributor/supplier with the correct signal from tariffs. Since it removes artificial incentives to increase sales and disincentives to DSM it makes possible the realisation of individual EE-DSM programmes. However, without an implicit allowance for including DSM costs into tariffs, the effect is LOW. *Market type 2*: MEDIUM because there is a full competition in supply but the role of regulated distributors (as parts of distr./supply companies) in the realisation of single EE-DSM programmes can be important. *Market type 3*: MEDIUM /LOW: even if suppliers will have incentives to increase sales, distributors can find it profitable to perform single EE-DSM programmes. The evaluation IMPROVES going from Multiple Driver Target to Revenue Target or adding some mechanism that directly promotes the DSM activity (M1 and/or M3)
M3. Ratemaking to Promote EE-DSM Programmes	From HIGH to LOW for Market type 1 to 3 for the same arguments of the M2. This mechanism directly acts only on programmes and services carried out by regulated energy companies, not on activity by unregulated companies, ESCOs and other actors. It can stimulate indirectly the activity of ESCOs which will work at implementing the DSM programmes run by energy companies.
M4. Obligations to Perform EE-DSM	LOW to MEDIUM for EE-DSM programmes. It depends of the level of obligation and the control procedures (if obligations are adopted alone). POTENTIALLY HIGH for EE-DSM programmes if implemented in conjunction with mechanisms allowing to fund direct DSM costs (M1 and/or M3) and to recover net lost revenues (M2, M3). POTENTIALLY HIGH for markets for EE-DSM services, if substantial target put on competitive suppliers, and effective monitoring of savings.
M5. Negotiated Agreements to Perform EE-DSM	LOW/MEDIUM if adopted alone. It does not attain the goal of influencing global energy and CO_2 trends, but it can attain the realisation of individual EE-DSM programmes; POTENTIALLY MEDIUM with companion mechanisms (DSM funding, obligation to report on EE-DSM)
M6. Legal and Technical Support to EE-DSM	LOW TO MEDIUM if adopted alone POTENTIALLY HIGH with companion mechanisms (DSM funding, and negotiated agreement or obligation)

C3: Compatibility with IEM legislation at EU and national level and other rules/constraints

These Criteria refer to:

- Relationship with retail supply competition in segments where retail competition exists
- Use of synergies with market forces (reliance on economic mechanisms and/or voluntary approaches vs. reliance on command and control)
- Compatibility with other public policy objectives (equity to different classes of customers, territorial uniformity of tariffs...)
- Independence from general taxation
- Robustness to changes in market structure and development of competition.

M1. Dedicated Funds to Finance EE and DSM	HIGH if all the actors (energy companies, ESCOs, retailers) can have equal and fair access to the fund and all the barriers to entry are removed. Independent from general taxation (if funds is created through special levy on tariffs). It is robust to changes in market structures and competition.
M2. Ratemaking to Remove Pressure to Increase Sales	HIGH. Tariff making is applied only to monopoly segments and in the same way for all companies, hence it will not affect competitive segments. It relies on economic mechanisms (removing profit losses connected to DSM programmes) instead of being a command and control. It is independent from general taxation and can be adapted to market changes, although in market types 2 and 3, the effect will be restricted to transmission and distribution companies. MDT tariffs reduce the incentive to price discrimination between different customer classes.
M3. Ratemaking to Promote EE-DSM Programmes	HIGH. Tariff making is applied only to monopoly segments and in the same way for all companies, hence it will not affect competitive segments. It relies on economic mechanisms (paying direct costs of, and lost revenues due to programmes) instead of being a command and control mechanism. It is independent from general taxation and can be adapted to market changes, although in market types 2 and 3, the effect will be restricted to transmission and distribution companies.
M4. Obligations to Perform EE-DSM	HIGH/MEDIUM. At national level, it will be applied to all companies (either distribution or retail supply companies) in the same way. European agreement on a harmonised level of DSM would be more important for this mechanism than for others. Obligations might be viewed as command and control policy. It is independent from general taxation and can be adapted to market changes.
M5. Negotiated Agreements to Perform EE-DSM	HIGH/MEDIUM Compatible with legislation. Relies on voluntary approach rather than on command and control, but practical experience shows that a certain degree of control is required to secure success. Presence of companies which do not participate in the agreement can arise competition issues. European agreement on a harmonised level of DSM would be more important for this mechanism than for others. It is independent from general taxation but may be difficult to adapt to market changes.
M6. Legal and Technical Support to EE-DSM	HIGH Legal Measures: - compatible with retail supply competition by definition - independent from general budget (except when fiscal benefits are offered) Technical Measures More costly, thus depending on general taxation or DSM funding mechanism.

C4: Ease of introduction in legislative and regulatory framework

These Criteria refer to:

- Necessity for new legislation at parliamentary level for the implementation of the mechanism
- Ease of network establishment:
  - Number of actors involved in implementation of the mechanism
  - Necessity for creation or reformulation of tasks of public bodies beyond what is needed in connection with the implementation of the IEM Directive
  - Necessity for creation of a new agency (independent status)

M1. Dedicated Funds to Finance EE and DSM	MEDIUM since · Needs political will and, maybe, legislation · Network establishment can be complex · May involve creation of new agency · Slightly higher prices of kWh initially (more than compensated by reduction in bills; UK experience shows a benefit/cost ratio of 1:5): Can be seen as a new tax
M2. Ratemaking to Remove Pressure to Increase Sales	HIGH/MEDIUM in most countries. Where a price regulation of monopoly segments is in place, it does not require new legislation, nor creation or reformulation of the tasks of public/independent bodies. A Regulatory responsibility has generally already been established or made explicit as a consequence of the IEM Directive implementation. MDT tariff making does not require additional tasks for the regulator compared to other regulation schemes.
M3. Ratemaking to Promote EE-DSM Programmes	HIGH/MEDIUM in most countries. Where a price regulation of monopoly segments is in place, it does not require new legislation, nor creation or reformulation of the tasks of public/independent bodies. A Regulatory responsibility has generally already been established or made explicit as a consequence of IEM Directive implementation. These mechanisms, being additional to the core tariff structure may require additional accounting efforts by the regulator.
M4. Obligations to Perform EE-DSM	MEDIUM. It might require new legislation, and reformulation of the tasks of public/independent bodies. This mainly concerns monitoring of performance and control of compliance, which can be difficult if a high number of energy companies is involved. Needs political will, since it may face strong opposition viewing it as "command and control" policy. Regulator or Government should take the additional task of ensuring compliance.
M5. Negotiated Agreements to Perform EE-DSM	HIGH/MEDIUM, since by definition it does not require new legislation but might need reformulation of tasks of public/independent bodies for compliance controls, which can be difficult if a high number of energy companies is involved. A high number of actors may also require intensive negotiations.
M6. Legal and Technical Support to EE-DSM	MEDIUM, Some actions need new legislation, (e.g., legal support mechanisms, fiscal support mechanisms or a guarantee fund), others may need redefining roles of existing agencies or creating new entities, for example for certification and control activities. A European framework might help reducing national barriers and ensuring harmonisation (legal definitions, evaluation procedures,…)

C5: Ease of integration in Energy Companies' objectives and practice

These Criteria refer to:

- Effectiveness in reducing/eliminating economic barriers to IRP and delivery of EE-DSM programmes and services (effects on profits)
- Does the mechanism take profit of customer contact? Can EE be an extension/deepening of existing services?
- Does the mechanism require new accounting and reporting procedures?

M1. Dedicated Funds to Finance EE and DSM	HIGH/MEDIUM since it is neutral to competition. DSM actions can be integrated in Companies' objectives and practice due to the funding of direct DSM programme costs. Needs new accounting and evaluation procedures by energy companies.
M2. Ratemaking to Remove Pressure to Increase Sales (for monopoly segments)	HIGH/MEDIUM. Since profits are relatively stable irrespective of sales changes, energy companies can more easily incorporate EE in their strategies and co-operate with EE actions of other actors. To ensure a high level of integration, the evolution of revenues should closely match the evolution of costs and thus be indifferent to changes in sales. Requires same or less reporting effort for energy companies than other regulation mechanisms. It acts on the distribution or distribution/supply tariffs, and thus takes profit of the connection of distribution companies with their distribution territory.
M3. Ratemaking to Promote EE-DSM Programmes (for monopoly segments)	HIGH/MEDIUM. DSM actions can be integrated in Companies' objectives and practice since the mechanism allows to cover both direct costs and lost revenues, and maybe a bonus/shared savings or similar is added.. Requires a certain reporting effort by energy companies, since single programmes should be analysed to evaluate energy savings, participation rates, costs etc..
M4. Obligations to Perform EE-DSM	LOW if applied alone. In this case, since profits continue to be vulnerable to global sales changes, energy companies might tend to pick up only peak load savings and perform "image" programmes with low energy saving content. HIGH/MEDIUM if accompanied by mechanisms to remove profit losses due to programmes (M2, M3, M1). Requires a certain reporting effort for energy companies
M5. Negotiated Agreements to Performe EE-DSM	LOW if applied alone. In this case, since profits continue to be vulnerable to global sales changes, energy companies might tend to pick up only peak load savings and perform "image" programmes with low energy saving content. HIGH/MEDIUM if accompanied by mechanisms to remove profit losses due to programmes (M2, M3, M1). Requires a certain reporting effort. Its integration into companies' practice might be eased by pre-existing environmental quality procedures.
M6. Legal and Technical Support to EE-DSM	MEDIUM . The mechanism themselves are designed to remove barriers and make easier the action of energy companies in designing/delivering/evaluating EE-DSM. Nonetheless some of the mechanisms might require new skills and accounting procedures, while at the same time substantially reducing transaction costs.

Insert: Some results from a quantitative analysis

In chapter 3.3.4, we have analysed the net economic effect of a hypothetical EE-DSM programme for domestic customers on four important types of energy companies, using hypothetical but typical cost data for the EU liberalised electricity markets of the next 5 to 10

years. We have found that, although being highly cost effective for society and the customers, such an EE-DSM programme will in the short run produce a loss for all four types of electricity companies:

for the vertically integrated company, a loss of 5.0 cEUR/kWh;
for the integrated distribution and supply company, a loss of 3.5 cEUR/kWh;
for the pure (unbundled) supply company, a loss of 0.1 cEUR/kWh;
for the pure (unbundled) distribution network company, a loss of 4.4 cEUR/kWh.

The reason is that the lost marginal revenues usually are much higher than the avoided costs in the average situation, and taking into account the current overcapacity situation in Europe.

How would the different families of policy mechanisms to support DSM improve this economic effect of DSM programmes? With respect to the six "families" of DSM support mechanisms, the following can be observed:

§ A **levy and funds system** (M1) will allow the companies to recover their EE-DSM costs (assumed to be 1 cEUR/kWh). So this alone will not be sufficient to completely remove the loss situation for the companies (except for the pure supplier). However, if the companies do the EE-DSM themselves, they can improve their customer relations. And if they do **not** do the EE-DSM themselves, they can be sure that another actor (maybe even a competitor) does it, because the levy and funds system will provide for it. So they will loose the net lost revenues (difference between lost marginal revenues and avoided costs) anyway. The net effect of participating in the implementation of EE-DSM is, therefore, **slightly positive** (through improved customer relations and long-run savings).

§ If the company is a **regulated monopoly** (distribution or supply to non-eligible customers), the price control authorities can use a **ratemaking procedure** which **removes the pressure to increase sales** (M2). This will refund to the companies the net lost revenues due to DSM. But only if the company is also allowed to **recover the EE-DSM costs** (M3), will be the **negative effect** be **completely neutralised**. The same goes if the general price control system is not changed, but an M3 mechanism to support single EE-DSM programmes is introduced: it needs to combine the recovery of direct EE-DSM costs and of net lost revenues. However, in competitive markets these mechanisms are applicable only for distribution companies (in integrated distribution/supply companies only for the distribution part, but this one is most important; the supply part of the company should be like a pure supplier, which almost has no loss, with the price structure assumed here). In markets with non-eligible customers, this is possible also for the integrated distribution/supply company serving these customers, so the positive incentive effect is better here. Introducing the M2 mechanism has the further advantage that it makes the company neutral to energy savings caused by programmes of the state or other actors. Such savings would otherwise cause all of our hypothetical electricity companies except the pure supplier a significant loss. So with M2, the company will not oppose to the introduction of other energy efficiency policy either, nor try to market extra electricity sales to achieve extra profits.

- **Obligation/Negotiated agreement** (M4, M5): With these mechanisms, the energy companies know that their competitors also have to provide the same level of electricity savings through EE-DSM. So there will be no net lost revenues, if every distribution and/or supply company in a country increases their competitive prices, since all of them have to recover the EE-DSM costs, and any net lost revenues. But still, it will be **better if the savings target is coupled with an explicit funding mechanism** for the direct EE-DSM costs and maybe the net lost revenues (for monopoly segments). Otherwise, there would be a large incentive to use cheap and ineffective programmes but try to claim to have reached the savings target.

- **Legal and technical support mechanisms** (M6): These mechanisms mainly reduce the transaction costs for implementing the EE-DSM programmes and services, and facilitate the emergence of a energy efficiency service market. However, they will not reduce the net lost revenues. Therefore, they are an **important complementary action** to the other mechanisms, **but not sufficient alone**.

As the analysis in chapter 3.3.4 has shown, some of the four types of energy companies may even make a loss on an energy efficiency service to larger customers. However, they have an incentive: their loss will be larger if the customer or a competing ESCO realises the savings. Still, this shows that our **policy mechanisms for supporting mainly EE-DSM programmes can also support the development of a market for energy efficiency services**. This is certainly true for the legal and technical support mechanisms (M6). It is also the case for the M2 mechanism, which reduces net lost revenues from regulated monopoly companies like distribution network companies. It has, however, to be analysed with care whether a financial support to the EE-DSM investment included in such a service should be provided by the financing mechanisms M1 and M3. Likewise, careful implementation will be needed, if EE-DSM services are to be included into the obligations/negotiated agreements. A precondition for this would be approved methods and a strict monitoring system for measuring and aggregating the energy savings achieved through the EE-DSM services.

C6. Ease of integration in ESCOs' objectives and practice

These Criteria refer to:

- Effectiveness in reducing/eliminating economic barriers to delivery of EE-DSM services (effects on profits)
- Does the mechanism take profit of customer contact? Can EE be an extension/deepening of existing services?
- Does the mechanism require new accounting and reporting procedures?

M1. Dedicated Funds to Finance EE and DSM	HIGH/MEDIUM But · it depends on the design of the mechanism: are ESCOs involved in the implementation of the DSM funded? · needs new accounting procedures and control, especially taking into account the possibility of a large number of ESCOs participating with a number of small projects Standardised evaluation and payment procedures (mechanism M6) should be developed to reduce transaction costs (e.g. a certain payment per kWh saved through a certain technology)
M2. Ratemaking to Remove Pressure to Increase Sales	MEDIUM: the creation/enlargement of the EE market produced by EE-DSM programmes administered and organised by energy companies will benefit also ESCOs (through activities under contract with energy companies and, indirectly, stand alone).
M3. Ratemaking to Promote EE-DSM Programmes	MEDIUM: same as for M2.
M4. Obligations to Perform EE-DSM	LOW. If applied alone, not likely to contribute to creation of an EE market sufficiently ample that will benefit also ESCOs. MEDIUM In combination with a funding mechanism, this is much more likely. The situation where ESCOs act as subcontractors to energy companies would require specific evaluation procedures (see M6).
M5. Negotiated Agreements to Perform EE-DSM	LOW. If applied alone, not likely to contribute to creation of an EE market sufficiently ample that will benefit also ESCOs. MEDIUM In combination with a funding mechanism, this is much more likely. The situation where ESCOs act as subcontractors to energy companies would require specific evaluation procedures (see M6).
M6. Legal and Technical Support to EE-DSM	HIGH. The mechanisms themselves are designed to remove barriers and make easier the action of ESCOs in designing/delivering/evaluating EE-DSM and being recognised as a valuable resource by potential customers. Nonetheless some of the mechanisms might require new skills and accounting procedures, while at the same time substantially reducing transaction costs.

C7. Ease of evaluation and ensuring compliance

These Criteria refer to:

- Ease of evaluation:
  - Are quantities to be estimated for evaluation likely to be subject to litigation?
  - Is information asymmetry between companies and regulator a relevant obstacle to the evaluation of the mechanism?
  - Intensity of control (e.g. by regulator, government,...) needed for the mechanism to work correctly and to prevent misuse of the money allocated to EE-DSM
  - Ease in establishing a relationship between energy savings and expenditure (depending on the type of services and programmes supported by the mechanism)
- Ease of ensuring compliance (if required for the mechanisms to work correctly)

M1. Dedicated Funds to Finance EE and DSM	MEDIUM if all kinds of programmes are included in the list of allowed programmes (market transformation, fuel switch, training, education,…) HIGH if the choice is restricted to programmes where evaluation of savings can rely on objective methods and on agreed procedures.
M2. Ratemaking to Remove Pressure to Increase Sales	HIGH. Quantities to be evaluated for the application of MDT (sales, nr. of customers, grid length) are less subject to litigation than kWh savings or costs for implementation of programmes, which are required to evaluate the performance of a fund or obligation mechanism. Since there is no need to evaluate kWh savings of specific programmes, also Market Transformation programmes, for which evaluation is difficult, might be seen as feasible by energy companies.
M3. Ratemaking to Promote EE-DSM Programmes	MEDIUM. Quantities to be evaluated (kWh savings or costs for implementation of programmes) can be subject to litigation. Independent estimate of these quantities, presence of Measurement & Verification protocols may relief the problem. A joint definition of a set of standard energy efficiency and market transformation programmes will also be very helpful. Market transformation programmes will anyway be difficult to evaluate for the purpose of this mechanism.
M4. Obligations to Perform EE-DSM	LOW/MEDIUM. Quantities to be evaluated (kWh savings or costs for implementation of programmes) can be subject to litigation. Independent estimate of these quantities, presence of Measurement & Verification protocols,... may relief the problem. A joint definition of a set of standard energy efficiency and market transformation programmes will also be very helpful. Market transformation programmes will anyway be difficult to evaluate. It might prove difficult to ensure compliance without a pre-existing agreement and mechanisms to allow for DSM programme cost recovery and to eliminate profit losses.
M5. Negotiated Agreements to Perform EE-DSM	LOW/MEDIUM. Similar to M4 (obligations). Likewise, it depends on the kind of programmes and services which are covered by the agreement, on the sharpness of formulation of the agreement itself, on the presence of explicit agreed and independent evaluation procedures. More difficult to handle if a high number of energy companies is involved.
M6. Legal and Technical Support to EE-DSM	It would probably be difficult to evaluate quantitatively the effectiveness (or cost-effectiveness) of these mechanisms, since it is a second level effect (they ease the realisation and the evaluation procedures of other mechanisms and programmes). Nonetheless they are important since they complementary and provide a sound base for other mechanisms.

Conclusions from the analysis

We summarise in the following table the results of the multi-criteria analysis of single mechanisms, each considered in isolation, that is for the moment excluding possible synergies of the simultaneous use of a number of mechanisms.

Table 4-4: Overview of the judgements from the multicriteria analysis

	C1	C2	C3	C4	C5	C6	C7
Keywords of Criteria	Energy companies to ESUs	Promoting DSM pro-grammes	In line with com-petition	Easy to introduce	Suits energy companies	Suits ESCOs	Easy to control
M1. Funds	* / **	*** / **	***	**	*** / **	*** / **	** / ***
M2. Ratemaking general	*** *	** *	***	*** / **	*** / **	**	***
M3. Ratemaking for DSM	** *	*** *	***	*** / **	*** / **	**	**
M4. Obligations	* / **	* / ***	*** / **	**	*	*	* / **
M5. Agreements	*	* / **	*** / **	*** / **	*	*	* / **
M6. Support	* / **	* / **	***	**	**	***	n.a.

Judgements: *** = HIGH ** = MEDIUM * = LOW n.a. = not applicable

*** * means HIGH for market type 1, changing to LOW for market type 3

For companies not subject to regulation (suppliers to eligible customers, ESCOs, …) tariff mechanisms have no direct influence[1]. Hence the presence of mechanisms of type M1(dedicated funds and levies) can be very important in order to eliminate disincentives and promote action (C2). In market type 2, especially if no clear regulation of the network exists, M1 type mechanisms may be the only available way to support DSM by competitive energy companies. Such mechanisms on the other side can present some difficulties for their introduction (C4), for the management by companies (C5, C6), and for programmes costs and effectiveness evaluation (C7).

If we consider financial aspects as a fundamental issue (economic attractiveness is expected to guide most of companies' choices), in monopoly market segments (distribution, supply to captive customers) mechanisms of M2 type (Multiple Driver Target and Revenue Target ratemaking) have an important role. They achieve the global objective of influencing energy and CO_2 evolution trends (C1); they are easy to introduce (C3, C4), apply and adapt (C7), they harmonise with the objectives of energy companies (C5). However, as the liberalisation progresses, the applicability of M2 mechanisms reduces to network companies (transmission/distribution).

In monopoly market segments also for mechanisms of M3 type we reach the same kind of evaluation, but not in relationship with the objective of an influence on global energy and CO_2

1 But they can have indirect influence, e.g. in the case programmes run by energy companies are partly realised by ESCOs.

trends but with the objective of promoting the diffusion of EE programmes and services (C2); some difficulties are present for the evaluation of single programmes (especially MT programmes) (C5, C7)

Introduction of obligations (M4) can represent a strong stimulus to the realisation of EE-DSM activities (C2), but procedures for introduction (C4) and control (C7) can prove complex; besides this, in the absence of mechanisms to remove losses and recover costs connected with programmes (M1, M2, M3), the obligation would be in contrast with the economic objectives of companies (C5); finally, especially if the quantitative level of the obligation is not high, it will not influence the global energy trend (C1).

Negotiated agreements (M5) provide the same Pros and Cons as obligations, but have the possible advantage that they may be much better accepted in the industry and politics. However, negotiated agreements can present big practical problems if the number of actors involved is high (C4).

Legal and technical support (M6) are welcome and useful for energy companies (C5) and ESCOs (C6) and they help removing non financial barriers; in order to achieve significant results the implementation should be particularly careful; in general they seem more adapt to reinforce other mechanisms than as stand alone mechanisms.

Compatibility with legislation and competition (C3) can generally easily be ensured in the application of each of the mechanisms analysed.

The applicability and the political feasibility of these mechanisms certainly depends on a variety of national circumstances and framework conditions. Two sets of the above criteria deal with the applicability to restructured energy markets (C3) and the political feasibility (C4), but in reality a closer look to the national situations is needed.

The applicability of some of the mechanisms depends on the stage of liberalisation. As a guiding principle for developing a national policy mix, we display in the following table, which of the mechanisms we think adaptable to which of the three basic market types. The table also displays for which types of energy companies (generation, transmission, distribution, supply or combinations thereof) we think each mechanism is applicable.

Table 4-5: Applicability of DSM support mechanisms to different market structures

Mechanism	Market Type 1: With non-eligible customers Market Type 2: All customers eligible; **no** clear network access Market Type 3: All customers eligible; clear network access
M1 Dedicated funds to finance EE and DSM	Applicable in all Market Types; all energy company types and ESCOs can apply/tender for funds
M2 Ratemaking of monopoly segments to avoid incentives for increased sales	Applicable, where price regulation exists, for the distribution prices in all Market Types, and for the supply prices to non-eligible customers in Market Type 1
M3 Ratemaking of monopoly segments to target single EE/DSM programmes cost recovery	Applicable in all Market Types, where regulation exists, for the distribution companies or the distribution parts of the companies, and for the suppliers to non-eligible customers in Market Type 1
M4, M5 Obligations or Negotiated Agreements to implement EE-DSM	Applicable in all Market Types, for the distribution companies, and for the suppliers to eligible or non-eligible customers However, difficulty increases with the number of companies involved.
M6 Legal and technical support for DSM services and programmes	Applicable in all Market Types; all energy company types can benefit
Obligations or Negotiated Agreements on reporting about IRP plans	Applicable for suppliers to eligible customers in Market Type 1, not applicable in Market Types 2 and 3
Obligations on reporting DSM results	Applicable in all Market Types as companion to other mechanisms

4.4 Combinations of Policy Mechanisms for Supporting DSM

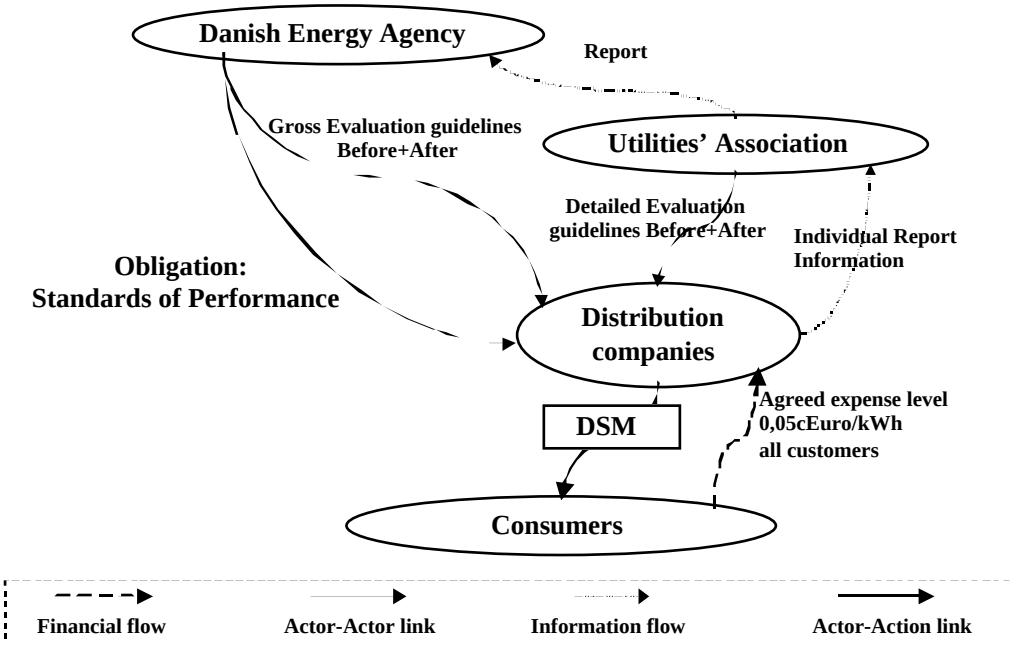
As the analysis of the experiences with IRP and DSM in the past (cf. Chapter 3.3.5 and Annex III) has shown, and the multicriteria analysis has confirmed, EE-DSM has been most effective where a combination of

1. an agreed, quantified target for energy savings,
2. a regulatory framework which eliminates artificial incentives to increase sales when non economic for customers and society
3. a channel or an allowance for raising funding, and
4. a standardised and mandatory scheme for cost-benefit evaluation of the EE-DSM

has been created. Such combinations have been used, e.g., in Denmark (see Box No 11), the Netherlands, or the USA. Sometimes the target is imposed by an obligation (e.g., in the UK or the USA), in other cases it is the result of negotiations (e.g. in The Netherlands or in Denmark in thepast). Furthermore, a policy package with the appropriate and needed legal and technical support mechanisms is useful in any circumstance.

Box n° 11: DSM policy support in Denmark: a mix of negotiated agreement (before restructuring)/ obligation (after restructuring), an allowance to fund DSM, and a revenue target regulation

The Danish Energy Agency reached an **agreement** with the energy companies to implement DSM activities identified in IRP (obligatory since 1994). **DSM costs are collected through the tariffs** by electricity distribution/supply companies on all customers and on average amount to 0,05 cEuro/kWh, corresponding to 1% of the revenues. The administration of the funds, the programme design and the measurement and verification of the activities are done by the distribution companies following guidelines from the Danish Energy Agency which controls and evaluates the overall mechanism. With the new energy law, the DSM programmes are now an **obligation** on the unbundled distribution network companies. As for **tariff regulation** of the distribution business, as in the past, it is formulated in such a way to guarantee a fair and fixed level of return on investments for companies irrespective of sales variations; hence companies are **not subject to artificial incentives to increase sales**, nor they suffer profit losses when undertaking EE-DSM programmes which reduce energy consumption.



The analysis of the individual mechanisms - multicriteria analysis and that of the applicability in defined market types - allowed us to identify the **useful combinations of mechanisms adapted to the market types**. These combinations are presented in table 4-6. For each market type, the combinations considered most appropriate for that market type are written in bold letters in the respective column in table 4-6 below.

Table 4-6: Useful combinations of DSM support Mechanisms

Combination of mechanisms	Market type 1	Market type 2	Market type 3
M1 (funds/allowance) + M2 (for monopoly segments only) + M6 (supports) + obligation to report on DSM results	yes	**yes**	**yes**
M4 (obligation) + M2/M3 (for monopoly segments only) + M6 (supports) + obligation to report on DSM results	**yes**	yes, D[1]	**yes, D[1]**
M5 (agreement) + M2/M3 (for monopoly segments only) + M6 (supports) + obligation to report on DSM results	**yes**	yes, D[1]	yes, D[1]

[1] "yes, D": applicable, but M2/M3 only applicable for distribution network companies; if the obligation is set for supply companies, which are competitive in these market types, maybe an allowance to fund DSM costs is feasible.

Multiple Driver Target schemes (M2) for the remaining monopoly segments are included in all the combinations, since they can increase, compared to Price Cap schemes, the range of EE-DSM actions that are economically feasible for the energy companies, and thus ensure the companies can promote energy efficiency on their own and be supportive of action eventually undertaken by others.

5 Options for EU Legislation to Stimulate EE-DSM and IASDO

The realisation of the cost effective energy savings that are within the range of action of energy companies (based on their knowledge of the consumers, on their capacity to communicate with them, on their new business incentives) is an urgent task of the European Union in the next decade. Many cost-effective measures were not realised in the previous market structure, and this fact remains unchanged in some countries and segments. Furthermore, the external costs incurred by the EU associated with energy will be significant in the coming years, and they are only partly "internalised" (taxes, Kyoto action plans), which does not transfer the full economic benefit to the operators and to the consumers.

Electricity and gas companies can contribute a significant part to the realisation of the energy efficiency potential, because they are professionals in energy, which allows them to act systematically compared to the dispersed sectors of end-users. Furthermore, in a competitive environment, they are presently looking for additional services for customer relationship or new value creation. New firms or subsidiaries of energy companies can be created to realise the potentials, if market forces are used to search for the most efficient implementing ways.

As a result of previous chapters, and following the experience of various Member States, a general structure seems most appropriate for the implementation of this part of energy efficiency, for which energy companies are the best actors (called here Demand Side Management - DSM): Each Member State creates a specific mix of policy mechanisms for the support to DSM, adapted to the national electricity and gas markets. Reporting takes place at national level for each project and each energy company, and there may be an EU wide aggregation of results. Common measuring and verification protocols and guidelines are used for each project, including for the certification of EE achieved by energy services.

How to implement an EU wide structure for a better realisation of potential benefits, i.e. by which legislative or regulatory means, this is the question that we shall address in this chapter. A first aspect to be treated is the question of subsidiarity: at which level (European, national, regional, etc.) should we establish a rule or a law? Then for the aspects that will be found to be better treated at EU level, should they be added to the IEM/IGM framework Directives or treated separately? In case they are subject to separate legislation, should they take the form of a revival of the existing draft RPT Directive? If not, what should be the new text?

5.1 The Need for an EU Legislation on EE-DSM

Most decisions in the new electricity and gas structure following the IEM/IGM Directives will be taken at national levels, after European harmonisation and with European overview and follow-up. At some points, the introduction of EE-DSM, particularly EE-DSM programmes, in the new market structure collides with the economic signals sent to the energy companies through these new rules and has to be harmonised, reported and analysed. For instance, reporting on Kyoto targets for the electricity sector and fair competition rules are only meaningful at EU level. If a European legislation is to be introduced, it should be of

the same style as the IEM and IGM Directives, i.e. introduce principles and definitions, harmonise targets, establish a list of possible means for action, and organise reporting.

The need for harmonised targets

A harmonised policy for stimulating EE-DSM is needed for all energy companies and across all Member States. The reasons for introducing such harmonised policy include:

- the need to complete the Internal Markets for electricity and gas. They need to be developed further to become markets for least-cost genuine (physical) energy services (cf. Chapter 2.2 for definitions), by including demand-side energy efficiency and thus fostering the substitutional competition between efficient energy supply on one side, and efficient use of electricity and gas on the other. The Internal Markets for electricity and gas needed harmonisation of the national markets through an EU Directive, and the completion of the Internal Market for least-cost genuine energy services will therefore also need harmonisation of the national markets through an EU Directive;

- the economic benefits to society and to customers, like reduced spending for the genuine energy services needed, and net increase in employment, which will be gained from cost-effective EE-DSM, and will for a large part be missed in the absence of such EE-DSM. Therefore, a harmonised level of EE-DSM activities, spending, and results will also contribute to the social and economic convergence within the EU;

- and particularly, the prevention of discrimination between energy companies active in different Member States. Let us assume, e.g., that Member State A encourages EE-DSM programmes, while a neighbouring Member State B does not. Let us further assume that energy company 1 is only active in Member State A, while energy company 2 is based in Member State B with 90 % of its sales, but also active in Member State A with 10 % of its sales. Company 2 could then try to dilute the costs of the EE-DSM programmes it offers to customers in Member State A into the bills for the much higher amount of sales it has in Member State B, and in order to gain market shares offer lower prices to customers in Member State A than company 1 can, as company 1 has to include the EE-DSM programme costs in the prices for all of its sales.
  Thus, a policy stimulating EE-DSM, which is not harmonised between Member States, will favour cross-subsidisation, which will be a disincentive for the energy companies to engage in EE-DSM even in those Member States which support EE-DSM. Hence, the overall level of adoption of EE-DSM would be much lower than with a harmonised policy;

- the commitments made by the EU in the Kyoto protocol, and the subsequent burden sharing agreement (Council Conclusions on a Community Strategy on Climate change, doc 9702/98, Brussels 19 June 1998). A harmonised level of EE-DSM will help each Member State to reach its target. Harmonisation at the EU level therefore ensures that all Member States use the most important possibilities for cost-effective EE-DSM to contribute to their, and the common target. Therefore, in the recent Communication from the Commission to the Council and to the European Parliament on EU policies and measures

to reduce greenhouse gas emissions: Towards a European Climate Change Programme (ECCP) (Document COM (2000) 88 final), "Energy efficiency in the electricity and gas supply industries" as well as "Energy Services" are among the proposed common and co-ordinated policies and measures on climate change.

Mitigating climate change would be an argument in favour of also introducing energy efficiency targets for the oil and coal consumption. However, in this study we focused on the completion of the Internal Markets for electricity and gas, and therefore, on the harmonisation of EE-DSM targets for these energies. The avoidance of discrimination between companies due to the different stage of liberalisation in the different EU countries is another reason for focussing on the electricity and gas industry. We estimate that the positive effects in customer loyalty (e.g., through reduced *bills*) for electricity and gas companies through EE-DSM will by far outweigh the possible negative effect of a slight *price* increase that may be needed to cover EE-DSM costs, hence rather **improve** the competitive situation of electricity and gas vs. competing energies. The European Commission is, however, advised to examine if, and how, at a later stage or through additional policy measures, a harmonisation of support by the Member States for EE-DSM activities by other segments of the energy supply industry, e.g., the industries supplying oil, coal, bottled gas, district heat, and heat from renewable energies, could be stimulated.

The need for joint monitoring of results

The EU is a "bubble" regarding the Kyoto Protocol. Therefore, the reporting on compliance of the CO_2 reduction is made centrally, with mandatory inputs from the Member States. As part of this follow-up, a share of the emissions, and a fortiori a share of the reductions should be given to the electricity and gas supply sector, and particularly on the demand side. The means to achieve the reductions also have to be reported. Thus, some kind of relation has to be made between global CO_2 reduction and electricity and gas supply, and within it, demand-side resources. The Commission should be requested to monitor Kyoto efforts allocated and the reported achievements through EE-DSM by each Member State, and to follow the correlation between price decrease, as well as the possible push to increase energy sales, through liberalisation on one side, and gas and electricity use on the other side. This will also give to Member States an indication on the effectiveness of EE-DSM measures taken in other Member States.

In the new integrated EU market, the programmes and services associated with the supply of electricity and gas represent a specific sector that can be entered both by energy companies, or by newcomers (in some countries, energy companies are not permitted to engage in EE-DSM, or at least not in DSM services). Without clear definitions, e.g. on monitoring and public reporting of results, there is a risk that money or rights (like data bases) associated with EE-DSM programmes are used unfairly for DSM or other energy-related services. This is another reason why the Commission has to get the picture of the results of the activity of new service companies and of the evolution of new subsidiaries of classic utilities, as well as the legal framework in which they operate, and has to harmonise some definitions.

Once a frame for EE-DSM programmes and services is established and the rules of fair competition are known, the Commission could check the publication in due time by the Member States of the plans made at each level for energy saving in gas and electricity end use, as well as a third party certification process of the savings claimed (see the experience of the Energy Saving Trust in the UK).

Central and homogeneous reporting at EU level will introduce a more general level of consciousness and allow exchange on "good practice". The results should be obtained from the Member States themselves or from regulators or agencies nominated by the MS (see EIA data base in the US). Each country would prepare its results by a set of **bottom up** consolidations starting either from companies (Energy companies, ESCOs, subsidiaries of energy companies, manufacturers, installers) certifying their results in terms of energy savings, or from state agencies, or research institutions charged with this task. A top down approach, i.e. trying to derive the achieved energy savings from the development of the average national energy intensities over time, would leave a too large zone of uncertainty due to the question how energy consumption would have developed in relation to the development of GDP in the absence of EE-DSM.

The need for subsidiarity

Subsidiarity is, on one hand, an important issue in the relations between action on the Eu and the national level. While we have discussed the need for harmonised targets and joint and consistent monitoring for energy efficiency DSM, the analysis as well as the Workshop discussions with practitioners shoed that the implementation of policy supporting EE-DSM and/or IASDO to reach this target must be adapted to the different national frameworks, structures, and stages of competition in the EU Member States.

On the other hand, in some situations, the best level to define some EE-DSM targets is even the local level, and we see in some Member States that not only targets on the national level are created. It is up to each Member State to define the *internal* subsidiarity levels in organising the EE-DSM process in each segment (generation, transmission, distribution, supply, energy-related services). Local obligations on energy companies could be reinforced by local authorities when they have environmental targets (Agenda 21, e.g.) and want to take advantage of their franchising rights to achieve part of their objectives. Such obligations have to be framed and supported by some market rules set at the national level.

Table 5-1: Pros and Cons of EU legislation to create a supportive framework for EE-DSM

IN FAVOUR OF.... INTRODUCING EU LEGISLATION	IN FAVOUR OF .... LEAVING EE-DSM TO MEMBER STATES
• completeness of IEM/IGM • avoid that active countries when aware of diversity decide to go backwards • push on passive countries: harmonisation of results • exchange on results/ joint monitoring • fair competition rules • "bubble" feeling and behaviour	• less opponents • respect present subsidiarity of EE-DSM level, which is diverse • take into account existing organisation, which is country dependent

Hence, an EU legislation to support a harmonised level of EE-DSM, and a joint monitoring is necessary. However, a good compromise has to be found between the **harmonisation of targets**, and the **subsidiarity in the national implementation and organisation** of the EE-DSM.

The next question is then, how such EU legislation on EE-DSM should be introduced. Should it be added to the IEM/IGM framework Directives or treated separately? In case it is subject to separate legislation, should it revive the existing draft RPT Directive? If not, what should be the new text?

5.2 The IEM/IGM Directives, or their Future Revisions, as a Possible Basis for EE-DSM and IASDO

The Directive on the Single European Markets for electricity and gas offer the Member States some points of leverage for energy policy to stimulate the use of EE-DSM and IRP to foster the development of markets for genuine energy services. In the IEM Directive, these points of leverage are particularly related to the Public Service Obligations (PSOs) and, more specific, to the provisions for the construction of new generating capacity and to the possibility to set priorities for cogeneration and renewable energies. Similar possibilities are offered by the IGM Directive.

Public Service Obligations

Article 3(2) of the IEM Directive allows the Member States to define Public Service Obligations (PSOs). This article also allows the Member States to carry out a long term planning as an instrument to ensure the Public Service Obligations. These tools might be adapted to incorporate IRP principles. E.g., the PSOs can relate to the protection of the

environment, and thus, could require energy efficiency, and thus, demand-side resource options, as a means to the protection of the environment. The "long term planning" could integrate IRP, which consists in the consideration of all sides of the question, supply, demand and the environment.

The PSOs are, however, not mandatory for the Member States, and the possibility to base IRP and EE-DSM on it is neither explicitly mentioned nor excluded.

Provisions for the construction of new generating capacity

For countries choosing the tendering system, article 6 (2) of the IEM Directive requires the manager of the transmission network or other bodies designated by the national governments to draft at least every two years "a regular estimate of the generating and transmission capacity which is likely to be connected to the system, of the need for interconnectors with other systems, of potential transmission capacity and of the demand for electricity." The Member States, which choose the tendering system, could require this resource acquisition plan to be filed according to IRP principles, and to incorporate EE-DSM resources. Thus, NEGAWatt Bidding (also called DSM Bidding) procedures could be part of the tendering procedure for new generation/transmission resources, in order to ensure the required capacity and energy at least cost. Although this is not explicitly mentioned in the IEM Directive, it is, therefore, also not excluded.

For countries choosing the licensing system, article 5 of the IEM Directive allows the Member States to make reference to the Public Service Obligations (PSOs) defined in article 3(2). As stated before, the PSOs can relate to the protection of the environment, and thus, could require energy efficiency as a means to the protection of the environment. The "long term planning" could be IRP. Licences for new electricity generation or transmission equipment could only be granted after all cost-effective DSM resources have been employed. Again, this is not explicitly mentioned in the IEM Directive, but it is, therefore, also not excluded.

Provisions for priority regulations for cogeneration and renewable energies

The IEM Directive offers the Member States to require the transmission and distribution system operators to give priority to generating installations using renewable energy sources, or waste, or producing combined heat and power. This could be made more precise by the Member States to require an IRP process as the basis for such priorities, or to require the inclusion of such resources into an IRP process. However, this is not written explicitly in the Directive, and the whole priority provision is not compulsory.

Conclusions

All in all, the IEM Directive could be used by Member States who wish to introduce at least elements of DSM and IRP into the business planning of energy companies, e.g., tied to the construction of new capacity or to priority regulations for renewables and CHP. However, these possibilities are weak – e.g., they do not stimulate DSM and IRP in periods or areas without a need for new generation or transmission capacity, at least in the licensing system, and they are non-compulsory for the Member States, so there will be little likelihood of a harmonisation. This is also the case for the basic framework conditions, in particular the degree of unbundling and retail competition, under which IRP and DSM would have to be performed.

Therefore, **more explicit regulations are needed to stimulate EE-DSM** and, where appropriate, IRP/IASDO. For renewables, a Directive has already been proposed (European Commission 1999). For the more cost-effective options demand-side energy efficiency and cogeneration, a similar explicit legislation is considered necessary.

Some countries have started to include energy efficiency and renewable energy obligations in the national legislation transposing the European IEM Directive. One can hope that when the balance of application of the IEM Directive is made and a further harmonisation is considered, this approach is either included in a revised text or applied by more countries. However, **as a revision of the IEM/IGM Directives is currently not expected before 2006**[1], this would delay the process to a time, when little remains to be done in favour of the Kyoto targets.

So, for questions of time schedule, **waiting for a revision of the IEM/IGM Directives is not an option, and a specific EE-DSM Directive should not be delayed further**. Let us also note that a lower price of gas and electricity expected for the coming years as a result of the IEM/IGM Directives may result in higher consumption than expected, and that rational consumer behaviour should now be obtained in a new way, not only through energy prices that correctly reflect externalities, but also through assistance to consumers to overcome not price-related barriers for cost-effective energy savings. Also there is the possibility that only one of the two framework Directives is revised or that their revision is not in phase, creating distorsion between energies. The European Union may need the new instrument in the coming years (2001 – 2008) to respect its international commitments in terms of climate change prevention and should not leave the question to the next generation.

Furthermore, it is probably easier in an era of prices decreasing through the introduction of the IEM/IGM, to collect part of the price decrease for funding cost-effective EE-DSM, in order to reduce customers' **bills** even further.

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1 At the meeting in Lisbon in March 2000, the European Council has called on the Commission to accelerate the opening of the markets for retail competition. However, it is unclear at the moment how fast this will be developed, and whether it will be introduced by a small amendment of the IEM Directive or a major revision. Only the latter might provide a chance to add EE-DSM legislation to the IEM Directive.

Table 5-2: The Pros and Cons of Introducing Specific EE-DSM Legislation

IN FAVOUR OF .... WAITING FOR IEM/IGM REVISION	IN FAVOUR OF.... CREATING SPECIFIC EE-DSM LEGISLATION
• less opponents • field results (negative or positive) will become more visible in the meantime • some countries are implementing the Directives in direction of EE-DSM and could become motors	• being on time for Kyoto commitments • not having to choose between the various "entry points" (Public Service Obligations, planning, licensing) of IEM/IGM • being specific to EE-DSM, avoiding distorsions • taking the opportunity of prices falling through IEM/IGM to collect part of the price decrease for funding EE-DSM to reduce **bills** even further

5.3 A Potential Revival of the Existing Draft RPT Directive

The existing Directive proposal on “Rational Planning Techniques” (COM (97) 69 final; Rational Planning Techniques are essentially IRP or IASDO) has received support from the European Parliament but not from the European Council. Still, it could in principle be used as a basis to create the instrument needed. The European Commission and the European Parliament saw the RPT Directive as a necessary complement to the IEM and IGM Directives. While the IEM and IGM Directives are to introduce and increase competition on the supply-side of energy, the RPT Directive focuses on the provision of genuine energy services at least cost, i.e. the trade-off between energy supply and energy efficiency technologies/services (Chapter 2.1). The exclusive emphasis here on the role of the distribution and/or supply companies in the IRP/RPT process foreshadows the restructured (unbundled) sector structure that is set out by the IEM/IGM Directives. However, the text underestimates the diversity of market structures that we have found when investigating the situation in the various Member States (cf. Chapter 3.1 and Annex II).

Furthermore, the fast evolution of the internal market requests significant changes in the proposed text, while central “planning” is no longer the best stimulation for implementing DSM. In many countries, there is no longer a reference actor on which to base IRP in the sense of balancing resources of all kinds in order to fulfil the needs of captive customers. A large number of pure supply companies have emerged, and these, together with incumbent distributor/suppliers from other areas compete for the customers who were previously tied to one distributor/supplier.

The following table presents a short overview of the acceptability of the elements of the draft RPT Directive, as it appears from the workshops held in the eight Member States participating in this study. It should be noted that these are opinions from important stakeholders, but *not* necessarily *the* position of each Member State cited.

Table 5-3: Acceptability of the elements of the draft RPT Directive

Provisions	Opinion
Article 2 a) and b) Obligation on distribution/ supply companies to file RPT plans to the authorities; obligation on MS to control implementation of cost-effective DSM identified in the RPT plans	IRP in the classical sense, performed by energy companies, is not considered possible in most countries any more, as there is no closed franchise territory for the supply of retail customers. Only an adapted IRP looking at avoiding network upgrades in limited areas/situations seems feasible and useful for network companies. In some countries with a market segment of non-eligible customers, another form of adapted IRP targeting the demand of this customers segment seems feasible. Top down "IRP" to be performed by the state and/or the regulator and/or the ISO exists on the paper in Portugal but has no practical results until now, a situation that could become frequent in other countries if DSM remained associated with central planning. In contrast, the IASDO principle as a basis for the analysis of the benefits and costs of DSM, and hence the decision on the implementation of DSM programmes and services, is feasible and useful for competitive supply as well. However, putting an obligation on energy companies to file resource plans based on the IRP or IASDO principles to the authorities, which is uniformly established at EU level, would only be accepted by Denmark and some workshop participants in Italy. In Belgium, it was considered a realistic option at national level combined with other mechanisms. Obligations on energy companies are simply considered unacceptable in Sweden and Germany, where they are considered not compatible with the liberalised market.
Article 2) c) MS should permit distribution/ supply companies to sell Energy services	This is generally accepted, except for clear opposition from France concerning the supply to non-eligible customers, where it is felt that the present monopoly company should not be given an opportunity to put itself into advantage over private sector ESCOs.
Decoupling of profits from sales volume	Possibility of acceptance from most countries for franchised T or D (and maybe franchised Supply) companies, depending on the formulation. However, opposition from French workshop participants.
Article 2) d) Encourage Specific EE-DSM activities	Generally not accepted or not deemed useful by the majority of opinions in the countries.

Although it seems for some countries possible to accept and implement a slightly amended RPT Directive, which just replaces RPT by DSM, and obliges the MS to put the planning obligations on distribution and/or supply companies (instead of combined distribution/supply companies as in the draft), opposition of some actors exists in each country (maybe except Denmark). In conclusion, most probably, only Denmark, Greece, and maybe Italy and the UK would support such an amended RPT Directive.

In fact, the most serious criticism to the draft RPT Directive has been that it puts uniform, and bureaucratic, planning obligations on the distribution/supply companies in all member states directly from the EU level, and that it seeks to prescibe a set of actions. This is thought not to comply with the different scope and speed of electricity and gas market liberalisation in the different countries.

On the other hand, what is needed to reach the targets of developing the energy markets further into markets for sustainable genuine energy services, cost savings through energy efficiency, and finally of CO_2 reduction, is to **create a framework which secures a harmonised level of energy efficiency reached by EE-DSM services and programmes**. There is also an opening from a number of companies and from Eurelectric itself on the question of "active" or new energy services (cf., e.g., EC/Eurelectric 2000). One Eurelectric document, e.g., discusses the expectation that Member States will introduce energy efficiency

programmes in co-operation with the electricity supply industry, and states that "The costs of energy efficiency programmes would vary between Member States, ..., but would generally be equivalent to around 1 % of the cost of the energy supplied." (Baggs et al. 1999). All these considerations have lead us to consider an EU Directive on EE-DSM as an alternative to the existing draft RPT Directive.

As we have shown above, market forces cannot achieve full realisation of DSM objectives. Furthermore, increased competition in the countries where there is still a dominant monopoly in place, like France or Belgium, has lead to a new behaviour of the companies, which limits the expansion of energy services by ESCOs. Therefore, both a supportive framework for EE-DSM programmes, and for improved competition and the creation of a self-sustained market for EE-DSM services, where these are feasible, is needed.

Hence, a completely new structure may be given to the draft EE-DSM Directive:

- aim to stimulate EE-DSM;
- include mainly EE-DSM programmes, but also EE-DSM services;
- put the main focus on stimulating EE-DSM by Distribution and Supply companies (not Generation or Transmission);
- acknowledge the necessity of quantitative results (setting of national objectives, reporting on results);
- while setting national objectives, give the Member States flexibility on the way to achieve them.

Table 5-4: Pros and Cons of an EE-DSM Directive vs. the Draft RPT Directive

IN FAVOUR OF .... REVIVING THE RPT DIRECTIVE	IN FAVOUR OF.... INTRODUCING AN EE-DSM DIRECTIVE
• existing vote of EU Parliament • showing process parallel to IEM/IGM • not risking to lose the present proposal without success of the alternative	• not reviving old oppositions • avoiding "planning" which is not the key factor; rather try to achieve results • obey subsidiarity of national policy choice • being specific to EE-DSM targets, avoiding to prescribe methods that may not fit all Member States, but still a complement to the IEM/IGM • possibility of finding compromise with ESI

From the Pros and Cons given in the table, we conclude that an EE-DSM Directive should be put into the legislation process, but that the proposal for an RPT Directive should only be withdrawn, after the new EE-DSM Directive has been adopted.

5.4 Creating a Separate EU Directive on EE-DSM

EE-DSM is not a new idea, and national surveys have shown some significant national success. There is enough information on some national success to establish a list of potential mechanisms offered to the choice of Member States (cf. Chapter 4). Mechanisms that existed before the IEM and IGM Directives in a monopoly situation are however suffering, namely due to unbundling (losses and gains are not applied to the same actor) but can be made effective again, while the new market forces in favour of energy efficiency services are still weak and can be reinforced. New explicit rules are needed to cope with the consequences of this contradictory situation and make EE-DSM mechanisms compatible and synergic with the Internal Market. A list of acceptable measures has to be proposed. In fact the various "mechanisms" described in Chapter 4 are aspects, which are interlinked and thus should be aggregated to put in place the European "mechanism" and the national "mechanisms".

As discussed in the national workshops and in previous parts, the instrument for harmonising the framework and targets for EE-DSM could be created by a separate Directive with close links to the IEM and IGM Directives. This link is logical particularly for two reasons: (1) EE-DSM becoming part of the business of the energy companies, it should be put at a similar level (or equitable level) in all countries for a good running of the integrated markets (cf. Chapter 5.1); and (2) fuel switching, load management or energy efficiency in one country will free capacity to transfer more electricity or gas from one country to another.

Following the criticism to the Draft RPT Directive, the text of an EU Directive on EE-DSM should direct quantified EE-DSM targets towards the Member States to ensure the harmonised level of EE-DSM, but should leave them freedom on how they want to stimulate the development of EE-DSM by the electricity and gas industries in their country.

The advantages of such a regulation compared to the draft RPT Directive are given in Table 5-4 above. Compared to a revision of the IEM/IGM Directives, such a separate EE-DSM Directive would also have the following main **advantages**:

- It pays full respect to the **subsidiarity** principle, because of the freedom for the Member States how to realise their target;
- it would be directed towards a **target**, **not** towards **methods** which may not fit every Member State and actor;
- it can be realised **more quickly** than an amendment of the IEM/IGM Directives.

The main disadvantage would be that it does not stress the integration of EE-DSM into the energy markets as much as if it was included into the IEM/IGM Directive. Therefore we recommend to integrate the EE-DSM Directive and the IEM/IGM Directives at a later stage.

Our **conclusion** from all these considerations is that we recommend to replace the proposal for an RPT Directive by a proposal for an EE-DSM Directive. This proposal will be described in further detail in Chapter 6.

6 Recommendations

6.1 Recommendations for EU Policy

6.1.1 Basic Considerations

From the analysis of electricity and gas market restructuring and the appropriateness of IRP and DSM, and from the analysis of possible options for EU legislation presented in Chapter 5, the study group came to the conclusion:

The best way to support a coherent development of EE-DSM services and programmes would be to complete and harmonise the Internal Market for Electricity and Gas (IEM/IGM) Directives by **a Directive on EE-DSM**. EE-DSM should, in accordance with Chapter 2, be defined to include both services (defined as directly paid by the customer or market agent who directly benefits) and programmes (programme costs not directly paid by the customer or market agent who directly benefits), and all of end-use energy efficiency, fuel switching, and load management, under the condition that they reduce the total costs of energy services to customers and society, and primary energy consumption as a proxy for the energy-related environmental risks and damages. This Directive should set a substantial, harmonised quantitative target for EE-DSM **to the Member States**, but leave it up to them, by which policy mechanisms that create a supportive framework for EE-DSM by the network-associated Energy Supply Industry (ESI) the Member States wish to achieve this target.

It has been shown in Chapter 5.1, why a harmonised policy target for stimulating EE-DSM is needed not only for all energy companies within one Member State, but across all Member States. A main reason for an EU policy initiative is that the competition on the supply side needs to be completed by an improved competition between energy supply on one side and EE-DSM on the other. This "substitutional competition" needs to be fostered by an EU Directive, just as the competition on the supply side was fostered through the IEM/IGM Directives. From this argument of completing the IEM(IGM, it follows that at a later stage the new EE-DSM Directive should be merged with the IEM/IGM Directives when they are revised. Furthermore, once such an EE-DSM Directive is adopted, the proposal for an RPT Directive can be with drawn.

It is important to note that in coherence with our perspective that EE-DSM is part of the Internal Market for Electricity and Gas, harmonisation is needed in the energy efficiency-DSM targets **to the Member States**. In contrast, the Member States need the maximum flexibility in the way they choose to support the ESI to reach the target. The Member States' individual way needs to be adapted to the evolution of their electricity and gas markets. Giving the Member States such flexibility would appropriately obey the subsidiarity principle.

6.1.2 A Proposal for the Contents of an EU Directive on EE-DSM

Based on these considerations, the study group developed a draft proposal for such an EE-DSM Directive. This draft proposal was tested for acceptance during the national workshops held in the eight participating countries during autumn 1999. Both the draft proposal and the results of this test are displayed in Annex IV to this report.

Based on the comments and conclusions from the national workshops, and on intensive discussions within the group, we put forward the following **proposal for the contents of an EU Directive on EE-DSM**. We are aware of the importance that details, formulations, and factors not directly related to a topic, might have for the acceptability of the proposals made, even in topics where there was consensus in the workshops. We therefore ask the reader to read the proposal carefully; we are also aware that it is quite innovative and may look complex for the current policy debate in most EU Member States. Explanations on the elements of this proposal, and the considerations that have led us to propose each of them, are provided in Chapter 6.1.3.

- The Directive should address the creation, **by the Member States, of a supportive framework for EE-DSM** activities by electricity and natural gas transmission network, distribution network, and supply companies; and by independent ESCOs.

- The Directive should have as the main feature:
  a **mandatory, quantified target for each Member State** to ensure a certain level of **EE-DSM programmes,** which should be reached 2 years after the decision on this Directive. This should be defined as a **harmonised** target for **both**
  (i) a certain minimum level of **energy efficiency improvement**; the minimum level for each Member State which is recommended by the study group, based on the results from Chapter 3.3.3, is to reach with **each year's EE-DSM programmes an additional saving, compared to the baseline** for the specific end-use technologies or customers targeted, **of 1 % per year**, of the consumption in each Member State in the previous year, expressed in TWh/year per Member State, to be additionally saved within each consecutive year. This target applies to the electricity and gas sector separately and to each Member State; the lifetime of the energy-efficient technologies, on which the savings are based, shall be at least 8 years on average for one year's programmes;

  and

  (ii) a certain minimum level of **investment** for **EE-DSM programmes**; the minimum level for each Member State which is recommended by the study group, based on the results from Chapter 3.3.3, is 2 %, respectively and separately for electricity and natural gas, of the total net revenue in that Member State from electricity and natural gas sales to final customers, i.e. net of taxes and levies. This target applies to the electricity and natural gas sector separately. The sum of the investments should be cost-effective. This EE-DSM programme investment must be additional to energy efficiency activities financed from the state budget at present.

Furthermore, the EE-DSM Directive should specify that:
The Member States shall dedicate to an appropriate **authority** the task to approve, and to monitor the energy savings and the cost-effectiveness of the EE-DSM programmes which are implemented to fulfil a Member State's target. **Standardised bottom-up methods** shall be used for the assessment of the final and primary energy savings, then environmental improvement (e.g., CO_2 reduction, reduction of hazardous gases, or nuclear risks), and the cost-effectiveness of the EE-DSM programmes before and after their implementation. The European Commission shall, in co-operation with the Member States, organise the development of such standardised methods; this shall not delay the realisation of the EE-DSM targets.

Complementary to this, the Member States shall support the development of a market for **EE-DSM services**. The Member States may achieve half of the savings target through encouraging EE-DSM services, if they can prove - through the standardised evaluation methods - that these services really achieve the savings. The investment target would then be reduced proportionate to the share of the savings target achieved by EE-DSM services. The limit to the contribution of EE-DSM services shall be revised after five years, based on the experiences with achieving and monitoring the savings from EE-DSM services.

- The Directive should **leave it up to the Member States how** they achieve the quantified target (i.e., using which specific mix of EE-DSM supportive mechanisms), but give a **non-exclusive list** of some important EE-DSM support mechanisms (e.g., a dedicated levy and funds system; obligations for, or negotiated agreements with energy companies to do EE-DSM; price regulation mechanisms; legal and technical supports for EE-DSM services and programmes) ;

- The Directive should **require the Member States, where** price regulation of the remaining monopoly segments (transmission network companies, distribution network companies, suppliers to captive customers) exists, to **align the development of revenues** over time more closely to the development of the relevant cost drivers in the practice of price regulation. This would promote economic efficiency as well as eliminate any artificial incentive to increase energy sales.

- The Directive should **require the Member States** to **report,** on an annual basis, to the European Commission on the amount of energy saved, and the cost-effectiveness of the EE-DSM implemented. The Member States should be obliged to also use the standardised bottom-up methods for the assessment of the energy savings and the cost-effectiveness of the EE-DSM programmes mentioned above for their reporting to the European Commission.

6.1.3 Explanations on the Choice of the Contents for the Draft EE-DSM Directive

The following detailed considerations have led us to propose the contents of a draft EU Directive on EE-DSM as given in Chapter 6.1.2:

1. **Address support by the Member States for EE-DSM**:
   It has been shown in Chapter 3, that EE-DSM needs support from the state, no matter whether it is programmes or services, or whether in markets for eligible or non-eligible customers. This does not necessarily mean direct financial support from the state or from general taxation to the operators of EE-DSM; rather setting the right framework and economic signals to make EE-DSM (more) attractive to energy companies.

   The main argument for addressing EE-DSM, not Energy Efficiency in general with this Directive is the completion of the internal markets for electricity and gas, by adding EE-DSM as defined above, and creating harmonised conditions on EE-DSM for energy companies across Europe to avoid discrimination between companies in different states (see Chapter 5.1). However, implementation of this target could include all mechanisms used by the Member States for supporting energy efficiency, if the mechanisms at least involved parts of the electricity and gas supply industry in the collection of funds for energy efficiency programmes, provided that energy companies also have access to the use of the funds for own EE-DSM programmes and start-up expenses for EE-DSM services. If, on the contrary, the Directive would address Energy Efficiency (EE) in general, and not EE-DSM by energy companies, the Member States could implement their EE targets without including energy companies, so the aim of harmonising EE-DSM across the EU and completing the internal markets for electricity and gas could be missed.

   The completion of the internal markets for electricity and gas, and the avoidance of discrimination between companies due to the different stage of liberalisation in the different EU countries, are also the reasons for focussing on the electricity and gas industry. The European Commission is, however, advised to examine if, and how, at a later stage or through additional policy measures, a harmonisation of support by the Member States for EE-DSM activities by other segments of the energy supply industry, e.g., the industries supplying oil, coal, bottled gas, district heat, and heat from renewable energies, could be stimulated.

   EE-DSM is a customer-oriented activity. Therefore, mainly those types of energy companies, which are close to the customers, should be addressed, and these are the distribution and/or supply companies. It may also be possible that transmission companies or TSOs can carry out a DSM bidding, i.e. call third parties for bids of energy efficiency or load management implementations, and so these types of energy companies are recommended to be included as well. If independent generators combine energy and EE-DSM services to large customers, they will be suppliers, and are thus included. On the other hand, pure generators selling on the wholesale market are not the focus of the proposed Directive and therefore not mentioned.

2. **Set a quantified, obligatory target to the Member States**:
   Using a quantified, obligatory target to the Member States is needed to install the harmonisation, but obey the subsidiarity principle for implementation of the target. This is why we propose a target to the Member States, not directly to the electricity and gas supply industry. The Member States need the freedom to choose mechanisms which are adapted to the electricity and gas markets, to stimulate EE-DSM activities by the electricity and gas supply industry, which will achieve a Member State's target set by the Directive.

   Concerning whether there should be investment and/or savings targets, the pros and cons of both options are: A certain level of investment is easier to monitor and verify, but the cost-effectiveness has to be secured by additional conditions (e.g., the standard benefit-cost tests from the IRP methodology mentioned in Chapter 2.2 and Annex I), and the incentive to improve the cost-effectiveness is relatively weak. In contrast, with an obligation for a certain level of energy efficiency improvement the incentive to improve the cost-effectiveness is strong, but it is more difficult to monitor compliance, because this requires to measure the savings reached vs. the market baseline for a technology or customer segment more exactly. Furthermore, with a savings target alone, there would be no incentive to implement "non-resource" or "soft" programmes, e.g., information campaigns, professional training programmes, etc. The savings of such programmes are not easy to measure, but they are nonetheless important parts of an overall EE-DSM strategy. The same is true for some market transformation programmes targeted mainly at market partners like manufacturers or retailers, for which it is more difficult to evaluate the savings than for, e.g., programmes targeting participating customers, but the savings of such market transformation programmes may be very large and persistent in time.

   Therefore, we propose to have **a combination of an investment target and a savings target**. Of the investment target, a maximum percentage (e.g., 25 % of the total target) could be defined for spending on "soft" programmes. For the "resource" programmes and services, like those which offer targeted audits, rebates, or third-party financing, it is necessary to measure the energy savings reached vs. the market baseline for a technology or customer segment to evaluate the cost-effectiveness, and thus an investment target and a savings target are linked to each other anyhow. This is, e.g., shown by the experience of the energy efficiency standards of performance in the UK, where first a savings target is set to the energy companies, and then this savings target is translated into an investment target by the analysis (ex ante) and evaluation (ex post) of concrete EE-DSM programmes. This link is reflected in the proportion of the two targets proposed; both the proportion and the level of the targets proposed are based on an examination of experiences and scientific analyses from different EU Member States (see Chapter 3.3.3).

   This way of defining the targets has been chosen because it is the most realistic and scientifically justified way:
   In our view, EE-DSM activities by the electricity and gas supply industries are a very important way to improved energy efficiency, but certainly not the only way. This is

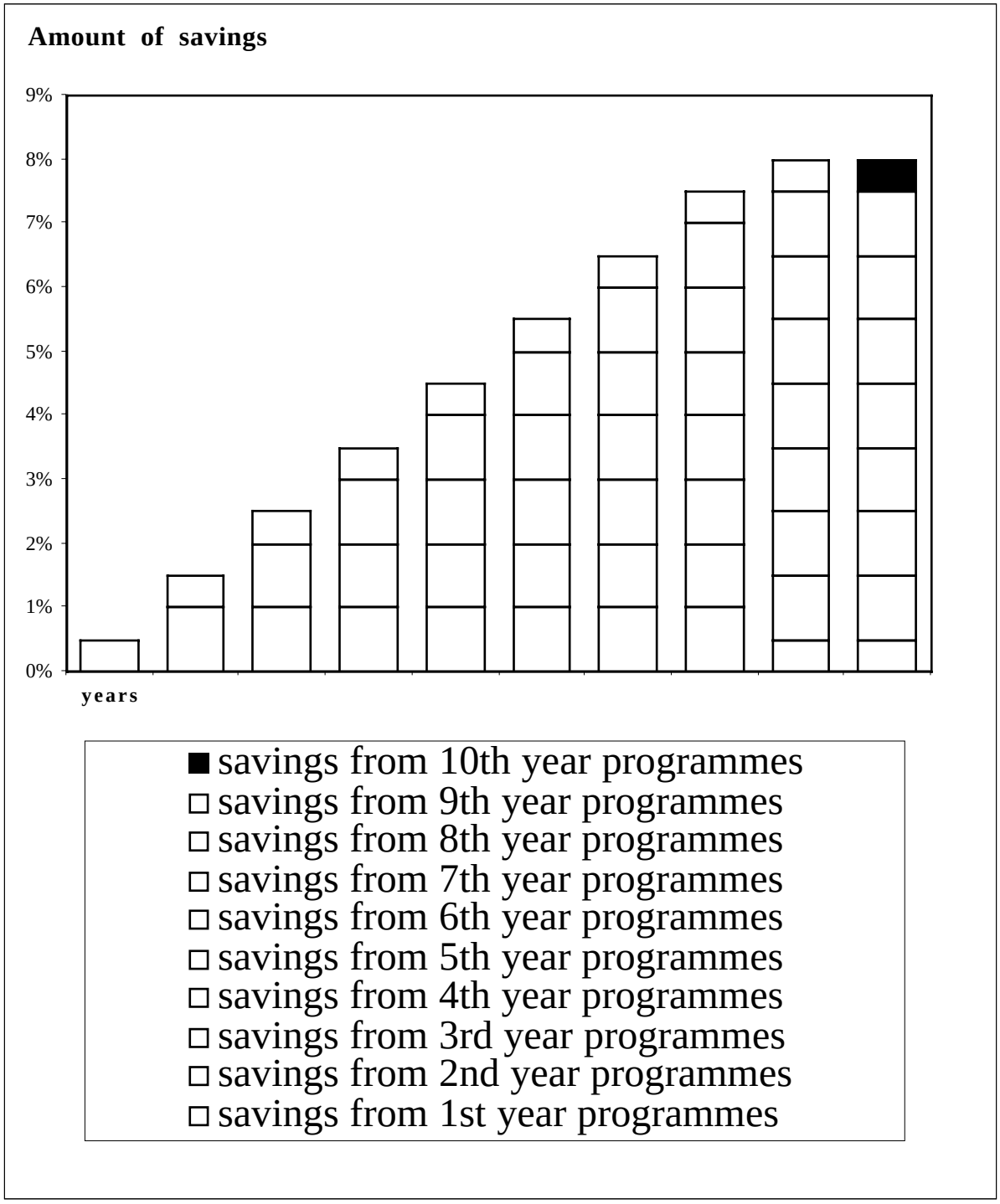
repeatedly stated in this report, e.g. in Chapter 3.3. Therefore, the target cannot be to achieve the full technical and economical potential of en-use energy efficiency by EE-DSM alone. In that case, the target would have to be about three times as high as proposed by us. Other actors and other actions need to complement the EE-DSM activities, which would be stimulated by the proposed Directive on EE-DSM.
It is also not easy to justify a target based on the energy efficiency improvement that would be needed to achieve the Kyoto target for each Member State or for the whole EU. The reason is that energy efficiency is only one option, besides e.g. renewable energy, cogeneration of heat and power, person and goods transport fuel savings, and measures for reducing non-CO_2 gases; and EE-DSM is only one option to realise the energy efficiency potentials. This will raise issues of burden-sharing between energy efficiency and other options, and make the debate highly country-specific. Furthermore, it will be based on closing a gap between business as usual and the Kyoto targets, rather than to focus on achieving a given technical and economic potential.
Hence, the best way to determine the target is to start from the technical and economic potential for energy efficiency, load management and eco-efficient fuel-switching, and then to look at experiences and analyses on how big a proportion of this potential can realistically be achieved through EE-DSM activities.

It should be noted, that the minimum percentages by which the targets are defined, are harmonised across the EU, but that the basis for the targets is nevertheless specific per country, i.e. the total net revenue from sales to final customers (net of taxes or levies) as the basis for the EE-DSM programme investment target, and the consumption in that Member State in the previous year as the basis for each year's savings target.

The investment and savings targets should be reached separately for both electricity and natural gas. If fuel switching reduces electricity but increases natural gas consumption, this increase in natural gas consumption should not be counted to the detriment of the natural gas savings target. The same applies for fuel switching from natural gas to electricity, in both cases provided that the fuel-switching activity is cost-effective and reduces primary energy consumption.

The savings target is defined so that with each year's EE-DSM programmes an additional saving of 1 % per year is reached; additional not only with respect to the market baseline for a technology or customer segment, but also with respect to the savings achieved by previous years' programmes. The following graph shows how this is meant, and how the total savings would accumulate over the years while this Directive remains in force. In this graph, an average useful life of the energy-efficient technologies of 8 years has arbitrarily been chosen. In most EE-DSM programmes, the useful life of the savings is much longer (10 to 15years).

Figure 6-1: The development over time of savings from EE-DSM activities required by the quantitative targets



Standardised methods for the assessment of the energy savings and the cost-effectiveness of the EE-DSM programmes are clearly needed for the credibility of the results achieved, and for the monitoring of compliance by the Member States. These should be bottom-up methods, i.e. for each EE-DSM programme and service evaluating the savings compared to the market baseline for the technology or customer segment targeted by the programme

or service. The European Commission should have a mandate to organise the development of such methods. A basis for this development can be provided by the European B/C Analysis Methodology (EUBC; SRC International et al. 1996) and the European Guidebook for Ex-Post Evaluation of Energy Efficiency and DSM Programmes and Services, which is currently developed in another SAVE project. For EE-DSM services, a development of standardised measurement and verification procedures, or an adaptation of the International Performance Measurement and Verification Protocol (IPMVP, www.ipmvp.org), should be carried out.

The standardised methods for the assessment of cost-effectiveness should be based on the IASDO principle (cf. Chapter 2.2), which is also a basis for the EUBC methodology. The IASDO principle is helpful for energy companies to find out about the cost-effectiveness of DSM programmes and services, and to learn more about how they can reduce the total costs of their customers and thus to gain an advantage in the market. IASDO can, therefore, stimulate both the uptake of EE-DSM and the evaluation of the cost-effectiveness, and thus is a good complement to other, more specific EE-DSM support mechanisms.

However, as the workshops have shown, most Member States would probably not accept the idea of putting obligations on their ESI/GSI to implement IASDO or even to file EE-DSM plans based on the IASDO principle, as the draft RPT Directive proposed. Therefore, we do not propose to the Member States to create such obligations.

Finally, we propose to primarily set the target for EE-DSM **programmes**. The reason is that these are usually targeted at energy efficiency or peak load improvements only, while energy efficiency or load management **services** are often part of a wider package of energy-related services. While it may be possible, with agreements or obligations on monitoring, to quantify the savings achieved through such energy-related service packages, it is often not easy to identify which part of the investment made by the supplier of the package is attributable to energy efficiency improvements. Furthermore, with services the supplier bears the full costs of the improvement, so that the ratio between investments of the actor and savings achieved will be higher[1]. On the other hand, services are directly paid by the customer or market actor who benefits, so there should be no issue of either increasing energy prices to recover EE-DSM programme costs and net lost revenues from the reduced energy sales caused by the EE-DSM, or not raising prices and consequently losing profits in a competitive market, which would require policy support, as is often the case for EE-DSM programmes.

There are, however, other barriers to the development of energy efficiency, or more

[1] An example may best explain this: Assume an efficient lighting retrofit that costs 20,000 EUR. With a service, the energy company bears the full investment and, say, 30 % overhead. Hence, the total investment *by the energy company* in the EE-DSM service is 26,000 EUR. If *the same saving* is achieved through an EE-DSM programme, e.g., offering targeted advice and a rebate of 50 % on the investment costs, with 20 % overhead on the rebate, then the total investment *by the energy company* in the EE-DSM programme is only 12,000 EUR, for the same electricity saving.

general DSM services, particularly for small and medium customers. Such barriers are, e.g., lack of knowledge of, or trust in this instrument by possible customers; risk, for possible service suppliers, of building up a new business field; legal or taxation system barriers preventing the installation of energy-efficient equipment in third-party financing. We therefore believe that policy support is also needed to stimulate the market for energy services, and that the proposed EE-DSM Directive should contribute to this.

On one hand, we are convinced that a supportive framework for EE-DSM programmes will also **indirectly** support the development of EE-DSM services – by raising awareness for the possibilities of energy efficiency on the customer side; by improving knowledge on energy-efficient technologies among market partners such as retail trade, engineers, architects, building and installation businesses, and by helping energy companies and other actors to build up and improve their skills and capacities in addressing demand-side energy efficiency.

But on the other hand, we also propose that the Directive on EE-DSM give a **direct incentive** to the Member States and to the possible suppliers of **energy efficiency services** to develop this market. Therefore, we propose that the Member States support the development of a market for EE-DSM services, e.g., with the legal and technical support mechanisms described and analysed in Chapter 4. And we propose that the Member States may achieve half of the savings target through encouraging EE-DSM services, if they can prove - through the standardised bottom-up evaluation methods - that these services really achieve the savings. Their investment target would then be reduced proportionate to the share of the savings target achieved by EE-DSM services. This is necessary to give an incentive to the Member States, and it is justified if the savings can be proven: there is then no need to care for these savings through investments stimulated by policy, since the market for energy efficiency services has realised these savings.

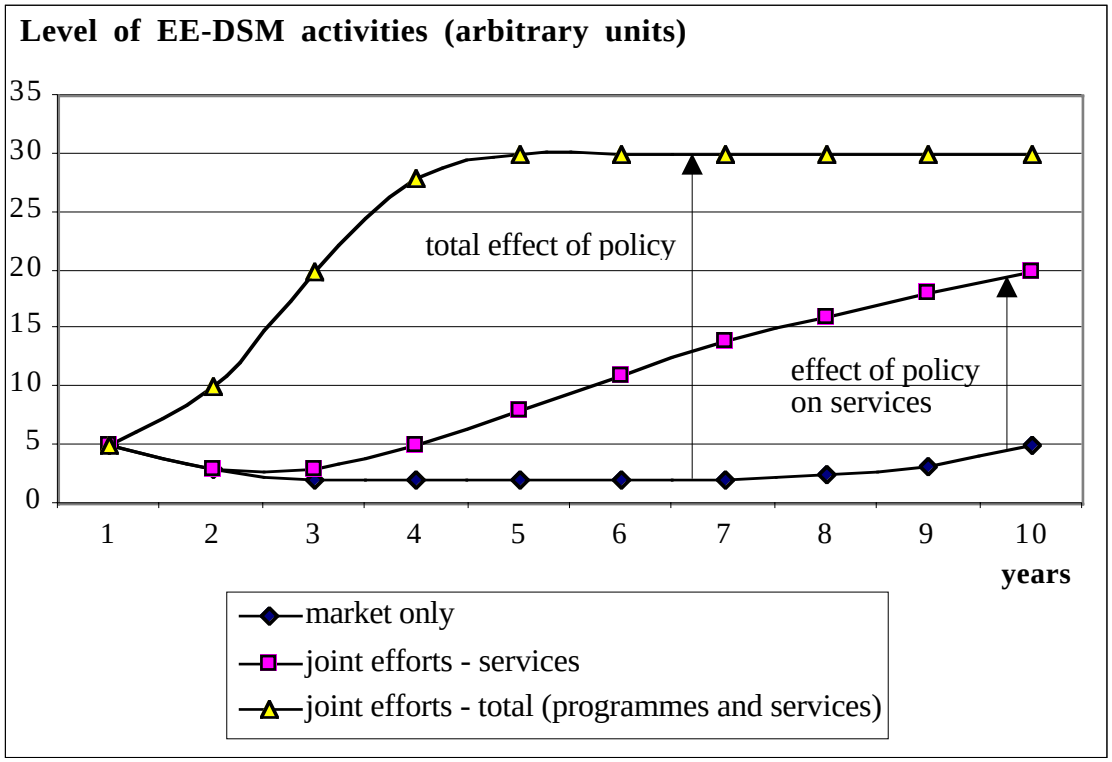
Stimulation of EE-DSM services could also be achieved by the Member States also with similar mechanisms as the support for programmes. E.g., in California or other states of the USA, many EE-DSM programmes now explicitly offer financial incentives to providers of EE-DSM services. Such programmes are called "Standard Performance Contracting Programmes" (Dickerson et al. 2000; Goldstone et al. 2000; Schiller et al. 2000).

However, there will also still be a need for EE-DSM programmes to reach the full economic potentials: some programme types, like general or targeted information, professional training, generation of databases, technology procurement and competition, and a number of other market transformation approaches will not find an actor who sells them as a service to individual customers. Furthermore, some technologies with small savings per unit but high number of units (e.g., CFLs, efficient appliances) may not be profitable to sell as a service. And finally, the monitoring of energy savings from EE-DSM services is more complicated, if these services are offered by independent ESCOs and energy companies without any DSM supportive mechanism. National policy will

have to create requirements for data provision by such actors. This will be easy if EE-DSM services are one way to achieve an energy saving target imposed on individual companies anyway, as in the UK. It may face resistance from the business otherwise. These are the reasons, why we propose to initially limit the contribution of EE-DSM services to the achievement of the national targets set by the EE-DSM Directive to 50 %. However, we propose to revise this limit after 5 years, based on the Member States' experiences on which percentage of the savings target can be achieved by EE-DSM services, and how accurately the savings from EE-DSM services can be monitored.

With such a Directive, the development of EE-DSM services may be much faster than if completely left to the market forces:

Figure 6-2: The possible development of EE-DSM services, and EE-DSM activities in total, with and without supportive policy (illustrative graph, not based on quantitative estimates)



3. **Leave it up to the Member States how they achieve the target**:
The choice of the appropriate policy mechanism (cf. Chapter 4 for the analysis of the most important options), and also the type of energy companies to support as an actor for EE-DSM, can depend very much on the structure of the ESI and the stage of liberalisation and restructuring in each Member State (cf. Chapter 6.2). This was clearly indicated by the workshops held during this project. Therefore, the Member States should be given freedom of choice as to how they wish to give sufficient support to their ESI to reach the national targets for EE-DSM. However, providing a list of policy mechanisms for guidance was considered useful during most workshops.

4. **Require the Member States** to **align the development of revenues** over time more closely to the development of the relevant cost drivers in the practice of price regulation:

   For reasons of economic efficiency, the revenues and finally the profits of regulated energy companies should reflect, and evolve with, the evolution of the relevant factors which drive their costs. Among these can be the energy consumption or the peak demand, but also the number of customers, or the length of a transmission or distribution grid. Analysis in a number of countries (e.g., the UK, Norway, Portugal) has shown that a regulation which takes into account a number of these factors, and which reconciles the actual evolution of revenues with the actual evolution of cost drivers from time to time, is a better way to align the development of revenues over time more closely to the development of the relevant cost drivers, as compared to traditional cost-plus regulation or to a price-cap regulation. Furthermore, such a regulation, where typically the weight given to the energy consumption as a driver is 50 % or less (even 0% for the retail supply function in some countries), is also giving more correct signals to the regulated companies on the benefits and risks of EE-DSM.

   It cannot be avoided that competition in retail supply gives incentives to the competing suppliers to increase their sales to increase their profits, even where this is harmful for the environment, and may not be optimising the welfare of the customers. But where monopoly segments still exist, and their profits a regulated, the regulation should strictly avoid to give unjustified incentives to increase sales, hence try to align the profits with the actual changes in costs due to changes in sales (e.g., by using a multiple driver target formula like in the UK, Portugal, or Italy for the regulation). This is essentially our **mechanism M2** (cf. Chapter 4).

   It should be noted that this is **not** a statement on the allowed level of profits, but **only** on the link between the development of revenues and cost drivers. The regulated companies are still given the possibility to keep profits achieved by reducing their costs compared to the costs calculated through cost drivers.

   Such a practice of regulation should also be required for reasons of harmonisation, i.e. to avoid to put some energy companies at disadvantage, e.g. if in the state where they operate there is a price regulation with disincentives to EE-DSM, and they are nonetheless subject to an obligation to deliver a certain amount of EE-DSM.

5. **Require the Member States** to **report:**
   Such a requirement is no doubt needed to assess the compliance of the Member States with the Directive. Standardised methods for the assessment of the energy savings and the cost-effectiveness of the EE-DSM programmes and services are clearly needed for the credibility of the results achieved, and for the monitoring of compliance by the Member States. The European Commission should have a mandate to organise the development of such methods. As the workshops confirmed, it should, however, be left to the Member States how they collect the necessary information on the savings achieved, and on the cost-effectiveness of the EE-DSM programmes. In most cases, this data collection will be

tied to the policy mechanisms for supporting EE-DSM programmes.

For the legal, technical and other supports given by the Member States to the development of EE-DSM services, setting up a statistical collection of data on EE-DSM services would be useful to demonstrate the extra benefits from such activities. Such databases are helpful anyway, to learn more about the development of the market for EE-DSM services, and where this may need more support.

6.1.4 Some Details for the Legislation on the EU and National Level

In the following table, some considerations on which other points have to be regulated in connection with the Directive and its implementation in the Member States are given.

Table 6-1: Some Details for the Legislation on the EU and National Level

POINTS FOR .... EU LEGISLATION	POINTS FOR.... NATIONAL LEGISLATION
• methods for cost/benefit analyses, metrics • common reporting rules and formats • exchange on results, actualisation of knowledge on mechanisms efficiency • fair competition rules on EE-DSM programmes and services (e.g., regarding competition between energy companies and others) • rules on the energy efficiency content of services • elasticity effects monitored: does the price reduction due to supply-side competition lead to higher consumption baselines?	• choice of "mechanisms" in list of agreed options • choice of method for collecting data to evaluate the results compatible with EU reporting guidelines, and institution in charge • e.g., respect or improve existing franchising organisation which is country dependent • e.g., definition and publication of list of programmes • e.g., creation and management of funds • e.g., allowance for partial rate-funding of services with high energy efficiency content • e.g., use of negotiated agreements or obligations to reach targets

6.2 Recommendations for Member State Policy

6.2.1 Guiding Principles for an EE-DSM Policy Adapted to the National Electricity and Gas Markets

As the analysis of the experiences with IRP and DSM in the past (cf. Chapters 3 and 4) has shown, EE-DSM has been most effective where a combination of

1. an agreed or mandated, quantified target for energy savings,
2. a channel or an allowance for raising funding, and
3. a scheme for cost-benefit evaluation of the EE-DSM prior to, and after implementation

have been created (e.g., in Denmark, the Netherlands, the UK, or the USA).

The empirical analysis also showed that it is possible to maintain and develop not only EE-DSM services, but also EE-DSM programmes in liberalised electricity and gas markets. As EE-DSM services will at least for the first years concentrate on the larger customers, there will continue to be a need for EE-DSM programmes. Furthermore, there is a need for policy support since also EE-DSM services face a variety of barriers for their development.

In Chapter 4, a number of mechanisms for the support of EE-DSM and IRP or IASDO have been analysed in detail. The applicability of these mechanisms depends, first, on a variety of national circumstances and framework conditions. These can, of course, not be dealt with in a theoretical manner here. Therefore, the study group has drafted below recommendations for each of the eight participating countries, for which EE-DSM support mechanisms we think adapted to the national situations.

These recommendations have been drafted **by the study group**, **as a group of individual experts**. These recommendations are, therefore, not related to the opinions of the organisations that the individual participants of the group represent. The recommendations are based on the analysis of the applicability of general principles on the situation for each country, and the knowledge of the experts from each country on the situation in this country. In particular, they include the inputs from the discussions at the national workshops held for this study.

The applicability of some of the mechanisms depends on the stage of liberalisation. As a guiding principle for national recommendations, tables 4-5 and 4-6 in Chapter 4 have displayed, which of the mechanisms we think adaptable to which of the three basic market types, and which useful combinations of mechanisms are considered most appropriate for which market type.

6.2.2 Recommendations for Belgium

It is well accepted, also within the electricity and gas industry, that energy companies should play an important role in doing DSM because it is recognised that: (1) DSM can be profitable for energy companies, (2) DSM improves customer relations and (3) DSM is part of the social responsibility of energy companies.

In a liberalised energy market a distinction is made between grid companies and supply companies. If DSM cost recovery is permitted by the regulatory authority, grid companies will be able to do both DSM services and DSM programmes. If no DSM obligations are imposed, supply companies are unlikely to do DSM programmes which are not directly or indirectly rewarded by the customer (e.g., under the form of a long term contract). In order not to disturb competition between various energy forms in a liberalised energy market, DSM obligations should be imposed on all energy supply companies: electricity, gas, oil and coal.

Table 6-2: Policy Recommendations for Belgium

Issue	Recommendations
Public benefit charge and dedicated EE&DSM funds	The present DSM charge of 0.0248 cEUR/kWh (1 cBEF/ kWh) sold should be increased. A corresponding DSM charge on other energy forms has to be introduced. The fund should be accessible not only to energy companies but also to ESCOs and other interested market actors. A competent administration has to be set up to organise the tendering and application procedure. A monitoring and verification protocol has to be worked out. The regions (Flanders, Wallonia and Brussels) should be fully responsible for the administration and control of the fund.
Ratemaking of monopoly segments	Price regulation to remove the incentives to increase kWh sales is considered to be very difficult in liberalised markets. As there will no longer be monopoly segments in the Belgian electricity and gas supply markets in the near future, ratemaking of monopoly segments is considered to make no sense, as long as prices for transmission and distribution are not given separately to customers.
Legal and technical support to DSM and energy services	By setting strict energy consumption standards for new and existing buildings, governments can stimulate customer demand for DSM actions. Governments have to make sure that all barriers impeding the development of ESCOs are removed. In Belgium for example, the technique of third party financing cannot be used in public buildings as a result of rules determining that all future expenses are to be locked up in the first year of the investment.
Obligation on EE-DSM or IRP	A study should be performed to examine whether and how a performance obligation can be put into practice. Because of practical problems and because of the difficulty of setting saving targets, dedicated funds to finance EE and DSM are preferred to performance obligations.
Others	Priority should be given to accompanying DSM measures by public authorities. For example, minimum standards for energy consuming equipment should be imposed. There is no sense in allowing an energy wasting machine on the market (e.g. a refrigerator with label F or G) while energy companies spend money on convincing customers to buy an efficient one (e.g. subsidies for refrigerators with label A).

Integrated resource planning (IRP) is considered in Belgium to work only in a fully vertically integrated energy sector. In the future, the Belgian energy sector will consist of competing energy supply companies and will no longer be fully vertically integrated. Therefore, the integrated assessment of supply and demand-side options (IASDO) by energy supply companies and ESCOs is the only realistic option for supporting DSM. Energy supply

companies may be encouraged to perform this job correctly, by imposing them IASDO as a public service obligation when transposing the EU Directive on the liberalisation of the energy market in national legislation.

6.2.3 Recommendations for Denmark

The table following below summarises the recommendations for Denmark. The recent process of liberalisation of the Danish electricity and gas markets and the adoption of an energy saving law implies several important changes from an energy efficiency perspective, including some new policy instruments. However, the main focus has been to ensure better co-ordination and cost-effectiveness of the different activities. The mix of different policies and measures applied and the number of actors involved are quite comprehensive, a fact that was also reflected in the national debate preceding the adoption of the energy saving bill.

In Denmark, the actors from the various fields are in favour of increased Energy efficiency. Electric utilities want the establishment of a planning forum and gas utilities require a minimum level of activities and quantified targets, while both require strong evaluation. Independent organisations and NGOs announce the high potential for savings and want ambitious targets and concrete actions to achieve them. Politicians recognise the importance of EE but require cost-effectiveness to support all decisions. Planning and evaluation are required by all.

Opinions are divided regarding energy company DSM. Politicians and electric utility companies (especially the distribution companies) are in favour of energy company DSM. However, only electric companies have a good tradition in providing DSM and have developed a good expertise. The gas and district heating companies, as well as oil companies, do not have this tradition. On the other hand, the Electricity Saving Trust prefer an independent operator supplying energy efficiency and the engineering firms want tenders for DSM activities.

With the adoption of the new electricity act, the distribution companies have been given an obligation to do DSM and the possibility of full cost-recovery. Amongst other things, this decision was based on the fact that the results achieved and the expertise acquired give the evidence that the energy companies are competent and commited to the task, and that it is thus natural to complete the market for energy with energy company DSM. Secondly, the separation by entity of distribution and supply is thought to minimise the potential problem of conflicting interests. Finally, a Public Service Obligation on DSM combined with a cost-recovery mechanism represents a relatively robust and stable financing mechanism and also ensures a certain level of continuity and institutional capacity.

It is generally recognised that “traditional” electricity sector IRP is not possible anymore due to the IEM Directive. However, the basic principles of assessing supply and demand side options on an equal basis still seem to be supported widely. IASDO is already applied by Distribution companies in their DSM plans. DEA supports the IASDO concept and intend to integrate in the forthcoming Energy Saving Bill. There is a clear will to consider energy

efficiency at least at the same level as renewable energy, which is positive for the development of IASDO.

Table 6-3: Policy Recommendations for Denmark

Issue	Recommendations
Public benefit charge and dedicated EE&DSM funds	Agreed expense, levies and recycling CO_2 taxes for the industry are already assigned to DSM&EE. In the light of the general acceptance of taxes and levies with full recycling, and based on the success and general acceptance of the Electricity Saving Trust, it could be considered to expand the scope of the Electricity Saving Trust or establishing similar bodies for other energy carriers, or to increase EE funding through increased recycling of energy/CO_2 taxes, especially for household and tertiary sector bodies. Efforts should be made to expand the use of innovative subsidy schemes, competitive tendering procedures etc. Secondly, regulatory oversight of energy company DSM expenses should be strengthened to increase "output efficiency" (savings/resource deployed) (see also below)
Ratemaking of monopoly segments	The new (June 1999) electricity bill includes a PSO on grid companies to do EE-DSM. It is recommended that the regulation of the supply prices to captive customers should be examined with respect to incentive structures in order to investigate the possibilities of/need for making the profits independent of kWh-sales. This has been established for grid companies (with a cost based revenue cap with pass-through of DSM programme costs), but the regulation of the kWh price charged to captive customers by the supply obligation companies (franchised suppliers) still seems unclear.
Legal and technical support to DSM and energy services	The general opinion is that planning, monitoring and evaluation has to be supported. Standardisation of impact assessment methods of DSM programmes should be emphasised – especially for "soft" programmes. For the latter, a shift of focus from the ultimate objective (normally CO_2 or kWh savings) to more operational, "second level" targets would be useful in order to make it easier to conduct meaningful evaluation and Measurement and Verification. The DSM service obligation on suppliers to captive customers should be used as point of departure to ensure the development of a fully commercial market for energy services. The authorities should take steps to verify and ensure compliance with the rather vaguely defined but very useful obligation.
Obligations to implement EE-DSM	The impact of this mechanism might be improved by introducing quantitative goals along with an economical frame. The present "gentleman agreement" of the appropriate level of expenses might prove to be insufficient, and thus quantitative targets might be needed. Such targets and frames should be analysed and set under the framework of the national "energy savings planification" (to be carried out by the ministry), that was introduced with the adoption of the energy saving bill in 2000. At the same time, the co-operative tradition between energy companies and the authorities should be pursued.
Obligations on reporting DSM results	Increasing the level of regulatory scrutiny of the energy company DSM expenses and the DSM plans submitted would improve the "sense of reality" and the link between plans and activities actually carried out. Secondly, decreasing the time horizon of the plans could contribute to such a development. A long term perspective is less important now, because the DSM plans no longer form an integral part of a traditional IRP plan (where a long term horizon is essential due to the lifetime of investments)
Link with climate change	The current DSM activities already focus on CO_2 reductions. This focus should be maintained, and at the same time the co-ordination between DSM activities (local) and state schemes (central) should be improved in order to maximise the total outcome of all the activities with respect to climate issues. Such a co-ordination is expected to be the result of the newly introduce obligation on the minister of energy to present annually an "energy saving progress report".
Inter-energy competition	With the adoption of the energy saving law, district heat and gas grid companies have a PSO to DSM just like the electricity grid companies. Local energy saving committees will be set up to assure co-ordination between different actors. Care should be taken to monitor that this mechanism to realise synergy potentials and economies of scope proves successful. Furthermore, steps should be taken to ensure that the experience obtained from the electricity sector IRP process is re-used in the new planning processes in the gas and district heat sectors.

6.2.4 Recommendations for France

Energy Efficiency programs and budgets were decreasing in France from the late '80s until 1998. This trend was stopped in 1999 and 2000, with a 100 MEUR increase on ADEME's budget for EE. The new impulse or EE is coming from the Kyoto involvement for France, which is to the emit same quantity of GHG in 2010 as in 1990, i.e. 140 MtC (66% of French GHG emissions reside in energy consumption and 9% in energy production). That means 16 MtC savings in 2010, compared to the BAU scenario. The main measures of the French National Plan for Climate Change Convention (Feb. 2000) are related to the transportation and building sectors, principally using eco-taxes and standards. The saving objective for electricity generation is 2 MtC (replacement of coal plants by gas cogeneration, electricity from renewable energies). EE-DSM and taxes on electricity are supposed to save 0,6 MtC .

In France, electricity and gas generation and distribution companies are mainly the two quasi-monopolistic public utilities EDF and GDF. They include DSM programmes into commercial activities at moderate level. New forthcoming operators will not accept measures giving a positive role to the utilities until the competition range becomes very large. Local authorities (distributing 4% of total electricity) are asking for a more important involvement. Impact on EE and DSM of this is still difficult to know

Table 6-4: Policy Recommendations for France

Issue	Recommendations
Public benefit charge and dedicated EE&DSM funds	It is considered necessary to implement a volumetric (kWh based) DSM public benefit charge, as the most appropriate way to stimulate the development of EE-DSM programmes and services in the French electricity and gas markets
Ratemaking of monopoly segments	In a first step, to examine, with all actors, the possibility of differentiating rates on specific electricity uses and electric heating in the residential and commercial sectors.
Legal and technical support to DSM and energy services	Indispensable. Should be much better at EU level, in order to avoid intra-national quarrels, and to help creating a European DSM-services market.
Obligation on IRP	First step will be to define legal and technical support. Second one to co-ordinate a discussion between actors on accurate details of who and how.
Link with climate change	DSM obligations or incentives have to be coherent with other national greenhouse measures in order to satisfy European Kyoto commitment of –8% CO2 emissions in 2008-2012 compared to 1990 ones.
Inter-energy competition	Electricity substitution by other fuels should be examined with EE goals, but also with effects on greenhouse gas emissions (today, French generation is 92% CO_2 free).

6.2.5 Recommendations for Germany

All actors recognise a need for increased policy actions for energy efficiency, since the conditions (e.g., price decreases due to competition in retail supply) do not favour energy efficiency at present. However, electric end-use efficiency still does not receive as much public attention as, e.g., thermal insulation, and energy efficiency in general receives less attention in the media and in politics than renewable energies.

Therefore, a new law supporting the development of renewable energies has recently been passed, but there are no plans for policy support for EE-DSM or even for IRP or IASDO. Only some experts in industry, science and policy clearly favour such policy. Many decision-makers still tend to believe that the competition in the electricity and gas markets will eventually lead to more energy efficiency services.

However, in order to reach the CO_2 reduction target on which Germany has committed itself, it will need to engage more strongly in policy for end-use energy efficiency. Therefore, the German government will be well-advised to include a clear policy support for EE-DSM and other EE activities into the dedicated energy policy for climate protection, which Chancellor Schröder announced at the COP-5 conference in November 1999.

Table 6-5: Policy Recommendations for Germany

Issue	Recommendation
Public benefit charge and dedicated EE&DSM funds	This is the main mechanism which is recommended to be created in Germany for stimulation of EE and EE-DSM. The main reason for this is that it is the only way to fund nation-wide EE-DSM programmes in the German liberalised electricity and gas markets, which are fully opened but with N-TPA for the use of the networks. A logical solution for raising the necessary funds would be to use a small part of the already decided increase in the electricity taxes until 2003 to fund EE-DSM and other EE activities on electricity, and to decide on a small increase of the taxes on gas and oil, to create funds for EE-DSM programmes in the heating market (mainly insulation of existing buildings).
Ratemaking of monopoly segments	A permission for distributors to recover EE-DSM costs via the distribution prices calculated according to the agreement of the associations of the energy companies and industry should be created in short term. If after 2001, a price regulation of the distribution network companies should be introduced, it should be using a „Multiple Driver Target“ scheme.
Legal and technical support to DSM and energy services	Amend legislation to ease TPF, and create support programmes (e.g., on Measurement and Verification; information of customers on TPF benefits; loan guarantee funds for TPF projects) according to the needs in Germany.
Link with climate change	These activities should be part of the Policy package to mitigate climate change which is to be decided during 2000.
Inter-energy competition	This should not be a problem, as prices of electricity have fallen, and gas and heat are recommended to be included in the EE&DSM funds. Fuel-switching issues have to be appropriately dealt with by the administrator of the EE&DSM funds.
Others	Install an effective support for the development of new decentralised CHP projects, as this would allow comprehensive energy services (CHP+EE-DSM) for medium to large customers.

6.2.6 Recommendations for Italy

Even though the Italian pro-capita electric consumption is lower than the European average, a number of studies show that there still exists a significant saving potential. Government (both the Ministry of Industry and Ministry of the Environment), the industry regulator and energy companies (at least the local distributors) all indicate that they are favourable to increase cost-effective energy efficiency in end-use. Much interest is shown for the development of energy efficiency programmes and the creation of an energy efficiency services market. The Ministry of Industry believes national electricity distributors are in the best position to implement DSM programmes and actions; importantly they have a permanent relationship with customers, full access to client data and for the moment ESCOs seem to be at a very infant development stage.

Table 6-6: Policy Recommendations for Italy

Issue	Recommendation
Public benefit charge and dedicated EE&DSM funds	As a hypothesis, funds could be adopted in those sectors where tariff mechanisms are not in place (ESCOs; retailers for eligible customers; specific activities of end-users).
Ratemaking of monopoly segments	The new tariff for the domestic sector will be "flat": different actors (Minister of Environment, environmental groups) have asked to change this decision and to re-establish a tariff structure progressive with consumption similar to the old structure that in the past had lead to consistent savings in the domestic sector. Efforts should be concentrated to induce the Authority to step back on the "flat" tariff decision. A DSM cost-recovery component should be introduced also for the distribution activity for eligible customers. All DSM cost-recovery components should recover direct costs and give positive DSM incentives.
Legal and technical support to DSM and energy services	Carry out as soon as possible the technical definitions needed for implementing the obligation to DSM introduced in the Bersani Decree. Eliminate all market barriers which restrain possible actions by the ESCOs. Some proposals for bills (still to be discussed by the Parliament) contain a prohibition to energy companies (retailers and distributors) to develop actions beyond the meter: if approved, these proposals could substantially reduce the possibility for exploiting the saving potential.
Obligations to implement EE-DSM	Clearly define the activities which will fulfil the existing obligation on distribution companies. There is no point in obliging utilities to do what they are already willing to do (like promoting heat pumps and fuel switching in their favour).
Obligations on reporting DSM results	Clear reporting at company, national and EU level is needed in order to monitor the level of activities, its evolution in time, the cost effectiveness of programmes, the effect of implemented mechanism for helping utilities to perform DSM.
Negotiated agreements in general	In many fields National government has in recent years attempted to achieve a broad base consensus before for introduction of new policy. This experience can also be used in relation to policies for the electricity market, at least once the definition of the regulatory framework is completed. In the negotiation process for both DSM and IRP a major part could be played by state actors. On the other side there is a relevant risk that vague commitments are reached with a low level of feedback and control on the real level of implementation of the agreements since past experience of local negotiated agreements has not shown till now clearly quantifiable results.
Others	The "Sole Buyer" must supply electricity to distributors for captive customers at the lowest cost: there is the possibility to set DSM Bidding Procedures. This is well accepted by all actors.

The industry Authority aims to cut energy companies revenues by up to 17% in 4 years. Federelettrica (the Italian association of local distributors) notes that since in Italy the "culture of efficiency" is not widespread, distributors will naturally focus their efforts on internal cost-cutting, which will consequentially limit the resources available for EE-DSM activities. Energy companies would like to include fuel-switching activities in the account of EE-DSM activities.

Until now, however, declarations rather than actions were made by all actors. All intentions must be verified, even because negative tendencies are also present. ENEL aims explicitly at expanding sales in the domestic sector (from 2500 kWh/year household to 4000) through the use of new tariffs for domestic customers which include volume discounts to consumption over 3000 kWh.

Hence a EU Directive to support the nascent good will, and to transform the new attention to DSM into coherent legislation and actions seems necessary.

6.2.7 Recommendations for Portugal

The need for Energy Efficiency is recognised by all actors, as well as it is recognised that a great energy efficiency potential exists, since Portugal is experiencing a fast development in terms of infrastructures and comfort habits. This is demonstrated by the fastest growing consumption of electricity and gas in the European Union. Nevertheless, the definition of an energy efficiency policy is still missing.

Regarding energy company DSM, which has very little tradition in Portugal, the legislative and regulatory framework is compatible to the adoption of a number of EE&DSM instruments, and some mechanisms already exist but are not put in practice. The most common stated justification for this situation is the lack of policy definition.

The situation regarding IRP illustrates this fact. An explicit legislative obligation for IRP within the Public Electricity System exists, which requires the consideration of demand-side options in the production system expansion plan. However, nothing is mentioned about the implementation of the demand-side options, among other limitations, reducing the practical achievements of this mechanism in respect to energy efficiency.

A significant number of mechanisms exist but are not implemented or have no significant results. The workshop revealed that the most important need is the definition of an energy policy regarding energy efficiency and Demand-Side Management, including quantified targets, in order to make these mechanisms effective. The following table summarises the recommendations, for each of the mechanisms that are part of the policy mix proposed.

Table 6-7: Policy Recommendations for Portugal

Issue	Recommendations
Public benefit charge and dedicated EE&DSM funds	"Activate" the component called "POL- to cover costs of measures of energy, environment and public interest policies“ included in the regulated and non-bypassable "Global Use of the System". The administration by an independent body (for example within the National Energy Agency) in co-operation with the regulatory entity. The funds collected would be used in three ways: (1) direct use in market transformation programs by the independent body; (2) redistributed based on a tendering procedure for specific programs, (3) redistributed through an application procedure. Those procedures would be open to energy companies, ESCOs as well as other actors. Limits would be put for each of these components and actors according to the results of a central IRP study (currently required by law). As an indication, the level of the fund should not be less than 1% of the revenues. In any case the cost effectiveness of the actions should be proven.
Ratemaking of monopoly segments	Introduce a target driver related to CO2 emissions reduction (proposal from the Regulatory Entity) in the revenue formula of the supply activity. Revise the costs recovery ratemaking mechanism (Rdsm component): clarify the application rules, namely Monitoring, evaluation, reporting, certification and verification (MERCV) rules; introduce a net lost revenue adjustment mechanism; consider to establish a minimum level of DSM direct spending.
Legal and technical support to DSM and energy services	Develop a legal definition of energy efficiency services, e.g. energy efficiency performance contracts. Adapt the public procurement rules to include the possibility of contracting energy efficiency services. Develop MERCV procedures to reduce costs and to increase confidence between parties
Obligation on IRP	Make effective the legislative obligation to do IRP within the Public Electricity System by: - performing a more detailed analysis of the options on the demand side, including a thorough cost-benefit analysis; - specifying the implementation of the IRP plan.
Link with climate change	Co-ordinate all these mechanisms with the action plan for CO2 emissions abatement. Consider environmental externalities in the cost-benefit analysis.
Inter-energy competition	Apply these mechanisms to the gas sector whenever possible in order to avoid differences in treatment between energy sources. Consider mechanisms to avoid discrimination regarding other sources (mainly oil products).
Others	Adopt an energy efficiency programme in the public premises, starting by the education and health buildings, due to the high visibility and replication potential of these sectors. Generalise a life cycle cost-benefit analyses of energy efficient solutions for relevant investments for these sectors. Extend, at a later stage, this approach to all public administration premises.

6.2.8 Recommendations for Sweden

The general attitude of various actors in Sweden towards energy policy actions for increased energy efficiency is slightly positive or neutral. Government and industry is hesitant to intervene in the electricity market in any way that may disturb/distort the market. Industry experience is that government has not been able to produce stable long-term policies and can not be trusted to keep agreements.

The attitude of various actors towards energy company DSM is mixed. Many energy companies are already delivering energy efficiency services on a commercial basis. Energy companies could, in principle, deliver also EE-DSM programmes. The problem is how this could interact with commercial services and if it is possible to define "energy company" in a fast changing market.

The National Energy Administration or the ISO, Svenska Kraftnät, could in principle do something similar to IRP. With no captive customers left in Sweden a possible agent for IASDO-DSM would be distribution companies. However, this is not possible under existing legislation and in the short term distribution companies may lack competence.

Table 6-8: Policy Recommendations for Sweden

Issue	Recommendation
Public benefit charge and dedicated EE&DSM funds	This option should be investigated further, not least because it has been the preferred solution in many other countries. A more independent body than, for example, the Energy Administration would be less sensitive to political changes and could probably make better choices on programmes etc., than the Ministry of Industry who decided on strongly questioned subsidies in the 1996/97 Energy Bill. It could in principle be set up to leverage commercial energy services and thus be of interest to industry. It must be neutral to competition and the commercial energy services market to be accepted. A public benefit charge may be resisted by both industry and government.
Ratemaking of monopoly segments	Only transmission and distribution companies are subject to price regulation (light handed). Variable charges would make energy efficiency measures more profitable and should be discussed further. It is a simple and effective measure which requires virtually no administration costs. Initial reactions from the regulator to this proposal were negative.
Legal and technical support to DSM and energy services	The Energy Administration, suppliers, or other players, should take the initiative to find ways of reducing transaction cost through standards, protocols, codes of conduct, or the like. Most actors in Sweden are likely to be positive.
Obligation on IRP	IRP obligation on energy companies is not compatible with the Swedish market model. The IRP methodology could be used by the ISO, Energy Administration or other agency, or future independent body, as a tool for prioritising DSM-like activities, market transformation programs, etc.
Link with climate change	Efforts in this area should be co-ordinated with climate actions since electricity for marginal consumption in Sweden is typically produced in coal-fired plants in Denmark, Finland, Germany and Poland.
Commercial DSM-services	It is important that information about the commercial energy efficiency services market is collected and analysed as a basis for government intervention through policy measures. For example, small customers do not get energy efficiency services since consumption per customer is too low to carry commercial services.
Inter-energy competition	Activities should not target electricity efficiency only. Competition neutral incentives means that companies that do not have electricity sales as their main business can also benefit from the incentives.
Others	If Sweden is serious about nuclear phase-out and climate policy a much greater effort must be expended on energy efficiency. The challenge to policy makers is finding measures that adhere to free-market principles since, at least presently, there is a strong political resistance to command and control measures.

6.2.9 Recommendations for the United Kingdom

The UK is already acting to improve energy efficiency, with energy efficiency obligations on local authorities and energy companies, direct funding for Government schemes, and a levy on business energy use, as well as various minimum energy efficiency standards.

Energy efficiency obligations on electricity companies – the Energy Efficiency Standards of Performance (EESoP) – have been in place since 1994. It is widely accepted that the EESoP programme has been a success, and has delivered cost-effective energy efficiency investments

for suppliers and customers. From 2000, the EESoP also apply to gas. The obligation is an energy saving target, to be achieved in the domestic sector, which over the first six years entailed the spending of a notional £1 per domestic customer per year. From 2000, however, there is no measure of expenditure, and suppliers can try to achieve their savings as cheaply as they wish, including via the provision of energy services. The EESoP have been set by the energy regulator, in consultation with energy suppliers and the energy saving Trust. From 2002, they will be set by the Government itself at an increased level, anticipated to rise to £3.60 per fuel per customer.

Some energy companies provide energy services in the commercial sector, but the concept has not taken off with small businesses and in the domestic sector. Some suppliers perceive difficulties in offering energy services to customers in a liberalised market, because customer loyalty is not guaranteed. It is hoped that the challenging targets under the Standards of Performance will inspire companies to keep trying.

Price controls in the UK have traditionally made revenue dependent on demand rather than customer numbers, but the balance has shifted. The split in Great Britain is now equal, and it is hoped that the shift will continue. Indeed, the split in Northern Ireland is now 75:25 for customer number:electricity sales.

Obliging energy companies to file IRP plans is not the most appropriate mechanism for making cost effective decisions to encourage DSM. Public planning by energy companies is incompatible with the UK liberalised market. Resource planning could occur via the regulator in tendering for new capacity, and distributors in the UK have an incentive to reduce distribution losses.

Table 6-9: Policy Recommendations for the UK

Issue	Recommendation
Public benefit charge and dedicated EE&DSM funds	There is a danger that dedicated funds are perceived as a tax, which can be unacceptable to Government, especially given the levels of fuel poverty among vulnerable households. Therefore, it is more prudent to set energy saving targets, even if these are calculated on the basis of the anticipated investment required. A business energy tax (the "Climate Change Levy") is already planned for 2001, some of which will be reinvested in energy efficiency for businesses.
Ratemaking of monopoly segments	Price controls for supply companies are likely to be lifted soon. The balance of revenue is 50:50 between customer numbers and volume of supply. There is scope to shift this balance further in favour of customer numbers.
Legal and technical support to DSM and energy services	Technical support is provided to business by Government encouragement of the take-up of energy efficiency best practice. This may be bolstered by additional funds, for example from the Climate Change Levy. The regulatory regime for energy service provision to domestic customers needs clarification, to reassure suppliers that their customers do not leave them with a large energy efficiency debt.
Obligation on IRP	IRP is not compatible with the deregulated market. A planning obligation should be on Government and/or the regulator rather than on energy suppliers or distributors.

Obligations to implement EE-DSM	An obligation on distributors to carry out DSM could work, although the decision has been made to place this on suppliers. The Government and/or the regulator need to ensure that all options for meeting demand are considered (IASDO). Embedded generation and CHP should not be prejudiced by such an arrangement. The Government and/or the regulator already set energy saving obligations on suppliers, and this needs to continue at an increased level. The level of energy efficiency activity should be negotiated within the UK, but should be explained and justified to the Commission.
Obligations on reporting DSM results	Suppliers report back to the regulator on energy savings, according to an agreed and consistent methodology. An audit of savings achieved by energy suppliers is carried out by an independent body. The audits should be subject to stricter and more clear penalties, but could also include rewards and incentives for companies to exceed saving targets, as in Northern Ireland. Reporting to the Commission could be based on these results.
Link with climate change	It is likely that the UK will meet its Kyoto targets through market induced changes in fuel mix rather than deliberate planning. The CO_2 reductions required will largely be met by the move away from coal and oil fired generation to combined cycle gas generation. Other projects such as SoP and Local Authorities CO_2 targets under the UK Home Energy Conservation Act may also contribute. A Directive complementing the internal energy market Directives and, as such, will focus on energy company related mechanisms.
Others	There could be an obligation on distributors to plan for new capacity, tender for network re-inforcement or buy electricity from embedded generators, renewables and combined heat and power. All options for meeting demand, including DSM, need to be considered when commissioning new generation capacity, without prejudicing the potential for CHP and embedded generation. In addition, local authorities in the UK are obliged to submit strategies and report on their strategies for improving the energy efficiency of housing in their respective areas.

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