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Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on energy end-use efficiency and energy services**

(presented by the Commission)

## EXPLANATORY MEMORANDUM

### 1. INTRODUCTION

This proposal has the objective of increasing end-use energy efficiency, using a number of operational measures. One of these measures is to develop the market for energy services, thus making energy efficiency an integral part of the internal market for energy. The proposal does this by providing a framework to promote the market both for energy services and for energy efficiency measures in general in major energy end-use sectors. The proposal covers the retail supply and distribution of extensive net-bound energy carriers, such as electricity and natural gas,<sup>1</sup> together with other important energy types, such as district heating, heating fuel, coal and lignite, forestry and agricultural energy products and transport fuels. The proposal also includes a savings target at Member State level as a means of measuring energy efficiency improvements and reaching sufficient market demand for energy services. It also includes a savings target for the public sector, plus an obligation for Member States to ensure that certain energy distributors and/or retail supply companies offer energy services to their customers.

This proposal, focusing on the promotion of end-use efficiency, should be regarded as a necessary instrument to complement the recently adopted legislation on the opening of the internal energy market, which mainly leads to efficiency improvements on the supply side.

By the envisaged efficiency improvements, the proposal will contribute to the mitigation of greenhouse gas emissions in view of meeting the EU's Kyoto emission reduction target of -8% in 2008-2012, as well as the individual targets of the acceding states, and to improving the European Union's security of supply as underlined in the Commission's Green Paper "Towards a European Strategy for Energy Supply".<sup>2</sup> Security of supply will be improved because energy efficiency measures will reduce energy demand and thus lessen import dependence.

Improved energy efficiency will also allow more rapid intervention if necessary to shift or reduce peak loads on the infrastructure of grid-bound energy, such as electricity. Recent blackouts in the EU have once again highlighted the necessity of managing energy demand.

#### 1.1. Why is there a need for a Directive on energy end-use efficiency?

There is a clear need to improve the functioning of the energy market by removing barriers in order to allow market forces to allocate economic and natural resources effectively. Competition from energy-efficient end-use technologies can thus bring greater economic efficiency to the ongoing reform of the internal energy market. The identified barriers are in most cases market failures that prevent the economic optimum from being achieved.

It is estimated today that the average cost in many Member States of saving a unit of (off-peak) electricity in the domestic sector is around 2.6 euro cents/kWh, compared to the average (off-peak) price for delivered electricity of 3.9 euro cents.<sup>3</sup> Similar gaps between the cost of savings and the price of delivered energy exist for the other energy carriers. Hence, the reform

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<sup>1</sup> Including liquefied gas (LNG) and liquefied petroleum gas (LPG).

<sup>2</sup> COM(2000) 769, 29 November 2000.

<sup>3</sup> The average on-peak price is 10.2 euro cents/kWh. (Source: OFFER and National Audit Office, UK 1998 and 2003).

of the energy market should promote competition not only between different energy sources but also between investments in energy end-use efficiency, on the one hand, and investments in energy supply, on the other.

The main obstacles preventing full integration of end-use efficiency measures into the internal energy market relate, *inter alia*, to the lack of a harmonised and credible framework of instruments, mechanisms, definitions and information regarding energy efficiency services and measures. In addition, there are other obstacles, such as institutional and legal barriers, the fragmentation of the efficiency market, lack of visibility of savings potentials, limited access to capital, and the lack of knowledge on the cost-effectiveness, returns and risks of investments in energy end-use efficiency.

Another common barrier is the investor-user dilemma –also referred to as 'split incentives'– where owners of, for example, residential buildings and offices try to minimise investment costs in efficient energy-using technology since the resulting higher running and energy costs from using less efficient technology will not be paid by them but by their tenants, renters or other users.

Yet another barrier is the disparity of discount rates, or the "pay-back gap", that results when, for example, energy supply companies with low internal rates of return requirements are able to build power plants and other infrastructure, while the rate of return for end-use consumers for investments in energy efficiency is invariably much higher. This is in spite of the large savings potential available. This is partly the result of a perceived higher risk regarding new and unknown –although often more efficient– technologies.

Because of their higher transactions costs and relatively limited access to the capital market, problems in financing efficiency measures for the household or domestic sector, as well as for small and medium-sized enterprises, are common.

Rules in many Member States today often divide public sector budgets into completely separate budgets for investments in energy-using technology, on the one hand, and budgets for the maintenance and operation of this technology, on the other. This division often makes it difficult to develop incentives for managers to invest in energy-efficient technology in the public sector. Removing this barrier will require changes in public administration practices.

The traditional system for calculating and contracting the size of the fees for suppliers of energy end-use technologies, as well as for installation engineers, builders and architects, often acts as a barrier. This is because these payments are usually proportional to the total investment cost, and have little to do with performance, including energy performance. To correct this, it would be necessary to make part of the size of the fee performance-based.

Volatile energy prices act as disincentives for investments in energy efficiency because pay-back times for the investments are uncertain. Increased awareness of energy prices and their fluctuations, together with improved metering, will increase the possibility to respond to these, provided energy services and measures are made available.

## **1.2. What could the role of energy services be in promoting end-use efficiency?**

*"Energy end-use services"*, or *"energy services for end users"*, is an expression used to denote those **services or physical amenities that energy provides to the end user in an integral package**, including the technology needed to produce these services. Examples are indoor

thermal comfort, lighting comfort, domestic hot water, transportation, product manufacturing, etc., all of which can have quality standards attached to them.<sup>4</sup> Energy end-use services thus require a combination of energy (either commercial energy or energy obtained from the environment via passive means) and energy-using equipment or technology. With energy services, payment for the service is integrated to include a single charge or payment for the energy used and for the technology involved. This payment is usually made directly by the consumer who benefits from the energy service. Such a single charge facilitates comparison of the actual costs of the energy service involved. For example, illumination in a building may consist of a package of services that includes lighting equipment, maintenance and electricity, a package that provides a predetermined level and quality of lux that is billed on the basis of €m<sup>2</sup> per year. With similar illumination services being offered by different enterprises, end-use efficiency improvements included in and paid for in this way will thus compete with each other to minimise the total cost of the package without reducing the quality or amount of the service provided. Thermal comfort paid in €m<sup>3</sup> per year is another example of this kind of integration which can lead to greater energy efficiency as well as economic efficiency. Examples of such services in operation are to be found in many Member States. (See **Annex A**).

A very important element of energy services is that price competition between energy services providers leads to **a reduction of the amount of energy consumed** in rendering the service, as the cost of the energy consumed by these services can be a significant part –sometimes the largest part– of the total cost of the service. Optimising the total cost of the service is achieved by minimising its life-cycle cost. This cost minimisation allows market forces to assume an important role in improving energy efficiency when energy services are provided.

Energy services are usually complemented by certain types of energy efficiency measures, such as the provision of information, guidance or evaluation. These measures may also include energy audits, informative billing, etc. **For the purposes of this Directive, the term "energy services" will thus refer only to integrated energy end-use efficiency services**, which include a strong element of energy-efficient end-use technology and the necessary energy to run it when they are delivered or supplied. Other measures for improved energy efficiency, such as efficient lighting sources, control systems and boiler replacement, would qualify as energy services as well if they were combined with the delivery of energy. Even without integrating energy, these measures are still very important in developing the market for energy services.

## **2. OBJECTIVE, SCOPE AND KEY ELEMENTS OF THE PROPOSED DIRECTIVE**

The prime objective of this proposal is to ensure more efficient end use of energy. One of the main mechanisms to promote this is by supporting and accelerating the development of a smooth functioning, commercially viable and competitive market for cost-effective energy efficiency measures. In addition, market subsidy and a certain level of government programmes are necessary in order to remove some of the market failures that are described in section 1.1, although this must be carried out without distorting the competitive market that is being developed. These subsidies and supports should give way to the provision of energy services, energy efficiency programmes and other energy efficiency measures on purely

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<sup>4</sup> Quality of such services can also be measured. Thermal comfort can be measured, for example, in terms of Fanger's Comfort Index, while illumination or visual comfort, for example, can be measured in lux, taking into account colour rendering.

commercial grounds. A market approach could also be provided by introducing so-called “white certificates”, tradable energy efficiency certificates. The Commission considers this to be a possible next step in a few years time and may then come forward with a proposal based on the experiences in some Member States currently developing and implementing such certification schemes. To accomplish this objective of more efficient end-use efficiency, **Member States are called upon to do the following:**

- remove barriers and provide credible information, mechanisms, tools and incentives for companies, such as energy distributors and retail suppliers, energy service companies, equipment installers, consultants and all other prospective and qualified providers, to offer energy services and energy efficiency programmes and measures their implementation and their financing;
- adopt **general national targets** of annual 1% cumulative savings to promote energy end-use efficiency and to ensure the continued growth and viability of the market for energy services. This obligation shall be expressed in terms of an amount of energy that should be saved as a result of these energy efficiency measures. Regardless of the total energy consumption patterns, which also result from economic and structural developments, there should be verifiable effects of annual savings of a cumulative one percentage point per year;
- ensure that retail suppliers or distributors of electricity, natural gas, fuel (heating) oil and district heating offer and actively promote energy services and/or energy audits. The provision and implementation of these services and measures may well be carried out by other qualified and/or certified bodies, but the active partnership of the energy providers in this endeavour is essential to the proper functioning of the market. Energy services and energy efficiency measures should be offered to all end-use sectors, including the domestic and commercial sectors, the public sector, and small and medium-sized enterprises, but excluding most energy-intensive process industries, where there are already incentives for the development of energy efficiency measures. Qualification, certification and accreditation schemes for energy service providers shall also be made available;
- appoint a body or agency that will oversee the savings obligations, the energy services obligation and the task of monitoring and verifying the fulfilment of these obligations;
- establish publicly overseen financing possibilities for energy end-use efficiency, especially for investments with comparatively long payback requirements or high transaction costs. Implementation, carried out by any certified or qualified provider of energy end-use services (including energy distributors and/or retail suppliers, energy service companies, installers, etc.) on a competitive basis, may thus be provided with financing possibilities such as rolling loans, grants, subsidies, etc.;
- ensure that the public sector in each Member State sets a good example regarding investments, maintenance and other expenditures for energy-using equipment, energy services and other energy efficiency measures. To accomplish this, Member States must adopt a **target**, expressed in terms of an annual improvement of total energy efficiency in the public sector of a cumulative 1½% per year, attributable to the implementation of energy services, energy efficiency programmes and other energy efficiency measures in the public sector. Fulfilling this target can require a share of all new investment and maintenance costs for energy and energy-related

expenditures to be purchased in accordance with energy-efficiency guidelines,<sup>5</sup> as allowed in the general public procurement rules, which have been laid down in Community legislation;

- require Member State regulators or their equivalent bodies for energy distribution and retail sales of grid-bound energy to take measures for the introduction of innovative tariffs, cost recovery regulations, revenue caps and similar instruments and obligations to promote energy services, energy efficiency programmes and other energy efficiency measures as a means of optimising revenues;
- establish energy efficiency programmes that promote and facilitate the provision of energy services and energy efficiency measures, such as energy auditing, energy and tariff advice provision, the provision of financial instruments for energy savings, etc;
- ensure that end-users are provided with competitively priced individual metering and informative billing that reflect their actual energy consumption and, as nearly as possible and when appropriate, its actual time of use. Metering and billing should thus include information on prices and consumption and other technical details that allow consumers to regulate and steer their own consumption. In general, Member States must ensure that metering and billing are designed to allow customers to take full advantage of any energy services, energy efficiency programmes and other energy efficiency measures offered them;
- report on the administration and implementation of this Directive.

This proposed Directive should be implemented with full regard to the framework of the Directives for the electricity and gas markets<sup>6</sup>, including the universal service obligation that provides consumers with the right to be supplied with electricity of a specific quality within their territory at reasonable, easily and clearly comparable and transparent prices.

Three of the six implementing Articles of Directive 93/76/EEC were superseded by Articles in Directive 2002/91/EC on the Energy Performance of Buildings. Because the present proposal will now cover the remaining three elements of Directive 93/76/EEC, specifically individual metering and billing of consumption of energy (Article 3); third-party financing of energy efficiency investments in the public sector (Article 4); and energy audits in industry (Article 7), the adoption of this proposal will allow the repeal of Directive 93/76/EEC.

### **3. THE POTENTIAL, THE TARGETS, THE IMPACT AND THE MARKET**

#### **3.1. The overall energy savings potential**

It is estimated today that, due to the many market barriers and market imperfections that still exist, there is a very large economic potential that remains in the form of unrealised energy savings. For industry this potential is estimated to be approximately 17% of current final consumption, realisable by 2010. For the domestic and tertiary sector, it is 22% and for transport 14%, excluding modal shifts<sup>7</sup>.

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<sup>5</sup> The use of public procurement as a means of advancing energy efficiency is also recommended in a Council Resolution of 7 December 1998.

<sup>6</sup> Directive 2003/54/EC and Directive 2003/55/EC.

<sup>7</sup> MURE model estimate based on current energy prices. European Commission, 2003.

Total final energy consumption in the EU is thus approximately 20% higher than can be justified on purely economic grounds. Estimates in a SAVE study<sup>8</sup> state that energy-efficiency measures and demand side management services can easily realise three-fourths of this cost-effective savings, i.e., 15 % in the medium term (10-15 years). This study also concludes that an accumulative target of 1 % a year for improvements due to energy efficiency and energy services is thus a realistic minimum level for energy efficiency improvement for the EU as a whole and for individual Member States. The technical potential for savings is at about 40 %<sup>9</sup> even higher than the economic (cost-effective savings potential).

Experience from different programmes in a range of EU Member Countries and non-EU countries shows that 0.5 to 1% savings per year are feasible in the electricity sector alone, compared to the market trend, based on annual investments of around 1 to 2% of the revenues from the sale of electricity.<sup>10</sup> As this is based on an average life for these measures of 8 years, this implies a benefit-cost ratio of 4:1.

The large potential for energy efficiency is also stressed in other studies<sup>11,12</sup> and presentations<sup>13</sup>, supporting the realistic character of a yearly accumulative target of 1 %. This target is not only supported by studies with scenarios and models but also by real projects in different Member States. Evaluations of these projects also show that typical energy performance projects often have a potential savings of 15-35 % (see also Annex A of the Explanatory Memorandum). The SAVE study indicated a net economic gain of 10 billion € and an emission reduction of 230 Mt CO<sub>2</sub>eq in a period of 10 years with yearly savings of 1 %.

Without reducing comfort or standards of living, it is therefore possible to reduce energy consumption by at least one-fifth at no extra net cost –and in many cases negative costs– because the saved energy is sufficiently valuable to repay the cost of investment in a reasonable length of time –well within the technical lifetime of the investment– and to cover interest charges<sup>14</sup>. If external costs are taken into account the benefits would be even bigger. Today savings of one fifth, were it to be calculated in terms of primary consumption, would correspond to over 8 400 PJ/year, or 200 million tonnes of oil per year.

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<sup>8</sup> SAVE study : Completing the Market for Least-Cost Energy Services. Wuppertal Institute for Climate, Environment Energy, Germany, 2000.

<sup>9</sup> Green Paper on Security of Supply, European Commission, 2000.

<sup>10</sup> SAVE Study: Completing the Market for Least-Cost Energy Services, Wuppertal Institute for Climate, Environment Energy, Germany, 2000.

<sup>11</sup> Harmelink, Graus, Blok, “Low Carbon Electricity Systems, Methodology & Results for the EU”, Ecofys study, 2002.

<sup>12</sup> European Climate Change Programme Report, European Commission, 2001.

<sup>13</sup> Pagliano, Politecnico di Milano, Proceedings of the 1st European Conference on Energy Service Companies, Milan, 2003.

<sup>14</sup> Numerous studies have been undertaken to estimate potential savings and CO<sub>2</sub> reduction possibilities in the buildings sector. Results of these vary somewhat, depending on the assumptions made regarding the rate of economic growth, the rate of diffusion of technology, and the shapes of the cost, price and learning curves. Options in the entire buildings sector, which represents 40% of EU final energy consumption, that have a negative or zero cost represent over 50% of the identified reduction potential for the sector, using a 4% real rate of return on investment. Zero and negative cost options are defined as investments that generate savings that are sufficient to pay back capital costs, cover maintenance, operating and interest costs within the normal (average) accepted technical life of the technology in question. **Source:** ECOFYS Study, “Economic Evaluation of Sectoral Emission Reduction Objectives for Climate Change”, commissioned by the European Commission, January 2001.

This saving would impact positively on EU industrial competitiveness by reducing cost and improving the effectiveness and added value of products produced for both the home and the export markets. In addition, employment has been calculated to increase measurably. The trade balance would also improve due to reduced energy imports, a factor working to prevent the increase in energy import dependency, which is 50% today. Moreover, positive regional and cohesion effects result from energy efficiency investments because of their decentralised nature.

Finally, reaching the 1% goal has been estimated to contribute almost half of the CO<sub>2</sub> emissions reduction necessary to meet the EU Kyoto commitment<sup>15</sup>.

Although EU and Member State legislation and other voluntary and non-legislative measures have contributed to improving end-use energy efficiency, there is still a need to remove barriers that still prevent these potential savings from being fully achieved and to establish a framework and a viable long-term market for commercial energy services, energy efficiency programmes and other energy efficiency measures.

### **3.2 The proposed 1% general savings target and the 1.5% target for the public sector**

Total energy consumption in Member States fluctuates from year to year for a number of reasons, including changes in economic activity (GDP); structural changes, such as energy-intensive base industry being replaced by service industries using less energy; fluctuations in weather conditions (degree-days) and finally, actual improvements in energy efficiency.

It is the last of these factors, genuine energy efficiency improvement, which is the objective of the 1% general target in this proposal<sup>16</sup> and also of the 1.5% target for the public sector.

The **general or overall savings target** in this proposal is expressed as an amount of energy that should be saved, attributable to energy efficiency measures for those final customers defined by the proposed Directive.

The amount of the targeted savings is 1% of the average consumption of these final customers in the five-year period immediately previous to the implementation of the proposed Directive<sup>17</sup>. This annual amount of energy to be saved as a result of efficiency policies and measures is proposed to be fixed for a period of 6 years.

In order to implement and meet the target in the proposed Directive, Member States will have to do the following:

- (1) to establish, on the basis of available official statistics from the most recent 5 years before the implementation of the proposed Directive, the average total consumption of those final customers defined in the proposed Directive.

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<sup>15</sup> “Energy Efficiency in the European Community –Towards a Strategy for the Rational Use of Energy, Commission Communication, COM (1998)246 final of 29.4.1998.

<sup>16</sup> To avoid duplication, energy consumption and energy efficiency measures in the industrial production processes covered by the Emissions Trading and the IPPC Directives are excluded, leaving about 75% of final energy consumption.

<sup>17</sup> This base period and resulting amount of savings are used for the duration of the target period.



- (2) to calculate 1% of the above average total consumption as the amount of final energy (expressed in PJ, Mtoe or TWh) that should be saved every year, over a period of 6 years, as result of efficiency measures.
- (3) to quantify and verify the effect of the measures taken or to be taken, using the guidelines given in Annex IV of the proposal. These guidelines will allow quantifiable savings to be attached to all the energy services, energy efficiency programmes and other measures that have been taken, including measures taken as early as 1991. Also included are such measures as energy taxes, building codes and information campaigns.

The duration of the impact of efficiency measures is on average 8 to 10 years, with some measures' impact lasting even longer<sup>18</sup>. By initiating new measures every year sufficient to realize a savings of 1%, the total impact of the savings in the first year will be to reduce consumption that year by 1%. Because of the continued impact and cumulative effect of the savings, for the second year the reduction will be 2%, and for the 3<sup>rd</sup> year it will be 3% and so on. For the sixth year, energy consumption for the sector covered will be reduced by 6 %.

It should be pointed out that this target for energy savings does not preclude the possibility for energy consumption to increase, due, for example, to strong economic growth or structural changes. The quantification and verification of savings then serves to show that without these measures energy consumption would have been even higher.

As an example, a country that had a calculated average final consumption of 100 units in the five previous years would be required to save 1 unit every year over a period of 6 years. It is very possible that in the following years the consumption in this country could continue to grow even after extensive savings measures are implemented. The combined effect of growth, structural changes and the implemented efficiency measures could for instance still lead to an increase of 102, 103, 104, 105, 106, 107 for the six years in this period. In order to meet the 1% per year target, the quantification and verification process should then prove that without the efficiency measures that were taken, consumption would have been 103, 105, 107, 109, 111, 113. The sixth year is still 6% lower than it otherwise would have been, and the target would consequently have been met.

It should also be noted that it will be relatively easier for those countries that have not yet undertaken significant measures in energy savings until now –for example Acceding Countries– to fulfil this obligation. This is because of the existence of a much larger potential for relatively low-cost savings measures<sup>19</sup>. By the same token, for those countries that have already made major efforts for saving energy, the effect of these measures will be taken into account as from 1991 (see Annex I).

The **public sector target** is also expressed as an amount of energy that should be saved, attributable to energy efficiency measures for the public sector. It is more ambitious than the general target, being 1.5 % per year. Energy efficiency is a strategy to deal with scarce public funds while at the same time addressing serious energy and climate challenges, using the concept of “leadership by example.”

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<sup>18</sup> SAVE Study: Completing the Market for Least-Cost Energy Services, Wuppertal Institute for Climate, Environment Energy, Germany 2000.

<sup>19</sup> Energy Charter Country Reviews, 2002 and 2003.

The gains to be made from improved energy efficiency in the public sector are substantial. The public sector (national, regional and local) in most Member States corresponds to about 10% of the total national energy use. With additional annual investments in energy efficiency as small as 80 million euro for the EU-15 over a 20 year period, annual energy savings of 9 to 13 billion euro by the year 2020 are considered a realistic potential<sup>20</sup>.

In Italy public administrations are obliged to implement energy savings solutions where they can prove technically and economically feasible. Special guidelines for energy-efficient public purchasing exist in Austria, Finland, Germany, The Netherlands, Sweden and the UK. In the UK, guidelines for public purchasing for government departments also include requirements for suppliers related to energy consumption. There is also a target for 1% per annum reduction in energy consumption on the government estate. Outside the EU, such guidelines also exist in Japan, Switzerland and the US. Special regulations to ensure the energy efficiency of public buildings exist in Austria, Finland, France, Germany, Italy and Switzerland. The US government has adopted overall goals for saving energy in federal government buildings facilities and reducing associated greenhouse gas emissions. These include specific policies on buying energy-efficient products that qualify for the Energy Star label and (for categories without an Energy Star label) products that are among the 25% most efficient models on the market, as determined by the US Department of Energy's Federal Energy Management Program (DOE/FEMP<sup>21</sup>).

The public sector in many EU Member States and Acceding Countries is characterized by co-operative purchasing and common buying agencies. Such procurement bodies exist in Austria, Finland, France, Germany, Hungary, Ireland, Italy, The Netherlands, Poland, Slovakia, Sweden and the UK.

It is the existence of the large-scale savings potential, together with the many existing Member State guidelines and large purchasing bodies that allow for a more ambitious savings target for the public sector.

### 3.3 THE ECONOMIC IMPACT OF SAVINGS TARGETS

Member States will choose how best to meet both the general target and the public sector target. Which industrial sectors, as well as which public sector bodies that will be chosen will, of course, also be a matter for Member States to decide. **The impact on individual industrial sectors will thus depend on the decisions made by Member States as they develop plans to realize the most cost-effective savings potentials.** Generally, however, the following can be said about major sectors.

#### Energy distributors and retail suppliers

The increased use of (integrated ) energy services as well as the increased investment in energy efficiency resulting from this proposed Directive will provide added value to the energy supply industry, allowing for greater product differentiation and increased competitiveness for energy on the basis of non-price factors (such as product quality). It will thereby increase productivity (value added/man-hour) and should increase revenues and allow for higher profit margins. Energy retailers and distribution companies may experience

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<sup>20</sup> “Harnessing the Power of the Public Purse, European PROUST Study on energy efficiency in the public sector, SAVE Programme, European Commission, March 2003”.

<sup>21</sup> Id.

reduced sales of energy to individual customers but this can be more than compensated for by increased revenues from new and retained customers, as well as higher profit margins from the sale of high-value services compared to selling energy alone<sup>22</sup>. The target and obligations set out in this proposal, as well as the other measures proposed, will help to create a level playing field that will make it easier for retail suppliers to enter this market. This will become increasingly important as market liberalisation progresses. Promoting this competition on the energy services market now will also allow a larger number of customer-oriented local retail companies to survive the ongoing trend toward market concentration.

This proposal also increases the opportunities for electricity distribution companies to choose demand management instead of supply and distribution system investments as a means to meet expected increased demand. Energy distribution companies may choose to invest in energy efficiency and similar demand management measures as a means to manage peak loads and to postpone, co-ordinate and re-schedule expensive investments in distribution systems. As investments in energy efficiency have been shown to be more than 30% cheaper than the price of off-peak electricity –not to mention peak prices– and cheaper and more acceptable than investments in distribution infrastructure, this increased flexibility has a clear economic value for the distribution companies. (The external environmental costs that are not included here imply additional societal benefits, benefits that pose a challenge for the regulators, since the distribution system will remain a regulated function of the electricity supply industry).<sup>23</sup>

#### Manufacturing , construction industries and SME's

The energy-intensive industries and other high-emission industries listed in Annex 1 to the Emissions Trading Directive<sup>24</sup> and those industries in Annex 1 to the IPPC Directive<sup>25</sup> are excluded from the scope of the present proposed Directive. This means that around 75% of EU industry, and their savings potential, are covered by the present proposal.

These remaining non energy-intensive manufacturing industries, such as SME's, the engineering products industry, the buildings industry and the service industry, should together with households and the transport sector deliver the savings target. However, it is left to the Member States to decide how to realize the savings target and therefore it is difficult to assess the exact impact on every sector.

Nevertheless, as argued above, energy efficiency measures are in general very cost beneficial and if Member State policies are developed in such a way that the most cost effective measures are taken first and the profits return to the investors then the impact will be positive for all sectors that are addressed.

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<sup>22</sup> While 10% of the workforce in the electricity supply industry is expected to be lost as a result of market liberalisation, the development of the energy services market, using many of the same skills, could compensate for much of this. **Source:** "Employment effects of future developments in the European Energy Market", A Technology Consultants, Hague, 1996.

<sup>23</sup> Directives 2003/54/EC and 2003/55/EC concerning common rules for the internal market in electricity and natural gas, and repealing Directives 96/92/EC and 98/30/EC respectively, have set forth the choice of using demand management as an alternative to new supply, allowing Member State authorities the possibility to tender for new capacity or energy efficiency and demand management measures. National regulatory authorities have also been called upon in these Directives to ensure that transmission and distribution tariffs take account of these demand management measures, thus allowing cost recovery and a reasonable profit margin in setting such tariffs.

<sup>24</sup> OJ L 275, 25.10.2003, p. 32-46.

<sup>25</sup> OJ L 257, 10.10.1996, p. 26-40.

Moreover, for those sectors that directly will be involved in the realization of saving measures or delivery of energy-efficient products, the impact on employment and profit will obviously be very positive.

The net impact on employment in the manufacturing and construction industries of a 1% annual improvement in energy efficiency has been shown to be substantially positive, even after taking into account all direct and indirect macroeconomic factors, including the reduced consumption of energy, impact on energy prices, reduced VAT, etc. The strongest effects, not surprisingly, are shown to in the area of semi-skilled labour in the buildings trades, which also affords the strongest regional policy effects<sup>26</sup>.

In the manufacturing sector, a 1% improvement in energy efficiency will impact initially by lowering the costs of peripheral technology used in production, such as compressed air, pumps, lighting, ventilation, etc. The increased demand and the added value of energy-efficient models will also make these models attractive for the product manufacturer because such products normally provide increased profit margins initially. Market shares on the home and export markets will increase. Re-gearing costs for changing to the production of more efficient models will be reduced as a result of the economies of scale and the more predictable market development resulting from an EU-wide energy-efficiency improvement of 1% per year. Small and medium-sized enterprises will especially benefit from the reduced transactions and other costs previously associated with investments in energy efficiency.

Increased efficiency in the automobile manufacturing industry is also expected to be a result of the increased demand for energy-efficient technology and services. This drive towards efficiency will continue to open new markets, at home and abroad. In the transport fuel sector, the added value of energy efficiency and energy services, including the close correlation between increased efficiency and increased safety (e.g. maintenance of correct tire pressure) will lead to positive societal benefits in the form of reduced mortality and injury rates from accidents. Modal shifting as a result of increased energy efficiency will also provide societal benefits in the form of reduced congestion and local pollution.

Finally, consumers will also benefit significantly from the 1% improvement in cost-effective energy efficiency. The increased production and availability of energy-efficient models will lower their unit production cost and their price. Increased competition on this product market will assure optimal production and that marginal cost is equal to price. The costs to consumers, especially life-cycle costs, of lighting heating, cooling, refrigeration, etc. will fall as the supply of energy-efficient technology increases and prices fall.

### **3.4. The market for energy services and energy efficiency measures**

A large part of the available energy savings potential that exists today can be effectively realised using a market for energy services and other energy end-use efficiency measures. If the necessary information is provided on energy services, if contractual, financial and legal instruments are put in place, if credibility and guarantees of performance and savings are established and if end-use customers and financial markets respond rationally, this would create a market for energy efficiency worth between 5 and 10 billion euros per year.<sup>27</sup> In addition, the energy efficiency market creates considerable real added value and is often characterised by highly labour-intensive investments. These lead to many positive local and

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<sup>26</sup> "Employment Impacts of Energy Conservation Schemes", ECN , October, 1999.

<sup>27</sup> Proceedings from Graz SAVE Conference, EWA 2000 and Proceedings from ECEEE Summer Study 2003.

regional effects, such as, for example, substantially increased employment when large retrofitting projects in the buildings sector are carried out.<sup>28</sup>

The largest untapped market for energy services and energy efficiency measures is in the buildings sector. The potential to improve transport efficiency is also estimated to be large, even when calculated without the effects of modal shift, which are as large as the potential end-use efficiency gains.

For the market for energy efficiency to be tapped, there is a need for professional players to work as intermediaries between the providers of energy-efficient technology, buildings and energy, on the one hand, and the buyers and users of these, on the other. In many cases, the first task at hand will be to inform and convince consumers of the benefits of energy efficiency and to enable them to use energy-efficient technologies and energy efficiency measures effectively. Initially, the extra information, communication, acquisition and administration costs could outweigh the immediate profits that are generated from selling the energy efficiency and energy services. In such cases, collectively financed programmes are needed to spread and reduce such costs.

A number of other important criteria determine the profitability of energy services, energy efficiency programmes and other energy efficiency measures. These include the size of energy consumption within individual projects, energy efficiency within the project known as opposed to new technology cost-effectiveness of the investments concerned. In addition, knowledge regarding alternative technologies and the availability of financing mechanisms, including funds, third-party financing and performance contracting, are important criteria for determining the profitability of energy services.

Performance contracting ensures cost-effectiveness based on a calculated and guaranteed commercial potential. The long-term potential market for performance contracting of energy services and energy efficiency measures in the EU has been estimated to be in excess of 25 billion euro.<sup>29</sup>

In a number of Acceding Countries, the concepts of energy services and the commercial implementation of energy efficiency measures are as well developed as in the Member States. For this reason, expanding the energy efficiency market in these new Member States can be accomplished in the same manner as in the Member States.

## **4. JUSTIFICATION FOR ACTION AT COMMUNITY LEVEL**

### **4.1. Current political context**

In its Green Paper on the security of energy supply, the Commission highlighted the following points:

- The European Union's dependency on external energy supplies is forecast, if no measures are taken, to increase from a current import dependency of 50% to 70% by 2030 due mainly to increased energy consumption.

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<sup>28</sup> SAVE Employment Study. European Commission 2001.

<sup>29</sup> IEA DSM Implementing Agreement 2003.

- The European Union has relatively limited scope to further influence energy supply and distribution conditions in the short to medium term, either by building new capacity or improving transmission and distribution. Therefore, efforts need now to focus on improving end-use efficiency and managing the demand for energy, *inter alia*, by increasing the availability of and demand for energy efficiency services.
- Moreover, as CO<sub>2</sub> and other greenhouse gas emissions in the EU continue to increase, it becomes more difficult to respond adequately to the challenge of meeting our Kyoto commitment. As 94% of EU CO<sub>2</sub> emissions –the most pervasive greenhouse gas– arise from human activity attributed to the use of energy, this sector has a unique opportunity and a responsibility to address both security of supply and climate change problems, and to increase industrial competitiveness and employment.

Recently, the “*Communication from the Commission on the Implementation of the first phase on the European Climate Change Programme (ECCP)*”<sup>30</sup> proposed a “Directive on Energy Demand Management”, suggesting the setting by Member States of efficiency improvement targets and investment targets,<sup>31</sup> together with supportive frameworks for the implementation and financing of such measures.

#### **4.2. Completing the Internal Market for Energy**

Directives 2003/54/EC and 2003/55/EC concerning common rules for the internal market in electricity and natural gas, and repealing Directives 96/92/EC and 98/30/EC respectively, have set forth the choice of using demand management as an alternative to new supply, allowing Member State authorities the possibility to tender for new capacity or energy efficiency and demand management measures.<sup>32</sup> National regulatory authorities have also been called upon in these Directives to ensure that transmission and distribution tariffs take account of these demand management measures, thus allowing cost recovery and a reasonable profit margin in setting such tariffs.<sup>33</sup> Member States must also ensure that all small and vulnerable customers, including small and medium-sized enterprises, enjoy the benefits of this market, as well as meeting public service requirements, including environmental protection, in accordance with the Directives.

While the retail markets for the production and supply of electricity, gas, coal, heating and transport fuels, and to a certain extent district heating and cooling, have been opened to competition, the results of these market forces have been seen almost exclusively in improved efficiency on the supply side. There has been improvement in the generation, refining, transformation and distribution of energy. However, the impact from this increased competition has not been positive on the demand side of the energy market in terms of improved end-use efficiency. An improvement of the energy market to include the demand side, with greater focus on energy end-use efficiency, can be achieved by developing a more structured, harmonised and formalised market for energy efficiency by quantifying, certifying

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<sup>30</sup> COM(2001) 580 final.

<sup>31</sup> Both the European Parliament and the Council have supported initiatives in energy services in Parliamentary Resolutions and Council Conclusions (A5-0054/2001 and Council Conclusions 8835/00 and 14000/00 of 2000). The Council, in its Resolution of 7 December 1998 (OJ C 394, 17.12.1998, p. 1) accepted an indicative target for energy intensity improvement of final consumption by an additional 1 percentage point per year, up to the year 2010, as useful guidance with which to increase efforts in this field.

<sup>32</sup> Article 7 of Directive 2003/54/EC.

<sup>33</sup> Recital 18 of Directive 2003/54/EC.

and ensuring the results of energy efficiency investments in terms of the improved energy efficiency they provide. This is considered an efficient, market-driven way to meet the objective of completing the internal energy market while, at the same time, making significant contributions to environmental and security of supply goals.

### **4.3. Additional impact from action at Community level**

The first objective of the proposed Directive is the improvement of energy end-use efficiency. A secondary objective is the creation of a self-sustaining, commercially viable market for energy services for efficient end use, under full competition. Developing such a market in the short to medium term by promoting and harmonising energy services and energy efficiency measures will allow it to reach a sufficient size, or critical mass, for economies of scale to emerge as well as numerous positive externalities. These cannot be realised on the limited and fragmented markets for energy efficiency measures that exist in the Member States today. This growth cannot be sufficiently achieved by the Member States alone. Because of the scale and effects of these actions and the need for similar definitions, mechanisms, programmes, funding, financial structures and services, it is deemed appropriate to achieve this objective at Community level. That action be taken at Community level is also important because of possible unequal burdens that might fall on individual Member States acting alone, and because of the associated risk that Member States could create new barriers to trade in the form of market distortions if they develop completely independent and separate markets for energy services. This is also highly relevant in case that this Directive would be complemented in the future by the introduction of tradable and mutually recognised energy efficiency certificates (“white certificates”). The increase in cross-border trade in energy gives a clear indication of this need for harmonisation at Community level.

Therefore, these measures are proposed in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty. Moreover, in accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve that objective.

## **5. THE RELATIONSHIP BETWEEN ENERGY EFFICIENCY MEASURES AND THE EU EMISSIONS TRADING SCHEME**

### **5.1. Principles of emissions trading**

The EU Emissions Trading Directive 2003/87/EC “establishing a scheme for greenhouse gas emission allowance trading within the Community”<sup>34</sup> implies that each Member State has to set an upper limit on total CO<sub>2</sub> emissions for selected industrial activities, including electricity production. This EU-wide “cap” introduces scarcity into the allowed emissions but “trade” introduces flexibility to meet the overall objective, and lowers the compliance cost by allowing buying and selling of allowances.

Under the Emissions Trading Directive, installations covered by the Directive 2003/87/EC (in the first phase 2005-2007 the scheme will capture close to 50 % of total carbon dioxide emissions in the EU-25) will have to surrender an amount of allowances equivalent to their actual CO<sub>2</sub> emissions. CO<sub>2</sub> allowances are initially distributed through national allocation plans. They can be freely bought or sold in case the number of allowances that an installation’s operator holds does not match the amount of CO<sub>2</sub> that they actually produce.

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<sup>34</sup> OJ L 275, 25.10.2003, p. 32-46.

## **5.2. Effects of emissions trading on end-use efficiency measures**

For small-scale end use of primary energy like gas, there is no direct link with the Emissions Trading Directive, as the end users envisaged by this proposal are not covered by the scheme. However, for the end use of electricity there is a direct effect of the Emissions Trading Directive as electricity producers and their electricity prices are indeed affected.

Firstly, the net effect of emissions trading **on the market** will likely be an increase of the production cost for electricity produced by fossil fuels. A price increase would, in itself, trigger energy efficiency measures.

The emissions trading scheme is internalising the cost of CO<sub>2</sub> in the electricity price and should therefore in itself constitute a sufficient and cost-effective system for both influencing the energy supply and the demand side. Some Member States could therefore be inclined to solely rely on emissions trading to ensure cost-effective emission reductions in the electricity sector. However, the assumed impact on the demand side is based on a (unrealistic) situation of perfect competition, where price signals are automatically picked up by the customers and where the many barriers as identified in paragraph 1.1, do not exist. Because of the existence of these barriers, the economic optimum impact on the demand side might not be achieved. It is therefore necessary that the emissions trading scheme is complemented through specific and targeted measures that tackle the barriers that are preventing economically sound energy efficiency improvements.

## **5.3. Effect of end-use energy efficiency measures on emissions trading**

A reduction of the overall electricity consumption in the EU achieved as a result of this Directive will lead to reductions of CO<sub>2</sub> emissions by power generators. This would reduce the allowance needs of power generators, and would therefore reduce the price of allowances. This would benefit all sectors covered by the emissions trading scheme. A harmonised mandatory target as proposed here will ensure an EU-wide level playing field with regards to the 'upstream' benefits for the power generators. Furthermore, pursuant to Annex III(4) of the emissions trading Directive, Member States will have to take into account the CO<sub>2</sub> reductions as a result of the Directive, when deciding upon the total number of allowances allocated in the national allocation plans.

In order to ensure complementarity between the emissions trading scheme and this proposal, the industrial sectors covered under Annex I of the emissions trading directive (and those covered under Annex I of the IPPC Directive) are not subject to this proposal.

## **6. COHERENCE OF PROPOSED MEASURES WITH EXISTING EU LEGISLATIVE INITIATIVES AND TOOLS RELEVANT TO ENERGY EFFICIENCY**

Energy services, energy efficiency programmes and other energy efficiency measures rely on and complement many of the tools created by other EU and Member State legislation, such as, for example, the energy efficiency labelling of household appliances and equipment.<sup>35</sup> Many providers of energy services are thus able to take into account the lower life-cycle costs of purchasing energy-efficient equipment on the basis of the information provided on the mandatory label and leaflet. Many consumers, for varying reasons, do not take these factors

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<sup>35</sup> OJ L 297, 13.10.1992, p. 16.



into account and they leave out the energy efficiency dimension entirely. Energy service providers act to incorporate this aspect, using, to considerable advantage, the information provided in these Directives.

The energy audits required for carrying out certification in the Energy performance of buildings Directive<sup>36</sup> is another example. These audits are required in order to comply with the certification requirement. Advice on how to improve the building is also required when the certification of the building is carried out. The increased use of energy services will allow the implementation of many measures proposed in the mandatory certification audits by virtue of the fact that they are presented to the property owner in favourable and readily understandable economic and technical terms.

Energy services, energy efficiency programmes and other energy efficiency measures also strongly complement the regular inspection of boilers and air-conditioning systems, as set forth in the same Directive on the Energy Performance of Buildings. While inspection is mandatory, there are no immediate incentives to improve or replace installations beyond the knowledge that there might be economic advantages. Energy services will provide more exact information on the costs and benefits of implementing the proposed measures and can offer guarantees of results, third-party financing and performance contracting as well.

In general, the market for energy services and other energy efficiency measures will give added impact to many existing EU Directives while, at the same time, these Directives will reinforce and facilitate the delivery of energy services and other measures.<sup>37</sup>

## **7. LEGAL BASIS**

In order to ensure a prudent, sustainable and rational utilisation of energy, to which Art. 174 of the Treaty refers, it is necessary to ensure that the demand side of the energy market functions as well as the supply side. Therefore, legislative measures are being proposed, including targets for Member States public authorities, which in the longer term should lead to a sustainable market for energy efficiency and in particular for energy services.

In accordance with Art. 175 of the Treaty, the potential advantages and costs associated with the proposed measures on the demand side have been taken in account.

## **8. CONTENTS OF THE PROPOSAL**

**Article 1** defines the purpose of the proposal and the manner in which it will be reached.

**Article 2** defines the scope of the proposal as covering the distribution and retail sales of the main energy sources to final customers in most major end-use sectors.

**Article 3** defines the terms and concepts used in the proposal.

**Article 4** obliges Member States to adopt and meet an annual energy savings target. A calculation methodology is set out in **Annex I**.

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<sup>36</sup> OJ L 1, 4.1.2003, p. 65.

<sup>37</sup> In promoting the development of energy services, co-ordination with other existing EU legislation, such as Directives 1994/2/EC, 1995/12/EC, 1995/13/EC, 1996/60/EC, 1997/17/EC, 1998/11/EC, and 2000/31/EC, is envisaged.

**Article 5** requires Member States to promote energy end-use efficiency through the use of public purchasing and to establish and meet an annual savings target of 1.5%.

**Article 6** requires Member States to lay down certain obligations concerning the participation of energy distribution and retail supply companies in the energy services market, including the offering of a minimum level of energy services or energy audits.

**Article 7** requires Member States to ensure the provision of energy services and energy efficiency measures for eligible customers and to ensure that these services and measures may be provided by any qualified market player.

**Article 8** requires Member States to ensure the existence of appropriate qualification, accreditation and/or certification schemes for energy services providers.

**Article 9** requires member States to provide for the availability of financial instruments for energy savings.

**Article 10** obliges member states to ensure that tariff structures do not promote increased energy consumption and that they allow for cost recovery if reasonable and competitive.

**Article 11** allows Member States to establish funds and funding mechanisms for energy efficiency programmes and measures.

**Article 12** obliges Member States to ensure the availability of energy audit schemes.

**Article 13** requires Member States to ensure accurate and informative metering and billing of energy consumption.

**Article 14** establishes a reporting procedure for Member States and for the Commission.

**Article 15** repeals Directive 93/76/EEC.<sup>38</sup>

**Articles 16, 17 and 18** provide for the transposition and administrative provisions of the Directive.

**The Annexes** to the proposal (**Annexes I – IV**) contain the main aspects to be taken into account when setting and verifying Member State targets, including conversion tables. They also provide guidelines for eligible energy services, energy efficiency programmes and other energy efficiency measures and for their measurement and verification.

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<sup>38</sup> Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE).

## Annex A:

### ENERGY SERVICES, ENERGY EFFICIENCY PROGRAMMES AND OTHER ENERGY EFFICIENCY MEASURES IN MEMBER STATES AND ELSEWHERE

In **Italy**, energy end-use efficiency is being promoted in several ways, including through tariff structures set forth by the regulators for electricity. Firstly, total revenues from certain customer classes are no longer 100% proportional to energy units sold, but partially dependent on the number of customers. Secondly, the costs of energy efficiency programmes incurred by utilities may be recovered through a small increase in the tariff.

**Sweden** also has a new system where electricity distribution tariffs are evaluated with the help of a model which, among other things, takes into account the length of the grid, the value of the installations, and the need for new investment.

Since 1992, distribution companies in **Denmark** have been obliged to grant energy counselling free of charge to customers within industry and trade as well as to household customers, e.g. through free energy efficiency audits for industry and trade, programmes promoting compact fluorescent lamps, rebate programmes for selected technologies, etc. These companies are allowed to collect the costs for these activities via the tariff.

For the year 2001, the savings through directly measurable energy efficiency measures by the electricity grid companies are calculated to be equal to 0.5% of total consumption (33 TWh/a), while the energy companies' investments (0.06 euro cent/sold kWh) are about 1% of the price per kWh net of taxes. For customers the average payback time is 4 years for the initiatives and the net value in the lifetime of the savings is calculated at approximately 32 million euros.

The energy efficiency activities of Danish distribution companies during the period 2002 -2004 will be approximately 26 million euros, which is equal to approximately 0.08 euro cent per kWh.

Between 1991 and 1997, some 600 million euros was spent in **the Netherlands** on energy services and programmes related to electricity and gas. This was through rebates for high frequency lighting ballasts, variable speed drives, compact fluorescent lamps, Class A refrigerators, and condensing boilers.<sup>39</sup> These programmes were based on negotiated agreements and funds created by a charge on energy of around 1.4 euro cents/kWh.<sup>40</sup>

In **Germany**, 80 utilities, under an agreement with support from the state government of North Rhine-Westphalia, increased the number of compact fluorescent lamps in use in the domestic sector by 1.4 million, saving 550 GWh at costs of 1.6 euro cents/kWh saved.<sup>41</sup>

Germany has adopted a new act on energy savings (*Energieeinsparverordnung*), which clearly addresses the demand side. This new regulation aims to reduce CO<sub>2</sub> emissions by 10 million tonnes by 2005. Energy efficiency in new buildings will be increased by 30% compared to the present standard.

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<sup>39</sup> DEA. E.piano 1999.

<sup>40</sup> 154.5 PJ = 42.9 TWh, -> 600 000 000EUR/42 910 000 000 kWh = 0.01398 EUR.

<sup>41</sup> (Thomas et al. 1997).

The **UK** has a programme called The Energy Efficiency Commitment (EEC), which currently has a target of 62 TWh savings over a period of three years. The EEC is a legal obligation on gas and electricity suppliers to reach an energy saving target. It is up to suppliers to decide how they meet the cost of delivering their EEC target. The current design of the EEC is to try to get suppliers to integrate energy efficiency into their businesses.

**Luxembourg** has set up a bonus scheme for the rational use of energy and renewable energies. Bonuses are paid for investments in all types of residential buildings.

In various projects in **Hungary** local authorities co-operating with ESCOs have succeeded in achieving much better energy efficiency in municipal buildings. Savings in heating costs of up to 70 % were reported<sup>42</sup>.

After a law was passed in 1995 in **Slovakia**, which allowed energy performance contracts to be signed, municipalities have been using this concept to improve energy performance of district heating installations. Energy savings are estimated to pay back the investments in six years<sup>43</sup>.

In **Slovenia** several initiatives have been taken in the past years to improve energy efficiency in residential buildings and households. These include a grant subsidy scheme for loft insulation, draught proofing and boiler adjustments, as well as activities of an Energy Advisory Network (ENSVET). The objective of ENSVET is to raise energy awareness and its activities are expected to contribute to the goal of a 2 % per year energy efficiency improvement.<sup>44</sup>

In **Norway**, the annual revenue cap for electricity distribution and transmission companies is set by the regulator. The revenue cap is based on historical costs related to their network activity and is adjusted, *inter alia*, to their efficiency.

Energy savings resulting from initiatives taken in 2002 in governmental programmes within industry, buildings, technology introduction and training and education accounted for 450 GWh saved energy. The amount invested was approximately 4.6 million euros, i.e. approximately 1 euro cent/kWh.

A government report from 1998 reveals that the potential for energy savings based on investments within the building mass is 14 TWh (of 72 TWh), providing an electricity price of approx. 5 euro cents/kWh or an oil price of approx. 3.5 euro cents/kWh. The calculations do not include potential for behavioural change as a result of information and education.

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<sup>42</sup> International Energy Agency, Energy Efficiency Initiative-Country Profiles and Case Studies, 1997.

<sup>43</sup> id.

<sup>44</sup> id.

Proposal for a

**DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on energy end-use efficiency and energy services**

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,<sup>45</sup>

Having regard to the opinion of the European Economic and Social Committee,<sup>46</sup>

Having regard to the opinion of the Committee of the Regions,<sup>47</sup>

Acting in accordance with the procedure laid down in Article 251 of the Treaty,<sup>48</sup>

Whereas:

- (1) In the European Community there is a need for improved end-use energy efficiency and managed demand for energy as there is relatively limited scope for any further influence on energy supply and distribution conditions in the short to medium term, either by building new capacity or improving transmission and distribution.<sup>49</sup>
- (2) Improved end-use energy efficiency will also contribute to the mitigation of CO<sub>2</sub> and other greenhouse gas emissions. These emissions continue to increase, making it more and more difficult to meet the Kyoto commitments. Human activities attributed to the energy sector constitute as much as 78% of the Community greenhouse gas emissions. The 6th environmental action program envisages that further reductions are required to achieve the UNFCCC<sup>50</sup> long term objective of stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
- (3) The Communication on the first phase of the ECCP<sup>51</sup> listed a Directive on energy demand management as one of the priority climate change measures to be taken at community level;

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<sup>45</sup> OJ C [...], [...], p. [...].

<sup>46</sup> OJ C [...], [...], p. [...].

<sup>47</sup> OJ C [...], [...], p. [...].

<sup>48</sup> OJ C [...], [...], p. [...].

<sup>49</sup> COM(2000) 769, Green Paper "Towards a European Strategy for Energy Supply".

<sup>50</sup> United Nations Framework Convention on Climate Change.

<sup>51</sup> European Climate Change Programme.

- (4) Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC<sup>52</sup> and Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas, and repealing Directive 98/30/EC<sup>53</sup> provide for the possibility of using energy efficiency and demand-side management as an alternative to new supply and for environmental protection, allowing Member State authorities, inter alia, to tender for new capacity or to opt for energy efficiency and demand-side measures, including systems for “white certificates”.
- (5) This Directive is without prejudice to Article 3 of Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC<sup>54</sup> that requires that Member States shall ensure that all household customers and, where Member States deem it appropriate, small enterprises, enjoy universal service that is the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable and transparent prices.
- (6) The liberalisation of the retail markets for end-use customers for electricity, natural gas, coal and lignite, heating and in some cases even district heating and cooling have almost exclusively led to improved efficiency and lower costs on the energy generation, transformation and distribution side<sup>55</sup>. This liberalisation has not led to significant competition on the basis of products and services which could have resulted in improved efficiency on the demand side.
- (7) In its Resolution of 7 December 1998 on energy efficiency in the European Community<sup>56</sup>, the Council endorsed a target for the Community as a whole to improve energy intensity of final consumption by an additional one percentage point per annum up to the year 2010.
- (8) Member States should therefore adopt national targets to promote energy end-use efficiency and to ensure the continued growth and viability of the market for energy services.
- (9) Improved end-use efficiency can be achieved by increasing the availability of and demand for energy services.
- (10) The Council Conclusions of 5 December 2000<sup>57</sup> list the promotion of energy services through the development of a Community strategy as a priority area for action to improve energy efficiency.
- (11) Energy distribution and retail energy sales companies can improve energy efficiency in the European Community if energy services are marketed that include efficient end use, such as efficient thermal comfort, domestic hot water, refrigeration, illumination and motive power. Profit maximisation for these companies thus becomes more

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<sup>52</sup> OJ L 176, 15.7.2003, p. 37.

<sup>53</sup> OJ L 176, 15.7.2003, p.57.

<sup>54</sup> OJ L 176, 15.7.2003, p.37.

<sup>55</sup> Implementing the internal energy market: First benchmarking report; European Commission, 2002.

<sup>56</sup> OJ C 394, 17.12.1998, p.1.

<sup>57</sup> Council Conclusions: Bulletin 5-2000, point 1.4.41.

closely related to selling energy services to as many customers as possible instead of selling as much energy as possible to each customer.

- (12) A good example regarding investments, maintenance and other expenditures for energy-using equipment, energy services and other energy efficiency measures should be set by the public sector in each Member State.
- (13) The energy services, energy efficiency programmes and other energy efficiency measures put into effect to reach the energy savings target may be supported and/or implemented through voluntary agreements between stakeholders and independent public sector bodies appointed by the Member States.
- (14) With the adoption of this Directive, all substantive provisions of Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency<sup>58</sup> are covered by other community legislation and therefore Directive 93/76/EEC should be repealed.
- (15) Since the objectives of promoting energy end-use efficiency and developing a market for energy services cannot be sufficiently achieved by the Member States and can therefore be better achieved at Community level, the Community may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve those objectives.

HAVE ADOPTED THIS DIRECTIVE:

## CHAPTER I

### SUBJECT MATTER AND SCOPE

#### *Article 1* *Purpose*

The purpose of this Directive is to enhance the cost-effective and efficient end-use of energy in the Member States by:

- providing the necessary targets, mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections for the efficient end use of energy;
- developing a market for energy services and for the delivery of energy efficiency programmes and other energy efficiency measures to end users.

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<sup>58</sup> OJ L 237, 22.9.1993, p. 28.

*Article 2*  
*Scope*

1. This Directive shall apply to the distribution and retail sales to final customers of energy.
2. Member States can exclude small distributors or retail energy sales companies from the application of this Directive.
3. Member States can exclude the buildings listed in Article 4(3) of the Directive 2002/91/EC of the European Parliament and of the Council on the energy performance of buildings<sup>59</sup> from the application of this Directive.

*Article 3*  
*Definitions*

For the purposes of this Directive, the following definitions shall apply:

- (a) **"Energy"**: energy in the form of electricity, natural gas (including liquefied natural gas and liquefied petroleum gas), district heating and cooling, heating fuel, coal and lignite, transport fuels (excluding aviation and foreign bunker fuels), and forestry and agricultural energy products and waste.
- (b) **"Energy efficiency measures"**: all actions, such as energy services, energy efficiency programmes and mechanisms or similar activities, initiated by any market player, including governments and authorities, that lead to verifiable and measurable improvements in end-use energy efficiency, and thus to energy end-use savings, during the period of measurement.
- (c) **"Energy Service"**: the physical amenity for energy end users derived from a combination of energy and energy using technology and, in certain cases, the operations and maintenance necessary to deliver the service (examples are indoor thermal comfort, lighting comfort, domestic hot water, refrigeration, product manufacturing, etc.) meeting quality performance requirements and improving energy efficiency, contracted for a fixed period of time and paid for directly by the customer or agent who benefits from them.
- (d) **"Energy efficiency programmes"**: measures (e.g. energy audits, financial rebates for energy-efficient equipment and information and other measures of the kind mentioned in **Annex III**) targeting energy end users or market agents and designed to help them undertake energy-efficiency measures, normally paid for **collectively** and offered by national agencies, energy retail suppliers, distributors and other market players.
- (e) **"Energy efficiency mechanisms"**: specific measures, such as certification, regulated tariffs, taxes, subsidy schemes, funds, etc., undertaken by governments or government bodies to create a supportive framework or incentives for energy

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<sup>59</sup> OJ L 1, 4.1.2003, p. 65.



companies, energy service companies, installers or other market players to provide energy services and energy efficiency programmes, not addressing end users directly.

- (f) **"Final customer"**: end-use customer in the household, agricultural, commercial, public, industrial sector (excluding those installations listed in Annex I of Directive 2003/87/EC<sup>60</sup> and those industrial activities listed in Annex I of Directive 1996/61/EC)<sup>61</sup> and in the transport sector (excluding means of transport in aviation and maritime shipping).
- (g) **"Third-party financing contract"**: a financial arrangement involving a third party – in addition to the energy supplier– that provides energy services and finances the investment. The financial value of the savings generated by the energy efficiency improvement determines the rate of recovery of costs, including a profit to the energy service provider.
- (h) **"Energy performance contracting"**: a financial arrangement that guarantees that the amount of energy efficiency improvement agreed as a result of the implementation of an energy service will actually be achieved.
- (i) **"Financial instruments for energy savings"**: third-party financing contracts, energy performance contracting, guarantee of savings contracts, energy outsourcing and other related contracts used in the market for energy services to ensure a level of savings and a level and quality of performance.
- (j) **"Energy distributor"**: the natural or legal person responsible for transporting energy, either through grids and pipelines ("grid-bound"), such as electricity (medium and low voltage), natural gas and district heating, or through other transportation and distribution networks designed to deliver such energy as heating fuel, coal, lignite and transportation fuels to final customers.
- (k) **"Retail energy sales company"**: a retail energy sales company, natural or legal person, with sales to final household, commercial and industrial customers purchasing energy for their own use.
- (l) **"Small distributors and retail energy sales companies"**: distributors or retail suppliers with annual turnover less than the equivalent of 50 GWh metered electricity of district heat and cooling consumption or equivalent delivered cubic metres or tonnes of the remaining energy carriers.
- (m) **"Energy service company" (ESCO)**: a company that delivers energy services, energy efficiency programmes and other energy efficiency measures in a user's facility, and accepts some degree of technical and sometimes financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on meeting quality performance standards and/or energy efficiency improvements.
- (n) **"Energy audits"**: a systematic procedure that obtains adequate knowledge of the existing energy consumption profile of the building site, industrial operation, etc.; identifies and quantifies cost-effective energy savings opportunities; and reports the findings.

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<sup>60</sup> OJ L 275, 25.10.2003, p. 32-46.

<sup>61</sup> OJ L 257, 10.10.1996, p. 26-40.

- (o) **"White certificates"**: certificates issued by independent certifying bodies confirming the claims of market actors for savings of energy, as a consequence of energy end-use efficiency measures.

## CHAPTER II

### ENERGY SAVINGS TARGETS

#### *Article 4*

#### *General target*

1. Member States shall adopt and meet a mandatory target for cumulative annual energy savings attributable to energy services, energy efficiency programmes and other energy efficiency measures such as those listed in Annex III.
2. The target shall consist of an annual amount of energy to be saved **that is equal to 1% of the amount of energy** distributed and/or sold to final customers, as calculated for the base year according to Annex I. The costs of the measures adopted to achieve this target should not exceed their benefits.
3. The first savings in the distribution and/or retail sales to final customers, according to this target, will be applied to the first calendar year after the year this Directive is transposed into national legislation. This savings will increase by the cumulative application of the targets of the following years, until and including the year 2012, for a maximum of 6 years.
4. The base year energy consumption and other conditions, such as taking into account the effects of measures implemented in previous years, shall be calculated in accordance with the methodology set out in **Annex I** and savings, measured and verified in accordance with the guidelines in **Annex IV**. For purposes of comparison and for conversion to a comparable unit, the conversion factors provided for in **Annex II** shall apply.
5. Member States shall provide for the appointment of one or more new or existing independent public sector authorities or agencies to be assigned overall control and responsibility for overseeing the framework for reaching the targets mentioned in paragraph (2), and therefore verifying the savings delivered by energy services, programmes and other energy efficiency measures, and reporting the results.
6. Upon expiration of the period during which the target is applied, the Commission will review the target mentioned in paragraph (2) and examine whether it shall present a proposal for a prolongation or amendment of this target.
7. After having reviewed and reported on this target the first time, the Commission will examine whether it is appropriate to come forward with a proposal for a Directive to develop further the market approach in energy efficiency by means of "white certificates".

*Article 5*  
*Procurement of energy end-use efficiency by the public sector*

1. Member States shall adopt and meet a mandatory target of an annual energy savings in the public sector through the procurement of energy services, energy efficiency programmes and other energy end-use efficiency measures. This target may be a sub-target of the overall target set out in **Article 4(1)**, meaning that fulfilment of the public sector target will contribute to fulfilling the overall target.
2. The public sector target shall consist of an annual savings of at least 1.5% of energy distributed and/or sold to this sector, allocated and calculated in accordance with Article 4.3 and the methodology in **Annex I**. For purposes of comparison and for conversion to primary energy, the conversion factors set out in **Annex II** shall be applied.
3. Member States shall appoint a new or existing organisation or organisations to assume the administrative, management and implementing responsibility for fulfilling the target on public purchasing and for providing advice and purchasing guidelines for energy efficiency. These may be the same independent public sector authorities or agencies as described in **Article 4(5)**.
4. To achieve the target adopted pursuant to paragraph 1, Member States can in particular use public purchasing guidelines to enable public administrations to integrate energy efficiency considerations into their investment and operating budgets and activities through the use of energy services, energy efficiency programmes and other energy efficiency measures. While respecting the procedures enshrined in national and Community public procurement legislation, the guidelines may cover the following:
  - (a) requirements for the use of financial instruments for energy savings, such as third-party financing and energy performance contracting, that stipulate the delivery of measurable and pre-determined energy savings (including whenever public administrations have outsourced responsibilities) when purchasing energy services and energy efficiency measures;
  - (b) requirements to purchase equipment and vehicles from energy-efficient products of each category of equipment and vehicles, using, where applicable, minimised life cycle cost analysis or comparable methods to ensure cost effectiveness;
  - (c) requirements to purchase products that have low standby power consuming mode using, where applicable, minimised life cycle cost analysis or comparable methods to ensure cost effectiveness.
5. Upon expiration of the period during which the target is applied, the Commission will review the target mentioned in paragraph (2) and examine whether it shall present a proposal for prolongation or amendment of this target.

## CHAPTER III

### PROMOTION OF ENERGY END-USE EFFICIENCY AND ENERGY SERVICES

#### *Article 6*

##### *Energy distribution and retail energy sales companies*

Member States shall remove barriers to the demand for energy services and ensure that energy distributors and/or retail energy sales companies selling electricity, gas, district heat and/or heating oil:

- (a) offer and actively promote energy services as an integral part of the distribution and/or sales of energy to customers, either directly or through other energy service providers. Energy audits shall be provided for free to their customers as long as 5% of them are not covered by energy services.
- (b) refrain from any activities that might impede the delivery of energy services, energy efficiency programmes and other energy efficiency measures or hinder the development of the market for energy services and energy efficiency measures in general. The authorities or agencies designated in Article 4(5) shall take the necessary measures to bring such activities to an end where they occur;
- (c) provide the information on their end-use customers necessary for the appointed authorities or agencies designated in Article 4(4) to properly design and implement energy efficiency programmes, and to promote energy services and energy efficiency measures. This information should include historical and current information on end-user consumption, load profiles, customer segmentation, and geographical location of customers, where applicable, while preserving the integrity and confidentiality of commercially sensitive information.

#### *Article 7*

##### *Implementation of savings*

1. Member States shall ensure that energy services, energy efficiency programmes or other energy efficiency measures are offered to all eligible customers, including small and medium-sized enterprises, consumers and voluntary aggregations of smaller customers; and that these energy services, programmes and other measures can be delivered and implemented, as appropriate, by qualified bodies, including equipment installers, energy service companies, energy advisors and energy consultants.

#### *Article 8*

##### *Qualification, certification and accreditation of energy service providers*

1. Member States shall ensure the availability of appropriate qualification, accreditation and/or certification schemes for market players delivering energy services, with a view to maintaining a high level of technical competence of personnel, and quality

and reliability of energy services offered. Proof of qualification, certification and accreditation for this purpose delivered by Member States authorities shall, if required by another Member State, be mutually recognized.

2. In accordance with Article 14, Member States shall include in their report to the Commission an assessment of the effectiveness of their national schemes for qualification, certification and/or accreditation and on the possible need for EU harmonization.

#### *Article 9*

##### *Financial instruments for energy savings*

1. Member States shall remove or amend national legislation and regulations that impede or restrict the use of financial instruments and contracts for energy savings in the market for energy services, such as third-party financing and energy performance contracting.
2. Member States shall make these instruments and contracts mentioned in paragraph (1) available, in the form of model contracts, both to public and to private purchasers of energy services and energy efficiency measures.

#### *Article 10*

##### *Tariffs and other regulations for net-bound energy*

Member States shall ensure that:

- (a) incentives to increase the volume of transmitted energy or sales of energy embedded in tariff regulation schemes in monopoly segments of the distribution of net-bound energy are removed. This may be done by the introduction of transmission and distribution tariff structures that take into account, in addition to the volume of sales, such factors as the number of customers served, by the use of revenue caps or by any other measures that can be deemed to have the same effect;
- (b) costs for investments made on the energy end-use side by distribution companies can be recovered by including them in their distribution tariffs, where appropriate, having due regard for the need to ensure equal competition and a level playing field for other providers of energy services. Cost recovery may be allowed for costs incurred in fulfilling energy service obligations pursuant to Article 6(a), provided that such costs are deemed reasonable and competitive by the responsible authority.

#### *Article 11*

##### *Funds and funding Mechanisms*

1. Without prejudice to Articles 87 and 88 of the Treaty, Member States may establish a fund or funds that will subsidize the delivery of energy efficiency programmes and other energy efficiency measures and promote the development of a market for energy services, including the promotion of energy auditing, financial instruments for energy savings and, where appropriate, improved metering and informative billing. The funds should target higher transaction cost or higher risk sectors, and promote the development of energy service companies (ESCOs) and other providers

of energy services, including independent energy advisors and installers of equipment.

2. The funds should provide for grants, loans, financial guarantees and/or other types of financing that guarantee results.
3. The funds should be open to all qualified providers of energy services, energy efficiency programmes and other energy efficiency measures active in the internal energy services market, such as ESCOs, independent energy advisors and equipment installers. Tendering shall be carried out in full compliance with current public procurement regulations, ensuring also that the funds complement and do not compete with, commercially-financed energy services, energy efficiency programmes and other energy efficiency measures.

#### *Article 12* *Energy audits*

Member States shall ensure the availability of independent, high quality energy audit schemes designed to identify potential energy efficiency measures and energy service needs and prepare for their implementation. The audits shall also be available for smaller domestic, commercial and small and medium-sized industrial premises and undertakings with comparatively high transaction costs.

#### *Article 13* *Metering and informative billing of energy consumption*

1. Member States shall ensure that:  
  
all end-use customers of net-bound energy distribution and/or retail supply companies are provided with competitively priced individual meters that accurately reflect the customer's actual energy consumption and actual time of use.
2. Member States shall ensure that:  
  
billing reflects actual consumption in understandable terms, and is carried out frequently enough to enable customers to regulate their own energy consumption. For net-bound energy, and where appropriate, distribution charges and energy charges shall be displayed in the same bill.
3. Member States shall ensure that:  
  
in or with bills, contracts, transactions, receipts at distribution stations and in promotional material, all energy distributors and/or retailers make the following information available to final customers:
  - (a) current actual prices and, where appropriate, actual consumption;
  - (b) where appropriate, comparisons of the consumer's current energy consumption with consumption for the same period in the previous year, in graphical form;
  - (c) comparisons with an average normalised or benchmarked user of energy of the same category;

- (d) environmental impact, such as CO<sub>2</sub>, of energy distributed or sold for consumption;
- (e) contact information, including websites, where information on available energy services, energy efficiency programmes and other energy efficiency measures, as well as technical specifications for energy-using equipment, may be obtained.

## CHAPTER IV

### FINAL PROVISIONS

#### *Article 14* *Report*

1. Member States shall report to the Commission on the overall administration and implementation of this Directive. The report shall include information on the measures taken or planned, including the qualification, certification and/or accreditation of energy service providers. It shall also include information on energy audit schemes, on the use of financial instruments for energy savings, on improved metering of consumption, and on informative billing. Information on the expected impact and financing of the measures should also be included.
2. Not later than 2 years after adoption of this Directive and every three years thereafter up to and including 2012, Member States shall submit to the Commission a report on their success in meeting the national annual energy savings target, as set out in **Article 4(1)**, on the public sector target, as set out in **Article 5(1)** and on the development of energy services, as set out in **Article 6(a)**. The effect of measures of previous years that has been taken into account in the calculation of the savings shall be duly specified and quantified. This shall continue until the final year of the target set out in Article 4 and 5 is reported on.
3. On the basis of the Member States' reports the Commission shall assess to what extent Member States have made progress towards achieving their national targets. The Commission shall publish its conclusions in a report, for the first time not later than 3 years after adoption of this Directive and thereafter every three years. This report shall be accompanied, as appropriate and where necessary, by proposals to the European Parliament and to the Council for additional measures.

#### *Article 15* *Repeals*

Council Directive 93/76/EEC shall be repealed with effect from the date of entry into force indicated in Article 17.

*Article 16*  
*Transposition*

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive on 1 June 2006 at the latest. They shall forthwith communicate to the Commission the text of those provisions and a correlation table between those provisions and this Directive.

When Member States adopt those provisions, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the texts of the main provisions of national law which they adopt in the field governed by this Directive.

*Article 17*  
*Entry into force*

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

*Article 18*  
*Addressees*

This Directive is addressed to the Member States.

Done at Brussels, [...]

*For the European Parliament*  
*The President*  
[...]

*For the Council*  
*The President*  
[...]



## ANNEX I

### **Methodology for calculating targets for end-use efficiency**

The methodology used for calculating the national targets set out in **Articles 4 and 5** shall be the following:

1. Member States shall calculate the arithmetic average of total final domestic energy consumption for the most recent five calendar-year period, previous to the implementation of this Directive for which official data are available, using this as the **base period** for the total duration of this Directive. This data shall be the amount of energy distributed or sold to final customers during the period, not adjusted for degree days, structural changes or for production changes.
2. The annual energy savings targets shall be calculated on the **base period** and expressed in absolute terms in GWh, or equivalent, using the conversion factors in **Annex II**.
3. Energy savings in a particular year that result from energy efficiency measures initiated in a previous year not earlier than 1991 may be taken into account in the calculation of the annual savings. These energy savings should be measurable and verifiable, in accordance with the guidelines in Annex IV of this Directive.

## ANNEX II

**Primary energy content of selected fuels for end use - conversion table**

<b>Energy commodity</b>	<b>kJ (NCV)</b>	<b>kgoe (NCV)</b>	<b>kWh (NCV)</b>
1 kg coke	28500	0.676	7.917
1 kg hard coal	17200 - 30700	0.411 - 0.733	4.778 - 8.528
1 kg brown coal briquettes	20000	0.478	5.556
1 kg black lignite	10500 - 21000	0.251 - 0.502	2.917 - 5.833
1 kg brown coal	5600 - 10500	0.134 - 0.251	1.556 - 2.917
1 kg oil shale	8000 - 9 000	0.191 - 0.215	2.222 - 2.500
1 kg peat	7800 -13800	0.186 - 0.330	2.167 - 3.833
1 kg residual fuel oil (heavy oil)	40000	0.955	11.111
1 kg light fuel oil	42300	1.010	11.750
1 kg motor spirit (petrol)	44000	1.051	12.222
1 kg paraffin	40000	0.955	11.111
1 kg LPG	46000	1.099	12.778
1 kg natural gas <sup>62</sup>	47200	1.126	13.10
1 kg LNG	45190	1.079	12.553
1 kg wood (25% humidity) <sup>63</sup>	13800	0.330	3.833
1 kg pellets/wood bricks	16800	0.401	4.667
1 kg waste	7400 - 10700	0.177 - 0.256	2.056 - 2.972

<i>1 MJ derived heat</i>	<i>1000</i>	<i>0.024</i>	<i>278</i>
<i>1 kWh electrical energy</i>	<i>3600</i>	<i>0.086</i>	<i>2.5<sup>64</sup></i>

<sup>62</sup> 93.0% methane.

<sup>63</sup> Member States may apply other values depending on the type of wood most used in the Member State.

<sup>64</sup> For savings in kWh electricity Member States may apply a default co-efficient of 2.5 reflecting the estimated 40% average EU generation efficiency during the target period. **Source:** Eurostat.

## ANNEX III

### **Eligible energy efficiency programmes and other energy efficiency measures**

This annex provides examples of where energy efficiency programmes and other energy efficiency measures may be developed and implemented. To be taken into account for meeting the energy savings targets set out in **Articles 4 and 5**, energy services, energy efficiency programmes and other energy efficiency measures must contain activities that result in verifiable and measurable savings that reduce energy use, without increasing the environmental impact. The energy services, energy efficiency programmes and other energy efficiency measures shall be cost-effective and their delivery and implementation open to all certified, qualified and/or accredited providers of energy services, energy efficiency programmes and other energy efficiency measures. This list is not exhaustive but is intended to provide guidance.

#### **1. Eligible areas where energy efficiency programmes and other energy efficiency measures may be identified and implemented:**

- a) heating and cooling (e.g. new efficient boilers, installation/efficient update of district heating/cooling systems, etc.);
- b) insulation and ventilation (e.g. wall cavity and roof insulation, double/triple glazing of windows, etc.);
- c) hot water (e.g. installation of new devices, direct and efficient use in space heating, washing machines, etc.);
- d) lighting (e.g. new efficient bulbs and ballasts, digital control systems, etc.);
- e) cooking and refrigeration (e.g. new efficient devices, heat recovery systems, etc.);
- f) other equipment and appliances (e.g. new efficient devices, time control for optimised energy use, stand-by loss control, etc.);
- g) product manufacturing processes (e.g. more efficient use of compressed air, condensate and switches and valves, use of automatic and integrated systems, efficient stand-by modes, etc.);
- h) motors and drives (e.g. increase in the use of electronic controls, variable speed drives, integrated application programming, frequency conversion, etc.);
- i) fans, variable speed drives and ventilation (e.g. new devices/systems, use of natural ventilation, etc.);
- j) demand response management (e.g. load management, peak shaving control systems, etc.);
- k) mode of travel used, e.g.
  - subsidised financing of buying/leasing energy-efficient vehicles;
  - incentives for transport fleet drivers to reduce fuel per trip/day/week/month, etc.;

- energy efficiency add-ons for vehicles, e.g. streamlining for trucks, fuel computers, tyre pressure monitors;
- eco-driving courses with measurable follow-up activities;
- energy efficiency audits on vehicles, e.g. tyres, emissions, roof racks, etc.;
- third-party financing projects involving transport fleet companies with the aim of reducing the amount of energy used;

1) modal shifts of travel, programmes that provide, e.g.

- car free home/office obliging, implementation of mobility guarantees for residents/workers, e.g. bicycle, public transport pass, easy access to hire cars, etc.;
- car free delivery days of children to schools and kindergartens;
- de-investment: car users renounce car ownership and in return receive reduced-cost alternative mobility, e.g. bicycle, public transport pass, easy access to hire cars, etc.;
- parking spaces in connection with public transport stops (park and ride systems).

## **2. Eligible horizontal measures**

Focused horizontal measures may be considered eligible if energy savings can be clearly measured and verified according to the guidelines in **Annex IV** of this Directive. This includes the following (non-exhaustive):

- regulations, taxes, etc. that aim primarily at reducing energy end-use consumption;
- standards and norms that aim primarily at increasing the energy efficiency of products and services;
- campaigns that promote energy efficiency and energy efficiency measures.

## ANNEX IV

### **Guidelines for Measurement and Verification of Energy Savings**

#### **1. How Energy Savings should be measured**

Energy savings shall be determined by estimating and/or measuring before and comparing to the use after the implementation of the measure, while ensuring adjustment and normalisation for extrinsic conditions commonly affecting energy use. Conditions commonly affecting energy use may also differ over time. Such conditions may be the likely impact of one or several plausible factors (not exhaustive):

- weather conditions, such as degree days;
- occupancy levels;
- opening hours for non-domestic buildings;
- installed equipment intensity (plant throughput);
- using schedule for installation and vehicles;
- relationship with other units.

In measuring the energy savings set out in **Article 4**, a bottom-up model shall be used. This means that energy savings obtained through a specific energy service, or in a specific energy efficiency programme, measure or project, shall be measured in kilowatt-hours (kWh), in Joules (J) or in kilogram oil equivalent (kgoe) and added together with energy savings results from other specific services, programmes, measures or projects. The assigned public authorities or agencies set out in Article 4(5) will ensure that double counting of energy saving, which results from a combination of energy efficiency measures, are avoided.

The achieved energy result to be reported in accordance with **Article 14** in the Directive shall be based on the following:

- (1) If the service or programme/project is finalised and sufficient data are available at the time of reporting, the results shall be measured according to point 2.1 in this Annex.
- (2) If the service or programme/project is not finalised or sufficient data are not available at the time of reporting, the results shall be measured according to point 2.2 in this Annex.

How to calculate the base year energy consumption is described in **Annex I**, a conversion table is contained in **Annex II** and examples of energy services, energy efficiency programmes and other energy efficiency measures are listed in **Annex III**.

#### **2. Data and Methods that may be used (Measurability)**

Several methods for collecting data to measure and estimate energy savings exist. At the time of the evaluation of an energy service, energy efficiency programme, measure or project, it

will not always be possible to rely strictly on measurements. A distinction is therefore made between methods measuring energy savings and methods estimating energy savings.

## **2.1 Data and Methods based on Measurements**

### **Bills from Distribution Companies or Retailers**

Metered utility bills may form the basis for measurement for a suitable and sufficiently long period before the introduction of the energy service, energy efficiency measure, service or programme. These may then be compared to metered bills for the period after the introduction and use of the measure, also for a suitable and adequately long period of time. The findings shall also be compared to a control group (no participation group) if possible.

### **Energy Product Sales Data**

The consumption of different energy products (e.g. petroleum, coal, wood, etc.) may be measured by comparing the sales data from the retailer or distributor obtained before the introduction of the energy services, programmes or other energy efficiency measures with the sales data from the time after the measure. A control group shall be used.

### **Equipment and Appliance Sales Data**

Performance of equipment and appliances may be calculated on the basis of information obtained directly from the manufacturer. Data on equipment and appliance sales can generally be obtained from the retailers. In some cases special surveys and measurements may also be carried out to obtain more precise data from the manufacturer or the retailer. The accessible data can be checked against sales figures to determine the size of savings.

### **End-Use Load Data**

Energy use of a building or facility can be fully monitored to record energy demand before and after the introduction of an energy service, programme or other energy efficiency measure. Important relevant factors (e.g. production process, special equipment, heating installations, etc.) can be metered more closely. At the micro level, specific circuits or equipment affected by the introduction of the new measure can also be monitored to record energy demand before and after.

## **2.2 Data and Methods based on Estimates**

### **Enhanced Engineering Estimated Data: Inspection**

Energy data may be calculated on the basis of information obtained by an external expert during an audit of, or other type of visit to, one or several targeted sites. On this basis, more sophisticated algorithms/simulation models could be developed and be applied to a larger population of sites (e.g. buildings, facilities, vehicles, etc.). This method will only confirm energy savings, not verify them.

### **Simple Engineering Estimated Data: Non-inspection**

Data may be estimated using engineering principles, without using on-site data, but with assumptions based on equipment specifications, performance characteristics, operation profiles of measures installed and stipulations based on statistics.

### **3. How to Deal with Uncertainty**

All the methods listed in Chapter 2 of this Annex may contain some degree of uncertainty. Uncertainty may derive from:<sup>65</sup>

- instrumentation errors: these typically occur because of errors in specifications given by the product manufacturer;
- modelling errors: these typically refer to errors in the model used to estimate parameters of interest from the data collection;
- sampling error: this typically refers to errors resulting from the fact that a sample of units was observed rather than the entire set of units under study.

Uncertainty may also derive from planned and unplanned assumptions; these are typically associated with estimates, stipulations and/or the use of engineering data. The occurrence of errors is related to the chosen system of data collection that is outlined in Chapter 2 of this Annex. A further specification of uncertainty is advised.

Member States may choose to use the system of quantified uncertainty when reporting on the targets set out in this Directive. Quantified uncertainty shall then be expressed in a statistically meaningful way, declaring both accuracy and confidence level. For example, “the quantifiable error is found with 90% confidence to be  $\pm 20\%$ ”.

If the method of quantified uncertainty is used, Member States must also take account of the fact that the acceptable level of uncertainty required in savings calculations is a function of the level of savings and the cost-effectiveness of decreasing uncertainty.

### **4. How to Verify the Energy Savings**

As far as economically feasible, the energy savings obtained through a specific energy service, energy efficiency programme or measure shall be verified by a third party. This could be done by certified consultants, ESCOs or other market players. The appropriate Member State authorities or agencies referred to in **Article 4** may give further instructions on this matter.

**Sources:** A European Ex-post Evaluation Guidebook for DSM and EE Service Programmes; IEA, INDEEP database; IPMVP, Volume 1 (Version March 2002).

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<sup>65</sup> A model for establishing a level of quantifiable uncertainty based on these three errors is given in Appendix B in the International Performance Measurement & Verification Protocol (IPMVP).