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THE EUROPEAN UNION**

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**NOTE**

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from :	General Secretariat of the Council
to :	Delegations
No Cion prop:	16261/03 ENER 362 CODEC 1858
Subject:	Proposal for a Directive of the European Parliament and of the Council on energy end-use efficiency and energy services

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Delegations will find attached a revised text of the above, prepared by the Presidency following the examinations of the proposal that took place in March and in September, taking into account clarifications provided by the Commission Services and on the occasion of the seminar on end-use efficiency - in particular on the methodology concerning energy efficiency targets - held on 21 September on the initiative of the Commission. Generally speaking the changes introduced aim to increase Member States flexibility regarding the definition of targets, choice of implementing measures and reporting requirements as well as clarify measurement issues. Moreover in the light of likely technical developments in this field it seems appropriate to foresee a comitology procedure (new Articles 15 and 16) for amending Annexes II, III and IV.

It is understood that all delegations maintain, at this stage, scrutiny reservations on the whole text.

New text is underlined, deletions are indicated by [].

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,

□<sup>1</sup>

HAVE ADOPTED THIS DIRECTIVE:

CHAPTER I

SUBJECT MATTER AND SCOPE

*Article 1*<sup>2</sup>

*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.

*Article 2*

*Scope*

1. This Directive shall apply to the distribution and retail sales to final customers of energy.
2. Member States may exclude small distributors and retail energy sales companies from the application of this Directive.

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<sup>1</sup> Citations and recitals to be examined at a later stage

<sup>2</sup> As usual Articles 1, 2 and 3 may have to be revisited in the light of changes made to operational provisions.

3. []

*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"**: a reduction in primary energy consumption, taking place in the energy transformation, transmission, distribution or end-use stage, due to technological, behavioural and / or economical changes, providing the same or a higher standard of comfort or amenities. End-use energy efficiency improvements reduce final as well as primary energy consumption.
- (c) **"Energy Service"**: the physical amenity for energy end users derived from a combination of energy and energy using technology and/or [] the operations [], maintenance and control necessary to deliver the service (examples are indoor thermal comfort, lighting comfort, domestic hot water, refrigeration, product manufacturing, etc.) []. Energy services meet quality performance requirements and improve energy efficiency, are contracted for a fixed period of time and paid for directly by the customer or agent who benefits from them.
- (d) **"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.
- (e) **"Energy efficiency programmes"**: activities such as energy audits, financial rebates for energy-efficient equipment, [] information [], campaigns, etc., normally paid for collectively and offered by national agencies, energy retail suppliers, distributors, energy service companies and other market players.
- (f) **"Energy efficiency mechanisms"**: horizontal and general measures, such as [] regulated tariffs, energy taxes, subsidy schemes, funds, certification schemes etc., undertaken by governments or government bodies to create a broad supportive framework or incentives for energy companies, energy service companies, installers or other market players to provide energy services and energy efficiency measures, not addressing end users directly.
- (g) **"Energy savings"**: an amount of energy determined by measuring and/or estimating consumption (final or primary) before and comparing it to the use after the implementation of a measure, while ensuring adjustment and normalisation for extrinsic conditions commonly affecting energy use.

- (h) **"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.
- (i) **"Energy service company" (ESCO)**: a company that delivers 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 the achievement of energy efficiency improvements.
- (j) **"Third-party financing []"**: a contractual arrangement [] that involves a third party – in addition to the energy supplier [] and the beneficiary of the energy efficiency measure - that provides the energy efficiency measures, usually finances the investment and charges the beneficiary a fee equivalent to a part of the energy savings achieved as a result of the energy efficiency measure.<sup>3</sup>
- []
- (k) "Energy performance contracting": a contractual arrangement between the beneficiary and the provider of an energy efficiency measure, where installation, maintenance and replacement of energy efficiency investments are paid for in relation to a contractually agreed level of performance including energy savings.
- (l) **"Financial instruments for energy savings"**: third-party financing [], 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.
- (m) **"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>4</sup> and those industrial activities listed in Annex I of Directive 1996/61/EC)<sup>5</sup> and in the transport sector (excluding means of transport in aviation and maritime shipping).
- (n) **"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 and cooling, or through other transportation and distribution networks designed to deliver such energy as heating fuel, coal, lignite and transportation fuels to final customers.

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<sup>3</sup> New recital: "By having recourse to third party financing the beneficiary avoids investment costs himself, using part of the financial value from the energy savings to repay the third party's investment and interest costs."

<sup>4</sup> OJ L 275, 25.10.2003, p. 32-46

<sup>5</sup> OJ L 257, 10.10.1996, p. 26-40

- (o) **"Retail energy sales company"**: a [] company, natural or legal person, with sales to final [...] customers purchasing energy for their own final use.
- (p) **"Small distributors and retail energy sales companies"**: distributors or retail suppliers with annual turnover less than the equivalent of 75 GWh metered electricity for district heat and cooling consumption or the equivalent [] of the remaining energy [].
- (q) **"White certificates"**: certificates issued by independent certifying bodies confirming the claims of market actors for savings of energy, as a consequence of energy [] efficiency measures.
- (r) **"Public sector"**: means the State, regional or local authorities, bodies governed by public law, associations formed by one or several of such authorities or one or several of such bodies governed by public law as defined in Directive 2004/18/EC<sup>6</sup>. This includes all bodies and categories of bodies governed by public law listed in Annex III of Directive 2004/18/EC<sup>7</sup>.
- (s) **"Body governed by public law"**: means any body: (a) established for the specific purpose of meeting needs in the general interest, not having an industrial or commercial character; (b) having legal personality; and (c) financed, for the most part, by the State, regional or local authorities, or other bodies governed by public law; or subject to management supervision by those bodies; or having an administrative, managerial or supervisory board, more than half of whose members are appointed by the State, regional or local authorities, or by other bodies governed by public law<sup>8</sup>.

## CHAPTER II

### ENERGY SAVINGS TARGETS

#### *Article 4* *General target*

1. Member States shall adopt and meet a six-year target resulting from cumulative annual energy savings attributable to energy services, energy efficiency programmes and other energy efficiency measures []. When adopting their national target Member States shall ensure that the costs of the measures adopted to achieve this target do not exceed their benefits.
2. The target shall consist of [] annual amounts of energy to be saved that are equal to 1% of the annual average amount of energy previously distributed and/or sold to final customers [].

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<sup>6</sup> OJ L 134, 30.04.2004. p. 127

<sup>7</sup> OJ L 134, 30.04.2004. p. 165-212

<sup>8</sup> OJ L 134, 30.04.2004. p. 127

3. The amount of energy savings [] shall be calculated in accordance with the methodology set out in Annex I []. For purposes of comparison and for conversion to a comparable unit, the conversion factors provided for in Annex II shall apply [] unless the use of other conversion factors can be justified. Eligible energy services, programmes and other energy efficiency measures [] are given in Annex III. A general framework for measurement and verification of energy savings is given in Annex IV.
  4. The first annual savings [.] , according to the target mentioned in paragraph (2), will be applied to the first calendar year after the date referred to in Article 16(1) and to the following years for which an impact can be shown. The cumulative savings will thus increase by the application of the annual targets of the following years, until and including the year 2012, for a maximum of 6 years.
  5. Member States shall assign to one or more new or existing independent public sector authorities or agencies the overall control and responsibility for overseeing the framework for reaching the target mentioned in paragraph (2); these bodies shall thereafter verify the savings as a result of energy services, energy efficiency programmes and other energy efficiency measures, and reporting the results.
- []
6. 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 [] efficiency measures. This target may be a sub-target of the overall target set out in Article 4(2), 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, Article 4(4) and Article 4(6). [].
3. Member States shall assign to a new or existing organisation or organisations the administrative, management and implementing responsibility for fulfilling the target [] set out in paragraph (2). 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 may provide advice and issue or make wider use of public purchasing guidelines. This will enable or require bodies governed by public law to integrate energy efficiency considerations into their investments, depreciation allowances and operating budgets

[]]. While respecting the procedures set forth in national and Community public procurement legislation, the guidelines shall include at least the following:

- (a) requirements for the use of financial instruments for energy savings, [] including energy performance contracting, that stipulate the delivery of measurable and pre-determined energy savings (including whenever public administrations have outsourced responsibilities) [];
- (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.

[]

### CHAPTER III

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

##### *Article 6*

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

1. Member States shall [] ensure that energy distributors and/or retail energy sales companies selling electricity, gas, district heat and/or heating oil:

[]

- (a) refrain from any activities that might impede the delivery of [] or hinder the development of [] markets for energy services and energy efficiency measures in general. [] The Member State shall take [] necessary measures to bring such activities to an end where they occur;
- (b) provide aggregated statistical information on their final customers necessary for the appointed authorities or agencies designated in Article 4(5) to properly design and implement energy efficiency programmes, and to promote energy services and energy efficiency measures. This information shall 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 [] information that is either of private character or commercially sensitive.

2. The Member States shall choose whether the companies listed in paragraph (1) of this Article, shall, either directly and/or indirectly through other contracted providers of energy services:

- (a) ensure the offer and promotion of competitively priced energy services to their final customers ;

(b) ensure the offer and promotion of competitively priced and independent energy audits to their final customers, in accordance with Article 12(2) of this Directive or;

(c) contribute to the funds and funding mechanisms referred to in Article 11 of this Directive the financial resources that correspond to the estimated costs of the activities to be offered in paragraph 2(a) or (b), with the level to be agreed with the relevant public sector authorities or agencies designated in Article 4(5), or;

(d) a combination of the options mentioned in paragraph 2(a), 2(b) and 2(c) of this Article.

3. The Member State shall guarantee that there exist sufficient incentives, equal competition and level playing fields for other companies than those listed in Article 6(1), -- e.g. ESCOs, energy equipment installers, energy advisors and energy consultants -- to independently offer and implement energy services and energy audits in the market.

4. If Member States choose to place responsibilities on energy distribution companies to ensure the offer energy services and/or energy audits to their customers, this must be done in such a way that the principle in the monopoly sectors of unbundling of energy distribution from energy generation, transmission and supply, as set out in Directives 2003/54/EC and 2003/55/EC, is respected.

#### *Article 7*

##### *Implementation of savings*

Member States shall ensure that information on energy efficiency mechanisms and financial and legal frameworks used in reaching the targets set out in Article 4 and Article 5 is transparent and widely disseminated to the relevant market players.

#### *Article 8*

##### *Qualification, certification and/or accreditation of providers of energy services and energy audits*

With a view to achieving a high level of technical competence [], objectivity, and reliability, Member States shall ensure the availability of appropriate qualification, accreditation and/or certification schemes for market players delivering energy services and energy audits.

[ ]Proof of qualification, certification and/or accreditation for this purpose delivered by Member States authorities shall, if required by another Member State, be mutually recognized.

[ ]

*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 [] for energy savings in the market for energy services [].
2. Member States shall make the instruments [] mentioned in paragraph (1) available, in the form of model contracts, both to existing and potential 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 []:

- (a) the removal of unintended and unnecessary incentives to increase the volume of transmitted energy [] sales [] embedded in tariff regulation schemes in monopoly segments of the distribution of net-bound energy []. This may be done by the introduction of transmission and distribution tariff structures that take into account, for example, in addition to reflecting the actual and expected costs of maintenance and offsets, the number of customers served and the suitability of the relationship between the fixed and variable cost components.. This may also be done through the use of revenue caps or by any other measures that can be deemed to have the same effect;
- (b) [] cost recovery may be allowed for costs incurred in fulfilling requirements pursuant to Article 6 (2) (b) by incorporating these costs into distribution tariffs if the audits are not offered on a commercial basis by other enterprises.[].

*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 to subsidize the delivery of energy efficiency programmes and other energy efficiency measures and to 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. If established, the funds shall also target end-use sectors with higher transaction costs and higher risks [], and promote the development of markets for [] providers of energy services [].
2. If established, the funds may provide for grants, loans, financial guarantees and/or other types of financing that guarantee results.

3. The funds shall be open to all  providers of energy services, energy efficiency programmes and other energy efficiency measures , such as ESCOs, independent energy advisors and  installers. Tendering shall also 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  efficiency measures.

*Article 12*  
*Energy audits*

1. Member States shall ensure to all sectors the availability of independent, high quality energy audit schemes designed to identify potential energy efficiency measures .
2. Energy audits shall also be made available for smaller domestic, commercial and small and medium-sized industrial premises and undertakings with comparatively high transaction costs. The segments of the market that have higher transaction costs and non-complex facilities may be reached by using off-site-inspection methods such as questionnaires made available on Internet and/or questionnaires sent to customers by mail. For market segments where energy audits are not offered on a commercial basis, Member States shall ensure their availability as described in Article 10(b) and /or Article 11(1).

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

1. Member States shall ensure that:  
  
final customers of electricity, gas, district heating and/or cooling, if the costs are reasonable in relation to the volume of consumption and  savings potential,  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:  
  
where appropriate, for energy distributors and retail energy sales companies, billing is based on actual consumption presented in clear and understandable terms, and is carried out frequently enough to enable customers to regulate their own energy consumption. . Information on distribution charges, energy volume charges and other associated charges shall be made available with their bill to provide the consumer with a comprehensive account of current energy costs.
3. Member States shall ensure that:  
  
where appropriate, for energy distributors and retail energy sales companies in or with their bills, contracts, transactions, and/or receipts at distribution stations  the following information is made available to final customers:
  - (a) current actual prices and  actual consumption;
  - (b)  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  efficiency measures, as well as technical specifications for energy-using equipment, may be obtained.

## CHAPTER IV

### FINAL PROVISIONS

#### *Article 14* *Report*

1. Not later than 3 years after the date referred to in Article 16(1), Member States shall submit to the Commission an interim report on the overall administration and implementation of the Directive.  A final report showing progress up to and including the year 2012 shall be submitted to the Commission not later than 8 years after the date referred to in Article 16(1). The interim report shall include i.a. the estimated progress to date with respect to  the  annual energy savings target, as set out in Article 4 (2) and Article 5 (2). The final report shall include definite results covering fulfilment of the target for the entire six-year period.
2. On the basis of the Member States' interim and final reports the Commission shall assess to what extent Member States have made progress towards achieving their national targets. The Commission shall publish  a report with its conclusions on the first interim reports, not later than 4 years after the date referred to in Article 16(1) . Not later than one year after receipt of the final reports from Member States, the Commission shall publish its conclusions in a final report. These reports shall be accompanied, as appropriate and where necessary, by proposals to the European Parliament and to the Council for additional measures including a possible prolongation of the targets and other provisions set out in this Directive.

#### *Article 15* *Review and adaptation of the framework*

The values and calculation methods referred to in Annexes II, III and IV shall be adapted to technical progress in accordance with the procedure referred to in Article 16(2).

*Article 16*  
*Committee*

1. The Commission shall be assisted by a Committee.
2. Where reference is made to this paragraph, Article 5 and 7 of Decision 1999/498/EC shall apply, having regard to the provisions of Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its Rules of procedure.

*Article 17*  
*Repeals*

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

*Article 18*  
*Transposition*

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive on 1 July 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 19*  
*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 20*  
*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 use the annual final [] inland energy consumption for sectors covered by the Directive for the most recent six [] year period, previous to the implementation of this Directive for which official data are available, to calculate an annual average amount of consumption. On the basis of this absolute amount of energy consumption, the annual 1% energy savings target as well as the 1.5% target for the public sector, will be calculated and the resulting absolute amount of energy applied for the total duration of this Directive. This energy consumption shall be the amount of energy distributed or sold to final customers during the six-year period, not adjusted for degree days, structural changes or for production changes.
2. The annual energy savings targets shall thus be calculated on the average energy consumption of the six-year 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 1995 may be taken into account in the calculation of the annual savings. These energy savings should be measurable and verifiable, in accordance with the general framework 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>9</sup>	47200	1.126	13.10
1 kg LNG	45190	1.079	12.553
1 kg wood (25% humidity) <sup>10</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>11</sup></i>

<sup>9</sup> 93.0% methane.

<sup>10</sup> Member States may apply other values depending on the type of wood most used in the Member State.

<sup>11</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 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 in meeting the [ ] targets set out in Articles 4 and 5, [ ] eligible energy efficiency measures must contain activities that result in verifiable and measurable savings that [ ] do not result in negative environmental impact. [ ] This list is not exhaustive but is intended to provide guidance.

#### **1. Eligible [ ] energy efficiency measures [ ]:**

- 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;

l) modal shifts of travel, measures 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**

General 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, and where impacts on savings are not already counted in other specific measures. This includes the following (non-exhaustive):

- regulations, energy taxes where 50% or more of the income is ear-marked to promote energy-efficiency measures, 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, including buildings;
- information campaigns that promote energy efficiency and energy efficiency measures.

## ANNEX IV

### **General framework for Measurement and Verification of Energy Savings**

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

Energy savings shall be determined by estimating [] 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); product mix;
- using schedule for installation and vehicles;
- relationship with other units.

In measuring the energy savings set out in Articles 4 and 5 to ascertain the impact of individual measures, a top-down model or a combination of top-down and bottom-up models or energy efficiency indicators may be used to measure the overall annual improvements in energy efficiency for the interim report in Article 14(1). For the final report bottom-up measurements to corroborate top-down measurements shall be used when such measurements are available.

A bottom-up model means that energy savings obtained through the implementation of a specific energy [] efficiency [] measure [] are measured in kilowatt-hours (kWh), in Joules (J) or in kilogram oil equivalent (kgoe) and added together with energy savings results from other specific energy efficiency measures []. The assigned public authorities or agencies set out in Article 4(5) will ensure that double counting of energy savings, which results from a combination of energy efficiency measures (including mechanisms), are avoided.

[]

A top-down model means that the amount of energy savings is calculated using the national or more aggregated sectoral levels of savings as the starting point. Adjustments of the annual data are then made for extraneous factors such as degree days, structural changes, product mix, etc. to derive a measure that gives a fair indication of total energy efficiency improvement. This method does not provide exact measurements at a detailed level nor does it show cause and effect relationships between measures and their resulting savings. However, the method is usually simpler and less costly and is often referred to as “energy efficiency indicators” because it gives an indication of developments.

The achieved energy savings results to be reported in accordance with Article 14 in this Directive shall be based on the following:

(1) If the energy efficiency measure is finalised and sufficient data are available at the time of reporting, the results may be measured according to Chapter 2.1 in this Annex.

(2) If the energy efficiency measure and its impact are interim or not finalised and/or sufficient data is not available at the time of reporting, the results may be measured according to Chapter 2.2 in this Annex.

(3) If bottom-up calculations are not available for certain sectors, top-down indicators or mixtures of top-down and bottom-up calculations may be used in the reports to the Commission. Some bottom-up calculations will be necessary to measure the impact of measures implemented after 1995 but still having impacts.

## **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 [] 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 energy bills may form the basis for measurement for a suitable and sufficiently long period before the introduction of the energy [] efficiency measure []. 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 should be compared to a control group (non participation group) if possible or, alternatively, normalised as described in Chapter 1 of this Annex.

#### **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 [] energy efficiency measures with the sales data from the time after the measure. A control group shall be used or the data normalised.

#### **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. [] Special surveys and measurements may also be carried out []. The accessible data can be checked against sales figures to determine the size of savings. When using this method, adjustment should be made for changes in the use of the equipment or appliance.

## **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 [] energy efficiency measure. Important relevant factors (e.g. production process, special equipment, heating installations, etc.) may be metered more closely. At the micro level, specific circuits or equipment affected by the introduction of the new measure may 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.). [].

### **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>12</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 for the data collected;
- 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 also 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  $\pm 20\%$ ”.

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<sup>12</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).

If the method of quantified uncertainty is used, Member States are also taking account [] 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**

[] Some energy efficiency measures last for decades while other measures last for a shorter period of time. The list below gives some examples of the lifetime of energy efficiency measures:

<u>Loft insulation</u>	<u>30 years</u>
	<u>40 years</u>
<u>Cavity wall insulation</u>	<u>30 years</u>
	<u>20 years</u>
<u>Internal/external wall insulation</u>	<u>15 years</u>
	<u>20 years</u>
<u>Double glazing</u>	<u>25 years</u>
	<u>20 years</u>
<u>Old boiler to new condensing boiler</u>	<u>20 years</u>
	<u>10 years</u>
<u>Programmable timers in space heating systems</u>	

Source: EST, UK

To ensure that all Member States apply the same lifetimes for similar measures, these lifetimes will be harmonised on a European level. The Commission, assisted by the Committee created in Article 16, shall therefore issue a complete list with the average lifetime of different energy efficiency mechanisms, measures and products not later than six months after the adoption of this Directive.

#### **5. How to deal with multiplier effects of energy savings**

The implementation of one energy efficiency measure, e.g. hot water tank and pipe insulation in a building, may give future multiplier effects in the market, meaning that the market will implement a measure automatically without any further involvement from the energy authorities or agencies set out in Article 4 (5) or any private based energy services provider. A measure with multiplier potential would in most cases be more cost-effective than measures that need to be repeated on a regular basis. Member States should estimate the energy savings potential of such measures including their multiplier effects and verify the total effects in an ex-post evaluation using indicators when appropriate.

Future potential energy saving results shall not be taken into account when Member States are reporting on the overall target set out in Article 4 and Article 5 of this Directive. Measures that promote long term market effects should in any case be encouraged and measures that already have resulted in multiplier energy savings effects should be taken into account when reporting on the targets set out in Article 4 and Article 5, provided they can be measured and verified using the guidance given in this Annex.

## 6. How to Verify the Energy Savings

If deemed cost-effective, the energy savings obtained through a specific energy service, energy efficiency programme or other energy efficiency measure shall be verified by a third party. This may be done by independent consultants, ESCOs or other market players. The appropriate Member State authorities or agencies referred to in Article 4 (5) may provide 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). **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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