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**COMMISSION STAFF WORKING DOCUMENT**

**EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT**

*Accompanying the document*

**Commission Regulation implementing Directive 2009/125/EC of the European  
Parliament and of the Council**

**with regard to ecodesign requirements for directional lamps, light emitting diode lamps  
and related equipment**

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### EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT

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#### **Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council**

#### **with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment**

**Lead DG:** DG ENER

**Associated DG:** DG ENTR

**Other involved services:** SG, LS, DG ENV, DG COMP, DG ECFIN, DG CNECT, DG MARKT, DG SANCO, DG TRADE, DG RTD.

#### **EXECUTIVE SUMMARY**

These actions are priorities of the Action Plan on Energy Efficiency<sup>1</sup> and the Energy Efficiency Plan 2011<sup>2</sup>.

The Ecodesign Directive 2009/125/EC of the European Parliament and of the Council lays down a framework for the Commission, assisted by a Regulatory Committee, to set eco-design requirements for energy-related products.

The Energy Labelling Directive 2010/30/EU of the European Parliament and of the Council lays down a framework for the Commission to set energy labelling requirements for energy-related products in delegated acts.

There are two types of lamps on the market: non-directional lamps (e.g. light bulbs) and directional light sources (DLS), which are called in popular terminology **reflector lamps** or **spot lights**, and which direct most of their light (at least 80%) in an angle of 120° or smaller.<sup>3</sup>

Non-directional lamps are already covered by ecodesign regulations 244/2009 and 245/2009. The planned ecodesign regulation covers directional lamps. These are divided into different types based on shape. Table 1 shows examples of the most popular reflector lamp shapes falling within the scope of the planned ecodesign regulation.

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<sup>1</sup> COM(2006)545 final.

<sup>2</sup> COM(2011)109 final.

<sup>3</sup> Most available directional lamp technologies (incandescent, halogen, compact fluorescent and light emitting diode) direct their light with the help of a built-in reflector. Some light emitting diode (LED) lamps do not require a separate reflector, as the diodes already provide light in a given direction.

Lamp type		Energy Class			
Voltage	Shape	G-D	D-C	B	A, A+, A++
Mains voltage (230V)	R80	 Incandescent	 Xenon-filled halogen <sup>4</sup>	—	 Compact fluorescent lamp
	NR63	 Incandescent	 Xenon-filled halogen	—	 Light emitting diode lamp (LED)
	MR16	 Conventional halogen	 Xenon-filled halogen	—	 Compact fluo.lamp, LED
Extra low voltage (12V)	MR11	—	 Conventional halogen <sup>5</sup>	 Infrared coated (IRC) halogen <sup>6</sup>	 LED lamp
	MR16	—	 Conventional halogen	 IRC halogen	 LED lamp
Energy saving compared to E class:			10-25%	50%	70-90 %

<sup>4</sup> A halogen capsule filled with heat-retaining xenon gas replaces the simple filament of incandescent bulbs or the conventional halogen capsule. As in reflector lamps, the filament or capsule is usually not visible, the change goes unnoticed even when the filament is replaced by a capsule.

<sup>5</sup> Extra low voltage makes these lamps relatively efficient even without any further improvement.

<sup>6</sup> Invisible special coating ("infrared coating") is applied to the glass of the halogen capsule, which reflects heat back to the filament, further increasing efficiency. The coating can only be applied to capsules with filaments designed for extra low voltage, so IR coated mains voltage lamps would have to be equipped with an integrated transformer that delivers extra low voltage to the filament. Such lamps exist but are very rare.

Directional lamps are not subject to minimum energy efficiency requirements in the EU. Household lamps are currently addressed in Commission Directive 98/11/EC implementing Council Directive 92/75/EC with regard to the energy labelling of household lamps, however directional lamps and professional lamps are currently exempted from the scope. In light of recent developments in the non-directional lamps market, it has become necessary to update the existing energy label for household lamps.

The approach for developing the proposed ecodesign implementing regulation for directional lamps and this impact assessment was structured in four steps:

Step 1: assessment of the criteria for ecodesign and energy labelling implementing measure as laid out in Article 15(2a)-15(2c) of the Ecodesign Directive and Article 10(2a)-10(2c) of the Energy labelling Directive, taking into account the ecodesign parameters identified in Annex I of the Ecodesign Directive;

Step 2: consideration of relevant EU initiatives, market forces and environmental performance disparities of the equipment on the market with equivalent functionality as laid out in Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy labelling Directive;

Step 3: establishing policy objectives including the desirable level of ambition, the policy options to achieve them, and the key elements of the ecodesign and energy labelling implementing measure as required by Annex VII of the Ecodesign Directive and Article 10(4) of the Energy labelling Directive;

Step 4: environmental, economic and social assessment of the impacts on environment, consumers, with a view to the criteria on implementing measures set out in Article 15(5) of the Ecodesign Directive and Article 10(3) of the Energy labelling Directive.

### **Step 1 Assessment of the criteria for ecodesign and energy labelling implementing measures**

In order to assess the criteria for ecodesign and energy labelling implementing measures as laid out in Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy labelling Directive, the Commission has carried out a technical, environmental and economic study for directional lamps ("preparatory study") following in particular the provisions of Article 15(4a) and Annex II of the Ecodesign Directive.

With regard to the criteria established by Article 15(2) of the Ecodesign Directive and Article 10(2) of the Energy labelling Directive, on the basis of the study the following can be concluded for the EU-25<sup>7</sup>:

Article 15 (2a) Ecodesign Directive and Article 10 (2a) Energy labelling Directive:	Annual sales volume in the EU:	approx. 330 mln
Article 15 (2b) Ecodesign Directive:	Most significant environmental impact – energy consumption of installed base:	30 TWh in 2007 50 TWh in 2020
Article 15 (2c) Ecodesign Directive and Article 10	Improvement potential (compared to the baseline)	10% (5 TWh) to 50% (25 TWh)

<sup>7</sup> Figures for EU-27 are somewhat higher and can be corrected on the basis of GDP

(2b) Energy labelling Directive:	in 2020):	
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The volume of sales of approx 330 million units for directional lamps per year is far above the indicative 200 000 units provided for in the Ecodesign Directive. Both the environmental impact and the improvement potential are considered significant.

## Step 2 Analysis of relevant initiatives at EU and Member State level

Further to Articles 15(2) and 15(4c) of the Ecodesign Directive and to Article 10(2c) of the Energy labelling Directive, relevant EU and national environmental legislation is considered. Related (voluntary) initiatives both on EU and Member State levels are taken into account, and barriers preventing for market take up of technologies with improved environmental performance are analysed.

Several market failures have been identified to explain that cost-effective technologies leading to energy efficiency improvements are not penetrating the market to a satisfactory extend by market forces alone.

The energy consumption of directional lamps is not a decisive factor for the purchasing decision of consumers. No easily accessible and understandable information on running costs/energy savings is available, and there is little awareness of the energy consumption and the associated costs (asymmetric information). Furthermore not all environmental costs are included in electricity prices, and because of the high initial investment needed, these lamps may not look economical to consumers, even if over the lifecycle they would bring overall cost savings through reduced electricity use and longer life. The recent character of new directional lamp technologies (such as infrared coated halogens and LEDs) means that relatively few consumers are aware of their particular functionalities, which may lead to consumer disappointment if the selected model is not optimal for the purpose.

Directional lamps are not covered by the energy labelling directive or by minimum efficiency requirements, and neither the Energy Performance of Buildings Directive (2010/31/EU) nor the Energy Services Directive (2006/32/EC) contain mandatory requirements on the energy efficiency of lighting systems that could encourage the uptake of more efficient directional lamps. In the professional sector, split incentives can form an obstacle to their more widespread installation. On the consumer side, aesthetic qualities of directional lamps play an even more important role in purchasing decisions than with non-directional lamps, so they are more difficult to address with financial incentives.

Finally, already installed lighting equipment might not be compatible in size or electrical characteristics with some of the new more efficient directional lamps ("negative lock-in effect").

Overall, the energy efficiency of directional lamps has not improved yet to a satisfactory extent. Therefore additional legislative action pursuant to the Ecodesign Directive and to the Energy labelling Directive should be taken at EU level, and Member States expect that a harmonised legislative framework will be established.

### Conclusion of Steps 1 and 2

The analysis carried out in Steps 1 and 2 shows that

- the volume of sales of directional lamps in the EU is significant;
- their environmental impact is significant, the main environmental aspect being their energy consumption;

- significant cost-effective improvement potentials for the energy consumption exist, which are linked to a wide disparity of the energy performance of directional lamps on the market with similar or identical functionality;
- initiatives at EU and Member States' level, and market forces do not capture the improvement potential to a satisfactory extent.

It is concluded that the criteria for ecodesign implementing measures as set out in Article 15(2) of the Ecodesign Directive and in Article 10(2) of the Energy labelling Directive are met, and directional lamps ought to be covered by an ecodesign implementing measure pursuant to Article 15(1) of the Ecodesign Directive, and by an energy labelling measure pursuant to Article 10(2) of the Energy labelling Directive. The existing energy label for household lamps (Commission Directive 98/11/EC) should be extended to directional lamps and professional lamps in general, and should be also reviewed to include classes above A for both directional and non-directional lamps.

### **Step 3 Policy objectives and options**

Further to Annex II of the Ecodesign Directive, the level of ambition for improving the energy consumption/efficiency aims at the least life-cycle cost for the user, while taking into account the requirements on ecodesign implementing measures related to, amongst others, functionality and affordability aspects, as set out in the Directive's Article 15(5). Furthermore, benchmarks for technologies yielding best performance, as developed in the preparatory study with additional input from the Consultation Forum, are considered. The results are reflected in the objectives that the proposed ecodesign regulation and the energy labelling regulation aim to achieve.

Several policy options for achieving a market transformation realising the appropriate level of ambition are considered, including the business as usual case, self-regulation, energy labelling only, ecodesign regulation only and a combination of the latter two.

However, due to the clear mandate of the Legislator for establishing ecodesign requirements and energy labelling for directional lamps, the depth of the analysis for other options is proportionate for an implementing legal act, and the focus is on the assessment of the proposed implementing regulations.

### **Step 4 Impact assessment**

An impact assessment of the possible policy measures is carried out, taking into account the criteria set out in Article 15(5) of the Ecodesign Directive, and the impacts on manufacturers, including SMEs.

In order to allow industry enough time for the transitions it is proposed to introduce minimum requirements in a 3-tier approach (2013/2014/2016), gradually working up – if appropriate according to an intermediate review - to an energy efficiency requirement which would phase out current day mains voltage halogen reflector lamps in 2016. This review is foreseen between the 2<sup>nd</sup> and 3<sup>rd</sup> tier, i.e. around 2015.

Chapter 5 of the full impact assessment studies the impacts of the 3 options 'label only', 'minimum requirement only' and a combination of both. The latter is subdivided in 2 sub-options, one where the 2016 target level corresponds to a level that merely improves mains voltage halogens as much as possible, and one which replaces them with energy saving lamps 2016. All options and sub-options involving minimum requirements apply the 3-tier approach in terms of timing and intermediate target levels.

Chapter 5 gives the details of the assessments.

The analysis of sub-options leads to savings as show in the below table.

<b>Summary of impacts</b>	<b>Lbl only</b>	<b>Min only</b>	<b>Lbl+Min I</b>	<b>Lbl+Min II</b>
<i><b>Versus Baseline</b></i>				
TWh saving in 2020	4.9	2.3	5.4	24.7
TWh saving in 2025	7.8	5.6	7.8	28.4
Accumulative TWh saving 2011-2020	25.8	7.1	32.2	89.3
Accumulative TWh saving 2011-2025	58.8	29.1	65.2	225.8
Mt CO2 saving in 2020	1.9	0.9	2.1	9.5
Mt CO2 saving in 2025	2.8	2.0	2.8	10.3
Accum. Mt CO2 saving 2011-2020	10.2	2.9	12.8	35.1
Accum. Mt CO2 saving 2011-2025	22.4	11.0	25.0	85.6
El. costs saving in 2020 (in bln. Euro)	0.7	0.4	0.8	3.8
El. costs saving in 2025 (in bln. Euro)	1.2	0.9	1.2	4.3
Accum. el.costs saving 2011-2020 (bln Euro)	3.9	1.1	4.9	13.6
Accum. el.costs saving 2011-2025 (bln.Euro)	9.0	4.4	10.0	34.5
Extra purchase cost in 2020 (in bln. Euro)	0.2	1.7	0.2	2.5
Extra purchase cost in 2025 (in bln. Euro)	0.3	1.6	0.3	-0.1
Accum.extra purch. cost 2011-'20 (bln.Euro)	1.1	12.5	6.4	27.1
Accum. extra purch. cost 2011-'25 (bln. Euro)	2.6	20.4	7.8	25.9
Total cost saving in 2020 (in bln. Euro)	0.5	-1.3	0.6	1.3
Total cost saving in 2025 (in bln. Euro)	0.9	-0.8	0.9	4.4
Accum. costs saving 2011-2020 (bln. Euro)	2.8	-11.4	-1.5	-13.5
Accum. costs saving 2011-2025 (bln. Euro)	6.4	-16.0	2.2	8.6

The analysis shows that the combined Minimum requirement / labelling sub-options offer the best savings and the strongest reduction in CO2.

#### Conclusion on Step 3 and Step 4

Based on assessment of costs and benefits Option Lbl + Min II is the preferred option, as it optimally fulfils the requirements of the Ecodesign and Energy Labelling Directives. Therefore ecodesign requirements on energy efficiency of directional lamps should be set in three stages becoming effective 1, 2 and 4 years after entry into force of the regulation. A complementary energy labelling scheme establishes benchmarks for energy efficiency of directional lamps.

Functionality and product information requirements in the ecodesign regulation should ensure that consumers switching to energy saving lamps such as LEDs or compact fluorescent lamps can choose the models best fitting their needs which will not disappoint them by their performance.

In addition, some ecodesign requirements should be set on auxiliary equipment such as halogen lamp control gear and luminaires, in order to decrease the electricity losses they cause and to improve their compatibility with energy saving lamps. A label applied to luminaires in shops should inform the users about the energy classes of the lamps with which the luminaire is compatible, in order to warn them of any negative lock-in effects.

This combination of ecodesign requirements and energy labelling implies the following:

- cost-effective increase of DLS efficacy;

- correction of market failures and proper functioning of the internal market;
- no significant administrative burdens for manufacturers or retailers;
- increased purchase cost, mitigated by economies of scale for efficient technologies and quickly compensated by savings during the use-phase of the product;
- that the specific mandate of the Legislator is respected;
- reduction of the electricity consumption of about 25 TWh/year versus the baseline in 2020;
- an accumulated impact by 2020 of 89 TWh in electricity saving, of 35 Mt reduction in CO2 emissions, and of € 14 billion saving in electricity costs;
- an accumulated impact by 2025 of 226 TWh in electricity saving, of 86 Mt reduction in CO2 emissions, and of € 34 billion saving in electricity costs;
- a clear legal framework for product design which leaves flexibility for manufacturers to achieve the efficacy levels;
- costs for re-design and re-assessment upon introduction of the regulation, which are limited in absolute terms, and not significant in relative terms (per product);
- fair competition by creation of a level playing field;
- no proprietary technology imposed on market players;
- no significant impacts on the competitiveness of industry, and in particular SMEs;
- positive impact on employment, in particular for SMEs.

Monitoring of the impacts will mainly be done by market surveillance carried out by Member State authorities ensuring that the requirements for ecodesign and energy labelling of directional lamps are met, whereas the appropriateness of scope, definitions and concepts will be monitored by the on-going dialogue with stakeholders and Member States.