

Brussels, 18 March 2009

## **Frequently asked questions about the regulation on ecodesign requirements for non-directional household lamps**

On 18 March 2008, the Commission adopted a regulation on non-directional household lamps which would replace inefficient incandescent bulbs by more efficient alternatives (such as improved incandescent bulbs with halogen technology and compact fluorescent lamps) between 2009 and 2012.

The following table of contents provides clickable links (while pressing on the CTRL button) to the main questions relating to this regulation.

Further information on the Ecodesign Directive (2005/32/EC) and its implementing measures can be found at:

[http://ec.europa.eu/energy/efficiency/ecodesign/eco\\_design\\_en.htm](http://ec.europa.eu/energy/efficiency/ecodesign/eco_design_en.htm)

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IV.1. The Commission decided in 2007 to extend anti-dumping duties on compact fluorescent lamps imported from China and some other Asian countries. Without these duties, compact fluorescent lamps would be much cheaper in Europe and more people would buy them. How is this compatible with the energy efficiency policy of the Commission?

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### I. Timing and level of ambition

#### I.1. Why is it necessary to phase-out incandescent bulbs?

Lighting may represent up to a fifth of a household's electricity consumption. There is a four to five-fold difference between the energy consumption of the least efficient and the most efficient lighting technologies available on the market. This means that upgrading the lamps could reduce a household's total electricity consumption by up to 10-15% and save easily 50€ / year (taking into account the purchasing cost of lamps).<sup>1</sup>

Thanks to the regulation, EU citizens are expected to save close to 40 TWh (roughly the electricity consumption of Romania, or of 11 million European households, or the equivalent of the yearly output of 10 power stations of 500 megawatts) and reduce CO<sub>2</sub> emission by about 15 million tons of per year. The regulation is thus expected to reinject about 5-10 billion euros in to the EU economy.

#### I.2. Exactly what will be phased out and when?

Inefficient lamps (incandescent bulbs and conventional halogen bulbs) will be phased out gradually from the EU market starting in September 2009 and finishing in September 2012.

Inefficient **non-clear (= non-transparent) lamps** will be phased out as from September 2009. Non-clear lamps will be required to be A-class according to the EU lamp energy label (or slightly less efficient for certain lamps such as those with external envelope). In practice, considering currently available technologies, this means that non-clear lamps will be compact fluorescent lamps which save about 80% energy compared to incandescent lamps, or LEDs (for the moment, only with quite low light output). Consumers who for various reasons (aesthetics, size, shape etc.) would prefer another lamp technology can buy clear (transparent) lamps.

Inefficient **clear (transparent) lamps** will be phased out progressively, starting with the highest wattage (100W incandescent bulbs and above) in 2009.

From September 2009, lamps equivalent in light output to 100W transparent incandescent bulbs and above will have to be at least class C (improved halogens instead of incandescent bulbs).

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<sup>1</sup> Assuming 20 lamps in the household, which are initially all incandescent lamps and changed to compact fluorescent lamps of equivalent light output.

By the end of 2012, the other wattage levels will follow and will also have to reach at least class C. The most commonly used bulbs, the 60W will remain available until September 2011 and 40 and 25W bulbs until September 2012.

Clear (transparent) lamp	Non-clear lamp
	

Improved halogen bulbs for luminaires using incandescent bulbs are already available on the market, however their use is not yet widespread. Large manufacturers have them in their product portfolio (such as "HaloLux Classic ES", "EcoClassic30" and "MasterClassic EcoBoost" halogen bulbs).

**The regulation only covers the so-called "non-directional" lamps.** These emit light equally in all directions, as opposed to directional lamps (such as reflector lamps/spots) where the light is directed by a reflector in a given angle, so the method of calculating the efficiency slightly differs. Work is currently ongoing on another regulation targeting directional lamps planned for adoption in 2010 (see [www.eup4light.net](http://www.eup4light.net) for the preparatory study). See also IV.2.

Non-directional halogen lamp	Directional halogen lamp (reflector lamp)
	

## Detailed phase-out plan

Grey cells indicate the technology in question is still available at the given time, white cells mean that the technology is phased out according to the provisions given in the "Requirement" column.

Date	Non-clear lamps				Clear lamps							
	Requirement	Incandescent	All Halogen	CFL / LED	Requirement	Incandescent / Conventional halogen				Halogen C	Halogen B	LED <sup>1</sup>
						≥ 100 W	≥ 75 W	≥ 60 W	60 W >			
Today	None				None							
September 2009 <sup>1</sup>	A <sup>2</sup>				C for ≥ 100W <sup>3</sup>		≥ E <sup>3</sup>	≥ E <sup>3</sup>	≥ E <sup>3</sup>			
September 2010	A <sup>2</sup>				C for ≥ 75W <sup>3</sup>			≥ E <sup>3</sup>	≥ E <sup>3</sup>			
September 2011	A <sup>2</sup>				C for ≥ 60W <sup>3</sup>				≥ E <sup>3</sup>			
September 2012	A <sup>2</sup>				C for all							
September 2013	Second level of functionality requirements <sup>1</sup>											
Review 2014	Review											
September 2016	A <sup>2</sup>				B / C <sup>4</sup>					4		

<sup>1</sup> First level of functionality requirements introduced in first stage. LEDs are exempted from all functionality requirements.

<sup>2</sup> Refers to lamp energy label class. Correction factors apply to certain lamps, allowing them to be B-class.

<sup>3</sup> Minimum requirement for all lamps: E class. F and G lamps phased out.

<sup>4</sup> Only special cap halogen lamps are allowed to be class C.

## ***Lamps to be phased out gradually***

### **- A. Incandescent lamp (GLS)**

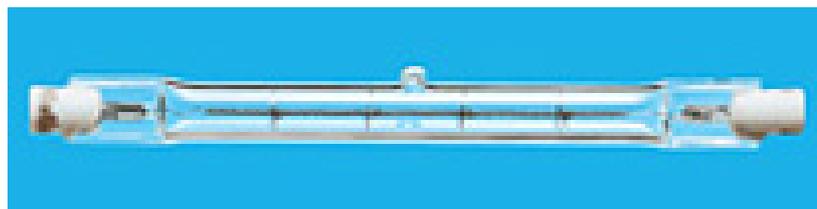
This lamp type was first commercialised in 1879 by Thomas Edison and reached the limits of further efficiency improvement in its current form already towards the middle of the last century. The light is produced by a threadlike conductor surrounded by inert gas or vacuum and heated to incandescence by the electric current passing through it.



### *Standard incandescent lamp*

### **- B. Conventional halogen lamps**

Improved incandescent lamp technology, first commercialised in the 1980's. Much smaller lamp size, equal or slightly higher efficacy than incandescents due to the replacement of the inert gas by gas containing halogens or halogen compounds. Their market share has been rapidly increasing in the past decade as their small size makes them more versatile for lighting design (luminaires and installations).



### *Conventional halogen lamps*

## ***Available alternatives***

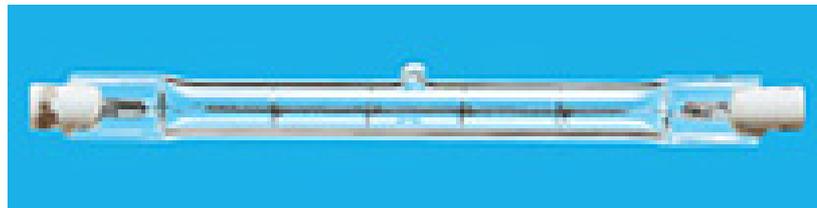
### **- A. Conventional low-voltage halogen lamps**

Many standard halogen lamps are low voltage lamps, which are more efficient than mains voltage (220 V) lamps. Conventional low voltage lamps (12 V) require a transformer either in the luminaire or integrated into the lamp. They can reach C-class efficiency and therefore will remain available until 2016.

### **- B. Halogen lamps with xenon gas filling (C-class)**

Recent technology. With xenon gas filling, the halogen lamp will use **about 25% less** energy for the same light output compared to the best incandescents, even at mains voltage. They can reach C-class efficiency and therefore will remain available at least until 2016. There exist two versions of this halogen lamp:

- a.) only the filling gas is replaced, the socket and the dimensions of the lamp are the same as for conventional halogens above, and therefore can only be used in luminaires with the special halogen sockets. These versions will remain available after 2016 in order to service the existing luminaire stock.



### ***Improved special socket halogen lamps***

- b.) the improved halogen capsule is placed in glass bulbs shaped like incandescent lamps with traditional socket, which makes it compatible with all luminaires using incandescent lamps (sold as retrofit “energy saver lamps”). These are to be replaced by class B or A lamps from 2016 (see next point).



### *C-class pear-shaped retrofit halogen lamp*

#### **- C. Halogen lamps with infrared coating (B-class)**

Recent technology. Applying an infrared coating to the wall of halogen lamp capsules considerably improves their energy efficiency, the lamp will use **about 45% less** energy for the same light output compared to the best incandescents. However, for technical reasons, this is only possible with low voltage lamps, so a transformer is needed, either as a separate unit, or integrated into the luminaire, or integrated into the lamp for an incandescent retrofit solution. As with the Halogen C lamps, both the special socket capsules and incandescent retrofit lamps are available in B class, however currently only one manufacturer is producing retrofit lamps (even though the technology is not protected by patents). Because of the heat coming from the lamp which affects the operation of the integrated transformer, their retrofit lamps are available only up to the equivalent of a 60W incandescent bulb.



*B-class pear-shaped retrofit halogen lamp with integrated transformer*

- **D. Compact fluorescent lamps (CFLs)**

It consists of fluorescent lamp tubes, for which the ballast is not sold as a separate item as for large tubes, but integrated into the lamp, which becomes a standalone retrofit solution to incandescent lamps. It was first commercialised in the 1980's. Its main interest lies in its long lifetime and high efficiency, the lamp will use **between 65% and 80% less** energy (from a third up to the fifth of the energy) for the same light output compared to incandescents. It sometimes comes with an external envelope which hides the tubes and makes it even more similar to light bulbs (though decreasing its efficiency). The envelope also shields off any unwanted ultraviolet radiations and risks connected to incorrect disposal.



*Compact fluorescent lamps with bare tubes and with bulb-shaped outer lamp envelope*

- **E. Light-emitting diodes (LEDs)** are a fast emerging technology, whose efficacy competes with that of CFLs. However, LEDs for room illumination are today only in the first phases of commercialisation, and rare are those that fulfil all the expectations of the consumers in terms of light output and other functionalities. They are likely to become true alternatives to CFLs very rapidly.

## Efficiency of lamp technologies compared with incandescent lamps (E-class)

Lamp technology	Energy savings	Energy class
Incandescent lamps	-	E, F, G
Conventional halogens (mains voltage 220 V)	0 – 15 %	D, E, F
Conventional halogens (low voltage 12 V)	25%	C
Halogens with xenon gas filling (mains voltage 220 V)	25%	C
Halogens with infrared coating	45%	B (lower end)
CFLs with bulb-shaped cover and low light output, LEDs	65%	B (higher end)
CFLs with bare tubes or high light output, LEDs	80%	A

### I.3. Why is the minimum efficiency requirement raised to class A only for frosted (non-transparent) lamps, not for all lamps?

The requirement on clear lamps is only raised to class C until 2016 (and to class B beyond 2016), so that other efficient technologies (such as improved halogen lamps) can remain on the market. This is necessary because current-day compact fluorescent lamps and light emitting diodes cannot provide the same type of light as the incandescent lamps that are being phased out. However halogen lamps do, and consumers who are keen on incandescent light quality for aesthetics or health reasons should have access to it.

### I.4. Why is the minimum efficiency requirement raised to class B for clear (transparent) lamps only in 2016?

This is done in order to ensure continuous supply of lamps for all applications and luminaires.

As of today, class B can only be achieved by halogen lamps that come with integrated transformers. These lamps are very new on the market, they do not exist yet with higher lumen outputs (the highest are equivalent to 60W incandescent lamps). Also, because of the size of the integrated transformer, the lamps may be incompatible with some luminaires. For the moment, it is therefore necessary to allow class C lamps on the market, which can be mains voltage halogen lamps without integrated transformer, that can be available in all lumen outputs and in all sizes. As these mains voltage halogen lamps are also rather new products currently sold in small numbers, industry needs to make investments to enlarge their production to supply the market after the incandescent phase-out. However, if the class C halogen lamps were to be phased out earlier than 2016, it would not be worthwhile for the industry to invest into them, so they would skip directly to class B lamps, which have the limitations in functionality outlined above.

**I.5. Isn't there a risk that there will be shortages of alternative lamp types when incandescent bulbs will be phased out?**

The International Energy Agency has gathered evidence (to be published soon) that the phase-out of incandescent lamps is unlikely to lead to worldwide shortages of compact fluorescent lamps. As most of the compact fluorescent lamps in Europe are imported from third countries, there is very little probability of shortages to occur. When it comes to efficient halogen lamps, the calendar of the phase-out in the regulation has been developed in a way to ensure that lamp manufacturers have the time to convert their incandescent lamp production lines to improved halogen lamp production.

**I.6. Isn't there a risk that European factories producing incandescent bulbs will be closed and their personnel fired when incandescent bulbs will be phased out?**

The calendar of the phase-out in the regulation has been developed in a way to ensure that lamp manufacturers have the time to convert their incandescent bulb production lines to improved halogen lamp production.

**I.7 Even the salespeople in the shops are unaware of the upcoming changes. How will people learn about the measure and know which lamps to buy from September 2009?**

It is in the best interest of industry and retailers to satisfy their clients at all levels of the distribution chain. The lamp industry has started to take care of information to retailers and to the public and to manage adequate supply of alternative product range. Although the regulation is not yet adopted, in the past weeks they have been extensive meetings with retailers to clarify the details of the incandescent bulb phase-out scheme and to make them aware of all the alternatives, so that in turn the retailers can channel the information to their customers and start placing orders to ensure a smooth transition.

Moreover, as soon as the regulation is adopted, the Commission is planning to convene the lamp industry, the retailers, other relevant stakeholders and the Member States to reinforce the communication for consumers across the EU.

**I.8. People are likely to stock up incandescent bulbs when they hear about the regulation. Does this not weaken the impact of the measure?**

Communication to consumers about available equivalent alternatives to incandescent bulbs (such as improved halogen bulbs) could help prevent much of the stocking of bulbs. Consumers will realise in the end that the alternatives provide substantial savings and have equivalent light quality to incandescents. They might decide not to use their old energy-wasting bulbs, or to install them only in rarely used places such as cellars.

Moreover, the estimate of 15 Mt CO<sub>2</sub> savings was calculated for the year 2020, by then any delaying effect of "hamstering" will have disappeared.

**I.9. Is it not disproportionate to ban incandescent bulbs from the market? Would it not be better to make use of other measures to achieve the switch (such as voluntary restrictions as in the UK, information to the public or taxation)?**

The draft regulation introducing minimum efficiency requirements (rather than a voluntary approach) is in line with the principle of proportionality. There is clearly a market failure in moving to the alternatives providing the least life cycle cost to the consumers. Since 1998, household lamps have to indicate their energy efficiency on the packaging, thanks to implementing measure 98/11/EC of the Energy Labelling Directive (92/75/EEC). In spite of the clear indications provided on the packaging and campaigns in many Member States, consumers have failed to direct their choices to the more efficient lamps offering equivalent service, and have been largely sticking to incandescent bulbs. This is due to the fact that the purchase price difference between incandescent bulbs and more efficient alternatives constitutes a psychological barrier, even if the higher initial investment pays off within a year and brings substantial (but much less visible) savings over the life cycle. Another deterring factor has been the sometimes poor quality of the so-called economic lamps placed on the market without being subject to quality requirements. This market failure can only be tackled with mandatory requirements on the efficiency level of all household lamps placed on the market in the EU. This also serves the interests of the internal market, as voluntary restrictions or taxes introduced in certain Member States or by some retailer groups in Europe would create barriers to the free movement of goods. They would have different efficiency limits and timing of the restrictions. In addition, for taxation to be an effective deterrant, it should multiply by 10 the price of incandescent bulbs.

Still the main point is that efficient lighting as provided for in the draft regulation is a way to save energy, to limit CO<sub>2</sub> emissions and to help consumers save money without loss of functionality.

**II. Legal framework (scope, exceptions, timing for adoption, application dates etc.)**

**II.1. Is the phase-out of incandescent bulbs the only provision of the regulation?**

No. The draft regulation covers the so-called "non-directional" lamps typically used in households. These include - among others - halogen lamps and compact fluorescent lamps, not only incandescent bulbs. Non-directional lamps emit light equally in all directions, as opposed to directional lamps (such as reflector lamps/spots) where the light is directed by a reflector in a given angle.

All non-directional household lamps will have to comply with the same minimum energy efficiency requirements. These requirements are set at such level that present-day incandescent bulbs and also conventional halogen lamps cannot fulfil them, therefore they will be phased out.

Alongside minimum energy efficiency requirements, requirements are also set on the functionalities of the concerned lamp types (e.g. lifetime and lighting performance), and on the product information to be displayed to allow the consumers to better select the appropriate lamps for a given purpose among the alternatives to incandescent lamps.

More information on the lamp types covered can be found in the technical briefing on the EUROPA website of Directorate General Energy and Transport.<sup>2</sup>

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<sup>2</sup> [http://ec.europa.eu/energy/efficiency/ecodesign/regulatory\\_committee\\_en.htm](http://ec.europa.eu/energy/efficiency/ecodesign/regulatory_committee_en.htm)

## **II.2. Does the regulation affect lamps not meant for household lighting (lamps for street lighting, for photography, for the partially sighted, for antique luminaires, for ovens, for terrariums etc.)?**

The aim of the regulation is to cover lamps that are typically used in household lighting, but also when they are marketed for non-household use. Therefore the following cases are possible for lamps not meant for household lighting:

- a.) For some of the special applications currently using incandescent bulbs or conventional halogen bulbs, the alternative technologies remaining on the market should be suitable options. Improved halogen bulbs provide exactly the same type and quality of light as incandescent bulbs or conventional halogens, they come in the same shapes and appearance, and fit into all existing luminaires. They start and provide their full light output as soon as they are switched on, and they are insensitive to frequent switching. Therefore they are suitable for devices using flashing light.

Modern compact fluorescent lamps come in many sizes and shapes, so their compatibility with existing luminaires (including antique ones) has greatly increased recently. At this stage, LEDs are a smart and aesthetic choice for creating and upgrading decorative lighting installations.

The purchase price of the alternatives is currently higher than that of incandescent lamps, but improved halogen bulbs should approach current incandescent lamp price levels once their mass production starts. Nevertheless, all alternatives provide substantial savings over the life cycle (varying from one alternative to the other), due to their lower energy consumption.

- b) All fluorescent lamps (with the exception of self-ballasted compact fluorescent lamps) and all high-intensity discharge (HID) lamps are excluded from the scope of the regulation. If the given device or application uses such lamps, they have to fulfil the requirements of the regulation on tertiary sector lighting products, not the requirements of this regulation. Note that most special purpose fluorescent or HID lamps are excluded from the scope of the tertiary sector lighting products regulation.
- c) Some lamps are exempted based on technical parameters, because the parameter makes it very clear that the lamp cannot be used in household room illumination. These lamps are: coloured lamps (defined by chromaticity coordinates), very weak or very strong lamps (below 60 lumens or above 12000 lumens light output, roughly corresponding to Christmas lights and stage lighting lamps) and ultraviolet lamps (based on light spectrum specificities).
- d) For special applications or devices where there is clearly no alternative to incandescent bulbs or conventional halogens (such as oven lamps, infrared lamps, rough service lamps, pet-care lamps etc.), the regulation allows the sales of special purpose lamps not fulfilling the requirements of the regulation, provided the special purpose is clearly stated on the packaging together with an indication that the lamp is not suitable for room illumination. These lamps are often designed to operate under extreme conditions (e.g. high temperatures). In case specific technical parameters of the lamp serve its special purpose, those parameters are to be indicated in the technical documentation file established by the manufacturer for conformity assessment.

### **II.3. The regulation is said to be implementing the Ecodesign Directive (2005/32/EC). What is that directive about?**

The Directive on the Ecodesign of Energy-using Products provides a framework for the Commission, assisted by a committee of experts from the Member States, to adopt environmental performance requirements that products need to meet for being placed on the EU market.

When setting the energy efficiency requirements for household lamps, the Commission has also to take into account other aspects, such as the life-cycle impact of the lamps in major environmental impact categories, their functionalities from the consumer's perspective, health and safety of the users, or the competitiveness of industry.

Such measures have to be preceded by extensive stakeholder consultation and be accompanied by an assessment of the impacts on the lamp industry and on consumers (affordability, aesthetic and quality of lighting).

Before adopting a measure, the Commission asks the opinion of a committee of Member States experts who vote (with the same number of votes as in the Council).

### **II.4. Is there scientific evidence behind the decision to phase out incandescent bulbs, including on the impact of alternative technologies? Were affected stakeholders consulted?**

Before the legislation on phasing out incandescent bulbs was drafted, an extensive technical-environmental-economic study looked into the different lamp technologies involved, in order to determine their improvement potential as regards the environmental impact of lighting over the full life cycle of the products, as well as the potential impact of their use on consumers and on the lamp industry. The study is available from the website [www.eup4light.net](http://www.eup4light.net). Stakeholders, including consumer organisations, green NGOs and industry associations had the opportunity to comment both during the preparatory study and on the early working documents of the Commission in the Ecodesign Consultation Forum.

### **II.5. Is the adoption procedure of the regulation completed?**

Yes. On 8 December 2008, it was a committee of Member State representatives that endorsed the draft regulation. The draft was then sent to the European Parliament and to the Council of Member States for scrutiny, who had three months, until 15 March 2009, to endorse or reject it. Since they did not object to it, the European Commission formally adopted it on 18 March 2009. It enters into force 20 days after its publication in the Official Journal of the EU. The first requirements will start applying from 1 September 2009, followed by five further stages in 2010, 2011, 2012, 2013 and 2016.

### **II.6. Will the regulation apply to lamps that are already in stores or in the stocks of the retailers at the date of application of the requirements?**

No. The regulation will only apply to the products that are "placed on the market" (sold by the manufacturer or importer) after the application date of the requirements. For the first stage requirements, this means after 1 September 2009, so 100 Watt incandescent bulbs that were already on the shelves of the retailers or in retailer stocks before 1 September will continue to be sold until they run out.

## **II.7. How come the bureaucrats of the European Commission are suddenly taking a decision that affects so much the life of every European citizen?**

By presenting a draft regulation aiming at phasing out the less energy efficient lamps, the Commission is implementing the specific mandate from the European Parliament and the Council of Member States as originally laid down in the Ecodesign Directive (2005/32/EC, see point II.3 of this FAQ). In its Article 16, the Directive specifically requested the Commission to introduce implementing measures on lighting in the domestic sector through this procedure.

The importance of this measure was underlined by the Spring European Council of 2007, which invited the Commission to *"rapidly submit proposals to enable increased energy efficiency requirements (...) on incandescent lamps and other forms of lighting in private households by 2009"* and by the Parliament itself in its resolution of 31 January 2008 on the Action Plan for Energy Efficiency, where the European Parliament stressed *"the importance of the Commission's keeping to the proposed timetable for the withdrawal of the most inefficient light bulbs from the market"*. Again, in October 2008, the Council of Energy Ministers invited the Commission to *"submit in 2008 a draft Regulation that will launch a gradual process of phasing out until incandescent lamps and all the worst-performing lights are banned."*

In parallel to these mandates, the Commission's services developed a draft regulation on non-directional household lamps. The procedure started already in December 2006 through a preparatory study. After a thorough technical-environmental-economic analysis of the available household lamps and their improvement potential, which was carried out openly with the involvement of stakeholders, a working document based on these recommendations was discussed with Member States and stakeholders (including a wide range of NGOs and industry) in the Ecodesign Consultation Forum in March 2008.

Building on the opinions expressed in the Forum, and on a parallel impact assessment, the Commission's services prepared the text of the draft regulation, which was fully endorsed in the Regulatory Committee on 8 December 2008, without opposition from any of the Member States.

The Environment Committee of the European Parliament discussed the measure on 17 February 2009 and decided not to object to it.

This exhaustive preparatory process has ensured that the interests of European citizens were well represented during the development of the draft regulation.

## **III. Compact Fluorescent Lamp issues**

### **III.1. What is the advantage of using compact fluorescent lamps?**

A compact fluorescent lamp offers:

- up to 80% energy saving compared to an incandescent bulb
- about 60 € cost savings over its lifetime
- a lifetime of at least 6-10 years (compared to 1-2 years for incandescent bulbs)
- no risk of burning due to the lamp's operating temperature
- a wider choice of colour temperatures (cool or warm light, incandescent bulbs can only be warm light)

### **III.2. By banning incandescent bulbs, are you forcing the use of compact fluorescent lamps? Are they not bad alternatives to incandescent bulbs?**

The best compact fluorescent lamps today can offer **lighting functionalities** approaching and in some respect surpassing that of incandescent bulbs (e.g. higher variety of colour temperatures). In order to guarantee a minimum quality for compact fluorescent lamps on the market, the regulation also establishes requirements on product functionality (lifetime, warmup times, colour rendering etc.). Requirements for adequate **information provision** on the product functionalities will also ensure that consumers can make **informed choices**. See the other questions in section III for the details.

Compact fluorescent lamps will not be the only lamps allowed on the market after the phase-out of incandescent bulbs. Compact fluorescent lamps produce similar light to frosted (non-transparent) incandescent lamps, but different light from **clear (transparent) lamps which are bright point light sources**. In order for such lamps to continue to exist, the **regulation allows transparent improved (class C according to the lamp energy label) halogen bulbs** on the market. Improved halogen bulbs provide exactly the same type and quality of light as incandescent bulbs or conventional halogens, they come in the same shapes and appearance, and fit into all existing luminaires. They start and provide their full light output as soon as they are switched on, and they are insensitive to frequent switching. These lamps can be useful also for consumers who are looking for alternatives to compact fluorescent lamps for other reasons (sensitivity to light or aesthetic considerations such as need for small lamps in decorative luminaires).

Improved halogen bulbs for luminaires using incandescent bulbs are already available on the market, however their use is not yet widespread. Large manufacturers have them in their product portfolio (look for lamps such as "HaloLux Classic ES", "EcoClassic30" or "MasterClassic EcoBoost").

### **Compact fluorescent lamp performance\_(quantity and quality of light, lifetime etc.)**

#### **III.3. Is it true that compact fluorescent lamps produce less light than incandescents?**

Compact fluorescent lamps can produce just as much light as incandescent bulbs. Consumers should check the product packaging to buy lamps of the appropriate power and light output. Currently, exaggerated claims are often made on the packaging about the light output of compact fluorescent lamps (e.g. that a 11-12 Watt compact fluorescent lamp would be the equivalent of a 60 Watt incandescent, which is not true). The regulation will introduce restrictions on equivalence claims made on the product packaging, in order to keep the claims reasonable. Until then, for guaranteed satisfaction, a simplified method could be used to compare wattages when selecting the compact fluorescent lamp, by applying a 1:4 ratio (example: the light output of 15W compact fluorescent lamp is slightly more than the light output from a 60W incandescent). Even with this conversion ratio, compact fluorescent lamps are much more energy efficient than incandescent bulbs.

Nevertheless, it is highly recommended to consider the light output of the lamps instead of their wattage if you want to compare them. It is this quantity (expressed in lumens on all lamps from 2010) that really describes the performance of a lamp, therefore it allows direct comparisons without a need for conversion. For example, a 15 W compact fluorescent lamp typically provides 799 lumens of light and a 60 W incandescent lamp 710 lumens. See also III.9.

**III.4. Is it true that compact fluorescent lamps have a much shorter life time than generally claimed?**

Untrue. There are indeed low quality compact fluorescent lamps that do not reach their normal life time (6000 h), but most respect the claimed values in average domestic use. The regulation introduces requirements on lifetime so that national market surveillance can eliminate free-runners.

**III.5. Is it true that compact fluorescent lamps should not be switched on/off frequently because it shortens their lifetime? For example, does it make sense to install them in a toilet which is used for 5 minutes 10 times a day?**

This functionality is also addressed by the regulation, requiring that compact fluorescent lamps should reach the claimed life time while being switched on/off once for every hour of operation. Where frequent on/off switching is likely, dedicated compact fluorescent lamps that can endure up to 1 million switching cycles, or other energy saving light sources insensitive to switching can be used (such as halogen lamps which will also remain available).

**III.6. Is it true that compact fluorescent lamps cannot be dimmed?**

Untrue, there are compact fluorescent lamps on the market that can be dimmed, and there are dimmers that can dim any compact fluorescent lamp. Consumers should carefully read product information concerning dimmability. Improved halogen lamps will also remain available and provide full dimmability in all circumstances.

**III.7. Do compact fluorescent lamps really take longer to switch on and warm up to full light output than incandescent lamps?**

True. In order to guarantee an acceptable level of service with any compact fluorescent lamp, the regulation introduces minimum requirements on switch-on and warm-up times. Switching on a compact fluorescent lamp shall not take more than 2 seconds, and it should reach 60% of its full light output within one minute. However, there are now compact fluorescent lamps on the market that come close to incandescent bulbs for these performance parameters from the point of view of the average consumer. If these are features consumers are concerned about, they should look out for the information on the product packaging, where the manufacturers will be required to display warmup-times. Improved halogen lamps will also remain available and provide full light output instantly.

**III.8. Isn't the shape of compact fluorescent lamps ugly and do they not produce unpleasant light (also in terms of colour rendering, colour temperature and light spectrum)?**

Consumers usually find modern quality CFLs perfectly suitable for everyday tasks and aesthetically pleasing. There may be some substandard compact fluorescent lamps on the market, but those will be removed through the functionality requirements of the regulation.

Improved halogen lamps will also remain available and produce exactly the same light quality as incandescent bulbs.

Overall, the perception of shape and light quality is quite subjective, however there are parameters that can be measured. On some of these parameters, CFLs are actually doing better than incandescent bulbs and halogens.

**- Size and shape**

Modern CFLs come in a variety of sizes and shapes approaching that of incandescent bulbs. The outer lamp envelope that hides the small twisted lighting tubes has become commonplace, and makes CFLs resemble frosted (non-transparent) incandescent bulbs in appearance.

- **Colour rendering**

In order to ensure proper colour rendering (ability to reproduce the colours of the objects lit) for CFLs, the draft regulation introduces a minimum requirement on this product parameter.

- **Colour temperature**

CFLs can be produced with different colour temperatures (warm/cold) depending on consumer needs, whereas incandescent lamps can only provide warm white light. The draft regulation requires the indication of colour temperature on the lamp's packaging, so consumers should watch out for this information.

- **Light spectrum**

The light spectrum of incandescent bulbs resembles that of natural daylight in that it is a continuous curve with no abrupt changes across the spectrum of colours. On the other hand, natural daylight is as strong at the blue and ultraviolet wavelengths as at the yellow and red wavelengths, whereas light from incandescent bulbs has very little blue component and an extremely high proportion of red and infrared component (therefore their light is very yellow and most of it is emitted as heat). Compact fluorescent lamps differ from natural daylight in that they do not have a continuous spectrum. They emit a high amount of light at certain wavelengths and almost nothing at adjacent wavelengths. However, in terms of the proportion of light emitted within the blue and red wavelength ranges, there are compact fluorescent lamps that are able to reproduce daylight more precisely than incandescent bulbs.

### **III.9. Is it true that compact fluorescent lamps do not always fit in the luminaires housing incandescent lamps?**

Compact fluorescent lamps exist today in many sizes and shapes to replace incandescent bulbs. Where there is indeed too little room for any compact fluorescent lamp to fit in, improved halogen bulbs could be used to replace incandescent bulbs.

### **III.10. Do compact fluorescent lamps lose light as they age?**

It is true that during their long lifetime, compact fluorescent lamps will gradually emit less light than at the beginning (incandescent bulbs lose light too, but because of their short lifetime the loss is less noticeable). At the end of their life, compact fluorescent lamps often lose 30% of their initial light. This is why the regulation requires that when claims are made on the packaging of a compact fluorescent lamp concerning equivalence with an incandescent bulb (see III.3), the light output (and power) required from the compact fluorescent lamp is overstated. This way the user will get initially more light from the compact fluorescent lamp than from the incandescent bulb that is claimed to be equivalent to the compact fluorescent lamp on the packaging. The regulation also introduces a minimum requirement on light output at the end of life of the lamps. Nevertheless, over its life, the light output of the compact fluorescent lamp may decrease below the light output of the "equivalent" incandescent bulb. Most users should not notice the difference, those who do will have the option of replacing the compact fluorescent lamp earlier than its normal end of life.

### **III.11. Is it true that compact fluorescent lamps do not work in cold temperatures ?**

A standard compact fluorescent lamp will indeed lose a substantial part of its light output in cold temperatures. However, there exist compact fluorescent lamps designed specifically for outdoor use which can withstand cold temperatures without losing performance. Consumers should watch out for this information (required by the regulation for display on the packaging) when purchasing compact fluorescent lamps. Improved halogen lamps will also remain available and can operate in any ambient temperature.

## Compact fluorescent lamp cost issues

### III.12. Aren't compact fluorescent lamps much more expensive than incandescent bulbs?

Compact fluorescent lamps are actually much cheaper than incandescent bulbs if you consider also lamp life time and costs related to electricity consumption while using the lamps. During the lifetime of one compact fluorescent lamp you will have used 6-10 incandescent lamps. And the compact fluorescent lamp will consume one fourth / one fifth of the electricity consumed by incandescents, another cost saver. A six-year-life energy-saving bulb would save about €60 during its lifetime (80W incandescent versus 20W compact fluorescent lamp). This is based on an assumption of 3 continuous burning hours per day, for an energy cost of 0,15 €/kWh.

## Compact fluorescent lamp environmental impact issues

### III.13. More materials and energy are needed to produce a compact fluorescent lamp than an incandescent bulb, and it also results in more waste at the end of life. Does this not outweigh the benefits of its energy efficiency?

According to the technical study ordered by the Commission to prepare for the regulation on household lamps ([www.eup4light.net](http://www.eup4light.net)), the impact of energy savings during the use of a compact fluorescent lamp clearly outweigh the environmental impact of its production and its end-of-life. Therefore using them rather than incandescent bulbs reduces the overall energy use and the environmental impact of lighting.

### III.14. Is it true that because of high energy use at start-up, compact fluorescent lamps have to remain switched on for 45 minutes before they bring any energy saving at all?

No. The energy use of compact fluorescent lamps in the first 2 to 3 seconds of their operation is slightly higher, but after that their power uptake is stabilised. In practice, they provide energy savings right from the moment they are switched on.

### III.15. Compact fluorescent lamps contain mercury, a hazardous material, incandescent bulbs do not. If more compact fluorescent lamps are used, does it not mean more mercury pollution in the EU?

Mercury is present in compact fluorescent lamps in such a small amount that during its lifetime a compact fluorescent lamp (CFL) will have saved more mercury emissions from electricity production in coal power plants (compared to the mercury emissions related to the incandescent bulbs' electricity need) than is contained in the CFL itself. Moreover, CFLs should be recycled according to EU legislation already in place.

Mercury is an important component of compact fluorescent lamps (CFLs) that plays a key role in their energy efficiency and also other parameters such as lifetime and warm-up times. There are up to 5 milligrams (0,005 grams) of mercury contained in a CFL (compared to 0,5 g in dental amalgam filling or several grams in older thermometers). The 5 mg limit is set in the Restriction on Hazardous Substances Directive (2002/95/EC).

Compact fluorescent lamps have been widely used in European homes in the past decade, they will not be introduced by this regulation. Most office and public buildings, and also most streets have been equipped for the last 50 years with fluorescent and high-intensity discharge lamps containing mercury (often much more than compact fluorescent lamps).

The Waste Electrical and Electronic Equipment Directive (2002/96/EC) provides for the collection and recycling of waste electrical and electronic equipments (WEEE), including lighting equipment such as CFLs. The Directive sets out collection requirements for all WEEE, specific treatment requirements and a recycling target for gas discharge lamps (including CFLs). According to the requirements, mercury needs to be removed from the collected lamps through treatment, and their recycling should meet an 80% minimum target. Once consumers learn that they have to take back their burned-out CFLs to collection points just as they do with batteries, the mercury content will be recycled and not released to the environment.

Member States have to ensure that users of electrical and electronic equipment are given the necessary information about the requirement not to dispose lamps as unsorted municipal waste and to collect such waste separately, as well as about the return and collection system available to them.

After the regulation is adopted, the Commission will remind the Member States of the need to reinforce the recycling of CFLs on their territory.

The Commission also proposed to recast the WEEE Directive on 3 December 2008, so that the collection target for all WEEE is increased and the recycling target for gas discharge lamps is set at the level of 85%. This proposal will now go to co-decision with the Council and the European Parliament.

From a life-cycle perspective, the proposed regulation is in any case the most eco-efficient solution. Indeed, according to the technical study ordered by the Commission to prepare for the regulation on household lamps ([www.eup4light.net](http://www.eup4light.net)), even in the worst possible case that a CFL goes to the landfill, during its lifetime it will have saved more mercury emissions from electricity production in coal power plants (compared to the mercury emissions related to the incandescent bulbs' electricity need) than is contained in the CFL itself, so the overall mercury pollution balance will be positive.

Improved halogen bulbs that do not contain any mercury are and will remain available, however they provide 25-45% energy savings compared to incandescent bulbs, whereas compact fluorescent lamps save up to 80%.

LEDs (light emitting diodes) are a rapidly emerging mercury-free technology, meeting or even surpassing compact fluorescent lamps in efficiency. However, at this stage they are not yet developed enough to be valid alternatives to the full range of household incandescent bulbs (mainly available in low light outputs only, equivalent to 25W incandescent bulbs). It can be expected that in the next few years they will develop to become replacements for most existing lamps, however there is no absolute certainty about that and we need to act on climate change right away with the products that are already on the market. Nevertheless, the Commission is financing research into LEDs for general lighting through the ongoing and future calls of the EU's 7<sup>th</sup> Research Framework Programme. The proposed regulation will be revised at the latest 5 years after adoption, and due account will be taken of the state of development of the LED market.

### **III.16. Compact fluorescent lamps cause losses in the electrical distribution grid due to a poor power factor. Incandescents do not. Is this taken into account when assessing their energy efficiency?**

According to the technical study ordered by the Commission to prepare for the regulation on household lamps ([www.eup4light.net](http://www.eup4light.net)), even if we assume they have a poor power factor, compact fluorescent lamps are overall much more energy efficient than incandescents. Besides, the regulation on household lamps requires a minimum power factor for compact fluorescent lamp lamps.

**III.17. Incandescent bulbs produce a lot of heat, compact fluorescent lamps much less. When compact fluorescent lamps replace incandescent bulbs in a room, does the increased heating need in the room negate the energy saving through the lower consumption of lighting?**

Though it is accepted that incandescent lamps emit heat, incandescent bulbs are not an efficient way to regulate indoor temperature. The location on the ceiling is inefficient, electrical heating itself is inefficient compared to other forms of heating (e.g. gas or heat pumps), the heating is unnecessary in the summer period and may even result in increased cooling needs, and not all rooms needing lighting need also heating. Because of all these factors, heat from lighting is considered as energy loss rather than useful energy.

Nevertheless, when it comes to quantifying the improvement potential of the switch from incandescent lamps to compact fluorescent lamps, the UK Market Transformation Programme recommends using correction factors<sup>3</sup>, to take into account what they call the "heat replacement effect". But even these factors remove only 20 to 30% of the estimated savings in energy costs and CO2 emissions, meaning that the balance of savings achieved is still substantial both for the consumer and for the environment.

The improved retrofit halogen bulbs that will remain available only provide 25-45% energy savings compared to incandescent bulbs (whereas compact fluorescent lamps save up to 80%), which means they still radiate much of the energy they use as heat rather than light.

### **Compact fluorescent lamps and health**

**III.18. The light produced by compact fluorescent lamps aggravates the symptoms of people suffering from auto-immune diseases such as lupus and ME. They now use incandescent bulbs in their homes, if these are phased out will they be left in the dark?**

The Scientific Committee on Emerging and Newly Identified Health Risks (on a mandate from the Commission services) has been looking into the question of possible health effects of compact fluorescent lamps on people with certain diseases and on the general public, following up to complaints from certain patients' associations. The Committee examined flicker, electromagnetic fields (EMF) and ultraviolet / blue light radiation from the lamps to determine whether they aggravate the symptoms of such patients. In its report<sup>4</sup>, the Committee found no evidence that would indicate that either EMF or flicker could be a significant contributor. For the general public, very close exposure to a bare lamp (< 20 cm) for more than 8 hours could eventually affect health by exceeding workplace limits on UV emissions. This is a situation that does not occur in normal use. Hands held very close to halogen lamps or touching incandescent lamps get burnt much more quickly because of the intense heat, so such a situation is not usual anyway with household lamps.

On the other hand, according to the report the symptoms of a maximum of 250.000 people in the EU suffering from diseases accompanied by light sensitivity could be aggravated in the presence of bare compact fluorescent lamps (independent of distance) due to UV and blue light emissions.

Using commonly available compact fluorescent lamps with a second lamp envelope can both solve the problem of light-sensitive patients and prevent overexposure of the general public even in extreme situations. However, the envelope slightly lowers (about 10%) the efficacy of the compact fluorescent lamp, meaning more lamps using more power will be needed for the same light output. Transparent or translucent luminaires that fully cover up the bare lamps have the same effect as a second lamp envelope. Also alternative technologies can be chosen by consumers, such as improved halogen lamps that have identical light spectrum to incandescent bulbs.

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<sup>3</sup> <http://www.mtprog.com/cms/product-strategies/subsector/cross-sector>

Related briefing notes: BNXS05, BNXS24, BNXS29

<sup>4</sup> [http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihr/docs/scenihr\\_o\\_019.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_019.pdf)

In addition, the ecodesign regulation on non-directional household lamps introduces maximum UV emission limit values for the lamp types involved.

**III.19. Is it true that compact fluorescent lamps produce light through high frequency discharges causing flicker and triggering attacks on people suffering from epilepsy?**

The Scientific Committee on Emerging and Newly Identified Health Risks (on a mandate from the Commission services) did not find proper evidence underpinning any negative health effects relating to flicker. The Committee examined flicker, electromagnetic fields (EMF) and ultraviolet / blue light radiation from the lamps to determine whether they aggravate the symptoms of such patients. In its report<sup>5</sup>, the Committee found no evidence that would indicate that either EMF or flicker could be a significant contributor. Modern compact fluorescent lamps operate at frequencies so high that they are beyond human perception. Also alternative technologies can be chosen by consumers, such as halogen lamps.

**III.20. Is it true that compact fluorescent lamps generate electromagnetic fields and should not be used as bedside lamps or desk lamps where they are too close to the human body?**

Compact fluorescent lamps have to comply with the EU requirements on product safety which also include electromagnetic fields. Also alternative technologies can be chosen by consumers, such as improved halogen lamps without integrated transformer, which only generate the same type of electromagnetic fields as incandescent bulbs.

**III.21. Compact fluorescent lamps contain mercury, which is a highly toxic substance. Do compact fluorescent lamps represent a danger to health because of that?**

Mercury is an important component of compact fluorescent lamps (CFLs) that plays a key role in their energy efficiency and also other parameters such as lifetime and warm-up times. There are up to 5 milligrams (0,005 grams) of mercury contained in a CFL (compared to 0,5 g in dental amalgam filling or several grams in older thermometers). The 5 mg limit is set in the Restriction on Hazardous Substances Directive (2002/95/EC).

Compact fluorescent lamps have been widely used in European homes in the past decade, they will not be introduced by this regulation. Most office and public buildings, and also most streets have been equipped for the last 50 years with fluorescent and high-intensity discharge lamps containing mercury (often much more than compact fluorescent lamps).

The mercury content cannot escape from CFLs, except in the event of accidental breakage of the lighting tubes. In that case less than 5 milligrams of mercury could be released.

The draft Ecodesign regulation requires manufacturers to explain on their websites how consumers should clean debris in case the CFL's tubes accidentally break, and to include on the packaging of each lamp the link to online explanations. Such an explanation is already available on the website of the European Lamp Companies Federation.

Buying commonly available CFLs with an outer non-breakable lamp envelope is another way to address the issue of mercury leakage in case of accidental lamp breakage, but the envelope slightly lowers (about 10%) their efficacy.

Consumers who would particularly worry about mercury can choose alternative technologies such as improved halogen lamps.

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<sup>5</sup> [http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihr/docs/scenihr\\_o\\_019.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_019.pdf)

### **III.22 Can compact fluorescent lamps make people ill?**

In normal use, compact fluorescent lamps do not make healthy people ill. They could aggravate the symptoms of some pre-existing conditions such as light sensitivity, but with some simple and commonplace precautions this aggravation can be avoided (see III.18). They do not flicker (see III.19) and the electromagnetic fields they emit are within health limits (see III.20).

### **III.23 Does the specific light spectrum of compact fluorescent lamps make them a threat to public health?**

The Scientific Committee on Emerging and Newly Identified Health Risks (on a mandate from the Commission services) has been looking into the question of possible health effects of compact fluorescent lamps on people with certain diseases and on the general public, following up to complaints from certain patients' associations. The Committee concluded<sup>6</sup> that for the general public, very close exposure to a bare compact fluorescent lamp (< 20 cm) for more than 8 hours could eventually affect health by exceeding workplace limits on UV emissions. This is a situation that does not occur in normal use. Hands held very close to halogen lamps or touching incandescent lamps get burnt much more quickly because of the intense heat, so such a situation is not usual anyway with household lamps. Using commonly available compact fluorescent lamps with a second lamp envelope or transparent/translucid luminaires that fully cover up the bare lamps can entirely prevent such a situation.

During the preparatory process, no scientific evidence was forwarded to the Commission about potential negative health effects on the general public of the light spectrum of compact fluorescent lamps other than in the ultraviolet range.

These lamps have been widely used in European homes in the past decade, they will not be introduced by this regulation. Most office and public buildings, and also most streets have been equipped for the last 50 years with fluorescent and high-intensity discharge lamps that have a light spectrum similarly structured to that of compact fluorescent lamps.

Also alternative technologies can be chosen by consumers, such as improved halogen lamps that have identical light spectrum to incandescent bulbs. The Commission is committed, however, to keeping this issue under close review over the next three years, during which incandescent bulbs are to be phased out, and, on the basis of further scientific evidence, to propose additional measures if they are deemed necessary.

## **IV. Other EU measures on household lamps and lighting**

### **IV.1. The Commission decided in 2007 to extend anti-dumping duties on compact fluorescent lamps imported from China and some other Asian countries. Without these duties, compact fluorescent lamps would be much cheaper in Europe and more people would buy them. How is this compatible with the energy efficiency policy of the Commission?**

When extending in 2007 the anti-dumping duties on compact fluorescent lamps imported from China and some other Asian countries for one more year, the Commission looked carefully into social, economic and environmental factors. However, as no request for extension of the duties was submitted by an economic actor in 2008, the duties were cancelled in October 2008.

### **IV.2. According to its title, the regulation covers "non-directional household lamps". Are there plans to cover other products with EU energy efficiency legislation, such as directional lamps, non-household lamps or lighting products other than lamps?**

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<sup>6</sup> [http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihr/docs/scenihr\\_o\\_019.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_019.pdf)

- **Directional lamps** (reflector lamps or spotlights, as opposed to non-directional lamps that emit light in all directions) are planned to be covered by a similar regulation, planned for adoption in 2010.
- **Non-household lamps** are already covered by a similar regulation targeting lighting products used in the tertiary sector (more specifically office and public street lighting). The technologies covered include most fluorescent tubes and many high-intensity discharge lamps.
- Among **lighting products other than lamps, ballasts** are covered in the draft regulation targeting lighting products used in the tertiary sector, which also contains some provisions for luminaires. Specific and more detailed measures on the efficiency of luminaires are also planned to be adopted by the Commission in 2010.

#### **IV.3. Are there plans to revise the existing lamp energy labelling?**

Lamps have had to display an A-G scale energy label on their packaging since 1998. It is planned to reexamine the scale taking into account the phase-out of many inefficient lamps and the recent appearance of more efficient lamps, and also to extend the scope of the label to the so-far excluded reflector lamps and low voltage lamps, probably in 2010.