Van Holsteijn
en Kemna

Vlaamse Instelling voor
Technologisch Onderzoek

Preparatory Study on Light Sources for Ecodesign and/or Energy Labelling Requirements ('Lot 8/9/19').

Comments of stakeholders following the meeting of 5 February 2015

(on Task reports 0 – 3 and presentation)

SPECIFIC CONTRACT No ENER/C3/2012-418 LOT1/07/SI2.668526

Implementing Framework Contract No ENER/C3/2012-418-Lot 1

Prepared by VHK, in cooperation with VITO and JeffCott Associates
Date: 15 April 2015

Prepared for the European Commission, DG ENER.C.3

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Contents

1. INTRODUCTION AND SURVEY OF COMMENTS

This document collects the comments that have been received from stakeholders on the draft Task 0, 1, 2 and 3 reports and on the presentation held during the 1st stakeholder meeting of 5 February 2015.

The report consists of a table for each stakeholder, containing:

- a summary of the comments,
- the reply of the study team to these comments,
- the actions undertaken to change the Task 0-3 reports, if any.

The original comments will be published on the website http://ecodesign-lightsources.eu/ in the documents section.

Comments have been received from the following stakeholders:

- Industry association representing leading European lighting manufacturers and national lighting associations LightingEurope (LE) [1]
- Federal Environment Agency of Germany (Umwelt BundesAmbt, UBA)
- European consumers organisations (ANEC&BEUC)
- Danish Energy Agency (DEA)
- International Association of Lighting Designers (IALD)
- European Committee of Electrical Installation Equipment Manufacturers NIKO/CECAPI
- Lighting products manufacturer Neonlite

[1] In addition to the formal comments of LE on the Task 0-3 reports, this also includes additional input received by the study team in December 2014 in reaction to a request to forward issues for the review of regulations 1194/2012 and 874/2012. These inputs could not be considered in the original issues of the Task 0-3 reports and are therefore taken into account now as 'comments'.

2. SUMMARY OF LIGHTINGEUROPE COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Scope / Definition	"Decorative" needs to be better defined: e.g. Gadgets which shine (light the way for someone) are no luminaires.	The need for better definitions has already been underlined in the Task 1 report and in the presentation, not only for "decorative". The gadget is understood to refer to the spectacles with integrated LEDs for reading, as shown during the meeting. No action on reports.
Special purpose, shock proof	The misuse of incandescent lamps as shock proof lamps should be highlighted: estimated real shock proof lamps = 9.8 million (pieces sales/year). Estimated misused of incandescent lamps = 294.7 million (pieces sales/year).	Shockproof lamps and related abuse have been extensively addressed in Task 1 par. 1.4.2.1, including also earlier LE comments, that are equivalent to the current comment. A short-term solution is under discussion, separately from the current study. A long-term solution is part of the more general problem of the definition of special purpose lamps, which is addressed in the study. The study mentions 16 mln pieces/year abusively sold as shock proof. The 294.7 mln mentioned by LE does not seem to refer to shock proof alone. It would be interesting to have a background / motivation for this figure. For reference: the MELISA estimate for total GLS sales in EU-28 in 2013 is 159 mln. No action on reports.
Testing	Measurements (slides 33-39): a general review of the technical parameters should be done: they should be reduced to a minimum (quantity) in order to allow an effective market surveillance, avoiding long time consuming tests measurements.	Following the 5 February meeting, where this point was also expressed, the study team undertook action to prepare a proposal. Additional proposals from the industry would be welcome. Study team will try to prepare a proposal; for the moment separately from existing reports.
Health aspects	Concerning Health issues (slide 100), please consult the LightingEurope Guide on photo biological safety.	The guide can be found on the LE website: http://www.lightingeurope.org/uploads/files/LE_Photobiological_Safety_Feb2013.pdf Task 3 report par. 5.1 has been edited to include a summary of this guide.
Dimming	Dimming (slides 104-118): as pointed out in the study, we have a legacy of many different dimmers. Nevertheless it is questionable whether LED lamps work with all of these dimmers.	This LE opinion is already clearly stated in the Task 3 report par 7.2.11. No action on reports.
Definition Standard vs. Regulation	The regulator should in future take into account much more than in the past current standards and standards in preparation. One of root causes of un-clarity in the market today, including surveillance issues, is the big gap between existing regulations and regulatory definitions with available standards and formal standardized definitions. With as result the need for repair actions (mandates) which could to a large extend have been avoided.	The Task 1 report extensively describes standards, regulations and definitions, but the difference in definitions between standards and regulations has not been explicitly addressed. Some difference in definitions may be unavoidable as standards and regulations have different aims. The comment is generic: a list of specific examples causing problems would have been helpful. Task 1 report par 4.1.4 has been edited to add this LE opinion.
Health aspects	Separately from the main comment, LE supplied additional information for integration in the health chapter: http://www.globallightingassociation.org/mint/pepper/tillkruess/downloads/tracker.php?url=http%3A//www.globallightingassociation.org/documents/gla_papers/20120226_Optical_Safety_of_LEDs_-_Long_Paper.pdf EMC-14-JAW-009, External TLA position paper SHAPE version.1, 2014-11-27.pdf	The last cited document will be published on the project website. Task 3 report par. 5.1 has been edited to include a summary of these documents.

Ref.	Stakeholder comment	Study team reply / action on reports
	The following is from December 2014 LE input [1]	
1194/2012 Definitions	In general, all definitions have to be reviewed in the light of new definition in standards	Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Control device	It is necessary to reconsider the requirement related to the minimum level of light emission of 1% because there are applications where a lower level is needed. To check possible exclusion for DALI and similar systems. Annex III, 2.3: dimming control device 1% of their luminous flux at full load: DALI and similar systems should be excluded, because there are other ways to control that lights are not left on unintentionally at the level below 1%. Full load definition needed as well.	The comment regards regulation 1194/2012 on the following points: - article 2 sub 23, control device definition - Annex III point 2.3, where it states: "*When a dimming control device is switched on at its lowest control setting for which the operated lamps consume power, the operated lamps shall emit at least 1 % of their luminous flux at full load*". Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Control gear compliance	Limitation for variance at 2,5% should be changed to a maximum for power limit up to 2,5% and minimum for efficiency down to - 2,5%. (Efficiency and power are coupled via luminous flux. What is the "variance" (is that the correct statistical word?) for the flux? If the whole variance is already claimed by the power – how much remains for the flux?)	The comment regards regulation 1194/2012, Annex IV, point 3, "*Verification procedure for equipment designed for installation between the mains and the lamps*". Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Equivalenc e claims	The equivalence claim is only based on the useful luminous flux. For LED also LLMF does not play a role as it is fixed at 70% (due to the life definition L70B50) – this is why LE can state that LED has a 1.15 factor for table 7 …." =1+0.5*(1-0.7). For a consumer the beam angle is important hence its printing on the packing (also in my view so should peak Cd). We wonder if equivalence claims should just be removed (certainly in the future) – they are only valid against the "original" lamp which will soon be phased out. The change to lumen marking was to allow the consumer to choose lamps based on light output irrespective of lamp technology and to facilitate easy market surveillance. The lamp types specified in table 6 are not completely covered by standard definitions. Conclusion: to delete equivalence claims table.	The comment regards regulation 1194/2012, Annex III, point 3, tables 6 and 7. Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 DLS vs NDLS lamps	(text summarized by study team). Some lamps are marketed, and conceived by consumers, as directional (regulation 1194/2012 applicable) but under market surveillance testing can turn out to be non-directional (regulation 244/2009 applicable) and then considered non-compliant, even if from the market point-of-view this is a non-sense. The opposite can also occur, i.e. LED lamps intended as retrofits for non-directional GLS lamps, that during testing turn out to be directional lamps and can then have compliance problems. Further discussion is necessary on the definition of directional lamps.	The comment regards regulation 1194/2012, article 2, sub 9, definition of directional lamps: " *'directional lamp' means a lamp having at least 80 % light output within a solid angle of π sr (corresponding to a cone with angle of 120°)* ". When examining lamp datasheets in the context of the Stage 3 market assessment, the study team encountered a related problem, i.e. it is often not clear from the datasheet if the lamp is to be considered as directional or non-directional. There are also comments from other stakeholders suggesting to reconsider the definition of directional lamps. Task 1 report 5.1.6 has been edited to include this comment.
1194/2012 Power Factor	(text summarized by study team). Revision of metric for "Power Factor" (see: LE_WG EE_PositionPaper_Power factor_final.pdf). Replacing power factor by distortion factor and displacement factor, following ongoing standardization activities.	The referenced document is available through: http://www.lightingeurope.org/uploads/files/Position_Paper_Power_Factor_Sept_2014.pdf. This is already discussed in the Task 3 report, par. 7.3 and annex F.3, including reference to the LE position paper. Task 1 report par. 5.1.6 has been edited to include this comment, with reference to Task 3

Ref.	Stakeholder comment	Study team reply / action on reports
1194/2012 Number of parameters	In general the total number of information parameters should be drastically reduced for market verification and enforcement purposes	This is similar to another comment above. Study team will try to prepare a proposal; for the moment separately from existing reports. Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Number of parameters	To facilitate SMEs the total number of parameters should be limited and the threshold levels should take into account the interest/technical possibilities of SMEs.	See previous point
1194/2012 Testing LED lifetime	(text summarized by study team). The requirements concerning 6000 h to be used to qualify LED (the same modifications on the way in the standardization field) should be modified; this is also necessary to ensure a comfortable time in the market for new products (taking into considerations other methods in use in other standards, e.g. family testing approach by IEC/Cenelec). The LED module standard, IEC 62717, provides means for applying a "family" concept.	This comment regards regulation 1194/2012, Annex III, point 2.2, table 5. Similar to other comments above, i.e. testing should be simplified. Study team will try to prepare a proposal; for the moment separately from existing reports. Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Definition LEDs	The definition of LED Modules and distinction from lamps should be reviewed and clarified to be aligned with standards (IEC 62504).	This topic is already addressed in the Task 1 report, par. 1.2.3, signalling the existence of different definitions and referring also to IEC 62504. Task 1 report par. 5.1.6 has been edited to include this comment.
1194/2012 Definition Lifetime	The lifetime definition of ErP and in the "Apples and Pears" (ZVEI) are completely different. ErP definition allows a lot different interpretations, what has to be prevented. The ZVEI Guide defines this point much better: The producer should show the triple information, means LxByCz or different values of LxBy and L0Cy, whereas we have here a clear definition that the values of x y and z are free definable by the producer.	The LxByCz lifetime information is already explained in the Task 3 report par 3.3.1, with reference to IEC 62717 and IEC 62722-2-1. The comment is understood to regard regulation 1194/2012, annex II (l), definition of lifetime. Task 1 report par. 5.1.6 has been edited to include this comment.
TLA, incl. Flicker and optical safety	(text summarized by study team). Temporal Light Artefacts (TLA, i.e. flicker and stroboscopic effect). In view of anticipated future European TLA standardization and regulation, we recommend to wait for the CIE and IEC publications of the proper TLA assessment methods and to avoid the adaptation of improper metrics, such as Modulation Depth (also called Flicker Percentage) and Flicker Index. Related supplied documentation: see above comment on 'Health aspects'.	This is the same opinion as expressed in the document "EMC-14-JAW-009, External TLA position paper SHAPE version.1, 2014-11-27.pdf", see other comment on health aspects above. Task 3 report par. 5.1 has been edited to include the comment and a summary of the related documents. Reference added to Task 1 report par. 4.1.1.
1194/2012 LED tube flux	Where does the tolerance of 25% apply? IEC 62717, for example, always refers to the individual LED module when applying 10% tolerance to the rated power and the rated luminous flux and 25% tolerance to peak intensity and to the beam angle. And what kind of tolerance is contained within the 25%? Is it applied on the average of measured 20 pieces, wherever measured – at the manufacturer's premises or at the market surveillance labs?	This comment has been understood to regard regulation 1194/2012, Annex III, sub 3.2: "*Claims that an LED lamp replaces a fluorescent lamp without integrated ballast of a particular wattage may be made only if:* *— the luminous intensity in any direction around the tube axis does not deviate by more than 25 % from the average luminous intensity around the tube ..* " Task 1 report par. 5.1.6 has been edited to include this comment.
874/2012	To modify the method to be used to update the Energy label following to the availability of new lamps (no mandatory new model identification due to the change of the energy label)	Task 1 report par. 5.1.7 has been edited to include this comment.
874/2012	To modify the requirement regarding the method to verify the luminaire compatibility with new lamps	The LE position paper can be found on:

Ref.	Stakeholder comment	Study team reply / action on reports
Luminaire compatibility with lamps	available on the market (compatibility level/work on the way in standardization field)". Recital 5: " *Luminaires are often sold with incorporated or accompanying lamps. This Regulation should ensure that consumers are informed about the compatibility of the luminaire with energy-saving lamps and about the energy efficiency of the lamps included with the luminaire...*" Annex V 2: "*The luminaire shall be considered to comply with the requirements laid down in Articles 3 and 4 if it is accompanied by the required product information, and if it is found to be compatible with any lamps with which it is claimed to be compatible according to point 2.2(IV)(a) and (b) of Annex I, applying state-of-the-art methods and criteria for assessing compatibility.*"" See attached LE position paper: LE_State of the Art Compatibility - LE Position Paper_140704_FINAL.PDF	http://www.lightingeurope.org/uploads/files/State_of_the_Art_Compatibility_-_LE_Position_Paper_140704_FINAL.pdf). Task 1 report par. 5.1.7 has been edited to include this comment.
874/2012 1000 h energy	(text summarized by study team). "Energy Consumption per 1000h" to include on the Energy Label for LED lamps. Regulation 874 states that the energy consumption value should include a factor for the losses in the electrical control gear. LED tubes do not strictly require external gear and therefore it could be argued that no correction factor should be applied. However, these are basically being sold as retrofits for ordinary LFL lamps, and it is therefore obvious to some people that they will end up being used on traditional ballasts and should therefore acknowledge the external control gear losses.	This comment regards regulation 874/2012, Annex VII, point 2. Task 1 report par. 5.1.7 has been edited to include this comment.
Task 1 Annex D	The annex gives the impression that by defining a spectrum (visible light) you can use this to determine whether you deal with special purpose. This will guide you for many cases in the good direction but certainly not for all. The list of special purpose lamps is pretty complete, however here the remark that new technologies – not based upon led – will have difficulties here (e.g. our water purification module instantTrust). Looking then also to the 'energy consumption' comparison for these lamps, it's hard to understand here why energy efficiency should not be the differentiation factor here. Effectivity of the purpose to serve (and this can be very very different) should be the differentiator. In many cases this will go hand in hand but certainly not for all".	The spectral distribution of the light or the (non-white) x-y colour coordinates can be used to identify many types of special purpose lamps, but the study team is well aware that this will not be sufficient for all cases. As stated also in reaction to other comments: Study team will try to prepare a proposal; for the moment separately from existing reports.

3. SUMMARY OF UBA COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Task 1 par. 1.2.3 LED/OLED definition	(text summarized by study team). Report states: "*As regards the definition of 'Light emitting diode (LED)', a major issue is whether the specification 'of inorganic material' should be present. In Regulation 1194/2012 this dictation IS present while in Regulation 874/2012 it is NOT.*" In common parlance, usually inorganic light emitting diodes are called "LED" and organic light emitting diodes are called "OLED". But both are light emitting diode, thus both are LED. This is like thinking on apples, but saying "fruits" and thinking on pears and saying "pears". When speaking about inorganic LED (apples), we should say ILED and solely when speaking about light emitting diodes in general –including inorganic and organic ones– (fruits), we should say "LED"; and organic LED (pears) still OLED. A title like "*Commission regulation No 1194/2012 (…) ecodesign requirements for (…) light emitting diode lamps*" may mislead to believe that OLED are affected by the regulation too, although that is not the case.	A footnote expressing this opinion has been added to Task 1 par. 1.2.3.
Task 1 par. 1.4.2.13 use of ecodesign sales limit criterion for scientific lamps	For "Scientific lamps" the rationale for excluding them is as follows: *"According to the (rough) estimates in Annex D.15, the total electric energy consumption for lamps with a scientific purpose in EU-28 is negligible and sales volume are below the 200,000 criterion of 2009/125/EC article 15. It is proposed to exclude these lamps from the current study because sales volumes do not meet the eligibility criterion. Additional attention is required to correctly define scientific lamps*." This reasoning is problematic since the 200,000 unit criterion is not intended to be applied to each subgroup but to product groups as a whole, and no precedence should be established here to change this rule. It still makes sense to exempt these very specific lamps from the study. However a precise definition based on technical properties is needed for such an exemption.	More in general, directive 2009/125/EC expresses that ecodesign measures should only be taken if it is worthwhile, i.e. if there is a significant impact. This is not the case for scientific lamps. If scientific lamps could be part of a wider eco-design measure on all lamps, they would not be specifically excluded for low sales. However, if they require a dedicated study, for a different function, leading to different requirements than for other lamps, the effort may not be worthwhile. The report already states the need for a good definition. A footnote expressing this opinion has been added to Task 1 par 1.4.2.13.
Task 2 sales for related products	We wonder why no specific research has been made to collect data for ballasts, control gears, lighting controls, dimmers, luminaires and other lighting related products. As far as we understood lighting related products are at least to some extent also part of the study. At least ballasts are covered by regulation 245/2009. Market data of these lighting-related products might be needed in later tasks.	Sales data on dimmers : see Task 3 par. 7.2.8. Sales data for LED luminaires (dedicated LED lamps): see Task 2 annex D.3. Sales data for ballasts: The study team processed Eurostat data, but they do not seem to be reliable, as also noted in CLASP, November 2014, "Mapping & Benchmarking of Linear Fluorescent Lighting". Sales data for lighting controls and non-LED-luminaires will mainly be left to the Lot37 systems study, and are not expected to be needed in this light sources study. Ballast sales data have been added to the Task 2 report in a new chapter 8.
Task 3 Environmental impacts (chapters 5, 6)	For the analysis of other environmental impacts we would like to refer to a study of Ökopol: http://www.oekopol.de/archiv/material/551_1_Oekopol_LED_Endbericht_Aug%202013.pdf . Only available in German, but has an English summary.	Task 3, par. 5.1 has been integrated with information from Ökopol. Information from the Ökopol document will also been used in the Task 4 report.
Task 3 LED lifetime	It should be analysed, if life-time information can be confusing for consumers as the declared values for LEDs might not be achieved in practice, because they do not rely on measurements. The study should thus consider information requirements	Lifetime information can be confusing not only for LED lamps (e.g. see Task 1 par. 4.1.2 and 3.1). We should also take care not to suggest that lifetimes for all LEDs are wrong. The core of the problem is lifetime testing for LEDs, which is currently under

Ref.	Stakeholder comment	Study team reply / action on reports
	specifically for LED-based light sources which take this into account.	discussion. The general demand is to reduce the testing time, which may not help the reliability of the results, but is desirable for other reasons. See also reply to other comments: the study team is trying to formulate a proposal for testing more in general. Does UBA have something in mind, suggestions would be welcome ? Study team will try to prepare a proposal; for the moment separately from existing reports. Task 1 report par. 5.1.7 has been edited to include this comment.
Task 3 par. 7.1 Thermal lock-in problem	(text summarized by study team). A combination of particular LED lamps with luminaires which are not designed for LED lamps may result in temperatures inside the luminaire which are too high for LED-lamps, thus leading to a significant shorter lifetime of these lamps. We prepared a technical background paper on this issue with illustrations and possible solutions. Details can be found in the annex A to this comment paper.	For the full annex A see the integral version of the UBA comments published on the website. The Task 3 report, par. 7.1, section on thermal compatibility, has been integrated with information from this UBA contribution.
Built-in LEDs	The study does so far not consider the tendency of LED modules being built into furniture and other products without the possibility to replace them (at least not with reasonable effort). As consumers are asking questions regarding this problem increasingly often, this issue should be covered in the study and it should be discussed briefly whether measures could be taken to deal with it (e.g., a requirement for an built-in LED modules to be replaceable or information requirements).	The first question to be answered by stakeholders and Commission would be if appliance-integrated lamps are in the scope of the study (see the presentation of 5 February 2015). If so, the point can be kept in mind when drafting the final regulation. No action in this moment.
Task 3 par. 3.6 EEI vs lm/W	During the meeting in Brussels on February 5th, 2015 Casper Kofod (Energy Piano, Denmark) proposed to use efficacy (lumen per watts) instead of the square root function ($0.88\times\sqrt{\Phi} + 0.049\times\Phi$). Often, in this context it is argued that for LEDs, efficacy would be the better choice to describe the efficiency, because LED light sources consists just of a number of identic LEDs; thus the efficacy of the whole is the same as the efficacy of the individual. • Regarding a wide range of luminous flux shows, that for higher lumen values the curve of the square root function and the curve of the efficacy move towards each other. That means: A relevant difference is restricted to low lumen values. • When looking on product data, we find that there are LED lamp types for which the square root function fits better to describe the efficiency and others for which the efficacy is the best 2015) – 3/4 Details can be found in the annex B to this comment paper. Light source data do not verify the argument, mentioned above. But they do not give a clear picture. Thus further study is needed. We work on that issue and will deliver more information about it.	For the full annex B see the integral version of the UBA comments published on the website. There is a related comment from DEA, see chapter 5 of this document. Basically, this is considered to be a technical issue, i.e. how does efficacy change with lumen or power for the different technologies. The topic will therefore be addressed in Task 4. The issue has been added in Task 1 par. 5.1.7 in the list of signalled points for review of regulation 874/2012.
Task 3 par. 3.6 EEI vs lm/W	In the study a number of efficiency values are mentioned as efficacy. That makes it a bit difficult to compare these values with limits, set in the regulations. Therefore we ask to present results as EEI. The chapter refers mainly to efficacy (lumen/watts), saying few words about other efficiency values. Regulations 244/2009, 1194/2012 and 874/2012 do not base on efficacy but on the Energy Efficiency Index (EEI). Therefore we ask to rename that chapter and to treat all relevant efficiency values within it.	(1) The study uses efficacy where a lumen output is related to a power input, and efficiency where a power output is related to a power input. We tried to do this consistently throughout all reports. (2) The Task 2 and 3 reports present the MELISA model. In this model it is convenient to work with lm, W and lm/W. It would be unnecessarily complex to work with EEI inside the model. (3) The model is intended to be used for scenario analyses in Task 7. These analyses will mainly depend on the shift in sales from traditional lamp

Ref.	Stakeholder comment	Study team reply / action on reports
		types to LEDs. During this shift, a governing principle is to maintain a lumen equivalence so that the total EU-28 lighting load (lumens) remains constant (except for a rebound effect, considerations on LLMF, general growth in number of lamps, etc.). During this shift it is anticipated that traditional NDLS lamps may be substituted by DLS LED lamps (for example LFL by LED tube). For this reason, in MELISA, all lumens are the total lumens emitted, not the lumens in a 90˚ or 120˚ cone for a directional lamp. As a consequence, efficacies for DLS and NDLS lamps are taken identical, and it would make no sense to calculate EEI from these data, at least for DLS lamps. (4) The EEI from the regulations also depend on correction factors, for example for external control gears. In this study we would like to keep the effects of light sources and of control gears separated. The meaning of the lm and lm/W in MELISA has been better explained in the Task 3 report, par. 2.2.
Task 3 par. 3.6.1	The report states: "*The EEI can be interpreted as an inverse statement of lamp efficacy. Lamp efficacy is expressed as luminous flux per electrical Watt. EEI is expressed inversely to this, with power as the numerator, and (a function of) luminous flux as the denominator.*" We would not follow that quite gross simplification. The EEI is not just the reversed efficacy, as the following equation shows. $\text{efficacy } \eta = \frac{\Phi}{P} \neq \frac{1}{EEI} = \frac{0.88\times\sqrt{\Phi} + 0.049\times\Phi}{P}$ $\Phi \neq 0.88\times\sqrt{\Phi} + 0.049\times\Phi$ To become equal, the factor 0.88 in front of the square root term would have to be changed into 0 and the factor 0.049 into 1. Indeed, in EEI these factors are far from that.	The text has been removed.

4. SUMMARY OF ANEC&BEUC COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Task 1 Scope Luminaires	We welcome the inclusion of aspects associated to luminaires in the scope of the study. From a consumer perspective it is important that minimum requirements on efficiency, lifetime etc. as well as labelling do not only cover light sources (such as lamps) but the whole functional unit of a 'luminaire'. This is especially relevant as more and more consumers buy luminaires with integrated LED-modules and hence, seek for information on the luminaire itself. We also welcome that compatibility of retrofit lamps with existing luminaires is also covered by this study. This is highly relevant as often consumers phase difficulties in choosing compatible retrofit LEDs for existing luminaires. However, currently the exact coverage of luminaires under the scope of the study on light sources (Lot 8/9/19) and under the study on lighting systems (Lot 37) is unclear. We stress the importance of exploring under this study (Lot 8/9/19) all luminaires relevant for consumers as they are products that the consumer is likely to choose without the technical support of a light planner.	The main topic for the Lot 8/9/19 study are the light sources, and work will concentrate on that, also considering the tight time schedule. As also explained during the 5 February meeting, we will anyway consider: - integrated LED-luminaires - lock-in problems in existing luminaires. - compatibility with dimmers and controls For the remainder, luminaires will be handled in the Lot 37 lighting systems study. Footnote added in Task 1 par. 1.12 expressing the ANEC&BEUC opinion.
Task 1 Scope Appliance integrated and decorative	We also welcome the proposal to include 'appliance-integrated lamps' into the scope (Task 1, p.43) both in terms of minimum requirements as well as in terms of labelling. We acknowledge the challenges associated with the category of 'decorative' lamps and agree that the cut-off point of decorative and non-decorative lamps is unclear (Task 1, p. 44).	Awaiting a decision from stakeholders and Commission, the study team is not specifically working on special purpose lamps and other now exempted lamps (including 'appliance integrated' and 'decorative'). As a first step, we are trying to work towards definitions, which is related to fast and cheap testing possibilities. Footnote added in Task 1 par. 1.12 expressing the ANEC&BEUC opinion.
Task 1 Scope MV DLS lamps	Additionally, we support that even if most of the directional lamps in households are low-voltage directional lamps (e.g. 12 V) mains voltage directional lamps should be taken into account within the scope of the study (Task 1, P. 63).	The stakeholder opinion requested on p. 63 does not regard the inclusion of MV directional lamps in the scope (they are certainly in), but the possible phase-out of directional MV halogen lamps in Stage 3 (September 2016) of regulation 1194/2012. The study team will issue a separate report on this. No action on reports.
Task 1 Scope OLED	Finally, we agree with the recommendation that emerging lighting technologies (e.g. OLED, see p.64-65, Task 1) should have to meet performance requirements -as LEDs already do- in an effort to avoid marketing of poorly performing 'new technologies'.	As additional information: regulation 1194/2012 applies only to inorganic LEDs, thus excluding OLEDs. However, the energy labelling regulation 874/2012 is NOT limited to inorganic LEDs, and thus should apply to OLED as well. No action on reports.
Task 1 Special purpose lamps	(text summarized by study team). UK's National Measurement Office (NMO) investigated whether special purpose lamps comply with the legislation requirements. (https://www.gov.uk/government/news/nmo-investigation-into-special-purpose-lamps) (December 2014) According to the research, industry considers the special purpose lamp market to be diminishing due to the fact that the cost of LEDs is dropping and consumers are progressively turning to LEDs. There is a wide variety of special purpose lamps broadly available and easily accessible. Certain online distributors could be contributing to the misconception that special purpose lamps are fit for household lighting through their product descriptions. It is hard to assess to what extent special purpose lamps are used for general lighting purposes. With LED becoming increasingly affordable, the motivation that drives consumers towards special purpose lamps for general lighting purposes could be associated	The press release in the reference is rather generic. The study team did not find a document on the research that provides further details. It is not clear which type of special purpose lamps were examined. Could be 'rough service lamps', but this is not clarified. The press release also states that: "*several businesses commented that there is no reasonable LED alternative to the 100 Watt incandescent (traditional) lamp*". Footnote added in Task 1 par. 1.4.2.1 with the reference to the NMO research.

Ref.	Stakeholder comment	Study team reply / action on reports
	to quality characteristics of LED lamps such as possible flickering, compatibility and light quality.	
Task 1 lifetime measures	Task 1, page 98 states that '*currently, for most lamp types in almost all jurisdictions, proving the claimed life of the lamp involves ageing a set of lamps to the claimed lifetime and checking that at least 50% of the samples have survived. Thus, this test actually proves the claimed median life of the lamp model. However, it could be argued that consumer expects that the claimed lamp life, as printed on the product packaging, is a minimum expected lifetime, or possible a mean lifetime. Consumers may be surprised to learn that a claimed lifetime of 10,000 hours means that, even under ideal laboratory conditions, only half of the lamps will survive to 10,000 hours. Additionally, lifetime testing of lamps is undertaken under ideal laboratory conditions of voltage and temperature, which may mean that, under real-world conditions, actual lamp lifetime is shorter.*' We agree with this statement and we consider this practice misleading for consumers, who cannot conclude that a particular lamp will last as long as its package says it will.	Footnote added in Task 1 par. 4.1.2 with the ANEC&BEUC opinion.
LED durability	(text summarized by study team). From tests on the durability of 90 LED lamp models (5 samples each) performed between 2011 and 2015 by consumer organisations, the following conclusions are drawn: - 4 out of the 15 models purchased in 2011 did not comply with regulation 1194/2012 since they lost over 20% of their light intensity after 5000 hours. - this failure was observed in only 3 out of the 75 models purchased later in 2012 and 2013 and no failure was observed in their latest purchase. - among the oldest bulbs, 18% of those purchased until early 2012 failed before passing the 5000 hours test compared to 3 % of those acquired later in 2012 and 2013. - more than one third of the light bulbs purchased in 2011 and early 2012 burned out after 10.000, while only 10% of the bulbs purchased in 2012 and 2013 failed. The findings illustrate a positive development. However, issues associated to the quality of the light and their compatibility with dimming mechanisms still stand. Particularly with regards to light quality, the suitability of the current test is a recurrent problem during product testing. Reference (in Portuguese): http://media.deco.proteste.pt/download/2522f15319ad4b0431bae9684f7cc63c09be77b5/tmpf26.pdf	The study team thanks ANEC&BEUC for this information, that will be used in the Task 4 report. Dimming problems and light quality problems are already addressed in the reports. Reference to this information added in the Task 4 report.
Task 3 par. 5.1 Health aspects	An in depth analysis of health concerns associated to LEDs is essential as health impacts may aggravate once LEDs will become the most common lighting solution. According to the report (Task 3, page 79) flicker '…can lead to headache, migraine, dizziness and impaired visual performance. Some LED lamps are free of flicker while others reach the maximum percent flicker value of 100%'. As LEDs are expected to broadly replace halogen lamps it is recommended to further investigate the extent of the issue and identify potential requirements to ensure stable and constant light.	Other stakeholders have supplied additional information on health aspects, that have been integrated in Task 3 par. 5.1. In general the topic has large international attention, but there do not seem to be reasons for immediate concern. No action, except for changes to Task 3 par. 5.1 following comments from other stakeholders.

5. SUMMARY OF DEA COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Task 1 special purpose definition	The definition of special purpose lamps from 1194/2012 should also apply to NDLS.	The opinion relates to Article 2, Definition 4 of regulation 1194/2012. Similar "special purpose" exemptions exist in other regulations (e.g. Article 1 of regulation 244/2009 for NDLS). As outlined in the Task 1 report, there is a fair degree of inconsistency between the various exemptions which could lead to ambiguous interpretation. The current actions to integrate the requirements for all light sources, and to revise the definitions for "exemptions/special purpose" aim to resolve this issue. Copying the 1194/2012 formulation to other regulations, or to a new integrated regulation, is not expected to be sufficient to resolve current loopholes and market surveillance problems. A footnote with the DEA opinion has been added in Task 1 par. 1.4.1.6.
Task 1 directional lamp definition	DEA find it is worth to reconsider if it has been favourable for EU to choose a different path than the rest of the world by introducing the "useful flux in a cone of 90° or 120°" as basic parameter for directional lamps. DEA appreciates the intention of applying parameters closely related to the consumer usefulness of the lamp but this increases the test price of directional lamps significantly, and risking to limit the market surveillance of directional lamp. Measurement of the useful flux value in a cone can only be established by a measurement of the light intensity distribution in a gonio-photometer followed by a numerical integration of the flux in the appropriate conical solid angles. This is several times more expensive than the measurement of the light flux using a photometric sphere which is used for non-directional lamps. The American standard for testing Solid State Lighting products IESNA LM-79-08 uses the forward flux (i.e. flux in the lower hemisphere) as the basic parameter for directional lamps (*see illustration in full text on website*). The DEA regards it as important that the same basic parameters are used worldwide so burdens of testing and market surveillance can be shared among many. Furthermore this more simple type of measurements can be performed by more laboratories.	While the provisional functional definition of "useful light" presented in the Task 1 report (par. 1.3.3) relies on the 90 and 120˚ approach, the cost of testing was also raised as a potential issue (e.g. par. 3.1), with the possibility of adoption of 2π measurement presented as a potential solution (par 4.1.4). Adoption of such an approach not only aligns with the increasing international approach (as noted by DEA for solid state lighting products in the USA, but also all directional lighting in Australia), it also reflects significant consumer usage of "directional lighting" for general illumination purposes. A revision of the functional definition such that the 2π measurement of useful flux approach is adopted for all directional lighting, would entail costs for the suppliers during the transition, but this should be limited to packaging only (as existing IES files will be available for most lamps and the 2π values should be easily identified). It should be noted that a gonio-photometer will still be required for the measurement of some declared values (i.e. the "degree of directionality" and light distribution declarations/diagrams) and any associated compliance activities related to these declarations. Task 1 report par. 4.1.4 and 5.1.6 have been edited to include the DEA opinion.
Task 1 directional lamp information	In case it is decided to continue with the current requirements to useful flux for directional lighting sources, DEA recommends that it becomes a requirement that for all directional light products, the manufacturer or sales company has to provide the light distribution as a photometric file in the IES format at their web sites. The manufactures already have to measure these data in order to make sure they comply with the EU regulation requirement concerning the useful flux. Provision of the IES makes it possible for the market surveillance authorities to	Whether the existing 90/120˚ or 2π tests are selected as the appropriate measurement of flux, the "publication" of the photometric file in the IES format is still likely to be of value to commercial designers/users and enforcement bodies as it provides other information related to directionality, distribution, intensity, etc. Further, given an increasing number of inherently directional light sources are being configured to provide non-directional lighting with a potential

Ref.	Stakeholder comment	Study team reply / action on reports
	execute numerical integration of the flux in the appropriate conical solid useful flux angles.	poor distribution in the 360˚ arc (e.g. all LEDs are inherently directional with non-directional illumination enabled through emitter positioning, distribution by phosphors, optics, etc.), there appears value in making such a requirement technologically neutral and mandatory across all light sources, hence providing both (professional) consumers and enforcement bodies with better information. There is a cost associated with such a declaration as the suppliers will be forced to undertake gonio-photometer measurements of lamps, but this cost should be marginal when amortised over even relatively small production quantities (and as noted above, most manufacturers will anyway have these files for most lamps). What may be more of a problem is exactly where such information is placed (the DEA proposal is for the information to be placed on the manufacturer or supplier … website). It is not clear who would hold the responsibility for "placement" in a scenario of a small non-EU manufacturer supplying to a local wholesaler and onward to a non-chain retail outlet – none of whom may have a website. Task 1 report 5.1.6 has been edited to include the DEA opinion.
EEI using square root formula vs. lm/W	In the current regulation, the labelling of all lighting sources is determined by a square root formula calculation system. LED lighting sources consist of a number of diodes each with the same lm/W so the formula is not accurate for LED light sources. Use of the square root formula has the consequence that LED lamps with relatively low energy efficiency obtain A+ label. Requirements for LED lamps are anywhere else in the world expressed by minimum lm/W requirements and not only for LED technology but also all other kind of lighting technologies. Some argue that for the fluorescent technology the square root relation applies. This is correct but the relation is not the same and as dominant as for the incandescent lamps. The actual market trend is that CFL sales decrease as the consumers prefer the LED lamps due to better lighting quality, higher efficacy, no warm up time, no mercury content and the LED prices decrease actually rapidly and have reached an affordable level. We are on the entrance to a LED mass market. Consequently, it is the right time to harmonize and transfer to lm/W requirements which are used in the rest of the world. Alternatively, the square root formula could be kept alive solely for the fluorescent technology while the new technologies (LED and OLED) should be covered by lm/W requirements.	There are also comments from UBA on the same topic, see chapter 3 of this document. Basically, this is considered to be a technical issue, i.e. how does efficacy change with lumen or power for the different technologies. The topic will be taken into account in Task 4. The issue has been added in Task 1 par. 5.1.7 in the list of signalled points for review of regulation 874/2012.
R7s and G9 lamps	In a future stage 7, we suggest that minimum ecodesign requirements for R7s and G9 are included. It is especially urgent for the G9 lamps as a there exist G9 adapters giving a major loophole in the existing regulation.	It is understood that this refers to regulation 244/2009, that now has Stage 6 (September 2016) as last stage. Lamps with R7s and G9 caps are now excluded from the Stage 6 requirements. This topic has been addressed in the Stage 6 review study, to which the current study refers (Task 1 report par. 2.6). The Task 4 report will explore if there is new information regarding the availability of LED substitutes for lamps with R7s and G9 cap.

Ref.	Stakeholder comment	Study team reply / action on reports
		Paragraphs in the Task 4 report will be dedicated to R7s and G9, and the DEA opinion will be referred to there.
Require A+ for LED	In a future stage 7, please define the ecodesign minimum requirements for most LED lamps to be A+. Market investigation in the IEE PremiumLight project indicates more than 50 % of the non-directional LED lamps at the market have class A+ efficacy	It is understood that this refers to regulation 244/2009, that now has Stage 6 (September 2016) as last stage. Given the desire for technology neutral standards, it may not be appropriate to have an LED-only performance requirement, but this does not exclude that the "A+" threshold could be requested on a non-technology-specific basis. The data from the IEE PremiumLight project to which the comment refers will be presented in the Task 4 report, that will more in general try to clarify the current state and future expectations for all lamp types. Current status and future expectations on efficacy of LED lamps will be presented in the Task 4 report.
LED test condition	LED lamp functionality is sensitive to the heat conditions in the fixture. It is recommended to change lifetime test conditions from 25˚C to 40˚C (have to be specified in accordance with the conditions in the respective standards)	The study team recognizes the adverse effect of high operational temperature on LEDs and there is indeed potential justification for proposing a change in ambient test conditions. However, to do so would: 1) Move away from a technologically neutral approach and place a particular technology under more stressful conditions. While this may be justified, it is against the spirit of current efforts. 2) While most labs would technically be able to produce the 40˚C ambient, it is anticipated few would wish to do so without charging significant penalties. Ageing tends to occur in large open rooms with 1,000's of lamps mounted on racks operating for months at a time, all at the same ambient. As 25˚C is the standard ambient test temperature for almost all lamps in most of the world, to test just LEDs at 40˚C would require the creation of a separate space with independent temperature control. This would be costly for all labs, and potentially impossible for some due to space constraints. Notes have been added to Task 1 par. 3.1 and par. 5.1.6 to include the DEA opinion.
Show CRI on package	Information about colour rendering (Ra value) should be required to be shown at the packing. In the IEE PremiumLight market research was found this is a very important light quality parameter for the consumers and several EU member countries has a long tradition for recommendation of a high colour rendering for some activities both at work and in the home.	Clearly colour rendering is important to the consumer (and as discussed in the Task 1 report, CRI is likely to remain the measurement metric in the near future despite its shortcomings). Therefore, declaration of the CRI could be of value. However, there are two potential issues: 1) Given the transition in information currently being provided to consumers (lumens rather than watts, different replacement lamp types, etc.), potentially additional confusion for the (domestic) consumer will arise from the mandatory declaration of CRI. 2) The declaration requirements on packaging are becoming challenging given the relatively small size of products.

Ref.	Stakeholder comment	Study team reply / action on reports
		Comments should be invited from industry on the potential for mandatory declaration of CRI (and potentially component Ra values) either on all products, or specifically products primarily used in the non-domestic sector where understanding is typically higher. Note has been added to Task 1 par. 5.1.6 to include the DEA opinion.
Require R9>0	DEA suggest the minimum colour rendering requirement CRI > 80 is extended with R9 > 0 as recommended by IEA SSL. It might also be recommended to provide LED lamps with CRI >90 for a future stage.	Given the desire for technology neutral standards, establishment of a separate CRI requirement for LEDs does not seem appropriate. Further, given the known issues with CRI as a metric, setting a cross product CRI requirement of >90 may in general be beneficial, but may inadvertently disadvantage some products that are perfectly acceptable (and in some cases preferable) to the consumer. The introduction of an R9>0 requirement also has the potential to disadvantage some products, but it is likely to be few relative to the consumer perception benefit from removing products that potentially render everyday objects (food/skin/…) very poorly. However, comment should be invited from industry to ensure there are no application specific issues with a R9>0 requirement. Note that the introduction of an R9 requirement will add very marginal cost to testing. Note has been added to Task 1 par. 5.1.6 to include the DEA opinion.
Power factor	The existing main power factor requirements should be kept to PF > 0.5 as this is fulfilled by products of quality and there is no reason to impose extra costs on LED for adding electronics which will be the consequence of requiring PF>0.7 and we want to stress IEC/EN are responsible for defining measurement methods while the public authorities are responsibility for defining the requirements. For the grid company, there are no grid measurements giving evidence of power factor problems in the grid supplying household consumers with many CFLs and LEDs. On the contrary the capacitive reactive loads from CFL and LED lamps compensate a part of the dominating inductive reactive loads in the domestic electricity supply grid. For the consumer, there are no benefits from power factor requirements. IEA SSL recommends the same power factor requirements as the existing EU requirements.	The power factor topic is discussed in the Task 3 report, par. 7.3 and annex F.3. There is also a comment of LightingEurope on this issue, see chapter 0 of this document. Task 1 report par. 5.1.6 and Task 3 par. 7.3 have been edited to include the DEA opinion.
Standby power for smart lamps	The best network-connected smart lamps operate with 0.17 – 0.25 W standby power consumption while other smart lamps have up to ten times higher standby consumption. DEA recommends maximum standby power consumption 0.3 W per smart lamp.	Please refer to the remarks made in the Task 1 report par. 4.1.2 and 4.1.4 (network-connected smart lamps). See also the Task 3 report par. 3.4.5 on standby power of smart lamps, and par. 7.2.9 for a comparison of app-controlled smart lamps and traditionally controlled lamps. An attempt will be made in Task 4 to capture the current state of smart lamps and to see what future expectations are. The DEA proposed value of 0.3 W could be a reasonable value to start the discussion and obtain comments from other stakeholders. Task 3 report par. 3.4.5 has been edited to include the DEA opinion.

6. SUMMARY OF IALD COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Scope	As a general comment, we would like to point out that this Study on Light Sources looks mainly at residential and household light sources; any regulations set up based on the residential market will have a great impact on non-residential (tertiary) markets.	The study regards all light sources, both for residential and non-residential applications. LFL, CFLni and HID lamps are explicitly included in the study and mainly used in the non-residential sector. No action on report.
Scope	We look at the specific inclusion of building floodlighting with concern. Given the wide variety of approaches to building lighting, we would like to avoid finding certain current styles and techniques of lighting constrained. The same applies with any definitions of "Decorative" lighting and even signage. We have also not seen references to Light Art whether it is an installation, projection or media façade type of project.	The 'scope decision table' presented in the Task 1 report and during the 5 February meeting is a proposal to stakeholders and commission. The scope of the study is still under discussion. The scope of the study should also not be confused with the scope of a future regulation, if any. In addition, eco-design measures do NOT remove design options if more energy efficient alternatives are not available. As regards the definition of special purpose lamps and other lamps currently exempted, and associated quick and cheap testing means, the study team will try to prepare a proposal; for the moment separately from existing reports. Added footnote with IALD opinion to Task 1 report par. 1.12.
LFL T5 HO Quartz MH	Overall the proposals could potentially risk the availability of replacement lamps for a very large number of existing lighting schemes. Proposals that would compromise the availability of T5 HO lamps for example would require extensive, and costly, replacement of fittings and lamps in many schemes. The further proposals to remove the availability of quartz envelope Metal halide lamps in favour of ceramic envelope would compromise the optical performance of many fitting types due to the significantly larger light source area. Metal halide should be considered as an energy saving lamp as it can be a single, powered light source for a multitude of lighting fixtures as in the case of fiber optic applications (one light source lighting 10 fixtures, as an example). The study should include system scale assessments of the impact of removing these specific lamp types and the financial burden placed on the owners of the affected properties.	The comment probably refers to summaries in the Task 0 report for regulation 245/2009 and for the Omnibus study. The study team did not make any proposals regarding LFL T5 HO or ceramic vs. quartz metal-halide lamps. The purpose of the preparatory study is mainly to inform the European Commission. Following the study, the Commission can propose an eco-design measure, but we are not at that point yet. Note that system aspects will be considered in the parallel Lot 37 study. The IALD opinion has been added in the paragraphs of the Task 4 report that deal with T5- and MH-lamps.
Special purpose lamps	We would like to see a clearer explanation of the rationale behind the assessments on the impact of misuse of special purpose lamps. The proposed energy savings and limiting availability of these lamp types seem very challenging.	The assessments on special purpose lamps (sales quantities and energy impacts) that are mentioned in the Task 1 report par 1.4.2 and in the 'scope decision table' presented during the 5 February meeting, are explained in Annex D.15 of the Task 1 report, see also the notes following the tables in that Annex. These do NOT regard 'misuse', but in general the 'use' of SPL. 'Abuse' of SPL has been discussed only for shock proof lamps, see Task 1 report par. 1.4.2.1 and further references there. See also a LightingEurope comment on this topic. No action on report.
CLASP report	We would advise to re-think the inclusion of the CLASP report in this study, due to the fact that the assumptions made in the study have yet to be contrasted with further research. http://www.lightingeurope.org/uploads/files/LightingEurope_finds_flaws_in_CLASP_report.pdf	This is listed as a comment on the Task 0 report and must then refer to par. 2.5 that summarizes a 2013 CLASP report. However, the referenced LightingEurope document criticizes another CLASP document from December 2014.

Ref.	Stakeholder comment	Study team reply / action on reports
		The latter document is cited in the Task 4 report, because it is a relevant source of information, together with the LightingEurope opinion.
Lighting function task 1 p 1-10	We agree that application of lighting equipment is so varied that specific studies should be carried out on an application by application basis.	As long as the product function is the same, products can be considered in the same study, e.g. general lighting function. If the product function is different (IR-lamps, UV-lamps, grow-lights, etc.) it would be preferable to perform a specific study. No action on report.
Definitions, control gear	We would like to stress that care is needed to ensure that there is no confusion between definitions. As it stands now, some definitions would require further refinement. It is important that this confusion does not cause unintentional effects - there is a potential risk of misalignment of definitions with the realities of the market. A good example to show this potential confusion relates specifically to control gear: power supplies are potentially separate (this is becoming normal industry practice a DC power supply is used in conjunction with gear to regulate current or voltage and interface with lighting control systems). This type of device falls between the definition of lamp control gear and control device particularly where it functions with a directly connected contact close switch or potentiometer. This could potentially have negative consequences in application and enforcement of future regulation, as these devices would not be regulated or not allowed to be manufactured. We would also like to mention that the references to ZHAGA documents would imply referencing a membership-based organization, whose documents are private and therefore not verifiable.	This comment is understood to apply to Task 1 report par. 1.2.2. Note that system aspects, including separate gear and power supply, will be further addressed in the parallel study on lighting systems (Lot37). Zhaga is only mentioned as a source of information. The IALD opinion has been added in a footnote of Task 1 par. 1.2.2.
Household lamp Task 1 par. 1.4.1.1	We believe that the attempt to narrow down a definition of household lamps could be challenging. Lamps are not used specifically and only in domestic application. Further technical considerations could be made here.	The report merely explains what a 'household lamp' is for regulation 244/2009. The study team agrees that use of this definition should be avoided in future regulations, if possible. No action on report.
Special purpose lamps Task 1 par. 1.4.1.6	The shown energy estimates for special purpose lamps are not entirely based on demonstrable calculations, and therefore we would advise not to take them into account.	See also answer to another comment above: estimates are motivated in Annex D.15. The estimates are rough and preliminary but the order of magnitude is assumed to be correct. The data are relevant for the scope decision. 'Not take them into account' does not get us any further. The IALD opinion has been added in a footnote of Task 1 par. 1.4.1.6.
Extreme physical environment Task 1 par. 1.4.2.1	With regard to Rough Service lamps there are still no alternative products in the market that are suitable to replace these in specific applications. This goes the same for lamps for use in high temperature environments such as domestic ovens or commercial ovens and kilns. Lack of lighting in many of these applications is a significant safety hazard; changing the lighting arrangement including sockets and secondary protection would compromise certification on some of these products, (significant financial considerations to change over this) which could potentially lead to a lock-in situation with future regulation of these products.	As regards rough service lamps, the most recent opinion from LightingEurope is that there are suitable replacements (see par. 1.4.2.1). That high temperature applications require special attention is already written in the report. The IALD opinion regarding rough service lamps has been added in a footnote of Task 1 par. 1.4.2.1.
Non-white Task 1 par. 1.4.2.2	Due to the definition of the Lumen relating to the V lambda curve this metric or any derived from is not recommended for measurement or regulation of lamps that are not visibly white. Lumen is not an absolute measure of electromagnetic energy but is an approximation of the human visual systems' response to specific frequencies.	The study team is well aware of the definition of 'lumen'. It has not been understood why the comment is relevant for this paragraph: it is not suggested anywhere to use lumen as a metric for non-white light. No action on report.

Ref.	Stakeholder comment	Study team reply / action on reports
Emergency task 1 par. 1.4.2.17	There seems to be a fundamental misunderstanding of building emergency lighting. In many cases this is required to be maintained, therefore is on whenever the building is occupied. Few if any lamps are specific to emergency lighting; however, it is worth noting that if regulation potentially makes these lamps unavailable there is a risk of failure inserting lamps with different characteristics in emergency systems.	At least in some offices that the study team members worked in, emergency lighting switched on only in case of a power failure. Task 1 par. 1.4.2.17 has been adapted and the IALD comment was added in a footnote.
Luminaires Task 1 par. 1.11	Luminaires are a complex area for regulation, due to the wide range of variability of the efficiency based on the optical performance and appearance required.	Agreed. No action on report.
Lamp life Task 1 par. 3.1	This section seems to conflate lamp failure with end of life. Discharge and Fluorescent lamps both reach end of useful life before technical failure occurs; there is already a definition in place of life expectancy on LEDs provided by ZVEI (Method for determining the life expectancies of LED-modules in electric luminaires, February 2003): "Duration given a pre-defined ambient temperature and conducting-state current until the light flux falls to below 50% of the measured original light flux in the given junction temperature range". Predicted lamp life is specified to a particular point of lumen depreciation; this is in reality the point beyond which lamps should be replaced, irrespective of technical failure. Beyond this point they are no longer fit to perform to the efficiency required. Some lamp and gear combinations particularly magnetic gear with both Mercury and Sodium lamps increase the current and therefore the energy usage as the lamps age – energy over life predictions can thus become inaccurate.	The section does not try to give a new definition of lamp life, but addresses testing-related problems and raises a potential consumer-interpretation problem with the current definitions. Life times are defined in various standards, and it might well be that the ZVEI definition was at the base of those definitions. See also Task 3 report par. 3.3: many of the lifetimes used in the MELISA model have been taken from ZVEI sources. No action on report.
UV radiation Task 1 par. 3.1	UV radiation Reference 188 is to an industry source. We believe the reference should direct to IEC/EN 6247 rather than a secondary source.	The industry reference is more informative and also covers ANSI/IESNA RP-27. Reference to IEC-webstore has been added
Resources task 1 par. 3.2	It is critical to take into account the resources involved in the manufacture, transport and installation when looking at the lifetime impact on resources of these products. While we acknowledge that energy in use is far greater than embodied energy, this balance must change with the increasing proportion of renewable energy generation. Studies have shown that, for example, in Iceland the CO2 equivalent of the change from incandescent to CFL actually increased as the Iceland energy generation is almost entirely non carbon based (please see reference in "Incandescent lamp phase out and its effect in Iceland"). (http://savethebulb.org/Halldor%20article.pdf)	Resources will be considered in Task 5 using the EcoReports associated to the MEErP. In this methodology the average European efficiency of electricity generation has been fixed on 40%, i.e. per definition 1 MWh electricity corresponds to 1*3600/0.4= 9000 MJ primary energy. The same 40% is used for all eco-design studies, not only for this lighting study. No action on report.
Flicker Task 1 par. 4.1.1	We believe this is an urgent problem that should be addressed. Work has been done and published by Professor Arnold Wilkins and others from Surrey University with methodologies for testing flicker and with recommendations for acceptable limits (Lehman, B. and Wilkins A.J. (2014). Designing to mitigate the effects of flicker in LED lighting. IEEE Power Electronics Magazine, Vol. 1, No. 3, September. http://www.energy.ca.gov/appliances/2014-AAER-01/prerulemaking/documents/2014-09-). These should be studied and used as is or with documented variations until such time as broader standards are developed; the introduction of new methodologies in future regulations should be addressed with care. Flicker is a specific and particular problem with LED given the generalised use of switch mode power supplies and PWM dimming from digital signals.	See also a LightingEurope comment on the same issue. The testing methodologies suggested by the IALD reference should primarily be considered in the ongoing standardization work. Once a standard has been agreed, ecodesign measures can include acceptable limits, taking also into account the findings of the research of Lehman et al. The IALD comment has been added in the Task 3 report par. 5.1.4 and 7.2.1, and in the Task 1 report at the end of par. 4.1.1.
HID lamps Task 1 par. 6.2.2	In reference to the statement in the study: "*There is value in highlighting the mechanism used by the US to phase out mercury vapour lamps, i.e. through prohibiting sale of the ballast rather than the lamp itself. Should it be considered appropriate, the use such a proxy mechanisms (e.g. via an auxiliary product as in this case, but also potentially by specific performance requirements)*	The option is presented as a possibility to maintain technology neutral lamp requirements. Costs for consumers are always considered in eco-design studies, at lifecycle basis (Tasks 5 and 6). No action on report.

Ref.	Stakeholder comment	Study team reply / action on reports
	may be an approach that could be used within EU to remove specific lamp types from the market while still maintaining technology neutral lamp requirements." We would like to stress that this may contradict the overarching objectives of Ecodesign, which should be technology neutral and not cause additional cost to consumers.	
Task 3 MELISA general	We would like to point out that with a single model it is challenging to cover the broad range of climatic, social, geographical conditions and electricity generating mixes of all 28 EU states. The MELISA model should be adapted and flexible enough to understand the variation across the EU 28; calculations based on this should be factored according to these variations. These differences impact lighting usage and therefore energy use.	Apart from project budget constraints, a major problem would be data availability. The same average data would be required as now presented in MELISA for the entire EU-28, but at country or macro-region level. These data are often not available, requiring a lot of (educated) guessing and assumptions. The study team is not convinced that this would lead to a better model for policy decisions. The sum of all country contributions would anyway have to be similar to the EU-28 totals that are now presented in MELISA (totals have been checked for reasonability). As regards different electricity generation mixes, see the reply to another comment above. An important aspect of eco-design measures is to create the same rules everywhere in the unified market: regulations resulting from the study, if any, should not be country- or region-specific. The scenario analysis in Task 7 also considers the impact on consumers and industry. As part of the sensitivity analysis, different impacts in different regions of Europe can be considered. There is also a role of the Member States here: they are involved in the decision making process and should timely react if they have evidence that a certain scenario will have a negative impact in their country. The comment has been added in the Task 3 report par. 2.1
Task 3 MELISA general	The overall impact of the 2009 Eco-design regulations have affected the lamp market, in particular the domestic sector. The overall aim of the Eco-design Directive and its subsequent regulations has been to reduce energy consumption and as well as greenhouse gas emission derived from energy use. We believe that technical based regulations are a base to reduce energy use in the EU, but this should be done jointly with efforts aimed at educating consumers.	Energy labelling of lamps aims at informing and thus educating consumers. No action on report.
Task 3 par. 3.2.1 operating hours definition	A methodology for determining operating hours is already established in EN15193 (LENI calculations). In view of avoiding potential situations where compliance with one regulation prevents compliance with the other, the IALD would recommend that MELISA uses the LENI calculation methodology to determine operating hours.	What would really be necessary are reliable measured data on operating hours in the non-residential sector, not calculated data. The study team extensively studied EN-15193 in the context of the Lot37 lighting systems study, see the 5 February presentation, sheet 96. More details will be provided in the Lot37 study. The main conclusion is that MELISA lumens and power correspond well with those calculated following the EN-15193 approach, but operating hours do not. The general impression of the study team is that the default potential operating hours of EN-15193 are too high. The EN-15193 methodology, including the estimate of daylight dependent factors and occupancy

Ref.	Stakeholder comment	Study team reply / action on reports
		dependent factors, would clearly be too complex to implement in a high-level model as MELISA. Non-residential LENI-values, i.e. kWh/m²/year, resulting from MELISA have been checked against available measured data (Task 3 par. 3.7.2), and seem reasonable. It is difficult to see how EN-15193 and eco-design measures on light sources could conflict. The comment has been added in the Task 3 report par. 3.2.1
Task 3 par. 3.2.3 operating hours residential	The data used in this section from 2012 indicated domestic hours of use to be 394 in UK; however MELISA model is using 450 hours, used to compare with 2008 REMODECE study. In connection to the point above (3.2.1.), we would strongly support initiating further research beyond the referenced DEFRA 2012 and REMODECE 2008 studies, in order to obtain an even clearer image of the effect of regulations on consumer behaviour and energy use across the EU 28 countries. The data used should reflect the effects of the regulations currently in place. The REMODECE data from 2008 predates any of the current regulations, and the DEFRA 2012 data only reflect the first year or two of regulatory impact. We would recommend reviewing comprehensively the effect of the current regulatory effort to understand the impacts and therefore the potential effect of further regulation on this market.	The UK-2012 value of 394 h/a is only for the UK. Remodece-2008 covered 12 countries and is thus more representative for a European average. Performing a new study as intended in the comment is clearly outside of the scope of the current study. Non-residential hours are more uncertain than residential hours, so if a study is undertaken, the study team would give priority to the non-residential sector. In general, the impact of the eco-design measures is clearly visible in the MELISA data presented in the Task 2 and 3 reports. The impact on the operating hours (rebound effect) has been taken into account, as far as available information allows. The comment has been added in the Task 3 report par. 3.2.3
Task 3 par. 3.3.1 life times	We have identified the same confusion between lifetime and operating life exist in this section as already pointed out Task 1. There is a divergence when quoting life of Fluorescent lamps against a discussion of 50% failure. At the stated life for fluorescent lamps 100% can be expected to be delivering less than 80% of initial Lumens though failures may be 2% to 5% of a given batch.	For LFL the MELISA lifetimes are intentionally based on the LSF=0.9 column of ZVEI, Annex E.2, table 73, and not on the LSF=0.5 column, in an attempt to take into account that lamps will be substituted according to maintenance schemes before their median (50%) time to failure is reached. For LFL T8 tri-phosphor at the used life of 13,000 h, LLMF is >91% according to table 73. It is not clear where the 80% mentioned in the comment comes from. The comment lacks a conclusion: according to IALD experience, which EU-28 average lifetimes should be considered in the MELISA model ? The comment has been added in the Task 3 report par. 3.3.2.
Task 3 par. 3.3.2 life times	Again LSF (Lamp Survival Factor) is quoted as measure for Fluorescent lamp life not Lumen maintenance which is the required measure to comply with lighting design requirements such as EU workplace lighting standards EN12464-1:2011	See earlier comments.
Task 3 par. 5.1 health	We would support further research on this area, to fully address the health effects of flicker and strobing published since last SCENHIR. The reference to glare in SSL products mentions that it is recommended to report the maximum luminance for finished SSL products. We would to get some further clarification on what exactly should be reported.	Also following comments from other stakeholders, additional information has been added to par. 5.1. As regards glare, see further details in the EIA 4E reference document, chapter 4. The comments have been added in the Task 3 report par. 5.1.1 and 5.1.2
Task 3 par. 5.1.2 Health aspects of LED	Based on existing EU research (http://ec.europa.eu/health/scientific_committees/opinions_layman/artificial-light/en/index.htm#1), we would like to understand better the rationale behind the section on more lighting points: "*Compared to other lighting technologies, SSL products are not expected to have more direct negative impacts on human health with respect to non-visual effects. However, the*	At the end of chapter 7, the EIA 4E reference further explains this: "The low cost of LEDs combined with their form factor and their low energy consumption may cause more lighting points to be installed at home, at work or in the streets, thereby increasing the overall exposure to artificial light and the potential

Ref.	Stakeholder comment	Study team reply / action on reports
	LED technology might lead to more lighting points being installed and consequently to an increase in exposure to artificial light."	risks linked to non-visual effects such as the perturbation of the biological circadian clock. The experts recommend preserving a dark nocturnal environment while maintaining a suitable exposure level during daytime through a combination of daylight and artificial lighting." Additional text also added to par. 5.1.2.
Task 3 par. 7.2.2 dimming	We have noted that in this section the report mentions constant current reduction and Pulse Width Modulation. We have acknowledged that there is no mention of combination of these two different types in mixed mode control gear. We believe this is highly effective for digital control.	The comment has been added in the Task 3 report par. 7.2.2.
Task 3 par. 7.2.3 Figure 34 3-wire	We would like to point out that in the diagrams taken from Lutron USA products, 3-wire fluorescent dimming has not been available in EU market for more than five years. The ballasts referenced would not meet current EU energy efficiency standards.	Comment has been added in par. 7.2.3.
Task 3 par. 7.2.4 Dimming	Regarding phase cut dimming, we believe that this is not an entirely ideal solution for LED and CFL lamps. We would recommend allowing the current technologies to stay in the market until a reliable dimming control technology has proven effective for these light sources.	The problems associated to phase-cut dimming have been extensively described in the report. It is not suggested anywhere in the reports that certain dimming technologies should be removed from the market. The central point is the compatibility between light sources and control components such as dimmers. Standardisation work is ongoing on this issue. No action on report.

7. SUMMARY OF NIKO/CECAPI COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Task 3 Dimming	During the stakeholder meeting a question was raised to CECAPI concerning dimmers. From the minutes: "*How many dimmers are still out there and will be used in the future? There may be 200 million installed out there, but Hans-Paul Siderius (HP) (Netherlands Enterprise Agency) and others doubt that there are still many consumers that will use them at some stage and instead will use the smartphone for smart lamps. RK mentions that the study cannot simply make such an assumption without proof. The study has anyway to make an estimate for the decision makers on how many citizens would go for hardware dimmer-substitution. RK mentions that the current sales number (5.5milion/year) and sales-trend can be an indicator of how many people still value this technology. Rony Haentjes (RH, NIKO/ CECAPI) will try to come up with more information on the issue*." CECAPI statement on the subject: CECAPI confirms the sales numbers of approximately 5.5 million phase-cut dimmers/year. The market is estimated to grow at 2% on average, with Trailing Edge dimmers growing faster (as more adapted to low voltage Halogen and LED lamps) and Leading Edge dimmers reducing in volume. We estimate that 75% of them are sold in residential premises. Phase-cut dimmers are very popular as it is a simple, affordable, sustainable and energy efficient way to dim lights. CECAPI does not foresee that users will shift towards smart lamps controlled by smartphones completely, but instead will remain using traditional dimmers where smartphone control will be an added feature. The reasons are: - People do not want to rely on smartphones/tablets only. Functionalities need to be executed independently from the availability of networks and battery capacities. - The use of traditional dimmers to control light sources is faster (e.g. always available, no entry code, no app start-up). - The interface to control the light output is known to the consumer and uniform for all lamps, independent of brands. The interface is also identical in form and design with the other control devices in the building. - Phase-cut dimmers are an integrated part of building management systems which controls light, temperature, blinds, ventilation, etc. with complete software packages.	Some of the information in the comment is already reported in the Task 3 report, par. 7.2. The CECAPI opinion on the shift toward smart lamps has been added in par. 7.2.9.

8. SUMMARY OF NEONLITE COMMENTS

Ref.	Stakeholder comment	Study team reply / action on reports
Task 3 Dimming	Following the discussion on lamp-dimmer compatibility during the 1st stakeholder meeting of 5 February 2015, Neonlite forwarded information to the study team regarding 3-step dimming LED lamps by Megaman. These lamps have integrated dimmers and can be controlled to 100%, 60% or 20% light output by operating an ordinary on/off switch. These lamps avoid dimmer-lamp compatibility problems and can be a solution in several situations.	A new paragraph 7.2.10 has been added to the Task 3 report to cover step dimming.