

## **Questionnaire Exemption Request No. 2013-5**

### **Exemption for “Cadmium in LCD Quantum Dot Light Control Films and Components”**

#### **Background**

The Öko-Institut together with Fraunhofer IZM has been appointed within a framework contract for the evaluation of applications for granting, renewing or revoking an exemption to be included in or deleted from Annexes III and IV of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.<sup>1</sup>

3M Optical Systems Division (OSD) has applied for an exemption of

#### ***“Cadmium in LCD Quantum Dot Light Control Films and Components”***

The applicant puts forward the following main arguments.

Quantum dot light control films are a new technology that has been developed to enable liquid crystal displays (LCD) to give a technically superior image with a much higher range of colours within a precise wavelength range than is currently possible from other commercially available LCD technologies. The principal’s envisaged final uses are in televisions, mobile phones, monitors, tablet PCs, etc.

According to the applicant, thin quantum dot light control films contain cadmium for which substitution is currently not technically practical. Alternative LCD technologies give broader ranges of colours which cannot be tailored to optimum wavelengths.

- Therefore, the primary justification for this exemption is that only quantum dot LCDs are able to achieve 100% colour gamut for all screen sizes

Additionally, the applicant has stated that OLED displays (a possible alternative) have been developed and have been used mainly for small-size screens of smart phones, etc., as manufacture of larger size OLEDs has proved to be technically challenging. Recently, some OLED manufacturers have claimed that larger size OLEDs can be constructed and will give the same colour gamut as quantum dot films, but the applicant explains that the

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<sup>1</sup> Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

energy consumption of an OLED display is estimated to be significantly higher than that of quantum dot film based LCDs.

- Thus a second justification is that the potential substitutes have a greater negative environmental impact caused through the higher energy consumption related to the use phase of LCD Quantum Dot Light Control applications.

For details, please check the applicant's exemption request at:

<http://rohs.exemptions.oeko.info/index.php?id=185>

This exemption request has been subject to a first completeness and plausibility check. The applicant has been requested to answer additional questions and to provide additional information (c.f. link above).

The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. 5 (1) (a) of Directive 2011/65/EU (RoHS II), which can be found under:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>.

If you would like to contribute to the stakeholder consultation, please answer the following questions:

## Questions

1. The wording suggested by the applicant for this new exemption would be **“Cadmium in LCD Quantum Dot Light Control Films and Components“**
  - a. Do you agree with the scope of the exemption as proposed by the applicant? Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.
  - b. Please state whether you either support the applicant's request or whether you would like to provide argumentation against the applicant's request. In both cases provide detailed technical argumentation / evidence in line with the criteria in Art. 5 (1) (a) to support your statement.
  
2. The applicant mentions that possible substitutes are OLEDs, traditional LED LCDs with more absorptive colour filters, RGB LEDs, Hybrid LEDs, wide colour gamut white LEDs, plasma displays and cadmium free Quantum Dots

- Please provide information concerning these possible substitutes or developments that may enable substitution or elimination at present or in the future. If possible please provide data to establish reliability of possible substitutes.
- According to the applicant OLED are the only possible substitutes relevant for the near future that can be used in similar cadmium QD-based LCD applications. Please explain in detail, the status quo of using OLED in comparison to applications using cadmium in LCD Quantum Dot Light Control Films and Components.
- Do you agree with the applicant's statement that OLED technology consumes three times more energy in the use phase than cadmium QD applications?
- Please explain further, what display sizes cannot yet be manufactured with OLED? Is it possible to use OLED and applications using CdSe QD in the same applications (can they replace one another), for instance in the small sized displays?

3..The applicant estimates that quantities of 147 kg of cadmium may be placed on the EU market annually through LCD Quantum Dot Light Control applications (TV, monitor, Notebook, tablets and smart phones), see also following table. As demonstrated in this table, it would be useful to receive information as to what % of LCD area in the EU uses OLED technology and what area this represents (see relevant columns). Please quantify for the EU, if possible. Estimation is fine in case you do not have exact data. Please elaborate as to assumptions and calculations

Application	Global Annual LCD Area (1) (m2)	EU Share of LCD Area (2) (m2)	% Using QD Film(3)	LCD Area Using QD Film in EU (m2)	% Using OLED	LCD Area Using OLED in EU (m2)
TV	157,333,925	26%	2%	818,136		
Monitor	29,365,561	26%	3%	190,876		
Notebook/Ultrabook	22,819,763	26%	7%	415,32		
Tablets	12,174,293	26%	60%	1,899,190		
Small displays (phones, etc.)	12,000,660	26%	20%	624,034		

4. Please indicate if the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits. If existing, please refer to relevant studies on negative impacts caused by substitution.

In case parts of your contribution are confidential, please clearly mark relevant text excerpts or provide your contribution in two versions (public /confidential).

Finally, please do not forget to provide **your contact details** (Name, Organisation, e-mail and phone number) so that Öko-Institut/Fraunhofer IZM can contact you in case there are questions concerning your contribution.