

## About Quantum Dot Enhancement Films - Hisense

Dear Ms. Baron:

I'm writing this letter as a formal show of support for two different exemptions that you are currently considering as part of your evaluation work on behalf of the European Union's Restriction of Hazardous Substances Directive, also known as RoHS. Those exemptions are:

- 1) Ex. Re. No. 2013-2 for "Cd in color converting II-VI LEDs ( $< 10 \mu\text{g Cd per mm}^2$  of light-emitting area) for use in solid state illumination or display systems" (Request for renewal of Exemption 39 of Annex III of Directive 2011/65/EU)
- 2) Ex. Re. No. 2013-5 for "Cd in light control materials used for display devices"

I serve as (**R&D Director**) for Hisense, the world's fourth largest manufacturer of flat-panel TVs, communication devices and other useful technologies with production facilities and R&D centers located in Europe, Asia, North America, Australia, Africa and the Middle East. Our company, which recently acquired Sharp America, is built on strategic pillars of technology, quality, integrity and responsibility. One of the things I'm most proud of the company about is its ability to develop energy-saving products that are better for the environment. Among the products I'd include in this list is our recently introduced 65XT910 series of ultra-high definition (UHD) televisions, which contain 3M Quantum Dot Enhancement Films that leverage cadmium-based quantum dots to bring about more vivid colors.

Allow me to explain. As you likely know, UHD televisions are quickly entering the market as the next technological advancement, offering superior picture quality and a wider gamut of colors. Yet new data shows that UHD models expend 30 percent more energy on average than HD models of the same size. A recent research study by the NRDC (<http://www.nrdc.org/energy/files/uhd-tv-energy-use-report.pdf>) revealed that, in the United States alone, replacing today's HD TVs with same-sized UHD replacements would result in 8 billion more kilowatt-hours of additional electricity annually, costing consumers \$1 billion more just to operate their televisions and releasing 5 million extra metric tons of CO<sub>2</sub> pollution. Of course, the numbers are similar for Europe.

Not all UHD televisions are alike, however, when it comes to their energy performance, and in fact the differences can be extreme. UHD televisions that utilize cadmium-based quantum dot technologies are demonstratively more efficient than quantum dot technologies comprised of other materials, i.e. indium-based solutions.

For example, a recent scientific analysis conducted by 3M Display Materials and Systems Division revealed that when the backlight component of the lone commercialized indium-based television was replaced with cadmium-based quantum dot materials and the color and brightness levels were turned down to match, the cadmium based television demonstrated a significant 20 percent decrease in power.

We believe cadmium-based quantum dot technology remains the only viable way to simultaneously achieve high-color performance and energy efficiency. Discontinuing the exemption may lead to an increase of consumers' electric bills, and may contribute to an overall negative impact on the environment, an outcome that runs counter to the spirit of the Directive.

Given a.) RoHS' mission of environmental protection, b.) the miniscule amount of Cadmium Selenide used ( $< 10 \mu\text{g Cd per mm}^2$ ) in a coated and sealed manner; and c.) the significant reductions in kilowatt hour and CO<sub>2</sub> emissions brought about when using cadmium-based quantum dot

technologies over the alternative, Hisense requests that the the Oeko-Institut' s previous recommendation for granting the above-listed exemptions stay and place and be renewed for a period of at least five years, at which time other technologies may have had time to demonstrate proper color and energy efficiency performance.

Please know you are welcome to contact me (contact information listed below) as you continue your re-evaluation.

Sincerely,

Mr. Huang ShunMing

[Tel:+86\(0\)532-55755032](tel:+86(0)532-55755032)

Mobile:18660284060

Email: [huangshunming@Hisense.com](mailto:huangshunming@Hisense.com)