Paper 7-422-17

Measurement of Automatic Brightness Control (ABC) in televisions: Critical for effective policy-making

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- Mission:
  CLASP improves the energy and environmental performance of the appliances & equipment we use every day, accelerating our transition to a more sustainable world.

- Where:
  - Established in the US since 1999
  - Worked in over 50 economies
  - Dedicated programmes in: Europe (since 2009), India, China

- More about us:
  - www.clasp.ngo

Presentation Outline

1. Introduction and Policy Context
2. New ABC Test Methodology
3. Application of new ABC Test Method
4. Policy Measure and Conclusions

Presentation Objectives

Objectives:

- Appreciate the value of ABC
- Understand the clear, simple test method devised for real-time power measurement
- Observe the ABC software response differences in the market today
- Understand the value policy measures could bring to Europe

Format:

- Happy to be interrupted for clarification, but let's save questions at the end

What is Automatic Brightness Control (ABC)?

- ABC is an energy saving feature of a TV that uses a built-in light sensor to detect ambient light levels in the room and adjusts screen brightness for viewer comfort.
- Reduced light levels => reduced screen brightness => energy savings.

What are some examples of policy measures concerning ABC?

Europe

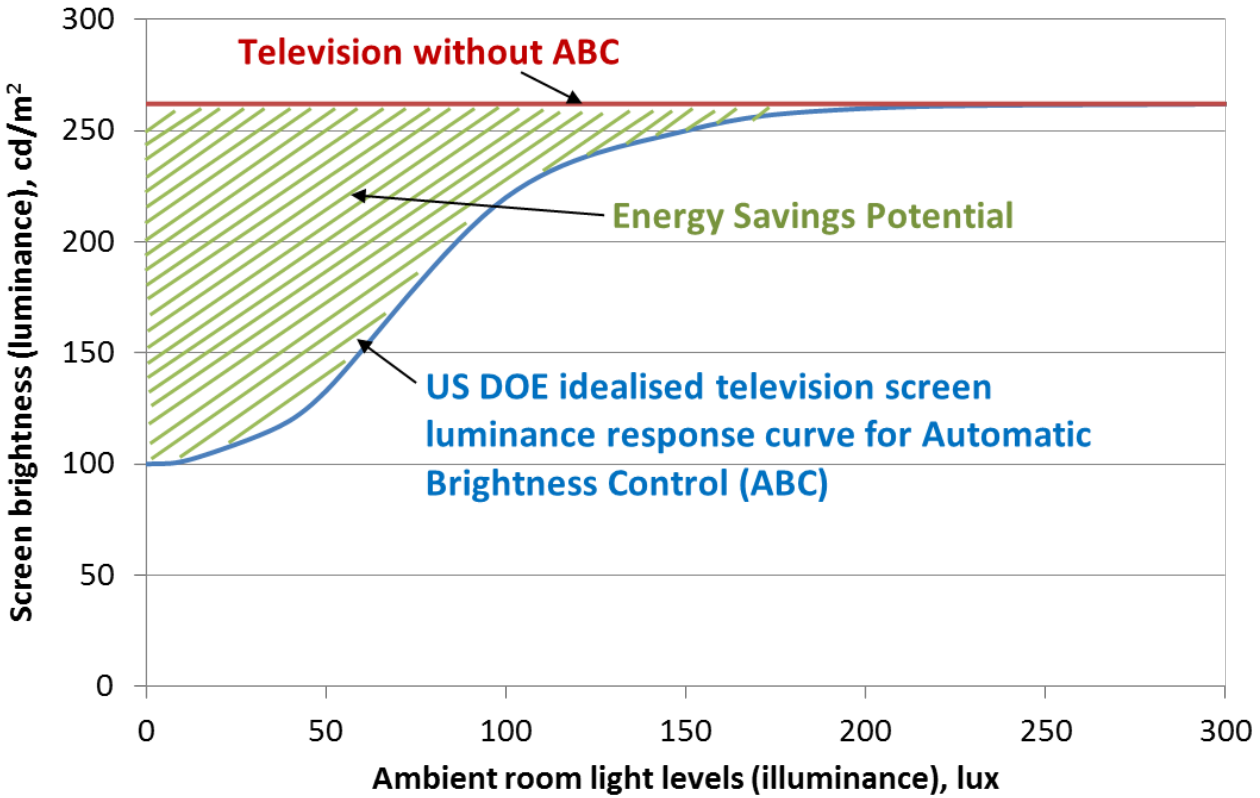
Offers manufacturers a 5% reduction on the power consumption in the calculation used to determine energy label class, as set out in the energy labelling regulation.

United States

Energy Star® allows products with ABC to have their on-mode power be the sum of 25% of power at 100 lux, 35 lux, 12 lux and 3 lux.

What is the idealised relationship between illuminance and luminance?

- US DOE study, 2012 looking at the room illuminance levels and screen luminance. Found a logarithmic response curve of human eye – doubling of brightness perceived the same - 10 : 20 :: 100 : 200 (lux)



So what's the issue?

- While the benefits in terms of energy and comfort are well understood, there has been no practicable method for measuring the television's performance until now…

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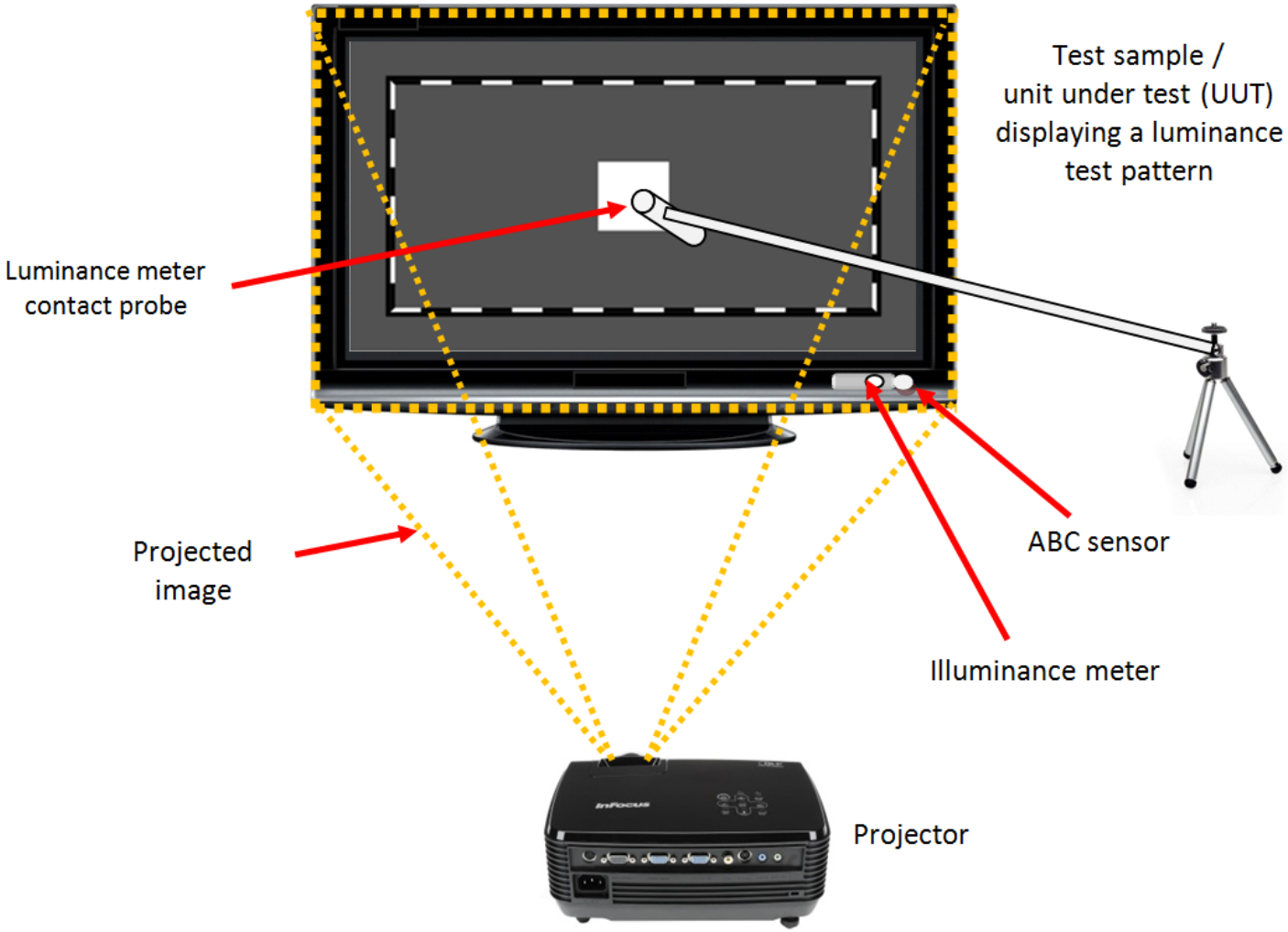
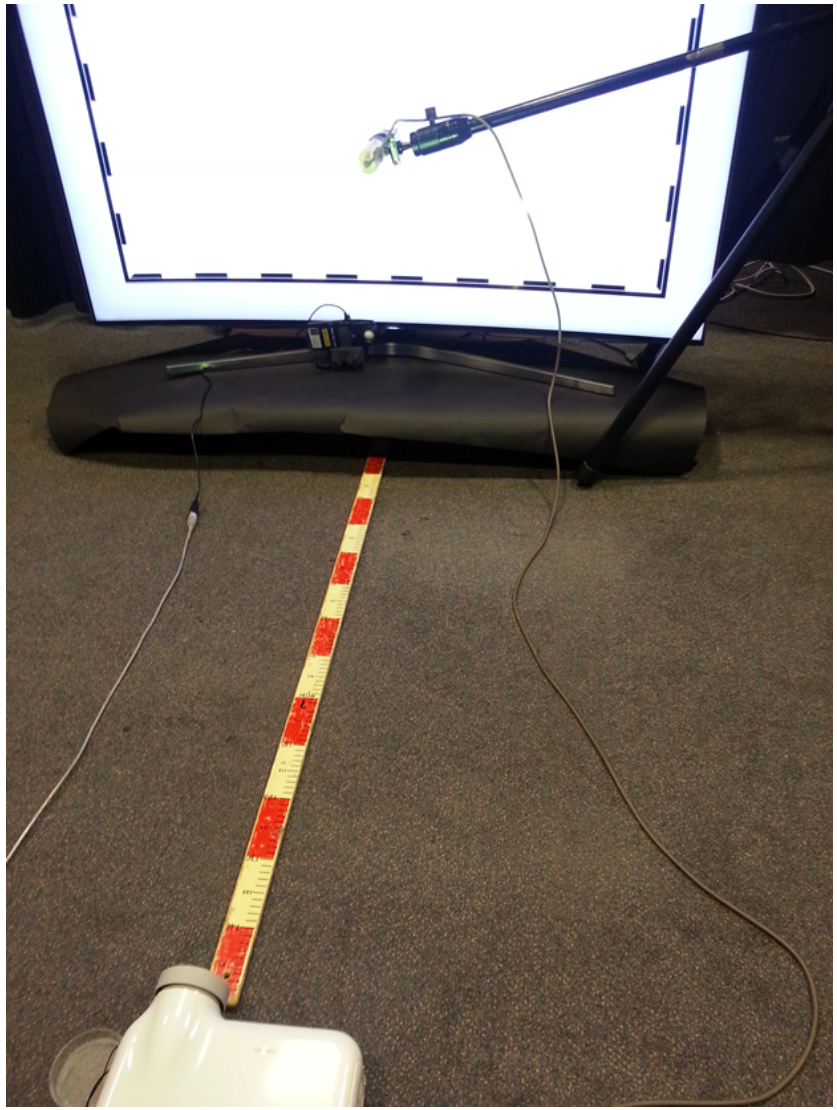
What are the advantages of the new ABC test methodology?

- Easily controllable illuminance simply and accurately targeted on to the television's ABC sensor via projector
- Excellent granularity in illuminance as the projector's light output is cycled from full brightness to black and then back to full brightness again;
- Very efficient from lab technician time perspective; and
- Results are accurate and repeatable.

Graphical illustration of the test setup…



Real Picture #1 of 2 ….



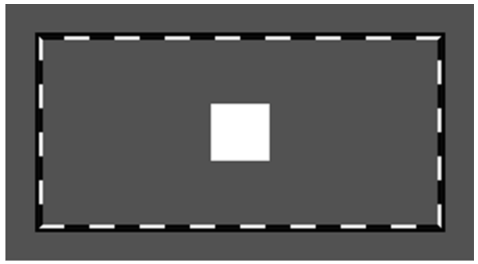
- Projector
- Luminance meter
- Illuminance meter
- TV (unit) under test

Real Picture #2 of 2 ….

- Data logging equipment
- Light meters – luminance (screen) and illuminance (room)
- Power meter – consumption (watts) over time
- Powerpoint presentation running projector

Description of the test methodology

- Test setup – TV, projector, light sensors and power meter set-up in a dark room. Data logging contact colour analyser used for display luminance measurements. Projector approximately perpendicular to screen of unit under test (not precise)
- Pattern – a modified European test pattern (EN 62087)
- Adjust to >300 lux – position the projector on full brightness until illuminance meter measures it



- Vary the projector light output – 39 slides in an automatic show from white (255, 255, 255) to black (0,0,0). Five seconds on each slide, white to black to white.

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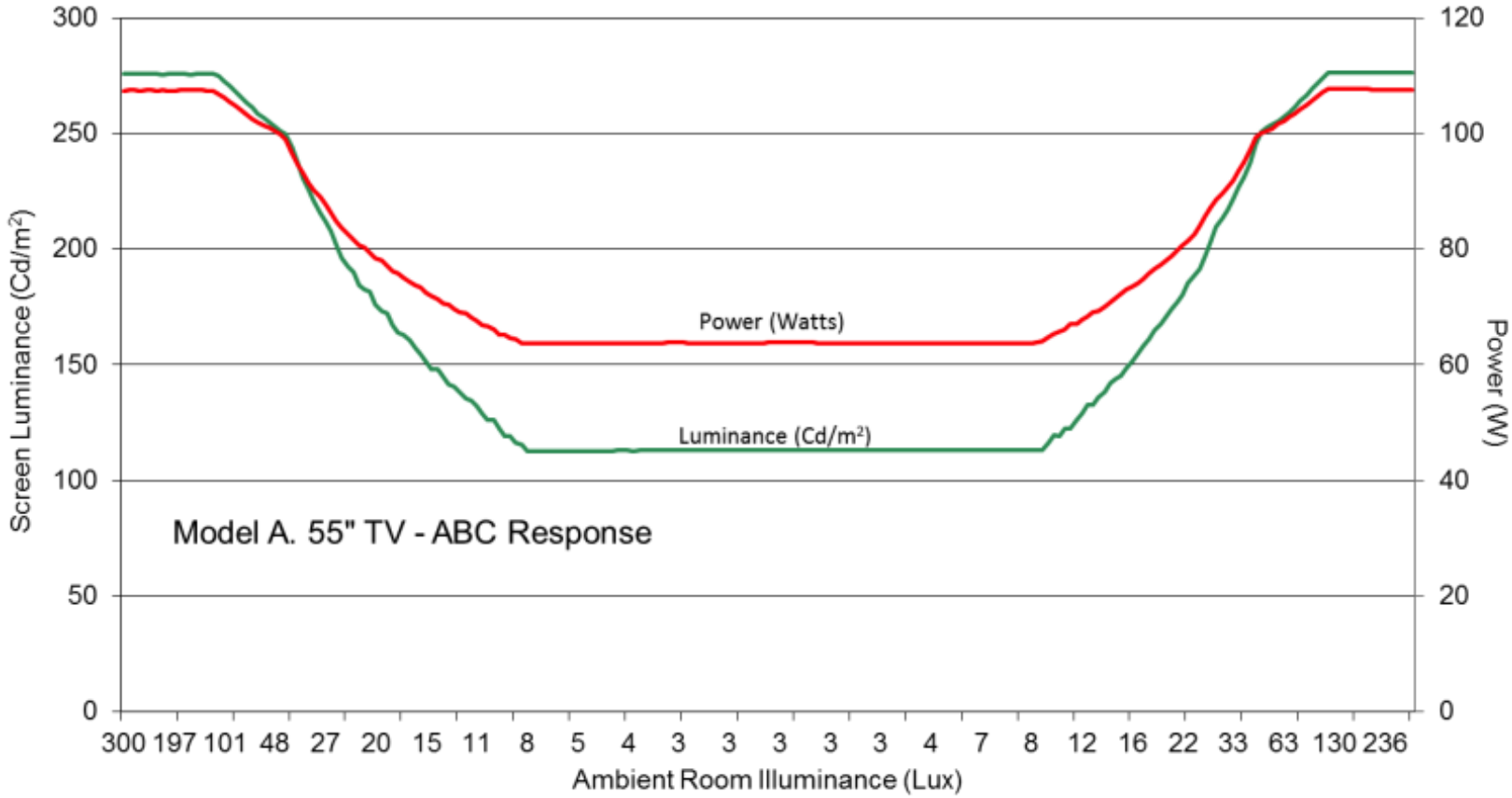
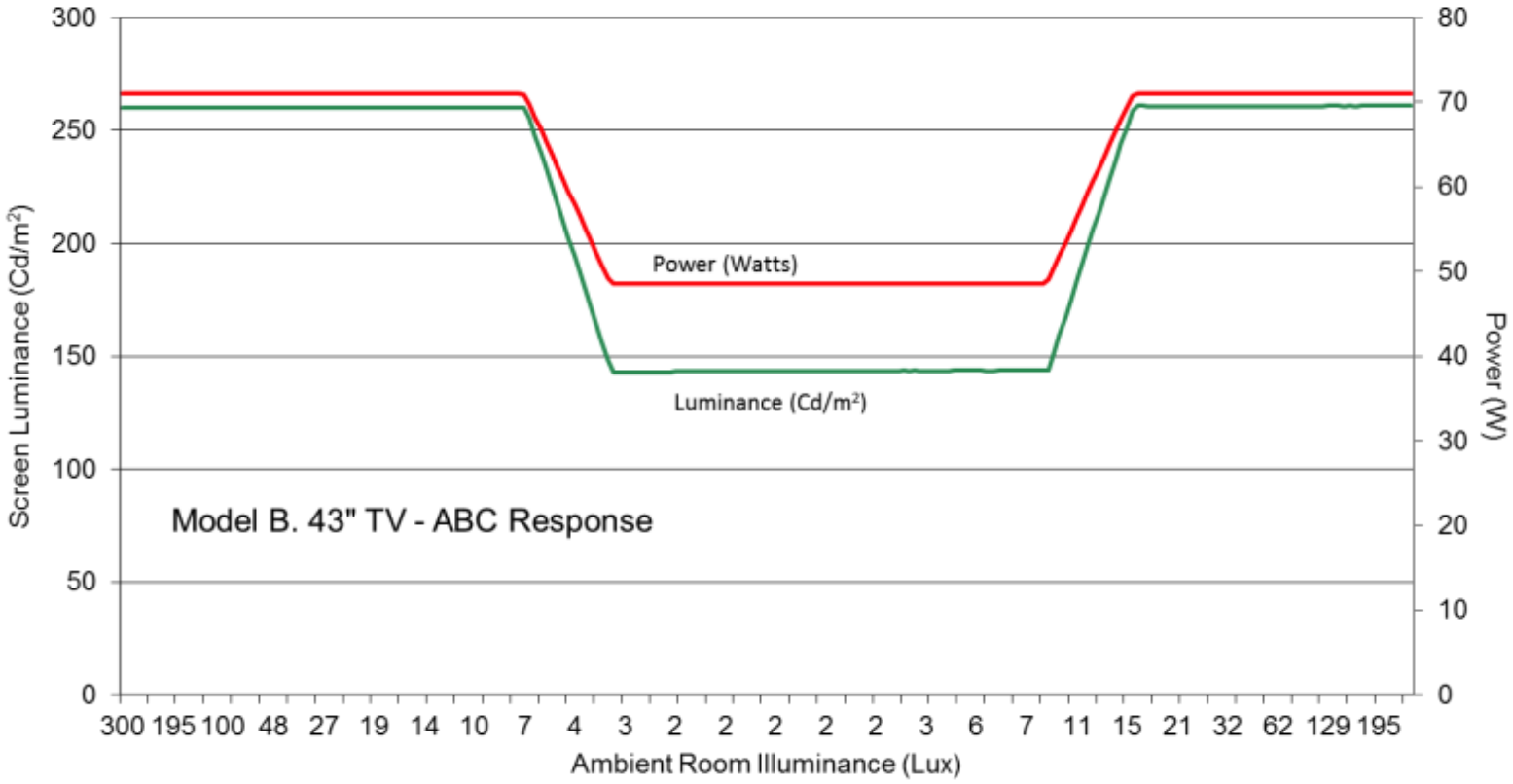
Application of the new test method… Model A

- Several case studies are presented in the paper
- Power and screen luminance – smooth variability
- 41% power savings comparing 300 lux and 2 lux



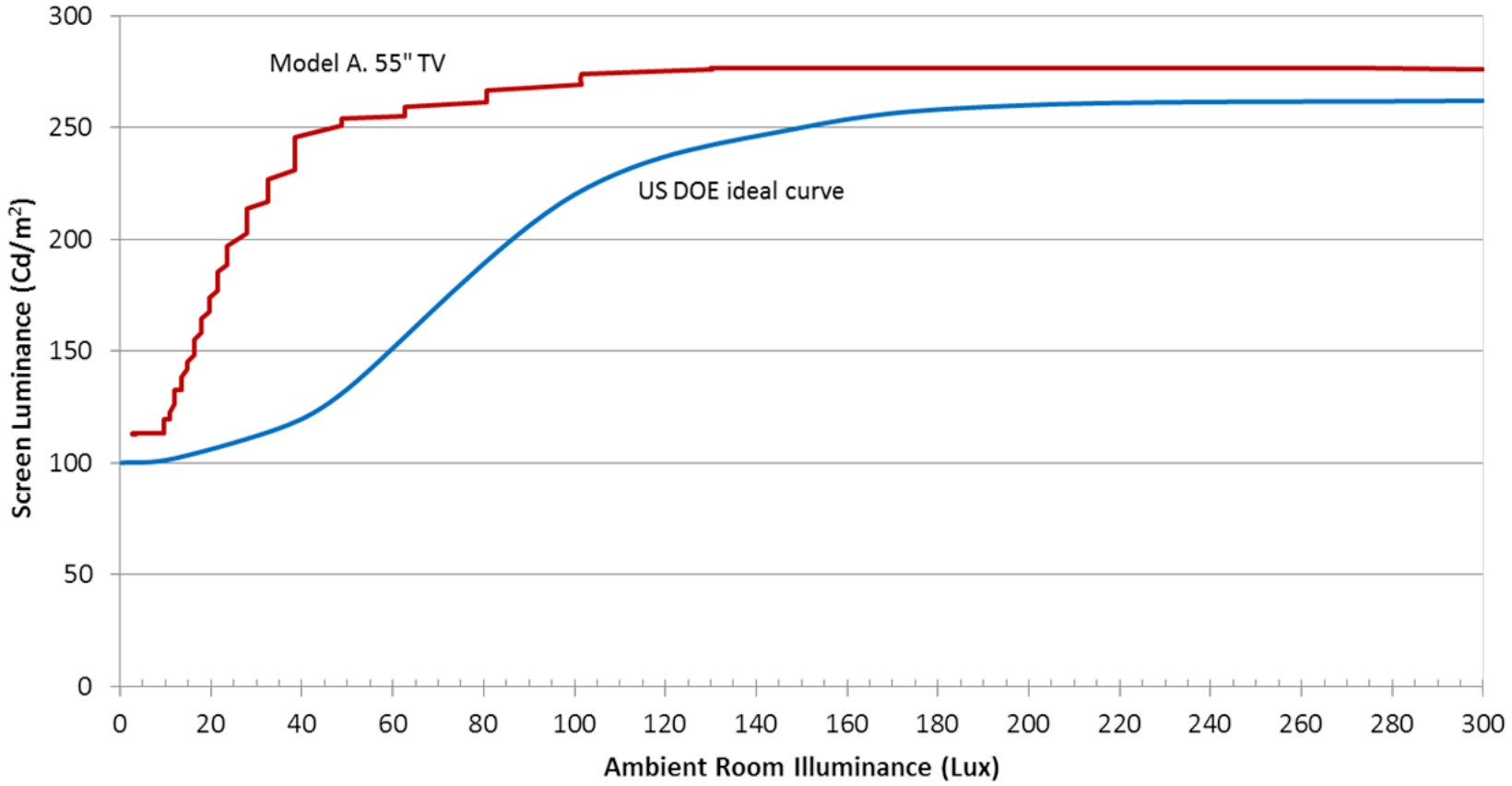
Another example of power vs. screen luminance….Model B

- A step response – room illuminance on X-axis varies, but no change in screen brightness until about 10 lux
- 32% power savings comparing 300 lux and 2 lux



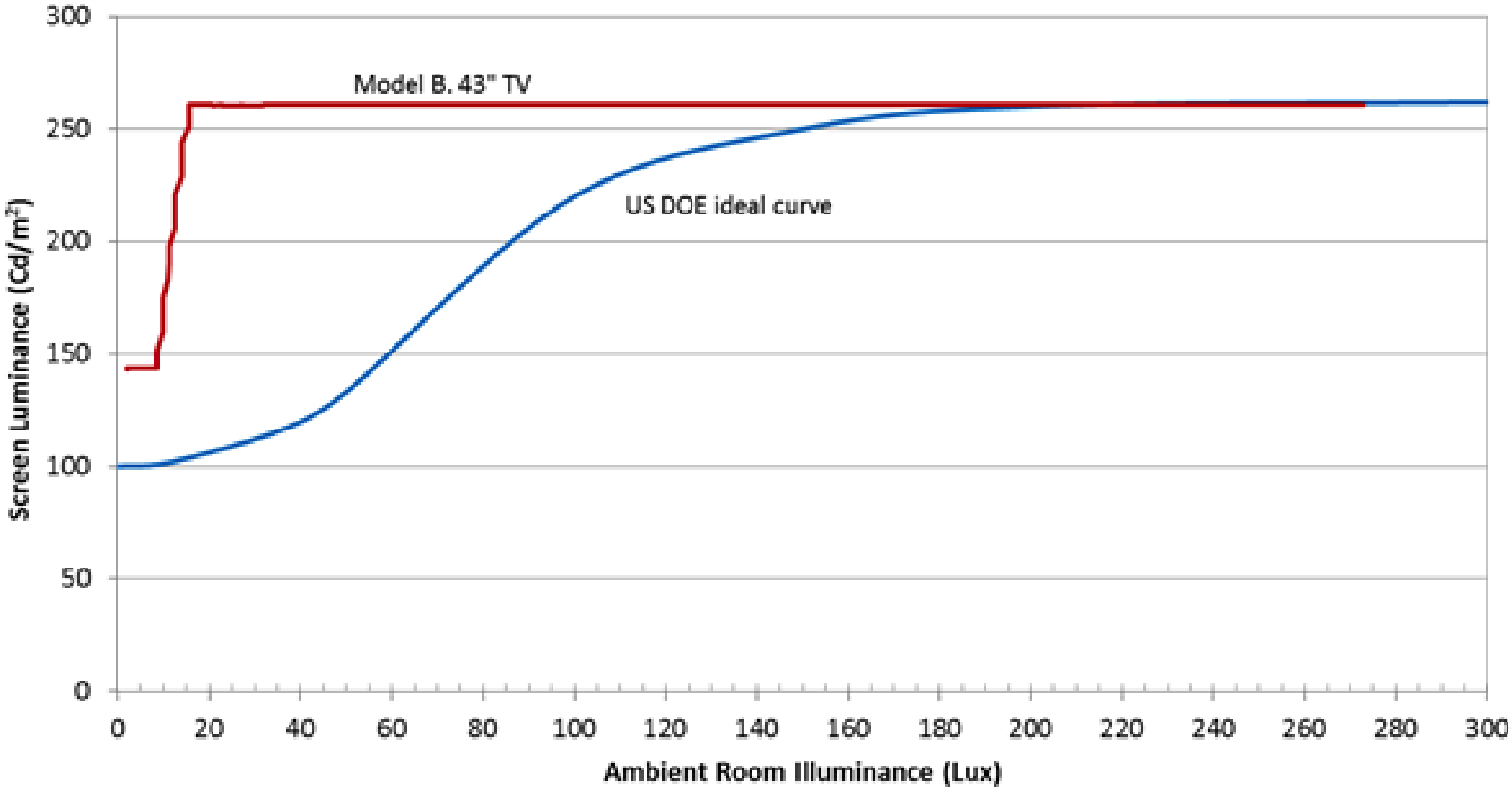
Room illuminance vs. screen luminance - Model A

- Comparison to ideal US DOE curve – saves some energy, but is brighter than DOE

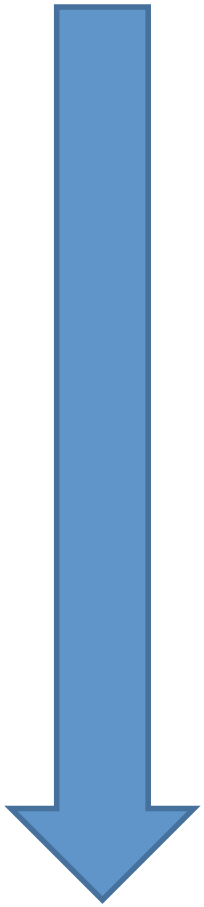


Room illuminance vs. screen luminance - Model B

- Comparison to ideal US DOE curve – does little to save energy, step function clearly visible



Objective of ABC Test Method…



- Testing and reporting on TV response curves for Automatic Brightness Control…
- Achieves better understanding of product behaviour
- Enables better policy measures to be written
- Incentivises manufacturers and will hopefully improve ABC algorithms that save energy

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Potential Policy Measure

- Commission is currently reviewing the TV regulation and has the potential to adopt this test method as a 'transitional method' until CEN/CENELEC publishes

- Looking at the World Trade Organisation draft published last December, text could be added to section 6.3 and bullet 9 in Annex IV.

Draft policy language

B) For products supplied with ABC enabled by default, $P_{measured}$ may be reduced by 15% in the calculation of the EEI provided that:

- *$P_{measured}$ is recorded with an ambient light illumination of 300 lux measured at the ABC sensor of the display product;*
- *$P_{measured}$ is recorded at all light levels (L) from 12 to 300 lux using a published transitional test method, and the screen luminance measured in cd/m2 is found to be no greater than +/- 5% of the recommended luminance level characteristic, defined by the equation: = 95+165/(1+EXP(-0.05*(L-75))) where L is the ambient light level measured at the ABC sensor of the display ranging from 12 to 300 lux; and*
- *$P_{measured}$ reduces by at least 20% when the ambient light illumination measured at the ABC sensor of the display product is reduced from 300 lux to 12 lux.*

Conclusions

- Many TV's offer ABC
- A novel test method now exists for measuring power consumption (and screen luminance) in relation to ambient room illuminance
- Testing was conducted on a small sample of real televisions and comparison made to published "ideal" screen luminance
- Clarity on ABC performance enables better policy making
- Commission has a golden opportunity with the current review
- Energy savings opportunity for Europe (and improved viewer comfort)

Questions and discussion

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