Transmitted by the expert from France

Informal document GRE-73-26
(73rd GRE, 14-17 April 2015,
agenda item 7 (j))

ECE R112 & R123
-
Conditions on the luminous flux of light sources

Foreword

- To show that the provision § 5.3.2.3 of Regulation R112 is useless.
- This prescription requires a minimum luminous flux of 1000 lumen for the LED modules contributing to the principal Low beam.
- We compare the optical efficiency and the power consumption of LED LB (less than 1000 lm on the source) with two halogen LB.

Optical systems

- Basic LB 1 – luminous flux of the LED Module= 1000 Lm. ~20W
- Basic LB 2 - Luminous flux of the LED Module = 800 Lm. ~16W
- H7 Reflector– 1500 Lm @ 13.2V. 58W
- H4 Reflector – 1020 Lm @ 13.2 V. 68W

What the driver sees

Basic LB 1 - Initial LED flux: 1000 lm

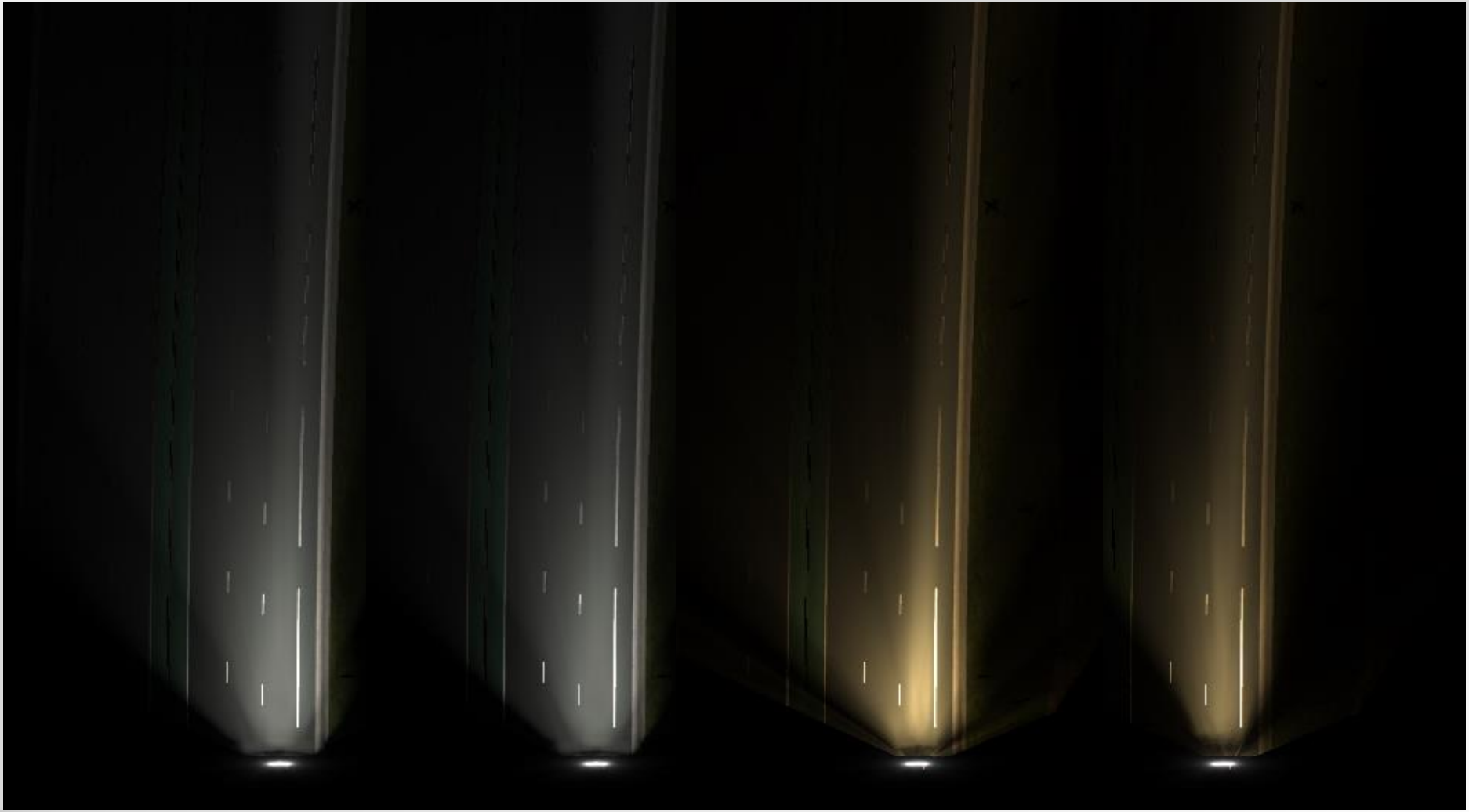
Basic LB 2 - Reduced LED flux: 800 lm

H7 LB Reflector - @13.2V

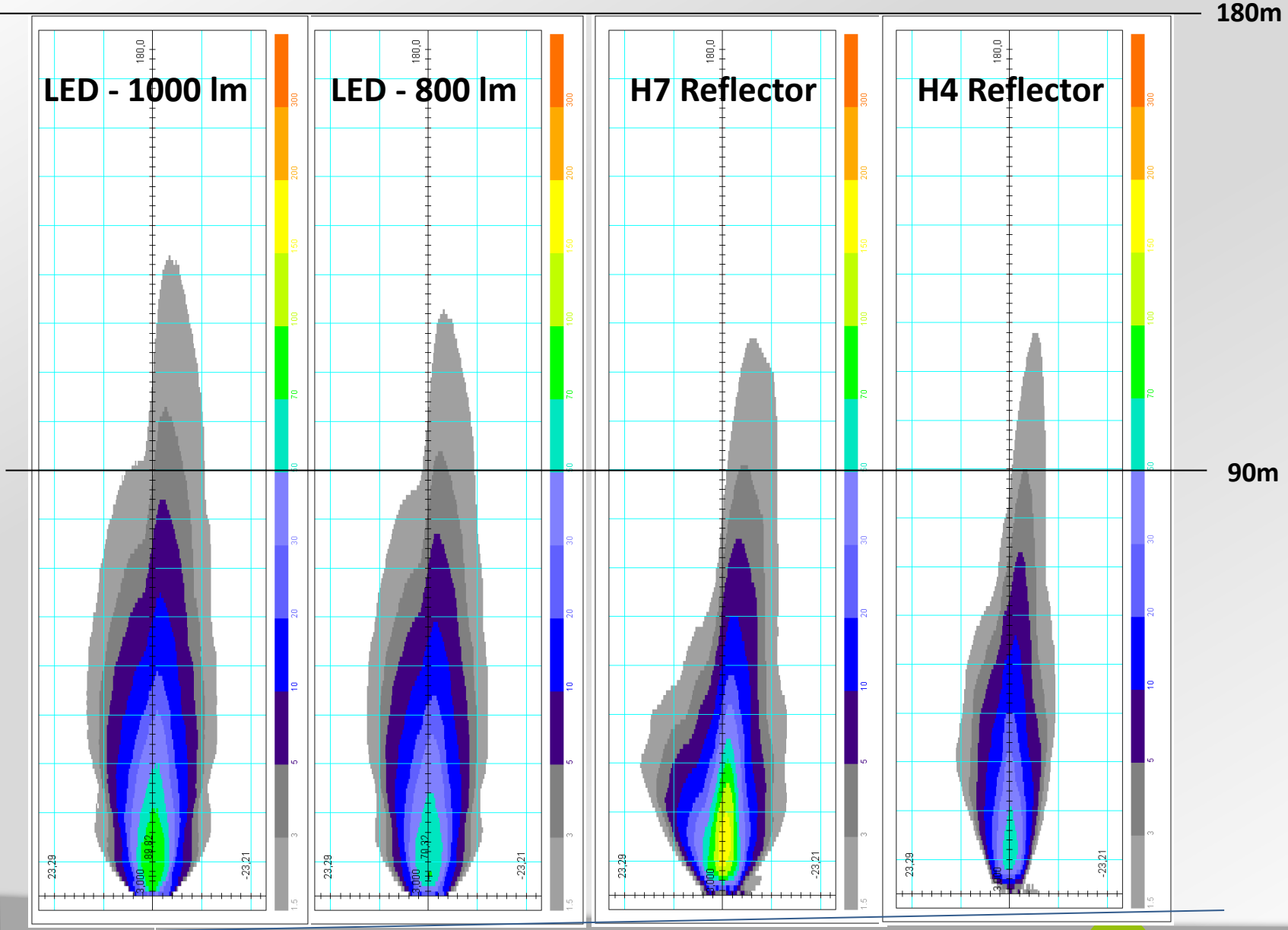
H4 LB Reflector - @13.2V

Bird's eye view

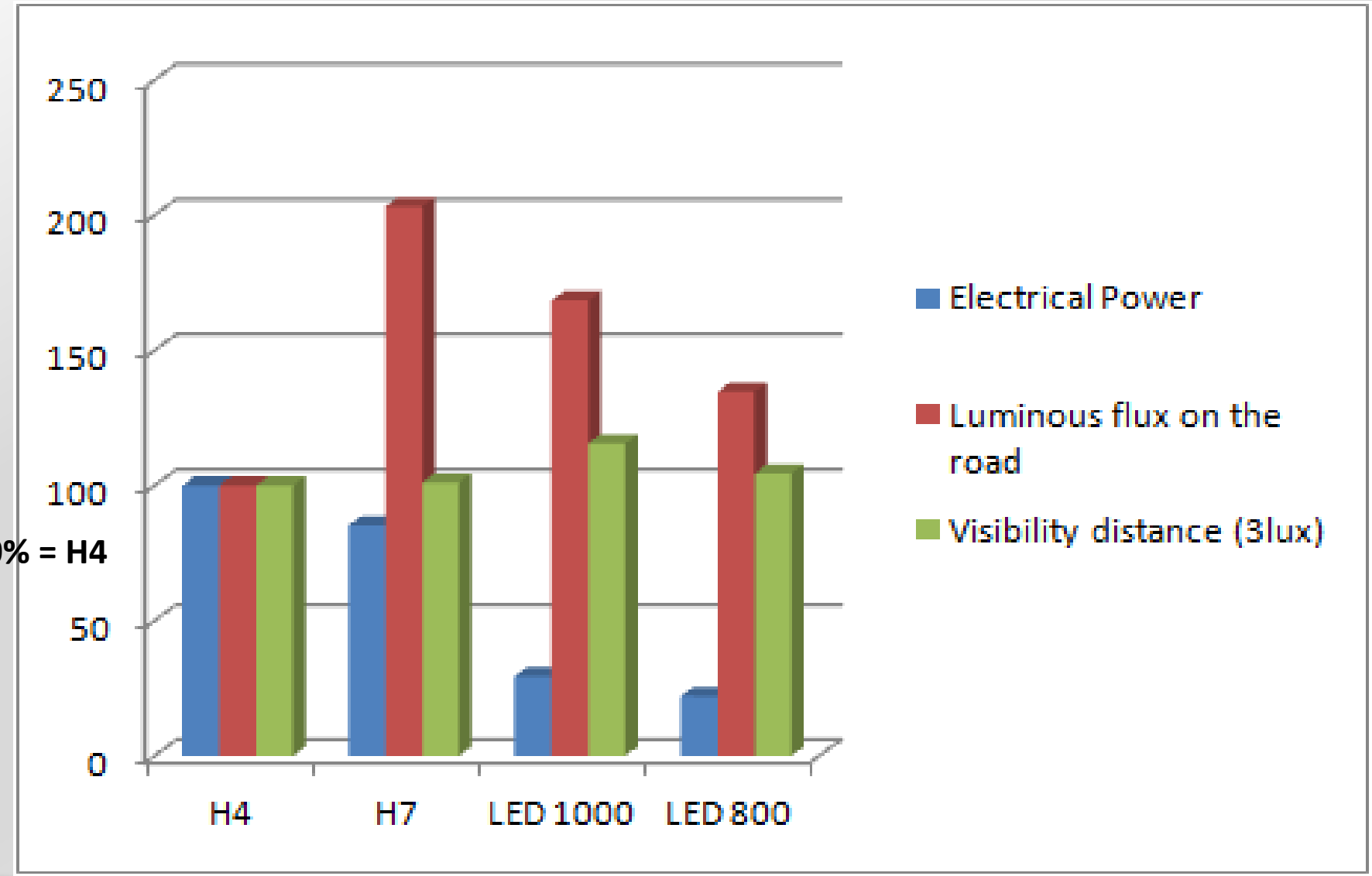
LED - 1000 lm | LED - 800 lm | H7 Reflector | H4 Reflector



Illumination on the road (Bird's eye view)



Synthesis


250
200
150
100
50
0
100% = H4
H4
H7
LED 1000
LED 800
Electrical Power
Luminous flux on the road
Visibility distance (3lux)

First conclusion.

- If the photometry, as defined by R112 is met, the beam pattern shall be considered as a safe one, independently of the light source.
- Luminous Flux of the LED contributing to main Low-beam greater than 1,000 Lm is **useless**.
  - **To be pointed out:** H8 bulb (luminous flux=800 Lm) may be used for low beam application.
- This prescription is not “Performance Oriented” and is “Design Restrictive”.

Previous GRE Sessions 2014.

- Spring 2014:
  - During the previous session (71st session) , this proposal was presented as two Informal documents by France.
    - 71/09 and 71/10.
  - Some contracting parties were reluctant to adopt such a proposal:
    - Possibility to design a compliant beam with patches on the road
    - Risk of low flux on the road.
- Fall 2014
  - France proposes new formal documents taking into account the fears of these contracting parties.
    - 2014/35 and 2014/36.
  - Some contracting parties pointed out the fact that the criterion proposed by France was not 100% relevant.

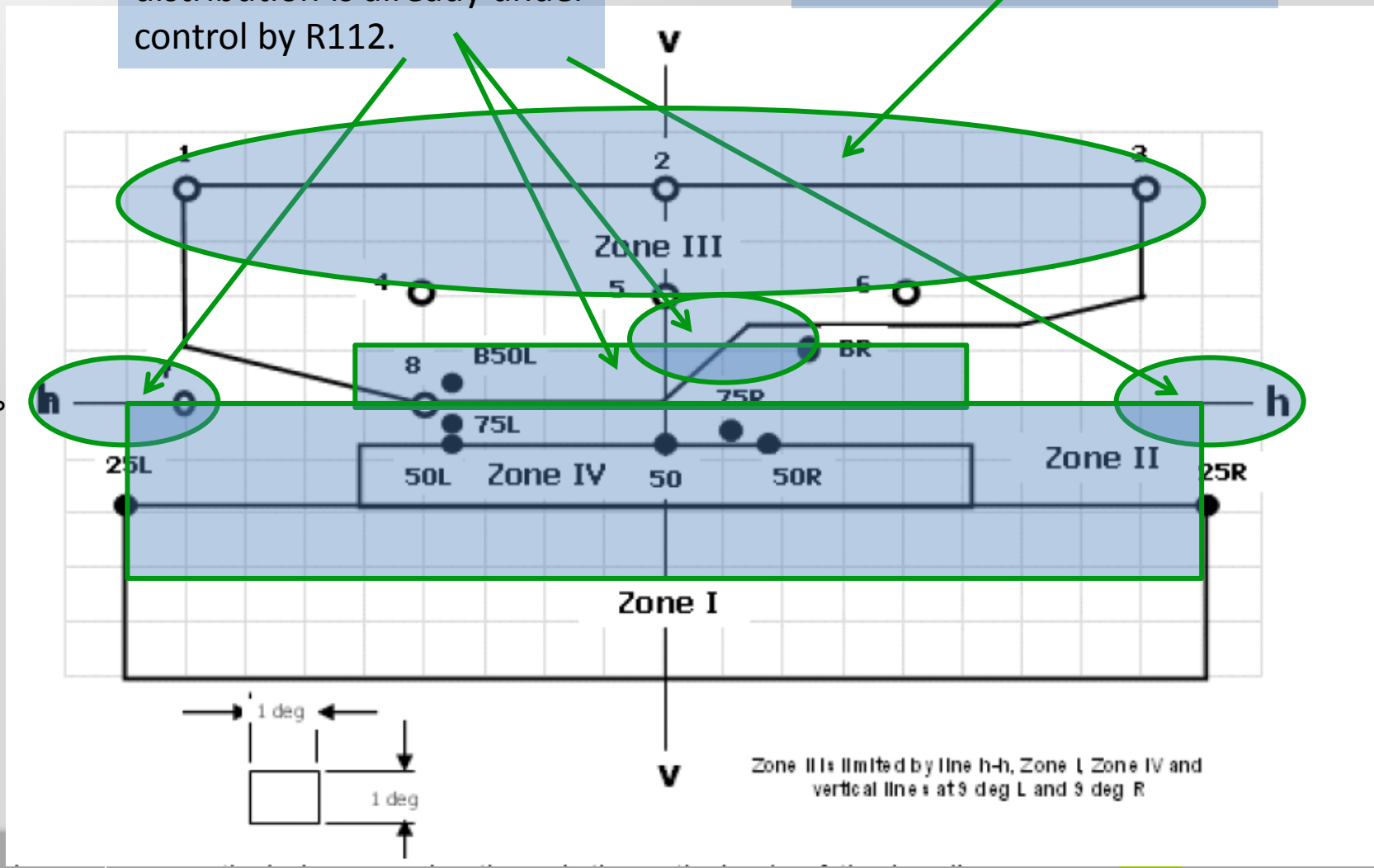
Characteristics of a safe low beam.

- No glare.
- Good visibility distance.
- Good road illumination on the road between 25m and 50 m.
- Good width of the beam pattern.
- Not too much light on the foreground.
- Enough light on the landscape.

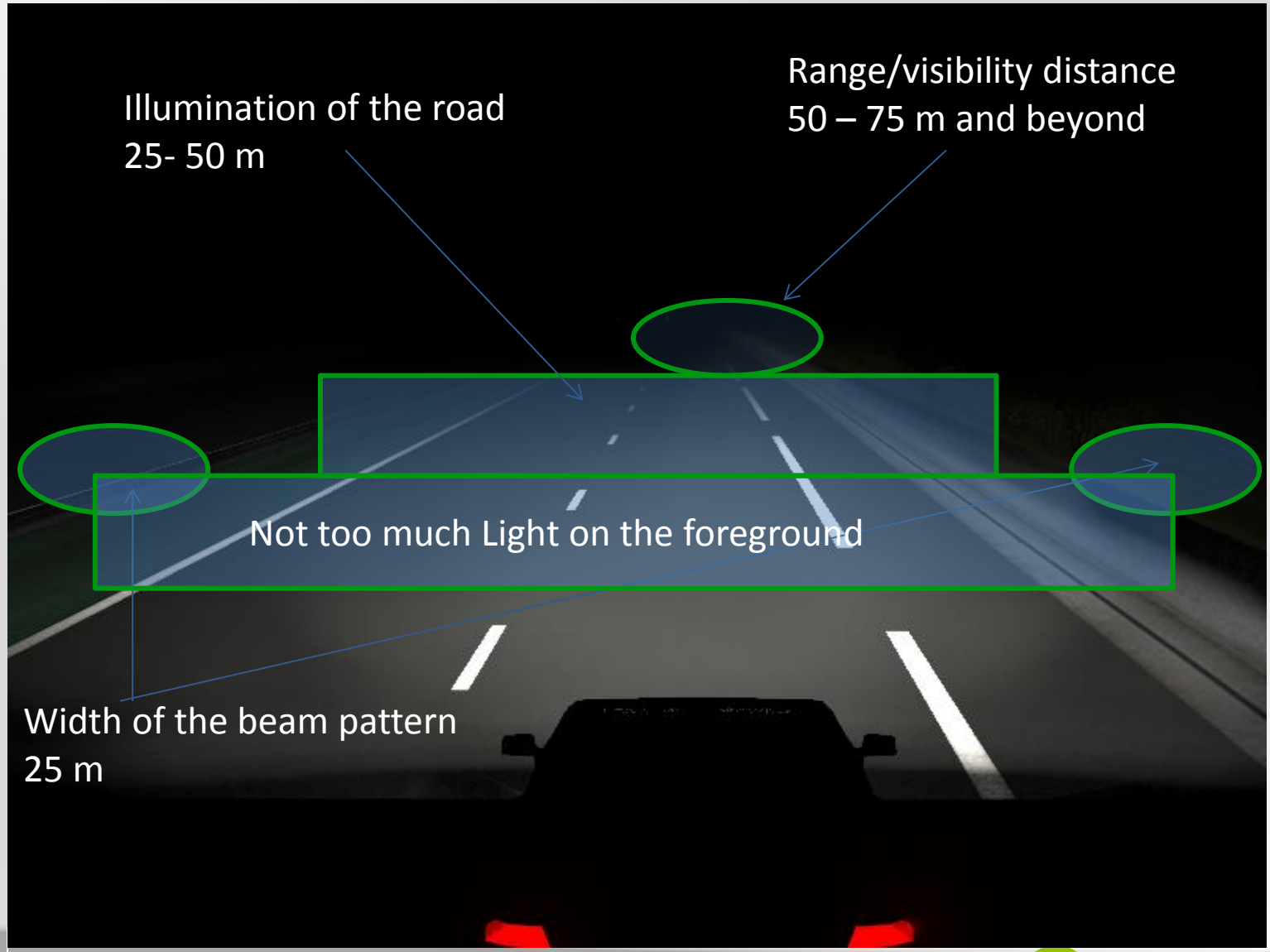
Current requirement of the regulation

Areas where the light distribution is already under control by R112.

No glare zone under control by R112.



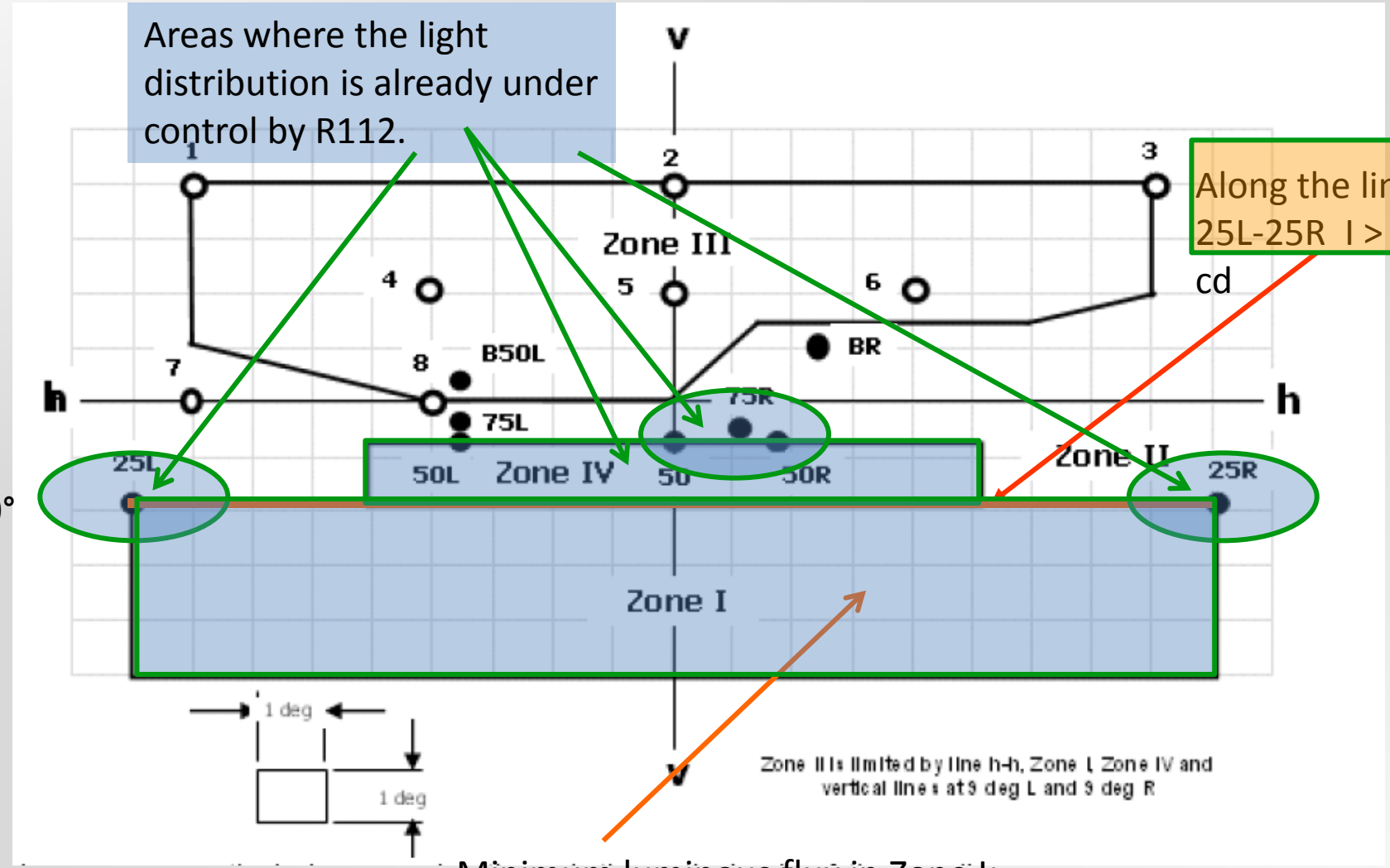
Requirement of the reg, on the road



Characteristics of a safe low-beam

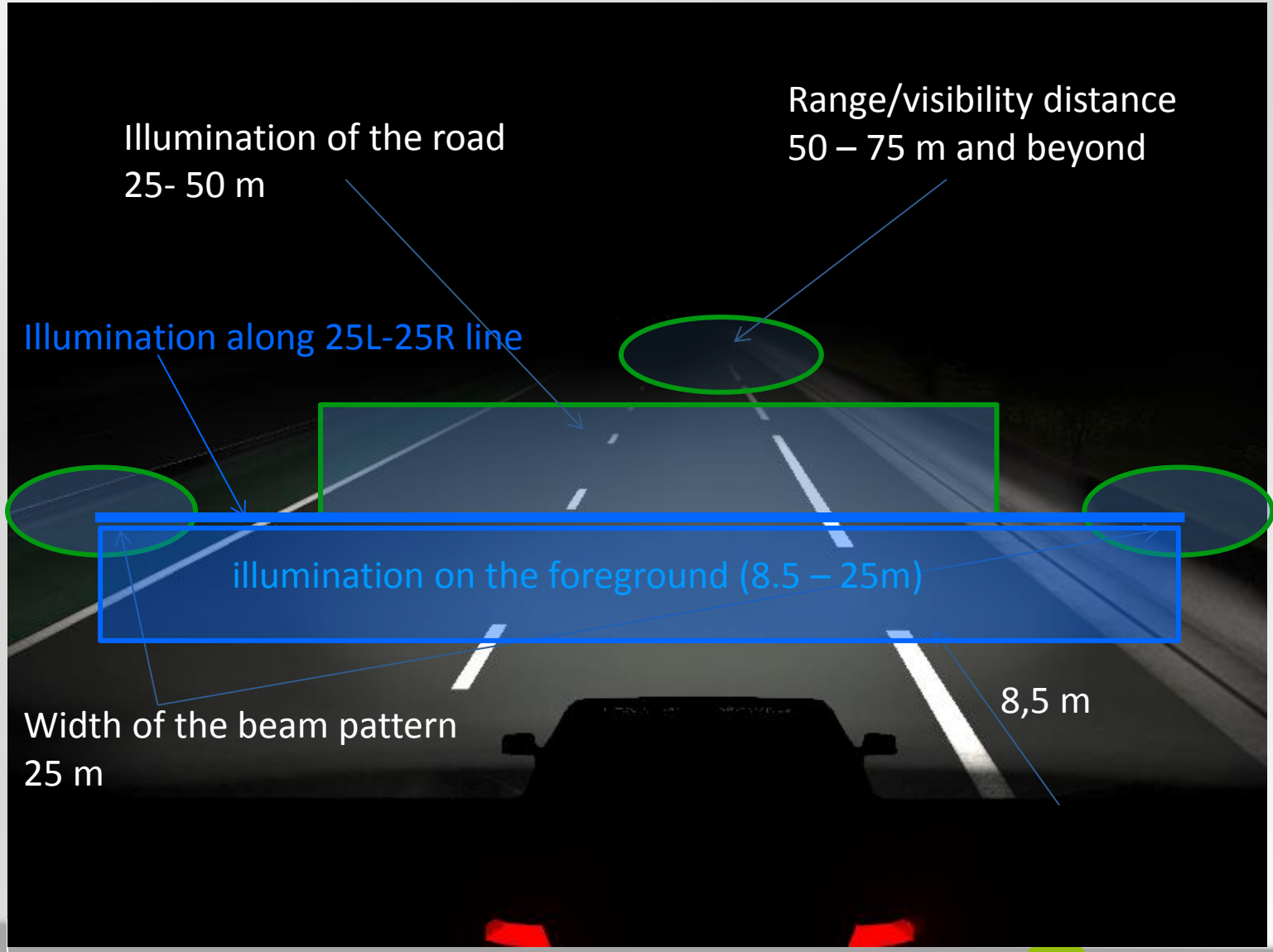
- No glare: OK.
- Good visibility distance: OK.
- Good road illumination on the road between 25m and 50 m: OK.
- Good width of the beam pattern: OK.
- Not too much light on the foreground : OK
- Enough light on the landscape: Not covered by the regulation.

Requirement with modification



Minimum luminous flux in Zone I:

Requirement with modification, on the road



Characteristics of a safe low beam

- No glare: OK
- Good visibility distance 50m – 75m and beyond: OK
- Good road illumination on the road between 25m and 50 m: OK
- Good width of the beam pattern: OK and improved.
- Enough light between 8.5 m and 25m : new prescription proposed: OK.

Conclusion

- The optical efficiency of a LED systems is better than that of a Halogen (60% versus 35%).
- The visibility distance and the light distribution of LED system with a luminous flux lower than 1000 lumen can be better than or equal to those of Halogen headlamps (e.g.:H7, H4).
- The power consumption of the LED system is lower.
- The minimum threshold of the luminous flux for LED modules required in R112 § 5.3.2.3. should be removed.
- During the sessions in March and in October 2014, some Contracting Parties were reluctant to remove the 1,000Lm because of a risk of low luminous flux on the road. This proposal brings an answer to their fear.