

LED technology

Global trends interacting with Automotive industry

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January 28th, 2019

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Executive summary

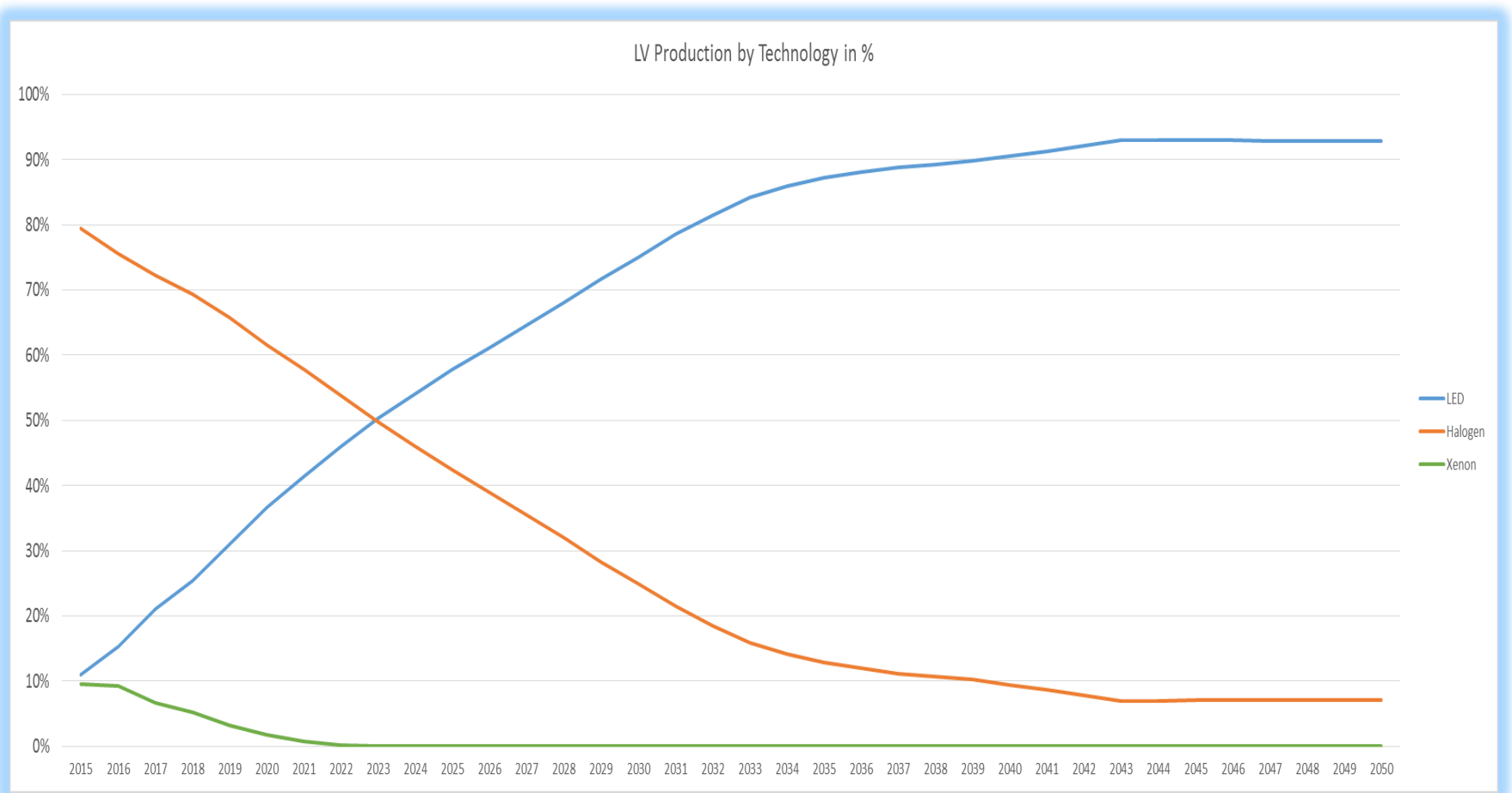
- The global light-vehicle production will continuously adopt LED technology as basic. Based on the given regulation, the car park remains with conventional lighting applications in significant quantities beyond 2040. To enable energy saving lighting, LED technology offers to reduce 65,1 GW electrical power on the vehicle in 2030 by the use of retrofitting solutions.
- EU is the leading political panel to support energy-efficient lighting by ban´s of elder technologies, other countries proceeding on a similar path. Incandescent and Halogen banned already in large scale for general purpose, review of applications every 5 Years next 2021.
- The global application of tungsten for lighting devices disappears to niches and specialty domains in the oncoming decade.

LED technology gives advantage to public users

- Comparison to conventional technologies incorporating Incandescent as well as low – and high pressure gas discharge allows
- More light:
 - Leads to safety and comfort
- Sustainability:
 - Longer life time in the application

New vehicle production - headlighting application

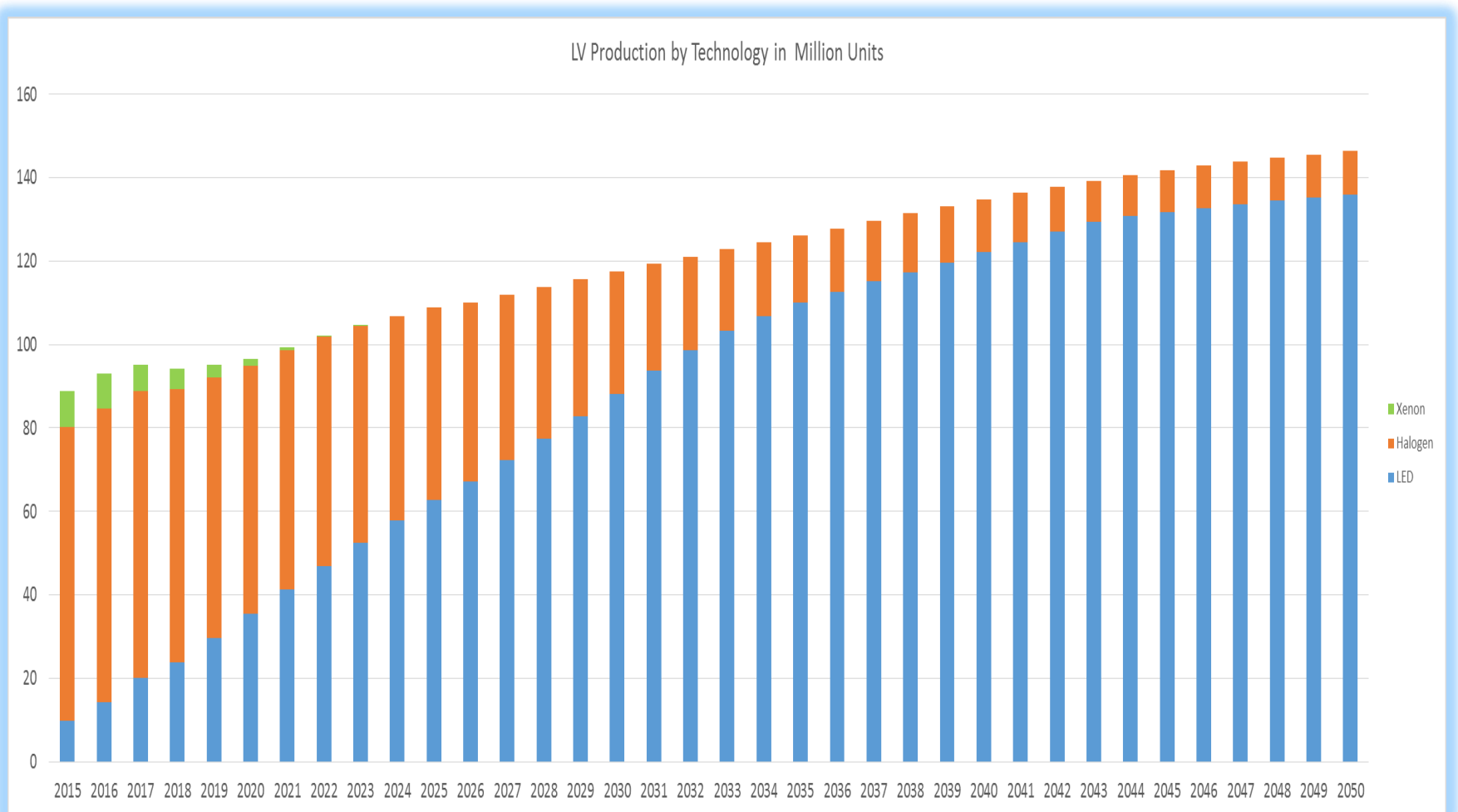
Technology break even expected for 2023



Source: IHS global insight, LUMILeDS Business analysis dept. 2019

New vehicle production – absolute production

The oncoming decade will initiate the turn towards LED adoption in headlighting

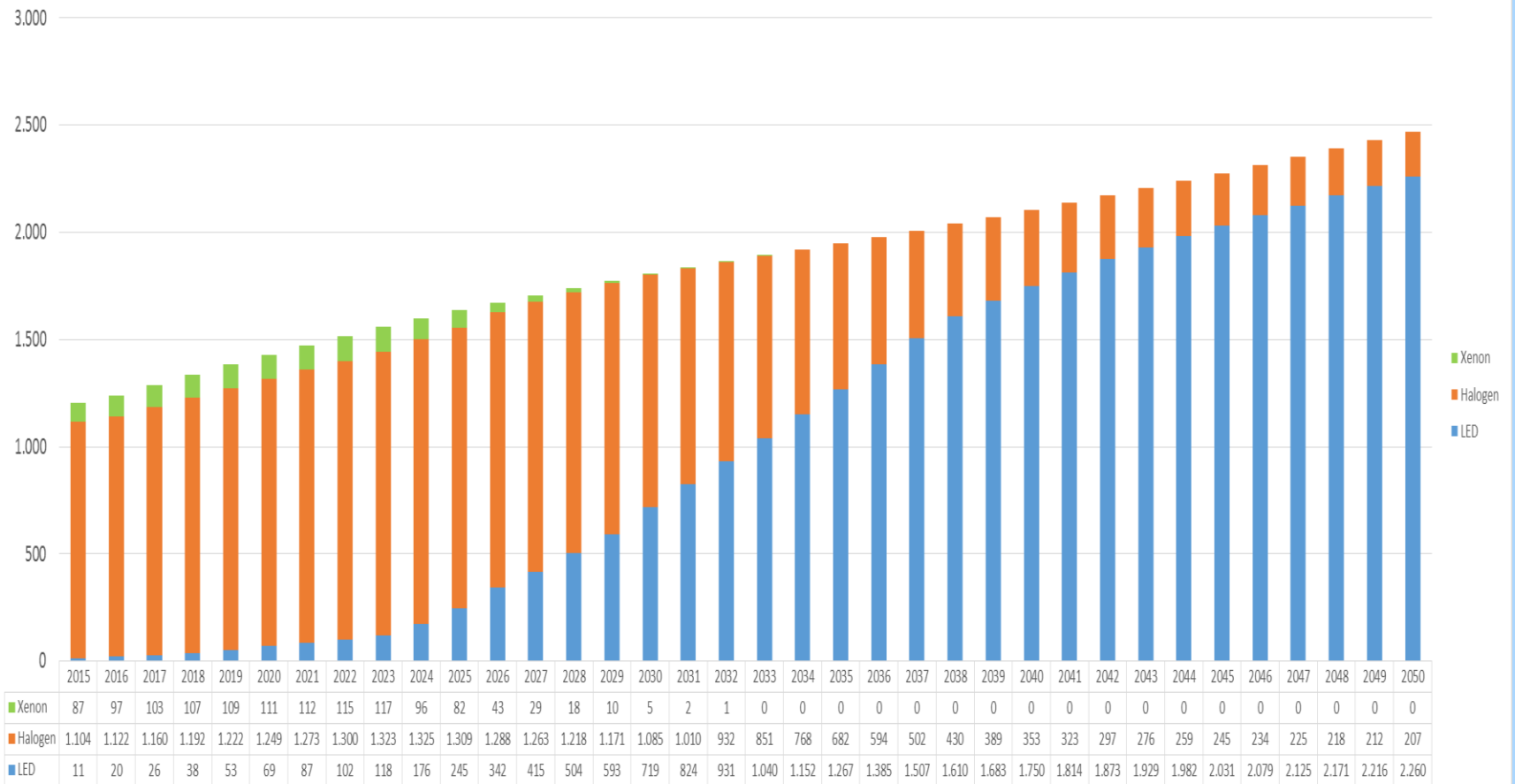


Source: IHS global insight, LUMILEDS Business analysis dept. 2019

Carpark development – absolute production

Incandescent majority beyond 2030

LV Parc by Technology in m units



LED technology introduction

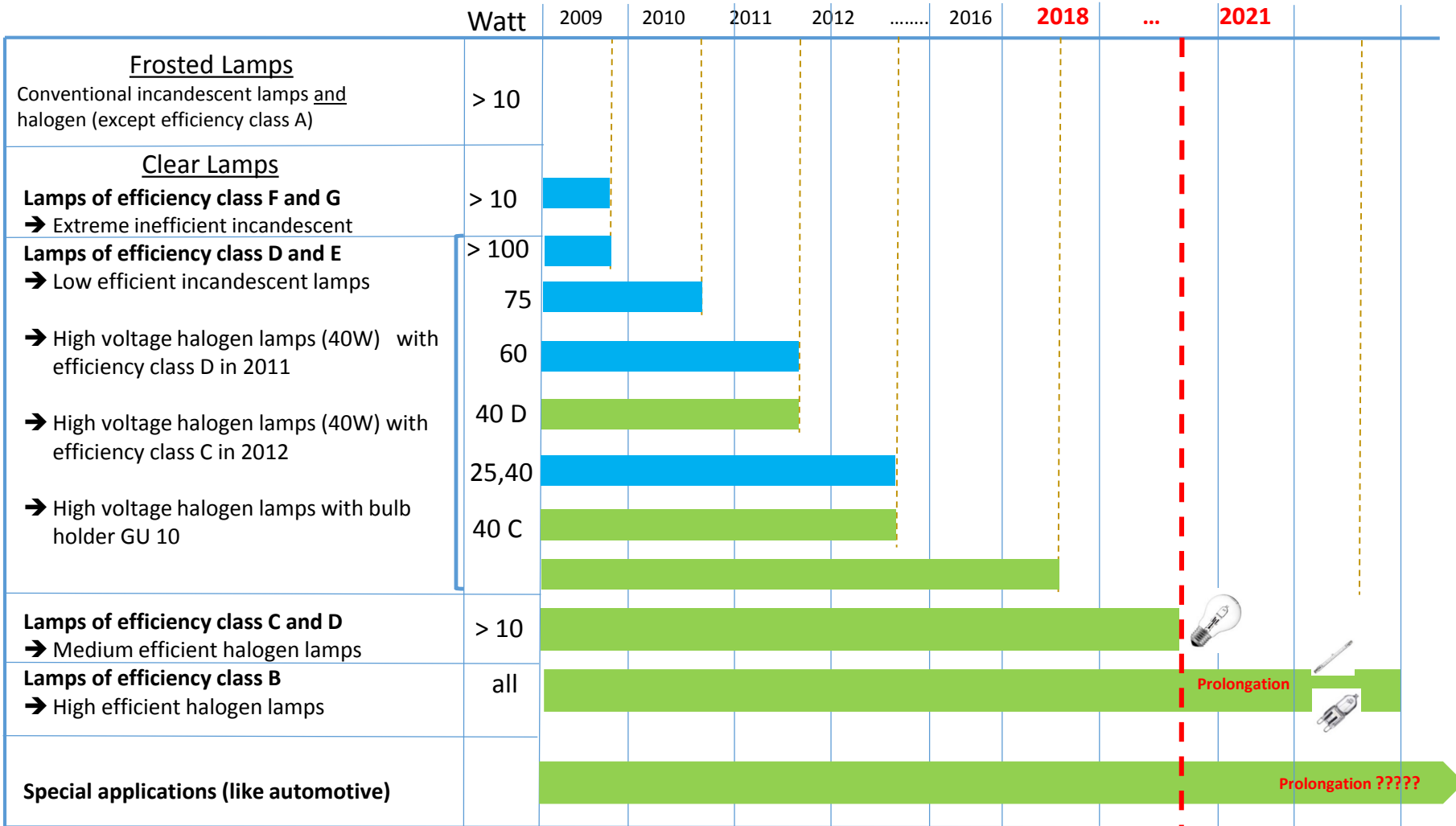
Conclusions based on 2050 prognosis

- For new vehicles the technology transition to LED will materialize in the oncoming decade
- The carpark development will not reflect the same
 - Regional differences lead to significant relevance of Incandescent in the oncoming two decades
- LED retrofit creates the opportunity to save energy:
 - Example 2030 for low beam application:
 - Power consumption Halogen 55W per low beam versus LED 25W (source: OICA presentation to EU 2010)
 - Per car: 110W versus 50W → 60W saving per car
 - In 2030, 1,085 Billion vehicles on the road

➤ ***Potential to reduce 65,1 Giga Watt electrical.***

EU program to on ban incandescent lamps

Respectively on September 1st



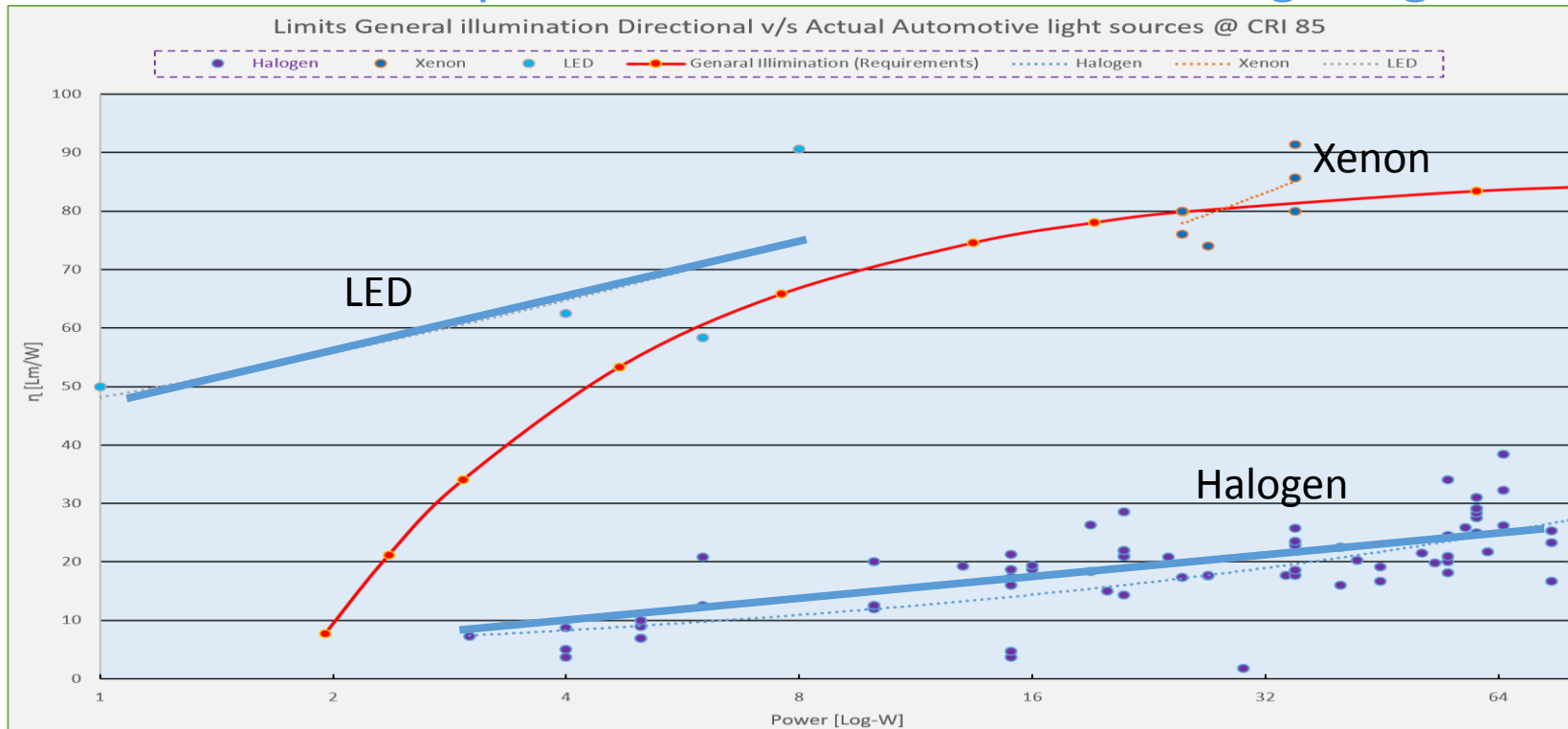
Incandescent lamps Halogen lamps

Eco-Design for Lighting (Single Lighting Regulation); target September 2021.

Within the context of the **3rd Ecodesign Working Plan** (2016-2019), the Commission is holding an **ongoing review of lighting products** in order to reflect the rapid technological transition in the lighting industry

- The review study has shown benefits of:
 - updating the requirements to **capture energy-saving potential** from technology improvements with projected improvements **41.9 TWh per year**,
 - **simplifying** the requirements by having **one single regulation** (repealing (EC) No 244/20092, (EC) No 245/20094, and (EU) No 1194/20126,
 - updating **energy labelling** regulations for lighting products in line with new legislation,
- In the **Single Lighting Regulation** a uniform maximum power requirement formula will be set to calculate the energy efficiency for all lighting products (light sources **AND** control gear).
- The level of this requirement is such that **most LED lighting products can meet it**, while most halogen light sources (HL) and fluorescent light sources cannot, and thus would no longer be able to enter the market after September 2021.
- In line with the principle to promote a **circular economy**, the regulation sets an obligation for the products in its scope **to be readily removable** from any product in which they are contained (e.g. luminaires, mirrors, shelves), without permanent mechanical damage.
- The regulation also includes **requirements on flicker**.

Performance Comparison towards Automotive Lighting



Per 2018- 09-01, the EU directives BAN “poor performing-light-sources” similar to the Automotive halogen bulbs, for general-illumination applications. Review every 5 Years.

Per today automotive-lighting is exempted until 2021.

Tungsten will simply not be used for Lighting any more.

The prognosis from 2012 matches the reality

- Overall, the total amount of tungsten in lighting applications reduced to a quarter
- Automotive application is (besides a few specialty lighting applications) the remaining top edge with regard to supply criteria:
 - Highest requirements on purity and reliability
 - Limited demand

PHILIPS 2012 lighting presentation

