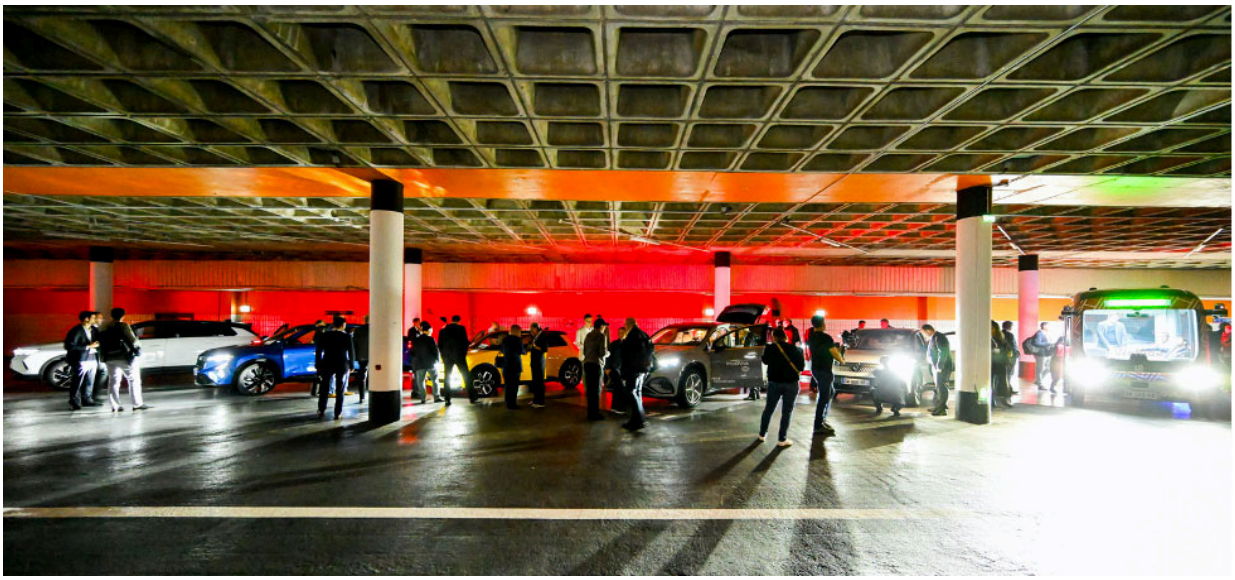
Tue, 22 October 2024
Weekly Newsletter

DVN Lighting

NEWSLETTER #876

Editorial

A Crazy French Week!



It is not every week that France is the centre of automotive and lighting community. It was great to have so many events in my hometown; no need for me to travel too far. What a pleasure to meet the French community all together (DVN, SIA, Renault, Stellantis, Valeo, OPmobility, Forvia…) welcoming competitors, tier-1 and -2 suppliers, and—certainly—friends. Because we are a community, all discussing our passion for cars and for lighting.

Who is else will scrutinize lamps like this? All DVN readers have the same addiction, I imagine.

I do not want to write too long an editorial today, because the newsletter content is really long and dense this time. Fetch a big cup of coffee and enjoy!

Paul-Henri Matha
DVN Chief Executive Officer and Lighting General Editor

In Depth Lighting Technology

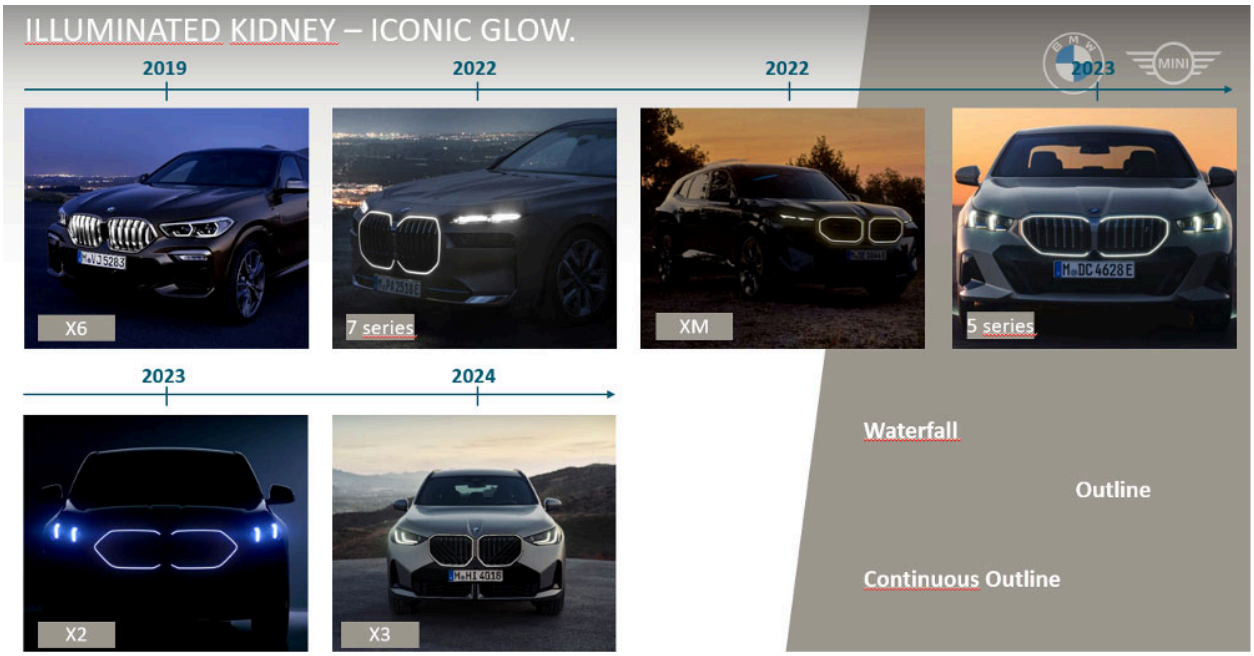
SIA VISION 2024: Main Takeaways

More than 500 persons gathered in Paris La Villette on 16-17 October for SIA VISION, the biennial symposium organized by SIA (Société des Ingénieurs Automobiles, the French SAE), including 41 exhibitors and more than 120 different companies, to talk about lighting and ADAS.

Gilles Vidal, head of Renault design, 10 years after Laurens van den Acker in 2014, presented his design vision and the importance of lighting:

- What is a good design?
  - Less but better as was saying Dieter Rams
  - Good design = Progress by Aesthetic, Function, Innovation, and Emotion
  - "Just right" is not the same for every brand
  - With that extra thing distinguishing it, for instance Lit logo, grille, charge indicator,..

Makers like Renault, BMW, and Stellantis presented their latest products. Illuminated grilles from BMW and Renault are below 18 Watts, and BMW announced a luminance of 2,000 cd/m^2.

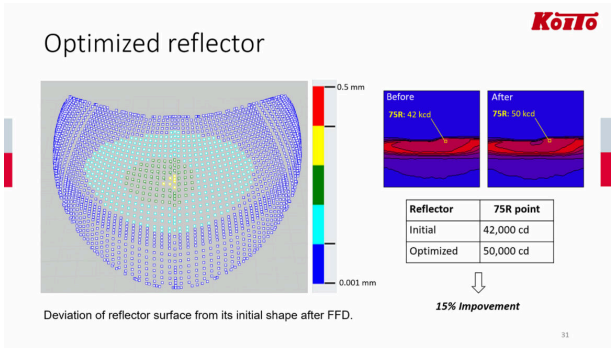


The lecture topics were divided into five groups:

Design elements

Flat surfaces, lit logos and bumpers, invisible light with laser etching (10-20 per cent efficiency for polycarbonate, versus 5-10 per cent for polypropylene in Flex-N-Gate's presentation), miniLEDs, and suchlike.

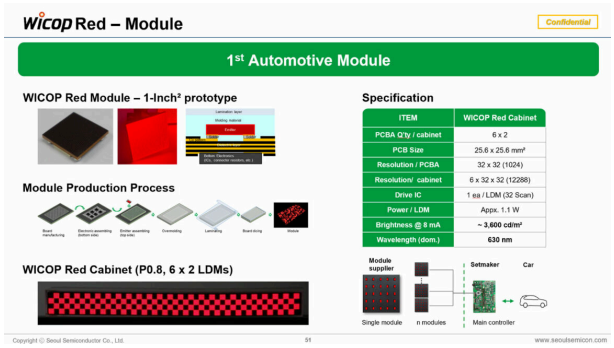
Koito explained their new methodology to do faster optical simulation with automatic optimization using advanced algorithms, freeform deformation, and ray tracing. One example: a 15-per-cent increase in low beam intensity at 75R, from 42 to 50 kcd, on account of the optimized reflector.

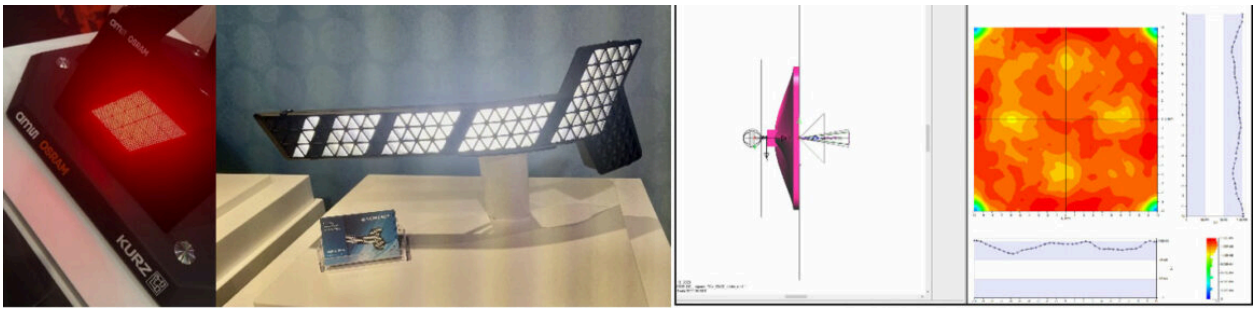


Communication with light

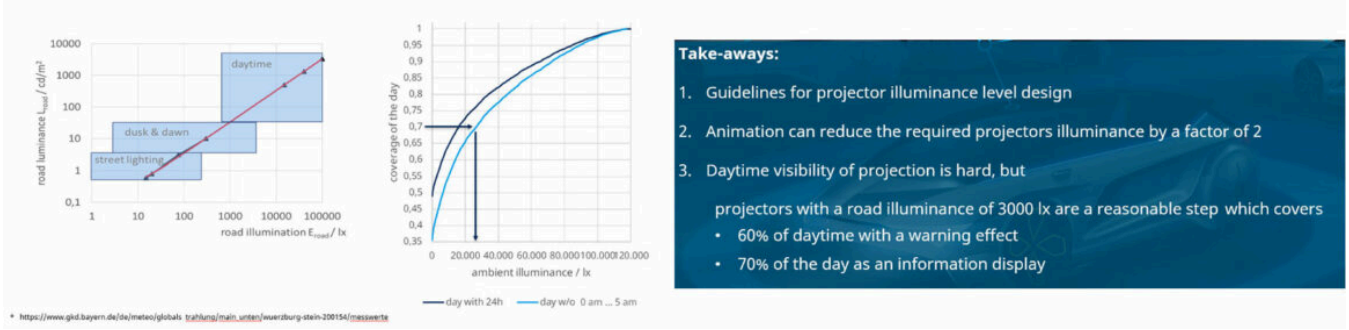
Charging-status lamps on the Renault R5; AD-S (Automatic Driving mode) with turquoise light on Mercedes models, signalling road projections.

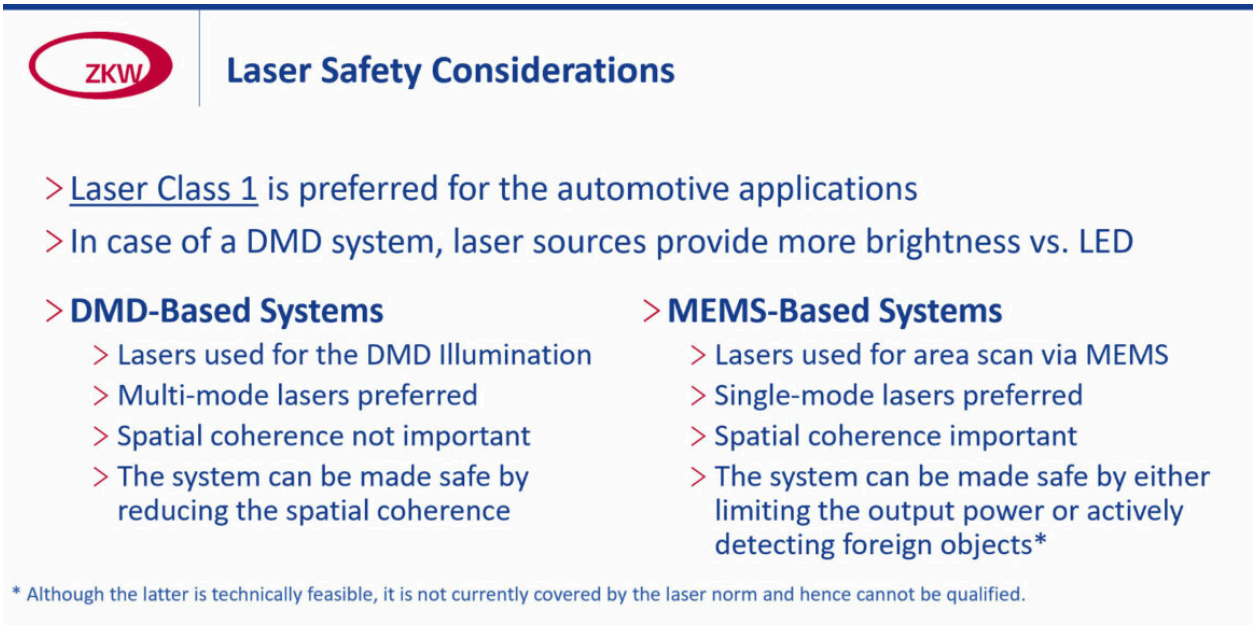
For these new functions, new light source technology is coming: low-power LEDs <0.1W, miniLED modules, large optical surfaces, and more.



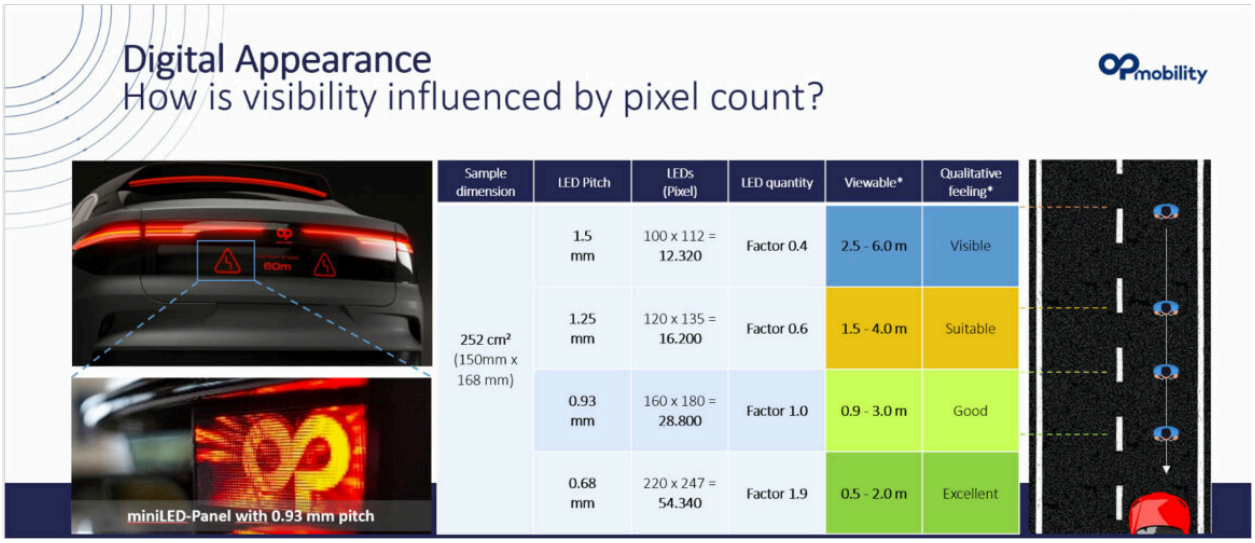


Dynamic signalling projection, visible by day, could be done with DLP or MEMS technology, LED or laser. Specifications converge around 3,000 lux on the ground (per Marelli) to be visible by day 70 per cent of the time (per dissertation of C. Bremer, 2021: *Technologische und Physiologische Bewertung Dynamischer Projektions im Automobil*).



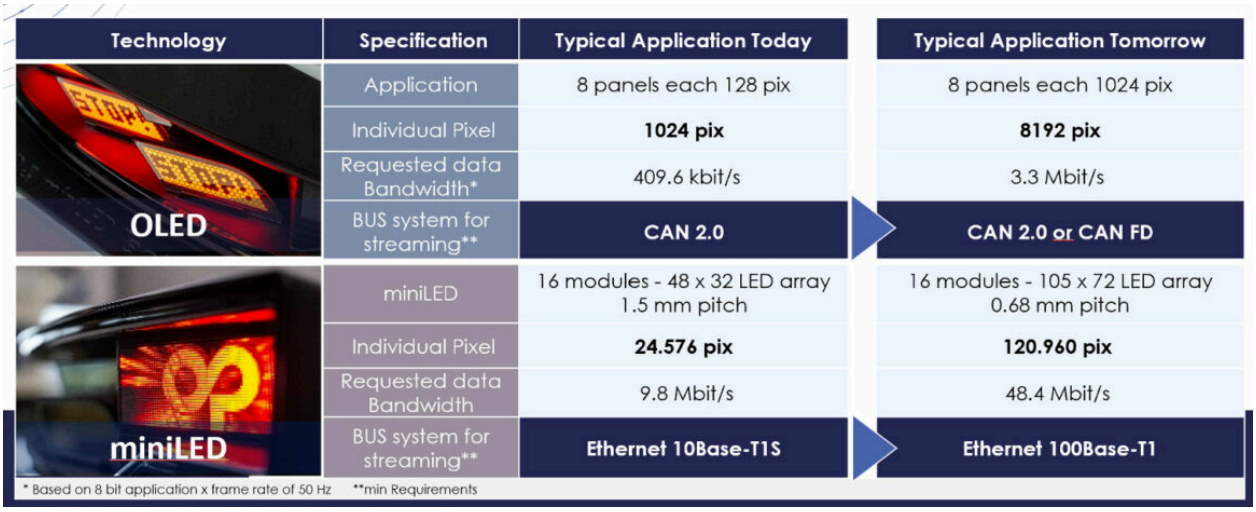


A good pitch specification for displays seems to be 0.7mm according to Opmobility's study —similar to Seoul SC's miniLED module—offering a good appearance from 0.5 to 2 m.



Sample dimension	LED Pitch	LEDs (Pixel)	LED quantity	Viewable*	Qualitative feeling*
252 cm² (150mm x 168 mm)	1.5 mm	100 x 112 = 12.320	Factor 0.4	2.5 - 6.0 m	Visible
	1.25 mm	120 x 135 = 16.200	Factor 0.6	1.5 - 4.0 m	Suitable
	0.93 mm	160 x 180 = 28.800	Factor 1.0	0.9 - 3.0 m	Good
	0.68 mm	220 x 247 = 54.340	Factor 1.9	0.5 - 2.0 m	Excellent

In this case, bandwidth may require ethernet to display the needed information (25 or 120 kilopixels)



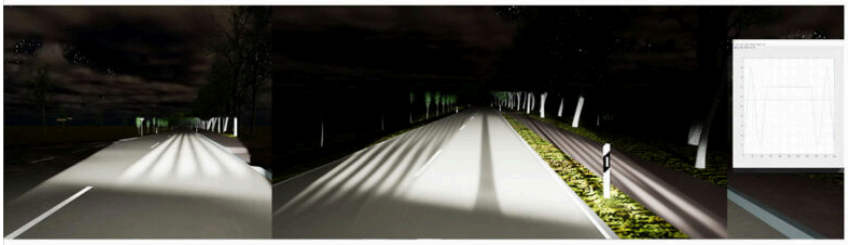
Technology	Specification	Typical Application Today	Typical Application Tomorrow
OLED	Application	8 panels each 128 pix	8 panels each 1024 pix
	Individual Pixel	**1024 pix**	**8192 pix**
	Requested data Bandwidth*	409.6 kbit/s	3.3 Mbit/s
	BUS system for streaming**	**CAN 2.0**	**CAN 2.0 or CAN FD**
miniLED	miniLED	16 modules - 48 x 32 LED array 1.5 mm pitch	16 modules - 105 x 72 LED array 0.68 mm pitch
	Individual Pixel	**24.576 pix**	**120.960 pix**
	Requested data Bandwidth	9.8 Mbit/s	48.4 Mbit/s
	BUS system for streaming**	**Ethernet 10Base-T1S**	**Ethernet 100Base-T1**

* Based on 8 bit application x frame rate of 50 Hz **min Requirements

Safety

Universities are studying how to best use the HD technology available on the market to increase safety with better object detections for human eyes and ADAS sensors.

For example: a striated light pattern for better camera perception:



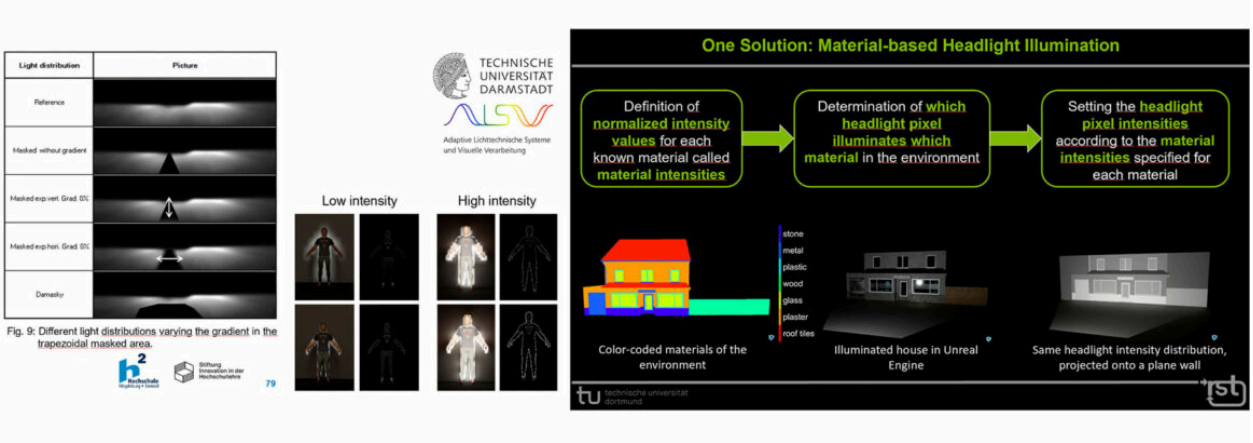
Lines 2 to 20 in rising quantity

2 Peaks and plateau shaped illumination in the middle

3D MAPPING SOLUTIONS technische universität dortmund FORVIA HELLA

	Coefficient of detected delineators present Detected vs. real delineators	Number of delineator detections	Average Confidence
Low Beam	86%	2,50	64%
Low Beam	90%	2,50	73%
Average Low Beam	88%	2,50	69%
darker trapezoidal shapes in forfield	78%	2,33	71%
homogen forfield, good side spread	80%	2,20	75%
Bright Spot	83%	3,13	80%
bright forfield	83%	3,00	61%
medium forfield	91%	2,50	61%
dark forfield	81%	2,00	35%
LB, 45° diagonal stripes at sides	only grey boards	0,83	65%
LB, thin stripes	93%	3,42	77%
LB, lifted symbole, bright farfield	88%	3,30	70%

Or usage of HD capabilities for pedestrian contour to avoid glare—reducing glareback from white objects or in bad weather by using HD mapping:



Definition of better signalling functions for 2-wheelers (VRUSC)

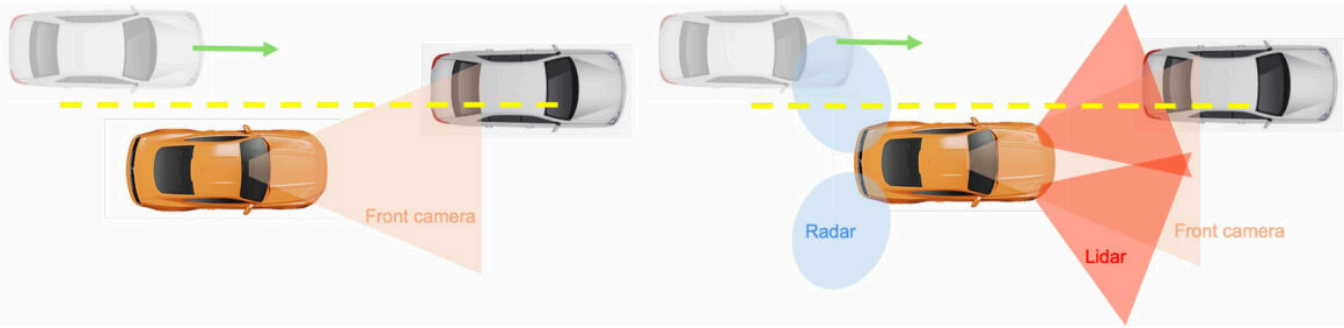
Human factors literature review: High level perspective

Lighting Characteristics	Intended Impacts			
	Presence/detection	Distance/location	Convey Size	Convey Intent
Intensity	•••••••••	•		••••
Color	•••			
Size		••	•	
Shape/profile	••••	••		••
Temporal (flash rate)	•••••			
Spatio-temporal (animation)	•••	•		•

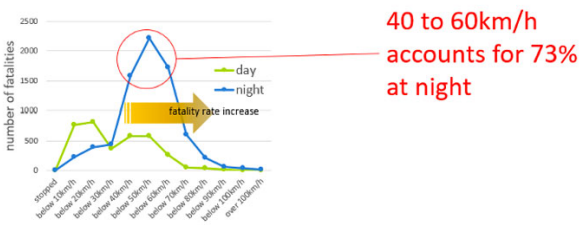
Machine vision literature review: High level perspective

Lighting Characteristics	Intended Impacts			
	Presence/detection	Distance/location	Convey Size	Convey Intent
Intensity		•		
Color	•			
Size				
Shape/profile	••		•	
Temporal (flash rate)	•••			
Spatio-temporal (animation)				

Reduction of glare in ADB scenarios with usage of radar and lidar to anticipate camera detection (Mobis)



Investigation of ADB potential to reduce fatalities: 20 per cent, per Japan's Institute for Traffic Accident Research and Data Analysis.



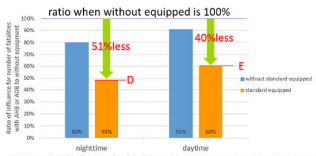


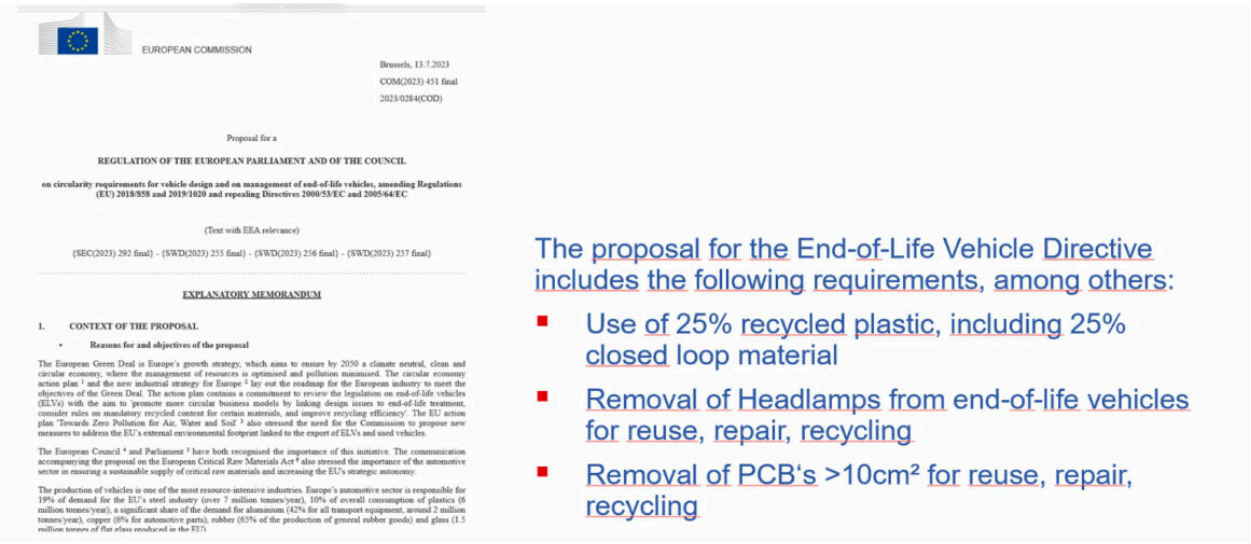
Fig.17 Ratio of influence for fatalities with AHB or ADB to without equipment (2020-2023)

> Compared to without equipped, **standard equipped in nighttime have 51% fewer accidents** (per registered vehicle). And in daytime, it's 40%.

> Difference of these will be the effect of AHB or ADB.

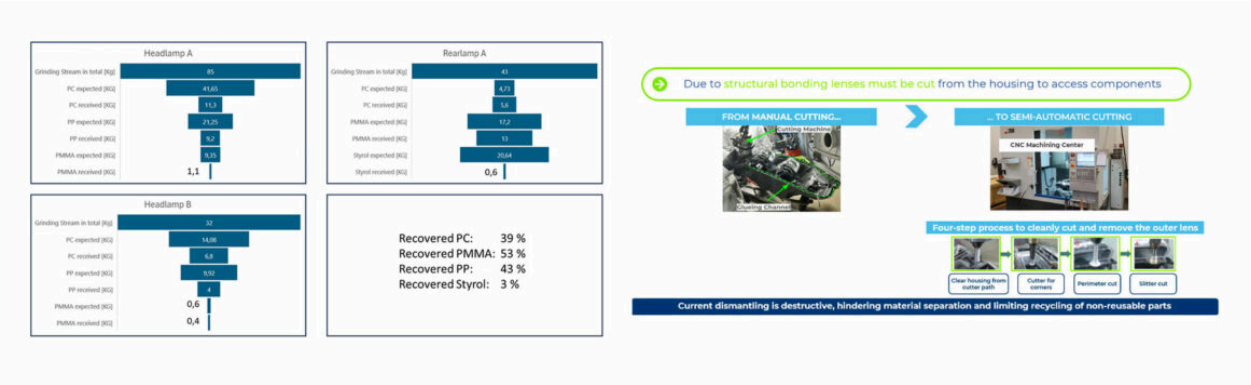
Sustainability

A European regulation is coming in 2030 that will impose new requirements for end-of-life vehicles.



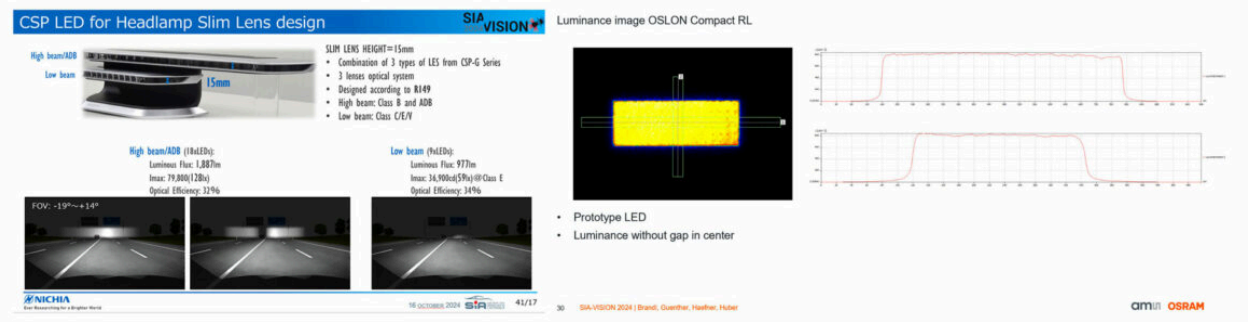
We are clearly not good enough on recycling. Just 9 per cent of the economy was circular in 2018, and in 2024 we're worse, at 7.2 per cent.

According to Hella, current plastic lamps are not readily recyclable. We recover less than half of lamp plastic, mostly due to contamination, specifically due to lens fixation concepts that need complex dismounting tools (see Valeo's explanation)



Reparability is a topic for sustainability, and also for customers due to cost. Lamps are the 6th-most-commonly replaced component on a car (after windshield, bumper, doors and side panels).
Some solutions exist, as shown in Renault's R4 presentation and in the Valeo booth with their Toyota headlamp.

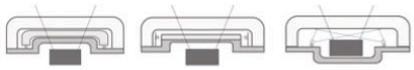
A second part of sustainability is reducing power consumption, and proposals are now coming from light source manufacturers to improve optical efficiency of slim low beams



ADAS sensors integration

Several lectures presented the integration of sensors in headlamps or rearlamps. Radars are the priory for that thanks to their relative compactness and their transmission properties.

One direction is the integration of radar behind an illuminated logo becoming a radome, with different possibilities to optimize both the homogeneity of light and the thickness as presented by Forvia.

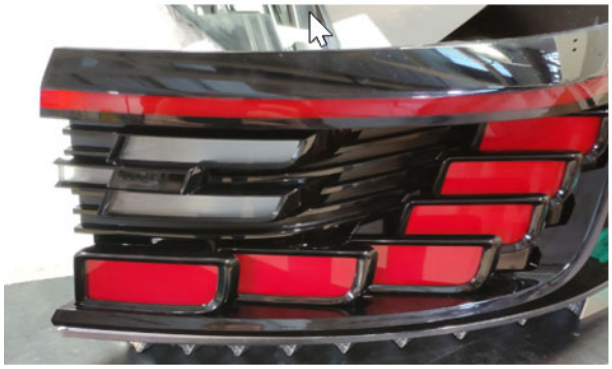


	Two-gap	Single gap	Zero-gap
Optic performance	++	-	+
Radar performance	+	++	++
Radar tolerances	o	+	++
Number of parts	-	+	++
Assembly complexity	-	+	-
Styling flexibility	++	o	o

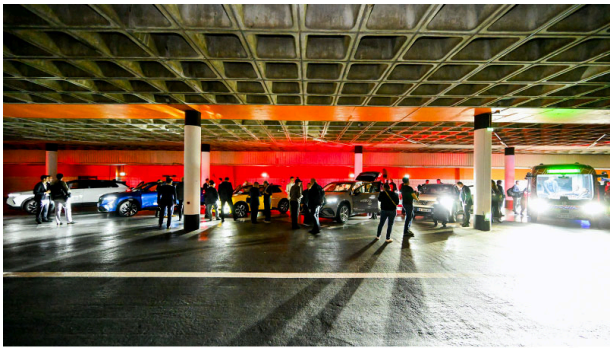
Magna presented also the integration of an automotive FMCW-MIMO 77-81 GHz radar sensor into a rear lamp. This solution can bring various advantages regarding performance, protection, and vehicle packaging.

For that, the thickness of materials of the lamp has to be optimized to reduce reflection and to improve performance, and to manage the heat distribution avoiding heatsink.

Forvia presented also a study for the integration of the different types of sensors including cameras, Lidar and radar in headlamps and rearlamps lamps, with the potential benefits of overview at crossings and turns, adjustment during the assembly of the headlamps and installation as a complete unit, with a potential better sensor fusion, better detection of the contamination, and reduced cost and weight. But there are still difficulties, particularly for adverse weather conditions.



Between the event's two days, nighttime ride-and-drive demonstrations that have long been a hallmark of the VISION congress allowed attendees to experience, first-hand, the latest lighting and ADAS innovations.



Lighting News

Magna Tech Days: Great Success for Innovation

LIGHTING NEWS

Recently, Magna Tech Days were organised at their U.S. headquarters in Troy, Michigan. The week-long event brought together over 250 customers and key automakers, along with media representatives, to showcase 30 technologies from Magna's business groups. Visitors experienced an indoor interactive showroom and outdoor vehicle demonstrations of the latest innovations in active safety, digital vision systems, and hybrid powertrain solutions.

Magna's lighting advancements on display included the company's FlecsForm™ portfolio, Invision™ ADB and projector portfolio, and breakthrough lighting. Automakers' interest in advanced headlamp projector solutions was addressed with the likes of a projector developed for the challenging U.S. ADB regulation.

Magna R&D Supervisor Rafat Mohammad said, "The key aspect with this regulation is that transition zone between the dark and light sections need to be within one degree of each other. With our innovative design, we've met that regulation and have actually exceeded it". The Invision™ family of ADB-capable light projectors has a range of resolutions, including a 48-pixel version with 22 beam segments for entry-level vehicles. For more advanced solutions, there are high-definition projector modules with 16- to 25-kilopixel resolution, depending on the LED chip technology. These modules can be designed to support high beam or low beam assist, road p

Magna also demonstrated their ultra-slim headlamp projectors, just 15mm high. These can produce a complete low and high beam pattern. They're scalable and use many common parts.

Magna's miniLED and microLED FlecsForm™ technology, previously shared at DVN workshops in North America and China, bring class, style, and design flexibility to exterior and interior lighting.

Building on this success, mini- and microLED light sources (<500 and <100 micrometers, respectively) offer exceptional brightness from a smaller surface area, providing opportunities to exceed today's lighting requirements and shape new features and functionalities.

Magna's lighting and exterior teams collaborate on an ongoing basis to explore possibilities of lighting and styling for future vehicle body designs, such as those featured on the Breakthrough Lighting™ demonstrator. By combining trending hidden-until-lit elements behind both a tinted polycarbonate lens and the more challenging painted thermoplastic body panel of a liftgate module, this technology provides automaker designers with endless freedom and options to meet evolving vehicle communication needs.

Forvia Hella Release '24-So-Far Figures

LIGHTING NEWS

Forvia Hella have announced their sales data for 1 January to 30 September 2024). Currency-adjusted sales in this period increased slightly by 0.8 per cent to €6.0bn, while reported sales remained at the previous year's level of €5.9bn. Global vehicle production fell by 1.6 per cent in the same period, having largely stagnated in the first half of the year.

Forvia Hella CEO Bernard Schäferbarthold says, "The third quarter in particular was challenging, as expected. Global light vehicle production was already at a low level in the first half of the year, and especially in the last three months production volumes have decreased significantly worldwide. In addition, in the third quarter negative effects from our customer mix, postponements in series launches and the slower ramp-up of electromobility were even more noticeable than before. Despite these challenging framework conditions, we maintained our sales at the previous year's level overall. Also, in view of the changed global manufacturer landscape, we will consistently drive forward our strategy of diversifying the customer portfolio and further balancing our business across the regions".

Sales development in the first nine months was supported by growth in the lighting business group—whose sales improved by 4.1 per cent to €3.0bn (previous year: €2.9bn). This is largely due to the full consolidation of the Chinese joint venture Beijing Hella BHAP Automotive Lighting, which has been in effect since the beginning of this fiscal year. In addition, new series launches and higher customer call-offs for individual series projects supported the business group's development.

In the electronics business group, sales fell by 3.9 per cent to €2.4bn (previous year: €2.5bn). Although the radar business in particular developed positively among other things due to new series launches in the Americas, customer-related postponements in new project launches, negative effects from the customer and product mix, particularly in China, and the temporary slowdown in electrification in Europe had a negative impact on business development.

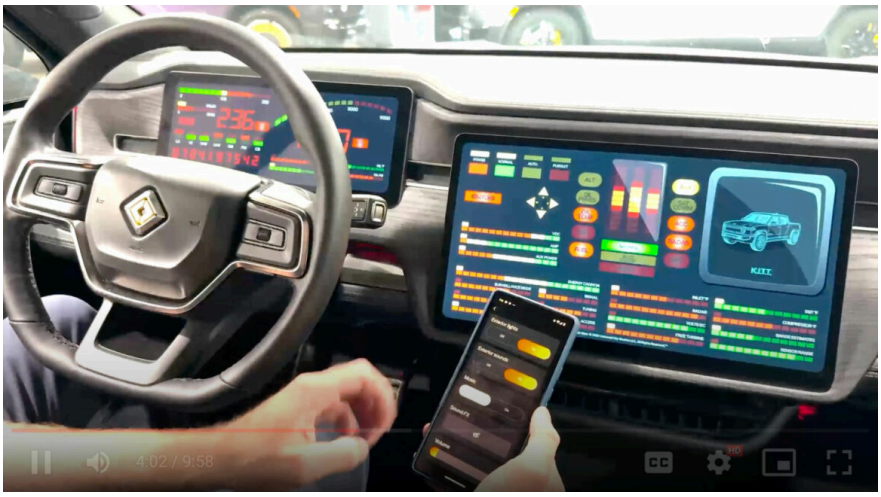
The full financial results for the first nine months of the fiscal year 2024 will be announced as planned on 6 November 2024.

Rivian Pushes Halloween-Themed Software Update

LIGHTING NEWS

Rivian is adding 'car costumes' for their EVs to make the in-car screens look like the time-machine DeLorean interface from *Back to the Future* or KITT from *Knight Rider*—that one animates back-and-forth-swooshing red KITT-like lights on the front of the gen-2 Rivian cars, too. There's also a 'Haunted' theme that displays a ghostly static TV screen inside the car.

The 'costumes' come via a software update for R1T and R1S vehicles with the 2024.39 update installed, and whose users have the latest version of the Rivian mobile app.



KITT-themed screen (Rivian image)

The 'costumes' extend to the manner in which the fun features are activated. The Knight Rider mode is chosen by picking a figure dressed as Michael Knight, then the car's interior display system will look like KITT's, and the original show's intro music will play. On gen-2 Rivians, the exterior lightbar will scan back and forth in red like KITT's, and the swoosh-swoosh sound effect that went with those lights in the show will play.

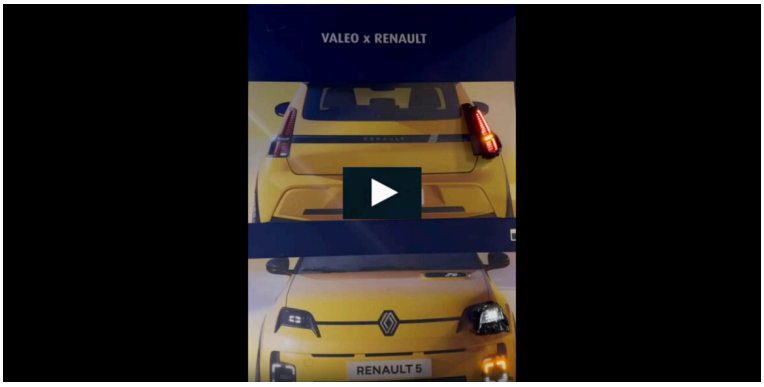
For the Back to the Future mode, you pick the figure in the mobile app dressed as Doc Brown. Then the car's interior screen will show the interface of that movie's DeLorean-based time machine, as well as music and the time machine acceleration sound effect from the film.

Paris Motorshow, Part I: Light Design

LIGHTING NEWS

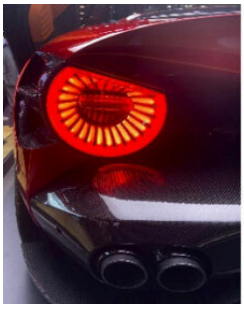
By Paul-Henri Matha

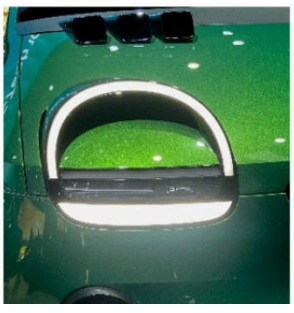
First of all, the Renault 5, my 'coup de cœur' (in English, I have a crush on it/I am smitten with it). I am not the only one with this feeling. Renault's lighting R&D and design teams have done a great job; same for Valeo.



I would divide what I saw into three design trends:

<u>Sculptural shape</u>

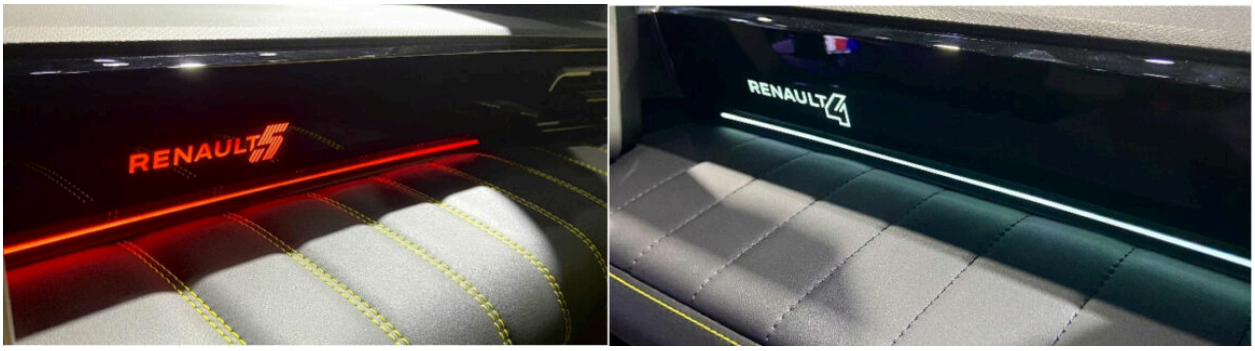




Lit grilles, bumpers, and logos; ISD (interactive social displays)

RGB interior lighting

All vehicles presented at the motorshow were equipped with RGB interior lighting, including A- and B-segment vehicles.



Marelli Front, Rear Lights on VW Tiguan

LIGHTING NEWS

Image source: © Volkswagen AG

The HD matrix headlamps on the VW Tiguan, like those in the Touareg contain Marelli's latest high-resolution platform module h-Digi® microLED. With the top headlamp of VW Tiguan, the digital front lighting from Marelli becomes popular in a high-volume car.

The compact, efficient microLED module uses ams OSRAM's Eviyos® HD 25 light source with 19,200 individually-addressable LEDs and a pixel pitch of 40 µm. It is combined with a special optical lens system and a new electronic control, both engineered in house by Marelli. The light cone is precisely modulated, and simple driver assistance patterns are projected on the road, directly in the driver's field of view, to facilitate driving on narrow lanes.

The headlamps were developed jointly by Marelli engineering departments in Reutlingen (Germany) and Jihlava (Czechia) and are being produced at the Jihlava plant. The all-LED rear lights, developed and produced in Sosnowiec (Poland), encompass the rear of the car from both sides, visually linked by the integrated logo. The full-width lamp, through its bottom surface, also illuminates the licence plate. The dynamic design of the taillamp is accomplished with Marelli's highly homogeneous Folia-LED technology. Multiple welcome and goodbye animations complete the attractive, smooth appearance.


Image source: © Volkswagen AG

Image source: © Volkswagen AG

General News

UTAC’s Céline Vallaude is New Euro NCAP President

GENERAL NEWS

Last week, Euro NCAP's Board of Directors met to elect their new President, Céline Vallaude —representative for the French Ministry of Ecological Transition and currently Head of Expertise & Vehicle Regulation at UTAC, the only official Euro NCAP test centre in France. She will replace Niels Ebbe Jacobsen, CEO of International Consumer Research & Testing (ICRT), the current Euro NCAP President who will finish his term at the end of this year.

Céline Vallaude says, "Euro NCAP has played a pivotal role in the implementation of safety systems in new vehicles sold in Europe for more than 25 years, becoming a flagbearer for safety worldwide. This safety leadership can be attributed to its ability to continuously update its requirements, encouraging industry to achieve the highest possible standards in a cost-effective manner. I intend Euro NCAP to continue to maintain this agility and level of expertise to support its growth. My aim will also be to ensure that Euro NCAP continues to manage its diverse testing programmes within an effective business model, maintaining financial sustainability whilst upholding the quality and independence of its assessment".

Outgoing President Niels Ebbe Jacobsen says, "It was an honour to move Euro NCAP forward and contribute to a more secure future for the organisation. There cannot be anything more important than the aim of saving thousands of lives on European roads. I am happy that the Board of Directors has elected unanimously Céline Vallaude as Euro NCAP’s new President, the FIA’s Laurianne Krid as Treasurer and BAST’s Andre Seeck as Secretary, this shows the combined strength we have as a Board".

And Euro NCAP Secretary General Dr. Michiel van Ratingen says, "I very much look forward to welcoming Céline Vallaude as President of Euro NCAP, Truck Safe and Green NCAP. I have no doubt her experience will assist Euro NCAP in meeting the important milestones that lie ahead and spearhead important developments in the organisation. Euro NCAP has much to look forward and an exciting time ahead with a new rating scheme to be unveiled in 2026".

Céline Vallaude currently manages the Technical Expertise Department (including regulation, Euro NCAP, and testing) of UTAC Group, one of Euro NCAP's accredited laboratories and which has been representing the French Ministry of Ecological Transition since the beginning of Euro NCAP. She graduated with a degree in Mechanical Engineering from ENSEM (École Nationale Supérieure d'Électricité et de Mécanique de Nancy) in 2001, specializing in fluid dynamics with a course at Bath University in the UK. She joined UTAC in 2002 as an emissions test engineer.

She has been the French expert for the Ministry of Ecological Transition for over 18 years, in meetings with the European Commission and at UNECE (GRPE and WP29). In 2015, she was appointed project manager for the Dieselgate MoT test campaign. Her involvement with Euro NCAP started in 2017, initially as vice-chair of the Green NCAP programme and from October 2017, representing the French MoT at the BoD. These two experiences have provided her with valuable insights into how Euro NCAP operates as a consumer association and the challenges it faces to keep the programme going and start new initiatives. Throughout her career, Céline Vallaude has focused on enhancing the social and environmental impact of vehicles by supporting the development of regulations and protocols, as well as validating vehicle compliance.