

Proliferation of ADB and Contribution to Safety

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DVN-Workshop Michigan
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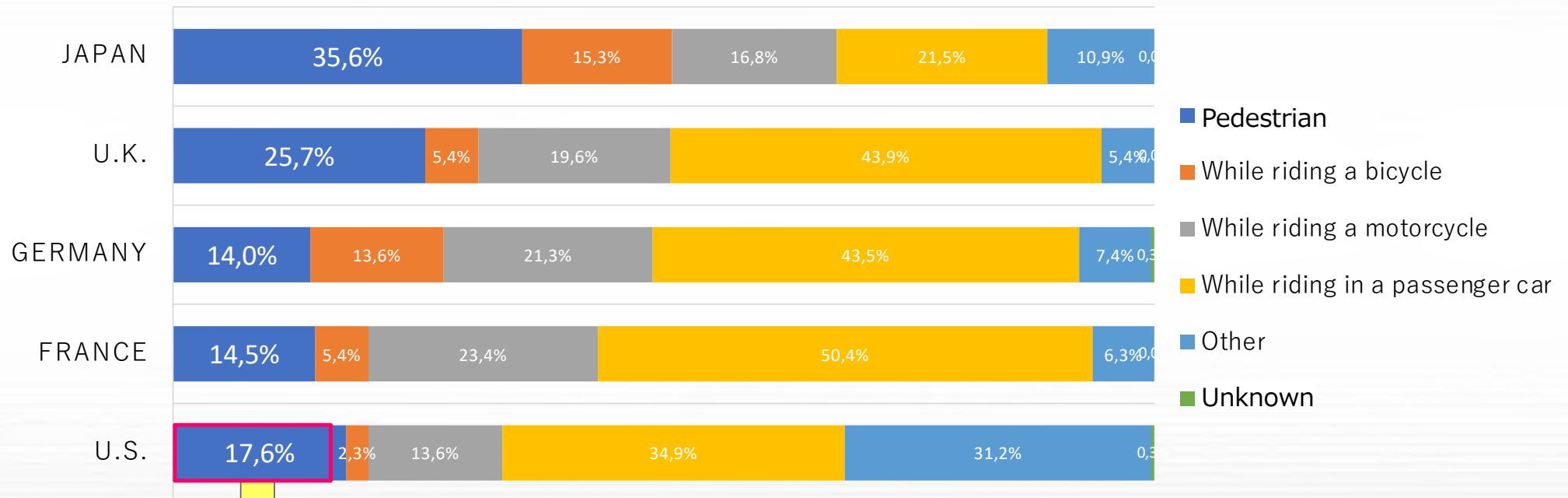
1. The need for ADB (Adaptive Driving Beam) as safety equipment
 2. Koito efforts to promote ADB
 3. ADB has a bright future
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1. The need for ADB as safety equipment

Pedestrian Fatalities

Comparison of composition of deaths within 30 days by state by country (2018)



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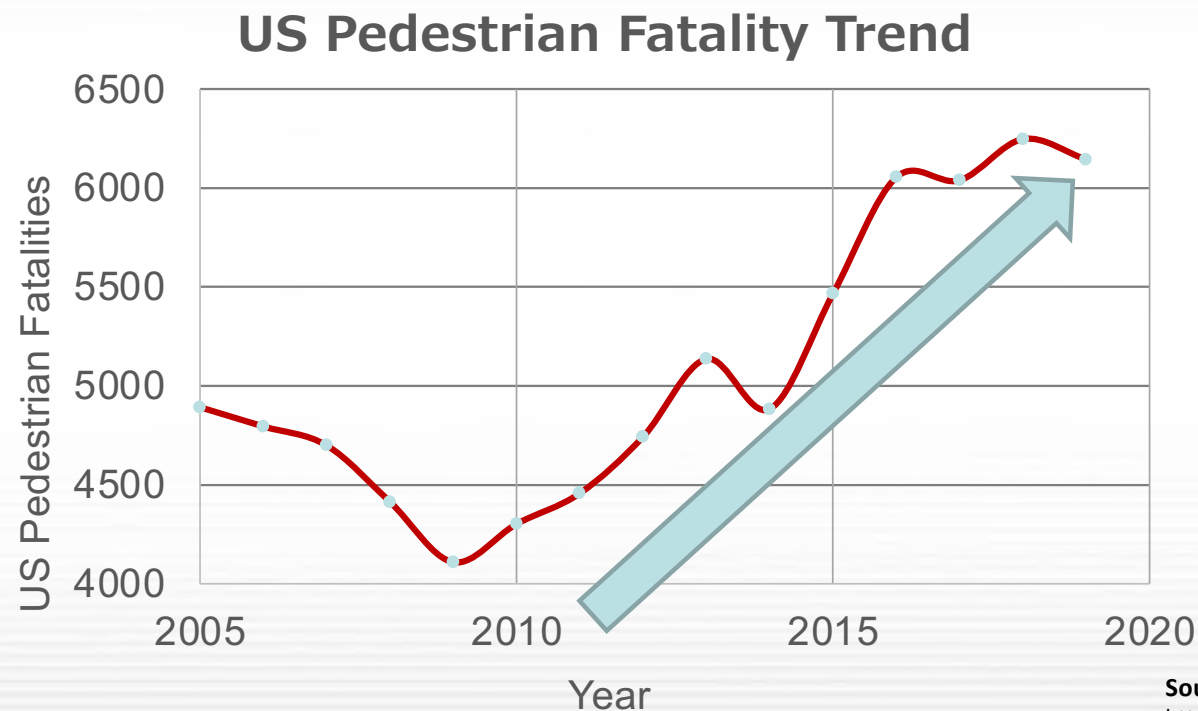
Source: National Police Agency (2/18/2021)

https://www.pref.fukui.lg.jp/doc/kenan/koutuu/koutuuzikotoukei_d/fil/sibouzikotokutyou.pdf

1. The need for ADB as safety equipment

Pedestrian Fatalities in US are Increasing at an Alarming Rate

Pedestrian fatalities declined until 2009 to about 4000 in US, last 4 years over 6000 fatalities

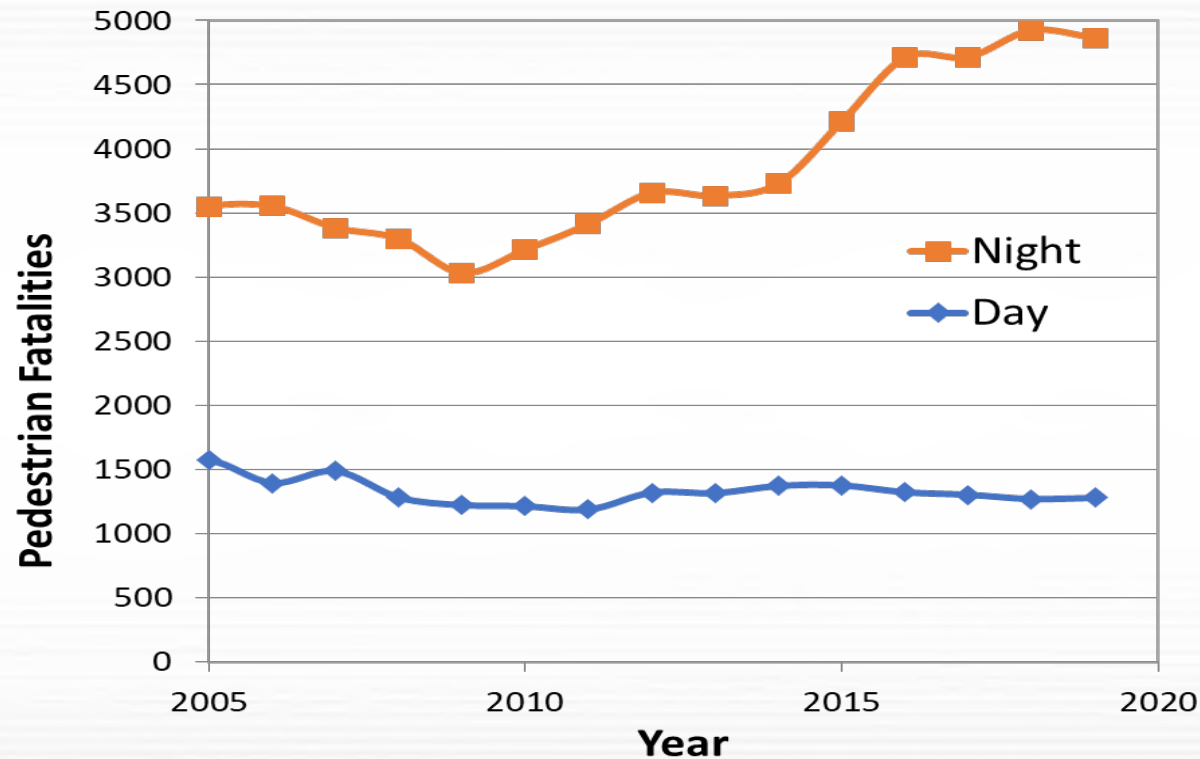


Source: FARS Database
<https://www-fars.nhtsa.dot.gov/Main/index.aspx>

What factors cause the increase and how much can ADB help to reverse the trend?

1. The need for ADB as safety equipment

Pedestrian Fatalities in US are Increasing at an Alarming Rate



Since 2009, Daytime Pedestrian Fatalities are up 5%

Since 2009, Nighttime Pedestrian Fatalities are up 61%

Conclusion: Pedestrians Must Become More Visible at Night!

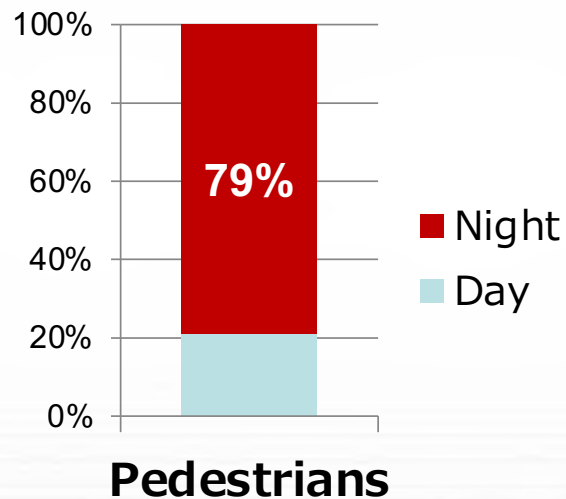
Source: FARS Database

<https://www-fars.nhtsa.dot.gov/Main/index.aspx>

1. The need for ADB as safety equipment

2019 FARS Fatality Data

<http://www-fars.nhtsa.dot.gov>



79% of pedestrian fatalities occur at night

→ High beam is effective for finding pedestrians at night



Lo beam

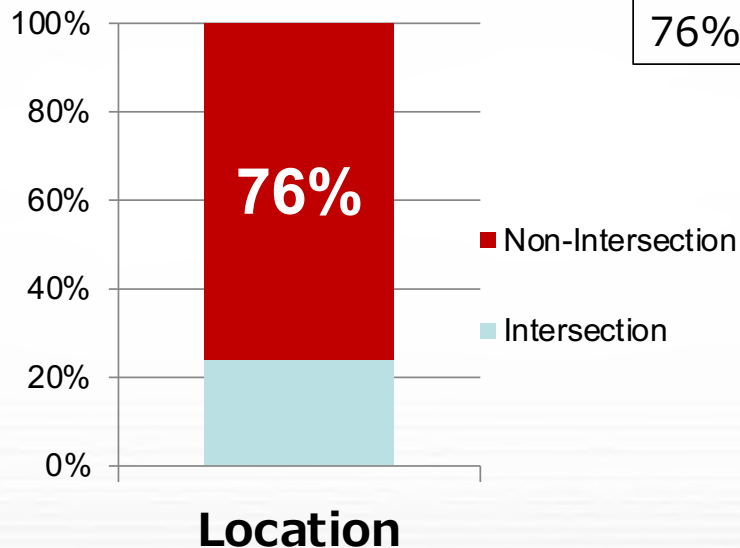


Hi beam

1. The need for ADB as safety equipment

2019 FARS Fatality Data

<http://www-fars.nhtsa.dot.gov>



76% of pedestrian fatal accidents are non-intersection walking accidents

→ADB is effective for early detection of crossing



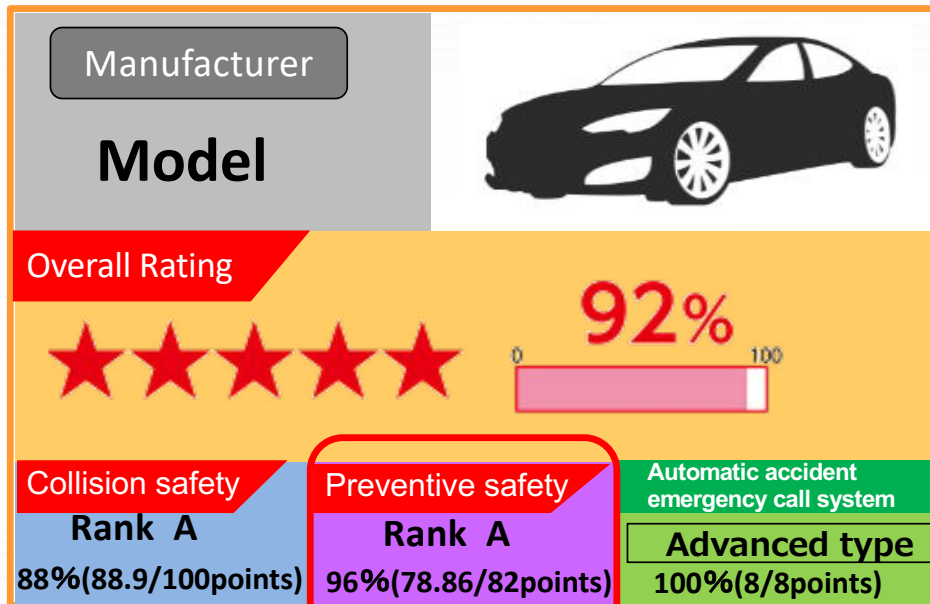
Conclusion: Pedestrians must become more visible away from intersection in unlit areas.

1. The need for ADB as safety equipment

Merit points added for equipment in automobile assessment

(since 2018 in Japan)

【SAMPLE】



- | | | |
|---------------------------------------|----------|-------------|
| • Autonomous Emergency Braking System | 64 | } 82 points |
| • Lane Departure Prevention System | 11 | |
| • Rear-view monitoring system | 2 | |
| • High-performance headlights | 4 | |
| • Pedal misapplication prevention | 1 | |

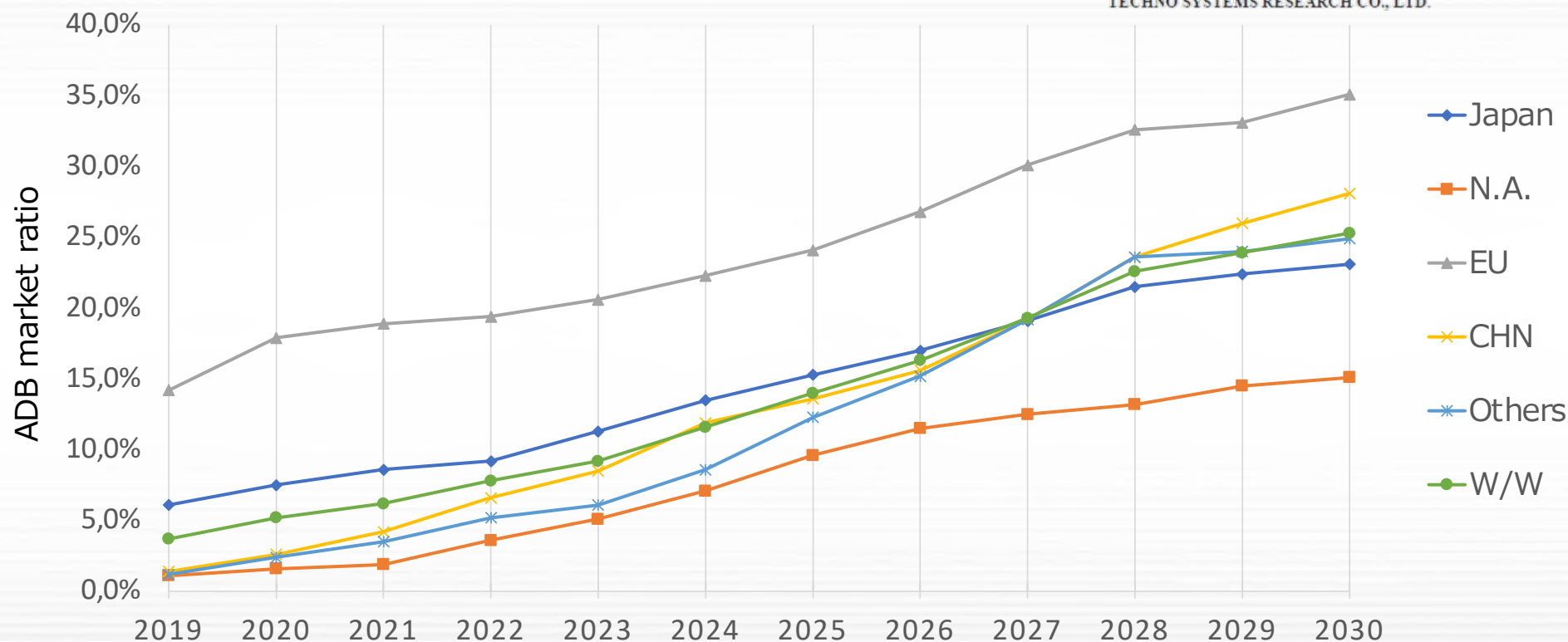
- The total score of the above five items is 66.40/82 or higher to obtain rank A.
- In the high-performance headlight category
ADB scored 5.0 points compared to 1.4 points for AHB.
(When both are activated at 41 km/h or faster)

ADB contributes to improving vehicle safety rank in Japan, and this trend is expected to reach global proportions.

1. The need for ADB as safety equipment

The market prevalence of ADB by region

Excerpt: 2021 automotive headlamp marketing analysis
TECHNO SYSTEMS RESEARCH CO., LTD.

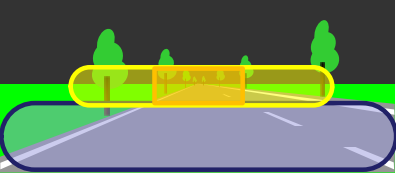

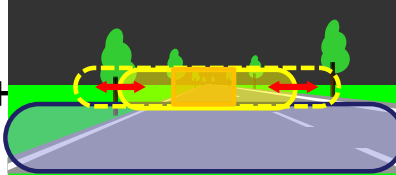
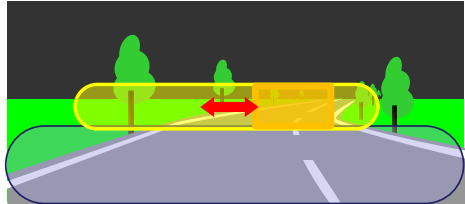
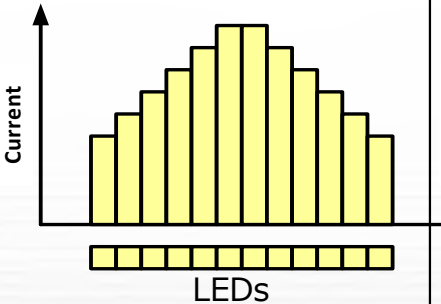
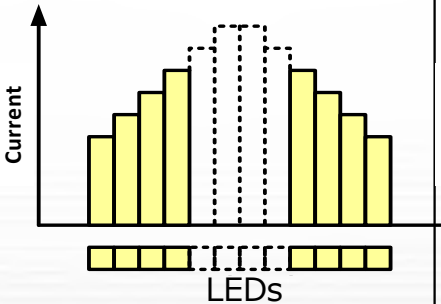
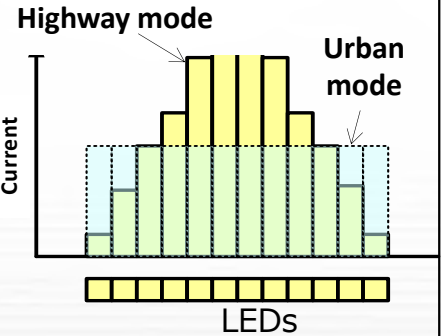
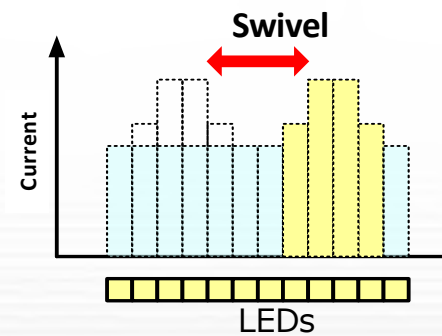


- The prevalence of ADB is expected to increase toward 2030 while Europe keeps leading the highest rate.
- Awaiting the US regulation to be amended in NA market but expected positive outlook once it is permitted in

2022

1. The need for ADB as safety equipment

ADB illuminates far distances and beyond the curve in addition to the basic shading function.

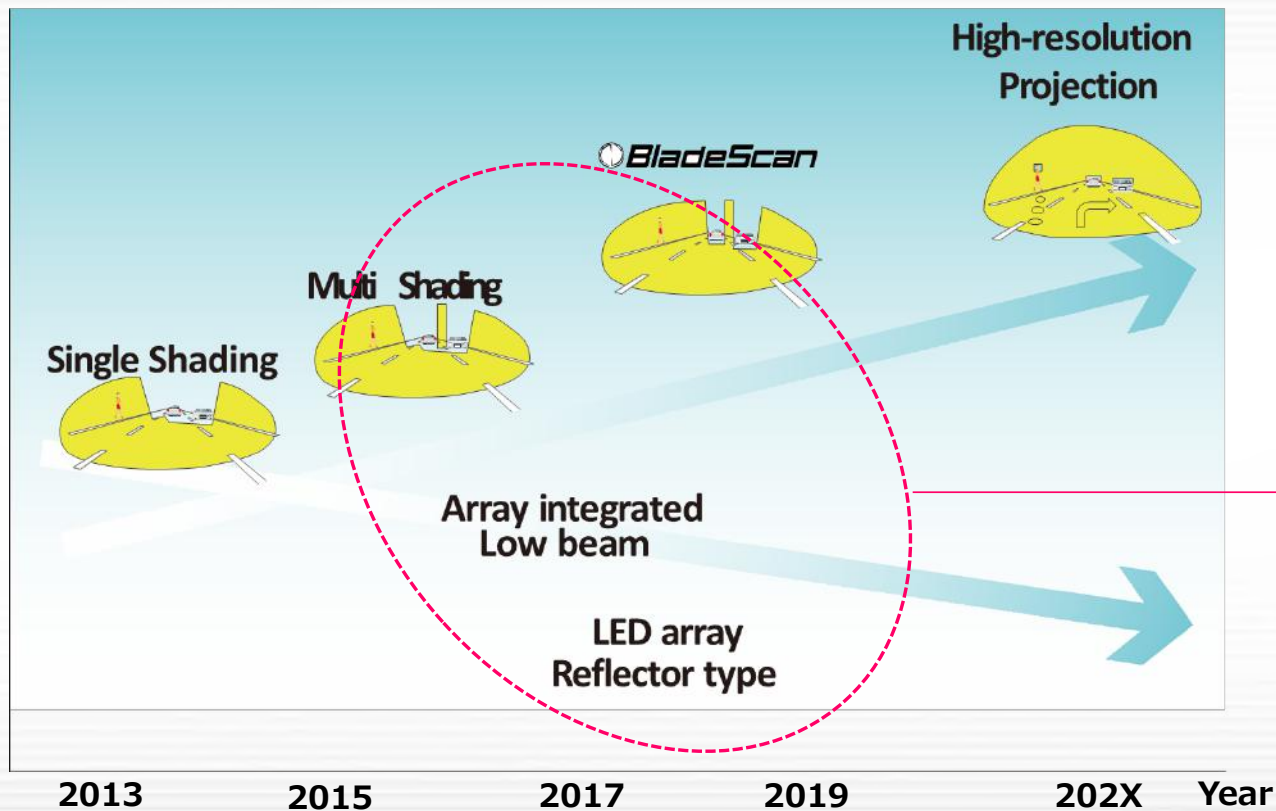
Function	General Hi beam	Shaded Hi beam	Hi (converged, diffused)	Curve (swivel)
				
LED Current distribution				

ADB has a role to play safety under any driving conditions.

- 1.The need for ADB as safety equipment
 2. Koito efforts to promote ADB
 3. ADB has a bright future
-

2. Koito efforts to promote ADB

Roadmap for ADB Evolution



ADB with 10 segmented LED array is the current mainstream.

A key to its prevalence is as follows;

- ① Coordination with styling
- ② High performance

2. Koito efforts to promote ADB

① Coordination with styling

HL styling trends

⇒ It tends to shift towards compact Lo/Hi beam unit & thin profile lamp contour as LED HLs are evolved.

(e.g.: TOYOTA COROLLA)

<https://cars.usnews.com/cars-trucks/toyota/corolla>



HALOGEN Lo/Hi



LED Lo Beam
HALOGEN Hi Beam



LED Lo/Hi (2eyes)



LED Lo/Hi (1eye)

2. Koito efforts to promote ADB

① Coordination with styling Adaptability

⇒ Develop compact ADB unit flexible for any styling

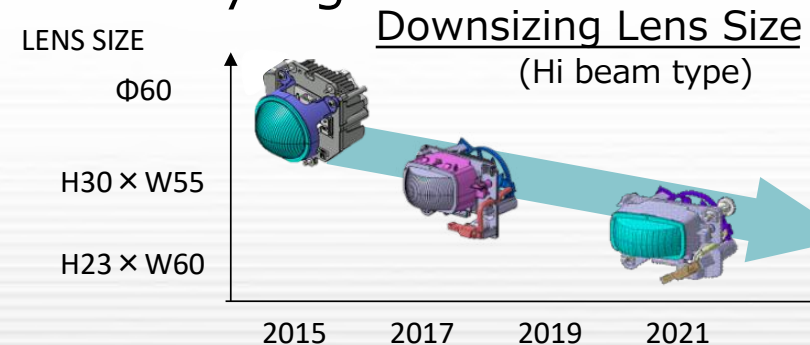
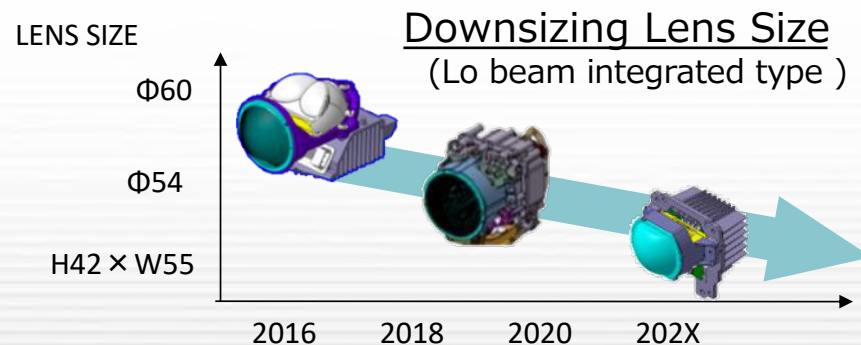
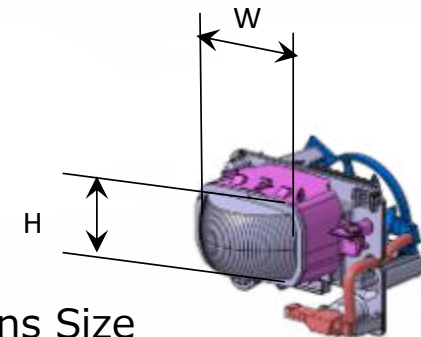
<https://cars.usnews.com/cars-trucks/>



Single eye styling



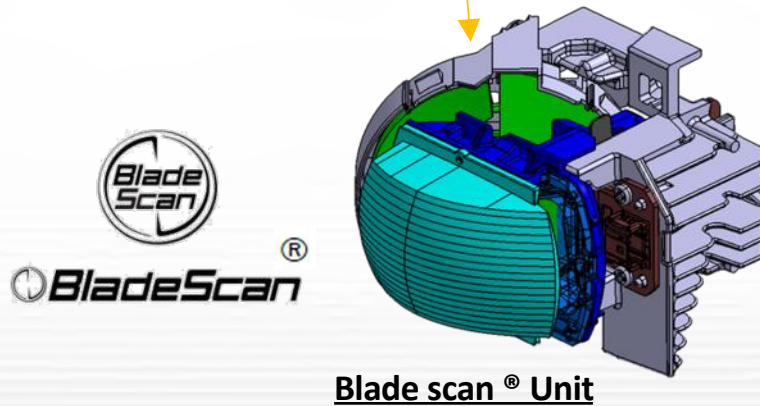
Slim (Multi) eyes styling



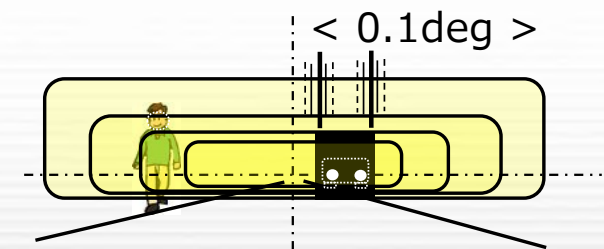
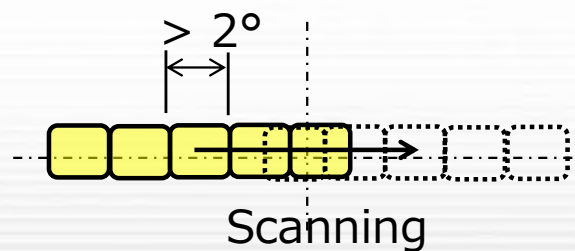
2. Koito efforts to promote ADB

② High performance

Scanning approach



Scanning can make higher resolution

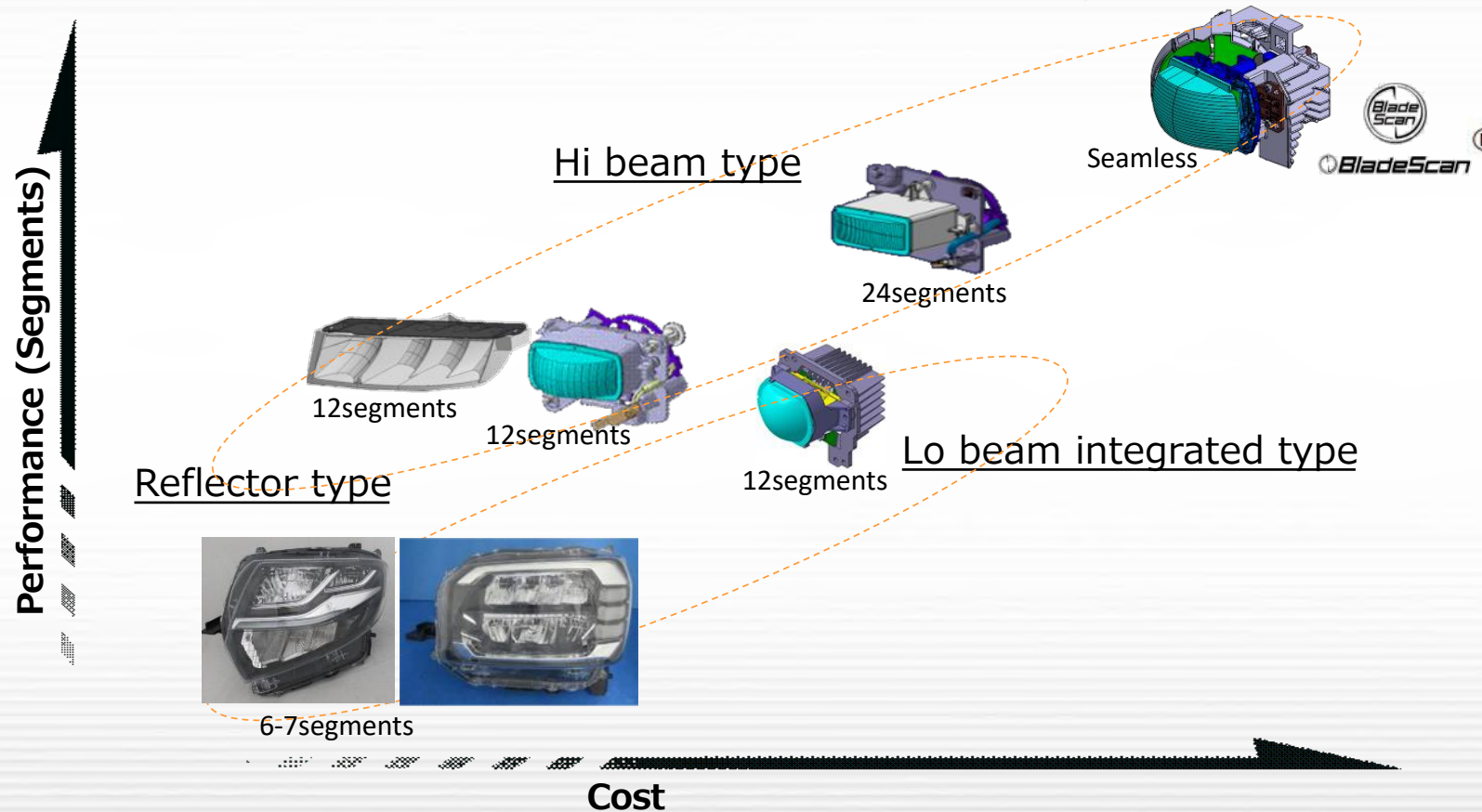


Scanning using a rotating mirror enables high-resolution ADB with only 10 LEDs.

2. Our Koito efforts to promote ADB

Current Lineup

⇒ A variety of ADB units are available according to vehicle type and design.



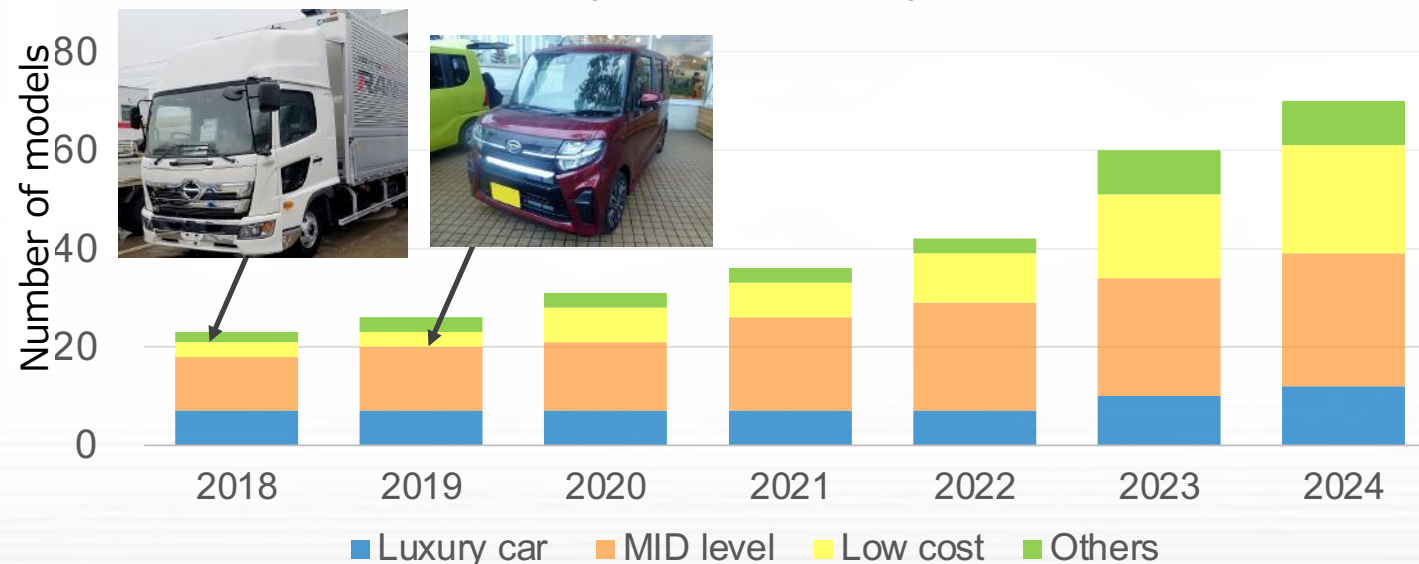
2. Our Koito efforts to promote ADB

Adopted for all categories of vehicles, from light cars to heavy trucks

CHANGES IN NUMBER OF MODELS WITH ADB
(JPN/SOURCED)

2018 First used in heavy-duty trucks
(HINO PROFIA/RENGER)

2019 First used in mini cars s
(DAIHATSU TANTO)



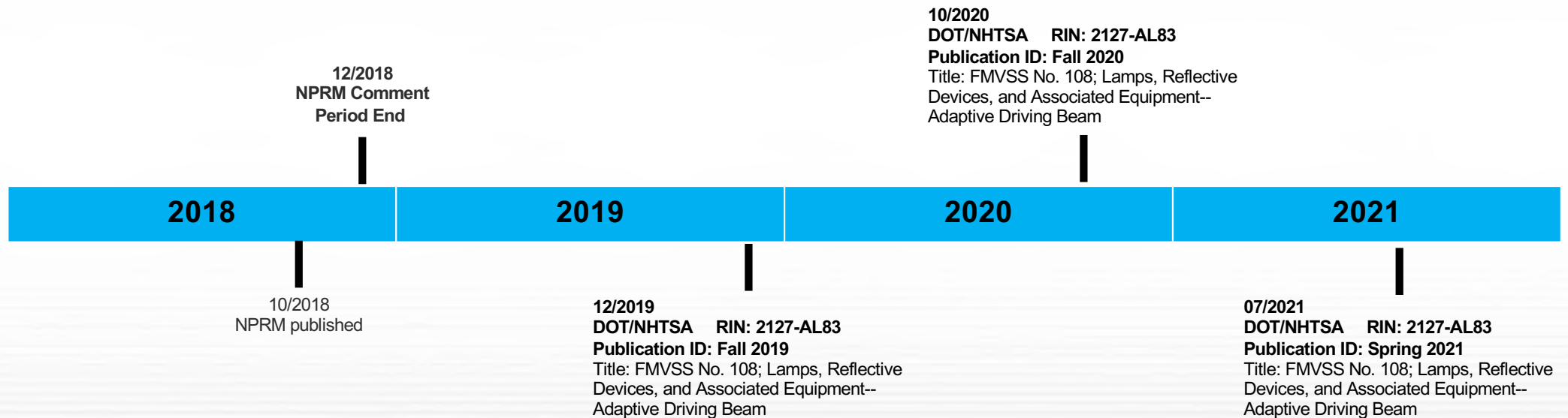
In 2020 and beyond, we expect the number of lamps with ADB to increase steadily.

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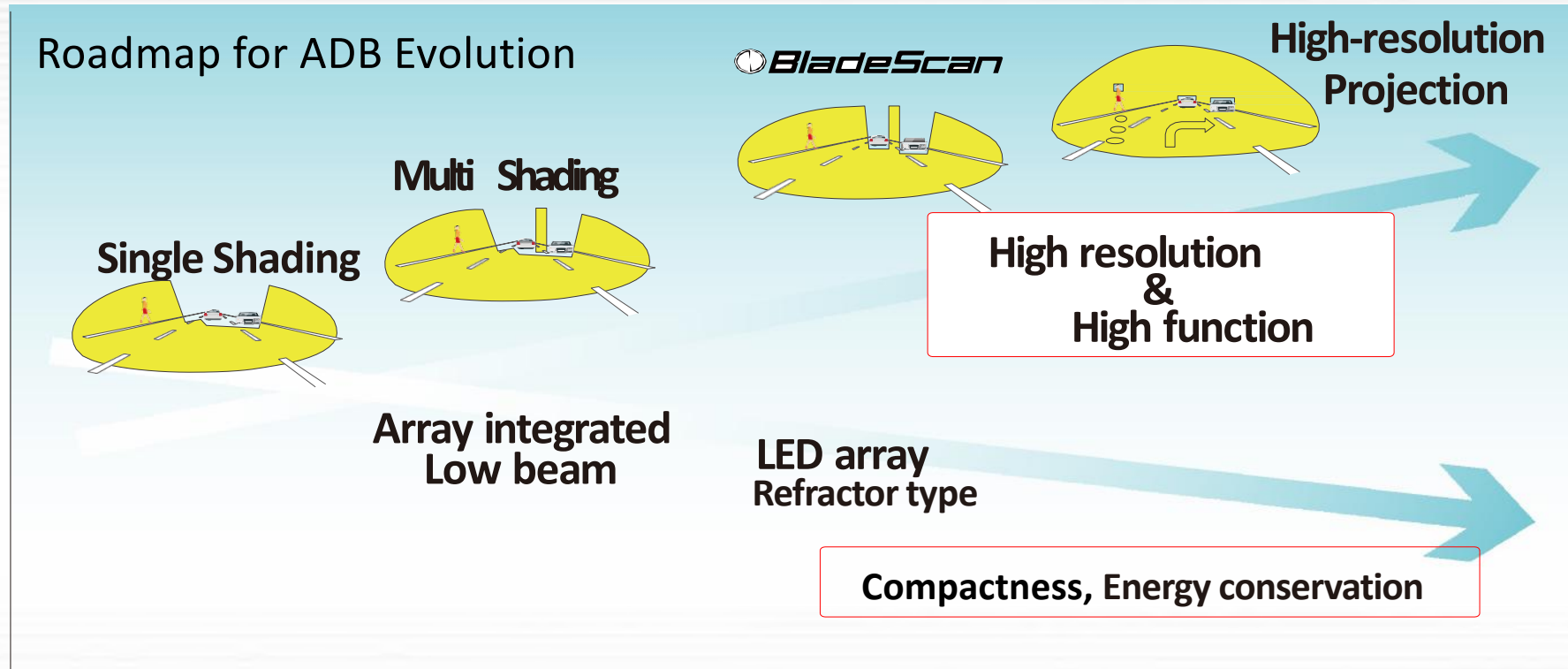
3. ADB has a bright future

North America expansion

NHTSA - ADB Final Rule Timeline and Dates:
Latest timing was July 2021



3. ADB has a bright future

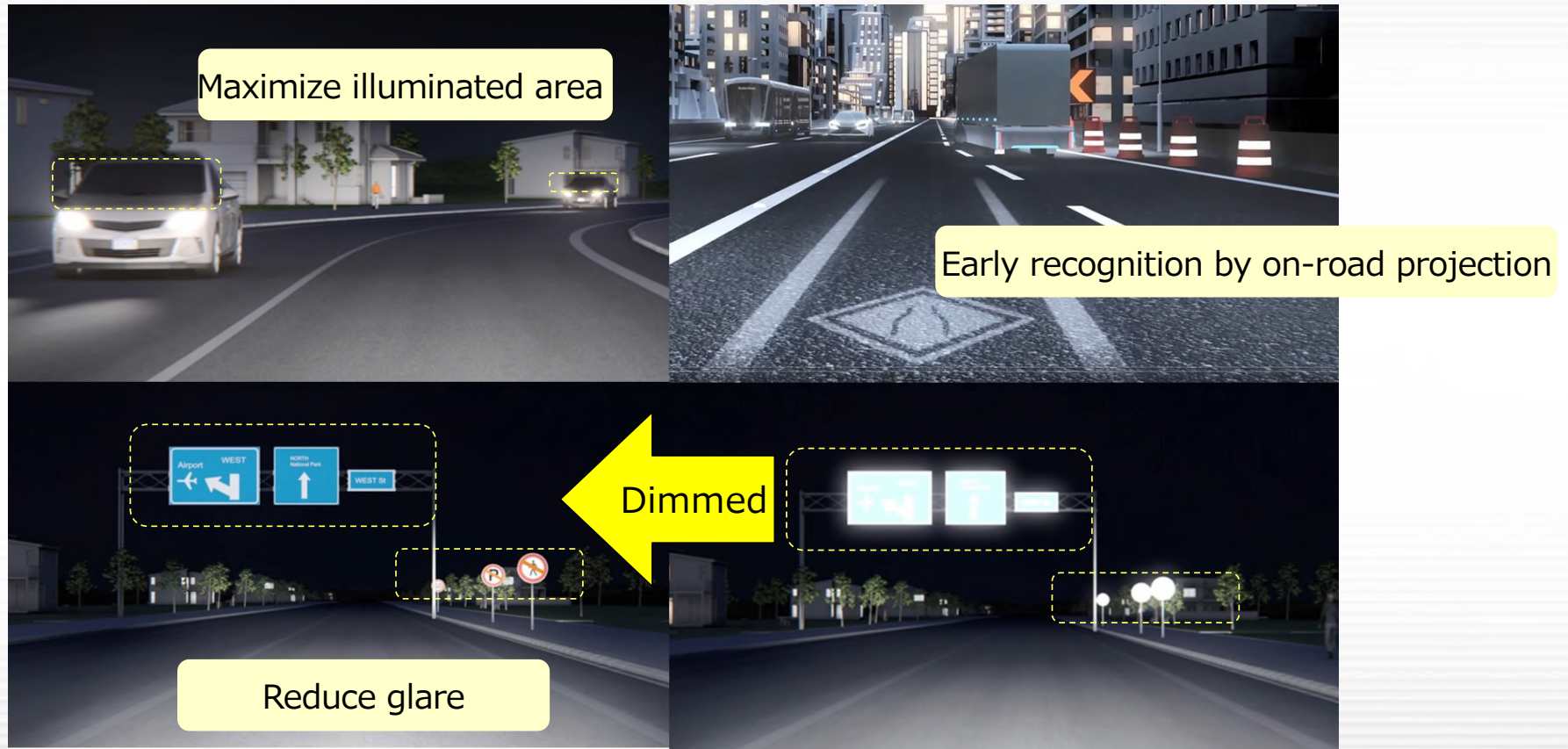


Bright future means

- ① Benefit for customers
- ② Benefit for the industry

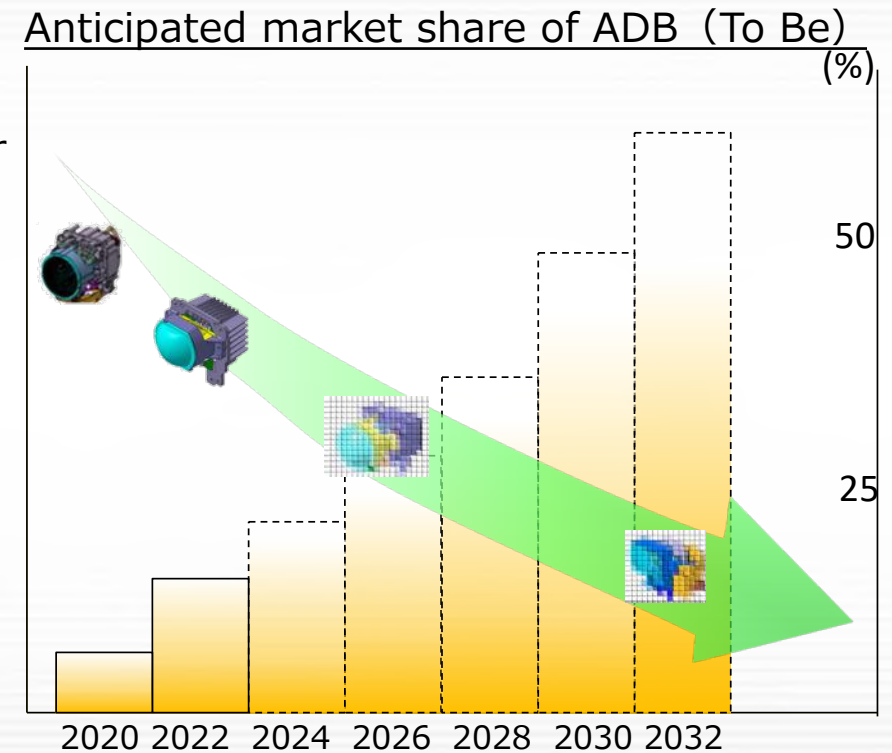
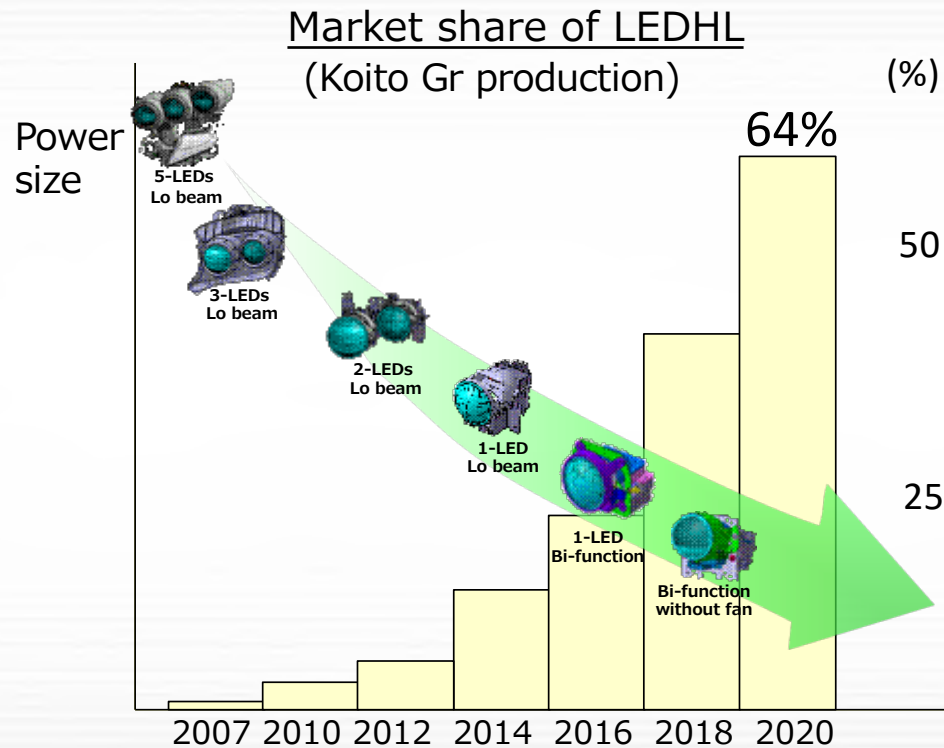
3. ADB has a bright future

① Customer benefits High-resolution & High-function for Safety



3. ADB has a bright future

② Industry benefits



Similar to the increase in LEDHL market share, we can anticipate the increase of ADB market share contributing not only to safety nighttime drive but also evolution in our industry.

LIGHTING FOR YOUR SAFETY

