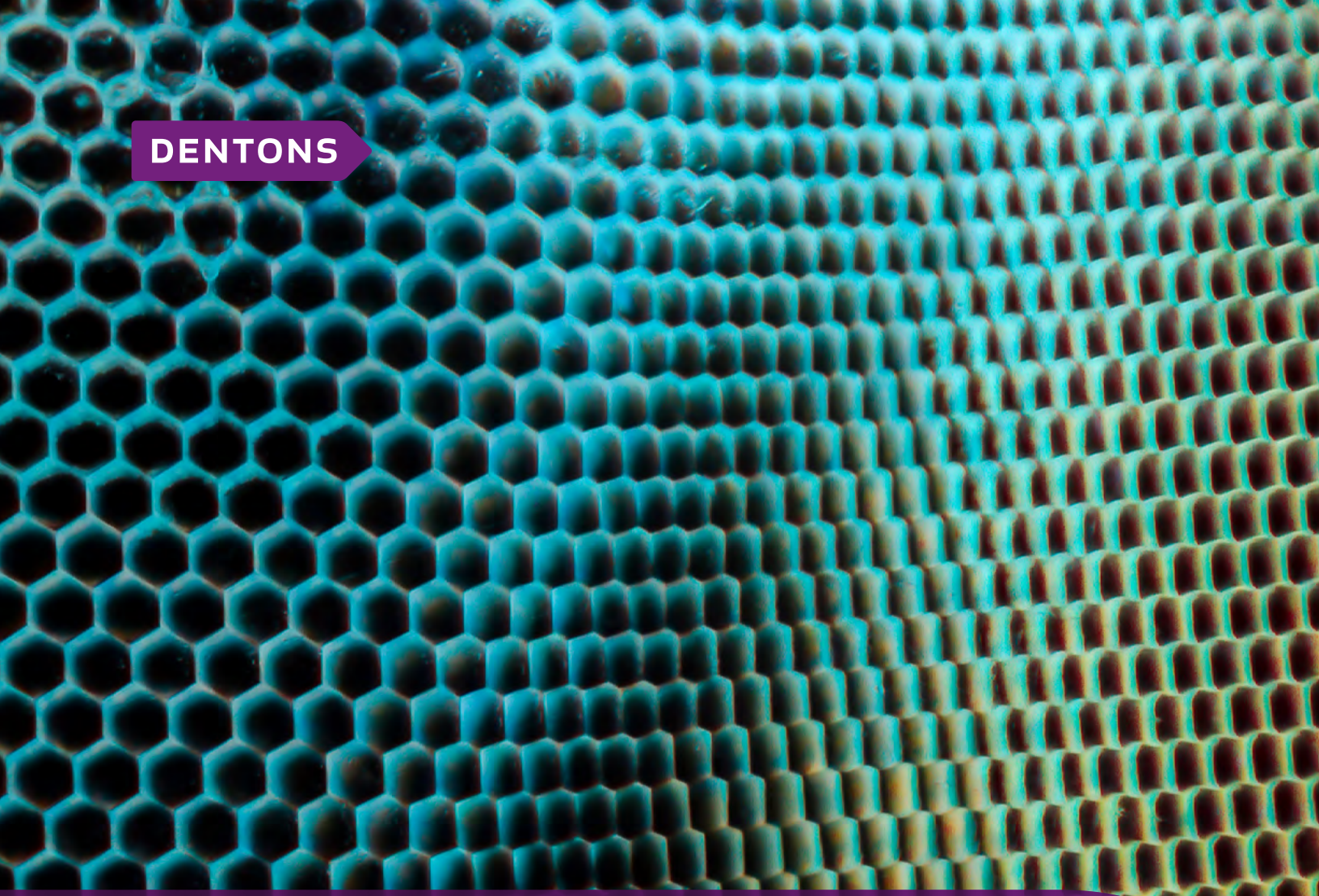
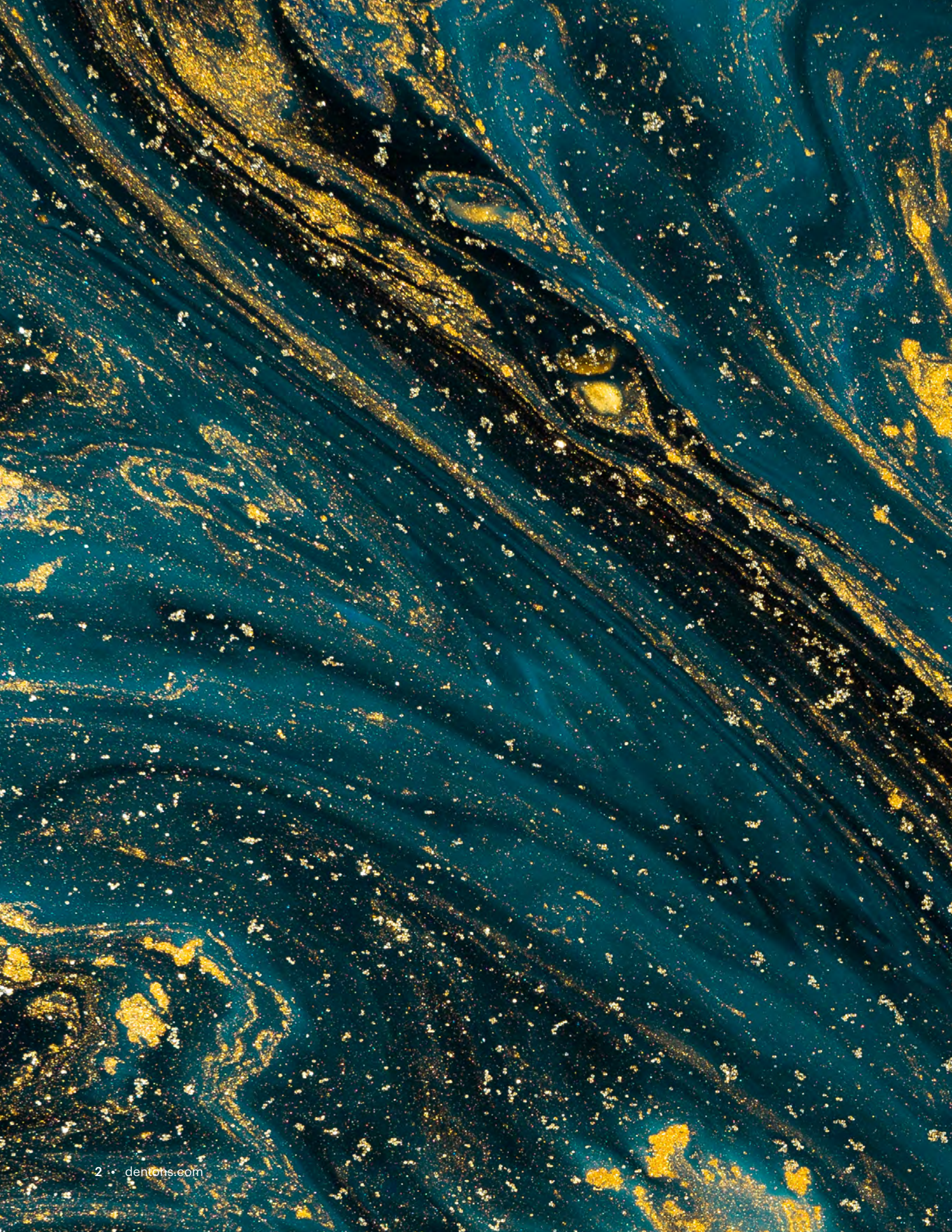


DENTONS

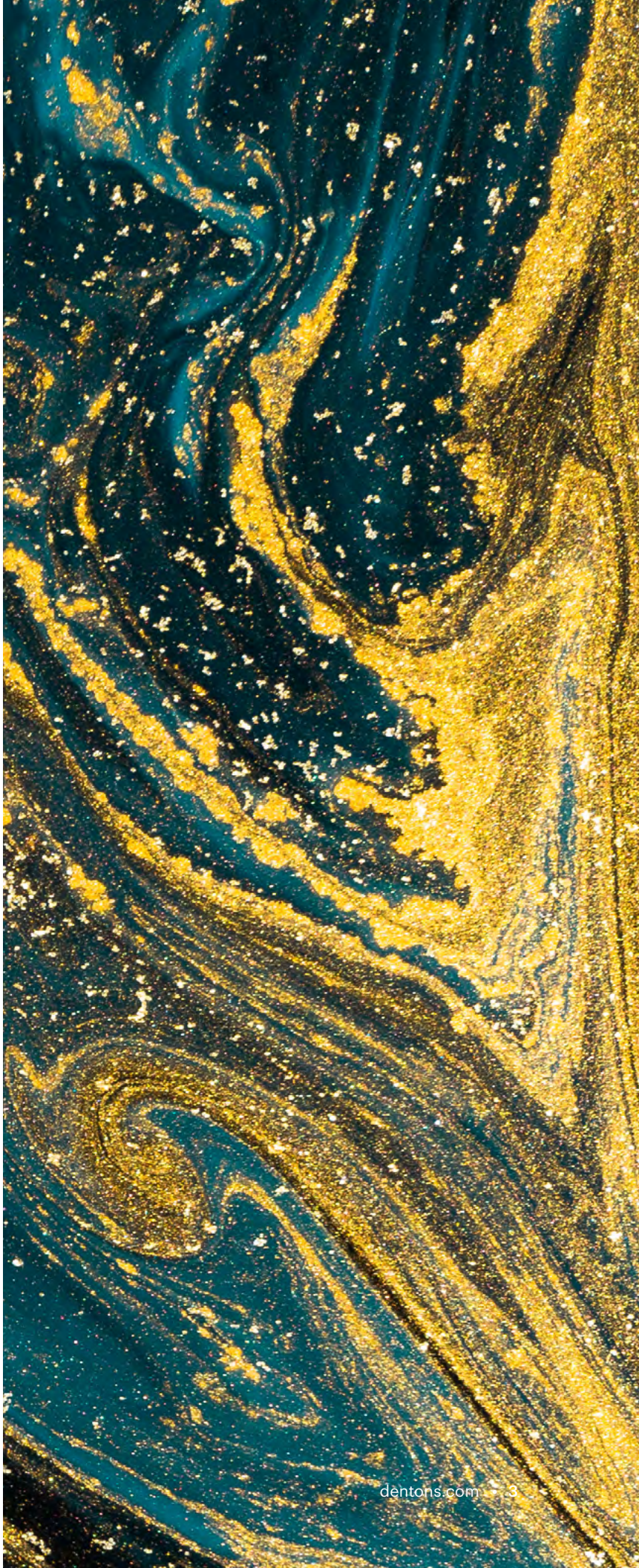
# Global Guide to Autonomous Vehicles 2023

Grow | Protect | Operate | Finance



# Contents





# Executive Summary

The global autonomous technology industry is continuing to grow and mature, but stakeholders still face a complicated array of laws, policies, and regulations. Companies in or around the AV space need clear guidance, despite regulatory schemes that can vary greatly across the world, and sometimes even within a single country.

The Dentons 2023 Global Guide to Autonomous Vehicles attempts to step into the fray and provides a detailed roadmap of the legal, regulatory and political landscape for autonomous vehicles so stakeholders can have the tools to navigate this emerging industry.

## What Does the Guide Cover?

Authored by our global autonomous vehicles team members, the guide covers the core areas outlined below:


## Regions

The guide focuses on the following 11 countries whose governments and automotive and technology industries have taken unique approaches to supporting the autonomous vehicles industry:

- Australia
- Canada
- China
- Germany
- Hungary
- Italy
- Poland
- South Korea
- Turkey
- United Kingdom
- United States

## Questions?

Should you have questions regarding any of the covered countries, please do not hesitate to contact our authors identified throughout the guide.

If you have questions of a more general nature, about the guide or the sector overall, please feel free to contact the leaders of our Global Autonomous Vehicles group, found below.

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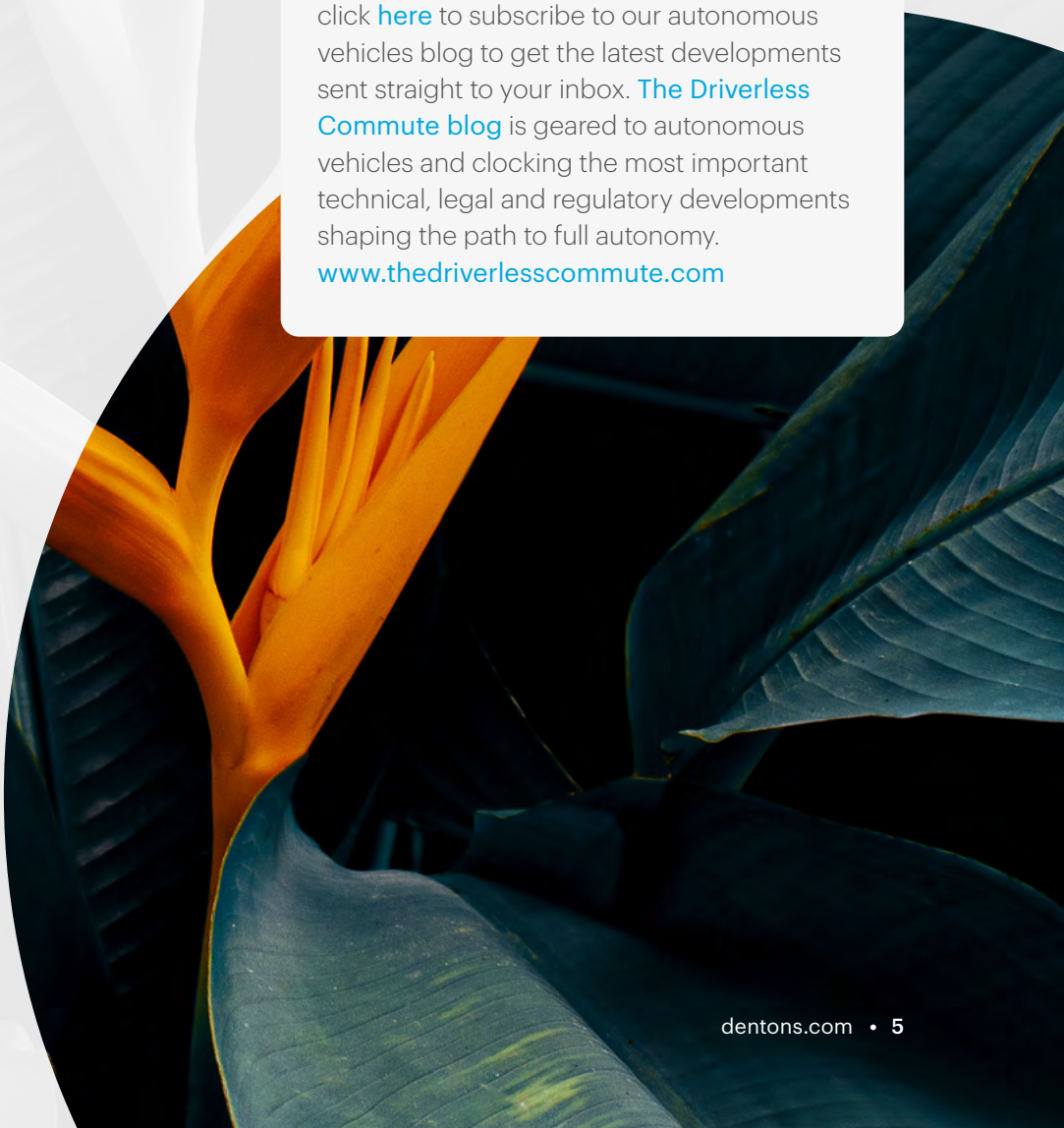
## Dentons' Global Autonomous Vehicles group

Dentons' global autonomous vehicles group can help you navigate the labyrinth of national, regional and local laws, regulations and guidance relating to the development and deployment of driverless vehicles. We offer a full array of tech, regulatory, transactional and litigation support the autonomous mobility ecosystem, including to start-ups, emerging companies, multinational vehicle manufacturers, automotive OEMs, vehicle or parts retailers and driverless-technology firms, insurance organizations, financial institutions..

## Stay in touch | The driverless commute

For more updates to help you stay connected, click here to subscribe to our autonomous vehicles blog to get the latest developments sent straight to your inbox. The Driverless Commute blog is geared to autonomous vehicles and clocking the most important technical, legal and regulatory developments shaping the path to full autonomy.
www.thedriverlesscommute.com



# Australia

## Regulatory Developments and Roadblocks

### Austroads

***Minimum Physical Infrastructure Standard for Operation of Automated Driving***

Report, released January 2022

- The report focuses on the minimum physical infrastructure needed for automated driving.
- It also includes recommendations for the short term (next five years) such as:
  - » Increasing the interpretability of Traffic Control Devices (**TCDs**).
  - » Increasing governmental investment in the use of intelligent equipment and signs at temporary work zones.

### National Transport Commission (NTC)

***The Regulatory Framework for Automated Vehicles in Australia***[1]

Policy paper, released February 2022

- This paper highlights that in early 2022, transport and infrastructure ministers approved the national in-service safety framework for automated vehicles in Australia.
- The framework attempts to strike a balance between aligning with international standards and addressing Australia's unique conditions.
- The paper importantly highlights that ministers agreed in February 2022 to the NTC's recommendations for the further detail of the in-service framework contained in the AVSL, including:
  - » prescriptive duties on the automated driving system entity (**ADSE**) (sections 5.1.2–5.1.4)
  - » the process for transferring an in-service automated driving system (**ADS**) to a new ADSE (chapter 7)
  - » the process for managing in-service modifications and aftermarket activations and installations, with further work on safety risks (chapter 8)
  - » the in-service regulator's functions (section 10.2)
- On 11 February 2022 at the 16th infrastructure and transport ministers' meeting, ministers also agreed that the Automated Vehicle Safety Law (**AVSL**) would be implemented through Commonwealth law.

1 NTC Policy Paper – regulatory framework for automated vehicles in Australia.pdf

## 16th Infrastructure and Transport Ministers' Meeting[2]

Meeting, 11th February 2022

- Ministers agreed that the future of the Automated Vehicle Safety Law will be implemented through Commonwealth law to deliver a nationally consistent regulatory approach.
- Ministers agreed that an Intergovernmental Agreement will be developed to support the new automated vehicle regulatory governance arrangements by late 2023.
- Ministers are scheduled to make future decisions on drafting instructions for the new law in late 2022 through future meetings.
- Complementary state and territory law amendments will support the national regulatory framework for automated vehicles.
- The Automated Vehicle Safety Law is expected to commence by 2026.

## Commonwealth Government

***Road Vehicle Standards Act 2018 (Cth) (RVSA) | 4 April 2022***

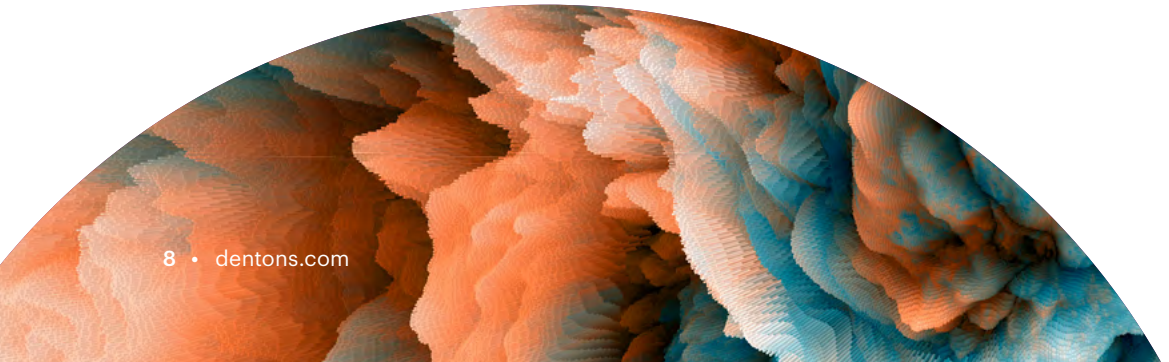
- On 1 July 2021, the RVSA replaced the pre-existing Motor Vehicle Standards Act 1989 (Cth).
- The RVSA includes a 12-month transition period to comply with the new provisions, beginning 1 July 2021.
- On 4 April 2022, the Department of Infrastructure and Transport announced this transition period would be extended by an additional year to 30 June 2023.
- The announcement followed intense lobbying by various sectors of the automotive industry, raising concerns that certain vehicles – such as specialised cranes in the construction sector – **may not meet the compliance deadlines**.

2 16th ITMM Communique 11 Februrary 2022 (infrastructure.gov.au)

# Driverless Testing and Deployment

## Rules and regulations largely unchanged

- The Trialing of driverless vehicles is permitted in Australia upon the grant of a relevant permit from each relevant state/territory. Generally, "trial permits" are granted on a case-by-case basis.
- Certain states (such as Victoria) require that the application for a trial permit to include a safety management plan that complies with NTC guidelines. And regardless of jurisdiction, appropriate safety hardware and software must be established in a safety management plan that complies with NTC guidelines. Whether vehicles must have the capability to be remotely operated is dependent on the safety management plan. Typically, Australian road rules require a person to be seated in the driver's seat. Certain states, such as New South Wales (NSW) and South Australia (SA), require the trialing organization to have third-party policy and/or public liability insurance.
- It remains a general rule that a human driver will be required in the vehicle unless a specific exemption or permit has been granted. As such, it is possible that vehicles trialed in Australia will not have human drivers. In this case, trialing organizations will need to demonstrate how they have addressed the relevant safety risks of not having the driver in the vehicle. Where there is a human driver, associated human factor risks will also need to be considered, including such behavioral requirements as alertness and ability to resume the entire driving task if requested or if there is an evident vehicle system failure.
- It remains the rule that while not driving, the human driver must not engage in activities that prevent him or her from responding to takeover demands. Activities not in line with the intended use of the automated driving function or prohibited by law include:
  - » Reading or viewing a device or thing unrelated to navigation or driving (ARR, Rule 299).
  - » Using a laptop (ARR, Rule 299).
  - » Using a mobile phone, except in permitted circumstances (ARR, Rule 300).
- Throughout vehicle testing, record keeping requirements apply. Generally speaking, trialing organizations should comply with all relevant crash reporting requirements, and report on incidents involving the automated driving system to authorities.
- The Australian Governments Department of Infrastructure classifies autonomous vehicles into six different levels, according to a standard developed by the Society of Automotive Engineers (SAE).
- Automation levels are based on the amount of human input required to operate the vehicle, from Level 0 (driver must perform all driving tasks) to Level 5 (vehicle can drive itself without any human involvement).
  - » Level 1 and 2
    - Vehicle assists with driving.
    - Person watches the road with hands on steering wheel and intervenes when required.
    - Includes features such as adaptive cruise control, lane assistance and parking assistance.



  - » Level 3
    - Vehicle drives itself some of the time.
    - Person not required to watch the road but, in some circumstances, must respond to requests to take back control.
    - Includes advanced driver assistance features such as traffic jam assist, which allows drivers to delegate driving in traffic jams to the car, with no supervision required.
  - » Level 4
    - Vehicle drives itself all of the time under certain conditions.
    - Person not required to take action when the system is driving.
    - Includes vehicles that are "driverless" on some routes, such as automated shuttle buses or taxis.
  - » Level 5
    - Vehicle drives itself all of the time, under all conditions.
    - Person is never required to drive or take action.
- Current state and territory road safety laws provide obligations and offences for human drivers and they will continue to do so. These laws do not provide obligations and offences for ADSEs. For example, current road safety laws will not cover a coding failure by the ADSE that results in a crash.[3]
- Law enforcement officers will continue to play an integral role in addressing road safety issues related to automated vehicles. Officers will need to monitor automated vehicles' compliance with road traffic laws and their safe interaction with other road users. They will need to interact with automated vehicles on the road, at the roadside and after a crash, and intervene in cases of road traffic law breaches.

## Liability

- In the event of a crash involving an autonomous vehicle:
  - » The Australian Consumer Law (ACL) provides a regulatory system of obligations and warranties in order for manufacturers to meet quality and safety standards; and
  - » Each state and territory has its own Civil Liability Act for personal injuries caused by motor vehicle accidents.
- While the usual negligence principles apply, there will be additional issues regarding liability for compensation. For example, there will be issues as to who will bear responsibility for harm with respect to higher levels of automation. Under the ACL, manufacturers and suppliers (such as sellers and resellers) may be held liable.
- In October 2017, the NTC released a discussion paper titled "Changing driving laws to support automated vehicles" (Discussion Paper).[4] The Discussion Paper provides in-depth analysis of the need to legally recognize an ADS in Australia. It explains that an ADS is a system – not a person – so it cannot be held responsible for its actions. An entity needs to be responsible for the actions of an ADS to ensure it can operate safely.
- In its Automated Vehicle Program[5] released in October 2019, the NTC confirmed it will consider data from insurers to assess and manage liability for road traffic law breaches and crashes.

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3 NTC Policy Paper – regulatory framework for automated vehicles in Australia.pdf, Page 74
4 NTC Policy Paper – Changing driving laws to support automated vehicles.pdf
5 Automated vehicle program | National Transport Commission (ntc.gov.au)

***The Regulatory Framework for Automated Vehicles in Australia***

Policy paper, released February 2022

- Next steps – AVSL
  - The NTC will work with the Commonwealth and states and territories to develop drafting instructions for the AVSL. Following further agreement by ministers, drafting of the AVSL will commence and, finally, the Bill will be presented to the Commonwealth Parliament for passage to become a law, to commence in 2026.
  - In preparing drafting instructions for the AVSL, further work will be done to fully understand the safety risks associated with significant modifications to an ADS (as described in chapter 8) and modifications to automate conventional vehicles (through an over-the-air switch-on of ADS functionality or fitment of an aftermarket ADS device) (as described in chapter 3). At a minimum, ADSEs will be required to meet first-supply safety requirements to demonstrate safety before these types of modifications can be made. Governments have, however, undertaken to determine whether additional safety requirements are appropriate to address the risks associated with these modifications.
  - The AVSL will be a Commonwealth law, and ADSE offenses would sit at the Commonwealth level. Breaches of the AVSL will most likely be prosecuted in state and territory courts exercising federal jurisdiction.
- Next Steps – Complementary state and territory legislative amendments
  - States and territories will regulate the humans who will use and interact with automated vehicles. Therefore, complementary and territory legislative amendments will be needed to support the national regulatory framework. Some of the key areas requiring legislative review include:
    - roadworthiness.
    - vehicle repair.
    - third-party interference with an ADS.
    - obligations on fallback-ready users of an ADS.
    - roadside enforcement (described further in section 11.2.4).
    - governance of automated vehicle trials.
  - The NTC will facilitate state and territory development of these reforms to ensure national consistency as much as possible.

## Progress and News Releases

- Mercedes-Benz Testing Driverless Vehicle in NSW | 16 May 2022[6]
  - Mercedes-Benz has confirmed it is undertaking AV testing in NSW as part of a range of 175 AVs, each of which contributes to international trials in cooperation with the US software firm, Nvidia.
  - The testing has included the collection of data pertaining to country-specific peculiarities in infrastructure, traffic rules and the behaviour of other road users, which ultimately informs necessary demands on sensors and the algorithmic calibration of proposed AV fleets.
- Country NSW to Host Largest AV Testing Site in Southern Hemisphere | 24 May 2022[7]

6 Autonomous car of the future quietly tested on Australian roads – Drive
7 Small NSW town of Cudal to host largest driverless vehicle testing site in southern hemisphere – ABC News

- The NSW Government has committed $10 million to upgrade an existing airport infrastructure and build the largest government-run AV testing site in the southern hemisphere.
- The small facility outside Cudal, in central-west NSW, will now host the Future Mobility Testing and Research Centre, where private companies have enlisted to test emerging technologies in the AV sector.
- The new upgrades will include the construction of an intersection and another kilometre of tarmacked road, as well as office infrastructure to accommodate more companies hoping to test their cutting-edge technologies.
- Included in the $10 million is $1 million to fund the development of a master plan to turn the old airport into an "autonomous vehicle-connected city."

# Connected Vehicles and Logistics

## Telecommunications and 5G

- Following industry consultation, the Australian Communications and Media Authority introduced the Radio Communications (Intelligent Transport Systems) Class License 2017, which will support the use of complying wireless technologies and devices. The regulations allow the 5.9 GHz band to be used for Intelligence Transport Systems (ITS) in Australia, and are consistent with the ITS arrangements in major vehicle markets such as the US and EU.[8] In the Australian context, short-range 5.9 GHz radios accommodate 4G C-V2X technology.

## Privacy

**Laws remain largely unchanged but are under review**

- The Privacy Act 1988 (Privacy Act) (and its accompanying Australian Privacy Principles (APPs)) regulates the management, storage, access and correction of personal information about individuals. This includes the collection of information from use of autonomous vehicles.
- An autonomous vehicle will also likely collect information about its users for the purpose of access (for example, facial recognition information), as well as location information (where a person goes, how long a person was at a location for, the next destinations) and preferences (for example, air conditioning temperature, music, etc.). Some of this information about users will likely be classified as personal information and as such, any collection and use will be subject to the Privacy Act 1988 requirements.
- Data is only allowed to be stored and transmitted if:
  - Collection of personal information is relevant to the functions and activities of the vehicle;
  - A person is aware of personal information collection and how that information is used through an up-to-date privacy policy and collection notices provided at the time information is collected;
  - Use and disclosure of personal information is consistent with the purpose for which it is collected, has the individual's consent and is for limited other purposes; and
  - Personal information is secure.

8 Australia clears 5.9GHz for connected vehicle services – Mobile World Live

- Consumers have the right to alter and correct their own personal information. An APP entity must take reasonable steps to destroy personal information or ensure it is de-identified if it no longer needs the information for any purpose for which it may be used or disclosed under the APPs. There is not, however, a right to be forgotten.
- Cybersecurity is regulated by the Privacy Act and its APPs. For example, the APPs prescribe that:
  - » Organizations must take reasonable steps to protect personal information that they hold from misuse, interference, loss and unauthorized access, modification or disclosure;
  - » Organizations must also take reasonable steps to destroy or de-identify personal information they hold if it is no longer needed for any purpose for which it may be used or disclosed, it is not contained in a Commonwealth record, and the entity is not required by or under an Australian law or a court or tribunal order to retain it.
- More recently, the Australian federal government introduced the Notifiable Data Breaches Scheme to manage cybersecurity accountability.
- The Privacy Act is currently under review, the details of which are set out below.

**Privacy Developments**

### High-Profile Data Breaches

- Over the course of 2022, Australia has seen a large number of high-profile data breaches which have consequently cast a spotlight on the Australian Privacy Laws.
- The Australian government's answer appears to be to increase penalties.

### Privacy Legislation Amendment (Enforcement and Other Measures) Bill 2022 (the Bill)

- The Bill was introduced to parliament on 26 October 2022. If passed it will introduce the following amendments:
  - » Increase in the maximum penalties for serious or repeated privacy breaches from the current $2.22 million penalty to whichever is the greater of:
    - $50 million;
    - three times the value of any benefit obtained through the misuse of information; or
    - 30 percent of a company's adjusted turnover in the relevant period.
  - » The Bill also provides the Australian Information Commissioner with greater powers to resolve privacy breaches and quickly share information about data breaches to help protect customers.
  - » The Australia Attorney-General recently released a report reviewing the Privacy Act, and including recommendations and proposals for amendments.[9]

9 Australia Attorney-General, "Landmark Privacy Act Review report released," (16 Feb. 23), available at https://ministers.ag.gov.au/media-centre/landmark-privacy-act-review-report-released-16-02-2023.

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# Canada

## Regulatory Developments and Roadblocks

### Regulatory overview

Autonomous vehicles in Canada are subject to regulation at three levels of government: (i) federal; (ii) provincial and territorial; and (iii) municipal. The federal government is responsible for regulating manufacturing and infrastructure as it relates to vehicles. The provinces and territories are responsible for the licensing of drivers, vehicle registration and insurance, and laws and regulations regarding the safe operation of vehicles on public roads. Municipalities can create and enforce bylaws for vehicle movement and exercise de facto control over public transportation. As such, the deployment of autonomous vehicles in Canada requires action from all levels of government.

Despite some cooperation and coordination between different levels of government and industry stakeholders, Canada lacks a national framework for the rollout of autonomous vehicles. A national framework could ensure consistency and limit the potential for legislative gaps.

### Federal

#### Guidelines for Testing Automated Driving Systems in Canada: Version 2.0[1]

**Purpose**

In August 2021, Transport Canada released the *Guidelines for Testing Automated Driving Systems in Canada: Version 2.0* (Testing Guidelines), replacing the earlier 2018 edition. Developed in consultation with provincial and territorial representatives of the Canadian Council for Motor Transport Administrators (CCMTA), these guidelines establish "a baseline of nationally consistent best practices to direct the safe conduct of trials involving vehicles equipped with automated driving systems (ADS)." The purpose of the new guidelines is "to clarify for trial organizations the various roles and responsibilities of federal, provincial and territorial, as well as municipal governments in approving and facilitating trials of ADS-equipped vehicles."[2]

**Scope**

The Testing Guidelines apply to any organization that is conducting research and development trials of ADS-equipped vehicles in Canada (SAE levels 3–5). These guidelines are intended to apply to temporary trials of ADS-equipped vehicles, not their permanent market deployment – the requirements for which will be developed by federal, provincial and territorial jurisdictions as ADS equipped vehicles continue to mature and evolve. Testing Guidelines primarily focus on operational safety practices for on-road testing.[3]

1 Transport Canada, "Guidelines for testing automated driving systems in Canada," online: <**https://tc.canada.ca/en/road-transportation/innovative-technologies/connected-automated-vehicles/guidelines-testing-automated-driving-systems-canada#_Toc78892210**>.
2 *Ibid.*
3 *Ibid.*

### Canadian Consumer Knowledge Gaps on Autonomous Vehicles

The J.D. Power 2022 Canada Mobility Confidence Index Study (Study), conducted by J.D. Power, Partners for Automated Vehicle Education-Canada, and MIT's AVT Consortium, with funding from Transport Canada, highlights Canadian consumer knowledge gaps on autonomous vehicles.[4] The Study is based on responses from an online survey of 4,000 vehicle owners aged 18 and over in Canada.

#### Key statistics

- More than 59% of consumers surveyed classified current driver-assisted technologies as fully automated, self-automated driving technologies. Based on these statistics, consumers are unaware that they are overestimating their autonomous vehicle knowledge.
- Consumer readiness for fully automated, self-driving vehicles was low, with the index score for consumer AV readiness at 37/100.
- 17% of consumers believed autonomous vehicles were presently available for purchase in Canada.
- Despite the knowledge gaps, consumers are at least willing to learn more about autonomous vehicles. For instance, 55% of consumers were receptive to completing training to operate an autonomous vehicle and 79% of consumers want more information on how vehicle technology meets government standards.

#### Solution

*"As manufacturers and other technology pioneers move to accelerate deployment of assisted and automated driving, education on what systems can and cannot do will become an increasingly complex hurdle for safe adoption. The sooner public-private stakeholders come together to embrace these challenges, adopt user-centric communication standards, and promote a unified viewpoint, the greater the opportunity will be to accelerate consumer satisfaction and safe technology utilization in this evolving sector,"* says Bryan Reimer, Ph.D., research scientist in the MIT Center for Transportation and Logistics AgeLab and a founder of MIT's AVT consortium.[5]

### Federal Government Creating an Innovation and Investment Agency

The federal government's 2022 budget proposes $1 billion over 5 years, starting in 2022-2023, to support the creation of an operationally independent federal innovation and investment agency.[6]

- The agency will work with new and established Canadian industries and businesses to help them make investments to innovate, grow, create jobs and be competitive in the changing global economy.
- A market-oriented innovation and investment agency has helped countries like Finland and Israel transform themselves into global innovation leaders. For instance, the Israel Innovation Authority has spurred the growth of R&D-intensive sectors such as the autonomous vehicle sector.

## Ontario

Ontario was the first Canadian province to allow on-road testing of autonomous vehicles through its 10 year pilot program, which started in 2016.[7]

- Ontario meets with program participants to discuss testing progress twice per year and participants are required to complete annual reporting forms.

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4 J.D. Power, "New Study on Fully Automated, Self-Driving Vehicles in Canada: There's a Problematic Knowledge Gap About Automated Vehicles," online: <https://www.jdpower.com/business/press-releases/2022-canada-mobility-confidence-index-mci-study>

5 *Ibid.*

6 Canada, "Budget 2022," online: <https://www.budget.canada.ca/2022/report-rapport/chap2-en.html>

7 Ontario, "Ontario Automated Vehicle Pilot Program," online: <https://www.ontario.ca/page/automated-vehicle-pilot-program>

- The program was updated in 2019 to allow testing of both automated driverless vehicles and cooperative truck platoons under certain conditions.
- On September 29, 2021, Ontario announced considerations toward testing automated farm vehicles and micro-utility devices.[8]

## Quebec

- In 2018, Quebec amended its *Highway Safety Code* (HSC) to define "autonomous vehicle" to include an SAE Level 3, 4 or 5 road vehicles and to permit pilot projects of autonomous vehicles on Quebec roads.[9]
- The HSC was also amended to prohibit the operation of autonomous vehicles, with the exception of SAE Level 3 vehicles, on public highways and roads where public traffic is allowed.
- Quebec also authorized a pilot program on August 10, 2018 to allow autonomous buses and minibuses to operate on certain public roads in Quebec on a trial basis. Any stakeholder who wishes to take part in the pilot program can submit an application, which among other things, must include a description of the test project, describe the project's goals, specify the duration, set out the safety measures and requires liability insurance for property damage in the amount of $1,000,000.[10]

## Other jurisdictions

- Autonomous vehicles are not regulated by the Alberta *Traffic Safety Act* and British Columbia's *Motor Vehicle Act*.
- On May 20, 2021, Manitoba's Bill 23, *The Vehicle Technology Testing Act* (Bill 23), came into force. Bill 23 amends the *Highway Traffic Act*, the *Insurance Act* and the *Manitoba Public Insurance Corporation Act* to allow for the testing of vehicles with automated driving systems or other new technology.
- Autonomous vehicles will be regulated under Nova Scotia's new *Traffic Safety Act* once it receives royal proclamation. It would allow the Minister to make regulations with respect to autonomous vehicles.

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8 Ontario, "Proposed Amendments to Ontario Regulation 306/15: Pilot Project – Automated Vehicles and Revised Regulations of Ontario 1990, Regulation 628: Vehicle Permits – Summary," online: <https://www.ontariocanada.com/registry/showAttachment.do?postingId=39087&attachmentId=50976>

9 *Highway Safety Code*, CQLR c C-24.2, online: <https://www.legisquebec.gouv.qc.ca/en/document/cs/c-24.2>

10 The SAAQ, "Autonomous Buses and Minibuses," online: <https://saaq.gouv.qc.ca/en/saaq/documents/pilot-projects/autonomous-buses-minibuses>

# Driverless Testing and Deployment

This section provides an overview of driverless testing across the country by, among other things, outlining some driverless testing initiatives and autonomous vehicle laws and regulations:

| Region | Driverless Testing |
|---|---|
| Federal | At the federal level, section 7(1)(a) of the *Motor Vehicle Safety Act* permits testing. Section 7(1)(a) provides for an exception that allows people or companies to temporarily import a vehicle that does not comply with the Canadian Motor Vehicle Safety Standards, if the vehicle is for testing, demonstration or evaluation.[11]<br>As stated in the previous section, Transport Canada released the Testing Guidelines in August 2021. The Testing Guidelines seek to clarify for trial organizations the various roles and responsibilities of federal, provincial and territorial, as well as municipal governments, in approving and facilitating trials of ADS-equipped vehicles. These guidelines establish safety best practices that trial organizations should follow when conducting research and development testing of ADS-equipped vehicles in Canada. |
| Alberta | In 2018, Pacific Western, along with the City of Calgary and Edmonton, announced the first-ever Autonomous Shuttle pilot program in Canada known as ELA (Electric Autonomous). |
| British Columbia | In 2021, the University of British Columbia partnered with the British Columbia Automobile Association (BCAA) to bring an autonomous bus shuttle bus system to campus in 2022.<br>*Setback*<br>In 2022, BCAA cancelled the planned 12-month pilot project.<br>"*It became clear that it wasn't possible to align the timing for each necessary aspect of the project, including regulatory approval, bus availability, and government program support*," says **BCAA spokesperson Sara Holland**.[12] |
| Manitoba | In December 2021, Manitoba released a report on the consultations it conducted with more than 270 Manitobans regarding their views on autonomous vehicle testing. Most respondents favoured testing within Manitoba and would feel safe as road users when automated or connected vehicles were being tested on roads.[13] |
| Ontario | In October 2022, Gatik and Loblaw announced the removal of the safety driver from its autonomous delivery trucks that have been operating since January 2020.<br>"*Being the first in Canada with this technology and deploying a fully driverless solution is exciting and illustrates our commitment to making grocery shopping better for customers*," says **David Markwell, Chief Technology and Analytics Officer, Loblaw Companies Limited**.[14] |
| Quebec | The City of Montreal deployed two autonomous shuttles along Plaza St-Hubert in two phases. The first phase was completed in fall 2021 and the second from May to July 2022. |

11 *Motor Vehicle Safety Act*, SC 1993, c 16 and *Motor Vehicle Regulations*, CRC, c 1038.

12 Brendan Kergin. "A free driverless shuttle bus service at UBC? Here's why that won't happen" (August 8, 2022), online: <https://www.vancouverisawesome.com/local-news/free-driverless-electric-shuttle-bus-ubc-gone-5673520>

13 Manitoba, "Province Releases Report on Consultations to Guide Autonomous Vehicle Technology Testing," online: <https://news.gov.mb.ca/news/index.html?item=52817>

14 Business Wire, "Gatik and Loblaw Make History with First Fully Driverless Deployment in Canada" (October 5, 2022), online: <https://www.businesswire.com/news/home/20221005005279/en/Gatik-and-Loblaw-Make-History-with-First-Fully-Driverless-Deployment-in-Canada>

| Region | Driverless Testing |
| --- | --- |
| Other Canadian jurisdictions | The CCMTA recommends any testing regulations be at least as strict as those implemented in Ontario. As such, a disengagement/engagement mechanism, failure alert and mechanism enabling the driver to take over all dynamic driving tasks are all likely to be required for AVs that are operated with a driver. Companies will need to obtain a test permit pursuant to an approved application to test on public roads and have a minimum $5 million in liability insurance coverage and beyond $5 million when testing larger vehicles (8 or more passenger capacity). Moreover, employees of the company testing the AV will likely be required to complete training (provided by the company) with respect to the capabilities and limitations of the test vehicle. The training logs must be submitted to the applicable provincial agency. |
| All jurisdictions | Underwriters Laboratories (UL) has released UL 4600, "Standard for Evaluation of Autonomous Products," which is the first dedicated safety standard for fully autonomous vehicles. |

# Connected Vehicles and Logistics

## 5G

1. Canada's spectrum regulator, Innovation, Science and Economic Development (ISED), has implemented a variety of approaches to spectrum sharing to support the deployment of 5G wireless networks and systems in Canada, including:
    a. a policy to allow terrestrial mobile and fixed services to share the millimeter wave bands (26.5–27.5 GHz, 27.5–28.35 GHz, and 37–40 GHz) with fixed satellite service;
    b. allowing licence-exempt use of the 64–71 GHz band on a no-interference, no-protection basis;
    c. decisions to issue flexible-use licences in the 600 MHz, 3500 MHz, and 3800 MHz bands to enable both mobile and fixed operations, thereby enabling spectrum sharing with existing services when practicable;
    d. allocating 1200 MHz in the 5925-7125 MHz frequency range to Radio Local Area Network (RLAN) applications, including allowing higher-power RLAN operations in 950 MHz of this spectrum in which sharing of spectrum will be managed through automated frequency coordination systems.
2. In parallel with this work from ISED, Canada's telecommunications regulator (the CRTC) and the telecommunications industry in Canada have done the necessary work to implement telephone numbering resource policies and procedures to prepare for the proliferation of devices in the Internet of Things (IoT) universe.
3. While both the CRTC and ISED have adopted many strategies over the course of the past two years to enable more efficient spectrum use and innovative new wireless applications, 5G network deployment has been slow in Canada. Thus far, the three dominant Canadian mobile wireless carriers' 5G deployments have been confined to limited local deployments.
4. This slowness may be due to a number of factors: (i) the relatively small size of the Canadian wireless subscriber market (as compared to its vast geographic expanse); (ii) the pace at which ISED has auctioned licensed 5G spectrum, which generally lags behind the US and other OECD countries by at least one and in some cases two or more years; (iii) wireless carriers in Canada individually have access to lesser amounts of contiguous spectrum given that spectrum set asides and caps have been a constant feature of each and every commercial mobile spectrum auction in Canada in since 2007; and (iv) lingering uncertainty surrounding the Government of Canada's decision not to decide whether Huawei network equipment would be permitted in Canadian 5G networks.
5. Or it may be the case that the phenomenon of working from home during COVID-19 related lockdowns has made closing the ever-present broadband connectivity gap between rural/remote Canada and urban Canada the undisputed telecommunications policy priority over 5G deployment. Between March 2015 and March 2022, the Government of Canada has announced CAD $7.2 billion in available funding and various provincial governments have made approximately CAD $10 billion available for rural and remote Internet infrastructure to help ensure that all Canadians have access to fast and reliable Internet, no matter where they live or work. Added to this major policy impetus is the fact that Canada's second largest telecom (Rogers) and its fourth largest (Shaw) have largely been in a holding patten given that in March 2021, Rogers announced that it would be purchasing all of the issued and outstanding shares of Shaw in a CAD $20 billion deal.
6. There are no spectrum auctions scheduled to proceed in 2022 – the 3800 MHz auction is slated for Q1 2023 in Canada. However, Q4 2021 saw a spate of announcements announcing the selection of core 5G equipment vendors by Rogers Communications, Xplornet and Videotron. With the Rogers-Shaw deal

anticipated to close at the beginning of Q2 2022 and with COVID-19 restrictions beginning to lift, 5G use cases and network deployments will undoubtedly take centre stage once again in Canada, as in the rest of the world.

## Data Privacy and security

Autonomous vehicles have the potential to record and use large amounts of extremely diverse data, including, infotainment preferences, biometrics, telematics or driver behaviours, for example.

Canada has a robust privacy regime which regulates the collection, use and disclosure of "personal information." In Canada, the concept of personal information is interpreted broadly and includes any information about an identifiable individual. Information will be about an "identifiable individual" where there is a serious possibility that an individual could be identified through the use of the information, alone or in combination with other information. Accordingly, much of the data collected by autonomous vehicles has the potential to be personal information.

Generally, the handling of personal information by the private sector is governed by the federal Personal Information Protection and Electronic Documents Act ("PIPEDA"); however, organizations operating in Alberta, British Columbia and Quebec may be excluded from the application of PIPEDA, as those jurisdictions have their own applicable "substantially similar" provincial legislation. This provincial legislation will apply to those activities (e.g., collection, use or disclosure) which occur in those provinces. There are separate privacy statues that will apply to the handling of personal information by the public sector. The considerations below are tailored to private sector stakeholders in the vehicle lifecycle chain (including, for example, manufacturers and fleet operators), referred to below as "owners and operators."

Here are some key considerations for owners and operators of AVs.

### 1. Legal authority

The handling of personal information in Canada is generally permitted through a consent-based framework, meaning consent must be obtained, or an enumerated exception to consent must be relied on to lawfully collect personal information. The collection, use and disclosure of personal information without consent is permissible in limited circumstances, none of which are likely to apply in the case of AVs handling personal information for the standard operation of the vehicle. Some of the consent exceptions will apply in the case of disclosures to law enforcement, pursuant to court orders, or other similar circumstances. These exceptions are narrowly framed and owners and operators of AVs should be cautious about these types of disclosures.

### 2. Transparency is key

As required under Canadian privacy laws, organizations must ensure that their privacy notices are drafted in plain language, widely accessible and sufficiently detailed such that individuals can meaningfully understand what they are consenting to. Individuals should not first have to purchase a vehicle in order to access and review the applicable privacy notices. In addition, as new features and uses evolve, privacy notices will need to be updated.

### 3. Purpose limitation

The potential for the information collected via AVs is vast. That said, before an organization collects personal information, it must identify the purpose for which it needs the information, keeping in mind that the purpose must be reasonable in the circumstances. Collecting personal information for speculative uses, or "just because," is not permitted. Under law, personal information collected for a purpose cannot be reused, in its identifiable form, for another purpose without proper legal authority.

### 4. Implement appropriate security safeguards

Organizations must implement appropriate security safeguards to protect personal information. AVs present specific threats and vulnerabilities relating to personal safety and security, and are potentially vulnerable to malicious actors who could gain control of the vehicle, or aspects of its function (e.g., payment, identity authorization, unlock/lock ability). AV owners and operators must establish a robust security program to assess the security safeguards and ensure careful implementation.

#### Privacy Developments

Canada's privacy laws are being modernized. On June 16, 2022, the Canadian government tabled legislation that would reform privacy law in Canada. Bill C-27, the Digital Charter Implementation Act, 2022 proposes to enact three new acts, including the Consumer Privacy Protection Act (CPPA) to replace Part 1 of PIPEDA, and the Artificial Intelligence and Data Act (AIDA) to regulate "artificial intelligence systems" and the processing of data in connection with artificial intelligence systems. Provinces have also started reviewing their own privacy laws. Québec's Bill 64, An Act to modernize legislative provisions as regards the protection of personal information, received assent on September 22, 2021 and set a precedent for GDPR-inspired reform in Canadian private-sector privacy law. In light of the actual and expected upcoming changes, organizations should prepare for changes, including:

- Lawful authority
- Legitimate interests

The CPPA proposes a new exception to consent for activities in which the organization has "a legitimate interest." Specifically, the CPPA would permit collections or uses of personal information without consent if the collection or use is made for the purpose of an activity in which the organization has a legitimate interest that outweighs any potential adverse effect on the individual, provided that a reasonable person would expect the collection or use for such an activity and the personal information is not collected or used for the purpose of influencing the individual's behaviour or decisions. There are a number of conditions that must be met before invoking this exception, including identifying potential adverse effects on the individual, and identifying and taking reasonable measures to mitigate the effects.

Under the new regime, AV owners and operators may be able to rely on legitimate interests as a lawful grounds to collect and use certain personal information generated by the vehicle. This could offer a preferable approach given the challenges of securing meaningful consent in the AV ecosystem.

#### Socially beneficial purposes

Successfully advancing the deployment of AVs will involve considerable data sharing within the AV ecosystem. This could include data sharing between various stakeholders exploring deployment, such as fleet operators, government, cities and transit authorities. Bill C-27 proposes a new exception to consent for disclosures made for a "Socially Beneficial Purpose." Under the exception, an organization may disclose an individual's personal information without their knowledge or consent if:

**a.** the personal information is de-identified before the disclosure is made;

**b.** the disclosure is made to:

  **i.** a government institution or part of a government institution in Canada,

  **ii.** any organization that is mandated, under a federal or provincial law or by contract with a government institution or part of a government institution in Canada, to carry out a socially beneficial purpose, or

  **iii.** any other prescribed entity; and

**c.** the disclosure is made for a socially beneficial purpose.

A socially beneficially purposes is defined as a purpose related to health, the provision or improvement of public amenities or infrastructure, the protection of the environment or any other prescribed purpose.

This new authority to share de-identified personal information may provide an opportunity for information sharing among public and private stakeholders in the AV ecosystem.

**Automated decision making**

The CPPA would impose both transparency and explain-ability obligations on organizations using automated decision systems to make predictions, recommendations or decisions about individuals that could have a significant impact on them. An automated decision system is defined as, any technology that assists or replaces the judgment of human decision-makers through the use of a rules-based system, regression analysis, predictive analytics, machine learning, deep learning, a neural network or other technique. A broadly similar requirement was also passed in Quebec.

It is unclear at this time whether the systems and software used in AVs are intended to be captured by this broad language – on a plain reading of the language, it appears to be the case. It is also unclear whether a decision about a vehicle will be a decision "about an individual." Assuming this is so, owners and operators of AVs will need to think about which systems are making predictions, recommendations or decisions that could be considered "significant" and for whom or what.

**Cross-border transfers**

Bill 64 will require that any communication of personal data outside Québec be subject to a privacy impact assessment to determine, prior to communicating the information outside of the province, that protection in the receiving jurisdiction would be "adequate" according to privacy principles. Organizations who use service providers in other jurisdictions, for example, must ensure they are compliant with applicable law before transferring personal information. If the privacy impact assessment reveals gaps, the organization must take steps to mitigate the identified risks of such transfer.

## Electric vehicles

> *"If countries want to reduce their emissions from vehicles and help meet climate targets through a move to EVs, then it is clear that regulation is absolutely key. There are some countries where we've seen regulatory action recently, most notably in the US, so it will be interesting to see whether that affects supply and demand going forward,"*
>
> **Randy Miller**
> Ernst and Young Global Advanced Manufacturing & Mobility Leader.[15]

15 Ernst and Young, "China, Norway and Sweden lead the pack on electric vehicle readiness – EY study," online: <https://www.ey.com/en_gl/news/2022/09/china-norway-and-sweden-lead-the-pack-on-electric-vehicle-readiness-ey-study>

## Federal

A strong federal policy for the electrification of vehicles would help Canada reach its mandatory target for all new light-duty cars and passenger trucks to be zero-emission by 2035 and result in significant economic benefits.

### Key concerns

- According to a report by Clean Energy Canada released in September 2022, Canada has the potential to build a domestic electric vehicle battery supply chain that could support up to 250,000 jobs by 2030 and add $48 billion annually to Canada's economy.[16] However, swift government action is required for Canada to realize its jobs and GDP potential. Where no additional government action is taken, the supply chain would create only 60,000 jobs and contribute $12 billion in GDP.[17]
- Canada needs to keep pace with the United States. The *Inflation Reduction Act* (US) announced, among other things, massive new investments in electric vehicle manufacturing, sales and infrastructure.
- Despite electric vehicle sales in Canada growing by more than a third in the first half of 2022, they are not keeping pace with the rest of the world, according to a report on global electric vehicle sales released by BloombergNEF.[18] Statistics Canada data shows electric vehicles comprised only 1 in 14 new vehicles in the first half of 2022, well behind the global sales mark of 13%.[19]
- British Columbia is the only jurisdiction in Canada exceeding the global mark, with almost 1 in 6 vehicles registered between January to June 2022 as electric.[20] This is largely due to provincial rebates for electric vehicle purchases combined with existing federal rebates.
- Canada ranked 13 out of 14 countries in Ernst and Young's 2022 electric-vehicle readiness index. Charging infrastructure and the high cost of electric vehicles were cited as reasons for holding Canada back.[21]

**Major Investments in Electric Vehicles made by Canada in 2022[22]**

> *Canada is "the only nation in the western hemisphere with all the minerals and metals needed to produce advanced batteries for electric vehicles,"*
>
> **Jeff Labonté**
> Assistant Deputy Minister of the Lands and Minerals Sector at Natural Resources Canada.[23]

16 Clean Energy Canada, "Canada's New Economic Engine: Modelling Canada's EV battery supply chain potential-and how best to seize it" (September, 2022), online: < https://cleanenergycanada.org/wp-content/uploads/2022/09/CanadasNewEconomicEngine_Web.pdf>
17 *Ibid.*
18 Automotive News Canada, "Canada falling behind as electric-vehicle sales pick up around the world" (November 18, 2022), online: <https://canada.autonews.com/electric-vehicles/canada-falling-behind-electric-vehicle-sales-pick-around-world>
19 *Ibid.*
20 *Ibid.*
21 Supra note 15.
22 Canada, "Fall Economic Statement 2022," online:< https://www.budget.canada.ca/fes-eea/2022/report-rapport/FES-EEA-2022-en.pdf>
23 House of Commons Canada, "From Mineral Exploration to Advanced Manufacturing: Developing Value Chains for Critical Minerals in Canada," online: <https://www.ourcommons.ca/DocumentViewer/en/43-2/RNNR/report-6/page-39#_ftnref8>

| Date | Investment |
|---|---|
| March 2022 | Honda Canada announced its plan to invest nearly $1.4 billion to retool its manufacturing operations in Alliston, Ontario, to launch the next generation of hybrid-electric vehicles, supported by $131.6 million in federal funding. The Ontario government is also providing $131.6 million in grant support. |
| April 2022 | General Motors of Canada announced its plan to invest over $2 billion at its Oshawa, Ontario, assembly plant and its CAMI assembly plant in Ingersoll, Ontario. The investment is supported by $259 million from the federal government to help advance the electrification of Canada's automotive sector. The Ontario government is providing up to $259 million in grant support. The federal government also proposes $1.7 billion over 5 years, starting in 2022-2023, to extend incentives for the zero-emission vehicles program until March 2025 to include more vans, trucks and SUVs.[24] |
| May 2022 | Stellantis announced its plan to invest in a multi-billion dollar project to support plants in Windsor and Brampton, Ontario, to implement flexible vehicle platforms at both plants and increase its production of electric vehicles, with support of up to $529 million from the federal government. |
| July 2022 | Umicore announced its plan to invest $1.5 billion in a net-zero facility that will produce essential components of electric vehicle batteries and create 1,000 jobs during construction and hundreds of permanent positions. |
| August 2022 | Volkswagen, Mercedes-Benz, and the federal government announced memoranda of understanding to deepen cooperation on electric vehicles and critical minerals supply chains. |
| October 2022 | Rio Tinto Fer et Titane (RTFT) announced in Quebec its plans to increase its production of critical minerals, cut emissions, and help build clean technology supply chains, supported by up to $222 million in federal funding. |

24 Government of Canada, "Minister Anand Announces New EV Chargers Coming to Ontario, Highlights Further Zero-Emission Vehicle Investments in Budget 2022," online: <https://www.canada.ca/en/natural-resources-canada/news/2022/04/minister-anand-announces-new-ev-chargers-coming-to-ontario-highlights-further-zero-emission-vehicle-investments-in-budget-2022.html>

### Zero Emission Vehicle Infrastructure Program (ZEVIP)

- ZEVIP is a $680 million initiative by the federal government running until 2027 to increase the availability of localized charging and hydrogen refuelling opportunities.[25]
- ZEVIP will support electric vehicle charging infrastructure deployment in public places, on-street, workplaces and multi-unit residential buildings.

### Zero Emission Transit Fund

- Through the Zero Emission Transit Fund, the Government of Canada is investing $2.75 billion over five years, starting in 2021, to support the electrification plans of public transit and school bus operators, support the purchase of 5,000 zero emission buses, and to build supporting infrastructure, including charging infrastructure and facility upgrades.[26]
- On March 30, 2022, the federal government announced that the Canadian Urban Transit Research & Innovation Consortium (CUTRIC) has been selected to work with transit bus operators to provide zero emission transit bus electrification and planning studies through the Zero Emission Transit Fund.[27]

## Ontario

- Ontario launched Phase 2 of *Driving Prosperity: The Future of Ontario's Automotive Sector* in November 2021. Phase 2 focuses on transforming the auto sector by building electric, autonomous and connected vehicles and supporting a broader supply chain, including the exploration, mining and production of critical minerals for the manufacturing of electric batteries in Ontario.[28]
- Ontario's goal is to build at least 400,000 electric vehicles and hybrids by 2030.
- The Ontario government with Hydro One and Ontario Power Generation's joint Ivy Charging Network is installing 69 fast chargers across 23 ONroute locations. In February 2022, the Ontario government announced the launch of the first six ONroute charging stations: Cambridge South, Cambridge North, West Lorne, Dutton, Odessa and Napanee.
- In March 2022, the Ontario government announced a commitment of $91 million to make electric vehicle chargers more accessible on public roads across Ontario.
- In December 2021, the Ontario government committed $56.4 million over 4 years to create the Ontario Vehicle Innovation Network to incorporate electric and low-carbon vehicle technologies into its existing mandate of connected and autonomous vehicles.[29]

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25 Canada, "Zero Emission Vehicle Infrastructure Program," online: <https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876>

26 Canada, "Zero Emission Transit Fund," online: <https://www.infrastructure.gc.ca/zero-emissions-trans-zero-emissions/index-eng.html#2>

27 Infrastructure Canada, "Government of Canada advances supports for zero emission bus transportation," online: <https://www.canada.ca/en/office-infrastructure/news/2022/03/government-of-canada-advances-supports-for-zero-emission-bus-transportation.html>

28 Ontario, "Driving Prosperity: The Future of Ontario's Automotive Sector," online: <https://www.ontario.ca/page/driving-prosperity-future-ontarios-automotive-sector#section-0>

29 Ontario, "Ontario Launches Flagship Initiative to Lead Development of EV and Smart Transportation Technologies," online: <https://news.ontario.ca/en/release/1001266/ontario-launches-flagship-initiative-to-lead-development-of-ev-and-smart-transportation-technologies>

## Other jurisdictions

> "BC leads North America in the sale of zero-emission vehicles, positioning us to achieve our targets established in the CleanBC Roadmap to 2030,"
>
> **the Honorable Bruce Ralston**
> Minister of Energy, Mines and Low Carbon Innovation.[30]

- British Columbia is leading the Canadian provinces in taking the most comprehensive approach to enabling electric vehicle adoption, including the adoption of purchase incentives, investments in infrastructure, and a strong mandate for minimum electric vehicle sales according to a scorecard released by Electric Mobility Canada.[31]
- British Columbia committed $67 million in the 2022 BC Budget to CleanBC Go Electric for financial rebates up to $4,000 to customers who buy ZEVs, along with investments in charging and hydrogen fueling stations, education and outreach.[32]
- In March 2022, General Motors and POSCO Chemical announced that they are working with the federal government and Quebec on a $500 million investment to build a new facility in Bécancour, Quebec, to produce cathode active material for GM's Ultium batteries, which will power electric vehicles such as the Chevrolet Silverado.[33]
- Quebec also offers rebates of up to $7,000 for the purchase of an electric vehicle.[34] Quebec finished the first half of 2022 with 11.4% of its vehicles registered as electric, second in Canada behind only British Columbia.

# Driving Forces

> "Canada is the world-leading hub of AI. There is a talent capability in AI, decision-making software and sensors at a density found nowhere else in the world. All the conditions should be right for Canada to be forging ahead in AVs,"
>
> **Colin Earp**
> KPMG Canadian National Transport Leader and Global Chair in Infrastructure Technology.[35]

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30 British Columbia, "Clean BC Go Electric," online: < https://newcardealersgoelectric.ca/about-the-program/#:~:text=%E2%80%9CBC%20leads%20North%20America%20in,Mines%20and%20Low%20Carbon%20Innovation.>
31 Electric Mobility Canada, "Canada electric vehicle scorecard: ranking provincial and territorial strategies, policies & investment," online: <https://emc-mec.ca/new/canada-electric-vehicle-scorecard-ranking-provincial-and-territorial-strategies-policies-investment/>
32 British Columbia, "Clean BC Go Electric," online: <https://newcardealersgoelectric.ca/about-the-program/>
33 GM, "GM Expands its North America-focused EV Supply Chain with POSCO Chemical in Canada," online: <https://www.gm.ca/en/home.detail.html/Pages/news/ca/en/2022/mar/0304_gm-expands-its-north-america-focused-ev-supply-chain-with-posco-chemical-in-canada.html>
34 Quebec, "Quebec new vehicle rebate," online: <https://vehiculeselectriques.gouv.qc.ca/english/rabais/ve-neuf/programme-rabais-vehicule-neuf.asp>
35 Matthew Halliday, "Canada has a secret weapon in the race for self-driving cars: winter," Toronto Star, (April 19, 2022), online: <https://www.thestar.com/sponsored_sections/2022/04/20/canada-has-a-secret-weapon-in-the-race-for-self-driving-cars--wi.html>

### 10 Autonomous Vehicles Startups to Watch in Canada[36]

| Company | Description | Location and Year Founded |
|---|---|---|
| LeddarTech | Provider of sensing, fusion and perception solutions for automotives | Quebec City (2007) |
| Waabi | AI-enabled platform offering self-driving technology for trucks | Toronto (2021) |
| Algolux | Provider of computer vision and cloud-based video analytics solutions | Montreal (2014) |
| GeoDigital | Provider of 3D data of real-world, remote sensor and spatial intelligence technologies | Hamilton (2005) |
| Area X.O | Provider of solutions for the development, testing and application of technologies | Ottawa (2020) |
| intramotev | Developer of autonomous electric cargo trains | Canada (2020) |
| Tiny Mile | Manufacturer of last-mile delivery robots for food delivery | Toronto (2019) |
| Rydesafely | AI-enabled platform offering testing solutions for autonomous software | Toronto (2020) |
| Downtown.AI | Provider of human movement predictive platform for mobility services | Vancouver (2017) |
| NuPort | AI-enabled platform offering autonomous driving solutions for trucks | Toronto (2019) |


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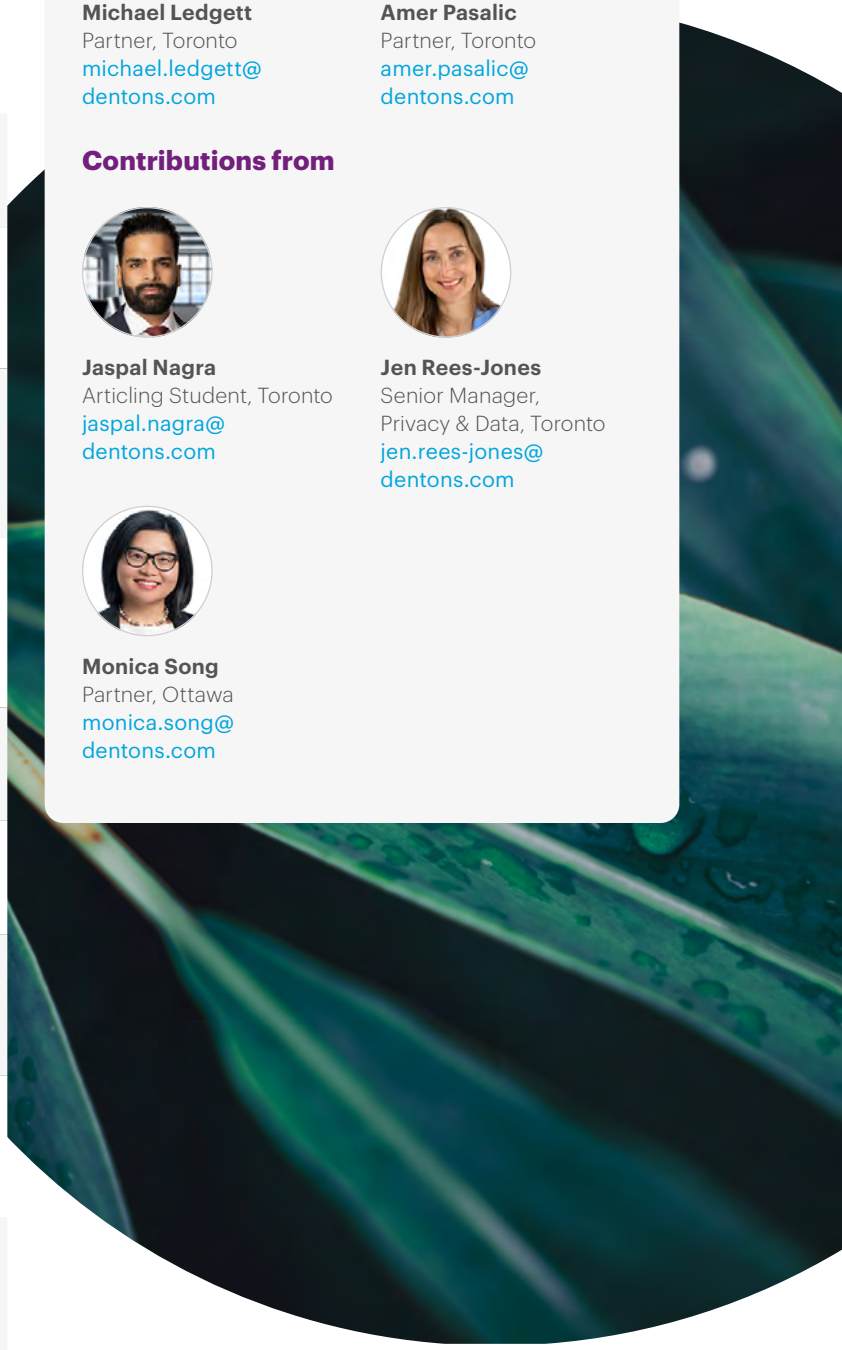


36 Tracxn, "Autonomous Vehicles Startups in Canada," online: <https://tracxn.com/explore/Autonomous-Vehicles-Startups-in-Canada>

# China*

Driverless technology continues to gain steam in China, both as it relates to public interest and regulatory scrutiny. To that end, in 2022, the Chinese government continued to address autonomous vehicles with several national-level policies, including:

- Encouraging the use of driverless vehicles for business activities in some scenarios;
- Proposing to prioritize the exploration of intelligent application scenarios of self-driving and intelligent shipping technologies in intra-park transportation, ferry feeder, intelligent distribution, etc.; and
- Taking 18 projects, including the *Beijing Pilot Application of Automated Driving for Urban Mobility Services and Logistics*, as the first batch of pilot projects on the application of intelligent transportation.

The number of demonstration zones for smart-connected vehicles also increased in 2022. Many regions carried out unmanned commercialization pilots for autonomous driving and allowed self-driving vehicles to carry out commercialization services without safety officers in the vehicle on social roads.

Shenzhen released the first autonomous vehicles legislation in the country when it promulgated the *Ordinance of Shenzhen Special Economic Zone* on Intelligent and Connected Vehicles. This ordinance outlines the responsibility in the event of a traffic accident, and separates the issue into two areas: (1) where there is a driver in the car (responsibility shifts to the driver); and (2) when there is no driver in the car (responsibility shifts to owner or manager of the vehicle). The ordinance also allows for redress to the extent the vehicle causes damage.

At the same time, more regions are issuing driverless road test licenses to promote the development of driverless technology.

According to SkyEye data, autonomous driving financing has exploded since 2016. However, 2022 had fewer financing events in the first two quarters due to the impact of the pandemic. Only 67 financing events occurred in China's autonomous driving sector in the first 10 months and the total disclosed financing amount reached $2 billion.

Compared to the same period in 2021, the events and amount of financing decreased by about 32% and 61% respectively. However, the third quarter had significant growth, with 41 funding events for autonomous driving companies occurring in the third quarter, a total amount of over $1.1 billion. Seven microchip companies such as Horizon, Black Sesame Technologies and Cambria Xingge received over $750 million in funding. Considering the slowdown in the pace of foreign investment, only three foreign companies received financing in the third quarter.

* We thank the team from Beijing Dacheng Law Offices, LLP, for their contribution to the Global Autonomous Vehicles guide. Beijing Dacheng Law Offices, LLP is an independent law firm, and not a member or affiliate of Dentons. Dacheng is a partnership law firm organized under the laws of the People's Republic of China, and is Dentons' Preferred Law Firm in China, with offices in more than 40 locations throughout China. Dentons Group (a Swiss Verein) is a separate international law firm with members and affiliates in more than 160 locations around the world, including Hong Kong, SAR, China. For more information, please see dentons.cn/notices or dentons.com/notices.

China's autonomous driving sector continued to maintain high momentum, reflecting the capital market's trust in China's innovative capability and development potential.[1]

Now China's biggest autonomous driving challenges relate to technical difficulties, especially regarding microchips. China's domestic self-research microchips have structural defects, and the microchip supply is deficient; microchip imports have also been hampered. At the same time, the microchip challenge has pushed China to invest in the development of the microchip industry and increase policy leadership and capital support for the microchip industry.

# Regulatory Developments and Roadblocks

## 1. Central Government policies

In 2022, the construction of the standard system for driverless vehicles accelerated, and the importance of vehicle data safety rose. The central government has issued several documents to promote the development and regulation of autonomous driving.

In terms of overall planning, 2022 is the second year of the 14th Five-Year Plan, and many detailed rules are springing up. In January, the State Council issued the *14th Five-Year Plan for the Development of Digital Economy* and the *14th Five-Year Plan for the Development of Modern Comprehensive Transportation System*, both of which steadily promote the application of autonomous driving and unmanned delivery.

In March, the Ministry of Housing and Urban-Rural Development issued the *14th Five-Year Plan for housing and urban-rural construction science and technology development plan*, requiring the synergistic development of smart cities and intelligent network-linked vehicles, the development of intelligent network-linked vehicles in public transportation, tourism, special operations and logistics, and other multi-scene application technologies and equipment. The Ministry of Transport and the Ministry of Science and Technology also jointly issued the *Medium and Long-term Development Plan for Science and Technology Innovation in Transportation (2021–2035), and* proposes to promote the development and application of automatic driving technology on roads as well as the research and application of automatic driving. The plan also assists driving in road freight transport, urban distribution and urban public transport.

In the same month, the General Office of the Ministry of Industry and Information Technology issued the *Guideline for the Construction of Telematics Network Security and Data Security Standards System*, specifying the development timetable and phased tasks on network security and data security systems. The Guideline also proposed the construction of a preliminary telematics network security and data security standards system by the end of 2023, completing over 50 urgently needed standards. By 2025, a more complete network security and data security standards system will be formed, and the development of more than 100 standards will be moving toward completion.

In April, five departments, including the General Administration of Market Regulation and the Ministry of Industry and Information Technology, jointly issued the *Notice on the Trial Implementation of the Automotive Safety Sandbox Supervision System*. This Notice proposes that five departments jointly launch a pilot automotive safety sandbox supervision exercise, and guide enterprises to identify problems, improve designs and reduce risks. As a useful supplement to the traditional regulatory approach, automotive safety sandbox supervision changes from passive to active supervision.

In the same month, five departments, including the Ministry of Industry and Information Technology and the Ministry of Public Security, jointly issued the

1 Autonomous Driving Industry Data, Q3 2022, 36 Krypton – ICVCity Institute, https://36kr.com/p/1951678953818499

*Guidance on Further Strengthening the Construction of Security System of New Energy Vehicle Enterprises*, which required enterprises to effectively fulfill their data security protection obligations, establish and improve the whole process data security management system and take corresponding technical measures and other necessary measures to safeguard data security.

In August, the Ministry of Transport launched a public consultation on the *Guidelines on Safety Services for Transportation of Autonomous Vehicles (for Trial Implementation)*, which encouraged the use of autonomous vehicles for business activities in certain scenarios.

In September, the General Office of the Ministry of Transport issued the *Announcement of the First Batch of Pilot Projects for Pioneering Applications of Intelligent Transportation (in the Direction of Automated Driving and Intelligent Shipping)*. The notice passed 18 projects, including the *Pilot Project for Pioneering Applications of Automated Driving for Urban Travel Services and Logistics in Beijing*, which is the first batch of pilot projects for pioneering applications of intelligent transportation.

In the same month, the Department of Science and Technology of the Ministry of Industry and Information Technology launched a public consultation on *National Telematics Industry Standard System Construction Guide (Intelligent Networked Vehicles) (2022 Edition)*. The Notice proposes to revise more than 100 intelligent networked vehicle-related standards, covering combined driving assistance, key systems for autonomous driving, networked basic functions, operating systems, high-performance computing microchips and data applications by 2025.

In November, the Ministry of Industry and Information Technology issued the Notice *on the Pilot Work of Access and On-Road Passage of Smart Internet-connected Vehicles*. The Notice put forward a series of planning and guidance requirements for smart Internet-connected vehicle products allowed into the pilot, further promoting the development process of smart Internet-connected vehicles.

## 2. Local policies

Local governments in 2022 are actively exploring policies to expand the scope of road testing and demonstration applications and putting autonomous driving in the 14th Five-Year Development Plan. One of the most notable regulatory documents is the *Shenzhen Special Economic Zone Regulations on the Management of Intelligent Networked Vehicles*. This regulation is the first on autonomous vehicles in China. It sets a precedent for the whole chain of legislation on autonomous vehicle road testing, demonstration applications, access registration, user management, traffic violations, accident handling and legal liability.

In January, Yangquan announced that the government would build an intelligent vehicle-road collaboration infrastructure on about 200 kilometers of open roads in both directions and 44 new traffic junction points, making it the first city in China to open its entire area to autonomous driving.

In March, the Beijing Municipal Office of High-Level Automated Driving Demonstration Zone issued the *Implementation Rules for Road Testing and Demonstration Application Management of Intelligent Networked Passenger Buses in the Beijing Intelligent Networked Policy Pilot Area (for Trial Implementation)* to fill the regulatory gap for intelligent networked vehicles.

In April, the *Beijing Intelligent Networked Vehicle Policy Pilot Zone Passenger Vehicle Unmanned Road Testing and Demonstration Application Management Implementation Rules (for Trial Implementation)* was officially released. It is the first time that autonomous, "unmanned behind the wheel" vehicles would be allowed in China.

In June, *Nansha District of Guangzhou* passed the *General Plan for the Pilot Area of Intelligent Network Vehicle Hybridization and Special Operation Scenario Hybridization* officially, making Nansha District the first testing area of intelligent network vehicle hybridization in Guangzhou.

In July, Beijing officially opened the first commercial pilot of an unmanned travel service in China, launching a regular charging service and allowing the safety officer to move from the primary driver to the secondary driver.

In the same month, the Executive Committee of the Yangtze River Delta Integration Demonstration Zone, the industrial information and communication management departments of Jiangsu, Zhejiang, and Shanghai, jointly issued *Several Initiatives on Accelerating the Development of Digital Economy in the Yangtze River Delta Eco-Green Integrated Development Demonstration Zone to Promote Early and Pilot Measures*. The notice requires the enrichment of open test road scenarios for autonomous driving and construct a leading domestic demonstration zone for vehicle-road coordination.

In August, government departments in Chongqing and Wuhan first released pilot policies for the commercialization of autonomous driving, allowing self-driving vehicles without a safety officer to carry out commercial services on social roads.

In September, Shaanxi Province issued the first five licenses for road testing of self-driving vehicles, and the Hengqin Guangdong-Macao Deep Cooperation Zone launched testing area of intelligent network-linked driverless vehicles.

In November, the Beijing Intelligent Networked Vehicle Policy Pilot Zone issued the second phase of autonomous driving test permits. Companies such as Baidu and Pony Smart got qualifications to start the "no one in the front row, someone in the back row" autonomous driving tests in Beijing.

# Driverless Testing and Deployment

In 2022, China's driverless testing saw tremendous progress. Not only did numerous districts open autonomous driving test zones and roads, but Beijing also opened the "front row unmanned" attempt, bringing the driverless test to its second phase. After the commercial pilot of self-driving started in Beijing, the mileage of unmanned road testing exceeded 300,000 kilometers by December 7. The number of orders for the commercial pilot of self-driving travel services exceeded 430,000, all of which are well-received by users. Chongqing, Changsha, Hefei, Yangquan and many other places have also started their self-driving taxi tests. Driverless testing is popular in China and there is a significant success in the commercialization of the driverless section.

In July, Beijing officially opened China's first commercial pilot of unmanned services, which allowed safety personnel to move from the driver's seat to the passenger's seat. In November, the Beijing government licensed Baidu, Pony.ai and other autonomous mobility enterprises to conduct the second phase of unmanned testing. Now licensed, Pony.ai and Baidu's autonomous mobility service platform Apollo Go respectively launched 10 unmanned test vehicles to test within a 60-square-kilometre area covering the complex urban road scenes in Yizhuang, Beijing's Economic Development Zone. From the consumer's angle, the technology and safety of auto vehicles are of the utmost concern to the public.

- Robotaxi: Robotaxi testing has made far-reaching progress in 2022. Baidu has completed unmanned testing for over 30 million public test miles and acquired over 400 test licenses.
- Robobus: Robobus has been tested in Guangzhou, Nanjing and other places. The AV companies, including Baidu, UISEE, EHang, and traditional bus manufacturers such as YUTONG Bus and KING LONG Bus, are making multi-line layouts. Companies such as Mogo Auto and UISEE have come up with corresponding solutions. They expect that by the end of 2022 there will be 60 unmanned bus routes running across the country with a total mileage of over 300km. Baidu and YUTONG Bus, among others, have already launched their second-generation unmanned buses.
- **Unmanned park logistics vehicles**: In addition to Huawei, Alibaba, Meituan and Jingdong have already launched unmanned park logistics vehicles; in 2022, companies like UISEE, CiDi and other brands have also launched their products in succession.
- **Robotic trucks**: Truck logistics has always been considered a grand prospect with brands such as PlusDrive, InceptioTechnology, Ponytron, Autratech and Qingtian Truck, but none of these brands have fully infiltrated the entire industry chain, thus cooperation among them is common. PlusDrive has cooperated with FAW Jiefang Automotive Company and SAIC Group and reached deep cooperation with logistics platforms such as Full Truck Alliance, SF Express and Amazon. Inceptio Technology has cooperated with OEMs like Dongfeng Commercial Vehicle and SINOTRUK, and logistics platforms like Deppon and Jingdong.
- **Unmanned sanitation**: There are over 20 companies exploring the industry of unmanned sanitation. Groups like COWAROBOT, Autowise.ai and WeRide have launched relevant products in Beijing, Shanghai and other domestic cities to carry out demonstration operations. Although challenges such as unclear responsibility subjects and plights of right-of-way management remain, groups like COWAROBOT, Autowise.ai and WeRide have launched relevant products in operation in Beijing, Shanghai and other domestic cities.
- **Unmanned delivery**: Unmanned delivery mainly includes indoor delivery robots and outdoor unmanned delivery vehicles. They apply to different scenarios respectively and solve the "Last Kilometer" delivery problem. However, due to a deficiency in the regulatory system, industrial standards, and supporting infrastructure facilities, the industry has developed at a low pace. Until now, more than 2,000 unmanned delivery vehicles have been put into operation by enterprises like Jingdong, Meituan and Cainiao.

# Internet of Vehicles and Logistics

## Data Privacy

Vehicle data privacy protection has received widespread attention in the era of automotive digital transformation, with numerous security vulnerabilities existing all over the customer, regulatory and cloud sides of intelligent network vehicles. Data security and compliance are even more of a concern for the Chinese government in the wake of Didi's incident.

At present, the Data Security Law of the PRC, the Network Security Law of the PRC and the Personal Information Protection Law of the PRC ("PIPL") comprise the regulatory system of governing data privacy and security as it relates to autonomous vehicles.

The *Several Provisions on the Management of Automobile Data Security (for Trial Implementation)* implemented on 1 October 2021, specifies that automotive data refers to data involving personal information and essential data in the process of automobile designing, manufacturing, selling, usage, operating and maintaining. It lists general requirements for automotive data processing and lays equal stress on both the security of vehicle data and its technological development. It advocates that automotive data processors adhere to "in-vehicle processing," "no collection by default," "accuracy range application" and "desensitization processing" in carrying out automotive data processing activities. It also specifies requirements for protecting personal information and handling sensitive personal information. In particular, the regulations emphasize that automotive data processors carrying out important data processing activities should comply with the requirement to store the data within the territory in accordance with the law.

Based on the PIPL and *Several Provisions on the Management of Automobile Data Security (for Trial Implementation)*, the *Security Requirements for Automotive Data Processing* (the *Requirements*) refines the compliance requirements for various parts of automotive data. The *Requirements* is a recommended national standard and not mandatory, but it can serve as a principal reference for enterprises in automotive data processing, provide guidance for the implementation of the *Several Provisions on the Management of Automobile Data Security (for Trial Implementation)* and other mandatory regulations. Also, it brings forward new requirements for automotive data security compliance, in line with the General Requirements for Data on intelligent network vehicles launched on February 2022.

On 28 October 2022, the Ministry of Industry and Information Technology of the People's Republic of China (MIIT) issued *the Regulations on the Administration of Road Motor Vehicle Production Access Permit (Exposure Draft)* (the "*Regulations*"), which sets out requirements for the management of the national road motor vehicle production access permit and clarifies the obligations and legal responsibilities of road motor vehicle manufacturers.

On 2 November 2022, the MIIT issued a *Notice on the Pilot Work on Access and On-road Passage of intelligent network vehicles (Exposure Draft)* (the "*Notice*"), which sets out the requirements for automotive cybersecurity and data security management capabilities at four levels: pilot cities, pilot vehicle manufacturers, pilot products and pilot users.

The risks posed by vehicle data security are manifold and can be grouped into three main categories: (1) driving safety; (2) privacy and security; and (3) national security. First, as it relates to driving safety, networking gives hackers the opportunity to hack into and potentially take control of vehicles, posing dangers to driving. With regard to privacy and security, smart vehicles are equipped with sensors that continuously access information about the car user, and even pedestrians outside the car. Third, as it relates to national security, a larger number of visual sensors, laser radars, millimeter-wave radars and other sensors on smart vehicles constantly scan the road and the surrounding traffic environment during the driving process, obtaining a large amount of geographical information, thus involving national information security.

## 5G

The industry chain of the vehicle communication module comprises the upstream raw material suppliers and module foundries (raw materials mainly include microchips, PCB boards, discrete components and structural parts, etc.), the mid-stream vehicle communication module manufacturers and the downstream vehicle manufacturers and Tier 1 manufacturers.

Among all unmanned technologies, 5G communication technology plays a crucial role. Currently, the standardized work of 5G-Advanced is underway. 5G-A is considered an intermediate stage in the evolution to 6G, and R18 is the first release of 5G-A. Along with the maturity of 5G technology, mobile communication will achieve lower latency, which can further drive artificial intelligence and computing networks to become more powerful, says Wang Dan, the reporter of 3GPP XRM from China Mobile Research Institute.

In recent years, 5G-equipped and C-V2X-equipped vehicles have launched in mass production, leading to a high demand for 5G and C-V2X automotive-grade modules. Apart from high technical requirements and long certification cycles, automotive-grade wireless communication modules also have a distinct first-mover advantage – whoever obtains the certification and cooperation from car manufacturers first will gain the leading edge. The industry barrier of automotive-grade wireless communication modules inspires the development of automotive wireless communication module products in the direction of 5G and C-V2X automotive-grade modules.

In the first half of 2022, the 14th Five-Year Plans issued by local governments all mentioned the development of the intelligent networked vehicle industry, putting forward new requirements and visions for vehicle communication technology.

The *14th Five-Year Plan for the Development of Modern Integrated Transport Systems*, released in January 2022, proposes to steadily promote the coverage of 5G and other network communication facilities to improve the coverage, real-time performance and reliability of information transmission in the transportation section. The Plan proposes to conduct pilot demonstrations of 5G-based application scenarios and industrial ecology in the intelligent transportation section. It proposes to promote the deployment and application of the Internet of vehicles, to support the construction of an intelligent management system that integrates "vehicle-road-transport management." It also proposes to build a new generation of broadband mobile communication systems for rail transit and aviation communication systems, to study and promote the compatibility and interoperability of multi-level broadband signaling systems, to synchronize and optimize mobile internet access conditions of rail transits and aircraft, and to promote the information-based level of postal-confidential communications.

### 5G Automotive-grade Modules

Quectel's 5G module AG55xQ series has provided support for more than 30 automotive customers' "5G+C-V2X" projects; GosuncnWelink has launched the world's first commercial automotive-grade 5G+C-V2X module, the GM860A, which is the smallest in the industry and utilizes the LGA package. It has also launched the 5G in-vehicle modules – the 860A-CIAG and 860A-C1AX. The market size of 5G in-vehicle modules will exceed 15 billion yuan in 2022.

### Automotive-grade Module Factories

Quectel's Hefei base has already been in operation and the Changzhou base will be fully in operation by the end of 2022. Gosuncn's Guangzhou base will be in operation in 2022. The construction of Sunsea Aiot's Zhuhai base commenced in June 2020. The base has been in operation and will be fully operational by the end 2022.

## Electric vehicles

The Chinese government attaches great importance to clean energy and issued several documents advocating for the development of new energy in 2022. The government also issued a document on 31 December 2021, extending the implementation period of the financial subsidy policy for new energy vehicles.

On 10 January 2022, the *Implementation Opinions of the National Development and Reform Commission and Other Departments on Further Improving the Service Guarantee Capability of Electric Vehicle Charging Infrastructure* was issued to promote and guarantee the implementation of the *Notice of the General Office of the State Council on the Issuance of the Development Plan for the New Energy Vehicle Industry (2021-2035)*. This implementation supports the development of the new energy vehicle industry, to break through the bottlenecks of the charging infrastructure's developments to promote the construction of the new power system in order to achieve the "double carbon" goal.

On 14 May 2022, the National Development and Reform Commission (NDRC) and the National Energy Administration (NEA) jointly issued a document entitled *Implementation Plan on Promoting the High-Quality Development of New Energy in the New Era*. The document put forward new regulatory ideas that encourage exploration of new modes of innovative new energy utilization, accelerating the construction of new power system, and supporting and guiding the healthy and orderly development of the new energy industry. The document also proposed to study the inclusion of the new energy sector's eligible public welfare construction projects into the scope of local government bond support. Under the premise of legal compliance, risk control and commercial sustainability, financial institutions can independently determine whether to issue subsidy-confirming loans to projects included in the list of renewable energy generation subsidies. The document also proposes to support eligible financial institutions to provide innovative solutions such as green asset-backed (commercial) notes and factoring to address the funding needs of new energy enterprises.

On 22 June 2022, the Standing Committee of the State Council confirmed to strengthen the support for automobile consumption, specifically addressing the support for new energy vehicles' consumption. Considering the current reality, the Committee will study the issue of extending the exemption of new energy vehicles from purchase tax when the policy expires at the end of the year. The Committee also proposed to eliminate local protection in the new energy vehicle market.

According to *the People's Daily*, in the first 10 months of 2022, the production and sales of new energy vehicles have completed 5.485 million and 5.280 million units respectively, both up 1.1 times year-on-year. Global sales accounted for over 60% of the total. In the first three quarters of this year, global sales of new energy vehicles exceeded 7.26 million units, with China's sales of new energy vehicles reaching 4.567 million units occupying 62.9% of the worldwide sales. Exports continued to grow at a high rate. For the whole year of 2021, China exported 310,000 units of new energy vehicles, up 3 times year-on-year; in the first 10 months of this year, 499,000 units of new energy vehicles were exported, up 96.7% year-on-year.

# Driving forces

Although Chinese AV companies have also experienced a capital winter, many have gained new grounds as a result.

## Baidu Apollo

Baidu's self-driving travel service platform, Apollo Go, has set up the largest unmanned self-driving fleet in China, with a total test mileage of over 36 million kilometers so far, and has launched commercial self-driving travel services in cities such as Beijing, Chongqing, Wuhan, Changsha, Hefei and Yangquan, among which Chongqing and Wuhan have achieved commercial self-driving travel services without safety officers in the vehicle.

In November 2022, Apollo was granted the permit for second-stage unmanned driving testing by the Beijing intelligent network vehicle Policy Pilot Zone, and the first batch of 10 fifth-generation unmanned vehicles, Apollo Moon, was put into operation for front-row unmanned road testing within the 60 square kilometers in the Beijing High-Level Automated Driving Demonstration Zone.

On November 29, Baidu released a new generation of Apollo autonomous driving maps at Apollo Day, as well as the Wenxin large model that landed on the technology applied to autonomous driving. It pointed out that Apollo currently has a full chain of technology solutions for autonomous driving system perception, predictive decision-making, planning and control, as well as data closure, maps and computing power. Among them, some of the technologies have been applied to Baidu's Wenxin Grand Model.

## Pony.ai

Pony.ai is an autonomous driving solution provider. Dedicated to creating artificial intelligence for robots, its main product is Pony.ai, which is based on radar, optical radar, GPS and computer vision technologies to sense its environment for autonomous driving purposes.

In March 2022, Pony.ai secured Series D funding.

On 24 April 2022, Pony.ai announced that it had won the tender for the 2022 taxi capacity indicator in Nansha District, Guangzhou, the first taxi operating permit issued to an autonomous driving company in China.

In November 2022, Pony.ai, together with Apollo, was awarded the second-phase testing permit for unmanned driving issued by the Beijing Intelligent Networked Vehicle Policy Advance Zone. Ten unmanned test vehicles will start a new form of testing in the 60-square-kilometer core area of the Economic Development Zone, covering the complex urban road scenes in Yizhuang, which will help to improve the efficiency of unmanned technology verification in a safe and controlled manner and gradually expanding the scale and scope of testing.

## Mogo Auto

Mogo Auto has the capability to operate a large-scale urban-level L4 self-driving public service fleet, including self-driving buses, shuttle buses, taxis, sweepers, patrol cars, logistics vehicles, tractor trailers, etc., covering the whole scenario of urban open roads, parks, scenic spots, ports, airports, highways, etc.

As of 2022, Mogo Auto's autonomous driving projects had accumulated over $10 billion in contracted amounts and are being tested and operated in Beijing, Shanghai, Jiangsu, Hunan, Henan, Hubei, Sichuan, Zhejiang, Guizhou, Yunnan and other locations. The company has received investment support from large industrial companies such as Tencent, Shunfeng, Jingdong, CITIC Capital and many state-owned industrial funds.

On 27 January 2022, the People's Government of Dali City and Mogo Auto Intelligence and Telemetics Information Technology Co., Ltd. signed a strategic cooperation agreement to jointly build an eco-tourism demonstration zone for autonomous driving around the Erhai Sea. The total investment of the project amounts to RMB 1 billion.

On 26 July 2022, Sichuan Tianfu New Area and Mogo Auto made a joint effort to build an ecological plateau for the intelligent network-linked vehicle industry in the national-level new area. According to the official announcement, the total amount of the project is about RMB 3 billion.

In November 2022, Ezhou City, Hubei Province's Lingang Economic Zone signed a strategic cooperation agreement with Mogo Auto Intelligence and Telemetics Information Technology Co., Ltd. According to the agreement, the total amount of the project is about RMB 1.114 billion, and the construction covers vehicle-road collaboration smart roads, multi-scene self-driving vehicle operation and urban traffic digital base.

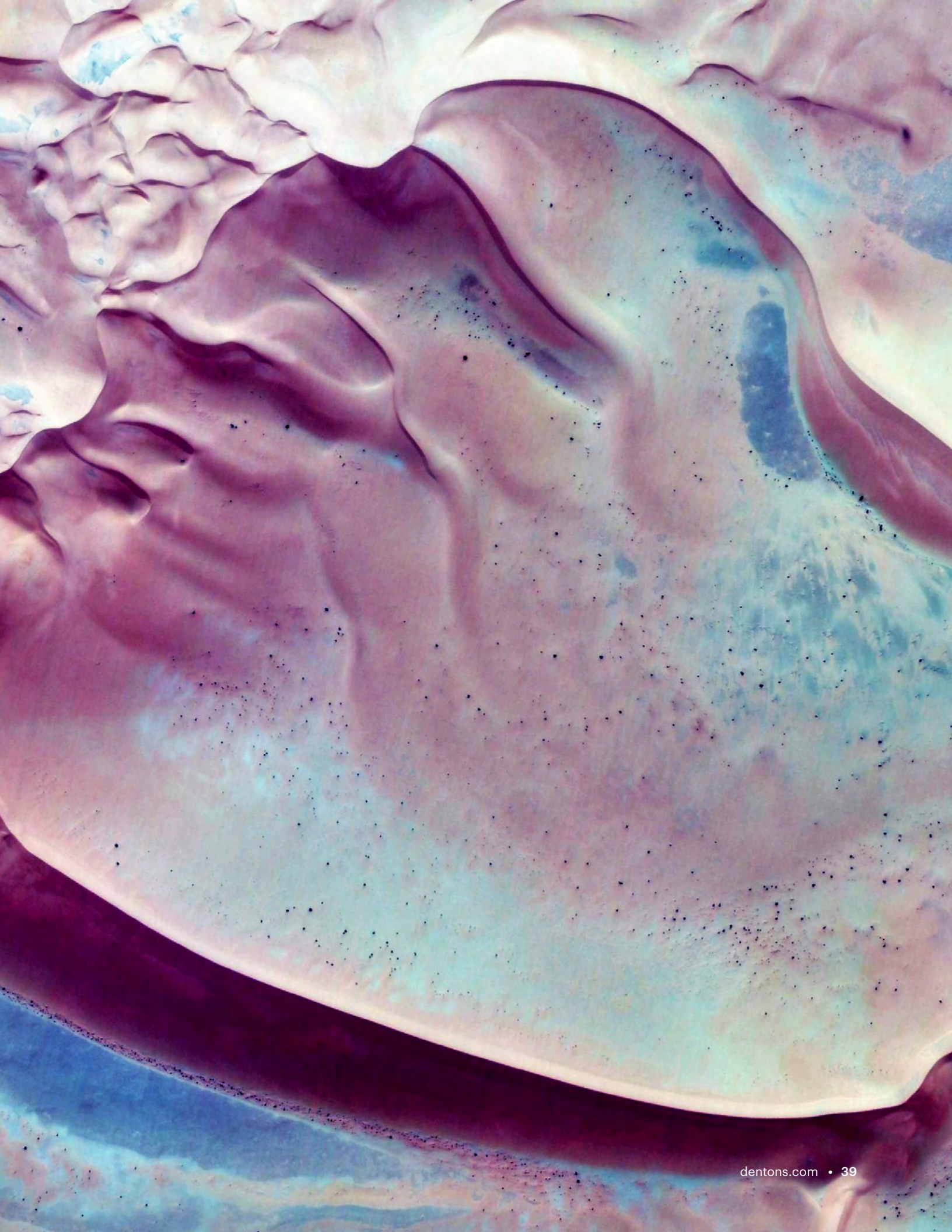
In the same month, the Yunnan Provincial Public Resources Trading Information Network showed that Mogo Auto won the bid for the Dali Erhai eco-tourism demonstration project, with the first phase of the project amounting to approximately RMB 289 million. According to the report, Mogo Auto will build a vehicle-road cooperative intelligent network infrastructure to support L4 level autonomous driving in the Erhai eco-corridor, and will also operate the world's first L4 level autonomous driving front-end mass production bus equipped with the "vehicle-road-cloud integration" system released by the company for the first time.

## Hesai Technology

Founded in 2014 in Shanghai, China, Hesai Technology is committed to be the "eyes of robots" and is a global leader in LIDAR for autonomous driving and advanced assisted driving (ADAS). Hesai has excellent R&D capabilities and deep technology accumulation in the core areas of optical, mechanical, electronic and software LIDAR, and holds hundreds of patents worldwide, with its self-developed microchip, functional safety and active anti-interference technologies breaking many industry records. At the same time, Hesai has a strong production capacity of automotive grade scale, and the "Maxwell" super manufacturing centre with an annual production capacity of one million units will be in full operation in 2022. The company has received over US$500 million in funding from institutions, including Xiaomi, Meituan, Bosch, Baidu, Lightspeed, High Tide, CPE and Qiming. The company's vision is to make human life more efficient and comfortable by empowering robots with high-performance, high-reliability and low-cost 3D sensors.

The number of LIDAR units delivered per month exceeds 10,000 units. 2022 will see the number of units delivered exceed 200,000 units, ranking LIDAR number one among global LIDAR companies in terms of revenue.

On November 2nd, Hesai Technology officially launched its pure solid-state LIDAR – FT120. FT120 has already received orders from several OEMs totaling over one million units and is expected to be delivered in mass production in the second half of 2023.



# Germany

## Regulatory Developments and Roadblocks

### Transport authorities

Germany, home to several leading automotive companies, is a leader in autonomous transportation. Among the institutions leading the effort to welcome autonomous vehicles is the Federal Ministry for Digital Affairs and Transport (BMDV), a supreme federal authority of Germany. The Ministry, together with its subordinate authorities, carries out departmental tasks in the fields of mobility of persons, goods and data. This responsibility includes the federal transport infrastructure (federal trunk roads, railway networks, waterways and air traffic routes).

The highest state authorities in the field of transport are the Ministry of the Interior, Sport and Integration and the Ministry of Housing, Construction and Transport. In addition, the following road traffic authorities engage the Road Traffic Regulations (StVO), the Holiday Travel Ordinance and the Federal Emission Control Act:

- Municipalities belonging to the district (local road traffic authorities);
- District authorities and municipalities in their own right (lower road traffic authorities);
- Governments (higher road authorities);
- State Ministry of the Interior, for Sport and Integration (supreme road administration).

The Federal Motor Transport Authority (KBA) was established by law on August 4, 1951, as the federal authority for road traffic. It belongs to the division of the Federal Ministry of Transport and Digital Infrastructure and sees itself as a service provider for motor vehicles and their users. In Germany, the KBA is the only type approval authority. Type approvals confirm that the legal safety and environmental standards as they relate to transportation are fulfilled. In addition, there are other type approvals required via the European Economic Area (EEA) and ECE regulations. The KBA informs other contracting states and national official monitoring organizations (Sections 19 and 29 Road Traffic Licensing Regulations (StVZO)) of type approvals granted.

With the type approval, the authority confirms that the serially manufactured approved product meets legal standards. Type approvals stand for safe and environmentally friendly technology on the roads.

- Vehicle type approvals can be granted in accordance with national regulations (Section 20 StVZO) or EC regulations (Directives 2002/24/EC, 2003/37/EC or 2007/46/EC).
- Component type approvals can be granted in accordance with national regulations (Section 22 or 22a StVZO), EU regulations (EC directives and regulations, EU regulations) and UNECE regulations (ECE regulations).
- Type approvals for systems can be granted in accordance with EU regulations and UNECE regulations.

In Germany, the Road Traffic Authority is the administrative authority, determined by state law in accordance with Section 44 StVO, responsible for monitoring and implementing the Road Traffic Regulations. The Road Transport Authority is not an independent organizational unit, but part of the local municipal administration (city administration or, in municipalities with a smaller population, the district administration).

Finally, in Germany, the motor vehicle registration office (and the driving license authority) may be assigned to the office that also assumes the task of the road traffic authority, but this does not necessarily have to be the case.

Each of the aforementioned institutions plays a role in approving and regulating autonomous vehicle testing and deployment.

But how is Germany as a whole approaching this new age and the new prosperity that may come with it? On which path will the country in the heart of Europe move toward a new age? The principle, that modern mobility is a key to future prosperity has also led the federal government to place the task of promoting this prosperity at the center of political action. The BMDV has therefore been given the important task of ensuring that key players from industry, research, associations, administration and politics work together with the aim of paving the way for solutions that are viable for a high-tech and leading automotive country like Germany and German society as a whole.

The coalition agreement for the current legislative period already provides for various measures to create modern, barrier-free, sustainable and affordable mobility. It is expected that the BMDV will therefore continue to advocate for the creation of optimal framework conditions for the introduction of automated and connected driving systems (ACD) into the regular operation of road traffic in the new legislative period.

For years, the BMDV has been working to make Germany fit for the future in terms of modern mobility. For example, since 2013 the federal ministry has established the Automated Driving Round Table (RTAF) as an advisory body. It facilitates a close exchange among actors from industry, science, associations and administration. The necessary know-how is bundled in such a way that a broad social consensus can be reached on all relevant aspects of ACD. The RTAF meets twice a year and has developed the necessary cornerstones for a successful introduction of ACD, which formed the basis for the federal government's "Strategy for automated and connected driving – remain the lead provider, become the lead market, initiate regular operation" (ACD strategy).

The ACD strategy was adopted by the German federal government in 2015. In order to ensure a fast and successful realization of the strategy, the objectives have been implemented with targeted measures in the fields of infrastructure, law, promotion of innovation, connectivity cybersecurity, and data protection, as well as social dialogue.

Unfortunately, the economy is still skeptical. And generally, German politicians on all state levels and the German auto industry struggle to conceptualize future technologies. Often, stakeholders mistake the technology as a simple development instead of an energy and traffic revolution.

Although Germany has a national strategy and ethical plans for AVs, the country´s federal structure may threaten consistency at the national level. So far, the main results of the federal government's implementation of the strategy are as follows:

- Adaptation of the national legal framework, in particular the amendment of the Road Transport Act;
- Adoption of an action plan to establish ethical rules for driving computers;
- Establishment and coordination of test fields for automated and connected driving in real traffic;
- Supporting the research and development of ACD solutions from basic to applied research;
- Active design of regulations and standards in committees at the European and international level.

Through these measures, Germany has emerged as an international pioneer in creating the framework conditions for ACD, which must be maintained and even further expanded.

**Automated driving is a cross-border issue, especially in Europe. At an international level, much has been done and actively led, especially by Germany:**

**2015**
A G7 declaration on automated and connected driving was adopted.

**2016**
The National Development and Reform Commission launched the national innovative development strategy of intelligent vehicles.

With the declaration of Amsterdam on self-driving and connected vehicles a joint agreement was made by member states, the European Commission and the private sector.

**2017**
A G7 declaration on cooperation for modern transport infrastructure and advanced technologies in transport was adopted.

**2018**
A joint Declaration of Intent on the Cooperation in the Area of Automated and Connected Driving between Germany and the People's Republic of China was adopted.

**2019**
In April, the G7 French Presidency held a technical workshop in Paris, to exchange national policy updates with a focus on safety validation, responsibility and acceptance.

## International law

In understanding the emergence of rules for autonomous vehicle deployment, a brief overview is required. Road traffic makes it possible to get from one place to another quickly and comfortably. In principle, the road network is not limited to the national area, but enables cross-border traffic and, for this reason, naturally affects the interests of several sovereign states at the same time. Vehicles are not only produced in the state in which they will later operate, but the automotive industry is characterized by imports and exports on a global market. Therefore, it is not surprising that international agreements were concluded with the intention of creating uniform traffic and registration rules for motor vehicles to guarantee the safety of road traffic across national borders.

One of these agreements is the Vienna Convention on Road Traffic (WÜ) of November 8, 1968, which is an international treaty obliging the contracting parties to adopt uniform traffic and licensing rules. Compliance with these provisions is a prerequisite for admission to international traffic (cf. Art. 3 Para. 3 WÜ).

But there are also numerous regulations at the European level that are intended to standardize the automotive sector in the individual member states of the European Union. For example, according to Art. 4 Para. 2 of Directive 2007/46/EC, member states may only grant approval for vehicles, systems, components or separate technical units if they comply with the requirements of this directive. With regard to these approval requirements, Art. 35 Para. 1 of Directive 2007/46/ EC refers inter alia to the UNECE regulations listed in Annex IV, Part II and declares them to be equivalent components of secondary community law. The abbreviation "ECE" is derived from the United Nations Economic Commission for Europe (UNECE).

On the basis of the Vehicle Parts Convention (FTÜ), the contracting parties crafted ECE regulations for wheeled vehicles, equipment and parts that can be fitted to wheeled vehicles (cf. Art. 1 Para. 1 p.1 FTÜ) by means of an administrative committee to which all contracting parties belong, in accordance with the procedural rules set out in Annex 1. This includes, for example, brake systems, steering systems or headlights. The contracting parties involved are the EU and, in addition to Germany, 46 other states. These ECE regulations, agreed based on the FTÜ, constitute a set of instruments designed to harmonize the international technical requirements for motor vehicles in order to remove barriers to trade in motor vehicles and their accessories. All contracting parties to the FTÜ may accept the individual provisions but are not obligated to do so. Where a contracting party has accepted a regulation, it shall be bound by international law, and shall undertake to register vehicles or parts approved, in accordance with the regulation in its own country.

For Germany, this recognition is standardized in Section 21 a Para. 1 StVZO. In order to make the ECE regulations binding at a national level, they must be transposed into national law. In the case of countries of the EU, this is regularly done by approving the regulation in accordance with the requirements of Directive 2007/46/EC, which can be viewed in Annex IV, Part II, p. 2.

**Recent developments include:**

A recent development is the amendement to UN Regulation No. 157, which extends the maximum speed for Automated Driving Systems (ADS) for passenger cars and light-duty vehicles up to 130 km/h on motorways, and allows automated lane changes, among other dispositions. This new regulation entered into force in January 2023, but only in those Contracting Parties (countries) that opted for its application. Amongst those countries, besides the European Union and many European states, are countries like the UK, South Africa, Korea, Japan, Australia and New Zealand.

The ECE regulations now comprise more than 130 technical regulations which, in addition to systems and components for active and passive safety, also deal with environmentally relevant regulations. Both the EU and Germany have accepted most of these regulations.

Some of these technical regulations have already been developed for autonomous and automated driving beyond assistance systems by the UNECE.

The General Vehicle Safety Regulation (Regulation (EU) 2019/2144) became applicable on July 6, 2022. This introduces mandatory advanced driver assistance systems to improve road safety and establishes the legal framework for the approval of automated and fully driverless vehicles in the EU. It also empowered the Commission to complete the legal framework for automated and connected vehicles. The provisions of Regulation (EU) 2019/2144 will apply to all new vehicles from July 7, 2024, with some of the measures being extended to different types of road vehicles by 2029.

Further, in September 2022, the ADS Regulation (Implementing Regulation (EU) 2022/1426) entered into force with detailed rules for the implementation of the above-mentioned Regulation (EU) 2019/2144. Now there is the possibility of a stand-alone EU type-approval for automated driving systems (ADS). With this regulation, EU law offers manufacturers greater freedom of design than German law, among other things, because technical supervision is not always necessary as in the AFGBV-Ordinance.

Also, in order to amend Annexes I, II, IV and V to Regulation (EU) 2018/858 of the European Parliament and of the Council as regards the technical requirements for vehicles produced in unlimited series, vehicles produced in small series, fully automated vehicles produced in small series and special-purpose vehicles, and as regards software updating, the Delegated Regulation (EU) 2022/2236 entered into force in November 2022.

## Road traffic law

As part of administrative law, traffic law is concerned with regulating traffic on public roads in Germany in such a way that no road user is harmed, endangered, obstructed or exasperated. It is not summarized in a single set of laws, but consists of several laws and ordinances, which are passed at the federal level and thus apply throughout Germany. Road traffic law in Germany is composed of the following laws and ordinances:

- The **Road Traffic Act (StVG)** is overarching: it contains rules on penalties and fines and lays down the basis for driving licenses and the registration of vehicles. Otherwise, it authorizes the Federal Ministry of Transport and Digital Infrastructure (BMDV) to implement these general provisions more precisely by means of ordinances.
- The **Road Traffic Ordinance (StVO)** is probably the most familiar aspect of traffic law and makes up the majority of driving lessons for German students. In short, it includes all the traffic rules that must be observed on German roads.
- In addition to the StVO, **the Road Traffic Licensing Regulations (StVZO)** defines the conditions under which motor vehicles and trailers can be registered for road traffic. It sets out in detail how these vehicles must be constructed and how they may be operated. The StVZO is to be gradually replaced by the Vehicle Registration Ordinance (FZV).

Up until now, the FZV has regulated precisely how the approval procedure should look, under which circumstances license plates are awarded, and which insurance coverage vehicles must have.

- Finally, the **driving license regulation (FeV)** prescribes the conditions an individual must fulfill in order to obtain a driving license, and the circumstances under which this license may be withdrawn.

As it relates to regulations that address autonomous vehicles specifically, there are currently different regulations in the individual US states and also in the individual EU member states, thus also for Germany.

At the international level, there are several agreements that provide the legal framework for national road transport legislation. One of the most important is the aforementioned Vienna Convention on Road Traffic of 1968. Automated systems were unknown in 1968 and therefore not regulated. Regulations at that time were based on a vehicle controlled by a human driver. By the change of the Convention in March 2016, automated systems have been allowed. However, fully autonomous (Level 5) driving was not yet possible, as the Convention still provided for a driver. In July 2022, further amendments to the Convention entered into force, which now also open the Convention to the use of driverless vehicles.

If we now take a look at the German legal situation, it becomes apparent that according to Section 1a of the Road Traffic Act, there are no legal restrictions against highly and fully automated driving at least for Level 3 (highly automated driving) and Level 4 (fully automated driving). However, the experts cannot achieve an unequivocal result with regard to the specific obligations, as laid out in section 1b StVG. This does not apply to fully autonomous driving (Level 5), which is why the legal experts assume that it is "still fundamentally inadmissible." The absence of the possibility that a person in the vehicle could, if necessary, take over the control of the vehicle is not provided for in the text of the law. As such, Level 5 autonomous driving is therefore not yet possible under German law either and initially requires further legislative steps.

In fact, the latest implemented right to enable Level 3 and 4 vehicles (except driverless/Level 5 vehicles) is already in force. Sections 1a and 1b StVG regulate the interaction between the vehicle with the highly or fully automated driving function and the driver. The new law provides for the use and concept of highly and fully automated driving functions.

Pursuant to Section 1 Para. 1 StVG, the Federal Ministry of Transport and Digital Infrastructure will evaluate the application of the provisions of the Act of July 12, 2021 after the end of 2023, in particular with regard to the effects on the development of autonomous driving, the compatibility with data protection regulations and the findings obtained on the basis of test permits within the meaning of Section 1 i Para. 2 StVG on a scientific basis in a non-personalised form and inform the German Bundestag of the results of the evaluation.

But with all these legal provisions and legal foundations presented, how can autonomous driving now be implemented in Germany in concrete terms? In summary, the following can be stated:

In Germany, vehicles with highly automated or fully automated systems may be used in traffic in such a way that the driver can hand over the vehicle control to the system in certain situations. The system takes over the longitudinal and lateral guidance of the vehicle, as well as acceleration and deceleration for defined applications, or for a limited time period. The driver no longer has to monitor the system permanently. Oftentimes, the system alerts the driver visually and acoustically when the vehicle needs to be checked again manually.

The operation of vehicles by means of highly and fully automated driving function systems is only permitted within the framework of normal use, whereby the intended purpose depends on the design. If an automated driving function is only intended for use on motorways, the system must not be used for traffic on other roads. The binding system description of the vehicle by the driver manufacturer must provide the driver with unmistakable information on the scope of the intended use.

During operation of a highly or fully automated driving system, the driver is allowed to turn away from the traffic situation. Within the scope of the mandatory system description, the driver may take his hands off the steering wheel, look away from the road and carry out other activities, such as processing e-mails in the infotainment system. As mentioned above, the driver no longer has to monitor the system permanently. However, he must remain vigilant. The driver is obliged to resume the vehicle control immediately if he recognizes or should recognize due to obvious circumstances that the conditions for an intended use of the highly or fully automated driving functions no longer exist. The driver must remain so perceptive that he can grasp the situations regulated by law and then resume control of the vehicle.

However, this shows once again that the new law does not regulate fully autonomous driving where there are only passengers (i.e., Level 5). There is still a legal need for regulatory action at national and international levels, and a possible need for technological development, as it relates to Level 5 autonomy.

Overall, the German federal government welcomes further developments in the field of autonomous driving. Its aim is to strengthen the German economic position in this sector. In its "Strategy for Automated and Connected Driving," which was formulated in 2015, Germany has set the goal of ensuring that Germany remains the "lead supplier for automated and connected vehicles" and becomes the "lead market" for this new technology. The introduction of autonomous vehicles into public road traffic is to be facilitated in particular by adapting the legal situation.

In 2016, the federal government set up an ethics committee to be able to find answers to the full range of questions related to autonomous driving, especially to deal with legal and ethical issues. The panel consisted of 14 scientists and experts. In June 2017, the Ethics Committee adopted a final report with a total of 20 ethical rules. Among other things, it was stated that the protection of man always has priority. The Ethics Committee has also made high demands when it comes to data protection. These are being used today in the development of automated and autonomous systems. In total, three clear principles apply: transparency, self-determination and data security.

At present, as previously mentioned, high and fully automated driving in the sense of Levels 3 and 4 is currently permitted in some areas in Germany. And although the COVID-19 pandemic and a change of government are currently pushing many political issues to the background, autonomous driving is being driven forward in Germany.

Following a bill proposed by then Transport Minister Andreas Scheuer, the Autonomous Driving Act came into force in Germany in July 2021, enabling Level 4 autonomous driving in defined operating areas, such as traffic between logistics terminals. This legal framework puts Germany at the global forefront of the race among countries to create the best possible conditions for autonomous driving.

Among other things, the law regulates the following issues:

- Technical requirements for the construction, condition and equipment of motor vehicles with autonomous driving functions;
- Testing and procedures for the granting of an operating permit for motor vehicles with autonomous driving functions by the Federal Motor Transport Authority;
- Regulations relating to the obligations of persons involved in the operation of motor vehicles with autonomous driving functions;
- Regulations relating to data processing during the operation of motor vehicles with autonomous driving functions;
- Enabling the (subsequent) activation of automated and autonomous driving functions of already type-approved motor vehicles ("dormant functions"); and
- Furthermore, adapting and creating uniform regulations to enable the testing of automated and autonomous motor vehicles.

In February 2022, the German government took note of the ordinance submitted by the Federal Minister of Digital Affairs and Transport (BMDV) to regulate the operation of motor vehicles with automated and autonomous driving functions and to amend road traffic regulations, which completes the national legal framework for autonomous driving.

In addition to the technical regulations, such as the technical requirements for the construction, condition, equipment for motor vehicles with autonomous driving function, the core of the legal ordinance is the regulation of the procedure for the admission of motor vehicles with autonomous driving function to road traffic. In order to enable the regular operation of these vehicles in public road traffic in defined operating areas, no singular technical exemptions of the respective federal state are to be required.

On July 1, 2022, the Ordinance on the Approval and Operation of Motor Vehicles with Autonomous Driving Functions in Specified Operating Areas (Autonomous Vehicles Approval and Operation Ordinance – AFGBV) came into force. The ordinance supplements the law on autonomous driving, which already came into force in 2021 and which regulates the basic legal requirements for the operation of motor vehicles with autonomous driving functions and caused corresponding amendments to the StVG. The ordinance now determines the technical requirements, the procedural regulations and the requirements for those involved in the operation of motor vehicles with autonomous driving functions, such as: the granting of the operating permit, the approval of defined operating ranges, the admission to road traffic, market surveillance, the requirements and obligations for manufacturers, owners and the technical supervision, data storage and test permit. With the ordinance, the traffic approval and operation of autonomous vehicles according to SAE Level 4 is made possible, but only on officially approved areas of operation (so-called defined operating areas) and only with an external supervisor always present (so-called technical supervision).

With the newly created law on autonomous driving, Germany is underlining its intention to remain a global leader in the field of transport in the future and is the first country with a fully comprehensive legal framework for automated driving. If the country manages to maintain this speed and openness to technology even after the change of government, the signs are good. The importance that politicians now generally attach to this topic for the future viability of Germany as a business location can be seen clearly in the following statements by the responsible representatives of the newly elected government:

> Policymakers must be tougher, clearer and more demanding than before when it comes to digitization. I want a gigabit society. To achieve the climate targets, we need more innovative developments in transport, a modern electricity infrastructure and rapid digitization.
>
> **Olaf Scholz**
> Chancellor of Germany

> Germany must have the ambition to play in the "Champions League" digitally, Wissing said – and when it comes to autonomous driving, he even sees the Republic soon as "Number One in the World." "I believe that we will be faster than China in this respect," Wissing said.
>
> **Volker Wissing**
> Federal Minister of Transport

> "Autonomous driving is a "game changer" that will change business models and pose new challenges for German automakers. However, I am optimistic that German automakers will be leaders in autonomous driving."
>
> **Christian Lindner**
> Federal Minister of Finance

# Driverless Vehicle Testing and Deployment

With its strong automotive industry, Germany is naturally also a sought-after testing ground for autonomous vehicles. With the speed limit-free autobahn, high-speed driving can also be tested here without any problems.

As it relates specifically to the legal framework for the testing of autonomous vehicles in Germany, vehicles may only be operated on public roads according to Section 3 Para. 1 S.1 FZV (Fahrzeugzulassungsverordnung) and only if they are registered. According to the Vienna Convention (WÜ), every vehicle must have a driver (Art. 8 Para. 1 (WÜ)) who must be able to intervene on request. From a liability perspective, the use of a so-called safety driver in testing vehicles and vehicle systems makes sense and is common practice. Test drivers must possess a valid driving license, otherwise, no additional training is necessary, but possible and useful.

The approval of prototypes for testing on public roads by means of a special permit is governed by Sections 19 ff. of the German Road Traffic Act (StVZO). The granting of permits must be obtained from the responsible District Office (Landratsamt) and is based on Section 20 StVZO for type approval and Section 21 StVZO for individual approval. Until now, up to Level 3 is possible for the individual approval of test vehicles.

The vehicle is tested for its suitability and safety for public road traffic within the framework of the approval procedure (i.e., it is checked whether the vehicle, its design or its equipment meets the construction and operating requirements of Section 30 StVZO). With regard to safety, the focus is on whether, based on general life experience or scientific findings, it is sufficiently likely that public road traffic and other road users may be endangered.

If the requirements of Sections 30-62 StVZO are fulfilled, the administrative authority grants approval and the vehicle is registered as a test vehicle. If the vehicle does not correspond to the regulations, an exception permission can be given over Section 70 StVZO by the highest national authority under certain conditions. The companies may test these on the intended test tracks during a possible limited time period. In general, all test vehicles must be tested on the designated test tracks (e.g., A9 Munich-Nuremberg).

Permission is also required for testing on private premises, provided that these are accessible to the general public.

There are no special insurance requirements for autonomous vehicles which go beyond the motor vehicle liability insurance prescribed in Section 4 PflVG (Pflichtversicherungsgesetz). However, it might be useful for the manufacturer to insure the test vehicle comprehensively in order to avoid possible liability issues, since the strong connectivity can also lead to completely new risks (e.g., cyber-attacks).

There are a few safety requirements that are important to note. At a minimum, requirement for functional safety, hardware and software systems must separate vehicle functions from infotainment, telematics and navigation applications. The control systems must contain sufficient redundancy. For example, safe holding must be ensured even in the event of a failure of the main control system. Suitable protection against external (cyber) attacks must be provided, as well as against manipulation of security-relevant elements.

At every stage of development, the vehicle must navigate at least as safely as if a human being controlled it. However, the possibilities of automated and autonomous driving must not be used to limit the autonomy of the road user elsewhere. An example could be a general speed limit that is "enforced" by the vehicle driving in strict compliance with the regulations. Data collection must not be used to establish new restrictions and controls throughout the country (e.g., for recording driving times). Technological development as such will make traffic safer and reduce risks such as those posed by overtired drivers.

Finally, in regard of autonomous trucking, MAN Trucking and Hamburger Hafen und Logistik AG (HHLA) successfully completed the three-year practical test, Hamburg TruckPilot, in June 2021. This test and other possibilities, such as the testing of connected truck columns on the A7 highway, would have shown the company that the use of self-driving trucks is technologically feasible and can be efficiently integrated into logistics processes. The company is working to bring self-driving trucks to series production readiness from 2030 and emphasizes that the law on autonomous driving in Germany, which was passed in July 2021, provides optimal conditions for testing driverless trucks under real operating conditions.[1] As it relates to AV deployment, in principle, there are no provisions that restrict consumers from riding in autonomous vehicles. The operators, however, must observe a few points. Experience with automated shuttles was gathered in a series of pilot tests over the last few years. The experiments have so far taken place in "protected areas" both in large cities and in small towns.

All pilot projects must be applied for on a case-by-case basis. As soon as the automated vehicle (shuttle) is to be driven on public roads, it needs, in addition to the obligatory liability insurance, an "approval on the basis of an exemption permit" in accordance with Section 70 of the Road Traffic Licensing Regulations (StVZO).

As soon as revenues are generated from the trial operation, an operating permit in accordance with the Passenger Transport Act is required.

Finally, in regard to autonomous taxi-like services, an operating permit in accordance with the Passenger Transport Act is required, just as it is for a normal bus or taxi company.

## Liability

A significant question facing automated and autonomous driving is that of liability in the event of an accident. In Germany and in some other countries, the legal situation is clear because there is a three-pillar model consisting of driver, owner and manufacturer liability. The driver is responsible for the driving task and must always monitor the vehicle and intervene in the event of an emergency, for example, in the case of semiautomated driving functions. If he fails to comply with his duties of care and thereby causes an accident, he is liable alongside the owner for the resulting damage. Additionally, the manufacturer may be liable under product and producer liability for damage caused by a product defect. This combination of driver, owner and manufacturer liability offers a balanced distribution of risk, ensures victim protection and has proven itself in practice. The liability model is also a good basis for new systems and the next steps in automated driving.

Politicians were also concerned with the issue of liability in connection with autonomous driving from the outset.

> When CSU politician Alexander Dobrindt was still Transport Minister, he had a simple solution to this complex problem: In the event of an accident with autonomous cars, he said, "the moment the computer takes over, liability passes to the manufacturer."
>
> **Alexander Dobrindt**
> German politician of the Christian Social Union of Bavaria. Former Federal Minister of Transport and Digital Infrastructure in the government of Chancellor Angela Merkel.

1 MAN's full commitment to autonomous trucks | MAN (mantruckandbus.com)

Given that car manufacturers could be held responsible, the car industry would do its best to defend itself against this. In sum, potentially liable are the driver, the owner, the car manufacturer and the producers of the individual vehicle parts.

The insurance industry, which has been dealing with liability issues for robotic cars for months, has a different view. According to insurers, the (insured) owner would have to be liable even if he did not make a mistake. This corresponds to the current legal regulation. However, the insurance company would pay for the damage and may seek recourse from the manufacturer if the latter is liable for a failure of the driving system.

In the case of semi-autonomous vehicles, the driver is in any event an integral part of the liability regime. According to German law, he must be guilty of intent, negligence or any other misconduct for liability.

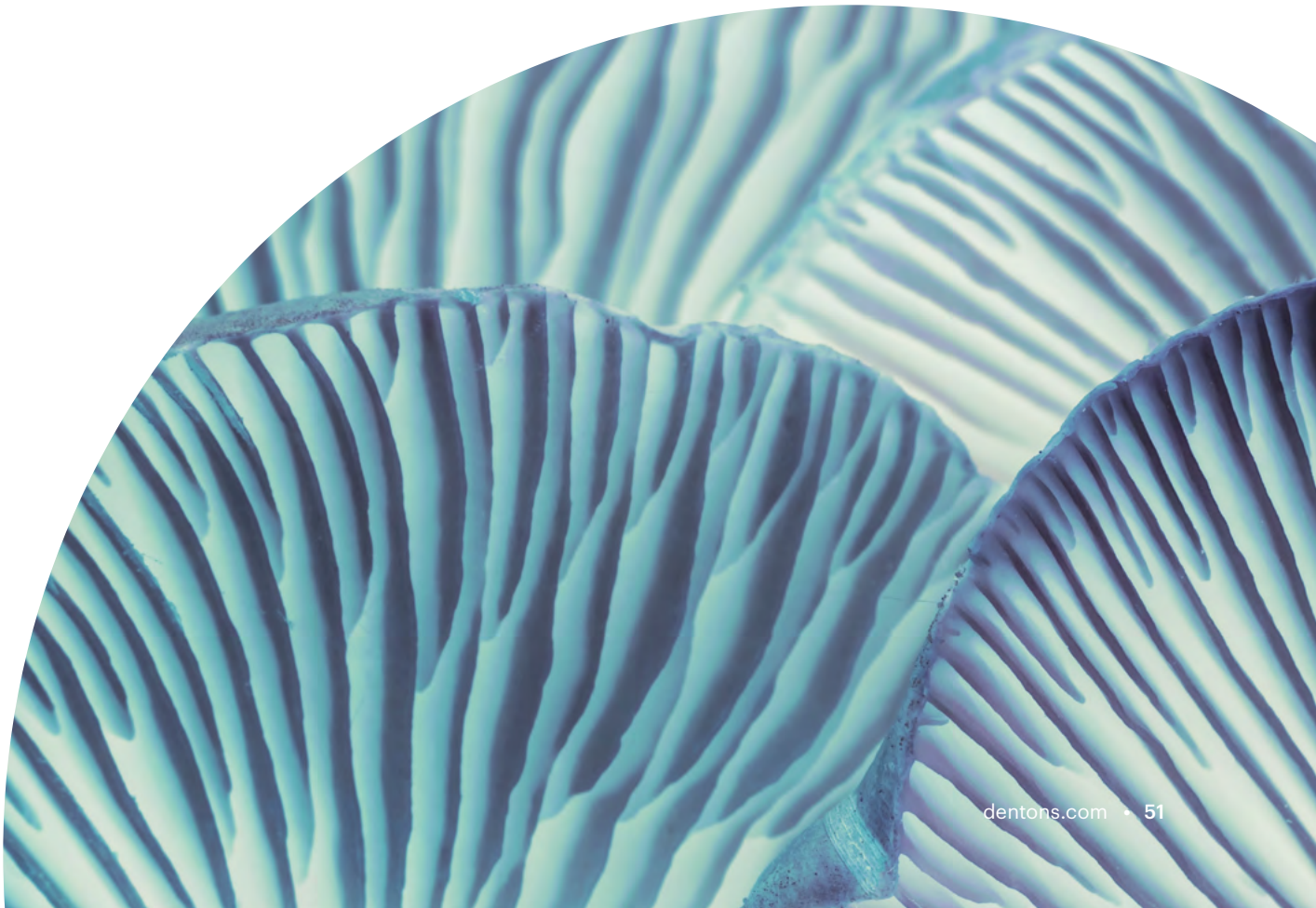
As of late, discussions have taken place about updating the liability regime to cover autonomous vehicles more specifically; however, the previous liability regime of German civil law is regarded as sufficient.

# Connected Vehicles and Logistics

## Data privacy and security

At a time when more and more citizens are concerned about the data collection frenzy of companies and data is even described as the "oil of modern times," the security of the data generated during autonomous driving is naturally of great importance.

The data collected by autonomous vehicles (location data, sensor data, etc.) is considered "personal data" as defined by the EU and Federal Data Protection Act (now BDSG) and as of May 2018, the EU Data Protection Regulation (GDPR). Such data can be traced back to the owner, driver or passenger and identified as information about personal or actual circumstances of a person. Most of the data collected by modern cars is assigned to the vehicle identification number (VIN).



The collection, storage and use of personal data is permitted under data protection law if there is a justification for doing so or if the data subject has given his effective consent. Limiting requirements (data economy, scoring in accordance with Section 31 BDSG 2018) must be observed for both mass collection and automated processing of personal data. Further restrictions apply to particularly sensitive data (e.g., information on health or ethnic origin, cf. Art. 9 GDPR). More than four decades ago, the Federal Constitutional Court put a stop to the creation of total personality profiles (profiling).

The GDPR proposes two major documentation concepts, which must be presented at all costs, if only to prove legal conformity in the event of possible complaints:

- **The directory of processing activities for customer data (formerly: procedure directory)**. This directory should be the central document in a company. It covers all typical processing steps (e.g., email marketing, CRM, customer analysis, etc.), but also payroll accounting or the merchandise management system, etc. and helps to comply with the obligations.
- **Documentation of processing security (technical and organizational measures)**. Customer and user data can be sensitive, which is why the legislature stipulates here that they must be well secured. It must comprehensively document which measures are taken to ensure that the data is and remains secure in the company.

Before collecting the data, the organization should make sure that all data is necessary and proportionate to the purpose for which it was collected.

The passing on or even the sale of user and customer data is not possible without further consideration of the following scenarios:

- Transfer/sale in the context of a complete company sale (since the responsible person does not change, there are no issues here).
- Disclosure/sale within the framework of an asset deal (consent of the affected parties may be necessary; further information can be found).
- Transfer of data within the scope of order processing (AV contract is necessary).
- Passing on data in third countries (e.g., Google Analytics; guarantees must be available).
- Transfer/sale for the purpose of address trading (as a rule, new consent necessary, insofar as not done in the collection of data).

Excluded from this are already publicly available data.

As is already the case under previous legislation, there is a right to information on the processing of personal data. Upon request, companies must provide information on data processing in a precise, transparent, comprehensible and easily accessible form in clear and simple language. This includes, for example, the storage period, the purpose for which the data are processed, which categories of personal data are processed, information on the origin of the data and possible recipients of the data.

A new feature is the right to a copy of the data. You can specifically request information about which personal data are processed by the responsible person (e.g., surname, first name, address, date of birth, profession, medical findings) and receive this in the form of a copy provided by the company.

Under certain circumstances, companies must delete data. This is the case, for example, when the data are processed unlawfully or are no longer needed for the original purpose for which they were collected.

Individuals may also request, under certain circumstances, that your data not be further processed. The data is therefore not deleted, but the data processor must block the data and cannot continue to use it as usual.

In an effort to address data security, the Act to Increase the Security of Information Technology Systems (IT Security Act), came into force in July 2015.

Through this Act, the federal government intends to make Germany's IT systems and digital infrastructures the most secure in the world.

In addition, The Federal Office for Information Security (BSI), which is responsible for security in information technology in Germany, has numerous references to the correct protection of data on its homepage.

The IT Security Act requires that operators of critical infrastructures in certain areas will have to comply with a minimum standard of IT security and report significant IT security incidents to the BSI. For the information technology and telecommunications sector, which is also highly relevant for automated and autonomous driving, the Ordinance on the Determination of Critical Infrastructures under the BSI Act (BSI-KritisV) already defines the scope of application.

The transport and traffic sectors also fall within the scope of the IT Security Act. The first regulation amending the KRITIS Regulation of June 21, 2017 (BGBI. I, p. 1903) determines exactly which annexes are included. Part 3, plant categories and threshold values, point 1.4, lists the traffic control and guidance system for the federal motorway network, as well as the traffic control and guidance system for municipal road traffic for cities with more than 500,000 inhabitants.

Even if this regulation is not yet directly aimed at (highly) automated or autonomous driving, it is already clear that a corresponding IT infrastructure will fall under the increased requirements of the IT Security Act.

## Telecommunications and 5G

One of the most important basic requirements for automated and connected driving is telecommunications connectivity. Germany still has a ways to go before it has a nationwide 5G network. Meanwhile, the rollout of 5G is progressing faster than expected. Last year, Telekom said it had upgraded around 45,000 antennas for 5G across Germany. More than 4,700 cities and communities are benefiting from the network rollout. The upgrade will continue in 2021. In January and February 2021, Telekom switched on 5G at 892 additional locations. At the end of 2021, the German Federal Network Agency, which is responsible for network expansion, reported that the rollout of 5G is making progress: The coverage of 5G by at least one network operator has increased to around 79% of the territory of the Federal Republic in 2022. The expansion is expected to be completed to around 99% in 2025.

The auction of the 5G frequencies in the 3.6 gigahertz range by the Federal Network Agency began on March 19, 2019, and ended with 6.55 billion EUR offered in total by the four bidders. The coverage obligations for the license winners include a requirement to supply speeds of a minimum of 100Mbps to at least 98% of households in each state by the end of 2022, as well as all federal highways, and the major roads and railways. Furthermore, each operator will have to set up 1,000 5G base stations by the end of 2022, in addition to 500 base stations in "white spot" unserved rural areas.

Some 2 GHz frequencies are also earmarked for 5G use, but will only be available between 2020 and 2025. Right from the start, 60 5G antennas have been transmitting in more than 20 cities and communities. More than 67,000 5G antennas are actively transmitting throughout Germany, 3500-4000 of them even in standalone mode (real 5G). In 2023, the aim is to achieve almost complete availability of well over 95 percent and to intensify the standalone expansion.

It is unknown if the newly elected government has taken a position between using 5G networks for cellular vehicle-to-everything communication or dedicated short-range communication. DSRC technology is already being used in Germany for the digital truck tolling system. From a technical point of view, this communication is desirable, but not necessary for the current sensor acquisition of the data by operating Level 3 vehicles.

Unlike the UK or France, the frequency spectrum in Germany is not regulated.

## Driving Forces

Several of Germany's powerful states are also working on AVs. Some examples are:

- North Rhine Westphalia, which includes Cologne and Dusseldorf, has established a *Zukunftsnetz Mobilität* (future of mobility) network to support municipalities, many with the promotion of AVs among its tasks.
- Berlin and Brandenburg (the state surrounding the capital) are both analyzing the market for research and development work on AVs.
- Public transport providers in Berlin, Hamburg and Frankfurt, as well as the national railway company Deutsche Bahn AG, are testing autonomous buses in a range of settings, and there are more than 20 AV test sites nationwide. Some say that the highly devolved nature of government, with more than 11,000 municipalities, makes it difficult to set national standards and strategy.
- A 9-kilometer test track for testing automated and connected vehicles (TAVF) is currently being built in downtown Hamburg. Funded by the BMDV, the city's infrastructure is being upgraded to enable I2V (Infrastructure to Vehicle) and V2I (Vehicle to Infrastructure). This will enable tests to be carried out in real public road traffic.
- Car manufacturer Mercedes-Benz becomes the first manufacturer in the world to receive UN approval for a Level 3 Autopilot in the new model S-Class. In Germany, the system can be used on 13,191 kilometers of highway in traffic jam situations and up to a speed of 60km/h after the Road Traffic Act was opened up to Level 3 systems.
- Car rental company Sixt and Intel subsidiary Mobileye plan to launch 25 robot cabs in Munich from 2022.
- Volkswagen is also testing self-driving prototypes in Bavaria. Volkswagen, for example, presented prototypes of an autonomously driving "Bulli" bus with electric drive at the last IAA. Initially, Volkswagen plans to test the technology with five upgraded ID.Buzz prototypes; series operation with such self-driving cab shuttles should then be possible from 2025.

## COVID-19 impact

With the outbreak of the COVID-19 pandemic, COVID-19-related issues and other topics, such as the federal election that took place in autumn 2021 and the subsequent formation of a new federal government under the leadership of the previous Finance Minister, Olaf Scholz, have dominated politics and pushed issues such as transport policy and autonomous driving into the background. There were no changes or significant progress in relation to transportation politics. However, Germany has already set an important course for the future of autonomous driving in this country during the last legislative period.

Since the beginning of the pandemic, AV companies in Germany were able to survive the pandemic and the related economic tumult. However, many struggled with the decrease in sales and had to adjust production due to COVID-19 regulations such as reduce the number of employees in factories or send employees on short time/reduced working hours during the past year, which was also completely dominated by the pandemic. This ultimately led to a reduction in production, as well as a slowdown in research and development regarding autonomous driving in 2021. However, after the last lockdowns and restrictions, the progressive vaccination status of the population and the decline in the threat of overburdening the German healthcare system enabled a rapid recovery of production and sales. Forecasts are positive and, despite the negative impact of COVID-19 over the last three years, autonomous driving efforts have continued. As mentioned above, despite the pandemic, the legal framework in Germany for autonomous driving has been renewed and numerous test opportunities have been continued or expanded. In addition, numerous initiatives have been launched from the industry and on the part of car manufacturers, such as robot cabs.

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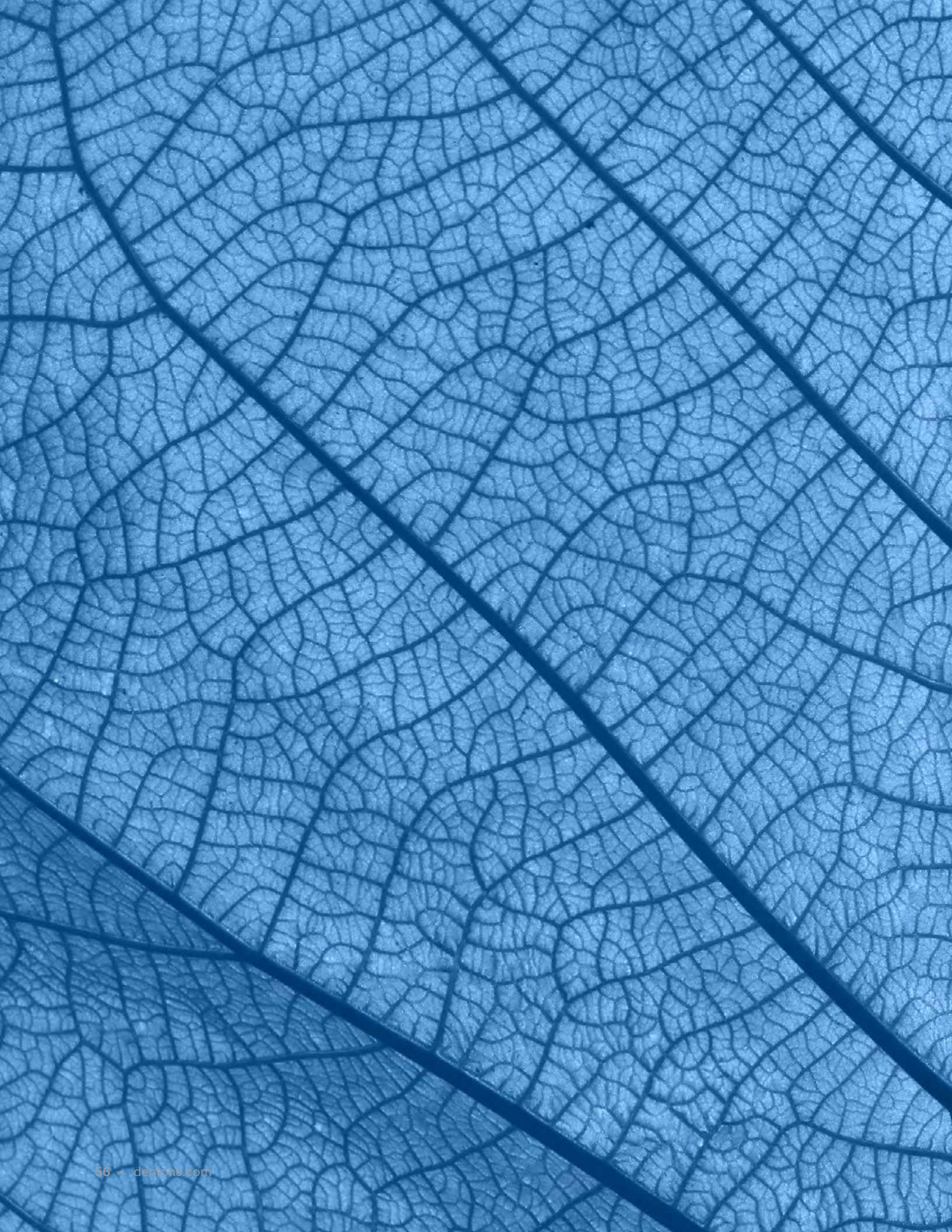

# Hungary

## Regulatory Developments and Roadblocks

The key regulatory instruments governing autonomous vehicles remained unchanged in Hungary over the past few years. Testing of autonomous vehicles on public roads is permitted; however, a test driver with special qualifications must always be present to monitor the systems and must be able to intervene if necessary. Most Hungarian policy-makers and key business figures support the implementation of modern technologies, such as 5G and electric vehicles, and the development of autonomous vehicles, even if other policy issues take precedence at certain points.

The former Minister of Technology and Innovation introduced the Artificial Intelligence Strategy of Hungary in 2020 for the next 10 years[1]. The Strategy mostly contains general aims for developments in the field of artificial intelligence. The Strategy includes the aim to form a supporting research and development environment for the symbiotic development of all professions necessary for the creation of the self-driving ecosystem. The Strategy aims to further develop testing facilities of autonomous vehicles and integrate them into the European testing environment.

The Minister responsible for transportation announced at a press event that Hungary is working on legislation to allow Level 3 autonomous driving.

The main regulatory obstacle to the introduction of comprehensive AV testing may be the lack of specific regimes for autonomous vehicles. In certain areas, for example in case of liability rules, the same regulations apply to all vehicles in the testing phase, irrespective of the specific needs of autonomous vehicles. Fortunately, however, the COVID-19 pandemic and economic disruption caused by the war in the Ukraine seemingly did not affect the ongoing autonomous vehicle projects.

## Driverless Testing and Deployment

The primary testing location for driverless vehicles in Hungary is the 250 ha (617acre) ZalaZone test park in Zalaegerszeg, West-Hungary[2]. The test park and its construction is highly supported by the Hungarian government. The test park offers a wide range of test facilities, including a high-speed handling course, smart city zone, motorway section and a special zone for testing advanced driver-assistance systems. The test park is supported by Ericsson's 5G technology installed on the communication towers of Magyar Telekom. The ZalaZONE Automotive Proving Ground facility was awarded with an Excellent Research Infrastructure Certificate by the National Research, Development and Innovation Office of Hungary[3] in 2021.

1 Hungary's Artifical Intelligence Strategy 2020 - 2030; Ministry for Innovation and Technology; May 2020
2 Zalazone: Welcome
3 ZalaZONE Automotive Proving Ground received Excellent Research Infrastructure Certificate – Zalazone – Research And Innovation

The Hungarian Road Management Company (Magyar Közút Nonprofit Zrt.) signed an agreement in 2019 with its Austrian and Slovenian counterparties to work together to prepare for collaborative, networked and autonomous vehicles.

The Hungarian-founded autonomous vehicle technology company, aiMotive, continues to carry out road testing in Hungary and in several other countries, including Germany, Austria, Latvia, Finland, France, Sweden and the USA using Toyotas and other vehicles equipped with aiMotive hardware and software[4].

In November 2022, global automotive giant Stellantis announced the acquisition of aiMotive to enhance Stellantis' artificial intelligence and autonomous driving technology, expand its global talent pool and boost the mid-term development of its STLA AutoDrive platform.[5]

# Connected Vehicles and Logistics

## 5G

In July 2019 – to fulfil the obligation stipulated in Directive (EU) 2018/1972 regarding 5G – the National Media and Infocommunications Authority of Hungary organized an auction for 5G frequencies in the 700 MHz, 2100 MHz, 2600 MHz and 3600 MHz frequency bands. The bidding companies purchased frequency usage rights for 15 years in three frequency bands for more than HUF 125 billion (approximately USD 320 million). The final results were published in 2020.

Although 5G deployment in Hungary is not robust, all major network providers offer 5G services. Additionally, infrastructure for 5G is continuing to be built (although it is generally only available in large cities and along major transportation routes at the moment).

4 Test schedule – aiMotive
5 Stellantis Accelerates Autonomous Driving Journey with Acquisition of aiMotive, a Leading Artificial Intelligence and Autonomous Driving Start-up | Stellantis

The use of 5G is widespread in autonomous technology testing; however – since its availability is limited – wide ranging tests have not yet started. Apart from Budapest, the ZalaZone test park was the first location in the country to have the proper infrastructure for 5G testing.

## Data privacy

The provisions of the General Data Protection Regulation (Regulation (EU) 2016/679) (GDPR) are directly applicable to data privacy issues in Hungary. However, there are a number of areas where the GDPR permits Member States to enact national legislation. In the course of implementing the provisions of the GDPR, the Hungarian Parliament adopted an amendment, the Right of Informational Self-Determination and on Freedom of Information Act ("Hungarian Information Act"). Autonomous vehicles are governed by both the provisions of GDPR and the Hungarian Information Act. All data collected by autonomous vehicles relating to individuals is considered "personal data," as these data are information relating to an identified or identifiable natural person (e.g., location data).

According to the rules pertaining to autonomous vehicles for development purposes, such vehicles must be equipped with a data recording device, which shall collect the following data: (i) name of the test driver; (ii) information on whether the vehicle operates in a manual or in an automatic mode; (iii) speed of the vehicle; (iv) GPS coordinates; (v) operation of the lighting and light signaling devices; and (vi) usage of the audible warning device.

Additionally, under the GDPR, personal data cannot be stored longer than it is necessary for the purposes for which it is processed. The rules pertaining to autonomous vehicles for development purposes specify that after the end of the test, the data specified above must be stored securely for 72 hours. Upon request, the data (including video and audio recordings) shall be sent to the competent authorities. In the case of a traffic accident, the data collected one hour before and one minute after the accident must be stored for three years.

## Electric vehicles

Electric vehicles are now a daily sight on the roads of Hungary. According to the data of the Ministry of Interior Affairs, the year-on-year sales growth of the number of fully electric vehicles in Hungary as of August 2022 rose by 63%, and at that time there were more than 30,000 electric passenger vehicles registered in Hungary[6]. The number of electric and hybrid vehicles registered in Hungary has doubled from January 2021 until August 2022 and passed 60,000[7].

The Hungarian government already launched several rounds of state-subsidized EV purchase programs; applicants were granted with subsidies of up to HUF 2.5 million (approximately USD 7,500). Companies are also encouraged to purchase EVs for the company fleets with certain corporate income tax rebates and reductions made available.

The National Bank of Hungary also proposed in a publication that instead of subsidized purchase programs, citizens should be entitled to a subsidy for the purchase of new electronic vehicles[8].

The government has decided to apply for funding under the Connecting Europe Facility EU funding instrument and requested an HUF 3.4 billion (approximately USD 8.6 million) subsidy for the installation of 127 ultra-high-speed e-chargers at 25 locations, along with the first hydrogen charging stations in the country[9].

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6 There are a lot of cars with green license plates already running in Hungary – Electric car drivers (villanyautosok.hu)
7 There are more than sixty thousand vehicles with green license plates (kormany.hu)
8 A fenntartható egyensúly és felzárkózás 144 pontja (mnb.hu)
9 Hydrogen wells and ultrafast chargers can be installed in Hungary – e-cars.hu and Government Resolution 1544/2022 (XI.16.)

Further, the government has passed legislation that a certain percentage of vehicles purchased under the public procurement regime must be zero emission or hybrid, and every second newly purchased city bus is required to run on clean energy, with the ratios gradually increasing for other types of vehicles as well until 2030[10].

The production of EVs began in the Kecskemét plant of Mercedes-Benz; the EQB model is the first mass-produced EV manufactured in Hungary[11].

In the beginning of 2022, Hungary and the KAMAZ group, Russia's biggest automotive manufacturer, announced their partnership. In the first phase of the cooperation, a research and development team will start working in Hungary and from 2025, the manufacturing of KAMAZ electric vehicles is planned to start[12].

The biggest vehicle engine manufacturing plant in the world, the Audi plant in Győr is also ramping up the production numbers of electric engines, which surpassed 250,000 units in 2021[13].

The construction of BMW's new production site in Debrecen, East Hungary, started in 2022, where 150,000 electric cars are planned to be constructed in each year starting in 2025[14].

## Driving Forces

- The Eötvös Loránd Research Network created a new, neural-net based model using big data for the control systems of autonomous vehicles that could allow for the introduction of Level 5 autonomy[15].
- aiMotive, the Hungarian-founded AV company, continues its road tests in Hungary[16] and abroad and announced further expansions and new solutions in 2021. In November 2022, Stellantis announced acquisition of aiMotive, which thus will continue its development programs under the wings of one of the largest automotive producers in the world[17].
- A collaboration started between the Technical University of Budapest, Ericsson and Magyar Telekom. The parties established a 5G test network in the vicinity of the university's buildings and intend to carry out the testing of 5G-based data communication solutions, allowing communication of autonomous vehicles and smart roads.
- The state-supported ZalaZone autonomous vehicles test park received further upgrades and is ready for complex high-capacity testing, including a high-speed handling course, smart city zone, motorway section and a special zone for testing advanced driver-assistance systems.
- The research center of leading AV technology developer AVL started operations in Zalaegerszeg (West Hungary), where the company intends to develop and test AV solutions[18].
- The Future Mobility Association was established with the aim to further spread information

10 Government decree prescribes the proportion of clean vehicles in Hungary – Electric motorists (villanyautosok.hu)
11 The first electric car of Hungary completed - Electric car drivers (villanyautosok.hu)
12 KAMAZ develops and manufactures electric vehicles in Hungary (kormany.hu)
13 Audi in Győr: a Hungarian success story | audi.com
14 The foundation stone of the BMW plant in Debrecen has been laid - Electric motorists (villanyautosok.hu)
15 Research network | ELKH – Eötvös Loránd Research Network
16 Test schedule – aiMotive
17 Stellantis Completes Acquisition of aiMotive to Accelerate Autonomous Driving Journey | Stellantis
18 AVL's new vehicle technology center has been handed over – autopro.hu

and facilitate research initiatives in the fields of electromobility and traffic management. The Association includes a number of high-profile Hungarian and international companies ranging from the energy sector, automotive manufacturers and IT solutions companies and also local municipalities and state-owned companies[19].

- The R&D center of Knorr-Bremse is working on the development of autonomous trucks. The company already produced prototypes that are able to autonomously maneuver in closed sites and have equipment, allowing Level 4 autonomy driving on highways[20].
- The Autonomous Systems National Laboratory was established under the initiative of the Hungarian State, aiming to facilitate research cooperation between research institutes, universities and companies. The laboratory focuses on research, development, patent, publications and workforce training in the fields of autonomous systems[21].
- Parts manufacturer active in AV development, Continental, invested further HUF 4 billion (approximately USD 12 million) to increase the capacity of its Artificial Intelligence Development Center, which aims to create next-generation automotive software solutions, making automated driving safe and affordable[22]. Besides its R&D bases in Budapest and Veszprém, Continental has recently inaugurated a new AV research centre in Szeged.

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19 Mobility of the future (jovomobilitasa.hu)
20 Smart trucks (knorr-bremse.hu)
21 Autonomous Road Vehicles | National Laboratory for Autonomous Systems (nemzetilabor.hu)
22 Continental Artificial Intelligence Development Center Budapest – Continental Hungary

# Italy

## Regulatory Developments and Roadblocks

In the past year, Italy seems to have made some small steps forward toward the implementation of self-driving vehicles.

Italy has long lacked specific legislation on the subject: a lack that was remedied in 2018 with the adoption of Ministry of Infrastructure and Transport's **Decree No. 90 of February 28, 2018** (known as the "**Smart Road Decree**") which provided for – *inter alia* – rules for testing autonomous vehicles on public roads, as well as for the establishment of a specific authority, the "Smart Road Observatory," in charge of coordinating experiments, initiatives and researches on autonomous driving vehicles and related road safety aspects.

While the rules in regard to the "testing" of self-driving vehicles (even if recent) were able to "absorb" the needs of the "driverless" world's technological developments, until July 2022 the general openness to the circulation of driverless cars found a difficult **obstacle** in **Article 46 of the Italian Highway Code,** which still defines vehicles as machines "driven by man" and, consequently, seems to rule out the possibility of cars not "governed" by humans.

There have been recent changes in the international legislation ruling autonomous driving that affected the Italian legal system and compel new requirements.

- On the one hand, the **Vienna Convention on Road Traffic** (a treaty signed in 1968, which governs international circulation of most worldwide countries) was recently modified by the introduction of **Article 34-bis** (entitled *"Autonomous driving"*), in force since July 14, 2022, which states that the requirement for a driver to be present in any moving vehicle is deemed to be fulfilled when the vehicle is using an autonomous driving system that complies with the relevant technical regulations (i.e., national technical regulations and any other international legal instruments applicable to motor vehicles, equipment and parts that can be fitted and/or be used on such vehicles) and national legislation on the functioning of the vehicle;
- On the other hand, the UN has adopted in the context of Regulation No. 157, an amendment with the purpose of extending the speed limit for automated driving systems for cars and light commercial vehicles up to 130 km/h on motorways: a limit that was previously set at 60 km/h. This specific measure will come into force in January 2023.

Stakeholders hope the international developments (to which the Italian legislator would have to conform as a contracting party in the context of the Vienna Convention on Road Traffic and as member of the UN) will – sooner or later – lead to specific rules that allow cars with a Level 3 ADAS[1] autonomous driving system to circulate within the territory of the Italian State[2].

In light of the above, the Italian Ministry of Infrastructure and Transport has already specified that the Regulation No. 157 – as recently amended – could be applied also in Italy, considering it does not violate Article 46 of the Italian Highway Code as the driver, also in vehicles with a Level 3 ADAS, still remains necessary[3].

There are some considerations:

- First, all changes introduced at the international level will still have to be transposed by the Italian legislator by means of specific internal rules. And, despite the "good intentions" expressed, the legislative changes necessary to make the circulation of self-driving car fully operational have not yet been introduced (first and foremost, Article 46 of the Italian Highway Code has not yet been amended by the latest legislation introduced on the subject), but...
- The biggest obstacle remains the Italian road infrastructure system: indeed, for the implementation of Level 3 ADAS, it will be necessary to adapt our country's roads and road infrastructures and lay the foundations to allow automated driving to spread in practice.

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1 i.e. *"Advanced Driver Assistance System,"* an autonomous driving system that allows *inter alia* the driver to not keep his hands on the wheel all time.

2 Indeed, the same Vienna Convention specifies that autonomous driving may leave its current experimental state only if the provision of the Convention itself will be transposed by national regulations, which – in any case – have the power to place limitations on its implementation.

3 The only change is that the driver will have to be able not only to take control of the steering wheel when necessary, but also to use the technology in consideration.

# Driverless Testing and Deployment

As pointed out in the context of last year's **Dentons Global Guide for Autonomous Vehicles 2022**, testing driverless cars is strictly ruled by the Smart Road Decree itself. This states:

- The only subjects allowed to perform AV tests are car manufacturers, universities and public/private research institutes;
- The testing activity is subject to the previous clearance of the road owner and to a specific authorization issued by the Italian Ministry of Infrastructure and Transport. In this respect, the authorization can be released only to vehicles already approved in a "non-AV" version and is valid only for a year (regardless of the fact that it could always be suspended or revoked for road safety reasons);
- Once the authorization has been issued, the actual testing can be performed only under specific conditions.

In light of the retraced regulatory framework, the most relevant experiment conducted in Italy is the one launched with the **Government's program** "***Sperimentazione Italia***," thanks to which – for the first time in the nation – a group of self-driving shuttles was put into circulation.

Additionally, the related project (better known as **Project SHOW**), funded by the European Union and the Iren Group), made it possible – starting in spring 2022 – to see driverless and fully electric shuttles circulating in the city of Turin: a city renamed – as a consequence – the "heart" of driverless mobility.

In this respect, Turin's transport councilor Chiara Foglietta proudly stated how:

> *"Turin is the first city in Italy to experiment with autonomous driving on the streets, and this is the first step towards alternative urban mobility. Smart mobility projects will have tangible effects on the quality of peoples' journeys and the environment."*

However, despite original expectations, the accessibility of the service to citizens was postponed due to difficulties related to the road traffic and the infrastructure system itself. In addition, the project is – in any case – still in an experimental phase: indeed, the service is limited to approximately 2 km of road section.

Another city that is emerging as a "living lab" of autonomous driving is Milan.

Particularly in the context of the "National Recovery and Resilience Plan" (**NRRP**) funds, specific ones have been earmarked for the development of "Mobility as a Service" ("**Maas**") projects.

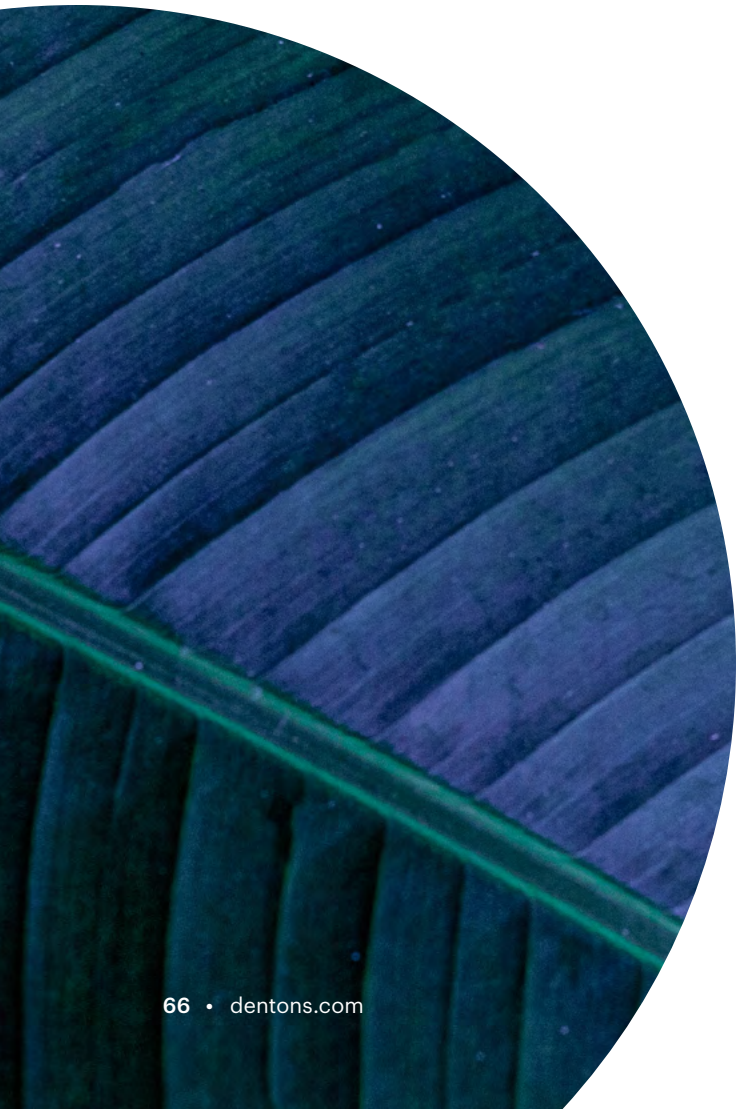
Indeed, between the end of 2021 and the beginning of 2022, a particular procedure was launched by both the Department for Digital Transformation ("**DTD**") of the Italian Council of Ministers Presidency ("*Presidenza del Consiglio dei Ministri*") and the Ministry of Infrastructure and Sustainable Mobility ("**MIMS**") to identify three cities to allocate the funds (for an overall amount of approximately 40 million Euros) in order to develop sustainable mobility services.

Milan (together with Rome and Naples) was one of the winners and (as a consequence) will convert part of its streets into a test circuit for self-driving cars, as part of the content of this project.

However, it's not really surprising that the Lombardy city will be the one that – as also stated by experts – will establish itself as the first "pioneer" of driverless and sustainable mobility.

Indeed – speaking about experiments – it's useful to point out that the **Italian University "Politecnico di Milano"** (which we already talked about in the *Dentons Global Guide for Autonomous Vehicles 2022* in respect to the autonomous driving simulator DiM400 developed by the same University), **has recently won the "Indy Autonomous Challenge," a competition that took part in Las Vegas on January 7, 2022 and which saw the latter triumph with the world's fastest self-driving car**.

The record set in the competition (278.4 km/h) was subsequently broken again on April 27, 2022, when the driverless car (called **'PoliMOVE**') reached a speed of 309.3 km/h.



# Connected Vehicles and Logistics

## 5G and Smart Roads

**The greatest novelty in respect to 5G and autonomous driving is the so-called "5G-CARMEN" project** ("*5G for Connected and Automated Road Mobility in the European Union*"), a project launched with the aim of testing new autonomous driving models with C-V2X technology and connected with the 5G network, along the well-known "Brennero street" (the road corridor connecting the Italian city of Verona with the German city of Munich).

(For detailed information about the project, visit: About – 5G CARMEN)

**The project is funded mainly by the European Union under the "Horizon 2020" programme and coordinated by the Bruno Kessler Foundation** ("**FBK**") and **has been allocated almost 20 million Euros** (of which approximately 14 million Euros came from European funds, while the remaining came from various commercial partners of the project).

**The experiment involves approximately 600 km of roads** through three countries (Italy, Austria and Germany), **along the Munich-Bologna motorway section**.

**The aim is to test autonomous and assisted driving functions and services connected to the 5G network:** particularly, vehicles capable of performing "co-operative maneuvers" (i.e. maneuvers that are performed based on the data sharing of speed and position with other vehicles), and lane changes were tested thanks to the network connection that allows data to flow between the various cars.

In respect to the project under consideration, the CTO of INWITT (one of the project partners that made its connectivity "infrastructure" available for the experimentation) has declared how the company was *"proud"* to have made its towers at disposal *"for a project that smacks of the future and that contributes to taking another important step towards a more digital and sustainable country and a Europe united also in innovation."*

**The matter of "connecting vehicles on roads" lends itself to the topic of Smart Roads**, representing another key step toward the implementation of self-driving vehicles.

(For an in-depth analyses on the topic, visit: Anas-smart-road-ENG.pdf (stradeanas.it)).

In parallel with the development of the recalled project – as part of the different "**Mercury Project**" coordinated by the Volkswagen Group, Movyon and Autostrade per l'Italia S.p.A. – **the first "smart motorway section" was opened in Italy**, covering a total length of 52 km along the motorway A1[4].

(In respect to this second project, you can refer to Mercury Programme – Autostrade per l'Italia).

Over the next few years, further motorway sections are expected to be added to the first Smart Road on the A1 motorway, providing additional services to the traffic users.

**The ultimate purpose is to make the entire motorway a smart and connected system in preparation for autonomous vehicles**, as clarified also by the chief executive officer of Movyon: "*Our goal is to continue to develop and make available on the road solutions that can connect interoperable with the on-board systems of any car maker, so as to make Italian roads ready for autonomous driving systems.*"

## Data privacy, data security, AI and liability

**Data governance is particularly relevant, as autonomous vehicles can collect a large amount of information relating to the car, the driver or the passengers**. Information that can identify directly or indirectly a natural person is considered personal data pursuant to the GDPR: this includes common personal data (such as the driver's complete identity), biometric data (such as voice or fingerprint recognition), behavioral data (such as driving patterns, habits and routes) and location data, but also other vehicle technical data that cross-referenced with the vehicle identification number (VIN) can be related to a natural person.

**In Italy, the data protection legal framework is mainly shaped by the GDPR, together with specific rules set forth by Legislative Decree no. 196 of June 30, 2003** ("**Data Protection Code**"). According to the GDPR, the processing of personal data is lawful if it is carried out relying on one of the legal bases provided by the law (including consent of the data subject). Moreover, additional requirements apply with regard to processing of special categories of personal data (such as biometric data).

In the autonomous driving scenario, there are many parties that can be involved in processing driver or passengers' personal data (such as the car manufacturer or the car software developers/providers). Such parties may hold different privacy roles and consequently may have to comply with different obligations. For example, the data controller – meaning who decides the purposes and means of the processing – must be able to demonstrate the compliance with the GDPR's provisions and, by way of example, must process personal data respecting the data protection principles set forth by the GDPR (such as data minimization, storage and purpose limitation) and must inform data subjects (e.g., car owners) on the processing activities carried out.

4 In particular, the sections of interest to the Smart Road for the A1 motorway are: (i) 26 kilometers of the motorway section between the northern part and the southern part of Florence, and (ii) 26 kilometers on the Bologna urban node.

In this respect, the European Data Protection Board has adopted the *"Guidelines 1/2020 on processing personal data in the context of connected vehicles and mobility related applications,"* aiming at providing a practical guidance for the stakeholders involved in the processing of personal data in relation to the non-professional use by data subjects of connected vehicles. The guidelines focus on the processing of personal data either inside the vehicle, exchanged between the vehicle and personal devices connected to it (e.g., the user's smartphone) or exported to external entities (e.g., vehicle manufacturers, infrastructure managers, insurance companies or car repairers).

**In addition, the collection and storing of information in a vehicle may trigger the application of the e-Privacy Directive**, as implemented in Italy within the Data Protection Code. In particular, to the extent that a vehicle may be considered a user's terminal equipment, the storing of information – or access to information already stored – in such vehicle or in its connected devices may require the prior consent of the car owner.

**Autonomous cars are connected to the Internet (or other networks) and therefore subject to cyber-attacks**, The European and Italian cybersecurity legal framework will have to be taken into account, including the NIS 2 Directive and the proposed Cyber Resilience Act (also with regard to the vehicles software and hardware components connected to the Internet or other networks).

**Moreover, given that autonomous vehicles increasingly rely on systems based on Artificial Intelligence and machine learning**, it should be taken into account the European framework on AI (in particular, the draft AI Act). In this respect, the autonomous vehicles' AI systems will likely be considered high-risk systems, which will be subject to specific legal requirements and have to undergo conformity assessments. Moreover, with regard to non-contractual civil liability, the newly proposed AI Liability Directive will ease the burden of proof for persons claiming compensation for damages caused by AI systems, without prejudice to the national laws' general civil liability provisions.

## Sustainable Mobility and Electric Vehicles

**We cannot talk about "driverless cars" without considering the topic of "sustainable mobility:"** indeed, the implementation of AV technologies goes "hand in hand" with the topic of electric vehicles and "green" transport.

In this respect – although with some contradictions – **Italy seems to have taken the issue very seriously** (in order also to comply with the "UN Agenda 2030 for Sustainable Development" objectives and with the European Union "Green Deal") **through the adoption of numerous initiatives to encourage the use of electric vehicles**, most of them conceived in the context of the already mentioned "National Recovery and Resilience Plan."

These initiatives include:

- Incentives for electric and hybrid cars, such as purchase bonuses and exemption on the car tax stamp for vehicles without emission and for plug-in hybrid cars;
- Benefits to buy smart mobility means such as electric scooters and e-bikes;
- Higher taxes for the most polluting vehicles;
- Provision of public funds to be destined to research funding and green mobility and alternative energy initiatives;
- **Redevelopment of urban areas in the logic of sustainable mobility with a gradual "dememorization of transport" with ecological methane and hydrogen or electric buses and hydrogen and electric trains for rail transport**.

The redevelopment shows how these initiatives and autonomous vehicles can work together collaboratively.

Indeed, according to the experts, one of the sectors that will be most affected by the coming of self-driving vehicles is that of public transportation.

In this respect, the already mentioned Turin shuttles of the Project SHOW present a clear example of the importance to rethink such public services for a driverless and electric future.

Finally, it should be pointed out that Italian car manufacturers are starting to focus more and more on the development of electric autonomous vehicles. For instance, the new FIAT 500 electric car already gives a "taste" of autonomous driving, even though the system is still on the "ADAS scale," only at level 2.

## Driving Forces

As can be deduced by the previous sections, besides "private parties," **public administrations, Universities and research institutes play a fundamental role with regard to the development of AV systems in Italy.**

In this regard, it might be advisable to recall that in 2020 the Italian Ministry of Infrastructure and Transport and the Ministry for Technological Innovation (most of whose functions, following the recent elections, were absorbed by the Ministry of the Economy), had signed a **"Memorandum of Understanding on Innovation for Autonomous and Connected Driving in Urban and Extra-Urban Areas"** (that will entry into force until 2023[5]) in order to support – as it can be read in the context of the latter – *"the constant cooperation between institutions, private companies and the academic world, with the aim of linking research and training activities with the needs of the production world, also with a view to creating new professional skills in the automotive sector and related mobility services."*

5 More specifically, Article 6 provides that: *"1. this Protocol shall have a duration of three years from the date of its signature. 2. Tacit renewal is excluded. 3. Any renewal, for a period of equal or different duration, may be requested in writing by either Party within three months of its expiry. Each Party receiving the renewal proposal, within 30 (thirty) natural and consecutive days from receipt of the proposal, shall undertake to communicate in writing its acceptance or refusal to the renewal."* Therefore, it will be seen during 2023 whether the recalled parties will decide to renew the initiative itself (being excluded, as can be inferred by Article 6, the tacit renewal).

In order to achieve the aforementioned goals, both parties undertook, in accordance with **Article 3** of the Memorandum itself, to carry out – each within the scope of its competence – communication, disclosure, study and reconnaissance activities in respect to the autonomous vehicles development.

In addition, the Ministries undertook to promote any useful action to implement experimentation and collaboration activities between public bodies and private entities in the AV sector, expressing the will to carry out this kind of initiatives and to provide infrastructure systems for the testing activities.

(The **Memorandum**: Guida_Autonoma_MID_MIT_.pdf)

**As far as universities and research institutes are concerned**, our country can boast some "excellencies," such as the already mentioned the Italian **"Politecnico di Milano**," that has contributed to the scope with the autonomous driving simulator DiM400 and the world's fastest self-driving car.

Another worthy reality in this respect is the "**University of Parma**," which already in 2009 set up **VisLab** ("*Vision and Intelligent Systems Laboratory*")[6], a start-up company that was established in the "university environment" in order to develop systems for artificial vision with applications in autonomous guided vehicles and that – already in 2009 – has realized a first prototype of automated vehicle (called "**Deeva**") equipped with sensors, micro-cameras and lasers capable of providing 360-degree sensory coverage around the entire car.

In 2019, Vislab obtained authorization from the Ministry to test the "vehicle" developed and contextually started a cooperation with Anas S.p.A., which – as recalled before – is carrying out the "Smart Road" project in our country (see in this regard the *Dentons Global Guide for Autonomous Vehicles 2022*).

(For more information in this respect: VisLab | Extend Your Vision – Extend Your Vision)

Last but not least, it is useful to point out that one of the areas that will be most important in the future for the development of self-driving cars also in our country is Artificial Intelligence (AI).

Indeed, if one looks into the future perspectives, for the implementation of ADAS Levels 4 and 5 (in respect to this latter level, in particular, there will be no role for the driver in conducting the vehicle) the development of a system completely based on IA and machine learning will be required.

Also from this perspective, Vislab represents an "excellence" with its activity of research on IA systems applied to the vehicle sector.

The implementation of this type of system, however, opens up a series of problems from a legal point of view, the first of which concerns how the liability arising from the use of these vehicles will be handled in future. In this regard, there is already part of the Italian legal doctrine that speaks of the possibility of recognizing "machines" as subjects endowed with "legal autonomy" and, therefore, as directly responsible for damages caused.

All we have to do, in the meantime, is wait for technological and regulatory developments.

6 Please note that in 2015, Vislab was acquired by the American company Ambarella.

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# Poland

## Regulatory Developments and Roadblocks

The Act on Electromobility and Alternative Fuels, effective January 2018, marked an important step toward the development of the autonomous vehicle market in Poland. The Act amended the Road Traffic Act to allow autonomous vehicle testing. It introduced to the Polish legal system a definition of "autonomous vehicle" as a motor vehicle equipped with systems controlling the vehicle's movement and enabling movement without interference by the driver, who can take control of the vehicle at any time.

In September 2019, the government adopted the **"Strategy for Sustainable Development in Transport until 2030"** emphasizing its focus on autonomous vehicles deployment "in the foreseeable future." The strategy underlines the need to provide support for the effective functioning and competitiveness of the domestic automotive market and the IT market, through setting up the National CAD Contact Point, defining the rules for testing and introducing autonomous vehicles for use in a way that ensures safety and social acceptance for such technology[1].

The most important works at the government level aimed at preparing for autonomous road transport have been conducted by the Ministry of Infrastructure. This includes the project **"Poland's Road to Transport Automation" (AV-PL-ROAD)**, the goal of which was to set up a green book of autonomous vehicles, create a CAD contact point and a road map for the introduction of autonomous vehicles in Poland.

One of the results of the AV-PL-ROAD project was the establishment of the **Autonomous and Connected Vehicles Competence Center (CK: PAP)** within the structure of the Motor Transport Institute in June 2021. The overriding goal of the Center is to support the government administration in the efficient and safe implementation of autonomous vehicles in Poland.

Recent years have also seen initiatives at the local level.

- In July 2019, the Mayor of Rzeszów signed a letter of intent with companies responsible for network infrastructure, telecommunications and cybersecurity regarding a partnership aimed at research and implementation of 5G technology. It will support the introduction of autonomous buses in the city, which will initially run on a line connecting two railway stations, and ultimately on the route from the city center to the airport.
- In September 2019, tests of automated electric minibuses were carried out in Gdańsk with a view to public passenger transport, in particular "first and last mile" connections, all under the aegis of the Sohjoa Baltic project.
- Other groundwork preparations for autonomous vehicles have taken place in the city of Jaworzno. The city has mapped streets and their surroundings to create a 3D map to support navigation for autonomous vehicles. The city also intends to develop legal, technical and organizational guidelines to ensure safety on the roads where autonomous vehicles will drive.

1 The strategy is available at: **https://www.gov.pl/web/infrastruktura/projekt-strategii-zrownowazonego-rozwoju-transportu-do-2030-roku2** (only in Polish).

- In January 2020, autonomous trams were tested in Cracow. The test was conducted in cooperation with Cracow University of Technology – Institute of Rail Vehicles, MPK Kraków and companies Newag, Cybid and Medcom. The aim of the project is to introduce autonomous trams to Cracow[2].
- In February 2020, the Autonomous Vehicles Working Group was established in Gdańsk. The inaugural meeting was attended by representatives of the Governor of the region, businesses interested in autonomous vehicles, clusters, and scientists. The task force is seeking to create the conditions for the development and sale of services and products related to autonomous vehicles.

According to experts, one of the roadblocks to faster implementation of autonomous vehicles in Poland is relatively strict regulations governing testing. Under current laws, such tests cannot take place if local residents raise objections. The government is aware of the problem and is working on liberalization of the current regulations.

"Before autonomization comes to us for good, there are many legal, infrastructural and technological challenges to be solved that require a systemic and coordinated approach. One barrier is, for example, the law, which in many cases does not keep pace with technical development. The technology is not good enough to deal with every potential road scenario. There is also the issue of building an expensive infrastructure that will be in a kind of symbiosis with the cars of tomorrow."[3]

**Marcin Ślęzak**
Head of the Motor Transport Institute's Connected and Autonomous Vehicles Competence Center

"There are many necessary changes. For example, there are problems with organizing testing. However, changes to the infrastructure seem to be more urgent. In both Poland and Europe, it is not always in a good condition – and sometimes it does not meet the requirements of autonomous vehicles. Beginning with road markings, not all roads have lanes marked with white lines that the software must 'see' to keep the vehicle on course."[4]

**Michał Sikora**
President of the Polish Automobile and Motorcycle Federation

2 Please see the report "Autonomiczny Transport Przyszłości," Polski Instytut Ekonomiczny, Ministerstwo Infrastruktury, kwiecień 2020 r. (available at https://www.gov.pl/web/infrastruktura/autonomiczny-transport-przyszlosci).
3 Please see https://www.its.waw.pl/download,5063,edd8247b261064fe2071c7c3a0232551,pl.html.
4 Please see Autonomous vehicles: A promising but distant future - Public Transport (transport-publiczny.pl).

# Driverless Testing and Deployment

Following the amendment of the Road Traffic Act in 2018, companies can test autonomous vehicles on public roads in Poland if safety requirements are met and they have a permit from the relevant traffic management authority.

### i. Application – formal requirements

The organizer of autonomous vehicle testing must submit a written application to the traffic authority responsible for management of the road on which the testing is going to take place. The application should state at least:

- full name and address/company name and registered office of the test organizer;
- place and date of start/end of the testing;
- planned route;
- a list of people responsible for securing the route of the autonomous vehicle; and
- signature of the organizer/representative.

Mandatory attachments:

- proof of compulsory civil liability insurance for damage arising in connection with such testing, which should take effect upon obtaining a permit for autonomous vehicle testing;
- proof of payment of the premium for this insurance; and
- a copy of the decision on professional vehicle registration.

### ii. Consultations with residents

When the full application is submitted, the traffic management authority conducts local consultations with residents of the municipality (Polish: gmina) where the autonomous vehicle testing is to be conducted, by placing the application on its website and setting a window of at least seven days for comments. Property owners along the planned route of the autonomous vehicle may voice objections.

### iii. Permit from the traffic management authority

The traffic management authority may issue a permit after obtaining the consent of the road administrator and the opinion of the relevant regional police officer regarding the impact of testing on traffic flow on the planned route of the vehicle. If such consent and opinion are not obtained, the permit will not be granted. In addition, the traffic management authority will not issue a permit where there is a risk that the autonomous vehicle testing will pose a threat to human life or health or to property of great value, or an objection is raised by an owner of real estate located along the planned route of the autonomous vehicle.

### iv. Obligations of the test organizer

Once a permit is issued, the test organizer is required to:

- enable the police to perform activities to ensure road safety and protect human life and health and property during the testing;
- ensure that during the testing, in a place intended for the driver, there is a person with a driving license who can take control of the vehicle at any time, in particular in the event of a road safety hazard;
- publicly disclose information about the testing and the route of the autonomous vehicle; and
- provide the Director of the Transport Technical Supervision with a report on the testing of autonomous vehicles and their equipment, in accordance with the form set out in the regulations, within three months of completing the tests.

As the presence of a backup driver during testing is compulsory, all autonomous vehicles must be equipped with a steering system and other elements the driver requires to physically take control of the vehicle. As a result, it is currently impossible to conduct testing of fully autonomous vehicles without a human at the wheel (Level 5 AVs as defined by SAE).

The current legal framework does not permit consumers to use Level 3-5 AVs on public roads in Poland.

Wider deployment of autonomous vehicles should be stimulated by the **UN Regulation on uniform provisions concerning the approval of vehicles with regard to Automated Lane Keeping System (ALKS),** adopted in June 2020, which is the first binding international regulation on Level 3 AV. It took effect in January 2021 and is applicable in EU Member States.

The UN Regulation allows for the introduction of automated vehicles equipped with the Automated Lane Keeping System on roads where pedestrians and cyclists are prohibited and which, by design, are equipped with a physical separation that divides the traffic moving in opposite directions. In a first step, the Regulation limits the operational speed to 130 kph maximum (effective as of January 2023; previously the limit was 60 kph5) and to passenger cars. Moreover, the driver should always have an option to override the system at any time.

# Connected Vehicles and Logistics

## Data privacy

Much of the data generated by autonomous vehicles will relate directly or indirectly to identified or identifiable individuals and thus may be classified as "personal data" within Article 4(1) GDPR. Such personal data may include vehicle data insofar as it can be associated with a natural person.

According to the GDRP (a principal data protection regulation in Poland), the processing of personal data is lawful if processed with the consent of the data subject concerned or on some other legitimate basis laid down by law. Special rules apply to processing sensitive data (e.g., biometric data or health-related data). Processing of such data is prohibited unless the data subject has granted explicit consent (a law may rule out this option), personal data are manifestly made public by the data subject or processing is necessary for specific reasons listed in the GDPR.

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5 Please see UN Regulation extends↑ automated driving up to 130 km/h in certain conditions | UNECE.

Under the GDPR, the **data controller** (e.g., a vehicle manufacturer gathering data on the wear and tear affecting the vehicle's parts to improve its quality) is obliged, inter alia, to:

- Have appropriate legal grounds for the processing of personal data;
- Implement appropriate technical and organizational measures to be able to demonstrate that processing is performed in accordance with data protection laws and ensure a level of security appropriate to the risk;
- Fulfil the information obligations and respect the rights of **data subjects** (e.g., car owners) (the right to be informed, the right of access, the right to rectification, the right to erasure, the right to restriction of processing, the right to data portability, the right to object to processing, the right not to be subject to automated individual decision-making, including profiling);
- Follow the principles of data protection by design and default;
- Maintain records of processing activities (there is a limited exemption from this obligation);
- Notify a personal data breach to supervisory authorities;
- Carry out a data protection impact assessment (DPIA), if required; and
- Designate a data protection officer (DPO), if required.

The data controller may use a third party to collect and process personal data on its behalf (e.g., an equipment manufacturer or automotive supplier). In such case, the data controller should ensure that it has a written contract with the **data processor** setting out the subject-matter and duration of the processing, the nature and purpose of the processing, the type of personal data and categories of data subjects and the obligations and rights of the controller.

You may also check EDPB Guidelines 1/2020 on processing personal data in the context of connected vehicles and mobility-related applications adopted on 9 March 2021, available at https://edpb.europa.eu/our-work-tools/our-documents/guidelines/guidelines-012020-processing-personal-data-context_it.

## 5G

On 6 March 2020, the President of the Office of Electronic Communications (UKE) announced a highly anticipated 5G auction. The auction was supposed to cover four nationwide frequency licenses in the 3.6 GHz band, and each booking included an 80 MHz block valid until 30 June 2035. The reserve price for each block had been set at PLN 450 million (approximately USD 120 million). Following the outbreak of COVID-19, the auction was suspended and not resumed. Instead, the government decided to launch a new auction.

On December 20, 2022 consultations of the auction documentation for "C" band (3480–3800 MHz) were launched. The subjects of the auction are four 80 MHz blocks in the 3480-3800 MHz band, for which the winners will receive 15-year licenses. The starting price for each of them is PLN 450 million. The auction procedure should take about 190 to 240 days. It is anticipated that C-band should be made available to operators in August 2023.

In the meantime, operators are using already possessed spectrum to offer commercial 5G networks for their subscribers. However, such commercial networks face some limitations on data speeds and territorial coverage.

## Electric vehicles

The key piece of legislation regulating the electric vehicle market in Poland is the Act of 11 January 2018 on Electromobility and Alternative Fuels, which transposes Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

It sets out a list of incentives for owners of electric vehicles, including:

- Exemption from excise duty,
- More favorable depreciation write-offs,
- Possibility of using bus lanes,
- Free parking in paid parking zones.

The Act also aims to establish the legal framework for the development of the infrastructure required for electric vehicles. One of the recent amendments to the act introduced a requirement to design and construct residential and non-residential buildings so that they can host EV charging stations.

In July 2021, the Ministry of Climate and Environment announced a new support scheme named "My Electric Vehicle." The goal of the program is the reduction of air pollutant emissions, e.g., by co-financing purchase or lease of zero-emission vehicles.

Electromobility Poland SA, a state-controlled joint venture established in 2016 by four Polish energy companies (Tauron, Enea, Energa and PGE), is working on a Polish electric car under the Izera brand name. Prototypes of Izera were presented in July 2020.

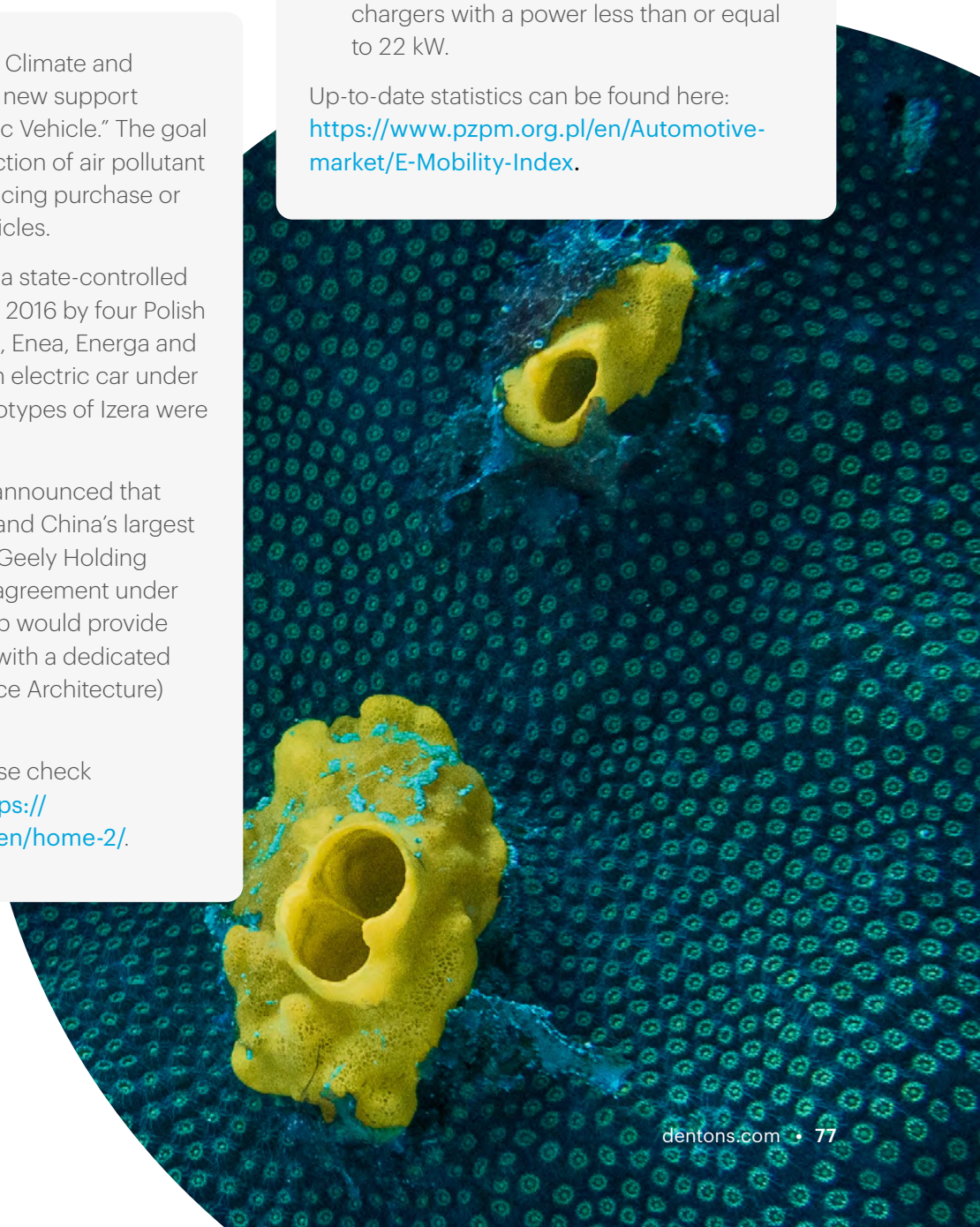
In November 2022, it was announced that ElectroMobility Poland SA and China's largest private automotive group (Geely Holding Group) signed a licensing agreement under which Geely Holding Group would provide ElectroMobility Poland SA with a dedicated SEA (Sustainable Experience Architecture) platform for electric cars.

For more information, please check https://izera.com/ and https://electromobilitypoland.pl/en/home-2/.

According to publicly available data, at the end of November 2022, there were:

- 59,187 electric passenger cars registered in Poland (compared to 35,222 in November 2021), namely 29,780 fully electric vehicles (BEVs) and 29,407 plug-in hybrids (PHEVs). The number of hybrid passenger cars and vans increased to 461,881 units (compared to 313,580 in November 2021).
- 2,527 charging stations for electric vehicles in Poland (compared to 1,813 in November 2021). 29% of them were fast DC charging stations and 71% were AC chargers with a power less than or equal to 22 kW.

Up-to-date statistics can be found here: https://www.pzpm.org.pl/en/Automotive-market/E-Mobility-Index.



# Driving Forces

**Motor Transport Institute's Connected and Autonomous Vehicles Competence Center (CK:PAP)**

The Connected and Autonomous Vehicles Competence Center was established as part of the "Polish Road to Automation of Road Transport" (AV-PL-ROAD) project, an initiative of the Motor Transport Institute, the Ministry of Infrastructure, and the Faculty of Transport of Warsaw University of Technology.

The Center serves as an expert institution and supports the government administration, among others, in the implementation of EU law. It also serves as a national contact point in the field of connected and autonomous vehicles. Additionally, it aims to coordinate and monitor research and development works. Plans of the Center include the expansion of advanced technical facilities of the Motor Transport Institute and the development of infrastructure, enabling in-depth research of technologies supporting the development of road transport automation.

The employees of the Center include experts in the field of road transport automation, intelligent transport systems (ITS), road safety, transport psychology and national and international vehicle type-approvals.

Marcin Ślęzak – Head of CK:PAP, Director of the Motor Transport Institute

For more information, please check: https://ckpap.its.waw.pl/en/about-us/.

**Ministry of Infrastructure**

The Ministry of Infrastructure is a central government body responsible for formulating transport policy. In recent years, the Ministry of Infrastructure has conducted works intending to enable the development of the unmanned aerial vehicle industry and preparation for the autonomous transport system. The Ministry has been supervising, e.g., the AV-PL-ROAD project, which was the most important initiative devoted to autonomous transport at government level, serving to create a green book of autonomous vehicles, conduct social research on the subject and prepare a roadmap for the implementation of autonomous vehicles in Poland.

Andrzej Adamczyk – Minister of Infrastructure

**Robotec.ai**

Robotec.ai is a software company that develops high-tech solutions for automated and connected vehicles. Its multidisciplinary team consisting of experts in robotics, electrical engineering, software development, machine learning and human factors supports car manufacturers in the field of software monitoring drivers and passengers. The company also implements machine-learning technologies in vehicles.

Michał Niezgoda – CEO at Robotec.ai

For more information, please check: https://robotec.ai/services/.

In Poland, there are several thriving centers dealing with autonomous driving. The works are carried out, among others, by Aptiv and Intel.

**Aptiv**

Aptiv's center in Cracow has been operating since 2000 and is considered one of the most innovative and developed research centers in Aptiv's portfolio. Currently, its local staff numbers almost 3,000 people, including 2,000 engineers. Offices are located closer to the center of Cracow, while in the suburbs there is a machine park and a special test track (SmarTrack), which is the first test track for autonomous vehicles in Poland[6].

The engineers from Aptiv's technical center in Cracow are developing a range of technologies for autonomous vehicles, including software,

6 Please see https://www.youtube.com/watch?v=iG9QTuRj0N0. Please also check: https://motofocus.pl/producenci-czesci-i-dystrybutorzy/96473/wizyta-w-centrum-badawczo-rozwojowym-aptiv-w-krakowie (in Polish).

autonomous driving and multimedia audio systems, navigation, entertainment and communication systems, e.g., innovative gesture recognition systems. While some solutions are already available on the market, the company's local team is also working on technologies of the future for the automotive industry[7].

Tomasz Miśniakiewicz – Country Director at Aptiv

**Intel**

Intel has recently announced the opening of a new competence center in Gdańsk. In its new laboratories, employees will work on projects related to autonomous vehicles, artificial intelligence, machine learning and data storage security.

It is worth noting that the campus in Gdańsk is already Intel's largest research and development center in the European Union[8].

On 7 June 2022, the Polish Motor Transport Institute organized an international conference "AV-POLAND Autonomous Future of the Road Transport." It was the biggest event of the year related to autonomous vehicles in Poland. A recording is available in English at https://www.youtube.com/watch?v=NUgVQwmjBTs.

For more information, please check https://avpoland.com/en/.

On 12–13 October 2022, the Polish Association of Automotive Parts Distributors and Manufacturers (SDCM) organized the "XVII Automotive Industry and Market Congress." One of the panels was devoted to autonomization of transport and other technological challenges and Polish law.

Recordings from the congress are available in Polish at https://kongres.sdcm.pl/relacja.

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7 Please also check https://www.aptiv.com/pl/aptiv-w-polsce.
8 For more, check https://constructionmarketexperts.com/en/news/intel-to-invest-in-artificial-intelligence-in-gdansk/

# South Korea

## Regulatory Developments and Roadblocks

Key Korean government agencies and their roles

| Government agencies | Role | Governing/Relevant Laws |
|---|---|---|
| Ministry of Land, Infrastructure and Transport (MOLIT)<br>(n.b. KATRI (Korea Automobile Testing & Research Institute) is an institution under MOLIT) | • Provides ITS (Intelligent Transport Systems) services and platforms.[1]<br>• Makes Laws and Regulations (e.g., announces safety standards for Level 3 AVs). | **Motor Vehicle Management Act**<br>This is a law governing the management, performance quality and safety of automobiles. It serves as the basis for operating AVs, e.g., provides the definition of AV, allows test driving, etc.<br>The Enforcement Decree of this Act stipulates the requirements for safe driving and test driving of autonomous vehicles.<br><br>**Guarantee of Automobile Accident Compensation Act**<br>This is a law that governs compensation for damage caused by the operation of automobiles. The Act specifies the obligations of the car owners, e.g., to subscribe to an insurance policy. (A requirement for insurance, even for the operation of test-driving, is stated in this law as well.) |
| Ministry of Science and ICT (MSIT) | • Information and Communication Technology Infrastructure<br>• ICT Service/Platform<br>• Frequency Distribution | Transport for NSW. |
| Korean National Police Agency (KNPA) | • Governs/regulates matters occurring on the roads (e.g., accidents).<br>• Issues driving licenses/ verifies authenticity of the licenses.<br>• Builds high-tech infrastructure in response to development of AVs (currently in the process). | **Road Traffic Act Amendment**<br>This is a law that aims to resolve traffic problems on the road and regulate safe driving.<br>The act originally assumed that a "driver" is a "human" and thus "driving" requires operation of a steering wheel and brake by a human being. However, on April 20, 2022, a partial amendment to the Road Traffic Act became effective. The new amendment adds the definition of a "self-driving motor vehicle" as a motor vehicle (i) which can move on its own without the control of a driver or passenger, and (ii) is equipped with a self-driving system. A "self-driving system" means automated equipment, software and all other related devices that enable the motor vehicle to move by recognizing and judging surrounding circumstances and road information on its own without the input of a driver or passenger. In addition, using vehicles, horse-led carts or trams on the road through a self-driving system is also included in the definition of "driving." |

1 Major ITS services and platforms designed and provided by MOLIT include AFC (Automatic Fare Collection), ETCS (Electronic Toll Collection System) and ATES (Automatic Traffic Enforcement System). The government provides national ITS data collected as such to the private sector to help the private sector with enhancing and expanding their ITS services. (See ITS brochure for further details; **https://www.molit.go.kr/upload/cyberJccr/pdf%20file/ITS**).

| Government agencies | Role | Governing/Relevant Laws |
|---|---|---|
| Ministry of Trade, Industry, and Energy (MOTIE) | • Advancement of Autonomous Technology<br>• Commercialization of Technology<br>• SME Globalization and Trading Support | |
| Korea Transportation Safety Authority (TS)<br>(Korea Automobile Testing & Research Institute) | • Conducts research before the government makes laws.<br>• Involved in drafting and publishing transportation-related policies. | |

## Rules, regulations, laws and guidance at the federal level

### Autonomous Vehicle Act

- **Effective from May 1, 2020**
- **Objectives:** Provides necessary support/infrastructure for introduction, spread and safe operation of AVs. Regulates necessary requirements in relation to AVs. Ultimately, the Act aims to contribute to the improvement of the public's living conditions and the development of the national economy by promoting and supporting the commercialization of AVs.
- **Key parts of the act**
  - » (1) Designation of autonomous driving safety zones: The act offers a basis for the Minister of Land, Infrastructure and Transport's authority to designate "autonomous driving safety zones" and certain places on public roads where people can operate their vehicles autonomously. In designating the zones, the Minister can consider whether the infrastructure has been created to support safe operation of AVs (Article 6 of the Act). In line with this provision, the Enforcement Decree of this Act provides the regulations on the standards and procedures for designating autonomous driving safety zones. More specifically, the Enforcement Decree requires that road structures, autonomous driving cooperation systems and the construction status of detailed road maps be considered when designating such safety zones. When designating or changing such safety zones, the authority shall notify autonomous vehicle manufacturers, etc. (Article 5 of the Enforcement Decree of the Act).
  - » (2) The Autonomous Vehicle Act enables the designation of AV pilot zones in which paid passenger ride and delivery services using AVs are allowed.
- Unconventional vehicles not complying with the Korea Motor Vehicle Safety Standards (KMVSS),[2] such as delivery robots, will be allowed if safety measures are provided by the operating entity.
- Pilot tests of the new V2X technology will also be allowed in the AV pilot zones.
- **Designation procedure:** Application by municipal and provincial governors Committee Review (chaired by MOLIT minister) Designation of AV pilot zone.

2 KMVSS refers to the corresponding standards of the Automobile Management Act of Korea. (a.k.a. Motor Vehicle Management Act) – See Chapter III of the Act for further details.

**Three guidelines were announced on December 15, 2020**

*"'Guidelines currently, and thus, do not have binding effect – persuasive/recommendation only. Published as government publications with the statement "considering the complex nature of the matter [AVs], it is hard to institutionalize in a short period of time" (press release by MOLIT on December 15).*

### 1. The Ethics Guideline for AVs and Stakeholders

- Press release: *"The principal rule is that AVs shall be designed and manufactured in a manner such that protection of human life can be prioritized. Accordingly, rules such as 'human lives shall be prioritized over property' and 'if avoiding accidents completely is impossible, [devise a method to] minimize the loss of life' are included in the Guideline. Also, there are some ethics guidelines in relation to the user of the AV, such as 'ones operating an AV should not infringe others' freedom and rights' and 'the user is required to take safety education to operate an AV properly.'"*

### 2. The Guideline for Cyber Security

- Based on the UNR No.155 introduced in June 2020, MOLIT has written the Guideline for Cyber Security focusing mainly on a recommendation for automobile manufacturers. The guideline was announced on December 15, 2020.

- *According to the guideline, a manufacturer should "preserve security by utilizing cybersecurity management procedures, for example, by 'detecting and notifying users of risks, based on a 'risk evaluation process;' reducing the level of risk by utilizing a 'security measures process;' carrying out a 'verification process' to confirm the adequacy of the security measures."* (press release)

» MOLIT is planning to revise the relevant law to in-corporate the guidelines and obligate the relevant parties to take actions to preserve cybersecurity.

### 3. The Guideline for the Manufacture/Safety of Level 4 AVs

» The government provided a system for commercialization of Level 3 AVs in July 2020 and is currently in the process of introducing one for Level 4 AVs. The guideline was announced on December 15 to promote technology development for AVs by providing recommendations on necessary requirements for the safe operation/design/manufacture of AVs before the government's official enactment of the law.

» **The guideline is composed of three parts**

- (i) System security area;
- (ii) Safe operation area;
- and (iii) Safety education and ethical considerations.

**Part (i)** provides guidelines to minimize design defects and malfunctions of the AV and to protect the AV from cyber threats. **Part (ii)** aims to minimize the risk of accidents in the operation stage by providing guidelines for safe interaction among the users of the road (e.g., pedestrians, other cars, etc.) under diverse road conditions. **Part (iii)** concerns proper design and operation of AVs.

## Key governmental policies on AVs

### Regulations for Drivers of Self-Driving Motor Vehicles

- On April 20, 2022, a partial amendment to the Road Traffic Act became effective. The amendment includes regulations applicable to drivers of self-driving vehicles. Drivers of self-driving motor vehicles that are not equipped with a complete self-driving system will be required to immediately respond to the demand of the system to drive the car in person. The drivers must take direct control of the steering wheel and braking system to assume driving. A violation of this obligation may be subject to a fine of up to KRW 200,000 or detention or penalty.[3]
- In the case of a road without a center line among roads where sidewalks and roadways are not separated, drivers of self-driving motor vehicles have obligations such as maintaining a safe distance, slowing down or temporarily stopping to protect pedestrians.

### 'ICT Regulatory Sandbox'[4]

The aim of this scheme is to help the market entry of new technologies and services that are acknowledged to be innovative and safe. The scheme allows technology and service developers to conduct demonstration tests (albeit with restrictions as to time, place, and scale).

#### Key contents/system

1. **Prompt Confirmation**: When a company is starting a new technology/industry, it can inquire whether any relevant regulations exist and whether a permit is required. The government agency will reply within 30 days. (If it receives no reply from the government within 30 days, then the company making the inquiry may assume there is no regulation that applies to its case).
2. **Temporary License**: Where companies providing new products/services are having difficulties in releasing their products/services in the market because of the ambiguous or unreasonable regulations, notwithstanding the safety and innovation of such products/services having been proven, a temporary

3 See Article 50(2) and 156(6) of the Amendment to the Enforcement Decree of the Road Traffic Act.
4 This Regulatory Sandbox scheme is being governed by the Ministry of Science and ICT of Korea, thus often referred to as ICT Regulatory Sandbox in a short form. (https://www.korea.kr/special/policyCurationView.do?newsId=148857563)

license may be granted. Once the temporary license is granted, the products/services are not subject to the existing regulations upon satisfying certain conditions. Licenses can be granted to cover a maximum of 2+2 years, with the approval of the "Public-Private Regulatory Special Case Deliberation Committee" (allowed for a two-year term, which may be extended for another two years, subject to an obligation to improve the relevant laws and regulations within the period of the license).

3. **Demonstration Exception**: When testing and verification of new products/new services is required at a time when relevant laws and regulations are ambiguous and unreasonable or when there are some prohibitive regulations, etc., testing of new technologies or services is permitted, despite the existing regulations, under certain conditions (e.g., within a limited area/scale/period). This exception can be allowed for a maximum of 2+2 years with the approval of the "Public-Private Regulatory Special Case Deliberation Committee" (allowed for a two-year term, which may be extended for another two years, subject to an obligation to improve the relevant laws and regulations during that period. When delayed, a temporary license may be used.)

A case that benefited from the system is the Siheung Bae-got New Town Life Park and its Autonomous patrol vehicle "Goalie." While the release was delayed, the project received permission for test-operating through the ICT sandbox system.

**'Land Transportation Innovation Fund'**

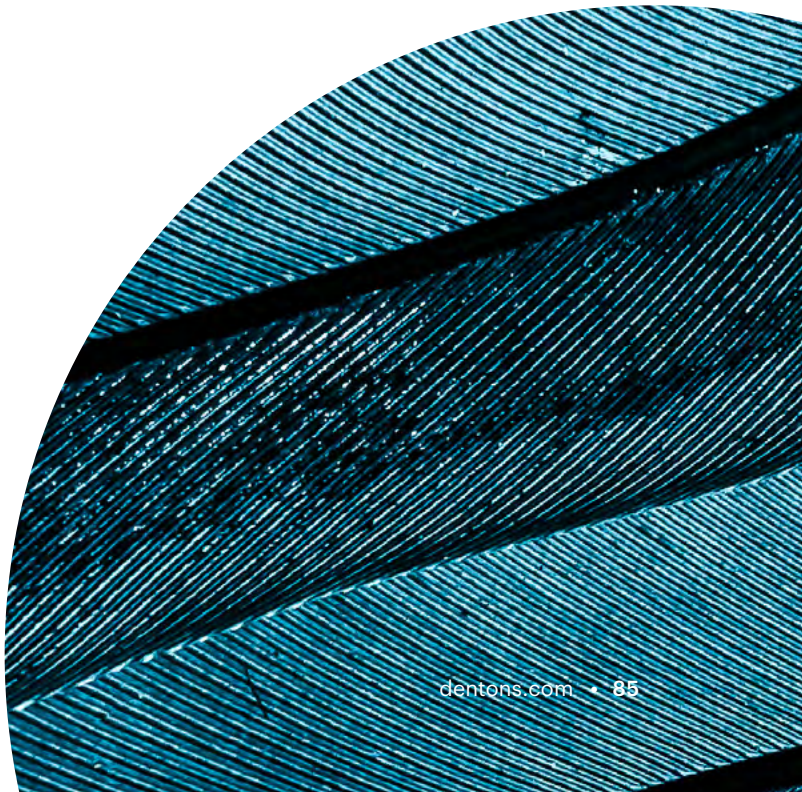
Operation began in 2020 with an investment of approximately KRW 17 billion but has since expanded. According to the Minister of Land, Infrastructure and Transport, it created KRW 340 billion of general and specialized sub-funds, recruiting private management companies for the No. 4 and No. 5 sub-funds of the "Land Transportation Innovation Fund" to support the innovative growth of small and medium-sized enterprises and ventures with promising technologies in the field of land transportation. The sub-funds are earmarked as follows:

1. **General (No. 4)**: Invest more than 70 percent in small and medium-sized venture companies that possess, develop or commercialize land transport technology in the land transport industry and related industries.
2. **Specialization (No.5)**: (i) Drone, (ii) Smart logistics, (iii) Autonomous vehicle (including ITS), (iv) Smart city, (v) Smart construction (including digital engineering, architectural BIM, etc.), (vi) Invest more than 60 percent in small and medium-sized venture companies in the field of green remodeling.

**Establishment of an 'Innovative Growth Support Center'**

The government established an Innovation Growth Support Center which was opened on September 29, 2022. This two-story center is as large as 2000m2 and is equipped with self-driving R&D facilities, such as a vehicle maintenance garage, security garage and a data analysis facility. This is a policy that enables small and medium-sized enterprises, for whom it has been difficult to equip their own vehicle storage facilities and research facilities, to develop and secure technologies without incurring large costs.

**Cross-ministry R&D plan for Commercialization of Level 4 AVs (investing approximately KRW1.1 trillion) commenced in 2021**



## Government stance/government representatives' statements

**Overall attitude: Supportive and willing to cooperate**

- Many regulatory obstacles remain, but government/relevant authorities are making efforts to alleviate them by implementing policies such as regulatory sandboxes.
- The Ministry of Land, Infrastructure and Transport has collaborated with the Korea Transportation Safety Authority (KOTSA) to upgrade facilities of K-City, an autonomous vehicle testbed in Hwaseong some 40 kilometers (24.8 miles) southwest of Seoul, to provide various environments that can simulate low-visibility weather conditions such as heavy rain and thick fog. Companies using K-City will be able to repeatedly test their developed autonomous vehicles in various driving situations. The next-generation intelligent transportation system (C-ITS) has been built on 603 miles of major highways, and the C-ITS infrastructure will be expanded through pilot and demonstration projects.[5]
- In June 2021, the Korea Transportation Safety Authority established the AV Transportation and Logistics Master Plan 2025 to commercialize autonomous driving-based transportation and logistics systems through the commercialization and proliferation of autonomous vehicles.

**AV Master Plan 2025**

**Vision:** The era of autonomous driving commercialization begins in 2025.

**Goal:**

1. Provision of autonomous driving commercial service on highways and major branches;
2. Development of technology based on autonomous driving service (BRT, on demand); and
3. Regulation improvement and infrastructure establishment for AV service.

**Strategy:**

1. Advancement of autonomous driving service technology;
2. Expansion of an autonomous service demonstration;
3. Creating the autonomous driving service business;
4. Reinforcement of autonomous driving safety; and
5. International cooperation related to autonomous driving job expansion.

5 Further details available at Spread of public and private C-ITS services "right hand"... Navi Data Fast and Accurate (smartcitytoday.co.kr)

# Driverless Vehicle Testing and Deployment

The Korean government has been operating a "temporary permit scheme" since 2016 to support the development of autonomous-driving technology. The scheme allows test-operation/test-driving of qualified AVs on public roads.

- In 2020, 119 AVs from 41 entities received permits and the distance driven in Korea has exceeded 1,170,000 km. As of November 2022, the Ministry of Land, Infrastructure and Transport (MOLIT) gave temporary permits to 258 self-driving cars. The number of pilot zones has also increased to 14, including Seoul, Sejong City, Gwangju, Daegu, Jeju and Pangyo.[6] The pilot zones are areas where various commercial autonomous vehicle-related services such as car-hailing services are demonstrated.
- It is expected that autonomous driving vehicles will begin being operated in the Gangnam and Cheonggyecheon Stream areas by the end of 2022.
- The MOLIT announced that it will establish and operate a weekly traffic safety training course for self-driving car test drivers (safety management personnel) to prevent safety accidents caused by self-driving car test operations.
- Self-driving car test drivers are those who check driving conditions and normal operation inside and outside autonomous vehicles and take emergency safety measures, and the MOLIT seeks to ensure safety by designating test drivers and imposing management obligations for safe driving. The curriculum is expected to strengthen self-driving stability by further enhancing test drivers' expertise and ability to cope with situations, even in the face of the recent increase in self-driving cars.

## Key revisions to note

- The categories of AVs can be broken down into three types: (A) the traditional type of AV; (B) AV without a driver's seat; and (C) Unmanned AV.
  - » Under the current procedures, type (B) and (C) AVs are not eligible to obtain a temporary permit. (In the case of type (B), a permit is obtainable only when an exception in the law applies.) After the revision occurs, both type (B) and (C) will be eligible to receive a permit.
- Tailored permitting requirements will apply for each type of AV. For example, for type (B) AVs, a temporary permit may be granted only if the AV has incorporated certain functions – e.g., an emergency stop button for passengers, emergency controls, automatic stop function in case of breakdown, etc. For type (C) AVs, emergency control buttons should be located on the left and right side of the AV.

## Temporary permits and other requirements for test driving

Currently, only autonomous vehicles that have received a temporary driving permit (upon the condition that a driver is on board) are allowed to operate on the roads across the country.

- At least a "temporary driving permit" from the Minister of Land, Infrastructure and Transport is required for test driving of autonomous vehicles. Also, a preliminary test drive of 5,000 km in accordance with the "Regulations on the Safe Driving Requirements and Test Driving of Autonomous Vehicles" is required.
- **Since February 2016**, permits have been granted only to vehicles that meet the "minimum safe driving requirements."

6 Further details available at The number of self-driving cars has doubled in Korea (smartcitytoday.co.kr)

## "Minimum safe driving requirements"

*[See "Regulations on the Safe Driving Requirements and Test Driving of Autonomous Vehicles" (Chapter 2, para 1)]*

- Vehicle must be certified to meet minimum safe driving requirements through a self-certification process by eligible manufacturers or by the government (Article 30(3) of the VMA; and Article 34 of the Enforcement Decree of VMA).
- Any car owner or party who has the right to use the car, who wishes to obtain a temporary driving permit for the purpose of testing/researching AVs ("applicant for autonomous vehicle temporary driving permit"), is liable for damages for personal injuries arising from the operation of such vehicle. In addition, he/she must subscribe to adequate insurance to ensure payment of damages.
- The applicant for an AV temporary driving permit must conduct sufficient pre-driving (5,000 km) at a test facility, etc. to confirm the operation of the autonomous vehicle functions.
- The applicant for an AV temporary driving permit must submit a list of test products and related data to the performance test agent. The test products and related data which must be submitted include: the vehicle subject to the permit application, descriptions of technical stages, structures and functions of such vehicle, insurance and other subscription certificates, pre-test driving report, etc.
- To obtain a temporary driving permit to operate an AV, an "AV test drive" notice must be posted on the rear of the vehicle. The size of the letters must be at least 70 mm in length and width, respectively, and such notice must be attached to a position of an appropriate height that can be easily seen by a driver behind such vehicle and must be identifiable at night.
- Permitted zones/areas for operation: Since November 2016, it has been possible to operate on all roads in the country except for protected areas for the transportation of vulnerable people (e.g., children protected areas). (Article 26-2(1)3 of the Enforcement Rules of the Vehicle Management Act).
- For any vehicles that have difficulty meeting the safety driving requirements and safety standards ("Vehicle Rules") due to their technical features (e.g., autonomous shuttle bus has no available driver's seats – thus, particular regulations such as the safety driving requirements and safety standards based on the existence of a driver's seat cannot be fulfilled), temporary operation thereof is permitted by applying special regulations.[7]

Test driving of autonomous vehicles on the condition that the driver will be on board was permitted by Ordinance of the Ministry of Land, Infrastructure and Transport (the Vehicle Management Act and the Enforcement Decree of the Vehicle Management Act).

- The test driver is responsible for any accidents that occur during temporary operation.
  - » **Scope of liability:** If a driver causes injury to another person, the driver is liable to compensate for the damage (injury) caused by the accident (Guarantee of Automobile Accident Compensation Act). However, in terms of criminal liability, AVs are not subject to punishment as an AV does not fall within the scope of "vehicle" under the Act on the Aggravated Punishment, etc.

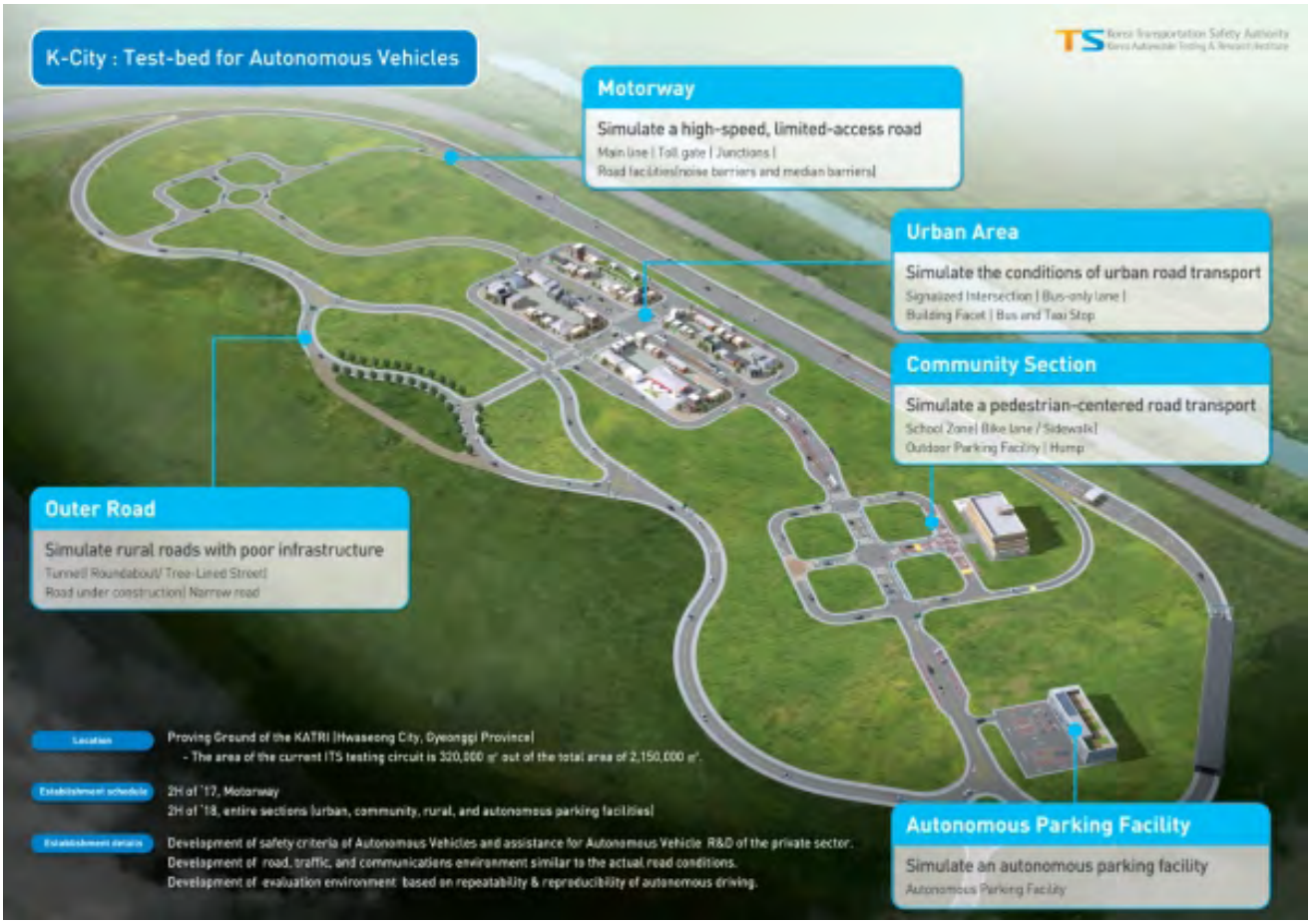
7 See Article 114 of the Regulation on the Performance and Standards of Automobiles and Automobile Parts; and Article 22 of the Regulation on Safe Driving Requirements of AVs and Test-driving.

## AV testing at the 'test-bed' (K-City)

- AV proving ground, K-City, officially opened in December 2018. K-City provides a real-world environment, including highways, urban and suburban roads, parking lots with 35 experimental facilities such as tollgates, crosswalks, BRT lanes, intersections, WAVE and 5G stations.
- Workspaces for participating companies and new facilities to simulate extreme weather and GPS shadowing will be added in 2023.
- Pedestrians and traffic will simulate a busy city road using robots. Self-driving cars will be evaluated based on their ability to avoid traffic and counteract unexpected situations.

### Mobility Innovation Roadmap

- On September 19, 2022, the Ministry of Land, Infrastructure and Transport (MOLIT) established the "Mobility Innovation Committee" to identify key technologies and prepare a future roadmap. The committee consists of experts from the private sector working solely in transportation, consumer products and IT fields. The MOLIT plans to enlarge and reorganize the Mobility Innovation Committee into a public-private joint organization for the smooth implementation of the mobility roadmap, to check the implementation status of the roadmap and for new and existing tasks.




Source: 'Test-bed' plan, Korea Transportation Safety Authority

- With the launch of Level 3 autonomous driving vehicles in 2022, the era of fully autonomous driving has begun, and it is expected that Level 4 autonomous vehicles will be commercialized in 2027. Based on this future scenario, by 2030, a total of 40 regulatory innovation tasks will be prepared, including 20 new tasks in three areas: vehicle, infrastructure and service. In order to enable free demonstration of autonomous driving technology and services, the MOLIT will designate autonomous vehicle trial operation districts in each city by 2025 through the introduction of a system for designation of autonomous vehicle trial operation districts, and after that, a specific area will be designated.[8]
- The key targets under the roadmap are as follows:

  1. A Level 3 autonomous car will be released by 2023, with Korea becoming the third country in the world to do so, after Germany and Japan.[9]
  2. Autonomous buses will be launched on public roads by 2025 and cars by 2027.
  3. The country will also change car insurance, driver's license and traffic-related laws to fit Level 4 automation.
  4. By 2030, real-time communication infrastructure will be built on national roads (about 110,000 km), and congested areas such as downtown roads. A nationwide real-time communication infrastructure on national roads on a direct communication method (WAVE or C-V2X) will be established. For non-congested areas, a hybrid method will be utilized, such as the existing mobile communication network (V2N method).

- **Short-term (2022–2023) major tasks:** (1) Allowing autonomous driving software over-the-air update (OTA); (2) Providing pseudonymization standards to promote the use of autonomous driving image data; (3) Establishing an authentication management system to strengthen the security of the autonomous driving cooperation system; (4) Expanding special cases for autonomous mobility service.
- **Mid-term (2024–2026) major tasks:** (1) Complementing safety standards for Level 4 autonomous vehicles and Level 3 commercial vehicles (buses, trucks); (2) Establishing an administrative sanctions system for traffic violations; (3) Revising driver concepts and deregulation of mandatory requirements; (4) Supplementing Level 4 autonomous vehicle insurance regulations; (5) Deregulating autonomous driving vehicle classifications to respond to the new mobility.
- **Long-term (2027–2030) major tasks:** (1) Establishing a Level 4 autonomous vehicle inspection/maintenance system; (2) Allowing new autonomous vehicles a simple license; (3) Deregulating the classification system for a passenger transportation business to introduce new services.

8 Further details available at South Korea unveiled the "Mobility Innovation Roadmap" to transform the cities – Mobility Innovators (mobility-innovators.com)

9 Further details available at Level 3 Autonomous Vehicles on the road in under a year in new plan | KoreaJoonGangDaily

# Connected Vehicles and Logistics

## Liability

### Responsibilities of the actors

The *Monthly KOTI Magazine on Transport* (2020.10) summarized responsibilities of the relevant actors, set out in the Ethics Guideline for AVs and Stakeholders, as follows:

| Government Agencies | Role | Governing/Relevant Laws |
|---|---|---|
| **Design Authorities** – who design the AV utilizing relevant software and hardware technologies. | • Design authorities must design AVs in a manner such that the vehicles can store driving records, etc.<br>• Design authorities must design AVs in a manner such that the vehicles may prevent accidents as much as possible. In the event of an unavoidable accident, AVs should be designed to minimize damage to the passengers and other parties. | |
| **Manufacturers** – who develop the AV technologies or manufacturers who assemble the cars. | • Manufacturers must produce AVs in a manner such that the vehicle can record and store any driving-related data.<br>• Manufacturers must produce and sell AVs in compliance with certification standards, bioethics, information and communication ethics and engineering ethics.<br>• Manufacturers are responsible for any damage caused by manufacturing defects of AVs.<br>• Manufacturers are obligated to provide AV owners and users with instructions (e.g., cautions in using certain functions of AVs and guidelines on safe driving) – they must provide the relevant information in writing and faithfully respond to any inquiries from the drivers and users.<br>• Manufacturers must be equipped with a cyber security system and must always provide drivers and users with information on any changing matters. | **Product Liability Act (by FTC)**: This law governs the liability of manufacturers for any damages caused by defects in products. AVs correspond to a product under the Product Liability Act, but the software (system/program used in AVs) therein cannot be considered as a product and therefore cannot be held responsible for the product. However, liability may be imposed if such software can be interpreted as embedded software. |
| **Service Authorities** – who provide services in response to the demand in the market, utilizing the AVs made by the manufacturers. (e.g., Siheungsi (City) provides patrol services with the "Goalie" manufactured by Mando; Incheon Airport provides transport services with the autonomous trains and carts manufactured by Incheon Airport Corporation and domestic SMEs.) | • Service authorities must protect the safety of users and shall not infringe or harm the interests of others or public interests.<br>• Service authorities must keep the software of AVs current to the most recent version available.<br>• Service authorities must protect the personal information produced in the course of providing services.<br>• Service authorities should make efforts to minimize any illegal use and abuse. | |
| **Drivers** | • Drivers must drive AVs according to the vehicle's intended purpose and functions.<br>• Drivers must not make any arbitrary or illegal modifications that could cause safety problems in AVs.<br>• Drivers must complete a sufficient amount of training for safety before driving. | |

At least for now, the statutes/laws of Korea are silent on issues concerning allocation of liability in case of accidents (the AVA only going so far as to stipulate a narrow insurance requirement).

**Additional liability imposed on manufacturers under the UN regulation**

- A new UN regulation will soon require vehicle makers in South Korea (together with those in Japan and the EU) to secure connected vehicles from cyber security threats.
- Concern on cyber security threats: Hackers remotely accessing autonomous vehicles, posing a risk to public health and security.

**UN regulation**

- Aim: Ensure manufacturers take adequate steps (e.g., take action and respond when consumers' cars get hacked) to protect their vehicles and customers from these types of threats.
- Manufacturers must address specific threats, such as potential malware infiltration of servers, which could give hackers access to troves of connected vehicle data.
    - » Manufacturers must document ways they will protect vehicles from specific threats, how they will update authorities on the success of their efforts at least once annually, how they will report pertinent data on cyberattacks.
- While the date of implementation varies by region, in South Korea the regulation was incorporated into the "Guidelines for Cyber Security," which were announced by MOLIT on December 15, 2020.

## Data privacy and security

**Exemption from general data privacy rules in the context of AV operation, subject to anonymization under the AVA**

Generally, under the data protection laws of Korea, activities/businesses that collect and use personal information are subject to strict restrictions, such as consent requirements, use for consented/specified purposes only, etc. Traffic information of pedestrians, other drivers and drivers of AVs, fall within the scope of "restricted" information as those are personal information as well.

However, the Autonomous Vehicle Act (AVA) provides an exemption from data restrictions in the Korean data protection laws. More specifically, Article 20 of the AVA provides that the three Korean data protection[10] laws are not applicable to the use of personal information[11] collected during the operation of AVs, provided that the information is anonymized.*

- Implications of the AVA: Collecting and using personal data may not necessarily trigger general data protection requirements under the relevant laws.

Note*: Providing an exemption for the data protection laws as such does not mean that use of the data is unconstrained throughout the interval between the collection of data and the anonymization of such data.

i. The AVA does not, by itself, clarify (to) what scope/extent the handling of such data is exempted from the restrictions before anonymization is done.

ii. Where personal data is collected outside Korea and anonymization is done outside, whether you need "consent" to use such data or are permitted to use it without consent remains unclear.

10 Personal Information Protection Act, Act on the Protection, Use, etc. of Location Information, and Act on Promotion of Information and Communications Network Utilization and Information Protection, ETC.

11 Personal information' here means (i) personal information within the meaning of Article 2-1 of the Personal Information Protection Act, (ii) location information of individuals within the meaning of Article 2-2 of the Act on the Protection, Use, etc. of Location Information, and (iii) other information designated as personal information by Presidential decree.

**The Guidelines for Cyber Security (announced by MOLIT on December 15, 2020)**

- Legal status of the guidelines: "Recommendations" (i.e., not yet a "law" and thus, persuasive only and not binding).
  - » However, the government stated in the guidelines published on December 15, 2020, that this is just a first step. The government is planning to enact laws/legal standards regarding cybersecurity, with the goal of implementing such laws.
- The guidelines have been made based on the UN Regulation on Cybersecurity (UNR No.155).

**Key contents:**

- Manufacturers are recommended to adopt a CSMS (Cyber Security Management System).
- To preserve cyber security, manufacturers are recommended, *inter alla*, to:
- Set a deadline within which the risk can be managed and respond as soon as possible to cyber threats to prevent/minimize the damages; and
- Continue monitoring the system after initial registration of the car and be equipped to detect cyber threats/attacks from the information collected (e.g., information collected from the data storage system of the car) and analyze the system's weakness.

**Global Information Security Standard**

- Hyundai Motor and Kia are strengthening in-car cybersecurity features. They have earned certificates from the cyber security and management system (CSMS) to meet the United Nations Economic Commission for Europe (UNECE) regulation R-155 for new car releases starting in July 2022 and changed the entire work process for establishment and operation of the CSMS during the entire life cycle of cars.[12]

12 Further details available at https://pulsenews.co.kr/view.php?year=2022&no=147214.

- LG Electronics received "TISAX (Trusted Information Security Assessment Exchange)" certification in all major areas of the electronic devices business to strengthen competitiveness in the automotive parts business.[13]
- TISAX is a global information security certification created by a German automobile industry association to standardize the different security evaluation criteria of different automobile manufacturers. It evaluates security in four aspects: information security system, partner security system, data protection system and prototype protection system.

## Telecommunications and 5G

### "5G+ Strategy"

**In April 2019**, the Korean government announced a "5G+ Strategy" to realize innovative growth based on 5G technology, through cooperation among related departments and agencies. The government selected 10 "core industries" and five "core services" as strategic 5G industries and introduced support plans customized to each industry, based on market maturity and demand.

"5G vehicles-to-everything(V2X)" was selected as one of the 10 "core industries," while 'autonomous vehicles' was selected as one of the five "core services."

For the selected "industries" and "services," the government is supporting the development of the technology and under such support some major Korean companies are devoting significant resources to its development.[14]

### Development/progress currently

**October 2022:** Hyundai Mobis, a South Korean auto parts and mobility solution maker, developed a 5G-based communication module for cars, a core part for autonomous driving and connected car systems that enables real-time, large-volume data processing, on October 3, 2022.[15]

- The new module combines communication and memory functions, as well as a radio frequency circuit and GPS, based on ultra-high speed, ultra-low latency and hyper connectivity technology.
- Hyundai Mobis will apply the 5G communication module in the vehicle's telematics service – a technology that connects the vehicle to the external control center to offer drivers with safety information and infotainment services. Examples of telematics services include over the air (OTA) update, real-time traffic information, and eCall service, through which the vehicle can make an emergency call following a collision. Also, the new module will be used in various aspects of Advanced Driver Assistance Systems (ADAS), pairing with radar, LiDAR and camera sensors.
- Hyundai Mobis will create a new, integrated solution using 5G communication modules and already-developed vehicle-to-everything (V2X) technology, to target the global market. This integrated 5G communication module and V2X solution will be applied in technologies such as collision avoidance systems, automatic speed control near school zone and vehicle control during emergency, which are all still in the initial development stage.

## Electric Vehicles

### Key Trends and Government Support

South Korea aims to significantly boost production of electric vehicles to more than double domestic carmakers' global market share to 12 percent by 2030. From 2009 to the first half of 2022, the government supported the purchase of 52,400 electric vehicles by paying subsidies for 13 years, and the number is anticipated to grow to more than 80,000 by the end of 2022. The government vowed to provide tax incentives and various supportive

13 Further details available at LG Electronics acquired global information security certification 'TISAX' | LG Global
14 Further details available at Korean Gov't Determined to Foster Core 5G Services and Industries – Businesskorea
15 Further details available at Hyundai Mobis completes 5G tech essential for autonomous driving (koreaherald.com)

measures to promote carmakers' investment worth about a combined 95 trillion won (US $66.03 billion) by 2026, according to the Ministry of Trade, Industry and Energy. The government also pledged to subsidize 20 electric shuttle buses for commuting to government offices, medical institutions and other welfare purposes.

**EV Charging Changes**

Korean electric vehicle owners will be allowed to lease their electric vehicle (EV) chargers if government-proposed legislative amendments are passed. In other words, EV chargers will soon be shared like houses on Airbnb. If the amendments to the Electric Utility Act are passed, privately owned EV chargers will be able to generate revenue. Installing EV charging facilities at gas stations will also be permitted, and areas where drones can be flown freely will also be gradually increased.

Under the current law, car owners can lease an EV charger only if they register as an EV charging company. The new law would allow for private EV chargers to be rented out in the form of online services or applications. As of now, temporary easing of regulations on some sharing services are being implemented, but when this ends, the sharing restrictions will be more relaxed.

Additionally, it will become easier to install EV chargers at gas stations. Since gas stations are regulated for internal combustion vehicles, current standards are very rigid, such as requiring EV charging facilities to be placed more than a certain distance from gas pumps. These standards will soon be relaxed. The government is proposing an improvement to the relevant standards, so that EV charging facilities can be installed at gas stations taking into consideration the structure of gas stations and situations surrounding safety measures.[16]

# Driving Forces

## Further developments

SK Telecom expands self-driving pilot zone to test advanced smart transportation system, June 2022, *Korea-EU Research Centre* : SK Telecom (SKT) has expanded a pilot driving zone for autonomous vehicles in Sangam, a western residential and commercial district of Seoul, to test a cooperative intelligent transport system (C-ITS) that provides real-time information such as traffic conditions, so that individual vehicles can share data and prevent traffic accidents. The smart road system incorporates smart vehicle and connected car technologies such as vehicle-to-everything (V2X) and internet of things (IoT) communications.

SKT will test an advanced system in the 32.3-kilometer section. SKT will provide additional services for safe driving such as child protection, pedestrian notification and CCTV images of unexpected situations. Self-driving cars can receive safe driving information by installing V2X terminals. SKT will use digital twin technology to create a virtual autonomous vehicle testing zone where researchers can use a control tower system to test the safety and efficacy of digital clones of their self-driving vehicles. Various weather conditions such as rain and snow can be simulated. The virtual zone will include actual roads, school zones, street trees, traffic lights and real-time traffic.[17]

16 Further details available at EV chargers could become small businesses if proposal passed (joins.com)
17 Further details available at SK Telecom expands self-driving pilot zone to test advanced smart transportation system | Korea-EU Research Centre (k-erc.eu)

## COVID-19 impact

**Support policies as to COVID-19**

**Largely two types of support have been provided by the Korean government:**

1. **Production Support**
    - **A.** Simplifying the import procedures for auto parts.
    - **B.** Special extension of work hours by allowing more than 52 hours per week.
2. **Liquidity Support**
    - **A.** Employment retention subsidies.
    - **B.** R&D Support for localization of auto parts.
    - **C.** Loan and credit guarantee program for SMEs.
    - **D.** Extension of debt maturity periods.

In Korea, it appears that COVID-19 has sped up AV legislation and adoption.

- **Incheon International Airport**. Introduced autonomous trains (and cart robots) – in operation since October 14, 2020; implemented without delay.
    - » **On October 14, 2020**, Incheon International Airport Corporation introduced and is operating the world's first indoor autonomous trains and cart robots. Each of the two autonomous trains are in operation in the duty-free area of the Arrivals hall at Terminal 1 and the duty-free area in the Departures hall at Terminal 2, respectively. The trains assist vulnerable users (e.g., the elderly, pregnant women, disabled, etc.), while the six cart robots are supplied to transport passengers' luggage and/or certain cargos.
    - » Both autonomous trains and cart robots were developed by Incheon International Airport Corporation in cooperation with domestic SMEs.
- **Siheung Baegot New Town Life Park**: Autonomous patrol car "Goalie" started operating.
    - » An autonomous patrol car Goalie was developed by Mando, the second largest auto parts maker in Korea. The Goalies began operating at Baegot Life Park in Siheung to patrol the area at nighttime and video-record CCTV blind spots, sending the recordings to the control center.
    - » The project was partially necessitated by relevant regulations rather than COVID-19 concerns. However, the ICT Board for regulatory sandboxes has allowed the test operation of Goalies to proceed and the project was given a temporary respite from regulatory regimes until March 2022.
- **"AV Pilot Zone" scheme**: A new system introduced under the Autonomous Vehicle Act (Effective May 2020).
    - » **AV Pilot Zone**: A special regulatory district to support the demonstration of autonomous driving services. If a district is selected as an AV pilot zone, self-driving manufacturers can carry out the simulation of real-life situations (and actually receive fares/consideration). Moreover, a diverse range of (special) exemptions from regulations is available for private manufacturers who are willing to test-operate in the AV pilot zone (e.g., they can obtain a permit for test-operating without meeting the vehicle safety standards). This provides an opportunity for a manufacturer to gauge market reaction and the government can collect relevant data and ideas that may be useful in making further policies/institutional improvements.

» Pursuant to the new law, "**AV Pilot Zones**" were designated[18] for the first time in November 2020. The regions that were selected and some key services that were allowed are as follows:

| No. | City/Province | Area designated as 'AV Pilot Zone' | Autonomous driving services to be provided include |
|---|---|---|---|
| 1. | Seoul | Area of 6.2km2 range in San-gam-dong area. | Shuttle service between DMC station and commercial/residential/ park areas. |
| 2. | Chungbuk/Saejong (jointly applied) | About 22.4km of Osong-Saejong Terminal route of BRT.[19] | BRT service between Osong Station and Sejong Terminal. |
| 3. | Sejong | 22.9km of BRT circular route and area of approximately 25km2 in living zones 1-4. | Demand-responsive shuttle bus service circulating within Sejong Government Complex. |
| 4. | Gwangju | Area of approximately 3.76km2 in 2 zones in Gwangsangu. | Road cleaning cars, waste collecting cars. |
| 5. | Daegu | Area of approximately 2.2km2 in Suseong Alpha City; area of approximately 19.7km2 of Technopolis and Daegu National Industrial Complex; and approximately 7.8km route of the road connected to industrial complex. | Shuttle service within Suseong Alpha City (Samsung Lions Park-Daegu Museum of Art route). Demand-responsive taxi service in Technopolis and the National Industrial Complex. |
| 6. | Jeju | Certain parts of the route between Jeju International Airport and Jungmun Tourist Complex (38.7km); and area of approximately 3km2 within Jungmun Tourist Complex. | Airport pickup shuttle services (Jeju International Airport-Jungmun Tourist Complex route). |
| 7. | Pangyo | Area of approximately 1.34km2 of Techno Valley, 2 Valley and connection section | Unmanned shuttles and robot taxis in Pangyo Techno Valley. |

**Based on an announcement of the Ministry of Land, Infrastructure and Transport made on June 24, 2022**

18 Under the supervision of the Ministry of Land, Infrastructure and Transport, the "Autonomous Vehicle Demonstration District Committee" was created to designate AV pilot zones. (The committee consists of six commissioners from public sectors (vice-ministers of the Ministry of Land, Infrastructure, and Energy / Ministry of Economy and Finance / Ministry of Science and Technology / Ministry of SMEs and Startups / National Police Agency, as well as the Minister of Land, Infrastructure and Energy) and 12 commissioners from private sectors (experts in automotive/transportation/communication/city).

19 BRT, which stands for Bus Rapid Transit, is a transportation system in Korea, offering ex-press buses-only lanes, convenient transit services, etc.

## Summary

Since the outbreak of the pandemic, the need and demand for so-called "untact" services has increased greatly in Korea, as in other countries around the world. Accordingly, the government has been supporting (and cooperating), more actively than ever, in the relevant projects/businesses of AV manufacturers.

Many Korean companies developing AV systems had been forced to stay at a demonstration stage, even after sufficient technology development, due to regulatory obstacles. However, it seems that the situation has improved for those manufacturers because the government is being more supportive and relaxing certain regulations to meet the increased demand for untact services (e.g., taxis without drivers) within Korea.

The government intends to take a phased approach by adding and upgrading regulations and laws related to technology, communications and insurance in steps in order to satisfy the standards and structure associated with operating autonomous vehicles. Between 2024 and 2026, the government intends to focus on devising a legal framework for Level 4 self-driving vehicles in terms of insurance policies and traffic systems to provide clear standards for legal responsibilities. To further realize its vision, the government also plans to establish real-time telecommunications systems for communication between autonomous cars along 110,000 km of roads in major cities by 2030.

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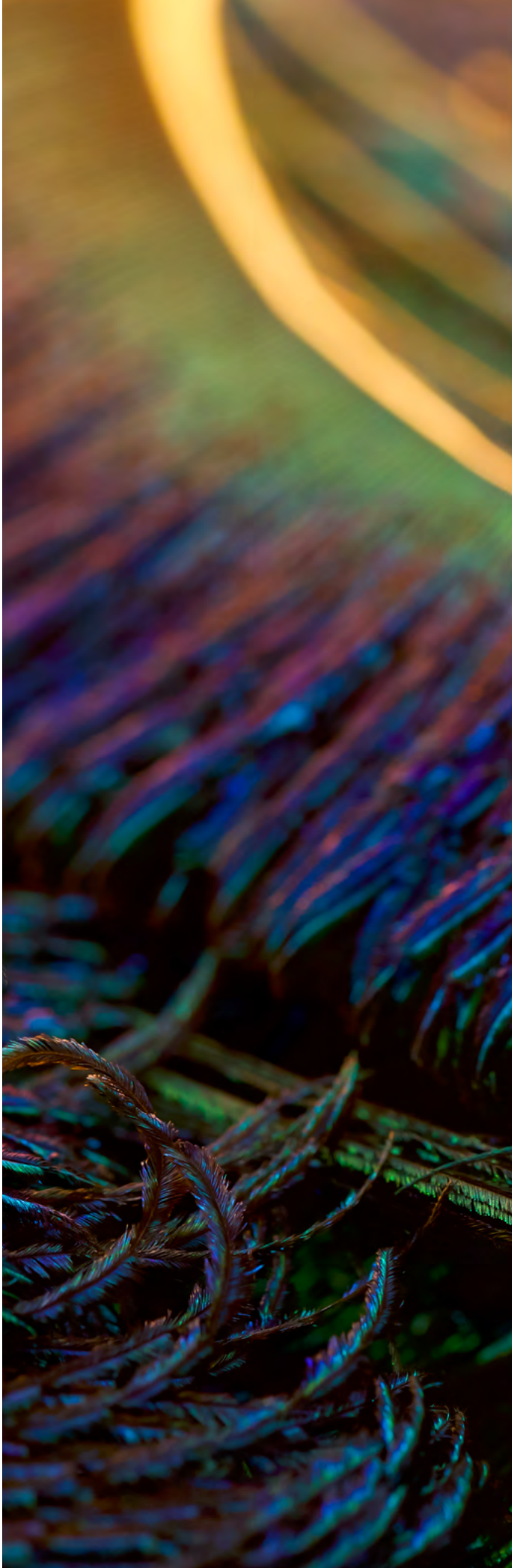


# Turkey

## Regulatory Developments and Roadblocks

Turkey recognizes the international efforts for development of driverless and automated vehicles. Although the regulatory background for autonomous vehicles is not ready for commercialization, this issue has been on the agenda of the legislators in recent years. Accordingly, support for automated vehicles has been the topic of policy documents and action plans. By the same vision, Turkey has also been breaking ground to implement regulations for electric vehicles and charging infrastructure. Below is a summary of recent legislative efforts relating to smart transportation and connected urban planning:

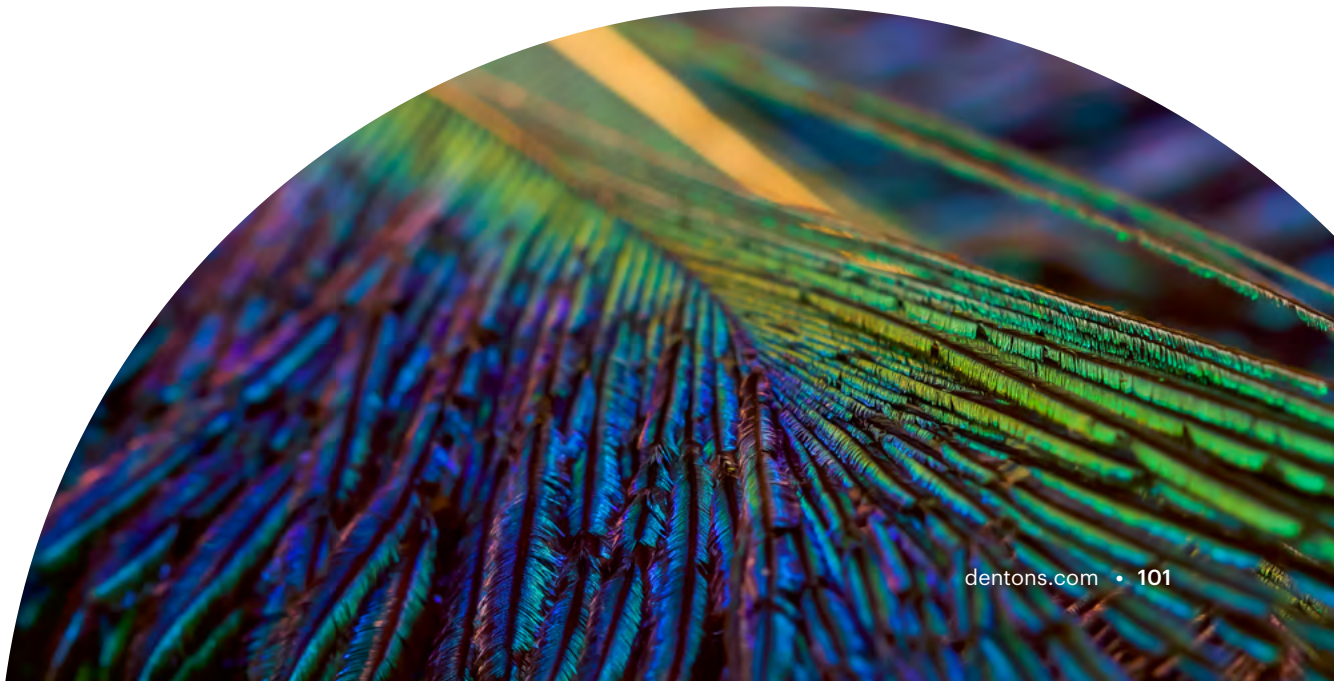
- The first strategy document and action plan for intelligent transportation systems was prepared by the Ministry of Transport and Infrastructure. This document took effect in 2014 and provided guidance for the period between 2014-2016.
- The Ministry of Industry and Technology has also prepared a strategy document and action plan (2016-2019) for Turkey's automotive Industry. This document focused on the implementation of international standards in developing intelligent systems such as driver assistance systems, emergency brake systems, active cruise control systems, lane-keeping systems, e-Call and testing of driverless cars.
- The Ministry of Environment and Urbanization has the responsibility to prepare a smart city strategy and smart city program. This program includes action plans to develop cities' infrastructural capabilities suitable for autonomous vehicles and other intelligent transportation systems.
- National E-Government Strategy and Action Plan (2016-2019), Information Society Strategy and Action Plan (2015-2018) and National Broadband Strategy and Action Plan (2017-2020) also aim to ensure collective development encouraging and facilitating the use of intelligent transportation systems.
- The Ministry of Transport and Infrastructure published the National Intelligent Transportation (ITS) Strategy Document and 2020-2023 Action Plan in August 2020. The Action Plan explicitly states that all groundworks in terms of development and expansion of autonomous and connected vehicles are planned to be completed by 2023. Furthermore, certain regulations and legislative amendments governing the data protection, telecommunication and liability regimes are expected to be enacted in 2021.
- The Ministry of Industry and Technology adopted the Regulation on Type-Approval Requirements for Motor Vehicles and Their Trailers, Systems, Components and Separate Technical Units (EU/2019/2144) known as "Type Approval Regulation." The newly introduced Type Approval Regulation sets forth certain type approval requirement for autonomous vehicles as well. The Regulation entered into force on June 7, 2022. The Type Approval Regulation mainly aims to harmonize the Turkish legislation with the EU rules. Therefore, the Regulation directly refers to the European Commission and the type approvals for vehicles granted within EU territory.
- As the Turkish government has recently demonstrated a significant interest in developing the automotive industry by introducing the production of the first

domestic car (namely, TOGG), relevant public authorities and municipalities started to prioritize investing in development of connected vehicles and smart city solutions. Turkey explicitly announced its belief that the transportation sector has been transforming as a result of the studies conducted on autonomous vehicles, connected vehicles and intelligent road systems. The 2020–2023 Action Plan states that driverless vehicles has been rapidly advancing due to applications such as traffic forecasts, smart decision making via machine learning, deep learning technologies and big data. With all these technologies, it is believed that traffic accidents, which constitute a major problem in transportation security in Turkey, can be prevented by early detection of potential dangers via pre-analysis of traffic scenarios. Therefore, Turkey wants to enact regulatory and legislative frameworks autonomous and connected vehicles as well as artificial intelligence, big data solutions and deep learning techniques.

- Therefore, Turkey works closely with stakeholders, academics and non-governmental organizations to determine the legislative agenda.
- Currently, Turkey has a long-term goal to conduct preparatory studies on retrofitting existing infrastructure so that it is suitable for autonomous driving and developing fully autonomous vehicles with use in all modes of transport.
- The regulatory agencies conducting studies to develop the infrastructure and legal background for driverless vehicles are found below. Although their regulatory authorities regarding autonomous and connected vehicles are not yet recognized by legislation, potential issues and disputes could be resolved in consultancy with the following public bodies:

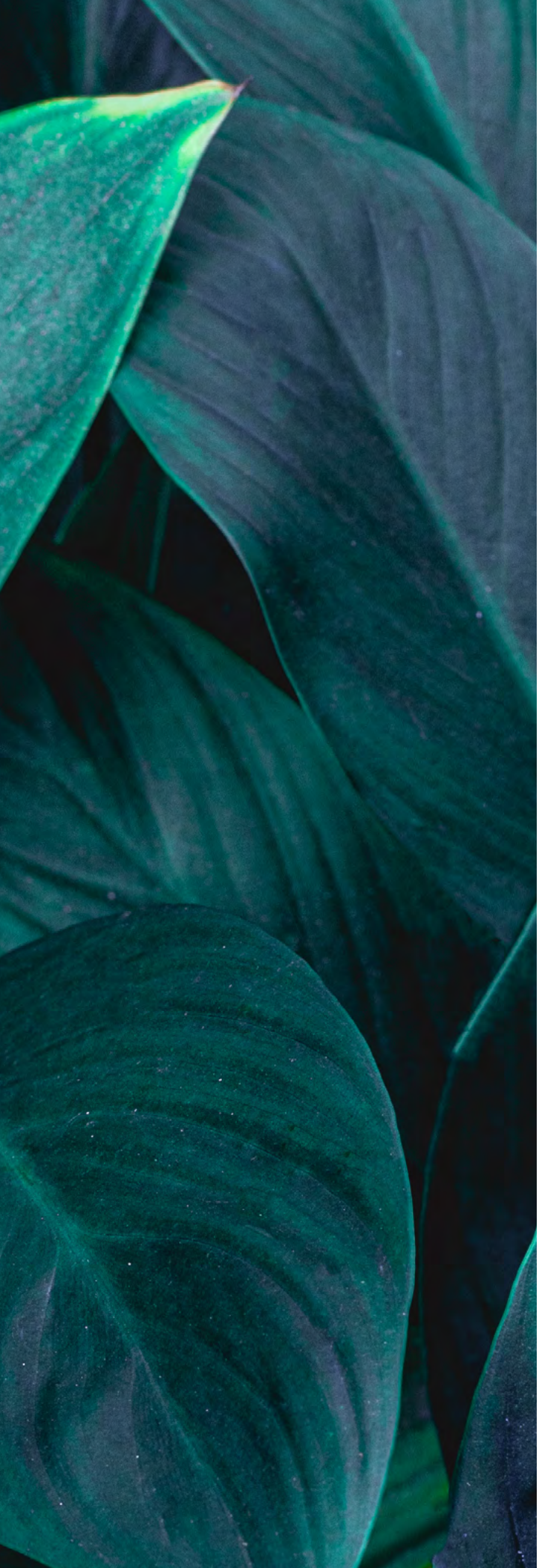
  - Ministry of Transport and Infrastructure (General Directorate of Transport Services Regulation)
  - Ministry of Environment and Urbanization Ministry of Information and Technology Turkish Data Protection Authority
  - Municipalities (particularly in terms of use of autonomous vehicles for public transportation purposes)
  - Information Technologies and Communication Authority

- Turkey rolled out its first domestically manufactured electric car branded as TOGG in October.



# Driverless Testing and Deployment

- Under Turkish law, there is no specific regulation or a competent body to deploy and expand driverless vehicle testing. However, the Ministry of Transport and Infrastructure's Action Plan for 2020-2023 plans to complete the establishment of Autonomous Driving Test and Certification Centers where functional and operational tests of autonomous vehicles are performed and certification services are provided.
- Having said that, the Type Approval Regulation permits the testing of autonomous vehicles by manufacturers in accordance with the requirements specified in the Annex-2 starting on July 6, 2022.
- Furthermore, test corridor deployments in EU countries and the development of driverless/connected vehicles have raised the profile of cooperative intelligent transportation systems (C-ITS), particularly the desire to begin test phase studies. In this respect, the Turkish government aims to complete the preparations for test phase and create a C-ITS test and application corridor by 2023.
- There are no other specific regulations or standards under current Turkish legislation governing autonomous vehicle testing or approval process for driverless vehicles. That said, the Type Approval Regulation stipulates the following requirements must be met by automated vehicles:
  - » Systems to replace the driver's control of the vehicle, including signaling, steering, accelerating and braking;
  - » Systems to provide the vehicle with real-time information on the state of the vehicle and the surrounding area;
  - » Driver availability monitoring systems;
  - » Event data recorders for automated vehicles;
  - » Harmonized format for the exchange of data such as multi-brand vehicle platooning; and
  - » Systems to provide safety information to other road users.
- It should be noted that those technical specifications relating to driver availability monitoring systems do not apply to fully autonomous/driverless vehicles.
- Moreover, as per the provisions of Type Approval Regulation which entered into force on July 6, 2022, autonomous vehicles are required to comply with the technical and type approval requirements of e-Call Regulation. In this respect, manufacturers are under obligation to ensure that autonomous vehicles utilized in Turkey are equipped with a permanently installed 112-based e-Call in-vehicle system.
- In terms of license requirements, there is no specific regulation or exception for autonomous vehicles in Turkey. In this respect, as Turkey is a party to the Vienna Convention (WÜ), every vehicle must have a driver (Art. 8 para.1WÜ) who must be able to intervene on request. Test drivers must possess a valid driving license; otherwise, no additional training is necessary. The General Directorate of Security is the body responsible for issuing driver's licenses. However, it should be noted that specific legislation and regulation is expected to determine license requirements in conjunction with an amendment regarding liability rules under Turkish Law of Obligations and Criminal Law.
- Further, product liability laws and product safety regulations require certain safety standards and currently do not provide any exceptions for autonomous products.
- There is no specific insurance requirement for autonomous vehicle testing. However, under Law No. 2918 on Highway Traffic, the person who owns the vehicle or who is registered as the buyer when sold with retention of title or lessee, borrower or pledgee in cases of long-term lease, loan or pledging is obliged to have a liability insurance.



- In terms of autonomous platooning, the Type Approval Regulation requires a harmonized format for data exchange (e.g., multi-brand vehicle platooning).
- The Type Approval Regulation permits the use of driverless vehicles for personal use on public roads by outlining the procedures and technical specifications for systems and the type approval of autonomous vehicles to ensure the safe operation of automated and fully automated vehicles on public roads. The Regulation was enacted on July 6, 2022.
- Legal and regulatory requirements regarding autonomous and connected vehicles are not governed by any single government entity and the legislative framework has not been adapted to specific requirements for autonomous vehicles. Therefore, requests to run trials and/or test certifications require market entrants to receive consultancy services from legal professionals who can conduct research to navigate regulations at international and domestic levels and effectively communicate with different public authorities, as well as non-governmental organizations. Moreover, despite harmonization requirements for Turkish legislation with relevant EU law, due to customs union and accession process, national regulations still address potential deficiencies under Turkish law. Therefore, the need for a specialized legal counsel goes beyond doubt for potential market entrants.
- While the Turkish government is still constructing its policy and strategic framework, neither testing nor deployment of autonomous vehicles is initiated in Turkey. Therefore, although there is no legislation explicitly prohibiting the use of driverless vehicles, Law No. 2918 on Highway Traffic and other traffic regulations are constructed using driver-based vehicles. Therefore, all approvals and license requirement for personal use of vehicles are based on the existence of a driver. Accordingly, consumers have not been permitted to use driverless vehicles for personal use.

# Connected Vehicles and Logistics

## Telecommunications and 5G

- In the National Broadband Strategy and Action Plan (2017-2020), development of 5G technologies in Turkey is considered a national policy priority. The primary objectives are supporting local production, creating test and R&D networks, and incentivizing sector participants. Moreover, the Action Plan introduces the goal of inclusion of intelligent transportation systems in the annual funding programs by the Ministry of Industry and Technology and Ministry of Transport and Infrastructure until 2023.
- While there have been no tenders for spectrum yet nor any licenses granted for 5G network in Turkey, the Information and Communication Technologies Authority ("**ICTA**") granted permits to three leading companies to conduct 5G tests in Istanbul, Izmir and Ankara.
- ICTA also requires that the SIM cards, eSIMs or modules having SIM card properties, etc. to be procured from operators licensed to provide mobile electronic communication in Turkey or to be programmable to allow them to be controlled by such operators via its **decision on e-Call services in motor vehicles** (*22.01.2018; 2018/DK-YED/27*). The same decision also provides that the e-Call in vehicles, along with servers that will provide the communication system allowing for value-added services, should be located in Turkey and personal data in such systems cannot be transferred abroad without explicit consent. Accordingly, the current enforcement trend focus on localizing the SIM card services in motor vehicles.
- ICTA expanded the scope of its localization requirement to cover all eSIM applications (via its decision *12.02.2019; 2019/DK-TED/053*). Accordingly, all infrastructure, system, and storage units including equipment and software related to the eSIM platform in GSMA standards should be established in Turkey, by a licensed local operator (or by a third party to be appointed by such local operators, but liability remaining with the local operator). The decision also states that all data should be kept within Turkey. Moreover, if the devices manufactured or imported to be used in Turkey have remotely programmable SIM technologies (eUICC, eSIM/embedded SIM, etc.), their relevant modules should be programmable only by local mobile operators. Similarly, only local mobile operator profiles may be installed for usage in Turkey.
- Reflecting on the foregoing enforcement policy, the Minister of Transport and Infrastructure stated that the eSIM application is "*100% domestic and national*" and "*Turkey's sensitive data will be completely in Turkey's control*" (*December 24, 2020*).

## Data privacy and security

### The General Data Protection Regulation and Data Protection Act 2018

- According to the Type Approval Regulation, any processing of personal data, such as information about the driver processed in event data recorders or information about the driver's drowsiness and attention or the driver's distraction within the scope of the autonomous vehicles, should be carried out in accordance with the Law No. 6698 on the Protection of Personal Data.("PDP")
- Furthermore, although Turkish e-Call Regulation does not contain any article on the personal data protection, it refers to the EU Regulation numbered 2017/79 to be taken into consideration in case of doubt. Therefore, we assume that the processing of personal data collected through the 112-based e-Call in-vehicle system is subject to Law No. 6698 on the Personal Data Protection ("PDP Law" like the EU reference to the GDPR).
- As in all industries developing with disruptive innovation and having a data-driven characteristic, it is expected that the connected

autonomous vehicles will collect and process a vast amount of data which have significant value for manufacturers and developers. Therefore, it is crucial to define which data is "personal" and benefits from protective cloak of PDP Law in Turkey.

- Personal Data is any information that can identify a natural person such as a name, an identification number, location data, an online identifier or one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person.
- Personal data relating to the race, ethnic origin, political opinion, philosophical belief, religion, religious sect or other belief, appearance, membership to associations, foundations or trade unions, data concerning health, sexual life, criminal convictions and security measures, and biometric and genetic data are deemed to be special categories of personal data.
- Special categories of personal data, if obtained by others, can leave the data subject open to discrimination unfair treatment. For this reason, sensitive personal data merit stricter protections than other personal data.
- Notably, only data relating to natural persons is protected under the PDP Law. Therefore, the term "data subject" is used in the Law to refer to natural person whose personal data is being processed.
- The procedures and principles for the processing of personal data in the Law are regulated in accordance with the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data No. 108 and the European Union Data Protection Directive 95/46/EC.
- The following general principles set out in the Law shall be complied within the processing of personal data:
  - » Lawfulness and fairness;
  - » Being accurate and kept up to date where necessary;
  - » Being processed for specified, explicit and legitimate purposes;
  - » Being relevant, limited and proportionate to the purposes for which they are processed; and
  - » Being stored for the period laid down by relevant legislation or the period required for the purpose for which the personal data is processed.
- According to Article 12 on data security of PDP Law, the data controller is obliged to take all necessary technical and organizational measures to provide an appropriate level of security for the purposes of:
  - » preventing unlawful processing of personal data;
  - » preventing unlawful access to personal data;
  - » ensuring protection of personal data.
- The Turkish Personal Data Protection Board has the power to take regulatory action to determine security requirements. In case the processing of personal data is carried out by another natural person or legal person on behalf of the data controller, the controller shall jointly be responsible with these persons for taking the necessary measures. Therefore, data processors are also obliged to take measures to ensure data security.
- The controller is also obliged to carry out the necessary audits or have them made, to ensure the implementation of the provisions of the Law. The controller can conduct this audit by itself or have them conducted through a third party.
- The data controllers and the data processors shall not disclose the personal data that they have obtained to anyone contrary to the provisions of the Law and they shall not use such data for purposes other than that for which the personal data has been processed.

- In case the processed data are obtained by others by unlawful means, the data controller shall communicate the breach to the data subject and notify it to the Board within the shortest time. Where necessary, the Board may announce such breach at its official website or through other methods it deems appropriate.
- The principles regarding the processing of personal data should be at the core of all personal data processing activities. Therefore, stakeholders must first determine if data collected by an autonomous vehicle is considered as "personal data" under PDP Law. It is generally understood that all these principles and requirements under PDP Law could be applied to autonomous vehicles, given there are no specific regulation or exemptions for the data collected, processed and transferred by autonomous vehicles.
- In conclusion, any manufacturer or business who aims to collect or exploit personal data collected and processed by autonomous vehicles could be characterized as a data controller and needs to meet the requirements set forth under PDP Law. In this respect, discussion regarding "legitimate interests," "performance of a contract" or "requirement for explicit consent" will inevitably be on the table for autonomous vehicles.

**Electric Vehicles and Charging Stations**

- There is a positive correlation between the number of electric vehicles ("EVs") and a more robust charging infrastructure. As the number of EVs increases, it incentivizes infrastructure providers to instal more E chargers. In this mutually benefical development cycle, the availability of charging infrastructure also motivates consumers' purchase intention of EVs. As consumers wait for the technology and the system to mature, manufacturers abstain from investing until they see demand in the market. The recent amendment made in Electricity Market Act No. 6446 ("Electricity Market Act") December 2021 serves jump start this cycle.
- Although total sales of EVs in the Turkish market were 3,283 between January 2022 and August 2022, it is believed that there is a compelling potential for EVs with the launch of domestic electric vehicle production (TOGG) soon. The rapid spread of EVs due to global developments aiming to prevent climate change inevitably requires radical changes, especially for the transportation sector. To meet the energy needs of this rapid spread, the infrastructure of electric charging stations must be developed. According to figures, more than 85% of EV charging occurs at home. However, it must be noted that to mitigate the range anxiety of the EV users, the availability of public charging infrastructure plays an essential role in extending EV adoption. Considering the complementary economic relationship and the causation between EVs and their charging stations, the foregoing radical changes in the transportation sector also led to quite a few legal changes.
- Although the Electricity Market Act will not solve the electric vehicle charging conundrum, it is a significant step forward. Within the amendments' scope, the definitions of certain terms such as EV, charging network, charging network operator, charging station, charging station operator and interoperability are provided. As the EV is defined as "a motor vehicle that uses an electric motor alone or as an ancillary and can be charged externally with electric energy," the scope of the Electricity Market Act not only covers "all-electric vehicles," but also "plug-in hybrid vehicles."
- Turkey rolls out its first electric car TOGG in October, 29th. Manufacturers expect to start commercial sales as early as the first quarter of 2023.
- These developments in the electric vehicle field are expected to increase the interest in the Automatic Vehicles.

# Driving Forces

## Manufacturers active in Turkey

- The Turkish automotive industry is already developing autonomous driving technologies. **Ford Trucks** has announced L4 highway tests. Ford has a strong manufacturing presence in Turkey via its Turkish JV Ford Otosan. Another notable Turkish manufacturer is **Karsan**, which operates in 20 different countries around the world. Karsan and software provider **ADASTEC** have deployed their L4 shuttle bus trial in restricted areas. This vehicle started to serve public transport in Norway in May 2022, thus becoming the first self-driving technology bus in Europe to carry passengers in the city.
- **Isuzu,** one of the leading medium-sized bus and coach manufacturing companies in Europe, also has a partnership with Turkey's Anadolu Group (i.e., Anadolu Isuzu).
- **Temsa,** which has been operating under the partnership of the Turkish conglomerate Sabancı Holding and the PPF Group (Skoda Transportation), is a global player that has brought many bus and midi-bus models to the sector since 1968. Temsa vehicles are actively used in 70+ countries around the world. For the last two years, Temsa has launched five different electric vehicle models ready for mass production. In addition to EVs, Temsa also conduct studies on autonomous buses at full speed for many years.
- Lastly, Turkey launched its long-awaited domestic automobile project in 2022 (**TOGG**). Bringing together Turkish conglomerates in coordination with the Ministry of Technology, TOGG was founded as a joint venture in 2018 by the **Anadolu Group, BMC, Turkcell, Zorlu Holding** and **the Union of Chambers and Commodity Exchanges of Turkey**. The unveiled models of TOGG have Level 3 autonomous driving assistance.

## NGOs active in Turkey

- As a NGO **Turkish Electric and Hybrid Vehicles Association** (TEHAD), works on Electric and hybrid vehicles.

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# United Kingdom

## Regulatory Developments

The UK government expects connected and autonomous vehicles to be a key area of growth over the coming decade, predicting that the technology will lead to the creation of 38,000 new high-skilled jobs, and that the industry could be worth £41.7 billion by 2035.

To ensure that the UK is able to benefit from these new technological developments, steps are now being taken to guarantee that the necessary legislation is in place to attract investment and to enable self-driving vehicles to be used on public roads.

Following publication of the recommendations made by the Law Commission in its Joint Report on autonomous vehicles (considered further below), the UK government published *Connected & Automated Mobility 2025: Realising the benefits of self-driving vehicles in the UK* in August 2022 (**Mobility 2025**). Mobility 2025 sets out the government's response to the Law Commission's recommendations and opened up a public consultation aimed at gathering data to inform strategic policy on connected and automated mobility in the UK.

In Mobility 2025, the government set out its vision for connected and automated mobility:

> "By 2025, the UK will begin to see deployments of self-driving vehicles, improving ways in which people and goods are moved around the nation and creating an early commercial market for the technologies. This market will be enabled by a comprehensive regulatory, legislative and safety framework, served by a strong British supply chain and skills base and used confidently by businesses and the public alike."

To deliver on its vision for connected and automated mobility, and realise the full potential of autonomous technologies in the UK's transport network, there will be a focus on the following areas:

- **Safety and security**: Mobility 2025 sets out proposals for a new safety framework which builds upon the existing safety framework for road and vehicle usage, but which will ultimately create a framework that allows for the safe operation of partial or fully autonomous vehicles on public roads, together with existing conventional driver-operated vehicles. Any such safety framework needs to be adaptable enough to allow for innovation within the sector without compromising the safety of all road users.

  The report identifies the testing and approval of self-driving systems as a particularly challenging area which needs to be addressed to ensure that all such systems are fit for purpose before entering into use on public roads. The government is in the process of developing their standards for autonomous vehicle safety and will publish further details in the future. At a high level, the government's ambition is that autonomous vehicles will improve road safety for all road users (and not increase safety for most users, or have a negative effect on any one group). Additionally, it is the government's expectation that self-driving systems will be subject to ongoing assessments throughout their lifecycle to maintain a high level of public confidence in the safety of these systems.

- **Securing industrial and economic benefits**: In Mobility 2025, the government states that its focus will now shift from supporting the development of early stage technology and development to providing an environment which supports attempts to commercialise these technologies. To facilitate this, the government will focus on two area in particular: (i) de-risking commercial deployment of the services; and (ii) strengthening the UK supply chain capabilities.
- **Delivering societal benefits**: In order to realise the potential benefits of autonomous technology, the government will continue to engage with key stakeholders and the public to ensure that the measures which it has in place to encourage the deployment of autonomous technology and its adoption by the public remain fit for purpose.

## Existing laws

Currently, the development and use of autonomous vehicles in the UK is governed by a number of different laws and guidelines, including:

- **The Automated and Electric Vehicles Act 2018 (AEVA 2018)**
  This sets out the legal definition of a vehicle which is "self-driving" (a vehicle which is "operating in a mode in which it is not being controlled, and does not need to be monitored by an individual"). It also overhauls the civil liability rules applicable to vehicles operating autonomously. These provide that the insurer is required to pay compensation to any person injured by an autonomous vehicle and afterwards seeks to recover its losses from any person or body actually responsible for the incident.
- **The Road Traffic Act 1998**
  This considers the licensing and insurance of all vehicles operating in the UK, as well as road regulation and traffic offences. Currently all vehicles and motorists must comply with this Act when operated on UK roads.
- **The Road Vehicles (Construction and Use) Regulations 1986**
  The regulations set out rules governing the design, manufacture, maintenance, construction and use of motor vehicles in the UK. Regulation 104 currently prohibits the use of any vehicle on the road where the driver does not have proper control of the vehicle. When testing autonomous vehicles in the UK, all applicable regulations in the Road Vehicles (Construction and Use) Regulations must still be complied with at all times (and in particular, Regulations 104 to 107).
- **The Highway Code**
  With effect from 1 July 2022, the UK Department for Transport made a number of changes to the Highway Code, including a new section relating to the use of autonomous vehicles. In particular, the new section has clarified that the driver of the car is liable for all incidents and damage caused by the vehicle where they are in control, but *not* where the vehicle is in self-driving mode. Where the vehicle is in self-driving mode, the individual is not required to pay attention to the road, but must be prepared to resume full control of the vehicle when prompted.

  These changes to the Highway Code only apply to autonomous vehicles which are approved by the Secretary of State for Transport under the Automated and Electric Vehicles Act 2018 and listed on the List of Self-Driving Vehicles. As of the date of publication of this guide, no vehicles are currently approved and listed on this list.

  It is important to distinguish between any such listed and approved autonomous vehicles, and vehicles which benefit from "driver assistance" features only, as the new sections of the Highway Code will only apply to the former, and drivers of vehicles fitted with any such "driver assistance" features shall at all times retain full responsibility for the safe operation of their vehicle, and will be required to pay attention at all times.

## Law Commission – Joint Report

The Centre for Connected and Autonomous Vehicles (CCAV) was created in 2015 as a new governmental body in the UK with specific expertise in the field. It was given a mandate to work together with academia and industry to promote autonomous technology in the UK, and to guide the development of suitable regulations.

In 2018, CCAV instructed the Law Commission of England and Wales and the Scottish Law Commission (the Commissions) to undertake a review of the current laws relating to autonomous vehicles, and to make recommendations for a new regulatory framework to govern the introduction and safe deployment of connected and autonomous vehicles on UK roads.

The Commissions published its findings in January 2022 in the Automated vehicles: Joint report. The report sets out a number of recommendations which have now been put to the legislators for consideration. Some of the key recommendations are:

- **A new Automated Vehicles Act:** Given the significant legal consequences which will arise with the widespread adoption of autonomous vehicles, the Commissions have recommended that new, UK-wide, primary legislation is required to deal with the regulation of autonomous vehicles on public roads.
- **The test for self-driving:** A clear test should be developed to determine whether a vehicle is to be considered "self-driving" (rather than merely providing features which offer driving-assistance). The Commissions suggest that a self-driving vehicle is able to control the vehicle safely and legally, even when not being monitored by any individual.
- **Safety standards:** The Secretary of State for Transport should publish a safety standard against which the safety of autonomous driving can be measured in practice and on a continuous basis. This should include a comparison against equivalent harm caused by human drivers, but the Commissions have not sought to define what level of safety would be acceptable.
- **Civil liability:** The Commissions considered issues relating to the insurance of autonomous vehicles, product liability laws and cases of contributory negligence. The key recommendations in this section are to: (i) expand the insurance provisions set out in AEVA 2018 so that they apply to all vehicles determined to be "self-driving;" (ii) review existing product liability laws to account for the additional challenges posed by emerging technologies; and (iii) ensure that there are provisions in place to provide compensation for injury or damage caused by uninsured usage of autonomous vehicles.
- **Wrongful interference:** The existing laws under the Road Traffic Act 1988 should be updated to create new offences relating to the tampering, interference or theft of autonomous vehicles.
- **Passenger services:** Any new Automated Vehicles Act should grant powers to the Secretary of State to issue permits for the provision of passenger services by autonomous vehicles.
- **Responsibilities of the "user-in-charge:"** The new Automated Vehicles Act should clearly define the responsibilities of the human "user-in-charge," and clearly distinguish these responsibilities from when any self-driving functions have control of the vehicle.
- **Marketing:** To avoid confusion, tighter controls should be introduced around what can and cannot be marketed to the public as an autonomous vehicle. It is envisaged by the Commission that it would be a criminal offence to use any terms (such as "autonomous" or "self-driving") to suggest that a vehicle is an autonomous vehicle, where it is not recognised by the Secretary of State as meeting the applicable test for self-driving.

The Law Commission has also been asked by CCAV to consider the law and regulation of *remote driving* on public roads, which relates to situations where vehicles are driven by a human operator at a remote location. Remote driving is

commonly used on controlled environments, such as in mining and agriculture, but not currently on public roads. Remote driving is seen by many as a technology which can facilitate the adoption of fully autonomous vehicles on public roads, as it will allow operators to take over from the technology where situations arise which cannot be handled by the autonomous technology or to allow for autonomous driving on motorways, before handing over to an operator for driving on the final stages of a journey where a vehicle may be required to navigate smaller public roads with less consistent driving conditions.

The Law Commission recently closed a public consultation into the matter, and is expected to publish its findings in 2023.

# Driverless Testing and Deployment

In the UK, it is permitted to trial and test autonomous vehicles. There are already a number of well-established companies operating in this space.

Any testing of autonomous vehicles must comply with the Code of Practice: automated vehicle trialling, which has been jointly published by CCAV, the Department for Transport and the Department for Business, Energy & Industrial Strategy. This aims to facilitate the safe deployment of the technology in the UK.

Interested parties are entitled to test autonomous vehicle technology on any UK road without the need to obtain specific permits in advance. Some of the key legal requirements are considered below.

## Vehicle standards

In accordance with the Code of Practice, any vehicle used for testing on UK roads must be roadworthy and meet the in-service requirements detailed in the Road Vehicles (Construction and Use) Regulations 1986.

## Adequate supervision

For autonomous vehicle trials on public roads, a suitably licensed and trained safety driver or safety operator should supervise the vehicle at all times. The safety driver/operator must ensure the vehicle is observing traffic laws, and should be ready and able to override automated operation if required. That person may be outside the vehicle as long as he or she has the ability to intervene and resume manual control, if necessary.

If the testing of any autonomous vehicle is to be undertaken on a remote basis, such remote-controlled trials should have appropriate redundancies in place to handle any failures or disengagements. These include warning systems and the ability to allow the safety driver/operator to take control of the vehicle at all times.

Those looking to undertake remote-controlled trials of an autonomous vehicle on public roads or other public places will need to ensure that the remote-control system is able to deliver the same level of safety as having a driver inside of the vehicle.

## Insurance

Under UK legislation, the use of non-autonomous motor vehicles must be insured (with the insurance attaching to an individual) so as to cover third-party risks. Failure to do so is an offence.

As detailed above, AEVA 2018 introduced a statutory insurance regime for autonomous vehicles which provides that, where an accident is caused by an insured autonomous vehicle, the insurer is liable for damage suffered by a person (covering death, personal injury and property, with limited exceptions). Where there is no insurance in place, the owner of the vehicle is liable for the damage.

AEVA 2018 prohibits the insurer from making any exclusions and limitations from the applicable insurance policy. This is subject to two exceptions: where an accident is caused directly by software alterations made by or with the knowledge of the insured person; or where the insured person failed to install safety-critical software updates he or she ought reasonably to have been aware of. In such situations, the insurer is entitled to recover any amounts it has paid out as a result from that person.

# Data Privacy

By its nature, the operation of autonomous vehicles will result in the collection and processing of vast amounts of data. Different types of data can be collected, generated, transmitted or processed, much of which will relate to the driver and/or passengers (for example, location data, information about the owner or driver of the vehicle and certain telematics data), and therefore be personal data for the purposes of the Data Protection Act 2018, the UK GDPR and the Privacy and Electronic Communications (EC Directive) Regulations 2003. Whilst existing data protection laws were not drafted with autonomous vehicles in mind, these laws are *technology neutral* and so, where personal data is being processed by any autonomous driving system, it must be done so in compliance with all applicable data protection laws.

The UK Information Commissioner's Office (ICO) has considered the processing of personal data by autonomous driving systems and vehicles, and has published a response to the Law Commission's Joint Report (considered above) on the topic.

The ICO emphasises the importance of *data protection by design*, meaning that developers of autonomous technology should consider potential issues which could arise from the processing of personal data from the outset of the design process, to ensure that adequate protections are built into the technology and not left to be addressed at a later stage of development. Autonomous technologies should be designed to minimise the collection of personal data, provide privacy-protective default settings and ensure that data subjects are well informed and have the option to easily modify configurations associated with their personal data. Additionally, such systems should aim to process personal data *locally* where it is possible to do so, to avoid the need to transfer personal data outside of the vehicle itself; where personal data must be transferred out of the vehicle itself, care must be taken to anonymise or pseudonymise such data where it is possible to do so. The system developer's must undertake data protection impact assessments to identify and mitigate the identified risks.

For the purposes of data protection law, the entity which is operating the autonomous systems and providing the service to the end user will be the *controller* of that personal data. Developers of autonomous technology should consider the following issues in particular:

- **Legal basis for processing**: The controller must ensure that it has a valid legal basis for processing all personal data which is collected by the system, in accordance with the requirements of Article 5 of the UK GDPR.

- **Data minimisation**: To comply with data minimisation requirements, the developer of the autonomous system must ensure that the system only collects personal data which is relevant and necessary to deliver the legitimate purpose of the processing. Developers of autonomous technologies are particularly encouraged to ensure that they only collect location data where it is absolutely necessary to do so, due to the invasive nature and the potential for location data to be used for surveillance purposes.
- **Notification of processing**: The controller of the personal data collected by the autonomous system must make a data privacy notice available to the data subjects, containing all necessary information required to comply with the requirements of Articles 13 and 14 of the UK GDPR. This can be particularly difficult in the case of autonomous vehicles where personal data can be collected from a number of data subjects in addition to the driver or owner of the vehicle (for example, passers-by who are captured by the autonomous vehicles recording equipment), and the controller must ensure that it has a workable way in which to provide notification of the data processing in situations where it does not have a direct relationship with the data subject or where the data is not obtained directly from the data subject.
- **Security**: The controller must ensure that adequate measures are in place to guarantee the security and confidentiality of all personal data which it collects and stores in the process of operating any autonomous vehicles. All reasonable steps should be taken to prevent such personal data being accessed by any unauthorised persons; for example, by using state-of-the-art algorithmic technology to encrypt such personal data, controlling access to the relevant systems through the use of passwords and other reliable user authentication technologies, setting up system partitions to ensure that personal data is segregated from other functions of the vehicle which also have online connectivity so that any compromise of a related system will not lead to loss of personal data stored separately and remaining vigilant to emerging cybersecurity threats and rapidly deploying patches to remedy identified vulnerabilities.

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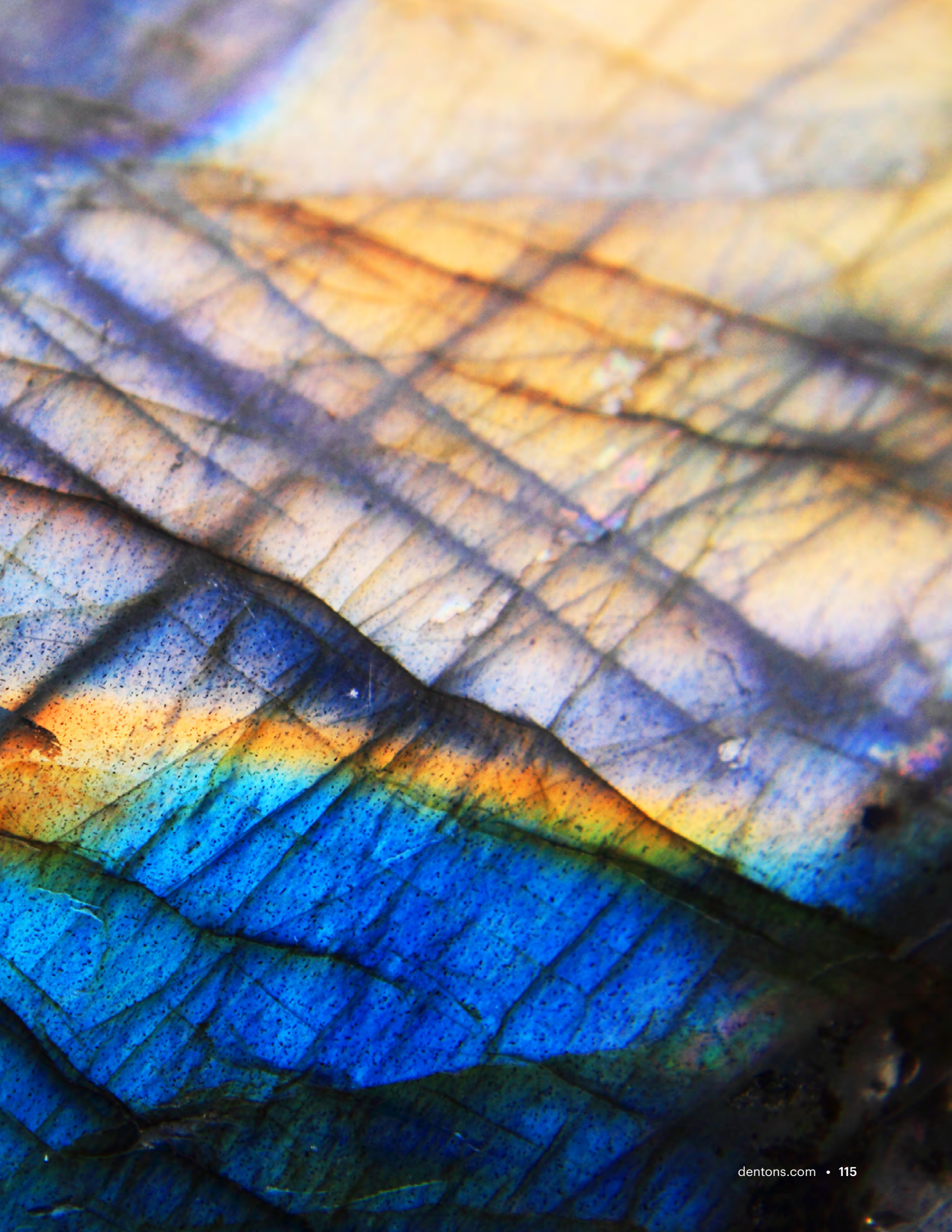

# United States

## Regulatory Developments and Roadblocks

Throughout the decades, the car has held a special place in the collective American psyche. Many grow up inundated by car advertising, the promise of independence and the relevance cars have in pop culture. And for years, Americans have been dreaming about a car that can drive itself.

That reality is coming true. Today, more than a decade after autonomous vehicle research began in earnest in the states, AVs have increasingly joined human drivers on public roads. States like California, Texas, Arizona and Nevada are home to hundreds of AVs, from robotaxis to delivery vehicles. The growth of the AV industry is now prompting federal and state lawmakers and regulators to consider what "rules of the road" and guidelines should be provided to AV developers, researchers and testers.

The question of whether and how a legal framework should be developed for AVs is not new. For years, lawmakers, stakeholders and advocates have discussed ways in which a framework for AVs should develop. In 2017, the US House passed the SELF DRIVE Act[1] by voice vote. The AV START Act[2] was also passed out of the US Senate Commerce Committee that same year by voice vote. That momentum in 2017 stalled, however, when thorny issues of preemption, arbitration and trucks were left out of both bills. Since that time, no AV bill has moved out of the federal Congress, leaving much progress to be made by the Executive Branch and the states.

The US Department of Transportation (DOT) under both President Obama[3] and President Trump[4], for example, issued plans and strategies for AV development and deployment. Although these reports and plans do not create legal obligations, they have been guideposts for manufacturers, stakeholders, and states to help think through future AV regulation and guidance. The Trump Administration also published three advanced notices of proposed rulemaking (ANPRMs) relating to AVs, but moved only one of these rulemakings to a proposed rule: the National Highway Traffic Safety Administration (NHTSA) Notice of Proposed Rulemaking (NPRM) on Occupant Protection for Automated Driving Systems[5]. Now, the Biden Administration has moved this proceeding to a final rule published March 30, 2022[6], the first DOT final rule on AVs.

The Biden Administration has also taken steps toward crafting AV regulations, issuing a Standing General Order for AV companies to follow. While neither Secretary Buttigieg, the US DOT nor NHTSA has openly addressed changing the nation's regulatory approach, these agencies are at least moving the proverbial regulatory ball forward.

In 2021, the Biden Administration took two new steps toward the advancement of a federal AV framework. In June 2021, the DOT issued a call

1 Cosponsors – H.R.3388 – 115th Congress (2017–2018): SELF DRIVE Act | Congress.gov | Library of Congress.
2 Cosponsors – S.1885 – 115th Congress (2017–2018): AV START Act | Congress.gov | Library of Congress.
3 NHTSA Federal Automated Vehicles Policy (transportation.gov).
4 Automated Vehicles – Comprehensive Plan (transportation.gov).
5 85. Fed. Reg. 17624 (Mar. 30, 2020).
6 87. Fed. Reg. 18560 (Mar. 30, 2022).

for public comment on "the development of a framework for Automated Driving System (ADS) Safety.[7]" Later that month, NHTSA issued a Standing General Order requiring the reporting of incidents involving vehicles equipped with an Automated Driving System (ADS) (Levels 3-5 Automation) or a Level 2 Advanced Driver Assistance System (ADAS).[8] The order requires motor vehicle manufacturers, motor vehicle equipment manufacturers and operators to report all crashes involving a vehicle equipped with the specified systems that results in injury or property damage.

Last year, in 2022, NHTSA issued its first release of data collected through the new Standing General Order.[9] The agency separated its data releases into two batches: those that deal with Level 2 systems and those that deal with Level 3 through 5 systems. One release captured all data from assistance systems currently helping consumer drivers, while the other release included data largely from testing projects across the country.

NHTSA made clear when releasing the data that it should be carefully examined. In some instances, the data could be incomplete or unverified. NHTSA also noted that different manufacturers receive different data from crashes, resulting in a non-standardized data set. Companies must report incidents within a certain time, but need not verify the incidents or look for additional information, meaning some reports may be consumer complaints[10].

In all, the reports showed 392 Level 2 vehicle crashes resulting in five serious injuries and six fatalities[11]. The report focused on Level 3 through 5 systems showed only 130 crashes resulting in only one serious injury[12]. When analyzing this data, consumers must consider the sheer number of vehicles currently equipped with relevant technology. Many newer vehicles include some form of Level 2 assistance such as automatic emergency braking, blind-spot detection and lane-keep assistance.

While the Standing Order and its reports have led to limited investigations and recalls, the agencies have yet to issue any opinion on the future of a regulatory framework based on this data and the public comments it previously received.

In March 2022, NHTSA revised several Federal Motor Vehicle Safety Standards (FMVSS) to consider the lack of steering wheels and gas pedals on highly automated vehicles[13]. The FMVSS amendments ensured that autonomous vehicles have the same level of protection as any other vehicle, but clarify the standards for manufacturers who manufacture cars without traditional controls. A group of Democratic Senators recently urged NHTSA to follow up on safety provisions found in the Infrastructure Investment and Jobs Act (IIJA), including directions to "issue minimum performance standards for crash avoidance technologies and to require all cars be equipped with a forward collision warning and automatic emergency braking system as well as a lane departure warning and lane keeping assist system" and "conduct a study on existing requirements for manufacturers to report information and data to DOT to help identify potential safety issues."[14] We have yet to see these actions from NHTSA, but could see some movement in the coming year.

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7 49 CFR 571.
8 National Highway Traffic Safety Administration requires autonomous vehicles companies to disclose crashes – Driverless Commute (thedriverlesscommute.com).
9 Car companies reported nearly 400 crashes of vehicles that used driver-assist tech (nbcnews.com).
10 Breaking: NHTSA releases data on incidents involving Advanced Driver Assistance Systems and Automated Driving Systems – Driverless Commute (thedriverlesscommute.com).
11 Summary Report: Standing General Order on Crash Reporting for Level 2 Advanced Driver Assistance Systems (nhtsa.gov).
12 Summary Report: Standing General Order on Crash Reporting for Automated Driving Systems (nhtsa.gov).
13 NHTSA Finalizes First Occupant Protection Safety Standards for Vehicles Without Driving Controls | NHTSA.
14 On Anniversary of Bipartisan Infrastructure Law, Van Hollen, Markey, Blumenthal, Colleagues Call on NHTSA to Implement Critical Safety Provisions | U.S. Senator Chris Van Hollen of Maryland (senate.gov).

The federal government is showing an increased willingness to regulate AVs. Whether this momentum continues through 2023 and into a presidential election year remains to be seen. For example, on March 1, 2023, the Autonomous Vehicle Industry Association (AVIA) released federal policy recommenations to Congress and the DOT, outlining recommendations for the development of a federal framework governing AVs. Whether this proposal gains momentum remains an open question. What we do know is that we could soon reach a zenith where policymakers and regulators recognize the industry's growth, giving reason to adopt a comprehensive AV framework and giving researchers and developers certainty as they work toward further deployment.

# Driverless Testing and Deployment

In the US, AV testing and deployment is governed at the state level. While some early-adopting states have created legal frameworks that encourage testing and development, others have no guidelines addressing the testing and use of AVs. In every case, the presence of a legal framework and guideline in a state at least provides certainty and trust for researchers and developers.

## Autonomous Trucking

New Mexico, Nevada, Arizona and Texas have all passed welcoming legal frameworks for AV companies. Together, these states have a formed a type of "autonomous trucking belt" in the Southwest, where companies are welcome to test their vehicles along wide stretches of public roads. Companies like Torc Robotics[15], Waymo[16], Cruise[17], Kodiak[18] and Gatik[19] are all carrying out important projects in these states.

## Autonomous Robotaxis

Robotaxis are currently being tested in major cities across the country. California has played a central role in robotaxi development as, not only the home of major players like Waymo and Cruise, but a prominent state for AV testing with strict consumer safety regulations and testing. While many states permit AV companies to self-certify, the California Department of Transportation and the California Public Utilities Commission have crafted a regulatory regime that more strictly requires oversight and approval.

This regulatory framework has begun to play out in the commercial space. Cruise received certification to offer fully autonomous robotaxi rides In San Francisco within certain limits. Waymo is also expanding into San Francisco and received approval to test certain vehicles in Los Angeles as well.[20]

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15 The Arizona Difference: Self-Driving Trucks in the Grand Canyon State (torc.ai).
16 J.B. Hunt, Waymo Add Wayfair to Autonomous Trucking Pilot in Texas | Business Wire.
17 Cruise Self Driving Cars | Autonomous Vehicles | Driverless Rides (getcruise.com).
18 IKEA tests driverless delivery trucks in Texas with Kodiak Robotics (cnbc.com).
19 Gatik expands autonomous box truck operations to Texas with $85 million in new funds | TechCrunch.
20 Waymo seeks permit to sell self-driving car rides in San Francisco | Reuters. Waymo to test driverless rides with employees in Los Angeles / Techcrunch.

# Connected Vehicles and Logistics

## 5G

5G infrastructure has the potential to supercharge the AV industry and lead toward the actualization of fully connected roadways. 5G providers are continuing to build out their networks in the US to help facilitate this change, which can present challenges as industry seeks to adapt to the new connectivity standards.[21] There remains significant debate within the US between stakeholders and advocates around the safety and reliability of new 5G networks, and the resiliency of the US supply chain. New investment from Congress relating to infrastructure funding may increase the likelihood of quicker adoption across the AV ecosystem.[22]

There is an ongoing dispute among regulators on how to approach wireless cellular Vehicle-to-Everything (C-V2X) technology for autonomous vehicle integration. V2X is an intelligent transportation system technology that allows data sharing between vehicles, roadside infrastructure, and nearby road users to enable various safety and efficiency applications. In 1999, the FCC dedicated the 5.9 GHz spectrum band for vehicle safety technologies to enable communication for connected vehicles and upgraded infrastructure. However in 2020, the FCC reassigned a portion of the band for unlicensed Wi-Fi content providers. The decision led to ITS America and the America Association of State Highway and Transportation Officials, with the backing of NHTSA, to file a lawsuit against the FCC claiming the reassignment would jeopardize safety by complicating wireless roadway communications. The suit was ultimately rejected by the United States Court of Appeal for the District of Columbia. The FCC originally intended to offer waivers to transportation stakeholders wanting to use the spectrum band but has yet to approve any deployments despite numerous requests. However, pressure from Federal regulators and Capitol Hill over the coming years could potentially force the FCC to renege on its 2020 decision or approve limited access to a frequency band of spectrum for transportation operations.

## Data Privacy and Security

AVs undoubtedly involve the collection and use of the personal data of their riders in a way that is new and unique. States such as California, Virginia, Colorado, Utah and Connecticut have adopted comprehensive consumer-focused data privacy laws that may impact how AVs collect and use rider information. There is also potential federal data privacy legislation that may work its way through Congress, presenting the potential of a 50-state data privacy solution. AVs also engage in substantial autonomous processing of information. This use of artificial intelligence and machine learning can present risk and opportunity as it relates to data analysis. US states are increasingly focused on this activity, with regulatory agencies zeroing in on discriminatory outcomes in the automated processing of personal information. At the federal level, the Biden Administration and the Office of Science and Technology Policy released the *Blueprint for an AI Bill of Rights* in hopes of guiding artificial intelligence and automated technology researchers and developers as they continue to develop groundbreaking technology. The blueprint include five key principles: safe and effective systems, algorithmic discrimination protections, data privacy, notice and explanation and alternative option.[23] Recently, the US Department of Commerce's National Institute of Standards and Technology (NIST) released a new AI Risk Management Fraemwork - providing stakeholders guidance on how to safel and effectively design and operate artificial intelligence. It remains an open question as to whether the NIST AI Risk

21 Verizon, AT&T agree to delay some 5G deployment until mid-2023 | Reuters.
22 The digital future requires making 5G secure (brookings.edu).
23 FACT SHEET: Biden-Harris Administration Announces Key Actions to Advance Tech Accountability and Protect the Rights of the American Public | OSTP | The White House.

Management Framework will become a de facto "reasonableness" standard adopted by state and federal regulators as it relates to the use and deployment of AI within the autonomous vehicles and mobility space.

Perhaps even more important in the space of AVs is cybersecurity. AVs are connected vehicles. Preventing bad actors from accessing the networks that connect AVs or taking over a vehicle is a top priority for industry and regulators. Whether and to what extent the AV frameworks being developed at the state and federal level introduce new cybersecurity requirements for those within the AV ecosystem remains to be seen.

## Electric Vehicles

The electrification of automobiles and the deployment of AVs has always been inextricably linked. In the future, most AVs will need to be electric vehicles. The electric vehicle industry is currently experiencing an incredible period of governmental support. In 2021, Congress passed the IIJA, which included almost $7.5 billion over five years for the launch of an electric vehicle charging network to combat range anxiety in consumers[24]. Last year, lawmakers followed by passing the Inflation Reduction Act (IRA), a critical piece of legislation that encourages consumer purchase of EVs and the construction of a national supply chain for electric vehicles and electric vehicle batteries.

In order to qualify for the IRA's tax credits, the law requires the electric vehicles to be assembled in the US using primarily domestic materials, including EV batteries.[25] The new requirement has caused significant controversy in the automotive industry, as most manufacturers were simply unprepared for such strenuous conditions.[26] Leaders from other countries have decried the obligation as "protectionist" and have worried about the effects the legislation could have on the industry globally. President Biden, however, has made clear he will not apologize for the IRA.[27] These requirements have the opportunity to revitalize the nation's manufacturing sector and build out, for the first time, a serious national supply chain for electric vehicles. States like Georgia are already reaping the benefits, as major car manufacturers announce that they will build electric vehicle and electric vehicle battery assembly plants in the US in order to take advantage of the available tax credits.[28],[29]

## Commercial Developments

### Waymo

Waymo is an Alphabet company spun off from the Google self-driving car project in 2016. Waymo now operates self-driving robotaxis and autonomous trucks. It hopes to receive approval to start a commercial driverless ride service in California.[30] Waymo may also begin operating certain vehicles in San Francisco and Los Angeles.

### Cruise

Cruise is an AV company based in San Francisco and supported by General Motors. After testing for years in its hometown, Cruise received the proper permits to operate a commercial robotaxi service in San Francisco with no safety driver in the car.[31] Cruise has also begun operations in Austin, Texas.[32]

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24 What to Know and Do to Receive IIJA Zero Emission Funding in 2022 | HDR (hdrinc.com).
25 Inflation Reduction Act Benefits: Electric Vehicle Tax Incentives For Consumers And U.S. Automakers (forbes.com).
26 Hyundai: Biden's EV tax credit rules deal 'astronomical' blow to business (cnbc.com).
27 Biden and Macron indicate progress over electric vehicle subsidy dispute | CNN Politics.
28 Hyundai, SK to build new battery plant in Georgia | Reuters.
29 Rivian to site second manufacturing plant in Georgia.
30 Waymo seeks permit to sell self-driving car rides in San Francisco | Reuters.
31 Cruise has expanded its driverless robotaxi service to daytime hours | TechCrunch.
32 GM Cruise robotaxis start service in Tesla's Austin – FSD still nowhere to be found | Electrek.

### Mercedes-Benz

Mercedes-Benz is the first automaker to secure government approval of its Level 3 autonomous vehicle system after it self-certified that its "Drive Pilot" system met all the needed requirements for operation on Nevada public highways.[33] Drive Pilot will operate at speeds up to 40 mph on "suitable freeways" and in high-traffic-density scenarios. The system, when engaged, will handle the driving task so the driver can take their hands off the wheel and do something else. The driver must keep their face visible to the in-car cameras at all times and be prepared to assume driving responsibilities if needed. Drive Pilot is expected to debut in the US in late 2023 in the 2024 S-Class and EQS sedan.[34]

### Zoox

Zoox, the Amazon-backed robotaxi company, recently secured a testing permit in California and has now begun offering driverless test rides to its employees. Unlike others in the space, Zoox's vehicles are purpose-built for autonomy, meaning they have no steering wheel or pedals. Zoox plans to eventually expand its service to the general public.[35]

### Kodiak Robotics

Kodiak Robotics is operating autonomous trucking projects from San Francisco to Florida, partnering with Ikea, Werner and 10 Roads Express. In 2025, Kodiak hopes to install its self-driving technology on a carrier's vehicle and charge a low per-mile subscription fee. Kodiak plans to partner with companies like Pilot to build hubs alongside major freight corridors where autonomous trucks and last-mile delivery vehicles can exchange freight seamlessly[36].

# Driving Forces

## Department of Transportation, NHTSA, Secretary Buttigieg

As Secretary of Transportation, Secretary Buttigieg will play a key role in guiding the US policy surrounding AVs and autonomous technology at-large. Secretary Buttigieg has repeatedly expressed his desire to make sure AVs are safe for consumers, above all else. NHTSA therefore will undoubtedly be heavily involved in the development of any new AV framework.

## California Department of Motor Vehicles (DMV) and California Public Utilities Commission (CUPC)

With so many AV companies testing in California, the CPUC and California DMV hold significant power over the future of AVs within California and potentially the country. Due to the lack of a significant national regulatory framework and the ability to self-certify in many AV-accepting states, the California DMV and CUPC serve as the nation's foremost consumer safety-certifying organizations around the use and testing of AVs.

## Congressional Autonomous Vehicles Caucus

In 2022, Rep. Bob Latta (R-OH) and Rep. Debbie Dingell (D-MI) announced the formation of the Congressional Autonomous Vehicles Caucus to introduce lawmakers to the intricacies and benefits of the AV industry. The Congressional Autonomous Vehicles Caucus will undoubtably play a major role in any possible movement toward the adoption of a legal framework for AVs in Congress[37].

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33 Mercedes-Benz is the first to bring Level 3 automated driving to the US – The Verge.
34 Mercedes-Benz is taking the lead in the US as first vehicle manufacturer to launch Level 3 vehicles on US roads in Nevada – Driverless Commute (thedriverlesscommute.com).
35 Amazon's Zoox is now operating its purpose-built autonomous taxi on public roads (yahoo.com).
36 Pilot Company and Kodiak Robotics Partner to Bring Self-Driving Truck Services to Pilot and Flying J Travel Centers (prnewswire.com).
37 With autonomous vehicle caucus, Congress members aim to advance technology for self-driving cars | Smart Cities Dive.

# State-by-State Round-Up

## Alabama

Alabama has been active in the regulation of AVs since it first formed a committee on the subject in 2016. The Alabama Department of Transportation has sole and exclusive jurisdiction over automated driving systems, AVs and tele-operations systems. At present, commercial vehicles are authorized to operate autonomously, either with or without a physical driver, so long as a remote driver is capable of operating the vehicle.

Since 2017, there have been numerous bills considered in the Alabama legislature to regulate AVs (including numerous sponsored by State Senator Gerald Allen (R)). In 2019, Senate Bill 47 was passed and signed into law, which created a framework and codified the rules for commercial AVs. The legislature also passed legislation in 2018 allowing for truck platoons.

Alabama is ripe for investment from the AV industry. Educational institutions in the state have taken a serious interest in autonomous technology and AVs. In 2021, The University of Alabama and Auburn University began sponsoring racing teams in the Indy Autonomous Challenge, a competition which brought together public and private partners to collaborate on autonomous race cars. The racing teams create software to operate autonomous racecars as they attempt to log the fastest times. The University of Alabama, alongside its partner from Politecnico di Milano, is now a two-time winner of the Indy Autonomous Challenge after taking home the top prize in 2021 and 2022.

It is also important to consider how Alabama's investment in the auto manufacturing industry will affect the AV industry in the future. In 2022, Mercedes announced it will begin production of its all-electric EQE SUV in Alabama[38]. Since AVs and electric vehicles are intrinsically connected, we can observe these developments in the EV space as a forerunner of things to come for autonomous vehicles.

Bills Introduced in 2021: Senate Bill 154

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Alaska

Alaska has yet to pass significant legislation regarding AVs, but the state is engaged in moving the AV ball forward. In 2021, the Alaska Connected and Automated Vehicle Working Group released its strategic plan for connected and autonomous vehicles in Alaska.[39] The working group, housed in the Alaska Department of Transportation and Public Facilities, laid out a near-term, mid-term and long-term focus for the state's adoption of AV technology.

The state's focus on connected AV technology is logical considering Alaska's challenging geography and environment. While that environment may prove challenging for autonomous robotaxis and delivery vehicles in their current state, the communication between infrastructure, a vehicle and other systems would likely provide for more efficient and safe transportation in Alaska.

38 Mercedes-Benz EQS SUV Production Started In Alabama (insideevs.com).
39 Alaska DOT Connected & Automated Vehicle Working Group Strategic Plan.

## Arizona

Arizona has long been one of the nation's leaders in AV research, deployment and acceptance. The historic welcoming nature of Arizona's AV regulatory structure has now solidified the state's standing as a hotbed of AV innovation. Waymo now provides fully autonomous commercial rides in the state[40] alongside Cruise[41]. And autonomous trucking companies have begun to leverage the state's friendly framework for testing and commercialization.

Arizona's rise to prominence in the AV space began with a series of executive orders signed by former Governor Doug Ducey. These efforts led to the state legislature codifying an AV framework in 2021, which formally outlines the requirements for AVs to operate in the state. The framework provides operators and owners with guideposts concerning accidents, taxes, operational requirements and permitting processes. Under this framework, fully autonomous vehicles may operate with the system engaged on public roads, without submitting supporting documents, so long as there is a licensed driver ready to take over the driving task, where necessary.

To operate an AV without a driver present, one must submit a "Law Enforcement Interaction Plan" to the Arizona Department of Transportation, along with a written statement acknowledging that, among other things: (1) the vehicle is in compliance with all applicable federal laws and standards; (2) in case of failure, the vehicle will reach a minimal "risk condition"; (3) the vehicle is designed to comply with all applicable traffic laws, and will have a person responsible designated to receive traffic citations; and (4) the vehicle meets all license, registration, title and insurance requirements.

In 2022, the Arizona legislature passed two additional bills addressing AVs: (1) House Bill 2273, which allows transportation networks to use AVs; and (2) House Bill 1333, which defines "Neighborhood Occupantless Electric Vehicle[s]," such as autonomous delivery devices. These bills will provide certainty to autonomous technology companies looking to join Arizona's AV industry.

Bills Introduced in 2021: House Bill 2007, House Bill 2476, House Bill 2083, House Bill 2813

Bills Passed in 2021: House Bill 2813

Bills Introduced in 2022: House Bill 2014, House Bill 2187, House Bill 2263, House Bill 2273, Senate Bill 1333

Bills Passed in 2022: House Bill 2273, Senate Bill 1333

## Arkansas

Arkansas first addressed the use of AVs in 2019 when it created an AV pilot program overseen by the State Highway Commission. Two years later, in 2021, the state legislature unanimously passed House Bill 1562, which transitioned the pilot program into a formal AV program. The law also introduced the concept of an On-Demand Driverless Vehicle Network, which would create for the operation of a vehicle network that connects autonomous vehicles to consumers for goods delivery or transportation. The State Highway Commission remains responsible for overseeing the implementation of the law. The state also allowed Driver Assistive Truck Platooning (DATP) under legislation that took effect in 2017. This legislation allows vehicle-to-vehicle communication to sync up to the vehicle's acceleration and braking systems, while leaving the steering to each individual driver. This process allows for quicker response times to an emergency braking event.[42]

While Arkansas does not boast the interconnected networks of Arizona or California, outgoing Governor Asa Hutchinson has made autonomous vehicle industry recruitment a key part of his vison for a flourishing Arkansas. In 2022, Governor Hutchinson announced a new partnership with Governor Kevin Stitt of Oklahoma to collaborate on AV and future mobility work.

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40 Now anyone can hail a Waymo robotaxi in downtown Phoenix | TechCrunch.
41 Cruise, Waymo push robotaxis amid doubts about self-driving tech (axios.com).
42 'Truck platooning' soon to be seen on Arkansas interstates – Talk Business & Politics.

Together, Arkansas and Oklahoma are paving a new path forward for states that want to attract the AV industry. While these states may not possess the same natural advantages as California or Arizona, Arkansas and Oklahoma are encouraging their public educational institutions, economic development organizations and industry leaders to work together to create an interesting environment that advances current work while encouraging new investment from companies involved in future mobility work[43].

Bills Introduced in 2021: House Bill 1562

Bills Passed in 2021: House Bill 1562

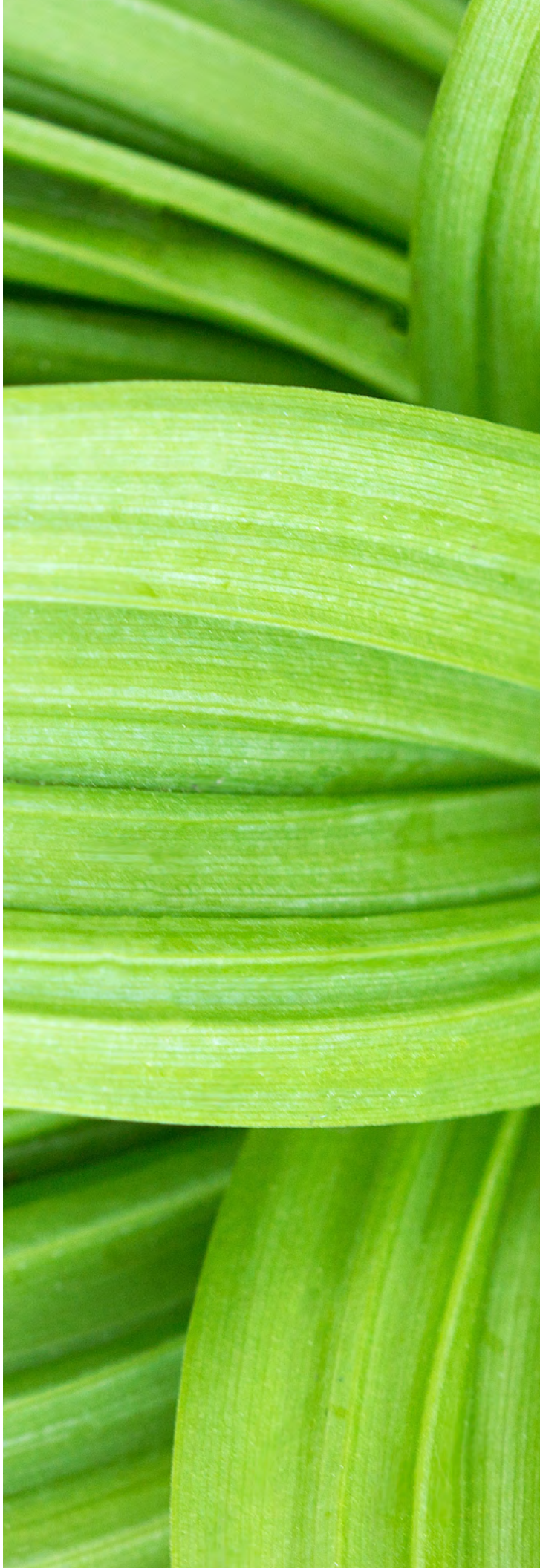
Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## California

California leads the nation in AV development, deployment and acceptance. With a comprehensive approach to regulating AVs and the participation of numerous AV operators, California is primed to be the home of our collective autonomous future.

Since 2017, California has enacted several laws that lay out procedures for the testing and deployment of AVs in the state. The state expanded its program from requiring backup drivers in all test vehicles to also allowing self-driving car tests without backup drivers. To qualify for a driverless testing permit, companies must show proof of insurance or a bond equal to $5 million, verify the vehicles are capable of driverless operation and verify that the vehicles meet Federal Motor Vehicle Safety Standards. As of 2021, 54 companies hold permits to test with a driver in the car and eight hold permits to test while completely driverless. In 2021, the state legislature also passed SB 500, which ensures that new light-duty AVs starting in model year 2031 are zero-emission vehicles. The state legislature also passed SB 570, which exempts AVs from regulations that are irrelevant to their operation (i.e., windshield wipers and speedometers), and provides alternative



43 New Early Adopters Look to Take Action in the US Autonomous Vehicle Industry – Driverless Commute % % (thedriverlesscommute.com).

standards. In 2022, the state legislature passed a law requiring any dealer or manufacturer that sells a vehicle equipped with or a vehicle able to be equipped with a Level 2 driver assistance program and provide the buyer or owner with a notice describing its abilities and limitations.

While the last year has seen some consolidation in the robotaxi space in California, Waymo and Cruise are continuing to break barriers and take steps toward comprehensive platforms within the state. Cruise, in particular, received certifications to begin offering commercial fully autonomous rides in San Francisco within certain limits. The company is now asking the California DMV to allow it to test the Cruise Origin on public roads. The Cruise Origin is a vehicle built from the ground up with autonomy in mind – meaning the Origin does not have a steering wheel, shifter or designated direction to move[44].

Waymo is on course to join Cruise and offer a commercial driverless platform of its own. Waymo is currently able to offer commercial rides with a safety driver in the front seat. Recently, it received permission from the DMV to offer commercial rides without a driver and now only needs a final permit from the California Public Utilities Commission to begin the service.[45] Waymo may also begin testing certain vehicles in Los Angeles and San Francisco.

California is a barometer for the AV industry. After years of hard work and development, it seems the AV companies created out West are finally seeing results.

Bills Introduced in 2021: Senate Bill 66, Senate Bill 570, Senate Bill 500

Bills Passed in 2021: Senate Bill 500, Senate Bill 570

Bills Introduced in 2022: Senate Bill 1398, Assembly Bill 2441

Bills Passed in 2022: Senate Bill 1398

## Colorado

Companies seeking to test and operate AVs in Colorado are greeted by a welcoming regulatory environment. Legislation enacted in 2017 allows driverless vehicles to be operated in the state, so long as they are capable of complying with existing state and federal law. Legislation passed in 2019 also requires the Colorado Department of Transportation (CDOT) to convene a working group to examine the impact of technology, including autonomy, on transportation business models. The group made its recommendation to the legislature in November 2019.

The CDOT is leaning into connected technology and has equipped miles of Colorado highways with roadside units that utilizes both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. In a state like Colorado, where weather patterns can make transportation unpredictable, connected vehicle technology could allow vehicles to know about hazardous conditions before they run into trouble. In July 2022, the CDOT selected Yunex Traffic to provide 150 roadside units and expand its connected vehicle program[46].

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Connecticut

Of the states that have passed AV laws, Connecticut has one of the strictest regulatory frameworks. To comply with Connecticut's regulations, operators must go through a multistage approval process, and testing is only allowed in select municipalities, to be designated by the commissioner of the State Department of Transportation. That said, Connecticut did loosen its restrictive framework by allowing the operator to not be in the driver's seat as long as they are physically inside the AV in order to

44 GM's Cruise pursuing permit to test its custom-built 'Origin' robotaxi in San Francisco | TechCrunch.
45 Waymo seeks permit to sell self-driving car rides in San Francisco | Reuters.
46 Yunex Traffic provides 150 RSUs for Colorado DOT's V2X | Traffic Technology Today.

engage the system. The state has also established a task force to study fully autonomous vehicles. In 2022, the state legislature passed a bill permitting and creating regulations for platooning.

In 2021, the Connecticut Department of Transportation (CTDOT) released a "strategic plan" for the adoption of Connected Autonomous Vehicle (CAV) technology. The CTDOT has made a strategic decision to focus its efforts on connected AV technology instead of pushing autonomous-only projects. Governor Ned Lamont (D) appointed Garrett Eucalitto as the next Director of CDOT at the end of 2022.[47] Eucalitto has previous experience working with AVs during his time as transportation program director for the National Governors Association (NGA).

Steve Cortese, a longtime financial advisor, and Professor Eric Jackson of UConn's Connecticut Transportation Institute, are planning to bring a state-of-the-art autonomous vehicle testing facility to a property they recently acquired from UConn's Storrs campus.[48] The facility would be the first of its kind in New England and the pair say they already have companies who are interested in working at the facility. Cortese and Jackson believe the project could place Connecticut at the forefront of the autonomous and connected vehicle landscape.

Bills Introduced in 2021: House Bill 6486

Bills Passed in 2021: N/A

Bills Introduced in 2022: House Bill 5255

Bills Passed in 2022: House Bill 5255

## Delaware

Delaware has yet to pass any major AV legislation or see any significant public investment from the AV industry.

In September 2017, Governor John Carney signed an executive order to establish an Advisory Council on Connected and Autonomous Vehicles. The Advisory Council was tasked with developing recommendations for innovative tools and strategies that can be used to prepare Delaware's transportation network for connected and autonomous vehicles. The Advisory Council's final report was submitted in September 2018. The report has not spurred any successful legislation to this point.

In 2022, Lena Mashayekhy, assistant professor of computer science at the University of Delaware's College of Engineering, received a Career award from the National Science Foundation. With the award, Mashayekhy will study mobility and the Internet of Things. Mashayekhy's work could prove formative for connected AVs as the state explores the creation of digital systems built to withstand incredible amounts of data necessary to make the AV system operate.[49]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Florida

Florida has long been considered a national leader in AV testing and deployment, as AV stakeholders see Florida's growing and aging population as an ideal place to test commercialization.

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47 https://portal.ct.gov/Office-of-the-Governor/News/Press-Releases/2022/11-2022/Governor-Lamont-Announces-Plans-To-Appoint-Garrett-Eucalitto-as-Commissioner-of-CTDOT

48 https://www.hartfordbusiness.com/article/meet-the-duo-behind-an-ambitious-30m-plan-to-build-the-regions-first-autonomous-vehicle

49 https://www.udel.edu/udaily/2022/july/engineering-nsf-career-award-lena-mashayekhy-national-science-foundation-2022/

In 2019, Florida relaxed its laws to allow for AV testing on public roads without a human operator in the vehicle. Within days, a Starsky Robotics 18-wheeler was on the highway with no one at the wheel in the midst of Sunday morning traffic. Notably, Florida has the third most truck drivers in the United States, behind Texas and California. In 2022, Kodiak Robotics, a leader in autonomous trucking, expanded service along the I-10 corridor to Jacksonville, Florida, in consort with its partner, 10 Roads Express, a provider of time-sensitive surface transportation for the U.S. Postal Service. To kick off the partnership, Kodiak carried freight nearly 5,600 miles from San Antonio, Texas; to the San Francisco Bay Area; to Jacksonville, Florida; and back to San Antonio.[50]

In 2021, Florida took another step toward the commercialization of autonomous technology with the passage of House Bill 1289, which legalized and developed a framework for autonomous delivery vehicles. Now, Florida can join other AV hubs, like California and Texas, in utilizing autonomous delivery robots to better serve its aging population and address its sprawling geography.

The University of Florida Transportation Institute, the Florida Department of Transportation and Yunex Traffic are also taking the first steps toward a dedicated autonomous vehicle project. At the Gainesville campus, two driverless shuttles are operating with Yunex on-board units that communicate with roadside units to create a connected AV network. The vehicles can now make left and right turns while also handling relevant traffic signals with coordination.[51]

Bills Passed in 2020: House Bill 1303

Bills Introduced in 2021: Senate Bill 1620 (companion to HB 1289)

Bills Passed in 2021: House Bill 1289

Bills Introduced in 2022: Senate Bill 150, House Bill 1525

Bills Passed in 2022: N/A

## Georgia

Georgia allows the operation of both AVs and trucks under legislation passed in 2017. Driverless vehicles are free to operate in the state, so long as they are fully insured and lawfully registered. At present, no robotaxi services are operating in the state; however, there are several autonomous shuttle projects, including an autonomous shuttle that traverses a 1.5 mile track in the Peachtree Corners Curiosity Lab.

With 2020 came the advent of "The Ray," an 18-mile stretch of I-85 in southern Georgia that will help test highway technologies, including a network of six roadside units capable of communicating with AVs. The pilot uses "CIRRUS by Panasonic," and is described as a "vehicle to everything" (V2X) system. This next-gen striping will assist autonomous and connected vehicle technology and serve as a unique place for testing CAV- (Connected and Autonomous Vehicles) equipped vehicles.

During the 2022 legislative session, Georgia lawmakers also passed new legislation allowing for the introduction of autonomous delivery vehicles into the state. Additionally, in 2022, T- Mobile, Applied Information and Temple, Inc. introduced 5G-connected infrastructure to the Peachtree Corners Curiosity Lab. By downloading the TravelSafely smartphone app, drivers can receive warnings and alerts from infrastructure while being able to send information back, such as a call for a green light. This installation will allow these companies to receive data and feedback from V2X technology tested in the field. Peachtree Corners continues to cement its position on the forefront of the Smart City movement. Now, the city is partnering with Partners for Automated Vehicle Education (PAVE), an educational coalition dedicated to teaching the public about AVs.

With a history of automobile manufacturing and access to major shipping ports along the coast and Hartsfield Jackson Airport in Atlanta, the state is positioned to play a major role in electric and AV

50 Kodiak partners with 10 Roads Express – Kodiak.
51 Florida AV project takes new turn | ITS International.

development and deployment. Over the last year, elected officials and relevant stakeholders have introduced a number of new electric vehicle battery projects to the state from major players in the space, including Hyundai, Rivian and SK Innovation. Additionally, these projects bring along their own cottage industries, as suppliers desire to be close to their clients. Governor Kemp has clearly realized Georgia has key natural advantages in this space and is working to maximize the state's potential to be the nation's hub for EV battery production. The "Battery Belt" being built just outside the Atlanta perimeter might radically change the face of the state and become the driving force behind EV production in the US.

Bills Introduced in 2021: House Bill 249

Bills Passed in 2021: Senate Bill 165

Bills Introduced in 2022: House Bill 249, House Bill 1009

Bills Passed in 2022: House Bill 1009

## Hawai`i

In 2020, Governor David Ige signed House Bill 2590 into law, creating a pilot program within the Hawai`i Department of Transportation (HDOT) to allow for AV testing on Hawai`i public roads. The law requires that a conventional human driver be physically present in the vehicle at all times to supervise the vehicle and prevent collision, if necessary. The passage of the law was due, in no small part, to the efforts of the Hawai`i Autonomous Vehicle Legal Task Force, which included Dentons Partner Bill Kaneko.

Hawai`i represents a unique environment for AV testing and deployment. The combination of an insulated traffic environment, relatively short commuting routes, a comparatively small population, and a limited number of weather and road variables make Hawai`i an attractive AV testing environment.

In 2021, the Naval Facilities Engineering Command, and Expeditionary Warfare Center, announced a $6 million award to the University of Hawai`i at Manoa's Hawai'i Natural Energy Institute. This award will support the institute's research into wave energy, including using wave energy converters (WEC) to recharge autonomous undersea vehicles. Additionally, professors and students from the University of Hawai`i field a team in the Indy Autonomous Challenge.

HDOT has also begun advocating for a "road usage charge" to begin replacing the revenue electric vehicle owners save by avoiding the gas tax. HDOT recommends that the charge begin with an .8 cent per mile rate and not exceed more than $70 on a yearly average. Since 2018, HDOT has demonstrated the project thorough a public pilot using 2,000 vehicles and with funding from a Federal Highway Administration (FHA) grant[52].

Bills Passed in 2020: House Bill 2590

Bills Introduced in 2021: Senate Bill 1008

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Idaho

In 2018, Idaho Governor C.L. "Butch" Otter signed Executive Order 2018-01 creating the Autonomous and Connected Vehicle Testing and Deployment Committee. The Committee's charge is to identify relevant state agencies to support the testing and deployment of autonomous and connected vehicles within the state. The Committee submitted its report in November 2018. The report has yet to spur any successful legislation relating to autonomous or connected vehicles.

On a related note, Idaho has joined ChargeWest, an agreement among multiple Western states to encourage rural charging stations for electric vehicles. Opportunities like ChargeWest are changing the popular sentiment around electric vehicles, which may lead to further developments in the AV space.

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022:

Bills Passed in 2022:

52 Hawaii DOT Advocates Road Usage Tax for EVs | Transport Topics (ttnews.com).

## Illinois

Both Illinois and Chicago officials have been slower than their counterparts to adopt AV-friendly frameworks. While Illinois has no legislation directly regulating AVs, an executive order signed by former Governor Bruce Rauner allows their operation in the state. The order established the Autonomous Illinois Testing Program, overseen by the state Department of Transportation, which permits AVs to be operated within Illinois with an employee of the manufacturer behind the wheel. In recent legislative sessions, there has been a movement to pass the comprehensive "Autonomous Vehicles Act," but it has yet to pass.

There continues to be stakeholder movement in the AV space. The Illinois Autonomous Vehicle Association (IAVA), a group of stakeholders and interested parties, has partnered with the Smart Transportation Infrastructure Initiative at the University of Illinois Urbana-Champaign to announce plans to build the Illinois Autonomous and Connected Track (I-ACT). The I-ACT will cover 430 acres of the former Chanute Air Force Base in Rantoul, Illinois. The project has already received support from the city, the university community and the Illinois Department of Transportation. Over the last year, the I-ACT has finished the conceptualization of the track and selected projects to engage. Construction is expected to take 12 to 15 months[53].

Bills Introduced in 2021: House Bill 4758, Senate Bill 3204, House Bill 2575

Bills Passed in 2021: N/A

Bills Introduced in 2022:

Bills Passed in 2022:

## Indiana

Although Indiana does not have any current laws or regulations regulating autonomous passenger vehicles, truck platooning has been regulated in the state since 2017. There have been efforts in the past to create an autonomous task force with the power to approve operation of fully driverless vehicles in the state, but all have failed to garner enough support to pass into law.

Private actors, however, have continued momentum within the state. The Indianapolis Motor Speedway, the Energy Systems Network and multiple other stakeholders worked together to introduce the Indy Autonomous Challenge (IAC). This challenge features college and university teams from around the world in an autonomous race around the Indianapolis Motor Speedway. All teams utilize the same Dallara-produced AV-21 retrofitted for automation. The teams are responsible for loading software able to put their cars across the finish line first over 20 miles averaging at least 120 miles per hour. After the inaugural challenge, the IAC announced subsequent events in Las Vegas and the Texas Motor Speedway. The IAC is encouraging developers and researchers to make breakthroughs in the race toward autonomy.[54]

Two Purdue University faculty members, Professor Brad Duerstock, a professor of practice in industrial engineering and biomedical engineering whose arms and legs have been paralyzed since he was 18, and Brandon Pitts, a Purdue assistant professor of industrial engineering, won first prize in the USDOT's challenge to design an accessible autonomous vehicle[55].

Between the state's top-tier educational institutions, its engaged private sector and its previously established manufacturing capacity, Indiana could develop into a powerhouse for AVs in the near future.

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53 Illinois Autonomous and Connected Track completes conceptualization | Illinois Center for Transportation | UIUC.
54 Indy Autonomous Challenge – Official Website.
55 How could future autonomous transportation be accessible to everyone? – Purdue University News.

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Iowa

Iowa allows driverless vehicles to operate on public highways without a conventional human driver physically in the vehicle if they meet a set of conditions, including that the vehicle is capable of achieving a minimal risk condition in the event of a malfunction and that the vehicle is capable of operating in compliance with the applicable traffic and motor vehicle safety laws and regulations. In 2019, Iowa passed Senate File 302 that establishes more regulation for AV vehicles, including terms for insurance and liability, and penalties. Iowa also authorizes on-demand driverless-capable vehicle networks to facilitate the transportation of persons or goods, including transportation for hire. In September 2021, the Iowa Transportation Department issued rules that guided the implementation of Senate File 302.

The John Deere factory assembly line in Waterloo, Iowa, has begun producing autonomous tractors after almost a decade of research. Autonomous tractors serve as an interesting test case for autonomous technology, as they bring the technology to corners of the country where consumers may not expect to find groundbreaking AV deployment.[56]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022:

Bills Passed in 2022:

## Kansas

In 2018, the Kansas Department of Transportation created the Statewide Connected and Autonomous Vehicle Task Force to increase awareness and educate state agencies on the process of deploying connected AV systems in Kansas. In 2019, the task force released a strategic plan to introduce connected AV technology in Kansas.

In 2022, Kansas adopted a full legal framework surrounding the operation of AVs within the state. "Driverless-capable vehicles" are now allowed to operate on public roads if they can reach a minimal safety condition; comply with state and federal laws and regulations; do not exceed a weight limit of 34,000 lbs. on tandem axels; and have a human driver in the vehicle for the first 12 consecutive months the vehicle operates in the state. Vehicles are exempt from the human-driver requirement if they lack controls or are not designed for human occupancy. Driverless-capable vehicle owners must submit an interaction plan to the Kansas Highway Patrol before the vehicles operate on public roads in Kansas.[57]

Already, Kansas is seeing investment from the AV industry. Gatik, an autonomous truck developer, is deploying AVs alongside Walmart and other key stakeholders in the state, including the Kansas Department of Transportation (DOT), the House and Senate and the Kansas Sheriffs' Association.[58] Additionally, Panasonic announced it will start building a new battery plant in Kansas and aims to begin mass production by March 2025.[59]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Passed in 2022: Senate Bill 313, Senate Bill 379, Senate Bill 546

Bills Introduced in 2022: Senate Bill 313

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56 Tired of waiting for driverless vehicles? Head to a farm – Southern Minnesota News.

57 Bill Resource (statenet.com).

58 Autonomous Logistics Startup Gatik Plans to Deploy its Fully-Autonomous Trucks in Kansas With No Safety Drivers Onboard – FutureCar.com – via @FutureCar_Media.

59 Panasonic to start building Kansas battery plant next month | Automotive News (autonews.com).

## Kentucky

In 2018, Kentucky passed legislation permitting commercial vehicles to operate in a platoon so long as there is a licensed driver behind the wheel and a marking designating that the vehicle is part of a platoon. Since that time, and despite efforts to the contrary, there have been no efforts to pass legislation addressing the use of passenger AVs.

That could soon change, as the state's Interim Joint Committee on Transportation signaled interest in AV legislation during a committee hearing this past fall. Legislators spoke with representatives from the AVIA, who answered questions about the technology's safety, applicability and potential benefits.[60]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Louisiana

In 2019, Louisiana passed legislation governing the operation of autonomous freight carriers and other autonomous commercial vehicles. This law permits the operation of autonomous truck platoons and specifically authorizes autonomous commercial motor vehicles to operate without a conventional driver physically present in the vehicle if the autonomous commercial motor vehicle meets a set of criteria, including that the vehicle is capable of operating in compliance with applicable law and is capable of achieving a minimal risk condition in the event of an emergency.

In 2021, Louisiana passed further legislation permitting the operation of autonomous personal delivery devices within the state, limiting such devices to 20 miles-per-hour at most, requiring that an employee be able to monitor and control the device, and requiring that any business operating such a device maintain an insurance policy with coverage not less than $100,000. The law also allows local governments to further restrict delivery devices in their jurisdictions.

In 2022, Louisiana passed additional legislation exempting vehicles intended to be operated exclusively by an autonomous driving system from requirements that are not applicable to those vehicles.[61]

Bills Introduced in 2021: Senate Bill 147

Bills Passed in 2021: Senate Bill 147

Bills Introduced in 2022: Senate Bill 453

Bills Passed in 2022: Senate Bill 453

## Maine

Maine does not currently have any laws or regulations pertaining to AVs. In 2018, legislation authorized the creation of a Commission on Autonomous Vehicles to coordinate efforts among state agencies and knowledgeable stakeholders to develop a process for testing automated driving systems on public roads. The law requires that the Commission issue a final report containing findings and recommendations, including suggested legislation. Additionally, Governor Paul LePage signed an executive order creating the Maine Highly Automated Vehicles (HAV) Advisory Committee to oversee the introduction of highly automated vehicles.

While there have been pushes for AV legislation in recent years, none have succeeded. Maine still has no standards for the registration of AVs, nor for the licensure of AV operators.

In 2022, the University of Southern Maine deployed autonomous delivery bots on campus to assist students and faculty. These robots, supplied by Sodexo, will make the campus more efficient and accessible.

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60 Transportation committee members learn about autonomous vehicles (lanereport.com).
61 Bill Resource (statenet.com).

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Maryland

In 2015, the Maryland Connected Autonomous Vehicles Working Group was formed as the central point for coordination on statewide connective and autonomous vehicle efforts. In 2017, the Maryland Department of Transportation adopted regulations for AV testing, including an approval process for all testing on public roads.

In December 2020, the state released its Connected and Autonomous Vehicles Strategic Framework, which laid out the state's thinking about connected and autonomous vehicles, and the ways in which partners could support the state's goals and overarching focus areas for resources. This framework invited public and private partners to consider connected and autonomous vehicle systems and evaluate how emerging technology could be integrated into and change their future objectives and plans.

In 2021, the state passed AV-adjacent legislation that allows for truck platooning and empowers the state to make regulations to carry out the law.

In the private space, the Maryland Autonomous Technologies Research Innovation and eXploration lab (MATRIX) is sponsored by the University of Maryland and allows students to get a personal look at the future of autonomy. These students work alongside a number of AV companies who utilize the space.

Bills Introduced in 2021: Senate Bill 291

Bills Passed in 2021: Senate Bill 291

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Massachusetts

While the state of Massachusetts has yet to pass a comprehensive framework concerning AVs, prior executive orders issued by Governor Charlie Baker established a process for testing AVs within the state. An additional executive order established an Autonomous Vehicles Working Group. In the past two years, multiple bills have been introduced in the legislature to regulate AVs on a more comprehensive basis, but none have passed.

Despite a lack of public movement on AV regulation, within the private space Massachusetts could become a hotbed for AV research and testing, as researchers and students at the Massachusetts Institute of Technology, among other educational institutions, are closely studying AVs and their related technologies.

Bills Introduced in 2021: House Bill 3595, House Bill 3475, House Bill 3434, Senate Bill 2351
Bills Passed in 2021: N/A
Bills Introduced in 2022: House Bill 3595, House Bill 4618
Bills Passed in 2022: N/A

## Michigan

Michigan has long been a leading state for AV testing. In 2016, the state approved legislation allowing for pilot testing of AVs. The state is also home to several large testing facilities, including the University of Michigan-owned Mcity. These projects were funded in part by the $60 million federal grant allocation for automated driving systems research for its Michigan Mobility Collaborative.

By investing in the autonomous future, Michigan is preparing itself for the coming transformation to AV manufacturing. Cruise, a GM-backed AV company, announced it will begin assembling its self-driving shuttle, the Origin, at a Detroit-Hamtramck Assembly plant in 2023. In 2019, Waymo opened "the world's first dedicated autonomous plant" in Detroit. In February 2022, Ford announced it would be teaming up with Google to renovate Michigan Central Station and turn it into a center for electric vehicle and AV research.

In 2022, Michigan passed legislation clearing the way for the state's department of transportation and key collaborators to construct a Connected and Autonomous Vehicle Corridor.[62] This corridor is currently slated to be a dedicated roadway alongside I-94, from Detroit to Ann-Arbor, fitted with new technology and key safety measures. The state claims this stretch of I-94 will be "the world's most sophisticated roadway."[63]

Bills Introduced in 2021: N/A
Bills Passed in 2021: N/A
Bills Introduced in 2022: House Bill 5601, House Bill 6369, Senate Bill 706, Senate Bill 1168,
Bills Passed in 2022: Senate Bill 706

## Minnesota

Although Minnesota has no laws or regulations specifically addressing the testing or operation of AVs, the state's Department of Transportation (MnDOT) is actively promoting and preparing for widespread autonomous technology deployment within the state following an executive order signed in 2018 by Governor Mark Dayton creating a Governor's Advisory Council on Connected and Automated Vehicles to recommend a path forward within the state. Its resulting 66-page report delivered a rosy outlook on automated cars and included draft legislation setting up a permit system and giving the MnDOT wide latitude to decide whether to allow a business to test, based on its history with self-driving technology. The Minnesota legislature has yet to pass legislation addressing AVs.

In 2021, both bills concerning autonomous vehicles stalled in the legislature. Senate Bill 214 sought to prohibit Level 4 or 5 automated driving systems from operating in the state. House Bill 230 encouraged the state to look into using autonomous vehicles for mass transit through a microtransit rideshare pilot program.

62 New Michigan law clears path for autonomous vehicle roadways – Land Line.
63 CAV Corridor (michigan.gov).

Despite the legislature's unwillingness to pass legislation, the state has helped launch a number of driverless shuttle projects over the last year, including one in Grand Rapids through goMARTI, Minnesota's Autonomous Rural Transit Initiative. The goMARTI shuttle project utilizes a number of partners, with the majority of funding coming from the Minnesota Department of Transportation, to launch five driverless shuttles provided by May Mobility, three that are ADA-compliant and able to be requested for pickup from an app on your phone. Over the next 18 months, the partners hope to gain key experience and data, further educate the public and provide safe and accessible mobility to those who face transportation challenges.[64]

Important projects like goMARTI are encouraged and supported by MnDOT's focus on connected and autonomous vehicles. In particular, the state sponsors a CAV Challenge, which encourages folks to submit ides for possible funding from MnDOT.[65]

Bills Introduced in 2021: Senate Bill 214, House Bill 230

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Mississippi

Mississippi has yet to pass legislation concerning autonomous passenger vehicles. However, the state does permit platooning, as long as the operator receives approval from the Department of Transportation and the Department of Public Safety.

Although there is no widespread adoption or deployment of autonomous vehicles in the state, one of the state's educational institutions is supporting the technology's development through the Mississippi State University Center for Advanced Vehicular Systems (CAVS). MSU CAVS has spent time focusing on how autonomous technology might operate in an off-road setting. In addition to their physical "proving grounds," it is developing an open-source simulator that will allow autonomous software to be tested in a virtual environment before it hits the open road (or off-road). In 2022, MSU CAVS announced a partnership with the Quantum Corporation to help store and process the large amounts of data needed to develop autonomous technology.[66]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Missouri

Missouri does not have any laws regarding the registration, testing and deployment of autonomous vehicles. In past legislative sessions, lawmakers have proposed legalization to prohibit the use of autonomous vehicles. In 2021, legislators introduced Senate Bill 452, which would have codified autonomous vehicles and laid ground rules for their operation. This bill did not generate momentum and failed. Senate Bill 176, which sets regulations for delivery robots, passed in 2021 and became law.

In 2022, lawmakers failed to pass Senate Bill 1038, a bill that would have legalized platooning in Missouri. While the state has been reticent thus far to engage with autonomous vehicle legislation, perhaps the new developments in its neighbor states, Arkansas, Oklahoma and Kansas, will cause Missouri to feel more comfortable opening up the state to the autonomous vehicle industry.

Bills Introduced in 2021: Senate Bill 176, Senate Bill 452

Bills Passed in 2021: Senate Bill 176

Bills Introduced in 2022: Senate Bill 1038

Bills Passed in 2022: N/A

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64 Home | goMARTI.
65 Connected and Automated Vehicles – MnDOT (state.mn.us).
66 News Story | CAVS (msstate.edu).

## Montana

Montana currently has no laws or executive orders governing AVs; however, the legislature did pass House Joint Resolution 10 establishing a study committee on autonomous vehicles in 2021. The committee will include people from the state's department of transportation, department of justice, highway patrol and automobile and insurance community, among others.

The lack of explicit regulation, however, has not deterred the state from working with AV companies. In 2022, Aurora announced its plans to build a 78,000-square-foot facility at the Montana State University Innovation Campus.[67] Aurora purchased Blackmore, a Montana-based company who specializes in Lidar, in 2019 and will now return to Bozeman for further investment. Montana State faculty are particularly excited for students and professors to work alongside a company in this innovative space.[68]

Embark Trucks announced that it completed a groundbreaking test on snowy conditions back during the spring of 2022 in Montana. The truck completed a 60-mile round trip on public roads during a period of snowfall with rates up to one-sixth inch per hour – eventually an inch of snow accumulated over three hours.

Due to these recent developments and the completion of the state's study committee, stakeholders may look for potential action in Montana during the upcoming legislative session.

Bills Adopted in 2021: House Joint Resolution 10

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Nebraska

In April 2018, Nebraska lawmakers cleared the way for companies to test self-driving vehicles, as long as the vehicle is capable of operating in compliance with traffic and motor vehicle safety laws. The AV may or may not contain a human driver, but if a human driver is present, he or she must be a licensed driver and covered by insurance. The law also authorizes the operation of an on-demand AV network for the transport of persons or goods, including for-hire transportation or public transportation.

While there has been limited deployment and testing across Nebraska, the state has not yet seen widespread deployment. There has been no momentum for further legislation. Last year, a proposal to study autonomous vehicles as they relate to a variety of unconsidered issues did not pass.

Bills Introduced in 2021: LR155

Bills Passed in 2021: N/A

Bills Introduced in 2022: LR 155

Bills Passed in 2022: N/A

## Nevada

Ever since Nevada passed AV legislation in 2012, the state has been at the forefront of driverless vehicle innovation. In 2017, with the passage of Assembly Bill 69, Nevada permitted the testing and commercial public deployment of AVs—later that year, Las Vegas had its first completely autonomous electric shuttle deployed for public use. In 2019, the AV startup Zoox received permission from the Nevada Department of Motor Vehicles to deploy AVs on state roads.

In 2021, the Nevada State Legislature passed two new bills that updated the state's code and kept it on the forefront of autonomous technology. Assembly Bill 412 codified requirements and exceptions for "neighborhood occupantless vehicle[s]" like the autonomous delivery vehicles beginning to roll out

67 Self-driving vehicle tech company Aurora announces facility to be built on MSU Innovation Campus (montana.edu).
68 Company specializing in technology for self-driving vehicles to build new Bozeman facility | KECI (nbcmontana.com).

across the country. These vehicles, like Nuro, are introducing consumers to autonomous vehicles and commercializing the technology.

Senate Bill 288 allows for an autonomous technology company to enter into an agreement with a transportation network in the state. This bill will clearly benefit rideshare companies looking to partner with autonomous vehicle companies.

Over the last year, Motional has launched rides in autonomous vehicles down the Las Vegas strip on three separate transportation networks: Via, Lyft, and Uber.[69] Motional has partnered with the State of Nevada to bring high-paying jobs to the state and cutting edge technology to Las Vegas. Instead of trying to build their own operation entirely from the ground up, Motional has partnered with three established players in the space who can focus on deployment. Motional, then, has the luxury of giving the technology its complete attention. For now, these rides are non-commercial and include safety drivers in the front seat.[70]

Bills Enrolled in 2021: Assembly Bill 412, Senate Bill 288
Bills Passed in 2021: Assembly Bill 412, Senate Bill 288
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

## New Hampshire

After previously vetoing a bill to permit autonomous vehicle testing in New Hampshire, in 2019 Governor Chris Sununu signed into law a bill that creates an automated vehicle testing pilot program in New Hampshire. The new law creates an autonomous vehicle advisory commission, a testing pilot program and sets requirements for vehicle deployment. The new pilot program permits testing on public roads. House Bill 116, which did not pass the state legislature, would have codified delivery robots. Additionally, there are some locals who are advocating for autonomous vehicles and autonomous shuttles in New Hampshire.[71]

Bills Introduced in 2021: HB 116
Bills Passed in 2021: N/A
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

## New Jersey

In 2019, New Jersey established an 11-member task force called the New Jersey Advanced Autonomous Vehicle Task Force to study autonomous vehicles and recommend laws, rules and regulations that New Jersey may enact to integrate autonomous transportation into the state's transportation system. However, since then, New Jersey has not passed any major legislation around autonomous vehicles.

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69 Uber and Motional launch robotaxi service in Las Vegas | TechCrunch.
70 Nevada Law Benefits Driverless Car Developers | PYMNTS.com.
71 The case for commuter rail in N.H. got worse, not better, in the last seven years – THE JOSIAH BARTLETT CENTER FOR PUBLIC POLICY (jbartlett.org).

Year after year, bills are introduced to create a legal framework for AVs, but they never come to fruition.

However, after years of inactivity, things are beginning to change. In December, Governor Phil Murphy announced that his office would partner with the New Jersey Department of Transportation, the City of Trenton and Princeton University to launch Trenton MOVES. Trenton MOVES will be the first autonomous vehicle-based urban transit system in the US. Companies are invited to share their interest in building an on-demand transit system that features 100 autonomous vehicles and serves the 90,000 residents of New Jersey's capital city. In February 2022, Trenton MOVES received a $5 million grant from the state's Department of Transportation to help support the project. Trenton MOVES says it has received interest from 20 different autonomous vehicle companies who want to participate in the project and has held a demo with May Mobility.[72] The project won a state transportation award for its planning as it continues to move toward actuality.[73]

Elsewhere in New Jersey, the Port Authority of New York and New Jersey (PANYNJ) ran a test period for two platooning autonomous shuttles from Navya that could be used to assist with first/last mile transport in crowded places of interest. The shuttles received rave reviews and were featured in a daily *New York Times* newsletter, where reporter James Barron described his experience stepping out in front of the shuttle to test its capabilities.[74]

Bills Introduced in 2021: Senate Joint Resolution 17, AJR 138, A 1187, A 1189, A 1607, Senate 2129, A 2807
Bills Passed in 2021: N/A
Bills Introduced in 2022: Assembly Bill 1810, Assembly Bill 1812, Assembly Bill 2030, Assembly Bill 2031, Assembly Bill 2038, Assembly Bill 2495, Assembly Joint Resolution 43, Senate Joint Resolution 20
Bills Passed in 2022: N/A

## New Mexico

Previously, New Mexico has seen a fair amount of autonomous vehicle investment, especially concerning autonomous trucks. However, until this year, the state had no formalized framework for autonomous vehicles or autonomous vehicle testing. House Bill 270 defines autonomous vehicles as those with Level 3, 4 or 5 systems, regulates autonomous vehicles and autonomous vehicle testing, and allows for platooning.

Already, New Mexico has seen this new legal framework pay dividends. Torc Robotics operates a testing center in Albuquerque.[75] Through its most recent legislation, New Mexico has joined other Southwestern states like Nevada, Arizona and Texas to create a sizable surface area of autonomous vehicle-supporting jurisdictions. This collaboration provides a solid testing area for autonomous trucks in particular, as they run longer routes.[76]

Moving forward, autonomous vehicle supporters are already expressing the need to invest in broadband access to fully realize the potential of CAV technology.[77]

Bill Introduced in 2021: House Bill 270
Bills Passed in 2021: House Bill 270
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

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72 Trenton, N.J., Works to Bring Autonomous Vehicles to City (govtech.com).
73 Trenton MOVES Wins State Transportation Award – MidJersey.News.
74 The Day I Stood in the Path of a Driverless Bus – The New York Times (nytimes.com).
75 Torc Robotics takes the long view as Daimler Truck's autonomous insider – FreightWaves.
76 Uber and its Technology Partner Aurora to Expand Autonomous Trucking Pilot in Texas – FutureCar.com – via @FutureCar_Media.
77 Lawmaker: Growth of driverless cars depends on broadband | Local News | santafenewmexican.com.

## New York

New York has highly restrictive regulations on AV testing. Under legislation approved in 2017, any testing must be approved by the commissioner of the Department of Motor Vehicles, supervised by the New York State Police and levied with significant hourly and per mile rates. Some autonomous companies have tested their technology in private areas away from New York's regulations, but there have not been any sustained large-scale testing efforts.

In the last year, there have been reports that Mobileye, the Intel-backed autonomous vehicle company, tested at least two vehicles in New York City for a period of time. The rollout was not highly publicized, but was conducted in alignment with New York regulations.[78]

Lastly, the Port Authority of New York and New Jersey partnered with Navya to launch two platooning autonomous shuttles as a limited project at JFK International Airport.[79]

Bills Introduced in 2021: A 639, A 3743, A 4280, A7744, S3909, S 6993

Bills Passed in 2021: N/A

Bills Introduced in 2022: A 9485, A 9705, S 8468

Bills Passed in 2022:

## North Carolina

In 2020, Governor Cooper signed SB 739 into law, allowing autonomous delivery devices in pedestrian areas and on highways. This year, the state legislature followed by passing Senate Bill 814, which codified and regulated "neighborhood occupantless vehicles." In contrast to SB 739, neighborhood occupantless vehicles are fully autonomous and do not require an operator.

North Carolina's esteemed universities have created a culture of excitement throughout the state at the thought of future technologies and mobility options. Researchers at NC State University have developed a technique that allows AVs to make important calculations more quickly through a cooperative distributed algorithm that breaks problems down into sub-parts that are solved in parallel.[80]

At North Carolina AT&T, university leaders are investing in autonomous vehicles and growing the school's fleet. Now, they have unveiled a 2-mile test track that allows researchers to test vehicles in real-world conditions. Faculty believe these autonomous shuttles could create more equitable transportation solutions in low-demand rural areas that need flexible solutions.[81] When these shuttles are launched, City of Greensboro officials have discussed integrating their operations into the wider city-wide transportation equation.[82]

Bills Introduced in 2021: HB 814

Bills Passed in 2021: HB 814

Bills Introduced in 2022:

Bills Passed in 2022:

78 Exclusive: Intel's autonomous vehicle unit Mobileye ends NYC testing (emergingtechbrew.com).
79 Navya Autonom® shuttles to undergo platooning demonstration of New York's JFK airport, first of its kind at an American airport – NAVYA.
80 Helping Autonomous Vehicles Navigate Tricky Highway Merges | NC State News (ncsu.edu).
81 N.C. A&T's Driving into The Future Event Unveils Rural Test Track for Autonomous Shuttles (ncat.edu).
82 Trolleys, Taxis And Autonomous Vehicles Discussed At City Council Meeting – The Rhino Times of Greensboro.

## North Dakota

North Dakota permits autonomous vehicle operation, as long as the vehicle is capable of operating in compliance with all applicable federal and state law. State law does not require a human driver to operate on the public highway if the autonomous vehicle is capable of achieving a minimal risk condition in case of a system failure. The law permits on-demand autonomous vehicle networks to provide transportation of persons or goods.

North Dakota also allows for truck platooning, subject to the Department of Transportation, in coordination with the State Highway Patrol superintendent, developing an operational plan that provides guidelines for operation. The plan must include operational information that is provided by a platoon technology provider or commercial motor vehicle operator.

In North Dakota, the agriculture industry is focused on utilizing autonomous technology to increase efficiency and production. The University of North Dakota received a $1 million grant from the Economic Development Administration (EDA) to study the economic impact of the state's uncrewed aerial systems network.[83] Grand Farm, an initiative dedicated to improvements in farming, hosted an event bringing together growers, stakeholders and autonomous industry experts to focus on possible opportunities to collaborate.[84]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Ohio

There are no laws in Ohio governing AVs, but there are relevant executive orders (EO) signed by former Governor John Kasich in 2018. The first EO created DriveOhio, a new division of the state DOT, that allows any company to test AVs in the state, so long as they register with DriveOhio and have a human operator behind the wheel. Four cities—Columbus, Dublin, Athens and Marysville—have already signed agreements with DriveOhio to test AVs on their streets, and the state has designated a 35-mile stretch of US Route 33 a "Smart Mobility Corridor" for the deployment of connected vehicle technologies. A $45 million SMART Testing Center opened in Logan County and funded by a partnership between Ohio State University and the state of Ohio, will include an indoor highway track capable of simulating ice and snow year-round. The second EO created regulations for testing self-driving vehicles in the state.

DriveOhio recently announced that it will soon began to deploy its Rural Automated Driving Systems project after two autonomous semi-trucks completed their controlled testing. DriveOhio continues to focus on long-term deployment of autonomous technology across the state.[85]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022:

Bills Passed in 2022:

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83 How UAS could help 'revolutionize rural living' – UND Today.

84 Grand Farm's Autonomous Nation Conference to Connect Autonomous Industry and Policymakers – sUAS News – The Business of Drones.

85 Autonomous semi-trucks to be on Ohio roads soon (wdtn.com).

## Oklahoma

Historically, Oklahoma has not prioritized autonomous vehicles, nor constructed any type of regulatory or legal framework. However, Governor Kevin Stitt has continued to sign autonomous vehicle legislation, including platooning laws, and the creation of the Oklahoma Advanced Mobility Pilot Program, which focuses on autonomous vehicle adoption. This past session, Oklahoma passed a law approving autonomous delivery vehicles. Notably, the law does allow cities and towns to ban the operation of delivery vehicles in their boundaries.

In 2022, Governor Kevin Stitt partnered with outgoing Arkansas Governor Asa Hutchinson to create an innovative partnership for the states to collaborate on autonomous vehicle and future mobility work. Together, Arkansas and Oklahoma are paving a new path forward for states who want to attract the AV industry. While they may not possess the same natural advantages as California or Arizona, Arkansas and Oklahoma are encouraging their public educational institutions, economic development organizations and industry leaders to work together in creating an interesting environment that advances current work while encouraging new investment from companies involved in future mobility work.

By creating out-of-the-box solutions, Governor Stitt and Governor Hutchinson have ensured that their states will not fall behind others, but still gather the full benefit of autonomous technology.

Bills Passed in 2020: SB 1688

Bills Introduced in 2021: N/A

Bills Passed in 2021: SB 706

Bills Introduced in 2022: House Bill 3317, House Bill 3483, Senate Bill 1541

Bills Passed in 2022: Senate Bill 1541

## Oregon

Oregon has no current regulations in place concerning autonomous vehicles. However, House Bill 4063, signed by Governor Kate Brown on April 10, 2018, named the Oregon Department of Transportation (ODOT) the state's lead agency on automated vehicle policy and directed the ODOT to facilitate a task force on automated vehicles. The task force submitted its first report to the legislature on September 10, 2018 and its second on September 9, 2019. The task force voted to continue meeting on an ad hoc basis in response to significant developments in automated vehicle technology and policy. The task force dissolved on January 2, 2021.

In the past, different agricultural producers have utilized autonomous technology in Oregon and we could see more integration in this space in the future.

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

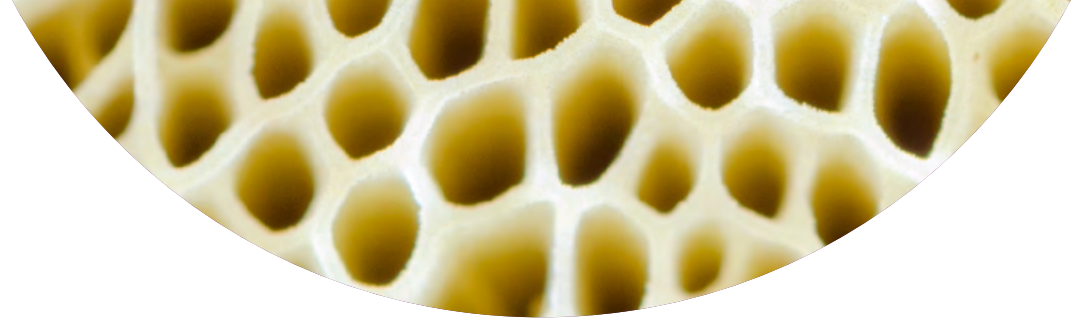
## Pennsylvania

After years at the forefront of autonomous vehicle research, due in part to Carnegie Mellon University's history in the space, Pennsylvania has finally passed a comprehensive legal framework for autonomous vehicles in House Bill 2398.[86] Now, Pennsylvania will be able to join in the investments from an industry that it helped incubate for years.

Now that autonomous vehicles can operate on public roads, many of the state's AV companies are looking forward to quickly moving toward commercialization.[87] Even still, the state's autonomous technology industry has experienced some consolidation while major players in the space dissolve and send their expertise to other players in the field. This consolidation

86 Bill Resource (statenet.com).

87 Pittsburgh Inno – New autonomous vehicle legislation has Locomation ready to 'go blasting' toward commercial deployment (bizjournals.com).



can benefit the industry in the long run as key experts collaborate and amplify each other's development efforts.[88]

Bills Introduced in 2021: N/A
Bills Passed in 2021: N/A
Bills Introduced in 2022: House Bill 2398, Senate Bill 965
Bills Passed in 2022: House Bill 2398

## Rhode Island

Rhode Island has yet to pass legislation on autonomous vehicles. The Rhode Island Department of Transportation started the Rhode Island Transportation Innovation Partnership (TRIP) in 2017 to encourage autonomous vehicle testing and usage. Multiple autonomous shuttles have conducted limited runs in the state.

Researchers at the University of Rhode Island continue to find innovative uses for automated technology and plan on including it in their new project, alongside the University of Hawai'i, to research "the shape, size and drifting speed of the icebergs, and the properties of the surrounding water."[89]

Bills Introduced in 2021: N/A
Bills Passed in 2021: N/A
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

## South Carolina

South Carolina has yet to pass legislation on autonomous passenger vehicles, but it has exempted platoons from certain traffic laws.

As a major player in automotive manufacturing, South Carolina will likely play a large role in producing the next generation of automobiles. BMW Manufacturing opened a new logistics center on Freeman Farm Road in Spartanburg, South Carolina, that utilizes autonomous vehicles to transport goods across two public bridges that lead to I-85.

Bills Introduced in 2021: N/A
Bills Passed in 2021: N/A
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

## South Dakota

South Dakota has directed the Transportation Commission to promulgate rules to authorize the testing and operation of platooning at electronically coordinated speed and distance intervals that are closer than otherwise allowed under the "following too closely" laws in the state.

Raven Industries, a South Dakota-based company, is continuing to lead the way in integrating autonomous technology with agriculture, a process it calls "autonomous farming."[90]

Bills Introduced in 2021: N/A
Bills Passed in 2021: N/A
Bills Introduced in 2022: N/A
Bills Passed in 2022: N/A

88 Apple expands car key sharing, Bird charts out a strategy and layoffs come for Motional | TechCrunch.
89 Using robots to study icebergs – URI News.
90 Helping Farmers Serve the World | Raven Industries.

## Tennessee

Legislation passed in 2017 allows certified autonomous vehicles to operate in the state, provided they contain automatic crash recording and notification technology. The law also preempts local regulation of ADS-operated vehicles and specifies that the ADS shall be considered a driver for liability purposes when it is fully engaged and operated properly. The TennSmart consortium, made up of government agencies, universities and companies with ties to the state, hopes to encourage collaboration and innovation in the AV area.

Vanderbilt University and the Tennessee Department of Transportation announced a partnership to conduct a road study on I-24 that examines how autonomous vehicles impact traffic. By recording traffic data and analyzing the videos, researchers will be able to identify where "phantom traffic" originates. Phantom traffic is slowdowns created by human reactions to traffic conditions instead of wrecks or emergencies. In addition to analyzing video tape, researchers will introduce 100 autonomous vehicles onto the road to see if autonomous vehicles can help mitigate the causes of phantom traffic. Last fall, researchers from the CIRCLES Consortium, which includes the previously stated members plus Nissan, Toyota and GM, launched this project in full. Now, selected testers are travelling along I-24, equipped with collection devices, each morning to gather data about traffic. These vehicles utilize adaptive cruise control and communication technology to work in sequence to eliminate the stop-and-go that clogs up morning commutes. If this project is successful, it could go a long way to eliminating "phantom traffic" as we know it.

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Texas

Texas' geography and friendly regulatory climate have made it a magnet for autonomous vehicle testing for some time. However, over the last year, it seems almost every major autonomous vehicle company has launched a project across Texas' wide plains. Texas is commanding a California-like status in the AV industry, with new projects from Waymo,[91] Cruise,[92] Kodiak Robotics,[93] Gatik,[94] Uber, Aurora[95] and Einride.[96] The I-45 corridor, in particular, has become a hotspot for autonomous truck testing.

State law allows an automated motor vehicle to operate in the state, regardless of whether a human operator is present in the vehicle, as long as certain requirements are met. Texas also preempts local regulation of automated motor vehicles and automated driving systems. During their last legislative session, Texas lawmakers passed two autonomous vehicle laws. Senate Bill 1308 instructs the legislature to study autonomous and connected vehicles and House Bill 3026 exempts autonomous vehicles from irrelevant regulations.

Texas provides the AV industry interesting opportunities, as it encompasses both the idyllic college town-like setting of Austin, perfect for robotaxis, with major economic powerhouses, like Dallas-Fort Worth, and a strong trucking industry. Texas is positioned for maximum growth in the AV sector as we move forward into an autonomous future.

Bills Enrolled in 2021: House Bill 3026, Senate Bill 1308

Bills Passed in 2021: House Bill 3026, Senate Bill 1308

Bills Introduced in 2022:

Bills Passed in 2022:

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91 J.B. Hunt, Waymo Add Wayfair to Autonomous Trucking Pilot in Texas | Business Wire.
92 Cruise opens robotaxi waitlist in Austin and Phoenix | TechCrunch.
93 Werner Enterprises and Kodiak Robotics Collaborate to Run 24/7 Long-Haul Autonomous Freight Operations (abc27.com).
94 Autonomous delivery company Gatik wins new pilot program with Pitney Bowes in Dallas (cnbc.com).
95 Autonomous trucks are rolling in Texas as Aurora and Uber test hauling goods (NYSE:VRTV) | Seeking Alpha.
96 Einride gets approval to operate autonomous electric trucks on US roads (electrek.co).

## Utah

Driverless vehicles are regulated on Utah roads under legislation approved in 2019. While any properly insured autonomous vehicles are allowed to operate, autonomous networks must be registered with the state. Vehicles must be operated in compliance with all applicable traffic and safety laws and must be able to achieve a minimal risk condition or make a request to intervene if a system failure occurs. Finally, Utah permits the Department of Transportation to obtain, collect and utilize anonymized location data of connected vehicles. In 2022, the state legislature did pass HB 137, which clarified that a "human driver" operating an autonomous vehicle was still subject to traffic laws, including a prohibition against driving under the influence.

Unlike some other Southwestern states, Utah has not seen widespread autonomous vehicle testing and acceptance. However, Utah is leading the way out West by partnering with the surrounding states of Montana, Idaho, Wyoming, Utah, Nevada, Colorado, New Mexico and Arizona to create ChargeWest. Charge West is committed to improving electric vehicle charger availability throughout the region. These efforts will assist the AV movement by laying the groundwork for mass EV deployment and adoption.[97]

Bills Introduced in 2021: House Bill 31

Bills Passed in 2021: N/A

Bills Introduced in 2022: HB 137

Bills Passed in 2022: HB 137

## Vermont

Vermont has established an automated vehicle testing program and granted authority to the Agency of Transportation to adopt specific rules. State law requires that during a test, an operator is seated in the driver's seat of the automated vehicle monitoring the operation of the vehicle and is capable of taking immediate control, if necessary.

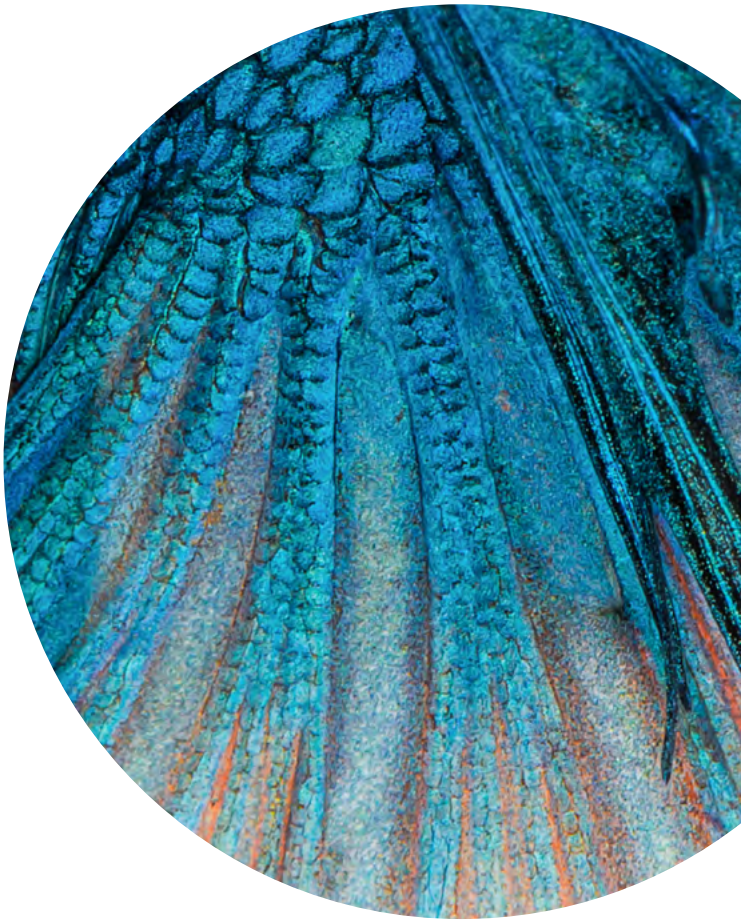
Although the state may not be at the forefront of the autonomous vehicle industry, Vermont has spent lots of effort ensuring that electric vehicles are able to secure a charger in the state when they need one.[98]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A



97 Utah group leads effort to build EV corridors across the Mountain West | KUNC.
98 Vermont Is No. 1 State for EV Charging | 2022-04-22 | ASSEMBLY (assemblymag.com).

## Virginia

Although Virginia has no laws or regulations specifically pertaining to autonomous vehicles, the state has taken an active role in encouraging testing and deployment. Seventy miles of Virginia highways have been designated "automated corridors" and outfitted with high-definition mapping and data acquisition systems to support automated-vehicle testing. Virginia has become a hotbed of autonomous vehicle activity and shows that autonomous vehicles can operate in regulation-less states, as long as the operator adheres to state and federal law.

Virginia's universities and institutions of higher learning are researching autonomous technology and continue to contribute to the autonomous sector. Virginia Tech has worked with Ford to research signals and communication systems for autonomous vehicles. Virginia Tech is home to the Virginia Tech Transportation Institute, which has partnered with the Governors Highway Safety Association (GHSA) to research how first responders can best interact with autonomous technology. The University of Virginia is also making a name for themselves in the autonomous space. UVA's Autonomous Racing Team participated in the Indy Autonomous Challenge and earned a spot as the fastest American car in the race. In 2022, Virginia Tech launched a new open-access tool that allows autonomous vehicle companies to examine and compare different cities and their conditions for autonomous driving.

At the beginning of 2022, Governor Glenn Youngkin appointed W. Sheppard "Shep" Miller III as Virginia's new Secretary of Transportation. Secretary Miller was the former chairman of Virginia Beach-based defense contractor KITCO Fiber Optics and a member of the Commonwealth Transportation Board.[99] Miller has said he wants to position Virginia for success when future mobility options become more widespread.[100] To that end, Iteris Inc, a company focused on smart mobility infrastructure management, entered into a contract to provide the Virginia Department of Transportation with connected and automated vehicle-related planning services.[101]

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

Bills Introduced in 2022: N/A

Bills Passed in 2022: N/A

## Washington, DC

In 2012, the District of Columbia became one of the first jurisdictions to pass legislation regarding the testing of autonomous vehicles. On November 2, 2020, Mayor Bowser signed the Autonomous Vehicles Testing Program bill, which was approved by Congress just a few days later. The Act regulates the testing of autonomous vehicles on District roads through a testing program at the District Department of Transportation. To test an autonomous vehicle on public roads, an autonomous vehicle-testing entity must submit certain information to the DDOT for approval, including vehicle information for each vehicle tested; a safety and risk mitigation plan; and a description of the area and conditions under which an autonomous vehicle can function while being tested autonomously. Among other things, the bill requires crash and data reporting, including any crash of its vehicles while under autonomous operation that results in property damage, bodily injury or death.

In early 2022, Bill 24-134 was introduced in the DC City Council to modernize the city's autonomous vehicle framework. The bill has been unable to gain traction and has languished in committee.

In the fall of 2022, Mayor Bowser announced the city's first Mobility Innovation District (The MID) anchored in Southwest DC along the waterfront. The MID will include partnerships with the Office of the Deputy Mayor for Planning and Economic

99 Youngkin announces transportation secretary – Virginia Business.
100 State transportation secretary swings through Northern Virginia, pledges 'metrics-driven' approach | Headlines | insidenova.com.
101 Virginia DOT selects Iteris for CAV technology initiative | Traffic Technology Today.

Development (DMPED), the Southwest Business Improvement District (Southwest BID) and community leaders. The district will focus on equitable access to transportation, Universal Basic Mobility (UBM) and electrification.[102] Through the MID, DC has an opportunity to establish itself as a global hub for innovative transportation solutions.[103]

Bills Passed in 2020: Bill 23-232 (Autonomous Vehicles Testing Program Bill)

Bills Introduced in 2021: B 134

Bills Passed in 2021: B 285

Bills Introduced in 2022: B 24-134

Bills Passed in 2022: N/A

## Washington

While Washington State does have a legal framework for autonomous vehicle, its regulations are not overbearing. Governor Jay Inslee signed an executive order in June 2017 to require that state agencies with pertinent regulatory jurisdiction "support the safe testing and operation of autonomous vehicles on Washington's public roads." The executive order establishes an interagency workgroup and enables pilot programs throughout the state. The order specifies certain requirements for vehicles operated with human operators present in the vehicle and for vehicles operated without human operators in the vehicle. In 2020, Washington passed House Bill 2676, that established minimum requirements for testing AVs, necessitating the reporting of planned local testing and any collision accidents. In 2021, Senate Bill 5460 defined autonomous vehicles as Levels 4 through 5, clarifying that Level 3 was not considered autonomous in Washington. The bill also provided the Department of Licensing additional rulemaking authority. In 2022, the state legislature considered multiple bills to change the reporting requirements for autonomous vehicles and autonomous vehicle testing. None of these bills were passed.

Multiple companies are self-certified to operate autonomous vehicles in Washington. Seattle, in particular, provides autonomous vehicle companies with an interesting test environment due to its unique streets, weather and diversity of transportation modes.[104] However, in late 2022, Seattle passed new regulations for AV companies wanting to test their vehicles in the city. Now, AVs must obtain a permit from the city, have a human driver in the vehicle ready to take control[105], and notify the city before testing and prominently display company logos on self-driving vehicles. The regulations also include an interesting requirement that companies notify the public before they launch a pilot program through two community events in order to receive a permit.[106]

These new regulations from Seattle show how cities can be active participants in the autonomous vehicle industry. Instead of relying on states to regulate, cities can make sure that the industry reflects their wishes and vision.

Bills Passed in 2020: HB 2676

Bills Passed in 2021: Senate Bill 5460

Bills Introduced in 2022: House Bill 1731, House Bill 2070, House Bill 2100, Senate Bill 5828

Bills Passed in 2022: N/A

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102 Mayor Bowser Launches DC's First Mobility Innovation District | mayormb.
103 Southwest DC mobility innovation pilot could provide high-tech transportation equity solutions – Greater Washington (ggwash.org).
104 Waymo Plans Wet Weather Driving Tests in Washington – IoT World Today.
105 Autonomous Vehicle Testing Permit – Transportation | seattle.gov.
106 Seattle launches permit system for companies testing self-driving vehicles on city streets – GeekWire.

## West Virginia

After years of inaction, West Virginia has finally passed major autonomous vehicle legislation. In 2021, West Virginia passed legislation offering tax credits for autonomous vehicle companies. In 2022, the state legislature passed two bills concerning autonomous vehicles. House Bill 4675 codifies, regulates and defines autonomous and semi-autonomous delivery robots. House Bill 4787 is a comprehensive legal framework that defines autonomous vehicles as Level 4 and Level 5 systems, regulates autonomous vehicles and allows for all manners of operation, including commercial and non-commercial, with a driver and without a driver present and platooning.[107]

This new legislation will give autonomous technology companies security and certainty as they begin to deploy in West Virginia. West Virginia is clearly taking steps to make itself a home for autonomous vehicle activity.

Bills Introduced in 2021: HB 2760

Bills Passed in 2021: HB 2760

Bills Introduced in 2022: HB 4675, House Bill 4787

Bills Passed in 2022: HB 4675, House Bill 4787

## Wisconsin

Former Governor Scott Walker signed an executive order in May 2017 creating the Governor's Steering Committee on Autonomous and Connected Vehicle Testing and Deployment within the state's Department of Transportation. The committee was tasked with advising the governor "on how best to advance the testing and operation of autonomous and connected vehicles in the State of Wisconsin." The Committee submitted its report in 2018 and made several recommendations, including requiring municipal oversight, an application process and backup drivers. While these have yet to be enacted, the committee also noted that it believes current state law "does not prohibit the operation of autonomous vehicles."

Despite the lack of any legal framework, Wisconsin regularly sees autonomous vehicle activity in the state. In 2017, the USDOT named University of Wisconsin–Madison one of 10 "proving ground pilot sites" for autonomous vehicles. Since then, UW–Madison has helped create the Wisconsin Connected and Automated Transportation Consortium alongside multiple partners, including engineering firms, the city of Madison and even the Road American race course. Together, these partners provide support and designated testing facilities for autonomous vehicles.

This year, the City of Racine announced the launch of its own driverless shuttle, the "Badger." Painted to resemble the University of Wisconsin mascot, this driverless shuttle is built in partnership with Perrone Robotics in Virginia, and help's the City of Racine live up to its "smart city" moniker. The Wisconsin Department of Transportation partnered with Racine, Gateway Technical College and UW-Madison to use the "Badger" to train local law enforcement officials on how to interact with autonomous vehicles. Now that AVs are a part of the city's transportation infrastructure, officials wanted to ensure they are able to safely adapt to vehicles without a driver to deal with directly. Projects like these drive home how important it is the public be introduced to AVs in a safe and moderated environment where they can learn without any unnecessary fear or misunderstanding.[108]

Bills Passed in 2019: N/A

Bills Introduced in 2020: N/A

Bills Passed in 2020: N/A

Bills Introduced in 2021: N/A

Bills Passed in 2021: N/A

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107 West Virginia HB 4675.

108 First responders start automated vehicle training in Racine (fox6now.com).

## Wyoming

In 2018, the Wyoming DOT director argued for the need to prepare for driverless vehicles. Wyoming is one of three states that received a grant from the USDOT in 2015 to participate in a connected vehicle pilot program tested along I-80. Yet, there are still no laws or executive orders governing AV use in Wyoming, though self-driving vehicles are not specifically prohibited by law. In 2021, Yellowstone National Park launched autonomous shuttles named TEDDY (The Electric Driverless Demonstration in Yellowstone). These shuttles, provided by Beep, helped alleviate the summer crowds.

In 2022, Senate File 16 sought to institute a comprehensive regulatory framework for autonomous vehicles in Wyoming, but failed in committee. The bill would have created markings requirements, insurance requirements and reporting requirements, and would have given authority to Wyoming Department of Transportation to create any further rules or regulations.

Bills Introduced in 2021: Senate 7

Bills Passed in 2021: N/A

Bills Introduced in 2022: Senate 16

Bills Passed in 2022: N/A

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