Study on exploring the possible employment implications of connected and automated driving

Scenarios for the deployment of CAD

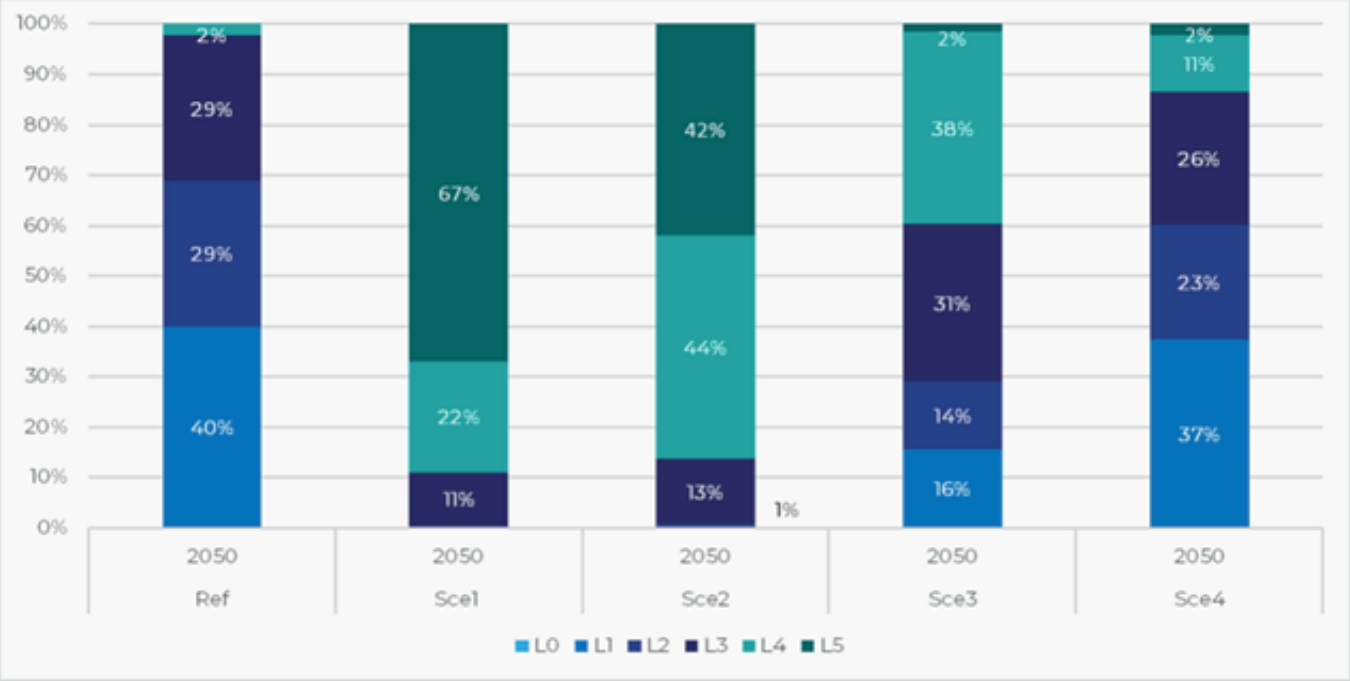
Four scenarios have been designed to explore different conditions for the uptake of autonomous driving. These encompass two “boundary conditions” analysing maximum and minimum uptakes and two intermediate cases:

- **Scenario 1:** Fast, private, unrestricted and partially distributed (Maximum uptake);
- **Scenario 2:** Fast, private, restricted and partially distributed (Intermediate uptake);
- **Scenario 3:** Moderate, shared, restricted and limited distribution (Moderate uptake);
- **Scenario 4:** Slow, shared, restricted and limited distribution (Low uptake).

The scenarios are designed taking into consideration a number of driving factors. These include the timing of the uptake of CAD vehicles, the choice of personal mobility, the conditions for the circulation of CAD vehicles in urban and rural areas, the changing deployment over time in European countries, the degree of user acceptance and the cost of vehicles and services.

The Scenario Model provides results for the following parameters:
- Car fleet composition;
- Bus fleet composition;
- Freight vehicles fleet composition;
- Passenger transport activity in terms of passenger-kilometres travelled;
- Freight transport activity in terms of tonnes-kilometres of road modes.

Estimated composition of the car fleet by automation level by 2050



Employment impact

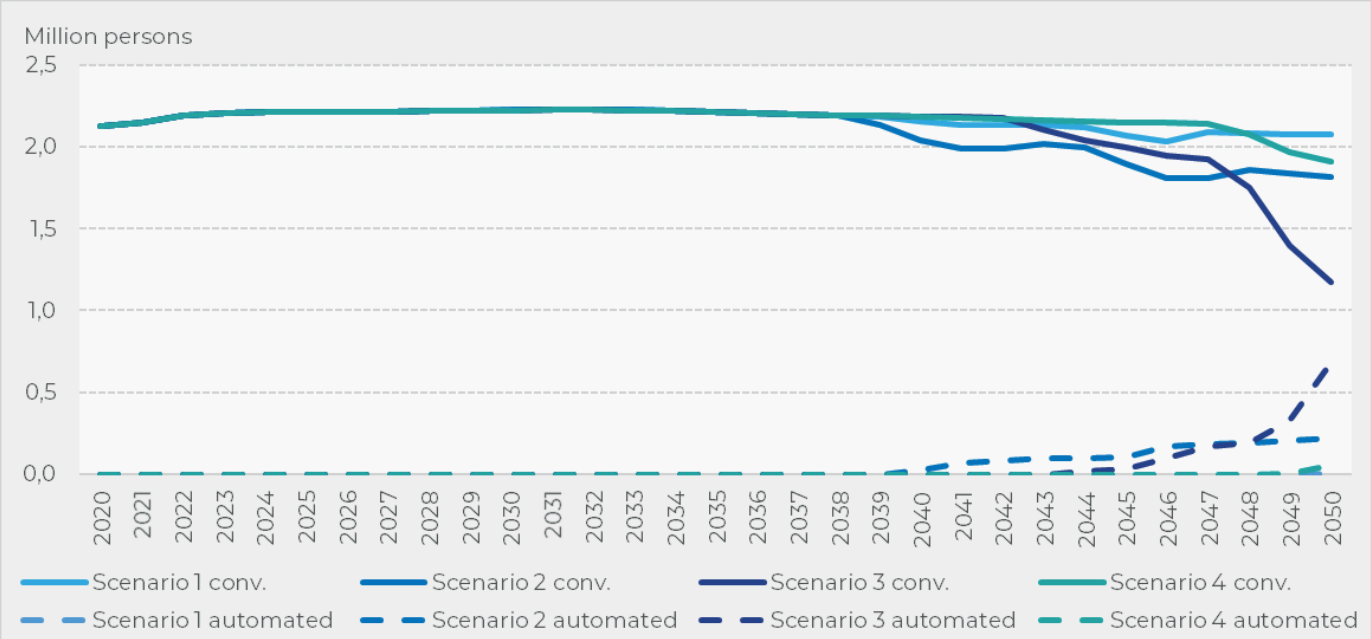
Employment changes EU27, in thousand jobs

	Transport Services						Manufacturing		
	Passenger			Freight			[in CAD relevant sectors][1]		
	2020[2]	2035	2050	2020[2]	2035	2050	2020	2035	2050
Scenario 1	2,122	+91	-46	4,508	+1,749	-2,302	9,190	-164	-168
Scenario 2	2,122	+91	-87	4,508	+1,431	-2,620	9,190	-164	-196
Scenario 3	2,122	+89	-265	4,508	+1,104	-1,247	9,190	-162	-275
Scenario 4	2,122	+89	-157	4,508	+899	+549	9,190	-163	-256
Employment in 2020 represents absolute employment in thousands jobs. Employment in 2035 and 2050 shows the difference, i.e. employment change, compared to 2020.									

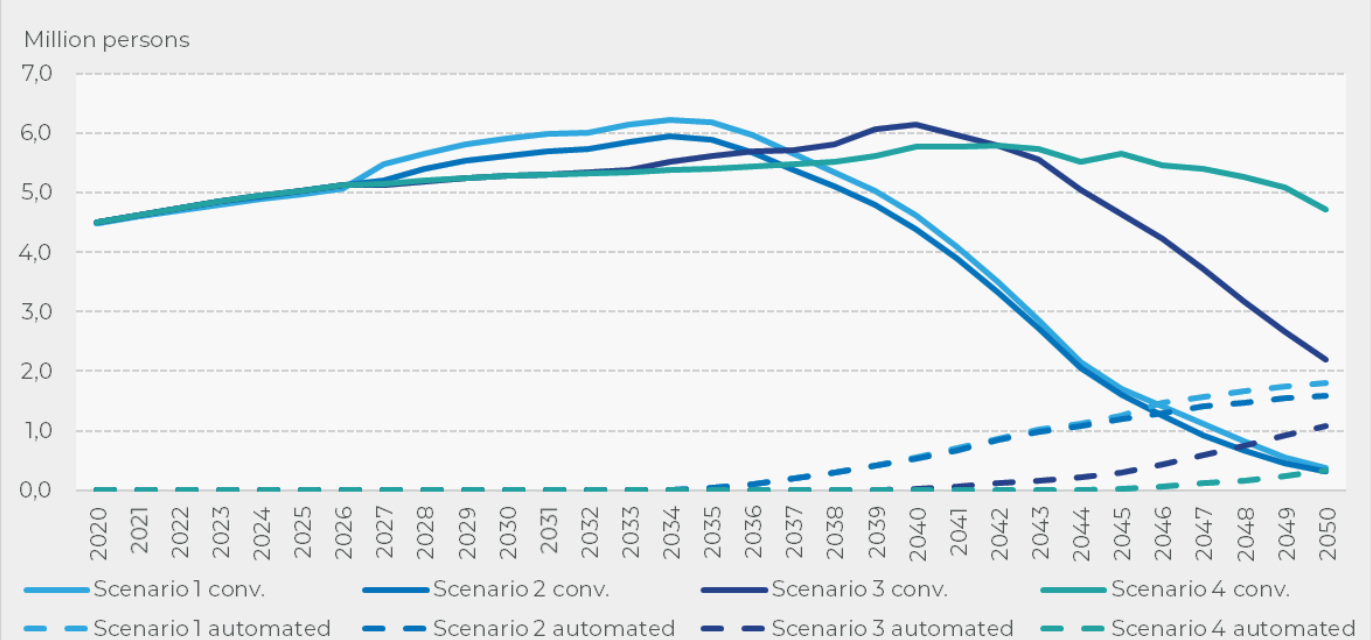
1 Employment in CAD-relevant manufacturing sectors includes employment in the sectors Vehicles, Electronics, Computers, and Communication.

2 2020 results have been calibrated to match empirical data, but some adjustments had to be made to account for differences in scope.

Transition to automated transport in passenger transport services, EU27 employment



Transition to automated transport in freight transport services, EU27 employment



Social impact

The introduction of CAD is expected to have far reaching employment impacts in the road transport sector and beyond. These demand-related effects, in turn, are anticipated to have various social impacts. Namely, it is forecasted that CAD will affect skill requirements for various occupations in the transport sector. It also has the potential to alter the gender balance in the sector, the age distribution of employees (in particular drivers and their future counterpart – mobility operators), and their income levels. The implementation of CAD is also likely to have some impacts on the sector's cross-cutting issues, which include shortage of drivers currently experienced in Europe and social inclusion in the road transport, both from an employment and a customer perspective. Finally, it could also come with the introduction of new business models and work environments such as mobile offices.

Policy options

Challenges and opportunities	Policy options for preparing the transition
Understanding the issues at stake	1. Set up **living labs** on CAD deployment, focusing on employment and social impacts
	2. Initiate and carry out **targeted studies** creating better understanding of CAD related employment and social impacts
	3. **Incorporate lessons learned from the current Covid-19 pandemic** in developing future proof CAD solutions, including developing health related design standards for future passenger transport solutions.
Creating awareness and activating stakeholders	4. Organise **awareness raising activities** for stakeholders involved
	5. Design **collaboration mechanism** to manage the transition process

	Policy options for facilitating the transition
The need for social dialogue	6. Run a **collaboration platform** on social impacts of CAD, potentially providing a joint **transition strategy** and **funding needs**
	7. Establish a **Framework Agreement on Automation** between social partners in transport

Policy options

long term

Policy options for facilitating the transition

An enabling regulatory framework

- 8. **Mapping of relevant social legislations** in road transport affected by automation and follow-up
- 9. Review **driving and rest time legislations** for driver
- 10. Review **legislations on skill requirements** for drivers based on evidence gathered on skill needs

Funding needs for the transition process

- 11. Provide **funding** for managing the transition, based on a **transition strategy**

Policy options for managing the transition

Imbalances in labour market demand and supply

- 12. Establish and run an **observatory of employment and social impacts** related to CAD deployment
- 13 **Match labour market demand and supply** in road transport
- 14. **Targeted retraining of displaced workers to be employed** inside or outside the transport sector
- 15. **Address spatial mismatch in labour demand and supply** caused by changing regional patterns in manufacturing and transport services

Mismatches in skills required due to automation

- 16. Create **approaches for lifelong learning** to help the current workforce to adapt to changing needs
- 17. **Adapt existing curricula** to prepare future workforce for changing skill needs

Work conditions, the attractiveness of the sector, and social inclusion

- 18. **Target a more diverse workforce** in promoting the road transport sector and encourage recruitment in the road transport workforce
- 19. Ensure that the deployment of CAD leads to **improved working conditions**
- 20. **Promote social inclusion in transport services** provided CAVS

Sustainable transport through CAD

- 21. **Limiting traffic** growth by imposing restrictions and promoting share mobility solutions
- 22. **Link CAD development to EGD objectives** to make transport more sustainable by moving towards efficient passenger mass transport and intermodal freight transport solutions

Further information on the study

The study on exploring the possible employment implications of connected and automated driving (CAD) was contracted by the Directorate-General for Research and Innovation (DG RTD) of the European Commission with the purpose of providing an:

1. Analysis of the short, medium and long term impacts of CAD on jobs, employment, skills and knowledge, as well as possible changes in work patterns and the work environment, business and operation models;

2. Investigation and elaboration of options in key policy areas, i.e. jobs, employment, skills, growth, transport and R&I, in order for the EU to take timely action for the safeguarding and enhancement of the positive effects and the avoidance or mitigation of the negative effects of CAD on jobs and employment.

The full study can be accessed here:

ecorys.com/cad

This study is a collaboration of

- **Ecorys** - managing the project, analysing social impacts, and developing policies.
- **TRT Srl** - designing transport scenarios.
- **M-Five and SEURECO** - modelling economic and employment impacts.
- **VTT** - providing policy and technical expertise.
- **IRU , UITP, and ERTICO** - providing stakeholder feedback.
- **CAM** - providing additional data and technical expertise.