

PILOT PROJECT WITH AUTONOMOUS BUS IN KONGSBERG 2018 - 2021

EXECUTIVE SUMMARY

From April 2019 to December 2021 the Public Transport Authority (PTA) Brakar has run a pilot project with an autonomous bus integrated in public transport service in the town of Kongsberg. There has been an operator on board the self-driving bus during the trial. The pilot project is in some respects considered to be globally unique. In August 2021, Brakar started a new trial in the city of Drammen based on the experiences from Kongsberg.

Multiconsult AS has assisted Brakar to sum up the results and knowledge from the trial in Kongsberg. The report is based on written material and logs supplemented by three interviews with participants in the project.

The purpose of Brakar has been to position itself as a proactive PTA in developing future mobility services. The trial should stimulate innovation and involve inhabitants in Kongsberg to try out the new concept.

In the interviews it was stressed that cooperation between several stakeholders was necessary to deliver public transport service with a self-driving bus. Brakar, Applied Autonomy, Vy Bus and the municipality of Kongsberg were major partners in the trial. The Norwegian Public Roads Administration played an important part in adopting the trial according to a law on trials with autonomous vehicles.

The self-driving bus (EasyMile EZ-10 generation 2) started regular services on Route 450 in April 2019 (off-peak hours) after testing from October 2018. Later the autonomous service was extended to afternoon rush hours and a shorter route on Saturdays. From September 2020, the service was produced with a new Generation 3 bus with improved lidar-sensors. Due to the Covid pandemic, route 450 was paused for two periods, one of them for as long as six months.

Route 450 provided low-speed-public transport, partly along streets without bus traffic prior to the trial. The autonomous bus gained some “regular” customers with need for a bus service on the new route. The number of passengers increased by 5 percent compared to a regular route that to some extent was replaced by Route 450.

Two Kongsberg-citizen surveys, in January and July 2019, show that nearly 70 per cent felt “fairly or very secure” on board the self-driving bus. People seemed to feel safer inside the bus than when they approached the bus as car drivers, bicyclists or pedestrians.

During the trial the bus travelled 12 175 kilometers in route production. The bus ran on a “virtual rail” according to a map constructed by GPS and the sensors of the bus. The self-driving bus could not leave the virtual rail. The operator had to maneuver the bus around obstacles.

In periods the route has been cancelled due to weather conditions, mechanical problems or maintenance of software. During the trial maintenance of software has been taken care of without disturbing operations.

The average speed is regarded to be a greater challenge than the maximum speed, which was restricted to 16 km/h because the Generation 2 bus lacked safety belts. The average speed has not improved over the project period. Vy Bus, who has operated the bus service, stated in an interview that the bus still stops in fog and when it is snowing. Others are more positive and point out that the bus runs more smoothly because the sensors are less sensitive than before.

When it comes to learning, Vy Bus says that the pilot is their first experience with self-driving buses. The pilot has shown that passengers accept the technology and feel safe taking the bus. The trial has also revealed the importance of a comprehensive digital network.

The long trial period (30 months, excluding two periods of Covid-stops) is regarded to be a strength to yield knowledge on self-driving technology in regular public transport. Knowledge, on more than technology, is shared with other organizations within public transport. EasyMile has acquired information on requirements to vehicles in public transport. Furthermore, there is a view that EasyMile EZ-10 is built on a platform relatively unsuited for autonomous buses.

The third and last interview was focused on overall status and future for self-driving buses. Autonomous transport will probably challenge the role of the public transport authorities. When autonomous transport makes transport services less expensive, it will open this market for new actors.

The participants in the trial agree that there is still a long way to go on technological development. The technology tested in Brakar and other Norwegian pilots can only be used in smaller areas with little and slow traffic. Further testing and development should implement state of the art autonomous buses, which are able to drive without an operator in mixed traffic.

An important question is when autonomous buses will be economically viable. At present, a self-driving bus operation costs 6 – 8 times more (operator included) than a similar route with a conventional bus with a driver. Sensors are very expensive, but there are reasons to be optimistic on this point. Recently there were news on new lidars to a much lower price. Prices for electric buses have decreased considerably in a few years.

It is considered that all public transport to some extent will be automated in the long term. To reduce costs, it is a prerequisite that automated buses will have no driver. A possible scenario is a system with automated routes with fixed timetables to handle major traffic flows combined with small autonomous and shared vehicles driving on demand.