UNLIMITED MOBILITY
AUTONOMOUS VEHICLES
Autonomous vehicles constitute a technological revolution, taking urban mobility to a new level.

Used to complement traditional transport modes, autonomous vehicles offer a mobility solution that is accessible, environmentally friendly, flexible and cost-efficient. Keolis is pioneering these developments and sees autonomous mobility as a seamlessly integrated component of transport networks.

68,000+ kilometres travelled.
17,000+ operating hours.
30+ deployments.
150,000+ passengers carried.

From the first launches by Keolis in 2016, until the end of March 2019.
THE URBAN CHALLENGES AHEAD

A NEW DEVELOPMENT MODEL

The exponential growth of cities worldwide calls for a rethink of urban development and everyday transport.

Autonomous mobility solutions can make a credible and sustainable contribution to this new model for cities.

MEETING THE CHALLENGES OF THE FUTURE

With rapid urban growth and increasing demand for public transport, the challenge in the years to come is to develop new mobility solutions that are efficient, sustainable and tailored to passenger needs. As a world leader in shared multimodal transport, Keolis has put this challenge at the heart of its strategy.

ACCELERATING URBAN TRANSFORMATION

Autonomous vehicles (AVs) constitute a technological revolution. Incorporated into urban transport networks, they provide passengers with more seamless, efficient and comfortable journeys, combined with cost savings and a lower environmental impact. AVs are a new way to travel and represent a significant opportunity to accelerate the development of public transport networks.

ANTICIPATING THE TRANSITION

To reap the full benefits of autonomous mobility, local transport authorities need to adopt a holistic approach to anticipating and managing this transition. An ideal scenario makes optimal use of all forms of mobility, and features close collaboration between public transport authorities, transport operators and other relevant stakeholders. Keolis is actively engaged as a key partner in this process in order to provide mobility services that are carefully tailored to the needs and expectations of citizens. The introduction of autonomous vehicles can help solve the issue of providing first and last mile connections in underserviced suburbs, for example, as well as encourage the shift from private vehicles to shared-ride services.

SEAMLESSLY INTEGRATED INTO SMART CITIES

In the smart, sustainable cities of the future, transport will be shared, personalised and multimodal. Autonomous mobility solutions are the perfect match for these requirements.

ON-DEMAND

Autonomous mobility provides efficient on-demand transport for people currently in areas which are currently under-serviced or not served at all, especially for first and last mile connections.

FOR EVERYONE

Autonomous mobility offers transport solutions for all: passengers with reduced mobility, children, urban and suburban populations, and people without a car.

INTEGRATED

Whether by shuttle bus or car, shared autonomous mobility supplements existing transport networks and alleviates traffic congestion. Passengers can choose their preferred means of transport from the wide range on offer.

ENVIRONMENTALLY FRIENDLY

Electrically powered autonomous vehicles are cleaner and quieter.

COMPLETELY SAFE

Autonomous vehicles help to significantly reduce the number of road accident, as research shows that 90% of these are currently caused by human error.

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2.4 billion private cars worldwide by 2050 – up from 1 billion today.


x 2

Urban transport demand will double by 2050.

67% of the world’s population will live in urban areas by 2050 – compared with 54% today.

41 megacities with more than 10 million inhabitants by 2030.

A WIDER CHOICE OF SHARED MOBILITY

Autonomous vehicles integrate seamlessly into a comprehensive multimodal transport offer that combines public and individual mobility solutions, improving the efficiency of transport networks and transforming public spaces.

AN INTEGRATED EXTENSION OF EXISTING NETWORKS

Autonomous mobility is an effective way of expanding an existing public transport network, especially in currently under-serviced areas or for the first and last mile of the journey. They are well suited to airports, university campuses, hospital complexes and tourist attractions which are spread over a large area.

TAILORED MULTIMODAL EXPERTISE

To develop its multimodal offering, including AVs, Keolis draws on its leadership in the operation and integration of traditional transport systems, combined with experience gained through the successful rollout of autonomous vehicle solutions in urban environments, in partnership with Navya (see pages 10-18, “Keolis, Pioneer in new mobility solutions”).

POISED FOR DEPLOYMENT

Discussions are currently underway at a national, European and international level to establish the necessary legal framework that will allow driverless vehicles to operate on public roads. Automotive manufacturers have announced that we can expect to see fleets of mass-produced driverless vehicles on the market from 2021 onwards, making autonomous mobility a reality for people everywhere.

MORE ATTRACTIVE PUBLIC SPACES

By making public spaces more accessible, autonomous vehicles (AVs) will enhance the appeal of our towns and cities. And by allowing local authorities to tailor transport services to the needs of citizens, AVs will reduce congestion, pollution and noise.

2016-2020

Cities test driverless shuttle buses under real conditions and prepare to integrate them into their local transport networks.

2021-2024

Mass-produced autonomous vehicles will start entering the market.

2024

Cities will roll out their first fleets of AVs.

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As technological advances drive progress in vehicle automation, new experiences in autonomous mobility are emerging, with ever-improving levels of performance and safety.

**THE INDUSTRY EXPERTISE OF KEOLIS**

As a leader in driverless automatic metros and tram networks, Keolis identifies the key benefits of technological developments to offer the best service for all modes of transport. Keolis also draws on its industry expertise to manage complex transport systems, while providing the highest levels of performance and safety to its customers.

**AUTONOMOUS OPERATION GAINING MOMENTUM**

The connected vehicle, with increasingly sophisticated driver aids on board, is already a reality today. This is the starting point for the autonomous vehicle, which handles all driving functions. Between connected and autonomous vehicles there are various degrees of automation.

**ENHANCING THE PASSENGER EXPERIENCE**

Convenience, comfort and safety – the three keywords that are defining the mobility experience of the future. Onboard, passengers can spend their time reading, chatting, working, or simply relaxing and enjoying the ride. In addition, environmentally friendly technology keeps air pollution and traffic noise to a minimum. And finally, the artificial intelligence systems in place ensure a smooth and safe journey.

**SELF-LEARNING ARTIFICIAL INTELLIGENCE**

Autonomous shuttle buses that are already on the market, are pre-programmed to operate in a specific area and use real-time sensors to compare what they see with their onboard mapping system, enabling them to detect and avoid obstacles in their path.
A WORLD FIRST IN LYON

In September 2016, Keolis, in partnership with SYTRAL (Lyon's public transport authority), the local government and Navya, launched an autonomous shuttle bus service for public transport. This free service uses two driverless shuttle buses, each carrying up to 15 passengers. In the heart of Confluence, the city’s environmentally friendly district, these fully electric vehicles serve five stops along a 1,350 m route, and connect with two existing tram stops. In total, more than 50,000 passengers have used the service since September 2016.

TECHNICAL SPECIFICITY
Shuttle crossing and bidirectional shuttle

Serving companies and a business park

“We are now committed to going beyond experimentation to demonstrate that this shuttle service can complement other modes of transport to provide denser urban coverage.”

Pascal Jacquesson, Managing Director, Keolis Lyon

SUCCESS IN THE UNITED STATES

An autonomous vehicle has been providing a free one-kilometre ride through Las Vegas centre, six days every week, since November 2017. Used by more than 25,000 passengers in its first year of operation and covering 3,715 km, it is also the world’s first autonomous vehicle service to run among traditional traffic on open roads.

“The city of Las Vegas is making major investments to improve mobility and safety, and provide reliable transportation choices to residents and visitors through the use of new technologies.”

Carolyn Goodman, Mayor of Las Vegas, Nevada, USA

“This experimentation is a decisive step for Keolis’ expansion in the United States and serves as a benchmark for when we hold for future business in urban transit, paratransit, shuttles and on-demand transport.”

Bernard Tabary, Chief Executive Officer, International

KEOLIS, DRIVING AUTONOMOUS MOBILITY

PIONEER IN NEW MOBILITY SOLUTIONS

Autonomous mobility is an everyday reality and Keolis has strategically positioned itself as a partner of choice for the roll out of these new transport solutions.
AN AUTONOMOUS SERVICE FOR EUROPE’S LARGEST BUSINESS DISTRICT

Since June 2017, La Défense, in the west of Paris, has been witnessing a small revolution with the trial of an autonomous, fully electric shuttle bus service. The innovative service has already attracted more than 45,000 passengers. The shuttles can seat up to eleven passengers with a further four standing and can carry passengers with reduced mobility. The free shuttle service stops at several pick-up points on two different routes. The innovative new service facilitates first and last mile connections in and around the 400-acre business district, for the half a million people who come to La Défense every day.

TECHNICAL SPECIFICITY

An environment with an abundance of glazed structures (buildings) that disrupts GPS signals and the geolocation of shuttles

“It works, and people like it. Even those who don’t use the shuttle aren’t concerned about its journeys. This type of vehicle is able to resolve the first and last kilometres issue.”

Stéphane Beaudet, Vice-Chairman of Île-de-France Mobilités and the Île-de-France region.

AUSTRALIA: FACILITATING CAMPUS ACCESS

To improve the lives of their students and staff, two major Australian universities – Trbne in Melbourne and Flinders in Adelaide – have launched experiments involving autonomous vehicles. The tests are demonstrating the interest of passengers for this new solution, which is well suited to resolving the transport issues of poorly served university campuses by public transport.
Since August 2018, an autonomous vehicle has been operating in the city of Candiac, Quebec, on the south shore of the Island of Montreal. This one-year experiment simplifies the commute for city dwellers by providing a connecting service with the central bus terminal. The vehicle serves four stops on its 2 km route. This type of long-term experiment on open roads is a first for Canada.

### Technical Specificity
- Shuttle operating on open roads that include rail crossings and traffic lights (V2I)

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A WARM WELCOME FOR TOURISTS IN BELGIUM

In autumn 2018, Keolis launched autonomous transport experiments in two Belgian cities to provide direct access to their tourist attractions. In Han-sur-Lesse in the south of the country, an autonomous vehicle takes visitors to and from the major tourist destination of the Domaine des Grottes de Han. In Waterloo, near Brussels, another autonomous vehicle serves a 2.4 km route around the battlefield of Waterloo, which attracts 500,000 visitors annually.

### Technical Specificity
- Rural area

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KEOLIS, DRIVING AUTONOMOUS MOBILITY
REVITALISING THE HISTORIC AND BUSINESS CENTRE OF NEVERS

Throughout the Christmas 2018 and 2019 sales periods, an autonomous vehicle served the historic centre of Nevers, which is also the city's business hub. The vehicle travelled a 1 km loop route through a pedestrian-only area (40%) and on normal traffic routes (60%), providing a service focused essentially on carrying passengers to and from the city's main car park. This 100% free mobility service is part of a wider city centre revitalisation programme, and proved hugely successful, carrying more than 3,000 passengers in 192 hours of operation.

TECHNICAL SPECIFITIES

Shuttle operating on open roads and through a very busy pedestrian-only area

Narrow street that made it difficult to use GPS

AN INTERMODAL SOLUTION FOR THE NETWORK IN RENNES

Since November 2018, two autonomous vehicles have been providing a free service to and from the Beaulieu campus of the University of Rennes. Part of their 1.3 km route is on public roads alongside all other modes of transport. Other parts use lanes dedicated to soft transport options. As an integral part of the Rennes network, this new line offers an intermodal mobility solution that complements a bus route and the future metro line B, which will serve the university.

TECHNICAL SPECIFITIES

Shuttle operating on open roads with a left-turn junction

Shuttle operating on open roads and through a very busy pedestrian-only area

NAVETTES AUTONOMES
TAILORED SUPPORT FOR LOCAL TRANSPORT AUTHORITIES

Autonomous mobility will not become a reality without close collaboration between private operators and local transport authorities. As part of this process, Keolis is ready to go that step further in supporting local authorities in their transition towards these new mobility solutions.

AN APPROACH BASED ON LISTENING

From the outset, Keolis has fostered relationships of trust with public authorities based on listening and dialogue. We believe this is the best way to understand the needs and concerns of the local community and, in turn, implement the right transport solutions, such as autonomous mobility. Listening is also the basis for understanding the needs and expectations of customers. The studies conducted by Keoscopie, our research observatory for new mobility trends, are a perfect illustration of this approach.

GOING FURTHER TOGETHER

Keolis is leading the field in autonomous mobility, drawing on our 35 years of expertise in automated driverless metro systems and our pilot projects worldwide. And we are ready to take the next step with local authorities to make autonomous mobility a seamless extension of their existing transport networks.

“The range of our in-service applications is a clear demonstration of our expertise as an autonomous vehicle operator, not only in terms of deployment, but also operation.”

Schéhérazade Zekri, Director of New Mobility, Keolis
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