

Better MOBILITY TODAY INSINGAPORE INQUEBEC INPARIS INRIODEJANEIRO

THENEWMOBILITY iNDiCators

A new kind of mobility is emerging. It is efficient, economic and sustainable, and meets the current and future challenges of towns.



Today, we have the power to change how we travel

Isabelle Kocher CEO of ENGIE



Together, we can take action. Today.



450 km: the actual range

of electrical vehicles using

new-generation batteries.

3.8 million less vehicles in the

streets in 2024: made possible

by the increasing number of



75% of people in France say they are in favour of driverless cars.



500,000 tonnes of CO, per year: is what the State of New York (USA) could save car-sharing services worldwide. if it converted its bus fleet to electric.



GNV

20% of journeys made in towns and cities used public transport in developed countries between 2001 and 2012.

15 million vehicles running

the target set by the NGVA

on gas in Europe in 2030: that's

(Natural Gas Vehicle Association).

equipped by ENGIE

€100 m

50,000

installed by ENGIE

obility is a daily challenge for all of us. Moreover, it is also a major issue for our cities which, in 2050, will account for 67%

BETTER MOBILITY TODAY **anetworkof SOLUTIONSFORGREEN MOBILITY**

In order to improve air quality, reduce noise pollution and traffic jams, and optimise transport networks, we have developed the green mobility solutions of ENGIE's Better Mobility TODAY program. Solutions that can be combined and are built to adapt to your needs.



answersto TRANSPORT CHALLENGES, **HereandNow**

Transport is currently a major concern for towns, their residents and businesses.

Find out how ENGIE is helping to improve their traffic flow, and to become more economical and efficient.

FOR CLEANER TRANSPORT

Rotterdam encourages electric transport with the largescale installation of charging terminals.

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FOR MORE FLUID TRAFFIC

Rio de Janeiro and the surrounding urban area are relying on the intelligent management of traffic to unblock the roads.

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A SEAMLESS, PERSONALIZED **EXPERIENCE FOR** PASSENGERS

Ouebec's authorities give bus users a useful, accurate and easily accessible source of information.

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FOR AN **OPTIMISED** TRANSPORT **NETWORK**

In Paris, RATP is optimising the operation of its network and offering a richer range of services.

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FOR A WIDER **RANGE OF** TRANSPORT **OPTIONS**

Brussels is diversifying its transport offering, with more and more alternatives to the car.

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A MORE SUSTAINABLE WAY OF DELIVERING GOODS

In France, Carrefour is increasing its use of biofuels produced from waste for its deliveries to hundreds of stores.

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AN ADVANCED METRO NETWORK

In Singapore,

page 20

the equipment used for the citv's Mass Rapid Transit system is modernised with the latest technology, as part of an ever more advanced network.

FOR GREENER LOGISTICS

is making roads a key part of its sustainable goods transport policy, equipping motorways with LNG service stations, from Poland to Portugal.

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The European Union

TODAY IN ROTTERDAM

INSTALLING THE EQUIPMENT TO DEVELOP ELECTRIC TRANSPORT

Rotterdam, the economic heart of the Netherlands and the country's second city with a population of 2.3 million, is committed to an electric transport programme. The city authority has rolled out a huge programme to install charging points on its main roads and parking areas.





WHAT'S AT STAKE

Why move to electric vehicles? First of all, it improves air quality. But also, because this mode of transport combines several advantages: it is clean and guiet and it emits less CO₂ than transport by combustion engine vehicles.

In the Netherlands, there are also tax advantages, which help to make the move to electric vehicles financially attractive.



ELECTRIC VEHICLES FOR EVERYONE

The Rotterdam city authority has committed to supporting electric transport in two ways:

• by setting up clean solutions and services for residents to facilitate usage:

• by committing to one quarter of its own vehicle fleet being electric.





A WIN-WIN PARTNERSHIP

ENGLE and EVBox are also responsible for the operation and maintenance

of these charging points for a period

Part of the installation cost is covered

the charging points. Thanks to this

ENGIE can offer a realistic financial

to commit to electric transport.

by profits from operating and supplying

operation and the provision of energy,

package to local authorities who want

In addition to the installation,

of twelve years.





ALMOST 3,000 CHARGING **TERMINALS**

In order to make it easier to charge electric vehicles and to encourage their use in the city, Rotterdam has entrusted ENGIE and EVBox with the installation and maintenance of:

• an initial network of 1,000 charging points in 2014;

• almost 1,800 additional charging points, which will be installed between 2016 and 2020.

The charging points have been installed at a number of locations across the city, where they are most needed by drivers. Locations include: railway stations, car parks, car-sharing areas, etc. Through a dedicated website, drivers can also make suggestions about where future charging points could be located - near their home, workplace or leisure facilities.

new charging points for electric cars are to be installed in The Hague and Rotterdam by 2020.

City authorities are also carrying out trials of wireless vehicle charging. A driver simply parks in a space equipped with a charging system which is installed at ground level and connected to a power supply. A mobile app is then used to begin charging and the driver can return to the vehicle when charging is complete.

Rotterdam is taking action today in order to offer alternative transport solutions to its residents.

WIRELESS TECHNOLOGY

The technology is particularly suited to driverless cars, which can be programmed to park in such places and then leave when their batteries have been fully recharged.

AND TOMORROW?

Rotterdam is one of the leading cities when it comes to electric mobility. It is also Europe's largest port and has made very ambitious commitments in the area of sustainable development. By 2025, the city intends to reduce its energy consumption by 20% and its greenhouse gas emissions by 4 million tons.

TODAY IN Rio De Janeiro

MAKING TRAFFIC MORE FLUID

The city of Rio de Janeiro is amongst the world's most congested. For the city and its suburbs, the main aim is to de-congest roads and help traffic flow. With Maestro, ENGIE provides a wide range of solutions to improve the management of urban traffic.







AUTOMATING TRAFFIC MANAGEMENT

the 10 densest zones.

The command centre for these installations optimises the management of the traffic lights.

The automated management helps reduce residents' journey times. It also has other positive effects for the city: reduction of traffic light maintenance costs, fuel consumption, emissions and accidents.

MANAGING TRAFFIC **IN REAL TIME**

ENGIE currently provides the city of Rio and its suburbs with Maestro, a wide range of urban traffic management solutions.

Cameras, speed checks, radio links, traffic lights and urban lighting control, real-time message display: the Maestro system captures traffic data in real time and the operation centre then uses this data to optimise road traffic.

Over cameras in Rio.

WHAT'S AT STAKE

Fighting urban congestion and its effects, namely increased fuel consumption, rise in air pollution and number of accidents.

In Niterói, a city located on the side of the bay opposite Rio, high-tech meters (data reception and transmission solutions), combined with intelligent cameras, have been positioned in

AND TOMORROW?

In Rio de Janeiro, ENGIE has been entrusted with the mission of adapting Maestro for an urban tunnel. All the tunnel's infrastructure (lights, ventilation, emergency exits etc.) will be linked to Maestro and controlled remotely. thus improving safety.

TODAY IN QUebec

A SEAMLESS, **PERSONALIZED EXPERIENCE FOR PASSENGERS**

For the 580,000 residents of the Canadian city of Quebec, the main form of public transport is the bus. The network comprises 4,500 stops, served by the Capital Transport Network (RTC) authority's fleet of more than 600 buses and Bus Rapid Transit (BRT) vehicles. Thanks to an information system managed by ENGIE, users can find out in real time when their next bus is scheduled to arrive.





NAVINEO, A TOTAL SOLUTION

ENGIE has been deploying its Navineo solution across RTC's entire network, including every vehicle, since 2016.

Using GPS technology, the CAD/AVL (Computer Aided Dispatch and Automatic Vehicle Location) system transmits real-time information from the 600 buses in circulation to a main control centre.



AN OPTIMISED SERVICE

By introducing Navineo, RTC was able to review its service and punctuality and redesign the timetables of all 135 of its routes.

This extensive review of services was carried out in just six months. And the benefits are already visable. By analysing punctuality and stop times, RTC has been able to recover and reinvest 20,000 service hours - enabling the authority to provide a better overall service to customers since late 2016.

onboard displays.



This new service offers bus users the option to receive alerts to their mobiles about the arrival time of the next bus at their chosen stop.



WHAT'S AT STAKE

Real-time information is a key issue for users of public transport. Once on board the bus, ENGIE provides visual and audible information about the journey, based on mobile apps and websites.

PASSENGER INFORMATION **IN YOUR POCKET**

Tools based on Navineo have also been made available to passengers via a mobile app, Nomade. Information about their next bus and the overall state of the network are available in real time from a smartphone.

AND TOMORROW?

RTC was awarded a prize by the **Quebec** Transport Association for its real-time information system. This tool uses technological innovation to make the best use of a transport network and improve the service to passengers.

TODAY IN Paris

OPTIMISE THE PUBLIC TRANSPORT NETWORK AND PASSENGER SERVICES

RATP, the Paris transport authority, operates a large part of public transport in Paris and its suburbs. Faced with several challenges in relation to issues of optimisation and innovation, the operator is supported by ENGIE in the transformation and renewal of its transport and related services.



WHAT'S AT STAKE

How do we improve all aspects (technical, commercial, user-related) of the Paris public transport network whilst ensuring continuity of service?



TRANSFORMING THE **TELECOMMUNICATIONS NETWORK**

RATP has its own communications **network.** It gives access to the internet and telephony, and also enables the radio communications necessary for the operation of its services.

ENGIE is responsible for the migration of this network to a new network and for the transformation and maintenance of the video systems on the metro lines. The scope of the contract is unique, since it involves carrying out, in one go and with no interruption of service (so only at night, a few hours at a time), the migration of one communications network to another.

This project notably required the creation of data centres dedicated to RATP, to store all the data collected by cameras and on the networks.



RATP functions are affected by this network transformation.



SIGNALLING FOCUSING **ON SAFETY**

ENGIE also provides railway signalling for drivers and for people working in control rooms.

The main theme of this assignment: safety. It's about making sure that the trains always run under perfect safety conditions. The demands are very high: the tolerated failure threshold is 1/1,000,000,000.





TODAY IN BRUSSELS

DEVELOPING BIOGAS BUSES

ENGIE has supported RATP in the development of refuelling solutions in RATP biogas/bioNGV bus depots. The particular challenge is to develop solutions to supply RATP with bioNGV, a type of gas which comes from the anaerobic digestion of waste. It is possible pool the bus stations with other logistics uses.

During the COP21, which took place in Paris in December 2015, ENGLE and RATP provided the environmentally friendly transport of the 1,000 participants to the climate summit for local leaders and the UCLG world council, using buses that ran exclusively on biomethane.



AND TOMORROW?

There are signs everywhere that urban public railway networks are becoming obsolete. The question of refurbishing them without interrupting the service is a crucial one, and ENGIE will be working on it.





SYSTEM WHICH CAN BE ACCESSED BY EVERYONE

ENGIE has deployed, for RATP, an audio and visual information system which aims to facilitate the journeys of all passengers. With the implementation of this system, RATP continues its accessibility policy for people with reduced mobility.

The information is broadcast on several channels: on buses, at the stops, on the internet (sites, applications etc.).

PROVIDE MORE TRANSPORT CHOICES

With 300,000 commuters entering Brussels every day, and 1.8 million car journey's being taken, the city is suffering from pollution, noise and congestion. The European capital is supported by ENGIE through its sustainable city policy, which aims to encourage new ways of getting into town and making the journey more pleasant.



WHAT'S AT STAKE

The city's transport authorities have committed to reducing congestion in a city where the car rules, with over 50 cars for every 100 inhabitants. To do this, they must offer alternative transport solutions to residents and workers.



MAKING THE BRUSSELS METROPOLITAN AREA **MORE ACCESSIBLE BY PUBLIC TRANSPORT**

ENGIE is helping the authorities to review the public transport network and to work out how it could be optimised; specifically, by creating new stopping points and interchanges, while also looking at ways to increase the frequency of vehicles arriving at each stop. The work involves deciding which mode of transport is most efficient for each particular zone of the Brussels area. Two studies of the transport connections between Brussels and its outer suburbs 20 kilometres away (the town of Willebroek and the airport), showed that a "trambus" (a double-articulated or 'bendy' bus with its own dedicated lane) would be the best option.

ENGIE has also drawn up a roadmap for the Belgian federal public authorities on the future of the rail network in the Brussels metropolitan area.



SMART INFRASTRUCTURE **TO OPTIMISE JOURNEYS**

ENGIE is helping to improve the traffic flow and give priority to public transport by enhancing the road infrastructure. This includes:

 configuring traffic lights at major intersections to give priority to public transport;

 providing drivers with real-time information about the parking spaces available. Providing information boards to guide drivers rapidly to the empty spaces, thereby avoiding the congestion created by drivers looking for somewhere to park.

intersections where priority is given to approximately fifteen tram and bus lines.

16,000

parking places monitored in real time in Brussels city centre.



such as train, tram, bus, and electric cars, are being developed by ENGIE in order to reduce car use.





DEVELOPING ELECTRIC VEHICLES FLEETS

ENGIE has made rapid charge points available to 50 drivers of electric taxis, with the charge points located just outside the company's premises in Brussels. The Group has also supported Belgian broadcaster RTBF in the study, deployment and management of a fleet of electric vehicles for its employees. Charging points have meanwhile been installed at various RTBF locations.

To optimise the charging of electric vehicles, ENGIE is also working on solutions for smart charging. They are designed to enable several cars to be charged at the same time, offering more efficient consumption and a lower cost.

AND TOMORROW?

ENGLE is carrying out two research studies to help the city authorities find a more sustainable way of providing mobility in and around Brussels. The Mobil2040 study aims to make mobility a key driver of urban transformation, while Rail4Brussels pulls together all the various solutions suggested by the different transport providers in the Brussels area and presents them in a single context for analysis and discussion.

TODAY IN FRANCe

THE CIRCULAR ECONOMY, FOR A LOW-ENERGY, SUSTAINABLE **TRANSPORT SYSTEM**

French supermarket group Carrefour has a clear objective: use biodegradable waste to fuel the trucks that deliver goods to its stores around the country. The waste, some of which is taken from Carrefour's own stores, is transformed into bio-methane gas and subsequently used to power a fleet of nearly 500 trucks in France.



A SUSTAINABLE MODEL

Bio-NVG* fuel is derived from biodegradable waste, making it a model of low-consumption and efficiency. From formation right through to consumption, the process recycles waste, the fuel emits very few fine particles and NOx - thereby reducing CO₂ emissions by 95%, plus the trucks involved make half the noise of those with diesel engines.

the reduction in CO₂ emissions, compared to diesel; generating a saving of 50,000 metric tons of CO, from a fleet of 500 trucks.

The first service station equipped for Bio-NGV* was opened at La Courneuve in the Paris region, near a number of major motorways. Open 24/7, it provides fuel for all types of Bio-NGV vehicles. It can also supply refrigerated trucks with liquid nitrogen, a greener alternative to using diesel for cold stores.



AN OPEN INVITATION

Carrefour has decided to accelerate the deployment of its trucks powered by bio-methane, taking the total to 500 by the end of 2017. At the same time, 20 service stations offering Bio-NGV* will be opened across France, and made available to all transport companies who wish to switch to bio-methane.

Bio-NGV* service stations opened in 2017.

*Bio-Natural Gas for Vehicles.

WHAT'S AT STAKE

To recycle biodegradable waste by turning it into a renewable fuel that produces only small amounts of CO₂ emissions. This is the 'circular economy' model adopted by Carrefour. in partnership with ENGIE.

MULTI-SERVICE STATIONS

metric tons of CO₂ saved by every refrigerated truck per year, thanks to the use of liquid nitrogen.

AND TOMORROW?

ENGLE already has a network of more than 140 service stations providing alternative fuels across France, with a further 20 being added by 2018. The aim is to open 100 new outlets throughout Europe by 2020.

TODAY IN Singapore

DELIVERING AND MODERNISING A TRANSIT NETWORK

Opened in 1987, the Mass Rapid Transit network soon established itself as the No. 1 public transport system for the city state. Today, it carries more than 3 million passengers a day. ENGIE has helped since the inception with the development and growth of the network, support the modernising and harmonising of the train systems over the different requirements and advancements in the systems.





A RELIABLE PARTNER FOR THE AUTHORITIES

ENGIE created its Services division in Singapore in 1984, during construction of the first section of the metro line. More than 30 years later, this division is still accredited with the local authorities and has the capability and on the field in depth experience to serve and support the many demand of renewal and implementation of new and older systems. ENGIE is one of the few companies in Singapore to be approved by the Land Transport Authority (LTA) and its operator SMRT for installing, maintaining, testing and deploying transport projects.

years' experience of working with the city's rail authority.



UPDATING THE EXISTING EOUIPMENT

Having installed the original signalling systems for the MRT lines, including the fully automated line from downtown to Changi airport, ENGIE has been updating the equipment with the latest technology from Mitsubishi. Among the projects involving ENGIE were the synchronisation of the signalling system with the automatic closing of train doors, and a series of extensions to existing MRT lines.



WHAT'S AT STAKE

Developed over the past 30 years, the network has been modernised with the latest technologies. Given its expertise and knowledge of the relevant systems, ENGIE is a partner of choice for this latest stage of the network's development.

AT THE HEART OF THE **TRANSPORT NETWORK**

With its extensive local experience and credentials, ENGIE is a key player in Singapore's transport system. ENGIE's experts deploy, install and maintain a series of advanced systems, and are also responsible for checking the suitability of equipment being installed in the network. They ensure that standards are met and that new equipment is both compatible with the existing installation and can be fully integrated in the future. This is a key requirement, given the continued growth of the network.

AND TOMORROW?

Singapore, which is recognised as a leader in the move toward Smart Cities. is also home to one of ENGIE's 11th international research centres, the ENGIE Lab Singapore. The company's first such centre in South East Asia, it can support a range of innovative projects for the city state in areas such as mobility, energy and the Internet of Things.

TODAY IN europe

ENCOURAGING GREENER LOGISTICS ON THE ROADS

Today, in Europe, industrial and logistics groups are investigating, with ENGIE, with a view to accessing new kinds of long distance transport. Their objective is to put in place logistics networks which are greener, and even completely "carbon neutral", running on gas fuel.



WHAT'S AT STAKE

Because transport is one of the largest emitters of atmospheric pollutants, accounting for 59% of the NO_x emitted in France, we need to invest in more sustainable modes of transport and develop alternative fuels, such as natural gas for vehicles (NGV).



ENGIE INVESTS IN NATURAL GAS FUEL

Convinced that natural gas is a fuel of the future for road transport, ENGIE is committed to developing a network of NGV fuel stations in Europe, and particularly in France.



stations (LNG is the liquefied version of NGV specifically adapted to long distance transport) will be built in Europe by 2021, about thirty of which in France.



BUSINESSES UNITED FOR THE DEVELOPMENT **OF THE LNG NETWORK**

Private groups are tackling the issue through the Connect2LNG project, launched in 2015.

All these companies, brought together in a consortium led by ENGIE, are committed to extending the pan-European network of LNG filling stations in order to encourage the development of green logistics.

ENGIE is providing appropriate solutions in terms of price, design, installation and maintenance of filling stations in order to make Connect2LNG a reality.

Over **1.000** км of range offered by LNG fuel. the liquefied form of NGV.





Since May 2013, the European Union has been deploying the Liquefied Natural Gas Blue Corridors European project in order to make LNG a real alternative for medium to long distance transport.

1 station every 400 km on the main European roads. ENGIE commits, over the next five years, to **developing the network** of LNG/CNG fuel stations.



AND TOMORROW?

Hydrogen is a clean energy solution produced from water and appropriate for transport. It is one of the future levers chosen by ENGIE in order to accelerate the energy transition. The Group is a partner of 11 projects which have been certified within the framework of the "Hydrogen Territories" call for projects initiated by the French public authorities.

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