NEW IDEAS TO CHALLENGE DAILY MOBILITY

SPRING 2018

PULSE

ENLIGHTEN
“FREE TRANSPORT IS OFTEN THE SHORT-CUT OR SHORT-TERM OPTION”

EXPLORE
THE POWER OF ELECTROMOBILITY

ACOMPLISH
RIDING THE TREND
HOW BIKES ARE CHALLENGING THE MIGHTY AUTOMOBILE

INSPIRE
CAPTURED LIVE
PULSE IS INTENDED FOR ALL STAKEHOLDERS, DECISION MAKERS AND OPINION LEADERS OF EVERYDAY MOBILITY. A KEOLIS-LED INITIATIVE, THIS BIENNIAL MAGAZINE AIMS TO FUEL DEBATE AND GENERATE DISCUSSION ABOUT THE TRENDS AND CHALLENGES THAT ARE SHAPING OUR INDUSTRY.

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pulse-mag.com
The world is undergoing great change. Shared mobility is changing too and will play an increasingly decisive role in our lives.

Until now, the objective of those involved in mobility could be simply defined as creating solutions to resolve an issue to deal with the number of passengers being carried. Today the time has come to bring the human element back to the heart of transport systems. I often say that the needs of the individual should not be forgotten in mass transit. On the contrary, we must get better at understanding them and getting to know the regions in which they live and evolve, in order to better understand their habits, needs and preferences.

At the same time we cannot pretend to imagine a specific response for each particular individual’s case. We need to work against the flow in order to decipher every single bit of information with curiosity and open-mindedness, so that we can identify underlying trends and find solutions to improve mobility for everybody. A fascinating challenge!

*Pulse* is a perfect tool for this observational and innovative approach. In this issue you can read articles and opinions about subjects as varied as electromobility, free transport, the Millennial generation’s mobility trends and the festival that transforms Melbourne’s trams into authentic artworks. A mass of ideas to reflect on and inspire all of those with an interest in shared mobility.

**ÉRIC CHAREYRON,**
*CEO of Keoscopie Observatory of Mobility Trends*
Emmanuel Couet
Chairman of Rennes Metropolitan Area (France)

Active in politics since the age of 17, Emmanuel Couet was elected Chairman of the Rennes Metropolitan Area (450,000 inhabitants) in 2014. Since then he has crafted its reach and is convinced that efficient transport systems and the freeing-up of public space can create value for cities. For Pulse he talks to us about his vision of urban mobility and the innovations that have been introduced in his area to reinforce the provision of public transport and reduce the use of private cars.

Matthias Finger
Researcher and professor at the Ecole Polytechnique of Lausanne (Switzerland)

Specialist in the management of network industries and transport regulation, Matthias Finger is notably a professor at the Ecole Polytechnique of Lausanne. In 2014 he became director of IGLUS (Innovative Governance of Large Urban Systems – iglus.org), a training programme supported by Keolis, whose objective is to help cities improve the governance of their infrastructure. He has written an opinion column for Pulse in which he discusses the role of public transport authorities in regard to the challenges they face from the digitalisation of mobility.

Charles Bombardier
Engineer and founder of Imaginactive (Canada)

Grandson of Joseph-Armand Bombardier, founder of the eponymous industrial company, Charles Bombardier is no typical engineer. Based in Quebec, his non profit-making association, Imaginactive, collaborates with industrial designers from all over the world. Their objective is to imagine together the vehicles of tomorrow. To date, 300 concepts have been studied. The only limits to Charles Bombardier are the limits of his own imagination.

Yves Crozet
Transport economist, Professor and research fellow in Lyon (France)

Specialist in transport economy, Yves Crozet is an economist, professor emeritus at the University of Lyon and research fellow at the Centre on Regulation in Europe (CERRE). He talked to the Pulse team about the issues of free public transport. This should provide public transport authorities and other urban stakeholders with valuable food for thought.

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digitalisation affects all human and industrial activities worldwide. Digitalisation consists of three closely linked dimensions, namely (1) data generation and storage (from more and more sources and in bigger and bigger quantities), (2) data exchange (bigger volumes, increasingly in real time) and (3) data analysis (bigger amounts of data, thanks to more and more sophisticated algorithms).

This purely technological evolution enables the emergence of so-called “digital platforms”, where data about physical activities are stored, exchanged and analysed. These platforms are establishing themselves as intermediaries between the providers of transportation services in the various transport modes and the users or consumers of such services (passengers). Initially, such platforms solely offered information about public transport offerings, such as timetables, increasingly in real time. These platforms then evolved into offering ticketing services. But now, we see the emergence of even more sophisticated platforms offering so-called “mobility platforms” that seek to establish themselves as intermediaries between the users or customers of a physical service (passenger). Initially, such platforms then evolved into offering ticketing services. But now, we see the emergence of even more sophisticated platforms offering so-called “mobility platforms” that seek to establish themselves as intermediaries between the users or customers of a physical service (passenger). Initially, such platforms then evolved into offering ticketing services. But now, we see the emergence of even more sophisticated platforms offering so-called “mobility platforms” that seek to establish themselves as intermediaries between the users or customers of a physical service (passenger). Initially, such platforms then evolved into offering ticketing services.

He same technological evolution can potentially be applied to urban mobility, and, as a matter of fact, is already being applied. So-called “mobility platforms” are seeking to establish themselves as intermediaries between the providers of transportation services in the various transport modes and the users or consumers of such services (passengers). Initially, such platforms solely offered information about public transport offerings, such as timetables, increasingly in real time. These platforms then evolved into offering ticketing services. But now, we see the emergence of even more sophisticated platforms offering so-called “mobility services”, travel services across modes, whereby a user can be transported from A to B in an integrated and seamless way (e.g., “Mobility as a Service” or MaaS).

A n all such digital platforms apply two basic economic principles: (1) named so-called “direct” and “indirect network effects”. We actually know “direct network effects” already from the traditional physical world: basically the value of a (physical and digital) platform goes up the more users or customers are connected to it. The more citizens are connected to the postal network, the higher its value to everybody who is connected, the more users are connected to a telephone network, the higher the value for all the users and of the network itself. Applied to a mobility platform, this means that the more transport modes and transport offerings are connected to the platform, the higher the value for all the (potential) users. “Indirect network effects” come on top of direct network effects and result from the analysis (by the platform) of both the users and the producers. The more knowledge we have about the users, the more valuable the platform becomes for the producers, and the more (quality) information we have about the producers, the more valuable the platform becomes for the users. Both, direct, but especially indirect network effects are strong drivers of monopolisation, a phenomenon also called “winner takes all”. In other words, there is generally only room for one digital platform in a given domain, meaning that, for purely economic reasons, there is typically only room for one digital mobility platform in one urban or metropolitan area. Thus, the mobility platforms that manages to be first on the market will prevent the survival of other competitive mobility platforms or even simply their emergence.

But what does this all mean for public transport authorities? It is obvious that such digital mobility platforms are of utmost interest for transport authorities and cities more generally. They contribute to organising urban transport more efficiently, reduce emissions, tackle congestion and increase safety. More generally, they also reduce car ownership (some of which may be owned by the transport authority) and digital mobility platform developers and operators. The latter are the most likely international companies that have already been able to learn from similar experiences elsewhere.

Nevertheless, I strongly advocate for a public policy or public service perspective when it comes to digital urban mobility platforms. Conversely, I am not advocating for a purely commercial approach to digital urban mobility (platforms) while a purely commercial mobility platform operator will ultimately want to maximise mobility by exploiting to the maximum the direct and indirect network effects, a transport authority seeks to promote the public interest, which, in this case, is to reduce the use of the private car for environmental, public health or simply efficiency reasons. From this public policy perspective, thinking in terms of integrated mobility, door-to-door transport and ultimately Mobility as a Service does make perfect sense. It is therefore cities and metropolitan areas that have to promote mobility through mobility platforms. This means that they have to plan for them, create the institutional conditions for them and most probably also contribute financially to them.

MATTIAS FINGER is a professor of management of network industries at Ecole Polytechnique Fédérale Lausanne (EPFL) and a director of the Florence School of Regulation Transport Area. Since 2014 he has directed IGLUS, an executive training programme on Innovative Governance of Large Urban Systems to which Koolis is a partner (www.iglus.org).

Illustrations: Bénédicte Gouveart (L) – Émilie Seto (R).
RENNES, INNOVATION ACROSS ALL LINES

Rennes tops the league of the best French cities to live and work in. For sure, being close to the sea, the air quality and the cultural choices on offer, are some of the reasons. But the economic strength and the share of population that use public transport are also part of the ranking criteria. Having said that, if you think about it, isn’t there a link between these two points?

Rennes Metropolitan Area

ID CARD

• Over 450,000 inhabitants living in 43 municipalities.
• Demographic growth: + 6,000 inhabitants every year.
• Unemployment rate: 7%, 2 points less than the national average.
• 2 metro lines by 2020 (the 1st opened in March 2002).
• 72 regular bus lines.
• 900 hire bicycles with 83 docking stations.

Economic success and mobility are linked and these links will only become stronger in the years to come*. Emmanuel Court affirms with strong conviction. Elected Chairman of the Rennes Metropolitan area in 2014, he is one of several who have crafted the success of the Metropole to make it a magnet of attraction nationally.

“The city of the future is one with a centre accessible from the outskirts and where intercity travel is seamless. If we look forward 10 years, I think this will be the number one point of attraction, particularly for young working people. This will have direct repercussions on the creation of economic, social and cultural value and enable the emergence of urban centres, ripe for innovation. If you want proof, you only have to look at some of the towns in Northern Europe or Germany: the most dynamic ones economically are those who have the boldest mobility and transport policies.”

Talking of bold decision-making, the city of Rennes has recently taken several. These are big challenges for this valley of 450,000 inhabitants which has to simultaneously anticipate population needs, maintain the pioneering position it occupies in the transport field and manage the consequences of its popularity. The multi-modal network has already been awarded the Golden Transport Pass for efficiency three times over by the monthly magazine “Towns, Rail & Transports.”

by Ingrid Labucan

You'll find them at the ‘Bikehouse’, run by Keolis. Bicycles at preferential rates. Enthusiasm is such that one million euro investment in bicycles! With 63 km of express bicycle networks (16 km in Rennes), the city is determined to continue its inter-modal efforts with a new Urban Mobility Plan, to be adopted in 2019, is behavioural change. An ambition to be achieved primarily by expanding the multi-modal network of public transport.

In this context, we would have to mention the opening of the second automated metro line – line B in 2020. This will enable 70% of the city of Rennes’s inhabitants (that will be 230,000 residents) to be situated less than 600 metres distance from a station. A great next step for encouraging public transport use and making journey times quicker. This new line represents undeniable progress but is not the only example. Rennes is determined to continue its inter-modal efforts with its transport service. The emphasis is on the buses with the Metropolitan Innovation Pact signed with the French government in January 2017. Buses are perhaps not the height of innovation? On the contrary. Services for surrounding areas are to be increased.

Bicycles will also go electric. These will play a crucial role in our Rennes Metropole, designated as an "archipelago". "In addition to urban bicycle hire schemes available in the city centre, we are encouraging long term hire of electric bicycles with preferential renting conditions. Today the fleet is composed of 1,900 electric bikes. We will make a significant investment in order to expand the fleet by 1,500 additional electric bikes per year. This kind of bicycle will be the perfect mode of transport for linking up municipalities of between 5 and 10 km in distance. At the same time, we are also in the process of developing an express bicycle network of 16 km across the city which will enable riders to travel between the city outskirts and the centre in 15 minutes", Emmanuel Couet illustrates.

The main objective of Rennes’ new Urban Mobility Plan, to be adopted in 2019, is behavioural change. An ambition to be achieved primarily by expanding the multi-modal network of public transport.

The city of Rennes understood the importance of data long ago as it is the first French city to have embraced Open Data nearly ten years ago. As regards transport cards, Rennes is streets ahead with its KurGo Services. “Rennes Metropole is a pioneer of the national system AMC (multi-citizen application) which allows for the addition of services on a transport card,” explains Mylène Péridy, Rennes Metropolitan Area Transport Manager. These work on a regional level and enable other councils to build on various services, like swimming-pool or media library entrance costs, or even pay school dinners or childcare.

So it’s a smart network that is being woven together with these initiatives which have all been designed to respond to the expectations of Rennes city dwellers. They have been researched and analysed in opinion polls carried out in situ or by telephone, particularly in the context of the public service delegation contract. "Constructing mobility policy for all travel, whatever the mode, from the viewpoint of the customer, is a ‘no-brainer’", is the message that Emmanuel Couet hammers home.

With innovative projects such as electric buses and bicycles as well as a reinforced use of data, it’s a smart network that is being woven together.

ACCOMPLISH INNOVATION, THE PLATFORM FOR MOBILITY

In a year’s time, the city of Rennes will adopt a new Urban Mobility Plan. Its principal objectives will reflect Emmanuel Couet’s vision of mobility. Put together following consultation with the region, the department, the state and neighbouring municipalities, the objective of this urban mobility plan is behavioural change. An ambition to be achieved primarily by expanding the multi-modal network of public transport.

In Rennes articulated buses are a tradition, not so easy to transfer their engines to electric power. The challenge lies with Bollore who will need to adapt its electric vehicles to the characteristics of the Rennes network. The city will then propose a consultation to evaluate the number of vehicles required for a 100% electric fleet. "The Rennes Metropolitan area has a long history of innovation in transport terms but that doesn’t stop us from being at a pivotal moment right now, confirms Emmanuel Couet. The region welcomes 6,000 new inhabitants every year. Imagine how many people that represents for a public transport delegation contract in seven years!" A contract awarded once again to Keolis in 2017. In order to respond to the challenges of economic appeal and population growth, the city and its partners are working on a global response based on residents’ usage habits. “It’s no longer possible to think in terms of public transport if we exclude passenger habits connected to car use. It is also essential to harness the benefits of new technologies, with digital and smart data. Mobility must be seen as a whole, like a service linked to others, all making people’s lives easier,” Emmanuel Couet states ambitiously.

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2020 will be the opening year for the metro line B, stretching from south-west to north-east. Due to high passenger numbers forecast, the amount of spaces in car-parks at the end of each metro line are to be increased. Between June 2018 and 2024, annual passenger numbers on public transport in the Rennes area, is set to increase from 83 million to 112 million.

A huge success considering that for 650,000 travel cards in circulation in the region, 250,000 of these are used in the city area.

From car manufacturers to network operators, including regional start-ups, all the actors of the economic fabric are asked to contribute their own digital building block. “We work in a context of transparency and accessibility to public data – within a regulated framework of course – so that each of us can benefit from this data and build new applications, new urban services,” adds Emmanuel Couet enthusiastically. The first result of this is the new STAR application launched in March 2018 which provides far more sophisticated services than current route planner calculation apps.

Given that Rennes mobility policy illustrates a very clear picture of modernity, it is out of the question to leave other residents by the wayside. Since January 2017, the city has introduced progressive, solidarity-based pricing. “Pricing to household and means-related,” adds Mylène Péridy. “The threshold for those eligible has also been raised, in particular for grant eligible students. The number of students benefitting from this measure has risen to 75%. It’s not just down to price, it’s also due to information campaigns carried out in tandem with Keolis and the online approach.”

Keolis Rennes works with the Witsalo start-up to create connected products which will collect real-time information over the network. One of the scenarios imagined is to monitor transport system congestion and propose alternative travel routes to passengers.

The city of Rennes, Keolis and the University of Rennes have also coordinated efforts to work on a better organisation of timetabling to even out traffic at peak travel times. What with travel discounts and adapted timetabling, students are definitely well-served. Another element of appeal for the town.

WINNING THE FIGHT AGAINST SINGLE CAR OCCUPANCY

As part of the new travel plan, this redesigned transport network represents a solid basis on which to build behavioural change. The objective here is to restrict single car occupancy, the heart of Emmanuel Couet’s and his team’s strategy. “Just imagine, for 100 cars in rush-hour, only 103 people are transported.”

However, if you listen to the Chairman of the Rennes Metropolitan area, the challenge is not insurmountable. Particularly with a car-pooling solution. “If the people of Rennes car-shared just one day out of five, that would be the end of traffic congestion problems... and a huge advance in terms of less pollution.

To this end, the city is offering two new dedicated services of car-sharing.

Restricting single car occupancy, is at the heart of Emmanuel Couet’s and his team’s strategy. To this end, the city is offering two new dedicated services of car-sharing.

This system of dynamic car-pooling developed by Keolis Rennes is available on the network’s new multimodal app, STAR. So an offer of car-sharing can come up at the same time with other travel routes provided in real time, or as an alternative to available transport networks.

“The driver who offers a journey is rewarded by voucher reductions valid in shops in the city. We are also thinking about an incentive system for the passenger. We will also encourage car-sharing with dedicated traffic routes and parking areas,” adds Mylène Péridy.

With these two tools, cost-free, car-sharing solutions are provided, both for long term and also on-the-move offers available to residents. Riding on its ambitious innovation policy, in conjunction with the entire Rennes ecosystem, the Rennes Metropolitan Area has invented new ways of travelling together, whether it’s on public transport or with a car-pool. Emmanuel Couet is convinced, with the freeing-up of public space, innovation also generates a stimulating urban context which in turn encourages an improved quality of life.
Why are US Millennials switching modes?

The Millennials, those born between 1982 and 2003, have a different approach to mobility than previous generations. They make greater use of public transit as part of a multi-modal lifestyle. A survey by the American Public Transportation Association sought to understand their mindset.

By Jean-Pierre Montal
Illustration: Micaël

Doing things differently

Millennials in the USA are defying their upbringing by choosing public transit. The largest generation in America’s history, are less likely than their parents to have grown up near convenient transit services and are less likely to have travelled by themselves on public transit as children. In 2017, a mobility attitudes survey conducted for Transit Center found that just over a quarter (27%) of those aged under 30 had travelled by themselves on public transit as a child. By contrast, almost half (49%) of those aged over 60 had done so. This gap is perhaps not surprising as only 38% of those aged under 30 said they had grown up in a neighbourhood that had convenient transit services. Yet, despite their sheltered, suburban upbringing, Millennials are more enthusiastic about transit than their parents, and more likely to ride it. In ‘traditional cities’/ Transit Center’s survey found that 43% of under 30s used transit at least once a week, compared to just 9% of over 60s.

A multi-modal lifestyle

Millennials are not wedded to any one transport mode. APTA conducted a survey of 1,000 Millennials in six American cities as part of a wider effort to understand their mindset. It found that more than two-thirds (69%) made journeys using multiple modes a few times a week, or more. They select the best transportation mode (driving, transit, cycling or walking) based on the trip they are planning to take.

Communities that attract Millennials are ones that offer a variety of transportation choices, as demonstrated by Millennial “hotspots”, popular neighbourhoods where residents have embraced a multi-modal lifestyle. APTA’s survey found that ease of getting around was the most commonly cited reason (42%) among Millennials for choosing an area to live in, followed by proximity to work (38%), city culture (37%) and a range of public transit options (36%). In the past, starting a family was seen as requiring a shift to a car centric lifestyle. But while Millennials are more likely to own a car if they have children, they continue to embrace the multi-modal lifestyle. More than two-thirds (61%) of millennial parents told APTA that they use more than one transportation option for getting to a destination daily.

Connecting with communities

Public transportation allows Millennials to work as they travel, a trend noted by 39% of those polled by APTA. It is also seen as increasing engagement with communities in both the real and virtual world. More than a third (36%) have noticed themselves and/or others socialising more while travelling, with much of this taking place online. APTA found that 46% of Millennials cited getting more time to socialise (online, or via mobile) as one of the benefits of using buses. Outside of the virtual world, a third (33%) say that the way they travel enables them and/or others to make welcome discoveries in their area, and find hidden gems that they would not otherwise have known about. And more than a quarter (26%) say the way they travel makes them and/or others feel like a better member of the community.

The basics still matter

If you want to keep Millennials happy on public transit, keep them connected and make the most of this clear competitive advantage over the car. APTA found that more than half (54%) would like Wi-Fi or 3G/4G connectivity wherever they go within the next 10 years, and 45% would like a more connected or tech-friendly experience. And most (59%) would like to see more real time updates to help them avoid waiting longer than needed.

But the perennial public transit basics of travel time, cost and reliability remain more important than “flashier” features like Wi-Fi. Cost and convenience are the main motivations behind millennial transportation choices (each are cited by 46% of respondents to the APTA survey). Looking to the future, more than three-fifths of Millennials would like transportation options that are more reliable (61%) and more affordable (62%). “My generation is strapped financially,” said one respondent, “This makes [us] need to be a bit more creative in how we get around town.”

"This is a major shift"
APTAs research has offered a fascinating insight into the pro-transit mindset of US Millennials. I think that younger Americans are becoming more global by the fact that they are showing signs of behavior that are more traditional in European countries. And, while taking public transportation may not be a revolutionary idea in a different country, you have to understand that as Americans, we have long been conditioned on personal ownership and driving freedom, so it is a major shift for many younger people to say that they actually prefer something different. It’s clear that this generation is very tech-savvy and open to new ideas and trends. The fact that its seems to be financially prudent gives transit an advantage over traditional vehicle ownership.”

DARNELL GRISBY, American Public Transportation Association director of policy development and research.
ROBOTS TO THE RESCUE!

Recent progress in artificial intelligence (AI) has paved the way for robotics to begin reshaping the transport sector. Today, robots are able to carry out an increasing number of routine and menial tasks. Here are five areas where robots are set to make a real difference.

EXPLORE

Heasy

Imagine a robot coming to help you out in a station. Instead of searching on the information panels, Heasy can give you all the information you need - routes, prices and timetables.

With computing power approaching that of the human mind, robots are beginning to be used to interact with customers. From mid-November to the end of 2017, a prototype manufactured by the Lyon-based Heas Robotics and tested by Keolis in an urban transport network in the city of Brest in western France is a prime example.

Heasy, as it’s known, approaches customers waiting in line, making use of a touch screen to provide them with information on a number of services.

SERVICES

customers waiting in line, making use of a touch screen to provide them with information on a number of things.

ROBOTS TO THE RESCUE!

AUTOMATED VALET PARKING

Robots able to park cars can make parking lots much more efficient, helping to cut down on the space needed for vehicles to circulate.

The largest automated parking system (APS) in Europe is in Aarhus (Denmark). It can park 1,000 cars using 20 lifts. In France, Stanley Robotics has developed Stan, an automated valet that parks all types of vehicles at the Charles-de-Gaulle airport in Paris.

SURVEILLANCE

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CHATBOTS

Robots can also be used to liberate customers online. A French company, Bookbeo has developed conversational robots known as chatbots to aid transport users in providing answers to specific information and traffic jams in real time. Users can interact with a chatbot via Twitter to find out about things like the closest bus stop, the state of traffic and possible routes.

CLEANING

Robotic cleaners are a form of service robotics, a thriving niche market. There are two main categories. The first is widely used in the cleaning industry. For example, cleaning operators may use a robot for more time-consuming tasks. The second is designed to meet much more specific requirements. One example is an entirely automatic cleaner robot, developed by the French company Immersive Robotics. It has been tested for the first time in Europe by France’s national rail company, SNCF, at Paris’ Gare de Lyon train station. It assists passengers who need to dispose of rubbish.

Recent progress in artificial intelligence (AI) has paved the way for robotics to begin reshaping the transport sector. Today, robots are able to carry out an increasing number of routine and menial tasks. Here are five areas where robots are set to make a real difference.
The 20th century was in many ways the century of the automobile. Architects and urban planners reshaped entire cities, building all manner of bridges, tunnels, expressways, freeways and parkways to accommodate private vehicles. But as cities have become increasingly congested and polluted, and the environment plus quality of life have taken on heightened importance over the past two decades, the humble bicycle has begun to make definite inroads into urban public transport.

**PERFECT CONDITIONS**

According to the consultancy Roland Berger, there were about 1,000 urban bike sharing schemes in 2016 worldwide, with more than 1.2 million bikes in cities. What’s more, the global market is expected to grow by 20% per year by 2020, reaching a total size of between 3.6 and 5.3 billion (€).

A number of factors lie behind the surge in the use of bicycles as a mode of transport in urban areas. For one, urbanisation has increased rapidly around the world in recent decades, with the UN estimating in 2007 that for the first time in history more than 50% of the world’s population lived in urban areas. As a result, bikes are increasingly seen as a viable alternative to the polluting car in crowded urban spaces.

In addition to urbanisation, as digital technology has become widespread, people are now able to connect to vehicles and infrastructure in real time easily via their smartphones. Bikeshares across the globe today make common use of this technology. Not only can users rent using their smartphones, but transit authorities and operators can manage flows and maintenance operations effectively.

“Beyond the spread of cities and the rise of digital technology, the past decade has seen the emergence of new consumer behaviour, where people are more comfortable with paying to share instead of owning. This is the so-called ‘sharing economy’,” explains Yann Rudermann, CEO of Citylo, a Keolis subsidiary dedicated to active mobilities.

Local governments are in tune with all of this. And as they are looking to tackle pollution, environmental degradation and make cities more liveable, they have taken advantage of the new technology and consumer behaviour to foster the use of bicycles as an alternative mode of transport. In short, the conditions are perfect for bicycles to proliferate in urban transit networks for many years to come.

**FROM STRENGTH TO STRENGTH**

Bike sharing systems have come a long way since their surprising origins in the famously bicycle-friendly Netherlands. In 1965, a group of Dutch anarchists decided to rattle the establishment and challenge the hegemony of automobiles on Amsterdam’s narrow streets by painting bicycles white and leaving them unlocked in public for anyone to use. Needless to say, the “white bicycle plan”, as it was known, was quickly nipped in the bud by the police.

As a result of increasing urbanisation, bikes are increasingly seen as a viable alternative to the polluting car in crowded urban spaces.

Fast forward to Copenhagen in 1995, where a system with stations was developed. Customers would deposit coins to unlock bicycles. But bike sharing really began to show signs of promise a few years later in the city of Rennes in western France when US media company Clear Channel Communications developed a precursor to today’s widespread schemes, paid for by advertising. Using information technology (IT) and docking stations, it allowed users to locate and access bicycles.

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As self-service bike-sharing systems have spread, so has the use of personal bicycles as a means of urban transport. At the same time, electric bicycles have become an increasingly common sight on city roads.

The major breakthrough came in 2005, when the city of Lyon launched the first truly large-scale self-service bike rental scheme, using docking stations and IT and mainly paid for by advertising. This was followed two years later by Paris’ groundbreaking bike-sharing system, Velib, which proved that such a scheme could be successfully used for daily transport in a large and dense metropolis.

“As self-service bike-sharing systems have spread, so has the use of personal bicycles as a means of urban transport. At the same time, electric bicycles have become an increasingly common sight on city roads,” Yann Rudermann, Public authorities have caught on and here too are encouraging the use of this alternative to personal vehicles: Norway, Sweden and France have all decided to subsidise to varying degrees the purchase of electric bicycles.

DIFFERENT BIKESHARE MODELS

Today, there are currently three models for bike-sharing schemes. The pioneering and dominant one in Western cities is the self-service system with docking stations. Users can either pay for individual trips or purchase an annual subscription, unlocking a bike from one station and docking at a station near their destination.

These systems work well when there are a certain number of users, and when transport

Bordeaux, France

Since it was launched in 2007 at TCL (now TBM), a network operated by Keolis, the V3 scheme has been wildly successful. With 1,750 bikes and 175 self-service stations, some 7,500 bikes are used on average per day. There are 12,000 subscribers and about 300,000 occasional users per year. Before V3 was put in place bikes accounted for a mere 4% of mass transit. In seven years the percentage has more than doubled, making Bordeaux the sixth most bicycle-friendly city in the world. The city is now aiming to bring its model share up to 7% by 2020, by continuing to extend and densify the V3 network each year.

Montreal, Canada

BIXI Montreal was launched in 2009 and was North America’s first large-scale bike-sharing system. It is run as a non-profit organisation, created by the city government. Like with many other bikeshares, each station has a kiosk where users can pay.

Hangzhou, China

With 46,700 bicycles and 2,700 docking stations as of 2013, not only is Hangzhou Public Bicycle China’s first bikeshare, it is also the world’s largest. Launched in 2008, it now plans to expand to 175,000 bikes by 2020. The system uses smart-card technology and provides real-time information to track bikes in use and ensure user demand is met adequately by the stations. The system is designed so bikes feed into the city’s public transport network, capitalising on the concept of the last mile.

“Despite their success in Asia and apparent ingenuity, they do, however, have several drawbacks,” warns Rudermann. “The quality of the bikes, for one, tends to be lacking. They cost about seven to eight times less than bikes used in self-service dock schemes, which means they are particularly susceptible to mechanical failures and vandalism. Added to this is the lack of maintenance due to the number of mechanical failures and vandalism. Added to this is the lack of maintenance due to the number of users. Bikes are therefore to be regulated to a certain extent.”

These are anchored in the cityscape, providing a reliable means of transport in the form of study bikes, which are often high-end. They can be electrically assisted, made of GPS and even have vibrating handlebars. What’s more, the bikeshares make use of cleaner technologies such as solar power for the docking posts and information kiosks. There are now hundreds of these systems around the world.

The other model competing for users in urban areas is the dockless bike share (the so-called free-floating system), which was developed in China and has spread throughout Europe and North America. The scheme consists of bicycles equipped with GPS trackers and digital locks. Users simply download an app on their smartphone and use it to locate and unlock a nearby bike. They then ride it to their destination and simply leave it wherever they choose.

Free-floating schemes have been hugely popular in China. Despite their success they do, however, have several drawbacks.

The free-floating schemes have been hugely popular in China, and their clear advantage for transit authorities is the lack of investment and infrastructure needed in getting them up and running. But make no mistake...
The third model consists of long-term bike rental for use in suburban areas, where there is a lack of urban density to make a bicycle a practical and profitable choice – i.e. docking stations need to be separated by relatively short distances. It targets users who are looking for a quality bicycle to use over longer periods of time but aren’t willing to purchase one.

The advantage is the user has an affordable option – which they can pay for on a monthly basis, for example – and they don’t have to commit in the long term. What’s more, employers and authorities can subsidise such rentals, much more easily than the purchase of a personal bicycle. There is also an operator available to service and maintain the bike when needed.

**INTEGRATING SEAMLESSLY**

One thing is having thousands of bicycles available for use on the streets, another is making sure they are fully integrated into the network as a real shared transport mode. Public transport authorities have a large role to play in fostering this by instituting local policies that link the use of bicycles to urban transit.

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The Netherlands currently has 1,800 docking stations (31 locations in the east and center of the country and can be hired using a smartphone. An extra 200 bikes will be available before 1 August 2018 and 360 new locations (total of 55 locations). Keobike is thus fast growing in the Netherlands. The bikes hang on carousels, which are equipped with solar panels on the roof to generate the power to rotate the bikes when they are needed. The application can be used to reserve and unlock a bike and makes use of an I-beacon to monitor the bike and its location at all times.

The French city of Dijon offers an example of how bicycles can become part and parcel of an urban transport network. For the first time in France, this city has recently signed a comprehensive mobility contract with Keolis to operate its public transport, car parks and short- and long-term bike rentals (400 short-term and 800 long-term rental bikes at 40 different stations). The idea is to eliminate the frequent debate between individual transport and public transport, by promoting the shared use of public space.

The full integration of bikes in the city landscape has to be considered alongside the question of security. Cyclists must be able to coexist with both vehicles and pedestrians. The number of cyclists being fatally injured on the roads in the US continues to be of concern. Bikes are a special case as they can access spaces reserved for vehicles and pedestrian areas. For this to work smoothly, besides creating bike lanes and making them safe, cyclists themselves must be educated so as to allow them to integrate seamlessly in urban traffic, be it motorised or not. This raises the question of a bike licence to help usher in the transition to complete acceptance of bicycles as a full-fledged and integral part of mass transit.

Denmark is an example of a country that has achieved progress in this area. By investing heavily in cycling infrastructure in Copenhagen, for instance, bicycle traffic has risen by no less than 68% in the past two decades, however the number of accidents remains small, allowing cycling to become a normal part of city life.

**PULSE**

The road has certainly been long, and the competition in the form of the automobile has been stiff. Yet despite the bumps and hurdles along the way, there is no turning back: bicycles as a mode of urban mobility are very much a part of city life in the 21st century. The question is how to fully anchor, extend and secure their use. But if the success of bike-shares across the world over the past decade is anything to go by, the humble bicycle has already won the race.
Public transport routes are like water channels criss-crossing cities, irrigating their different districts. Each line tells, in its own way, the chapter of a bigger story. Inspirational stuff for artists and photographers in particular, always on the lookout to get a unique shot. Situations, faces and moods brought together by urban transport. Realist, dream-like, funny and sometimes moving... discover in the following pages the many facets of New York, London and Singapore. Three cities revealed by their transport systems.

RENNY WHITEHEAD, NEW YORK, USA

"Given that this most famous of cities is also probably one of the world’s most photographed, I wanted to find my own way of telling a New York story. I came up with the idea of using the subway system with its grime, attitude and everyday hustle. It’s the beating heart of an incredibly diverse city so I thought it would be the perfect place to capture something truly representative of New York."

www.newclearphotography.com
EDWIN KOO, SINGAPORE

“Transit is a work about the strange phenomenon of daily displacement. Traveller’s feelings are always concealed, except for that split second before the doors close, when they are confronted with an absolute stranger who is in the process of revealing their true inner feelings, forever in a still image. Transit became a game for me. One that creates a collective portrait of modern commuters. Of course, the photos are all random, just like the idea of meeting someone on a train being a random moment in time.”

www.edwinkoo.com

NICK TURPIN, LONDON

“While waiting for a friend outside a café in the winter I noticed how beautiful the illuminated windows of the passing buses were and how the rain and condensation made them look so painterly. That moment started a three year long project. I spent many cold and wet hours watching people in London’s double-decker buses, making me feel like a wildlife photographer watching the behaviour of a species in their natural habitat.”

nickturpin.com
WE MAKE HOW CAN ONE?
lifestyles.
The context of the Keoscopie
vulnerabilities researched in
four major human
impairments, health problems,
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PEOPLE GET AROUND
their journey, for example, the nearest
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Audiospot, an app for blind people.
Another example is
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This application localises the user and
announces useful information during
their journey, for example, the nearest
bus stop, the relevant bus routes and
arrival time of the next bus.

In France, 12 million people suffer
from a disability(1). The Disability law
stipulates that public transport must
be 100% accessible to people with
reduced mobility in 2018 (in 2021
for interurban connections and 2027
for all rail traffic)(2).

European law states that they should
have “generalised accessibility” to
transport. Apart from adapting rolling
stock to their needs, the sharing of
information represents a key lever in
providing disabled people with access
to transport.
The iWheelshare application provides
an interactive and evolving map that
details all the places – and not just
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Increasing mobility also comes from
a better understanding of existing
services, particularly digital tools.
This is a critical issue, not just for older
citizens who are often disoriented by
the general digitalisation of society,
but also for people who cannot afford
to buy a smartphone.
The Greater Bordeaux area opted for a
“mobility platform” launched by Keolis
in partnership with Wimoov (see insert
right page). It’s a network of helplines
established in the 28 municipalities
of the area which are manned by
mobility advisors. Their tasks are to help
passengers get to know the network,
tell them about new mobility solutions
adapted to their needs and educate
them to use digital tools associated with
transport (ticketing, searching for travel
routes...). Some 80% of older citizens
benefited from the service and now
travel regularly and feel more at ease
with their transport usage.

In general during the first stages of the
illness, depending on the case, people
are still able to use public transport thus
maintaining their independence and not
becoming isolated. The United Kingdom
decided to tackle this public health issue
head on. More than 200 councils have
been awarded a “dementia friendly”
label. Specific adaptations have been
made to buses for the illness that affects
people’s attention span with enhanced
comprehension for announcements
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Degenerative dementia (of which
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Yves CROZET

Yves CROZET is an economist, professor emeritus at the University of Lyon (IEP) and research fellow at the CERRE (Centre on Regulation in Europe - Brussels). From 1997 to 2007, he was director of the Laboratory of Transport Economy (LET). He is chairman of the French Road Union think tank and a board member of the French National Highway System. He is mayor of Saint-Germain-la-Montagne in France, Loire department.

In small towns, and also medium-sized ones, the networks are not large and are often based on a small circuit of bus or coach routes. They use the existing highways and are not very costly. Based on what I was able to observe during my time as mayor of a small town, local authorities often have the necessary budgets to finance a policy of free transport. The capital necessary for the functioning of a network can thus come from their budget allocations, rates and taxes or also from public borrowing.

On the other hand, in large-scale regions, the cost of transport networks is high, in particular for underground or tram services. These towns do not have the budgets required for financing the introduction of free transport and guaranteeing a good long-term, quality service. The economic viability of free transport therefore depends greatly on the size of the town and the extent of free pricing. We should also point out that some free transport systems are no more than a facade as in reality they are truly financed by passengers. That’s the case for example in the tourist town of Chamonix, a major French winter sports resort. The shuttles used for transport are not extensive and the ticket cost is low. Profit margins do not account for a large part of transport costs which are financed by taxation and private companies.

Germany recently made the headlines when it announced its intention to introduce free public transport in five major cities. Yves Crozet reacts with firm conviction to the project which he believes is often linked to electoral promises. In his opinion, if free transport remains an isolated measure without restrictive policies on the use of private cars, it has no impact.

Free transport is often presented as a panacea to all problems of mobility. Users of public transport have no other choice since private car use remains the overriding motorised form of transport. The problem occurs when we transpose the idea of free transport to large regions. In such cases it is presented as a panacea to all problems of urban mobility (pollution, congestion, mobility as a civic right...), when in reality it only makes full sense when it is part of a more global policy that aims to reduce the use of private cars by tolls, dissuasive parking costs, and restrictive measures for polluting vehicles. Without these measures, free transport is surely a popularity-seeking measure.

Therefore, do you consider that free transport always has a cost?

We hear a lot about the subject of free transport. Is it a realistic project?

The economic viability of free transport therefore depends greatly on the size of the town and the extent of free pricing.
Once passengers had crossed free. The city got rid of the abandonment it due to bad citizen's behaviour. In 2013 before completely 3.5 km2 was at that time totally free. The “Fareless Square” was introduced in 1979. This zone of 3.5 km2 was at that time totally free. The city got rid of the system in 2013 due to bad citizen's behaviour. An alternative possibility would be raising local public borrowing. Both these solutions have significant consequences for regions.

Furthermore, free transport may also raise the risk of public transport services being misused, given by use some parts of the population for example of the effect of regular passengers, with the additional risk of damage and bad Citizens... It is important to consider the image free transport conjures up. Non-payment has a psychological effect, it induces an absence of value for a passenger. Providing free transport could encourage citizens to take it for granted and even to misuse the service, if we push our reasoning even to the extreme. Pricing gives the passenger a sense of responsibility and gives value and credibility to public transport.

The impact of free transport is positive for the future of transit systems. With free transport comes the question of financing infrastructure, particularly in large regions. Developing new networks is very expensive. If we take the example of the Ile de France region, Ile de France Mobilités (formerly STIF), borrowed 1 billion (€) a little over two years ago. In the next ten years, current projects will increase this borrowing to 9 billion (€), not including investment in the Grand-Paris-Express.

How can such an amount be repaid without passing on some part of this to the passenger?

Let me give you another example, there is a project for a new underground line out to the west of the Lyon Metropolis. Research shows that such a project would require investment of several hundred million euros. In this context how can we even envisage free transport?

It is therefore hard to imagine how we could manage without passengers' contributions when large regions today face the challenge of maintaining, renovating and developing their transport infrastructure and services. These cities must be able to respond to passengers' current requirements, the evolution of technology, and the growth of their populations and regions they inhabit.

Providing free transport could encourage citizens to take it for granted and even to misuse the service. The majority of free travel experiences have been carried out in small towns. Is this also the case internationally?

Several of the cases experienced in other countries have been in large cities, occasionally on the scale of the entire city, others have been on a smaller scale.

Lyon, the capital of France decided to introduce free transport across the city. They have a population of 400,000.

Lyon, an American city of over 600,000 inhabitants introduced a travel-free zone, only in the centre of the city.

In several European, Canadian or American cities, free travel exists in some zones of the hyper-centres or serving particular areas (universities, shopping malls).

PORTLAND: The “Fareless Square” was introduced in 1979. This zone of 3.5 km2 was at that time totally free. The city got rid of the system in 2013 due to bad citizen's behaviour. An alternative possibility would be raising local public borrowing. Both these solutions have significant consequences for regions.

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We need to be honest about explaining how free transport will be financed. A probable response is an increase in taxation.

Why have some of these initiatives been abandoned? If we take the example of Portland, free travel was restricted to a zone of 3 km2 in the city centre but passengers took advantage of this and continued their journey beyond the free zone. In Tallinn, on the other hand, they are continuing with the policy but it is restricted to city residents, they are only 400,000 after all. Costs are passed on in local taxes.

Whatever the system envisaged, it is important in my opinion to maintain the act of validating a travel ticket so as not to devalue the service provided, even if the individual benefits from an advantageous price.

In your opinion, what would be the ideal pricing system?

As an economist, I would recommend a pricing system based on the distance travelled, as is the case in several cities such as Washington or Singapore.

There is no ideal transport pricing system without parallel restrictive policies in relation to car use.

Would taxing car use in the city be a solution to financing public transport? For city councils motorised mobility has a significant monetary and environmental cost (highway maintenance, signage...). However, in France car use is practically free in towns. It is essential to create restrictions on car use, like for example, urban tolls, licencing system or expensive parking. This revenue could then be used to finance more efficient and less costly transport systems for passengers.

All too often transport and highway policies are led independently, one could even say in a contradictory manner. Only a global approach will result in a modus shift of car drivers to shared transport.

In France

In the long run, does free transport bring about other risks or problems?

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Volkswagen is also onboard, announcing last year it will invest 1.4 billion (€) in developing electric trucks and buses.

While buses represent only a small fraction of the pollution stemming from transport, their electrification can be particularly effective in reducing emissions and noise pollution.

The fourth driver is industry standards. The European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC) and other bodies such as the International Organization for Standardization (ISO) are working to develop European and international standards with respect to charging, which are set to come in place over the next two years. This will level the playing field for manufacturers and operators and further spur market growth.

ON THE VERGE OF ELECTRIFICATION

China exemplifies this well. More than 350,000 electric buses are already in service in the country, and the south-eastern city of Shenzhen has become the first city in the world to go completely electric, with more than 16,000 buses on the streets.

In the West, Northern Europe has led the way in the use of biofuels for mass transit – with Sweden being the pioneer – and is now moving towards electric buses, with the rest of Europe and North America now following in its path.

This trend is likely to intensify for several reasons. One, public opinion, the media and politicians are pushing industry to follow through on the energy transition.

A third reason is down to the actual supply of battery-electric buses (BEBs). Manufacturers have developed their offer of electric buses extensively over the last two years. BYD and Volvo are just two examples of auto manufacturers banking on BEBs, with both unveiling new models in 2017.

Electric buses hold the potential to spark a modal shift away from personal automobiles in cities and towns across the globe, lending them great promise in reshaping mass transit in our increasingly urbanised world.

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Los Angeles — In 2017, the Foothill Transit network in the suburbs of Los Angeles, was the first American network to start using a fast-charging electric bus (see following page).

On top of all of this, more and more cities are lining up to transition their bus fleets to BEBs. In October 2017, within the frame of C40 (Cities Climate Leadership Group) majors from a dozen global cities, including London, Paris, Los Angeles and Mexico City, signed the Fossil-Fuel-Free Streets Declaration, pledging to procure zero-emission buses from 2025 and “ensure a major area of (their cities) are zero emis- sion by 2030”.

TOWARDS A VAILABLE FUTURE

For the time being, BEBs cost twice as much as diesel buses. In effect, the excess expense today comes from the high pric- es of batteries — whether it’s the initial investment or the cost of replacing them (although public transport operators can usually benefit from rental opportunities from manufacturers, if buying the batt- eries proves too costly). However, prices of batteries have plummeted up to 90% in the last 20 years. Though urban bus fleets have yet to be replaced by electric buses, it is important transit authorities adopt a transition period and carry out trials. This will help ensure the energy transition is being carried out in line with the different environmental guidelines and targets. It will also enable authorities to take into account the local expectations, contexts and challenges by creating models and evaluating the techni- cal and economic impacts. Moreover, this approach will enable operators to provide the best possible quality and deliver the optimum cost in the long run.

Recharging the batteries efficiently is the key to running successful trials. There are two ways this can be achieved. The first is charging along the line. This is done by fast charge, i.e. when the bus stops, a pantographic system connects to an overhead fast-charge for a few seconds to a few minutes. This provides a large enough charge for the vehicle to continue until the next charge. This can either be at every station, every few stations or at the end of the line. Helsinki, Finland, currently has several fast-charge BEBs in service.

The second charging solution takes place by plugging during 6 to 8 hours, when the bus is at the depot. For BEBs, this consists of an overnight charge.

Of course, the type of solution opted for depends on factors such as the topology of the route, the distance between stops, climatic conditions, time spent at stops and the number of passengers.

INTEGRATING ECO-BUSES INTO A GLOBAL URBAN POLICY

Replacing fleets of diesel buses will certainly help unoccluded congested cities by reducing GHG emissions as well as fine particles and nitric oxide. But their ability to drive down emissions is much greater when the whole system is taken into account. In other words, quiet cutting-edge BEBs can very likely foster a modal shift, getting people to leave their private vehicles at home. And this is where the significant impact will be.

According to calculations by the World Bank, if buses carrying 150,000 passen- gers per day on a simulated 30-km transit corridor were to shift to 100% electric, annual emissions would be cut by 27%. However, if 10% of passengers have made a modal shift — i.e. they leave their cars at home — this would be equal to a full 48% drop in emissions.

China clearly appears to be leading the way when it comes to this shift. As mentioned before, the city of Shenzhen is a case in point, with its more than 16,000 fully-electric buses.

Taking the long view, the transition to alternative energies in transport is more than simply a change in motorisation – it’s the emergence of a new mode of transport, which poses numerous interconnected challenges. Despite these challenges, electromobility is here to stay and electric buses are without a doubt a driver for bringing more sustainable transport to urban areas around the world. In short, they are certain to shape and experience public transport as urban transit providers: the utility company that supplies the power to charge the buses and the electric bus manufacturers who supply the infrastructure to keep our fleet moving. We also work with our bus operators to train their teams on operating and maintain- ing electric buses.

In 2017, the American Public Transit Association awarded its Platinum Level designation for significant sustainability accomplishments to Foothill Transit, the first time this level had been attained by a bus-only public transit system. Our decision to have an 100% electric bus fleet by 2030 was therefore a natural continu- ation of our commitment to pushing the envelope. It also re- flects the spirit of our ambitions to be the premier public transit provider committed to safety, courtesy, quality, responsiveness, efficiency and innovation.

The benefits of electric buses for people and the environment are clear. They reduce emissions of harmful chemicals into the air, protecting a major public health benefit. Cleaner air increases life expectancy and protects vulner- able populations like children and the elderly who are most susceptible to lung and heart disease. It also helps to restore balance to the ecosystem and contributes to the fight against global climate change. Electric buses also run quieter than a normal conversation, reducing noise pollution and improving quality of life. And our all-elec- tric buses require no oil change, have lower maintenance costs and save on fuel costs.

Since our announcement, other transit authorities have undertaken similar commitments, including the Los Angeles Metro Authority. We are pleased to share our experience and have hosted visiting government and transit officials from this country and around the world.

We communicate our progress regularly with stakeholders at community engagement events, on our website and via ads in local publications. Regional stakeholders, bus operators and mechanics, and both customers and non-riders have had ample opportunity to all-electric and look forward to the positive impacts it will have for our communities and the environment.●

Kevin PARKS MCDONALD

FOOTBALL TRANSPORT QUICK FACTS

LARGEST MUNICIPAL
OPERATOR

in Los Angeles County
14 million riders per year

361 BUSES
in joint CNG, BEV and
17 fast-charge electric

367 BUSES
operated by Leeds of which 14 are electric
WHAT ALTERNATIVES TO CONVENTIONAL FUELS?

A
fter many years of popularity, diesel is today at the heart of the debate on environmental challenges and public health. Responsible for CO2 emissions, the fuel is a major contributor to global warming. It pollutes on a local level, releasing nitrogen oxide and fine particles, both of which are harmful. Its use maintains our dependence on fossil fuels. And finally, it is also the cause of a more insidious pollution, that is noise pollution. According to the World Health Organisation, traffic noise may be a cause for some serious mental illnesses.

That is why it is crucial to limit the use of fossil fuels and diesel, in particular: this challenge is supported by the continued development of environmental norms that impose emission ceilings across the world (Euro VI in Europe for instance) and encourage the development of diesel alternatives.

Among the current solutions, the most obvious is alternative fuel. HVO (Hydrotreated Vegetable Oils, hydrocarbon manufactured by the hydrogenation of vegetable oil) is a direct substitute for diesel. Natural gas, once compressed, can also be used as fuel (NGC). The use of hybrid engines (combustion engine and electric motor) drastically reduces fuel consumption and thus the emission of pollutants.

Finally the most radical solution is 100% electrical mobility, made possible with embedded batteries. Buses using fuel cells are also being developed. Hydrogen generally provides electricity power the vehicle’s electric engines.

As Jean-Marc Ducros, Director of Alternative Energies at Keolis, reminds us: “There is no ideal solution, there are case by case solutions which take into account the operating constraints and budget requirements of each network (topography, climate, use...). The energy transition cannot take place without major technological breakaways and there are a multitude of technical solutions available on the market right now that enable us to move away from our diesel dependency.”

STOCKHOLM, SWEDEN
Since 2013, Stockholm has been renewing its fleet with the ultimate aim of having purely 2030 hybrid buses. As part of the European project EZUS – Zero emission Bus Bikes System – the project was initiated with eight 12-meter hybrid buses. These buses cut fuel consumption by 35%.

SHENZEN, CHINA
Now running, the line used by China to express its conversion to electric vehicles, is fully self-explanatory in Shenzhen. Recharging lines (+30% compared to diesel vehicles) have been installed to speed up the conversion for the totality of its 36,318 buses: no electrically powered, yet, ahead of New York with its fleet of 5,750 electric buses.

PAU, FRANCE
The vote has passed. The towns of Pau has decided to power its buses with hydrogen from September 2023. The plan is to equip on extra line. With a fuel cell filled with hydrogen, the buses which can be recharged in 10 minutes, will have an autonomy of 300 kilometers.

ALTERNATIVE FUELS

HVO [HYDROTREATED VEGETABLE OILS]
Fuel produced from vegetable oils or animal fats.

- Technology developed for urban areas, in development for long-distance
- Competitive price
- Very quiet: less than 3dB(A) compared to diesel
- Can be integrated with mild hybrids
- In the medium term, long-distance coaches will be able to run on liquefied natural gas (LNG)
- Limited distribution
- Not available in petrol stations
- Mostly produced from palm oil

NATURAL GAS FUEL AND Bio-NGV

- Technology developed for urban areas, in development for long-distance
- Competitive price
- Zero local emissions (particulates and NOx)
- Low CO2 emissions (varying according to electrical source)
- Quiet
- Limited autonomy
- Battery charging time
- Battery recyclability
- Can be produced locally from renewable energies
- Carbon-free emissions
- Maintenance of cells, roof-top batteries
- Filling time (approximately 3 minutes)
- Fuel cell cost (less expensive than diesel vehicle), recharging infrastructure and cost
- Technology and network still in development

PULSE NEW IDEAS TO CHALLENGE DAILY MOBILITY

HYBRID

2 ENERGY SOURCES
are used together to run a vehicle, one of the two is electric.

- Zero local emissions (particulates and NOx)
- Low CO2 emissions (varying according to electrical source)
- Quiet
- Limited autonomy
- Battery charging time
- Battery recyclability
- Can be produced locally from renewable energies
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ELECTRIC

BATTERY

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HYDROGEN

Hydrogen fuel cells together with batteries, can power an electric engine.

- Carbon-free emissions
- Can be produced locally from renewable energies
- Quiet
- Filling time (approximately 3 minutes)
- Maintenance of cells, roof-top batteries
- Can be produced locally from renewable energies
- Quiet
- Filling time (approximately 3 minutes)
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Charles Bombardier is one of those inventors whose only frontiers are those of the imagination. His ideas are sometimes fantastical but always inspiring.

Where did the idea for imaginative snowmobiles come from?

Imaginactive is first and foremost an idea factory. An invention presented on our site can lead to the generation of other ideas. Some of them may be one-off projects, others may be spectacular developments. It’s fantastic to be active on both extremes of the spectrum.

Does Imaginactive want to work with people capable of developing your ideas?

It’s a bit like that. We have an approach that aims to seek out and bring together businesspeople, scientists and industrial designers so we can improve what’s already out there and help society to move forward. If concepts are successful, they can attract big companies who are able to invest the necessary resources into progressing technology and developing new markets.

Does that mean that all the projects you present are feasible?

Imaginactive was founded as an engineer. It’s a solid base on which to imagine the future together with broad perspectives. My projects have to be based on rational foundations so that the next level can be extrapolated and take our thinking out of the box. I am not linked to any one component and I finance my own projects. This allows me to act with great freedom which is extremely precious, at the same time though, it’s easy to get lost without precise directions.

So where does your ability to shift your mindset come from?

It’s a kind of a freestyle based on observation and a particular way of thinking about life. I identify problems and imagine solutions to solve them whilst weighing up the pros and cons that these innovations would bring. I try to open doors so that professionals, companies and the general public discover innovations that professionals, companies and the general public discover.

What is the roadblock that differentiates the engineer from the inventor?

The engineer is trained to problem-solve, one problem after the other, stone after stone. It’s a rational approach that is different to the inventor, who will first define his idea and then seek the means to achieve it without necessarily taking the time to check all hypotheses. I find it’s easy to get lost without precise directions.

Does imagining tomorrow’s mobility mean we have to break with today’s framework?

We have to stop thinking of vehicles as a means of getting from A to B. They need to allow us to do more for example, reduce stress, communicate and work better. Also reduce the risk of accidents and why not improve the environment instead of making it worse?

So what is the advantage that comes from working with industrial designers who are not involved in the actual invention but more its form and functionalities.

And who are the individuals that have inspired you?

Sam Lapointe. He was the first industrial designer at Bombardier Recreational Products (BRP). He designed hundreds of snowmobiles, motorcross, watercraft and other avant-garde concepts for the company from the 60’s to the 80’s. When I was a child, I saw and tested several of his inventions.

His work and that of many other industrial designers, engineers and technicians working at Bombardier Recreational Products have always inspired me (and still inspire me).
ACCOMPLISH

MELBOURNE’S MOVING ARTWORKS

Created in the late seventies, the Melbourne Art Tram wraps public tramways with artworks. The result of a creative partnership between different players in the city. The idea is to give people the opportunity to be touched by original Melbournian artworks. Returning after a 20-year interlude, the project’s blending of public transport and great local artists has proven hugely popular.

by Robert Jack

WRAPPED TRAMS

“The Melbourne Art Trams project could only happen in Melbourne, with our world-class artists and our world-class tram network,” says Jonathan Holloway, Melbourne Festival’s artistic director.

Now in its fifth year, the annual project invites artists and community groups from the Australian state of Victoria to submit designs that will adorn trams on Melbourne’s iconic network, the world’s largest. It’s a revival of the ‘Transporting Art’ scheme, which ran from 1978 until 1993. The workmen at the Preston Workshops where Melbourne’s trams were painted watched with interest as renowned artists transformed trams into mobile artworks, and over the following four years, a total of 16 trams were painted. The Melbourne Art Trams project involves eight trams each year. The trams are no longer painted, instead the artwork is transferred onto ‘vinyl’ and ‘wrapped’ around them. The project takes contemporary art to a mass audience. More than 1.8 million people board a Melbourne Art Tram each year, and many more experience the designs as they travel on the city’s 250 km network. The public can vote for their favourite design and the winner of the People’s Choice Award receives an A$5,000 prize.
A CREATIVE PARTNERSHIP

The Melbourne Art Trams project is made possible through a creative partnership between Melbourne Festival, Creative Victoria and Public Transport Victoria in collaboration with Yarra Trams, which operates Melbourne’s entire tram network. And Keolis Downer Victoria, the operator of Yarra Trams, facilitates the project each year.

The partners start each February with a public expression of interest for Victoria-based artists. Their selection panel ensures that the artists are representative of Melbourne’s diverse communities, and include at least one emerging artist and one community entrant.

The eight successful applicants are chosen in June, and the artists then work with Yarra Trams to adapt their designs to the intricacies of the tram’s class they have been given to work with (some parts of the trams cannot be covered because of safety or passenger requirements). The trams are then wrapped and are launched in October, coinciding with the annual Melbourne Festival, one of Australia’s leading arts festivals.

In addition to having their work paraded through Melbourne’s streets for six months on a twenty-tonne canvas, the artists each receive A$5,000 — and they can double their money if they win the People’s Choice Award.

ACCOMPLISH

“AMAZED BY THE REACTION OF PEOPLE”

The public has fallen in love with the Melbourne Art Trams, and it has become one of the city’s major annual public art projects. It has also put the city on the map internationally, with many tourists taking photos that they share with friends and family around the world.

“There’s huge anticipation and build up each year when we unveil the designs for the eight trams,” says Philip Askew, General Manager Marketing and Digital at Public Transport Victoria, the authority responsible for providing, coordinating and promoting public transport in Victoria. Passengers can track the real-time location of each of the trams using the city’s TramTracker app.

“I’m still amazed by the reaction of people on the street when they see these colourful wrapped trams passing through the city or their neighbourhood.”

“It creates a real connection with our passengers and adds to their sense of pride and shared ownership of Melbourne’s tram network.”

“It’s great kudos for the tram network to be the carrier of this art each year, cementing our place as the iconic image of Melbourne and our role in the community”, adds Emilie van de Graaff, Director, Passenger & Network Innovation at Keolis Downer.

“And the trams look fantastic. We love watching this come to life each year and hope it will continue for a long time yet.”

Read the full interview of Jonathan Holloway, Melbourne Festival’s Artistic Director on pulse-mag.com

NEW IDEAS TO CHALLENGE DAILY MOBILITY

Bhushan Hasket – Artist and graphic designer whose art is inspired by popular Indian street and tribal art.

Bushra Hasan – Artist and graphic designer whose art is inspired by popular Indian street and tribal art.

Josh Muir – Indigenous artist who is a two-time winner of the National Indigenous and Torres Strait Islander Awards.

Oliver Hutchinson – Emerging artist, photographer, new media and visual artist based in Melbourne.

Robert Owen – A renowned Australian artist who studied sculpture at the National Art School, Sydney.

Emma Anna – Visual artist and creative producer whose work draws upon a diverse range of professional and personal experience.

Matthew Clarke – Artist from South West Victoria, inspired by the environment and people around him.

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