Environmental solutions

transdev
MOBILITY INSPIRED BY YOU

Connecting new lines, together.

Drawing from our long experience as a multimodal operator, we look forward to assisting you with the construction and optimization of your mobility systems and services.

Our ambition is to develop with you, in a genuine spirit of partnership, customized, safe, effective and responsible transit solutions that are adapted to your needs and constraints and closely in tune with customer expectations.

The mobility of the future will be personalized, autonomous, connected and electric. This is our firm belief. Innovation is at the heart of our approach, in order to constantly improve the performance of public transportation services and make the promise of “new mobilities” a reality, for everyone.

As well as uncompromising safety, which is our credo, our overriding concern is the satisfaction of our customers and the quality of their experience. Every team member in the group engages on a daily basis to meet these challenges and implement solutions both for today and for the future.

Thierry Mallet
Chief Executive Officer

Public transit, **playing a key role in climate change and energy mix**

A TWOFOLD CHALLENGE; GLOBAL AND LOCAL

Climate change and its impact on air quality represent a major threat to the environment and public health. During the Paris COP21 in December 2015, nearly 200 countries signed a universal agreement to cut Greenhouse gases (GHG) and avoid the most dangerous effects of climate change. They committed themselves to keep the average global temperature rise below 2°C, which means a 70% GHG emissions reduction between 2010 and 2050*.

In this climate-resilient global context, the International Association of Public Transport (UITP) supports climate change actions through its Declaration on Climate Leadership that demonstrates the sector support to double the market share of public transit by 2025.

Locally, transit authorities have defined their own objectives; the Netherlands are engaged in a concerted process of transition towards zero emission by 2025. In France the Energy Transition Law demands a 50% reduction of GHG emissions by 2050. In the USA, California is seen as a pioneer in the combat against climate change and it aims to reduce energy consumption in the state by 50% by 2030.

PUBLIC TRANSIT – A KEY LEVER

The environmental impact of a modal shift is significant. Greenhouse gas emissions and energy consumption of a single trip can be divided by twenty if it is made using public transit rather than a private car.

The main mission of public transit is therefore to tackle the environmental threats by being efficient. Efficient in the service provided (reliability, quality, safety) and in minimizing the costs to be a real alternative to the private car. Efficient in the way services link up with car usage. The aim is not to reject car usage but limit it to "win over " new customers and convince them to change their mode of transportation.

Public transit providers must help develop the future modes of sustainable transportation so increased passenger flows can be absorbed and accommodated, and at the same time guaranteeing seamless transit. If we consider that 30% of the world's of GHG emissions are linked to the transportation sector, we must also shoulder the responsibility of improving the ecological impact of our operations by proposing a new energy mix and directly contribute to the reduction of local air and noise pollutants.

A WIDE RANGE OF SOLUTIONS TO ANSWER LOCAL NEEDS

The energy transition is a key aspect of Transdev's service offer to local governments and Public Transit Authorities.

Transdev offers various ecofriendly options. Among them: alternative fuels, renewal of heat engines, hybrid and fully electric vehicles.
Since the implementation of the first electric minibuses in city centers (La Rochelle and Rotterdam), Transdev has expanded its electromobility fleet with self-service car sharing, hybrid taxi fleet and standard capacity electric buses.
With 56% of the global fleet considered to be low emission and capitalization of initiatives through its Electric Bus Living Lab, Transdev is now recognized for its experience and expertise in the range of potential solutions, their costs and their impacts on environment and operations.

** Intergovernmental Panel on Climate Change (IPCC)*

Good reasons to choose **Transdev**

WINNING THE SUSTAINABLE MOBILITY BATTLE

Reducing the local carbon footprint

Faced with the ever-present challenges of intermodality and optimized management of transit systems, Transdev also devotes its expertise to increasing ridership, through real-time information, mobile apps, service quality, efficient systems and "soft" modes, all designed to convince as many people as possible to choose mass transit.

With a 30% increase since 2000, Nantes has the second highest ridership rate in France: 195 journeys per inhabitant per year; In Dublin, Ireland, ridership increased by 55% between 2005 and 2016. At the same time, Transdev Dublin has been awarded multiple times for its involvement in environmental matters.

ROBUST PROCESSES AND GLOBAL CERTIFICATIONS

Putting the environment at the heart of our management systems

One of the major keystones of our environmental approach is assuring quality management in our operations. 75 locations worldwide including the Transdev Group headquarters are ISO 9001 certified, which demonstrates our capacity to meet customer needs through continuous improvements.
Transdev shows its commitment to environmental protection by certifying its networks with ISO 14001. For example, in South Korea, Ireland, Portugal, France, Spain and all operations in Sweden, 14001 compliance has enabled us to be at the forefront of COP 21 priorities.

CONSULTING AND EXPERIMENTATION

Paving the way to the best energy mix

To ensure a successful transition toward renewable energies, we rely on a solid base of know-how, enhanced by experiments. The Electric Bus Living Lab is a transportation and research community that analyzes and capitalizes on the various electric mobility trials led by Transdev worldwide. It is a tool to advise transit agencies on their best choice in terms of environmental performance, safety, operations and economic impact. In Nantes, France, after a three year study, Semitan and Transdev decided to transform the Busway into an e-Busway by the end of 2019. In northern Sweden, Transdev is testing special batteries adapted to extreme temperatures.
Transdev Netherlands together with the partner TNO, independent Dutch research institute, developed an electromobility toolbox, a data modeling system to assist local authorities in the switch to electromobility.

A COMMITTED PLAYER

Specific answers to local needs

Transdev is involved in different initiatives to improve local quality of life. In Dublin, Ireland, LUAS cut electricity consumption by 15% and water consumption by 41% between 2010 and 2016.
In La Rochelle, France, Transdev's subsidiary Proxiway is working in partnership with the French Energy Agency ADEME on a logistics platform, reducing the negative impact of goods deliveries. Since 2006, it has saved nearly 90 tons of CO_2 and 35,000 liters of fuel per year.
To encourage the best initiatives from start-ups to improve mountain air quality, Transdev launched in 2016 the Mountain & Mobility call for projects (MO2) in the Mont Blanc area.

OPTIMIZED AND TAILORED SERVICE

Efficient operations and maintenance

Thanks to the on-board tools developed by Transdev, 5,000 of our vehicles and vessels have accurate real-time data so that bus drivers can adapt their driving and consume less fuel. The result is a 5 to 6% drop in pollutant emissions. Transdev has also developed and implemented sustainable driving techniques that are followed up by driver training courses every 5 years. In Sweden, the Blue Flow system on the vessels at Styrsöbolaget has already enabled to reduce their fuel consumption by 25% within Göteborg harbor between 2000 to 2016.

MANAGEMENT OF ENERGY CONSUMPTION

Adapted and sustainable performance

Transdev has expertise in designing optimized transit systems tailored to mobility flows and local environmental challenges. It develops the right and sustainable level of service offer, through tiered transit networks and integrated alternative solutions. For example, Link in Tampa, USA, a first mile/last mile solution, and Fleet me, a unique ridesharing service in Auxerre, France.
Transdev has also strong knowledge and experience in fleet management and preventive maintenance, providing local authorities with support and solutions adapted to their specifications.

ABOVE AND BEYOND THE STANDARDS

Transparency and commitment

In line with Caisse des Dépôts, our majority shareholder's strong environmental ambition, Transdev abides by the strictest standards of environmental transparency and governance.
In 2003, Transdev was an early signatory of the Global Compact, a United Nations initiative aiming to encourage businesses all over the world to adopt and promote 10 principles relating to Human Rights, international work standards, environmental protection and the fight against corruption. In 2015 Transdev reached the Global Compact Advanced level, which is the highest recognition.
Since 2004, Transdev has been an active participant of the UITP Sustainable Development Charter emphasizing our contribution to sustainable mobility.

The Electric Bus Living Lab

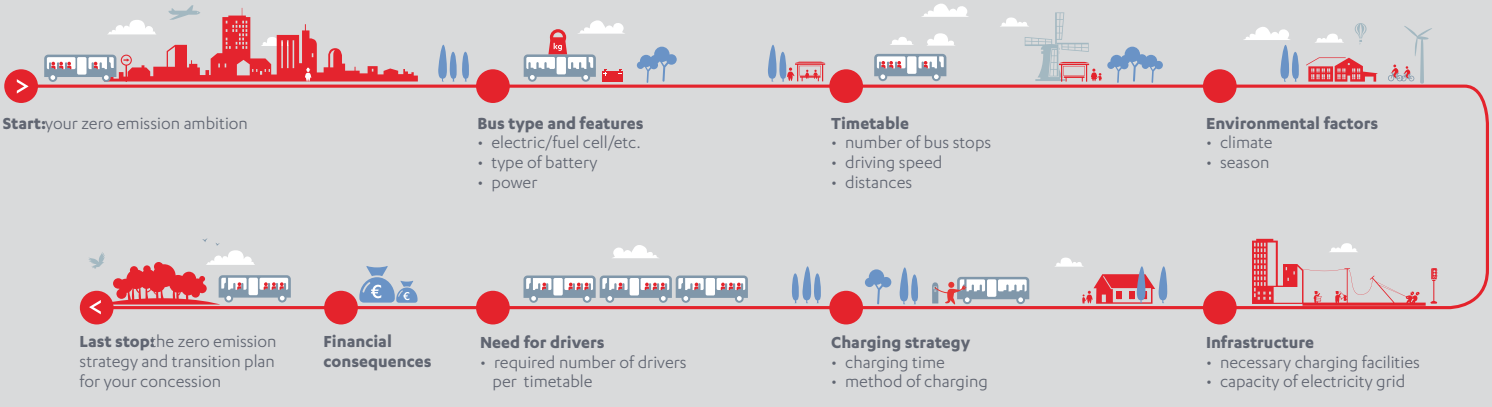
Transdev has created the Electric Bus Living Lab to advise and support local authorities in their fleet transition initiatives toward zero emission solutions. It intends to support Transdev projects alongside those being made by local authorities to develop greener transportation.
The Living Lab gathers public transit authorities, networks and experts, government agencies and research centers. They openly and transparently share their experiences of operating various 100% electric vehicle technologies. The aim is to help transit authorities make the best choices for their local context by being completely aware of the impact of investment and operational costs, as well as the environmental, customer service, operational performance and safety aspects.

AN OPEN, INTERNATIONAL AND COLLABORATIVE COMMUNITY

Several months prior to the negotiations of the COP21 Climate Agreement, the Living Lab was created in Nice, France, the site for the WATT trials (Wireless Alternative Trolley Technology) an electric bus project using opportunity charging. This first meeting attracted participants from countries where Transdev operates and runs electromobility trials and experimentations to discuss their national commitments and share a global vision.

The 2016 edition of the Living lab in Eindhoven, Netherlands, showed a significant increase in the number of electromobility initiatives reflecting local authorities' growing political will and interest in clean solutions. The 90 participants, including speakers from five countries explored a plethora of topics while visiting the site of what has since become the location of the largest electric bus fleet in Europe operated by Transdev. Topics of discussion included electrification studies for the Nantes Bus Rapid Transit (BRT) network, and the rapid charging electric bus system in Umeå, Sweden. The political agenda was also shared as the State Secretary of the Ministry of Infrastructure and the Environment of the Netherlands delivered the vision of the country and elected officials and representatives from public authorities in France expressed their commitment toward energy transition.

Parameters of the eBus Living Lab



A TOOLBOX TO IDENTIFY THE MOST ADAPTED ELECTRIC SOLUTION

Using an initiative introduced by the Transdev Group, our teams in the Netherlands developed a dynamic toolbox in partnership with TNO, the independent Dutch research institute. This toolbox is designed to help local authorities and operator wanting to identify the electric solution that best suits their specific needs.

Five parameters are taken into account: 1. Vehicle characteristics, 2. Operational impacts, 3. External factors, 4. Charging infrastructure, 5. Financial elements.

This holistic and inclusive approach to electromobility structured by this comprehensive eBus Toolbox puts Transdev at the very forefront of the energy mix transition.

Our ambition:

"To be the trusted partner of our clients and customers by pioneering in mobility."

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GROUPE Caisse des Dépôts

Group Client Department
www.transdev.com

CB 05/2017 – Photos : Photothèque Transdev - Rik v/d Wildenberg – Création : W I W&CIE – Réalisation : AS Multimedia

Amsterdam Region – THE NETHERLANDS

Amstelland-Meerlanden contract: Europe's largest fleet of electric buses

CONTRACT FACTS

TRANSIT AUTHORITY
Vervoerregio Amsterdam

PARTNER
Schiphol Airport

OPERATOR
Connexxion, Transdev Netherlands' subsidiary

CONTRACT START
2016

KEY FIGURES

Amstelland-Meerlanden Region
300 km²
1.3 M inhabitants

SYSTEM
R-Net serves communities in the Amstelland-Meerlanden area; SchipholNet provides an airport-specific service.

DISTANCE TRAVELED
Around 30 million km a year

VEHICLES
259 including 100 electric buses in 2018
313 including 266 electric buses in 2021

STAFF
800 employees

Context

The Netherlands has made a concerted commitment to achieving zero-emission transportation by 2025. As part of that initiative, the country unveiled its Green Deal energy policy in 2013, pledging support for innovative projects that protect the environment and boost the national economy. In this context, the Amstelland-Meerlanden region has, as of 2016, issued an RFP requiring the chosen partner to operate a zero-emission fleet. This is one of the biggest contracts in the Netherlands (worth an estimated €1.9 billion over 15 years), in a region that sits at the heart of the Dutch economy, with a bus fleet serving Schiphol Airport and the surrounding area.

Objectives

Transdev-Connexxion won the contract to operate transportation services in the Amstelland-Meerlanden region based on a three-pronged strategy:

› Improve transportation services in a region where the already-dense population (over 1.3 M people) is set to grow 22% by 2040

› Provide a high-quality service for residents and visitors

› Establish, as soon as 2021, a 90% electric bus fleet and help Schiphol Airport meet its target of becoming climate-neutral.

Transdev's answer

A 24/7 service, 365 days a year

At the same time as the conversion to electric vehicles, there was an overhaul of the transportation system. R-Net and SchipholNet provide a round-the-clock service. R-Net serves the communities of Aalsmeer, Amstelveen, Haarlemmermeer, Ouder-Amstel and Uithoorn, providing several connections to Amsterdam, Haarlem and Ronde Venen. SchipholNet is dedicated to airport services with more frequent shuttles.

The solution uses spacious 18m articulated buses to increase rider capacity.

A zero-emission transportation system

Since March 2018, Transdev has been operating 100 electric buses in the area around Schiphol Airport. The fleet will be expanded over the next few years and will comprise around 90% electric buses by 2021.

Other initiatives introduced to promote sustainability include fitting depots with solar panels and using electric vehicles for on-demand services.

The electricity used to power buses comes exclusively from renewable sources, mainly wind turbines.

An inventive recharging system for uninterrupted service

A 24/7 service means that buses need to be on the road as much as possible. Transdev's solution allows them to top up in under 30 minutes at the terminal, with a complete charge done overnight (4-5 hours) at the depot. The buses will carry a 170 kWh battery providing a range of around 72 km between charges.

The pantograph charging system optimizes the space available inside vehicles and at depots while reducing overall weight.

The 500 drivers joined a zero-emission (ZE) training course that included a session on safe battery charging.

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RESULTS

› 24/7 service, 365 days a year
› AML has Europe's largest electric bus fleet, with 100 vehicles

Eindhoven – THE NETHERLANDS

BRAVO[1] – A tailor made concession serving zero-emission goals

CONTRACT INFORMATION

TRANSIT AUTHORITY
Province of North-Brabant

CONCESSION COMPANY
Southeast Brabant Bus Concession

OPERATOR
Hermes, a Transdev Netherlands subsidiary

CONTRACT START
December 2016

END OF CONTRACT
2025 or 2027

KEY FIGURES

750,000 inhabitants

SYSTEM
72 routes
(7 of which are operated by electrical buses)
1,528 stops

RIDERSHIP
19.1 million trips in 2016

DISTANCE TRAVELLED
15.3 million km in 2016
(including 3 million by electrical buses)

VEHICLES
218 buses of which
43 electrical buses

STAFF
500 employees

Context

The Netherlands are engaged in a concerted process of transition towards zero emission including the aim of rolling out fully electric fleets by 2025. This aim is driven by the Government's Green Deal partnership agreement designed to facilitate the emergence of innovative projects to protect the environment and support the Dutch economy. The State is working with public and private stakeholders (local authorities, companies, research institutes...) to remove the barriers hindering energy-saving projects. The Netherlands' ambition is to become "an international leader in smart and sustainable transportation[2]". North Brabant wanted to apply this challenge in their Province and launched a call for tenders that requested high sustainable standards.

Objectives

› Develop a solid partnership with the Province of North Brabant to shape the concession with ambitious goals in the areas of sustainability, innovation and mobility.

› Reach zero-emission transport by 2025.

› Strictly adapt the supply to the demand.

Transdev's answer

Toward a fully electrical fleet

Transdev fully advocates innovations and zero emission and has therefore invested millions of euros to make this concession succeed. With the set goals, this concession is one of the most progressive in the Netherlands and Europe.

Transdev bought 43 electric articulated buses in 2016. These articulated buses, similar in design to those used on BRT networks, provide Wi-Fi and contactless card top up systems. The return on investment has been calculated taking into account the lower fuel cost and a strategy to increase route ridership. This rollout is closely monitored by TNO, Transdev Netherland's research partner, which will incorporate the findings into the Transdev toolbox model. All the observations made from operating this fleet will encourage the Living Lab's progress.

Standard capacity buses will then be added in two additional phases to take the feet's total to 203 buses by 2024. This offers Hermes the possibility to investigate and test, together with local partners and bus manufacturer VDL, which zero emission buses are technically, functionally and economical the best possible option.

High frequency buses

Buses in Eindhoven and surroundings drive continuously, allowing a sort of tramway system, both in transport opportunities as in appearance. This model is called Evolance, related to Volans – the network of buses in the Province of North-Brabant. The 18 meter Evolance electrical buses have a high frequent 'show up and go' time table system between important destinations in Eindhoven, such as the Airport and the High Tech campus.

Valuable partnerships

To reach the described goals, the partnerships with Brabant companies and universities, are crucial. During the years to come Transdev will develop with them, the most sustainable public transport in the Netherlands. Partnerships have been established with amongst others VDL, Technical University Eindhoven, Fontys and Eindhoven Airport.

(1) BRAVO stands for 'Brabant Vervoert Ons' meaning "Brabant transports us" and also "Brabant exalts us"
(2) Sharon Dijksma, State Secretary of the Ministry of Infrastructure and Environment, May 2016, Electric Bus Living Lab, Eindhoven

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RESULTS

› BRAVO is a pioneer in zero-emission bus fleets in Europe.

Île-de-France – FRANCE

Transdev

For eco-friendly, efficient mobility

CONTRACT INFORMATION

TRANSIT AUTHORITY
Île-de-France Mobilités, Greater Paris Region

OPERATOR
Transdev IdF

CONTRACTS
80 different contracts operated on behalf of Île-de-France Mobilités
35% of suburban peri-urban bus/coach routes

KEY FIGURES

SYSTEM
11.7 million inhabitants in 1,280 municipalities, including the city of Paris

NETWORK
Fixed routes
Express services
On-demand services

RIDERSHIP
185 million passengers/year

VEHICLES
2,700 buses and Support Vehicles

Context

Given its economic weight, the greater Paris area (the Île-de-France region) is of strategic importance. The world's top tourist destination, Paris and its metropolitan area are economically dynamic and contain major research and academic clusters. Among all challenges, at the top of the list are housing and transportation. In this context, Île-de-France Mobilités mission is to modernize and extend existing systems while improving passenger comfort.

Transdev's answer

Transdev supports Île-de-France Mobilités policy of bus services development in suburban and peri-urban areas in the greater Paris region:

› By providing its expertise in terms of identification of mobility flows and market analysis.

› By counseling local governments on network design issues in order to encompass all mobility needs.

Express Lines: improving mobility in Île-de-France

As one of the major transit operators in the greater Paris region, Transdev manages most of the Regional Express Lines in close partnership with Île-de-France Mobilités.

The Express Lines are operated according to the highest standards in the industry: high quality of service, real-time passenger information, on-board entertainment and high-profile interior design of vehicles are some of the distinctive attributes of these lines.

Objectives

› Provide better transit coverage and connections to large secondary hubs to balance out the inequality in transit services available in the central business districts and the suburban and peri-urban areas.

› Make transit services more attractive and efficient.

› Increase transportation capacity to relieve both traffic congestion and overcrowded buses.

› Improve connections to the airports in the area.

Opening the first fully electric bus line in the region

Since December 2015, Transdev has been testing an electric bus on the R'Bus network between Argenteuil and Sartrouville rail stations in the Paris region. Its batteries have sufficient range (250 km) to provide daily service without the need for recharging. In addition to the electric mini-buses already operated by Transdev in Île-de-France (Rambouillet and Coulommiers), the aim is to propose a fully electric route to the Île-de-France Mobilités transit authority by the end of 2018.

Customer feedback about this test vehicle has been very encouraging. Key points highlighted are the fact that is quiet, modern and comfortable. This feedback supports the case for the expansion of zero emission fleets in dense urban areas.

Special training modules are being delivered for drivers in the areas of operations, safety and charging. The maintenance teams have undergone specific electrical trainings and the depot will be equipped with a smart charging system calibrated to meet the operation needs, preparing the future expansion of our electrical fleet in the network.

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RESULTS

› **Successful launch of the first fully electric line in the Paris Region to be operated with standard vehicles.**

Barcelona – SPAIN

TRAM – A demanding environmental management for a more sustainable transit system

CONTRACT INFORMATION

TRANSIT AUTHORITY
Autoritat del Transport Metropolità de Barcelona (ATM)

CONCESSION COMPANY
Tramvia Metropolità SA

OPERATORS
Transdev (66%), Moventis (34%)

CONTRACT (Public-Private Partnership)
Operation and maintenance of two light rail lines, Trambaix and Trambesos

CONTRACT START
2000

CONTRACT DURATION
28 years

KEY FIGURES

SYSTEM
6 light rail lines
30 km of light rail
56 stations

RIDERSHIP
26.8 million trips in 2016

DISTANCE TRAVELLED
2.59 million km in 2014

VEHICLES
41 light rail vehicles

STAFF
209 employees

Context

In 2002, the city of Barcelona developed its Agenda 21, intended to change behaviors and involve citizens in favor of sustainable development. In support of this, TRAM, which operates the two sections of the light rail system Trambaix and Trambesos, designed its Energy Efficiency Plan for the 2013-2015 period.

Objectives

› Help Barcelona achieve its target to reduce greenhouse gas emissions by 1% per year, by proposing a clean and efficient transit system.

› Optimize the operational energy consumption of the light rail system and its environmental benefits.

Transdev's answer

Certification

› TRAM has a comprehensive quality system, including ISO 9001, EN 13816 and OHSAS 18001 certifications.

› In 2006, the system obtained and has since maintained ISO 14001 certification for its environmental management system, after working closely with maintenance teams and subcontractors.

› Internally, this certification is accompanied with daily and monthly reports which now integrate the most demanding environmental procedures and managerial standards.

Internal audit and resource management

› Transdev has conducted a complete internal environmental audit through which it was able to identify points for improvement and determine means of action integrated with its new Energy Efficiency Plan.

› Different actions have been carried out such as:

- Installation of a control station to measure and manage energy consumption on four light rail vehicles (two on the Trambesos line and two on the Trambaix line);
- Launch of a new eco-driving system;
- Optimization of the light rail vehicle air conditioning system;
- Fitting of an LED lighting system at stations;
- Installation of an intelligent lighting system in the light rail depots.

› A new Energy Efficiency Plan for the period 2017-2020 is being established in order to improve energy consumption and CO_2 emissions, as well as actions to lower water consumption.

RESULTS

› **The implementation of the actions in the Energy Efficiency Plan 2013-2015 have resulted in a 4.5% energy consumption reduction to 628,000 kWh/year, as well as a reduction of CO_2 emissions to 168 tons/year which is well under the target of 213 tons.**

› **The light rail fleet uses a water recovery and recycling system during maintenance, representing a saving of 70% of water consumption for each vehicle cleaned.**

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Ouest Étang de Berre – FRANCE

Autocars ALIZÉS – Environmental progress and biodiversity, the cornerstones of a committed strategy

CONTRACT INFORMATION

TRANSIT AUTHORITY
Aix Marseille Provence Métropole

OPERATOR
Co-contractors Autocars Alizés and Transdev Istres, subsidiaries of Transdev

END OF CONTRACT
2019

MANAGED ACTIVITIES
Fixed routes (buses, coaches), school transportation, transportation on demand.

KEY FIGURES

104,000 inhabitants served (Ulysse system: 177,000)

SYSTEM
13 fixed routes
1 downtown minibus
2 summer lines
5 TOD sectors
44 school routes

RIDERSHIP
2 million trips in 2016

STAFF
164 employees (including 112 drivers)

Context

Ouest Étang de Berre is a rural farming region made up of areas of outstanding biodiversity (protected areas of environmental value, protected wetlands, natural habitat). It is also heavily impacted by industrial, port and logistics activities, sources of high levels of road and marine traffic.

Objectives

› As an operator, to limit the energy footprint of our activities and reduce greenhouse gas emissions.

› Devise and implement an innovative approach in favor of biodiversity.

Transdev's answer

Our enhanced CSR ambition

The CSR policy established by the Autocars Alizés system hinges on 4 key objectives, as a "responsible" company:

› playing a part in local life,

› managing our environmental footprint,

› promoting social dialogue and inclusion throughout our employees' professional life,

› listening and responding to our stakeholders' expectations.

As part of the local community, Transdev actively participates in the yearly «Clean Istres» initiative, where all environmental stakeholders get together on a massive cleaning event, followed by a festival focusing on environmental issues.

Environmental performance

› Implementation of an action plan:

- in depots (reduction of lighting of installations and offices, installation of low voltage bulbs),
- with staff (challenge for sustainable development week, selective recycling),
- in terms of resources (monthly monitoring of water and electricity consumption).

› Transdev signed the Objective CO_2 Charter of the French Road Transportation Operators, focusing on the following themes:

- management (optimization of energy, water and paper resources in the company),
- drivers (raising awareness of effective use of air conditioning and heating in vehicles),
- fuel (monitoring of consumption per type of vehicle and associated preventive maintenance actions),
- vehicles (motor oil analysis on all new vehicles).

Supporting protection of biodiversity

In partnership with CDC Biodiversité, a specialized subsidiary of Caisse des Dépôts Group, Autocars Alizés has developed a project involving the environmental restoration of an abandoned road to a green pathway. The project has received a favorable opinion from local civil servants, and is currently being presented to local authorities.

RESULTS

› 9% reduction in electricity consumption in depots.

› 2% reduction in the operation's overall water consumption.

› Creation of a "paperless" best-practice policy.

› Renewal of triple AFNOR certification in 2017.

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Dublin – IRELAND

LUAS – An activist and committed system

CONTRACT INFORMATION

TRANSIT AUTHORITY
Transport Infrastructure Ireland

OPERATORS
Transdev
Dublin Light Rail Limited

CONTRACT START
2014 (held since 2004)

CONTRACT DURATION
5 years

KEY FIGURES

1.2 million people served

SYSTEM
2 lines
37 km of track
54 stops
6 Park & Rides

RIDERSHIP (approx.)
34 million passengers/year
93,000 trips/day

VEHICLES
66 vehicles

STAFF
320 staff (190 drivers)

Context

In the 2016 strategy "Transport Strategy for the Greater Dublin Area" published by the National Transport Authority it was stated that "The strategy must promote [...] transport options which provide for unit reductions in carbon emissions and [...] reduce car use". In 2016 TII drafted the "Dublin Light Rail Sustainability Plan 2016-2020" to guide the implementation of sustainability initiatives to assist in reducing the environmental impact of the LUAS operation with regards to energy consumption, resource usage and waste reduction.

Objectives

› Reduce carbon emissions associated with LUAS energy usage by 2% across Service Delivery (Operations and Maintenance).

› Achieve and maintain ISO 14001 status.

› Achieve and maintain the 'Business Working Responsibly Mark', Ireland's only certification for responsible and sustainable business practices.

› Educate commuters and the wider population of Dublin on the environmental benefits of public transportation.

Transdev's answer

Sustainability

Transdev developed the Eco-Calculator online tool to allow passengers to measure their CO_2 emission savings for each personalized trip. The calculator uses travel indicators to calculate global network efficiency compared to individual car use on the same route.

Transdev has developed an energy and resource management program that provides in-depth visibility of the following:

› Water consumption (depots, offices and tram wash);

› Electricity consumption (trams, stops, park and rides, depots and offices);

› Gas consumption (depots and offices);

› Waste generation (depots, offices, stops and trams).

This allows for more precise targeting of energy and resource saving initiatives and campaigns.

Investing in Environmental Research

Transdev Dublin and RPA co-funded a research project of the Dublin Institute of Technology, entitled 'An investigation into options for reducing energy in the operational phase of a light rail system'. The collaboration between the public sector, the private sector and education was a very innovative aspect of this initiative.

Certified network

› Since 2004, and most recently recertified in April 2017, Transdev has been awarded and maintained the ISO 14001 certificate for environmental management, evidence of its organized and systematic approach to reducing its environmental footprint.

› Transdev publish an annual Corporate Social Responsibility report. That report includes an environmental performance update and is sent to all stakeholders. It can also be found on the Transdev Ireland website.

Awards related to Environment

Transdev Dublin has been awarded multiple times for its involvement toward environmental matters:

- 2016 Logistics and Transport Awards - Green Mover Award
- 2016 REPAK Ireland PAKMAN Awards - Green Transport of the Year Award
- 2015: Green Transport Award
- 2013: finalist in the Sustainable Energy Awards in the Research Category
- 2012: finalist in the Sustainable Energy Awards for Energy Efficiency and Energy Awareness
- Since 2012, Transdev has been awarded the 'Business Working Responsibly Mark', indicating excellent business practice across workplace, marketplace, environment, community and management and communication
- 2011: finalist in the Green awards category "Green Travel Initiatives" and highly commended in the 2011 Light Rail Awards, category "Environmental Initiative of the Year"

RESULTS

- **In 2016, Transdev Ireland signed the Business in the Community Ireland COP21 Commitment & Call for Action making commitments to further reduce grenhouse gas emissions.**
- **Water consumption -41% since 2010.**
- **Recycling Rate 25% versus 8% in 2010.**
- **Electricity consumption (kWh/passenger) -15% versus 2010.**
- **5 times less CO_2 than a private vehicle on the same route.**
- **+55% ridership increase between 2005-2016.**

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La Rochelle – FRANCE

Yelomobile – Fully electric vehicles for a new era of clean transportation

CONTRACT INFORMATION

TRANSIT AUTHORITY
Communauté d'Agglomération de La Rochelle

OPERATOR
Proxiway, a Transdev subsidiary

CONTRACT START
2006

CONTRACT DURATION
12 years

ACTIVITIES MANAGED
Electric car-sharing
Urban Dispatch Center
Electric P+R shuttle
Experimentation with electric cyber-mobility

KEY FIGURES

80,000 inhabitants

YELOMOBILE
Implemented: 1999
13 stations
28 Citroën CZéro
18,756 trips
168,114 km

P+R SHUTTLE
Implemented: 2003
One 47-seat full-electric Oréos 4X
Frequency: ~ 10 min

ELCIDIS
Implemented: 2001
2 Citroën, 1 Modec, 1 Gruau
12,920 deliveries
(1,300 tons) in 2016

YÉLO BY NIGHT:
2,424 trips
4,427 passengers

Context

A forward-looking and enterprising city, La Rochelle has always encouraged new solutions for green mobility and proposed innovative alternatives. Self-service bike sharing was introduced in 1976, followed by the "journée sans voiture" (car-free day), in 1997, the solar-electric sea bus in 1998 and electric car-sharing in 1999. More recently, La Rochelle has signed up to major European programs, such as Thermie and FP7, confirming its position as a showcase of sustainable mobility in Europe.

Objectives

› Achieve objectives of an ambitious Transportation Strategy by reducing car traffic in the city center by 10% and transportation-related greenhouse gas emissions by 20% by 2020.

› Propose a whole array of electromobility services for goods and passengers which are fully integrated into the public transit system.

› Remain a pioneer in experimentation with advanced clean transit systems.

Transdev's answer

Yélomobile – Shared electric vehicle

Proxiway, Transdev's subsidiary in charge of the development and sustainability of the car-sharing system, is supporting the local transit authority with its wide-ranging expertise:

› Advising on the renewal of the vehicle fleet: car manufacturer tenders compatibility analysis with existing system, qualitative user tests;

› Developing intermodality with the Yélo public transit system: a single card to travel on the whole transit system and hire a vehicle;

› Updating the information system managing the whole customer experience: information (availability of fleet), season tickets, tracking of usage (kilometers, time spent on board, etc.) and billing;

› Promotional fares for business and tourist customers.

P+R electric shuttle – The relaxing way to get into the city

Responsible for the operation of an electric shuttle between a Park & Ride site on the outskirts and the city center, Proxiway helps to:

› Maintain continuity of service by optimizing the charging of vehicles;

› Ensure an intermodal service for the Jean Moulin Park & Ride (single ticket).

Elcidis – Goods keep our cities alive

The ELCIDIS logistics platform set up under the European Thermie program is intended to reduce the negative external costs of the delivery of goods in a dense urban environment. Proxiway assists:

› The fleet optimization, through the use of smaller capacity vehicles that are more environment friendly;

› In limiting and improving flow of car traffic in the city center, thus improving the punctuality of deliveries.

New electric mobility offers

› Using electric cars, Yélo by Night assures the continuity of public transit services on Thursdays, Fridays and Saturdays from 9pm to 6am the next day. It also operates the night before holidays.

› Since September 2016, Transdev operates ferry services in the bay area. Equipped with latest technology, ferrys are electric and solar powered through installed capacity generating panels.

RÉSULTATS

› Yélomobile: 708 tons of CO_2 avoided, 231,200 liters of fuel saved (2014).
› Elcidis: 46,668 liters of fuel saved, 159 tons of CO_2 avoided.
› P+R shuttle: 671,734 quiet emission-free kilometers.
› Transition of ferry operations in 2016 carried out with success.

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Nantes – FRANCE

SEMITAN – An energy and ecological transition flagship, driven by constant innovation

CONTRACT INFORMATION

TRANSIT AUTHORITY
Nantes Métropole

OPERATOR
SEMITAN (14.99% Transdev)

CONTRACT (SEM)
Operation and maintenance of transit system (light rail, Busway, BRT, bus), Customer Relations, Sales and Marketing, delegated project management mandates

CONTRACT START
1979

KEY FIGURES

24 towns served
600,000 inhabitants
524 km²

SYSTEM
3 light rail routes over 43 km
6 km of Busway
77 km of Chronobus
97 light rail/Busway stations
2,400 stops

RIDERSHIP
133,5 Million passengers/ year in 2016

DISTANCE TRAVELLED
28 million km/year

VEHICLES
91 light rail units
380 buses, 90% NGV

STAFF (bus & tramway)
1,800 employees, of which 1,200 drivers

Context

Since 1979, the Nantes urban area has distinguished itself for its ground-breaking approach and strong commitment to clean public transit (reintroduction of light rail, massive use of NGV – Natural Gas Vehicles – hybrid buses).

SEMITAN (Société d'Économie Mixte) works alongside the city in implementing its transit improvement projects and solutions with the least environmental impact possible.

Objectives

› Develop innovative and effective technical and commercial solutions to optimize modal shift.

› Guarantee efficient maintenance to ensure return on investments.

› Ensure transit solutions that have a positive impact on climate change and energy mix by a CO_2 emissions reduction plan, the development of electric buses and the introduction of hydrogen buses.

Transdev's answer

To encourage modal shift, a transit system of excellence

› Since 2006, Nantes Métropole and SEMITAN have been diversifying the service offering and boosting the performance and therefore the appeal of the urban area transit systems:

- Implementation of Busway (one of the first French BRT) in 2006,
- Then 7 additional Chronobus lines between 2012 and 2013
- With a frequency of 3 minutes for the Busway, 5 minutes for Chronobus

› In terms of light rail, SEMITAN offers a high level of performance (94% on-time performance, commercial speed of 20km/hr, frequency of 82 vehicles per peak hour at the crossover of the 3 lines in the city center).

Environmental commitments

› In 2015, SEMITAN is the first big urban transit system in France to sign the "Objectif CO_2" charter with the government (DREAL; the Department of Regional Environment, Planning & Housing, and ADEME, the Environment and Energy Management Agency).

The signing of the charter illustrates SEMITAN's commitment to reduce greenhouse gas emissions and is based on a three-year action planning focusing on vehicles, energy use, human aspects and organization.

Innovations and pilots

› SEMITAN has been operating hybrid buses since 2013 (6 in 2015) and is preparing for the imminent introduction of electric BRT services.

› SEMITAN and Mission Hydrogène are coordinating a project for the development of hydrogen power in mass transit, via the development and implementation in 2015 of a river shuttle pilot (NAVHYBUS) powered by a hydrogen fuel cell.

RESULTS

› A system showcasing French public transit know-how (multimodality, ridership, quality of service).

› 195 journeys per inhabitant, per year, 2nd highest rate in France.

› An exemplary transit system that is at the forefront of climate change and energy mix with already a very limited use of diesel which currently only accounts for a few % of the bus fleet.

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New Orleans, LA – UNITED STATES

Committed to the environment and local communities

CONTRACT INFORMATION

TRANSIT AUTHORITY
New Orleans Regional Transit Authority

OPERATOR
Transdev

CONTRACT START
First Delegated Management contract in the USA
Signed in 2009

KEY FIGURES

378,000 inhabitants served
194 km²

SYSTEM
5 streetcar lines
34 bus routes

RIDERSHIP
18.7 million passenger trips/year

VEHICLES
138 buses
66 streetcars
60 paratransit vehicles
10 minibuses

STAFF
726 Employees in total, including 375 bus and streetcar operators.

Context

After Katrina hit New Orleans in 2005, the city implemented a holistic strategy for a sustainable recovery of New Orleans, the GreeNOLA plan. This comprehensive approach aims to reconstruct in a better and more sustainable way.

As the partner for the New Orleans RTA, within the Public Private Operating Partnership, Transdev is committed to delivering safe, innovative and environmentally-friendly solutions. We strive to create strong social and environmental partnerships in the communities we serve.

Objectives

› Developing an efficient and attractive system with ambitious ridership objectives and a greener fleet

› Strong Environmental Management Systems

› Usage of sustainable systems and processes dedicated to consumption monitoring and reduction

Transdev's answer

Greening fleet and infrastructure

› In order to reduce the footprint of our fleet, we have:

- particle traps installed on emissions systems for the entire revenue fleet (part of storm-related fleet replacement);
- Nitrogen tire-fill program installed for use in all vehicles;
- An onboard engine operation / driver interface system (ANGO): 4 test vehicles;

› As for infrastructure, we make efforts in the following fields:

- Conversion from naphtha to aqueous-based washing solvent;
- Implementation of recycling program at NORTA facilities;
- Motion-sensor light switches installed in the offices at Canal Street;
- Campaign launched to substitute T-12 bulbs / ballast with T-8 bulbs / ballast during routine lamp replacement.

An Environmental Management System

› To implement a genuine environmental management system, the following legal, regulatory and procedural developments have been undertaken:

- An environmental filing system;
- Legal and regulatory systems and required training;
- RTA-specific Environmental Management System (EMS) & Compliance manual;
- An inventory of Standard Operating Procedures developed for individual RTA shops.

Eco-driving: accidents and CO_2 emissions reductions

› Transdev now uses the SmartDrive system, which includes instant driver feedback, event recording and tracking, idle thresholds, and a driver training program individually tailored based on data generated from the system.

This program, initially designed to decrease accidents, also allows fuel savings.

› We have started a formal eco-driving program that allows drivers to gain points for various prizes for improving their fuel efficiency while on the road.

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RESULTS

› Ridership on the RTA (all modes) has grown an astounding 62% since 2009, greatly surpassing the population growth of 13% in New Orleans.

Rouen – FRANCE

TCAR – An environmental game-changer with energy expertise

CONTRACT INFORMATION

TRANSIT AUTHORITY
Métropole Rouen Normandie

OPERATOR
Transports en commun de l'Agglomération de Rouen (TCAR), Transdev subsidiary

END OF CONTRACT
2025

ACTIVITIES MANAGED
Light rail, bus, school transportation, transportation on demand for persons with reduced mobility

KEY FIGURES

415,000 inhabitants

SYSTEM
2 light rail routes
with 1 joint section
23 fixed bus routes
3 BRT routes
5 FAST routes
33 school routes
1 Noctambus route

RIDERSHIP
51.5 million passengers in 2016

STAFF
1,174 employees,
of which 723 drivers

Context

To combat climate change more effectively, Métropole Rouen Normandie (MRN) intends to put mass transit at the heart of its "Agenda 21".

As MRN's partner, TCAR is supporting the local government in its ambitious "green energy mix" project and its objectives to reduce transportation-related pollution emissions and develop sustainable eco-mobility.

Objectives

› Make the transit system more effective and attractive to increase ridership of all inhabitants of the metropolitan area.

› Implement new sustainable fuel solutions for the bus fleet.

› Provide measuring tools to steer environmental performance.

Transdev's answer

Development and reorganization of the system

› Transdev is assisting local decision-makers in restructuring the system, in order to reduce polluting emissions and better serve passengers.
By reorganizing services, Transdev was able to optimize the kilometers offered while better meeting passenger needs.
In September 2014, 5 FAST lines were implemented, enhancing the level of service offered.

› Transdev plays an important role during big events like the Armada, promoting green travel by guaranteeing better accessibility of mass transit and deploying incentive-based policies, resulting in a 155% increase in ridership during the event.

Expertise in alternative fuels

› Transdev assisted and advised MRN in an extensive evaluation of alternative fuel solutions, with the aim to reduce greenhouse gas emissions, procurement and servicing costs. 70% of the fleet now runs on biodiesel. Electric buses experimentations are also conducted in the network since 2016.

Environment-friendly vehicles to make Rouen a green city

› Rouen's light rail units are fitted with regenerative braking systems.

› Transdev is working in partnership with Rouen on a greener landscape program, to improve quality of life:
- more attractive transit services,
- pedestrian spaces,
- better accessibility,
- development of 15,000m² of landscaped green spaces on the light rail route.

RESULTS

› **Development of an optically guided high frequency transit system which cuts net annual CO_2 emissions by 2,550 tons, on three BRT routes.**

› **15% cut in CO_2 emissions and a 30% reduction in fuel consumption.**

› **A light rail ride in Rouen emits 21.5 times less CO_2 than the same ride in a private vehicle.**

› **80% of the electricity generated when braking is recovered and injected back into the system.**

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GREEN DEPOTS

REFERENCE COUNTRIES

United States

- Leesburg Bus Depot, Loudoun County
- Lextran Bus Depot, Lexington, Kentucky

France

- Romainvilliers Bus Workshop & Offices, Ile de France region
- Bregaillon Depot, Toulon

Challenge

Transdev does not generally own the infrastructure it uses. It operates its transit services from a variety of different buildings and depots, some old, some new, some in the city center and others in industrial areas, with some services or routes in environmentally sensitive areas. Whatever the local situation, Transdev is committed to programs aimed at proposing the most efficient state-of-the-art infrastructure, building innovative new depots or guaranteeing the most sustainable management possible of inherited depots.

Transdev's "green depots"

Transdev has developed a strong expertise in building, operating and maintaining Green Depots along with suppliers, financial partners and Public Transit Authorities. Our High Environmental Quality depots are easily recognizable through one or more of the following criteria: low-energy buildings, water recycling systems, solar panels, green walls, waste recycling processes and introduction of sustainable and eco-friendly materials.

Green depots are also recognizable by their results: depending on the project, energy gains can be of 25% to 60% in comparison to standard depots, and water consumption reduced by 1/4 to 1/3.

Depots at the forefront of environmental standards

In France, the Romainvilliers workshop/office in Île-de-France, designed by Transdev, is the first building of this type to receive French HQE certification, so the 2,700 m^2 building meets the energy performance requirements of low energy buildings. It saves on clean water use and is built of environment-friendly materials (ecoconstruction), while at the same time being a pleasant living environment.

In Loudoun County, USA, Transdev manages the Leesburg Depot. With a total surface area of 8,528 m^2, the depot is in the process to obtain a Silver LEED certification, a green building certification program by the U.S. Green Building Council that recognizes best-in-class building strategies and practices. The Leesburg site uses heat pumps and geothermal wells as well as solar heating for water.

Buildings producing their own energy and managing their consumption

In Toulon, France, the "new generation" Bregaillon depot includes air and energy management functions controlling consumption and producing clean electricity (solar panels). In addition, the building was also designed to ensure more sustainable management of water: recovery of roof water and water from washing buses...

PERFORMANCE

- Buildings meet low energy building standards, compliant with Factor 4 of the French Climate Plan.
- Annual saving of 9.7 tons of CO_2 in Toulon.
- Water recovery: equivalent to annual consumption of 67 to 130 people in Romainvilliers.

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ECO-DRIVING ASSISTANCE SYSTEMS

DEPLOYMENT

23 transit systems equipped worldwide

Using 15 different brands of eco-driving technologies

Over 5,000 vehicles (both rail and road) fitted with eco-driving assistance systems

4,500 road vehicles fitted with safe driving assistance system (USA)

Challenge

Fossil fuels account for a significant majority of the energy used by land-based mass transit. To do their part in the fight against climate change, public transit operators must respond to the challenge of limiting and minimizing the impact of such fuels by reducing their consumption. This can be done in several ways, particularly through the involvement of all team members in a policy of sustainable development and eco-driving efforts; applying the principles of responsible, green-driving over the long-term. In addition, eco-driving is also part of a wider effort to lower accidents and maintenance costs. On this topic, Transdev is able to contribute global, multi-system and multimodal experience and offers transit authorities the solutions most adapted to their local context.

Transdev's eco-driving assistance systems

To validate the best systems and create a breadth of experience on a global scale, Transdev has tested more than fifteen tools, within its operations worldwide for the three key modes of travel: road, rail and sea.
These systems are intended to provide direct assistance to drivers by displaying real-time performance information on the control panel then by printing periodical monitoring records to allow a subsequent analysis of driving behaviors. At the same time, specific training modules have been developed by the Group and are dispensed to drivers by local training services.

The key advantages:

- Contributes to manage energy consumption;
- Raises employee awareness of safety incidents and accident rates;
- Helps reduce maintenance costs;
- Enhances the customer experience.

Agile monitoring systems

- In Netherlands, Connexxion installed the device Sycada in 2013. The objective of the program is, by influencing the driver, to provide a comfortable journey, save fuel and thus protect the environment. In 2016, this device was installed on 1,500 vehicles and the drivers have saved a total of 4.7 million liters of fuel which is 25% of total savings. In addition, it has resulted in decreased vehicle damage and improved on-time performance.
- In France, Transdev has deployed the eco-driving assistance system ACTIA since 2015. The driving information and the GPS location are collected in real-time. This system transforms this raw data into client comfort and consumption scores with an individulized compensation system. ACTIA is entirely deployed in the Transport Rapides Automobiles network (220 vehicles) and has allowed a fuel reduction since 2015.
- In Sweden, Transdev installed the Blue Flow system on its ferries in 2010 to help captains optimize their energy consumption. The information can also be analyzed ashore, afterwards and during the run. In 2016, this system was installed on 13 ferries and allowed the saving of 20 to 25% fuel consumption.
- In response to the Swedish success with Blue Flow, Australia decided in 2016 to equip its vessels with the system in Brisbane and Sydney. Assisted by the Swedish colleagues the system is showing promising results and will be part of a concerted effort during 2017 to improve fuel consumption, safety performance, and customer satisfaction.

Driving assistance training programs and incentives to encourage better performance

The deployment of such systems always go along with driver training. Drivers are further involved in the process through incentive systems rewarding the best performance, while guaranteeing the confidentiality of individual performance (Connexxion group).

PERFORMANCE INDICATORS

- Reduction in fuel consumption: 9.3% in the Connexxion operations in the Netherlands in 2016, and 20-25% in Sweden over the past 7 years. Blazefield, UK reported fuel savings of €190,000.
- Transdev North America has been able to reduce high risk behavior events by 55% since the inception of the SMART Drive program.
- Reduction of maintenance costs.
- Improvement of passenger comfort.

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"FULLY-ELECTRIC" VEHICLES

FULLY-ELECTRIC VEHICLE DEPLOYMENT

7 countries

27 locations

Charging/battery technologies:

> Overnight charging

> WAVE Inductive charging

> Conductive Opportunity charging

> Hydrogen fuel cells

Challenge

Given the challenges of climate change and the share of land-based transportation in global greenhouse emissions (over 15%), transit operators must take their responsibility in the aim for sustainable mobility. The use of electric vehicles appears to be an increasingly credible solution to the use of fossil fuels, especially for urban mass transit where matters of vehicle autonomy and speed are less of an issue than for intercity or long-distance services.

Transdev is at the very forefront of the development of different "fully electric" solutions. By so doing going beyond conventional and hybrid vehicles, and offering its clients the benefits of the widest possible array of experiences.

Transdev's "fully-electric" vehicles

In order to validate the best systems and offer a diversified range of experiences, Transdev is piloting three fully electric mobility solutions in pre-operations and actual operational mode.

City center micro-shuttles

The shuttle solution has been thoroughly tried and tested, the technical performances being ideally suited to operating conditions. Transdev is currently the leading operator in France of this type of vehicle with over 40 micro, mini and midi buses, i.e. 42% of the French fleet.

Pros: all the advantages of electric solutions (silence, flexibility, no gas emissions...), especially small highly accessible vehicles which are perfectly suited for urban environments.

Cons: costs still 40 to 50% higher than diesel drives. The capacity and range limits are not a drawback given their use in short urban circuits.

Autonomous battery buses

The fully electric bus solution is quickly developing as issues of battery weight and capacity are being successfully addressed.

Under the Finnish national program "EVE" (Electric Vehicle) 2011-2015, Transdev Finland tested T.ebus, fully-electric urban buses in commercial operation conditions and a challenging climatic environment (-25° and snow to +30°), on some routes in Espoo, in the greater Helsinki area.

In 2016 Transdev purchased 43 electric articulated buses to be implemented in the Bravo network in North Brabant, Netherlands. Standard capacity buses will be added in two additional phases reaching the goal of a fully electric fleet by 2025.

Opportunity charging buses with fast charge en route

This third solution is perfectly suited to the constraints of an urban environment which allows permanent "refueling" all along the routes and throughout the day.

In November 2014, Transdev participated in a pilot (the first in France) of the first fast charge electric bus at Nice Côte d'Azur airport. The WATT solution did not require any dedicated infrastructure other than the "posts" that both store and transfer the energy. Placed next to the bus stop or integrated into them, they were supplied by the low voltage electricity system which charges the super-capacitors they are fitted with.

In October 2017, Transdev will have 13 conductive opportunity charged standard buses in operation out of the Arcadia facility in the eastern part of Los Angeles, USA. In Umeå, northern Sweden, the city's nine rapid charging electric buses are particularly suited to the extreme temperatures in this part of the country. With 33 electric buses in 2019, more than half of Umeå's fleet will be electric.

Pros: high capacity range with a relatively simple infrastructure: not all the stops have to be fitted with a charging post.

PERFORMANCE INDICATORS

> Reduction of greenhouse gas emissions and air pollution.

> Reduction of noise and vibration of heat engines.

> Improvement of driver and passenger comfort.

> Operating performance now very similar to diesel solutions.

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The Transdev Electric Bus World

- Mini-bus
- Standard/articulated bus
- Autonomous vehicle
- School bus
- Double decker bus

* including Hydrogen buses

– *During 2017*