Customer Magazine

SOLARIS

A CAF GROUP COMPANY

www.solarisbus.com

2/2022 (29)

Event of the year

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the Urbino 18 hydrogen bus

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with Krzysztof Dostatni,
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Introduction

Dear Readers, dear Friends,

this autumn was chock-full of great and remarkable events and meetings. September was an extremely important month for our company as, at last, we could share with you the results of many months of work by numerous Solaris teams.

The No. 1 event was certainly the official unveiling of the newest hydrogen bus in our offering, the Urbino 18 hydrogen. Its perfectly selected hydrogen system components, optimised fuel cell parameters, and a completely new modular drive all ensure excellent performance in this completely zero-emission vehicle.

The launch of the articulated hydrogen bus, combined with the third edition of #SolarisTalks, attracted experts, journalists and fans of safe and zero-emission public transport. Thank you for joining us on that day! For those who couldn’t attend, in the new issue of the Solaris Customer Magazine we have prepared coverage of the launch

and a vast amount of photo and video material, as well as a detailed technical description of the new hydrogen model. Enjoy!

Numerous trade fairs that have taken place in the last few months have provided an excellent platform for swapping experiences and having inspiring discussions. Our latest electric solutions were showcased at trade fairs in Paris, Kielce, Milan, Madrid and Stockholm.

Our efforts have recently been recognised in two different competitions. We received the Polish Project Excellence Award for the Urbino 9 LE electric project, and our ESG-related activities were acknowledged by the Green Eagles competition held by the daily newspaper “Rzeczpospolita”. Distinctions of this kind feel like extra wind in our sails, a motivation for us to put even more development projects in train.

Each achievement and each success is doubly gratifying when facing the difficult times we now have to operate in. Our industry is confronted with numerous challenges. However, I strongly believe that together we will be able to continue on the path taken, and that our continual efforts will result in long-term results.

In the run-up to Christmas time, I would like on behalf of Solaris to wish you good health, and a joyful and peaceful time spent with your nearest and dearest. May all your dreams come true! Have a great 2023!

Kind regards,

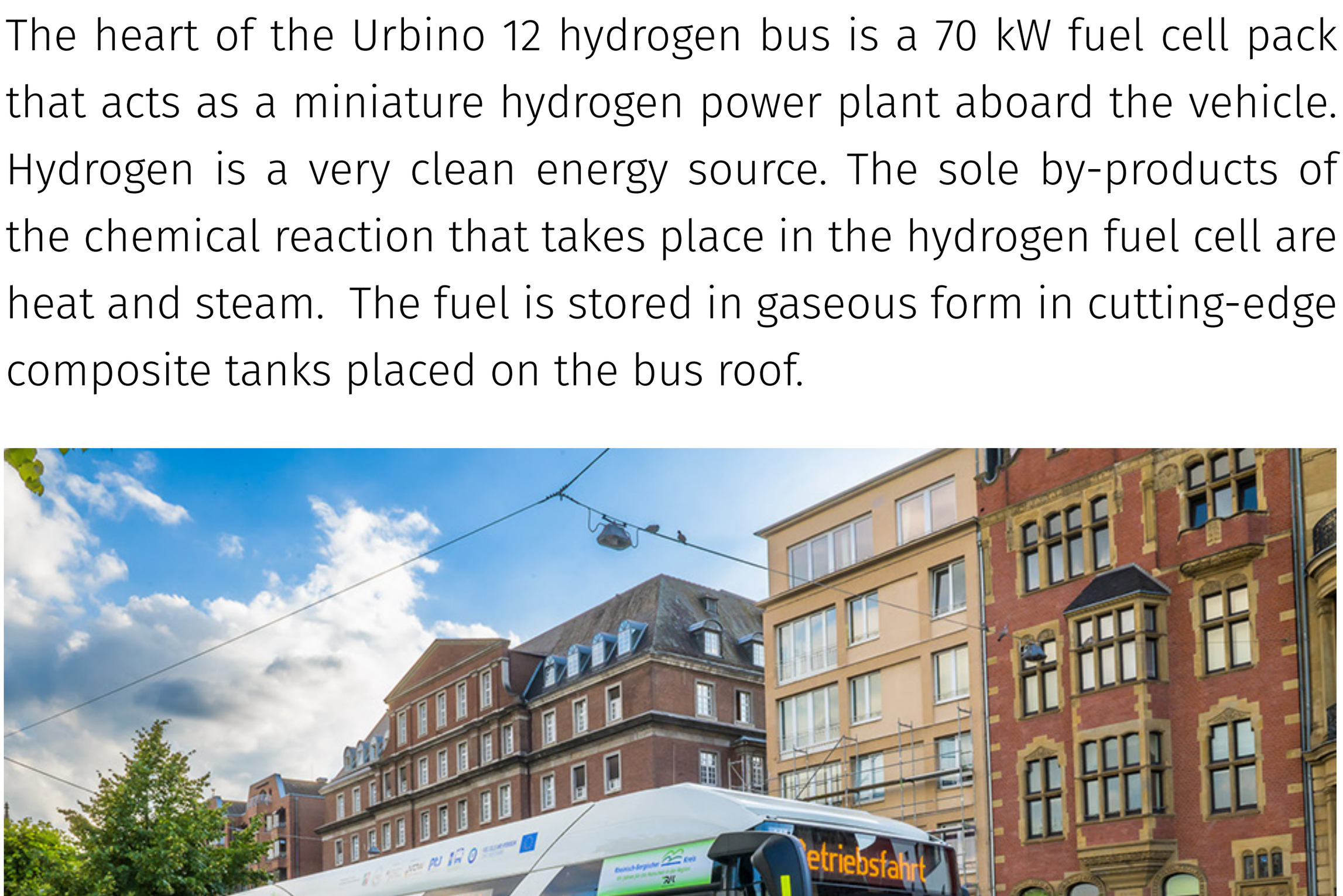
Javier Calleja
CEO of Solaris

Bratislava goes for hydrogen

› The carrier from Bratislava (DPB) has opted for four Urbino 12 hydrogen. The vehicles will hit the city's streets in July 2023. This is the first order placed under a framework agreement. In the long run, up to 40 hydrogen Solaris buses may make their way to the Slovakian capital.

The public transport operator in Bratislava has signed a contract to purchase four Solaris Urbino 12 hydrogen buses. They will be the first ever hydrogen buses not only in Bratislava, but also in Slovakia. According to a framework agreement concluded by DPB with the bus maker, the Slovakian carrier may eventually order up to 40 hydrogen buses. The four ordered vehicles will be delivered in July 2023.

The heart of the Urbino 12 hydrogen bus is a 70 kW fuel cell pack that acts as a miniature hydrogen power plant aboard the vehicle. Hydrogen is a very clean energy source. The sole by-products of the chemical reaction that takes place in the hydrogen fuel cell are heat and steam. The fuel is stored in gaseous form in cutting-edge composite tanks placed on the bus roof.



Hydrogen Solaris buses **to go to Venice**

› Solaris will deliver four Urbino 12 hydrogen buses to Venice. The contracts were concluded with Italian carriers AVM Venezia and ACTV SPA Venezia. The 12-metre hydrogen-fuelled buses will arrive in Italy in mid-2023.

The Urbino 12 hydrogen buses will serve the residents of Venice and its surroundings thanks to contracts signed with carriers AVM Venezia and ACTV SPA Venezia, which provide public transport services in Venice as well as within the communes of Venice and Chioggia. The deliveries are slated for the end of the second quarter of 2023.

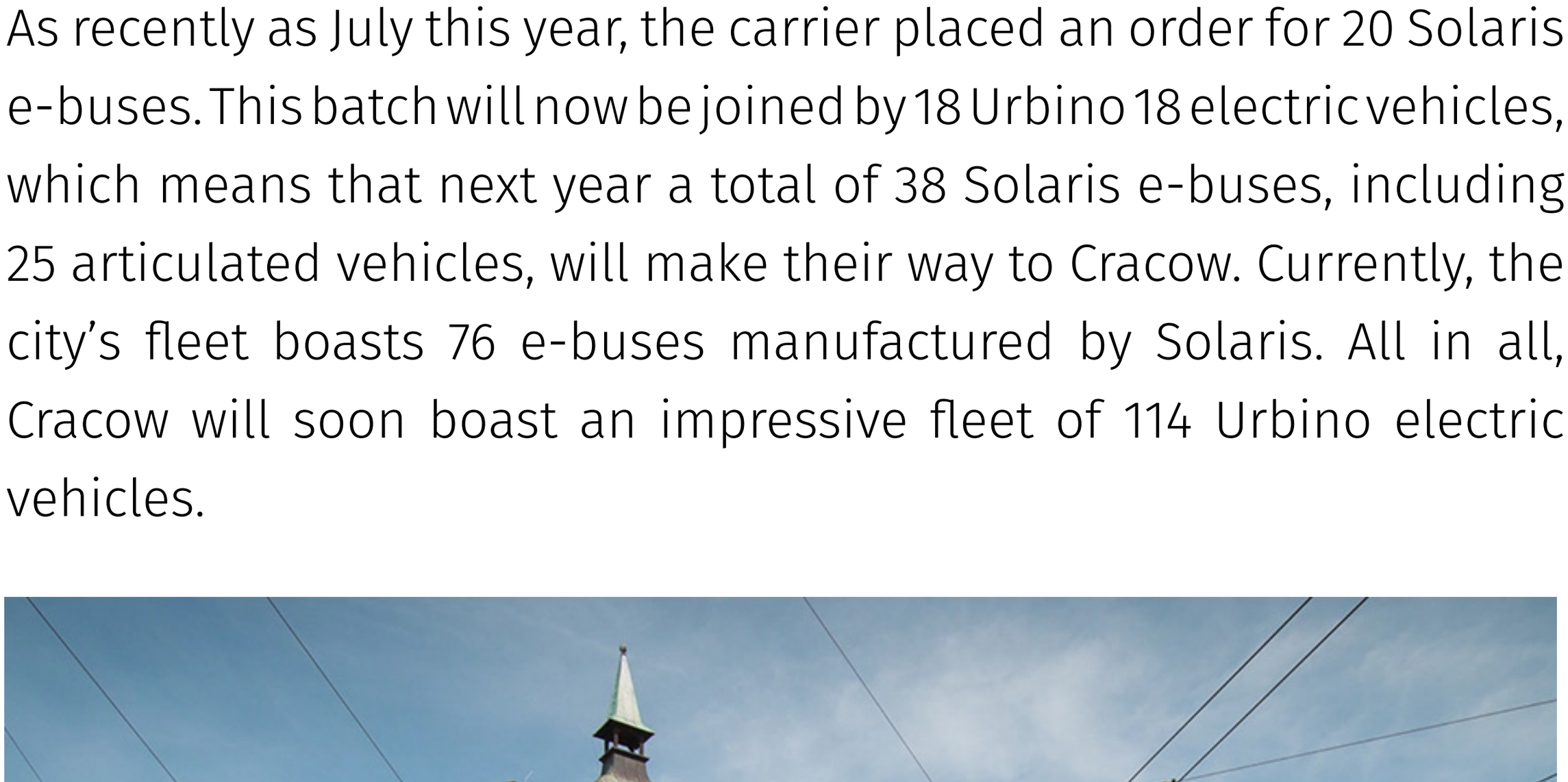
The Urbino 12 hydrogen units destined for Venice are yet another batch of vehicles producing no local emissions that will serve the residents of this region. In 2020, under a contract concluded with ACTV SPA Venezia, Solaris delivered 30 Urbino 12 electric vehicles to the city along with charging infrastructure. They have been deployed to exclusively provide public transport in two city districts located on the islands in the Venetian Lagoon: Lido and Pellestrina.

18 articulated Solaris e-buses **to go to Cracow**

› Solaris has won a tender held by public transport operator Miejskie Przedsiębiorstwo Komunikacyjne (MPK) in Cracow for the delivery of electric buses. At the end of October the carrier signed a contract with the manufacturer for the delivery of 18 articulated electric vehicles.

Public transport company Miejskie Przedsiębiorstwo Komunikacyjne (MPK) in Cracow has again opted for Solaris to supply it with cutting-edge zero-emission solutions. This time, the carrier placed an order for 18 articulated battery-powered buses. The e-buses chosen by MPK in Cracow will be, in terms of their design, adapted for both charging using a plug-in connector and pantograph charging. The energy storage system will consist of Solaris High Energy batteries with a capacity of over 400 kWh.

As recently as July this year, the carrier placed an order for 20 Solaris e-buses. This batch will now be joined by 18 Urbino 18 electric vehicles, which means that next year a total of 38 Solaris e-buses, including 25 articulated vehicles, will make their way to Cracow. Currently, the city's fleet boasts 76 e-buses manufactured by Solaris. All in all, Cracow will soon boast an impressive fleet of 114 Urbino electric vehicles.



Olivier Michard joins Solaris Board

› At the beginning of November, Olivier Michard joined the Management Board of Solaris, taking over responsibility for Sales, After Sales and Marketing.

Olivier is part of Solaris company since June 2021 as he became CEO of Solaris France. Olivier has over 20 years of international experience in automotive industry, including 10 years living abroad (Brazil, China, Italy, Spain and UK). His career path was also related to the bus industry. He worked for Iveco France as a Business Director where he was in charge of sales, after-sales and network activities. Before joining Solaris he held the role of Business Director EMEA in ESG – Ecco Safety Group where his main tasks included reorganising all the sales processes and increasing the sales potential through customer acquisition.

Huge hydrogen investment of Poznań

› Poznań's public transport operator MPK has purchased 25 hydrogen-fuelled Solaris buses. Initially, Solaris won a tender for the delivery of 15 vehicles, but the carrier exercised its option of extending the order by another 10 buses.

From the left: Marek Grzybowski (Deputy CEO for Technical Affairs, MPK Poznań sp. z o.o), Krzysztof Dostatni (CEO of MPK Poznań sp. z o.o.), Jacek Jaśkowiak (President of the City of Poznań), Javier Calleja (CEO of Solaris Bus & Coach sp. z o.o.).

The largest order to date for Solaris hydrogen buses has been placed by Poznań. The local public transport operator purchased 25 hydrogen-fuelled Solaris buses.

Investments of the city of Poznań in green public transport are gathering pace. MPK Poznań already boasts 58 electric Solaris buses, which account for nearly 20% of its fleet. 25 Urbino 12 hydrogen buses will join Poznań's zero-emission fleet in the second half of 2023. Refuelling of the buses will take place at a hydrogen refuelling station located at the petrol station at Warszawska street in Poznań.

Solaris wins **the Polish Project Excellence Award 2022**

› The Solaris team was recognised in the Polish Project Excellence Award 2022 competition in the New Technologies, Science and Innovation category for the Urbino 9 LE electric project. The awards were handed out on 20 October in Warsaw during a gala event accompanying the 25th IPMA Poland Conference.

The Polish Project Excellence Award is an annual competition held by the International Project Management Association. Its aim is to promote best practices in project management as well as to evaluate and recognise excellence in the management of projects submitted for the competition. Solaris took third place in the New Technology, Science and Innovation category for its Urbino 9 LE electric project. On behalf of the entire project team, the award was received by Łukasz Chełchowski, Bus Development Director, Rafał Białek, Senior Project Management Manager and Olga Janowska, Senior Product Development Leader.

The Urbino 9 LE electric is a new type of low-entry electric buses, which was launched in autumn 2021. The success of the project is evidenced by the fact that the new Urbino 9 LE electric had managed to generate considerable interest, even before the product was officially released for sale. The company has received orders for this model from operators in Germany, Spain, Italy and Poland, having already contracted more than 30 units of this 9-metre electric bus.

From the left: Maciej Ostrowski (IPMA PPEA 2022 competition assessor), Piotr Potaczek (IPMA PPEA 2022 competition assessor), Rafał Białek (Solaris Bus & Coach), Olga Janowska (Solaris Bus & Coach), Artur Marsy (IPMA PPEA 2022 competition lead assessor), Łukasz Chełchowski (Solaris Bus & Coach).

Solaris recognised for its **ESG activities**

› The editorial team of the Polish daily “Rzeczpospolita” has again announced the winners of the Green Eagle awards. Solaris Bus & Coach sp. z o.o. has been recognised in the Enterprise category.

From the left: Marcin Piasecki, managing editor at “Rzeczpospolita”, chair of the prize committee; Agata Stańda, Director for Strategy and Transformation, Solaris Bus & Coach sp. z o. o.; Maciej Maciejowski, CEO of Gremi Media S.A., the publisher of “Rzeczpospolita”.
Photo: Jacek Kamiński.

Solaris has received the Green Eagle award in the Enterprise category in the third edition of the competition held by the daily newspaper “Rzeczpospolita”. The Green Eagle prize is awarded by a committee consisting of environmentalists, business representatives and editorial team members of the daily “Rzeczpospolita” to individuals, companies and local authorities that are implementing modern, environmentally friendly solutions.

Solaris was recognised for various innovative green solutions implemented on an industrial scale, in particular for its electric and hydrogen buses. The pro-environmental projects submitted by the manufacturer included the zero-emission Urbino 18 hydrogen bus, which is the latest product in the manufacturer’s offering, the Charging Park, a cutting-edge charging station for e-vehicles, as well as life cycle assessments carried out for the buses it produces.

Stylish trolleybuses in Arhnem, the Netherlands

› Solaris and Dutch operator Hermes, part of Transdev/ Connexxion, have signed a contract for the delivery of 10 Trollino 18 trolleybuses featuring our unique MetroStyle design. They will be the first Solaris trolleybuses to be deployed in the Netherlands.

Solaris will deliver 10 emission-free trolleybuses to Arnhem, the only Dutch city with a trolleybus network. The ordered Trollino 18s will operate between the University in Arnhem and the University in Wageningen.

They will stand out due to their dynamic and stylish MetroStyle look. One important feature of the trolleybuses ordered by Hermes is that they will be able to drive without being connected to overhead wires. This will be possible due to traction batteries with a capacity of around 90 kWh, charged using the “In-Motion-Charging” system.

These will be first Solaris trolleybuses in the Netherlands.

From the left: Bart Kraaijvanger, Zero Emission Program Manager for Transdev Netherlands, Martijn Mentink, Executive Director at Hermes for the South-East Region, Wil Willems, Managing Director of Solaris Netherlands B.V., Bartłomiej Cieślik, Senior Area Manager, Solaris Bus & Coach sp. z o.o.

Event of the year

We have just celebrated a unique event: the launch of the Urbino 18 hydrogen bus combined with the #SolarisTalks 2022 conference. The launch of the Urbino 18 hydrogen bus took place on 14 September at exactly noon. The official demonstration of the articulated model was preceded by another edition of #SolarisTalks, a conference entirely dedicated to e-mobility. Both events took place in Cracow and were also broadcast live.

There were lots of positive impressions and emotional moments, as well as inspiring conversations about the zero-emission future of towns and cities – that is how one may recap the event in Cracow on 14 September. It was an extraordinary meeting, as Solaris celebrated on that day the launch of its latest product – the highly technologically-advanced Urbino 18 hydrogen bus. At the invitation of Solaris, representatives from towns and cities that are developing modern public transport came from all over Europe, as did journalists, to the capital of the Lesser Poland region. After a break of two years, this was a great opportunity to meet again in person, talk to each other, and share one's own experience in implementing e-mobility solutions in towns and cities. The whole event was broadcast on YouTube and on the manufacturer's website, www.solarisbus.com, which made it possible for a worldwide audience to follow it live.

#SolarisTalks conference

Before the launch of the new hydrogen bus in Solaris's range, the manufacturer invited all participants and viewers to **#SolarisTalks,** a regular conference dedicated to e-mobility. The conference was opened by Javier Calleja, CEO of Solaris. In his speech, Mr Calleja referred to the challenges posed by climate change and to the extensive experience of Solaris in developing zero-emission technologies. Then, the stage was taken over by Solaris's experts, who took the conference participants on an exciting journey through the latest trends in modern and sustainable public transport.

The special guest speaker was **Alisa Meyer** from the Alternative Drives Department at German operator Regionalverkehr Köln, the public transport operator providing services in the German city of Cologne. She talked about the challenges of introducing and operating hydrogen buses in a modern city both from the perspective of the user and the local public transport operator.

All of the speeches at #SolarisTalks 2022 can be accessed on Solaris's YouTube channel [LINK]

E-mobility panel

Solaris. By innovation we change the image of public transport

Łukasz Chełchowski,
Bus Development Director

Flexibility in After Sales support

Jakub Jóźwiak,
After Sales Director

E-mobility. The future is smart and electric

Romuald Witkowski,
Project Management Director

Hydrogen panel

Deploying Europe’s biggest Fuel Cell Bus Fleet. Practical experience from RVK

Alisa Meyer,
Alternative Drives
Department, RVK

Hydrogen. Constantly developing technology

Paweł Mańkowski,
Hydrogen Technologies Leader

Launch of the Urbino 18 hydrogen bus

After the speakers' presentations at #SolarisTalks 2022, the time came for the most eagerly awaited part of the day: the launch of the Urbino 18 hydrogen bus. The official demonstration of the vehicle began with a screening of the launch video.

After that, the guests who were gathered in Cracow had an opportunity to see the new vehicle in the flesh for the first time and to take a closer look at it. Solaris engineers, responsible for the development of this hydrogen-powered articulated vehicle, were also at hand to explain to the audience the ins and outs of operating the latest product in the zero-emission Urbino family.

The launch video of the Urbino 18 hydrogen bus can be watched on our YouTube channel.

The launch of the Urbino 18 hydrogen bus, combined with the #SolarisTalks 2022 conference, was undoubtedly one of the key industry events of the past year. The reaction from both the invited guests and the media was extremely positive, and the launch video on the company's YouTube channel has already been watched by over... 100,000 viewers! We would like to express our sincere thanks to everyone who was with us on that special day, both in the real and virtual worlds.

[Watch the Urbino 18 hydrogen launch video now! [LINK]]

3rd edition of
#SolarisTalks

5 speakers

100,000 views of the launch video

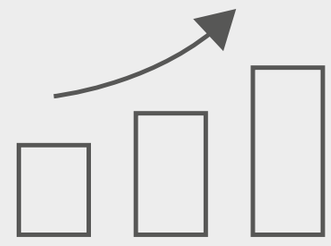
Even more clean kilometres

Urbino 18 hydrogen

14 September saw the launch of the Solaris Urbino 18 hydrogen, an articulated hydrogen-powered bus. It joined our 12-metre model, which has been arousing great interest amongst European customers for three years now. The latest model is the result of several years of work by Solaris's engineers. Perfectly selected hydrogen system components, optimised fuel cell parameters, and a completely new modular drive ensure excellent performance in this completely zero-emission vehicle. The Urbino 18 hydrogen bus is definitely a standout in Solaris's offering.

Using hydrogen in public transport is an opportunity for emission-free, quiet and innovative urban mobility. Numerous European towns and cities are already opting for hydrogen vehicles for their bus fleets.

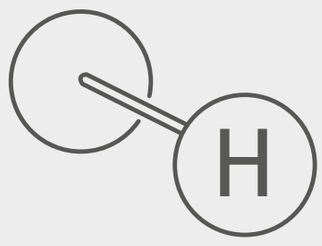
Growing market interest



Solaris has observed a growing interest in hydrogen-fuelled models for a few years now. Today, almost 80 Solaris hydrogen buses carry passengers in Italy, Germany, the Netherlands, Sweden and Poland. Another 90 units of this bus type are being manufactured and will soon roll out onto streets in cities in Spain, France, Czech Republic and Slovakia, amongst other countries.

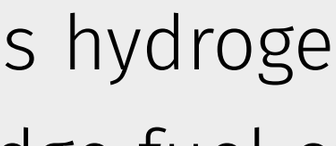
The 12-metre hydrogen bus has been part of the manufacturer's range for three years now, and on 14 September this range was complemented by an articulated hydrogen-fuelled model. The Urbino 18 hydrogen bus was developed as Solaris's response to increasing demand for hydrogen-powered vehicles. The company wants to provide its clients with the widest possible range of environmentally friendly vehicles, i. e. hydrogen, electric buses and trolleybuses.

Urbino 18 hydrogen – improved technology



As with the shorter version, the main energy source in the new Urbino 18 hydrogen is hydrogen. The heart of the Urbino 18 hydrogen bus is a cutting-edge fuel cell that acts as a miniature hydrogen power plant. Hydrogen is transformed by the fuel cell into electricity which is then transferred to the driveline. Solaris batteries with a capacity of around 60 kWh, mounted in the vehicle, serve as an auxiliary power source, used, for example, during acceleration as well as as storage for recovered energy.

More room



Solaris's new vehicle doesn't feature a conventional engine compartment as it has been equipped with a modular drive system. The space thus saved has allowed the bus maker to increase the

vehicle's passenger capacity. What is more, by eliminating the engine compartment, more space on the roof has been created, where composite light hydrogen tanks with a total capacity of 51.2 kg have been mounted. The use of a modular drive also facilitates servicing as its main components are now accessible from floor level.

Long range

Thanks to the hydrogen technology applied and an increased number of new, light hydrogen tanks, the brand-new bus will perform excellently on longer routes. It will be able to cover about 350 km on a single refill in various weather conditions. Full refuelling of the vehicle takes around 20 minutes. Depending on the configuration, the bus will be able to carry up to 140 passengers. The latest model can be type-approved as a class II vehicle, which makes it possible to deploy it on inter-city routes.

Best safety systems

Clients will be offered the possibility of customising the bus to cater for their individual preferences. The bus will be available

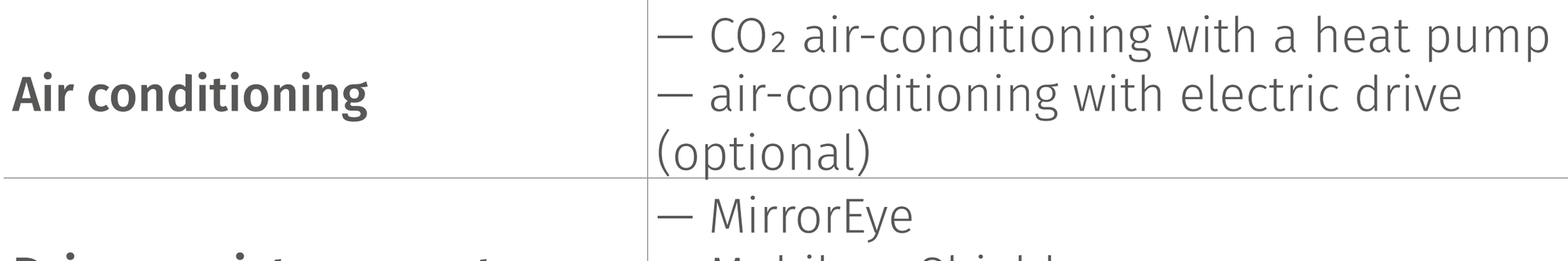
with four door arrangements: 2-2-2-0, 1-2-2-0, 1-2-2-2 and 2-2-2-2. As standard, the new model will feature an air-conditioning system for the passenger compartment with a heat pump, which uses heat drawn in from outside to create the right vehicle temperature. The air conditioning in the driver's cabin is powered by the passenger compartment unit. As regards additional features, clients may choose from a variety of solutions, for example, they may opt for ADAS, i. e. advanced driver assistance systems such as MirrorEye or MobilEye Shield+.

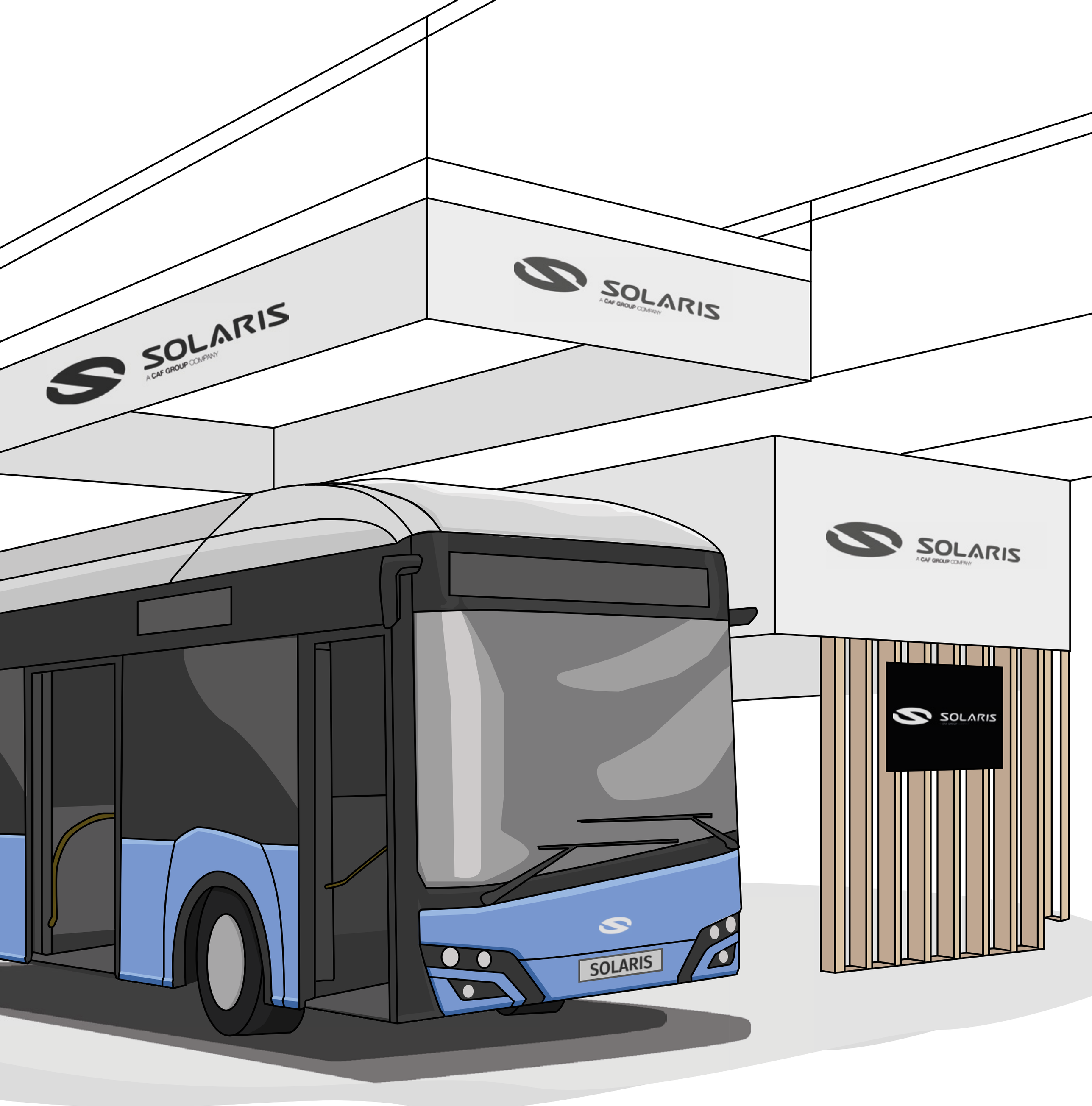
The first deliveries of the 18-metre articulated vehicle will be possible as early as the second quarter of 2023.

Solaris Urbino 18 hydrogen

Technical data

Dimensions	L 18,000 mm, W 2,550 mm, H 3,300 mm
Front overhang	2,700 mm
Wheelbase	5,900 / 6,000 mm
Rear overhang	2,700 mm
Engine	Central motor
Hydrogen fuel cell	100 kW
Hydrogen tanks	— Composite tanks 5 x 312 l — Composite tanks 3 x 190 l
Batteries	Solaris batteries with capacity of ca. 60 kWh
Charging system	Plug-in (for servicing purposes)
Front axle	Independent axle
Centre axle	Neutral axle
Drive axle	Portal axle – central engine standard
Door arrangement	2-2-2-0 Optional: 1-2-2-0 / 1-2-2-2 / 2-2-2-2
Entrance height	320 mm
Articulation mechanism	Electronically controlled
Passenger capacity	Up to 140 passengers depending on the configuration and equipment
Maximal number of seats	53
Maximal number of seats available from low floor	20
Air conditioning	— CO_2 air-conditioning with a heat pump — air-conditioning with electric drive (optional)
Driver assistance systems	— MirrorEye — Mobileye Shield+ — Touch screen
GVW (gross vehicle weight)	29,000 kg

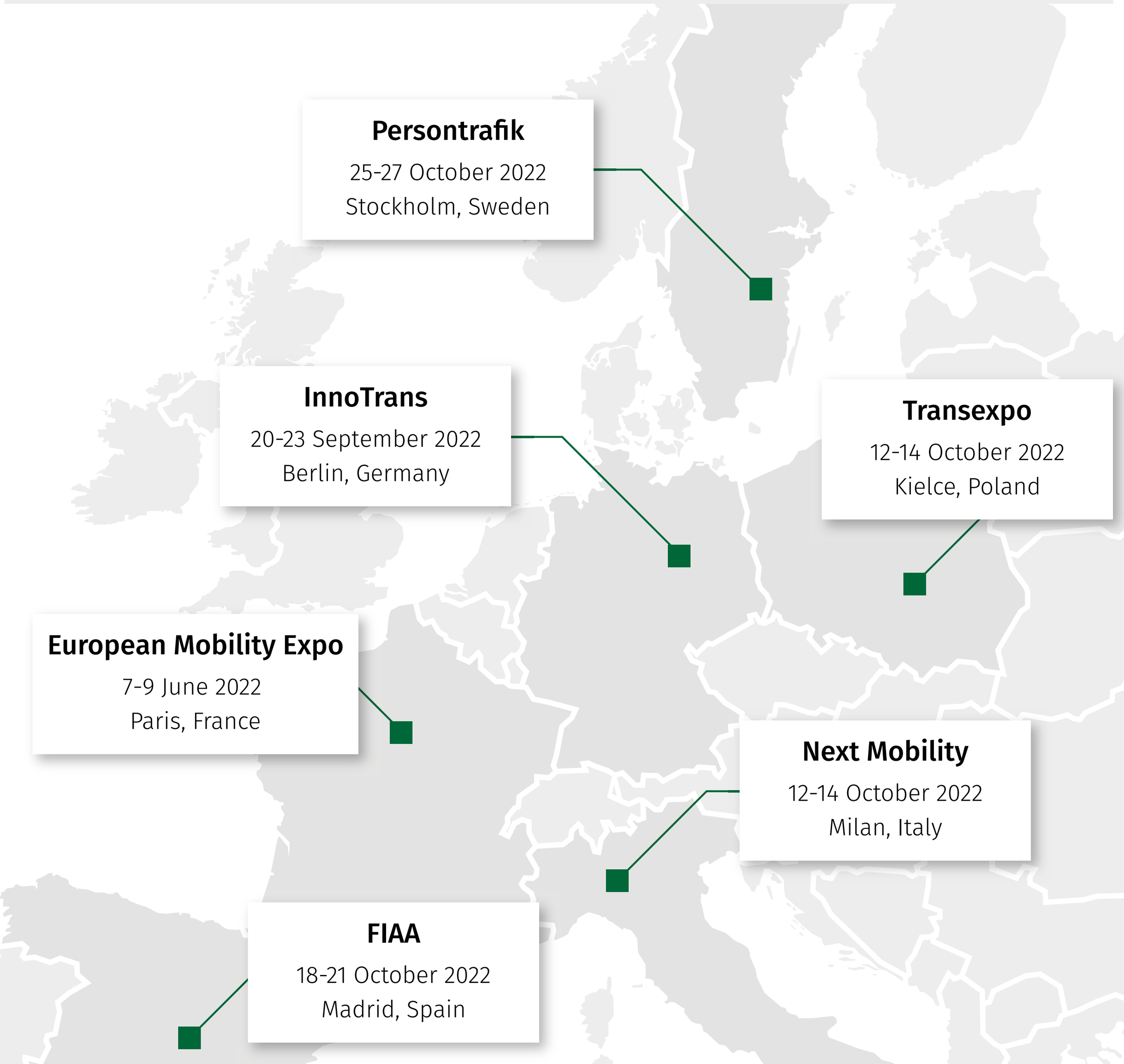




Trade fair tour by Solaris in 2022

At various industry trade fairs held in recent months throughout Europe, Solaris presented its broad range of e-mobility solutions: a new battery generation, an innovative hydrogen-fuelled bus and flexible battery solutions.

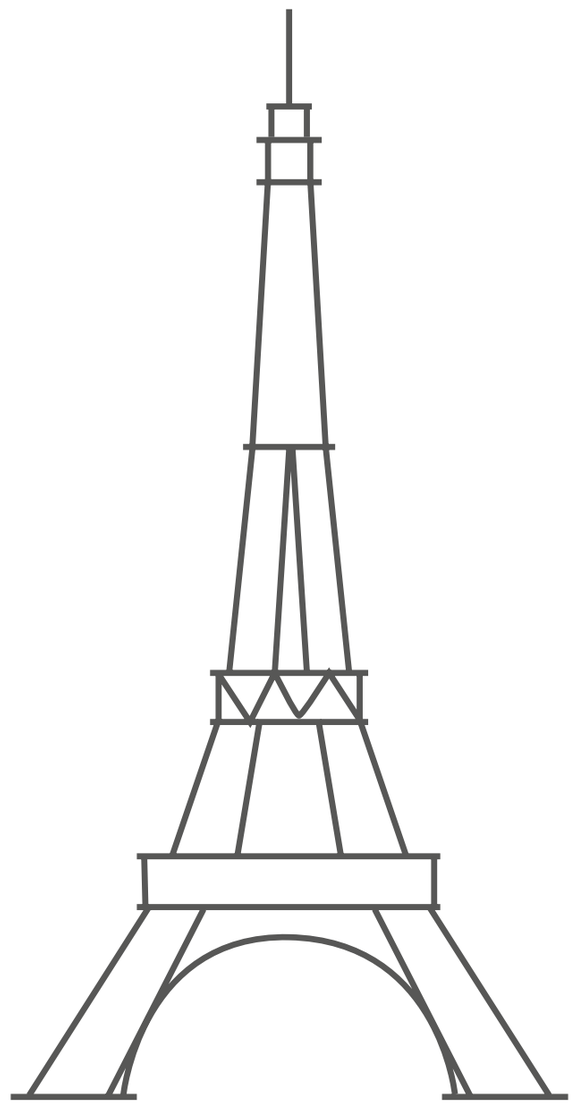
Back in 2011, when Solaris unveiled its first electric bus, its offering included only one battery option. Since then, the company has extended its technical competence in the area of e-mobility remarkably. Solaris's extensive experience, gathered from operating vehicles in over a hundred towns and cities in various climates, makes it possible for Solaris today to offer optimal, environmentally friendly solutions to its customers. Visitors at this year's public transport trade fairs across Europe could see this for themselves. Solaris has of course not been idle this season and demonstrated its latest and most innovative solutions at trade fairs in Paris, Berlin, Kielce, Milan, Madrid and Stockholm.



We would like to thank everyone who visited our trade fair stands for coming and for the interesting discussions that ensued!
See you at the next trade events!

Two zero-emission buses at **European Mobility Expo**

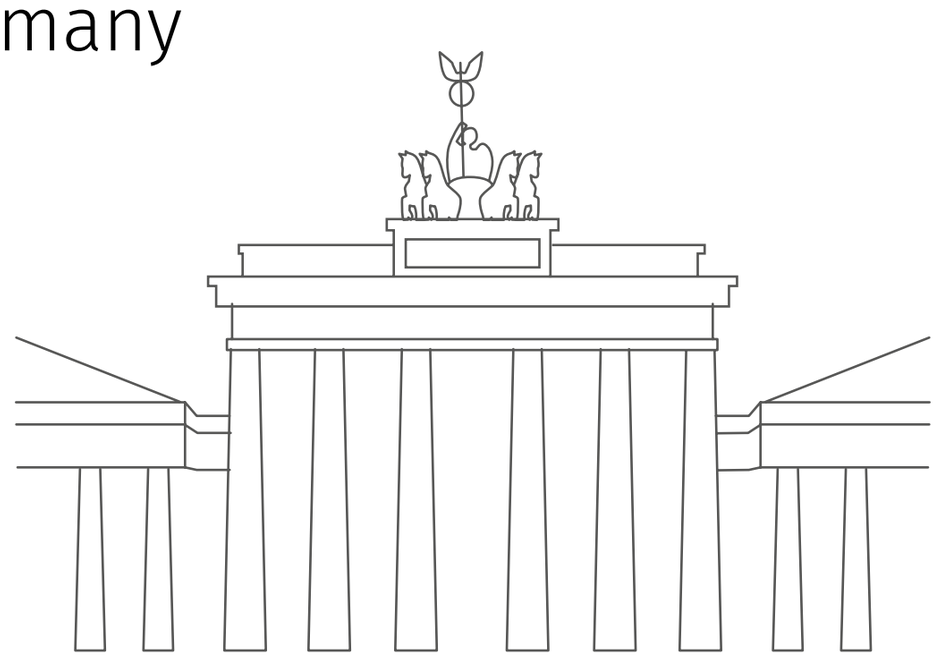
7-9 June 2022, Paris, France



The European Mobility Expo 2022 trade fair, held in Paris, focused on public transport and sustainable mobility. As a manufacturer that has been investing in technologies to reduce the adverse impact of transport on the environment, Solaris was there among almost 250 exhibitors from over 60 countries. At the exhibition, Solaris presented two zero-emission cutting-edge vehicles. The visitors had an opportunity to take a closer look at two buses: the Solaris Urbino 12 hydrogen bus and the Urbino 9 LE electric vehicle, which is the shortest model in the manufacturer's range that can be type-approved both as a class I and class II vehicle.

New Solaris hydrogen bus at InnoTrans

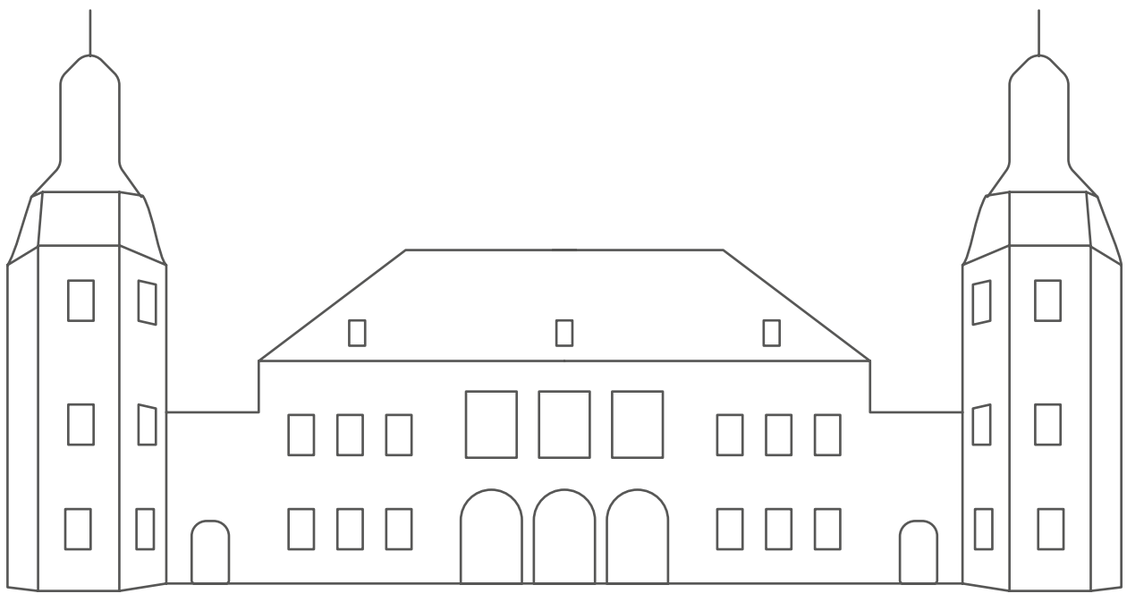
20-23 September 2022, Berlin, Germany



The 13th edition of InnoTrans, International Trade Fair for Transport Technology, in Berlin took place at the end of September, shortly after the official launch of Solaris's latest vehicle, the Urbino 18 hydrogen bus. Due to a pandemicinduced break, the previous, 12th, edition of InnoTrans was held in 2018. The zero-emission hydrogen bus from Solaris, on display in the outdoor Sommergarten Bus Display area, perfectly fitted into the main theme of this year's trade fair – innovation and environmentally friendly drives, with an emphasis on hydrogen drives. It is also worth mentioning that it was at InnoTrans in Berlin that the Urbino 18 hydrogen bus was presented for the first time to the wider public.

Transexpo and the latest battery solutions

12-14 October 2022, Kielce, Poland

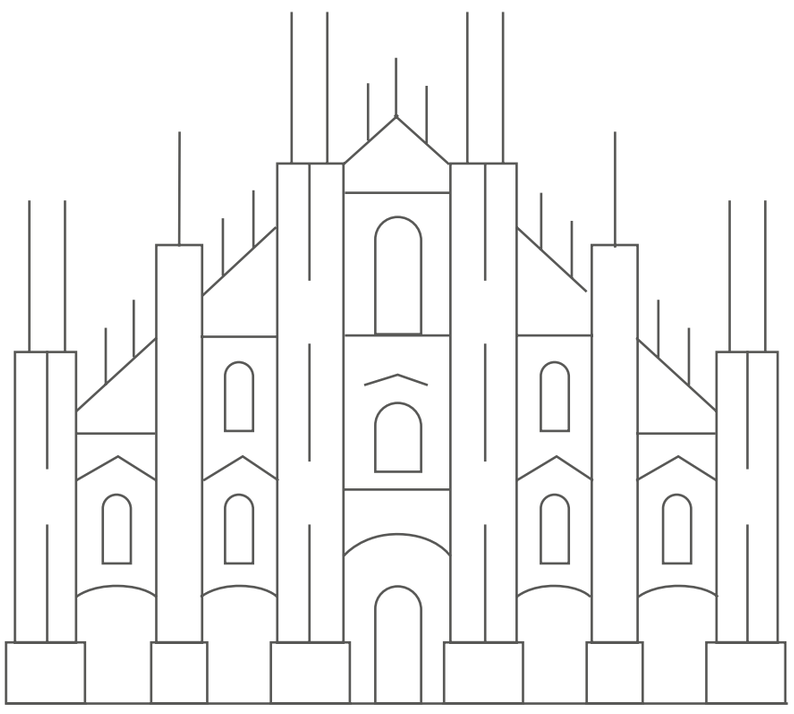


The 15th International Fair of Public Transport Transexpo focused on electric buses. Which is why battery electric Solaris buses had to be there too. One of them was the Urbino 12 electric bus, the flagship model of the bus maker, and the one most often chosen by clients. However, the bus on display with its very well-known design, has been equipped with new generation high-capacity batteries for even better performance parameters.

Another bus exhibited on Solaris's stand was the Urbino 18.75 electric bus, which was also awarded the Kielce trade fair medal for best product in the Bus category. Our classic articulated model was extended to increase the passenger capacity. The Urbino 18.75 electric on display was one of a whopping 183 units ordered by Norwegian carrier Unibuss AS from Oslo.

Next Mobility with our articulated hydrogen bus and electric midibus

12-14 October 2022, Milan, Italy

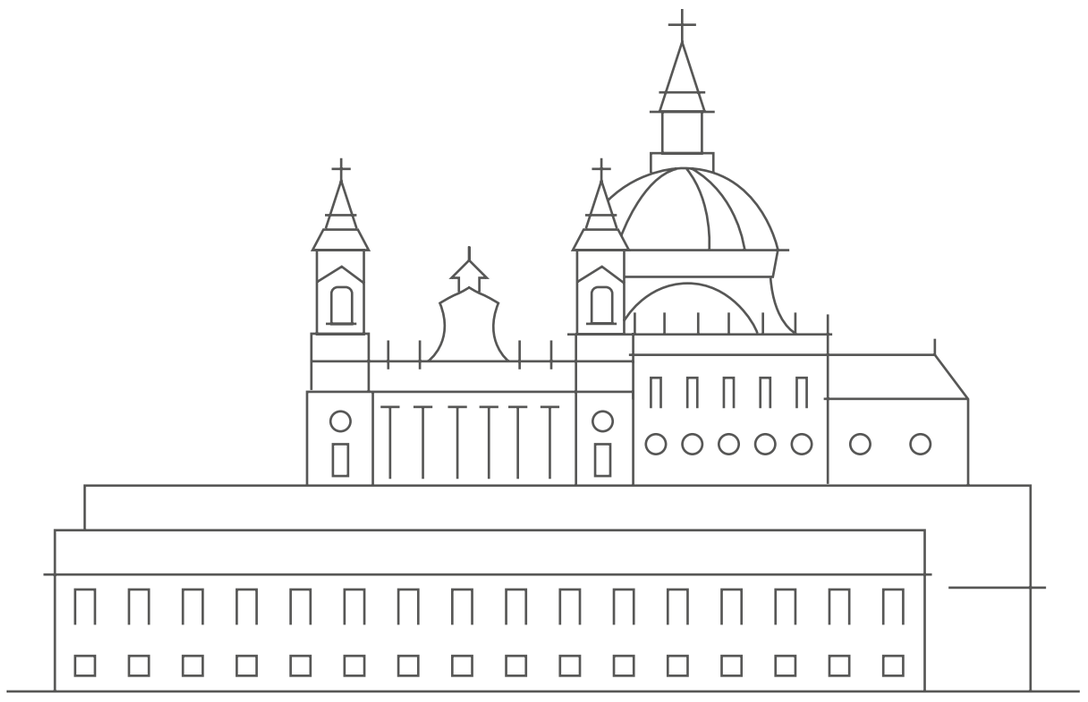


Vehicles, solutions, policies, and technologies for a sustainable mobility system – these were the themes of the international Next Mobility Exhibition dedicated to public transport. In Milan, Solaris decided to showcase its latest two bus models. One of them was the battery-powered Urbino 9 LE electric midibus that usually carries passengers in Bolzano on a daily basis. In addition, Milan was the first city in Italy to have the pleasure of seeing the articulated Solaris hydrogen bus on display. The event in

Milan was the second stop, after Berlin, on the European tour of the new Urbino 18 hydrogen vehicle.

9-metre e-bus at FIAA

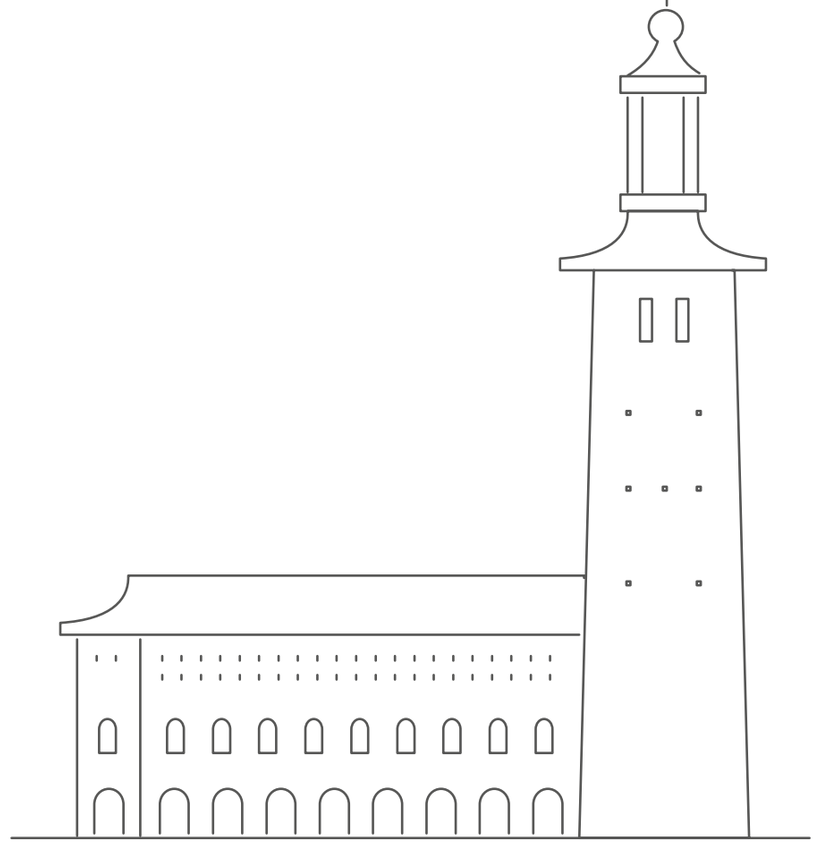
18-21 October 2022, Madrid, Spain



The FIAA (Feria Internacional del Autobús y del Autocar) is the second biggest trade fair in Europe for getting to know the wide range of products, technologies, and services available on the public transport market. The event also involves the showcasing of new bus and coach models. This leading trade fair also hosts the prestigious European Minibus of the Year award. It is also for this reason that Solaris decided to present the smallest bus in its portfolio there, the Urbino 9 LE electric bus, which aroused great enthusiasm and appreciation on the part of trade fair visitors.

Two e-buses at Persontrafik

25-27 October 2022, Stockholm, Sweden



One of the most important events for the public transport industry in Europe returned after a four-year hiatus. This year's Persontrafik took place in Stockholmsmässan, the famous exhibition facility in Stockholm. At stand C15:40, Solaris Bus & Coach showcased one of the company's latest solutions for electric urban transport. The buses demonstrated in Stockholm, the Urbino 15 LE electric and the Urbino 18.75 electric, have been designed specifically with the needs of Scandinavian markets in mind. They feature such unique solutions as additional insulation of the side walls, roof, and chassis (around the wheel arches), double-glazed side windows and heating mats installed in the floor around the door.

Strategic goal:
Sustainable transport

As soon as next year, public transport in Poznań will enter the hydrogen age. We talk to Krzysztof Dostatni, CEO of public transport operator MPK Poznań about investments in environmentally-friendly public transport, preparations to include 25 hydrogen buses in the fleet and future development plans.

Customer Magazine: Investments made by Polish public transport operator MPK in environmentally-friendly public transport over the last few years are impressive and in many respects ground-breaking. What is your main motivation behind these activities?

Krzysztof Dostatni: Public transport company MPK Poznań is open to new technologies and ready for any challenges. We keep up to date with industry and, as far as possible, financial news and make the most of available solutions. Why? Because we care about residents and passengers. And because we care about our company's growth and about its employees. We want public transport in Poznań to be modern, accessible, reliable, and at the same time environmentally friendly. This is important as we need to bear in mind the requirements imposed on us by the E-mobility and Alternative Fuels Act. In this respect, we are already following the policy of the city of Poznań and its "Strategy for e-mobility development for the city of Poznań until 2035", which sets out its "Strategic objective II – Zero- and low-emission passengers". This document indicates clearly the direction of measures to be undertaken to transform public transport into passenger-friendly transport that generates ever lower emissions.

CM: The fleet of MPK Poznań now boasts 58 e-buses. What is your experience operating them?

KD: The first e-buses in Poznań went into operation in 2019. They have performed well although we have not been spared certain "teething troubles", which the manufacturer has quickly dealt with. The deployment of e-buses entailed the construction of charging infrastructure. E-buses in Poznań can be charged using two charging methods: cable charging, employed mainly when parked in the depot, and a pantograph, to recharge the batteries quickly at terminal stops when being operated. MPK Poznań also has mobile charging stations.

CM: As soon as next year, public transport in Poznań will enter the hydrogen age. And right away, carrier MPK has purchased an impressive 25 hydrogen buses. How long did it take you to take the decision to include hydrogen vehicles in your fleet?

KD: Based on our extensive experience in raising both European and domestic funds, as soon as we found out about the opportunity provided by the Green Public Transport programme, we submitted our application. We applied for funding to purchase 84 e-buses with a hydrogen fuel cell and to build a hydrogen refuelling station. The funds were awarded on a first-come, first-served basis, which meant that the application had to be prepared as well and as quickly as possible, even though it concerned an area that was completely new to us.

Our application was approved, however interest in the programme was so high that the National Fund for Environmental Protection and Water Management deemed our project impossible to be implemented in its entirety. Following approval of the application, we were offered funds, admittedly a limited amount, but it was still the highest amount granted among the applications submitted in this call for proposals. It was agreed that we would purchase 25 standard-length buses. Taking into account this number of vehicles, we decided that, at least at first, it would not be necessary to build our own hydrogen refuelling station. The project was the result not only of excellent team work by many MPK Poznań employees, but also of their enthusiasm, commitment and perseverance.

CM: What kind of measures need to be undertaken, apart from raising funds, selecting the supplier and purchasing the buses, to introduce hydrogen solutions to a fleet?

KD: Naturally, a new type of vehicles poses a challenge, on the other hand, we stand a chance to gain new experience, knowledge and skills. The supplier of vehicles will be obliged to provide our employees, including drivers and service technicians, with training on servicing hydrogen vehicles. We, on the other hand, will retrofit our facility to service this type of bus.

CM: How will hydrogen be supplied to ensure the operation of 25 buses in the city?

KD: MPK Poznań has already signed a contract for hydrogen supplies. The oil industry company PKN Orlen, which submitted the winning bid, plans to build the requisite infrastructure at its petrol station located at Warszawska street in the vicinity of the bus depot. This will be a facility open to the public, which means that not only buses of MPK Poznań will be refuelled there but also any other user of hydrogen-powered vehicles will be able to benefit from it. Pursuant to the contract concluded with Solaris Bus & Coach, the first hydrogen buses will hit the streets of Poznań in the second half of 2023. That will also be the moment when regular hydrogen fuel deliveries will start.

CM: Does the purchase of 25 Urbino 12 hydrogen imply that you are going to turn your back on e-buses?

KD: For years, MPK Poznań has been gradually replacing its vehicles with ones that meet the highest emission standards, as this translates to better air quality in the city, and increased quality of life for Poznań's residents. This applies both to our tram and bus fleets. We

are aware that we are responsible for the environmental impact of our vehicles, but we are limited by the resources at our disposal. It is no secret that the prices of electric or hydrogen buses are much higher than those of vehicles with conventional drives, and it is only the possibility of using EU or domestic subsidies that allows us to meet expectations. MPK Poznań is looking optimistically towards hydrogen technology and believes that hydrogen is the future of public transport. However, we still plan further investments in standard electric buses.

CM: Do you intend to visually distinguish your new buses? Our customers often opt for additional wrapping or colours quite different from the usual livery.

KD: Conceptual work on visually distinguishing the hydrogen buses is already underway. We want to maintain the existing colour combination, i. e. green and yellow with a metallic and pearl effect, which is very well-known to Poznań residents, but we will certainly additionally single out the new vehicles. We will try to surprise our passengers to some extent. Perhaps it will be an additional wrapping, as is the case with e-buses, or perhaps it will be something else...

CM: What other ambitious goals does MPK Poznań set itself and what challenges does the changing economic and social environment entail?

KD: Public transport is one of most important tasks when it comes to the functioning of a city. The environment, especially recently, have been changing very rapidly. The pandemic and the war in Ukraine do not make it easy for companies like ours, where the modus operandi consists in providing services rather than generating profits. Guaranteeing the highest possible service standards means constantly balancing between having funds and spending them. We are aware of the increasing expectations of our passengers, hence we continually invest in modern, environmentally-friendly, air-conditioned and low-floor vehicles. Without great support in the form of EU subsidies, it would be difficult, if not impossible, to implement projects and thus to make a change for the better.

Our goals are identical to those of the city, and they relate not only to the fleet. We want public transport to be more attractive so that residents choose it over their own vehicles. For this to happen, public transport must be reliable, punctual, accessible, comfortable, etc. Therefore, the city of Poznań is continuously improving the ITS system, prioritising public transport vehicles, introducing bus lanes, bike boxes at intersections and installing tram-bus lanes. At the same time, it is investing in vehicles and expanding the tram network and interdependent infrastructure. We want public transport to be increasingly attractive and environmentally friendly as well as beneficial to residents, including passengers and public transport employees.

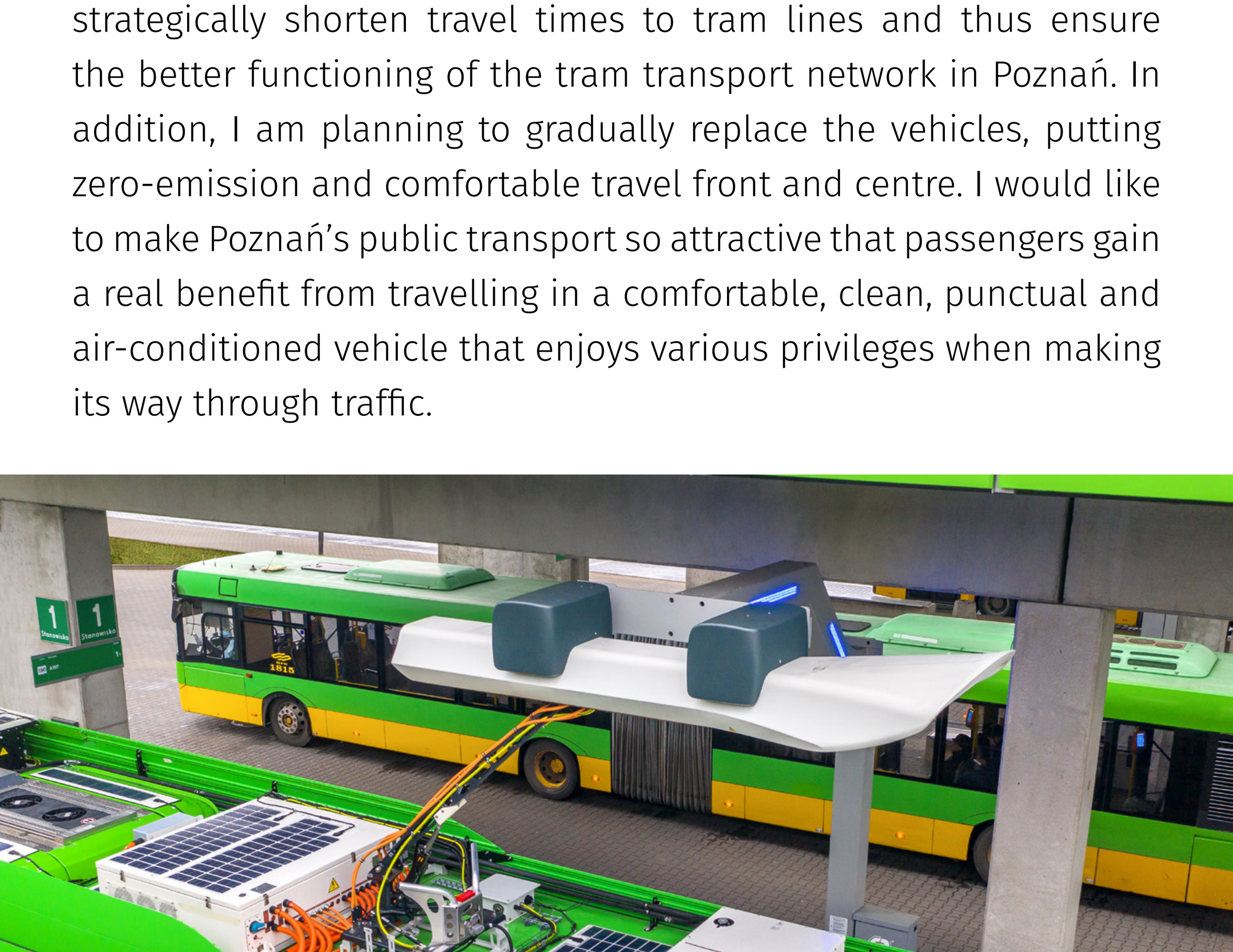
MS: To finish, let's move onto... the future? What do you think public transport will be like in 20 years?

KD: WI believe that, along with urban sprawl and increasing environmental awareness, transportation in cities in the near future will be

substantially different from what we have today. The problem of traffic jams and air pollution should be solved by modern technologies and a change in thinking regarding mobility, which is heading towards zero-emission, autonomous and shared mobility.

According to estimates from international organisations, by 2050 some 68% of the world's population will live in cities. This means that already existing problems related to air pollution, congestion and the shortage of parking space may be exacerbated in the future. That is why it is so important to develop an appropriate concept for a transportation system to provide city dwellers with a high quality of life, taking into account the good of the environment.

This is a long-term and more general view of things, but looking 20 years ahead to our area of operation, I would like to see a new tram depot built in the north-western part of Poznań, which would strategically shorten travel times to tram lines and thus ensure the better functioning of the tram transport network in Poznań. In addition, I am planning to gradually replace the vehicles, putting zero-emission and comfortable travel front and centre. I would like to make Poznań's public transport so attractive that passengers gain a real benefit from travelling in a comfortable, clean, punctual and air-conditioned vehicle that enjoys various privileges when making its way through traffic.



Charging Park

Impressive investments

At the end of September Solaris launched two new investments carried out on the company's premises in Bolechowo: the new Warehouse Hall and an innovative Charging Park for electric vehicles.

For many years now Solaris has maintained its leading position when it comes to delivering low- and zero-emission urban transport solutions to towns and cities throughout Europe. Keen to be in the vanguard of manufacturers that have a real impact on the green shift in public transport, the company is continually investing in further development. Among many other initiatives that have been implemented in recent months, two deserve special attention: the 10,000 m2 of new warehouse space, equipped with cutting-edge logistics systems and solutions, and the Charging Park, a unique charging station for e-vehicles.

Ribbon-cutting ceremony

The two latest investments by Solaris were launched at an official opening ceremony on Thursday, 29 September, in the presence of invited representatives from local authorities, business partners and media. Both the Warehouse Hall and the Charging Park have been built directly on the premises of the factory in Bolechowo, near Poznań, where the company's headquarters are located.

Warehouse Hall:
a key role in the supply chain

The new Warehouse Hall has a surface area of 10,000 m2. It has been built in the immediate vicinity of Solaris's factory, with which it is connected by roads and utilities. The new warehouse plays a key role in the supply chain for parts and components needed for the manufacturing of Solaris buses and trolleybuses.

The Hall is equipped with a modern multi-level warehouse platform with an automated conveyor belt. Almost 25% of the total space of the Warehouse has been dedicated to office and social space. Advanced smoke detection systems have been installed throughout the facility, and the equipment used in the new Warehouse has been

fitted with special covers to dampen the noise generated by daily operations.

The new warehouse facility has a reinforced roof, with 572 photovoltaic cells with a total capacity of 260 kWp. In addition, 80 kWp charging stations have been erected on the site.

There are also plans to retrofit, among other buildings, the Delivery Hall and the new Service Workshop with photovoltaic panels, as well as to install photovoltaic cells on the parking shelters.

Charging Park:
a central site for charging e-buses

The Charging Park is an innovative, multi-bay charging station for battery-powered vehicles: e-buses, hydrogen buses and trolleybuses. This investment in our own Charging Park - a single central site for charging e-buses - marks a natural step in the dynamic development of Solaris's zero-emission range. The Charging Park has been developed to demonstrate to our clients novel charging solutions for Solaris buses. In addition, it offers one more unique feature: it enables us to test new technologies and functionalities as regards the charging and discharging of the e-vehicles we have manufactured.

The Charging Park consists of eight charging bays, pantograph infrastructure, plug-in charging stations, a section of overhead trolleybus wires, an interactive kiosk with an LCD screen, and a technical room.

This is the first bi-directional charging park supporting Vehicle-to-Grid (V2G) functionality in Poland, i. e. a bidirectional energy flow between vehicles and the grid. This technology makes it possible to flexibly charge and discharge buses. It allows us to discharge buses for test purposes and to use them as mobile energy storage facilities, which leads to more effective cost management.

Covering an area of 5,000 m2, the Charging Park boasts cutting-edge charging systems produced by three suppliers:

The first charging system consists of two independent plug-in chargers with a power output of 150 kW, each featuring V2G. This innovative solution has been implemented and delivered with full bi-directional capability (charging and discharging bus batteries) for the first time ever in the Polish market and is one of the first of its kind in the European market.

The second system consists of an innovative charger with eight charging points (with a power output ranging from 150 kW to 600 kW) that can charge three vehicles at the same time. This charging station is fitted with current collectors compatible with all pantograph types used by Solaris (a roof-mounted pantograph, an inverted pantograph, and a ride & charge system). In addition, the charger boasts three cable-charging solutions. The first one is a liquid-cooled plug-in HPC connector that enables the vehicle to be charged at night with an output of up to 300 kW. With the other two charging connectors, buses can be charged with an output of up to 150 kW.

The last charging system in the Park is based on a charger with four charging points with a total power output of 360 kW, which enables the concurrent charging of two buses each with up to 150 kW, or it will enable the charging of one bus with a power output of up to 360 kW in the near future (only via pantographs). It supports two plug-in outlets, a roof-mounted pantograph and an inverted one.

Energy-efficient solutions

As with the Warehouse Hall, the Charging Park features photovoltaic panels, a fact which will increase the share of renewable energy used to satisfy the daily energy demands of the entire factory.

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“As one of the biggest employers in the region, we are particularly committed to continually improving and optimising solutions in our factory. Our aim is to effectively boost the company’s potential and to respond accurately to the market’s fast-changing needs. Therefore, we are constantly investing in developing our products technologically and in improving our production processes, as well as in creating new technologies that contribute to enhancing the quality of our work and boosting the competitiveness of our company.”

Dariusz Michalak, PhD. Eng.
Deputy CEO of Solaris Bus & Coach for R&D, Quality Assurance and Procurement

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Hydrogen in your fleet?

A short guidebook to organising the servicing of hydrogen vehicles

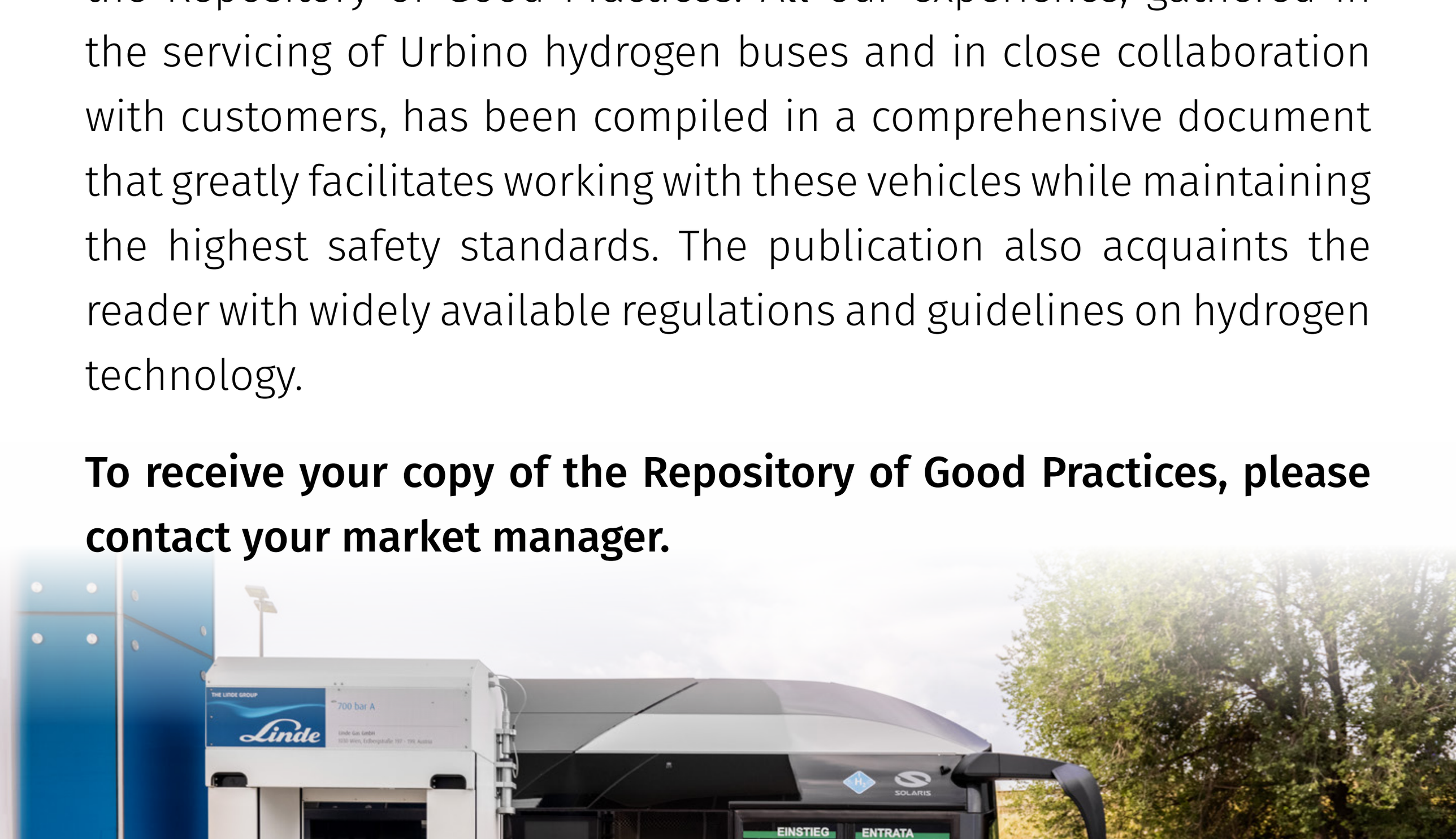
Are you considering deploying hydrogen vehicles in your fleet but don’t know how to start? Well, the implementation of new technologies can pose various challenges, particularly at the initial stage of deployment. Equipping the workshop, providing training courses for the staff or maintenance servicing – all this follows different procedures. When entering this new area, service technicians may need more instructions, a kind of a roadmap to show them the ropes. Responding to this demand, Solaris has drawn up a “hydrogen guidebook”. With this Repository of Good Practices, the addition of hydrogen-fuelled vehicles to the fleet will become even easier.

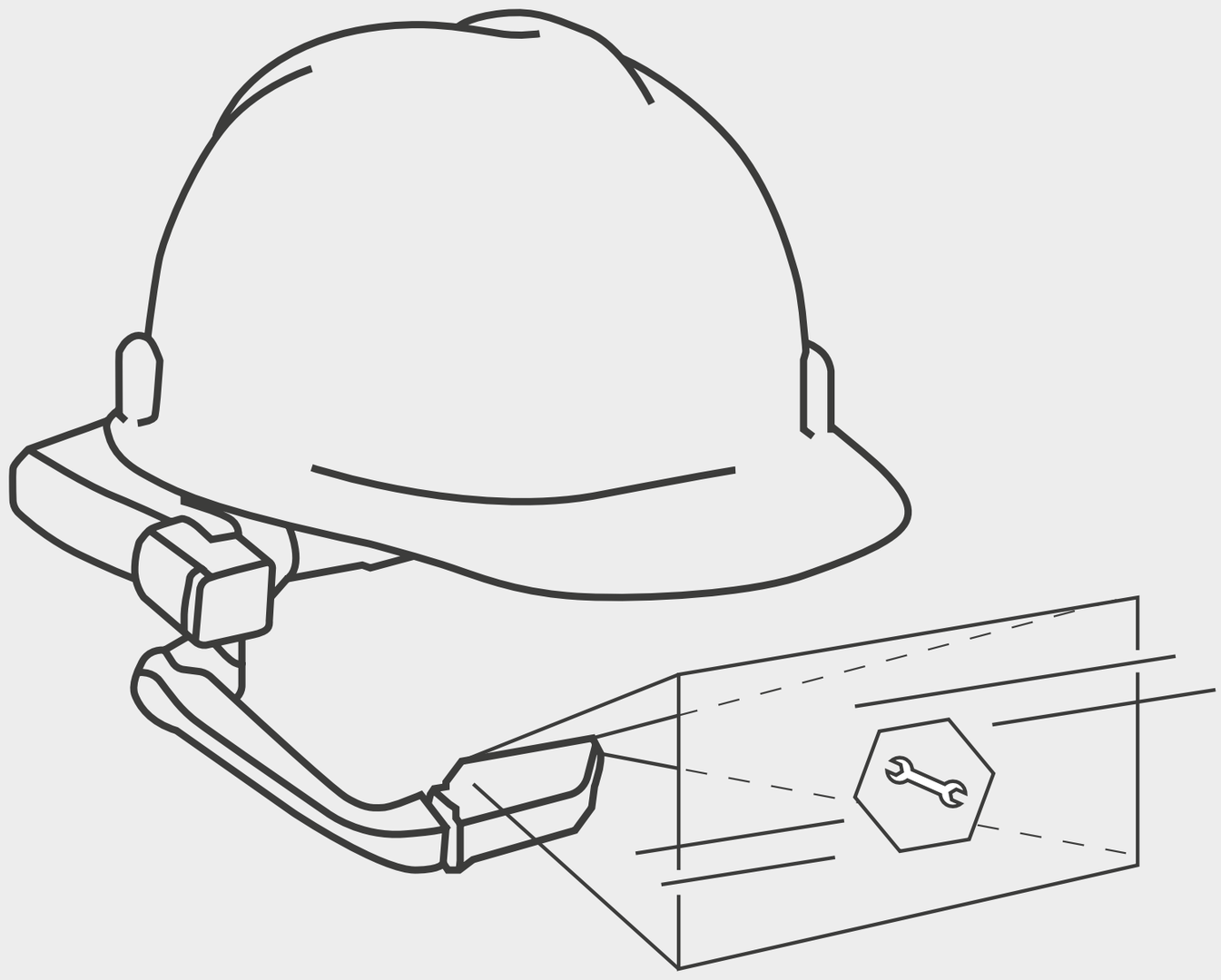
At a time when the share of zero-emission vehicles in transport operators' fleets is increasing, hydrogen-powered vehicles are consolidating their position alongside electric vehicles. Every carrier is invariably aiming to ensure the highest possible availability of its vehicles on the streets. For this to happen, they need to properly mobilise and manage the resources available to be able to provide maintenance services, including increasingly for hydrogen vehicles.

With the growing market interest in Urbino hydrogen models, Solaris has drawn up a special publication, the Repository of Good Practices. Step by step, the guidebook describes all the actions that need to be undertaken at each preparation stage: from the decision to deploy hydrogen technology to the moment hydrogen vehicles roll out onto the streets to carry passengers.

How do you adapt your workshop? Do you need specially trained staff? How do you ensure safety when using hydrogen technology? What does refuelling entail? Can a hydrogen bus be parked in a roofed hall? The answers to these all questions and more can be found in the Repository of Good Practices. All our experience, gathered in the servicing of Urbino hydrogen buses and in close collaboration with customers, has been compiled in a comprehensive document that greatly facilitates working with these vehicles while maintaining the highest safety standards. The publication also acquaints the reader with widely available regulations and guidelines on hydrogen technology.

To receive your copy of the Repository of Good Practices, please contact your market manager.





eSSyncroService,

or service support fit for the 21st century

The highest possible availability of vehicles – this is what public transport operators are always striving for. The rapid rectifying of faults, and efficient servicing, are key to ensuring the highest possible operability of bus fleets. However, the situation may become complicated when a vehicle featuring a new technical solution needs a repair or when a problem on a bus occurs for the first time ever. For unexpected faults and new challenges, service technicians may call on the support of Solaris's team of experts. Our "flying experts" are an integral feature of cooperation between us, the manufacturer, and our customers throughout Europe. Now, Solaris is expanding this service via the addition of new technologies such as augmented reality tools to further speed up servicing and maintenance work, if only by eliminating time-consuming travel to the customer.

How does eSSyncroService work?

The main tool of eSSyncroService is its unique goggles. Wearing these specially designed glasses, a service technician carrying out a repair may display any necessary technical documents with a voice command and access them while having his/her hands free. They have a view of the fault and, at the same time, they can see

a comprehensive scan of the vehicle or the necessary section of the service manual. These elements form a picture that is accompanied by instructions and the next steps to be taken. These can include remarks concerning the next steps in the repair, but also information on the safety rules to be observed at any given time.

The use of augmented reality (AR) technology in servicing vehicles may be extremely beneficial, including due to the possibility of contacting Solaris experts remotely. In more complex cases, Solaris experts can lead the technician step by step through the repair, and the technician is able to provide them with a real-time picture of the activity being carried out. The software allows them to apply markers on the virtual view to indicate the specific components to be repaired, thus making the work much easier.

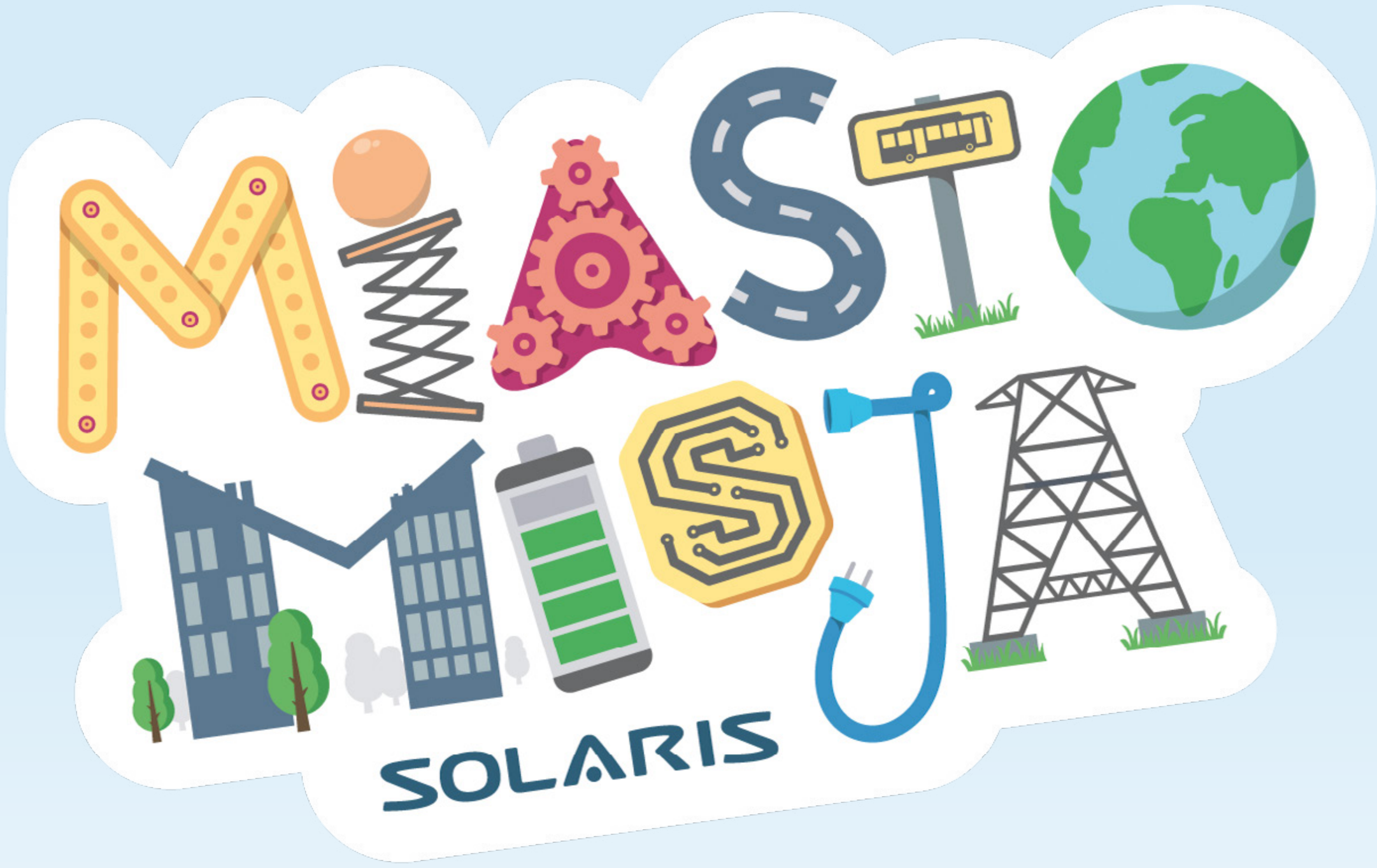
Importantly, eSSyncroService provides continuous access to the safety rules to be observed, at any given stage, by the person servicing the vehicle. Additionally, the tool makes it obligatory for the technicians to confirm that they have taken all safety precautions required at a given point in time, which increases their safety.

What are the benefits of eSSyncroService for the client?

eSSyncroService shortens repair times to the minimum and reduces the time during which a vehicle is out of service. Due to remote servicing and contact with Solaris experts, time spent travelling to the customer is eliminated. What is more, this solution offers a possibility to simultaneously contact experts from different places around the world, which means access to extensive expertise and high quality assistance, regardless of their location.

Who can use this solution?

We would like to invite each carrier that has Solaris buses in their fleet to use this service. eSSyncroService is developed based on scans of vehicles and their documentation. They can easily be done for every client who wants to deploy this modern tool in their fleet.



Green prizes

for creativity and the power of the imagination

The first edition of the #CityMission by Solaris initiative to promote public transport among children has come to an end. Green prizes, i. e. breathing murals and an air-purifying vertical garden, have been installed in three primary schools in Poznań.

#CityMission by Solaris is an educational initiative initiated by Solaris in spring 2022. The project consisted of three elements: environmental workshops, a location-based game, and a contest, where pupils could win breathing murals and an air-purifying vertical garden. The task was to design a cutting-edge environmentally friendly bus of the future. The works sent by participants turned out to be extremely creative and original, and the contest jury had a tough nut to crack when selecting winners.

THE WINNERS WERE:

Primary School No. 19, os. Oświecenia 1, Poznań
Team: Eko 19-nastka, **Prize:** breathing mural

Polish-English Bilingual Private Primary School, ul. Piwna 1, Poznań
Team: π-wna, **Prize:** breathing mural

School and Kindergarten Complex No. 1, os. Łokietka 104, Poznań
Team: Krejzolki Konstruktorki, **Prize:** vertical garden

Team: π-wna, Polish-English Bilingual Private Primary School

Team: Eko 19-nastka, Primary School No. 19

Team: Krejzolki Konstruktorki, School and Kindergarten Complex No. 1

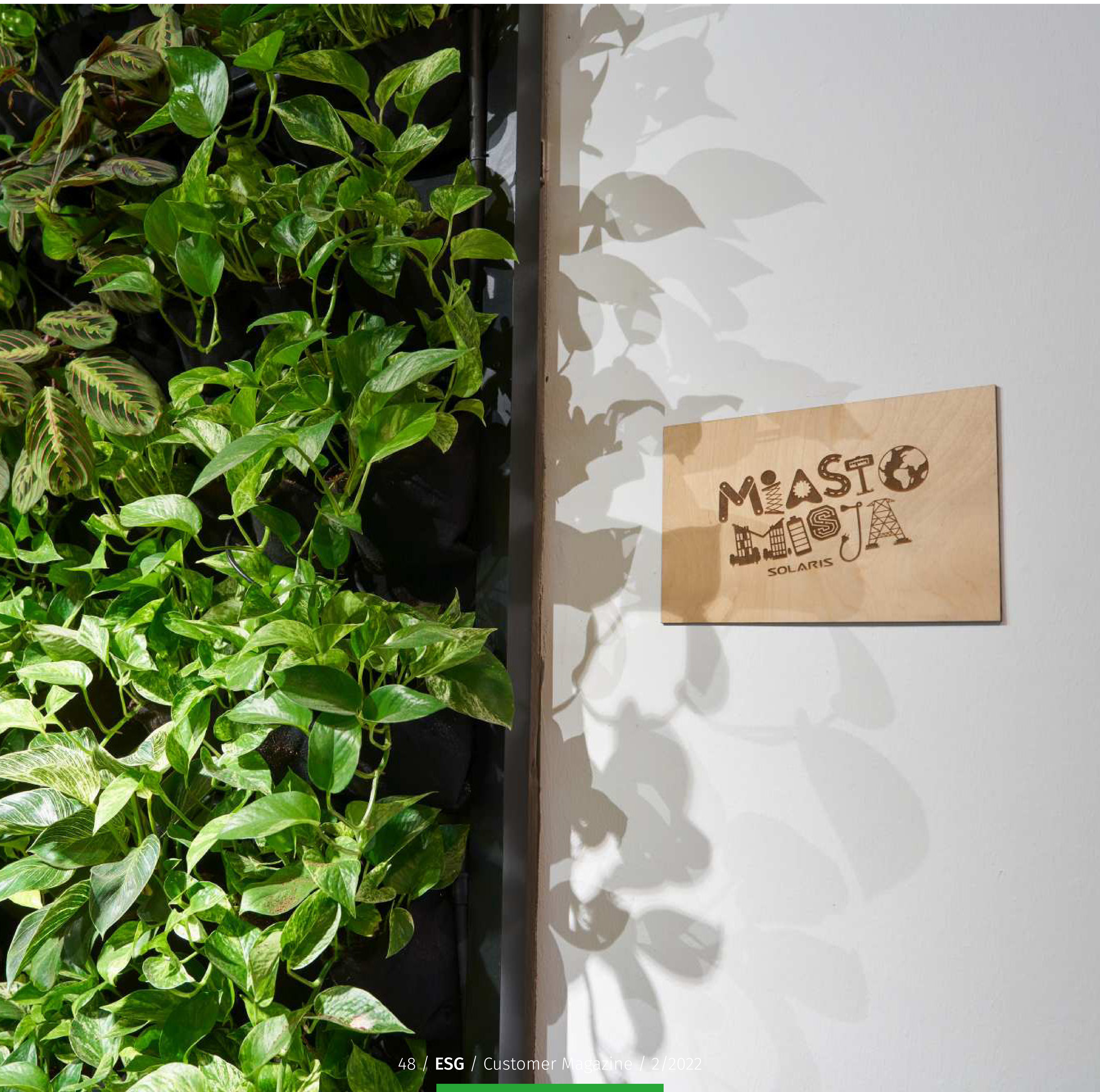
The green prizes have already been installed on the premises of the winning schools. They now improve air quality in the school surroundings, as well as create an original and creative space for spending time together.

The breathing murals have been designed together with pupils from the winning teams and they include references to their contest entries. The person responsible for installing them was a graphic artist specialising in wall paintings. The murals were painted using photocatalytic paints. These contain titanium dioxide which, under the influence of UV radiation and in the presence of oxygen and water, causes pollutants, toxins and microorganisms to break down (oxidise). As a result, the colourful murals created on the premises of the winning schools not only visually enrich the common space, but also purify the air.

The vertical garden has been designed and installed with the help of qualified specialists who design green spaces. Plants placed in the green wall absorb carbon dioxide while releasing oxygen into the environment, and also absorb toxic pollutants emitted by any painted or varnished surfaces. The air-purifying green wall consists of 144 potted plants.

#CityMission by Solaris is the main project by Solaris in the area of corporate social responsibility and will be continued in the years to come. Via the project, the company wishes to enhance environmental awareness among young children, to encourage them to use public transport and to convince them of its advantages. In its first pilot edition, the contest was designed for pupils in grades 1 to 3 at primary schools in Poznań and the surrounding area. The choice of this location was not a coincidence as this is the region where Solaris originates from. Due to the very high interest this year, Solaris plans to develop this educational initiative in future editions.

For more information [LINK]



A sustainable company

Solaris’s next Sustainability Report is now available. By regularly reporting on its ESG activities, we emphasise how important social issues and environmental concerns are to us. Promoting the sustainable development of public transport has been part and parcel of the company’s activities since its very beginning and a large part of the report is dedicated to this issue. But that’s not all - this comprehensive document also describes how the organisation itself minimises its impact on the environment, how it operates in the social space, and how it ensures compliance with the best corporate governance standards.

The Sustainability Report 2021, published in September, is now Solaris’s second non-financial report, which confirms its determination to undertake ESG activities and report on them. As previously, the report has been drawn up in accordance with the international GRI reporting standards. Relevant sustainability

aspects and the scope of reported data have been selected with the involvement of stakeholders strategically relevant to Solaris's operations.

The report is available on the Solaris's website. What is more, the producer has created an interactive landing page with a summary of the report, which sums up the company's key ESG activities in 2021 in a reader-friendly way.

The document includes an extensive description of measures undertaken by Solaris as a response to challenges posed by increasing urbanisation as well as global climate and civilisation-related changes. It is split into four chapters: "Sustainable Cities", "Environment", "People" and "Corporate Governance".

Innovations to reduce energy consumption

A great deal of space in the report has been devoted to activities that lie behind the company's success stories, i. e. product innovations, various investments and resource-saving solutions, both applied in the production process and in vehicles when they are in operation. The Development Department's intensive work to increase the nominal energy capacity of our batteries has resulted, for example, in significantly higher vehicle ranges, and the Solaris Charging Park for electric vehicles, one of the most innovative sites of its kind in Europe, was among the remarkable investments carried out in 2021.

Eco-labels

Additionally, in 2021, Solaris began to conduct Life Cycle Assessment (LCA) studies for two of its bus types – the Solaris Urbino 18 electric and the Solaris Urbino 12 hybrid buses - and, in April 2022, it received Environmental Product Declarations (EPD) for these vehicles based on these LCA analyses. This assessment has allowed the company to identify processes, materials and components which have the greatest impact on the environment, and thus to devise measures to reduce their adverse effects on the environment.

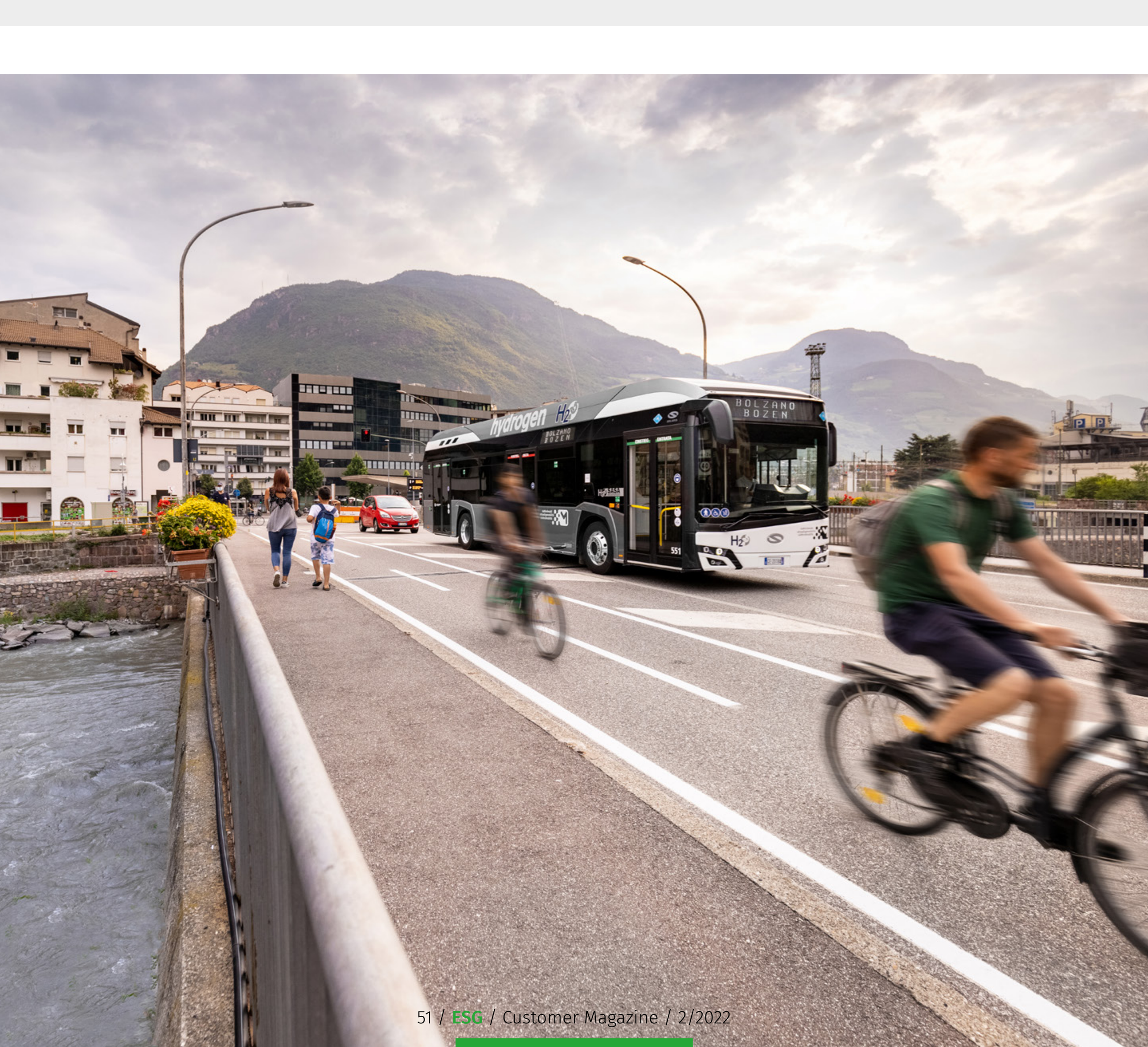
It is the people that matter

An important factor contributing to a company's growth is the development of its employees. In its report, Solaris sets out

a variety of activities undertaken for the sake of its employees to provide them with opportunities to improve themselves in areas that both support the achievement of business objectives and also broaden their professional skills.

As regards social issues, in 2021 the company put in train new educational initiatives for the younger generations to enhance their environmental awareness and encourage them to use public transport. The CityMission by Solaris project was devised for pupils in grades 1 to 3 of primary school and included a creative competition, educational workshops and a location-based game (for more about the finale of the project, already concluded in 2022, see page 45).

The report summary is available at: https://esg.solarisbus.com/ [LINK]



“Solaris has been striving to enhance the quality of life of city residents and to provide passengers with the best travel experience possible. As part of the CAF Group and as an international company with 16 subsidiaries Europe-wide, Solaris is fully aware of its impact on international communities and, at the same time, of its responsibility towards these groups. That is why Solaris is continuously working to reduce any potential adverse effects and to amplify the positive effects of its business activities, all of which have been presented in the Sustainability Report in a very detailed and comprehensive manner”.

Javier Calleja
CEO of Solaris Bus & Coach

We delivered a total of

1492

buses and trolleybuses

35%

of them are

zero-emission vehicles

at the place of use

We delivered our vehicles to

45 European towns and cities

346 e-buses
119 trolleybuses
54 hydrogen buses

41%

of our output was made up of

vehicles with alternative drives

We are the leader in sales of zero-emission buses in continental Europe, boasting a market share of over

15%

Modern Cities:

Nested transport

i.e. the **latest trends** in the development of urban transport networks

Not only a bus stop, but a whole ride, on demand – does that make sense? Definitely! One just needs to change existing modes of thinking, to exploit the potential of information technologies and the existing communication infrastructure. New trends in operating public transport networks provide answers to old challenges.

Encouraging residents to use public transport has been, for years, one of the main challenges faced by city authorities. Despite growing environmental awareness and the saturation of cities with cars, people often still opt to travel in their own car rather than take a bus or tram. The latest trends in organising public transport systems show a very interesting solution to this problem.

Nested transport

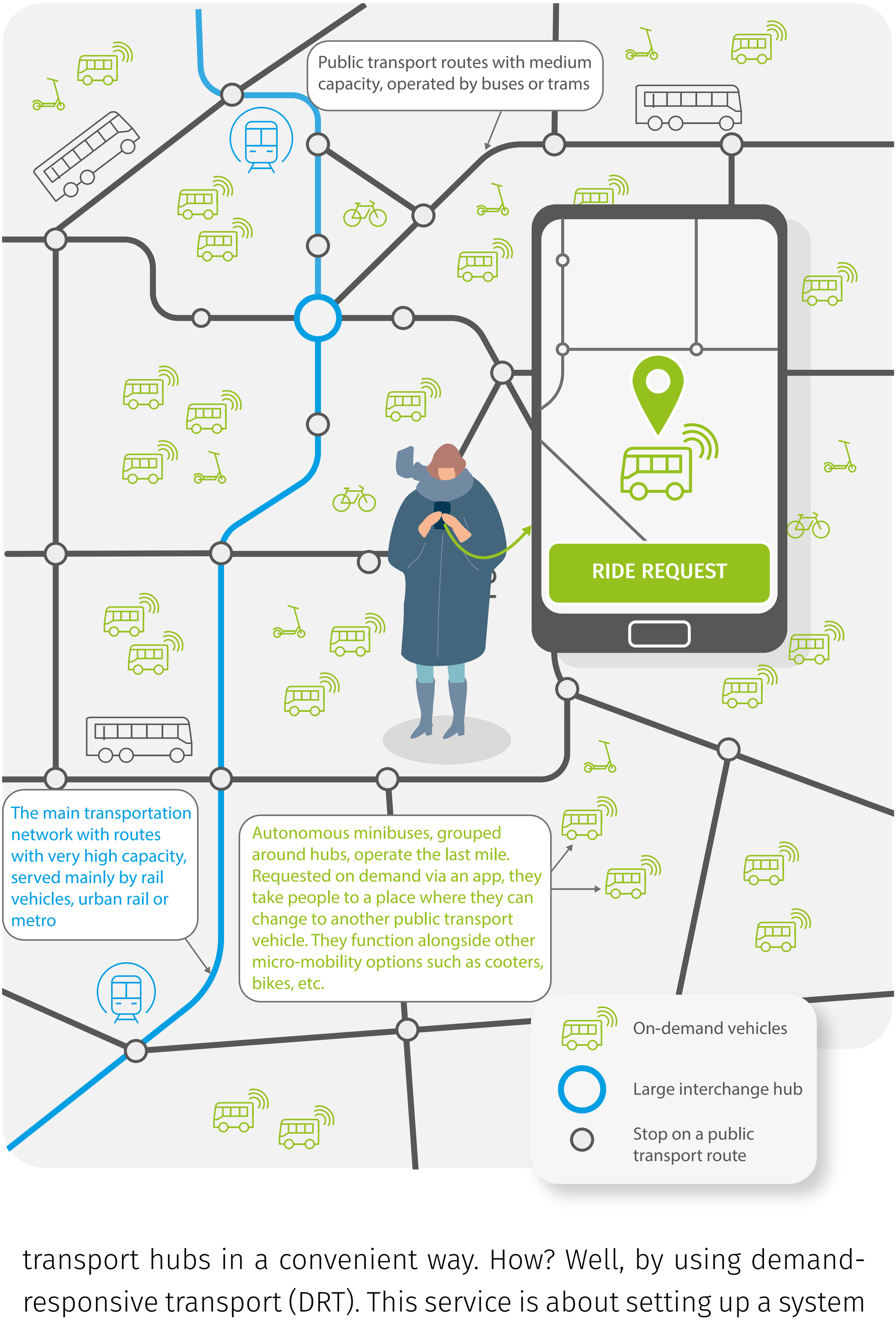
The idea of nested transport systems implies a completely new way of perceiving the public transport network and the role of a passenger. The previous approach assumed a rigid system to which residents were expected to adapt. Fixed routes on which public transport vehicles regularly run wend their way around towns and cities. On the other hand, a passenger needs to get to a specific place at a specific time to be able to use the public transport service.

While transparency and predictabil-ity are undoubtedly an advantage of this system, the problem lies in the above-mentioned rigidity and lack of flexibility. A city is a living organism, subject to constant changes, and a transport network, once established, does not always keep up with the needs of passengers.

Operators are very familiar with the problem of empty buses, where too few passengers ride on a given bus route, which naturally generates high costs. On the other hand, giving up on such a bus route would exclude people who use it regularly.

Another challenge is the problem of the first and last mile. Residents become discouraged by the distance to the nearest bus stop or an interchange hub, which makes the journey last much longer. This problem greatly affects older people and people with disabilities, who are simply not able to walk the distance to or from the bus stop by themselves. In such cases, it is much easier and quicker to use a car or a taxi, even taking into account annoying traffic jams or higher travelling costs.

So-called “nested transport systems” addresses precisely these problems. The main idea behind this transport system is to put the passenger’s needs at the centre and to enable them to reach



transport hubs in a convenient way. How? Well, by using demand-responsive transport (DRT). This service is about setting up a system of minibuses which run deep into residential districts or remote suburban areas. From there, they pick people up and take them to the next destination where they can change to another public transport vehicle: bus, tram, metro or suburban rail. Smart buses run solely when demanded by passengers who can summon the service by telephone or with a dedicated mobile phone app. Thus,

passengers get around the city quicker and more comfortably, and the operator doesn't have to operate bus routes with low passenger demand.

In this way, the public transport network is changing its character from a linear to a nested transport system, encompassing many mini hubs that are reached by passengers. Importantly, this change in the public transport system doesn't involve changes in the existing infrastructure. It is only about the complementary services and exploiting this infrastructure to the maximum extent.

Big data

Use of digital data is a very important element determining the success and efficiency of DRT-based transport. Their appropriate integration and ongoing updating are the basis not only for planning the routes operated by smart buses, but also for developing mobile applications for passengers that enable them to request a lift in a convenient way. By using such a tool on their smartphone, passengers can, among other things, check if there is a bus nearby that is going to their desired destination and, via an online request, request it to stop at the desired location. This makes it much easier to plan a journey from A to B, and the passenger is not discouraged from using public transport by waiting a long time at the bus stop. Operators, in turn, monitor in real time how the needs of residents are developing and see whether the services they offer are efficient.

Buses deployed to provide such transport services generate lower costs than maintaining regular routes served by larger vehicles. Their efficiency is also increased as they are dispatched only to destinations where they are currently needed.

Owl or squirrel?

Public transport on demand is not only an interesting idea for the future, but is actually an increasingly widespread solution currently being tested and deployed in numerous towns and cities across the world, for example, in Seoul, Singapore, Sydney, Frankfurt, Szczecin and Cracow, and in the region of Ile de France, and around Wales.

Particularly noteworthy is the case of Seoul, where smart buses set off at night (Owl Buses) or periodically during the rush hour, providing transport services for passengers on the most congested, short routes (Squirrel Buses). The operator provides a sufficient number of buses on a given route on the basis of big data analysis. At night, active mobile devices in a given neighbourhood are monitored, as well as the number of taxis being ordered. During the day, on the other hand, the buses are made available based on traffic intensity data.

This demand-responsive public transport solution is also rapidly developing in the French region of Il de France. Smart buses are already available in 21 designated zones around Paris, and residents can request a ride every weekday, either by phone or via a dedicated app.

Will the idea of nested transport and DRT services become part and parcel of the landscape of modern metropolises? Well, we will see for ourselves in the coming years, but one thing is certain – in our fight against pollution and congested streets, it is worth taking up the challenge.

SOLARIS
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We wish you a very **Merry Christmas**,
full of peace, joy and happiness!
May success and prosperity accompany you
and your nearest
and dearest in the New Year!

The Management Board
and Team at Solaris Bus & Coach