

Mod 17-0037P PDeb Pierre DEBANO 19 rue des Champs de Linette F 51200 EPERNAY Gare SNCF + 1500 m Mobile : + 33 (0)6 60 93 72 66 Mél : pdebano@laposte.net https://fr.linkedin.com/in/pierre-debano-a2b62a123	Note numéro : 22-1284V date : 14/09/2022 Classification Objet : Conférence Solaris E Mobility Urbino18 Hydrogène 14-09-2022 E-Mobility conference Présentation en première mondiale du Solaris Urbino 18 hydrogène Copies écrans et notes
Référence fichier 22-1284V PDeb Conf Solaris E Mobility Urbino18 H2 14-09-2022 Affaire	Distribution ABCTrans + solarisfrance@solarisbus.fr alisa.meyer@rvk.de
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Grand merci à Solaris pour avoir donné accès à tout le monde intéressé.

1 - Quelques réflexions

L'événement était annoncé dans la presse spécialisée sans donner le lien

Je vais donc sur le site Solaris

<https://www.solarisbus.com/>

Seulement voilà, rien sur la manifestation sur le site en français

J'essaie de changer la langue en cliquant sur le bouton FR, mais rien ne fonctionne. (depuis, cela fonctionne)

Au final, en navigant sur internet, j'ai trouvé le site avec accès direct en anglais. Il faut avoir envie de voir la manifestation

<https://www.solarisbus.com/en/premiere>

- Manifestation bien organisée en anglais. Il y aurait la transcription simultanée en bas de l'écran, cela aiderait notamment pour appréhender les valeurs données
- Les grands angles sont pénibles car on ne voit plus bien les diapositives présentées. Il faudrait centrer sur les diapositives et mettre le conférencier en vignette
- Des diapositives passent trop vite donc pas le temps de faire une copie écran pour certaines

Pas d'adresse mél des conférenciers sauf pour l'intervenant de Cologne. Donc impossible de les contacter

E-Mobility conférence

Dommage que l'on n'ait pas parlé plus des bus électriques batteries et du trolleybus, dont personne ne parle mais qui a le meilleur rendement des bus zéro émission

Débat très intéressant

Un intervenant français, dont j'ai compris parfaitement les mots anglais mais « je n'ai pas compris la question » !!!!!!!

Un intervenant a soulevé la question du prix avec chaque ville qui veut son véhicule spécifique, et il a bien eu raison

Des questions iconoclastes sur l'hydrogène auxquelles il n'a pas été vraiment répondu. Là aussi la transcription des questions réponses téléchargeable sur internet serait intéressante

Présentation Solaris Urbino 18 hydrogène

Vidéo magnifique en termes de communication

<https://www.solarisbus.com/en/premiere>

Concernant le véhicule, bravo au designer, on est enfin sorti de ces élucubrations « disaires » non fonctionnelles qui ont conduit chez Solaris au « Tram Style » (moins 5% en capacité pour le trolley 18 m de Salzbourg) et chez Van Hool au METTIS. Heureusement, ces deux constructeurs sont revenus au raisonnable (Van Hool avec sa série A) avec face avant verticale, double porte à l'avant et pas de caches roues, et cela fait de très beaux véhicules. Comme l'a fort justement dit la représentante des transports de Cologne lors du débat précédent, les voyageurs attendent que le bus passe à l'heure, et elle s'est arrêtée là.

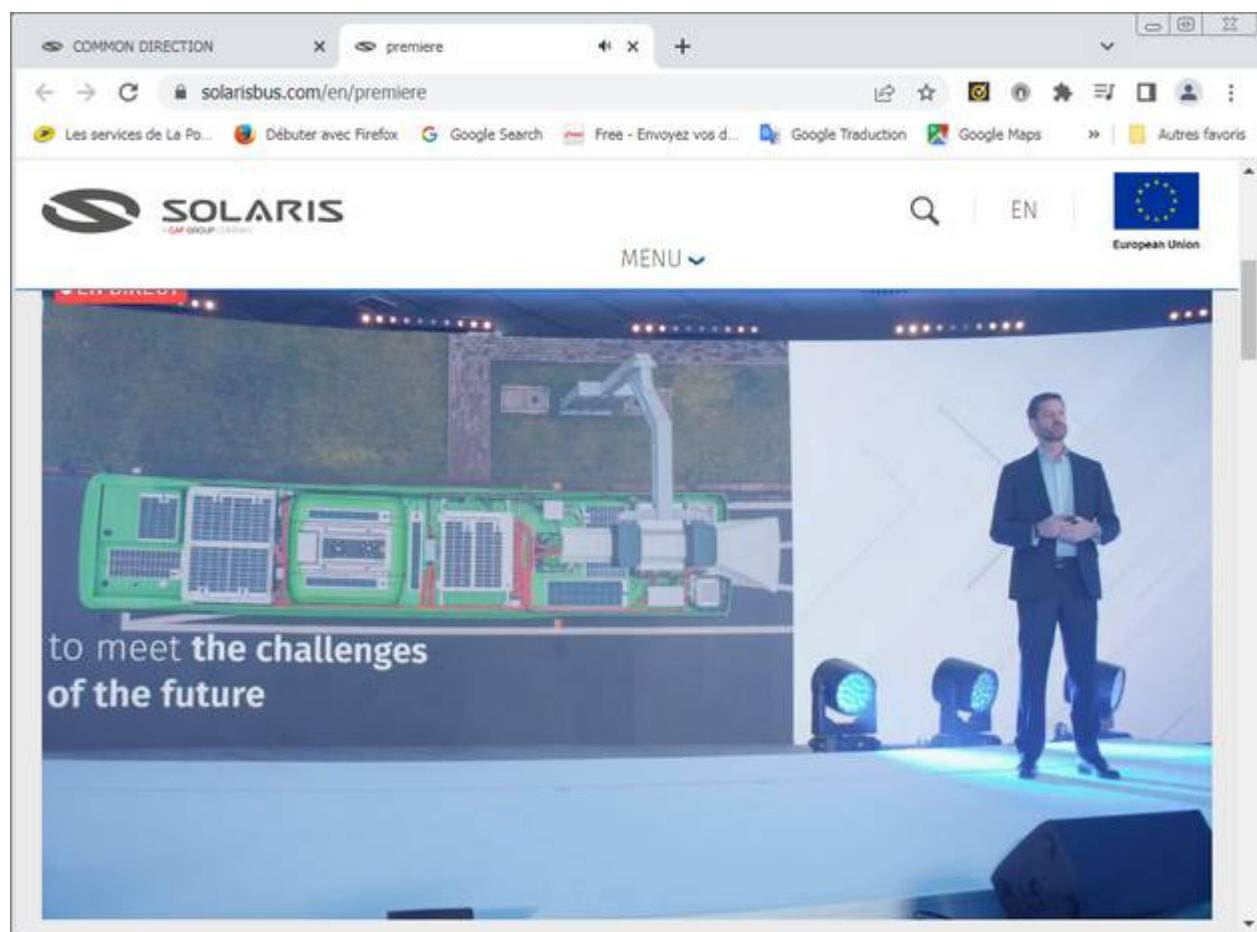


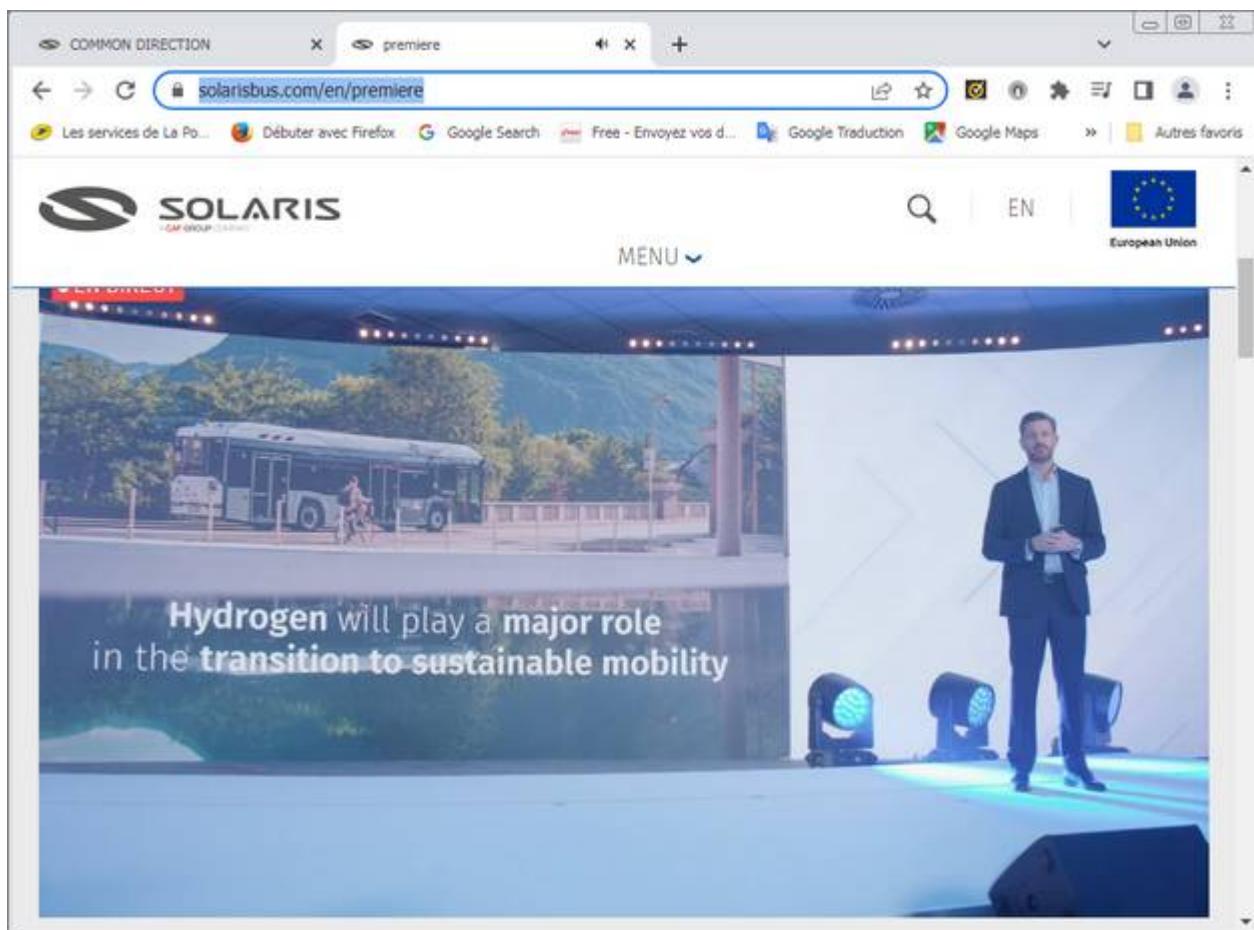
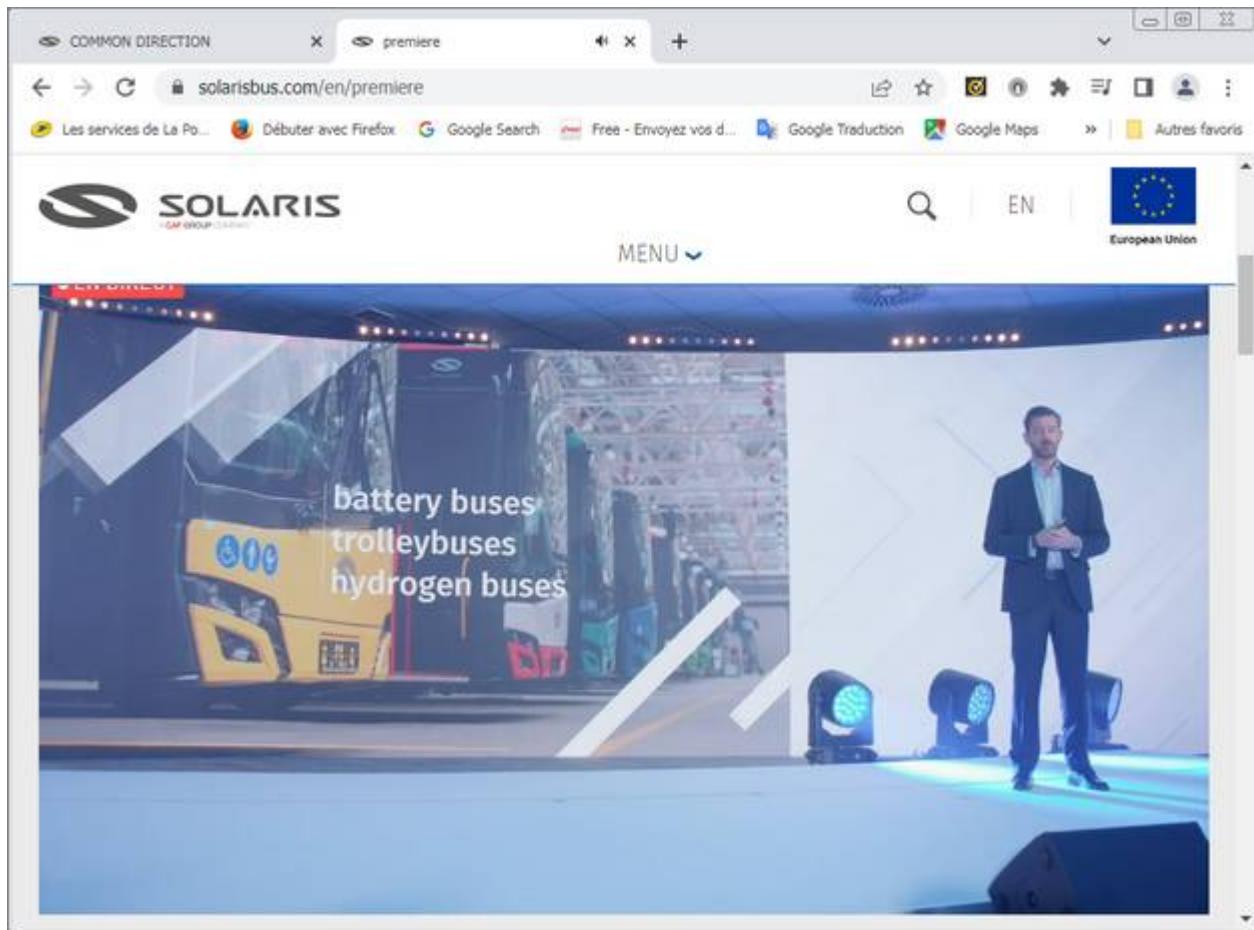
The World Premiere of Solaris Urbino 18 hydrogen and #SolarisTalks

• EN DIRECT

2 – Les copies écran E Mobility

Celles qui paraissaient les plus intéressantes, mais certaines ont été loupées à cause du défilement trop rapide





COMMON DIRECTION premiere

https://www.solarisbus.com/en/premiere

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SOLARIS

MENU

European Union

6 LENGTHS

- 9 m
- 10.5 m
- 12 m
- 15 m
- 18 m
- 24 m

7 DRIVES

- electric
- hydrogen
- trolleybus
- hybrid
- mild hybrid
- cng
- diesel



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MENU

BATTERY TYPES

- Solaris High Power
- Solaris High Energy

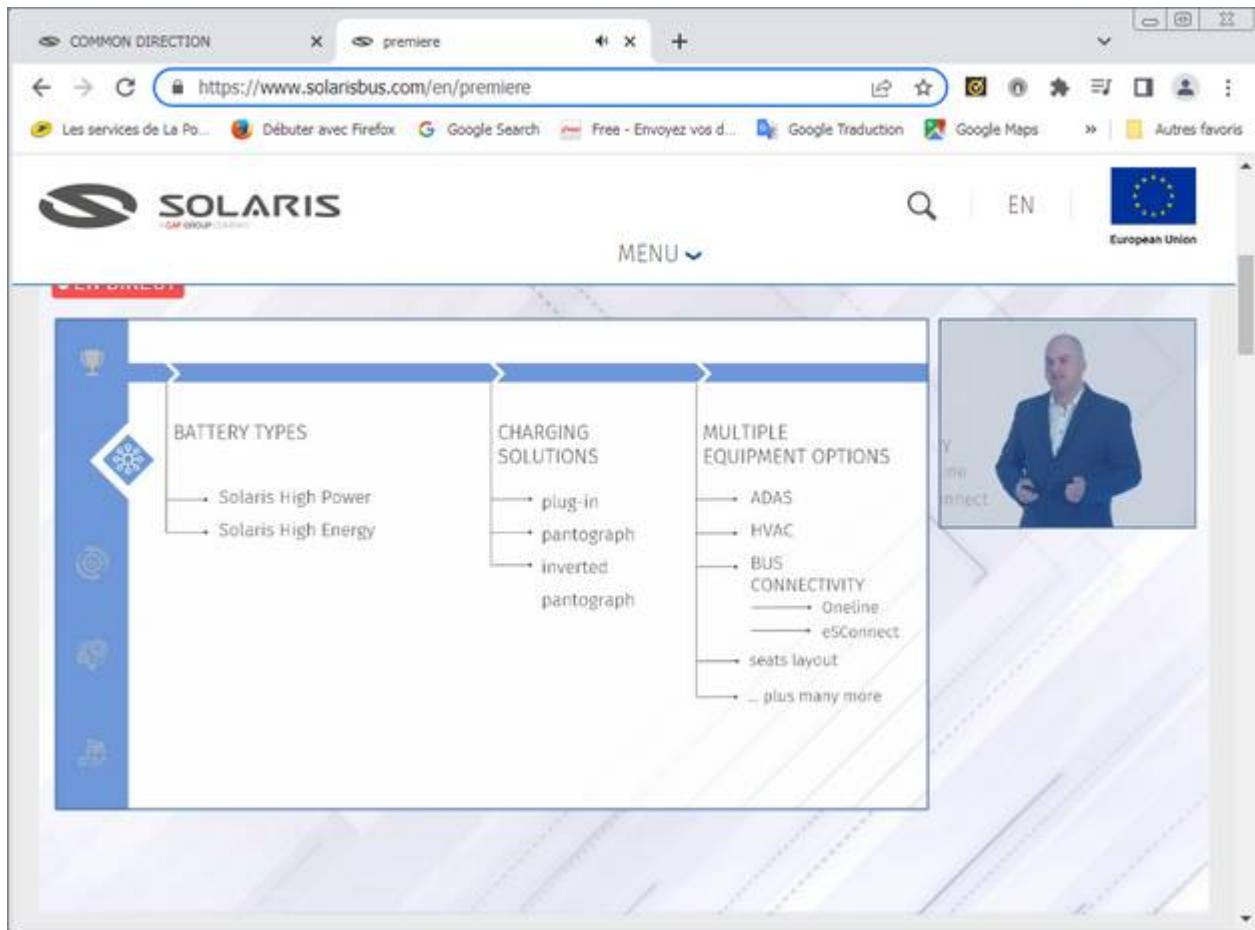
CHARGING SOLUTIONS

- plug-in
- pantograph
- inverted pantograph

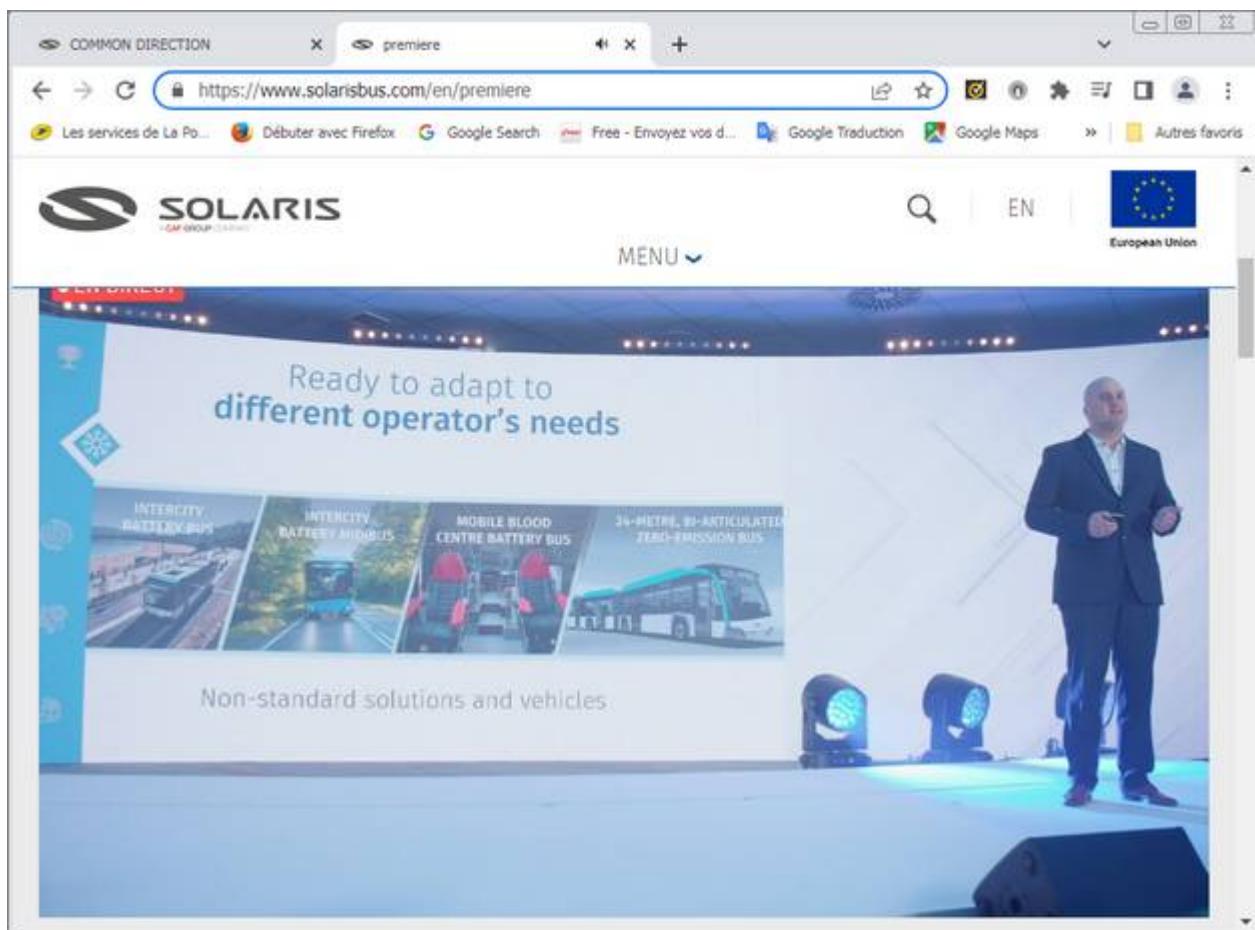
MULTIPLE EQUIPMENT OPTIONS

- ADAS
- HVAC
- BUS CONNECTIVITY
 - OneLine
 - eSConnect
- seats layout
- plus many more





ADAS : Advanced Driver Assistance Systems



The screenshot shows a presentation slide from the Solaris website. The slide title is "The product mix has changed". It features a donut chart for the year 2021, indicating that 41% of drives are alternative, while the remaining 59% are combustion. To the right, a circular graphic shows a forecast for the future: "100% alternative drives" by "in the FUTURE". Below this, three arrows point to factors: "changes in the area of production", "new competences", and "crew transformation". A sidebar on the left lists icons for bus, truck, and car. A video player at the bottom shows a man speaking, with the word "FUTURE" overlaid. The Solaris logo is at the top left, and the European Union flag is at the top right.

The screenshot shows a web browser displaying the Solaris website at solarisbus.com/en/premiere. The page features the Solaris logo and navigation links for EN, European Union, and a search function. A main heading reads "Multiple options on a single production line". To the left, a sidebar lists "Production management" with bullet points: "complex, sophisticated process", "takes place simultaneously", "different lengths and types of buses are produced at the same time", and "different parts are assembled". To the right, there are three images: a speaker in a blue suit, a worker assembling a bus interior, and a worker on a lift working on a bus exterior. The URL in the address bar is solarisbus.com/en/premiere.

COMMON DIRECTION X première +

https://www.solarisbus.com/en/premiere

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EN European Union

MENU

Constant product development

JOUANNOT Thibault Il reste moins de 10 minutes à l'heure Bonjour, Les 25es rencontres

COMMON DIRECTION X première +

https://www.solarisbus.com/en/premiere

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EN European Union

MENU

Romuald Witkowski
Project Management Director
SOLARIS BUS & COACH

The screenshot shows the homepage of the Solaris website. At the top, there's a navigation bar with links to "COMMON DIRECTION", "premiere", and other browser tabs. Below the bar, the Solaris logo is displayed, followed by a search icon, language selection ("EN"), and a European Union flag. A "MENU" dropdown is visible. The main content area features a large image of a modern city street with greenery and a bus, overlaid with a blue diagonal banner containing a quote icon and double quotes. To the right of the image, there's a video player showing a man in a suit speaking.

This screenshot shows a specific page from the Solaris website. The URL in the address bar is https://www.solarisbus.com/en/premiere/. The page title is "E-mobility is the only way". On the left, there's a vertical sidebar with icons and text: a quote icon with double quotes, a building icon with the text "Cities are responsible for 75% of global CO₂ emissions", a bus icon with the text "About 25% CO₂ emissions in Europe come from transport", and a globe icon with the text "Well-planned and green urban transit is a critical component of the worldwide effort to stem climate change". The main content area features a large image of a bus interior looking out onto a city street, with a video player showing a man in a suit speaking to the right.

COMMON DIRECTION premiere

https://www.solarisbus.com/en/premiere

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EN European Union

MENU

Public transport makes it happen

EV constitute the biggest share in buses sales when compared to other segments

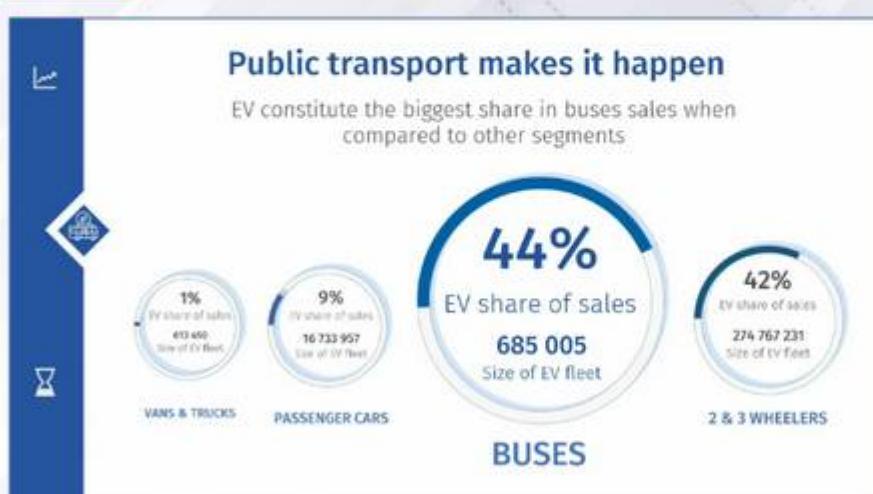
EV share of sales: 44% (BUSES)

VANS & TRUCKS: 1% (413 460 size of EV fleet)

PASSENGER CARS: 9% (16 733 957 size of EV fleet)

2 & 3 WHEELERS: 42% (274 767 231 size of EV fleet)

685 005 Size of EV fleet



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MENU

Solaris electric vehicles

2572 electric buses

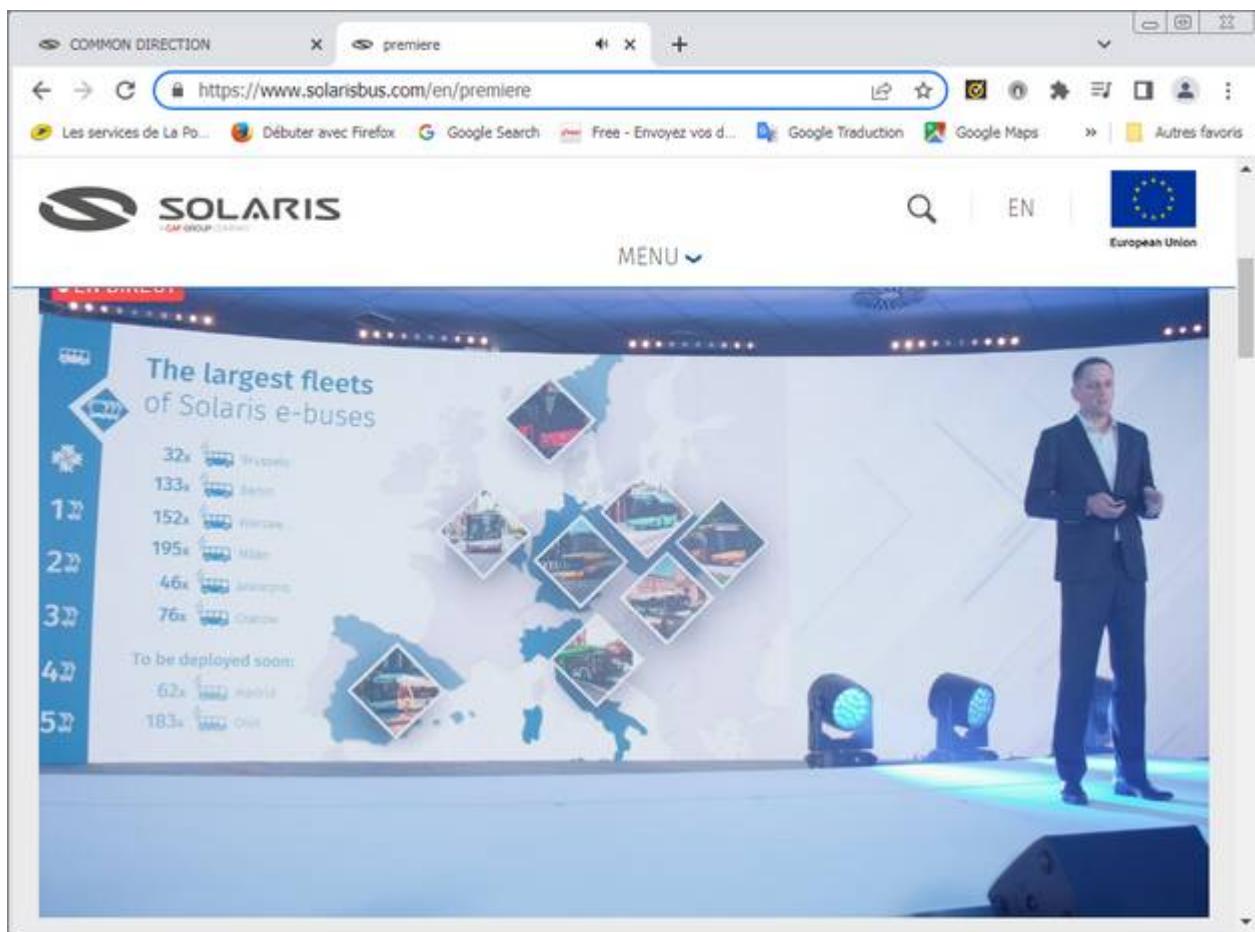
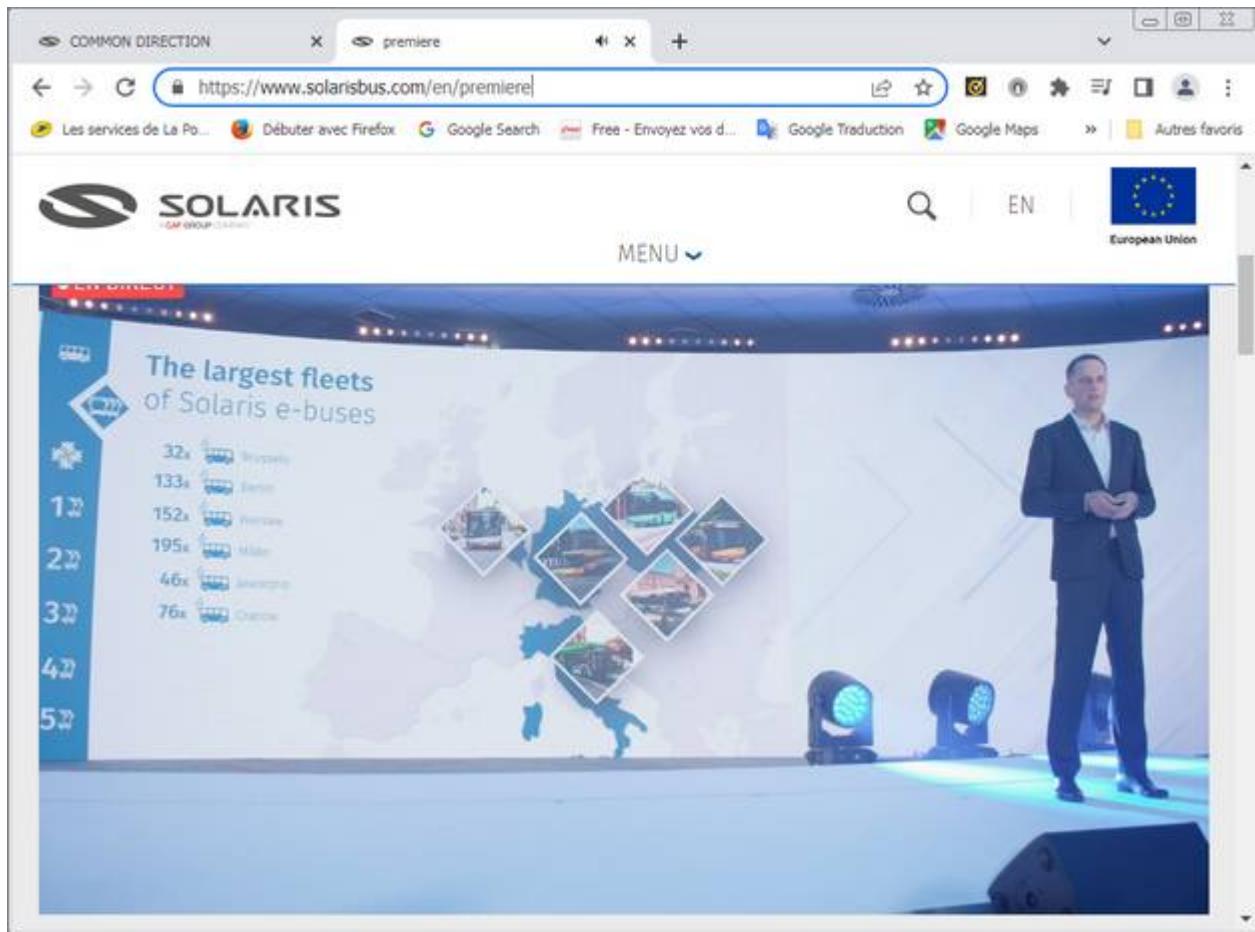
1395 delivered

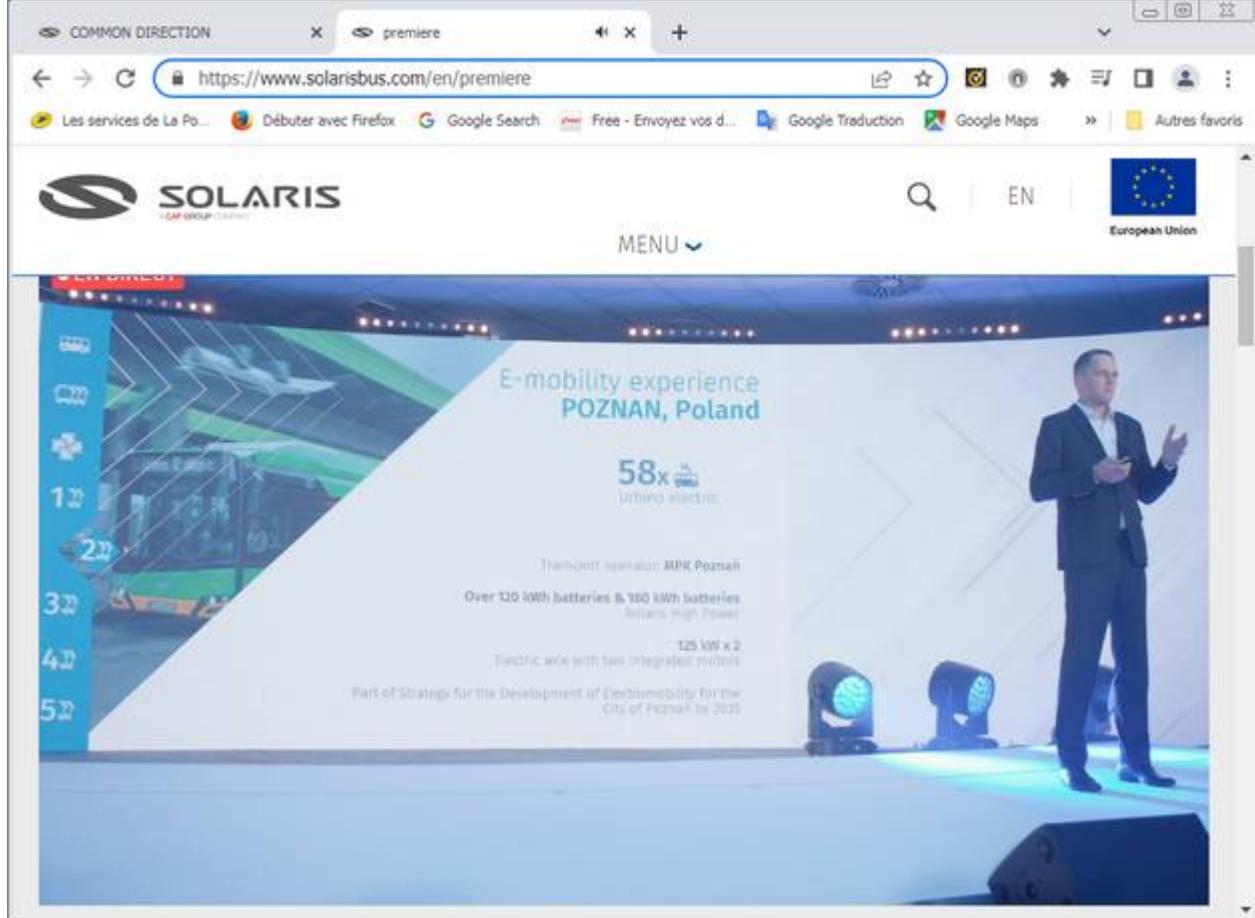
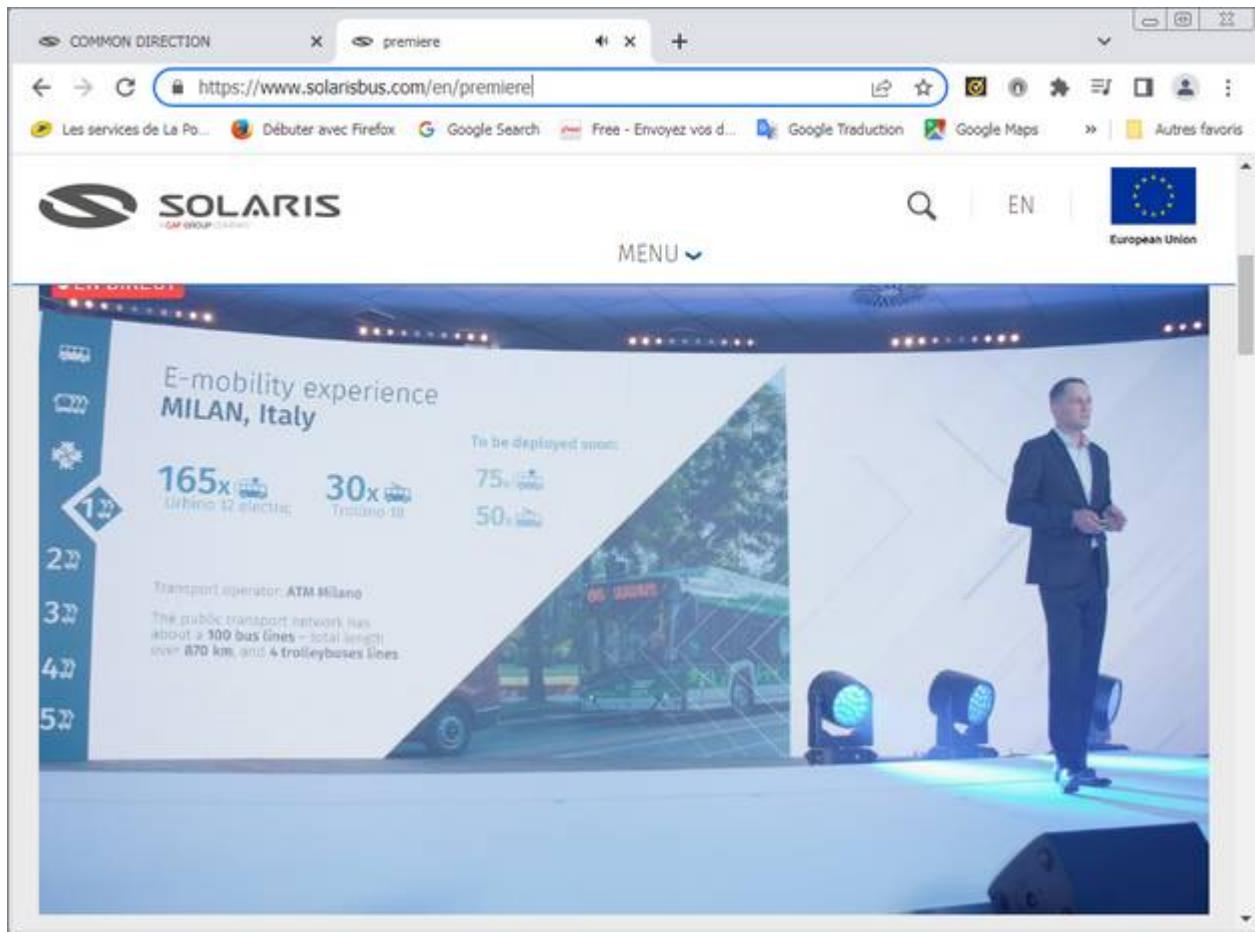
1177 soon to be delivered

20 countries

116 cities







The screenshot shows a web browser displaying the Solaris website at <https://www.solarisbus.com/en/premiere>. The page features a large banner image of a green electric bus. To the left of the banner is a vertical menu with icons for bus types and numbers 1 through 5. The main content area is titled "E-mobility experience POZNAN, Poland". It highlights "58x H₂ Urbino electric" buses, mentioning "Over 120 kWh batteries & 180 kWh batteries Solaris High Power" and "125 kW x 2 Electric axle with two integrated motors". It also notes "Part of Strategy for the Development of Electromobility for the City of Poznań by 2035". A small video window on the right shows a man in a suit speaking. The Solaris logo and "SOLARIS" text are at the top left, and "EN" and "European Union" buttons are at the top right.

The screenshot shows a web browser displaying the Solaris website at <https://www.solarisbus.com/en/premiere>. The layout is similar to the first screenshot, featuring a banner of a green electric bus. The vertical menu on the left shows icons for bus types and numbers 1 through 5. The main content area is titled "E-mobility experience OSLO, Norway". It shows "Option 42x H₂ Urbino 12 electric" and "To be deployed soon: 183x H₂ Urbino 12,75 electric". A video window on the right shows a man in a suit speaking on stage. The Solaris logo and "SOLARIS" text are at the top left, and "EN" and "European Union" buttons are at the top right.

Il y aurait une commande de biarticulés ?

COMMON DIRECTION premiere

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MENU

E-mobility experience
BOLZANO, Italy

5

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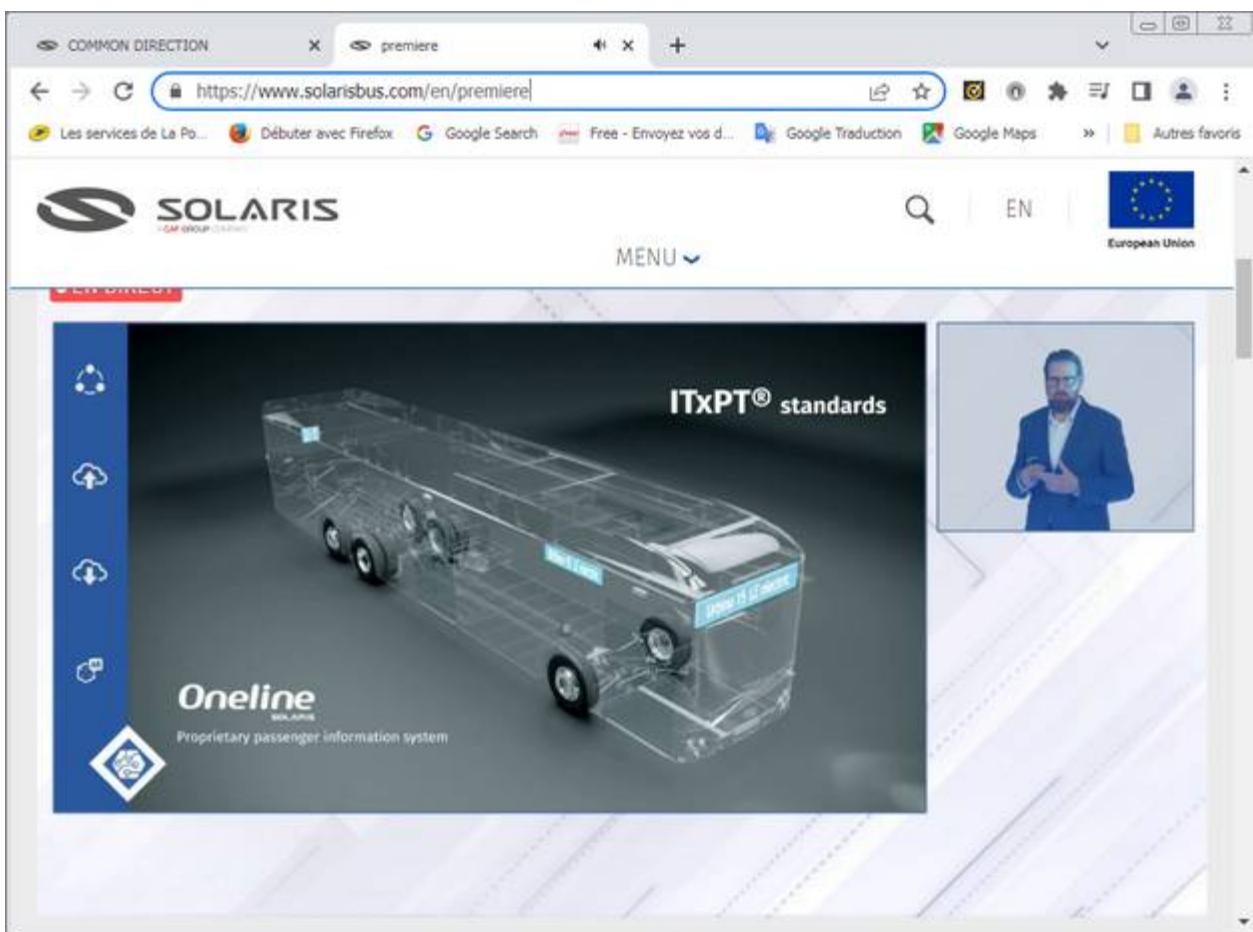
SOLARIS

MENU

The screenshot shows a Firefox browser window displaying the Solaris website at <https://www.solarisbus.com/en/premiere>. The slide features the Solaris logo and navigation links for 'COMMON DIRECTION' and 'premiere'. It includes a search bar, language selection ('EN'), and a European Union flag. The main content area displays icons for various bus technologies: ELECTRIC (battery), HYDROGEN (hydrogen tank), TROLLEYBUS (trolleybus), HYBRID (hybrid power source), CNG (CNG cylinder), and DIESEL (diesel pump). Below these icons is a stylized hand icon. A text box contains the message: "Each technology requires **different support**". To the right, there is a video player showing a man in a suit speaking.

The screenshot shows the same Firefox browser window on the Solaris website. The slide features the Solaris logo and navigation links. The main content area shows a photograph of several red and white articulated buses parked in a row at a maintenance facility. A blue diagonal banner overlays the bottom right of the image with the text: "Preparation for maintenance". To the right, there is a video player showing a man in a suit speaking.

80% des failures viennent du software



3 - Questions Réponses E Mobility

1 – devait être suédois

TCO

Prix énergie multiplié par 4

Rép recherche solutions qui conduisent à faible TCO, allongement durée de vie bus

2 -

3 - Allemand

Standardisation serait-elle le cas pour le futur

Réponse you are right standardization is the main key
modularité

4 Roumanie dame

Retour sur investissement

Rép

Augmentation des prix énergie très importante

Peut être Diesel ou CNG more safe

5 -

Evoque que pour tram chaque ville a voulu son tram et cela a coûté très cher

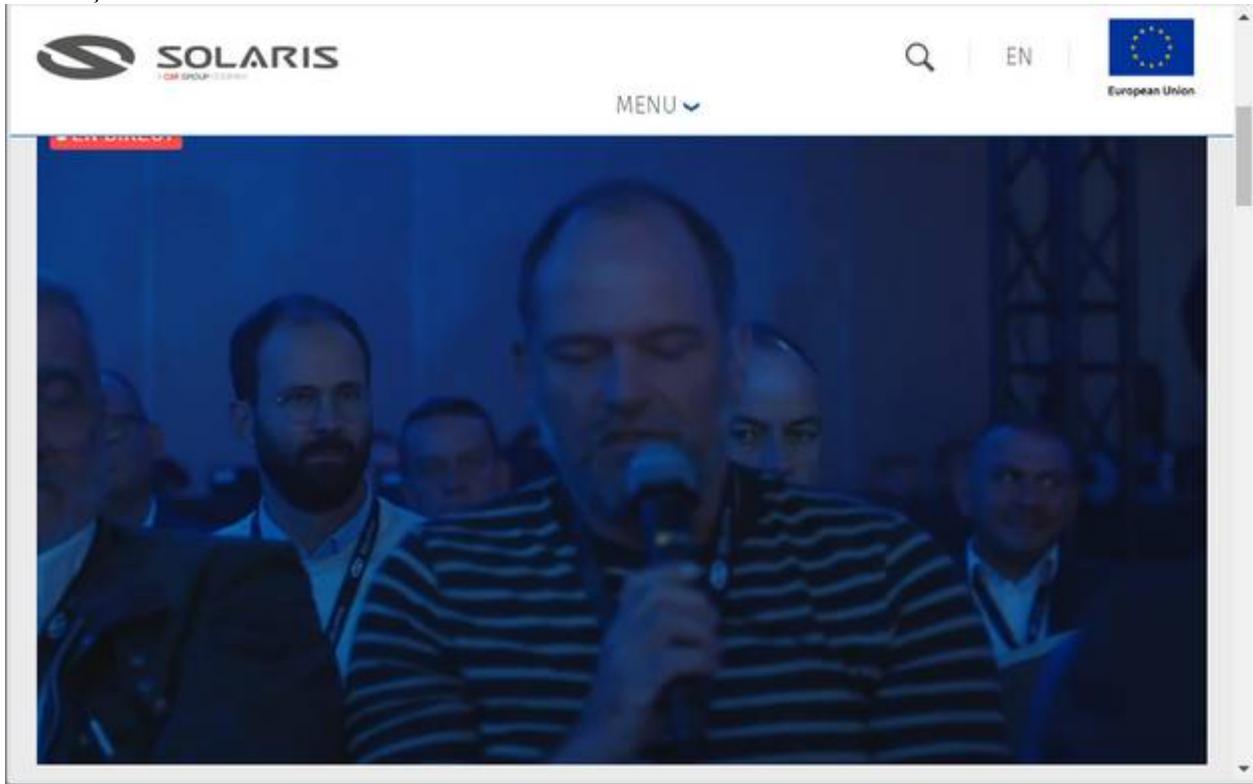
Problème H2, liquide ou compressé

Rép

Solaris a choisi compressé

H2 compressé réçus in tanks

Solaris a des compresseurs pour porter à 350 bars



Rep : tous les véhicules ont la possibilité de remote access

4 - Reprise présentations E Mobility

A screenshot of a presentation slide. At the top left is the Solaris logo. To the right are search and language (EN) icons, followed by the European Union flag. Below the header is a large photograph of a man in a blue suit, identified as Paweł Mańkowski, speaking. In the bottom left corner of the slide, there is a Solaris logo and text identifying him as the Hydrogen Technologies Team Leader in R&D Department at SOLARIS BUS & COACH. The slide also features a background image of a white bus with "BOLZANO BOZEN" written on it.

COMMON DIRECTION premiere

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EN European Union

MENU

Green Deal

goal: 90% greenhouse emissions reduced to 2050

1 HYDROGEN – one of key factors for decarbonisation in Europe

2 One of its main objectives is to increase the use of clean vehicles and alternative fuels, such as hydrogen.



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EN European Union

MENU

Hydrogen Strategy in EU

2020-2025	2025-2030	2030-2050
 6 GW renewable hydrogen electrolyser	 40 GW renewable hydrogen electrolyser	90% greenhouse emissions reduced
 1 million tonnes of renewable hydrogen	 10 million tonnes of renewable hydrogen	
OBJECTIVES <ul style="list-style-type: none">decarbonisationhydrogen production	OBJECTIVES <ul style="list-style-type: none">hydrogen significant part of energy systemup to 45% in energy mix by 2030	OBJECTIVES <ul style="list-style-type: none">Hydrogen technologies deployed on a large scale



COMMON DIRECTION premiere

<https://www.solarisbus.com/en/premiere>

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SOLARIS CAP GROUP

EN European Union

MENU

Hydrogen Valleys – synergy effect

WHOLE HYDROGEN VALUE CHAIN ON REGIONAL LEVEL

60 regions in Europe involved.

- Leading regions
- Participating regions
- Interested regions

SOLARIS has joined two such initiatives:

- Wielkopolska Hydrogen Valley
- Mazovia Hydrogen Valley

EN DIRECT

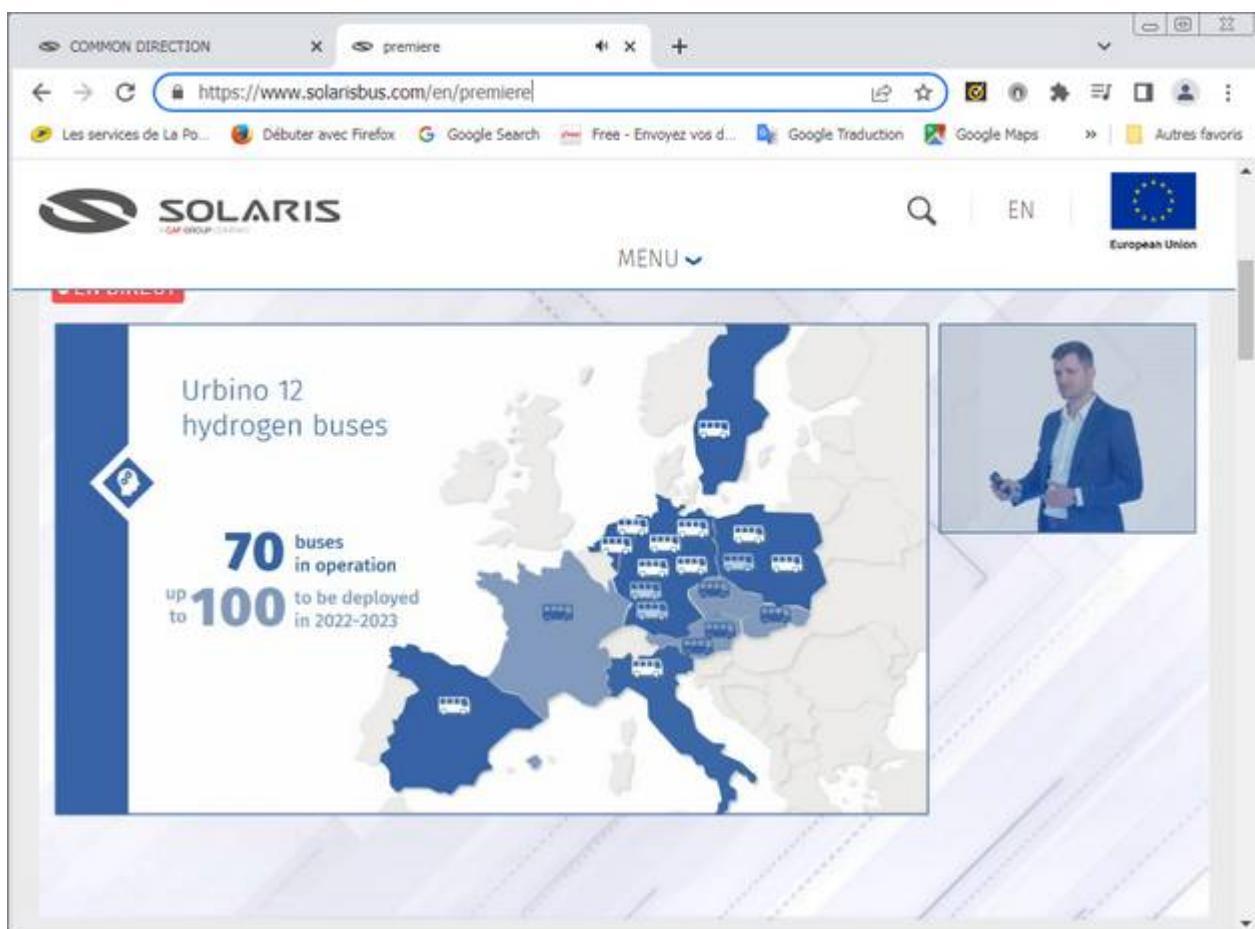
Hydrogen infrastructure is constantly developing

More and more hydrogen stations in Europe

230 stations in operation

A man in a dark suit is standing on a stage, presenting to an audience. The stage is illuminated with blue lights.

EN DIRECT



Magnifique coup de brosse à reluire pour les clients

**Every city
is different**

RANGE
NEEDED

INFRASTRUCTURE
AVAILABLE

PASSENGER
CAPACITY

CLIMATE
CONDITIONS

TOPOGRAPHY

FEASIBILITY STUDY = CONFIDENT CHOICE

Parameters calculated and verified within feasibility study gives us and the customer confidence that the bus will meet expectations and requirements

Pas de solution standard pour refuelling station H2

COMMON DIRECTION premiere

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SOLARIS - CAR GROUP

EN European Union

MENU

Refueling infrastructure
– no standard solutions so far

Different approach
when it comes to the components used to make the station, to the refueling process, to communication and knowledge-sharing

Bus-station communication
Constant development of communication systems.

No standardisation
Solaris aims to create standards and seek new solutions

HYDROGEN ENERGY STORAGE

COMMON DIRECTION premiere

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SOLARIS - CAR GROUP

EN European Union

MENU

Safety is a key

HYDROGEN SYSTEM safety measures

- 1** All hydrogen components are **LOCATED ON THE ROOF OF THE BUS** refuelling connector is located in lower parts
- 2** Safety devices **MONITORING AND DETECTING HYDROGEN** on board
- 3** Tanks fitted with **OVERLOAD VALVE** cutting off the potential leak
- 4** Tanks fitted with **TPRD VALVE** which releases hydrogen if the temperature is high
- 5** **4 DETECTING SENSORS** monitoring the installation

Sensors d'impact 1^{er} à fournir

COMMON DIRECTION premiere

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Technology and system development

The diagram illustrates the progression of Solaris hydrogen technology over eight years. It features a blue arrow pointing upwards and to the right, with several milestones marked by diamond icons along its path. The milestones are:

- 2014: Urbino electric with hydrogen range extender
- RANGE
- FUEL CELL OPTIMISATION
- 2015: Urbino 12 hydrogen
- SOFTWARE IMPROVEMENT
- 2016: Reduction of hydrogen consumption
- 2017: New R134 norm
- 2018: Further optimization of product and systems
- 2019: REACH THE BUS MAXIMUM POTENTIAL

2022: Urbino 18 hydrogen

A small video player in the top right corner shows a man in a suit speaking.

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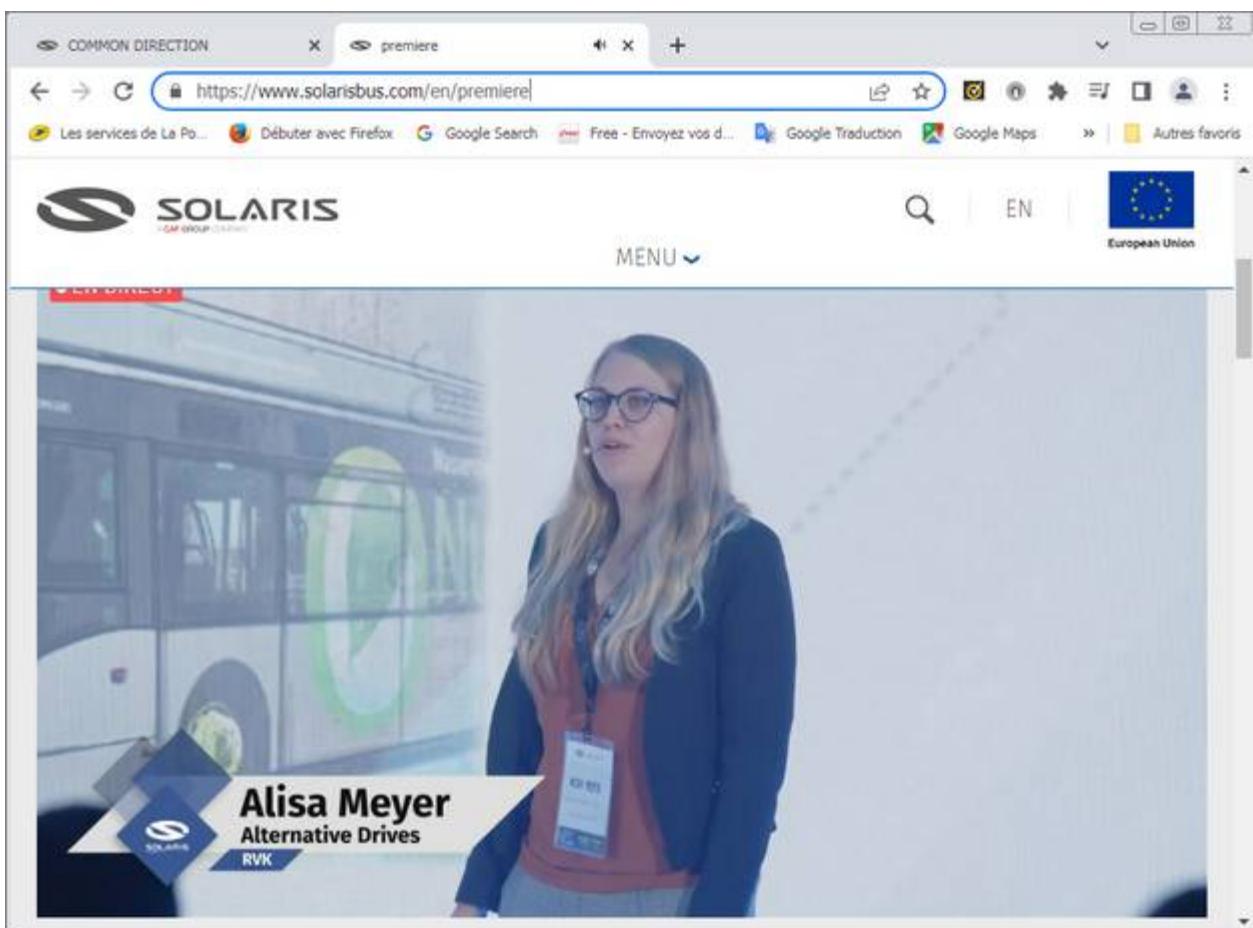
MENU

Solaris hydrogen technology – enhanced

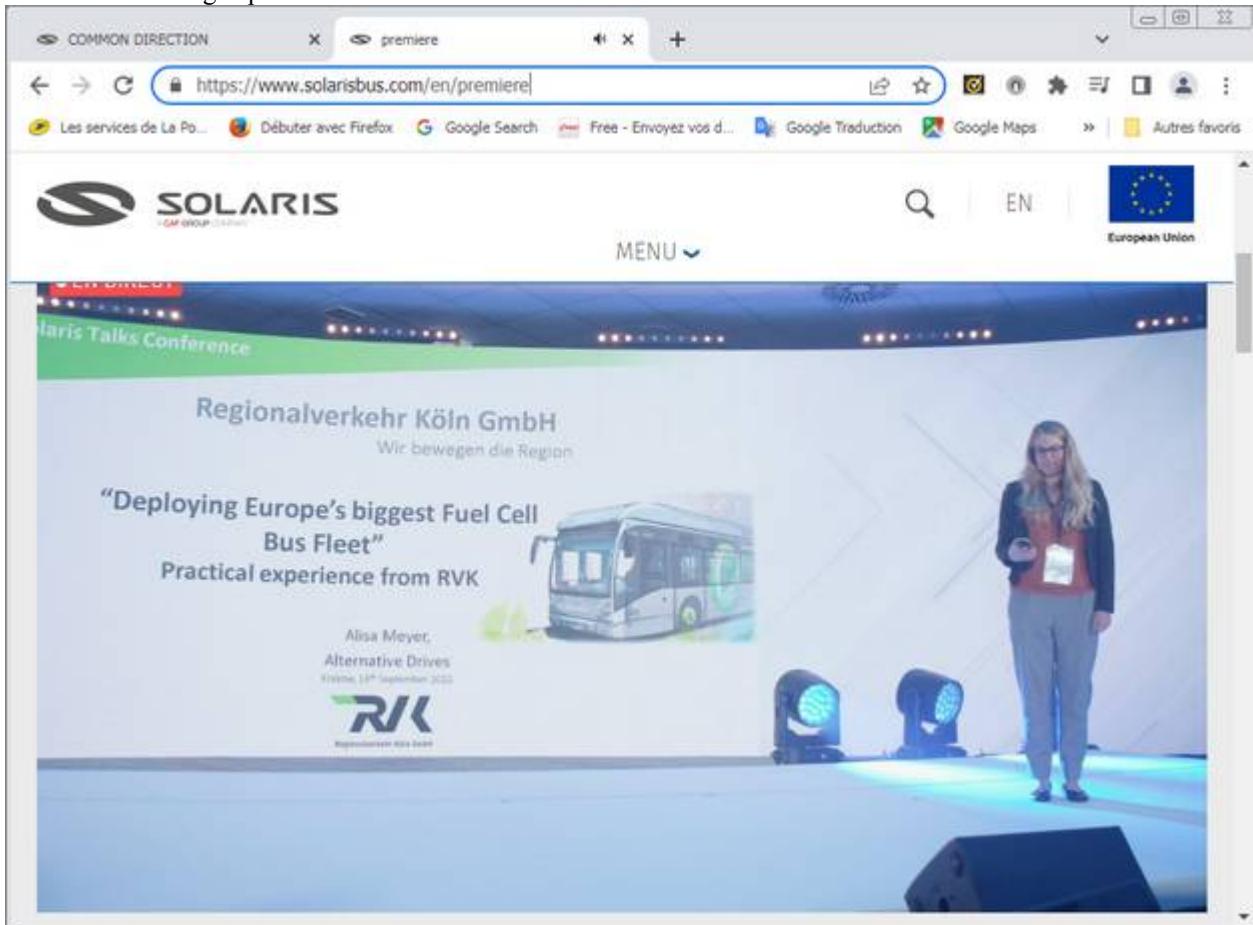
The diagram highlights four key enhancements in Solaris hydrogen technology:

- NEW FUEL CELL: Improved parameters
- NEW INTERIOR UNIT: Higher level of customisation
- E-PROPULSION: Modular drive means more flexibility
- BETTER PERFORMANCE IN DIFFERENT CONDITIONS: Meeting the needs of customers

A small video player in the top right corner shows a man in a suit speaking.



Du réseau de Cologne parle du H2



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SOLARIS CAP GROUP

EN European Union

MENU

Regionalverkehr Köln GmbH – Company Profile

Regionalverkehr Köln GmbH (RVK)

Regional public transport operator

- Approx. 920 employees
- Net app. 2.529 km
- Area covered: approx. 2.800 km²; more than 2,3 mio. inhabitants
- 21,13 Mio. km, 23 Mio. pax annual
- Buses in operation: approx. 565 (348 RVK owned buses plus approx. 217 buses from subcontractors)

RVK's core area of operation

Depot

Headquarter

RVK

Wir bewegen die Region

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SOLARIS CAP GROUP

EN European Union

MENU

RVK's areas of activities

Transport Services	Digitalization	Climate and Future
<ul style="list-style-type: none"> • Use of 18 m, 12 m & minibuses in self-directed daily service or on behalf of others • Scheduling and realization of on demand mobility services in the own operation area and for third parties („Hipper“) • E-Bike rental systems in rural areas 	<ul style="list-style-type: none"> • Daily operations <ul style="list-style-type: none"> • Depot management system • Control centre • Customer information systems • Cashless and digital payments • Passenger counting systems • Mobile devices for drivers • Mobile services for passengers (Free-Wifi) • Bus assistance systems for road safety 	<ul style="list-style-type: none"> • Energetic refurbishment and modernization of all depots • Large-scale projects <ul style="list-style-type: none"> • Education and training centre Mechemich • Climate-neutral bus depot „Grüner Mobilhof Berg, Gladbach“ • Procurement and use of climate-friendly drives (vehicles and refuelling infrastructure) • Mobile H2 Hubs for refueling

Wir bewegen die Region

RVK

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MENU EN European Union

Project Zero Emission

Negotiated Environmental Agreement by RVK:

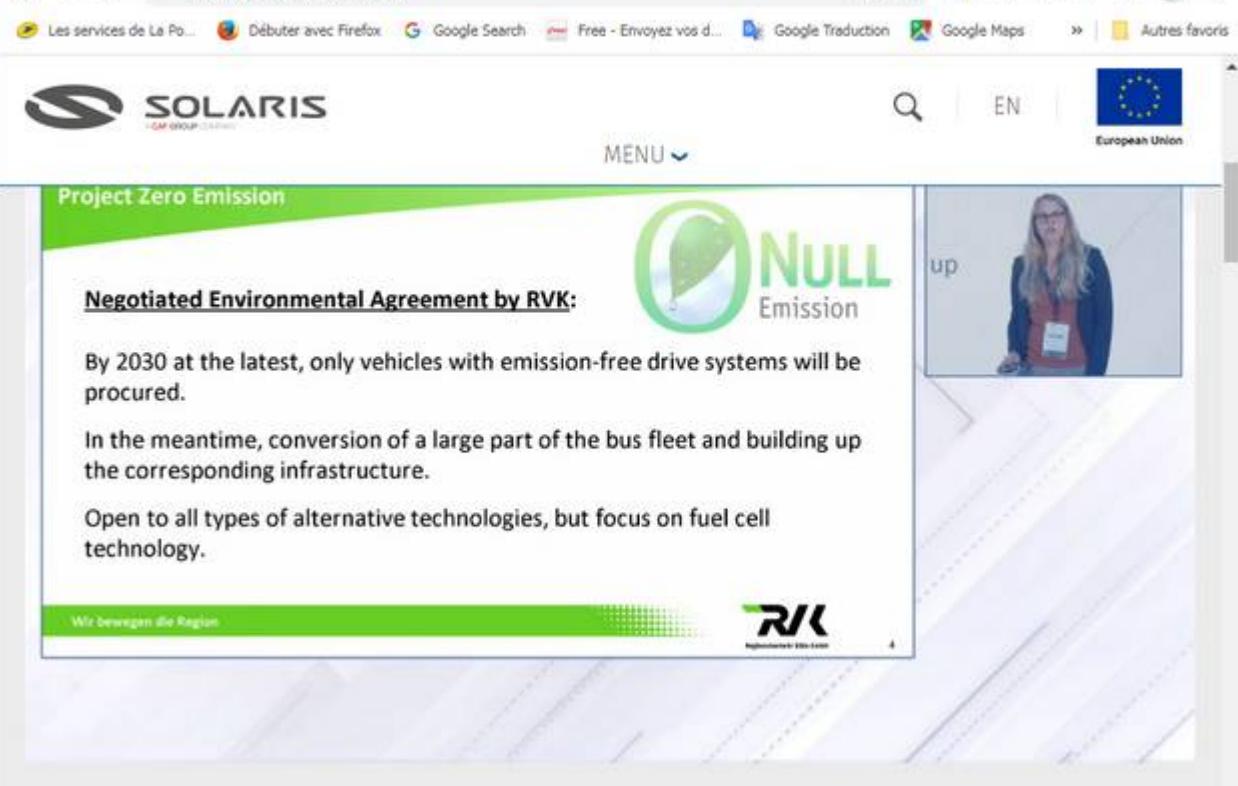
By 2030 at the latest, only vehicles with emission-free drive systems will be procured.

In the meantime, conversion of a large part of the bus fleet and building up the corresponding infrastructure.

Open to all types of alternative technologies, but focus on fuel cell technology.

Wir bewegen die Region

RVK Regionalverband Köln-Euskirchen



COMMON DIRECTION premiere

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SOLARIS - GAG GROUP

MENU EN European Union

Why focus on Fuel Cell Buses?

- Range
- Refueling time
- Flexibility
- (local) zero emission

1:1 replacement of conventional vehicles

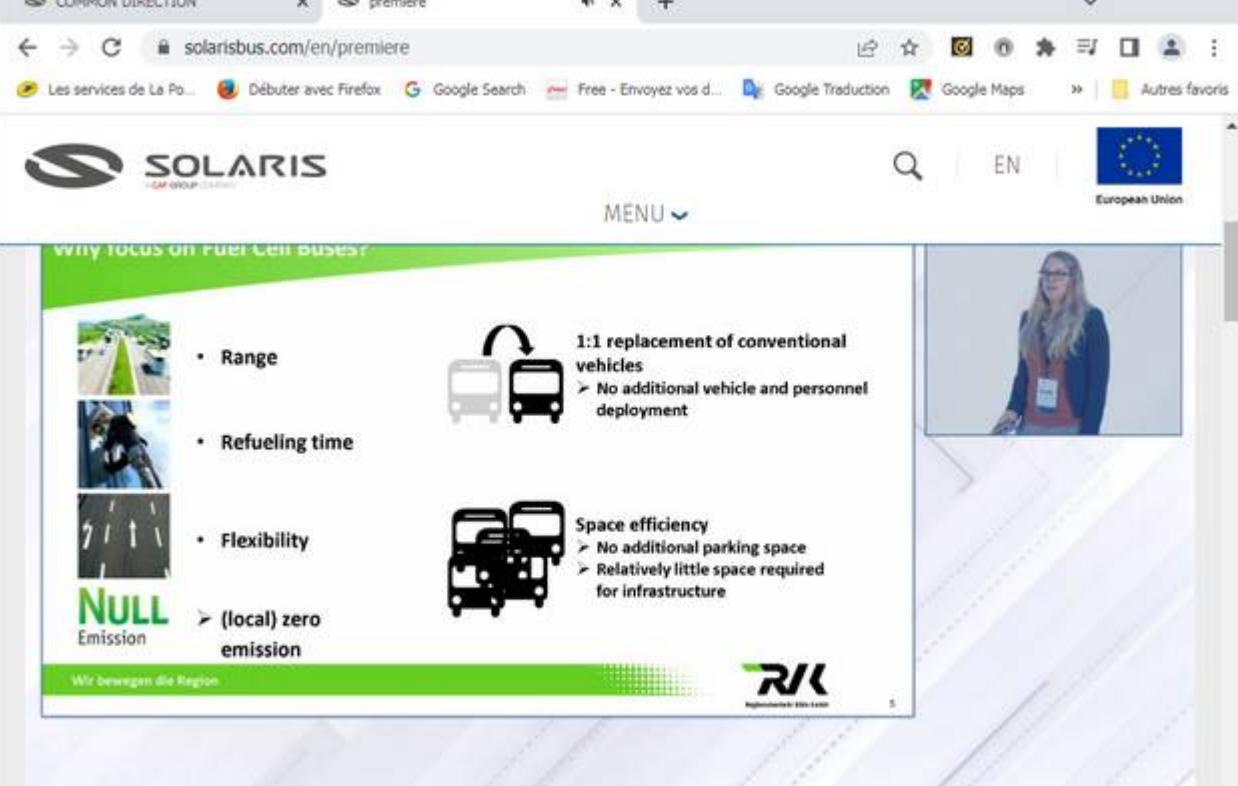
- No additional vehicle and personnel deployment

Space efficiency

- No additional parking space
- Relatively little space required for infrastructure

Wir bewegen die Region

RVK Regionalverband Köln-Euskirchen



Refuelling time comparable bus

COMMON DIRECTION premiere

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SOLARIS - CAR GROUP GERMANY

MENU

European Union

52 Fuel Cell Buses

2 own H₂-refueling stations

H₂

for the Cologne Region

Clean Hydrogen Partnership

Co-funded by the European Union

NIP

NOW

PTJ

RK

Wir bewegen die Region

The project is supported by the Clean Hydrogen Partnership and its members: Hydrogen Europe, Hydrogen Europe Research and Hydrogen Technology Research.

WIR BEWEGEN DIE REGION

7

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European Union

Framework of H₂-refueling stations by 2025

Hürth / Frechen / Brühl

Bornheim

Education and training center Mechnich (AWM)

Wermelskirchen

Grüner Mobilhof Berenberg (climate-neutral bus depot)

Cologne / Bonn Airport

Meckenheim

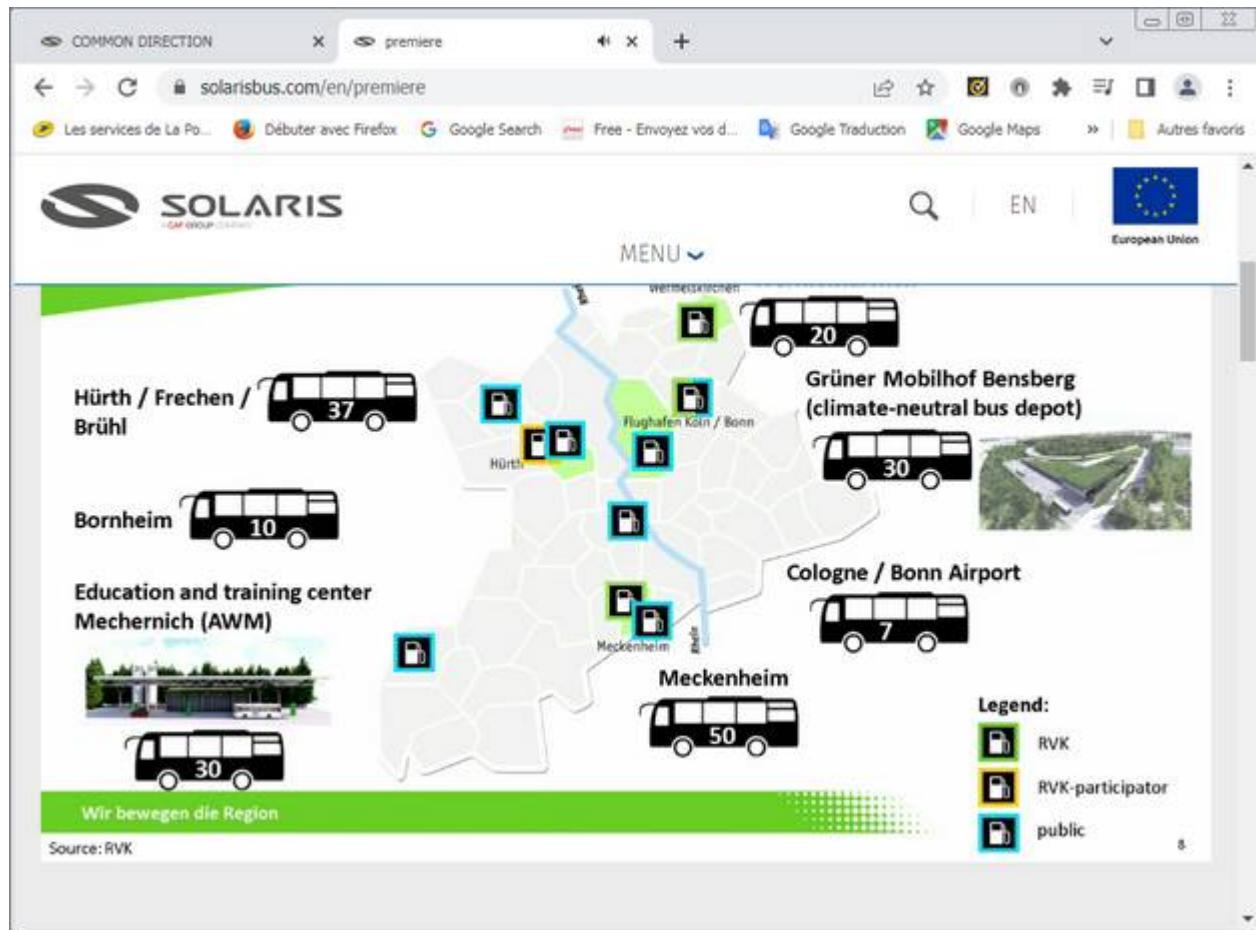
WIR BEWEGEN DIE REGION

Source: IVVS

Legend:

- blue square: H2C
- red square: IVVS participant
- green square: public

The map shows the locations of hydrogen refueling stations in various towns and cities around Cologne, including Wermelskirchen, Grüner Mobilhof Berenberg, Cologne/Bonn Airport, and Meckenheim. Each station is marked with a blue square icon representing H2C. The legend also includes red squares for IVVS participants and green squares for public stations.



The screenshot shows a slide titled "Practical experience from daily operations". The slide contains the following text and a video player:

Practical experience from daily operations

- Feasible integration of the buses into existing operational structures
- Consideration of a certain adaptation time in ramp-up phase (diesel buses as reserve)
- Development and establishment of regular discussions and communication channels with suppliers
- Comprehensive training of enough workshop employees
- Need for optimization in the delivery of (conventional) spare parts
- High and avoidable downtimes due to long bus repair times and delivery times of spare parts (diesel buses as reserve)
- Average consumption lower than anticipated
- Decreasing investment costs, but other trends of prices (hydrogen and maintenance costs) remain to be seen

A video player on the right shows a woman speaking, with the word "(diesel)" appearing next to her. The SOLARIS logo is visible at the bottom right.

Plus de bus DZ en réserve que souhaité

COMMON DIRECTION premiere

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European Union

Prices of Fuel Cell Buses

Development of procurement prices for FC buses

Project / Year	Procurement Price (€)
2011 - Phileas Buses, RVK	1,860,000
2014 - Van Hool Buses, RVK	1,290,000
2015 - 3Emotion- Project	850,000
2017 - JIVE Project	650,000
2018 - JIVE 2- Project	625,000
2021 - Price Limit BMDV	590,000
Market outlook	< 500,000

Wir bewegen die Region

RVK Regiobusverkehr Köln GmbH

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MENU EN European Union

EN DIRECT

Next steps

Extension of RVK's bus fleet:
Procurement of additional
108 Fuel Cell Buses
and use of
10 hydrogen refueling stations
in the Cologne region till 2025





Wir bewegen die Region  Regionalverband Ruhr-Kreis

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EN DIRECT

Procurement of Solaris Buses

- Contract with Solaris for up to 40 Fuel Cell Buses already signed
- Delivery of the first 12 m-buses at the end of this year
- Test of 18 m-Prototype under real conditions at RVK also in this year





COMMON DIRECTION premiere

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Conclusion

- In 2025, around 75 % of the RVK-fleet will consist of emission-friendly buses (160 fuel cell and 70 CNG buses)
- Use of up to 10 HRS in area of operation (mix of own HRS and HRS of third parties, mobile hubs and focus on public accessibility)
- Further fleet conversion after 2025 in current planning → Compliance with self-commitment from „Project Zero Emission“

RVK Betriebstechnik AG



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When will you ride a fuel cell bus?



Contact details:
Adrian Zinke
Director Technical Department
Regionalverkehr Köln GmbH
E-Mail: adrian.zinke@rvk.de

The project is supported by the Clean Hydrogen Partnership and its members Hydrogen Europe and Hydrogen Europe Research.

Co-funded by the European Union



5 - Questions Réponses E Mobility

1 - Roumaine Dame

Qui fournit H2

Rep différents

2

Est ce que vous pensez H2 intéressant sur le coût
H2 Liquéfie

Rep

Prix aujourd'hui pas compétitif, décroîtra

Liquid H2 bus gaz

Rep Solaris the most of them utilise compressé pas liquide. Today compressed H2 is the way

3 -

Prix bus H2 et certains font peu de km par jour

Rep RVK

Prix 18m H2 il doit descendre

4 Espagnol

Cout H2 more higher than fuel or électricity

H2 a plus de sens au delà de 300 km quid pour class 2

Solaris : si demande

5 Français

Life time fuell cell

Sensibilité Fuell cell à la qualité H2

Rep Solaris

25000 heures mais on peut ne pas tout changer mais seulement des pièces

99 ;96 % OK aujourd'hui

On ne recommande jamais d'utiliser du H2 basse qualité

6

H2 is safe is a joke

Rep Solaris nous croyons que H2 est safe. On fait des tas de recommandation, si vous suivez les règles c'est safe

7 Suédois ?

Revient sur TCO

Vision du coût dans le futur

Safety is a real problem terrorist attack

Rép RVK : prix : l'usager ne paye pas à la fin, c'est la ville

8 -

Price 1kg H2

Rep RVK before crise H2 prix comparable Diesel Aujourd'hui higher c'est le problème

9 -

Immobilisation + importante, y t'il plus de pannes or spare parts

Rep RVK Spare parts (problème d'appro)

10 -

Opinion voyageurs

Rep RVK happy ; riverains happy no noise Pour les voyageurs le + important le bus arrive l'heure

11 -

on discute du futur Quels facteurs Prix du bus ? prix Energy ?

Lequel des 2 sera le plus important et qui décreaserai

RVK on doit refuelling every day

12 –

comparaison en % H2 avec DZ

Question nbre de stations H2 comparé nombre de bus

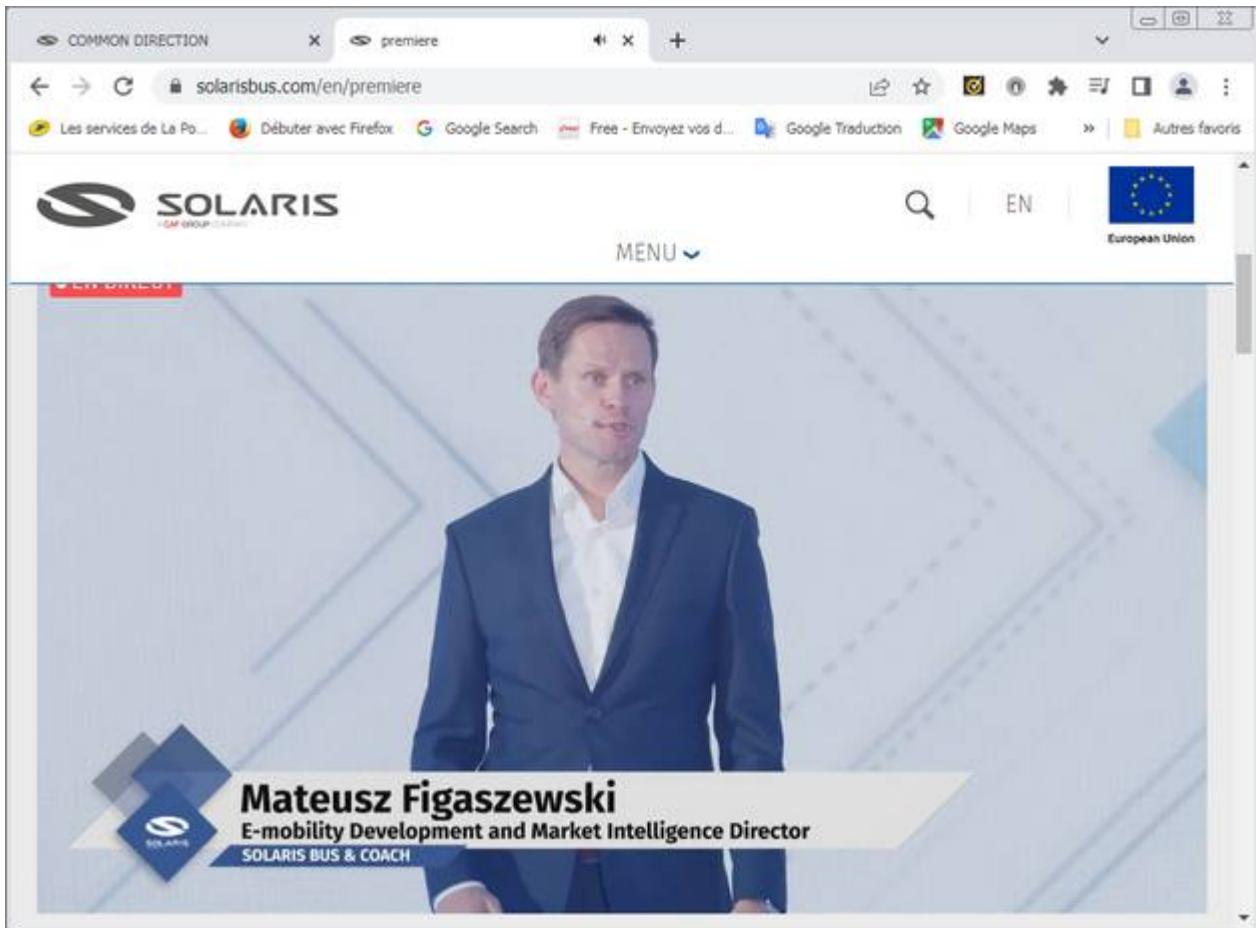
Rép RVK decentralisée structure, distance trop grande

13 – Magazine Transport anglophone

8 kg /km

RVK 8 kg/km moyenne yearly Pas de grosse différence hiver été

6 – Présentation Solaris Urbino 18 Hydrogène

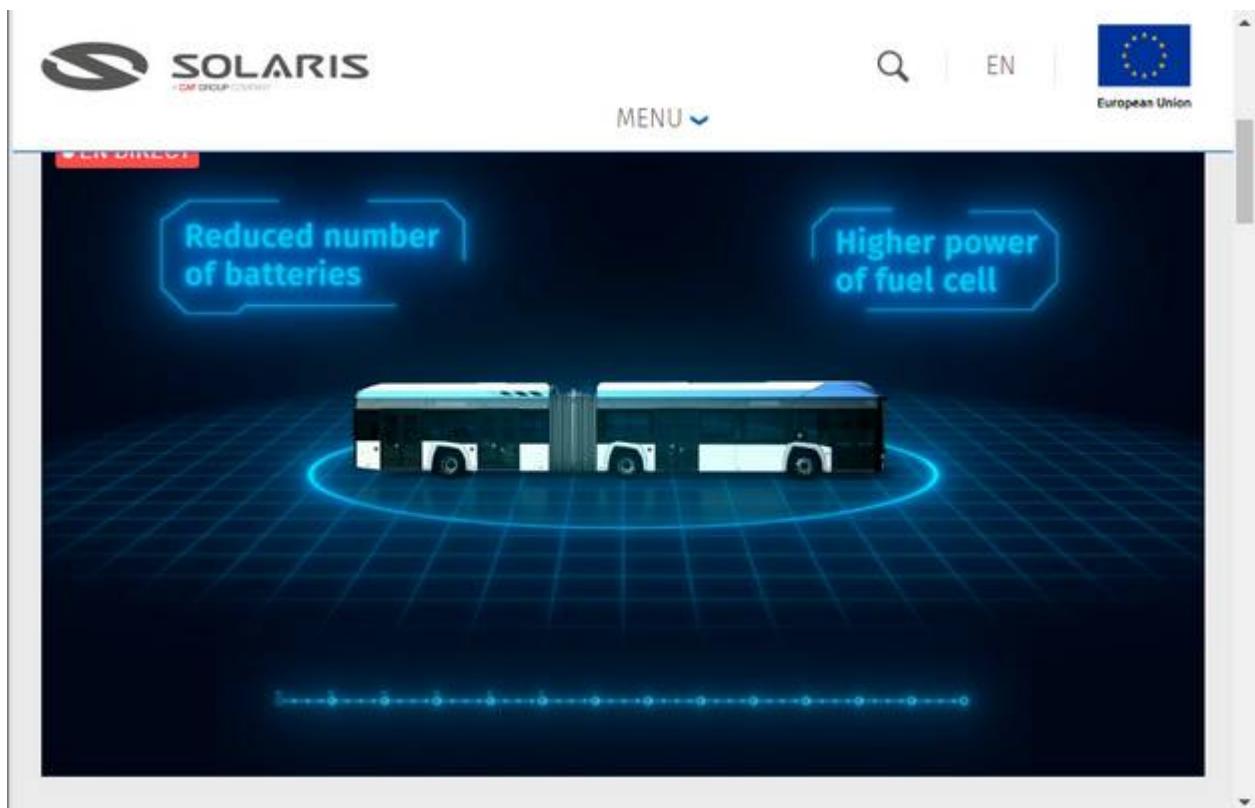
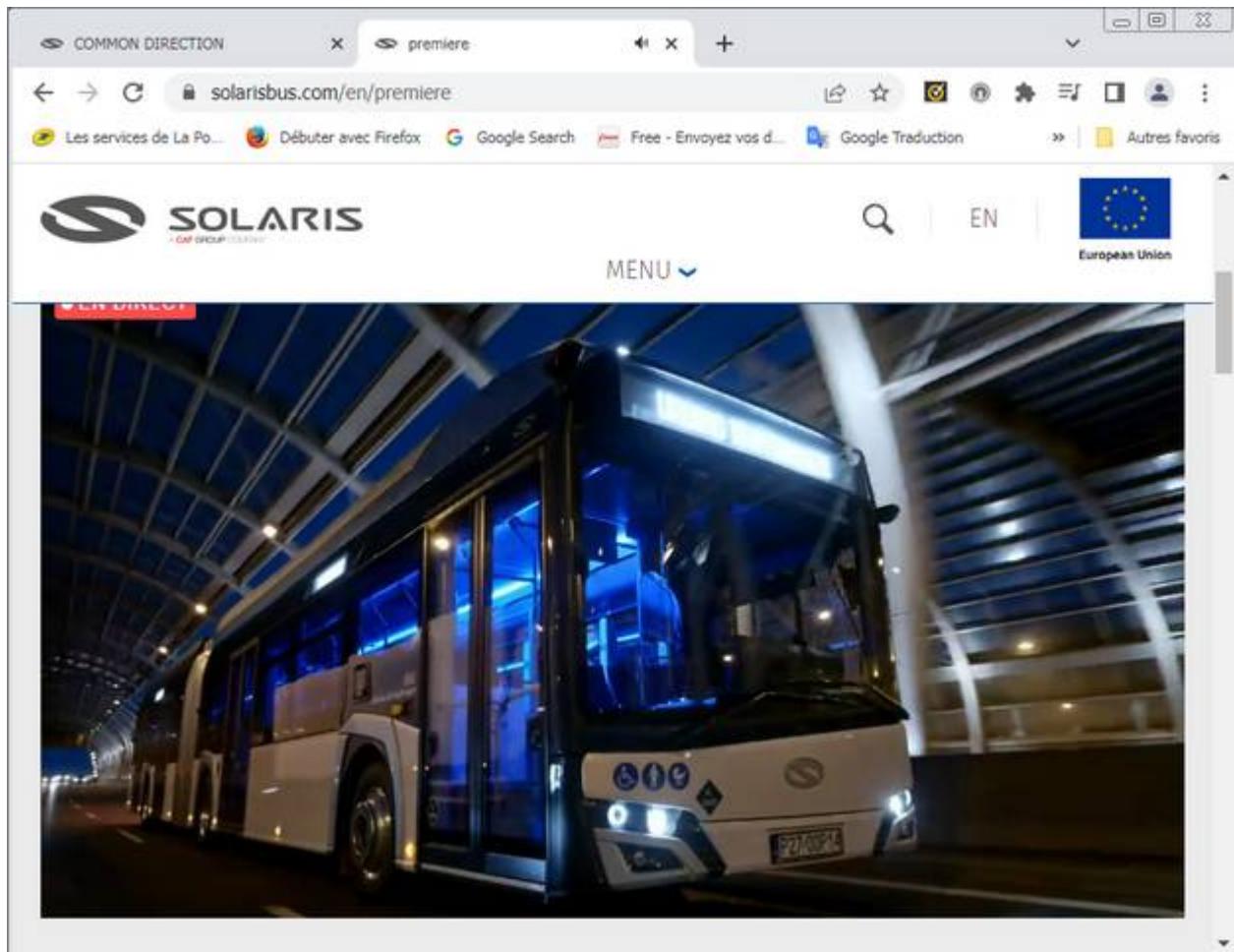


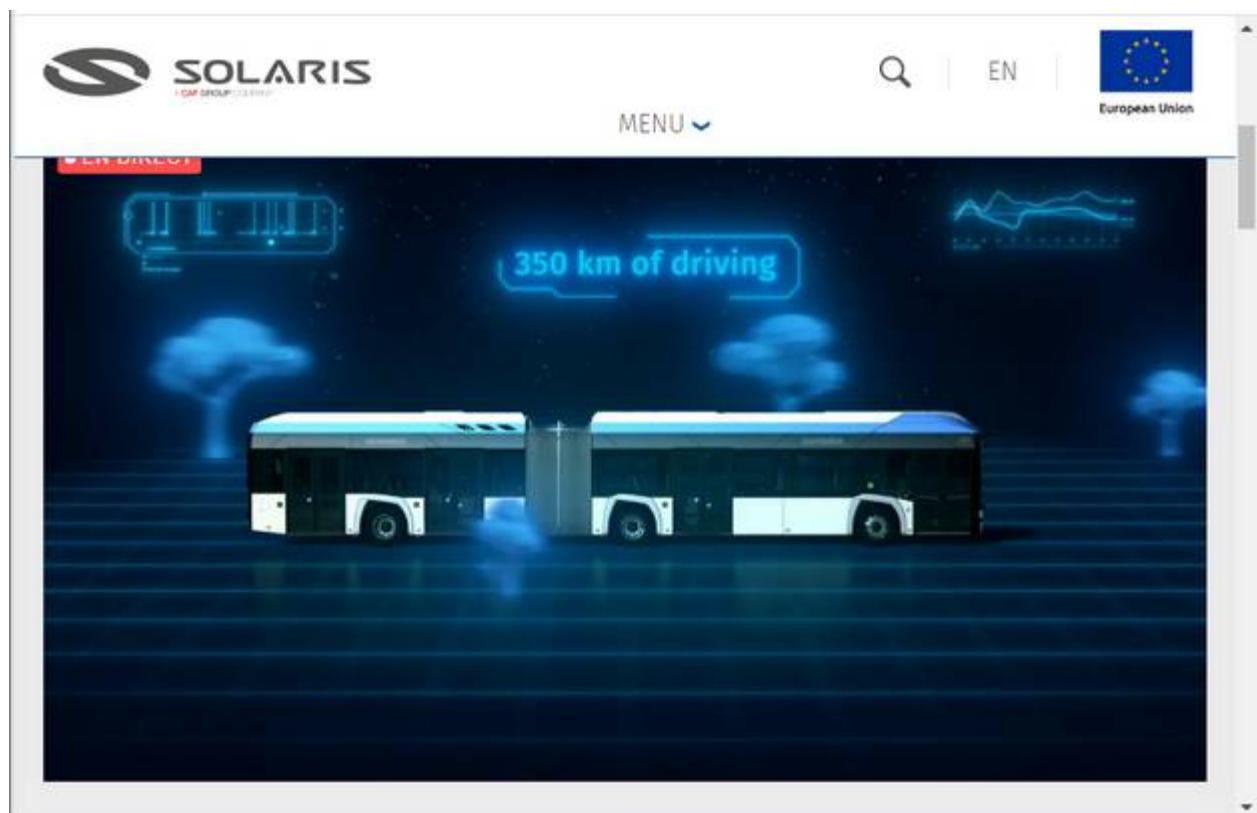
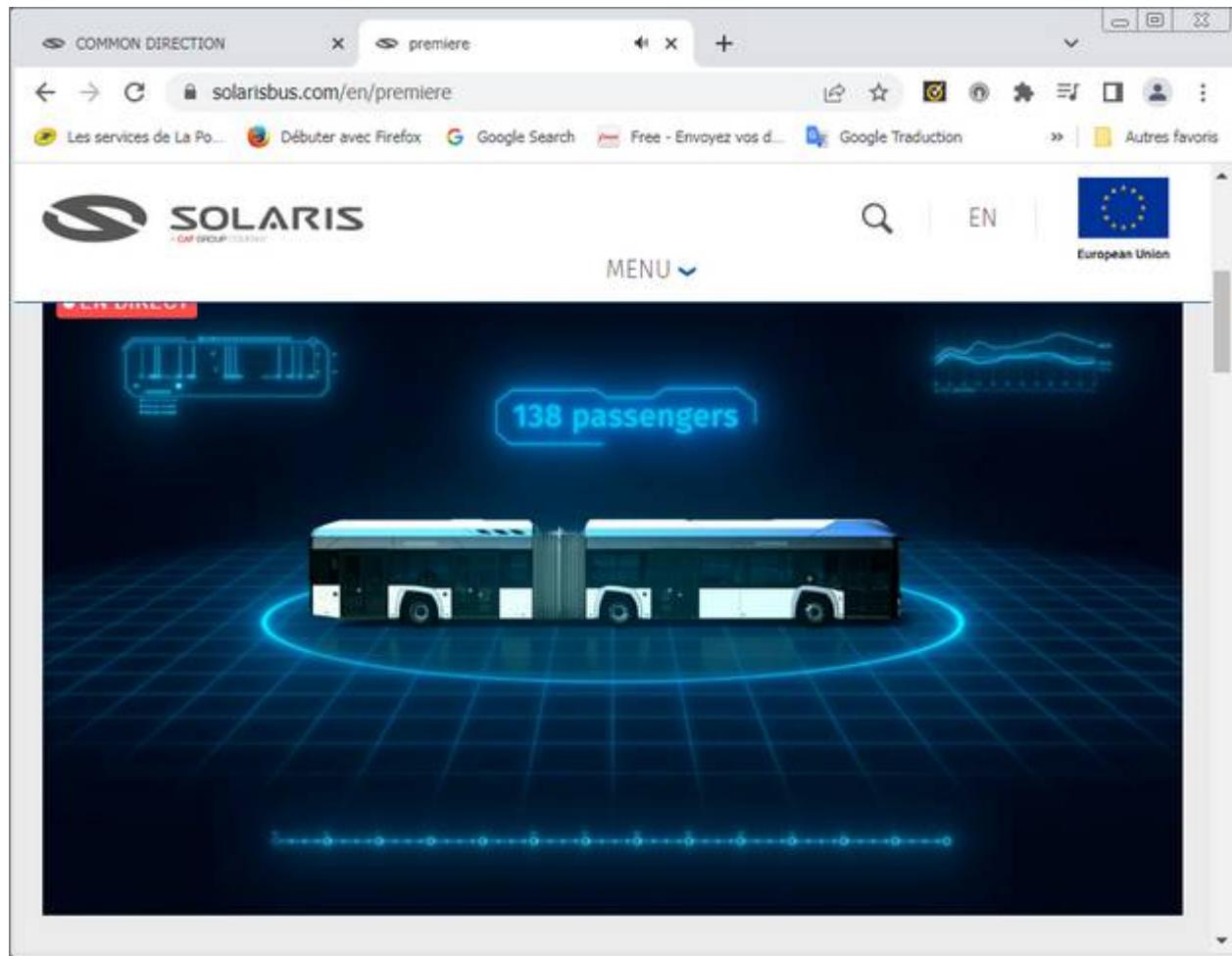
• EN DIRECT



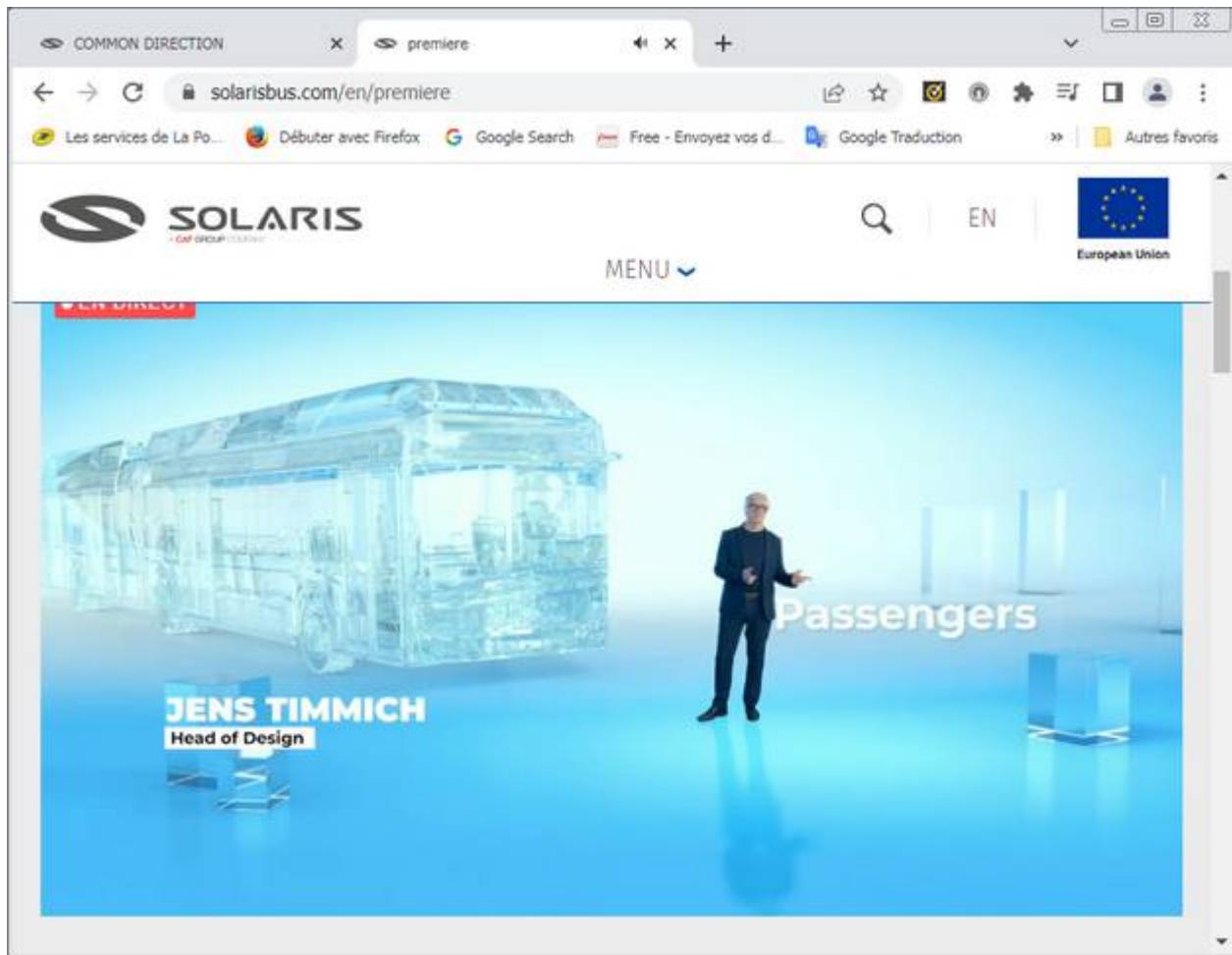
• EN DIRECT

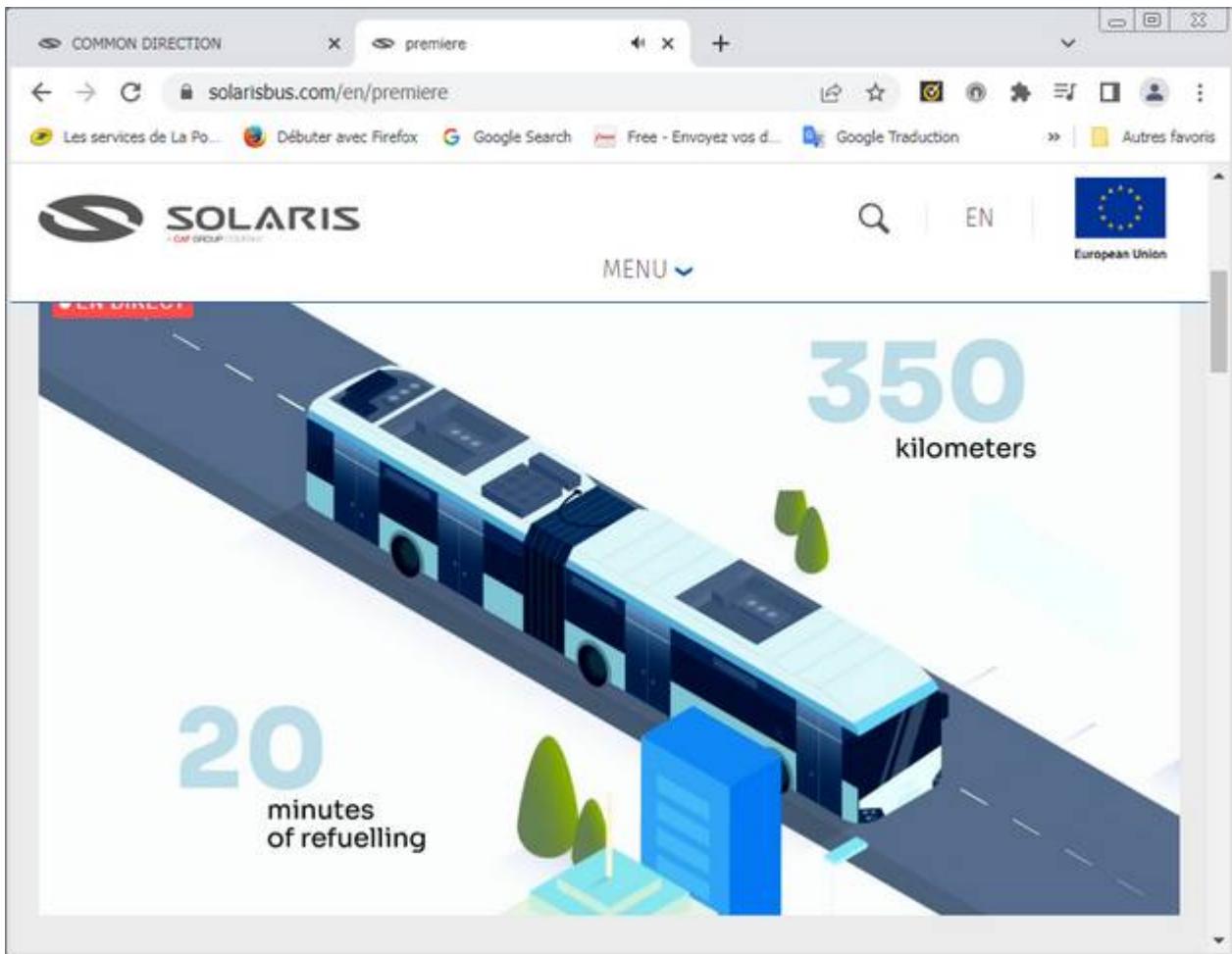






Refuelling 10mn





Il n'y a eu que la vidéo, pas de discussion, dommage.

La discussion a peut-être eu lieu en circuit fermé pour éviter la diffusion de questions iconoclastes !!!

FIN