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EUROPE 2025
CONGRESS
BRUSSELS, BELGIUM 6-9 OCT 2025
in collaboration with:
European Commission

EUROPEAN ZERO EMISSION BUS CONFERENCE

7th - 9th Oct 2025

@ Busworld Europe Brussels

Organised by

ERM

BUSWORLD foundation
the global bus alliance

ZERO EMISSION BUS CONFERENCE 2025

SESSION #7

13:30 – 16:30

Organisational Change and Real-World Performance of Zero Emission Buses

PLENARY SESSION

EUROPEAN ZERO EMISSION BUS CONFERENCE 7th - 9th Oct 2025 @ Busworld Europe Brussels

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Agenda for this session

13:30 – 14:35	Case studies & industry insights
14:35 – 15:05	Coffee break
15:05 – 16:30	One case study + panel discussion

EUROPEAN ZERO EMISSION BUS CONFERENCE 7th - 9th Oct 2025
@ Busworld Europe Brussels

The PTA & PTO Perspectives on Oslo's ZEB Transition

Jon Stenslet

Manager Vehicles and Depots, Ruter

Glenn-Ivar Gaalaas

Head of Fleet, Facilities & Infrastructure, Unibuss

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ZERO EMISSION BUS CONFERENCE 2025

(E-bus winter experience)^2

ZEB conference Busworld
8 Oct 2025

Glenn-Ivar Gaalaas
Head of Fleet, Facilities and Infrastructure
PTO: Unibuss, Oslo, Norway

Jon Stenslet
Manager Vehicles, Depots, E-infra and Driver Facilities
PTA: Ruter As, Oslo, Norway

UNIBUSS Ruter#

2017: Trialling 6 electric buses

2019: 70 e-buses enter service

2022: 109 e-buses
→ 7 months delay

2023: startup of 259 + 76 e-buses

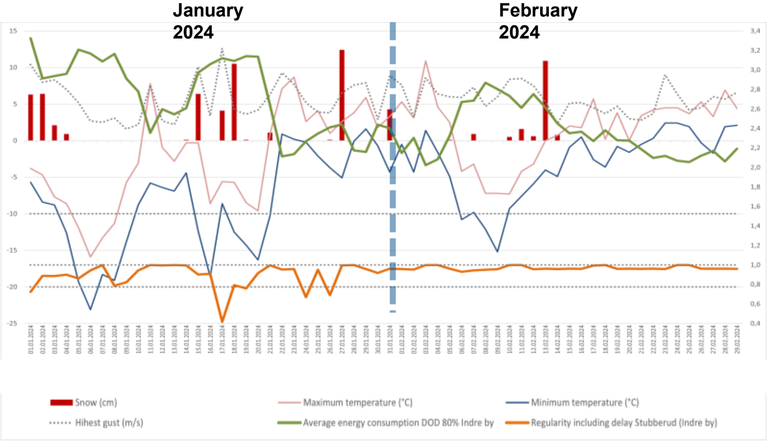
Elbusskaoset: – Busskrisen kan vare i mange år
Elbuss-kollapsen i Oslo:
Ap: - Må vurdere å beholde dieselbusser
Was Oslo paralysed after all of its electric buses broke down due to the cold?
100% ELECTRIC
Nær 6000 innstilt Oslo
Electric flop: buses in Oslo break down in the cold
25.12.2023| News from World
Potential bankruptcy threatens bus services in Oslo
Frazer Norwell
Slik skal Ruter hindre nytt busskaos
Ruter og Unibuss er forberedt på en ny, streng vinter. Nye varmeapparater drevet av biodiesel på 183 elbusser er ett av tiltakene.
– skapte trafikkork i
elbussene er helt krise i
Eirik Hoff Lysholm
Finn en regnskapsfører i Oslo
På tide med en tannlegetime?

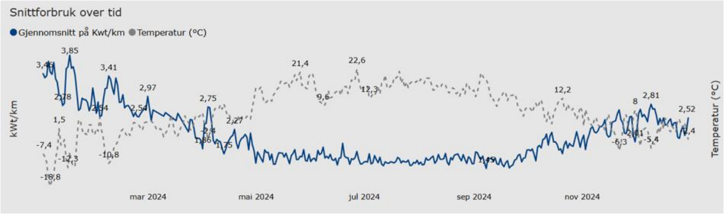
Lessons Learned from winter 2023/24

Picture:
© Verdens Gang

Analysis – Bus Regularity and Energy Consumption

- Correlation between regularity and challenging climatic conditions
- High energy consumption –Lower regularity
- Regularity average in January was 89% - lowest regularity recorded on January 17th at 42%
- Regularity average in March was 99,9%
- Range average ≈ 250 km on September 1st and ≈ 120 km on January 1st





Range of Consumption (2024)

3,85kWh (Winter)

1,45kWh/km (Summer)

Operational Performance Winter 2024/25 (Regularity)

>99,9%

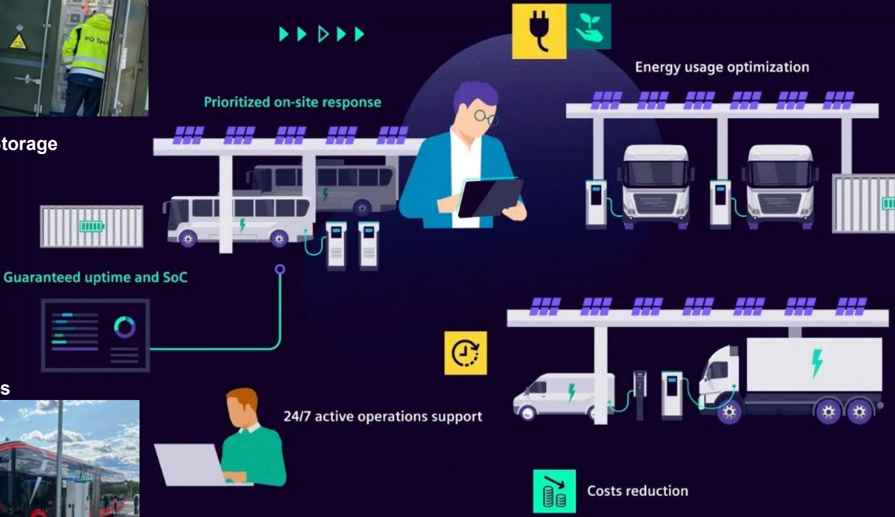
Picture:
© Verdens Gang

UNIBUSS

Next Step – Energy System Optimization

© Siemens

Battery Energy Storage



Solar Plant System

Grid Connection & Charging Infrastructure

Electric Buses

What to expect the first years

(or: stuck in the snow - how fast can you learn+adjust?)

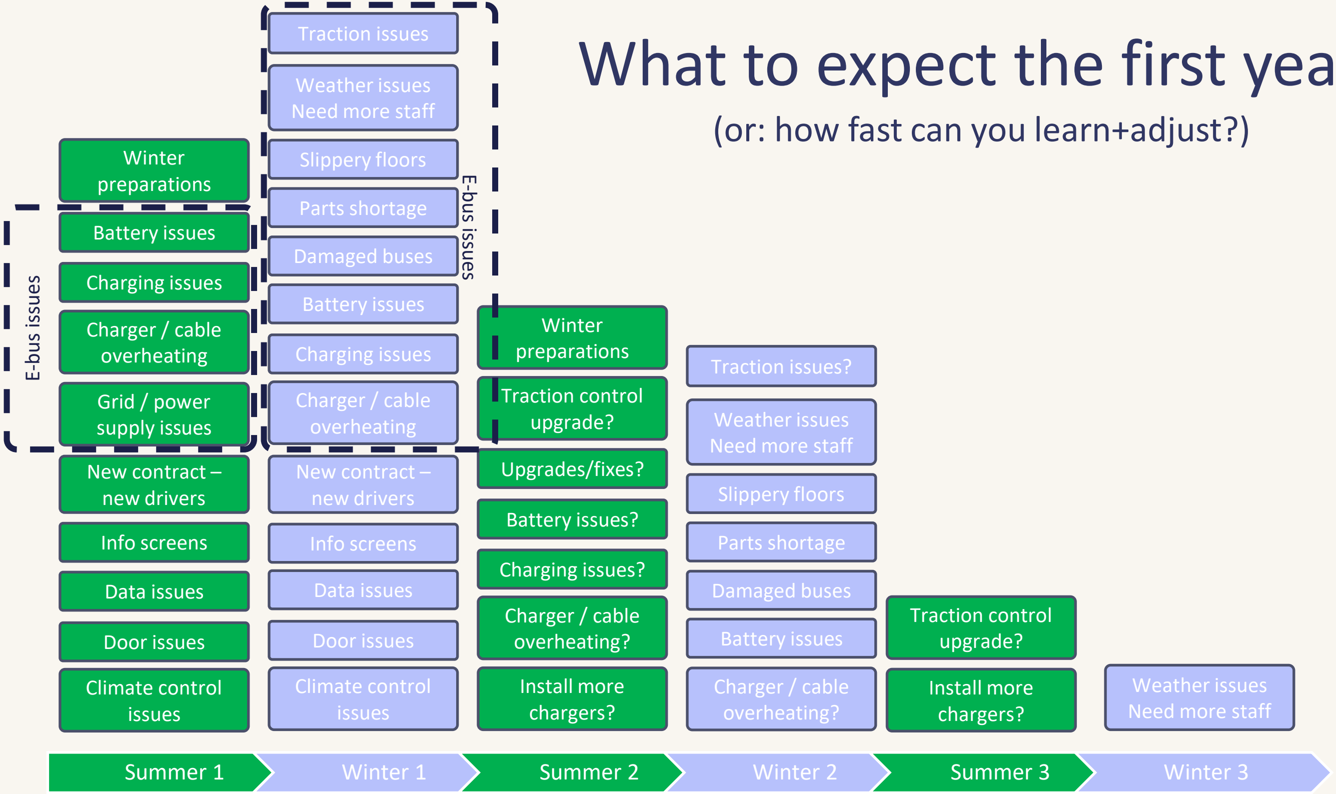
Photo: Vårt Oslo / Vegard Velle

Challenge 1:
frozen floor gets slippery and stops doors from closing
(less/different heating in E-buses?)

Challenge 2:
snow og sand/grit stops ramp from closing (new sensor issues)

What to expect the first years

(or: how fast can you learn+adjust?)



Typical bus type - Oslo

Oslo city bus – 18,75m
Enter and exit via all 4 doors
→ Efficient on/off boarding

Delivered with electric heating.
→ Installed HVO heater 2024/5

Photos: Ruter As

Oslo city bus – 18,06m
Enter and exit via all 4 doors

Heated with CO2 heat pump
Motor on axle 2 and 3
→ Installed extra battery pack
Empty weight 23t w/driver

Very good traction in winter ☺

→ New std requirement for
articulated buses (2 axle drive)

Playing with margins.. (for traction in winter conditions)

License No.	Fuel type	Bus type	Busstype	Dry weight - drive axle	Dry weight - total	Weight ratio - drive axle
EF 45192	EL	Articulated	Solaris Urbino 18,75	8 690	20 610	42 %
ED 19647	EL	Articulated	VDL SLFA-180	9 620	21 700	44 %
EV 70580	EL	Articulated	BYD K11U	9 020	20 200	45 %
DR 61226	Diesel	Articulated	Scania Citywide LE	8 930	19 455	46 %
DR 16287	Diesel	Articulated	Solaris Urbino 18,75	9 180	18 035	51 %
DN 82417	Diesel	Articulated	MAN Lion City GL	9 485	18 144	52 %
EB 21337	EL	Single	BYD K9UB-DW	8 830	14 090	63 %
CF 98113	Diesel	Single	Iveco Crossway	7 925	12 275	65 %
BU 16319	Diesel	Single	Scania Citywide LE Subu	8 780	13 365	66 %
BU 16266	Diesel	Boggie	Scania Citywide LE Subu	10 960	15 315	72 %
BT 93275	Diesel	Boggie	Iveco Crossway	10 750	14 650	73 %
BT 95120	Diesel	Single	Setra S418 Business	8 826	11 662	76 %

Winter tire traction grip reduced

Tire wear increased

ASR (anti-spin) needs improvement

Portal drive axle with central electric motor and differential = Not optimal

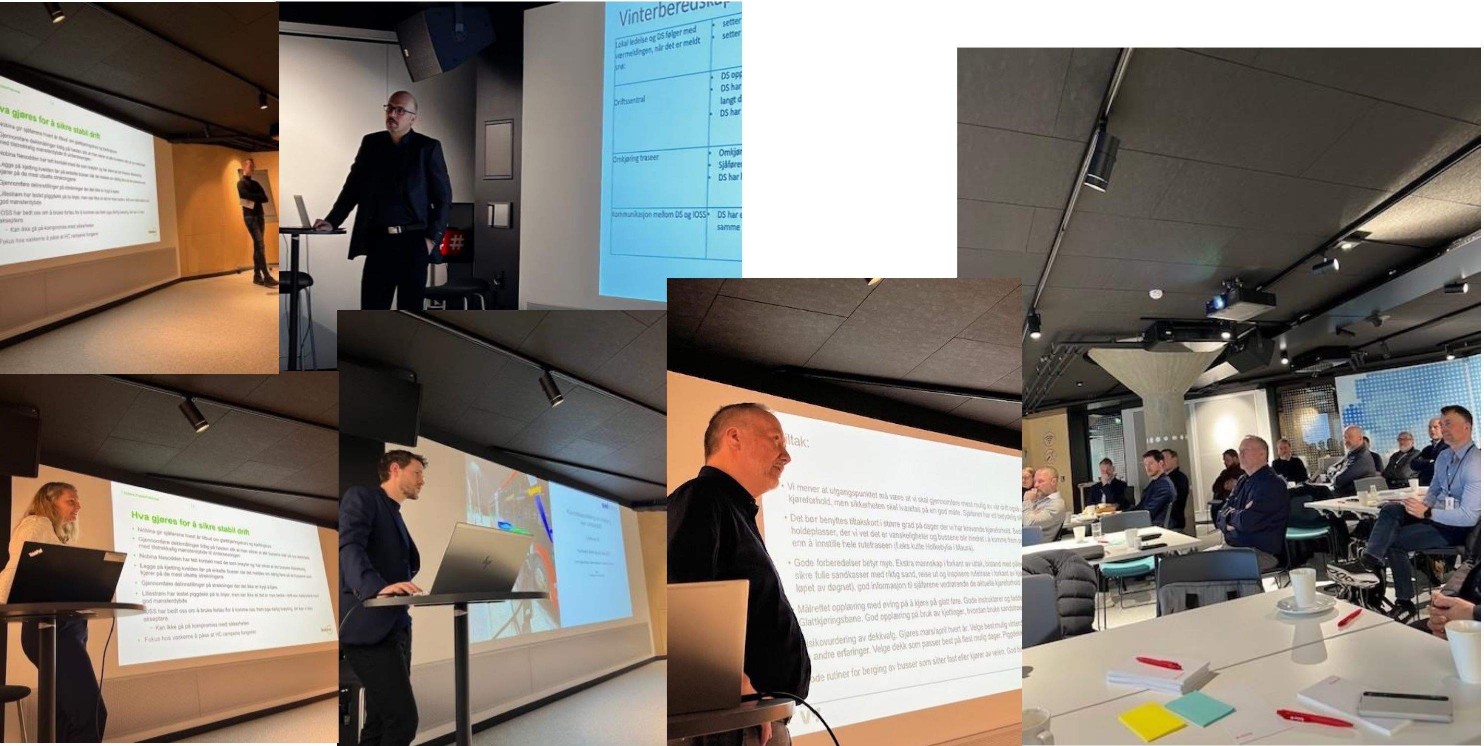
→ Wheel hub drive preferred (keep tractiontorque on both tires at all times)

Knowledge sharing

Experience and dialogue about winter operations

Ruter invites 4 PTO's to share experiences and fixes

Sharing of experience from winter operations



We need more cooperation with road maintenance management on snow removal and gritting (gravel on snow/ice)!

Increased proportion of days with demanding driving conditions - more changeable weather

Snow removal in Oslo was at times very inadequate

Establish operator contacts directly with those who manage snow removal services

Need action cards for prioritizing deviation routes for bus lines/routes

A lot of damage to buses, among other things due to poor snow removal

Need joint meetings (Ruter and operators) with road maintenance

The rig for emission-free operation is more vulnerable than before → The house of cards collapses more easily

Vehicle plans must be more robust during the winter period

Further develop additional action cards for operational deviations

Greater dependencies in the operational value chain

Now we also use 'crawling speed', 3km/h

The range is significantly shorter than expected on electric buses

Studded tires are best suited where there is little bare asphalt

Preheating 1-2 hours, also before charging?

… the problem less on buses with additional heater on HVO

Difficult to test everything in full scale before the launch date (chargers

Tyres must be tested with the buses that will use them

2023: Is the industry ripe for completely emission-free heating?

During coldest days we had to pull frozen buses into workshop to get them to start

New technology and many new drivers - more training for mastering electric buses and slippery roads

Important to test charging infrastructure – functional test and full-scale use

On the worst days, we use 12m shuttle buses with snow chains on part of the route

#

Questions?

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UNIBUSS

Ruter#

Key Takeaways from JIVE & JIVE 2, Two Flagship Fuel Cell Bus Projects

Magali Senaux

Senior Consultant, ERM

EUROPEAN ZERO EMISSION BUS CONFERENCE 7th - 9th Oct 2025 @ Busworld Europe Brussels

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JIVE and JIVE 2: Key fuel cell bus performance outcomes

ZEB CONFERENCE 2025

MAGALI SENAUX, SENIOR CONSULTANT – PROJECT MANAGER

ZERO EMISSION

Clean Hydrogen Partnership

Co-funded by the European Union

Sustainability is our business

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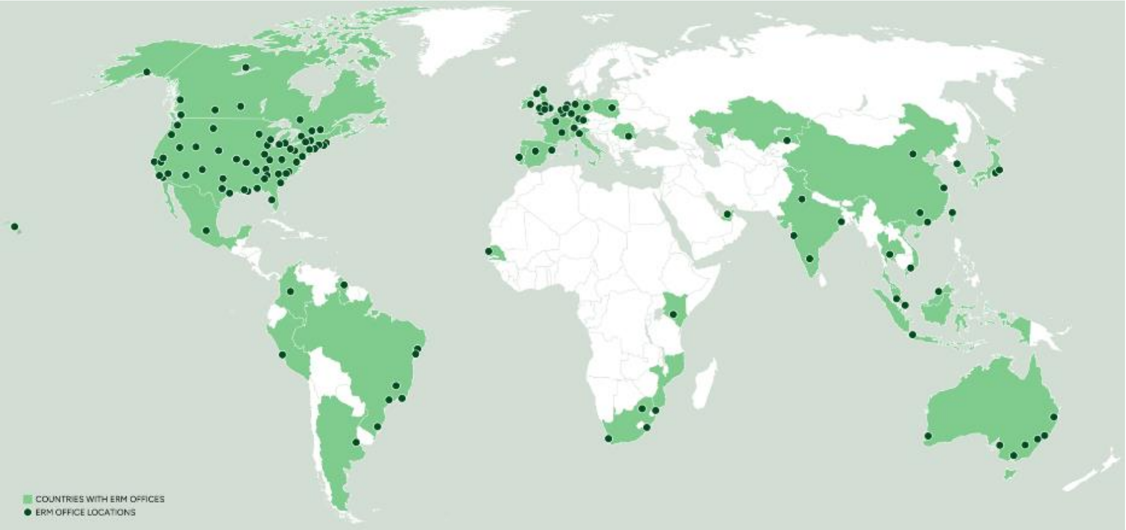
Introduction to ERM's expertise in Transport decarbonisation

We've supported vehicle fleet operators, international organisations, infrastructure providers, Government bodies, and finance players in Europe, North America, and Australia

ERM

8000+	40	**ESG & Sustainability consulting leader**
Professionals	Countries & territories	Verdantix Green Quadrant 2024



We cover all relevant transport modes and low carbon solutions

- Electric
- Fuel cells (H_2)
- Bio-methane
- Liquid biofuels

We support our clients through our various expertise

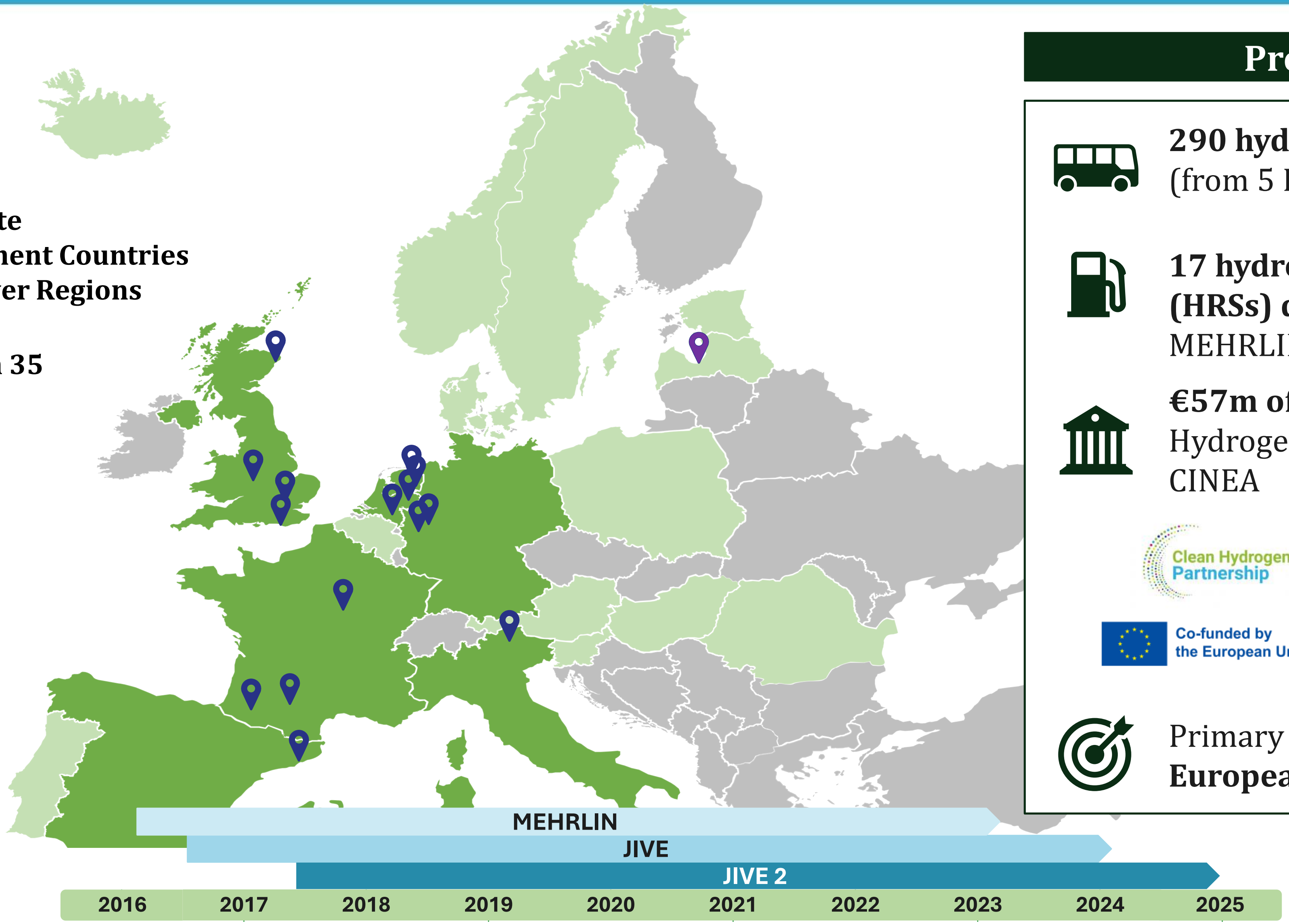
- Funding acquisition
- Charging strategies
- Supply chain analysis
- Due diligence
- Decarbonisation roadmaps
- Project implementation
- Feasibility studies
- Techno-economic analysis
- And more…

JIVE & JIVE 2: Accelerating the deployment of hydrogen technology within public transport

ZERO EMISSION

15 Sites
1 Demo site
6 Deployment Countries
14 Observer Regions

More than 35 Partners



Project Details

290 hydrogen buses deployed (from 5 European bus OEMs)

17 hydrogen refueling stations (HRSs) deployed (7 under the MEHRLIN project)

€57m of funding from the Clean Hydrogen Partnership & **€5.5m** from CINEA

Clean Hydrogen Partnership
Co-funded by the European Union

CINEA
Co-funded by the European Union

Primary goal to **stimulate the European FCB market**

JIVE and JIVE 2 distinguished themselves from past projects through the scale of the deployments

290 buses from **5 European OEMs**

Single deck buses (~68% including 2% articulated) and **double deckers** (~33%)

Fleet sizes between **5 to 50+ buses**

As of end of March 2025, **>24.5M km** have been driven cumulatively

WRIGHT | SOLARIS | CaetanoBus | SAFRA Accélérateur de mobilité décarbonée | VANHOOL

Aberdeen (UK)


Groningen (NL)

Barcelona (ES)

Pau (FR)

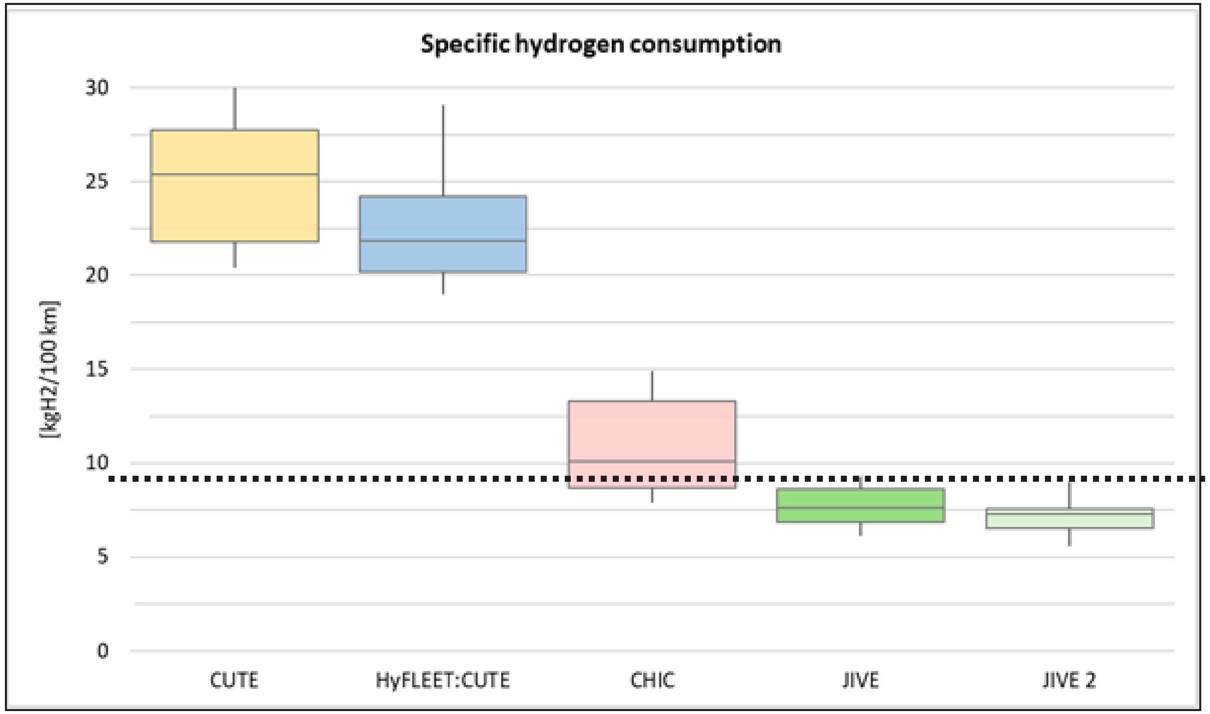

Auxerre (FR)

Key outcome #1: Buses have demonstrated great performance regarding improved fuel consumption

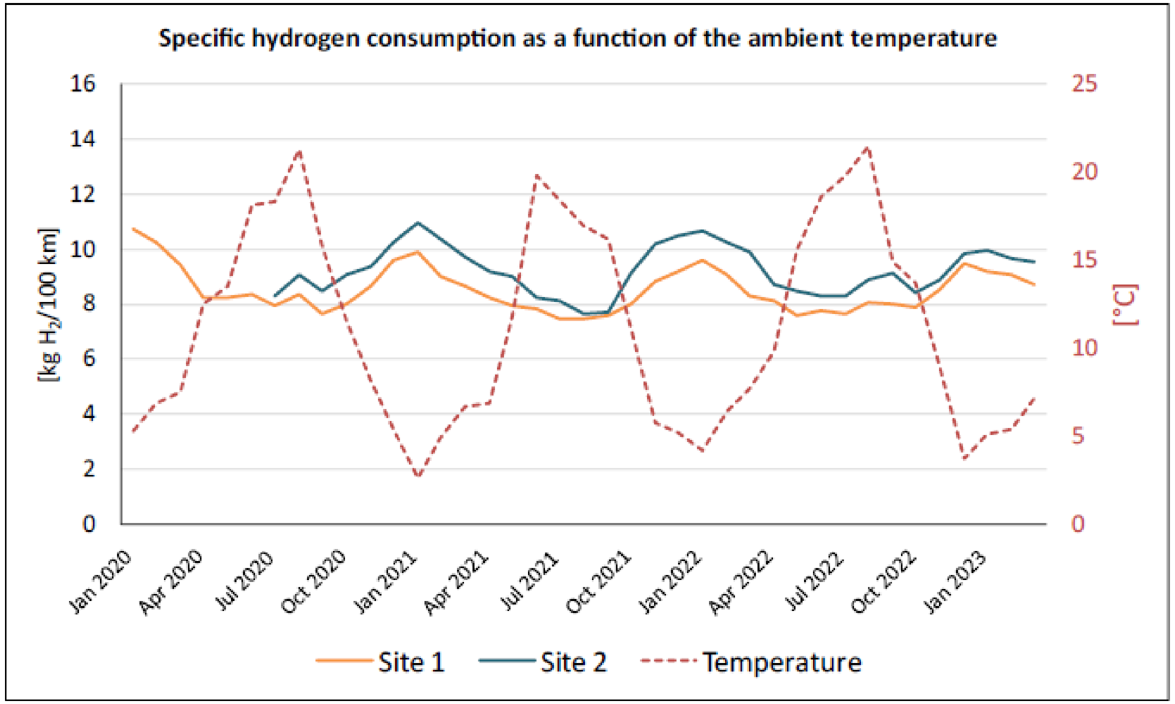
ZERO EMISSION

Fuel Consumption

Target: <9 kg/100 km (standard buses) / <14 kg/100 km (articulated buses)



2001 – 2005	2006 – 2009	2010 – 2016	2017 – 2025
27 FCB	47 FCB	54 FCB	290 FCB

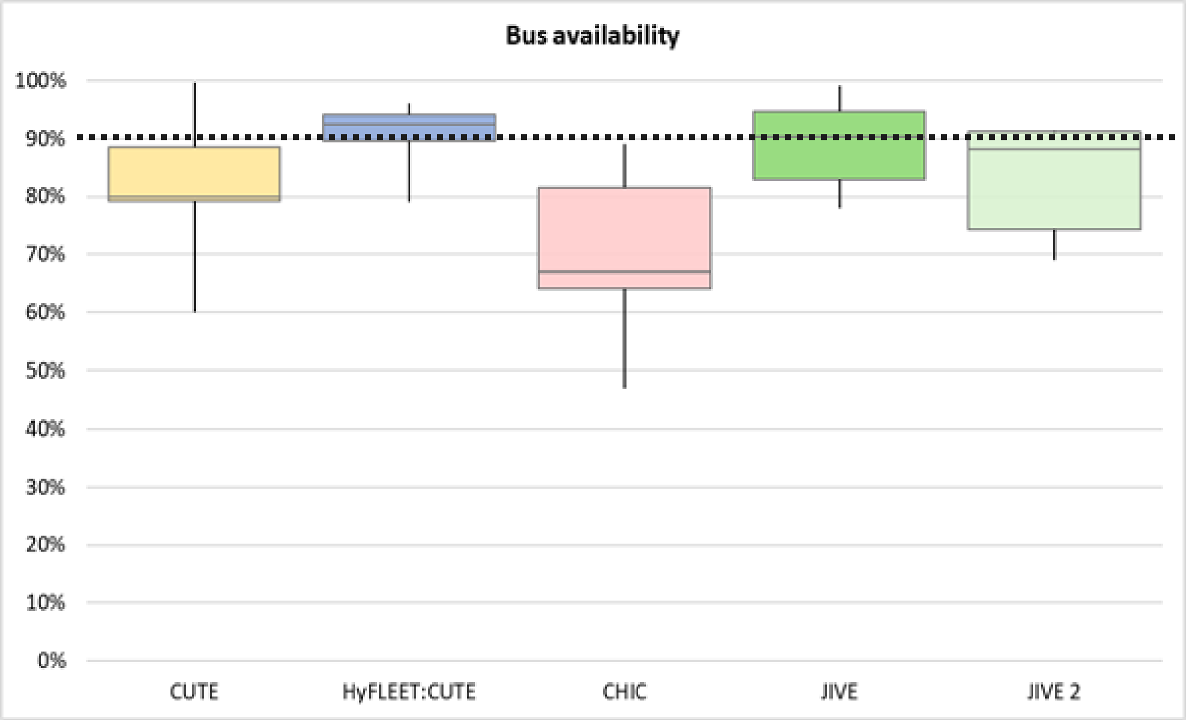


- Driving style also impacts the hydrogen consumption

Key outcome #2: Bus availability has also greatly improved compared to previous EU projects

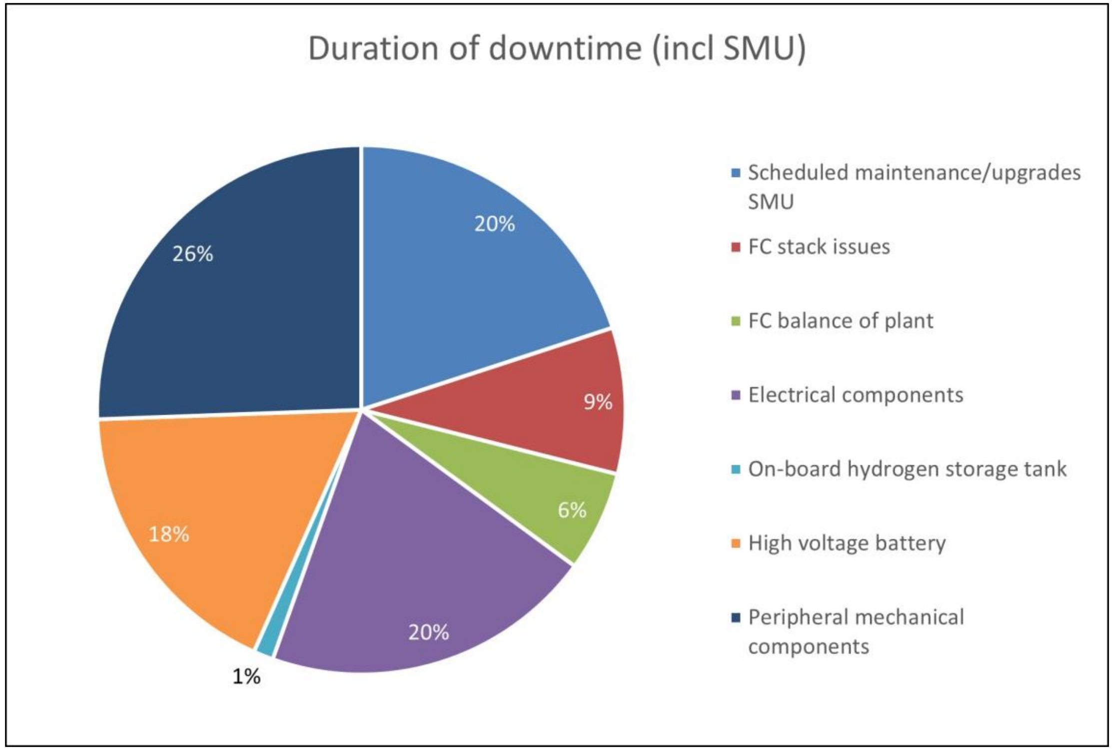
ZERO EMISSION

Availability Target: >90%



2001 – 2005 2006 – 2009 2010 – 2016 2017 – 2025

27 FCB 47 FCB 54 FCB 290 FCB



Note: HyFLEET:CUTE project buses had unusually high availability due to intensive, non-standard maintenance

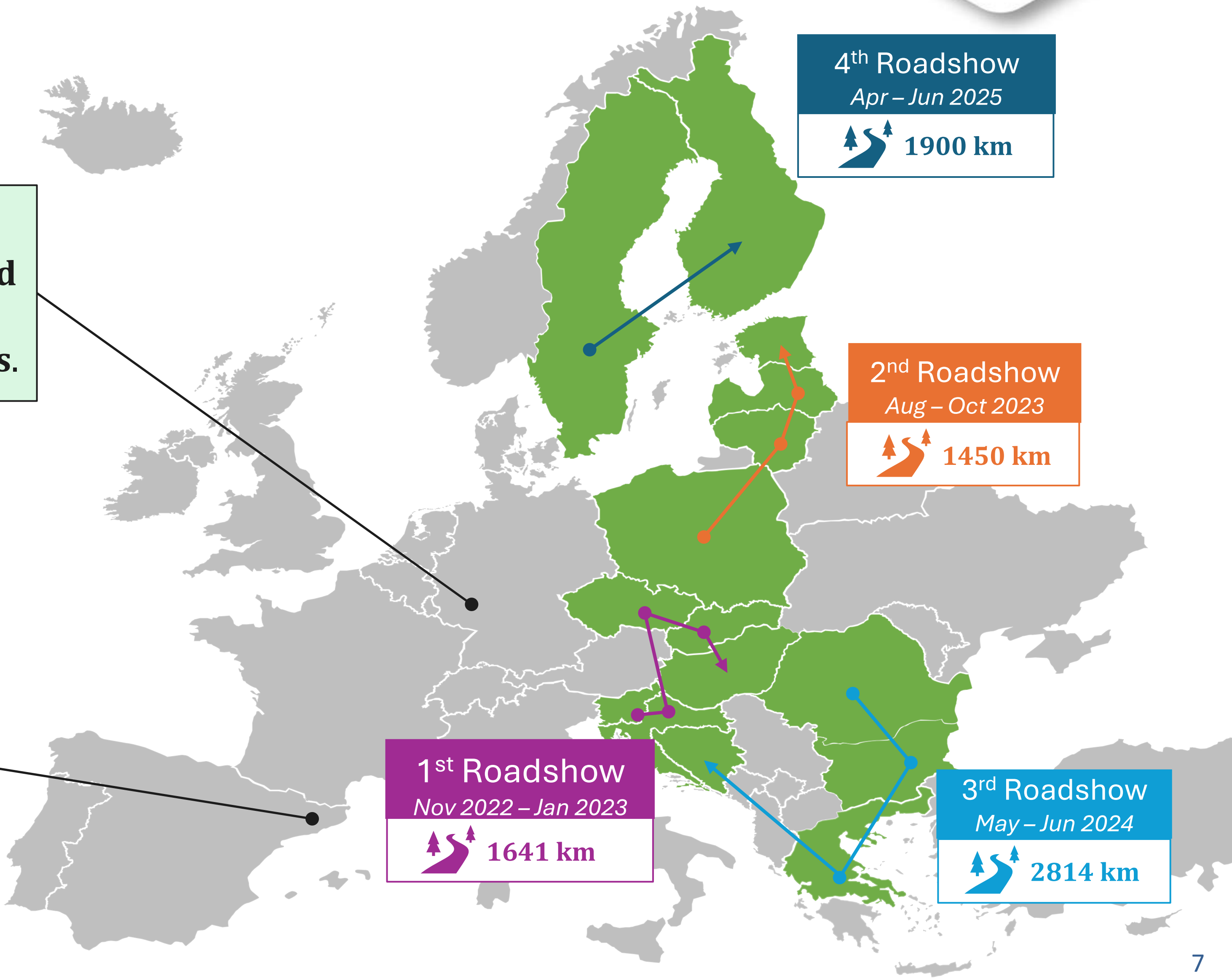
Key outcome #3: The projects have been able to stimulate the uptake of further fuel cell buses across Europe

Cologne area, DE

With the delivery of **31 FCB in 2024**,
RVK's total **fleet expected to grow to 160 FCB by end 2025**,
50 of which were procured **through the JIVE projects**.

Barcelona, ES

With the delivery of **2 new articulated FCB in 2024**,
TMB's total **fleet now consists of 46 FCB**,
10 of which were procured **through the JIVE 2 project**.



Key outcomes

Buses have demonstrated great fuel efficiency

Bus availability has substantially improved compared to previous demonstrations

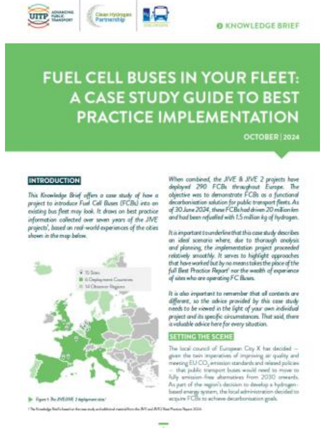
The projects have stimulated the future uptake of fuel cell buses across Europe

Engage with the JIVE/2 partners and sector stakeholders:

Register your interest for the Continuity Forums:

Continue learning more about the projects

Find all reports published on the **projects' website**



Continue following the projects via **LinkedIn**

Don't hesitate to also contact me via email if you have any questions or would like more information on the projects

Magali.Senaux@erm.com

Thank you

If you're interested in discussing more about the JIVE projects or other, get in touch!

Magali.Senaux@erm.com

Technical Insights from Fuel Cell Bus Deployments: Operator and Manufacturer Perspective

Andreas Meyer

Technical Director, Wuppertaler Stadtwerke

Nicolas Pocard

Vice President, Marketing & Strategic Partnerships, Ballard

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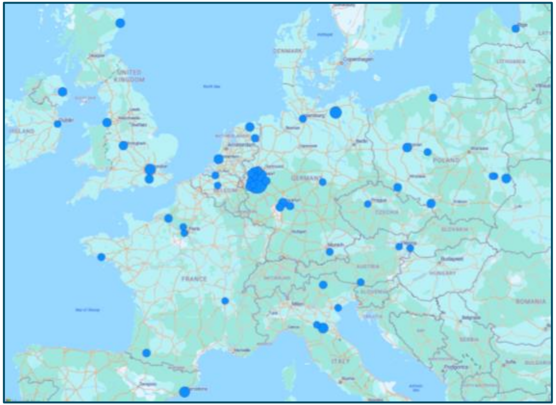
BALLARD™

Real World Performance of Hydrogen Fuel Cell Zero Emission Buses

Nicolas Pocard
Vice-President Marketing and Strategic Partnerships

Shaping the Future of Zero-Emission Transit

- **1100+ FCEBs on the road in Europe** – ZEB technology with highest year-on-year growth
- **880** Ballard-powered FCEBs deployed in Europe – **80% market share**
- **Proven performance** with over 200 million km in service globally
- Road experience, **operator & OEM feedback inform next generation fuel cells for transit bus**
- Next generation **module performance and lifecycle cost** can help operators close the TCO gap



Operating in 13 countries and 50+ cities

Fuel cell buses have reached maturity and are now commercially proven for high-duty transit

FCEB – a challenging market

- **Significant growth** in fuel cell bus deployments with over **1,100 FCEB in Europe and 250 in NA**
- Today, battery electric buses are dominating the ZEB market, but FCEB deployments in NA and EU have progressed faster in 2024, especially in Europe.
- Deployments of FCEBs are **scaling up**, driven by the transition to zero-emission bus fleets supported by net zero regulations, strong mandates, and public funding.
- Proven operational advantages of FCEBs as **one-to-one replacement** of diesel buses and the **complexity of depot electrification** at scale are moving more transit operators toward fuel cells
- But **growth** is heavily dependent on subsidies, as FCEBs have not reached TCO parity with BEB
- **Hydrogen price and availability**, along with high vehicle prices, are the main adoption barriers
- Hydrogen **policy and funding uncertainty** are challenging future market growth

FCEBs have high potential but challenged by lifecycle cost and hydrogen availability

The case for fuel cell buses – drivers for successful deployment

Cities – net zero focus, manageable H2 logistics, higher average speed

Regions with **access to hydrogen**

Access to **ZEB funding** programs (national or/and regional)

Agencies with zero emission bus **experience/infrastructure**

Transit agencies with **longer routes and express buses**

Transit agencies with more **articulated buses** (better FCEB performances)

Cities in regions where **FCEBs have already been deployed** – less risk and ecosystem in place

Cities already operating FCEBs – **repeat orders**

Agencies with an **internal hydrogen champion**

Voice of the customer: real-world experience informing development

Operator Requirements

Improve stack & BOP component life.

Reduce spare part lead times

Proactive diagnostics & predictive maintenance tools.

Continuous, modular training in local languages.

Long-term service agreements with transparency.

Ballard response

Product Development:

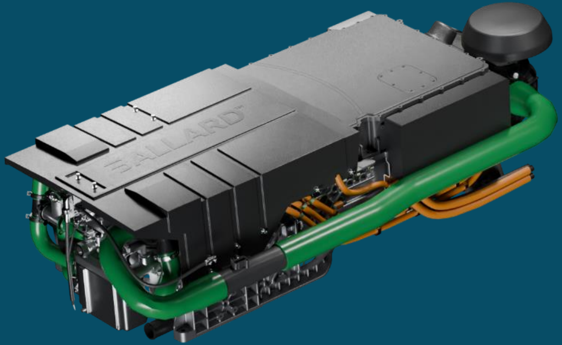
- FCmove®-SC - designed for durability and easier service.

Service Improvements:

- Regional parts hubs - under development.
- Predictive maintenance capability and advanced data analytics.
- Expanded e-learning & train-the-trainer programs.

Lifecycle contracts & extended warranties.

FCmove®-SC Key Improvements



Hall 9 – Booth 956

30% increase in system power (EOL)
Fully integrated module with built-in power management (DC/DC converter) for simplified vehicle integration.

Higher operating temperatures
Operates at 60–75°C outlet temperatures, reducing cooling requirements—lowering cost, decreasing weight, and improving fuel efficiency.

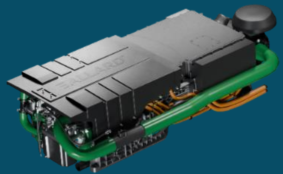
Maintenance-friendly design
40% reduction in part count with easily accessible serviceable parts, interfaces, and outlet locations.

Enhanced durability and reliability
Proven materials and advanced technology deliver a 20–30% reduction in expected life cycle costs.

Engineered to power transit buses – lower life cycle cost, simplified integration and enhanced safety

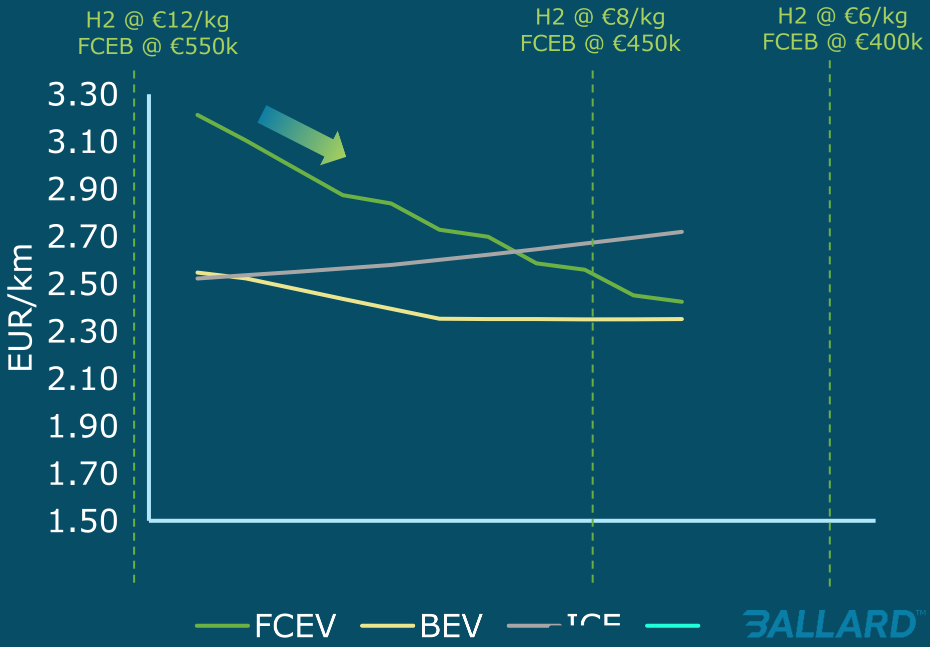
Advancing towards TCO parity

FCmove®-SC contribution



Reduce vehicle cost (capex)
- Increased FC scope
- Smaller radiator
- Easier integration

Reduce operating cost
- Lower fuel consumption
- Reduced maintenance time
- Lower PM and CM cost



Operator Perspective - Hydrogen Fuel Cell

Zero Emission Buses

Andreas Meyer
Technik Kfz

WIR SIND WEGBEREITER WSW.

WSW mobil GmbH: About the site

Location	Wuppertal (Germany)
Number of buses	52
Type of buses (brand, single/double decker/articulated)	10x van Hool (A330-FC) 29x Solaris (Urbino 12 Hydrogen) 13x Solaris (Urbino 18 Hydrogen)
Total mileage since start of operation	Van Hool: 1.511.000km Solaris: 1.675.000km (Total: 3.187.000km)
Type of route(s)	All routes (no restrictions)
HRS (public/private, manufacturer)	1x Privat, external, Maximator GmbH 1x Privat, depot, Everfuel
Amount of H2 dispensed since start of operation	217.000kg

WSW mobil GmbH: Key milestones

Key milestones:

2017
Project start

2017/18

- Procurement and order of 10x Van Hool FC-busses
- Start of planning for the HRS

2019/20

2019
- Joint procurement for 25 FCbs (15 for Cologne and 10 for Wuppertal)
- Delivery of first Van Hool FCb
- Driver training & final acceptance of Van Hool FCbs
- Retrofit Depots and maintenance facilities
- Start civil work HRS - Maximator (MEHRLIN)

2020
- Solaris was won the tender for 25 FCB
- All 10 FCBs (Van Hool) were delivered and accepted
- Start of Operation HRS

2021/22

- Delivery & final acceptance of all 10 Solaris FCbs
- Start of operation of Solaris FCB's

- *Procurement process for depot HRS*
- *building permit HRS*

2023/24

- All 20 FCB are in regular use
- HRS (Maximator) is in regular use

- *Start civil work depot HRS – Everfuel*
- *Procurement for additional 32 FCb*

2025

- Project "WSW x AVL - Analysis and optimization of fuel cell buses"

- *Delivery & final acceptance of 32 Solaris FCbs*
- *Start of Operation depot HRS (Everfuel)*

- All 52 FCbs are in regular use
- Both HRS are in regular use

WSW.

Motivation

To optimize the entire system, from energy use to bus tires, all systems involved in the chain were examined.

More detailed investigations were carried out on the following system elements in particular:

- Power source
- Availability Electrolyzer with the most effective use
- Drivetrain in the bus

All analyses aim to optimize the economic efficiency of vehicle use. This also includes the approach of improving the service life of all components.

“Analysis and optimization of buses with FC”

Objectives

- Optimize the power-split strategy to extend the service life of the fuel cell system
- Simulate selected driving cycles using the modified operating strategy
- Evaluate the impact of the new strategy on:
  - Fuel cell system lifetime
  - Driving cycle performance

Approach

1. Provision of route and bus data
2. Creation of simulation model
3. Powertrain simulation
4. Optimization
5. Evaluation

Performance Challenges

Issues & Observations of 2021 buses

#1 - Maximum FC Power to ~50kW
#2 - SOC drops to ~0% several times a day
#3 - Dynamic performance of FC power

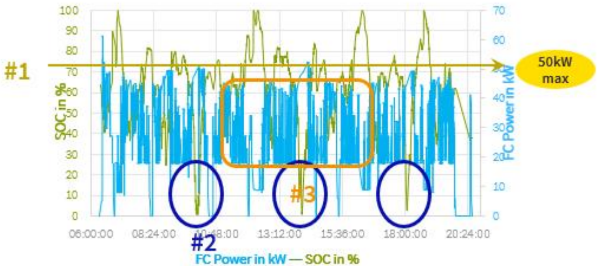
1. Observations (#1) **in ten 2021 buses** linked to dynamic fuel cell use (#3) - high idle voltage, large voltage swings and humidity cycling during operation. This is not observed in **2024/2025 buses**

2. The design of the hybrid driveline (battery and fuel cell) along with its power control strategy can directly affect fuel cell performance and impact stack lifetime.

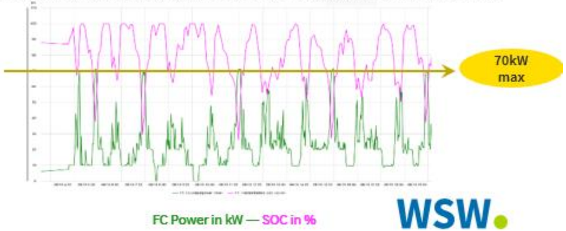
3. Effective FCEB performance requires careful consideration of **battery sizing (buffer storage)** and **predictive power control strategies** to optimize fuel cell performance.

WSW Bus fleet	Fuel Cell	HV-Battery
10x Van Hool - 2019	Ballard FCvelocity-HD85 - 85 kW	36 kWh
29x Solaris - (10x 2020; 19x 2024)	Ballard FC Move - 70 kW	30,47 kWh
13x Solaris (18m) - 2024	Ballard FC Move - 100kW	60,8 kWh

SOC and FC power diagram for one day of a 2021 bus



For comparison: SOC and FC power diagram 2024/2025 Bus



WSW

Conclusions/Next Steps

Observations

- Measurements showed critical behavior, especially in terms of fuel cell power and battery state of charge / drivability.
- Fuel cell power of 70 kW isn't fully achieved during operation, even at low battery state of charge.
- Technical solutions are being tested - new vehicle control software to improve drivability, smooth fuel cell load transitions, and improve overall operation.

Next Steps

- Regular meetings with the OEMs (Solaris / Ballard)
- Determination of SoH of battery and fuel cell
- Software Optimization: Drivetrain components software updates/adjustments
- Remedial Options: module refurbishment with Ballard's latest stack technology - designed for higher durability under different humidity cycling and voltage conditions.
- Development of joint strategy for monitoring the FCs to enable preventive measures.

Only through intensive cooperation between industry and users can the overall system be further optimized and the economic burden of fleet electrification be overcome.

Return of Experience from the Industry

Flavio Grazian
Project Manager – Knowledge & Innovation, UITP

Carlos Rivo
Commercial Director, UNVI

Dr. Andreas Z'Graggen
Global Sales Manager, ABB

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Writing the future of urban sustainable transportation

Market needs

- Decarbonization
- Energy Efficiency
- Safety
- Reliability

WHO WE ARE

- Independent traction system provider globally
- Your preferred partner from product to system and standard to customized solutions based on your needs

WHAT WE STAND FOR

Long history and a rich heritage of technology innovation in transportation segment, which enables us:

- **Efficient e-mobility solutions**: Offers reliable, high-efficiency traction systems to power electric buses, reducing emissions and fuel dependency.
- **Enhanced operational performance**: Delivers technology that increases vehicle uptime, range, and energy efficiency for bus fleets.
- **Sustainable urban transportation**: Supports cities in achieving environmental goals with zero-emission technology that promotes cleaner, quieter urban travel.

Traction Battery Pro

Mobile Inverter HES580

Traction Motor AMXE250S

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1995 **30** 2025
YEARS

Helping to decarbonize the best touristic European cities with 100% electric sightseeing buses since 2017, …

Adapting to customers' needs to achieve Zero Emissions

Carlos Rivo
Managing Director

MADE IN EUROPE MADE IN

Coffee Break

Session continues at 15:00

PANEL DISCUSSION

David Barnett

General Manager Engineering

Translink

Lidia León Talavera

Deputy Director for Operation Centres

EMT Madrid

Martin Dean

Managing Director of Bus

Go-Ahead

Jon Stenslet

Manager Vehicles and Depots

Ruter

EUROPEAN ZERO EMISSION BUS CONFERENCE 7th - 9th Oct 2025 @ Busworld Europe Brussels

Panel Session

Organisational Change and Real-World Performance of Zero Emission Buses

Translink

- Integrated public transport provider in Northern Ireland
- 300k passenger journeys per day
- 44m miles per year
- Operate over 1500 vehicles – Bus, Coach and Rail
- Maintain over 80 stations and 300 miles of rail infrastructure
- Committed to a 50% carbon reduction by 2030 and carbon neutral by 2040
- 25% of Buses now Zero Emission

Organisational Change and Real-World Performance of Zero Emission Buses

- What operational and organisational changes are critical to successfully integrate zero-emission buses?
- What key performance indicators such as energy consumption, availability, reliability, and downtime are used to monitor ZEB fleets?
- What are the main challenges you've faced in scaling up ZEB fleets, both technically and organisationally?
- What lessons can we learn :
  - Delivering change in the organisation
  - Training and upskilling staff
  - Fleet deployment strategies
  - Route planning
  - Managing recharging or refuelling requirements


EMT MADRID
EMT
CIEN X CIEN
ELECTRICO
EMT
CIEN X CIEN
ELECTRICO
ELECTRICO
744
3478 LPY SP
0942 MGM SP
546
Irizar
204

UITP's Insights on ZEB Performance

Arno Kerkhof

Head of Bus Unit, UITP

EUROPEAN ZERO EMISSION BUS CONFERENCE 7th - 9th Oct 2025 @ Busworld Europe Brussels

ERM

BUSWORLD foundation the global bus alliance

Oct 2025
ArK

UITP insights on ZEB performance from the perspective of the global network that unites worldwide public transport bus operators

Arno Kerkhof
Head of Bus Unit – Knowledge & Innovation

1. UITP Knowledge & Innovation network in a nutshell

2. Bus data in a growing world of public transport data 📊 What's new in our latest Global Urban Mobility Indicators

3. Bus Committee : the ZEB Observatory & Thermal Comfort Toolkit

4. Reserarch & innovation - EBRT2030 project – electric BRT demonstrators (real world)

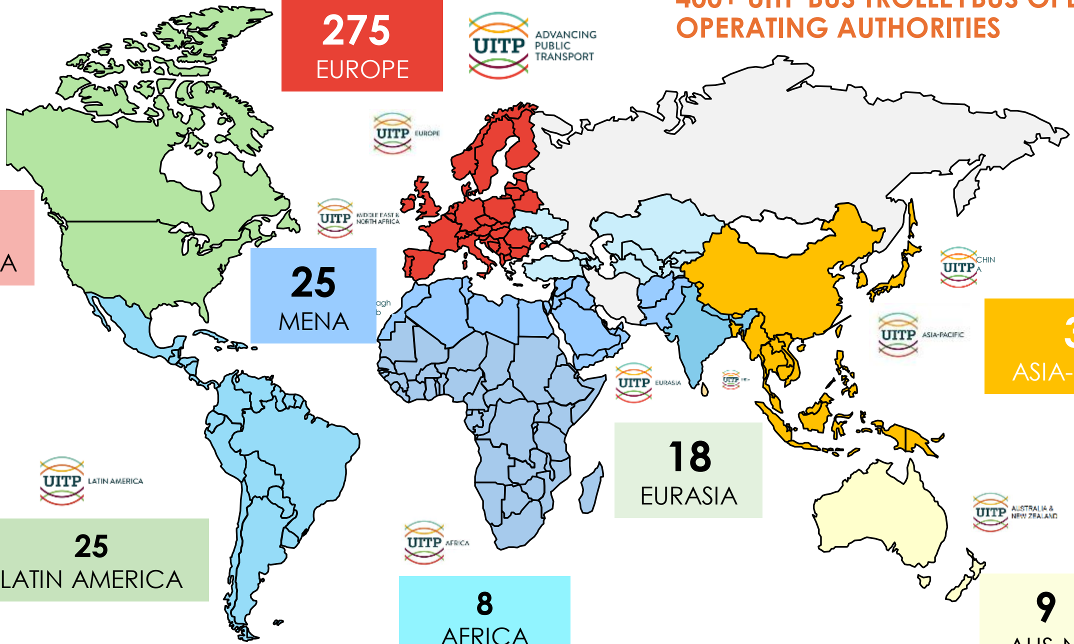
5. UITP Academy with spotlight on next bus programs

Action Point : Congestion-free bus lanes !

1 UITP CORPORATE BUS UNIT

UITP Bus Division a truly global network

400+ UITP BUS TROLLEYBUS OPERATORS & OPERATING AUTHORITIES



275 EUROPE

33 NORTH AMERICA

25 MENA

35 ASIA-PACIFIC

18 EURASIA

25 LATIN AMERICA

8 AFRICA

9 AUS-NZ

No members

UITP DIVISIONS & COMMITTEES

The UITP working bodies

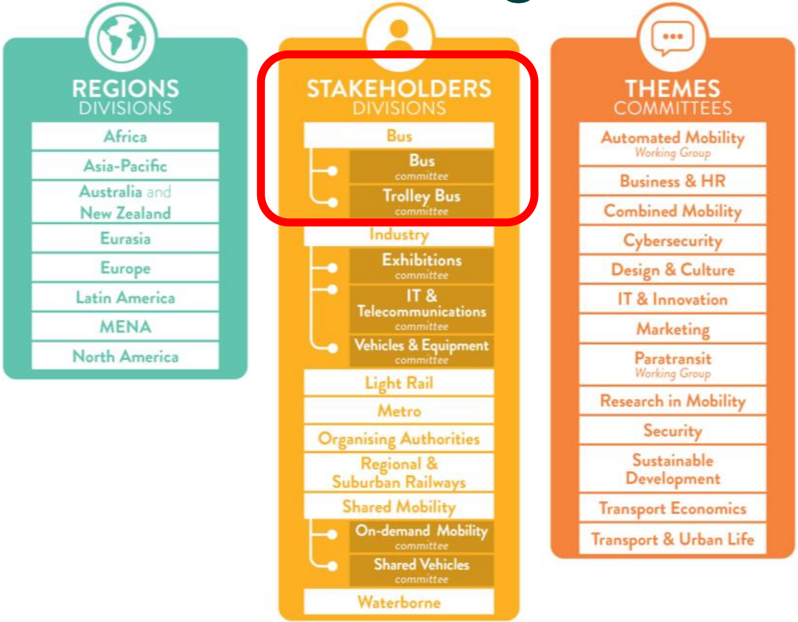
8 Regional Divisions

8 Stakeholders Divisions

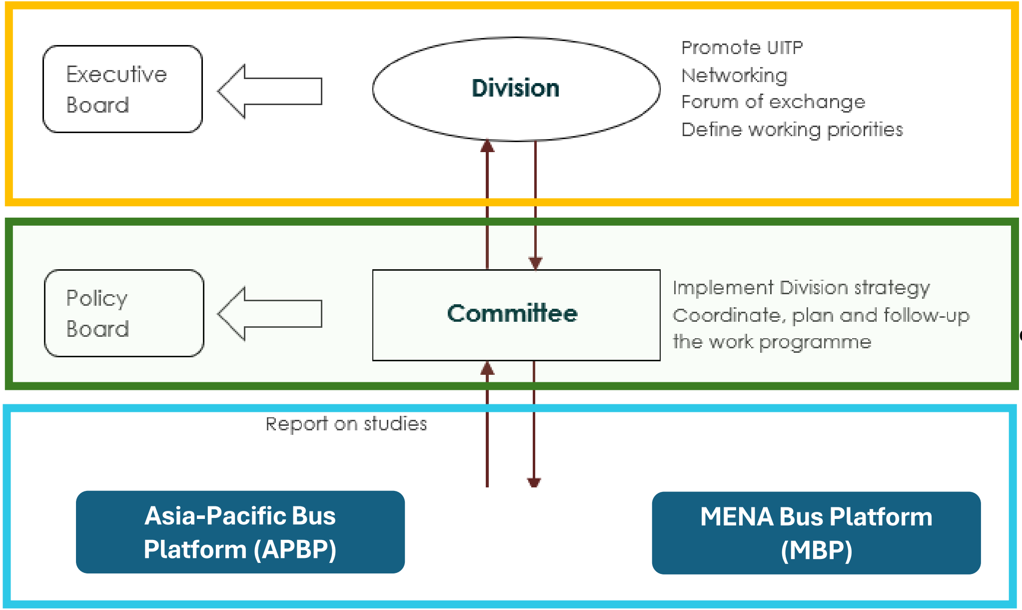
12 Stakeholders Divisions Committees

11 Thematic Committees

2 Thematic WGs



Bus BODIES - STRUCTURE



MARIA ALBUQUERQUE
(CARRIS, LISBON BUS)

CHRISTOPHE MARTIN
(TEC, WALLOON)

LUIGI DI STASIO
(CTM , CAGLIARI

2 GLOBAL URBAN MOBILITY INDICATORS

GLOBAL URBAN
MOBILITY INDICATORS

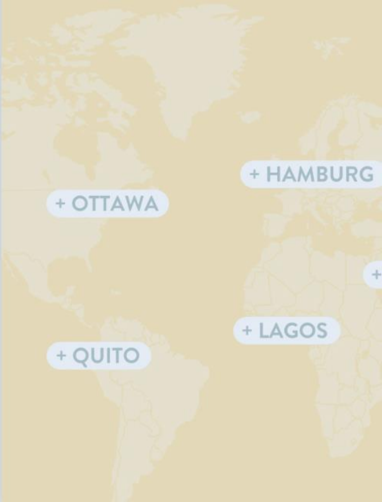
WHAT'S NEW?

EXPLORE

FEATURES

53

CITIES
WORLDWIDE



AN
DICATORS
'S NEW?

FEATURES

53

CITIES WORLDWIDE

MORE GLOBAL THAN EVER

7

NEW CITIES

A FULLER PICT
OF THE **PUBLIC**
TRANSPORT SE

NEW METRICS FOR
BRT & TROLLEYBUSES

MORE GLOBAL THAN EVER

7

NEW CITIES

DE

A FULLER PICTURE OF THE **PUBLIC TRANSPORT SECTOR**

NEW METRICS FOR
BRT & TROLLEYBUSES

AUTOMATION

DISCOVER THE NUMB
AUTONOMOUS VEHIC
METRO CARS IN EACH

BERLIN

Global Urban Mobility Indicators 2023

	Bus	Metro	LRT
Opening Year		1902	1895
Annual ridership per capita	129	148	56
Annual passenger-kilometres per capita		676	171
Number of lines		9	22
Network length/bus lanes in km per million inhabitants	30**	41	55
Number of stops/stations per million inhabitants		49	115
Number of vehicles/metro cars per km of network		8.5	1.9
Number of vehicles/metro cars per million inhabitants	456	350	107
Number of automated vehicles/metro cars	0	0	0
Annual vehicle-kilometres per capita	26	6	6
Other	8% Share of battery electric buses	0% Share of automated network length	100% Share of low-entry LRT vehicles

URBAN MOBILITY LANDSCAPE

Shared and on-demand mobility

- Ride hailing ✓
- Bike sharing ✓
- Car sharing ✓
- E-scooter sharing ✓
- Moped sharing ✓
- Demand responsive transit ✓

- Cableways ✓
- Waterborne ✓
- Open loop payment ✓
- Public Transport App ✓

15,646 employees in public transport

348 cars per 1,000 inhabitants

3.2 euro cost of a 1-trip public transport ticket

10 road traffic related **fatalities** per year per million inhabitants

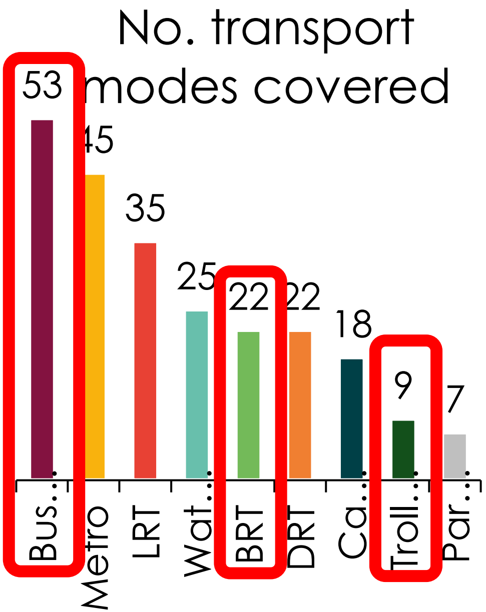
15 taxis per 10,000 inhabitants**

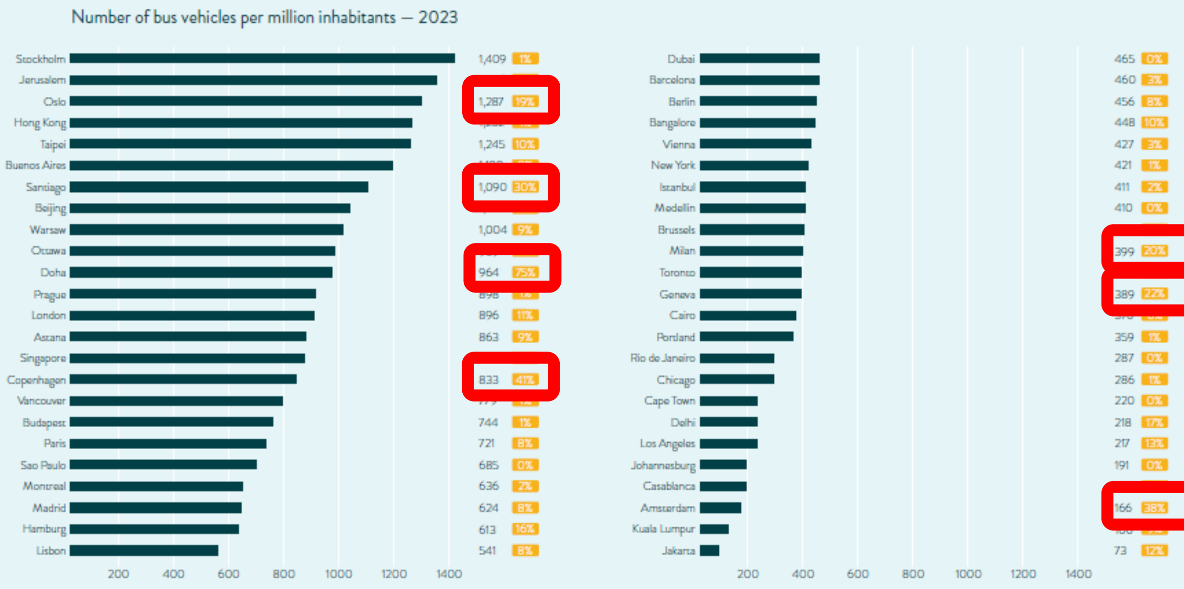
1,777km of bicycle network*

*Data from 2021 **Data from 2022

Global urban mobility indicators

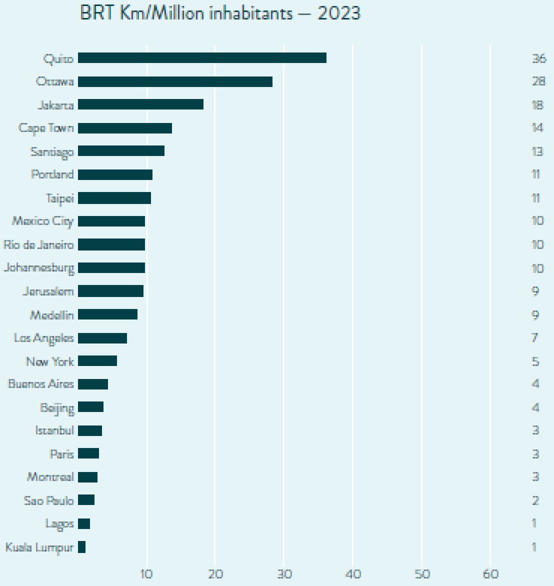
- **Goal**: Annual report providing a comprehensive urban mobility overview at the city level worldwide.
- **Target/data unit**: Urban mobility indicators; PT metrics; sharing mobility services
- **Coverage**: 53 cities worldwide
- **N. Indicators investigated**: 33, quantitative and qualitative indicators
- **Main indicators**: Annual ridership, Network length, Fleet, Pass-Km, Veh-km, Shared mobility
- **Data collection**: Desk research + primary contacts
- **Frequency**: 1 year (started in 2023)
- **Next edition**: 2025
- **Output**: Digital report and dataset
- [Link MyLibrary]

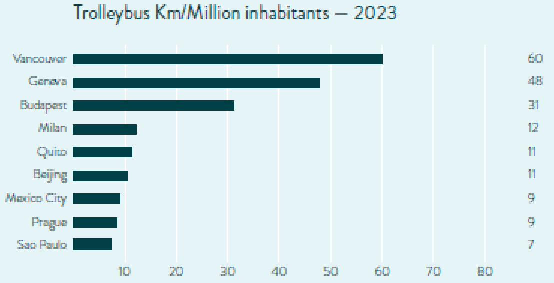




BUS FLEET WORLDWIDE

BRT AND TROLLEYBUS NETWORK LENGTH



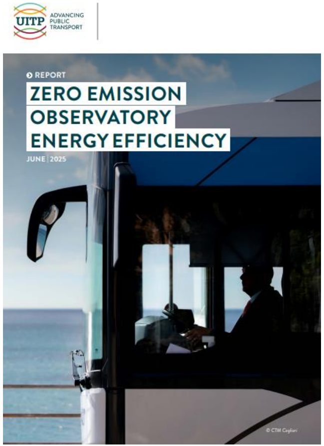


TESTIMONY
UITP ASIA-PACIFIC DIVISION

3 REAL WORLD BUS OPERATIONS

ZEB Observatory Bus Committee

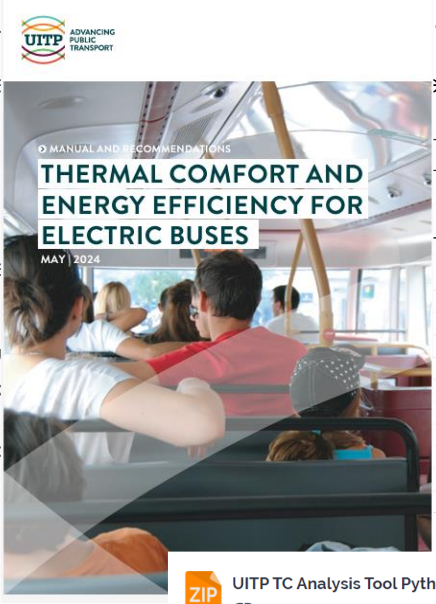
- In the UITP Bus Committee, some operators are already very advanced with around 70-100% of their fleets as zero-emission buses, many others are currently in the 10–20% range, and some are still starting their transition, but big and fast changes are taking place every month as buses are commissioned.
- Members contribute **real-world data** on speed, temperature, battery management, HVAC use, charging strategies and vehicle weight, linking these factors to energy efficiency and operational range.
- **Spotlight Result**: BEBs were found ~20% more energy-efficient at average speeds of 32 km/h than at 10–13 km/h in moderate temperatures (11–20 °C), highlighting the benefits of smoother flow, better routes and priority measures.

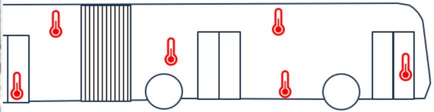


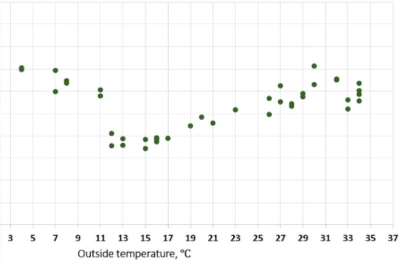
Content related with other UITP Bus Committee work:
- **Thermal Comfort Toolkit**: Report, Recommendations Summary, Analysis Tool on Python
- UITP Action Points: **Regions Thrive with Congestion-Free Bus Networks**

Thermal Comfort Kit

This UITP Bus Committee Working Grou … cross diverse regions and climates sharing operational data, fie … ng from Ottawa or Oslo to Barcelona and Dubai, enabling evide … ency and thermal comfort in BEBs.







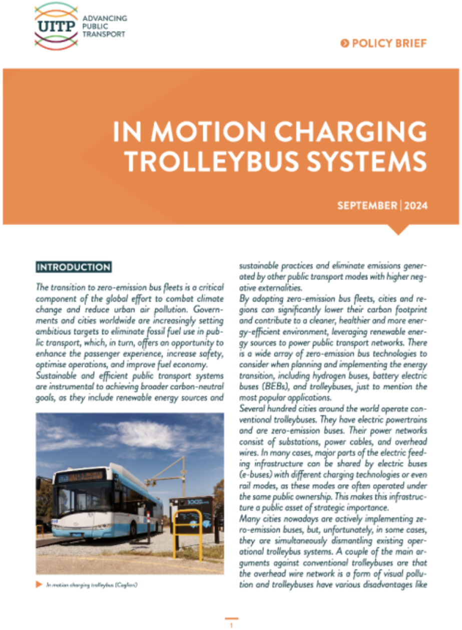
Spotlight Result:

- **How to measure Thermal Comfort? … STANDARD"**
  - Methodology proposed by the …
- **HVAC impact** on total energy cons…
  - Heating in cold regions can a… total energy use (e.g. Stockho…
  - Cooling in hot regions can re… energy use (e.g., Australia)

UITP TC Analysis Tool Python.zip

Policy Brief on In Motion Charging Trolleybuses

Following the success of a unique series of three Knowledge Briefs the UITP Trolleybus committee decided to release a Policy Brief on IMC Trolleybuses


UITP ADVANCING PUBLIC TRANSPORT

POLICY BRIEF

IN MOTION CHARGING TROLLEYBUS SYSTEMS

SEPTEMBER | 2024

INTRODUCTION

The transition to zero-emission bus fleets is a critical component of the global effort to combat climate change and reduce urban air pollution. Governments and cities worldwide are increasingly setting ambitious targets to eliminate fossil fuel use in public transport, which, in turn, offers an opportunity to enhance the passenger experience, increase safety, optimise operations, and improve fuel economy.

Sustainable and efficient public transport systems are instrumental to achieving broader carbon-neutral goals, as they include renewable energy sources and sustainable practices and eliminate emissions generated by other public transport modes with higher negative externalities.

By adopting zero-emission bus fleets, cities and regions can significantly lower their carbon footprint and contribute to a cleaner, healthier and more energy-efficient environment, leveraging renewable energy sources to power public transport networks. There is a wide array of zero-emission bus technologies to consider when planning and implementing the energy transition, including hydrogen buses, battery electric buses (BEBs), and trolleybuses, just to mention the most popular applications.

Several hundred cities around the world operate conventional trolleybuses. They have electric powertrains and are zero-emission buses. Their power networks consist of substations, power cables, and overhead wires. In many cases, major parts of the electric feeding infrastructure can be shared by electric buses (e-buses) with different charging technologies or even rail modes, as these modes are often operated under the same public ownership. This makes this infrastructure a public asset of strategic importance.

Many cities nowadays are actively implementing zero-emission buses, but, unfortunately, in some cases, they are simultaneously dismantling existing operational trolleybus systems. A couple of the main arguments against conventional trolleybuses are that the overhead wire network is a form of visual pollution and trolleybuses have various disadvantages like

In motion charging trolleybus (Cagliari)

1

4 BUS R&D with EBRT2030

Creating a new generation of advanced, fully electric, urban and peri-urban European BRTs, enhanced by new automation and connectivity functionalities

Obj. 1

➢ **operations-focused demos**: 6+1 demos of BRT system innovative solutions in real operation, both city-&operator-led and BRT system-focused, or focused on specific tech developments at system or subsystem level

Obj. 2

➢ The development of **technology-focused key innovative solutions** for BRT, both at system and subsystem level, at level of vehicle, infrastructure, operation, and IoT connectivity

Obj. 3

➢ The definition a **new European concept of BRT for year 2030**, benefitting of evaluation, multiplication and replication of the real-operation test of innovations

6+1 operation-focused Demos: Barcelona, Athens, Prague, Rimini, Amsterdam, Eindhoven & Bogota

eBRT2030 project aims to reduce:

- Cost/km/passenger by 10%;
- TCO by 10%;
- Greenhouse gas and pollutant emissions by 70%, and
- Traffic congestion by 10%

Technological Innovations:

- Vehicle
- Charging
- IoT Connectivity

01 January 2023 **31 December 2026**

REPORT ‘On the road to a concept for brt’

- State of the art of the BRT systems worldwide at the vehicle, infrastructure and operations level
- Definition for BRTs for different regions, contexts and purposes
- Scorecard adapted to eBRT2030 capturing the “double E” component of the Project: European and Electric.

Report release: 2024

- Report: “ON THE ROAD TO A CONCEPT FOR BRT”

5 UITP TRAINING ACADEMY

UITP ACADEMY

Upcoming Bus Training Programmes

China Bus Study Tour 2025

20 - 24 October 2025

Shenzhen | Guangzhou | Beijing

Bus Électriques

25 - 27 November 2025

Dakar, Sénégal

CLOSING REMARK : ACTION POINT CONGRESTION- FREE BUS LANES

Recently published

- CONGESTION-FREE BUS NETWORKS (Q3 2025)

When was the last time your city or region systematically assessed how well buses perform?

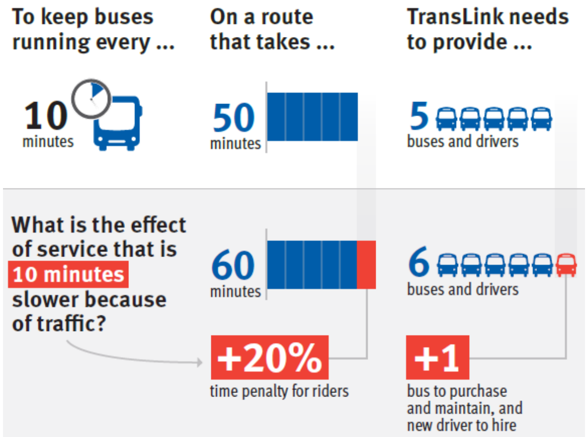
San Francisco’s 14 Mission Corridor

Plzeň – America Street Car-Free Zone

Montréal

Benefits for the sector

- *Sustainabiltiy*
    - Reduces greenhouse gases, air pollution, and car dependency.
- *Economic vitality and good use of public resources*
    - Maximizes people transport, enabling business growth without road expansion. Bus lanes move 6,000+ people per hour compared to 1,500 in a car lane.
    - Faster buses means freeing the budget for service increase at equal total operational cost.
- *Social equity and quality of life*
    - Faster buses foster inclusivity, affordability, and mobility for all by enhancing access to jobs, education, healthcare and social interactions.
    - Reduces congestion, making cities more livable and improving quality of life.



The cost of delays. Source: Translink

• Single Lane Bi-directional Bus Lane

- 1 MIN VIDEO - UITP SUMMIT SPECIAL RECOGNITION AWARD INNOVATION AWARDS SOLUTION BUS INFRASTRUCTURE

RECOGNITION

Thank you!!

End of Day

Learn more at our sponsors' booths:
ABB - Hall 8, Booth 814B
Ballard - Hall 9, Booth 957
REFIRE - Hall 11, Booth 1186
JEMA Energy - Hall 6, Booth 652A
Yutong - Hall 3, Booth 305

Join JEMA ENERGY's booth for drinks!

starting at 16:45

Hall 6, Booth 652A

busworld
EUROPE 2025
CONGRESS
BRUSSELS, BELGIUM 6-9 OCT 2025
in collaboration with:
European Commission

EUROPEAN ZERO EMISSION BUS CONFERENCE

7th - 9th Oct 2025

@ Busworld Europe Brussels

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the global bus alliance

ZERO EMISSION BUS CONFERENCE 2025