



HORIZON 2030 – ZERO-EMISSION BUS SYSTEMS AS THE BACKBONE OF CLIMATE-NEUTRAL CITIES

EBRT2030 PROJECT – LIGHTHOUSE EXAMPLES OF
ELECTRIFIED BUS RAPID TRANSIT SYSTEMS IN OPERATION,
PRAGUE 23 OCTOBER 2024



Funded by the
European Union

- **Project overall duration: 48 months**
- **Start date: 1/1/2023**
- **Total person month: 2823**
- **EU Grant: 22 776 213,57**
- **49 partners** (OEMs, Suppliers, Tech Providers, PTOs/PTAs, Research and networks) - Management:
 - Strategic and overall operational Coordinator: **UITP**
 - Technical Manager: **VUB** (MOBI-EPOWERS RG)

Grant Number: 101095882

Main Objective: Create a New Generation of advanced full electric, urban and peri-urban European BRT enhanced with novel **automation** and **connectivity** functionalities.

EU-funded project and major milestone in electric mobility that seeks to **support sustainable urban transport by proposing innovative solutions for electric Bus Rapid Transit (BRT)**



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%

- Research and innovation projects are essential in **the current transformation** of the sector with zero-emission technologies and support for deployment.
- If electric buses are the natural step in the evolution of urban bus systems, autonomous and electric Bus Rapid Transit (BRT) are the latest step towards the **future**, combining the best of electric technology (emission-free, silent), BRT (segregated lanes, priority measures) and autonomous and connected driving.





The key objectives of the eBRT2030 project are:

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

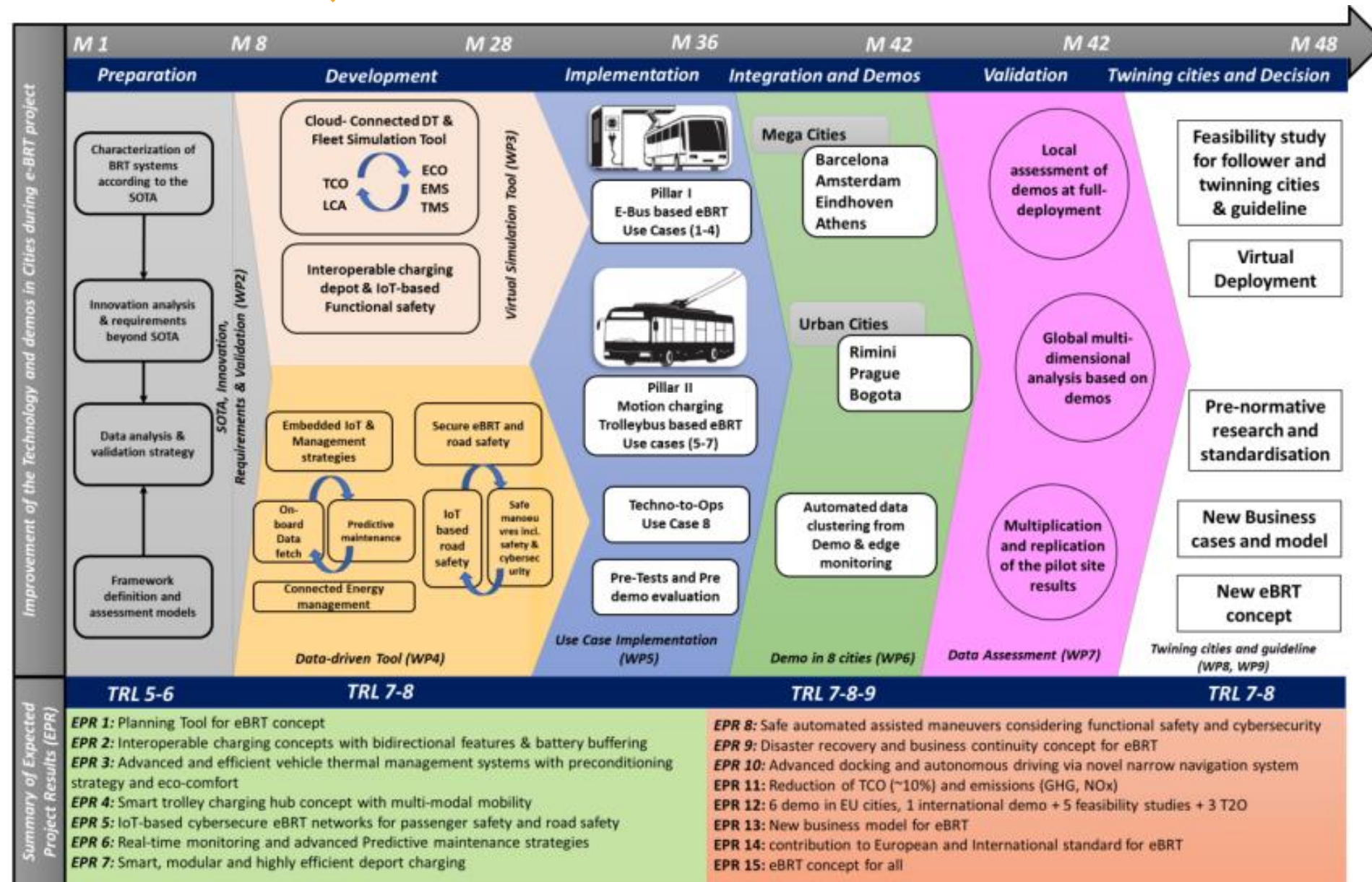
Obj. 2

- 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

eBRT₂₀₃₀ Current Status: Development and implementation



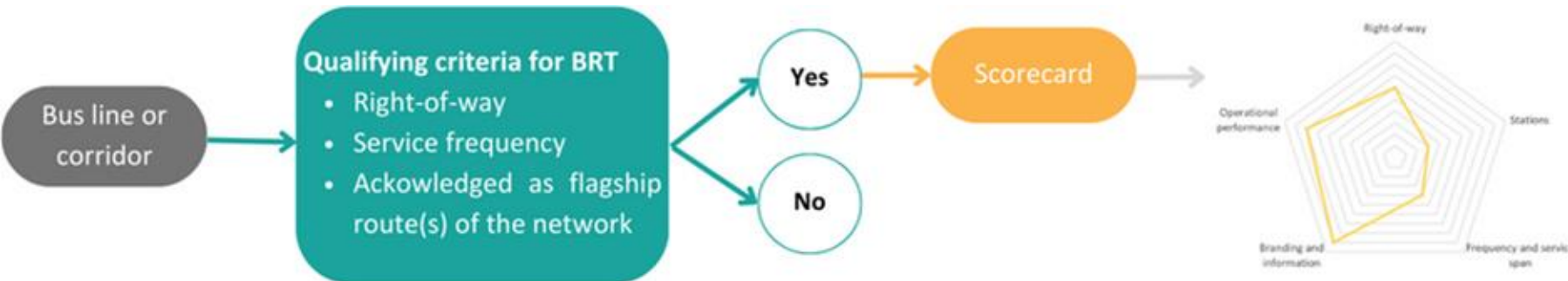
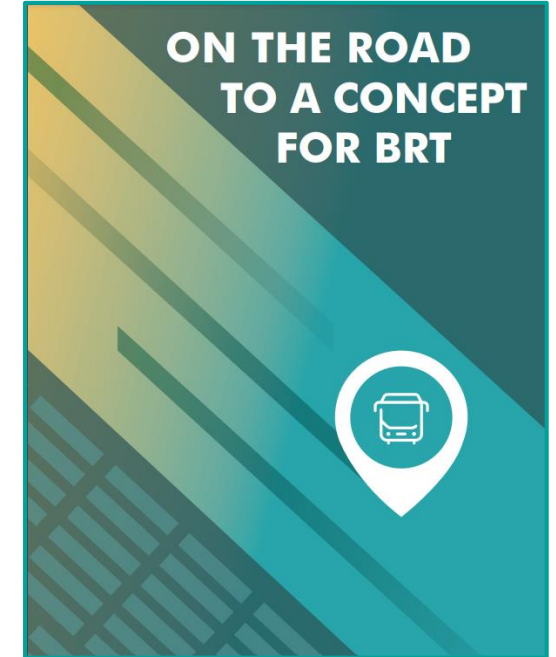
First Year:
Preparation;
definition of the
requirements

Currently: Focus
on the
development of
the technologies
and subsequent
implementation in
the Demos

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: “ON THE ROAD TO A CONCEPT FOR BRT”



Vehicle



INNO A1: Predictive maintenance strategies, including battery state-of-health (SoH) estimation



INNO A2: Intelligent driver support and safety systems



INNO A3: Optimized connected vehicle digital twin



INNO A4: Advanced energy and thermal management

Charging

INNO B1: Bi-directional modular charging systems for bus-to-grid services



INNO B2: Hybrid charging system with stationary battery buffer



INNO B3: Hub mobility charging system



INNO B4: In-motion charging systems



INNO B5: Enhanced electric road system with MW charging



IoT Connectivity

INNO C1: IoT monitoring platform with connected ITS systems



INNO C2: Efficient, integrated and smart charging management systems



INNO C3: Adaptive fleet scheduling and planning tool



Tech2OP approach for future eBRT solutions

Tech2OP -1: Innovative hybrid battery concept (IVECO)

Tech2OP -2: Smart Narrow Navigation (Volvo)

Tech2OP -3: Advanced SRS solutionforeBRT2.0 (Alstom)



BARCELONA

Upgrading a heavy-demand bus route with connectivity and high-service capabilities



AMSTERDAM

Using an innovative new hybrid charging system and smart control units to meet challenges of network capacity limitations



PRAGUE

In-Motion Charging of high demand bus line



ATHENS

Efficient hybrid mode charging EBRT



RIMINI

Advancing emissions and costs reduction, customer experience, and safety with EBRT



EINDHOVEN REGION

Advancing charging infrastructure and energy management



BOGOTA

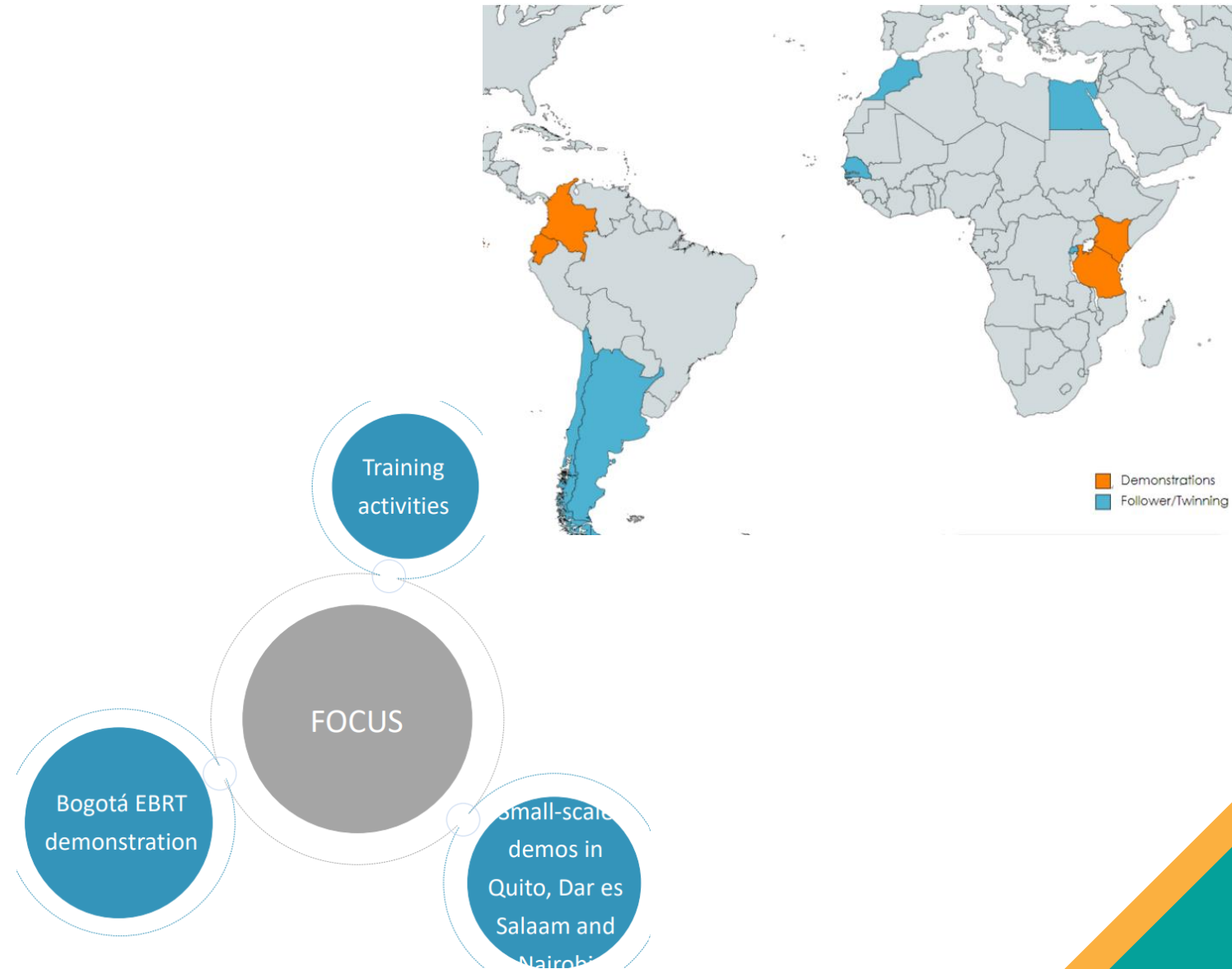
Bogota as basis for an international demonstration and validation cluster

🔄 **International Demo Cluster:** Small scale demos/feasibility studies:
Possible Cities: **Quito, Dar es Salaam, Nairobi**

🔄 **Future eBRT cities User Group** To promote replicability:
Representatives of cities and PTOs with an interest in implementing eBRT systems. First meeting took place in Barcelona in the framework of UITP Summit (June 2023)

Potential Follower/Twinning Cities:
Latin America: Buenos Aires, Cali, Medellin, Pereira, Santiago

Africa: Cairo, Dakar, Kigali, Marrakesh



International replication demonstration cluster



- **The international replication demonstration cluster** will build on the European demonstrations and co-develop innovative EBRT solutions with cities, operators and entrepreneurs in dynamic e-bus markets in Latin America and Africa.
- The **activities are in synergies with other EU-funded projects (Sol+), partnerships and UITP's regional offices to foster international cooperation and capacity building in these countries.**
- This will aim to foster the role of European technology and knowledge in these regions and **provide feedback to the European demonstration cases with different perspectives on technologies and operations.**

- On 6 March 2024, DPP put in operation its newly built **trolleybus line in the city** between Veleslavín Railway Station and Václav Havel Airport Prague.
 - Extremely busy line (>90,000 km/year/bus), 20,000 pax/day + air baggage
- The city of Prague will **increase the transport capacity on the line to/from Václav Havel Airport Prague by about 30%**
- In-motion (hybrid) charging systems, **where the bus operation vehicles transitioned to a fully electric system**, employing double-articulated battery trolleybuses optimizing the in-motion charging of the buses (23-25 m)
- Infrastructure (750 V DC) **Charging rate in motion > 50%**
Possibility of charging (static) (2x terminus + depot)





Rimini: IMC TrolleyBus 'MetroMare' eBRT

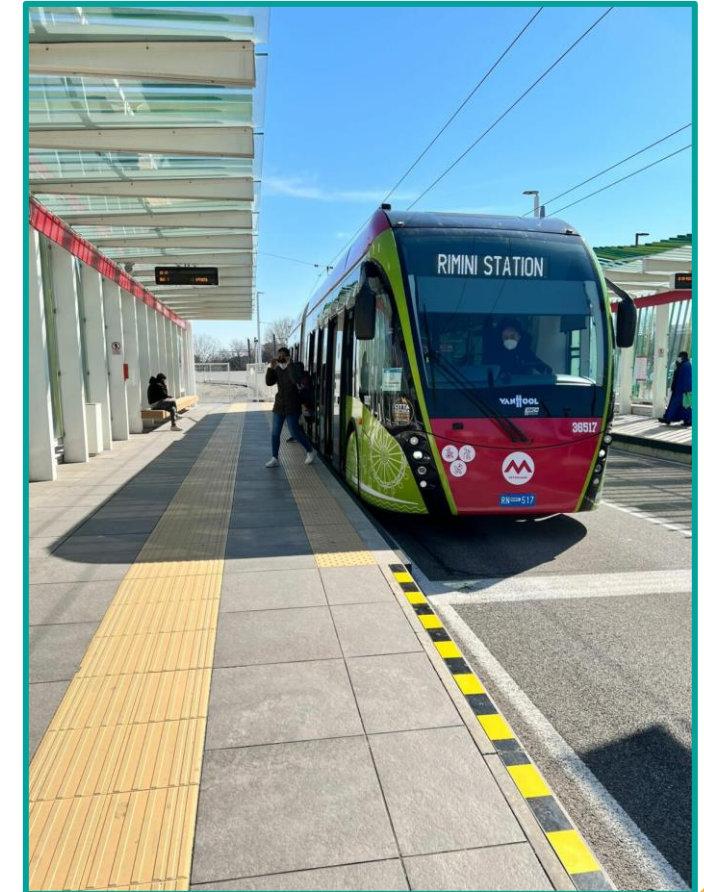


Innovations of the demo focus on improved customer experience, safety and cost reduction

- AI-based Predictive maintenance strategy
- Automatic track road safety
- Real time passenger counting and predictive forecasting of customer load models
- Integrated charging hub

Vehicles are 18 m full electric trolleybuses. The main driving force is transmitted through a 750 V power line

The eBRT is in Operations since November 2021. System runs entirely on its dedicated reserved lane



THANK YOU !



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