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# Balance Shifts in Public Transport: Operators and Industry in the Energy Transition Era

Internationalization | business models | strategies

Flavio Grazian, Project Manager, K&I, UITP

# THE INTERNATIONAL ASSOCIATION OF PUBLIC TRANSPORT



# WHO WE ARE

We are the only **worldwide network** to bring together all public transport **stakeholders** and all sustainable transport **modes**.



1,900

MEMBER COMPANIES



FROM

100

COUNTRIES



13

OFFICES

# WHO ARE OUR MEMBERS?

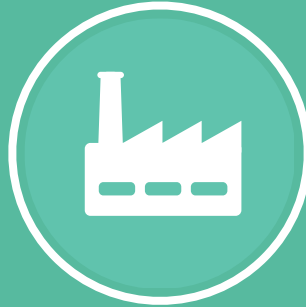
AUTHORITIES



OPERATORS



INDUSTRIES



RESEARCH  
INSTITUTES  
& ACADEMIA



ASSOCIATIONS





# The Bus Sector Today

In the energy transition era





# ZERO-EMISSION BUSES AROUND THE GLOBE



## Europe

- Stock: 15.000 ebuses in 2023
- eBuses = 43% of new registrations 2022
- All ZEB for new registrations after 2030
- Sales of BEB expected to surpass diesel in 2023
- Strong focus on innovation, interoperability and automatization of charging infrastructure

## MENA

- Pilots phase – first trials
- Qatar = 100% e-buses by 2030
- eBRT project in Cairo with locally manufactured buses
- Trolleybus BRT Marrakesh 2017

## China

- Carbon neutrality by 2060
- Currently: 378,700 e-buses (50% of total fleet)
- Shenzhen: 16.000 e-buses (first 100% ebus fleet since 2017)

## North America

- Policy framework more incipient than EU
- Only 1 OEM!
- Ramp-up phase: 50% Clean buses, 1.600 ZEB (2%)

## Latin America

- Around 5000 ebuses, of which 1064 trolleybuses
- Strong political drive + support from ZEBRA.
- Mass deployments in one shot: Bogotá: 1458  
Santiago de Chile: 2043

## Sub-Saharan Africa

- Pilots e-Matatus
- First eBRTs: Dakar, Nairobi, i.e. Kenya = rapid progress & strong leadership from the local bus industry

## ANZ

- 200 ebuses in Australia
- NSW to transition 8000 buses to ZEB by 2030
- 300 ebuses in NZ by end 2023. Plans to decarbonize urban buses by 2035

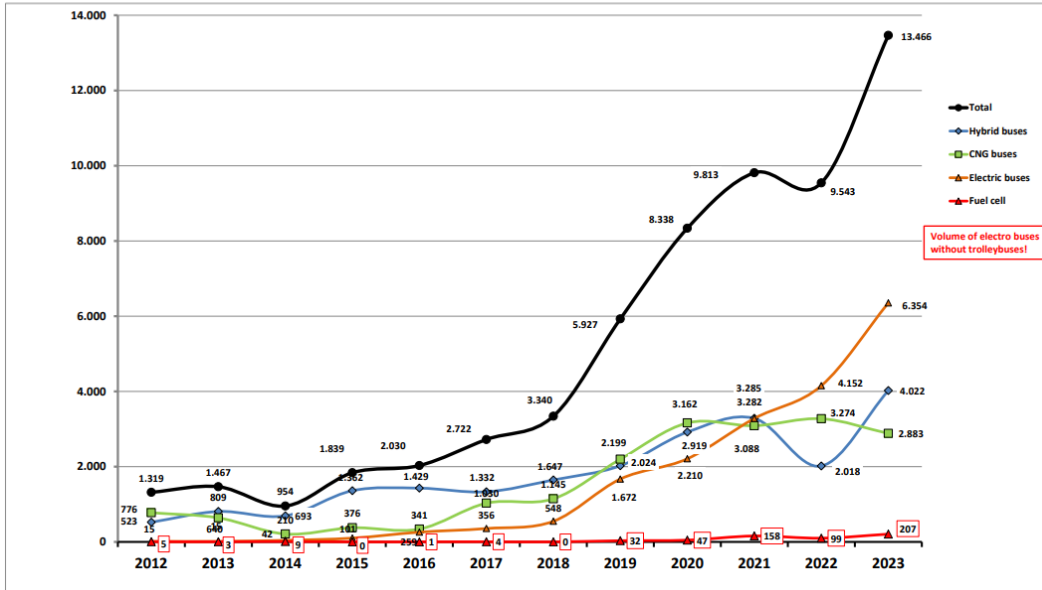
# ZOOM IN EUROPE: ALTERNATIVE DRIVELINES

Diesel Buses are down; Battery Buses are up

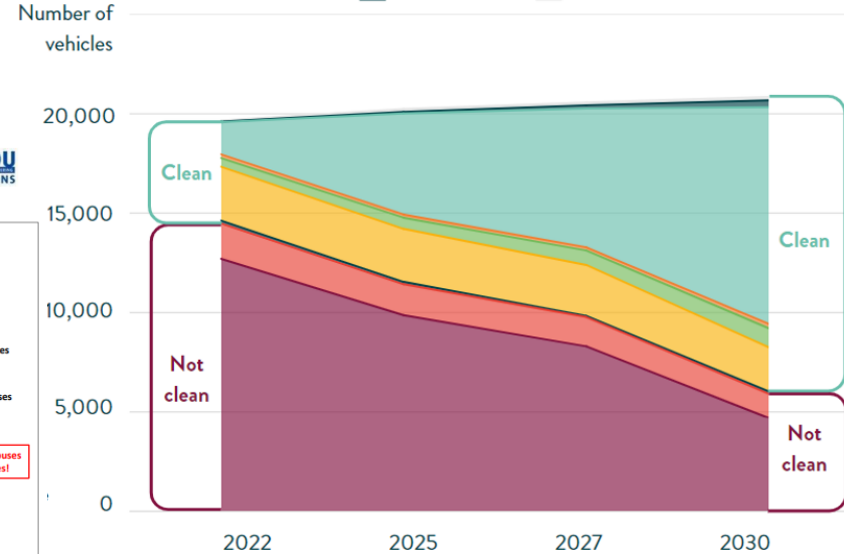
Development of Alternative Drivelines, GVW >8t

Years 2012-2019: Western-Europe + Poland / Years 2020-2023: EU27+UK+ICE+NO+CH

CHATROU  
CME SOLUTIONS



- Diesel B7
- Mild/Full Hybrid
- HVO
- Natural gas
- Fully electric trolleybus
- Plug in hybrids
- Battery electric bus
- Hydrogen bus
- Other



Total Bus Fleet size by propulsion type between 2022 – 2030

Source: UITP Bus Fleet survey 2023





# RESULTS OF EUROPE BUS FLEET SURVEY 2023

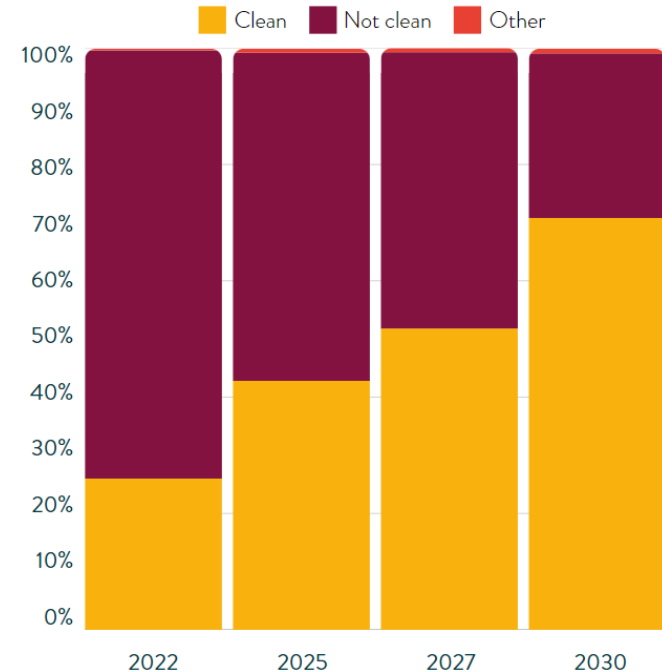
- **The bus market in Europe is changing**
- For many bus operators and authorities alike, **improving sustainability is an enormous challenge**
- Ambition is great – but it must go together with realistic targets and feasible expectations of capacity
- Different regions envisages different energy mixes to cut emissions

**More than half of respondents' bus fleets will run on clean energy by 2027**

Share of clean bus fleet across Europe between 2022 - 2030

Source: UITP Bus Fleet Survey 2023

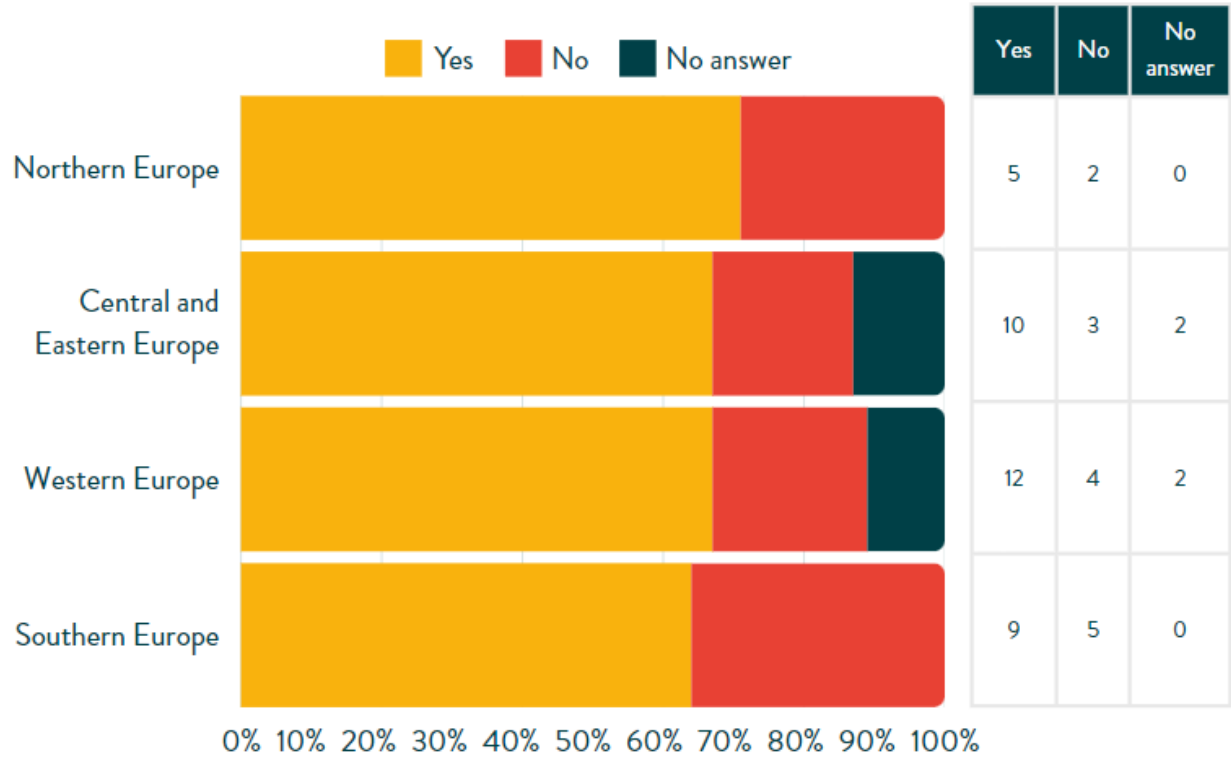
"Clean and not clean vehicles are defined according to the Clean Vehicles Directive (EU Directive 2019/11610)"





# Bus operators across Europe expect service levels to grow

“Do you expect to operate more services in the future?”



Expected bus public service evolution by subregion

Source: UITP Bus Fleet Survey 2023



# SCENARIO

**Politiche favorevoli alla decarbonizzazione e tecnologie pulite stanno guidando il mercato verso autobus puliti**

- Fit for 55, Green Deal, CVD, AFID

**Forte leadership di alcune città con strategie di decarbonizzazione delle flotte di autobus e PT a emissioni zero entro il 2025-2030**

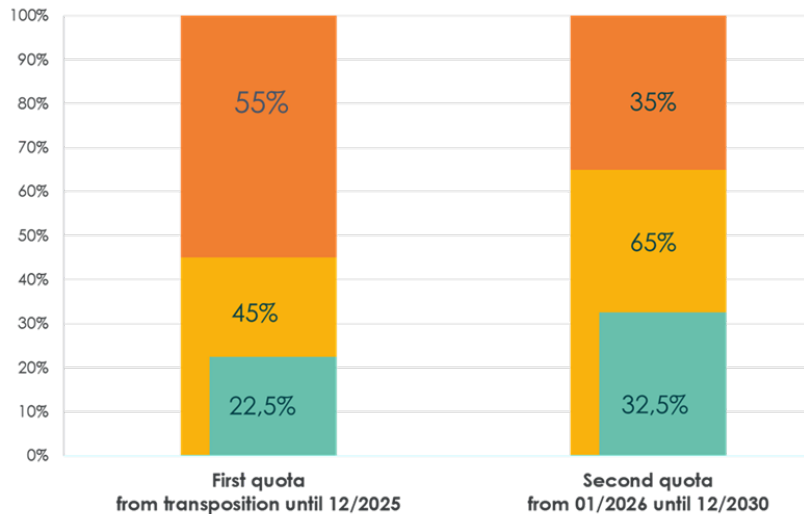
- Alcune città hanno obiettivi più ambiziosi di quelli stabiliti dall'attuale quadro politico (CVD)

**Nuovi modelli di business che riducono il rischio tecnologico e l'impatto finanziario da parte degli operatori.**

**Nuovi attori, nuovi ruoli**

- Es.: Santiago del Cile, forte ruolo del fornitore di energia

## CVD Quotas and periods



# ➤ OSTACOLI NELLA TRANSIZIONE

Different regions have different concerns. We still have some significant challenges

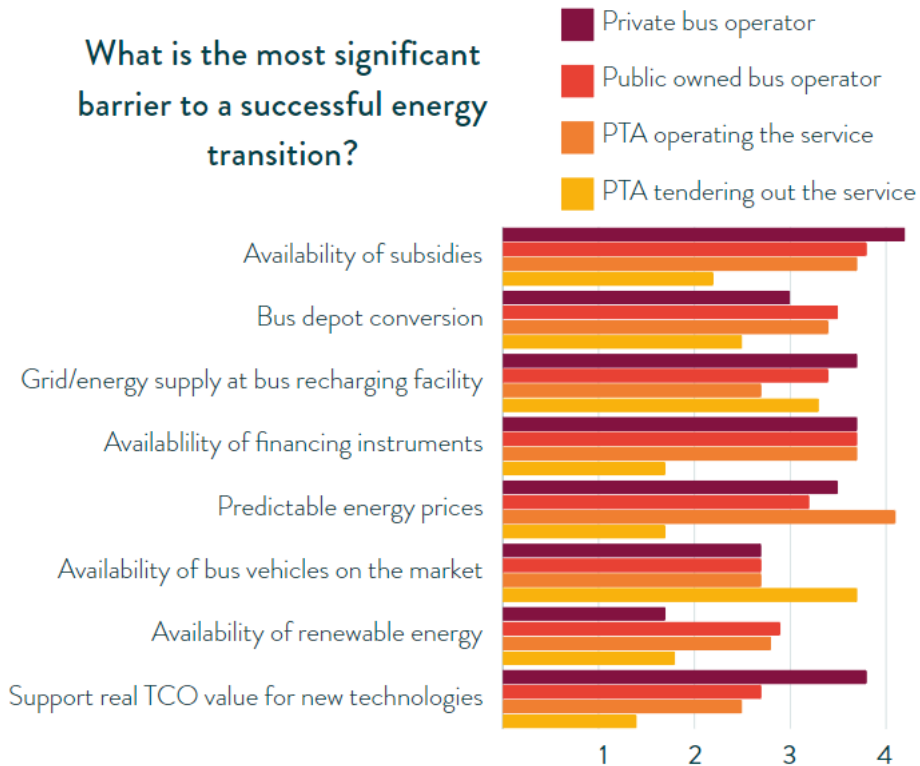
Combined with these challenges, the workforce is shrinking

Each type of organisation faces different obstacles

Barriers to a successful energy transition by type of organisation

Source: UITP Bus Fleet Survey 2023

What is the most significant barrier to a successful energy transition?





## Fattori chiave e sfide nella transizione



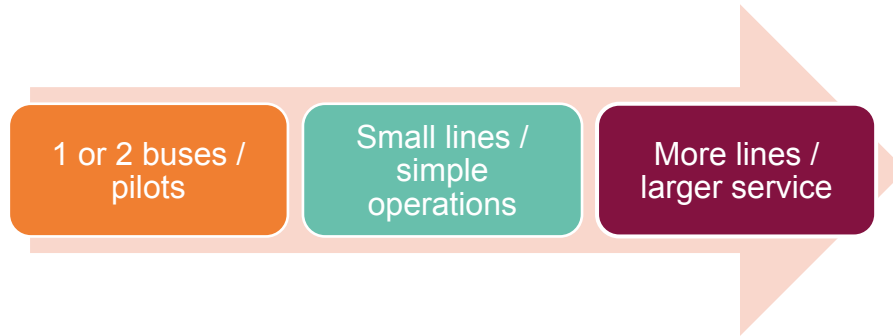
# ➤ THE BUS SECTOR TODAY: CHALLENGES AND DRIVERS

Policy points towards ZE	Energy transition & energy crisis	Recovered ridership up to 80%	New mobility context	ZEB as an opportunity
<ul style="list-style-type: none"> <li>• Strong leadership of Cities in setting ambitious targets for ZE</li> </ul>	<ul style="list-style-type: none"> <li>• Targets by 2025-2030 require high level of political commitment</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced revenues vs fleet renewal plans</li> </ul>	<ul style="list-style-type: none"> <li>• Home-office</li> <li>• Use of other modes</li> <li>• Increased car use?</li> </ul>	<ul style="list-style-type: none"> <li>• To rethink and optimize the system</li> <li>• To revamp the image of the urban bus</li> <li>• Improve image</li> </ul>
Policy & procurement targets	Financial constraints	Introduction of a new technology	Fulfill operational requirements	People: Workforce & Passengers
<ul style="list-style-type: none"> <li>• Mandatory targets by 2025 and 2030</li> <li>• For some cities, even more ambitious</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased revenues</li> <li>• CAPEX investment (vehicles, charging/refueling infra, depot upgrades) is high</li> </ul>	<ul style="list-style-type: none"> <li>• Energy transition plan's timeline</li> <li>• New business models</li> <li>• e-Bus ecosystem: new actors, new roles</li> <li>• Interoperability of charging infra</li> </ul>	<ul style="list-style-type: none"> <li>• Range</li> <li>• Timetables</li> <li>• Trainings</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Finding and retaining talent</li> <li>• New profiles, more skilled and diverse</li> <li>• Attract new passengers</li> <li>• Recover ridership</li> </ul>



# FLEET RENEWAL

From simple to large scale operations



## Simple operations

Early-stage of new **urban strategy** for mobility and decarbonization

Selection of the **more suitable line(s)**

Early involvement of stakeholders: **joint**

**feasibility studies**

IT supporting fleet monitoring to optimise operation

## Large-scale operations

- Conventional fleet replacement (**no backup**)
- Full operational conditions: Higher mileage, hours of operations, and passenger loads.
- **Interoperability of charging solutions** is a must
- **Co-existence of different Clean Bus propulsion technologies**

# FATTORI CHIAVE

1. **Dall'approvvigionamento di veicoli a quello del sistema**
2. **Standardizzazione e interoperabilità** per la ricarica rapida ed ad alta potenza  
**«Intelligenza» IT** per ottimizzare il funzionamento della flotta e la sua integrazione con l'infrastruttura di ricarica

**Diagnosi telematica, programmazione e dispacciamento, guida ecologica, informazioni sui passeggeri in tempo reale, ecc.**

**Strategie di ricarica intelligenti e fornitura di energia e accesso alla rete**

**Risparmio energetico** applicando algoritmi di ricarica intelligenti.

**Aggiornamento del deposito** (fabbisogno energetico e capacità di alimentazione, accesso alla rete, ecc.)

**Forte cooperazione e coinvolgimento di tutte le parti interessate sin dall'inizio**

**Scambio di know-how e buone pratiche**

**Info: UITP Bus Fleet Renewal Checklist <https://www.uitp.org/publications/bus-fleet-renewal-checklist/>**



# E-BUS OPERATIONS TODAY

## **Standardisation & interoperability of high-power fast charging**

### **IT intelligence for optimised fleet operation & integration into the data-driven system**

- Telematic diagnosis, scheduling and dispatching, eco-driving, real-time passenger information, etc.

### **Smart charging strategies and energy storage systems**

- Considerable savings potential on energy bill by applying smart data-driven charging algorithms.
- Depot upgrade involves increased energy needs and power capacity; assessment of new depot location and access to grid.

### **Bus electrification requires strong cooperation among all stakeholders**

- Bus operators, the city, bus/charger OEMs, IT solutions companies, grid and energy utilities, etc.

## The challenges ahead

- **Access to the grid**, peak shaving, self-production of energy
- **E-bus fleet upscale** for any bus service, including BRTs.
- **Efficient depot management**
- **Building and adopting autonomous driving advancements in specific bus operations use cases:** depot automation, autonomous BRTs,...



# ➤ WHAT NEXT?

- **«Estensione" delle operazioni eBus**
  - Servizi di autobus on-demand, servizio nelle zone rurali, periurbani...
- **I sistemi e-BRT come passo naturale nell'evoluzione dei sistemi e-bus**
  - Study "Transforming cities with BRT systems": [https://cms.uitp.org/wp/wp-content/uploads/2020/07/BRT\\_ENG\\_Web.pdf](https://cms.uitp.org/wp/wp-content/uploads/2020/07/BRT_ENG_Web.pdf)
  - **Report 'On the road to a Concept for BRT** <https://www.uitp.org/publications/on-the-road-to-a-concept-for-brt/>
- **Sinergie con Automazione ed IA**
- **Favorire il quadro normativo per migliorare le relazioni tra gli attori (operatori di rete/ DSO, autobus/metropolitana) in termini di approvvigionamento e scambio di energia**
- **LCA & Economia Circolare**
  - Ristrutturazione del veicolo per prolungare la durata dell'e-bus (età media del veicolo superiore a 8-10 anni come per gli autobus ICE)
  - Second-life vita delle batterie, smaltimento, ecc.



# Considerazioni Finali

- Clear that new competences are needed; PTOs and PTAs needs to take this into consideration; it goes now well beyond planning and operating
- Multiple barriers that could hinder fleet renewal, e.g. lack of subsidies, depot conversion, or energy supply;
- L'elettrificazione degli autobus richiede una forte cooperazione tra tutte le parti interessate
  - Operatori di autobus, OEM di autobus/caricabatterie, società di soluzioni IT, reti e servizi energetici, ecc.
- The number of fully electric BEVs will increase six times by 2030 compared to 2022 fleet size
  - BEV Overnight Charge - with plug will be more than half of the total fully electric BEVs
  - Fully Electric FCEV H2 will be introduced in bus fleet almost in all the country covered by the survey but they will have a limited penetration, 1.7% of the fleet by 2030

# Conclusioni

- Supporto finanziario, volontà politica e know-how come ingredienti fondamentali per riorientare il sistema di trasporto pubblico verso gli autobus a emissioni zero
  - Crescente importanza delle autorità cittadine e locali
- È necessario un cambiamento mentale dal guardare il veicolo in isolamento a un approccio più olistico sia a livello di rete che a livello di attori
- L'introduzione degli autobus a Zero Emissioni è un'occasione d'oro per ripensare e ottimizzare il sistema attuale, rinnovare l'immagine dell'autobus urbano (innovazione, comfort, rispetto per l'ambiente) e riconquistare la fiducia dei passeggeri nel PT nel periodo post-pandemia
- Lo scambio e la condivisione di conoscenze e competenze rimane fondamentale per capire quale soluzione o mix di soluzioni adottare (Idrogeno, elettrico, ecc.).



# Grazie !



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