

# A STUDY ON THE SECONDHAND CITY BUS MARKET IN EUROPE

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## INTRODUCTION

*Strict requirements for local emission reductions, extensive environmental regulations and higher expectations on passenger comfort have led to a widespread demand for only brand new or newer buses in fleet renewal schemes. Subsidies for clean and zero emission vehicles acquisition in EU countries have provided further incentives refraining operators to keep buses longer in operation, as costs for more intense refurbishment and heavier maintenance (OPEX) are less advantageous compared to the cost of acquiring new vehicles (CAPEX).*

*But what happens to ageing buses with higher emissions standards and still operating within their lifespan? UITP, in partnership with the European Investment Bank (EIB), carried out a study on the secondhand bus market to capture the practices and policies of different European cities about end-of-life practice on 12-metre diesel city buses with the help of UITP members and organisations.*

*This Knowledge Brief presents an overview of this study and a brief outlook on the future of second-hand buses.*



## BACKGROUND

The goal of the study was to shed light on the current mechanisms of city bus end-of-life in different, municipal and private bus operators across regions of Europe, and to gain first hand insights about how companies deal with it and how the market functions. The study maps the current practices observed in the public transport city bus sector and reviews different ways of dealing with buses after their first operational life<sup>1</sup>.

This topic is gaining prominence as a result of European initiatives such as the European Clean Vehicles Directive, which are pushing for clean bus deployment, and a change in mentality towards longer lifecycles such as the circular economy. Overall, these will consequently push diesel buses out of first operation into the secondhand market before the end of their lifespan.

1. The study does not claim to represent a full picture of the entire market and rather presents a snapshot of current practices and policies from different European cities.

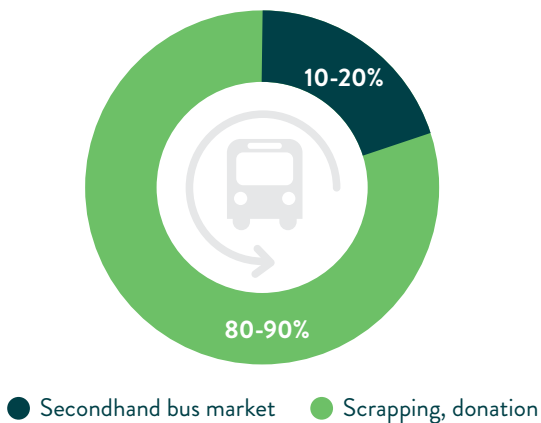
The study is focused on the most common type of vehicles representing the biggest market of bus public transport:

- City buses
- 12-metre
- Diesel

### A SNAPSHOT OF THE SITUATION

The secondhand bus market is a relatively small market. There are an estimated 200,000 city buses in operation with 15,000 units being taken out of active use each year and replaced with new registered buses (the replacement market). Only 10–20% of the dismissed buses find a second life. This is simply because most buses are entirely used up to their technical life duration (15-20 years) and then scrapped. In cases where buses are taken out of service at early ages, buyers could be found, mostly in distant or significantly poorer countries.

Share of dismissed city buses



According to bus dealer company VBI, the factors influencing the market value of a secondhand bus can be ranked as:

- 1  **THE BRAND**
- 2  **EMISSIONS CLASS**
- 3  **AGE**
- 4  **VEHICLE CONDITION**
- 5  **MILEAGE**

Most of the vehicles which can be reused are common Low Floor/Low Entry buses, measuring 12-18 metres.

### FLOW OF TRADE

Historically, the secondhand bus export took place towards Eastern Europe and Eurasia, particularly Russia, Belarus, and Moldova. This has changed over time because of tougher environmental standards, lowering the maximum age of secondhand vehicles (around 5-6 years), and higher import taxes to protect local industry in those countries. For example, governments encourage the purchase of electric buses produced in the region instead of buying used buses from the EU.

However, there are still opportunities in Ukraine or smaller cities in the South East and Eastern European countries such as Romania, Serbia, Poland, Latvia, Italy, Moldavia, Bulgaria, Poland, South Italy, Greece.

Exporting secondhand buses to countries in Africa and South America has been a possibility especially for Southern European operators as their buses are built for warmer climate but also due to proximity. Transport costs can be between €4,000–€8,000 per bus or more depending on distance.

## Flow of trade from Europe for used buses

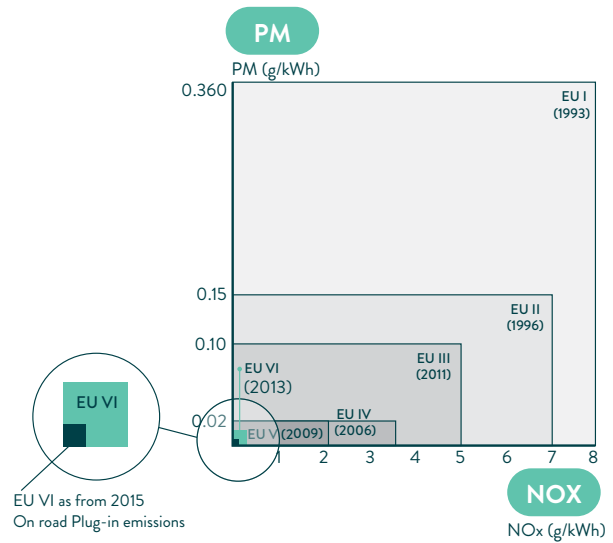


## A DECENTRALISED LANDSCAPE OF REGULATIONS

Due to different local requirements in relation to specific needs, buses cannot be easily used in other cities and often must be scrapped after their first life if they cannot find a new buyer. Particularly in relatively wealthy countries with competitive tendering regimes for operating services, it was observed that buses often can no longer be used after the age of 7-10 years, as only EURO VI or 'zero local emission' buses are allowed in contracts and new buses are preferred.

At the same time, there are still many cities with relatively low budgets and very old bus fleets (EURO I - III), especially in the south and south-east of Europe, which could achieve a quick improvement in both quality of service and local environment with relatively younger buses with better emission standards ( $\geq$  EURO IV) from other parts of Europe. Realising such transfers is intrinsically complicated, raising issues of guarantees, availability of spares, training, information about availability and sufficient funding must be provided. However, this could function as a 'bridge' for cities with very old bus fleets to acquire younger secondhand buses to reduce emissions and increase conditions for a better quality of city life.

## Threshold values of European Emission Standards



According to secondhand bus dealer company BASCO, the difference in welfare, policies at local level, and state contributions in the public transport sector between Northern Europe and Central, Southern and Eastern Europe, leads to a difference between countries regarding seniority of bus fleets. The average age of buses in Northern Europe is about half of those circulating in Southern Europe. This gap in vehicle age can be explained by the practises of bus stakeholders in the wealthiest states who dismiss vehicles with a residual life span of more than 50% (3-9 year old vehicles). These vehicles could become useful assets for cities with an average bus age of more than 10-20 years. Often, buses which are 20-30 years old with low emission standards such as EURO I and II are still in operation. An exchange of these buses, for example with EURO IV, V, VI secondhand buses would significantly and immediately reduce their local emissions.

However, high-technology diesel buses often experience problems in countries with low fuel quality (e.g. high sulphur content), spare parts and maintenance knowledge issues. In these countries, buses with EURO IV or below are still in higher demand than buses with higher emission standard technologies.



## FACTORS HAMPERING A VIABLE SECONDHAND MARKET IN EUROPE

This section puts forward some factors that impede a viable secondhand bus market in Europe. With these factors in mind, the following section elaborates on some recommendations to stimulate the market.

### LOCAL TECHNICAL SPECIFICATIONS

#### Dimensions and equipment

These specifications can include number and width of doors, number, height and distances of seats and aisles, air conditioning, double glazing, floor insulation, driver cabin arrangements, colour outside and inside of the bus. Even the design and colour of the seats, handrails, floor, and walls can make buses unique. Further local ticketing, security and infotainments systems are often very different between cities and operators.

Harmonising these different local requirements, or at least reducing the number of varieties, could be a solution in the long-term to facilitate the exchange of used buses. Also, a greater tolerance in meeting local requirements for secondhand buses could be a way of achieving cheaper and faster solutions, especially in situations where the specifications are more bound by tradition rather than functionality.

#### Climate conditions

Buses are built for the needs of the local climate and the comfort of passengers. For example, they may require heating systems, double windows and anti-corrosion specifications. This means that the secondhand bus market is shaped by the volumes of buses which fit better to the similar climate conditions. Buses from the Northern Europe can be better suited in colder Eastern regions, whereas buses from warmer countries can be better placed in South Europe, Africa, or South- and Central America.

The result is that different local restrictions and preferences mean that fewer secondhand buses can meet these requirements. On the other hand, there may not be enough buses available at the right time to meet the specific need. This is particularly evident when a bigger fleet of homogeneous buses is required. The variety of brands, models and equipment features can make it difficult to use, not least maintain these buses for buyers.



### LEGAL, POLITICAL AND ENVIRONMENTAL RESTRICTIONS

The use of secondhand buses is sometimes not possible for authorities and operators, due to local political decisions:

- Exports and imports of used buses to/from outside of the EU are taxed differently due to local tariffs and import duties. This has an impact on whether a bus can be sold or not.
- Subsidies for new buses are granted under the conditions that they are not sold before a certain number of years of operations in a city. Sometimes scrapping is obliged after this period to reduce the number of old buses regardless of the operability.
- In many cities the authorities require a maximum age for a bus and fleet which leads to removal of buses.
- Environmental restrictions in tenders to use, for example only electric buses or EURO VI buses, forces more vehicles out of operation. They must either find a second life or face being scrapped. The likelihood of finding another operational life in another EU country is decreasing because more countries are implementing similar environmental restrictions imposed on EU level.

This issue is to some extent an economic and political question. Some secondhand, well maintained buses can improve the quality of service and environment substantially in some parts of Europe and elsewhere at a more affordable level.



## UITP'S RECOMMENDATIONS

In cities where not all fleets can be converted to electric buses immediately, possibly for operational or economic reasons, or urgent additional buses are needed, higher quality secondhand diesel buses could function as a bridge until budget and implementation of the new buses is settled. Secondhand diesel buses with better environment standard ( $\geq$  EURO IV) could both improve the service quality and improve the environment in the short-term and eventually support the massive deployment of new technology buses.



The vast number of varieties between local technical requirements and lack of standardisation has a large influence on the acquisition of secondhand buses. This is because, besides emission level, brand, technical conditions and mileage, bus equipment also has a very big impact on the purchase value of a bus. Conversions, including those that would be necessary to meet local specifications, can be expensive and will further reduce the market value of a bus.

The maintenance costs naturally increase when a bus gets older. Labour cost for maintenance differs very much across European regions. Local Total Cost of Ownership (TCO) calculations make the usage of secondhand bus difficult in high-cost countries, but feasible in low-cost countries. For this reason, older secondhand buses that come with higher maintenance needs could be market competitive and utilised in low-cost regions, whereas this would not be the case for a similar bus operating in high-cost countries.

Furthermore, the study results suggest that life cycle investigation for more sustainable solutions to use younger used buses (less than 10 years) instead of scrapping them or exchange with very old or polluting fleets. This significantly contributes to the sustainability and circular economy perspective and could also stimulate the secondhand bus market.

Moreover administrative, taxation and legal hindrances, and subsidy schemes for new energy buses are also reducing the chances to find new operators for secondhand diesel buses. However, the reduction of administrative and legal burdens could facilitate the selling or buying of used buses.

A more transparent secondhand bus market could lead to both economic, social and environmental benefits, especially as a means of helping less affluent cities to improve both the service and the environment and to fill the gaps when transferring to electric mobility. As well as stimulating the development of a viable secondhand bus market in Europe.

## CLEAN BUS EUROPE PLATFORM

The Clean Bus Europe Platform is a programme under the European Commission's Clean Bus Deployment Initiative that aims to support the deployment of clean bus technologies across Europe. The Platform brings together European cities, transport authorities and operators, and relevant stakeholders to boost and support the exchange of knowledge and expertise on clean bus deployment. The Clean Bus Europe Platform hosts a 'Clean Bus Toolkit', including a library with materials on the secondhand bus market in Europe.





## THE FUTURE SECONDHAND ELECTRIC BUS MARKET

When it comes to ‘new’ 100% electric buses, we still see today that similar age restrictions apply in tendered bus service contracts and similar depreciation periods, although EURO emission classes that regulate internal combustion engine buses do not apply. Whereas traditional electric buses with power supply from overhead wires via trolleybus poles (trolleybuses) have been in operation for decades, ‘new’ e-buses which have stored the energy on board in modern lithium-ion batteries or in hydrogen tanks, are entering public transport<sup>2</sup>.

As e-buses already have zero local emissions, the question that arises is why e-buses cannot be operated like other electric vehicles such as trolleybuses for 20–25 years? The answer is that trolleybuses are standardised, their technology is fully developed, and the driving conditions are typically good. E-buses, on the other hand, are still subject to constant technical development and, above all, the question of the service life of the batteries and their future replacement costs would be uncertain if they were used for longer. Therefore, to be on the safe side, public transport providers would expect them to be in operation for approximately 7-10 years, like the guarantee periods for the batteries that are initially installed.

However, a ‘shorter-term’ vehicle life cycle model, in which e-buses are disposed of with the batteries at the end of their life, contrasts with a ‘longer-lasting’ concept of sustainability. In such a strategy, only the batteries should be replaced at the end of their lifespan. This enables the bus to last two or three times longer than the short-term concept.

On the other hand, a case-by-case TCO calculation of the ‘sustainable’ concept should be compared with the short-term concept. Higher quality e-bus models could however justify their higher prices in a long-life usage model.

## Electric bus standardisation

Although combustion engine bus technology is still relatively harmonised, feedback from the study revealed that there is still a lot to be done with the ‘standardisation’ of electric buses (BEV and FCEV) and connected e-bus systems (energy storage and charging/filling). With the newer 100% e-buses, it is important to standardise the vehicles and the systems. This will facilitate easier maintenance and increase their sellability on the secondhand market. Higher quality e-bus models could ultimately justify their higher prices in a long-life usage model.

Although some respondents in the study feared that ‘too much’ standardisation could hinder future innovations, most of them would like to standardise at least the interfaces between the main important components and their system environments (battery, charging, drive technology).



## CONCLUSION

*The secondhand bus market in Europe has changed over the last 15–20 years. On the one hand, the overall demand for buses has increased but environmental requirements, stricter emissions standards, and other local restrictions have shortened the first life use of diesel buses and made it difficult or impossible to buy used buses. In addition to political requirements for urban transport companies, a key driving force for changes is the availability of subsidies for new technology bus acquisition such as e-buses.*

*The use of secondhand buses also depends on the local technical specifications and required equipment. A bus conversion (retrofit) into a specific*

<sup>2</sup> For further information on e-bus deployment, check out UITP’s [Best practices and commercialisation approaches](#) and [Bus fleet renewal checklist](#).



city's standard is often not economically viable and neither is the transport, insurance, and homologation costs of moving buses from one city to another. Moreover, the oversupply of relatively young secondhand buses mostly from the affluent countries, can offer advantages to other parts of the world where public transport currently is less developed and financial resources are scarce. These higher quality diesel buses can act as a bridge to meet growing demand and achieve environmental improvements quickly, at least for a transitional period, until full fleet conversions are concluded with electric or alternatively fuelled buses, and financing mechanisms are available.

The study showed that less administrative, taxation and legal hindrances and more transparency and information about the secondhand bus market is recommended to improve the reuse of buses.

This involves harmonisation between different local specifications in the form of standardisation or common guidelines, at least within regions with similar climates. This could help the resale value of secondhand buses in the future and is even more important for electric bus fleets.

To achieve a secondhand e-bus market like that of the diesel bus market, common standards for the interfaces of critical components would be valuable, at least at the European level.

As an international association which brings together all public transport stakeholders, UITP holds an advantageous position for further analysis and action.



This is an official Knowledge Brief of UITP, the International Association of Public Transport. UITP has over 1,800 member companies in 100 countries throughout the world and represents the interests of key players in this sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

This is an official Knowledge Brief prepared by UITP in partnership with EIB

Over the last few years, EIB has been actively supporting the transition to zero-emission buses. During this process EIB approached UITP to undertake a study to help answer the question: What happens to the dismissed buses in EIB supported replacement projects? The conclusions of the study will be used to inform EIB's approach to lending for fleet replacement projects. EIB does not finance second hand buses and its approach to financing new buses is set out in the recent '[Climate Bank Roadmap](#)' document. The Bank is also concerned about the disposal of dismissed buses either through appropriate scrapping or sale to responsible operators through the secondhand market.

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