



CO₂ CERTIFICATION FOR BUSES

The International Association of Public Transport (UITP) shares the societal concern around the emission of carbon dioxide (CO₂) and its impact on climate change. Our members – public transport authorities and operators across Europe – have always been procuring the cleanest and most energy-efficient buses available on the market.

We follow with great interest the Commission's initiative to standardise the CO₂ certification and monitoring of heavy-duty vehicles, in particular buses, and would like to bring the customers' perspective to the discussion.¹

1. HOW CO₂ IS ASSESSED IN BUSES TODAY

For many years, the energy consumption and, more recently, the CO₂ emissions of buses have been crucial factors influencing the choice of rolling stock during a procurement. In order to facilitate the comparison of different buses in the frame of a tender prior to the purchase, the public transport operators (PTOs) and the bus industry – both represented in UITP – have jointly developed **Standardised On-Road Test (SORT)** procedures since 2004. If requested in a tender, manufacturers provide as part of the bid SORT data on the fuel consumption of the bus type to the PTO, which is then able to compare the different data it received from different manufacturers. Over the years, the SORT has become *the* reference in terms of energy consumption requirement across the UITP membership and far beyond.

Three different SORT driving cycles exist for urban, mixed and sub-urban driving and can be combined and scaled in order to calculate a realistic value for any specific bus route (e.g., an operator may take 65% of "SORT 1" and 35% of "SORT 2" to get a realistic value for a specific bus line which the new bus shall be used on).

Today, SORT testing procedures exist for nearly all drivetrains and fuels/energy (diesel, CNG, hybrids, electric, fuel cells).

¹ This position paper has been developed with the kind support and expertise of UITP's Bus Committee.

SORT is based on the following elements:

- a standardised driving pattern (choice of 3 SORT cycles)
- a standardised vehicle of any size including double-deckers (load, state of auxiliaries, ...)
- standardised outside conditions (weather, wind, road slope, ...)
- applicable by an independent 3rd party stakeholder, either as a witness or for validation purpose of the test results
- provision of relevant information for the public transport company (energy consumption, measurement report (to verify that the value is valid for the offer)

One of the advantages of SORT is that the operator can easily reproduce the test later in time to compare in-service results with the values received during the tendering process, for instance to check, in case of significant discrepancies observed, whether the customer-specific vehicle has the same fuel efficiency as the vehicle offered with a bus-type based SORT value. This is relevant, as public transport operators often have to report to their mayor or public administration on the CO₂ emissions generated by their services, so they need reliable data.

The [SORT material](#) is provided by UITP and accessible to anyone for a small fee.

2. WHAT WE EXPECT FOR THE FUTURE

The Commission, in an effort to monitor and reduce CO₂ emissions from road transport and contribute to the EU's climate policy, has been developing the VECTO simulation tool² and is establishing legislation that requires the certification of CO₂ emissions for new vehicles. A CO₂ certification system already exists for cars, vans and trucks today. While light-duty vehicles use the WLTP test procedures, trucks use VECTO instead. **Once standardised CO₂ values are available for buses, these are expected to be used for further European legislation, for example in future road charging legislation (Eurovignette directive), in the Clean Vehicles Directive, etc.**

Parallel to the Commission's work on VECTO, the established SORT values will continue to be relevant in the tender and business domain at least in the short term. It is expected that VECTO will gradually replace SORT in the midterm (as of ca. 2023/2024), which would have the advantages of providing more detailed data for each individual bus including auxiliaries, avoiding confusion between two parallel fuel consumption values based on different methodologies, and being more economical; however, **bus operators wish that SORT only be replaced by VECTO if the design of the tool and the simulated consumption data it provides are convincing for the customers**, i.e. if the PTOs and PTAs are convinced that they can trust it. While it seems logic and common sense to strive for a convergence of the two initiatives (conciliating the interests of the Commission, the bus operators and the bus industry), this shall not be taken for granted. In fact, the PTO's tender books in a procurement process are not bound to specify consumption requirements in any specific way, other than the way which their company judges effective.

² A process lead by the European Commission and commissioned to the Technical University of Graz

In order to make VECTO relevant for bus operators and authorities, UITP would like to see the following criteria fulfilled:

PROVIDE RELIABLE DATA

The safety of the software has to be ensured by the European Commission. It is key to **prevent any possibility to influence the outcome**. UITP asks for transparent documentation and explanation of the assumptions included in the algorithm (load, speed profile, etc.).

ENSURE DATA ACCURACY BEFORE, DURING AND AFTER THE “VECTO” DEVELOPMENT PROCESS

The bus sector wants to pro-actively prepare for applying VECTO-based fuel consumption data in bus procurements by **learning about such data**; in particular, our members want to learn how VECTO-generated data compares to SORT data and to the real-life fuel consumption data recorded within the company. (See more details in section 3 below.)

Secondly, we have always requested an **on-road verification** as part of the VECTO procedure and are pleased that this is being considered for buses. We urge the Commission to keep this important verification in place.

Once a bus is on the market, it is crucial to **monitor the data**. This can be ensured through regular automatic tests of one in x hundred buses. In addition, bus operators and authorities should know where to turn in case they would like to have the VECTO data double-checked by a third party.

PROVIDE RELEVANT DATA IN THE CUSTOMER SHEET

Besides declaring the CO₂ value, it is essential to provide also the energy consumption values (expressed in kWh per 100 km) in the customer sheet. **This data shall be provided for each cycle used in the simulations, and for two loadings per cycle**, in order to allow bus operators to weigh the different cycles and calculate a mixture that is closest to the reality in their bus services – the way they currently do it for SORT (see above). Furthermore, **energy consumption and CO₂ data should be provided separately for each external source of energy** (for instance: separate values for fuel and electricity in case of a diesel plug-in hybrid).

POSSIBILITY TO RUN VECTO BASED ON A SPECIFIC REAL-LIFE DRIVING CYCLE

Bus operators and authorities are interested in simulating and comparing the fuel consumption and CO₂ emissions of buses not only on the basis of the standardised cycles used for the CO₂ declaration, but based on a real-life driving cycle (e.g., of a specific bus line in the local environment) that the operator/authority can provide. The European Commission should enable **PTAs and PTOs to access the VECTO tool for such types of simulations** – either directly through an “open VECTO” portal, or indirectly via the manufacturers. In any case, this process should be as easy and lean as possible.

INCLUDE EVERY ENERGY SOURCE

The bus market is rapidly changing. Thanks to the Clean Vehicles Directive (2019/1161/EU), more and more authorities and bus operators will procure alternatively fuelled buses. The Clean Vehicles Directive establishes for each EU Member State binding minimum quotas of publicly procured buses that have to be “clean”, i.e. powered by electricity or other alternative fuels. These quotas range from 34% to 45% as of 2 August 2021 (step 1) and from 48% to 65% starting on 1 January 2026 (step 2), half of which need to be zero-emission vehicles (sub target for both steps).

In order to be able to effectively monitor and influence the CO₂ emissions of the bus sector, it is crucial that energy consumption values can be attributed not only to diesel buses, but to all types of alternatively fuelled and hybrid buses. All relevant powertrain technologies should be included in VECTO. In practice, the CO₂ emissions will differ, for the same bus, from one city to another, depending on the energy/fuel source. However, this can be calculated by each bus operator locally, if the vehicle-specific energy consumption data is available.

3. EVALUATING AND CREATING TRUST

When creating the SORT procedure, in 2004, UITP united the bus and gearbox manufacturers and bus operators around the same table, and both sides agreed on a common approach to generate useful data. Now that the VECTO-based certification system is being developed, this cooperation has to start anew.

UITP and ACEA, together with several bus manufacturers who are contributing to the creation of the VECTO tool, are well engaged in a process to **compare VECTO and SORT values for certain buses**, which UITP sees as a necessary first step towards agreeing on and implementing a possible transition from SORT to VECTO in the years to come. The data generated by this exercise will allow the public transport sector to learn more about VECTO, to build trust (provided that the data is convincing) and to learn how to potentially use and interpret the new CO₂ values during public procurements. **UITP members would like to see this comparison done before the set-up of VECTO is finalised, to ensure that the results can be presented to UITP’s members and taken into account by the European Commission.**

4. CONCLUSION

Public transport authorities and operators are increasingly concerned about CO₂ emissions from transport. This paper outlined their expectations towards the new CO₂ certification scheme. **UITP recommends to the Commission to consider the customers’ perspective when designing the VECTO tool for buses, in order to enhance the relevance of these VECTO values for business interactions.** This would help to improve the level of detail of energy consumption data that is provided to customers, and facilitate the CO₂ reporting of public authorities. If VECTO gradually replaced the SORT protocol, it would also avoid a situation in which two energy consumption tests exist in parallel: the CO₂ certification based on VECTO, which is required for European vehicle registration and regulation, and SORT, which is currently used for commercial purposes. This would in turn reduce the costs of bus tendering processes.

About UITP EUROPE

UITP is the international association representing public transport stakeholders. In the European Union, UITP brings together more than 450 urban, suburban and regional public transport operators and authorities from all Member States. We represent the perspective of short distance passenger transport services by all sustainable modes: bus, regional and suburban rail, metro, light rail, tram and waterborne.