MICHELIN X® INCITY™ EV Z

275/70 R 22.5 152/149J

EPD®

THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

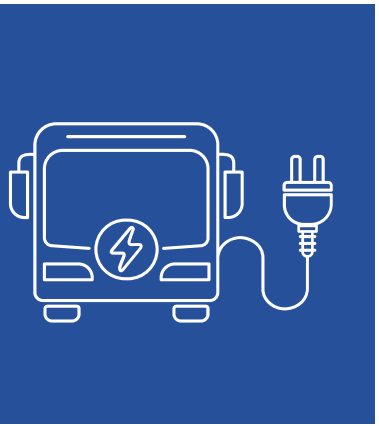
In accordance with ISO 14025:2010

EPD® REGISTRATION NUMBER: S-P-04768

ISSUE DATE: 2021-11-22

VALIDITY DATE: 2026-11-22

EXTERNAL CHALLENGES GUIDE OUR EFFORTS TO CONTRIBUTE TO A MORE SUSTAINABLE URBAN MOBILITY



#By Design, our MICHELIN X® INCITY™ EV Z tire aims to:

- participate in a **Safer**, more **Efficient** & **Durable mobility**
- support the **Electrification** trend of **City-Buses**

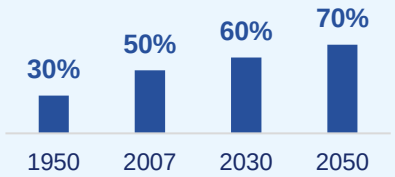
#We have also engaged on a broader commitment:

- promote **Life-Cycle Analysis** to measure the total environmental impact of our product
- **Act within** our corporate pledge:

"*Tomorrow, everything at Michelin will be sustainable*"

CITIES FACE INCREASING MOBILITY-RELATED CHALLENGES…

URBANIZATION (1)



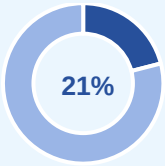
MOBILITY GROWTH (2)

Passenger activity: **+ 74%**

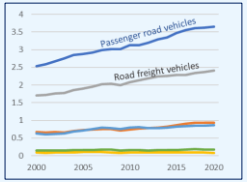
2000-2017

Freight activity: **+68%**

CO_2 INCREASE (3&4)



Road transport



CITY CHALLENGES

80% of people living in cities are exposed to air pollution (5); noise, fatalities…

Congestion costs EU **1 % GDP** (6)

40% of the global workforce citing the commute as the **worst part of their day**. (7)

... AGAINST WHICH PUBLIC TRANSPORT HAS SEVERAL MERITS

10 TIMES SAFER
per mile than traveling by car (1)

Bus is the segment with the
HIGHEST EV ADOPTION RATE (3)

SAFE

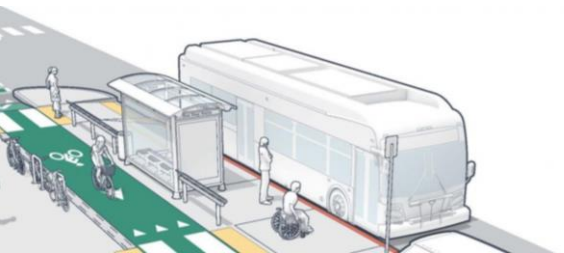
GREEN

EFFICIENT

ACCESSIBLE

Less Congestion with
20% OF PASSENGER TRANSPORT (2)

All **GENDER,** all **AGE,** people with **DISABILITIES** (4)



A CONTRIBUTION TO A MORE SUSTAINABLE PUBLIC TRANSPORT
MICHELIN X® INCITY™ EV Z

SAFE — EFFICIENT — GREEN — ACCESSIBLE

Committed on Safety:
- ✓ 3PMSF
- ✓ Long lasting reliability & strong casing endurance

Improved fleet Efficiency
- ✓ Mileage +25%(1)
- ✓ Regrooving & Retreading

Reduced Environmental footprint
- ✓ Lower CO_2 emissions & energy consumption (2)
  - ○ EV Bus: -1960kWh/bus/year
  - ○ ICE Bus: -280l/bus/year & -0,7ton CO_2/bus/year

Facilitated Electrification of City buses
- ✓ Higher load Capacity Up to 8T (3)
- ✓ Standard tire market dimension

1/Projected wear life, based on Internal measurement on Electric Bus placements October 2021 at Eindhoven to compared 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) (on average 188 000km on Steer & 126 000km on Drive) versus MICHELIN X® INCITY™ HLZ (148/145J) (on average 136 000 km on Steer and 84 000km on Drive) and at Amiens to compared 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) (on average 175 000km on Steer and 94 000km on Drive) versus MICHELIN X® INCITY™ HLZ (148/145J) (on average 138 000 km on Steer & 64 000 km on Drive). Longevity test run in average real usage (D50) with 50000 km at Amiens and 80 000 km at Eindhoven run and extrapolated with estimated longevity at 2mm.
Actual results may vary according to road & weather conditions & way of driving.
2/ Internal Calculation based on RR value with TCO2 Simulator Tool for the gains per bus/year on E-BUS & ICE-BUS 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) versus MICHELIN X® INCITY™ XZU (148/145J);
On EV BUS : -2,8kWh/100km on average of 70 000km/year = -1960kWh/bus/year based on Urban e-Bus configuration 4x2 & energy cost 1kWh=0,1€.
Full Energy Cost 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) 146,67 kWh/100km versus MICHELIN X® INCITY™ XZU (148/145J) Full Energy Cost 149,42 kWh/100km
On ICE Bus -1kg of CO2/100km on average of 70 000km/year = -280l /bus/year based on Urban ICE-Bus configuration 4x2 & diesel cost 1l=1€. Full Energy Cost 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) 34,94 l/100km versus MICHELIN X® INCITY™ XZU (148/145J) Full Energy Cost 35,33l/100km so -0,4l/100km so -280l/bus/year on average of 70 000km/year.
CO2 Emissions on 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) 128,60g CO2/km versus MICHELIN X® INCITY™ XZU (148/145J) 138,90gCO2/km so so -0,7ton of CO2/100km
3/ Comparison of Load Index 275/70 R 22.5 MICHELIN X® INCITY™ EV Z (152/149J) versus MICHELIN X® INCITY™ XZU (148/145J). Up to 8 tons due to the +15% load capacity as defined in ETRTO for urban usages (LI 152 for single fitment = 7100kg+ 15% = 8165 kg on front axle)
Results may vary according to tire dimensions.

THE LATEST MICHELIN TECHNOLOGIES AT THE SERVICE OF A MORE SUSTAINABLE MOBILITY: MICHELIN X® INCITY™ EV Z

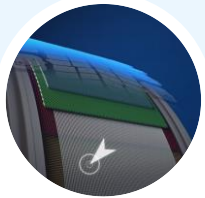
SAFE — EFFICIENT — GREEN — ACCESSIBLE

REGENION

Self-regenerating tread blocks, supported by MICHELIN mold 3D metal printing technologies, providing solid **grip** throughout the tire's **lifetime** and conditions. New grooves emerge over the tire's life for enhanced **mobility.** The more **compact** and **rigid** tread pattern provides higher **mileage,** higher **aggression resistance** and lower **fuel consumption.**

INFINICOIL

A **continuous steel wire** – which can be as long as 400 meters – wrapped around the tyre provides it with greater **stability** throughout its lifetime. The tyre's **endurance** is enhanced with higher **load index** or harder **usage conditions.** It improves the casing **mileage potential** and enhances **fuel savings.**

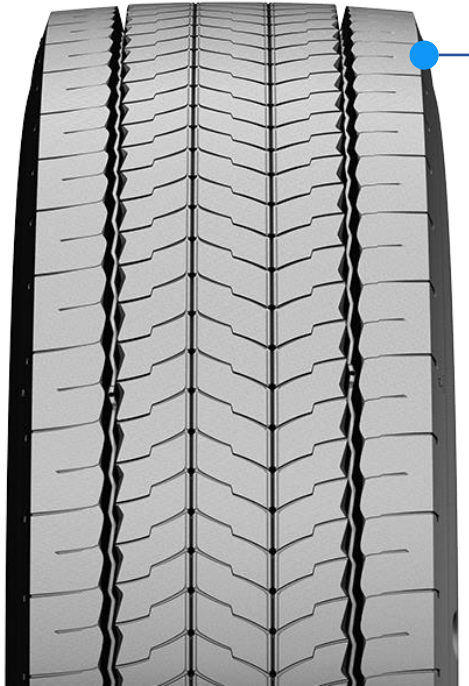


POWERCOIL

A new generation of more **robust** steel cables offers a better **oxidation resistance** and enhances the casing **endurance.** It improves the casing **mileage potential.** These steel casing cables are lighter leading to a better **rolling resistance.**

MICHELIN X® INCITY™ EV Z

275/70R22.5 MICHELIN X INCITY EV Z TL 152/149J



SYNTHETIC RUBBER
7.35kg (12.9%)

NATURAL RUBBER
20.02kg (35.2%)

STEEL
11.54kg (20.3%)

TEXTILES
0.06kg (0.1%)

SILICA
1.03kg (1.8%)

CARBON BLACK
12.83kg (22.6%)

OTHER MATERIALS*
3.97kg (7.0%)

*Chemicals and additives

CONTENT DECLARATION

EPD type & region of applicability:
Cradle to grave, Europe

Tire designation information:
- Tire size: 275/70 R22.5
- Tire mass: 56.8 kg
- Tire sub-categories: City bus tire
- Nominal section width: 205mm
- Aspect ratio: 70
- Casing construction: 5 Steel plies
- Rim diameter: 22.5 inches
- Load index: 149
- Speed rating: J

Retreadability:
Yes

Rolling resistance coefficient value:
6.0 kg/t

Tire category:
City bus tire

Functional unit:
1 tire driven 1000km

LCA software:
Simapro release 9.1.1.1

LCI databases:
Ecolvent 3.6

Plant:
Michelin plant in Aranda, Spain

An EPD® within the same product category but from different programmes may not be comparable.

Calculated impacts are only related to tires within the scope of this PCR and shall not be compared to vehicle performance.

UNDERSTANDING ENVIRONMENTAL IMPACTS

- **Contribution to global warming** is measured by the emission of **greenhouse gases.**

Ecosystem health impacts are measured by:

- Emissions of sulfur dioxide and other chemical substances that create **acid rain** which in turn damages terrestrial and freshwater ecosystems in a process called “acidification “
- Released chemicals that damage **the ozone layer** and its ability to absorb ultraviolet radiation that is harmful to plant life
- Nutrients that **degrade freshwater bodies** through the loss of oxygen and acidification in a process called “eutrophication”

Human health impacts are measured by:

- **Air pollution** caused by:
  - emissions of **particulate matter**
  - formation of **photochemical ozone,** a major contributor to **smog**
- released chemicals that **damage the ozone** layer and its ability to absorb ultraviolet radiation that is harmful to humans

Use of ressource:

- withdrawal of freshwater
- energy generation from both renewable and non-renewable sources
- depletion of minerals, fossil fuels and other non-living or “abiotic” resources that are non-renewable

Reuse of resources:

- mass of the product remaining at end of life
- ability to reuse the product’s components
- recycling of the product by recovering materials and energy

- **Product stage:** it represents the cradle-to-gate impacts of a tire, including the processes that provide the material and energy inputs into the product system, manufacturing of raw materials into the finished tire, and transport processes up to the factory gate, as well as the processing of any waste arising from the processes.

- **Mounting stage:** includes the activities from the tire factory to the final user, i.e., successive transport stages.

- **Use stage:** includes the activities covering the period from the handover of the tire until it reaches its end of life, including the fuel/energy consumption and related emissions attributable to the tire, and particle emissions related to tire and road abrasion.

- **End of life stage:** The end of life stage of the tire product starts when it is removed from the vehicle, does not provide any further operational function, and is at the end of the reference service life. It includes the transportation of the tire to the end of life treatment facility and the end of life treatment of tires being landfilled or incinerated without energy recovery.

(*) see UL PCR Tires: UL 10006 version 3.04 for any further details

ENVIRONMENTAL IMPACT CATEGORY

Europe (ILCD Method)	UNIT	TOTAL	PRODUCT STAGE: RAW MATERIALS	PRODUCT STAGE: TRANSPORTATION	PRODUCT STAGE: MANUFACTURING	MOUNTING STAGE: DISTRIBUTION	USE STAGE: TIRE IN USE	END OF LIFE STAGE: TIRE END OF LIFE TRANSPORTATION	END OF LIFE STAGE: TIRE END OF LIFE TREATMENT
Global warming potential	kg CO_2eq	1.68E+01	8.19E-01	9.75E-02	1.29E-01	6.65E-02	1.57E+01	1.99E-04	9.91E-05
Acidification potential	mol H+eq	9.91E-02	6.69E-03	1.28E-03	2.08E-04	2.59E-04	9.07E-02	6.93E-07	9.29E-07
Eutrophication potential (freshwater aquatic)	kg Peq	1.60E-02	3.54E-04	4.93E-07	1.36E-05	6.50E-07	1.56E-02	1.01E-09	4.12E-08
Photochemical ozone formation potential	kg NMVOCeq	4.00E-02	2.99E-03	8.29E-04	3.40E-04	2.66E-04	3.56E-02	6.54E-07	1.14E-06
Ozone depletion potential	kg CFC-11eq	1.94E-06	1.57E-07	1.74E-08	2.67E-08	1.21E-08	1.73E-06	3.67E-11	1.44E-11
Abiotic depletion potential	kg Sbeq	2.22E-04	2.25E-05	2.01E-08	7.70E-08	2.73E-08	2.00E-04	4.78E-11	4.38E-11

INDICATORS DESCRIBING RESOURCE USE

	UNIT	TOTAL	PRODUCT STAGE: RAW MATERIALS	PRODUCT STAGE: TRANSPORTATION	PRODUCT STAGE: MANUFACTURING	MOUNTING STAGE: DISTRIBUTION	USE STAGE: TIRE IN USE	END OF LIFE STAGE: TIRE END OF LIFE TRANSPORTATION	END OF LIFE STAGE: TIRE END OF LIFE TREATMENT
Total use of RENEWABLE primary energy	MJ	62.17	0.63	0.00	0.95	0.00	60.58	0.00	0.00
Total use of NON-RENEWABLE primary energy	MJ	363.78	23.57	1.43	2.24	1.00	335.54	0.00	0.00
Use of fresh water resources	$_m$3	2.88E+00	3.40E-02	3.35E-04	3.32E-03	2.68E-04	2.84E+00	8.00E-07	1.85E-06

INDICATORS DESCRIBING PARTICULATE EMISSIONS

	Unit per FU/DU	TOTAL
Particulate matter (PM10)	kg	1.77E-03
Particulate matter (PM2.5)	kg	5.44E-04

INDICATORS DESCRIBING WASTE AND RESOURCE RECOVERY

	Unit per FU/DU	TOTAL
Tire end-of-life treatment	kg	0.409
Components for reuse	kg	0.00
Materials for recycling	kg	0.22
Materials for energy recovery	kg	0.16
Exported energy (materials for energy recovery)	MJ	4.12

WHY THIS EPD?

Michelin recognizes the mobility-related challenges inside cities.
The **MICHELIN X INCITY EV Z** offer is an effort to help deliver Safer, Greener, more Efficient and more Accessible mobility.

We also want to promote a more comprehensive approach, long-term **and fully transparent:** the **Environmental Product Declaration (EPD)** is a mark of our good faith to take into account the total **environmental impact of our products.**

Several types of environmental impacts were evaluated in this life cycle assessment with **a LCA :**

- direct impacts to global warming and to ecosystem and human health
- indirect impacts from the use and reuse of resources.

This EPD is based on verified life cycle analysis (LCA) data. It summarizes and communicates transparent and comparable information about the **environmental impact of the product at each phase of its life cycle,** to inform our customers and other interested parties.

Florent Menegaux,
Chief Executive Officer

THIS EPD certification is fully aligned with our purpose

OFFERING EVERYONE A BETTER WAY FORWARD

Because we believe that mobility is essential for human development, we are innovating passionately to make it safer, more efficient and more environmentally friendly.

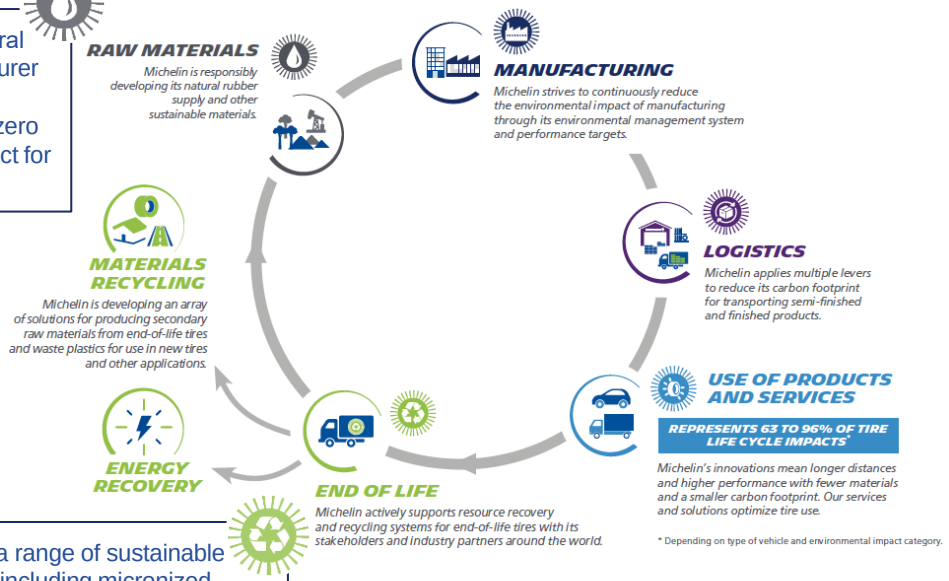
Our priority and firm commitment is to offer our customers uncompromising quality.

Because we believe that all of us deserve personal fulfillment, we want to enable everyone to do his or her best, and to make our differences a valuable asset.

Proud of our values of respect for customers, people, shareholders, the environment and facts, we are sharing the adventure of better mobility for everyone.

SUSTAINABILITY MEANS REDUCING THE LIFE CYCLE IMPACT OUR PRODUCTS & SERVICES

As one of the world's leading users of natural rubber, Michelin was the first tire manufacturer to pursue a sustainable sourcing strategy built on the principles of zero deforestation, land conservation and respect for supplier communities.



We are developing a range of sustainable materials solutions, including micronized rubber powders from scrap tires and bio-sourced butadiene and resins.

Across the value chain Michelin is:

- ✓ Reducing CO_2 emissions to achieve its targets validated by SBTi*
- ✓ Taking multiple actions under its biodiversity commitments
- ✓ Integrating life cycle assessment into the tire design process

ON THE PATH TO REACH CARBON NEUTRALITY

MANUFACTURING
Scopes 1 & 2 (2)

Reduction in energy consumption + Shift towards clean energy

2030: -50% (4) CO_2 emissions vs 2010

2050: CARBON NEUTRALITY (1)

LOGISTICS
Scope 3 (3)

Transport less, better and differently

2030: -15% (4) CO_2 emissions vs 2018

2050: CARBON NEUTRALITY (1)

SUPPLY CHAIN
Scope 3 (3)

2024: 70% (5) of emissions from suppliers covered by science-based targets

2050: CARBON NEUTRALITY (1)

REDUCE REUSE RECYCLE RENEW

ON THE PATH TO REACH FULL CIRCULARITY OF PRODUCTS

with 40% of sustainable raw materials in 2030, 100% in 2050

NATURAL RUBBER

ResiCare

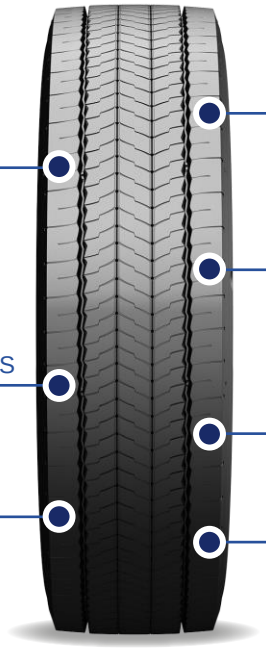
BLACK CYCLE *

BIOIMPULSE

PLASTIFIERS

CARBIOS

TEXTILES



SYNTHETIC RUBBER

BIOBUTTERFLY **

PYROWAVE

FILLERS

enviro

BLACK CYCLE

LTLehigh TECHNOLOGIES

METALS

MICHELIN

OTHER

MICHELIN

PLANET

** European project funded by Horizon 2020, project number : 82068*

*** With the support of ADEME (ADEME: French Environment & Energy Management Agency)*

AMBITIONS FOR 2030

act4nature international

(*) Replacement of pesticides and fertilizers by mechanical methods combined with other alternative solutions

EPD PROCESS CERTIFICATION	CONTACT	LCA AUTHOR	PROGRAMME OPERATOR
			
- Third party verifier: Damien PRUNEL LCIE BUREAU VERITAS 33, Avenue du Général Leclerc 92260 Fontenay aux Roses - France **- Accredited by:** Recognized individual verifiers, approved by the International EPD® System.	**Manufacture Française des Pneumatiques MICHELIN** 23, Place des Carmes Dechaux 63040 Clermont-Ferrand Cedex 09 FRANCE For additional information related to the activities of the Michelin Group: www.michelin.com In regards to this environmental declaration, please contact: **Nicolas Beaumont**, Sustainable Development and Mobility department, nicolas.beaumont@michelin.com	**Nicolas Jeannoutot** nicolas.jeannoutot@michelin.com	**EPD® International AB** info@environdec.com **The International EPD® System** EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com

ANNEX

SLIDE 3 CITIES FACE INCREASING MOBILITY-RELATED CHALLENGES…

(1)Urbanization
https://ourworldindata.org/urbanization
United Nation - Department of Economic and Social Affairs, 2018 Revision of World Urbanization Prospects
Link: https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html
(2)Mobility growth, passenger and freight activity 2000-2015
SLOCAT: Transport and climate change 2018
Link: https://tcc-gsr.com/
(3)Share of Heavy-vehicles in Road transport CO2 emissions
Lorries, buses and coaches are responsible for about a quarter of CO2 emissions from road transport in the EU and for some 6% of total EU emissions.
Source = European commission
Link: https://ec.europa.eu/clima/eu-action/transport-emissions/road-transport-reducing-co2-emissions-vehicles/reducing-co2-emissions_en
(4)CO2 emissions trend
IEA link: https://www.iea.org/data-and-statistics/charts/global-co2-emissions-in-transport-by-mode-in-the-sustainable-development-scenario-2000-2070
(5)Air Pollution
WHO*More than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed WHO limits.*
Link: https://www.who.int/news/item/12-05-2016-air-pollution-levels-rising-in-many-of-the-world-s-poorest-cities
(6)Congestion
European commission: Congestion in the EU is often located in and around urban areas and costs nearly EUR 100 billion, or 1 % of the EU's GDP, annually
Link: https://ec.europa.eu/transport/themes/urban/urban_mobility_en
(7) Commuting
WBCSD*Commuting contributes to air pollution and congestion and impacts people's well-being negatively with over 40% of the global workforce citing the commute as the worst part of their day*
Link: https://www.wbcsd.org/Programs/Cities-and-Mobility/Transforming-Urban-Mobility/Commuting-Behavior-Change

ANNEX

SLIDE 4 … AGAINST WHICH PUBLIC TRANSPORT HAS SEVERAL MERITS

(1)Safety

APTA. American Public Transportation Association

Link: https://www.apta.com/wp-content/uploads/Resources/resources/hottopics/Documents/APTA%20VZN%20Transit%20Safety%20Brief%208.2018.pdf

Public transportation is one of the safest ways to travel. It is ten times safer per mile than traveling by car because it has less than a tenth the per-mile traffic casualty (injury or death) rate as automobile travel.

Data shows that metro areas with higher public transportation use have lower traffic fatality rates

(2)Efficiency Green

SLOCAT: Transport and climate change 2018

Light-duty vehicles (LDVs) and air transport together account for 78% of passenger transport activity, and 93% of passenger transport CO2 emissions.

(3) Green

BNEF Electric Vehicle Outlook 2020

Quoted by www.sustainable-bus.com

Link: https://www.sustainable-bus.com/news/electric-vehicle-outlook-2020-bnef-electric-buses/

(4) Accessibility

APTA quoted by metro-magazine.com

Link: https://www.metro-magazine.com/10032643/public-transit-users-can-save-10-160-annually-says-apta-report

Various: ACEA

https://www.acea.auto/fact/buses-what-they-are-and-why-they-are-so-important/

Buses and coaches improve social inclusion, providing access to education, employment and healthcare to all – including those on low incomes, those who do not drive, the older generation, people with disabilities and people living in remote areas

With one bus capable of replacing 30 cars on the road, buses help ease traffic congestion.

Buses and coaches have the lowest carbon footprint per passenger of any form of motorised transport.

Buses are a safe transport mode, responsible for just 2% of road fatalities in the EU

ANNEX

SLIDE 15 ON THE PATH TO REACH CARBON NEUTRALITY

GHG (Green House Gas) Protocol definition

(1) Carbon Neutrality : Having a net zero Carbon Footprint, or in other words, balancing the amount of carbon Emissions released into the Atmosphere with an equivalent amount of carbon removal, or simply eliminating carbon Emissions altogether.

(2) SCOPE 1 Direct GHG emissions occur from sources that are owned or controlled by the company, both stationary and mobile sources.
SCOPE 2 GHG emissions from the generation of purchased electricity, steam and heating/cooling consumed by the company

(3) SCOPE 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. These activities are organized into 15 categories, 8 of which represent the upstream value chain and 7 the downstream value chain.

(4) GHG A greenhouse gas (GHG or GhG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. CO_2 is Greenhouse gas.

(5) Science Based targets Initiatives (SBTi) : The Science Based Targets initiative (SBTi) is a leading independent international organization which encourages participating companies to set greenhouse gas (GHG) emissions-reduction targets. SBTi Partners: UN Global Compact (UNGC) | CDP (Carbon Disclosure Project)|World Resources Institute (WRI) | WWF (World Wildlife Fund)

General Programme Instructions of the International EPD® System.
Version 4.0 | 2021-11-18

MICHELIN