CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Share of zero or low emissions technologies in road vehicles fleet (ENV_PL_PF2)

DOMAIN

Transport	**Environment**	Energy	Society	Economy

TOPIC	**Pollution**	
IMPACT	**Transport pollutant emissions** *Reducing the pollutant emissions of urban mobility*	**ENV_PL**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Transport activity is a major contributor to pollution, significantly impacting air quality, human health, and climate change. A substantial portion of transport activity takes place in urban areas, where high population density and concentrated economic activity lead to high travel demand. The reliance on motorized vehicles powered by fossil fuels exacerbates pollution levels by emitting particulate matter, nitrogen oxides and volatile organic compounds. These emissions contribute to respiratory diseases and environmental degradation. By addressing urban transport emissions, cities can enhance air quality, reduce carbon footprints, and create healthier, more sustainable environments for residents.

This indicator is an estimation of the share of zero or low emissions out of road vehicles fleet in the pilot area. **It is a relevant indicator when the policy action is aimed at promoting the penetration of a higher share of cleaner vehicles. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

The indicator is weighted share. Being a percentage it is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

There are two alternative methods for the calculation of this indicator. The difference between the two is the source of the data regarding the size and composition of the road vehicles fleet. The first method is based on the availability of the data on registered vehicles by vehicle type and fuel type **in the pilot area**. The last specification is relevant as registers of vehicles often do not provide very spatially detailed data. Registered vehicles might not be available at municipality level. If data exists, the first method is more significant and allows to consider different vehicle types. The second method estimates the shares of different technologies in the vehicles fleet using responses from a sample survey. This method can be applied even if data from vehicle register is unavailable. However, it is more approximated and consider only private cars and, maybe, two-wheelers.

For both methods, **the calculation is managed endogenously within the supporting tool** upon the provision of the required input related to the composition of the vehicles fleet. The estimation process is explained below.

METHOD 1	METHOD 2
Share of zero or low emission vehicles using vehicles register data	**Share of zero or low emission vehicles using responses to a sample survey**
It is an estimation based on observed fleet composition.	It is an estimation only for cars and based on estimated technology shares.
Complexity 	Complexity 

Significance

Significance

Method 1

Share of zero or low emission vehicles using vehicles register data

Significance: **1.00**

METHOD OF CALCULATION

The indicator is computed **within the supporting tool** according to the following steps:

- **Estimation of the share of each technology** out of vehicles in the fleet (see equation below)
- **Estimation of the weighted share of zero or low emission vehicles** (see equation below)

INPUTS

The following information is needed to compute the indicator:

a) **The number of road vehicles in the fleet** for each relevant technology. The technologies to be considered are the followings:

- **Gasoline**
- **Gasoline non-plug-in hybrid**
- **Gasoline plug-in hybrid**
- **Diesel**
- **Diesel non-plug-in hybrid**
- **Diesel plug-in hybrid**
- **LPG**
- **CNG**
- **Battery electric / Trolley**
- **Fuel cell**

If some of these technologies are not relevant in the pilot area, they can be excluded.

In principle, the data should consider different road vehicle types: two-wheelers, cars, Light Duty Vehicles and buses. The minimum requirement is that at least cars are considered.

The experiment would result in a modification of the estimated share.

EQUATIONS

The share of each technology in the vehicles fleet is computed according to the following equation:

$$VehShr^{g} = \frac{FltVeh^{g}}{\sum_{g} FltVeh^{g}}$$

Where:

$FltVeh^{g}$ = Number of vehicles of technology *g* in the road vehicle fleet.

The weighted share of zero or low emission vehicles is computed by means of the following equation:

$$\boldsymbol{ZeLoFltShr} = \sum_{\boldsymbol{g}} (\boldsymbol{VehShr^g} * \boldsymbol{TechWgh^g})$$

Where:

$VehShr^g$ = Share of vehicles of technology *g* in the fleet

$TechWgh^g$ = Weight associated to technology *g*

The weights associated to the technologies are pre-defined values. The following values are used:

Technology	**Weight**
Gasoline	0.00
Gasoline non-plug-in hybrid	0.10
Gasoline plug-in hybrid	0.20
Diesel	0.00
Diesel non-plug-in hybrid	0.05
Diesel plug-in hybrid	0.10
LPG	0.00
CNG	0.00
Battery electric / Trolley	1.00
Fuel cell	1.00

Method 2

Share of zero or low emission vehicles using responses to a sample survey

Significance: **0.75**

METHOD OF CALCULATION

The indicator is computed **within the supporting tool** according to the following steps:

- **Estimation of the weighted share of zero or low emission vehicles** (see equation below)

INPUTS

The input required is the share of each technology in the road vehicles fleet. These shares should be computed using the results of a sample survey where respondents are asked to report the road vehicle they use (see guidelines for the surveys for suggestions on the formulation of the question). Given the responses collected from the survey, the shares should be computed as follows:

$$SVehShr^{g} = \frac{SFltVeh^{g}}{\sum_{g} SFltVeh^{g}}$$

Where:

$SFltVeh^{g}$ = Number of reported vehicles of technology *g* in the fleet of the sample (note that if correction factors are associated to the respondents in order to re-balance the composition of the sample, these correction factors should be applied in the equation above. For instance, if one respondent is associated to a correction factor of 0.7 and reports one vehicle, that vehicle should be counted as 1 x 0.7 = 0.7 in the equation above.

Since the survey would likely involve only households, the responses collected would refer only to cars and, maybe, two-wheelers.

EQUATIONS

The equations **used within the supporting tool** to calculate the indicator is:

$$\boldsymbol{ZeLoSFltShr = \sum_{g} (SFltShr^{g} * TechWgh^{g})}$$

Where:

$TechWgh^{g}$ = Weight associated to technology *g*

The weights associated to the technologies are the same pre-defined values specified for the method 1

ALTERNATIVE INDICATORS

This indicator refers to the penetration of zero or low emission vehicles in the fleet. An alternative indicator is **ENV_PL_PF1**, which has the same form but refers only to new registrations rather than on the whole fleet. The indicator described in this factsheet can be considered a more representative picture of how relevant zero or low emission vehicles are in the pilot area. On the other hand, the alternative indicator ENV_PL_PF1 can be considered more focused on the effect of the measures experimented in the pilot, as they can only affect new registrations and not the existing fleet. In an extreme situation, where just one new electric car is registered and added to a vehicle fleet without neither electric nor hybrid cars, the indicator described in this factsheet would be very close to zero, while the alternative indicator would be 1. The two indicators are of the same complexity; the significance depends essentially on what should be measured.

It should also be noted that the share of zero or low emissions road vehicles is one of the three components of **ENV_US_EL1**. This indicator combines the share of zero or low emissions road vehicles, the noise level in the experiment area and periods and the share of vehicles irregularly parked or the share of urban surface dedicated to vehicle parking to assess overall urban liveability. The online tool automatically computes ENV_US_EL1 if the three sub-indicators have been calculated.

If the focus is on carbon emissions instead of air pollution, indicators **ENV_DC_EF1** and **ENV_DC_EF2** can be used. These measure the average CO2 emissions per kilometre travelled of newly registered vehicles and of the overall fleet, respectively, offering insight into the fleet's contribution to greenhouse gases emissions.