CIVITAS indicators

Share of electric/hydrogen cars in the fleet (ENV_DC_APV2)

DOMAIN

Transport	**Environment**	Energy	Society	Economy

TOPIC	**Decarbonisation**	
IMPACT	**Zero-emission cars** *Increasing the share of zero-emissions cars in the fleet*	**ENV_DC**

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 transport demand. The reliance on motorized vehicles powered by fossil fuels exacerbates climate change by emitting greenhouse gases, such as CO2. By addressing urban transport emissions, cities can enhance air quality and reduce carbon footprints.

This indicator is an estimation of the share of zero-emissions (electric and hydrogen) cars in the urban fleet. **It is a relevant indicator when the policy action is aimed at reducing the impact of urban mobility and transport on climate. A successful action is reflected in a <u>HIGHER</u> value of the indicator.**

DESCRIPTION

The indicator is the share of Battery Electric Vehicles (BEV) and Fuel Cells Vehicles (FCEV) out of the cars registered in the urban area. Being a share, the indicator is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

There are two methods for the calculation of the indicator. One method consists of computing the share of BEV and FCEV vehicles using the **data of registered vehicles**. This method is straightforward and fully significant. **The requirement for its application is that data on registered is available at the required level of detail**. Often data on registered cars is published only at a level of spatial aggregation coarser than the pilot area (e.g. NUTS 3 regions) and only with reference to one period (e.g. at the end of the year). This issue is especially relevant if the pilot area is just one part of a municipality and if the pilot is expected to last less than one year.

An alternative method is estimating the share of BEV and FCEV vehicles by means of a **sample survey**. Asking a sample of individuals the number of cars owned or used, and their technology allows to estimate the share of zero-emission vehicles in the private personal fleet. On the one hand, a sampling estimation is less significant than an observed data drawn from a register. On the other hand, this method can work even if the pilot area is spatially limited as the sample can be collected among the inhabitants of the area. Organising a sample survey requires some resources and implies some complexities, but the survey can be used to collect more information than the one needed for this indicator. See the dedicated "Sample surveys guidelines" for methodological indications.

Whatever the method used, the share of zero-emission cars should be computed exogenously and then coded in the supporting tool.

METHOD 1	METHOD 2
Calculation of the indicator using vehicles registration data	Estimation of the indicator using responses from a sample survey
Complexity	Complexity
Significance	Significance

The estimation process is explained below for both methods.

Method 1

Calculation of the share of zero-emission cars using vehicles registration data	Significance: **1.00**	

The following information is needed to compute the indicator:

    a) **The number of cars** registered in the pilot area by fuel technology.

The experiment would result in a modification of the composition of the registered cars by fuel technology.

METHOD OF CALCULATION

The indicator should be computed **exogenously** according to the following steps:

- **Extraction of the number of registered cars in the pilot area** at the latest available date classified according to fuel technology**.**

- **Estimation of the indicator** (see the following equation).

EQUATIONS

The value of the indicator should be computed as:

$$ZrEmCarSh = \frac{RegCar^{<BEV>} + RegCar^{<FCEV>}}{\sum_f RegCar^f}$$

Where:

$RegCar^f$ = Number of registered cars of fuel technology f

$RegCar^{<BEV>}$ = Number of registered Battery Electric cars

$RegCar^{<FCEV>}$ = Number of registered Fuel Cells cars

Method 2

Calculation of the share of zero-emission cars using responses from a sample survey	Significance: **0.75**	

The following information should be collected by means of the sample survey for each respondent:

a) **Overall number of cars available in the respondent's household.** The information concern available rather than owned cars in order to consider company cars.

b) **Number of Battery Electric cars (BEV) available in the respondent's household.**

c) **Number of Fuel Cells hydrogen cars (FCEV) available in the respondent's household.**

The experiment would result in a modification of the number of BEV and FCEV cars available in the households.

METHOD OF CALCULATION

The indicator should be computed **exogenously** according to the following steps:

- **Calculation of the total number of cars available in the households of the sampled individuals** (see equation below).

- **Calculation of the total number of BEV cars available in the households of the sampled individuals** (see equation below).

- **Calculation of the total number of FCEV cars available in the households of the sampled individuals** (see equation below).

- **Estimation of the indicator** (see equation below).

EQUATIONS

The calculation of the total number of cars available in the households of the sampled individuals is just the summation of number of available cars reported by all sampled individuals:

$$AvailCar = \sum_d AvailCar_d$$

Where *d* is the generic component of the sample.

The calculation of the total number of BEV and FCEV cars available in the households of the sampled individuals is just the summation of number of these cars reported by all sampled individuals:

$$AvailCar^f = \sum_d AvailCar_d^f$$

Where *f* is either BEV or FCEV.

The indicator can be computed using the equation:

$$ZrEmCarSh = \frac{AvailCar^{<BEV>} + AvailCar^{<FCEV>}}{AvailCar}$$

ALTERNATIVE INDICATORS

This indicator provides a measure of how relevant zero-emission vehicles are in the total fleet of cars available in the pilot area. Since many cars remain in the fleet for several years and zero-emission vehicles entered the market only relatively recently, their share is generally quite small. This indicator helps to measure how significant zero-emissions vehicles are in the existing fleet, but it does not say anything on speed at which zero-emission vehicles are entering the car fleet. This latter information is provided by the indicator ENV_DC_APV1, which has the same form but is computed on new registered cars rather than on the overall fleet.

While this indicator considers passenger vehicles, ENV_DC_AFV1 and ENV_DC_AFV2 illustrate the share of zero-emission **freight vehicles** among newly registered freight vehicles and over the whole fleet, respectively.