








CIVITAS indicators

Public charging stations per inhabitant by charging speed
(ENV_ES_EA2)

DOMAIN

				
Transport	Environment	Energy	Society	Economy

TOPIC

Energy supply

IMPACT

Availability of alternative energy supply
Increasing the number of public charging stations for electric vehicles

ENV_ES

Category

Key indicator	Supplementary indicator	State indicator
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CONTEXT AND RELEVANCE

As cities shift towards decarbonized transport systems, electric mobility has emerged as a key component of sustainable urban mobility strategies. Electric vehicles contribute to environmental goals by reducing tailpipe emissions of greenhouse gases and air pollutants such as nitrogen oxides (NOx) and particulate matter.

The widespread adoption of electric vehicles (EVs) hinges, among other factors, on the availability of a reliable and extensive public charging infrastructure. This indicator measures the number of electric charging stations within the pilot area, **allowing to evaluate policy actions aimed at expanding charging infrastructure. A successful intervention is reflected in a HIGHER value of this indicator.**

DESCRIPTION


The indicator measures the number of electric charging stations per inhabitant in the experiment area **by charging speed**. It consists of a **vector** of five values, each representing the number of stations within a specific power output range in kilowatts:

- **Slow (≤ 7.5 kW):** Typically requires 10 hours or more to fully charge an EV with an average battery capacity of 80 kWh.
- **Quick (7.6–22 kW):** Charging time is approximately 4 to 7 hours.
- **Fast (22.1–50 kW):** Charging takes around 90 minutes.
- **Ultra-fast (50.1–150 kW):** Charging time ranges between 30 and 60 minutes.
- **High Power Charging (HPC, ≥ 150 kW):** Enables charging in approximately 15 to 30 minutes.

The unit of measurement is **charging stations per inhabitant**.

METHOD OF CALCULATION AND INPUTS

The indicator should be calculated **exogenously** based on direct observation **and then coded in the supporting tool**.

Method	
Estimation of the indicator based on observed data	Significance: 0.25 
INPUTS	
<p>The following information is needed to compute the indicator:</p> <ol style="list-style-type: none">a) The number of charging stations for electric vehicles in the experiment area by power output.b) The population size of the experiment area. <p>The experiment would result in an increase in the number of charging stations in the experiment area.</p>	

METHOD OF CALCULATION

The indicator is computed exogenously according to the following steps:

- **Retrieval of the number of charging stations for electric vehicles in the experiment area by power output.** This information can be obtained from municipal records or by inquiring with charging station operators in the experiment area. Once collected, the data should be classified into the following five categories according to power output:
 - Group 1: Slow charging, ≤ 7.5 kW
 - Group 2: Quick charging, 7.6–22 kW
 - Group 3: Fast charging, 22.1–50 kW
 - Group 4: Ultra-fast charging, 50.1–150 kW
 - Group 5: High Power Charging, ≥ 150 kW
- **Retrieval of the number of inhabitants within the experiment area.** This value can be obtained from census data.
- **Estimation of the indicator** by computing the ratios between the number of charging stations by power output obtained in the first step and the number of inhabitants obtained in the second step.

EQUATIONS

The equation computing the indicator (last step of the method of calculation) is the following:

$$ChrgStPerInh_p = \frac{ChrgSt_p}{Pop}$$

Where:

$ChrgSt_p$ = Number of electric charging stations in the experiment area belonging to power output group p

Pop = Population in the experiment area

ALTERNATIVE INDICATORS

This indicator measures the number of electric charging stations per inhabitant in the experiment area. It distinguishes charging stations based on their power output and, therefore, charging speed.

Alternative indicator **ENV_ES_EA1** does not distinguish charging stations by power output. This alternative can be used for higher-level evaluations where less detail is needed. It can also be employed when data on station specifications is unavailable or inconsistent.