CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Non-fossil fuel supplied at charging stations and fuel stations (ENG_DC_FC3)

DOMAIN

Transport	Environment	**Energy**	Society	Economy

TOPIC	**Decarbonisation**	
IMPACT	**Non-fossil energy demand in transport** *Increasing non-fossil energy in the transport sector*	**ENG_EF**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Transport activity is a source of pollution and greenhouse gas emissions. Emissions are a consequence of energy use, and their volume depends on two main elements: the amount of energy used, and the sources of the energy used. Improving the sustainability of urban transport implies that either the amount of energy used is reduced or that the role of renewable energy is increased, or both. This indicator focuses on the latter approach.

This indicator is the quantity of non-fossil fuel supplied at public charging and fuelling stations. **It is a relevant indicator when the policy action is aimed at increasing the amount of renewable energy used for mobility and transport. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

The indicator is the set of values providing the amount of energy demanded in the experiment area for each fuel type. Therefore, the indicator is **multidimensional**, made of **several values**.

The indicator is expressed in **two units of measurement**, depending on the fuel type:

- Hydrogen: 1000 kilograms
- Electricity: 1000 kWh

Not all the fuel types must be included in the indicator; if some fuel type is not relevant in the experiment context, it can be skipped.

It should be noted that **this indicator provides a partial measure of the demand of energy** as it does not cover domestic charging of electric vehicles.

METHOD OF CALCULATION AND INPUTS

The indicator should be computed exogenously, by collecting data from fuel stations and charging stations operators and then coded in the supporting tool.

Method 1

Energy supply data collected from fuel stations and charging stations operators	Significance: **0.75** 

INPUTS

The following information is needed to compute the indicator:

a) **The amount of energy sold in a period of four weeks** for each fuel type. The following fuel types are to be considered:
   - **Hydrogen**
   - **Electricity**

   If a fuel type is not relevant in the experiment area (e.g., there are no fuel stations for hydrogen) **they are excluded from the indicator** and from the data collection. The amount of energy supplied should be collected from fuel stations and charging stations operators.

The number of operators of charging stations and other charging facilities for electric vehicles in one urban area, is generally limited; it should be feasible contacting all operators and collecting data for all charging points. Similarly, the number of fuel stations for hydrogen, if any exist, should be small; again, collecting data from all stations should be feasible.

The experiment would result in a modification of the amount of energy supplied by the fuel and charging stations in a period of four weeks.

METHOD OF CALCULATION

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

- **Identification of the existing fuel stations and charging stations.**
- **Data collection from the operators of the identified fuel and charging stations.**
- **Definition of the vector of energy demand** in the monitored period for all fuel types

EQUATIONS

The total energy supplied per fuel type $EngSupl^e$ is obtained as the summation of the energy supplied per fuel type by each fuel and charging station in the experiment area:

$$\boldsymbol{RnwEngSupl^e = \sum_s RnwEngSupl_s^e}$$

Where:

$RnwEngSupl_s^e$ = Amount of non-fossil fuel type *e* supplied by fuel or charging station *s* in the monitored four weeks

NORMALISED VARIATION INDEX

This indicator consists of two values, namely the electricity and hydrogen supplied at charging and fuel stations in the experiment area. To assess the contribution of this indicator to the overall change induced on the domain “Energy”, the **total non-fossil energy supplied** is calculated and **expressed in tonnes of oil equivalent** (toe). This total is **computed by the supporting tool automatically**, using the following equation:

$$TotRnwEngSupl = \sum_e (RnwEngSupl^e * ConvFact^e)$$

Where:

$RnwEngDem^e$ = Supply of **non-fossil fuel type** *e* in the monitored four weeks.

$ConvFact^e$ = Conversion factor from the native unit to toe for non-fossil fuel type *e*.

A successful experiment corresponds to a lower value of this total energy demand.

A **Normalised Variation Index** (NMI) can be used to compute the summary impact of the pilot in the domain “Energy”. For this purpose, it is required that the value index becomes larger as the pilot is successful. The index is **automatically obtained within the supporting tool** without the need for any additional input as:

$$NMIEngSupl = \left(\frac{TotRnwEngSupl[AE]}{TotRnwEngSupl[BAU]}\right) * 100$$

Where:

$TotRnwEngSupl[AE]$ = Value of the total energy supplied in the After-experiment condition

$TotRnwEngSupl[BAU]$ = Value of the total energy supplied in the BAU condition

ALTERNATIVE INDICATORS

This indicator deals with the supply of non-fossil energy for transport activity in the urban area. It is an indicator based on **observed** data; therefore, it provides an objective measure. On the other hand, it does not include the energy used for recharging electric vehicles at home, which is currently a significant share of total energy used for vehicle recharging; therefore, it only provides a partial measure of transport energy demand.

Alternative indicators **ENG_DC_FC1** and **ENG_DC_FC2** assess the demand for non-fossil energy for transport activity in the experiment area. The former is computed based on modelled transport demand and exogenous parameters, while the latter is based on modelled transport energy demand. While they are not based on observed measurements, they are more significant than the indicator described in this factsheet because, in principle, it accounts for the whole demand, including energy used for charging electric vehicles at home. The two alternative indicators are also simpler to compute compared to the indicator described in this factsheet, because extracting information from an urban transport model, when one exists, is more straightforward and less time-consuming than requesting and collecting information from a variety of charging stations providers and fuel stations operators.

To assess **total fuel** demand (i.e., fossil and non-fossil fuels), indicators **ENG_EF_ED1, ENG_EF_ED2** and **ENG_EF_ED3** can be used. These indicators allow to evaluate measures that aim to decrease energy use by the transport sector in the experiment area.