CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Modelled road freight vehicles-km (TRA_FR_MA3)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Freight**	
IMPACT	**Motorised freight transport** *Reducing freight traffic in the urban area*	**TRA_FR**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Motorised road freight transport refers to the movement of goods using motor vehicles such as trucks and vans. This mode of transport is essential for delivering goods to businesses and consumers in urban areas, supporting local commerce and daily life. However, freight vehicles contribute disproportionately to energy consumption, emissions, air pollution, noise, space occupancy, and congestion. These factors negatively impact quality of life and environmental sustainability in cities. Strategies to reduce and optimise freight traffic, such as increasing load factors by consolidating deliveries and reducing distances travelled by introducing lockers and neighbourhood pick-up points, help creating healthier, safer, and more efficient urban environments.

This indicator provides a measure of the contribution of motorised freight vehicles to the road transport activity in the experiment area. **It is a relevant indicator when the policy action is aimed at reducing the vehicle-kilometres travelled on urban roads by freight vehicles. A successful action is reflected in a LOWER value of the indicator after the experiment compared to the BAU case.**

DESCRIPTION

The indicator is the number of yearly vehicle-kilometres travelled by motorised road freight vehicles in the experiment area. Its unit of measurement is **veh-km/year**.

METHOD OF CALCULATION AND INPUTS

This indicator is based on the total vehicle-kilometres travelled by motorised road freight vehicles, as derived from an urban transport model. **If a city already has a transport model** that accounts for freight transport, the calculation of the indicator is relatively straightforward. However, **if no such model exists**, the complexity increases significantly, as developing an urban transport model from scratch is a complex and resource-intensive task.

This section describes some steps to be taken ensure that the indicator reflects a standardized one-year period. **The indicator should be computed exogenously and then coded in the supporting tool**.

Method 1

Road freight vehicle-kilometres drawn from an urban transport model	Significance: **0.50** 

INPUTS

The following information is needed to compute the indicator:

a) **The vehicle-kilometres travelled by motorised road freight vehicles** in the period covered by the urban transport model.

Urban transport models can refer to different periods e.g., one peak hour, two peak hours, one peak and one off-peak hour, an average day and so on. Whatever is the period, the emissions provided by the model are the input required, which need to be

translated in an annual value (see *Method of Calculation*). If the model already provides annual emissions, this information is already the indicator.

The experiment would result in a modification of the number of vehicle-kilometres travelled by road freight vehicles estimated by the model.

METHOD OF CALCULATION

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

- **Identification of the period covered by the transport model** (e.g., one peak hour, two peak hours, whole day, etc.)**.**
- **Identification of the share of daily of traffic covered by the transport model.** The share of traffic covered by the transport model depends on the modelled period and on the distribution of transport activity in the 24 hours. This distribution is different in different contexts. If a transport model exists, this parameter is usually known. If not, 10% is a reasonable value for a morning peak hour.
- **Definition of the factor to extrapolate from day to year.** Most of the models refer to an average working day. If so, this term depends on the number of working days per year. Again, if a model exists, this parameter is usually known. If not, 270 working days/year can be considered.
- **Calculation of the extrapolation factor**. The extrapolation factor should be the product of two terms above (see the following equations).
- **Application of the extrapolation factor and estimation of the indicator** (see the following equations).

EQUATIONS

The extrapolation factor should be computed as:

$$\boldsymbol{ExtpFact} = \frac{\mathbf{1}}{\boldsymbol{DayModShr}} * \boldsymbol{DaytoYear}$$

Where:

$DayModShr$ = share of daily of traffic covered by the transport model

$DaytoYear$ = Factor to extrapolate from day to year

Example, if the model covers two hours and $DayModShr$ = 16% of daily traffic, and 270 working days ($DaytoYear$) are considered, the extrapolation factor is:

$$ExtpFact = \frac{1}{0.16} * 270 = 1687$$

The value of the indicator is then computed as:

$$\boldsymbol{FreightVKT} = \boldsymbol{ModFreightVKT} * \boldsymbol{ExtpFact}$$

Where:

$ModFreightVKT$ = Vehicle-kilometres travelled by motorised road freight vehicles in the experiment area, related to the modelled period, extracted from the model.

ALTERNATIVE INDICATORS

This indicator measures of the contribution of motorised freight vehicles to the road transport activity within the experiment area using traffic simulation models. In contrast, alternative indicator **TRA_FR_MA1** estimates the number of road freight vehicles on a sample of roads through traffic counts.

As this indicator (**TRA_FR_MA3**) relies on traffic models, it accounts for the entire road network rather than a sample of roads, making the indicator well suited for system-wide analyses; it provides a measure of the number of vehicle-kilometres travelled by road freight within the experiment area, offering a comprehensive understanding of freight traffic. However, it should be noted that the computation of this indicator may only be feasible if traffic models are already in place in the city, as developing an urban transport model from scratch is a complex and resource-intensive task. Meanwhile, **TRA_FR_MA1** is computed based on data obtained through observation, avoiding the need to set up traffic models. Data collection is conducted using equipment such as detection loops, cameras, or it can be performed manually. In cities where classified traffic counts are already conducted regularly, the effort to compute this indicator is minimal, as the necessary data is already available. Furthermore, this indicator may be best suited for local analyses or specific corridors since it relies on a sample of roads. It does not provide information on travel distances and therefore cannot estimate total vehicle-kilometres travelled by freight vehicles.

TRA_FR_MA2 measures the share of deliveries made by non-motorised vehicles. This alternative indicator is suitable to assess projects aiming to shift freight traffic from motorised to non-motorised vehicles. An increase in deliveries made by non-motorised vehicles is assumed to imply a reduction in motorised freight traffic in the experiment area.