








CIVITAS indicators

Measured noise level (ENV_NS_NE2)

DOMAIN

				
Transport	Environment	Energy	Society	Economy

TOPIC

Noise

IMPACT

Transport noise emissions

Reducing the level of noise generated by transport

ENV_NS

Category

Key indicator	Supplementary indicator	State indicator
---------------	-------------------------	-----------------

CONTEXT AND RELEVANCE

To be drafted.

This indicator provides a measure of the level of noise in the roads of the pilot area. **It is a relevant indicator when the policy action is aimed at reducing the annoyance and the damages to health resulting from the noise generated by urban transport. A successful action is reflected in a LOWER value of the indicator.**

DESCRIPTION





The indicator is the average of different measures of the noise level (namely, Equivalent Sound Level – LAeq) in a sample of roads in the pilot area.

The indicator is expressed in decibels (dB).

METHOD OF CALCULATION AND INPUTS

The indicator should be computed exogenously, by applying one of the two methods described, and then coded in the supporting tool.

There are two alternative methods of calculation available for this indicator. The two methods distinguish for the number and the length of the periods when measures are made. One method is simpler, but therefore provides less significant results; the other method is more complex and therefore provides more significant results.

METHOD 1		METHOD 2	
Noise measured in a smaller sample of periods		Noise measured 24 hours in a larger sample of periods	
Complexity		Complexity	
Significance		Significance	

Method 1

Noise estimated in a sample of roads in three 2-hours periods of three working days

Significance: **0.75**



INPUTS

The following information is needed to compute the indicator:

a) **The measures of noise (Equivalent Sound Level – LAeq) in the pilot area.**

According to this method, the measures should be made:

- **In one or more spots (up to 10 spots)** in the pilot area, depending on its size (e.g., in small pilot areas one spot is sufficient, if the pilot involves the whole city it is recommended to identify 10 spots). A spot is a specific location on one road where transport noise level is significant before the experiment or could become relevant when the pilot is implemented (e.g., because a multimodal hub is opened). Locations where non-transport noise sources can affect measures should be avoided.
- **In three different working days** (unless there are specific reasons why transport noise is expected to be higher in non-working days).
- **In three 2-hours periods** – morning peak; afternoon off-peak; night).

The experiment would result in a modification of the measured level of noise in the same locations and in equivalent periods.

METHOD OF CALCULATION

Using Method 1, the indicator should be computed **exogenously** according to the following steps:

- **Collection of noise measures for all spots in each sampled day.**
- **Estimation of the average noise level in each spot of each sampled day.** The average is computed considering the three 2-hours periods as independent observations (see equation below).
- **Estimation of the average noise level in each sampled day.** The average is computed considering each spot as independent observations (see equation below).
- **Estimation of the index** by computing the average noise level of the three sampled days (see equation below).

EQUATIONS

The average noise in one spot in one day can be computed as:

$${}_dL_{Aeq_r} = \frac{\sum_t {}_tL_{Aeq_r}}{3}$$

Where:

${}_d^t LAeq_r$ = Equivalent sound level measured in the period t , in the spot r , in the day d

The division by 3 is because measures are made in 3 different periods.

The average noise in one day should be computed as:

$${}_d LAeq = \frac{\sum_r {}_d LAeq_r}{R}$$

Where:

R = Number of spots where noise has been measured.

Building on the calculations above, the indicator should be computed as:

$$NoiseLev = \frac{\sum_d {}_d LAeq}{3}$$

The division by 3 is because measures are made in 3 different days.

Method 2

Noise measured for 24 hours in a sample of roads in five working days

Significance: 1.00



INPUTS

The following information is needed to compute the indicator:

b) **The measures of noise (Equivalent Sound Level – LAeq) in the pilot area.**

According to this method, the measures should be made:

- **In one or more spots (up to 10 spots)** in the pilot area, depending on its size (e.g., in small pilot areas one spot is sufficient, if the pilot involves the whole city it is recommended to identify 10 hot spots). A spot is a specific location on one road where transport noise level is significant before the experiment. Locations where non-transport noise sources can affect measures should be avoided.
- **In five different working days** (unless there are specific reasons why transport noise is expected to be higher in non-working days).
- **For the whole day (24 hours).**

The experiment would result in a modification of the measured level of noise in the same locations and in equivalent periods.

METHOD OF CALCULATION

Using Method 2, the indicator should be computed **exogenously** according to the following steps:

- **Collection of noise measures for all spots in each sampled day.**
- **Estimation of the average noise level in each sampled day.** The average is computed considering each spot as independent observations (see equation below).
- **Estimation of the index** by computing the average noise level of the five sampled days (see equation below).

EQUATIONS

The average noise in one day should be computed as:

$${}_dL_{Aeq} = \frac{\sum_r {}_dL_{Aeq_r}}{R}$$

Where:

R = Number of spots where noise has been measured.

Building on the calculations above, the indicator should be computed as:

$$NoiseLev = \frac{\sum_d {}_dL_{Aeq}}{5}$$

The division by 5 is because measures are made in 5 different days.

ALTERNATIVE INDICATORS

This indicator consists of the measured level of noise in some sample locations. Since it is based on observations, its significance is high. On the other hand, its calculation requires a specific on-site measurement campaign with dedicated equipment and specialised operators for its correct installation.

An alternative indicator is ENV_NS_NE3, which is based on the annoyance reported by a sample of inhabitants of the pilot area. This alternative indicator is less significant than the one described in this factsheet, because it is based on qualitative and subjective evaluation. Nevertheless, the estimation of this alternative indicator could be less complex, especially if a sample survey in the pilot area is already envisaged to collect information needed for other indicators. In that case, adding one question regarding noise would be basically effortless.