CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Cost efficiency of measures based on transport first level impacts (ECO_CE_TCE)

DOMAIN

Transport	Environment	Energy	Society	**Economy**

TOPIC	**Measures efficiency**	
IMPACT	**Efficiency of transport system changes** *Obtaining transport value for money*	**ECO_CE**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Different policy measures aimed at improving transport sustainability can be designed and implemented to achieve the same result (e.g., mode split towards active modes). Measures produce an effect, while, at the same time, require some resources for their implementation and/or management. Indicators related to the intensity of the effect show the effectiveness of the measures. Indicators considering the intensity of the effects as well as the cost required for implementing and managing the measures allow to extend the analysis to their efficiency. A measure producing some lower effect but requiring much less resources would be more efficient.

This indicator is relevant as **it provides a measure of the cost-efficiency of the measures experimented considering the first level (i.e., most direct) effects on the transport system (i.e., not considering energy or environmental or social effects). A successful action is reflected in a LOW value of the indicator.**

DESCRIPTION

This indicator is a **dimensionless index** obtained as function of costs of the experimented package and an index of changes achieved in the transport sector.

METHOD OF CALCULATION AND INPUTS

The indicator is computed as a ratio between yearly net costs of the experimented package and a composite index of relative changes generated in the transport sector. **Yearly net costs, the composite index of transport changes and the ratio between the two are computed within the supporting tool building on a set of inputs**.

Method

Calculation of the indicator based on costs of measures and on computed indicators for the transport system domain

Significance: **1.00**

METHOD OF CALCULATION

The indicator is computed according to the following steps (managed in the supporting tool):

- **Quantification of the net yearly cost of measures**
- **Quantification of the relative variation of transport indicators**
- **Normalisation of the relative variation of transport indicators**
- **Definition of weights applied to transport indicators**
- **Quantification of the transport variations index**
- **Quantification of the cost/transport variation ratio**.

INPUTS

The following information should be coded in the supporting tool to compute the indicator:

a) $ConstrCost_m^s$. **Total construction (i.e., building infrastructures) costs for each measure involving some infrastructure building and for each subject (public administration, private companies) bearing the cost**. These costs should be taken from the documentation of the projects or asked to relevant stakeholders. See the section of the evaluation framework user guide dedicated to the quantification of costs.

b) $OthInvCost_m^s$. **Total other investment costs (e.g. for fleet renewal) for each measure involving some fixed investment and for each subject (public administration, private companies) bearing the cost**. These costs should be taken from the documentation of the projects or quantified according to information collected or estimated for other indicators. See the section of the evaluation framework user guide dedicated to the quantification of costs.

c) $YearOpCost_m^s$. **Yearly operating costs for each measure involving some management and for each subject (public administration, private companies) bearing the cost**. These costs should be taken from the documentation of the projects or quantified according to information collected or estimated for other indicators. See the section of the evaluation framework user guide dedicated to the quantification of costs.

d) $TrIWght_i$. **Weight associated to each transport system first level indicator**. Evaluators define the set of transport system first level indicators used for the assessment. This is done through the supporting tool in the initialisation of the process and does not need to be repeated for the calculation of this indicator. Also, **the supporting tool will provide reference values of the weights. The evaluator can either accept or change these reference values** if they feel that other values are more representative of the relative importance of the indicators. **However, there are two rules that the modified weight values must respect**:

$$TrIWght_i \leq \frac{TrISgn_i}{\sum_i TrISgn_i} + 0.15$$

$$\sum_i TrIWght_i = 1$$

Where $TrISgn_i$ is the significance level of the first level transport indicator *i*, i.e., the value reported in the right-top of the indicator template section explaining the calculation method.

The former rule enacts that the modified weight is not too greater than the weight resulting from the level of significance of the indicator. This rule controls that an indicator with a low significance level does not become too important in the overall index of transport change induced by the experiment.

The latter rule is just the condition that weights sum to 1.

Both rules are enforced within the tool.

EQUATIONS

The equations **used within the supporting tool** to manage the calculation, building on the provision of the inputs, are the followings:

Quantification of the net yearly cost of one measure *m* for one subject (public authority, households, companies) *s*:

$$YearNetCost_m^s = \frac{ConstrCost_m^s}{30} + \frac{OthInvCost_m^s}{10} + YearOpCost_m^s$$

30 reflects the exogenous assumption that the amortisation period of new infrastructures is 30 years.

10 reflects the exogenous assumption that the amortisation period of new fixed capital different from infrastructures is 10 years.

Quantification of total net yearly cost of the experiment per inhabitant:

$$YearNetCost = \frac{\sum_s \sum_m YearNetCost_m^s}{PilotPop}$$

Quantification of the pure relative variation of each transport system indicator:

$$\Delta TrI_i = \frac{TrI_i^{AEx}}{TrI_i^{BAU}} - 1$$

The values of the transport system indicators for the BAU case and after the experiment are taken by the supporting tool directly from the calculations made to quantify them. This indicator will be based only on the computed first level transport system indicators.

Normalisation of the relative variation of each transport system indicator:

$$Norm\Delta TrI_i = \Delta TrI_i \quad if\ a\ positive\ variation\ imply\ an\ improvement\ of\ sustainability$$
$$= -\Delta TrI_i \quad otherwise$$

Estimation of the weighted composite variation of transport indicators:

$$TrIChange = \sum_i Norm\Delta TrI_i * TrIWght_i$$

Estimation of the cost/change ratio (indicator value):

$$\boldsymbol{TrEff = \frac{YearNetCost}{TrIChange}}$$

OTHER RELEVANT INDICATORS

This indicator measures the efficiency of the experimented interventions regarding to impacts on the transport system. Other indicators are available to quantify the efficiency regarding to impacts on environment (indicator **ECO_CE_VCE**), on energy (indicator **ECO_CE_GCE**), on society (indicator **ECO_CE_SCE**) and on a single composite index summarising changes in all domains (indicator **ECO_CE_PCE**)