

2005 Emission Inventory

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Spatial disaggregation of emissions

A very common problem is the apportionment of an emission datum evaluated at an aggregated territorial level, such as a region or a nation, to a portion of territory contained in it, e.g. a county or a municipality.

This operation of disaggregation is carried out basing on some indicators, also called "surrogated variables " or "proxy variables", considered able to represent the weigh distribution of the different emission on the territory.

In order to go from a "total" value of a given emission to a "local" one, is then possible to use this formula:

$$E_l = E_t * V_l / V_t \quad (2)$$

where:

E_l = local emission;

E_t = total emission;

V_l = local value of the surrogated variable;

V_t = total value of the surrogated variable.

Examples of surrogated variables are number of inhabitants, fuel consumption, industrial production, or the employees in a given sector whose emission is to be evaluated. The choice of the surrogated variable is a very sensitive element, and must also take into account the available information about emission factors.

This approach was used also in the inventory and in the INEMAR database: the disaggregation of county emissions at municipal for each activity was carried out using some proxy variables.

Example In order to explain the application of this methodology si riporta come esempio the calculation of N₂O emission from the use of fertilizers on ploughed lands (activity SNAP 10.1.2) in the municipality of Dovera (CR):

A_{CR} = indicator = use of fertilizers in the Province of Cremona = 13,183 t/year; FE_{N_2O} = N₂O emission factor = 20 g/kg of fertilizer. N₂O emission from the use of fertilizer in the Province of Cremona is then:

$$E_{CR,N_2O} = A_{CR} * FE_{N_2O} = 13,183 * 20 = 263,660 \text{ g/y} = 263 \text{ kg/y}$$

La surrogated variable used per la disaggregation is the area of ploughed land (hectares):

Total area of ploughed land in the Province of Cremona = 162,896.68 ha Area of ploughed land in the municipality of Dovera = 1,059.02 ha Using (2) N₂O emission in the municipality of Dovera is:

$$E_{\text{Dovera},\text{N}_2\text{O}} = E_{\text{CR},\text{N}_2\text{O}} * \text{Sup}_{\text{Dovera}} / \text{Sup}_{\text{CR}} = 263 * 1,059 / 162,897 = 1.71 \text{ kg/y}$$

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