

J. Díaz^{*1}, J.A. Fernández¹, S. Alonso¹, S. Laso¹, S. Ruiz², M. Puente², I. Fernández²

¹ Dirección General de Medio Ambiente. Gobierno de Cantabria

² Dpto. Ingeniería Química y Química Inorgánica. Universidad de Cantabria

Dirección General de Medio Ambiente. Gobierno de Cantabria.
C/ Lealtad 24, 39002 Santander. SPAIN. ✉ diaz_j@cantabria.es

Introduction

Fugitive emissions are considered the discharge to the atmosphere of particles or gases that occurs over large areas from often indistinct elements. Although the large number of individual elements represent many point sources, they collectively represent a large, diffuse source of pollution. The estimation of these emissions extent is very complex, because of the diversity, heterogeneity and number of sources included in this group. The computational complexity involves making approximations for its quantification, which contrasts with the air emission inventories results, that reflect the importance of fugitive emissions, mainly in the urban environment. The urban environmental quality improvement involves reducing air pollution from these sources, for what it is important to provide reliable and accurate emissions information.

The e-AIRE project (Integrated Environmental Strategies to Reduce Emissions), is one of the 28 approved in 2010 by the Interreg IVB SUDOE program, being led by the Government of Cantabria. As part of this project, a review of the methodology and data needed for estimating air emissions from diffuse sources is being carried out, in order to improve air emissions inventories and reduction plans, especially for greenhouse gases [1].

Procedure

For the methodological analysis of the procedure for estimating air emissions, the most important diffuse sources with importance in the urban environment have been selected, as shown in Table 1.





SNAP	Tier 1	Tier 2	Tier 3
02 	Typology and fuel consumption based on 4 simplified fuel categories	Typology of combustion heaters in residential, services, commercial and institutional areas, and associated fuel consumption	May be applicable to commercial and institutional level by collecting more detailed data on facilities kind and used technologies
05 05 	Total volume of gasoline sales	Distribution of gasoline volumes depending on facilities kind and fuel characteristics	Distribution of gasoline volumes depending on the facilities kind and details, fuel features and vapor recovery systems efficiency
07 	Vehicles distribution based on 5 categories and associated fuel consumption	Emission standards, vehicle fleet distribution in terms of technological development and associated fuel consumption	Emission standards, vehicle fleet distribution in terms of technological development and associated fuel consumption, distance traveled based on the type of vehicle and road, weather conditions
08 	Distribution of machinery, aircraft, ships and railway fleets, by type of use and associated fuel consumption	Distribution of machinery, aircraft, ships and railway fleets, by category of equipment and technology, and associated fuel consumption	Number of machines, airplanes, ships and railways in terms of technology and power, annual hours of use, and associated fuel consumption

Table 2. Detail levels and activity data needed to estimate emissions from diffuse sources, based on the EMEP EEA 2009 methodology

Analysis of the activity data available in the studied sectors aims to improve the estimation of atmospheric emissions of these sources, which represent a 39 % of Cantabria of CO₂ equivalent emissions, as shown in Figure 1 [3]. For this purpose, it has been designed a procedure for the collection of available activity data related with:

SNAP 02	number and types of combustion heaters in domestic, commercial and institutional sectors, as well as associated fuels.
SNAP 05 05	gas stations study and detailed analysis of distributed fuel volumes, technologies used and the implemented measures for vapor recovery.
SNAP 07	current vehicle fleet stock data update, and analysis of emission standards, traveled distances, road characteristics and driving modes.
SNAP 08	number and kind detail of industrial and agricultural vehicles, and associated fuel consumption. Regional information of the consumption of aircraft (especially in LTO operations), ships (especially in the Santander bay and commercial and fishery harbours and marinas) and railways.

Acknowledgments

Territorial Cooperation
Programme Interreg IVB SUDOE



SNAP code	Activity	Main pollutants
02	Non-industrial combustion plants	CO ₂ , CO, NO _x , N ₂ O, NH ₃ , SO ₂ , NMVOC, PM, Heavy metals, PAHs, PCDD/F
05 05	Gasoline distribution	NMVOC
07	Road transport	CO ₂ , CO, NO _x , N ₂ O, NH ₃ , SO ₂ , NMVOC, PM, Pb, PAHs
08	Other mobile sources and machinery	CO ₂ , CO, NO _x , N ₂ O, NH ₃ , SO ₂ , NMVOC, PM, Heavy metals, PAHs

Table 1. Most important diffuse sources with importance in urban areas and main pollutants from these fugitive emissions

The reference methodology proposed in the EMEP EEA air pollutant emission inventory guidebook, 2009 [2] has been applied for the diffuse sources air emissions estimation. This methodology establishes three levels of complexity in the emission calculation procedure, referred tier 1, 2 and 3, which require to have different activity data related to emission sources. The estimation of fugitive emissions is usually done based on a simplified methodology (tier 1), due to the data complexity and volume required to obtain a higher degree of detail (tier 2 and 3), as shown in Table 2.

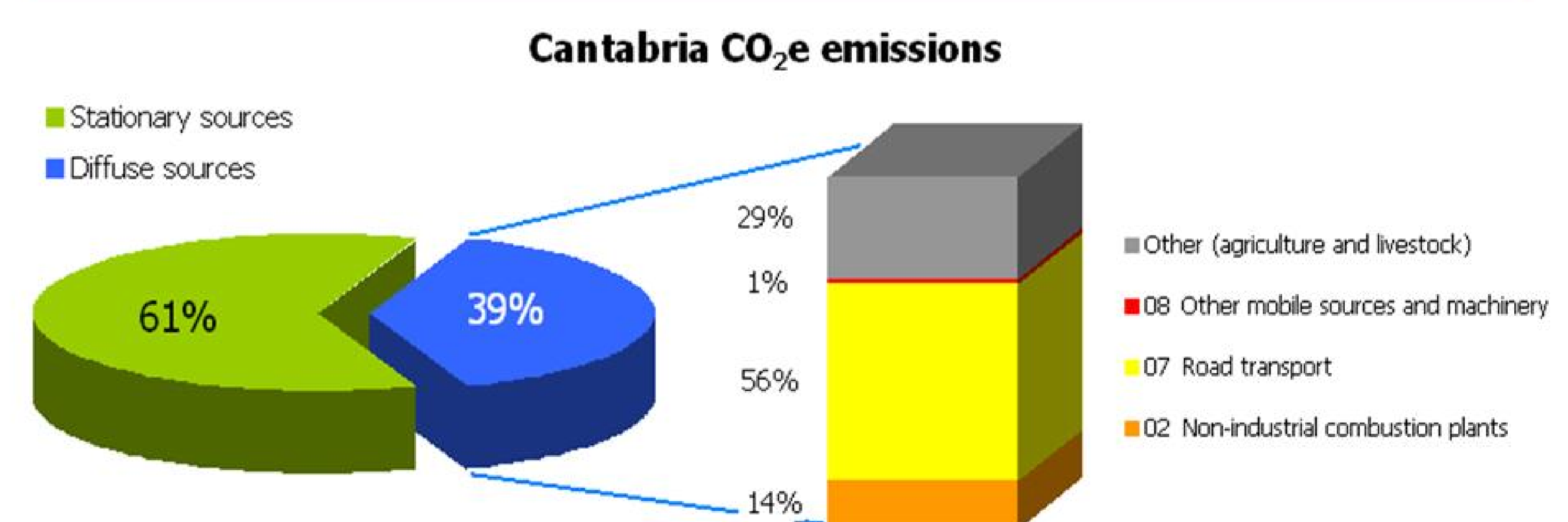


Figure 1. CO₂e emissions distribution in Cantabria and diffuse sources detail. Regional emissions inventory for 2008

Conclusions

Using a specific analysis of the methodology for estimating air emissions resulting from diffuse sources with importance in urban environment, associated with the activity data collection for the selected SNAP categories, it could be obtained a higher detail in the estimation of their atmospheric emissions, improving its accuracy and reliability, which makes possible to improve the implementation and design of the measures to reduce emissions in urban areas.

References

- [1] Programa e-AIRE. www.e-aire.eu
- [2] EMEP/EEA air pollutant emission inventory guidebook – 2009.
- [3] Plan de Calidad del Aire de Cantabria 2006-2012. Dirección General de Medio Ambiente del Gobierno de Cantabria.