Contribution of Biomethane to Reduce CO_2 Emissions from Agricultural Tractors Fleet: A Theoretical Approach

Giulia Barucco, Niccolò Pampuro, Lucia Vigoroso and Eugenio Cavallo
Istituto di Scienze e Tecnologie per l'Energia e la Mobilità Sostenibili (STEMS)
National Research Council of Italy (CNR)
Strada delle Cacce, 73, 10135 Torino, ITALY
niccolo.pampuro@stems.cnr.it

Abstract

The agricultural sector may reduce carbon dioxide (CO_2) emissions derived from fossil fuels combustion, contributing to achieving the European Union environmental decarbonization targets set for 2030. In this context, biomethane has a growing interest as a sustainable alternative to fossil fuels in term of CO_2 emission. In particular, according to the 2009/28/EC European Unione Directive, emissions from the fuel in use shall be considered to be zero for biofuels and bioliquids. For this reason, CO_2 emissions produced from biomethane combustion can be regarded as highly promising to increase agricultural sustainability. This study aims to propose a theoretical approach to estimate the amount of CO_2 emissions of agricultural tractors' fleet and a method to calculate the amount of biomethane required to replace fossil fuel. The method of estimation of the CO_2 emitted by tractors is based on the amount of tax-reduced fuel consumed each year in an area, then the amount of biomethane required to replace Diesel fuel used by agricultural tractors in the same area is calculated. The method has been applied to the Piedmont Region, NW Italy, retrieving figures from an official open-access online regional database where the consumption of Diesel fuel is recorded year by year. The amount of biomethane necessary to achieve the European environmental goals in terms of CO_2 emissions reduction is estimated by adopting a methane emissions factor. After introducing the theoretical approach, the paper describes the different steps of the method from the Diesel fuel consumption data retrieving to the following calculation for CO_2 emission and the biomethane estimation for the Diesel fuel replacement.

Keywords
Carbon neutrality, Climate resilience, Renewable energy