Ammonia and particulate matter removal efficiency of a dry and a wet acid scrubber in pig barns

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**Abstract.** Air inside pig barns is characterized by high concentration of ammonia (NH3), particulate matter (PM) and other airborne pollutants, such as odors. The same poor-quality air then dumps into the environment causing pollution in the surrounding areas. Thus, the identification and adoption of mitigation strategies for intensive livestock farming is necessary, both to reduce the environmental impact related to livestock production, and to help solving the issue related to air pollution. Air treatment technologies have the double benefit of abating pollutants emissions and improving air quality inside the barns. In this context, the LIFE-MEGA project intends to reduce NH3 and PM emissions in pig barns by applying two different abatement technologies: a commercial dry scrubber already used in bakery industry and a wet acid scrubber prototype realized using citric acid instead of sulphuric acid. Citric acid was chosen as it is safer to handle and harmless for pigs and workers. The project started in October 2019 and will finish in September 2023. Both air treatment technologies are being tested in two Italian farms during the fattening phase and in two Spanish farms in the weaning one. The aim is to verify the achievable abatement efficiency of the two abatement systems during different growing phases and with different housing condition, ventilation system and slurry management. In Italy the scrubbers were firstly installed for 12 months (2 fattening cycle) in a farm located in Lodi province, where animals were housed in a naturally ventilated building, on a concrete floor with fully slatted outdoor runs. Pig slurry was removed using a vacuum system. Currently, the two abatement systems are installed in the second farm (Pavia province), where pigs are housed in a naturally ventilated building, on a fully slatted floor, and slurry is removed using a vacuum system. To test the wet acid scrubber NH3 abatement efficiency the VERA protocol was applied, whereas to test dry scrubber PM abatement efficiency Haz Dust instruments were used as gold standard. According to preliminary results, in the first farm the wet scrubber could reduce NH3 emission up to 61% and the dry scrubber could abate PM up to 37%. In the second farm the monitoring campaigns are still ongoing but, based on the first data collected, the wet scrubber presents a lower NH3 removal efficiency (around 22%). Regarding the dry scrubber, due to technical problems, first data still need to be collected. In conclusion, these abatement efficiencies could be considered a promising result.