An Analysis of Abatement Potential of Greenhouse Gas and Ammonia Emissions in Irish Agriculture to 2030

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A marginal abatement cost analysis was used in order to assess the abatement potential of a range of mitigation measures, as well as their associated costs/benefits on both greenhouse gas (GHG) and ammonia emissions for the period 2020–2030. This analysis was necessitated a) by increases in Irish agricultural output that have occurred post milk-quota removal and as a consequence of the national FoodWise 2025 initative and b) requriements to achieve national GHG and ammonia reduction targets. The achievement of these targets are challenging considering that agriculture comprises 32 % of GHG and 98 % of national ammonia emissions.

Measures were sub-divided into four different categories: a) Measures with reduced agricultural GHG (i.e. directly reduce methane and nitrous oxide); b) measures that reduced ammonia, c) Measures which enhance CO_2 removals from the atmosphere in terms of land management or Land-Use, Land-Use Change in Forestry (LULUCF), and d) reductions from displacement of fossil fuels via enhanced cultivation of biomass and/or adoption of anaerobic digestion.

The total level of GHG abatement of all three categories averaged over the period 2021–2030 was 6.9 Mt CO_2-e yr^{-1}. When broken down between subsectors, the total mean abatement potential arising from cost-beneficial, cost-neutral and cost-effective mitigation measures for agricultural emissions (methane and nitrous oxide) and assuming linear rates of uptake was 1.91 Mt of carbon dioxide equivalents (CO_2-e) per annum from 2021–2030 with over half of this potential either cost beneficial or cost-neutral. Nitrogen management and animal breeding were identified as the most effective options. The enhancement of CO_2 removals, particularly from afforestation and management of high organic soils could potentially remove another 2.94 Mt CO_2-e from 2021–2030 reaching a maximum of 3.25 Mt CO_2-e by 2030. The cultivation of biofuel / bioenergy crops, and AD has potential to account for a further reported reduction of 2.05 Mt of CO_2-e per annum by 2030, mainly associated with the displacement of fossil fuel usage. In terms of ammonia, the abatement potential was estimated between 17–21 kT NH_3 by 2030, with urea substitution, N management, low-emission landspreading of manures and slurry acidification identified as the primary abatement strategies.

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