

# LESS key to reducing Ammonia emissions

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**T**eagasc recently published *An Analysis of the Cost of the Abatement of Ammonia Emissions in Irish Agriculture to 2030*, otherwise known as the Ammonia MACC Curve. This document sets out the options for Irish agriculture to reduce ammonia emissions. Almost 99% of ammonia emissions come from agriculture.



**What is the problem with ammonia?**  
After ammonia is lost to the atmosphere, much of it is re-deposited and where this occurs, it can cause significant damage to sensitive habitats. It can also cause health problems – ammonia combines with other air pollutants to form minuscule particles, known as PM2.5, which can trigger respiratory problems when inhaled into the lungs.

Since 2011, ammonia emissions in Ireland have been steadily increasing and in 2018, reached approximately 118,000t. Teagasc projections indicate that without action, emissions will continue to increase. Our national target, on the other hand, is to be down to 112,100t by 2020, with further steady reductions to 107,500t by 2030.

**Where does ammonia come from?**  
Animal housing, manure management and storage account for 47% – almost half – of total ammonia emissions. The next biggest portion (30%) comes from spreading manure. Another 12.3% comes from grazing, but having animals grazing for as long as possible is important, as ammonia losses at grass are low compared to

when animals are housed. The final 10.6% comes from the application of chemical nitrogen – particularly urea.

**Reducing Ammonia**  
Teagasc has examined different measures to reduce ammonia emissions. The two main criteria being considered are how much reduction can be practically achieved by implementing a measure, and how much it would cost to implement that measure.

In the MACC curve (Figure 2), the measures are ordered from left to right based on cost – the lowest on the left. Of the 13 measures considered, six come at no cost and can, in fact, improve farmers' income when implemented. The width of the bars indicates the amount of possible mitigation.

**How to reduce ammonia**  
In the MACC curve, there are two wide bars. Low Emission Slurry Spreading (LESS) and the replacement of urea with protected urea

accounts for 80% of the potential ammonia reduction. The usage of LESS is increasing rapidly. It is likely to continue to rise, as regulations increase and farmers realise the benefits of retaining more nutrients and reducing the contamination of grass with slurry.

While the uptake of protected urea has been slow to-date, ongoing research is demonstrating that it is as effective as urea and CAN right throughout the season. The fact that it delivers very significant reductions in both ammonia (compared to urea) and greenhouse gases (GHG) (compared to CAN) will lead to it becoming the predominant form of N fertiliser on Irish farms.

Of the other measures, reducing the crude protein of dairy rations at grass is becoming widely accepted as yielding multiple benefits – reducing ammonia and GHG emissions, reducing costs and improving performance. Over the next few years, amendments to slurry will also play a role.

**Figure 1:** Breakdown of agricultural sources of ammonia emissions in Ireland (based on EPA, 2020).

