NORTHERN IRELAND ENVIRONMENT LINK
Ammonia Impacts Workshop:
Proceedings and Recommendations

April 2019

Introduction

The issue of Ammonia emissions and Nitrogen deposition and their impact upon our environment (and indeed our health) has risen up the agenda in recent months. As the ammonia problem is particularly acute in N. Ireland in comparison to parts of the UK/ Ireland, the then Minister for Agriculture, Environment and Rural Affairs (DAERA) asked the Agricultural Land Use Expert Working Group to research the topic. Their subsequent report, *Making Ammonia Visible* produced in December 2017 has informed the Department's development of an Action Plan on Ammonia which they plan to issue for public consultation later in 2019.

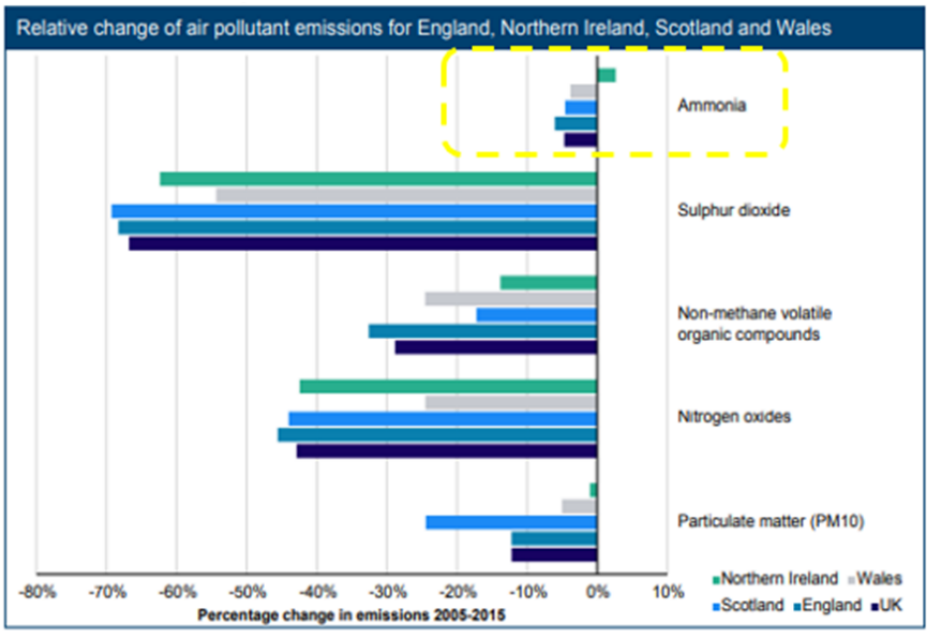
In response, NIEL held a site visit and workshop on Thursday 4th April 2019 to discuss the ammonia issue at first hand in preparation for development of NIEL 'Ammonia Position Paper' and subsequent response to the DAERA Ammonia Action Plan consultation. The workshop featured presentations from DAERA (and NIEA) departmental staff and input from other organisations already working elsewhere on this issue such as the Centre for Ecology & Hydrology and Plantlife UK.

Following the presentations, delegates were asked to reflect upon what they had heard and consider two main issues, namely: What actions or measures are required to reduce ammonia emissions in Northern Ireland? and, What measures or actions are required in terms of habitat restoration and building more resilient ecosystems in response to the threat from ammonia?

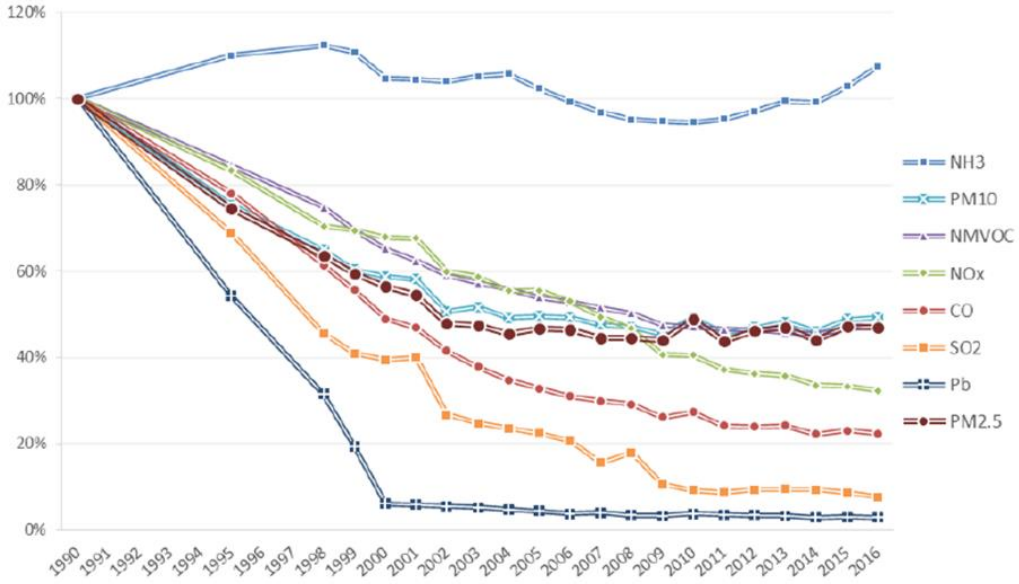
What follows is a synopsis of the main points raised during our discussions as well as a summary of the actions and measures delegates felt needed to be enacted to tackle the issue of ammonia deposition.

Northern Ireland's Ammonia Challenge

Ammonia is a powerful air pollutant, a highly reactive form of Nitrogen. It is big issue in Northern Ireland and has major implications not only for biodiversity on our designated and non-designated sites but is also linked to our poor air and water quality and therefore human health.



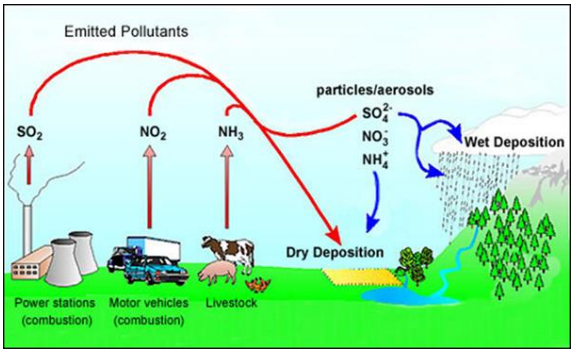
Ammonia is a significantly bigger issue in Northern Ireland in comparison to other parts of the UK. We are responsible for approximately 12% of UK ammonia emissions, despite only having 3% of UK population and 6% of the land area.



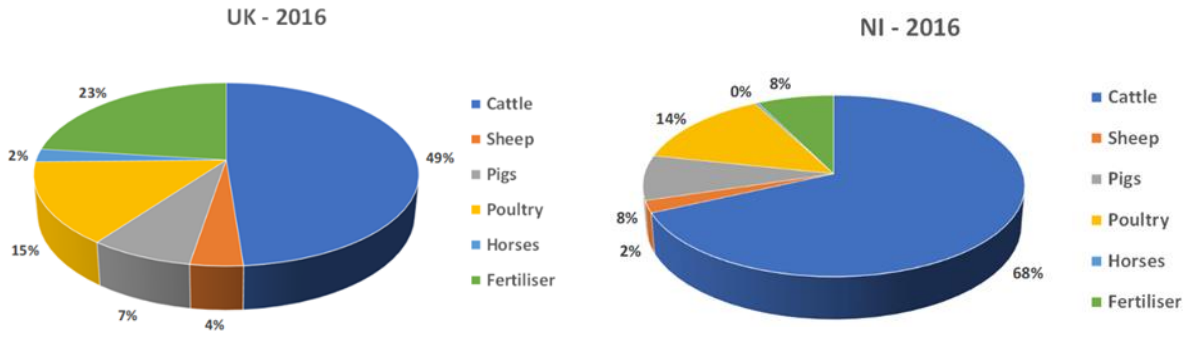
Despite witnessing a drop in many of the key air pollutants (largely due to regulation) in Northern Ireland in recent years, the problem of ammonia has not received enough attention. Indeed, we are the only part of the UK to see a rise in Ammonia emissions levels since 2005. It has been estimated that the cost of ammonia emissions on health and biodiversity in the UK will reach over £700m p.a. by 2020. While a conservative estimated has placed the figure for Northern Ireland at around £107m p.a. by 2020.

Sources of Ammonia Emissions in Northern Ireland

While ammonia pollution can originate from a range of sources, in Northern Ireland over 90% of emissions come from agriculture. Cattle (beef and dairy) are responsible for around 70% of ammonia emissions. Intensive pig and poultry sectors accounting for 20% of emissions. Given the importance of the agricultural industry to the Northern Ireland economy, around 75% (about 1 million hectares) of our land is farmed with the industry employing more than 3.5 % of the total workforce (compared to the UK average of 1.2 %), it is unsurprising that the industry represents the key source of emissions.

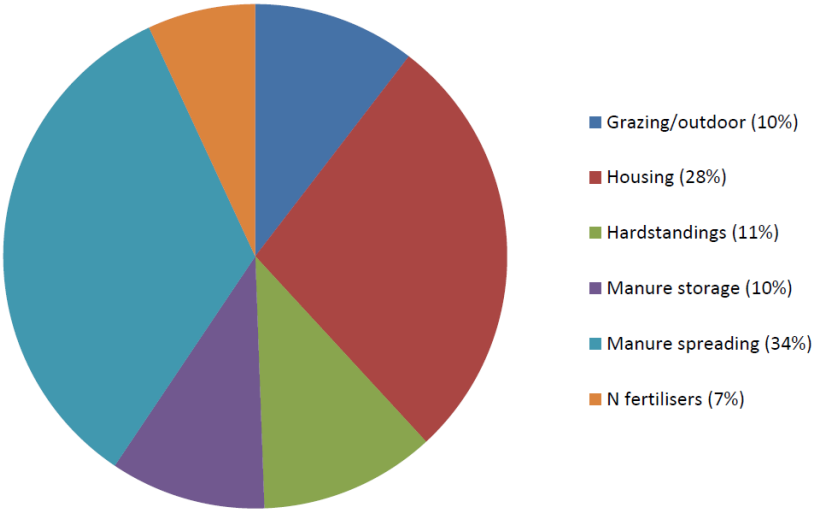


Ammonia – UK & NI Agricultural Sources By Species



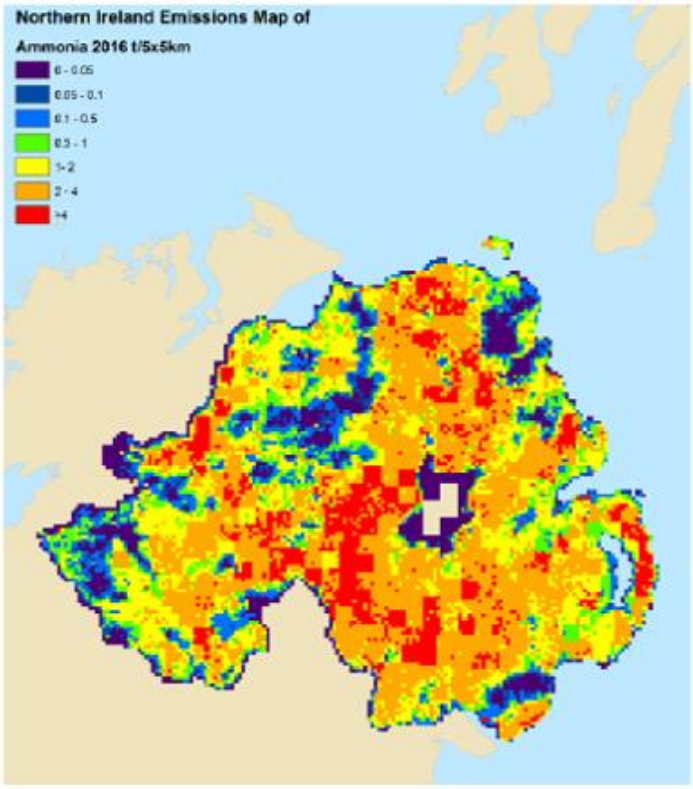
It should be noted that under the Pollution Prevention And Control (Industrial Emissions) Regulations (Northern Ireland) 2013, while intensive pig and poultry units over specified thresholds (Poultry: 40,000 bird places, Pigs: 750 sows or 2000 production pigs over 30 kg) must obtain a permit to operate and use the best available technologies in order to control the environmental impact of their activities, the remaing agricultural including the beef and dairying sectors are not subject to these regulations.

Ammonia - Northern Ireland Agricultural Emissions by Source (2015)



The combined sources of ammonia associated with housing livestock and manure spreading amounts to over 80% of the total figure with handling and storage of manure responsible for 44% of all emissions . In total, ammonia emissions from agriculture have risen by 9% since 2010.

Ammonia emissions cause the subsequent deposition on land of various nitrogen compounds. This deposition occurs in two ways, namely through dry deposition (deposits of nitrogen relatively close to the source) and wet deposition (deposits of nitrogen in rainfall which can be carried much further away from the original source).



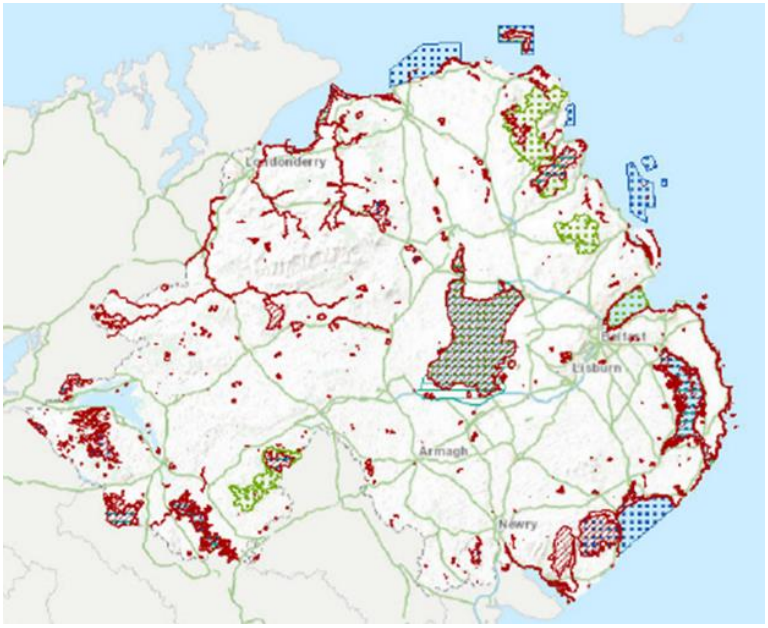
These deposits of nitrogen aid the growth of some plant species, but they can have extremely negative consequences for plant species that are adapted to low nitrogen concentrations, most notably in the designated sites and priority habitats that represent our most sensitive and environmentally important species and areas. The problem is exacerbated by the fact that vegetation with low levels of nitrogen takes up much more ammonia from the atmosphere than that with high levels, such as agricultural crops and grassland (Making Ammonia Visible Report, 2017).

NI Ammonia Emissions 2016

National Atmospheric Pollution Inventory: Air Pollution Inventories for England, Scotland, Wales and Northern Ireland: 1990-2016.

Ammonia: Designated Sites & Priority Habitats

Northern Ireland Protected Areas



Special Areas of Conservation
Special Protection Areas
Ramsars
Areas of Special Scientific Interest

- 90% NI Protected Habitats
- 98% NI Special Areas of Conservation
- 83% NI Special Protection Areas

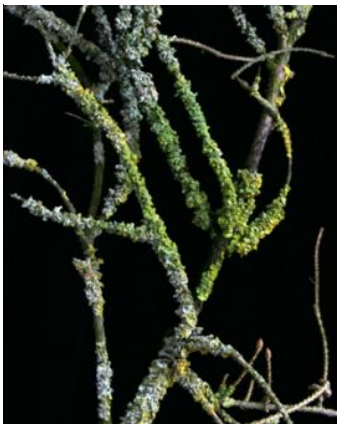
Exceeding critical loads of N deposition, the point at which ecological damage occurs

In Northern Ireland, our areas of highest ammonia emissions tend to coincide with the places in which most of our intensive agriculture takes place, with many of our priority habitats either within or surrounded by these areas.

Nitrogen/Ammonia Impacts on Habitats

Healthy Sphagnum Mosses

Algal growth, associated w/ N deposition



Ammonia damage to mosses, structural damage, with algal growth, increase in grasses

Left - Xanthoria – N-loving, Pollution-tolerant lichen, urban and agricultural pollution
Below – Cladonia sp. – slimey, bleached, structural breakdown

Healthy and dead sphagnum as witnessed by workshop delegates on site visit to Ballynahone Bog - a designated SAC, Ramsar Site and ASSI.

Drivers for tackling Ammonia Emissions in Northern Ireland

- UK (including N. Ireland) releases of ammonia are controlled under the Pollution Prevention and Control (PPC) regulations; and regulations on releases to surface waters.
- European laws also control releases to air and water; releases from industrial plants (84/360/EEC); and ammonia pollution of the aquatic environment (76/464).
- Air Quality (NECD) - Reduce ammonia emissions by 8% by 2020 and 16% by 2030 (against 2005 baseline).
- Internationally, the UK is a signatory to the international UNECE Convention on Long-Range Transboundary Air Pollutants (LRTAP);
- The Gothenburg UN/ECE Protocol to abate acidification, eutrophication (where over-fertilisation causes water bodies to become "choked" with weeds) and formation of ground level ozone.
- Biodiversity (Habitats Directive, Conventions) Halt loss of biodiversity & ecosystem services by 2020 - Restore/secure priority habitats and species at favourable conservation status. Periodic reporting on Habitats Directive identified air pollution from ammonia emissions as a

threat in 29 out of 38(75%) of Northern Ireland's Terrestrial Priority Habitats, and as a threat of high significance in 17 (45%) of those habitats.

- Biodiversity Strategy for Northern Ireland to 2020 – Action: Identify options to lower ammonia and associated nitrogen emissions to meet UK targets.

- NI State of Nature Report 2016: Over 1,400 species known to occur in Northern Ireland were assessed using modern Red List criteria. Of these, 295 (20%) are at risk of extinction from the island of Ireland.

Progress on tackling ammonia and nitrogen deposition around the UK

Briefing for Northern Ireland Environment Link Ammonia Impacts Workshop Jenny Hawley and Ben McCarthy.

Excessive reactive nitrogen in the atmosphere (including ammonia) has broad and far-reaching impacts. This includes impacts on Water quality, Air quality, Greenhouse balance, Ecosystems & biodiversity and Soil quality (WAGES) (European Nitrogen Assessment, 2011). Specific and complementary action for each area is required to reduce these societal impacts.

This table provides a reminder of the UK's targets and commitments under EU and international legislation/agreements to tackle ammonia emissions from farming and to protect biodiversity from nitrogen deposition, and the main areas of government action in Scotland, England and Wales. It is clear that international and European frameworks have been important in developing UK and country responses although unclear how this will continue post Brexit. Coordinated action across all government levers (e.g. regulation, policy, advice and site protection) is necessary to realise the societal benefits of reduced ammonia emissions. Across the UK all public bodies have statutory duties to 'further the conservation of biodiversity' including through the necessary provision of effective measures to conserve the protected sites network.

The table is not meant to be comprehensive but rather an overview of the requirements and respective governmental response across GB.

	Action to tackle ammonia emissions	**Action to reduce nitrogen deposition**
International targets	Under the UNECE Gothenburg Protocol, the UK has a target of reducing ammonia emission by 8% by 2020 (from the 2005 baseline), as reflected in the EU NECD target. This is an international commitment which is not affected by the UK's exit from the EU. UNECE has also published guidance on national nitrogen budgets and abatement of ammonia emission. Despite the known health impacts of ammonia emissions, World Health Organisation guidelines do not cover this pollutant.	The UK is committed to achieving the Convention on Biological Diversity's 'Aichi' targets, including Target 8: 'By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.' It is also expected that the UK government will sign up to the post-2020 framework towards the 2050 vision that requires comprehensive action across the drivers of biodiversity decline, including pollution. The UN Sustainable Development Goals provide a similar (and longer-term) basis for action in relation to several of the goals, such as SDG 15 Life on land.
EU targets and legislation	National Emissions Ceiling Directive (NECD 2016/2284/EU) • sets out emissions reduction targets for 2020 and 2030 for a range of air pollutants, including ammonia; • UK's ammonia reduction targets are 8% by 2020 and 16% by 2030 (from the 2005 baseline); • due to recent increases in ammonia emissions, the UK is likely to miss the 2020 target.	The Habitats Directive is the main driver of action on nitrogen deposition as it requires EU member states to maintain designated sites in favourable condition. The EIA Directive is also an important mechanism for protecting designated sites through planning and development processes.

	Action to tackle ammonia emissions	Action to reduce nitrogen deposition
	The UK Government has recently submitted several documents to the EU as part of the NECD reporting requirements, including the National Air Pollution Control Programme which summarises actions for each devolved administration. On exiting the EU, the UK government has committed to maintaining EU environmental standards; Plantlife is calling for the NECD 2030 targets to be retained in domestic legislation.	
UK	Air quality, agriculture and public health are devolved matters. However, the UK Government reports to the EU and UN bodies on action across the UK and coordination is required on air quality in particular as a transboundary issue.	Across the UK all public bodies have statutory duties to 'further the conservation of biodiversity' including through the necessary provision of effective measures to conserve the protected sites network. Action to progress the conservation of biodiversity is increasingly devolved although coordinated UK action is required.
Scotland	Ammonia was not tackled directly in the 2015 'Cleaner Air for Scotland' strategy. A review of the strategy was announced in late 2018 and we understand that this will address ammonia emissions. Plantlife is engaging through Scottish Environment Link and directly with the Scottish Environmental Protection Agency.	Nitrogen deposition is recognised as an issue, but there is no programme of action to tackle it in the 'Cleaner Air for Scotland' strategy, Biodiversity Route Map to 2020 or elsewhere.
England	Defra's Clean Air Strategy 2019 (Chapter 7) sets out a package of new regulation, advice and support to cut ammonia emissions from farming and anaerobic digesters, inc.: • requirement to use low-emissions technology, housing and management techniques • regulation to minimise fertiliser pollution • extend environmental permitting to dairy and intensive beef. This looks good, but the devil will be in the detail as many elements are still to be developed by "expert groups". The impacts of ammonia emissions on public health are a key driver for this package of actions. Code of Good Agricultural Practice (COGAP) for reducing ammonia	The Clean Air Strategy 2019 (Chapter 3) commits to: • 'reduce damaging deposition of reactive forms of nitrogen by 17% over England's protected priority sensitive habitats by 2030 and review what longer term targets should be'; • 'these measures are expected to protect an additional 200,000 hectares of natural habitat (an area the size of Warwickshire) from excessive nitrogen deposition'. Plantlife is calling for these targets to be incorporated into secondary legislation linked to the Environment Bill later in 2019. Natural England has been running a number of pilot projects as part of a wider 'Atmospheric nitrogen theme plan' on SACs – known as **Shared**

	Action to tackle ammonia emissions	Action to reduce nitrogen deposition
	emissions published in 2018 (voluntary guidance). £3 million announced in 2018 for Natural England to provide advice to famers through Catchment Sensitive Farming. The Environment Bill is expected to contain new primary legislation on air quality; this should continue its passage through parliament later in 2019 (depending on Brexit outcomes).	**Nitrogen Action Plans** (SNAPs). There has been limited action to date (e.g. Dynamic Dunes) and almost no published information on progress aginst delivering SNAPS, although a report is expected later in 2019. The new **Environmental Land Management** system (farm payments post-Brexit) will target funds "to protect habitats impacted by ammonia" (unclear whether for on-site measures or for nearby farms).
Wales Wales (cont.)	The Welsh Government intends to consult on and publish a new 'Clean Air Plan for Wales' in 2019, but the timetable is unknown (further details available in Defra's Clean Air Strategy section 9.7). Separately, the Welsh Government announced that new regulation on agricultural pollution will come into force in January 2020. The announcement focuses on the aim of improving water quality, but the regulations will also reduce ammonia and GHG emissions by requiring good nutrient management planning, sustainable fertiliser application and manure storage standards. These regulations are an initial step in providing baseline regulation to underpin future farm payments schemes post-Brexit.	Natural Resources Wales and the Welsh Government have taken a number of steps: • published a 2015 thematic action plan on atmospheric N deposition affecting Natura 2000 sites; • developed a small number of 'Site Nitrogen Action Plans'; • published a report on assessing and addressing N impacts on Natura 2000 sites in 2015; • revised the screening process and thresholds for environmental permits and planning applications that may impact designated wildlife sites; • published guidance to local planning authorities on taking into account cumulative impacts of developments in assessing planning applications. A new Nature Recovery Action Plan for Wales is to be developed in 2019 and Plantlife is calling for N deposition to be addressed as part of this. The Environment Act and Wellbeing of Future Generations Act provide a further legal basis to make the case for action, e.g. a commitment to the 'sustainable management of natural resources' with the Welsh Government, Public Service Bodies and NRW identified for specific action.

Dealing with Ammonia – A Response from GB Environmental NGO's

Jenny Hawley, Senior Policy Officer for Plantlife outlined to delegates the priority areas identified by environmental organisations in GB in response to the ammonia challenge. There priority areas are:

- Farming & Land Management
- Planning & Permitting
- Air Quality
- Nature Conservation

Farming & Land Management Requirements

Combination of regulation, advice and financial support

- voluntary measures are insufficient
- 'polluter pays' must apply
- enforcement must be resourced

Integrated approach (in policy & for the farmer):

- air pollution
- water pollution
- greenhouse gas emissions
- on-farm nature conservation

Post-Brexit farm payment schemes and regulatory baseline are key opportunities

Planning and Permitting

Stronger planning processes and environmental permitting:

- increase capacity, training and resources for permitting and advisory staff in statutory agencies and local authorities to implement existing regulations and legislation
- extend permitting to smaller poultry units and to beef & dairy sectors
- take into account cumulative impacts of development in a local area
- review ammonia critical levels and nitrogen critical loads for screening assessments

Air Quality Requirements

Full integration of ammonia & the impacts of N deposition into Air Quality policy and strategy

- Recognition of the public health impacts of ammonia (contributing to particulate matter formation), as well as environmental impacts
- Statutory national targets for reducing ammonia emissions and N deposition for 2030 and beyond, with:
  - Mechanisms for reporting and accountability
  - Training, capacity and resources for delivery and compliance
  - Support for monitoring and data analysis

Nature Conservation Requirements

- Establish a transparent national framework and allocated funding for the prompt delivery of Site Nitrogen Action Plans (SNAPs) for affected SACs
- Incorporate nitrogen deposition levels and impacts into the monitoring, assessment and management of Sites of Special Scientific Interest (SSSIs)
- Integrate N deposition into biodiversity strategies with targets for mitigation and restoration of habitats and species diversity
- Produce a social and economic assessment of the impact of air pollution on species, natural resources and ecosystem services
- Support further research to improve the evidence base around options for action by policymakers, planning authorities and site managers

Presentation Discussion Points

- Delegates noted that the argument around the need to tackle ammonia could be better framed as the risk to human health rather than environmental health.
- The issue of cheap food and true cost of intensive farming needs to be addressed as it is to the detriment of both farming and the environment.
- There was agreement on the need for measures within future agri-environment schemes to provide opportunities for farmers to avail of schemes for Ammonia emission mitigation.
- As the island of Ireland represents a single biogeographic unit the issue of Ammonia needs to be dealt with collaboratively on a north/south basis.
- Delegates were in agreement with priority areas identified by environmental organisations in GB in response to the ammonia challenge. Additional Northern Ireland specific actions and priorities were added following the workshops.

Workshops

Given the background knowledge and information provided by the speakers in the morning session, delegates were split into working groups and asked to consider two specific questions:

- What measures/ actions do you think are required to reduce our Ammonia Emissions either at either or government or farm level?
- What measures/ actions do you think are required for habitat restoration and building resilient ecosystems in response to the threat from Ammonia?

The response to these questions is provided below and form the basis for NIEL's recommendations for DAERA/NIEA action in response to the high Ammonia emissions in Northern Ireland.

RECOMMENDATIONS

Actions to Reduce Ammonia Emissions

Government Action - Policy

- As there is a sense that our food system is broken and is having an detrimental impact beyond farming, government needs to develop a clear roadmap in relation to what it and society wants from the agriculture industry including from our landscapes, nature and wildlife.
- While DAERA had outlined a number of possible measures, delegates feared that these would constitute 'chipping away at the margins' unless there overall reduction in livestock numbers.
- Legislation will be required as voluntary action is unlikely to deal with our ammonia issue. However, before introducing new legislation/ regulation, government needs to ensure policy in relation to ammonia is fit for purpose in terms of getting us to where we want to be.
- All mitigation measures need to be combined for maximum effect, similarly mitigation measures should be aimed at addressing more than one problem.
- Existing regulation should be scrutinised and where possible utilised to reduce ammonia emissions. Examples include the Habitats Directive and Nitrates Action Programme.
- Consideration given to public consultation on capping of emission levels on larger farms with some of the 'savings' passed on to smaller farms.
- Thought given to development of a Green Paper followed by a White Paper as a statement of government policy in relation to ammonia. Similarly, the proposed DAERA Northern Ireland Environment Strategy must outline how emissions will be reduced.
- In terms of human health, while ammonia is not currently covered in relation to local air quality management, in NI monitoring of ammonia could be added to the existing monitoring network as a means of securing additional data.

Government Action - Planning

- Permitted Development (PD) – government needs to tackle the issue of unintentional or deliberate misuse of permitted development rights to establish farm buildings which may be adding to our ammonia emission levels.
- Clarification needs to be provided to farmers as to when the use of PD is allowed and when a planning application is required. If the issue of PD continues to be interpreted incorrectly, consideration should be given to changing what is currently allowed under PD.
- Government needs to dis-incentivise farmers considering deliberately erecting livestock buildings without planning permission and then seeking retrospective permission if challenged. Indulging this activity sends out the wrong message to the wider farming community and can undo the mitigation measures undertaken by neighbouring farmers.

Government Action – Research / data gathering and sharing

- Greater research, advice and information is required from government in terms of the best available technology in relation to planning and on-farm ammonia mitigation.
- Further research is required as to the possible use of vegetation barriers (hedge & trees) to reduce the impact of ammonia emissions and in particular how planting could be done in such a way as to provide additional benefits for biodiversity.
- Development of an improved NI central ammonia monitoring network to compile data from different organisations who monitor emissions at various locations so that the information is collated and publically available.
- Improved research and evidence into the background ammonia concentration to establish what mitigation measures are required in specific areas.
- Greater collaboration is required with the relevant bodies in the Republic of Ireland to gain an improved understanding of the level and impact of cross border ammonia deposition.
- Research into the effectiveness of biological additives to slurry to bind ammonia and thereby reduce emissions at the mixing and spreading stages of the cycle.

Government Action - Support

- Support and incentives coupled with advice will be required for the agricultural industry to adapt their on-farm practices. This advice should be provided via CAFRE or if necessary, subcontracted externally to eNGOs/ others.
- Post Brexit agricultural policy should move away from the damaging CAP towards more environmentally friendly support such as a Single Farm Payment model that helps farmers to deliver public goods including reduced ammonia emissions. Future Rural Development Programmes could also provide support through specific farm business improvement measures.

Government Action - Communication

- Communication and how government delivers its ammonia message to farmers will be crucial especially to those in the agricultural community who may be resistant to change.
- The need for face-to-face communication is vital at a time when the trend has become for on-line advice. It may be more prudent therefore to commence engagement with small groups of highly motivated farmers in the first instance.

On Farm Measures

- DAERA should help develop and promote the concept of 'Ammonia Champions' across the farming sectors (dairy, beef, poultry, pigs etc.) and use these farms as focus farms to demonstrate on-farm actions to reduce ammonia emissions.
- Development of partnerships to facilitate a 'push-pull' approach to on-farm ammonia reduction. A shared stakeholder approach is required to ensure proposed ammonia policies are appropriate (push factor) while the supply chain is also required to play its part (pull factor).
- Farmers also need to be encouraged to undertake ammonia reduction measures. Consideration should be given to the introduction of low-ammonia certification. This however will require action to gain consumer 'buy-in' and demand for products that are certified as originating from low ammonia farms.
- As the problem of high ammonia deposition in Northern Ireland is the result of multiple factors, it would be unfair for the agriculture industry to be solely responsible for addressing the issue. If on-farm measures are to be effective, other factors that contributed to the current high levels of ammonia also need to be addressed including existing government strategies and policies as well as the on-going drive for additional productivity from big processors. Any burden of change therefore does not solely rest with the farmer.

Habitat Restoration in response to the threat from Ammonia

Information / Advice

- Habitat restoration will require a partnership approach involving landowners, government, eNGOs, and the wider community
- CAFRE landholding should be 'gold standard' – need for government to lead, CAFRE, Forest Service, NIEA estates etc.
- A demonstration by doing approach is required which will mean advice delivered through 'boots on the ground' to facilitate change
- Awareness raising is required on the range of ecosystem services provided by designated sites and the many benefits they provide for society including air and water quality.
- Additional and on-going monitoring on/around sites to improve understanding of sources and action required
- Many farmers remain unaware that the can apply for money for their bog even if it is designated.

Site Work / Adjacent land

- Actions related to bogs should be consistent with the likely future measures to be included under the proposed Northern Ireland Peatland Strategy, the forthcoming Environment Strategy for Northern Ireland and actions required for climate change mitigation and adaptation.
- Raised Bogs SACs: drain blocking required across all sites in Northern Ireland. This is imperative to help build resistance to both climate change and the ammonia issue. Healthy Sphagnum mosses can help withstand ammonia deposition better. Restoring hydrology e.g. rewetting should therefore be a central aspect to future site work.
- Rather than piecemeal plans, a landscape scale approach through the use of ecological corridors and green infrastructure will ensure greater effectiveness.
- While possibly controversial in intensively farmed areas, slurry handling adjacent to sites needs to be very site specific.
- Buffer planting is required where suitable to limit the impact of deposition. Screening of farm buildings and sites with vegetation barriers would also provide wider biodiversity benefits. The type of buffer will need to be site specific with a focus on agroforestry rather than forestry. Nitrogen fixing crops should also be encouraged where appropriate. Buffers are essential round the worst affected zones.
- Stocking density may have to be limited adjacent to specific sites with consideration also given to the promotion/ use of more appropriate stock.

Resourcing

- We have a number of Conservation Action Plans ready to be rolled out (largely facilitated by Interreg funding). However, there is a danger that a number of these plans will have no resources attached to them. Resourcing needs to be kept at forefront of government thinking so that these plans can be implemented.
- Where resourcing is limited it should be targeted at specific site restoration.
- Public Goods – payments for restoration long-term flexible payments should be considered which goes beyond the current cost incurred/ income-forgone model.