

Inf. Doc. to UNECE Convention on Long-range Transboundary Air Pollution, 42nd Executive Body meeting (December 2022).

National responses to the ammonia questionnaire and preliminary main messages

Submitted by the Co-chairs of the Task Force on Reactive Nitrogen, with the assistance of the Secretariat and the Gothenburg Protocol Review Group.

Summary:

It was agreed at the 59th Working Group on Strategies and Review that the Task Force on Reactive Nitrogen, in cooperation with the UNECE Secretariat, would prepare a questionnaire to parties on their progress in developing National Codes of Good Agricultural Practice for reduction of ammonia emissions (according to Annex IX of the Gothenburg Protocol) and in their wider approaches to implementing measures linked to Annex IX on ammonia. Responses to the questionnaire were provided by 23 Parties to the Convention, which are here combined and summarized together with main messages.

This document provides a first look at the questionnaire outcomes, while further examination by the Task Force and WGSR will be useful to inform next steps. As the responses provide an update on the progress of ammonia measures in the 23 responding Parties, it would in particular be useful to consider these responses in view of possible follow-up action in response to the review of the amended Gothenburg Protocol. The responses can help determine whether (or which) other or additional measures to further reduce ammonia emissions should be considered in subsequent steps, taking into account the identified barriers. It would also be useful to extend or repeat this questionnaire to the EECCA and Western Balkan countries, as little information has been received from these countries so far.

A. The Questionnaire

The following questionnaire was sent to all the Parties of the Convention, including both Parties and non-Parties to the Gothenburg Protocol. The questions were separated into three sections, according to this distinction about Parties.

Questions to Parties to the Convention: Ammonia Questionnaire (December 2021)

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?
 - a) national policies and legislation
 - b) guidance on voluntary measures available
 - c) no actions were taken so far
 - d) plans for future actions only
2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.
 - a) Code established, published and disseminated? Yes/No
 - b) Please briefly summarize the main provisions of the National Ammonia Code:
 - c) Please provide an internet URL for your national ammonia code or pdf copy if available
 - d) Please confirm that the Excel spreadsheet has been checked, and where necessary updated: Yes/No
3. What actions have been taken to limit ammonia emissions from urea-based and other fertilizers?
4. What actions have been taken to ensure that low-emission slurry application techniques are used that reduce ammonia emissions by at least 30% compared with the reference?
5. What actions have been taken to ensure that solid manure is incorporated into soil within 24 hours of spreading?
6. What actions have been taken to ensure that new and existing slurry stores on large pig and poultry farms use systems that reduce emission by at least 40% compared with the reference?
7. What actions have been taken to ensure that new animal housing on large pig and poultry farms use systems that reduce emission by at least 20% compared with the reference?

B. For Parties to the Convention who are not Parties to the Gothenburg Protocol or where Annex IX does not apply:

8. What measures for ammonia are currently implemented or planned to be implemented?

C. For all Parties to the Convention:

9. What do you see as the main barriers and opportunities associated with reducing ammonia emissions (including in relation to Annex IX)?

END OF QUESTIONNAIRE.

B. Summary of national responses to the questionnaire

Responses to all or part of the questionnaire was received by **23 parties** to the Convention, including: Austria, Belgium, Bulgaria, Canada, Finland, France, Germany, Ireland, Italy, Latvia, Malta, Monaco, Portugal, Republic of Croatia, Republic of Cyprus, Republic of Moldova, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom and the United States.

Questions 1-7 apply for Parties to the Convention who are also Parties to the Gothenburg Protocol

Question 1.

- 1. What actions have been taken to reduce losses from the whole nitrogen cycle?**
- a) national policies and legislation
 - b) guidance on voluntary measures available
 - c) no actions were taken so far
 - d) plans for future actions only

Parties provided a wide range of narrative answers (as listed in Part C of this document). Synthesis of these responses has yet to be completed.

Question 2

- 2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.**
- a) Code established, published and disseminated? Yes/No
 - b) Please briefly summarize the main provisions of the National Ammonia Code:
 - c) Please provide an internet URL for your national ammonia code or pdf copy if available
 - d) Please confirm that the Excel spreadsheet has been checked, and where necessary updated: Yes/No

Parties provided detailed narrative answers (as listed in Part C of this document). Annex B to this document shows the main elements from the Excel spreadsheet of responses about NACs.

In summary:

- 11 Parties reported a NAC published as an independent document
- 8 other Parties reported a NAC published but included in a general code of good practices
- 7 Parties reported that a NAC is being drafted or under revision
- 4 Parties reported that there are plans to develop a NAC
- 3 Parties reported that a NAC does not exist, and there are no plans yet for its development

Question 3

3. What actions have been taken to limit ammonia emissions from urea-based and other fertilizers?

The three most common measures pointed out by the countries are:

- Urea based fertilisers: immediate incorporation
- Reinforce the use of crop rotations
- Reduce the overall use of nitrogen fertilisers

Question 4.

What actions have been taken to ensure that low-emission slurry application techniques are used that reduce ammonia emissions by at least 30% compared with the reference?

The three most common measures pointed out by the countries are:

- The use of spreading techniques to reduce emissions
- Incorporation of slurries
- Adopt organic practices

Question 5.

5. What actions have been taken to ensure that solid manure is incorporated into soil within 24 hours of spreading?

Several countries claimed to have laws/regulations including the obligation to incorporate manure within 24 hours after application.

Question 6.

6. What actions have been taken to ensure that new and existing slurry stores on large pig and poultry farms use systems that reduce emission by at least 40% compared with the reference?

Several countries claimed to have laws/regulations to define the storage facilities construction and management, including the need for environmental permits.

Question 7.

7. What actions have been taken to ensure that new animal housing on large pig and poultry farms use systems that reduce emission by at least 20% compared with the reference?

Measures to reduce emissions in from animal housing reported by the parties include low emission feed, housing ventilation, and adoption of Best Available Techniques (BAT).

The responses generally indicate that all the measures adopted as mandatory, or voluntary are guided by the requests of the action plans for vulnerable zones in the country

Question 8. (for Convention parties where Annex IX does not apply).

8. What measures for ammonia are currently implemented or planned to be implemented?

Non-Parties to the Gothenburg Protocol also claim the adoption of similar measures to reduce ammonia emissions from the different activities. No responses were received from Parties to the Gothenburg Protocol where Annex IX does not apply (i.e., outside the core geographic area of EMEP).

Question 9. (for all parties to the Convention)

9. What do you see as the main barriers and opportunities associated with reducing ammonia emissions (including in relation to Annex IX)?

Main barriers identified are mostly related to:

- insufficient legislation and regulation
- economic/investment and financial availability
- lack of awareness
- lack of voluntary adoption of BAT
- lack of enough technology

C. Detailed results of the questionnaire by party

Table 1. links to the National Ammonia Code published as independent document

Country	
Bulgaria	https://www.mzh.government.bg/media/filer_public/2020/03/13/pravila_vuzduh.pdf
Finland	https://julkaisut.valtioneuvosto.fi/handle/10024/163564 (in English)
Germany	https://www.umweltbundesamt.de/publikationen/ammoniakemissionen-in-der-landwirtschaft-mindern
Ireland	gov.ie - Code of Good Agricultural Practice for reducing Ammonia Emissions from Agriculture (www.gov.ie)
Latvia	www.zm.gov.lv/public/ck/files/LLPN_amonjaks_010620.pdf
Portugal	http://www.isa.ulisboa.pt/proj/nitroportugal/docs/2019/Portuguese%20version%20Ammonia%20Framework%20Code.pdf
Slovak republic	https://www.minzp.sk/files/vestniky/vestnik-2020-2.pdf
Slovenia	https://www.gov.si/assets/ministrstva/MOP/Dokumenti/Zrak/Dobra-kmetijska-praksa-AMONIAK-2020.pdf
Spain	https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/primerpncca_2019_tcm30-502010.pdf
Sweden	God jordbrukarsed för att begränsa ammoniakförlusterna - Jordbruksverket (jordbruksverket.se)
Switzerland	Available in French, English and German

ANSWERS TO QUESTIONNAIRE

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a) national policies and legislation
- b) guidance on voluntary measures available
- c) no actions were taken so far
- d) plans for future actions only

Country	a)	b)	c)	d)
Belgium	Annex	Annex	n.a.	n.a.
Canada	Y	Y	n.a.	n.a.
Finland	Y	Y	n.a.	n.a.
France	Annex			
Germany	Y	n.a.	n.a.	n.a.
Ireland	Annex	Annex	n.a.	n.a.
Latvia	Annex	Annex	n.a.	n.a.
Malta	Annex	Annex	n.a.	n.a.
Portugal	Annex	Annex	n.a.	Annex
Republic of Cyprus	Y	Y	n.a.	n.a.
Slovenia	Y	Y	n.a.	n.a.
Spain	Annex	Annex	n.a.	n.a.
Sweden	Annex	Annex	n.a.	n.a.
Switzerland	Y	Annex	n.a.	n.a.

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

- a) Code established, published and disseminated? Yes/No
- b) Please briefly summarize the main provisions of the National Ammonia Code:
- c) Please provide an internet URL for your national ammonia code or pdf copy if available
- d) Please confirm that the Excel spreadsheet has been checked, and where necessary updated: Yes/No

Country	a)	b)	c)	d)
Belgium	N	n.a.	n.a.	Y
Canada	N	n.a.	n.a.	Y
Finland	Y	annex	Table 1	Y
Germany	Y	Annex	Table 1	
Ireland	Y	Annex	Table 1	N
Latvia	Y		Table 1	Y
Malta	N	n.a.	n.a.	Y
Portugal	N	Annex	Table 1	Y
Slovak Republic	Y	Annex	Table 1	Y
Slovenia	Y	Annex	Table 1	Y
Republic of Croatia	N	n.a.	n.a.	n.a.
Republic of Cyprus	Y	Annex	Pdf	Y
Spain	Y		Table 1	N
Sweden	Y		Table 1	Y
Switzerland	Y	Annex		Y

3. What actions have been taken to limit ammonia emissions from urea-based and other fertilizers?

Country	
Belgium (Flanders)	In the reinforcements of the 6 th manure action program (MAP 6+) obligations have been taken up for the low emission application of urea-based fertilisers. They have to be incorporated immediately into the soil or urease inhibitors must be used. It is expected that the legislation will be agreed in 2022. For other fertilisers the legislation on low emission application in already a long time in place.
Canada	Farmers, especially dryland farmers using limited inputs, are motivated to reduce fertilizer inputs. Urea fertilizer efficacy is improved in spring planted crops by side-banding 5 cm below (and to the side) of the seed furrow with the planter. This has the combined effect of reducing N loss as ammonia accessibility to roots and improved P uptake (in the moister sublayer of soil) which favours roots for more uptake. Side-banding is used also for corn where a secondary application may be needed at around 9 leaves, and this is side-dresses which could be injected (good) or surface banded (less good). There has been wide adoption of side-banding N and P especially on the prairies where early N is needed but is a major cost for farmers and

	<p>margins are often very low depending on international prices (i.e. no subsidies). This was validated in a farm survey which has been published by Sheppard, Bittman and Bruulsema. This has had a significant impact on Canadian emissions and is reflected in Canada's ammonia indicator and inventory. Anecdotally there may be a move away from this because with larger fields, farmers feel that loading fertilizer in their seeded slows down seeding. For ammonia it is also important when fertilizer is applied because of temperature and rainfall effects. This is because it depends on future weather after application which cannot be predicted but will determine crop demand and soil mineralization. A good soil test in the semi-arid areas is helpful for estimating carryover N, which could be high, but still requires yield guesses etc.</p> <p>An important innovation in Canada is improved crop rotation practices, often with legume/ pulse crops that add biologically fixed N. How this N is treated vis a vis fertilizer depends on the particular issues. There is little ammonia loss, and likely lower N₂O but there could be leaching in fall and winter</p>
Finland	<p>Urea-based fertilisers account for less than 1% of all inorganic nitrogen fertilisers used in the Finnish agriculture. There are no actions/measures to control ammonia emissions from urea-based fertilisers. Nitrogen fertilisation limits set in national legislation (Government Decree on Limiting Certain Emissions from Agriculture and Horticulture, 1250/2014; "Nitrates Decree") and in the environment payment scheme of the Rural Development Programme (measure "Balanced use of nutrients") limit the use of fertilisers. Also, the informative measures limit fertilisation. Additionally, placement fertilisation that effectively reduce ammonia emissions from fertilisers is typically used for cereals in Finland (according to the EMEP/EEA emission inventory guidelines (2019b, A1.2.2), fertiliser-N that is immediately incorporated into the soil will not be a source of ammonia as the NH₄⁺ ions are absorbed onto soil colloids or nitrified).</p>
Germany	<p>Due to the new fertilizer ordinance (2020) it is required: Urea-based fertilizer must be incorporated into the soil after spreading or urea inhibitors have to be used for these fertilizers. Upper limit for the field application of organic fertilizers of 170 kg N per hectare and year also concerns digestates from biogas plants. Application techniques with low ammonia emission have to be used on cultivated soils from February 2020 on and on grassland from February 2025 on. Organic fertilizer has to be incorporated into the soil after spreading on bare soil within four hours and from February 2025 on within one hour.</p> <p>With the new fertilizer ordinance federal states are obliged to designate nitrate vulnerable zones. A general administrative regulation (AVV GeA) was generated in 2020 to standardize the procedure for designating NVZ. However, following strong concerns from the COM, the administrative regulation had to be revised and is expected to be adopted in 2022. A total of nine additional measures must be implemented in the newly designated area, seven of which must be implemented throughout the federal territory and two are state-specific measures. The following two measures are likely to have an impact on emission reduction: 1) Nitrogen fertilization 20 % below calculated fertilizer requirement and 2)</p>

	<p>Compliance with the 170 kg N per ha limit for the use of organic fertilizers at the field level instead of farm level.</p> <p>The Material Flow Balance Ordinance (Stoffstrombilanzverordnung, StoffBiIV) was adopted in 2017 to set an upper limit for the farm-gate surplus for nitrogen and phosphorous. However, the current ordinance is unlikely to have an emission-reducing effect, as it only applies to some farms and there are no penalties for exceeding the upper limit. The ordinance is currently revised and according to the fertilizer law the new ordinance has to be adopted in 2023. The key point of the adjustment process is the assessment of the upper limit for nitrogen and phosphorus surpluses.</p>
Ireland	<p>Reducing overall chemical nitrogen use: Chemical Nitrogen use on Irish farms must be reduced to <350,000 tonnes by 2025 and <325,000 tonnes by 2030. Promote the use of protected urea: 65% of straight Calcium Ammonium Nitrate to be replaced by protected urea (or other protected nitrogen products) by 2030. Promote increased use of leguminous crops (such as clover) to fix nitrogen in production systems reducing the reliance on chemical fertilisers. Increasing organic farming: Increasing the area farmed organically in Ireland from 74,000 hectares to 350,000 hectares by 2030</p>
Latvia	<p>Actions to reduce ammonia emissions from urea-based and other fertilizers are included in:</p> <ul style="list-style-type: none"> - Cabinet of Ministers Regulation No 834 of 23 December 2014 "Requirements for the protection of water, soil and air from pollution caused by agricultural activities" includes a requirement to apply solid manure into the soil within 24 hours after spreading and liquid manure within 12 hours and a ban on the use of ammonium carbonate fertilisers. - Cabinet of Ministers Regulation No 829 of 23 December 2014 'Specific requirements for the performance of polluting activities in animal housing facilities' requires liquid manure storage facilities to be closed type or with a permanent natural or artificial floating cover that reduces evaporation and permanently covers the surface of the storage facility..
Malta	<p>Although a consolidated National Ammonia Code has not been developed to date, the practices that limit ammonia emissions include:</p> <ul style="list-style-type: none"> • Manure clamps should be built with three rendered high walls with the least possible surface: volume ratio (A reduction in the surface area implies a reduction in the emission of ammonia. The storage of manure in high heaps lowers nutrient losses). • Mineral nitrogen fertilisers and organic fertilisers including livestock manure must be applied close to sowing. Splitting of fertiliser application is recommended whenever possible (Nitrogen from mineral and organic fertilisers is easily leached, and there is also a high risk of ammonia losses by volatilisation during and after the application of organic fertilisers and urea. The risk of volatilisation losses is extremely high on soils with a high pH value. Therefore fertilisers should be applied as close as possible to the planting or sowing of the crop. As soon as a crop has been established, it will take up the fertiliser nutrients, and the potential for losses decreases.)

	<ul style="list-style-type: none"> • Whenever possible, subsurface placement of mineral and organic fertilisers is recommended (Fertilisers applied on the soil surface are not immediately available to the crop. The nutrients first have to be dissolved in rain and irrigation water and then be transported to the root zone. Moreover, fertilisers on the soil surface are highly vulnerable to nutrient losses by surface runoff and ammonia volatilisation.) • Liquid and solid manure should be incorporated into the soil as soon as possible. Liquid manure can be applied close to soil surface if it cannot be incorporated without damaging a growing crop. (If the manure DM content is 30% or higher and application takes place in the dry season it does not need to be incorporated on the same day of application. Most of the ammonia losses occur during the first 3 hours after application.) <p>Keep the water consumption for cleaning purposes as low as possible (Reduction of water will produce less wet manure and improves its fertilizer value with a reduction of bad odours and loss of ammonia.)</p>
Portugal	The CBPA, with mandatory application only in ZV, includes guidelines for limiting the use of urea-based fertilizer. The CBPA Amoníaco includes a chapter specifically dedicated to this objective. It is also expected that the good practices implemented through support for actions Ac.7.1, Ac.7.2 and Ac.7.5 of the PDR 2020, which promoted the rational use of fertilizers, have contributed to this objective.
Republic of Cyprus	Instead of using fertilizers with high concentrations of nitrogen, the farmers are using mineral fertilizers
Slovenia	<p>Under the Rural Development Program 2014-2020, a number of measures have been financed that directly or indirectly contribute to reducing the consumption of mineral fertilizers. Among them, we highlight the following:</p> <ul style="list-style-type: none"> - Organic farming, - Extended crop rotation, - Fertilization based on measurements of mineral N in the soil, - Low-emission application of organic fertilizers, - Cover crops and catch crops (green cover), - Minimal tillage, - Fertilization only with fertilizers allowed in organic farming in orchards and vineyards. <p>There were no specific measures to reduce ammonia emissions from urea application. Indirectly, the co-financing of equipment for inter-row cultivation, which allows the incorporation of urea at the time of the top-dressing of crops, contributed to the reduction of ammonia emissions. These investments were also supported under the Rural Development Program 2014-2020.</p>
Spain	<p>Currently, legislation to regulate the use of fertilizers in agriculture is being developed at national level. For this reason, in the Draft Royal Decree establishing standards for sustainable nutrition in agricultural soils, a limitation on the use of urea and a reduction of the use of nitrogenous fertilizers will be encountered. Thus, article 12 specifically addresses this issue:</p> <p>Article 12. Nitrogenous fertilizer products</p> <p>1. The use of fertilizer products based on ammonium carbonate is</p>

	<p>prohibited.</p> <p>2. The use of fertilizers that produce less ammonia emissions will be encouraged, as far as possible, taking into account the characteristics of the soil, climate and crop.</p> <p>3. Except for hydroponic crops, only up to 25% of the annual nitrogen needs of a crop may be provided through urea fertilizer products, which includes urea and nitrogen solutions.</p> <p>4. In cases where urea-based fertilizer products are applied, at least one of the methods indicated in part B of Annex V must be used, or any other for which a similar efficiency has been demonstrated when it comes to reduce ammonia emissions</p>
Sweden	The use of ammonium carbonate fertilizers is banned (Ordinance 1998:944). Mineral fertilizers based on urea that is spread on bare soil shall always be incorporated into the soil within four hours of the spreading. The purpose of this rule is to minimise ammonia losses during spreading (Swedish Board of Agriculture, Regulation SJVFS 2004:62).
Switzerland	General reduction of N inputs by restrictions via operational N balance

4. What actions have been taken to ensure that low-emission slurry application techniques are used that reduce ammonia emissions by at least 30% compared with the reference?

Country	
Belgium	<p>Wallonia</p> <p>Together with PROTEC'EAU, the association 'Fourrages-mieux/Agra-OST' make some pilot research on organic fertilisation and promote it with good practices. They make surveys to better know the practices in Wallonia. The PGDA gives some constraints to limit N loss of manure management (a summary is available in French) : limit on the quantity applied in some vulnerable areas, limit on timing of manure spreading, promotion of good equipment for spreading (since 1 January 2015, the spreading of slurry "in the form of an upward spray" (non-inverted pallet nozzle) with barrels with a capacity of more than 10,000 liters is prohibited),...</p> <p>Flanders</p> <p>All provisions are taken up in the legislation and are already a long time in place.</p>
Canada	There are no actions but there is some adoption based on a 2005 survey. Reason for adoption is to reduce runoff and odour usually, reducing ammonia is a co-benefit. Greatest adoption is in Quebec and Manitoba but overall it is still low. Note that because of the large Canadian beef sector a lot of FYM is produced that cannot be applied with low emission applicators and may be incorporated before tilled annual crops
Finland	According to the Nitrates Decree, solid and liquid manure must be incorporated within 24 hours of application with the exception of application by means of trailing hose or broadcast application to standing crops. Additionally, in the environment payment scheme of the Rural Development Programme has a measure on the injection of slurry into the soil. In 2020, 4623 farms implemented this measure. The acreage where slurry was injected totalled to 206 000 ha.

Germany	The Fertilizer Application Ordinance (DüV, 2020) has been adapted. Low emission techniques have to be used during spreading.
Ireland	<p>Ireland has availed of a derogation from the 170kg livestock manure nitrogen limit as provided for in the Nitrates Directive. This derogation enables farmers to exceed the 170 kg nitrogen limit up to a maximum of 250 kg N/ha subject to compliance with specific environmental conditions. From 2021, all slurry spread on derogation farms must be applied by using low emission slurry spreading (LESS) equipment. Farmers must furnish records on the volume of slurry spread by LESS to the Department of Agriculture, Food and the Marine (DAFM). Derogation farms are estimated to account for 26% of the volume of slurry spread in Ireland.</p> <p>The Nitrates Action Programme (NAP) is given effect by the Good Agricultural Practice (GAP) Regulations. These regulations provide for the compulsory usage of Low Emission Slurry Spreading (LESS) equipment for all farmers outside of the Nitrates Derogation who operate at a stocking rate of 170kg nitrogen per hectare and above prior to export of livestock manure from the holding.</p> <p>Ireland's NAP gives effect to the requirements of the Nitrates Directive in Ireland. A new NAP for 2022 to 2025 has been formulated by the Government and is to be finalised in March 2022. To meet ammonia targets further compulsory implementation of LESS for more farmers will be required. The proposed new GAP regulation measures within the draft NAP are as follows:</p> <ul style="list-style-type: none"> • From 1st January 2023, compulsory usage of LESS will be introduced for all farmers operating above 150 kg livestock N/ha. • From 1st January 2024 compulsory usage of LESS will be introduced for all farmers operating above 130 kg livestock N/ha • From 1st January 2025 compulsory usage of LESS will be introduced for all farmers operating above 100 kg livestock N/ha. • This requirement to use LESS also applies to the application of slurry produced by pigs on any holding from 1st January 2023. • In addition, all organic manures applied to arable land must be by LESS or incorporated within 24 hours of application. <p>Uptake of LESS on all other farms is expected to increase throughout the decade such that by 2030, 90% of all slurry applied in Ireland is done so using LESS technology.</p> <p>The uptake of these technologies is currently being supported through the DAFM Targeted Agricultural Modernisation Schemes (TAMS) and the Green, Low-Carbon, Agri-Environment Scheme (GLAS). Through the TAMS schemes the DAFM has funded the purchase of approximately 5,000 LESS machines, while approximately 4,500 farmers have received payments under GLAS by utilising the LESS measure.</p>
Latvia	<p>The Common Agricultural Policy Strategic Plan 2023-2027 supports:</p> <ol style="list-style-type: none"> 1) on-farm investments for low-emission slurry application techniques: <ul style="list-style-type: none"> o Slurry spreading tanks; o Equipment for slurry spreading tanks: <ul style="list-style-type: none"> ▪ Suspension systems; ▪ Spreading systems with injector-type coulters; ▪ Spreading systems fixed on soil tillage machines; ▪ Spreading systems with hanging pipes;

	<ul style="list-style-type: none"> ▪ Spreading systems with manure acidification options; <ul style="list-style-type: none"> ○ Pipeline systems for the transport of liquid manure; ○ Sulphuric acid containers, acidification equipment. <p>2) An eco-scheme measure "Agricultural practices that reduce carbon and ammonia emissions" has been established providing payment for the precise incorporation of liquid organic fertilisers (liquid manure, slurry, digestate) into the soil using a band spreader or an injection method</p>
Malta	<p>Under S.L 549.66, slurry is prohibited to be applied as a fertiliser. Even where animals are housed, all animal passage ways must be covered at all times to avoid the production of slurry.</p> <p>The production of slurry is diverted to sealed cesspits certified as leak proof by warranted architects. It is managed in a closed environment through collection and treatment. Malta does not yet have a system to estimate the reduction in ammonia emissions as a result of these actions.</p>
Portugal	<p>REAP/PGEF recommends the use of the injection technique to incorporate slurry into the soil. The CBPA details injection techniques and the CBPA Amoníaco deepens low-emissions techniques and the conditions for their applicability</p>
Slovak Republic	<p>similar techniques as for the application of fertilizers</p>
Slovenia	<p>Low-emission slurry application techniques were financially supported by Agri-environment-climate payments in the frame of the Rural Development Program 2014-2020. Investments in low emission slurry tanks were also supported under the Rural Development Program 2014-2020.</p>
Spain	<p>Legislation is being developed at national level to regulate the use of slurry application techniques that reduce ammonia emissions. For this reason, in the Draft Royal Decree establishing standards for sustainable nutrition in agricultural soils, work is being done to implement the use of reduction techniques in the application of slurry. Article 10 (point 4) of this regulation states:</p> <p>Article 10. Application of organic or organo-mineral products or materials, including waste. In any case, when solid manure or slurry or organic or organo-mineral products or materials, including waste, are applied, it will be mandatory to use at least one of the emission mitigation measures included in Annex V or any other technically endorsed and recognized by the autonomous communities for which similar efficiency has been demonstrated when it comes to reducing ammonia emissions.</p> <p>In addition, Royal Decree 1378/2018, has been approved, amending Royal Decrees 1075/2014, 1076/2014 and 1078/2014, all of them of December 19, issued for the implementation of the Common Agricultural Policy in Spain</p>
Sweden	<p>When spreading takes place in growing crops, it is not always possible to incorporate the manure into the soil. In the counties of Blekinge, Skåne and Halland (southern part of Sweden), the spreading of slurry in growing crops shall be carried out using a technology that efficiently reduces ammonia losses. Spreading in growing crops shall be carried out using among others one of the following options:</p> <ul style="list-style-type: none"> - A method that places the slurry directly on the ground underneath the green cover, for instance band spreading.

	- Injecting of slurry or a similar method that places it directly into the ground
Switzerland	- Low emission slurry application mandatory after 2024 (where topographically possible i.e. slope below 18%) - Financial incentives for low emission slurry application (2008 until 2021)

5. What actions have been taken to ensure that solid manure is incorporated into soil within 24 hours of spreading?

Country	
Belgium	<u>Wallonia</u> The PGDA says : “[...] The application of fast-acting organic fertilisers is prohibited on non-vegetated land, regardless of slope, unless the effluent is incorporated into the soil on the day of application.” <u>Flanders</u> This provision is taken up in the legislation and is already a long time in place.
Canada	No actions. There is a diminishing amount of land for incorporation. Also, feedlots lose a lot of N from manure in pens, so that labile N is low in applied FYM. Measures are first needed to control losses in feedlots.
Finland	According to the Nitrates Decree, solid and liquid manure must be incorporated within 24 hours of application with the exception of application by means of trailing hose or broadcast application to standing crops.
Germany	The Fertilizer Application Ordinance (DüV, 2020) has been adapted. manure has to be incorporated into the soil after spreading on bare soil within one hour.
Ireland	Within the Draft NAP there is a proposal for having all organic manure applied to arable land by LESS or incorporated within 24 hours of application. Some research projects are underway which should deliver results in the next five years or so. This research concerns the use of injection techniques to land-spread slurry on grassland and the use of rapid incorporation techniques post spreading on cropland.
Latvia	According to Paragraph 3.3.6. of Cabinet Regulation No 834 of 23 December 2014 “Requirements Regarding the Protection of Water, Soil and Air from Pollution Caused by Agricultural Activity” the State Plant Protection Service performs inspections of users of fertilizers. Each year, the farms for planned inspections are selected taking into account the risk factors such as the number and density of livestock. The solid manure must be incorporated in soil within 24 hours of spreading, violation of the requirement is administrative offence and results in penalty. The State Plant Protection Service is also proactively communicating with Farmers and agricultural consultants, including through organized workshops, to educate about the impacts of timely manure application on N losses in the form of emissions. No violations of solid manure for incorporation into soil have been identified in the last 5 years
Malta	Provisions in the S.L 549.66 regulate the application of manure and the way it is to be applied into the soils to avoid nutrient losses as much as possible. The proper application of solid manure in fields is monitored by

	the Nitrates Action unit in which inspection campaigns through a risk analysis are carried out every year as well as any reports received be followed up.
Portugal	The REAP/PGEP requires the incorporation of slurry into the soil up to a limit of 12 hours after its application. This limit being 24 hours for solid manure and other fertilizers
Republic of Cyprus	New legislation and training of the farmers.
Slovak Republic	A legal obligation to require the incorporation of solid manure into the soil has been introduced.
Slovenia	The incorporation of solid manure into the soil was financially supported only in hop production (Agri-environment-climate payments under the Rural Development Program 2014-2020). With the exception of advisory activities, no such measures were implemented on arable land.
Spain	<p>Legislation is being developed at national level to regulate ammonia emission reduction techniques in the agricultural and livestock sector related to the application of solid manure to the soil. For this reason, in the Draft Royal Decree establishing standards for sustainable nutrition in agricultural soils, work is being carried out on establishing the obligation to bury manure before 12 hours after its application (Article 10.3):</p> <p>Article 10. Application of organic or organo-mineral products or materials, including waste. Manure and organic or organo-mineral products or materials, including waste, must be buried as soon as possible after application and always within the first 12 hours, using a moldboard plow, chisel, cultivator or equipment that ensures equivalent work, except if any of the following circumstances occur:</p> <p>a) The enclosures in which direct sowing or conservation agriculture is practiced, including woody crops with green covers between lines, or grassland or have the crop already born.</p> <p>b) When slurry and other liquid materials have been applied to the soil by injection or using band systems with hoses.</p> <p>c) When applying material that has been previously composted or digested and presents an analytical certificate with an ammonia content of less than 0.6% with respect to the fresh weight of the material.</p> <p>The competent authorities of the autonomous communities, taking into account agroclimatic characteristics of their territories, may establish a maximum period of less than 12 hours' time, to carry out this burial when mandatory. Additionally, the obligation to adopt one of the emission mitigation measures included in Annex V is established. The farmer will have the possibility of voluntarily choosing to bury the manure before 4 hours</p>
Sweden	<p>Solid manure that is spread on bare soil in the counties of Blekinge, Skåne and Halland (southern part of Sweden), shall be incorporated into the soil within four hours of the spreading.</p> <p>4. and 5: Agri-environmental payments for investments that contribute to reduce emissions of ammonia were included in the Rural Development Programme for the period 2014-2020. The maximum support level was 40% of the costs.</p>
Switzerland	Recommended for arable plots, according to good agricultural practice.

6. What actions have been taken to ensure that new and existing slurry stores on large pig and poultry farms use systems that reduce emission by at least 40% compared with the reference?

Country	
Belgium (Flanders)	<p>These storages are commonly part of the stable system. New and renovated stables for pigs and poultry must be built as low emission stables. This includes construction regulations or the use of air scrubbers. See also question 1 a).</p> <p>See also chapters 5.9 and 5.28 of the VLAREM II regulation (order of the Flemish Government of 1 June 1995 concerning General and Sectoral provisions relating to Environmental Safety), including (construction) provisions for animal housing and coverage of animal manure (see https://navigator.emis.vito.be/mijn-navigator?wold=8884).</p>
Canada	<p>No measures at present. The focus has been to generate biogas through generous supports of various types that generally shift costs to consumers.</p>
Finland	<p>The Nitrates Decree requires that all manure storages built from the beginning of 2015 for slurry and solid manure (on large and small farms) must be covered. A floating cover may also be used in slurry storages, as well as natural crust for cattle slurry. The requirement also applies to storages for organic side fractions and organic fertilisers. Additionally, for all manure storages, the provisions in the environmental permit must be based on the best available techniques (see the next question and reply).</p>
Germany	<p>The Technical Instruction on Air Quality Control (TA Luft, 2021) has been revised 2021. New external slurry stores have to be covered to reduce ammonia emissions by at least 90% compared with the reference (without cover).</p>
Ireland	<p>An interim review of the next NAP will be carried out to undertake an assessment of the effectiveness of the NAP measures and introduce any new measures that may be needed to reflect new data or significant changes to the agricultural sector. A review of future strategies for the covering of external stores will be undertaken as part of the interim review.</p>
Latvia	<p>In the application for a Category A polluting activity, the operator shall submit, inter alia, information regarding the implemented and planned available technical methods, including the reduction of ammonia emissions from the planned activity. The permit shall specify the specific measures to be taken to reduce ammonia emissions.</p> <p>For Category A polluting activities, operators shall be required to comply with the requirements of the best available techniques (BAT) conclusions on Intensive Raising of Poultry or Pigs. Compliance with the conditions included in the permits is controlled by the State Environmental Service within the framework of the planned inspections.</p> <p>In 2021, the State Environmental Service started to implement the Agricultural Operators Control Program, which was developed for 2021-2025. It also examines how operators implement the best available techniques, incl. compliance with other permit conditions. In 2021, 5 in-depth inspections of compliance with the requirements of the best available techniques in Category A polluting activity facilities were carried out (Subclause 6.6 of Annex 1 to the Law on Pollution: Farms for intensive breeding of pigs and poultry with a number of places a) more</p>

	<p>than 40,000 poultry, b) more than 2000 pigs for fattening weighing more than 30 kilograms, (c) more than 750 sows).</p>
Malta	<p>Poultry farms in Malta do not have a set up for slurry production, rather the solid waste is gathered in a manure clamp.</p> <p>Swine farms are set up to have slats and slurry is channelled into cesspits that are leakproof and found to have sufficient capacity for the storage of such waste depending on number of heads of that farm.</p> <p>Yearly inspections are carried out to ensure that no waste dumping occurs and to ensure that the waste management structures are in good state of repair with valid documentation certifying to be leak proof.</p> <p>Any new farms that may wish to be established or the expansion of farms need to apply for a permit. Such permit is scrutinised by the national authorities that calculate the waste management facilities (dimensions) that the application must have in order to ensure green light for development.</p> <p>Malta does not yet have a system to estimate the reduction in ammonia emissions as a result of these actions.</p>
Portugal	<p>REAP/PGEP establishes rules for the storage of slurry and solid manure, in terms of construction, capacity to be installed and associated good practices. Also, the investment measures of the PDR 2020, and of the future PEPAC, support the implementation of constructions and equipment to adapt the facilities to the objectives of reducing ammonia emissions by livestock farms. The CBPA Amoníaco includes specific recommendations for this objective NH₃.</p>
Republic of Cyprus	<p>Usage of artificial crust and/or floating plastic bodies to cover the tanks</p>
Slovak Republic	<p>Decree No. 410/2012-obligation to take measures to achieve the required percentage reduction</p>
Slovenia	<p>Large pig and poultry farms are required to obtain environmental permits. They must comply with the mandatory emission levels set out in the Conclusions of BAT (COMMISSION IMPLEMENTING DECISION (EU) 2017/302 of 15 February 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the intensive rearing of poultry or pigs).</p>
Spain	<p>Measures to reduce emissions in the storage of slurry from pigs and poultry are established in:</p> <ul style="list-style-type: none"> - Royal Decree 637/2021, of July 27, which establishes the basic regulations for the management of poultry farms (article 12 "Reduction of emissions in the farm" and Annex IX). - Royal Decree 306/2020, of February 11, which establishes basic regulations for the management of intensive pig farms, and modifies the basic regulations for the management of extensive pig farms (Article 10 "Reduction of emissions in farms"). <p>The links to the corresponding regulations can be found in question "4.b".</p>
Sweden	<p>Large pig and poultry farms need environmental permits for their activities. The permits are individual and take into account best practices and best available techniques as stipulated in the Environmental Code (SFS nr: 1998:808). Minimum requirements are also stipulated in the EU:s Industrial Emissions Directive (IED). In the</p>

	south and in central parts of Sweden, special requirements regarding the filling and covering of slurry stores apply to agricultural enterprises that keep livestock. A method to reduce ammonia emissions is to cover the slurry stores with, for instance, a roof, a floating plastic cover or a stable natural crust. If the slurry store is filled underneath the cover, this can be kept intact even during filling, which reduces the risk of ammonia emission.
Switzerland	- Mandatory cover of slurry tanks, since 2022 (time limits for retrofitting of existing installations of 6 to 8 years).

7. What actions have been taken to ensure that new animal housing on large pig and poultry farms use systems that reduce emission by at least 20% compared with the reference?

Country	
Belgium (Flanders)	New and renovated stables for pigs and poultry must be built as low emission stables. This includes construction regulations or the use of air scrubbers. The reduction efficiencies are much higher than 20% for these low emission stables. The number of animals kept in low emission housing systems can be found in the manure report 2021 pages 38-41, see https://publicaties.vlaanderen.be/view-file/47252
Canada	No action taken. New animal friendly housing favours more ammonia loss due to large exposed surfaces. However, emissions are mitigated with very controlled diets which are advanced in Canada which help to reduce emissions in housing. This includes dairy which is not mentioned in question 7 but should be considered for the North American context. Also, winter grazing will reduce emission from winter dry lots- Canada has good data for 2010 on ample adoption
Finland	According to the Environmental Protection Act (527/2014), large pig and poultry farms need an environmental permit. The provisions in the permit must be based on the best available techniques. The goal when using best available technology is to prevent the release of emissions from the livestock building into the environment as much as possible by using the most environmentally efficient, economically feasible technical solutions and operating methods. Pig and poultry production units included in the scope of the application of the Industrial Emissions Directive (IED) apply BAT conclusions (published on February 21, 2017) concerning their industries that also include requirements on ammonia emissions. Environmental permit decisions for such "directive-size" livestock buildings specify emission limit values per animal place in such a manner that the target levels presented in the BAT conclusions will not be exceeded during the regular operating conditions of the building. The operators must also annually report their actual emissions.
Germany	The Technical Instruction on Air Quality Control (TA Luft, 2021) has been revised 2021. New animal housing on large pig and poultry farms (IED-farms) with air ventilation have to use air cleaning systems to reduce ammonia emissions by at least 70% compared with the reference.
Ireland	Under the minimum specification for the upgrading of poultry houses 2016 for grant applications, "the ventilation systems for broiler housing shall be designed so that the concentration of ammonia (NH3) does not exceed 20 ppm and the concentration of carbon dioxide (CO2) does not exceed 3000 ppm measured at the level of the chickens' heads."

Malta	Malta only has one large poultry farm which falls within the thresholds stipulated in the Industrial Emissions Directive and is therefore obliged to follow the Best Available Techniques stipulated in the Commission Implementing Decision EU 2017/302 for the intensive rearing of poultry and pigs. Malta does not yet have a system to estimate the reduction in ammonia emissions as a result of these actions.
Portugal	The investment measures of the PDR 2020, and of the future PEPAC, support the implementation of constructions and equipment to adapt the facilities to the objectives of reducing ammonia emissions by livestock farms. The CBPA Amoníaco includes specific recommendations for this objective NH ₃ .
Republic of Cyprus	Usage of partially slatted floors, v –shaped channels and shallow v – shaped gutters.
Slovak Republic	Decree No. 410/2012 and applies to farms under an integrated permit
Slovenia	Large pig and poultry farms are required to obtain environmental permits. They must comply with the mandatory emission levels set out in the Conclusions of BAT (COMMISSION IMPLEMENTING DECISION (EU) 2017/302 of 15 February 2017 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the intensive rearing of poultry or pigs).
Spain	Measures to reduce emissions in pig and poultry housing are established in: - Royal Decree 637/2021, of July 27, which establishes the basic regulations for the management of poultry farms (article 12 "Reduction of emissions on the farm", and section 1 of annex IX). - Royal Decree 306/2020, of February 11, which establishes basic regulations for the management of intensive pig farms, and modifies the basic regulations for the management of extensive pig farms (Article 10 "Reduction of emissions in farms"). The links to the corresponding regulations can be found in question "4.b".
Sweden	Large pig and poultry farms need environmental permits for their activities. The permits are individual and take into account best practices and best available techniques as stipulated in the Environmental Code (SFS nr: 1998:808). Minimum requirements are also stipulated in the EU:s Industrial Emissions Directive (IED)
Switzerland	- Financial incentives for low protein / phase feeding of pigs - Financial incentives for air purification in livestock housing - Financial incentives for slurry acidification systems

B. For Parties to the Convention who are not Parties to the Gothenburg Protocol or where Annex IX does not apply:

8. What measures for ammonia are currently implemented or planned to be implemented?

Country	
Austria	In the context of the new EU common agricultural policy (CAP), subsidies, inter alia, for low-emission manure spreading techniques, low-emission animal housing, livestock feeding, manure compartmentation and

	<p>livestock manure covering or housing will be continued and enhanced (https://info.bmlrt.gv.at/themen/landwirtschaft/eu-agrarpolitik-foerderungen/nationaler-strategieplan/gsp-einreichung.html). Ongoing awareness-raising measures and the national advisory code of good agricultural practice to control ammonia emissions (https://info.bmlrt.gv.at/themen/landwirtschaft/landwirtschaft-in-oesterreich/klimawandel-luftreinhaltung/Landwirtschaft-und-Luftschaedstoffe.html) also serve as key components to reduce ammonia emissions. Furthermore, the development and improvement of effective measures is constantly supported by research carried out by the Austrian Environmental Agency (UBA) and the Agricultural Research and Education Centre Raumberg-Gumpenstein (https://raumberg-gumpenstein.at/forschung/hot-topics/emissionen-immissionen.html).</p> <p>In the context of water pollution and the EU Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources, regulatory measures that co-benefit ammonia emissions were introduced via an ordinance of the Federal Minister for Agriculture, Regions and Tourism. The ordinance is currently under revision and the draft that has been sent into public consultation suggests amending the measure regarding solid manure application by reducing the incorporation time from within at least 24 hours to 12 hours.</p> <p>In the context of the EU Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants, the Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology is currently working on an ordinance in agreement with the Federal Minister for Agriculture, Regions and Tourism that will introduce a set of regulatory measures for ammonia in the agricultural sector. Planned measures will cover more stringent requirements for solid manure application (incorporation time to be further reduced to at least 4 hours), restrictions for the use of urea fertilizer and requirements for manure storage. Moreover, incentives will be put in place to push the shift to low-emission slurry application techniques, ie to direct incorporation of liquid manure.</p>
Canada	<p>Canada is taking action to support sustainable agriculture and food systems through major policy initiatives, including:</p> <ul style="list-style-type: none"> • The Pan-Canadian Framework on Clean Growth and Climate Change which identifies increasing carbon storage in soils, generating bioenergy and bioproducts, and advancing innovative GHG-efficient practices as action areas for the agriculture sector; • The federal, provincial and territorial Canadian Agricultural Partnership which supports on-farm adoption of beneficial management practices and clean technologies, and invests in science and innovation research activities; and • A Food Policy for Canada which includes reducing food loss and waste as a priority. <p>The Canadian Agricultural Partnership (Partnership), launched on April 1, 2018, is a five-year \$3 billion investment by the federal, provincial, and territorial governments to help the agriculture and agri-food sector ensure continued innovation, growth, as well as addressing priority environmental issues related to water, soil, air, biodiversity, and climate</p>

	<p>change. Under the Partnership, up to \$690 million in federal programs is available to enhance the competitiveness of the sector through research, science and innovation, with an emphasis on environmental sustainability and clean growth. In addition, up to \$436 million is available for cost-shared programs between the federal and provincial/territorial governments that are designed to raise producers' awareness of environmental risks and accelerate the adoption of on farm technologies and practices to reduce these risks, including through improved manure management and storage, precision farming practices for fertilizer use and nutrient management plans, among others. Additional programs complementing the ones offered under the Partnership to support sustainable farming practices include:</p> <ul style="list-style-type: none"> • The Canadian Agricultural Strategic Priorities Program (\$50.3 million over five years) focuses on four priority areas: adoption of new technology, environmental sustainability, strategic development and capacity building and emerging issues; however ammonia is not highlighted • The Agricultural Clean Technology Program (\$25 million over three years) is part of the Government of Canada's suite of clean technology programs and initiatives, and helps the agriculture sector reduce greenhouse gas (GHG) emissions by targeting developments in bioproducts and precision agriculture; however ammonia is not considered • The Agricultural Greenhouse Gases Program (\$25 million over five years) is a partnership with universities and conservation groups across Canada to support research projects into GHG mitigation practices and technologies that can be adopted on the farm, including practices and technologies to reduce methane from livestock production; however not focussed on ammonia <p>The Living Laboratory Initiative (\$10 million over five years) where farmers and scientists co-develop new farming practices and technologies on working farms to address persistent agri-environmental issues. Limited focus on ammonia</p>
Italy	<p>Even if we are still not parties to the Gothenburg Protocol (but we are now in the final step of the ratification procedure) we are in any case in the position of implementing its provisions according to EU legislation. Measures for reducing ammonia have been included in the National Air Pollution Control Programme foreseen by NEC directive and the programme has the National Code for Ammonia in attachment.</p>
Monaco	<p>In Monaco, between 1990 and 2020, NH₃ emissions increased from 0.001 kt to 0.0013 kt (an increase of 28.9%). The emissions are mostly due to « Road transport » (0,000909018 kT in 2020) and « Public electricity and heat production » (0,000125509 kT in 2020).</p> <p>In order to decrease emissions of NH₃, several policies and measures has been implementing and are planned in different sectors:</p> <ul style="list-style-type: none"> • <u>ROAD TRANSPORT</u> <p>Clean mobility subsidies (for electric / hybrids vehicles and electric bicycles) are available. It must be noticed that this kind of vehicles represent 10% of the Monaco's vehicle fleet in 2021.</p> <p>The development of public transport infrastructures is done and still in mind of the Government's decisions. For example, we can find a logistics</p>

	<p>hub, a multipurpose commuter parking, specific lanes for public transportation.</p> <p>The replacement of thermal buses by electrical ones is in progress.</p> <p>At last, measures to encourage the use of bicycle and car sharing are promoted by the Government.</p> <ul style="list-style-type: none"> • <u>PUBLIC ELECTRICITY AND HEAT PRODUCTION</u> <p>The Government has adopted, in 2017, a waste management plan to 2030 with in particular the objective of “0 single-use plastic in 2030”.</p> <p>In this context, important regulations are adopted in order to improve the waste management, to ban plastic utensils (as single-use plastic bags, the plastic straws and the single-use plates, cups, glasses and cutlery).</p> <p>All employers must provide employees with reusable tableware in the workplace.</p> <p>A new waste treatment facility will be built by 2030. The specification of the treatment process will be focused on environment impact and on integration of new particularity for plastic sorting.</p>
Republic of Moldova	<p>After the approval of the Law on atmospheric air quality, we intend to develop the secondary legislation as the mechanism for putting into operation the law. It should be created the followings:</p> <ol style="list-style-type: none"> 1. National Air Pollutant Emission Inventory System, 2. National Air Quality Monitoring Network, 3. The National air pollution control program and 4. To be calculated the emissions ceiling and regulation of national emissions of certain air pollutants
US	<p>The United States and Canada are not required to achieve ammonia emission reductions or develop a national advisory code for ammonia as described in Annex IX of the Gothenburg Protocol. However, the United States does have voluntary programs in place for abatement of ammonia.</p> <p>When developing strategies to achieve the National Ambient Air Quality Standard for PM_{2.5}, States may consider abatement of ammonia emissions as part of their implementation plan for reducing PM_{2.5}. Also, the United States Department of Agriculture conducts research and develops best practices manuals for reducing nitrogen loss and ammonia emissions from crops and livestock.</p>

C. For all Parties to the Convention:

9. What do you see as the main barriers and opportunities associated with reducing ammonia emissions (including in relation to Annex IX)?

Country	
Austria	<p>It has proven to be very difficult to implement regulatory measures for the agricultural sector as the EU CAP principle forbids to subsidize regulatory measures. This principle hampers efficient ammonia reductions because financial subsidies are an important part of the income of an average agricultural holding within the EU. Moreover, the agricultural lobbies are very well organized and are considered to be politically influential.</p>
Belgium (Flanders)	<p>Opportunities:</p> <ul style="list-style-type: none"> ○ More focus on knowledge transfer in the management of low emission techniques

	<ul style="list-style-type: none"> ○ Focus on technology for good enforcement strategies. <p>Barriers:</p> <ul style="list-style-type: none"> ○ Reduction efficiencies can be lower in practice than scientifically derived ○ Measurements of emissions are complicated and expensive.
Canada	<p>Examples of potential barriers/opportunities include (but are not limited to):</p> <ul style="list-style-type: none"> • Limitations in data collection and quality, particularly on the adoption of low emission products • Costs are still an issue in some cases, except for high value crops. • Application rates can be problematic therefore good soil tests are recommended. <p>Weather predictions play a key role in application decisions. Accurate predictions can help improve decision making including on splitting applications. Although this has other risks and costs like more spreading costs and dry weather with low uptake of second application compared to all applied early. In addition injected fertilizer is not necessarily a better approach as this could cause more N₂O and NH₃ under certain conditions</p>
Germany	<p>One of the main barriers is the strong lobby in agriculture. For example, the implementation of the BAT Conclusions (2017) were delayed for four years due to the resistance of the farmers' association. One opportunity is the implementation of cost-effective measures with positive side effects, like nutrient adapted feeding for pig, poultry and cattle. In Germany we have a political discussion about increasing the animal welfare. It is important to use synergies in livestock farming by improving the animal welfare in natural ventilated installations. These housing systems may reduce ammonia emissions compared to the reference due to lower temperatures and lower emitting surfaces.</p>
Ireland	<p>Barriers:</p> <p>high cost of purchasing abatement technologies such as LESS equipment, supply and availability of protected N products, lack of skills managing clover in the grass sward, education/awareness of smaller farmers</p> <p>Opportunities:</p> <p>Reduced cost to the farmer with decreased use of chemical fertiliser, reduces negative impacts on surrounding ecosystems, improving nitrogen use efficiency</p>
Italy	<p>From a general point of view, the complexity of the GP sometimes does not help Countries to put in place all it is needed to implement the content of its technical annexes. In Europe we do not see big barriers except for some lack of coordination with the agriculture sector. In the last few years something is changing, and more resources have been also allocated to this aim. It would be a big opportunity to spread the implementation of win win strategies able to reduce ammonia emissions and to go towards a high-quality agriculture economically sustainable for farmers.</p>
Monaco	<p>The NH₃ emissions for Monaco are very low and mostly emitted by “Road transport” and “waste incineration” sectors.</p>

	<p>Moreover, it must be noticed that Monaco doesn't have agriculture nor heavy industry.</p> <p>However, many important actions as those listed above, are done to reduce pollutant and GHG emissions for these sectors.</p> <p>This double target thus constitutes an opportunity to facilitate political decision-making and the allocation of ad-hoc budgets.</p>
Latvia	<p>The main barriers are the financial impact and availability of financing, unprofitable investments for farmers, increase of production prices due to the current geopolitical situation, lack of understanding among farmers concerning the need in ammonia reduction. The opportunity is to change farmers' habits and promote more environmentally friendly practices, which could reduce ammonia emissions.</p>
Malta	<p>Opportunities are related to emission reductions from the agricultural sector in the international context. Global action in this context is deemed positive by Malta since local research shows that Malta is impacted by transboundary contributions of ammonia generated by farming practices in Northern Europe (Scerri et al, 2018).</p> <p>The main barriers would be to develop modelling techniques to quantify emission reductions and willingness of the operator to comply with the required investment. Moreover, keeping in mind the size of Malta, the viability of cost effectiveness of such abatement technologies is questionable since these would only apply to very few operators</p>
Portugal	<p>We can indicate that one of the main barriers is the lack of information on the results of the application of existing regulatory and financial instruments (and mentioned above), particularly those of small and medium-sized enterprises, to be able to assess their effect in terms of ammonia reduction.</p> <p>-The quantification of ammonia emission is therefore limited to the national statistical information which provides Tier 1 approach to the emission inventories. Portugal plans to develop actions to, in the short and medium term, improve the level of existing information, namely in the articulation with the basic information needs for the estimation of emissions in the inventory (IIR).</p> <p>Addressing to this lack of information is an opportunity to better identify the reference situation regarding the good practices for ammonia already implemented in Portuguese agriculture, integrate this information into the accounting of the IIR inventory and, yet better guide policies to increase the universe of farmers with good practices for ammonia reduction.</p>
Republic of Cyprus	<p>Investing money on measurements to control ammonia emissions is one of the main barriers but on the long term it would become an opportunity to the farmers from the nitrogen savings.</p>
Republic of Moldova	<p>One of the main barriers is the lack of a performant National Air Quality Monitoring Network.</p>
Slovenia	<p>The main barrier to reducing ammonia emissions is small-scale, part-time farming, which limits both investment and knowledge transfer. Implementation of low-emission slurry application techniques is also often limited by relief (especially on slopes). The opportunity lies primarily in the implementation of low-emission slurry application techniques on grasslands. In the current period of the Rural Development Programme, these techniques have been spread on</p>

	<p>arable land, but due to conditionality of payments with other requirements, participation in this measure has not been attractive for grassland farmers. In the draft of Slovenian Strategic Plan of Common Agricultural Policy 2023-2027 this problem is solved.</p>
Spain	<ul style="list-style-type: none"> - Awareness, training, advice and support for farmers and livestock owners - Coordination between Administrations - Coordination with researchers so that administrations and farmers can make use of the latest available developments - Monitoring of the measures implemented by the administrations - Verification of whether farmers are properly implementing the measures - Reflection of emission mitigation measures in the national emissions inventory. - Sufficient human resources to update the integrated environmental updates in a timely manner
Sweden	<p>There is an ongoing spontaneous transition from solid manure systems to slurry manure systems. Slurry application techniques provides greater opportunities to increase plant nutrient utilization and to reduce ammonia losses and other nitrogen losses.</p>
Switzerland	<ul style="list-style-type: none"> - Economic constraints, in particular for mitigation measures in livestock housing - Lack of national or international standards for emission mitigation measures in livestock housing - Political will

ANNEX A.

SUPPLEMENTARY INFORMATION

BELGIUM

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a) national policies and legislation

Brussels-Capital region

The sources of NH₃ emissions identified in BCR (urban area) and their contribution in % to the total emissions of the Region in 2020 are as follows:

- Road transport: 34%
- Combustion in residential and tertiary buildings: 34%
- Farming: 12%
- Industry (process) and product uses: 10%
- Waste management (excluding energy recovery): 5%
- Energy production (electricity, cogeneration): 3%
- Industry (combustion): 1%
- Off-road: 0.14%
- Other modes of transport (rail, river, pipeline transport): 0.01%

Road transport and building heating are therefore proportionally less important sources for the other Regions, for which agriculture and industry are the dominant sources, differences which can be explained by the essentially urban character of the Brussels Region.

The Guide to the main urban planning and territorial regulations applicable to urban agriculture projects opens in a new window provides an inventory and gives an explanation of the main approaches and regulations with a view to harmoniously integrating agriculture in the territory of our Region. , in the current state of knowledge and applicable texts.

Brussels' air-climate and energy plan was adopted in 2016. **Belgian national energy and climate plan** was adopted in 2019.

Those two plans foresee a lot of measures to reduce greenhouse gases emissions in BCR. The GHG main emitting sectors are building and transportation (same for NH₃). Those measure contribute actively to reduce the NH₃ emissions in BCR.

More detailed info on Brussels' national climate and energy plan (most recent plan adopted so far)

The Brussels contribution to the national NECP for the period 2021-2030 has set a target to achieve at least a 40% reduction in direct CO₂ emissions by 2030 compared with 2005 and incorporates a framework for reducing indirect emissions.

- The **construction sector** accounts for 60% of the region's direct CO₂ emissions. Considerable progress has already been made in new construction, putting our region at the forefront in this sector. The challenge now is to tackle the issue of renovating existing buildings and of implementing a strategy to reduce their environmental impact. The aim of such a strategy is to upgrade buildings to be highly energy efficient by 2050. The objective for the residential sector is to achieve an average level of primary energy consumption of 100 kWh/m² per year. Housing will gradually be improved and made more efficient through 5 phases of renovation from 2030 onwards, for buildings to be certified EPB. The objective in the office sector is to move towards energy-neutral buildings.
- **Decarbonisation of heating and domestic hot water** solutions is one of the major challenges. The next decade will see an end to coal-fired (2021) and oil-fired (2025) heating installations. The Brussels plan also includes determining the future of natural gas installations after 2030. The current financial support mechanisms to promote energy-efficiency renovation will be adapted to these new goals.
- Emphasis will be placed on strengthening support for **renewable energies** in the urban context. By continuing and expanding the efforts undertaken to stimulate solar photovoltaic, thermal and heat pump energy, the Government hopes that production of electricity in the E-SER and C&F-SER heat sectors will attain 470 GWh by 2030.
- **Waste incineration** produces significant greenhouse gas emissions. The Resource and Waste Management Plan aims to reduce waste production by 20% for households and professionals by 2030. In addition, Europe will require household waste (orange bags) to be sorted from 2023 onwards.
- If the Region is to achieve its climate objectives, it must reduce emissions from the main emitting sectors especially in **transport**. The regional climate target implies the progressive decarbonization of the transport sector through the following two types of measures:
 - Reducing the requirements for transport facilities that emit greenhouse gases and are energy-intensive. Above all, this objective is based on the adoption and implementation of the regional transport plan 'Good Move' ('Towards a more energy-efficient city').
 - Improve the performance of the remaining vehicles and upgrade Brussels vehicles to a zero-emission fleet. The transition has already begun with the implementation of the **low emission zone**, brought into force in 2018. The Government has confirmed its willingness to **phase out diesel by 2030 at the latest, and petrol and LPG by 2035** at the latest. In its 2019–2024 majority agreement, the Government also decided to prioritise the development of light, low-carbon and shared vehicles and, after an analysis of economic and environmental efficiency, to promote alternative propulsion systems to diesel and gasoline, in line with its mobility and environmental objectives.

Wallonia

In Wallonia, the PGDA (Programme of sustainable management of the N) was set up in response to the Nitrates Directive. The program is regularly updated : the last version

was published in 2014 and the next update is on development. The PGDA is the main document to control N losses in agriculture. Even if the PGDA was developed to reduce N loss in water, the measures have also impacts on N emissions. The document (French version) is available on the PROTECT'EAU website: <https://protecteau.be/fr/nitrate/agriculteurs/legislations/pgda> . A summary is also available in German. PROTECT'EAU is the organism mandated by the Public Service of Wallonia (Agriculture & Environment services) to promote the technical advices and good practices of the PGDA.

Flanders

See Flemish Manure Decree (<https://navigator.emis.vito.be/mijn-navigator?wold=312>): Decree of 22 December 2006 on the protection of water against pollution by nitrates from agricultural sources.

- Section III of the Flemish Manure Decree contains restrictions on the land application of manure and fertilisers in accordance with good agricultural practices and taking into account the characteristics of the relevant water sensitive area (nitrogen management), including maximum application standards, catch crop obligations, periods when fertilisers can be applied and minimum storage capacities for livestock manure. It contains the methods of applying manure and fertilisers to soil (low emission spreading techniques). Some of the obligations will be made more effective by the reinforcements of the 6th manure action program (MAP 6+). It is expected that the legislation will be agreed in 2022.
- Section IV of the Flemish Manure Decree contains provisions on the declaration and calculation of manure production. Calculation takes into account the feeding strategies (use of specific feeds need to be proved)

See also the Ministerial Decision of 31 May 2011 to amend Annex I of the Ministerial Decision of 19 March 2004 establishing the list of low ammonia emission animal housing systems in implementation of Article 1.1.2 and Article 5.9.2.1bis of the Decree of the Flemish Government of 1 June 1995 laying down general and sectoral provisions on environmental health (for pigs and poultry housing systems).

- b) guidance on voluntary measures available

Brussels-Capital region

Regarding urban agriculture : in the framework of the **good food strategy**, BRC supports and develops professional agriculture based on ecological criteria. Among the actions carried out by the Region to support and develop professional agriculture, we can mention in particular:

The BoerenBruxselPaysans project : BoerenBruxselPaysans is a pilot project mainly funded by the European Regional Development Fund (ERDF). It is implemented by 4 associations and 2 administrations (including Brussels Environment). Located at the edge of the peri-urban territory, mainly in Anderlecht (Neerpede and Vogelzang), this project aims in particular to facilitate and increase local food production and processing according to **ecological production methods**. It allows new farmers who have responded to a call for applications to launch their project thanks to individual support (training, methodological and technical support) and the provision of land (Agricultural Test Area), infrastructure and tools for 2 seasons. It also contributes to the development

of short processing and sales circuits, as well as awareness-raising and networking actions.

The support service in urban agriculture : This “facilitator” service stimulates the creation or development of urban agriculture projects by providing a web-based information platform and a service of multidisciplinary experts. It is intended in particular for business creation or development projects, property owners and developers, or public bodies and communities.

- The development and dissemination of guides and standard lease contracts for the rental of agricultural land.
- Calls for professional agriculture projects (in 2016 and 2017, respectively 16 and 17 urban agriculture projects were subsidized)
- Vocational training in urban agriculture.

Wallonia

In Wallonia, the code of good agricultural practices is still in development.

Flanders

A new advisory service ‘Guidance service for a better soil and water quality’ (B3W) has started from 2021. They are organising peer to peer learning events between farmers by focus groups and thematic exchange moments. See: <https://b3w.vlaanderen.be/> They have a budget of 1,87 million euro per year.

- c) no actions were taken so far
- d) plans for future actions only

Brussels-Capital region

Brussels’ air-climate and energy plan is now in review. A new project of plan should be adopted by May the 25th. It will be submitted to an analysis of environmental impacts, then to public consultation, before its final adoption, around march 2023.

Flanders

An update of the Flemish air policy plan 2030 was recently started. Its finalisation is planned for the spring of 2023. It will also review and revise the NH₃ reduction measures for agriculture.

FINLAND

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? (‘National Ammonia Code’, NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:

Finland adopted the first action plan to reduce ammonia emissions in 1994 and has updated the plan regularly after that. The current updated action plan covers years 2021-2017 and it follows the previous action plan covering actions for years 2018-2020.

The action plan for 2021-2027 consists of eleven interlinked objectives:

- Promoting the inclusion of provisions to reduce ammonia emissions in environmental permits and notification decisions.
- Updating the report Paras käytettävissä oleva tekniikka kotieläintaloudessa ("Best available technology in livestock farming in Finland"; Mikkola et al. 2002).
- Continuing with the support for application by means of injection as part of the agricultural support scheme in 2021–2027. Preparation of the CAP strategy plan for 2023–2027 is ongoing.
- Continuing the granting of investment aid to cover manure storages, cooling of manure channels and acquire manure treatment equipment, as well as to implement other investments that will reduce emissions.
- Promoting research on new manure storage cover materials. Investigating the practical performance of the new cover materials that have performed well in studies.
- Continuing to support the balanced use of nutrients in 2021 and 2022. Preparation of the CAP strategy plan for 2023–2027 is ongoing.
- Handling through advice the importance of reducing excessive protein feeding to reduce ammonia emissions, as well as the optimal processing, storage and application of manure and organic fertiliser products, and the manner in which the nutrients in manure must be considered when fertilising plants. In investment-related advice, emphasising the significance of the covering of manure storages and the injecting of slurry in the reduction of ammonia emissions.
- Continuing with the animal welfare payment scheme in 2021 and 2022. Preparation of the CAP strategy plan for 2023–2027 is ongoing.
- Continuing with the studies on the suitability of various acids, the application techniques and the effects on the ammonia emissions from manure under the Finnish conditions.
- Promoting the implementation of measures in the environmental protection guide for fur farms.

- Providing more advice on air pollution control in fur production. The provided advice emphasises the means of reducing ammonia emissions during the processing and storage of manure.

GERMANY

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

e) national policies and legislation

- Fertilizer Application Ordinance (DüV, 2020),
- Allgemeine Verwaltungsvorschrift zur Ausweisung von mit Nitrat belasteten und eutrophierten Gebiete, General administrative regulation (AVV GeA, 2020),
- Stoffstrombilanzverordnung, Nutrient-Flow Balances (StoffBilV 2017);
- Technische Anleitung zur Reinhaltung der Luft, The Technical Instruction on Air Quality Control (TA Luft, 2021);
- Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV, 2017), Ordinance on Installations for the Handling of Substances Hazardous to Water

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:

Chapters: 1. Ammonia in the Environment and in farms; 2. Feed and Feeding of livestock; 3. Mitigating measures in housing; 4. Measures for manure storage; 5. Low emission techniques for spreading of manure; 6. low emission techniques for synthetic fertilizers; 7. Aspects for bio gas production; 8. Increasing nitrogen use efficiency; 9. Legislation

IRELAND

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

a) national policies and legislation

Yes – see the following:

- Climate Action Plan 2021

- National Air Pollution Control Programme Report
- Nitrates Action Programme
- Nitrates Derogation

f) guidance on voluntary measures available

Yes – see the Code of Good Agricultural Practice for reducing Ammonia Emissions from Agriculture

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:

The objective of the Code is to provide best guidance on farm practices that will reduce and limit ammonia emissions from agricultural and land management practices. These practices are centred on the agricultural management activities, which are the key sources of ammonia emissions, namely;

- Fertiliser application;
- Manure application;
- Animal feeding strategies;
- Animal housing and
- Manure storage.

Specific good practice measures for each of these activities are outlined in the infographic on pages 5-7 and in detail on pages 13-33.

LATVIA

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

c) national policies and legislation

When looking at the whole nitrogen cycle, nitrogen from agricultural activities is rapidly released to the environment in a number of ways, including leaching of nitrate to water or as gaseous emissions to air. As there are interactions between ammonia and other nitrogen transformations, nitrogen losses and nitrogen uptake by plants, these factors need to be considered together over the whole nitrogen cycle to optimise nitrogen use in crop production, reducing water and atmospheric pollution:

1) National legislation to prevent nitrate leaching:

Requirements for the reduction and prevention of nitrate leaching from fertilisers and manure storage are included in the Cabinet of Ministers Regulation No 834 of 23 December 2014 "Requirements for the protection of water, soil and air from pollution caused by agricultural activities" and Cabinet of Ministers Regulation No 829 of 23 December 2014 "Special requirements for the performance of polluting activities in animal housing".

2) National legislation on the reduction of ammonia emissions:

Ammonia emissions are mainly caused by solid and liquid manure produced by livestock, as well as nitrogen fertilisers used for crop fertilisation. Ammonia emissions from manure originate from animal housing, manure storage sites and when manure is spread on the field.

Measures to reduce ammonia emissions in Latvia are included in the Action Plan to Reduce Air Pollution 2020-2030 and funding for their implementation is planned under the Common Agricultural Policy Strategic Plan 2023-2027:

- The use of new technologies to ensure the precise application of mineral fertilisers;
- Development of crop fertilisation plans that ensure optimal fertilisation of crops;
- Production of nitrogen-fixing crops;
- Covering liquid manure storage facilities;
- Replacement of lagoon-type storage with cylindrical storage;
- Use of slurry application technologies that reduce ammonia emissions;
- Promotion of extended grazing in livestock farming;
- Development of organic farming;
- Provision of training and advisory services to farmers on how to reduce ammonia emissions from agricultural activities.

These measures are included in the draft Strategic Plan of the Common Agricultural Policy of Latvia 2023-2027, which was submitted to the European Commission at the end of 2021.

At the same time, the Cabinet of Ministers' Regulation of 23 December 2014 No 834 "Requirements for the protection of water, soil and air from pollution caused by agricultural activities" and the Cabinet of Ministers' Regulation of 23 December 2014 No 829 "Specific

requirements for the performance of polluting activities in animal housing", which are mainly related to the reduction of nitrate leaching, include certain requirements that also contribute to the reduction of ammonia emissions: solid manure should be applied into the soil within 24 hours after spreading, and liquid manure within 12 hours, and the use of ammonium carbonate fertilisers is prohibited. Liquid manure storage facilities are also required to be closed type or to have a permanent natural or artificial floating cover to reduce evaporation and to cover the surface of the storage facility permanently.

d) guidance on voluntary measures available

- "Code of good agricultural practice", issued in 2008, publicly available in Latvian [HERE](#).

- In 2020, under the supervision of the Ministry of Agriculture "Guide on Good Agricultural Practices for Reducing Ammonia Emissions in Latvia" was developed and published. It includes voluntary recommendations for measures in rearing of dairy and beef cattle, pigs, poultry, as well as in manure storage and use and mineral fertiliser application. The Guide (in Latvian) is available at [HERE](#).

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:

The Guide on Good Agricultural Practice for Reducing Ammonia Emissions in Latvia contains voluntary recommendations for farmers to reduce ammonia emissions in:

- rearing of dairy and beef cattle, pig and poultry;
- manure storage ;
- manure application;
- mineral fertiliser application.

MALTA

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

a) national policies and legislation

With regards to Regulations, S.L. 549.124 on the 'Limitation of Emissions of Certain Atmospheric Pollutants Regulations' provide for national air pollution control programmes to include measures to control ammonia emissions.

Moreover, S.L. 549.25 on the 'Protection of Waters Against Pollution caused by nitrates from Agricultural Sources Regulations' provides for measures to limit the discharge of nitrogen compounds from agricultural sources into the aquatic environment.

S.L. 549.66 which emanates from S.L. 549.25, on the 'Implementation of the Nitrates Action programme Regulations' regulates the storage and application of fertilisers, both organic and inorganic on all farm holdings throughout the Maltese territory which is classified in its entirety as a Nitrates Vulnerable Zone

b) guidance on voluntary measures available

With regards to guidance documents, The Maltese Code of Good Agricultural Practice includes a number of measures which contribute to reducing losses from the whole nitrogen cycle. Specifically, the code contains recommendations concerning all aspects of agricultural production, namely: Animal husbandry Manure handling Fertilization practice, these are mainly considered as obligatory codes.

Nevertheless there are also some voluntary codes like for example 'Keep the water consumption for cleaning purposes as low as possible'. This is because lower consumption of washing water will lower the transport costs of slurry and effluent. Reduction of water will produce less wet manure and improves its fertilizer value with a reduction of bad odours and loss of ammonia.

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

- a) Code established, published and disseminated? Yes / No.
- b) Please briefly summarize the main provisions of the National Ammonia Code:
- c) Please provide an internet URL for your national ammonia code or pdf copy if available:
- d) Please confirm that the Excel spreadsheet has been checked, and where necessary updated: Yes/No

To date Malta has not published the National Ammonia Code. This is however expected to be developed on the basis of the good agricultural practices that would reduce ammonia emissions within the context of fertilisation storage and application, for which a regulatory framework is already in place pertinent to the nitrates action programme regulations. The ultimate objective is to have a seamless policy and regulatory framework that would ensure best possible practices, for farmers in ensuring sustainable agriculture practices in fertilisation management and general agricultural practices that would minimise ammonia losses. Although Malta has not published a national ammonia code, the Maltese Code of Good Agricultural Practice includes measures which can contribute to the reduction of ammonia emissions.

PORTUGAL

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a) national policies and legislation

To reduce losses from the entire nitrogen cycle, Portugal has been publishing several legislation, namely:

- Within the scope of the Water Law (*Law n.º 58/2005 of 29 December, <https://dre.pt/dre/legislacao-consolidada/lei%20/2005-34506275>*), since 1997 have

been applied specific rules for wastewater discharges in sensitive areas subject to eutrophication (*Decree-Law n.º 152/97 of 19 June*, <https://dre.pt/dre/legislacao-consolidada/decreto-lei/1997-75044039>) and for the protection of waters against pollution caused by nitrates from agricultural sources (*Decree-Law n.º 235/97 of 3 September, amended by Decree-Law n.º 68/99 of 11 March*, <https://dre.pt/dre/detalhe/decreto-lei/235-1997-641126> and https://dre.pt/dre/detalhe/decreto-lei/68-1999-158047?_ts=1654646400034).

- With the application since 2008 of the regime for the exercise of livestock activity (REAP), published by Decree-Law n.º 214/2008 of 10 November (*revised by Decree-Law n.º 81/2013 of 14 June*, <https://dre.pt/dre/legislacao-consolidada/decreto-lei/2013-34580475>), was established licensing rules for the adoption of good practices for animal handling and livestock effluent management (inside and outside the farm) and, whenever applicable, of the Best Available Techniques recommended within the scope of Integrated Pollution Prevention and Control. The livestock operator with farms of a herd' significant size/ intensity is required to submit Livestock Effluent Management Plans, where they must prioritize livestock effluent destinations for agricultural, organic and/or energy valorisations. (*Ordinance 79/2022 of 3 February*, <https://dre.pt/dre/detalhe/portaria/79-2022-178602023>).
- With the transposition of the National Emissions Limits Directive (NEC revised), requirements were established to reduce ammonia emissions in the agricultural and livestock sector (*Decree-Law n.º 84/2018 of October 23*, <https://dre.pt/dre/detalhe/decreto-lei/84-2018-116747964>), to be implemented in this context by the National Air Pollution Control Programme (PNCPA 2030), currently being completed in order to conclude during 2022. This Program will reinforce the objective of reducing NH₃, already foreseen in the National Strategy for Air for 2020 (*ENAR 2020* (<https://dre.pt/dre/detalhe/resolucao-conselho-Ministros/46-2016-75207497>)).

b) guidance on voluntary measures available

Portugal adopted his first Code of Good Agricultural Practices (CBPA) in 1997, revised in 2010 and recently approved (*Order n.º 1230/2018 of 5 February*, <https://dre.pt/dre/detalhe/despacho/1230-2018-114627305>). This Code, developed to assist farmers and agricultural entrepreneurs to rationalize fertilization practices and cultural techniques/operations that, directly or indirectly, interfere in the dynamics of nitrogen and phosphorus in agrarian ecosystems, becomes:

- mandatory at vulnerable zones (ZVs) - action program for nitrate vulnerable zones (*Ordinance n.º 259/2012 of August 28*, https://dre.pt/dre/detalhe/portaria/259-%202012-174783?_ts=1647561600044);
- the source of nitrogen excretion rates (Nexc) used for all animals (except dairy and non-dairy cattle) in the national emissions inventory (*National Informative Inventory Report 2022*, https://www.apambiente.pt/sites/default/files/_Clima/Inventarios/IIR20220415.pdf).

The national Code of Good Agricultural Practices for the reduction of Ammonia (CBPAAmoníaco) has been elaborated in 2021, and it was adapted from the UNECE Framework Code. It is foreseen to be published soon.

Furthermore, the 2014-2020 Mainland Rural Development Program (*PDR 2020*, <http://www.pdr-2020.pt/>) promotes voluntary measures/actions that can contribute to improving the Nitrogen Cycle, namely:

- Investments (construction and equipment) in the farm (Action 3.2), if oriented for reducing emissions and leaching of N;
- Organic Agriculture (Ac.7.1), Integrated Production (Ac.7.2) and Efficient use of water (Ac.7.5), which promote good agricultural practices to rationalize fertilization (fertilization plan and field notebook);
- Operational groups (Ac.1.1), Training and dissemination (Ac. 2.1) and Advice (Ac.2.2), to transfer knowledge to producers.

c) plans for future actions only

For a more efficient management of nitrogen, the National Strategy for Agricultural and Agroindustrial Effluents 2030 (*ENEAPAI 2030, Council of Ministers Resolution 6/2022 of 25 January, <https://dre.pt/dre/detalhe/resolucao-conselho-ministros/6-2022-178152679>*) aims to provide an hierarchy of sustainable solutions that privileges the valorisation of effluents, as well as mechanisms to reinforce their traceability, including the implementation of electronic guides for the transport of livestock effluents (e-GTEP) and electronic transport guides for other animal by-products (e-GAS) that this ordinance now enshrines. Gives primacy to solutions for agricultural valorisation of livestock effluents. Any solution will be conditioned to the improvement of the quality of the water bodies of the hydrographic regions, associated with sustainable management models and aligned with agricultural and environmental policies and the principles of the circular economy.

The CAP Strategic Plan for 2023-2027 (*PEPAC, https://www.gpp.pt/images/PEPAC/PEPAC_Submetido/PEPAC_30122021.pdf*) deepens the measures recommended in the 2020 PDR, providing a set of support that can contribute to the improvement of the nitrogen cycle, including to the reduction of NH₃ emissions. Will promote, namely:

- Agricultural Investment for Performance Improvement Environmental (C.2.1.2) - the adequacy of constructions (e.g. livestock facilities, storage) and/or equipment (e.g. solid/liquid separator, effluent injectors) may be supported;
- Investment in the Bioeconomy to Improve Environmental Performance (C.3.1.2) - structures and equipment that enhance the recovery of sludge, manure, and by-products (circular economy) may be supported;
- Organic farming (A.3.1), Integrated Production (A.3.2), Soil management: Management of permanent pasture (A.3.3.1), Soil conservation: Direct sowing, Grazing, Biodiverse Pastures (C.1.1.1.1) and Efficient use of water (C.1.1.1.2), which promote good agricultural practices to rationalize fertilization (fertilization plan and field notebook);
- Soil management: Promotion of Organic Fertilization (A.3.3.2), specifically oriented for agricultural valorisation of livestock effluents, also introducing practices for the application of effluents with an impact on the reduction of NH₃.
- Operational groups for innovation (C.5.1), Training and information (C.5.2), Advice (C.5.3), Agro-environmental and Climate Knowledge (C.5.4), to transfer knowledge to producers.

The PNCPA 2030, that in context contributes more specifically for the control of ammonia emissions, is being developed taking into account the actions foreseen in ENEAPAI.

SLOVAK REPUBLIC

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

g) national policies and legislation

1. We have adopted a code of good agricultural practice.
2. We have banned the use of ammonium carbonate as a fertilizer.
3. We have taken measures to reduce ammonia emissions from livestock farming.

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:
Measures for livestock farming aimed at housing, feeding strategy, manure storage, manure application to the soil.

SLOVENIA

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:
The Code contains all the contents defined in Annex III of the New NEC Directive. It contains the following chapters:

- Introduction
- Slovenia's commitments to reduce ammonia emissions
- Advisory Code of Good Agricultural Practice for the control of ammonia emissions
- Concern for an efficient nitrogen cycle on the farm
- Ways to reduce ammonia emissions by regulating the protein content of ruminant diets
- Opportunities to reduce ammonia emissions by regulating protein content of pig and poultry diets
- Ways to reduce ammonia emissions from barns
- Opportunities to reduce ammonia emissions from the storage of livestock manure
- Opportunities to reduce ammonia emissions from the application of livestock manure
- Ways to reduce ammonia emissions from fertilization with mineral fertilizers.

SPAIN

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?
 - a. national policies and legislation
 - b. guidance on voluntary measures available

At national level, the adopted Integrated National Energy and Climate Plan 2021-2030 (PNIEC 2021-2030) and the 1st National Air Pollution Control Program (PNCCA) include a set of policies and measures to reduce nitrogen emissions. These policies and measures become mandatory through the approval of regulations at national level, forcing the use of techniques to reduce these emissions.

In Royal Decree 306/2020, of February 11, which establishes basic regulations for the management of intensive pig farms, and modifies the basic regulations for the management of extensive pig farms, specific and mandatory measures are established to reduce nitrogen emissions in general and ammonia in particular for pig farms, specifically in their articles;

- Article 9. Manure Management,
- Article 10. On-farm Mitigation and
- Article 11. Best Available Techniques Registry.

In addition, annex VII lists the Best Available Techniques to be adopted by newly installed pig farms. Similar requirements can be found in articles 11, 12 and 13 of Royal Decree 637/2021, of July 27, which establishes the basic regulations for the management of poultry farms

The Spanish Ministry of Agriculture is working on a draft of a Royal Decree that will regulate the general registry of Best Available Techniques in livestock farms, and provides a tool and technical support for the calculation, monitoring and notification of emissions from livestock. This support is given through a computer tool (ECOGAN) which includes the general registry of BATs, and provides options to estimate, monitor and notify emissions from livestock. ECOGAN is available for farmers and general public on the website:

<https://www.mapa.gob.es/es/ganaderia/temas/ganaderia-y-medio-ambiente/calculo-emisiones/default.aspx>

Moreover, the autonomous communities have established Codes of Good Agricultural Practices on a voluntary basis for their region.

In addition, future measures are being coordinated within the framework of the Strategies Plan of the Common Agricultural Policy (Objective 5).

The measures regarding nitrogenous fertilization included in the PNIEC and in the PNCCA are being provided with a regulatory basis within the framework of the draft Royal Decree which set out the standards for sustainable nutrition in agricultural soils (PRDNS). Within the usual regulatory process, the latest public version has received numerous allegations from competent authorities (agricultural and environmental), agricultural and livestock production sector, associations, research sector and individuals. These allegations are being analyzed in order to improve the draft Royal Decree.

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC)
Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

a. Code established, published and disseminated? Yes

In 2017, the Spanish Ministry of Agriculture published the Guides of the Best Techniques to reduce the environmental impact of livestock.

https://www.mapa.gob.es/es/ganaderia/temas/ganaderia-y-medio-ambiente/mejorestecnicasdisponiblesparareduceelimpactoambientaldelaganaderia_tcm30-436663.pdf

These guides included basic information on the best environmental techniques in general and, in particular, those that are most effective in reducing ammonia and methane emissions in livestock.

In addition, in the same year, the Framework Code for Good Agricultural Practice for Reducing Ammonia Emissions was translated into Spanish, https://www.mapa.gob.es/es/livestock/temas/livestock-and-medio-ambiente/ece_ebair_120_espdocumentoorientativosobreelamoniaco_tcm30-436094.pdf

Spain does not have a National Ammonia Code. However, obligations to reduce NH₃ emissions are established through national regulations. Through these regulations the policies and measures to reduce NH₃ emissions established in the National Program for Atmospheric Pollution Control (PNCCA) are implemented. The Program addresses national reporting obligations within the framework of Directive (EU) 2016/2284 of the European Parliament and of the Council, of December 14, 2016, regarding the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC.

The measures for the reduction of ammonia emissions from fertilization will be part of the regulatory body once the PRDNS is published. In addition, each region or Autonomous Community has available the Code of Good Agricultural Practices on a voluntary basis.

b. Please briefly summarize the main provisions of the National Ammonia Code:

Ammonia emissions mitigation measures are implemented in the national regulations, listed below:

- Adopted livestock farms regulations:

- Royal Decree 306/2020, of February 11, which establishes basic regulations for the management of intensive pig farms, and modifies the basic regulations for the management of extensive pig farms.

<https://www.boe.es/buscar/doc.php?id=BOE-A-2020-2110>

- Royal Decree 637/2021, of July 27, which establishes the basic regulations for the management of poultry farms.

https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-12609

- Livestock Farms Regulations that are under development:

- Draft Royal Decree establishing basic regulations for the management of bovine farms.

https://www.mapa.gob.es/es/ganaderia/participacion_publica/proyecto_rd_ordenacion_bovina.aspx

- Draft Royal Decree establishing standards for sustainable nutrition in agricultural soils. This regulation is under development.

https://www.mapa.gob.es/es/agricultura/participacion_publica/rd_nutricion_sostenible_suelos.aspx

- Royal Decree 47/2022, on the protection of waters against diffuse pollution produced by nitrates from agricultural sources

<https://www.boe.es/buscar/doc.php?id=BOE-A-2022-860#:~:text=A%2D2022%2D860-Real%20Decreto%2047%2F2022%2C%20de%2018%20de%20enero%2C%20sobre,%C2%AB%2>

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c. Please provide an internet URL for your national ammonia code or pdf copy if available:

- National Program for the Control of Atmospheric Pollution: measures of the agricultural and livestock sector on pages 169-189.

https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/primerpncca_2019_tcm30-502010.pdf

The links to the national regulations in which the different aspects for the reduction of ammonia emissions in the agricultural and livestock sector are implemented are indicated in the previous question

SWEDEN

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a. national policies and legislation: Farmers, unless very small, need environmental permits for their activities. The permits are individual and take into account best practices and best available techniques as stipulated in the Environmental Code (SFS nr: 1998:808).

b) guidance on voluntary measures available: The web site 'Greppa näringen' (<http://greppa.nu/>) was launched in 2006 and have information on how to reduce losses of nutrients, including ammonia. The web site is continuously updated and also have information in English ([In English - Greppa](#)).

SWITZERLAND

Questions to Parties to the Convention: Ammonia Questionnaire (December 2021)

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a) national policies and legislation

Regarding the whole agricultural nutrient household:

- One major goal of the agricultural policy, which was introduced stepwise since 1994 was to reduce environmental impacts of agriculture. Farms receiving direct payments (subsidies) (>90%) were obliged to produce according to proof of ecological performance (PEP) which included complimentary measures regarding animal welfare, nutrient balance, biodiversity, crop rotation, soil protection and pesticide use.

- Farms participating in PEP had to reach a Nitrogen (N) and phosphorous (P) balance with a maximum of 10% surplus when comparing plant nutrient requirements according to

official guidelines and nutrient input in the form of manure and mineral fertilizer. This new restriction lead to a more conscious use of manure and a decrease of mineral N fertilizer use by 20% between 1990 and 2002 and -38% between 1990 and 2020. According to Spiess (2020) mineral fertilizer in 2018 contributed 31% of the total N inputs to agriculture in 2018 (imported feed 35%, N fixation legumes 24%, atmospheric N deposition 8%) compared to 31% in 1990 (imported feed 35%, N fixation legumes 35%, atmospheric N deposition 8%) compared to over 40% in 1990 (imported feed approx. 25%, N fixation legumes ~25%, atmospheric N deposition ~13%).

Regarding ammonia emissions:

Mandatory measures

- Reduction of N inputs by restrictions via N balance on farm level (see above).
- Mandatory cover of slurry tanks, since 2022 (environmental legislation)
- Low emission slurry application mandatory from 2024 onwards (environmental and agricultural legislation)

Voluntary measures

- Financial incentives for low emission slurry application (2008 until 2021), low protein / phase feeding of pigs (2018 until 2022), emission mitigation measures in cattle stables (sloped floors, elevated feeding stalls), air purification in livestock housing, slurry acidification systems, grassland-based dairy and meat production

Regarding nitrogen oxides emissions:

- Emission limit values for stationary installations, according to BAT (environmental legislation)
- Emission standards for vehicles, in accordance with UNECE World Forum for Harmonization of Vehicle Regulations (WP.29), and for non-road machinery, in accordance with EU 2016/1628, (environmental and road traffic legislation)

b) guidance on voluntary measures available

Leaflets from national advisory services (in German and partially French):

- Ammonia losses from agriculture (AGRIDEA)
- Reducing ammonia losses from manure application (AGRIDEA)
- Reducing ammonia losses from cattle housing and exercise yards (AGRIDEA)
- Emission reducing measures for slurry spreading (AGRIDEA)
- N-reduced phase feeding of pigs (AGRIDEA, BLW/KOLAS),
- Covered slurry stores (BLW/KOLAS)
- Air cleaning measures for forced ventilation livestock housing systems (BLW/KOLAS, Cercl'Air)

Documents available under <https://www.ammoniak.ch/grundlagen/vollzugsunterlagen>

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

b) Please briefly summarize the main provisions of the National Ammonia Code:

- Description of national legislation for reducing ammonia emissions
- Description of organizational measures for reducing ammonia emissions (e.g. respect meteorological conditions for slurry application)
- Description of technical measures for farm buildings and slurry management and application according to BAT

UK

Questions to Parties to the Convention: Ammonia Questionnaire (December 2021) – United Kingdom response

1. What actions have been taken to reduce losses from the whole nitrogen cycle?

- a. national policies and legislation**
- b. guidance on voluntary measures available**
- c. no actions were taken so far**
- d. plans for future actions only**

England:

A) National policies and legislation: The Clean Air Strategy was published in January 2019 and set out concerted action Government will take to reduce ammonia emissions from farming in line with our clean air targets.

B) Guidance and Voluntary Measures Guidance (the Code of Good Agriculture for reducing ammonia emissions) was published in 2018 alongside a video for farmers to highlight key actions to reduce ammonia emissions. Several grant schemes have offered funding for ammonia reducing measures including low emissions spreading equipment, slurry covers, slurry scrapers, tree shelter belts and low emissions flooring systems for livestock housing. Advice, demonstration events and case studies on reducing ammonia emissions have been made available through the Catchment Sensitive Farming Programme.

D) Plans for future actions: Defra has consulted on measures to reduce ammonia emissions from urea fertilisers and will publish a response setting out the action that will be taken in due course. Defra plans to consult on measures to reduce ammonia emissions from organic manures later this year. This is likely to include proposals to require the use of low-emission slurry and digestate spreading equipment by 2025, the rapid incorporation of manure to land, the covering of slurry and digestate stores by 2027. The Clean Air Strategy also commits to introducing mandatory design standards for new intensive poultry, pig and beef livestock housing and for dairy housing and extension of environmental permitting to the dairy and intensive beef sectors by 2025 to limit pollution from these sectors. The Environment Agency has been working with industry organisations to develop best available techniques that will underpin these measures.

An expert group including agricultural policy experts, agronomists, scientists and economists has been appointed to make recommendations on the optimal approach to minimise pollution from organic and inorganic fertiliser use. The recommendations should be published this year.

Scotland:

A new air quality strategy was published in July last year. This commits to producing a voluntary code of practice for agriculture but work has not started on this yet. Initial discussions on the code and other actions have taken place and work will progress on this during the course of the year.

Wales:

The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 include a number of measures to reduce losses from the nitrogen cycle. The measures will be phased in over three years, with the initial measures applying to farms from 1 April 2021 and the remainder being phased in from January 2023 and August 2024.

From 2021:

- Controls on the spreading of nitrogen fertiliser at high-risk times and high risk areas
- Closed periods between September and January for spreading manufactured nitrogen fertiliser
- Incorporation of manure within 24 hours (exemptions may apply e.g., if precision spreading equipment is used)

From 2023:

- Rules on the placement of temporary field heaps for farmyard manure (mandatory covering of poultry manure field heaps)
- Nitrogen limits for organic manure (250kg per individual hectare a year from all organic manures, with no more than 170kg of nitrogen a year from livestock manure when averaged across the holding)
- Nutrient management planning required for any nitrogen fertiliser application, which includes the soil nitrogen supply and the requirement of the crop
- Nutrient applications must not exceed specified crop limits

From 2024:

- A minimum five-month storage capacity for slurry (six month for pigs and poultry)
- Closed periods for spreading slurry between September and January (depending on soil type)

Although primarily aimed at addressing water pollution, our impact assessment estimated these measures will result in a 1.5% reduction in ammonia emissions. Further interventions to tackle agricultural pollution will be necessary to achieve air quality targets, including Wales's contribution to a 16% reduction of UK ammonia emissions by 2030.

In April last year, Farming Connect launched a new online tool to help Welsh farmers put in place changes to lower ammonia emissions. The interactive tool gives advice on the actions a typical Welsh farm may be able to take to improve air quality and the real business benefits they can bring. It also shows what support is offered by Farming Connect, the Welsh Government and others. The tool is one of the ways the Welsh Government is acting on its commitment in the Clean Air Plan for Wales to give farmers up-to-date advice on how to lower ammonia emissions.

Northern Ireland:

In NI the DAERA Nutrient Action Programme (NAP) which commenced on 11 April 2019 provides Regulations for the period 2019-2022. Details of the NAP are available at: <https://www.daera-ni.gov.uk/nutrientsactionprogramme2019-2022>

In 2019 Northern Ireland was successful in applying to the European Commission to renew a Derogation from the Nitrates Directive permitting the land application of up to 250kg N per hectare per year from grazing livestock manure under certain conditions. Details are at: <https://www.daera-ni.gov.uk/publications/nutrients-action-programme-nap-derogation-2019-2022>

An Ammonia Strategy for NI has been developed by DAERA and is pending consultation. The Ammonia Strategy comprises three pillars:

- An ambitious and verifiable ammonia reduction programme for implementation on farms including a series of Northern Ireland wide measures and spatially targeted measures in areas around designated sites, designed to meet conservation objectives.
- A programme of restoration and management of our most valuable habitats to alleviate the symptoms of ammonia and nitrogen exceedance;
- A revised Operational Protocol for the assessment of impacts from atmospheric nitrogen pollution.

The DAERA Code of Good Agricultural Practice for the Reduction of Ammonia Emissions, launched on 16 May 2019, provides guidance on how farmers, growers, land managers, advisers and contractors can minimise ammonia emissions from agriculture (further details at question 2 response).

The DAERA College of Agriculture, Food and Rural Enterprise (CAFRE), provides training on ammonia and on-farm mitigation technologies. The CAFRE Estate demonstrates ammonia mitigation technologies around five main work areas: animal nutrition; livestock housing; slurry management; use of Low Emission Slurry Spreading Equipment; and vegetative recapture. Nutrient management training is provided including the use of LiDAR derived nutrient run-off risk maps, and a suite of Nutrient Calculators and Decision support tools for farmers are available including organic nitrogen loading, storage capacities of organic manures and crop nutrient calculator. In addition, training materials and nutrient management planning tools are being developed for future delivery of the recently announced DAERA Soil Nutrient Health Scheme (SNHS).

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC). Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

a. **Code established, published and disseminated?** Yes – apart from Scotland where it is currently being drafted.

b. **Please briefly summarize the main provisions of the National Ammonia Code:**

England - The Code of Good Agricultural Practice (COGAP) for reducing ammonia emissions was published in 2018. This a guidance document produced by Defra in collaboration with the farming industry. It explains the practical steps farmers, growers, land managers, advisors and contractors in England can take to minimise ammonia emissions including from the storage

and spreading of organic manures, spreading of inorganic fertiliser, livestock housing and through altered livestock diets,

Scotland – N/A

Wales – Livestock feeding strategies, reducing housing emissions, manure storage systems, application of organic manures and application of mineral fertilisers

Northern Ireland:

- Reducing ammonia emissions when storing organic manures.
- Applying organic manures effectively and efficiently.
- Using chemical nitrogen manures effectively and efficiently.
- Dairy and beef sector specific measures.
- Pig sector specific measures.
- Poultry sector specific measures.

c. Please provide an internet URL for your national ammonia code or pdf copy if available:

- England: <https://www.gov.uk/government/publications/code-of-good-agricultural-practice-for-reducing-ammonia-emissions/code-of-good-agricultural-practice-cogap-for-reducing-ammonia-emissions#about-this-code>
- Scotland: <https://www.gov.scot/publications/prevention-environmental-pollution-agricultural-activity-guidance/pages/1/>
- Wales: <https://gov.wales/sites/default/files/publications/2019-04/code-of-good-agricultural-practice-guidance-on-reducing-ammonia-emissions.pdf>
- Northern Ireland: <https://www.daera-ni.gov.uk/publications/code-good-agricultural-practice-reduction-ammonia-emissions>

d. Please confirm that the Excel spreadsheet has been checked, and where necessary updated: Yes

3. What actions have been taken to limit ammonia emissions from urea-based and other fertilizers?

England:

Defra's Code of Good Agricultural Practice for reducing ammonia emissions includes guidance on reducing ammonia emissions from inorganic fertilisers including those containing urea. Defra consulted from November 2020 to January 2021 on policy options to reduce ammonia emissions from urea fertilisers in England. The government response to this consultation will be published this year.

Scotland:

None currently.

Wales:

Guidance has been incorporated into the Code of Good Agricultural Practice.

Northern Ireland:

Actions listed under the NAP, NAP derogation and the Code of Good Agricultural Practice for the Reduction of Ammonia Emissions have been taken to reduce ammonia emissions from urea-based and other fertilisers.

4. What actions have been taken to ensure that low-emission slurry application techniques are used that reduce ammonia emissions by at least 30% compared with the reference?

England:

The Clean Air Strategy set out plans to introduce a new requirement for slurry and digestate to be spread using low emissions spreading equipment by 2025. Defra is planning to issue a consultation on detailed policy proposals to reduce ammonia emissions from the management of organic manures in 2022. Funding has been made available through the grant schemes to support farmers to invest in low emission spreading equipment.

Scotland:

None currently.

Wales:

Advice has been incorporated into the Code of Good Agricultural Practice. Low emission spreading equipment is supported through grant funding.

Northern Ireland:

Under NAP Low Emission Slurry Spreading Equipment must be used in the following circumstances:

- On derogated farms, all slurry spreading after 15 June each year must be done using LESSE.
- From 1 February 2020 for spreading anaerobic digestate. This applies to anaerobic digester owners or any farmer importing digestate.
- From 1 February 2021 by slurry contractors. The definition of a contractor is anyone receiving payment for spreading slurry, where they do not claim Basic Payment Scheme on that land.
- From 1 February 2022 on farms with 200 or more cattle livestock units (LU) and farms with a total annual livestock manure nitrogen production of 20,000 kg or more from pigs.

5. What actions have been taken to ensure that solid manure is incorporated into soil within 24 hours of spreading?

England:

Defra's planned consultation on the management of organic manures in 2022 will include policy proposals to require the rapid incorporation of manure to land.

Scotland:

None currently.

Wales:

Advice was incorporated into the Code of Good Agricultural Practice but this became a requirement on 1 April 2021, as part of the Water Resources (Control of Agricultural Pollution) (Wales) Regulations.

Northern Ireland:

For intensive livestock IPPC permitted operations solid manures should be incorporated, by using methods such as ploughing, discing or through the use of a rotary cultivator, within 24 hours unless:

- the soils are susceptible to erosion and incorporation would increase the chances of soil erosion occurring;
- the applications are made to grassland;
- the applications are made to established crops.

The DAERA 2008 Code of Good Agricultural Practice for the Protection of Air, Water and Soil states that to make best use of nitrogen in solid manure and to minimise nitrate leaching losses it should be applied to arable ground in spring where possible. Rapid soil incorporation will minimise nitrogen losses. N.B. The area of arable land relative to grassland in NI is very small.

6. What actions have been taken to ensure that new and existing slurry stores on large pig and poultry farms use systems that reduce emission by at least 40% compared with the reference?

England:

Defra's Code of Good Agricultural practice provides guidance on techniques to reduce ammonia emissions from storage of slurry. Funding for covers have also been offered through grant funds. Intensive pig and poultry farms covered by the Environmental Permitting regime are also required to apply Best Available Techniques to reduce ammonia emissions. Defra is also planning to consult on the management of organic manures in early 2022 will include policy proposals to phase in requirements to cover slurry and digestate stores.

Scotland:

None currently.

Wales:

Advice has been incorporated into the Code of Good Agricultural Practice. Covers for slurry stores are supported through grant funding.

Northern Ireland:

Under the IPPC Directive, intensive pig and poultry units in NI over specified thresholds must obtain a permit to operate. The thresholds for poultry are 40,000 bird places and for pigs 750 sows or 2000 production pigs over 30 kg. Poultry and pig units requiring permits to operate must comply with the Best Available Techniques (BAT) Conclusions document for the Intensive Rearing of poultry or pigs (IRPP) published on the 21st February 2017.

7. What actions have been taken to ensure that new animal housing on large pig and poultry farms use systems that reduce emission by at least 20% compared with the reference?

England:

Intensive pig and poultry farms covered by the Environmental Permitting regime are required to apply Best Available Techniques to reduce ammonia emissions.

Guidance on reducing ammonia emissions from livestock housing is included in Defra's Code of Good Agricultural Practice for reducing ammonia emissions.

Under the clean air strategy, mandatory design standards for new intensive poultry, pig and beef livestock housing and for dairy housing will be introduced and environmental permitting will be extended to the dairy and intensive beef sectors by 2025 to limit pollution from these sectors.

Scotland:

None currently.

Wales:

Advice has been incorporated into the Code of Good Agricultural Practice. Large Pig and Poultry units fall under require a permit which mandates the use of BAT.

Northern Ireland:

As part of the application process for new IPPC permitted new animal housing on large pig and poultry farms applicants are required to provide detailed information on the impact on the environment. To meet regulatory requirements the techniques must be BAT and meet the other requirements of the PPC Regulations. Resulting emissions must be compared with any BAT based benchmarks and the impact of those emissions on the environment must be assessed. Details are available at <https://www.daera-ni.gov.uk/articles/intensive-livestock-installations-0>

9. What do you see as the main barriers and opportunities associated with reducing ammonia emissions (including in relation to Annex IX)?

England:

In 2019, the UK published the Clean Air Strategy which set out the comprehensive actions required across all parts of government and society to improve air quality. This included plans to reduce ammonia emissions but the timescales required to implement key legislation have been longer than anticipated. The UK is in the process of revising our National Air Pollution Control Programme (NAPCP) and will set out the additional measures needed to bring the trajectory of emissions reductions back on track. This new NAPCP will capture the changing context brought about by wider policy commitments, including climate policies Net Zero).

The main barrier to implementation of ammonia emissions techniques are costs, the practicality (including around occupational health and safety, challenges of retrofit) of some

measures for farmers, data gaps on efficacy and environmental impact and safety of some measures and (in terms of ability to implement at pace) market supply of emissions reducing equipment.

Increasing deployment of anaerobic digestion facilities is a major barrier to reducing ammonia emissions. The by-product of this process, digestate, is a nutrient-rich substance that is used as a soil fertiliser. It has a high readily available nitrogen content and is therefore a potent source of ammonia emissions when exposed to the air.

Regarding policies on urea fertilisers specifically, there are substantial practical challenges in safely accommodating an increase in storage for ammonium nitrate and data gaps on the impacts of urease inhibitors on food supply chains and the environment. In addition there is the current worldwide shortage of supply of ammonium nitrate.

Barriers to abating emissions associated with the management of organic manures include the high cost and practicality (including health and safety issues) of covering stores challenges of low emission spreading equipment of sloping land, stony and drained soils and the risk of additional environmental impacts such as pollution swapping and plastic waste.

It should be noted that ammonia emissions are not in reality simply based on fixed emissions factors, as assumed in emissions inventories but are highly sensitive to meteorology, in particular temperature (Sutton et al, 2013). Therefore, more work is needed to assess the consequences of climate change on the rate of release of ammonia emissions.

Wales:

Barriers include the cost of measures and technical limitations (e.g. retrofitting of covers on slurry stores). Opportunities include the incentive to identify and implement cost effective measures to reduce losses of N in view of elevated fertiliser prices.

Northern Ireland:

Potential barriers:

- Costs – both capital costs and running costs depending on the specific approach used to reduce ammonia emissions.
- Uptake rates.
- The unsuitability of some ammonia reducing technologies for retrofitting in existing livestock housing.
- Lack of knowledge of ammonia reducing techniques and their optimal management.
- Farm size and structure.

Potential opportunities:

- Potential for costs savings and increased sustainability through more efficient nutrient utilisation throughout the livestock production cycle.
- Environmental benefits including reduced levels of ammonia and nitrogen deposition at designated sites.
- Novel unproven technologies may present more cost-effective ammonia reduction methods.

- Promotion of appropriate ammonia reducing methods through DAERA Knowledge and Technology Transfer channels.
- Further studies to identify the co-benefits and risks of climate policies on ammonia emissions
- Further research and development to address evidence gaps in the ammonia inventory, including improving emission factors to better represent farm practices and uptake of mitigation methods
- An ongoing comprehensive ammonia research and monitoring programme to inform best practice in ammonia management, including a better understanding of wider impacts across the environmental spectrum (e.g. land and nutrient management, water quality, species recovery etc).

FRANCE



8. Quelles mesures concernant l'ammoniac sont actuellement mises en œuvre ou prévues ?

C. Pour toutes les Parties à la Convention :

9. Selon vous, quels sont les principaux obstacles et opportunités associés à la réduction des émissions d'ammoniac (y compris en relation avec l'annexe IX) ?

Principaux freins : difficultés économiques structurelles du secteur pour faire face aux coûts et aux changements de pratiques.

Opportunités : Outre la diminution des risques pour la santé et les écosystèmes voisins, la lutte contre la volatilisation de l'ammoniac est aussi pour les agriculteurs une façon de maintenir la fertilité dans les sols, et donc de diminuer le poste d'achat d'engrais. De plus elle est corrélée à une diminution des émissions de GES (N₂O) et une diminution des nuisances olfactives.

FIN DU QUESTIONNAIRE.

COURTESY TRANSLATION

Questions to Parties to the Convention: Ammonia Questionnaire (December 2021)

A. For Parties to the Convention who are also Parties to the Gothenburg Protocol:

1. What actions have been taken to reduce losses from the whole nitrogen cycle?
 - a. national policies and legislation

If we think of cycle N, the scope of the question is quite broad.

For agriculture, the losses that need to be controlled are nitrates NO₃ in the water, and nitrous oxide N₂O in the air as well as ammonia NH₃.

With regard to NO₃, France has set up, in accordance with Directive 91/676/EEC, an action programme, which consists of a national program (PAN) and regional action programmes. This program defines the measures to be applied by farmers located in vulnerable areas. French vulnerable zones were revised in 2021 to take into account the evolution of nitrate levels in surface and groundwater as well as eutrophication. The action program (national and regional components) are currently being revised.

Regarding NH₃, France has implemented, in accordance with Directive (EU) 2016/2284, its National Plan for the Reduction of Atmospheric Pollutant Emissions (PREPA 2017-2021), the 2nd version of which (2022-2025) is in validation course. On the agricultural component and NH₃, the PREPA notably enabled the adoption in January 2021 of the Less Emission Spreading Equipment Plan (PMEME).

In addition, farms concerned by Directive 2010/750EU on industrial emissions ("Industrial Emission Directive", IED) must since February 2021 demonstrate the implementation of the combined Best Available Techniques (BAT) allowing compliance with the limit values of NH₃ emissions. Several aid schemes have been deployed to help with the acquisition of agricultural equipment to reduce emissions into the air (coverage of stockbreeding effluent storage equipment, less emissive spreading equipment, air, etc.), representing a public aid budget of approximately €35 million over the 2016-2021 period. Finally, with regard to NH₃ and N₂O, article 268 of the recent Law on combating climate change and strengthening resilience to its effects (known as the "Climate and Resilience" Law), of August 22, 2021, provides for the definition of annual emission reduction targets for these two gases by 2030, as well as the implementation of a national action plan with a view to

reducing ammonia and nitrous oxide emissions linked to the use of mineral nitrogen fertilisers, and is considering the establishment of a fee on the use of mineral nitrogen fertilisers.

Under these circumstances the N reduction projections are :

Polluant	Scénario	Unité	Année			
			2005	2020	2025	2030
NOx	AME	kt	1422	547	443	332
		%		-62%	-69%	-77%
	Objectifs NEC/PREPA	kt		711	569	441
		%		-50%	-60%	-69%
SO2	AME	kt	462	90	88	80
		%		-81%	-81%	-83%
	Objectifs NEC/PREPA	kt		208	157	106
		%		-55%	-66%	-77%
COVNM	AME	kt	1189	555	542	529
		%		-53%	-54%	-56%
	Objectifs NEC/PREPA	kt		678	630	571
		%		-43%	-47%	-52%
NH ₃	AME	kt	621	590	586	582
		%		-5%	-6%	-6%
	Objectifs NEC/PREPA	kt		596	571	540
		%		-4%	-8%	-13%
PM _{2.5}	AME	kt	247	108	96	86
		%		-56%	-61%	-65%
	Objectifs NEC/PREPA	kt		180	143	106
		%		-27%	-42%	-57%

Focus on the 2021 Climate and Resilience Law

According to article 268 of the law of August 22, 2021 on the fight against climate change and the strengthening of resilience, a fee on the use of nitrogenous mineral fertilizers according to their emissivity is part of the measures envisaged, considering the economic pressure on the agricultural and livestock sector, and the measures adopted in other European Member States. The fee could be implemented if the annual NH₃ or N₂O reduction targets (to be defined by decree) were not achieved for two consecutive years. Beforehand, a study must present:

- An analysis of the conditions of the fee (rate, basis and allocation of revenue to the agro-ecological transition);
- The social, economic and environmental impacts of the creation of such a tax;
- The possibility of evaluating differentiated rates according to the NH₃ and N₂O emission factors of the different types of fertilizer.

The results of this study are expected in the coming months in order to assess the conditions for implementing this measure.

Focus on PREPA

PREPA is a French integrated policy which compiles tools to combat air pollution, in particular to combat losses from the entire nitrogen cycle. Please find below a structured presentation of the PREPA :

<p>Country: FRANCE</p>	<p>Please indicate the pollutant(s), emissions of which are being controlled</p> <p>Pollutant(s): NOX, SO2, CH4, NH₃, COV and all other regulated air pollutants-2025 and 2030 objectives : article D. 222-38 of the code de l'environnement and article L. 222-9 of the same code</p>
<p>Protocol(s): Göteborg</p> <p>Please indicate the name of the protocol(s) to the Convention, obligations under which are being fulfilled</p>	<p>Sector:</p> <p>Please indicate the sector (e.g. agriculture, industry, urban planning, environment, etc.), or sectors (if several) for which the strategy, policy or measure has been mainly designed</p> <p>Agriculture, Breeding, manure, Industry, Transportation, residential heating, building</p>
<p>Type of strategy, policy or measure and the level of implementation:</p> <p>A National Air Pollution Control Programme (NAPCP) was adopted in 2017 to comply with the NEC directive. This integrated strategy named PREPA for National plan for reduction of air pollution since 2017 till 2021 is currently under update for the 2022 to 2026 period : economic e.g. incentive and disincentive (taxes, funds, subsidies, prices or caps/ceilings, payments, rebates, ...); both voluntary (agreements, programmes, contracts), and regulatory (legislation), with other measures : educational, informational, communication</p> <p>Please state at which level (municipal, regional, sub-</p>	<p>Method used for the current analysis:</p> <p>Please identify the method used for collecting information and the analysis made</p> <p>National regulatory data basis GEREPI implementing European environmental Directives</p> <p>National energy consumption data</p> <p>French air pollutant inventory and report (NIR) submitted to the Transboundary Air Convention and to the European Commission</p> <p>Monitoring data collected by the French air pollutant network</p> <p>Evaluation and projection work currently on progress</p>

<p>national, national) the policy, strategy or measure is targeted or implemented</p> <p>The PREPA is a national tool</p>	
<p>What is the main objective of the strategy, policy or measure? When has it been implemented/or will be implemented?</p> <p>The “PREPA, French national plan for reduction of air pollutants” is a national integrated plan which has been implemented from 2017 to 2021 in the framework of the European regulation issued from the Göteborg Protocol. The PREPA is currently evaluated to be updated and enhanced where necessary by the beginning of the year 2022, in order to meet the objectives of pollutant reduction by 2030. The new PREPA connection to climate change objectives and to the French national low carbon strategy and to the other sustainable policies will be strengthened compared to the first one, which ran from 2017 to 2021, when existing measures are not sufficient.</p>	
<p>Background and driving forces :</p> <p>The PREPA was adopted to comply with the NEC directive. PREPA is currently being updated as an update at least every four years is required by the NEC directive.</p>	
<p>Description of the strategy, policy or measure:</p> <p>The PREPA is monitored by the French Ministry for an ecological transition, managing ministries, sectors representatives, local geographical levels, NGOs and citizens under an incentive widely discussed process. A meeting of the FR National Council for the Air is organised once a year to follow up the PREPA.</p>	
<p>Costs, Funding and Revenue allocation :</p> <p>The measures listed within PREPA have their own funding. The total cost is difficult to evaluate, because it is hard to strictly differentiate what specifically belongs to air pollutant action, because of interaction with other policies such as climate for instance.</p>	
<p>Effect and impacts on reducing air pollution:</p> <p>The PREPA, required by Article L. 222-9 of the Environment Code, was first implemented in 2017 for the period 2017 to 2021 and will continue from 2022 to 2025. An assessment of the reductions in emissions achieved thanks to the PREPA policy measured between 2017 and 2021, is being achieved during the year 2021. The current update of the PREPA for the years to come will make it possible to define the tools necessary to reinforce and accelerate the actions. Many measures are directly related to individual behaviors. The individual factor is very much influenced by incentives such as financial bonuses, for example to buy a less polluting car or to improve the thermal insulation of one's apartment. In the meantime, the Government is implementing measures to accelerate the renewal of cars, such as the establishment of low-emission zones by regulatory</p>	

means, or improving the performance of biomass heating. The boundary between mandatory action and regulatory action is not strictly drawn. Pushing and pulling complement each other.

References/Further information: Please provide most relevant sources for information such as references for web links, books, other resources.

<https://www.ecologie.gouv.fr/politiques-publiques-reduire-pollution-lair>

MAIN PREPA MEASURES FOR AGRICULTURE (work in progress)

Raise awareness and train professionals and future professionals on air quality in agriculture

Raise awareness and train professionals - farmers, cooperatives for the use of agricultural equipment (Cuma), agricultural work companies (ETA) - on the effects of agricultural practices and systems on air quality	Consideration of air quality and gains related to good agricultural practices in favour of air quality (rapid burying of inputs, etc.) in training and professional meetings, in line with the Less Emissive Spreading Equipment Plan (PMEME) Communication campaigns on the gains related to good agricultural practices in favour of air quality (rapid burying of inputs, etc.), particularly during the main spreading periods
Involve agricultural and agronomic education to raise awareness and train on the effects of agricultural practices and systems on air quality	Consideration of the issue of air quality in the reference system for agricultural education diplomas Inventory of the existing and possible creation of educational resources addressing air quality
Promote the "Guide to good agricultural practices for improving air quality" developed as part of PREPA 2017-2021	Update of the guide sheets and development of new sheets if necessary Reinforcement of the distribution and appropriation of the guide by professionals, in particular through the production of communication media to highlight in the territories in a positive and concrete way the good practices included in the guide
Promote and disseminate the results of research on the theme of "air and agriculture"	Strengthening the transfer of research results and support for farmers in favour of air quality, in particular by setting up and/or leading networks of local correspondents in charge of the theme (private, public, consular sector in particular), in line with the Less Emissive Spreading Equipment Plan

Support and guide technical developments and farmer practices favorable to the reduction of ammonia emissions

Develop the rationale for nitrogen fertilization to reduce doses and limit nitrogen losses	Promotion of the integrated approach and dynamic reasoning of fertilization (adjustment during vegetation phase) Identification of relevant tools for calculating the predicted dose and managing nitrogen fertilization that can be used at the national level or in certain territories Support for the appropriation of tools by professionals in the field
Mobilize European, national and local funding to help invest in virtuous materials, improve practices and move towards less emissive systems	Aid for investment in manure storage covers, in less emissive spreading equipment, in precision farming tools and in decision-making tools for fertilization Mobilization of the local authorities for the amplification of funding in favour of air quality under EAFRD investment aid, in line with the Less Emissive Spreading Equipment Plan Valorization of aid schemes for organic farming and the development of leguminous plants Monitoring of available funding and information of professional agricultural organizations when an opportunity is identified Support for the pooling of agricultural equipment and technical services when the size of the farms and their density make them relevant with regard to the cost of less emissive equipment
Promote the "air quality" criterion in the eco-conditionality of support, planning and development systems	Promotion of agricultural systems, virtuous cropping and livestock practices with regard to air quality with those responsible for setting up call for projects, financing, planning and development systems, in particular the Schemes Regional Planning, Sustainable Development and Equality of Territories ("SRADDET"), Plans for the Protection of the Atmosphere ("PPA"), Local Plans for Quality Improvement ("PLQA"), Climate-Air-Energy Plans ("PCAET") Support for the development and promotion of tools allowing the reduction of emissions to be taken into account (brands, labels, certifications, etc.)
Put in place regulations on vane nozzles that promote more virtuous equipment in terms of ammonia emissions in line with the Less Emissive Spreading Equipment Plan	Construction of regulations in consultation with stakeholders Analysis of the progressiveness of the measure and possible adjustments with regard to environmental, social, administrative and technical-economic considerations, in particular the topographic and agronomic specificities of the plots
Promote the rapid incorporation, burial, injection and infiltration of the most emissive nitrogenous fertilizers and provide for regulations in relevant situations in line with the Less Emissive Spreading Equipment Plan	Compilation of existing data and support for experiments Identification of relevant situations requiring the application of regulations, with regard to environmental, social, administrative and technical-economic considerations Proposed regulations in dialogue with stakeholders

<p>In accordance with article 268 of the law of August 22, 2021 on the fight against climate change and strengthening resilience to its effects, consider a tax on nitrogenous mineral fertilizers based on their emissivity, while still preserving the viability of the agricultural sectors concerned and not to increase any distortions of competition with the measures in force in other Member States of the European Union.</p>	<p>Produce a report that:</p> <ul style="list-style-type: none"> - analyses the conditions, in particular of rate, base and allocation of revenue to the agro-ecological transition, under which a possible fee could be introduced in order to allow compliance with the trajectory of reduction of these emissions; - studies the economic, social and environmental impact of the creation of this fee, in particular its consequences on the economic viability of farmers by sector; - examines the advisability of setting differentiated rates according to the ammonia and nitrous oxide emission factors of the different types of fertilizers <p>Potential implementation of the fee in the event of non-achievement of the annual reduction objectives (defined by decree) of ammonia or nitrous oxide emissions for 2 consecutive years from today up to 2030.</p>
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IMPROVING KNOWLEDGE AND INNOVATION

<p>Improve knowledge on the origin of pollution and its impacts</p>	<p>Continuation of the chemical characterization program for particles (CARA)</p> <p>Continuation of the national program for the measurement and evaluation of long-range air pollution in rural areas (MERA) and support for collaboration between stakeholders (approved air quality monitoring associations and others) across borders to improve knowledge of long distance pollution</p> <p>Study of the impact of atmospheric pollution (ozone and methane as an ozone precursor) on the quality and yields of agricultural production</p> <p>Monitoring and promotion of the work of the PRIMEQUAL (inter-agency research program for better air quality) and CORTEA (Knowledge, source reduction and treatment of air emissions) programs</p>
<p>Identify and evaluate technologies and techniques for reducing and controlling air pollutant emissions</p>	<p>Monitoring, promotion and pursuit of calls for specific or integrated projects (example: PIA, etc.), including the biannual call for research projects AQACIA (Improving air quality: understanding, innovating, acting) of the ADEME (3.5 million euros/year) enabling:</p> <p>Support research and innovation to reduce agricultural emissions, in particular within the framework of the 4th future investment program and the AQACIA program.</p> <p>Initiatives should be encouraged in the following areas:</p>

	<ul style="list-style-type: none"> - feeding and genetic selection favorable to the reduction of nitrogenous excretions of animals, - nitrogen fertilisers: emission coefficients according to practices and environmental conditions; evaluation of certain organic fertilizer and innovative nitrogenous mineral fertilizers, - less emissive spreading equipment (in line with the Less emissive spreading equipment Plan) and decision-making tools in this area - the characterization of agricultural systems with regard to their impact on the air - alternatives to the burning of agricultural residues, in particular vine shoots
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Ammonia code

2. Has an advisory code of good agricultural practice to control ammonia emissions been established, published and disseminated? ('National Ammonia Code', NAC) Please also see and check the attached Excel spreadsheet, which gives information for different countries based on responses up to summer 2021.

a) Code established, published and disseminated?

Yes : In April 2019, see : <https://agriculture.gouv.fr/un-guide-des-bonnes-pratiques-pour-ameliorer-la-qualite-de-lair-refreshed-2020>.

Please briefly summarize the main provisions of the National Ammonia Code :

The code refers to Directive UE 2016/2284 and describes in dedicated forms good practices and their co-added values, avoiding pollution transfers. This in order to improve air quality :

- Breeding : cows, pigs, chicken...for the various types of tasks : feeding, buildings, storage, manure, grazing.
- Agriculture : N-fertilization and spreading modalities ; waste management ;

Please provide an internet URL for your national ammonia code or pdf copy if available: April 2019, see : <https://agriculture.gouv.fr/un-guide-des-bonnes-pratiques-pour-ameliorer-la-qualite-de-lair>

d. Please confirm that the Excel spreadsheet has been checked, and where necessary updated:

Yes, it has been updated in January 2022 (excel sheet mentioning the code has been updated accordingly).

3. What actions have been taken to limit ammonia emissions from urea-based and other fertilizers?

Please refer to forms 11, 13 and 14 of the code.

4. What actions have been taken to ensure that low-emission slurry application techniques are used that reduce ammonia emissions by at least 30% compared with the reference?

Please refer to form 12 of the code.

5. What actions have been taken to ensure that solid manure is incorporated into soil within 24 hours of spreading?

Please refer to forms 12 of the code.

6. What actions have been taken to ensure that new and existing slurry stores on large pig and poultry farms use systems that reduce emission by at least 40% compared with the reference?

Please refer to forms 5, 6 and 7 of the code.

7. What actions have been taken to ensure that new animal housing on large pig and poultry farms use systems that reduce emission by at least 20% compared with the reference?

Please refer to forms 5, 6 and 7 of the code.

B. For Parties to the Convention who are not parties to the Gothenburg Protocol or where Annex IX does not apply:

8. What measures for ammonia are currently implemented or planned to be implemented?

C. For all Parties to the Convention:

9. What do you see as the main barriers and opportunities associated with reducing ammonia emissions (including in relation to Annex IX)?

Main barriers : structural economical difficulties of the sector to face the costs and the changes of practices.

Opportunities : First, struggling against ammonia emission reduces health risks and damages to ecosystems near-by. It's also an opportunity to face climate change and to adapt to it. For the farmers, this is an opportunity to higher the fertility of their soils and thus to reduce cost of purchasing mineral fertilizers.

END OF QUESTIONNAIRE.

Annex B: Status Summary of National Ammonia Codes (draft)

#	Party to the Gothenburg Protocol	Published as an independent document	Date of publication	Published but included in a general code of good practices	Date of publication	The document is under revision	Expected date of publication	The document is being drafted	Expected date of the draft delivery	There are plans to develop such a document	Expected date to start the drafting process	The code does not exist, and there are no plans yet for its development
1	Austria											
2	Belgium							Y	End 2022 (Walloon region)			
2	Belgium											Y
3	Bulgaria	Y	March 2020									
4	Canada											Y
4	Czechia	Y	November 2008			The updated codex is completed.	Publication is expected during May 2021					
5	Estonia	Y	September 2019									
6	France		April 2019, see :	Y								
7	Germany	Y	2003			Y	Summer 2021					
8	Italy			Y	23 December 2021							
9	Latvia	Y	2020									
10	Lithuania			Y	2019							
11	Liechtenstein			Y	national air quality plan							
12	Malta			Y	2001							
13	Monaco											
14	Portugal			The document is concluded	It is foreseen to be published in 2022	Y	?			Y	2022	
15	Republic of Croatia											Y
16	Republic of Cyprus			Y	06/06/2014							
17	Republic of Finland	Y	March 8th 2018			Y	new version June 30th 2021					
18	Republic of Moldova											
19	Romania									Y	2021	
20	Slovak Republic	Y	2. May 2020									
21	Slovenia	Y	2020									
22	Sweden	Y	2006									
22	Sweden	Y	2020									
23	Spain	Y	2017									
23	Spain	Y	2017									
23	Spain	Y	13/02/2020									
23	Spain	Y	27/07/2021									
23	Spain									for dairy & non dairy cattle	2022-2023	
23	Spain									all species	2nd semester 2022	
23	Spain									for pigs	Available from march 2022	
23	Spain									all species	2022-2025	
23	Spain					Y	before 2023					
24	Switzerland			Y								
24	Switzerland				Module: Nutrients and fertiliser use in agricult		2012					
24	Switzerland				Module: Structural environmental protection in		2012					
24	Switzerland				Module: Biogas plants in agriculture		2016					
24	Switzerland				Other modules not concerning air protection							
24	Switzerland				Soil protection in agriculture		2013					
24	Switzerland				Phytosanitary products in agriculture		2013					
24	Switzerland				Link: Vollzugshilfe Umweltschutz in der Landwirtschaft (admin.ch)							
25	United Kingdom (England)	Y	27/07/2018									
25	United Kingdom (Northern)	Y	16/05/2019									
25	United Kingdom (Scotland)			Y	11/03/2005			Y	new version later in 2021			
25	United Kingdom (Wales)	Y	02/04/2019									
26	US									Y		
	Number of Parties	11		8		5				4		3