

Options for revision of Annex IX of the Gothenburg Protocol.

“Measures for the control of emissions of ammonia from agricultural sources.”

Heads of Delegation Meeting of the UNECE Geneva Air Convention (5-7 October 2026)

Note submitted by the co-chairs of the Task Force on Reactive Nitrogen¹

Summary: Annex IX of the Gothenburg Protocol plays a key role in reducing ammonia emissions, mobilizing better nutrient management and reducing transboundary air pollution. The annex represents a basic set of mandatory requirements as drafted in the mid-1990s and adopted in 1999, since when parties have gained 30 years of experience in implementing ammonia mitigation methods. In this note, we reflect on the experience of the last three decades and the recent feedback from parties and experts as a basis to sketch out possible options for revision of Annex IX. The Task Force invites Heads of Delegation to reflect on the options to allow their further refinement.

Background

1. The history of Annex IX and the opportunities for its revision have been set out in ECE/EB.AIR/WG.5/2026/INF.8, as presented to WGSR-64 in May 2026.² Annex IX was drafted in the mid-1990s, and is thus around 30 years old. Since then, parties have gained substantial experience in implementing ammonia mitigation measures. The present revision of the Gothenburg Protocol is thus a long-overdue opportunity to update Annex IX.
2. Annex IX represents a short set of *basic mandatory requirements* to reduce agricultural ammonia emissions for the parties within the EMEP area. The annex does *not* specify the use of any specific techniques, but rather sets benchmarks of required emissions reductions (set as percentages compared with reference methods). Annex IX is important as it sets a *level of ambition for ammonia mitigation on farms* that complements the national emission reduction commitments (as adopted in 2012 and under the current revision process).
3. Annex IX is complemented by the Guidance Document on Preventing and Abating Ammonia emissions.³

¹ The note is informed by feedback from the 64th meeting of the Working Group on Strategies and Review (WGSR-64, 18-20 May 2026) and the online briefing of the Task Force on Reactive Nitrogen (3 July 2026). It provides a starting point for further discussions.

² See <https://unece.org/environment/documents/2026/03/informal-documents/opportunities-revising-annex-ix-gothenburg>

³ The 3rd edition was adopted in 2012 (ECE/EB.AIR/120) and subsequently published for dissemination as ‘Options for Ammonia Mitigation’ (<https://www.clrtap-tfrn.org/>). A new edition is currently being developed by TFRN (ECE/EB.AIR/WG.5/2026/INF.5).

4. The current revision of Annex IX is an opportunity to update it from a technical perspective, to address gaps in its provisions and to review the ambition level of the commitments. It is also an opportunity to make the links to wider thinking on sustainable nitrogen management.⁴
5. Revision of Annex IX is needed from both environmental and economic standpoints. As emissions of SO₂ and NO_x have reduced, ammonia makes a particularly important contribution to particulate matter air pollution and to nitrogen deposition to sensitive ecosystems, including through its ‘alkaline air’ effect, which makes it more damaging to vulnerable ecosystems per kg N than wet-deposited nitrogen. At the same time, repeated fertilizer crises (e.g., linked to the Ukraine War and the Iran War), have pushed up fertilizer prices and supply uncertainties, highlighting the imperative to waste less reactive nitrogen, where ammonia emission reduction makes a significant saving, contributing to the ‘circular economy’.⁵
6. The TFRN paper ‘*Ammonia mitigation for economic and environmental benefits*’⁵ has highlighted the many ‘low-hanging fruit’ for ammonia abatement, where investment can help farmers save money by reducing the requirement to purchase expensive nitrogen fertilizers and unneeded feedstuffs. In 2022 (a year of high fertilizer prices associated with the Ukraine war), the EU wasted around €60 billion worth of reactive nitrogen from the agri-food chain,⁶ which is roughly the entire annual budget of the EU Common Agricultural Policy.

Approaches to maximize cost effectiveness

7. Revision of Annex IX provides an opportunity to mobilize significant emission reductions in a cost-effective way. To achieve this means that **the focus of revision is to adopt an ambition level that matches to the low-hanging fruit for ammonia mitigation**. Whereas certain parties may need to go further than specified in Annex IX to avoid adverse effects,⁷ we anticipate that the present focus of Annex IX revision is to bring forward a *substantial cohort of parties by establishing a shared standard focused on cost-effective ammonia mitigation*.
8. Another way to maximize cost-effectiveness is to **consider mitigation requirements in relation to farm size and equipment size**. For further details, see

⁴ The principles underlying ammonia emission reduction, as part of wider sustainable nitrogen management, are outlined in the ‘UNECE Guidance Document on Integrated Sustainable Nitrogen Management’ (<https://unece.org/environment-policy/publications/guidance-document-integrated-sustainable-nitrogen-management>).

⁵ <https://unece.org/environment/documents/2026/03/working-documents/ammonia-mitigation-economic-and-environmental>

⁶ All pathways included, with most ultimately deriving from fertilizers (with some from biological nitrogen fixation), including losses from manures, human excreta and wasted food. Values based on nitrogen flows estimated by the *European Nitrogen Assessment*, combined with a 2022 fertilizer price of €2.70 per kg N (*International Nitrogen Assessment*, in press).

⁷ The Ammonia Guidance Document (see note 3) outlines a comprehensive set of measures including those with higher ambition than the benchmarks of Annex IX. Countries can benefit from the Ammonia Guidance Document where they need to implement measures that are more ambitious than Annex IX.

the document '*Consideration of farm-size differences as an aid to cost-effective ammonia emission reduction*' (presented to the Heads of Delegation [HoD] meeting, Leiden, 5-7 October 2026). That document compares the use of different metrics to set the thresholds, either as livestock units (LSU) or as annual amounts of nitrogen excreted per farm. We use the findings of that analysis in the present document to exclude the smallest farms from requirements under Annex IX. Such an approach favours cost-effectiveness because ammonia mitigation methods tend to have lower net costs (or increased net profit) when implemented on larger farms or with equipment sharing. The approach simultaneously reduces overall regulation costs, while helping to preserve valued family farms.⁸

Key points of recent feedback

9. A number of changes to the present document have been made in relation to recent expert feedback from TFRN and WGSR-64.
10. Among others, the options include: a) further details to encourage sustainable nitrogen management, with benefits for increasing resilience and environmental protection by reducing overall nitrogen losses, b) attention to the processing of other organic matter (in addition to processing of livestock manure), given the wider significance of anaerobic digestion for ammonia emissions, and c) a provision in relation to standards for manufacturing and sale of new slurry spreading equipment.

Tabulated options for Annex IX revision

11. For the detailed description of options, please see **Tables 1 to 3** that follow, where we compare Annex IX in its original form (from 1999) with options for its revision. A third column offers explanatory notes.⁹

Possible additional provisions of a future Annex IX

12. The options outlined in Tables 1 to 3 focus on providing a short-list of the most critical actions. The brevity reflects the request from parties for a focused approach. Additional potential provisions (as also previously discussed at ECE/EB.AIR/WG.5/2011/3) could include the following, subject to further guidance from parties:
 - a. **Targets for increasing nitrogen use efficiency and for reduction in wasted nitrogen resources** in crop and animal production and integrated farms.
 - b. Provisions for achieving **improvements in farm gate nitrogen balances for demonstration farms** in each country, taking into account spatial nitrogen pollution swapping and synergies across near and remote spaces.

⁸ Such thresholds could also apply to equipment specifications, e.g., exemptions for small slurry tankers.

⁹ For background, see ECE/EB.AIR/WG.5/2026/INF.8 and (earlier) ECE/EB.AIR/WG.5/2011/3:

<https://unece.org/fileadmin/DAM/env/documents/2011/eb/wg5/WGSR48/ECE.EB.AIR.WG.5.2011.3.E.pdf>.

The present document is updated with the latest perspective.

- c. Implementation of **nitrogen input-output balances on all farms above specified size thresholds**, with collection of baseline values in a first 5-year period, and targets for improvement over successive 5-year periods. Such budgets are much more easily done with modern farm equipment like yield monitors etc.
- d. **Establishment of national nitrogen budgets** as far as is technically feasible based on available statistics, and monitoring of improvement, setting ammonia emission reduction in context of other improvements, including considering imbalances between regions (within and between countries).¹⁰
- e. **Targets for improvements in livestock feeding strategies for farms above certain size thresholds**, over 5-year periods towards target values specified in the Guidance Document.

13. **Increasing nitrogen use efficiency** (i.e., N in outputs / N in inputs) and **reducing nitrogen surpluses** (i.e., N in outputs minus N in inputs) measured over several years are critical to reducing excessive amounts of reactive nitrogen in soils (i.e., that which is excess to crop requirements). This is a key point in the **reduction of reactive nitrogen emissions** from fertilizers, manures and soils. In this way, simultaneous reductions can be achieved of NH₃, NO_x, N₂O, N₂ emissions, leaching of NO₃⁻ and other N compounds, and overall reduction in wasted reactive nitrogen resources (and associated with other problematic nutrients such as phosphorus).

Questions to Heads of Delegation (Leiden, 5-7 October 2026)

14. We invite the HoD meeting to provide feedback on the approaches and options shared in this document, enabling further discussion by TFRN (Leiden, 8-9 October).
- a) Does the overall approach match to the needs of Parties to reduce ammonia emissions while allowing appropriate flexibility?
 - b) Does the range of ambition of the options provide a suitable starting point for further consideration by the Parties?

Table 1: Comparison of Annex IX of the Gothenburg Protocol with options for its possible revision. New text is shown in **bold**, deleted text is ~~crossed out~~. Footnotes highlight potential variation in ambition level.

Existing Annex IX (1999 text)	Options for revision of Annex IX	Explanatory notes
MEASURES FOR THE CONTROL OF EMISSIONS OF AMMONIA FROM AGRICULTURAL SOURCES	MEASURES FOR THE CONTROL OF EMISSIONS OF AMMONIA AND OTHER NITROGEN-CONTAINING SUBSTANCES FROM AGRICULTURAL SOURCES	Title of the Annex. The addition emphasizes co-benefits, including reducing emissions of nitrogen oxides (NO _x) from agricultural soils.
1. The Parties that are subject to obligations in article 3, paragraph 8 (a), shall take the measures set out in this annex.	<i>[Paragraph for later discussion]</i>	Flexibility may be increased if parties cannot all agree (e.g. establishing a list of parties adopting Annex IX).

¹⁰ Reporting of national nitrogen budgets is already established under the main text of the revised Gothenburg Protocol of 2012. Additional options could consider further development of the approach.

1.bis	This annex describes the minimum reductions for the control of ammonia emissions; these can be reached by using the ‘Guidance Document on Preventing and Abating Ammonia Emission from Agricultural Sources’ and any amendments as adopted by the Executive Body (hereafter referred to as the Ammonia Guidance Document).	The Ammonia Guidance Document [formerly called Guidance Document V] is referred to in several places and the amendment brings this to the start of the annex.
2. Each Party shall take due account of the need to reduce losses from the whole nitrogen cycle.	Each Party shall take due account of the need to reduce losses from the whole nitrogen cycle. Each Party shall as far as possible identify coherent packages of measures that help can maximize co-benefits of ammonia mitigation and minimize trade-offs, as described in the Guidance Document on Integrated Sustainable Nitrogen Management, and any amendments thereto.	This now allows mention of the integrated nitrogen guidance document, which also describes how to design coherent ‘packages of measures’ (Chapter 7).
2.bis	Each Party shall develop strategies for increasing nitrogen-use efficiency and reduced waste of reactive nitrogen resources in crop and animal production to foster simultaneous reduction of ammonia, nitrogen oxides, dinitrogen and nitrous oxide to air and reactive nitrogen losses to water, while building resilience through actions to increase recovery and reuse of existing reactive nitrogen resources. Parties shall report their activities at the request of the Executive Body.	The new text reflects the need for strategies that reduce the wasteful loss of valuable reactive nitrogen resources, with multiple environmental and economic benefits, especially in the context of vulnerability to repeated fertilizer crises. A quantitative target for this provision is not set. ¹¹
2.ter	Unless otherwise specified, the time-scales for the application of the minimum measures set out in this annex are: (a) three years after the date of entry into force of the present revised Protocol for Parties already Parties to the Gothenburg Protocol (hereafter ‘existing Parties’), (b) six years after the	This paragraph updates and consolidates the previous dates of entry into force, noting that additional time may be needed for current non-Parties. If the Gothenburg Protocol revision were signed in 2028 and come into force (after sufficient ratifications) by 2033, then most

¹¹ Parties could increase the ambition of this provision by considering options for *quantitative* targets, for example, building on the existing commitment of the Global Biodiversity Framework to halve pollution of excess nutrients between 2011-2020 and 2030, and or targets for increased nitrogen use efficiency and reduced waste of reactive nitrogen resources (including targets for maximum soil ‘nitrogen surpluses’).

	date of entry into force of the present revised Protocol where a Party was not a Party to the 1999 Gothenburg Protocol or its 2012 revision (hereafter ‘new Parties’).	requirements of this annex would apply by a) 2036 for current parties) and b) 2039 for new parties. ¹²
2. quater	Where measures other than those listed as Category 1 in the Ammonia Guidance Document are used to meet the requirements of this Annex, parties shall report these, including justification of the verification procedures used to estimate the abatement efficiencies specified.	The Ammonia Guidance Document lists Category 1 as the best-established methods. This provision ensures that, where Category 2 and 3 measures are used, there is appropriate demonstration of their effect in reducing ammonia emission. ¹³
<u>A. Advisory code of good agricultural practice</u> 3. Within one year from the date of entry into force of the present Protocol for it, a Party shall establish, publish and disseminate an advisory code of good agricultural practice to control ammonia emissions. The code shall take into account the specific conditions within the territory of the Party and shall include provisions on: - Nitrogen management, taking account of the whole nitrogen cycle; - Livestock feeding strategies; - Low-emission manure spreading techniques; - Low-emission manure storage systems;	<u>A. Advisory code of good agricultural practice</u> Within one year from the date of entry into force of the present Protocol for it, Each Party shall establish, publish and disseminate an advisory code of good agricultural practice to control ammonia emissions, drawing on principles from the Framework Code for Good Agricultural Practices for Reducing Ammonia Emissions, adopted by the Executive Body at its thirty-third session (ECE/EB.AIR/129) and any amendment thereto. The advisory code shall take into account the specific conditions within the territory of the Party and shall include provisions on: (a) Nitrogen management, taking into account the full nitrogen cycle; (b) Livestock feeding strategies; (c) Low-emission manure spreading techniques approaches;	This addition ensures that Parties benefit from the Framework Code in preparing their National Ammonia Codes. ¹⁴ Some parties found the term ‘code’ confusing as implying that the NACs reflect mandatory legal requirements. The term ‘advisory’ addresses this confusion.

¹² These timescales represent an easily achievable low level of ambition. A higher ambition could be achieved by setting earlier dates of the requirements.

¹³ The draft revised Ammonia Guidance Document (ECE/EB.AIR/WG.5/2026/INF.5) includes a new appendix ‘Methods for ammonia measurement and quality criteria’. The option represents a low ambition, where parties subsequently agree on the preferred form of reporting. A higher ambition would specify reporting timescales and requirements in Annex IX itself.

¹⁴ Establishment of a National Ammonia Code (NAC) is mandatory in the 1999 Gothenburg Protocol, while the content of a NAC may be voluntary. It is up to Parties to decide if a NAC should include mandatory actions, in line with national legislation. A higher level of ambition could specify that NACs be made available on the internet and lodged with the UNECE Secretariat for sharing with other Parties. Parties may also wish to consider how to further promote wider dissemination of the NACs (e.g., linking NACs to grants for farmers, other support payments and government programmes such as crop insurance).

- Low-emission animal housing systems; and - Possibilities for limiting ammonia emissions from the use of mineral fertilizers. Parties should give a title to the code with a view to avoiding confusion with other codes of guidance.	(d) Low-emission manure storage systems; (e) Low-emission manure and other organic matter processing, including anaerobic digestion, composting and other systems; (f) Low-emission animal housing systems; (g) Possibilities for limiting ammonia emissions from the use of mineral fertilizers. Parties should give a title to the code with a view to avoiding confusion with other codes of guidance and as far as feasible be linked to other codes of good agricultural practices describing good management of the overall nitrogen cycle.	Provision e) was previously missing, and is now also covered in the draft revision of the Ammonia Guidance Document. The framing ‘other organic matter’ ensures that the risks of anaerobic digestion for ammonia emission are addressed The insertion encourages that the National Ammonia Codes make the link to wider sustainable nitrogen management which is critical in order to highlight the economic benefits.¹⁵
<u>B. Urea and ammonium carbonate fertilizers</u> 4. Within one year from the date of entry into force of the present Protocol for it, a Party shall take such steps as are feasible to limit ammonia emissions from the use of solid fertilizers based on urea.	<u>B. Urea and ammonium carbonate fertilizers</u> For field application of fertilizers based on urea, approaches shall be used that have been shown to reduce ammonia emission by at least 50% for solid fertilizers and at least 30% for liquid fertilizers, compared with the reference specified in the Ammonia Guidance Document.¹⁶	Based on substantial developments over the last 30 years, the revised text now includes a quantitative benchmark for reduction, representing a middle ambition option allowing wide flexibility in the choice of measures to achieve the required reduction. The old text did not address emissions from liquid fertilizers.
5. Within one year from the date of entry into force of the present Protocol for it, a Party shall prohibit the use of ammonium carbonate fertilizers.	Within one year from the date of entry into force of the present Protocol for it, A Party shall prohibit the use of ammonium carbonate fertilizers from the date of entry into force of the revised protocol (existing Parties) or from two years after the date of entry into force (new Parties).	This provision has since been reflected in the EU Fertilising Products Regulation (EU 2019/1009), which does not include ammonium bicarbonate (ABC) fertilizer.¹⁷

¹⁵ An option with higher ambition could specify that: ‘The advisory code shall be reviewed and updated at least every five years and whenever the framework code is revised’.

¹⁶ A reduction of >50% can be achieved by use of urea incorporation (within 24 hours of application), urease inhibitors (except for urea ammonium nitrate, UAN, solutions where 30% reduction can be achieved), or by replacing urea with a non-urea fertilizer. A higher ambition option would be to require 50% reduction for all urea use (requiring incorporation of UAN solutions), while a lower ambition option would be to require 30% reduction for all urea use. The addition of provisions for use of ammonium sulphate and ammonium phosphate fertilizers would be a further high ambition option (see ECE/EB.AIR/WG.5/2011/3).

¹⁷ Experience over the last decade has indicated that there could be renewed interest in using ABC as a fertilizer when this is produced by recovery of organic nitrogen pools in a circular economy perspective. If ABC is stored under cover and fully incorporated into soil immediately on application, it has been suggested that its use might be permitted in this context. Parties may wish to review this provision.

C. Manure application 6. Each Party shall ensure that low-emission slurry application techniques (as listed in guidance document V adopted by the Executive Body at its seventeenth session (decision 1999/1) and any amendments thereto) that have been shown to reduce emissions by at least 30% compared to the reference specified in that guidance document are used as far as the Party in question considers them applicable, taking account of local soil and geomorphological conditions, slurry type and farm structure. The timescales for the application of these measures shall be: 31 December 2009 for Parties with economies in transition and 31 December 2007 for other Parties. 1/ 1/ For the purpose of the present annex, "a country with an economy in transition" means a Party that has made with its instrument of ratification, acceptance, approval or accession a declaration that it wishes to be treated as a country with an economy in transition for the purposes of paragraphs 6 and/or 9 of this annex.	C. Application of manure and organic digestates For land application of slurry (i.e. liquid manure), digestate and solid manure, approaches shall be used (as listed in the Ammonia Guidance Document) that have been shown to reduce emissions as specified in Table 3 [high/medium/low ambition]. This provision applies to the land application of slurry, digestate and solid manure from all livestock types to both arable land and grassland.	The revised scope now also includes the spreading of digestates remaining after anaerobic digestion. Stakeholders have found the original text to be confusing. The revised provision provides clarity on the requirements alongside specific exemptions to maximize benefits, while minimizing costs. The option is pitched at the most cost-effective measures, recognizing that band spreading methods (trailing hose, trailing shoe and injection) offer multiple benefits for reduced ammonia emissions, reduced run-off and for improved yield (by more-even manure application). Other methods can be used that achieve the same reduction. This provision is quantitatively one of the most important in overall ammonia emission reduction in the UNECE region.
6.bis	Within one year from the date of entry into force of the revised Protocol, each Party shall ensure that all newly manufactured and sold equipment for spreading slurry or digestate achieves at least 30% emission reduction on average compared with the reference specified in the Ammonia Guidance Document.¹⁸	This measure brings clarity on the selling of new equipment to meet a basic standard. It means that the 'slash-plate slurry spreader' (1950s technology) is finally replaced by modern technology. Adoption of this provision would be a major public milestone for the UNECE. The requirement can be met by trailing hose, trailing shoe and injection band-spreading approaches, which reduce ammonia emissions, run-off and improve agronomic benefit through more-even application of slurry. Add-on approaches can further reduce emissions (e.g. acidification, application timing, solid-liquid separation, dilution etc).

¹⁸ The requirement represents a low ambition. Exemptions may be specified for spreaders attached to small slurry tanks (less than 2 m³) and equipment produced specifically for use in experimental research.

7. Within one year from the date of entry into force of the present Protocol for it, a Party shall ensure that solid manure applied to land to be ploughed shall be incorporated within at least 24 hours of spreading as far as it considers this measure applicable, taking account of local soil and geomorphological conditions and farm structure.	[This provision is replaced by the revised provision for manure application listed at section 6 above]	Full incorporation of manure within 4 hours achieves a 45-60% ammonia emission reduction, while full incorporation within 24 hours achieves around 30% reduction compared with the reference of surface application. Limitations for grass and after sowing are addressed in the revised text (section 6 above, and Table 3a, 3b, 3c).
<u>D. Manure storage</u> 8. Within one year from the date of entry into force of the present Protocol for it, a Party shall use for new slurry stores on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, low-emission storage systems or techniques that have been shown to reduce emissions by 40% or more compared to the reference (as listed in the guidance document referred to in paragraph 6), or other systems or techniques with a demonstrably equivalent efficiency. 2/ 2/ Where a Party judges that other systems or techniques with a demonstrably equivalent efficiency can be used for manure storage and animal housing in order to comply with paragraphs 8 and 10, or where a Party judges the reduction of emissions from manure storage required under paragraph 9 not to be technically or economically feasible, documentation to this effect shall be reported in accordance with article 7, paragraph 1 (a).	<u>D. Manure and digestate storage outside of animal houses</u> For new slurry stores outside of animal houses for cattle, pig and poultry, and for new stores for digestate, low-emission storage approaches shall be used that have been shown to reduce ammonia emissions by 60% or more compared with the reference, as listed in the Ammonia Guidance Document.¹⁹	The revised provision ensures that newly build slurry stores achieve an appropriate standard based on a wide range of techniques described in the Ammonia Guidance Document. The provision does not apply to manure stores inside (underneath) animal houses where emissions are included as part of the housing emissions. Based on 30 years of experience since Annex IX was drafted (as reflected in the Ammonia Guidance Document, the caveats of note 2/ are no longer applicable.
9. For existing slurry stores on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, a Party shall achieve emission reductions of 40% insofar as the Party	For existing slurry and digestate stores, low emission storage approaches shall be used that have been shown to reduce ammonia emissions by 40% compared with the reference	This provision applies for all farm types, apart from small farms as specified by the exemption.

¹⁹ The provision represents a medium ambition. As noted in ECE/EB.AIR/WG.5/2011/3, this provision could be set with a higher level of ambition (80% reduction) or a low level of ambition (40% reduction). These reduction tiers are outlined in the Ammonia Guidance Document: a low ambition of 40% reduction is typically achieved via natural crusts and other natural floating covers; a medium ambition of 60% reduction is achieved by well-established natural crusts and floating materials like leca balls; a high ambition of 80% reduction is achieved by rigid, airtight or impermeable tensioned membrane covers.

considers the necessary techniques to be technically and economically feasible. 2/ The timescales for the application of these measures shall be: 31 December 2009 for Parties with economies in transition and 31 December 2007 for all other Parties. 1/ For note 1/, see Manure application.	described in the Ammonia Guidance Document. Exemptions to this provision shall apply for ‘small farms’ of less than 50 livestock units or 3500 kg N excretion per year (see note to Table 3) and for existing lagoons of more than 5000 m² surface area, for which ammonia emission reductions of 40% should be achieved, as far as the Party considers it technically and economically feasible.²⁰	The provision is new in including emissions from storage of cattle manure, which was previously missing from the 1999 version of Annex IX. A further exemption applies for very large <i>existing</i> lagoons.
9.bis	For existing and new stores for solid manure, low-emission storage systems such as described in the Guidance Document should be used, so far as it considers them technically and economically feasible. When it is considered not feasible, this shall be reported by the Party.	Provision to reduce ammonia emissions from storage of solid manure is missing from the 1999 version of Annex IX. This new provision is targeted to mobilize action by Parties in addressing this source and to report progress.
E. Animal housing 10. Within one year from the date of entry into force of the present Protocol for it, a Party shall use, for new animal housing on large pig and poultry farms of 2,000 fattening pigs or 750 sows or 40,000 poultry, housing systems which have been shown to reduce emissions by 20% or more compared to the reference (as listed in the guidance document referred to in paragraph 6), or other systems or techniques with a demonstrably equivalent efficiency. 2/ Applicability may be limited for animal welfare reasons, for instance in straw-based systems for pigs and aviary and free-range systems for poultry. [For note: 2/ See under ‘manure storage’]	E. Animal housing For animal housing, a Party shall use systems (as listed in the Guidance Document) that have been shown at minimum to reduce emissions as specified in Table 2.	The distinction between new and existing animal housing is now incorporated into the table. The revised provision applies for all livestock types, including cattle, which were missing from the 1999 version of Annex IX.

²⁰ Other levels of ambition for excluding small farms would be possible, see note ‘*Consideration of farm-size differences as an aid to cost-effective ammonia emission reduction*’ (October 2026).

Table 2. Ammonia emission reduction requirements for animal housing.

Category	Minimum emission reduction compared with the reference ^a	Exemptions/Conditions
Existing pig and poultry housing on farms with more than 380 livestock units or excretion over 25000 kg N per year.	20%	[Note: the exact value of these farm thresholds require further discussion and harmonization. Here the focus is on the approach in principle.]
New or largely rebuilt cattle housing ^b	25%	As far as a Party considers it feasible and acceptable for animal welfare reasons. When it is considered not feasible, this shall be reported by the Party.
New or largely rebuilt pig housing ^b	60%	A relaxation to 35% reduction applies for locations where the average air temperature of the warmest month exceeds 20°C (based on a five year mean).²¹
New and largely rebuilt broiler housing ^b	20%	Includes chicken, turkeys, geese and other table birds [Note: The net cost of meeting this provision is negligible for all countries.]
New and largely rebuilt housing for layer hens ^b	50% (caged layer hens) and 60% (non-caged layer hens) ²²	
New and largely rebuilt animal housing on farms for animals other than those already listed in this table ^b	Use of low-emission housing systems	As far as they are considered technically and economically feasible. When it is considered not feasible, this should be reported.

a/ The reference specified is that listed in the Ammonia Guidance Document.²³ The percentage values represent performance on average, as described in the guidance document.

b/ Livestock farms with less than 50 livestock units or less than 3500 kg N excretion per year would be exempt from these requirements.

²¹ The provision represents a mid-level ambition. Changing the exemption for warm climates to 25% would represent a low level of ambition.

²² These provisions represent mid-level ambition. A lower ambition level for caged layer hens would be 30% reduction compared with the reference.

²³ All references to the 'Ammonia Guidance Document' in Tables 1-3 refer to the document that is current at any time. The reference systems remain unchanged between the 2012 version of the Ammonia Guidance Document and the draft revised Guidance Document (ECE/EB.AIR/WG.5/2026/INF.5).

Table 3a (*high ambition*) Ammonia emission reduction requirements for slurry and solid manure application to arable and grassland.

Category	Minimum emission reduction compared with the reference ^a	Exemptions/Conditions
For slurry and digestate application to arable land and grassland and for solid manure application to bare soils	To use methods that reduce emissions by at least 60% compared with the reference method	Small farms ^b Specific soil conditions ^c
For slurry and digestate application to solid-seeded winter cereal crops after seedling emergence	To use methods that reduce emissions by at least 50% compared with the reference method	[Note: The relaxation is because the most effective low-emission methods are not suitable in this situation.]
For solid manure application only to grassland or arable crops after sowing	To use methods that reduce emissions by at least 30% compared with the reference	The reduction should be achieved as far as the Party considers it feasible. When it is considered not feasible this should be reported by the Party. [Note: The relaxation is because the most effective low-emission methods are not suitable in this situation.]

a/ The reference specified is that listed in the Ammonia Guidance Document. The percentage values represent performance on average, as described in the guidance document.

b/ For livestock farms defined as ‘small farms’, this requirement applies only as far as the Party considers it feasible. This relaxation does not apply to manure transported for application to arable farms. ‘Small farms’ are defined as either: a) those livestock farms holding less than 50 livestock units (Note 1), or b) those livestock farms where total nitrogen excretion is less than 3500 kg nitrogen per year, or c) 1600 kg N per year in identified environmentally sensitive areas. Parties shall report which threshold they adopt in implementing these provisions.

c/ A relaxation of the requirement to 30% reduction compared with the reference applies due to technical feasibility to fields with: (i) stony soils, (ii) high clay soils (>35% clay particle content) in very dry conditions, (iii) peat soils (>25% organic matter content), and (iv) a slope of more than 15% from horizontal.

Note 1: The following equivalents for Livestock Units (LSU) shall apply: Bovine animals <1 year old (0.4 LSU), Bovine animals ≥1 to <2 years old (0.7 LSU), Male bovine animals ≥2 years old (1.0 LSU), Heifers (≥ 2 years old) (0.8 LSU) and Dairy cows (1.0 LSU), Non-dairy cows (0.8 LSU), Piglets liveweight <20 kg (0.027 LSU), Breeding sows ≥50 kg (0.5 LSU) and Other swine (0.3 LSU).

Table 3b (*medium ambition*): Ammonia emission reduction requirements for slurry and solid manure application to arable and grassland.

Category	Minimum emission reduction compared with the reference ^a	Exemptions / Conditions
For slurry and digestate application to arable land and grassland and for solid manure application to bare soils	To use methods that reduce emissions by at least 30% compared with the reference method	Small farms ^b Use of small spreaders ^c [Note: Exemptions for specific soil conditions are not needed for this option]
For solid manure application only to grassland or arable crops after sowing	To use methods that reduce emissions by at least 30% compared with the reference method	The reduction should be achieved as far as the Party considers it feasible. When it is considered not feasible this should be reported by the Party [Note: The relaxation is because the most effective low-emission methods are not suitable in this situation]

a/ The reference specified is that listed in the Ammonia Guidance Document. The percentage values represent performance on average, as described in the guidance document.

b/ For livestock farms defined as ‘small farms’, this requirement applies only as far as the Party considers it feasible. This relaxation does not apply to manure transported for application to arable farms. ‘Small farms’ are defined as either: a) those livestock farms holding less than 50 livestock units (Note 1), or b) those livestock farms where total nitrogen excretion is less than 3500 kg nitrogen per year. Parties shall report which threshold they adopt in implementing these provisions.

c/ When using existing mobile slurry tankers and solid manure spreaders having less than 2 m³ capacity, this requirement applies only as far as the Party considers it feasible.

Note 1: see footnote to Table 3a.

Table 3c (*low ambition*): Ammonia emission reduction requirements for slurry and solid manure application to arable and grassland.

Category	Minimum emission reduction compared with the reference ^a	Exemptions/Conditions
For slurry and digestate application to arable land and grassland and for solid manure application to bare soils	To use methods that reduce emissions by at least 30% compared with the reference method	Small farms ^b Use of small spreaders ^c [Note: Exemptions for specific soil conditions are not needed for this option]
For solid manure application only to grassland or arable crops after sowing	To use methods that reduce emissions by at least 30% compared with the reference method	The reduction should be achieved as far as the Party considers it feasible. When it is considered not feasible this should be reported by the Party [Note: The relaxation is because the most effective low-emission methods are not suitable in this situation]

a/ The reference specified is that listed in the Ammonia Guidance Document. The percentage values represent performance on average, as described in the guidance document.

b/ For livestock farms defined as ‘small farms’, this requirement applies only as far as the Party considers it feasible. This relaxation does not apply to manure transported for application to arable farms. ‘Small farms’ are defined as either: a) those livestock farms holding less than 50 livestock units (Note 1), or b) those livestock farms where total nitrogen excretion is less than 3500 kg nitrogen per year. Parties shall report which threshold they adopt in implementing these provisions.

c/ When using any mobile slurry tankers and solid manure spreaders having less than 5 m³ capacity, this requirement applies only as far as the Party considers it feasible.

Note 1: see footnote to Table 3a.