



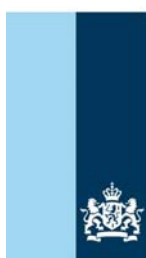
European Union Network for  
the Implementation and Enforcement  
of Environmental Law

## IMPEL Project:

# Comparison Programme on Permitting and Inspection of IPPC Pig Farming Installations in IMPEL Member Countries

## *Final Report*

October 2009



VROM-Inspectie  
Ministerie van Volkshuisvesting,  
Ruimtelijke Ordening en Milieubeheer



Institute for  
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Policy

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### **Introduction to IMPEL**

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Bruxelles, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 6th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its websites at:  
<http://europa.eu.int/comm/environment/impel>  
[www.impeltfs.eu](http://www.impeltfs.eu)

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<p><b>Project participants:</b> Representatives of 17 IMPEL member countries and the European Commission</p>	
<p><b>Executive summary:</b></p> <p>Intensive pig farms above a specified capacity are regulated under the IPPC Directive. However, it has been noted that the control of environmental impacts can be difficult and the permitting and inspection regimes with regard to these installations show differences between the Member States. In order to examine the range of practice in the Member States, this IMPEL project was undertaken.</p> <p>The project undertook its work through a survey of IMPEL's views of key environmental issues arising from pig farms and a survey of how they address the regulatory requirements of IPPC (permitting, inspection, etc.) with respect to these. Three joint inspections were also undertaken to pig farms in Germany, Latvia and Italy to examine and compare issues and practices in more detail. Results of these activities were discussed at a project workshop, reaching conclusions and recommendations directed to IMPEL, its members, the European Commission and the relevant BREF Technical Working Group (TWG).</p> <p>Member States variously regulate pig farms above and below the capacity limit in the IPPC Directive. This includes conditions on animal housing, manure handling and storage and restrictions on emissions, including odour. However, for the latter specific use of air abatement techniques is limited. For manure spreading, some requirements may be included within IPPC permits, but many Member States use other regulatory regimes for control. This variation and complexity means that IMPEL members should explore further their experiences of integrating different regulatory approaches to achieve optimal outcomes.</p> <p>Manure storage systems vary across the Member States. Storage can occur in the pig stalls, in lagoons and in contained stores. Some Member States have a combination of approaches. Permits usually contain a range of details on the type, capacity, structure, etc., of the manure store. Some approaches are problematic for inspections, such as checking leakage from lagoons. It is not clear what is BAT under different circumstances and this should be explored further by the TWG. Also IMPEL members could develop protocols for integrity checking and other forms of inspection.</p>	

Manure spreading may result in water contamination, air and odour emissions. Some regulation may occur under IPPC, but other regulations are more usually applied, such as the Nitrates Directive. It is also important to note that implementation of the Water Framework Directive may add to the controls to be applied. There are legal problems integrating regulation – spreading may involve other farmers at some distance from the manure source. There are some ways to tackle this, but a fully integrated approach from manure production to spreading is difficult for many Member States. However, further integration should be pursued and the revised BREF should address manure spreading techniques.

There is a variety of animal housing systems in the Member States. Housing is a principle source of air and odour emissions. While conditions on housing are required in all surveyed Member States, the level of detail and variety of options varies significantly. In particular, the economic constraints of upgrading older housing are a problem in seeking farmers to improve their facilities. The ability to inspect housing also varies. In some Member States environmental inspectors are not allowed to enter housing for hygiene control reasons. These issues require further examination by the TWG. It is also important to ensure that permits contain conditions that can be readily assessed for compliance checking.

Air abatement systems are not common in the Member States. They are costly and only work with closed housing systems – so are probably not appropriate for a retrofit to older housing. However, they are useful in reducing ammonia and odour. Further research (by Member States and the TWG) should be undertaken on the costs and benefits of different air abatement options.

While odour is noted as a significant problem in many Member States, regulation varies. Some set minimum standard distances to neighbours, while others require estimates of emissions, modelling and odour measurements. As odour arises from different operational areas (housing, manure storage and spreading), an integrated odour management plan is often good practice. It is also possible that feed quality might affect odour. This area should be examined in more detail by IMPEL members and the TWG.

IPPC permits issued by the Member States vary in their level of detail. Few contain emission limit values, partly because of the lack of BAT AELs in the BREF. Most permits set a range of structural, operational and management conditions for various aspects of the farm. It is important for permits to set out all of the necessary conditions, that these can be checked by inspection and that they are simple for farmers to understand. The TWG should also consider how to make sure the BREF conclusions can better be translated into permit conditions.

Inspections vary in intensity and frequency, such as whether manure spreading or the inside of housing is included. They may also be integrated or medium-based inspections. Protocols for inspection could be developed by IMPEL members and it is important to ensure that methods are adopted to ensure the full conditions of the farm are inspected.

The project concluded that further exchange of information between IMPEL members on IPPC pig farming is important and that the results of the project should be taken forward by the BREF TWG.

**Disclaimer:**

This report is the result of a project within the IMPEL-Network. The content does not necessarily represent the view of the national administrations or the Commission.

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### **Annexes to the Project in a Separate Report**

- Annex 1: Results of the Survey of Key Environmental Issues from IMPEL Members**
- Annex 2: The Questionnaire Used to Survey IMPEL Members on the Regulation of Pig Farms**
- Annex 3: Collation and Summary of the Results of the Questionnaire Survey**
- Annex 4: Summary of the Project Inspections to Pig Farms and Regulatory Authorities in Italy, Latvia and Germany**
- Annex 5: Workshop Agenda**
- Annex 6: Participants at the Project Workshop in Utrecht**

## 1. INTRODUCTION

Intensive pig farms above a specified capacity are regulated under the Integrated Pollution Prevention and Control (IPPC) Directive (2008/1/EC). However, it has been noted that companies operating several IPPC pig farming installations in different IMPEL Member Countries have suggested that the permitting and inspection regimes with regard to these installations show unnecessary and unjustified differences. In order to examine the range of practice in the Member States and examine how far any differences exist, this IMPEL project was established.

The aim of the project was for IMPEL members to learn from each other, to exchange experiences and know-how and identify good and where possible best practices in the regulation of pig farms. The project would also develop recommendations to assist regulators in improving the environmental performance of pig farms.

This report describes how the project was undertaken and sets out the key issues and conclusions concerning a number of environmental issues related to pig farming identified as important by IMPEL members. It also contains a range of recommendations to improve the regulation of pig farms and considers how further collaboration by IMPEL members on this issue can proceed.

## 2. PROJECT ACTIVITIES, METHODS AND MANAGEMENT

The project was managed by a Core Team consisting of representatives from IMPEL members from five Member Countries. The Core Team established the working methods of the project and identified the priority issues that would be addressed.

In order to facilitate the work of the project an information exchange forum was established. This allowed interested parties (IMPEL members and others) to register and view documentation generated by the project as well as other useful documents uploaded to assist understanding and debate. The aim of the forum was also to provide a platform for information exchange after the conclusion of the project.

The first task undertaken in the project was to survey the views of IMPEL members on the key environmental issues that they saw as important in relation to IPPC pig farms. The identification of key environmental issues was important in enabling the project to focus its work. The views were collated and the Core Team identified five issues that were most commonly highlighted as important:

- **Manure storage:** including issues of capacity, leakage, protection of water.
- **Manure spreading on land:** determining conditions for spreading, protection of surface and ground waters (interaction of IPPC with other regulations).
- **Animal housing systems:** impacts of different housing types on emissions, meeting requirements in the IPPC Best Available Techniques (BAT) Reference Document (BREF).
- **Air abatement techniques:** end of pipe techniques to control emissions, such as scrubbers and biofilters.

- **Odour assessment:** including public interaction and measures to reduce odour (other than housing and abatement techniques).

Further information on the survey of the key environmental issues is provided in Annex 1.

In order to investigate these issues in more detail, a questionnaire was developed by the Core Team which sought information from IMPEL members on how each of the key environmental issues was addressed during the regulatory process for implementing IPPC – applying for a permit, determining permit conditions, monitoring and inspection. At the end IMPEL members were also able to add any further points that they thought were important for the project. The questionnaire was circulated to IMPEL co-ordinators for distribution to relevant authorities. A copy is provided in Annex 2.

The questionnaire generated responses from 26 regulatory authorities across 17 Member States. Some responses were received from national level authorities, some from large regional authorities and some from local authorities. The type of authority also varied in their involvement with IPPC regulation of pig farms, for example with some involved in permitting, some inspection and some in all regulatory aspects. A detailed collation of the responses to the questionnaire is provided in Annex 3.

In order to understand the regulatory and environmental issues in the Member States, three visits were made to Member States. In each case joint inspections were carried out at IPPC pig farms to provide practical experience of the variety of farms in the EU and to discuss issues with the operator. Meetings were held to discuss the regulatory background in the Member State/region and to discuss the site permit in detail. The visits included participants from a number of Member States in order to provide different perspectives. Reports of the visits are provided in Annex 4 covering the following:

- Modena, Italy, 1-2 April 2009.
- Latvia, 23-24 April 2009.
- Schwerin, Germany, 7-8 May 2009.

The project concluded with a workshop in Utrecht, the Netherlands, on 10-12 June 2009 for 31 participants from 20 Member States (a list is provided in Annex 6). The workshop began with a visit to PTC Barneveld in the Netherlands to view some aspects of Dutch intensive pig farming in practice and methods to reduce environmental impacts. The workshop began with a review of lessons learnt from the joint inspections which, together with the visit in the Netherlands, provided a solid framework of practical experience for further discussion. The workshop then proceeded with discussion of each of the key environmental issues identified above. The issues raised, conclusions and recommendations form the basis for this report, which also draws on results from the questionnaire and Member State visits.



### *Participants at the project workshop in Utrecht*



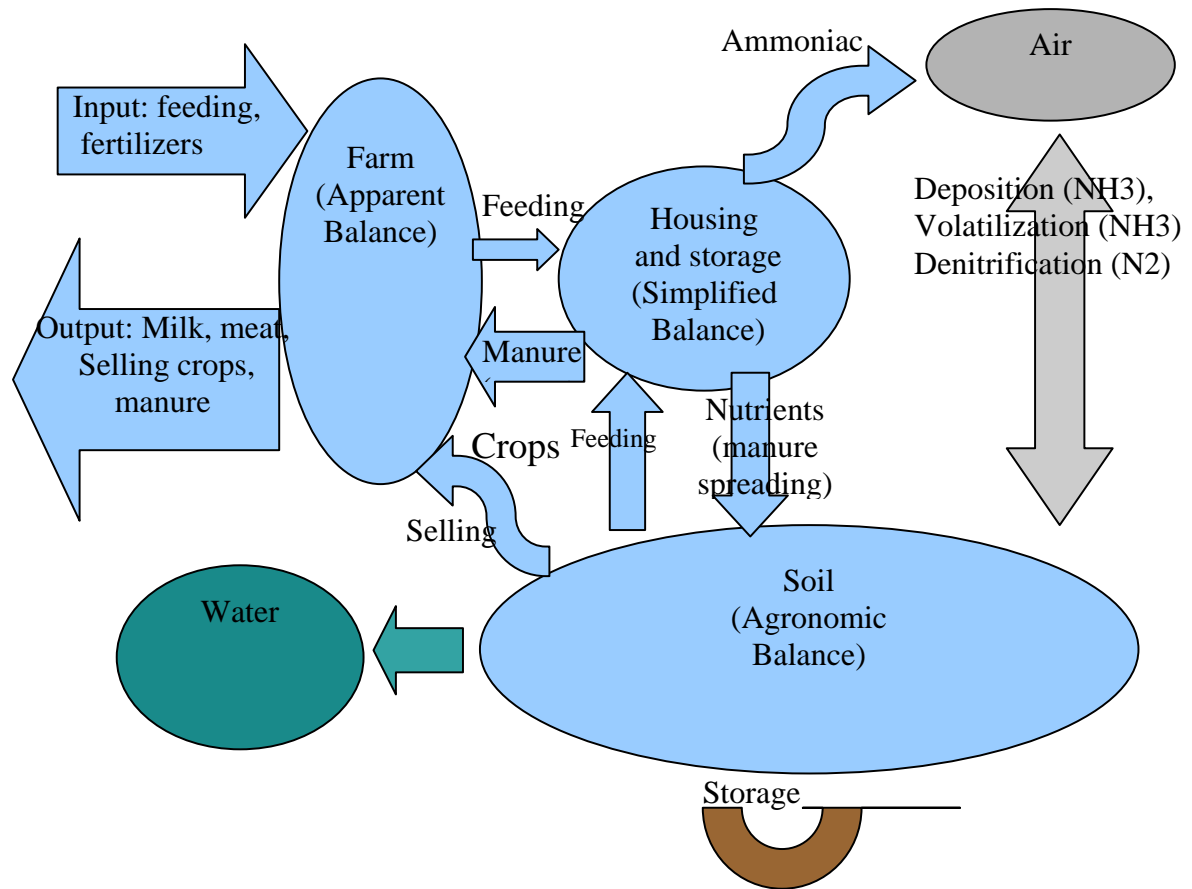
## **3. MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATIONS OF THE PROJECT**

### **3.1 Introduction**

The following sections set out the main findings of the project. This begins with a consideration of the regulatory context of the project, examining the scope of the IPPC Directive and other relevant regulation. The report then addresses each of the five key environmental issues in turn, setting out the key issues that were identified, the regulatory context and conclusions. Finally, this section concludes with specific conclusions regarding the permitting and inspection processes. Each section includes recommendations. These recommendations are made to a variety of relevant audiences, including EU policy makers, the Technical Working Group (TWG) responsible for the revision on the intensive farming BREF and to national and regional authorities responsible for implementing the regulation of pig farms.

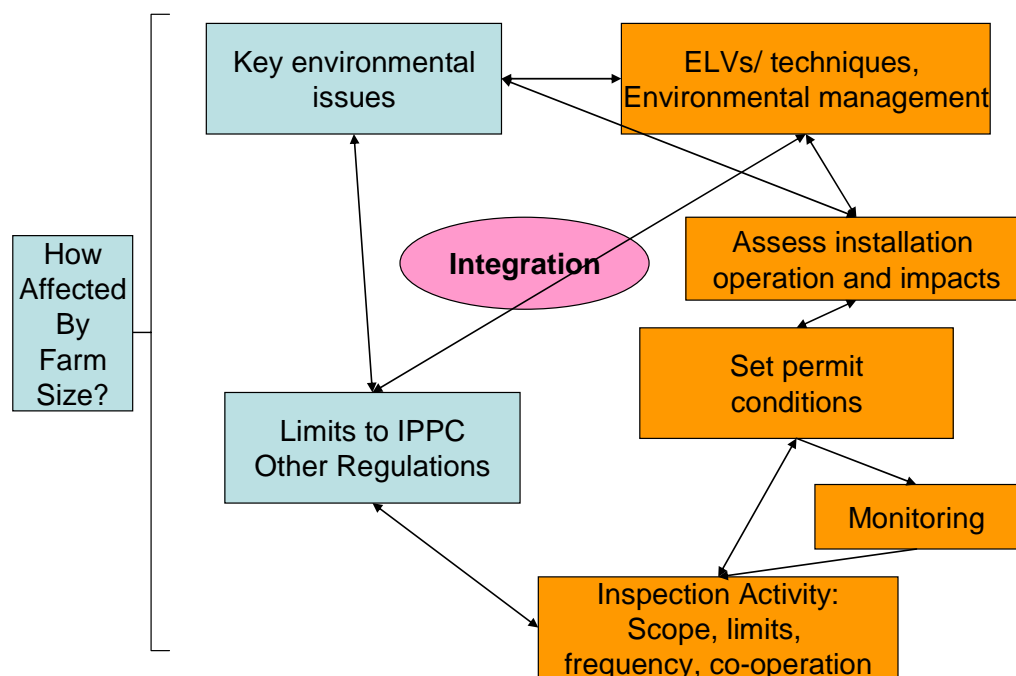
Pig farms have a variety of impacts on the environment. However, each stage of a pig farm has its particular impacts, but these are linked, such as is seen through considering the nutrient accounts of the farm. The following figure describes this. One can consider such accounts at different scales. For example, there is the global balance of the whole farm, there may also be an account generated by examining the housing and manure storage. Finally, nutrient accounts can be assessed at the field level (agronomic inputs and outputs). Thus the scale of assessment of the processes in and

around a farm are important in understanding its impacts and, importantly, in making effective regulatory decisions.



Bringing the environmental impacts and regulatory activities together is, therefore, important. The following figure sets out a conceptual model of the issues addressed in this report relating to intensive pig farms. The starting point is the key environmental issues – the main environmental problems that environmental authorities need to address. In assessing the operation of the installation and its impacts, consideration clearly has to be taken of available techniques, emission limits, etc., that can be used to address the problems. Assessment leads to the setting of permit conditions, reflecting available techniques and monitoring obligations, which should contribute to assessing compliance. However, compliance assessment is the realm of inspection, which varies in its scope (integrated or not, etc.), frequency, etc. These regulatory aspects are also related to whether issues must be, can be, or cannot be addressed within IPPC and whether other regulatory regimes are available (and whether these are integrated or implemented separately). All of these issues need to be thought of in an integrated way – how conditions and permit conditions relate to the key environmental issues, how inspection reflects the use of techniques, etc. They are not

separate compartmentalised stages. Finally, all of the issues – from the environmental problems to the last stages of regulation vary with the size of the farm.



This overview only sets a guide to the summary of analysis undertaken in the project set out below. Reality is more complex.

### 3.2 The Regulatory Framework

The primary regulatory focus of this project has been the implementation of the IPPC Directive to intensive pig farms. However, assessment of practical regulatory issues within the project has shown that it is usually not possible to consider the Directive in isolation. This is for the following reasons:

- The IPPC Directive applies to pig farms above a specified capacity. However, some Member States also apply the same or similar approaches to pig farms below this capacity.
- Some aspects of pig farming, particularly, manure spreading, may be difficult to include within IPPC regulation and are addressed under other regulatory regimes.

While some Member States establish specific regulatory regimes for different issues (or to implement different EU Directives), others have adopted approaches to bring

regulatory regimes together. This may be driven by an aim to provide a more holistic environmental and business focus on different economic sectors, including the agriculture sector. Indeed, such approaches are often highlighted as examples of 'better regulation'. In particular, in this project an emphasis on a holistic approach to manure management from production to use, on and off site, was made. Further consideration of this is given below.

This means that while Member States need to address the specific legal obligations set out within the IPPC Directive, they are not limited by the Directive in developing improved ways to deliver effective environmental outcomes for pig farming within, for example, a life cycle approach.

*It is recommended that Member State authorities share further experience of how to integrate regulatory and environmental objectives in improving the environmental performance of pig farms and related activities.*

As stated above, IPPC applies to pig farms above a specific threshold (determined by animal numbers). However, a number of Member States do not limit their regulatory activity to these farms. For example, in one area of France, it was reported that permits are applied to about 880 pig farms, although only about 50 of these are under IPPC. Setting objectives for smaller farms was not the primary focus of this project, but questions were raised on how this might be addressed, such as whether the level total ammonia emissions from a farm might be a trigger for applying specific conditions.

As noted in 3.1 above, the different phases of IPPC regulation are: permit application, instruction, permitting, monitoring and reporting, and inspection. French experience, for example, shows that the links between the different phases are not optimised, with some links working well, but others not. In Italy, for example, the permit contains a list of items that should be inspected, enhancing integration of the regulatory activities. These issues are not limited to pig farms under IPPC, but do need to be addressed in their regulation.

*It is recommended that IMPEL members seek ways better to integrated actions across the regulatory cycle and share experience on this, particularly on linking permitting and inspection actions.*

It is, therefore, important for the reader to take these comments on the regulatory framework into account through the rest of this report which, while focused on IPPC, is not limited to this particular item of legislation.

### 3.3 Manure Storage

#### *The issue*

Manure and/or slurry derived from pig farms needs to be stored before it is transported from and/or used by the farm. Such stores are potential sources of emissions to air (ammonia and odour) and are a risk of pollution to water. Some types of manure store can also be at risk of explosions, therefore safety is an issue. As a result, effective control of these environmental risks is important.

There is a range of different approaches to manure storage. Slurry can be stored under the pig stalls themselves. It can be transferred from the stalls to contained stores or to lagoons. These can be on the site of the farm, or off-site and may or may not involve separation of solid and liquid elements prior to storage. Such stores may be covered or not covered and be made of different materials (concrete, metal, etc). Different methods may be used to transfer the manure. In some cases the stored manure may be subject to treatment (e.g. in Cyprus with the use of aerobic digestion). The type of store will reflect the type of manure (solid or liquid, straw-based, etc). Different types of store seem to be favoured in each Member State. For example, the project visited a closed storage system in Germany (picture) and a lagoon system in Italy (picture).

#### *Manure Storage in Germany*



Photo: Joyce van Geenen

## *Lagoon System in Italy*



Photo: Fausto Prandini

### *Regulatory issues*

Regulators have to consider a range of different issues in assessing the performance of manure stores. These include:

- The number, type, material and capacity of the store.
- How long the manure has to be stored.
- Treatment of waste water discharged from lagoons.
- Ammonia and odour emissions.
- The relative importance of the environmental issues, e.g. how problematic is odour.
- Cost issues, e.g. in relation to the covering of stores.

Operators applying for permits typically are asked to provide a range of details on manure storage covering most of the issues identified above. However, the range of conditions set out in permits varies. Permits generally require stores or lagoons to be operated according to specific conditions. The Netherlands sets a condition on the maximum size of a store (for safety reasons) and many Member States set minimum capacity limits – ranging from four to ten months' production. This variation reflects

constraints on spreading, such as in different climates. However, problems can arise, such as when disease outbreaks interrupt the ability to remove manure from farms.

Costs of manure storage are significant and this has posed problems for regulators, with farmers variously challenging the need for investment for new or modified stores or the timing of upgrading requirements in permits.

Manure storage can pose problems for inspection. For closed stores, systems to identify whether leakage has occurred are available. For lagoons, some Member States require these to be occasionally emptied to test structural integrity. Some Member States demand certification of the storage systems and construction materials as well as testing by certified companies. One method to identify leakage problems more rapidly is to monitor local groundwaters for lagoon systems and, for storage tanks, to include drainage systems underneath them which can be monitored for leakage.

### *Conclusions and recommendations*

There are significant differences between the Member States in their approach to manure storage. It is likely that some variation is justified as environmental problems also vary. However, this does not mean that all variation that is currently observed is BAT.

Testing of manure stores, by the operator or inspector, can be problematic in some cases. By groundwater monitoring leakages can be identified, which is especially important in sensitive areas.

The upgrading of manure stores is a challenge for many farmers and for regulators in setting conditions which are both ambitious and realistic within a timeframe which is economic.

Manure is stored prior to its use in spreading, etc. The type of manure and treatment, if any, should be considered in an integrated way with the regulation of spreading. The two activities are strongly inter-related.

*It is recommended that the BREF TWG undertake a careful examination of what is to be considered as BAT for manure storage taking account of the different situations in the Member States as well as new developments in this area.*

*It is recommended that protocols are developed with respect to effective and efficient testing of the integrity of manure storage.*

*It is recommended that the BREF TWG examine best practice in the testing of sealing/leakage of lagoons with different types of bottom construction.*

*It is recommended that regulators and the BREF TWG examine in more detail the costs and benefits of improvement options to provide clearer guidance for regulators on this issue.*

*It is recommended that regulators adopt an integrated approach to manure management, linking thinking on manure production, storage and spreading to optimise process and environmental outcomes.*

*It is recommended that there is a closer link between the development and implementation of good agricultural practices (e.g. by an agricultural authority) and the requirements of IPPC.*

### **3.4 Manure Spreading**

#### *The issue*

Manure (solid, slurry, etc.) when spread on land adds nutrients (nitrogen and phosphorus) to the soil, which can leach into ground and surface waters. This can be a problem where there are concerns over eutrophication of water bodies and/or nitrate levels in drinking water sources.

Spreading can also result in emissions to air – of ammonia and odour. The latter, in particular, can cause problems with nuisance to neighbours.

In some respects removal of manure from a farm can be viewed as a waste management issue. However, it is not simply waste, as it has a nutrient value for crops and when used in accordance with crop requirements is a fertiliser. In some Member States (e.g. the Netherlands) the quantities produced are so large that farmers pay to have it removed. In some others, the manure has sufficient value that farmers can sell it or at least give it to other farmers.

#### *Manure spreading in France*





### *Regulatory issues*

Manure spreading is not commonly regulated within IPPC permitting (e.g. it is included in France). Some Member States (e.g. the UK) do include it if it occurs on land owned by the pig farmer on the same site. However, in some Member States (e.g. Ireland) pig farms generally do not own a significant area of farmland for spreading the manure generated.

Manure spreading is subject to other regulatory constraints. Within EU law the Nitrates Directive (91/676/EEC) is most prominent, limiting the total quantity of nitrogen that can be applied, with restrictions on when it can be applied (e.g. time of year, restrictions concerning waterlogged or snow-covered soils, etc.). It should be noted, however, that such restrictions apply either in designated Nitrate Vulnerable Zones or the whole territory of some Member States, depending on nitrate problems. The conditions are not, therefore, universal. There is also concern over phosphorus. There are no prescriptive controls at EU level on this issue. However, it is likely that implementation of Programmes of Measures under the Water Framework Directive (2000/60/EC) will require action in some catchments to reduce phosphorus and this may result in further restrictions on manure spreading. This will pose a problem for regulators as arable farmers, for example, may be prevented from using manure due to phosphorus limits while still needing to add nitrogen. This would imply a use of artificial nitrogen fertilisers rather than pig manure, which would increase problems for manure disposal.

Where pig farmers provide manure to other farmers for spreading, Member States adopt different approaches to integrating regulation. In Poland there is a requirement for pig farmers to own 70% of the land on which spreading will occur. Others (e.g. Romania) require a contractual arrangement between the pig farmer and the recipient farmer, or that the recipient has a nutrient management plan. In Ireland, for example, the pig farmer must demonstrate that there is adequate recovery capacity available for the quantity of slurry generated on the pig farm, which involves the pig farmer establishing in association with the receiving farmers a nutrient management plan for each farm, i.e. the pig farmer must take some responsibility for ensuring that the pig slurry is managed appropriately and recovered as fertiliser rather than being disposed of. Such approaches imply a direct relationship between the producer and user, i.e. the producer of the manure knows where it will be spread. However, in some cases (e.g. the Netherlands) producers pay an intermediary company to remove manure, so there is no direct link to the final user.

There are legal problems in linking the conditions applied in permits to pig farms and the use of manure by third parties. Indeed, even if the same person is involved, they can establish separate companies (legal entities) responsible for the pig farm and for manure management to inhibit integrated regulation. Even if permit conditions require the operator to ensure the recipient of manure has a nutrient management plan (or similar), that plan cannot be enforced through the permit. There is concern, therefore, about the value of such a requirement. However, some conditions can be established which assist the process, such as testing of manure quality and record keeping by the pig farmer and receiving farmer.

Farmers spreading manure can be subject to a range of conditions, such as methods of application (injecting, timing of ploughing, etc.), ensuring soil suitability, avoiding slopes, etc. This is often accompanied by the need for a nutrient management plan, implying a need for information on the quality of the soil and manure (e.g. for nitrogen and phosphorus), obtained by tests or use of standard factors.

The challenge for more integrated regulation from producer to spreading can reflect institutional arrangements in Member States. In many, manure spreading is overseen by an agricultural institution (Ministry or regional department), while IPPC is implemented by an environmental authority. In Modena, Italy, responsibility for IPPC intensive farming installations was given to the Provincial agricultural department (other IPPC installations are the responsibility of the environment department), which is also the responsible institution for protection of the water bodies. This arrangement has led to a more integrated approach to manure management. In England and Wales the Environment Agency is responsible for IPPC, but also has significant involvement in regulation aspects of agriculture, which has led to the development of a 'whole farm approach' to improving environmental and regulatory performance. This helps bring manure management thinking together.

#### *Conclusions and recommendations*

There is wide consensus on the problems that arise from manure spreading. However, addressing these is not always easy. IPPC does not cover all of these, although other regulatory approaches can be effective in improving environmental performance. Nevertheless, new challenges are on the horizon, such as the need to implement the Water Framework Directive.

*It is recommended that Member States should adopt integrated approaches to manure management - from production to spreading. IMPEL members should exchange further experience on opportunities and constraints in doing this.*

*It is recommended that the BREF includes BAT and best practice in manure management/spreading.*

*It is recommended that authorities identify the key obligations that will arise from implementation of the Water Framework Directive and ensure these are integrated with obligations on farmers with regard to manure spreading.*

*It can be difficult to ensure afterwards that spreading is undertaken according to prescribed conditions, therefore it is recommended that inspection activity is undertaken during spreading.*

### 3.5 Housing systems

#### *The issue*

Efficient animal housing is critical in reducing the environmental impact of intensive pig farms. Housing includes the structure of the pig stalls or pens (which vary according to the specific nature and stage of the pig production), type of flooring, manure storage and handling in the housing, ventilation systems, feed systems, etc. The nature of the housing also varies with the age of the farm, with older farms typically less ‘sealed’ than newer housing. Also variations in production methods mean that in some farms pigs are maintained closely within stalls, while for others they may have freedom of movement within straw-covered pens or even have access to areas outside of the housing.

Housing is a principle source of emissions to air – ammonia, odour and particulates. Specific abatement techniques are addressed in the following section, but a variety of techniques can be employed to reduce such emissions within the housing, particularly effective floor construction that allows efficient removal of manure.

#### *Exterior of animal housing in Latvia*



Photo: Kerstin Elberskirch

### *Interior of animal housing in Latvia*



Photo: Kerstin Elberskirch

### *Regulatory issues*

There is significant debate in some Member States on what is BAT in relation to different aspects of housing. For example, some farmers prefer deep slurry storage, but this is not considered to be BAT in the BREF. The Netherlands has a long list of different animal housing types that it has determined as BAT for specific pig production situations. Also interpretation of the BREF is difficult, such as what is meant by ‘frequent’ removal of slurry. In Slovenia operators are required to refer to the BREF in order to determine what is BAT for housing systems. However, most have problems with this, being unable to use such a large technical document in English.

For older housing regulators often require upgrade plans from farmers. However, there is significant debate on what timescale for upgrading is appropriate. Some argue that upgrading should take place after the end of the usable life of the building, but this could be several decades. Alternatively, some regulators impose relatively tight timetables for change (2-3 years), although this does have to take account of changing economic conditions. Wide disparity on this issue between the Member States could have economic consequences, but it is not clear what upgrade timetable would be reasonable.

The level of detail on housing varies in the conditions set out in permits. In the Netherlands specific details of housing design usually are established in permit conditions; inspection is carried out at this detailed level. In contrast, in the UK the permit itself does not prescribe housing conditions, but requires operators to operate

the housing according to the details provided in the permit application and may require the operator to undertake a review of housing and its management. Where housing conditions are not prescribed in the permit, it is not possible subsequently to assess compliance, as is the case in Slovenia.

Many aspects of housing cannot be easily inspected during operation. The structure of manure collection, storage and movement under the animal stalls is, for example, difficult to inspect. Therefore, it is important to undertake an inspection of these issues during construction, especially as these are unlikely to change during operation.

Housing can pose problems for inspectors. In some countries (e.g. Portugal) inspectors do not enter housing due to hygiene concerns, while in others (e.g. Slovenia), inspectors regularly enter the housing. Therefore, in the latter permits may prescribe the capacity of the installation (number of pigs) and inspectors enter to check this. This is further addressed in the section on inspection, below.

### *Conclusions and recommendations*

Ensuring effective housing consistent with BAT is a significant challenge for authorities. Interpretation of what is BAT is sometimes difficult, as is the ability to persuade farmers to invest in improvements.

It is also important to stress the conclusions from earlier sections of this report of the need for integrated thinking on ammonia and odour management, so that housing design and pig production (e.g. feed quality) are not addressed in isolation from the regulation of manure storage and spreading.

The following recommendations are, therefore, made.

*It is recommended that the European Commission give consideration to how to make the BREFs better available to the Community's stakeholders in languages other than English.*

*It is recommended that IMPEL members exchange further information on experience on upgrading requirements for older farms and, in particular, the justification for these decisions.*

*It is recommended that IMPEL members exchange further experience on the types of detail on housing set out in permit conditions and how these can be used in compliance assessment.*

*It is recommended that permitting authorities should consider establishing some conditions in permits to ensure that critical requirements related to housing are defined in such a way that compliance can be assured.*

### 3.6 Air Abatement

#### *The issue*

The principle emissions to air from pig farms are ammonia, odour and particulates (the latter especially for straw-based farms). Many techniques can be applied to reduce these emissions, including changes of housing design (e.g. flooring, ventilation, etc.), methods for manure transfer, storage conditions, etc. To supplement these, end-of-pipe techniques have also been developed. However, very few Member States (at least Germany and The Netherlands) have reported that such techniques are either being used by farms or are being actively considered by regulators for inclusion within permit conditions.

#### *Air abatement system in Germany*



Photo: Joyce van Geenen

#### *Regulatory issues*

Air abatement systems are costly. Indeed many consider them to be prohibitively expensive for routine application. Some members highlight the importance of linking the need to require air abatement systems with clear evidence of impacts of ammonia or odour, but that this can be difficult to prove in practice. The use of other techniques to reduce pollution in housing design, feed quality, etc., should be explored to determine if these would be sufficient to address the problems identified before seeking to impose end-of-pipe solutions.

In some cases air abatement systems can be cost effective. Adding an air abatement system to an existing stall would usually cost less than building a new housing system.

Air abatement systems only work if the housing is a closed system, whereby all exhaust air can be treated. This is problematic for older housing, which may 'leak', resulting in significant non-point sources of pollution. Where air abatement systems are required, it is also important that they are fully effective, as there is concern that some might decline in effectiveness over time. The effectiveness over time is also very much dependent on the operation by the farmer. This means that inspection on this issue is very important.

Permitting authorities generally ask operators for information on air emissions during permit application – their type, sources and, sometimes, their behaviour in the environment. However, while permits often contain management or structural obligations to reduce emissions, it is rare for emission limit values to be set in permits. There are no emission levels associated with BAT provided in the BREF and the use of ELVs is only possible where diffuse sources are minimal and may be most appropriate where air abatement is required.

#### *Conclusions and recommendations*

Air abatement systems are useful in reducing emissions where these are causing serious environmental problems that are hard to tackle through other means. However, it is not clear how often this would necessarily be the case, even for new housing, and, therefore, when such abatement systems are BAT.

The primary focus should be on the environmental outcomes – ensuring that emissions do not cause adverse impacts. Therefore, the benefits and disadvantages of air abatement systems should always be compared to those from process integrated techniques.

*It is recommended that those authorities/Member States which require the use of air abatement systems undertake further analysis of the effectiveness and costs of different systems and how these compare for different farm types. This information should be made available to all IMPEL members.*

*It is recommended that the BREF TWG undertake a detailed examination of the different types of air abatement systems, examining their relative effectiveness, their effectiveness in comparison with other techniques to reduce emissions (including over time and with respect to the size of the farm) and the relative costs of such systems.*

### **3.7 Odour Assessment**

#### *The issue*

Odour is the principle concern that arises from local communities in relation to pig farms. It can cause a nuisance and result in complaints. Odour arises from the pig manure and the animals, therefore it can come from housing, manure transfer and

storage and manure spreading. A study in the Netherlands found that about half of the nuisance arose from housing and half from manure spreading, control of which requires different regulatory approaches. However, experience in the project also shows that the level of odour that arises from pig farms varies significantly. This partly reflects measures taken to control emissions, but also other factors, like feed, may affect the odour levels.

There is a range of techniques that can be taken to reduce odours (see the sections above) on manure storage, spreading, housing systems and air abatement – reflecting structural changes and management approaches. However, it is important to link the techniques applied with the level of odour problem. It is likely, for example, that the degree of nuisance of a particular odour level varies according to location and context.

### *Regulatory issues*

The regulatory system for odour from pig farming usually only covers the pig houses, although some Member States also set rules for spreading in relation to odour. Some Member States set an objective in a permit to minimise complaints. Odour complaints can be recorded, validated and ‘quantified’, this being the most basic assessment method for odour impact.

Other Member States have established minimum distances by which new pig farms can be built in relation to housing (e.g. 200-300 m in Sweden to 2 km in Cyprus). Minimum distances may also vary with the type and number of animals and applied odour abatement techniques. Such a requirement is also an aspect of the land use planning processes.

A few Member States (e.g. Germany and the Netherlands) set numerical odour immission limits in permits (e.g. in the Netherlands dispersion modelling should usually show odour immission caused by pig houses is not greater than 2-8 ou<sub>E</sub>/m<sup>3</sup> as a 98<sup>th</sup>-percentile at the nearest housing). Therefore odour emissions are measured or estimated using standard emission factors and are subject to dispersion modelling.

As with ammonia emissions, few Member States set requirements for abatement systems to control odour. In most cases, conditions in permits concern the need for effective manure management, housing ventilation and manure storage conditions. End of pipe air abatement techniques can also be effective to reduce odour from pig houses. Masking agents may be expensive and are seldom effective. They also add additional chemicals to the environment. For this reason the Netherlands, for example, is opposed to their use.

For spreading, nuisance can be minimised by taking account of wind direction, public holidays, etc. A good approach is to set a condition for a farmer to have an odour management plan that includes all potential odour sources and seek to control these in an integrated way.

Inspections can check whether the odour control conditions are being applied, minimum distances respected and the numbers of animals is in compliance with the permit. However, if specific odour limits are required of operators, these can be more difficult to enforce: monitoring the odour emission and immission is possible but is



costly and time-consuming. Nevertheless, a check on the number and type of animals and the housing system, as well as a check on the proper functioning of the abatement techniques, are achievable and usually give a good estimate of the expected odour impact. Complaints, although subjective, are an indication of severe nuisance. However, it can be difficult for inspections to determine whether complaints are due to a failure by the farmer to do what is required in the permit, or whether problems were not adequately addressed during permitting.

### *Conclusions and recommendations*

Setting detailed conditions to control odour is often problematic for regulators. However, using standard distances for new farms in land use planning and use of odour management plans in permitting are good practice.

*The BREF TWG should seek to quantify the relative reductions in odour that can be achieved by different techniques and how these can be used separately or in combination to give different desired outcomes.*

*It is recommended that authorities consider using odour management plans with operators, including all aspects of pig farm operation from production to manure spreading.*

*It is recommended that further work is undertaken to establish the relationship between feed type and odour production.*

*It is recommended that IMPEL members exchange experience in the setting of conditions regarding odour that can be effectively checked during inspection and are enforceable.*

## **3.8 Permitting**

A number of issues related to permitting have been addressed in the sections above. However, it is also important to note some general conclusions. The project identified a variety of approaches to permitting in the Member States. Most authorities require operators to provide a significant range of information during the permit application process, including details on animals, housing structure and performance, manure management, storage, emissions and details of any directly associated activities. However, the degree of detail in permits varies between the Member States. Some are relatively detailed, with conditions on many aspects of the operation of the installation. However, others are relatively short, with a limited number of prescribed conditions.

It is important to note that few permits contain emission limit values that the operator has to meet (these may be prescribed where air abatement is required). Indeed, it was noted that the BREF contains no BAT associated emission limits. While some members found, therefore, that the BREF was difficult to interpret in setting permit conditions (particularly in comparison with most other IPPC sectors), it was also noted that setting emission limit values for this type of installation is problematic.

Therefore, most conditions relate to the structure and management of the installation and the techniques applied.

The conditions with which operators have to comply can be established in different ways. Many are established on a case by case basis in bespoke permit conditions. To a certain extent this is inevitable, given that no two farms are the same. However, some conditions may also be set out in general binding rules or other forms of national or regional legislation. These may relate to emissions or to quality objectives. This full range of sources of conditions was particularly evident in the project visit to Germany.

It was also noted that there are strong interactions between the techniques applied to reduce emissions in the environment – controls on air emissions, for example, may have consequences for water. Therefore, an integrated assessment needs to be made in setting permit conditions, so that there is a holistic view of what is BAT. For example, an assessment could be based on nitrogen emissions as a whole (ammonia, nitrate, etc.) as an integrating tool, while also addressing local impacts. The development of such assessment methods and tools should be shared between the Member States and inform the work of the TWG.

Participants also noted that farm owners are not like many other industrial IPPC operators, which may have an environmental manager (or similar). Therefore, it is important for permits to be clear and easy to understand in order to assist operators in achieving compliance.

*It is recommended that the BREF TWG, in revising the BREF, pay particular attention to recommendations for how its conclusions on BAT can be translated into practical permit conditions.*

*It is recommended that permitting authorities ensure that all permits set out all of the conditions necessary for the farm to avoid environmental problems and that these are clear enough so that compliance can be assessed.*

*It is recommended that integrated assessments of techniques to control emissions to different aspects of the environment are made and that these approaches are shared between Member States and used by the BREF TWG.*

*It is recommended that permits are written in as simple and clear a way as possible, particularly that all compliance conditions are clearly set out, without recourse to cross-reference to annexes, etc.*

### **3.9 Monitoring and Inspection**

Monitoring is an important aspect for all IPPC installations in order to assess their operation, environmental performance and compliance with permit conditions. Member State authorities require a range of monitoring obligations on pig farms. These include detailed recording of animal numbers, manure management procedures, integrity of manure stores, etc. Obligations for direct monitoring of emissions are rare, though this may occur where air abatement systems are in place. Some ambient

environmental monitoring may be required, such as for odour levels in sensitive locations. Importantly, where lagoons are used, groundwater monitoring is an important means to detect problems with leakage. For manure spreading, monitoring is generally limited to keeping records of spreading activity (timing, amount, location, quality, etc.). However, the project identified some concern over the accuracy of reliance on records alone.

Inspection of intensive pig farm installations and related activities varies across the Member States. Results from the questionnaire noted that inspection frequency varies significantly between and within Member States, from several times per year to once every four years. The Member State visits also noted that inspectorates may focus on specific issues, e.g. with separate inspections for air and water issues, while in other cases fully integrated inspections may occur.

The project also identified significant constraints on some aspects of inspection. For example, as noted above, inspection of the structural integrity of lagoons is particularly problematic. In some Member States there are also problems for inspectors to enter within the animal housing itself due to concerns over hygiene and spread of disease. It was also noted that inspectorates can find difficulties in interpreting conditions in permits with which they are to assess compliance.

Various procedures have been adopted to address these problems. Inspectors addressing different environmental issues do collaborate on inspection visits. This reduces the burden on the operator and enhances understanding of the installation. Also important is collaboration with veterinary inspectors who enter animal housing and can check issues of importance for environmental inspectors, where the environmental inspectors do not have access.

Overall, the results from the project demonstrate that what constitutes an ‘inspection’ varies. Therefore, care has to be taken in interpreting general data on inspection activity and there could be problems in interpreting how general inspection obligations (such as is set out in the Commission’s IPPC Recast Proposal) are realised in the practical supervision of pig farms.

For example, for many Member States manure spreading is not included (or included in a limited way) within IPPC permits. Spreading activities, as noted above, are though usually subject to regulatory obligations. However, inspection of these can often be limited. In some cases regulation is by an environmental authority (also covering IPPC), while in others this may be by an agricultural authority. While farmers are often required to produce manure or nutrient management plans, most regulatory checking relies on examination of records. There is concern whether these are accurate statements of what happens in practice. More on-site inspection is, therefore, likely to be beneficial.

An important conclusion is that there is no single ‘definition’ of what constitutes an inspection. An inspection may assess compliance with all aspects of permit conditions or address parts of the permit. This becomes important where there is guidance or even prescription to undertake inspection activity. In such cases it is important to be clear what constitutes an inspection.

*It is recommended that the European Commission (and other EU institutions) considers the scope and limits of inspection activity in further revision of the Recommendation on Minimum Criteria for Environmental Inspections or setting out inspection requirements in a revision of the IPPC Directive to ensure that this reflects the variety of practices, constraints and opportunities in the Member States.*

*It is recommended that inspectorates identify ways to undertake occasional checks to ensure that record keeping by IPPC operators and farmers spreading manure is accurate.*

*It is recommended that Member State authorities establish practical working relationships with other inspectorates, where necessary, to enhance the effectiveness and scope of inspection activity. Exchange of experience on this between IMPEL members would be welcome.*

*It is recommended that inspectorates work closely with permitting authorities (where these are separate) to provide feed-back on how to ensure that permit conditions are set in such a way that they can be properly assessed during inspection and, therefore, that compliance can be determined.*

*It is recommended that relevant Member State authorities develop plans for on-site inspection of selected farms during manure spreading in order to ensure spreading plans are complied with.*

#### **4. PROJECT FOLLOW-UP**

This project has addressed a range of regulatory issues relating to intensive pig farms. However, project participants have recognised that it is only the start of a process of improving understanding of the issues and improving regulation by IMPEL members. It was agreed, therefore, that activities should continue after the formal completion of the project itself.

In particular, project participants noted that the Technical Working Group for revision of the intensive farming BREF could benefit from the conclusions and detailed information arising from the project and follow-up activities, both directly and to guide further investigation by the TWG. This report makes specific recommendations for the TWG, but it is also clear that IMPEL members have further information from which the work of the TWG could benefit and that there are questions or issues that the TWG should examine in more detail than has been possible in this project.

The participants concluded that the information exchange forum established for the project should be maintained for further exchange by Member State authorities. The types of information that could be shared include:

- Examples of permits issued in each Member State.
- Development of a standard list of permit requirements.
- Examples of guidance issued by the Member States to operators.
- Assessment methods for different environmental problems.

- Practice on taking into account Programmes of Measures under the Water Framework Directive.

Further activities might also be appropriate, such as undertaking joint inspections to share experience or joint training.

Overall, therefore, participants recognised the value of the project in identifying the key regulatory challenges that the Member States face in improving the environmental performance of intensive pig farms. Key conclusions have been identified and recommendations made. However, further collaboration between IMPEL members would continue to add value to the work already undertaken and assist members in their work.

*It is recommended that IMPEL maintains an information exchange forum in order to facilitate exchange of practical experience on the regulation of pig farms by its members.*

*It is recommended that IMPEL members identify key information sources (e.g. national guidance, permits, etc.) that would be useful for other members to benefit from.*

*It is recommended that there should be a follow-up project(s) on how to assess the emissions of ammonia and odour from (not only pig) farms in the permit procedure and how, subsequently, to set permit conditions and undertake inspections. Currently, Member States adopt different approaches, use different models, etc., so that a detailed comparative assessment would be useful.*

## **5. SUMMARY OF RECOMMENDATIONS**

The project has identified a number of recommendations set out in the sections above. These are summarised below rearranged according to the various audiences to which they are directed.

### **5.1 Recommendations to the European Commission**

1. *It is recommended that the European Commission give consideration to how better to make available the BREFs to the Community's stakeholders in languages other than English.*
2. *It is recommended that the European Commission (and other EU institutions) considers the scope and limits of inspection activity in further revision of the Recommendation on Minimum Criteria for Environmental Inspections or setting out inspection requirements in a revision of the IPPC Directive to ensure that this reflects the variety of practices, constraints and opportunities in the Member States.*

## **5.2 Recommendations to the BREF Technical Working Group**

- 1. It is recommended that The BREF should include consideration of BAT and best practice in manure management/spreading.*
- 2. It is recommended that the BREF TWG undertake a detailed examination of the different types of air abatement systems, examining their effectiveness in comparison with other techniques to reduce emissions (including over time and with respect to the size of the farm) and the costs of such systems.*
- 3. The BREF TWG should seek to quantify the reductions in odour that can be achieved by different techniques and how these can be used separately or in combination to give different desired outcomes.*
- 4. It is recommended that the BREF TWG, in revising the BREF, pay particular attention to recommendations for how its conclusions on BAT can be translated into practical permit conditions.*
- 5. It is recommended that permitting authorities establish some critical conditions related to housing in such a way that compliance can be complied with.*
- 6. It is recommended that integrated assessments of techniques to control emissions to different aspects of the environment are made and that these approaches are shared between Member States and used by the BREF TWG.*

## **5.3 Recommendations to IMPEL**

- 1. It is recommended that IMPEL maintains an information exchange forum in order to facilitate exchange of practical experience on the regulation of pig farms by its members.*

## **5.4 Recommendations to IMPEL members and other national authorities**

- 1. It is recommended that Member State authorities share further experience of how to integrate regulatory and environmental objectives in improving the environmental performance of pig farms and related activities.*
- 2. It is recommended that IMPEL members seek ways better to integrated actions across the regulatory cycle and share experience on this, particularly on linking permitting and inspection actions.*
- 3. It is recommended that Member States should adopt integrated approaches to manure management - from production to spreading. IMPEL members should exchange further experience on opportunities and constraints in doing this.*
- 4. It is recommended that authorities identify the key obligations that will arise from implementation of the Water Framework Directive and ensure these are integrated with obligations on farmers with regard to manure spreading.*

5. *It is recommended that IMPEL members exchange further information on experience on upgrading requirements for older farms and, in particular, the justification for these decisions.*
6. *It is recommended that IMPEL members exchange further experience on the types of detail on housing set out in permit conditions and how these can be used in compliance assessment.*
7. *It is recommended that permitting authorities should consider establishing some conditions in permits to ensure that critical requirements related to housing are defined in such a way that compliance can be assured.*
8. *It is recommended that those authorities/Member States which require the use of air abatement systems undertake further analysis of the effectiveness and costs of different systems and how these compare for different farm types. This information should be made available to all IMPEL members.*
9. *It is recommended to include in the permit a requirement for operators to make an odour management plan, including all aspects of pig farm operation from production to manure spreading.*
10. *It is recommended that further work is undertaken to establish the relationship between feed type and odour production.*
11. *It is recommended that IMPEL members exchange experience in the setting of conditions regarding odour that can be effectively checked during inspection and are enforceable.*
12. *It is recommended that permitting authorities ensure that all permits set out all of the conditions necessary for the farm to avoid environmental problems and that these are clear enough so that compliance can be assessed.*
13. *It is recommended that permits are written in as simple and clear a way as possible, particularly that all compliance conditions are clearly set out, without recourse to cross-reference to annexes, etc.*
14. *It is recommended that inspectorates identify ways to undertake occasional checks to ensure that record keeping by IPPC operators and farmers spreading manure is accurate.*
15. *It is recommended that Member State authorities establish practical working relationships with other inspectorates, where necessary, to enhance the effectiveness and scope of inspection activity. Exchange of experience on this between IMPEL members would be welcome.*
16. *It is recommended that inspectorates work closely with permitting authorities (where these are separate) to provide feed-back on how to ensure that permit conditions are set in such a way that they can be properly assessed during inspection and, therefore, that compliance can be determined.*

17. *It is recommended that relevant Member State authorities develop plans for on-site inspection of selected farms during manure spreading in order to ensure spreading plans are complied with.*
18. *It is recommended that IMPEL members identify key information sources (e.g. national guidance, permits, etc.) that would be useful for other members to benefit from.*