

# Evaluation and comparison of nitrogen mitigation measures across sectors

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## Abstract

To account for the complexity of the nitrogen problem, a holistic and integrative approach is needed that includes all relevant sectors – agriculture, industry and energy production, transportation and households. We developed a tool that compiles mitigation measures from all fields and compares and evaluates them according to their legal and technical feasibility, effectiveness, efficiency and acceptance to identify the most suitable measures that should be included in an integrative strategy for nitrogen emission reduction, also taking interrelations between the measures into account.

Keywords: reactive nitrogen, mitigation measures, policy instruments

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## 1. Introduction

Nitrogen in its reactive form is released as different compounds by various sectors, especially industry and energy production, agriculture and transport. To develop an effective strategy for nitrogen mitigation, a holistic and integrative approach is needed that includes mitigation measures from all fields.

## 2. Method

We conducted a broad literature review of existing inventories of mitigation measures, reports of implemented mitigation measures in Germany or other European countries and suggestions for mitigation measures from different organisations.

The results were compiled in an excel tool, where information about the mitigation measure, the corresponding policy instrument, the addressed nitrogen compound and sector, the implementing regulation and a possible measure design were systematically documented.

We then developed a set of evaluation criteria to assess and compare the measures across sectors and identify measures most suitable for the German nitrogen strategy.

An evaluation approach has been developed which allows a semi-quantitative comparison between different types of measures. The evaluation of the individual criteria includes a rough classification on an ordinal scale. Synergies and conflicts with other policy fields have been described qualitatively.

## 3. Results

The result is an excel tool with a compilation of nitrogen mitigation measures from different sectors – industry, transportation, agriculture, households and waste – that have an emission reduction potential. The tool allows sorting and filtering the measures according to different criteria, depending on the interest of the user. Five main criteria were used to evaluate the measures: effectiveness, efficiency, acceptance, technical and legal feasibility.

From the excel tool, a profile for each individual measure can be generated. The five main criteria are also displayed in a radar diagram for each measure, which also allows for direct comparisons between measures.

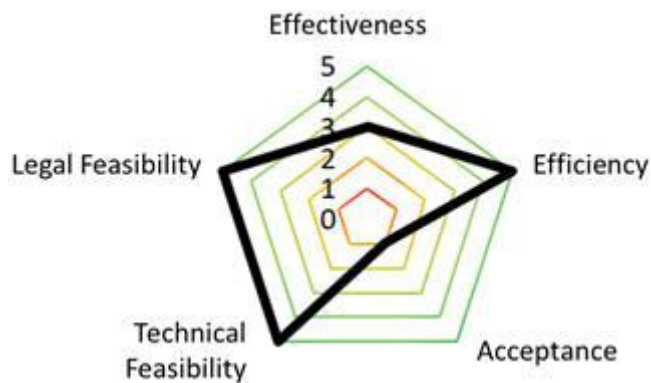


Figure 1: Evaluation criteria for a mitigation measure

Measures with high effectiveness and high efficiency include mostly agricultural measures, like a tax on nitrogen surplus and spatial restrictions for livestock farming. For the industrial sector, a tax on nitrogen oxide emissions has a high efficiency and average effectiveness. Measures for the transport sector have a lower effectiveness in comparison with the other sectors, but a comparison within the transport sector to identify the most efficient measures is nevertheless important to select suitable measures for every field of action.

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