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## Abstract

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Topic: Identification and assessment of relevant instruments and measures for the design of climate protection in transport

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Today, climate change and its consequences are more than ever before one of the greatest global challenges. According to the most recent calculations of the Intergovernmental Panel on Climate Change (IPCC) global emissions of greenhouse gases (GHG emissions ) must be reduced to almost zero until the year 2070 to limit the effects of climate change to a level compatible with the environment. With the ratification of the Kyoto protocol in 2002 and with the decision of the German energy concept in 2010, the German Federal Government has committed itself to reduce the domestic GHG emissions by 40 percent until the year 2020 compared with 1990. While already great successes were achieved in the sectors of energy and industry, the transport sector remains unchanged and now represents almost 20 % of GHG emissions in Germany. Transport-specific objectives defined by the Federal Government for 2020 – the reduction of final energy consumption and the increase of the number of registered electric vehicles – can only be attained with drastic measures, so that in the transport sector is thus urgent need for action towards climate protection.

One reason for the transposition deficit of climate protection measures at municipal level is among other things the lack of tangibility and the lack of local concern, so that there is (still) no sufficient motivation on implementing target-aimed climate protection measures which are, however, well-known and technically feasible. The aim of this paper is to demonstrate initial solutions for the closing of this so-called implementation gap by a compilation of existing climate protection relevant instruments and measures, as well as by a preparation of approaches for their valuation with regard to a possible target contribution towards climate protection and approaches for measuring the success of these instruments and measures.

This paper introduces the theme at the beginning via the climate-relevant foundations and by highlighting the current trends of the transport sector and serves in particular to raise awareness for the interaction between of climate protection and transport sector. It is stated here which problems exist concerning climate change and which negative effects could emerge from climate change. The need for action in transport sector is ultimately derived from increasing transport services for passenger traffic and freight traffic, as those compensate the previous gained successes in the range of specific GHG emissions reduction of vehicles and thus jeopardize the achievement of climate protection goals in the transport sector. Further reduction

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of specific GHG emissions are thus not sufficient to achieve an effective contribution, but rather have to be flanked by the transposition of suitable climate protection relevant measures.

Accordingly, in the next step the existing climate protection relevant instruments and measures, which have an impact on the traffic behavior, are identified by an international literature research. For a better understanding a distinction between the meaning of instruments and measures is initially necessary. Subsequently, the various classes of instruments are divided in regulatory, market-based, planning and cooperative instruments, they are described in more detail in their character and respective relevant representatives are identified and exemplary listed (e.g. electromobility law, traffic development plan and voluntary commitments). The identified climate-related measures are described by a classification according to the respective modes of transport, are cataloged and ultimately they are assigned to the instruments.

Due to the comprehensive identification of the instruments and measures the interaction between the political-administrative levels as well as the handling of the application of planning instruments at municipal level can be demonstrated in the next step. Special focus is on the description of the existing implementation gap, in order to justify the phlegmatic acting in the area of climate protection. Coordinated measures by the coordination of the individual instruments among themselves as well as between the municipalities and their surrounding municipalities are furthermore presented as a precondition for a target-oriented effect.

The development of the approaches to assess the identified instruments and measures takes place in several stages in the following. First of all, the fundamental problems of evaluation due to the global nature of the phenomenon of climate change are listed in order to subsequently derive the evaluation criteria. The target impact of measures, e.g. traffic avoidance, modal shift or traffic optimization, is described as one of the most important criteria. One particular difficulty for an assessment of the measures follows from the practiced application of measures in packages of measures, which results ultimately in interactions and the reduction of CO<sub>2</sub> emissions cannot be quantified ex ante. The concept of the necessary accompanying measures is described in the context of the interactions. For the subsequent evaluation of the planning instruments the climate protection relevant measures are combined into strategies for action, whereby the main emphasis of the respective instruments are shown.

The creation of a tool to capture the integration of climate protection relevant measures and of the implementation of the planning instruments within the municipalities is the next stage. For this purpose, a questionnaire is elaborated, which will be tested for its practical applicability with three selected municipalities and subsequently will be developed into a tool. The knowledge gained from the pretests are incorporated in the evaluation of measures and instruments.

Within the evaluation of measures and instruments the measures are initially assessed qualitatively on the basis of the criteria defined and the results are presented in a structured

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manner, whereby it shows that among the measures of the transport sector in particular the measures in the area of urban development can make a significant contribution. This is also reflected in the evaluation of the instruments, which ultimately represents the main emphasis of this paper. In total 20 planning instruments are investigated for the possible integration of climate protection relevant measures and within the instruments identified strategies for action are assessed against each other. The priority and commitment for the implementation of climate protection relevant measures as well as the fixing period of time of the instrument itself completes the evaluation. Finally, approaches for measuring success on measures implemented are listed, which could be developed further into monitoring tools.

A summary review of all work stages ultimately shows that a reduction of GHG emissions in the transport sector can only be achieved by the implementation of climate protection relevant measures at all political-administrative levels. The existing instruments at municipal level can be inserted for a target-aimed contribution to climate protection by a realignment, whereby a strategic-conceptual level must be established. This level is formed by an integrated traffic development plan, which shows in coordination with the land-use plan as well as other sectoral planning and under the premise of the climate protection the objectives and measures in transport sector. The remaining, existing planning instruments can be maintained in their hitherto proven application in this way, but have to be developed from the strategic-conceptual level in their arrangement. The addition of instruments of frameworks, which are derived from the urban development frameworks of construction management, is also discussed and expressed as a recommendation.

