Supporting Information for

Supporting Data S1: Original .json data anonymized in Excel

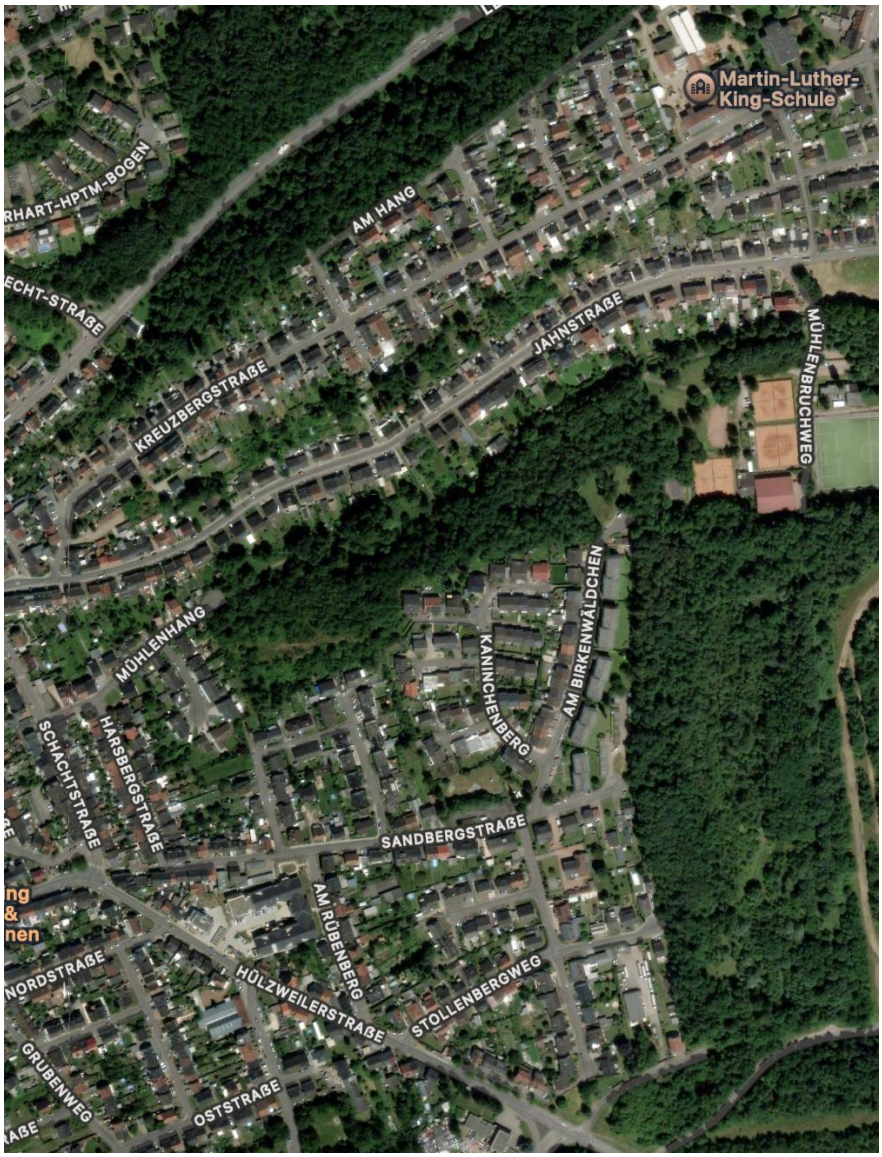
The original data from all 473 .json files has been printed in the attached Excel file. Due to anonymization, it is not possible to share the original .json files, since they include information about personal addresses, names, and contact information of both customers and the technical team. The provided information from the .json file is saved for each test including a unique Gas Meter Serial Number and the relevant values and units.

Supporting Text S1: Additional information about the leak rate testing

The leak rate testing was performed twice for each installation. Only the first one was applied in the analyses because it shows the original system as found without any changes. The first testing was performed before installing the regulator to the installation, the second one after changing the installation by installing the regulator. The second test has the purpose of juristically protection for the operator and the person in charge providing documentation of a safe installation.

Each test was carried out to install a gas regulator to an already existing system. Before changing the system, it is necessary to know whether the regulator can be installed safely or not, which required a safety test for unknown leakages.

Supporting Figure S1: The analysed area in Saarlouis is shown in Figure 1.



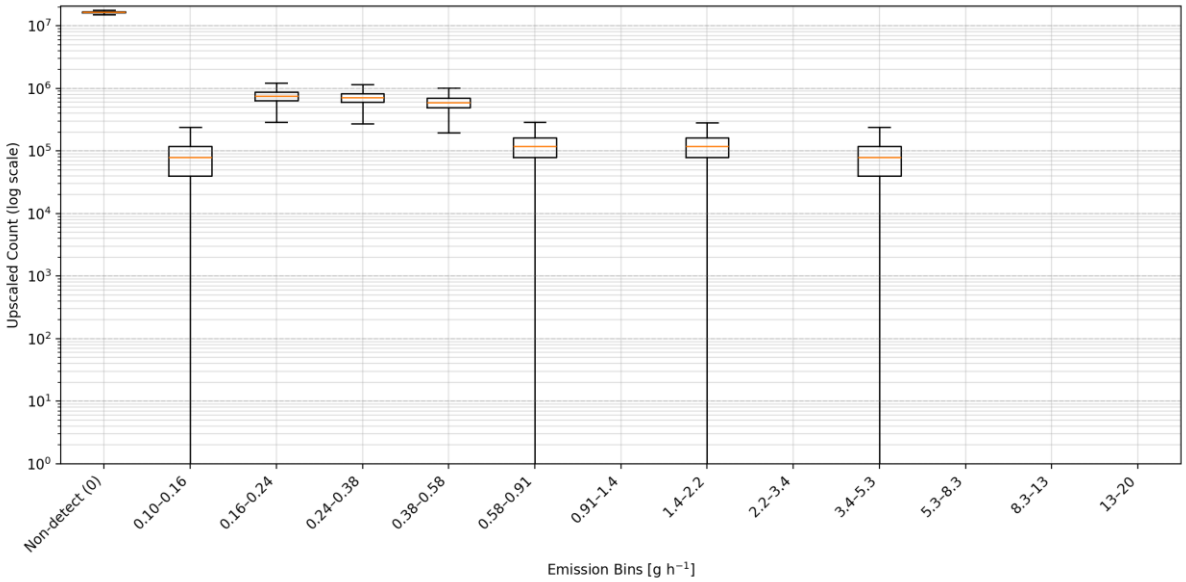
Supporting Figure S1: Aerial Overview of the analyzed area in Saarlouis, Germany

Supporting Figure S2: An example of an installation after attaching the gas regulator can be seen in figure 2. It is also visible, that the installation of the meter is between the change of ownership and the meter. In this specific case, the installation did allow the installation in a horizontal position, in other cases the regulator was installed in a vertical postion. The installation itself was not changed during the process and the applied materials were chosen based on the existing installation material.



Supporting Figure S2: Example of an installation after attaching the gas regulator

Supporting Figure S3: For the Bootstrap formulation Figure 3 shows the positive emission rates upscaled to a national level in residential installations in Germany. This figure can be compared to the results of Figure 4 in the main article.



Supporting Figure S3: Boxplot of emission bins for Bootstrap formulation for national upscaled methane emissions in residential installations in Germany.

Supporting Table S1: Overview of active grid connections operated by Netzwerke Saarlouis GmbH as reported for 2024. The total of 5,712 connections provides the reference baseline against which the sample of installations analyzed in this study is compared. The data are derived from "Strukturmerkmale des Gasversorgungsnetzes der Netzwerke Saarlouis GmbH gem. § 23c Abs. 4 EnWG zum 31.12.2024".

Supporting Table S1: Number of exit points (inlet-side pressure)

Inlet-side pressure [bar]	Number of Installations
≥ 1	4
$\geq 0.1 \ldots 0.99$	642
< 0.1	5,066
Total	**5,712**