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Part 2 of the Project „Legal Barriers to Climate
Protection in Planning and Construction of Buildings“
Summary

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Summary

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1 Research assignment and initial situation

The research project “Informative and Transparent Heating Bills as a Contribution to Climate Protection” explored whether and how far heating bills can be developed into an informative and transparent tool which contributes to a further reduction of energy consumption for heating and domestic hot water, and which consequently further reduces CO₂ emissions of residential buildings. Such a tool has the potential to serve as another building block towards achieving the government’s climate protection targets.

In Germany, 28% of all energy consumption is attributed to private households of which 84% is used for heating and domestic hot water. In accordance with the German Heating Costs Ordinance, consumption-based billing of the costs for heating and domestic hot water has been mandatory since the early eighties for buildings with more than two flats with a central heating source. These types of buildings alone account for almost 50% of German housing stock. The introduction of the German Heating Costs Ordinance has contributed to an average reduction of about 15% in energy consumption. The project concludes that through a heating billing procedure that takes into account efficiency principles, it is possible to achieve an additional reduction in heating energy consumption of 3.5 – 7%. In total, an additional CO₂ emission reduction of 1.7 to 3.3 million tons of CO₂ per year could be achieved this way.

The development of informative tools within the framework of heating and domestic hot water billing leads to a unique challenge: these bills are heterogeneous, complex, and entail a few special features that are not found on other bills. This is largely due to the typical heating supply structure found in buildings that are regulated according to the German Heating Costs Ordinance: Heating systems are typically operated by the respective landlords or building managers, and heat and domestic hot water then are supplied to the tenants and residents. For this process, fuel/energy and further services are purchased from third parties. The costs for these services are then split among the residents. And in this process, typically 50 – 70 % of the costs must be attributed to each flat according to the metered consumption. The remaining costs are then split irrespective of consumption and are based on the living space or floor area of each tenant. The collection of consumption data, the distribution of costs, and the billing itself are both time-consuming and costly. And, the bills are often extensive and difficult to understand. For this reason, landlords and building management tend to hire external service providers: energy services providers.

Most residents are unable to decipher figures concerning their individual heating consumption, which are generally presented in heat cost allocator units (number of consumption units for heating) and in cubic meters (domestic hot water), because of the complex regulation for heating costs attribution. Hence, it is almost impossible recognize the influence of potential energy saving efforts on someone’s personal heating bill. In addition to user behavior (room temperature and ventilation habits), a flat’s heating energy consumption is significantly affected by the energetic state of the building. Additionally, the location of the flat in the building (peripheral or central position), the number of residents, as well as their actual presence, and the orientation of the building all have an influence on heating energy consumption. Another influencing factor on the flat’s consumption are neighboring flats because of the transmission between the flats, and the transmission from the building’s distribution pipes.

2 Procedure

Firstly, the project “Informative and Transparent Heating Bills as a Contribution to Climate Protection” examined the most significant aspects of billing heating and domestic hot water costs. Furthermore, the project analyzed transparency tools applied in comparable fields (electricity

and gas billing, among others), as well as their (legal) implementation. Moreover, this study also considers already existing offers for more transparency in heating and hot water costs, for example, the consumption analysis according to § 7 of the German Heating Costs Ordinance. Based on a review of existing research in this area, the evaluation of selected pilot projects, and own calculations, the project investigated the above mentioned saving potential as a result of a more comprehensible and transparent heating bills, and evaluated the economic efficiency of such a tool.

In a further step, the European Energy Efficiency Directive 2012/27/EU was also taken into consideration. This directive contains numerous provisions regarding energy saving and can be seen as an important catalyst for more transparency and comprehensibility regarding heating bills. Article 10 of the Energy Efficiency Directive contains requirements for more comprehensibility and transparency of bills, such as information about the actual consumption, the consumption in the same time period of the previous year (particularly in graphic form), and a comparison with an average normalised or benchmarked final customers in the same user category. Nevertheless, there is room for legal interpretation as to whether these requirements can also be applied to heating bills. Regardless of this question, the opinion of the researchers far outweighs the technical reasons for the application of corresponding transparency building blocks in the field of billing heating and hot water costs.

Based on the steps outlined above, the research team developed recommendations for a standardized bill (prototype), and discussed these with selected heating cost allocation companies, housing associations, housing industry and tenant associations, as well as with residents. Next to the steps of calculation that are necessary for the bill, the standardized bill contains key heating figures and graphically displays data that shows recipients the exact amount of heating energy consumption and heating and hot water costs. In regards to the prototype, the study recommends a legal integration of specific points for more transparency and comprehensibility. For this purpose, wording recommendations for a revision of the German Heating Costs Ordinance were compiled.

3 Result: the “standardized bill”

The “standardized bill” developed within the scope of the project is described below. It could be established as a uniform format of a heating bill, which could be used regardless of the energy services provider. The prototype shows typical situations of a heating and hot water supply, and can be a starting point for the further development and transfer to other more specific supply constellations.

A cover letter is placed in front of the standardized bill, and contains the following points:

- The heating costs of the flat in the billing period, and any necessary back payments or available credits
- Efficiency information about the flat’s energy consumption in comparison to the building, based on the end energy consumption according to § 19 of the German Energy Saving Ordinance (EnEV), and graphically visualized in accordance with the energy certificate (color scheme). This way, any differences between the building and the flat are made transparent. Residents will also be informed that there are various reasons for deviations (the location of the flat in the building, etc.). Such visualizations are already available in the market. The cover letter also contains a QR-code, which encrypts and stores all basic data about the flat and the building used in the heating bill, and can be

read with a barcode scanner. This data allows a simple use of further advisory services regarding the heating bill.

The cover letter is prepared by energy services providers. It is designed so that it can be printed on the building management's or landlord's letter head. This procedure makes sense, as residents receive efficiency information directly from their contracting or contact partner, and back payments or refunds occur within this relationship, as well. This procedure directs any questions about the heating costs bill to the contact partner who is responsible for the tenant (contact partner in property management or for the landlord).

The actual bill consists of 5 sections and is attached behind the cover letter:

- **Section 1 – Calculation and division of consumption:** Sections 1 and 2 present the “actual heating bill”. Section 1 calculates the consumption values for the flat and the building.
- **Section 2 – Calculation and division of costs:** Section 2 breaks down the incurred costs and depicts the calculation process for the flat's cost calculation.
- **Section 3 – Costs and consumption analysis (billing year):** The tabular overview contains data for the billing period in absolute amounts, as well as selected values from the flat and building in comparison. Section 3 compiles the cost and consumption data from Sections 1 and 2 neatly arranged. Furthermore, energy consumption and energy heating costs are shown in specific values in relation to the living area, as is often found in the housing industry, for a better comparison. The redundancy of this information is deliberate, so that the “standardized bill” will be apparent to those who prefer the absolute amounts as well as those who prefer the specific values. The section “Tips about further advisory services” was presented as an example.
- **Section 4 – Cost and consumption analysis (historical, three years):** The graphic consumption analysis shows the historical development of the heating energy consumption, as well as the flat's and building's energy and heating costs over the last three billing periods, in absolute amounts. Its design is also based on commonplace market depictions. Additionally, Section 4 contains a depiction of the historical development of selected building performances. Here the yearly, weather-adjusted end-energy consumption over the last three years is communicated, whose average corresponds to the end energy consumption of the building according to §19 of EnEV depicted in the cover letter. The depiction of these characteristic values makes the energy saving effects of thermal technical improvements visible. The depiction of the development of the heating price delivers tips to residents regarding cost increases through the purchase of energy or services. An essential element of the depiction is the illustration of the percentage change in the diagrams.
- **Section 5 – Clarifications and Glossary:** Here the individual sections are described, the most important abbreviations and technical terms are explained, and accompanying information about the influence of usage on energy consumption is given.

4 Additional information for landlords and building management

The standardized bill is characterized by the additional information it provides for landlords and housing management (provided that the data is available). Here the boiler's heating performance and efficiency are evaluated, as well as the hot water heating system. This additional information should be a part of the so-called “building bill” in the future. It should motivate

landlords and building managers to carry out thermo technical improvements in the building. The following information is included:

- **Section 6 – Statistical heating performance analysis and efficiency evaluation:** This section contains a heating performance analysis that is based on the building's monthly consumption data. This data is already available to housing companies that have implemented a professional energy monitoring system. Alternatively, it can be collected with little additional effort by the property management. With the help of a graphic method, fuel and energy consumption are correlated with outside temperature. This statistical heat load analysis in particular provides the required boiler capacity (maximum heating load of the building at design temperature) and the average base load of the building for hot water, provided that the hot water is centrally heated over the heating system.

The information regarding the building's maximum heating load enables a check of the existing boiler's capacity, connected with the possibility of adjusting the boiler output to the demand through a reduction of the burner capacity, thereby also reducing standby losses. Based on this calculation, a new boiler can be sized to be smaller, which saves on investment costs, as well as increases the efficiency of the new boiler.

The comparison of fuel and energy consumption with the end energy consumption allows a determination of the boiler's annual capacity factor, and an evaluation of its efficiency. The boiler's capacity factor (hot water and/or total), as well as the capacity factor for the hot water storage and distribution, can be determined if corresponding heat meter readings are known and available. A lower boiler capacity factor signals possible savings potential from boiler replacements. Furthermore, potential success deriving from implemented optimization measures becomes visible.

5 Digression: Pushing forward the due date

Steps needed for heating costs to be calculated closer to the accounting period were examined within the scope of this digression. The goal of such a regulation was to achieve savings potential in heating energy consumption through a prompt reflection of the costs. The accounting period and any other possible unique factors (for example, climate and personal use) would then become even more apparent.

A shortening of the accounting period would be theoretically possible. The additional costs for this amount to about 2 to 10 Euros per flat per year under the current market and legal situation. The corresponding saving potentials of heating energy consumption are unquantifiable, but presumably rather low. Furthermore, a shortening of the accounting period for heating bills would significantly increase the effort for all participants involved in the process (landlords, property management, heating cost allocation companies, electricity and district heating, and gas providers).

A shortening of the accounting period would only make sense if all the residents received a transparent heating bill. Furthermore, a shortening of the accounting period can be seen as a cost efficient alternative to sub-annual (electronic) consumption analysis (frequent/sub-annual billing information), but with higher additional costs per flat and per year.

6 Digression: Flat-wise heat distribution

A second digression examined whether lawmakers, for reasons of energy saving and climate protection, should mandate flat-wise heat distribution, especially in cases of new buildings and major renovations. In this project, the flat-wise heat distribution was considered a condition for the installation of heat meters in individual flats. Such meters, would increase transparency for users through the possibility of directly reading the heat consumed in kWh.

With flat-wise distribution, the thermal energy for heating and domestic hot water would be captured and logged in a central location, and then be passed on to the flat and distributed there. In sophisticated new buildings, which are typically equipped with underfloor heating, a flat-wise distribution is already standard practice today.

With regards to heating, no savings can be expected, compared to the conventional strand-by-strand distribution. In the case of simultaneous flat-wise hot water preparation savings potentials probably exist. The resulting reduction in consumption costs more or less compensate for the additional costs of the flat's central heat meter, replacing heat cost allocators and hot water meters. Due to further advantages in operating costs that may occur from flat-wise distribution, the heating costs in these cases are generally not higher than in the case of strand-by-strand distribution. What is problematic is the higher material input necessary for this kind of heating system installation, which would likely result in higher investment costs in many cases.

