English Summary

Research Project:

“Allgemeinstrom: Energy saving of electric power used in multiple dwellings for collective facilities”

(in German: „Allgemeinstrom in Wohngebäuden: Dämpfung der Wohn-Nebenkosten durch Innovationen zur Reduktion des Allgemeinstromverbrauchs“

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Goal of the research project

The term *Allgemeinstrom* is used to describe electric power in residential buildings with multiple dwellings that operate collective facilities. An example might be stairwell lighting.

With approximately 3 million multiple dwelling buildings located in Germany, the *Allgemeinstrom* accounts for a significant portion of the energy demand and it is estimated to cause more than 2 million tons of CO_2 emissions per year. Therefore, the primary goal of the research project was to deliver scientifically confirmed information with respect to the technological and economic options for the reduction of *Allgemeinstrom* consumption which accounts for the additional fees within the rental agreements of the present and future residential building inventory. More broadly, the research project is also supposed to offer suggestions to policy makers and funding institutions for future regulations and formulating funding for energy efficiency programs.

With the exception of the centrifugal pumps ensuring the heat circulation within the building, there are currently only a few demands on the energy efficient use of *Allgemeinstrom* present in Germany. At the same time, the trend in the construction and modernization undertakings of residential buildings continues to focus primarily on the provision of “more comfort”. Due to the limited attention paid to energy efficient technology in this segment, the above mentioned trend results in the increase of power consumption. The domain of *Allgemeinstrom* appears to many as bagatelle.

Therefore, the following questions were analyzed for the domain of the multiple dwelling residential building:

- What are the usual consumption values of *Allgemeinstrom* (e.g. kWh/m^2; kWh/dwelling; €/m^2)?
- Which devices, facilities, and uses cause the *Allgemeinstrom* consumption?
- What technological and economic gains can be gained through consumption reduction/optimization?
- Which options are available to policy makers and funding institutions?

Procedure

The consumption of the *Allgemeinstrom* in multiple dwelling residential buildings was studied within the framework of this research project. The power used for the operating of the heating

system was just marginally considered as there is a sufficient body of the literature available on the given topic.

The data was collected through literature and internet research, analysis of information supplied by producers, expert interviews, measurements in residential buildings conducted with the help of the energy supplier EWE, and secondary and tertiary data analysis (operating cost accounts, rent index). The data was then scientifically analyzed and evaluated.

Summary of the results

Table 1 summarizes the identified *Allgemeinstrom* costs and consumption figures (incl. auxiliary energy – power for heating + hot water).

Allgemeinstrom in multiple dwelling buildings of Germany	Power costs (est. 0,20 €/kWh)	Power consumption
Total	0,82 to 1,36 bn. € per year	4,1 to 4,8 bn. kWh of final energy per year
Cost per dwelling and year	50-67 € on average	250 to 335 kWh of final energy on average
Cost per m^2 of living space and year	0,74 € to 1€ per year on average	3,7 to 5,0 kWh of final energy on average
Cost per m^2 of total net floor area A_N and year		8,4 to 11,3 kWh of final energy on average

Table 1 Cost and consumption of *Allgemeinstrom* in Germany

In a multiple dwelling building, *Allgemeinstrom* consumption can be caused by a wide variety of devices and appliances. Some examples include:

- Pumps and other devices necessary for the operation of the heating system
- Intercom with accessories (e.g. door opening mechanism)
- Stairwell lighting
- Amplifier for receiving / distribution of the cable television.

In addition, there were other *Allgemeinstrom* power consuming devices identified throughout the research project which might be possibly installed in a dwelling. Table 2 lists examples of these *Allgemeinstrom* consuming appliances.

Intercom with video signal transfer, antenna amplifier for satellite TV, antenna amplifier for terrestrial signal, smoke and heat venting system, lighting in the cellar and in the corridors, lighting in the attic, drying room lighting, lighting in the washing-machine room, lighting in the bicycle storage room, lighting in the central heating room, entry lighting, emergency exit markings, heat oil tank leak monitoring system, heat oil feed pump, boiler, heating controller, lift, heating remote monitoring system, lift remote monitoring system, elevators etc.

Table 2 Examples of *Allgemeinstrom* consuming appliances

The research project investigated the typical power consumption of such appliances. In this respect, the literature review proved to offer rather limited input. Additional information was collected by the use of our own measurements as well as through the measurements of other parties.

Policy options / Suggestions for policy makers

Federal government (*Bund*) and policy makers at the federal state (*Länder*) level could offer technical as well as informational impulses by using regulatory instruments. Energy conservation regulations for buildings, building codes of federal states, and envisaged energy efficiency regulation could offer the appropriate means.

With respect to technological impulses, minimal requirements on the important building's infrastructural elements (lifts, lighting of the communal areas, heating of outer surfaces as gutters, stairs, etc.) could be formulated. These would have to be followed once the building modernisation or new building construction is undertaken. Other appliances, as e.g. gutter-heating, could be banned by the energy laws of the federal states.

Minimal requirements suggestions are:

- For heating of outer surfaces: automatic control and regulation of heat energy based upon the time, temperature, and humidity.
- For lighting: Ban on the use of conventional light bulbs within the communal areas (stairwells, hallways, underground parking, etc.). This could be achieved by the product-neutral ban on the use of light bulbs below the prescribed energy efficiency limit.
- Lift: Only the installation of lifts reaching energy efficiency class A or B according to VDI 4707 during the stand-by- as well as operating-period would be allowed in the residential buildings

However, separate prescriptions for each product group (e.g. broadband amplifier) do not seem to reach the desired results in the case of many other *Allgemeinstrom* consuming appliances. The stand-by operation is common to many of them. Therefore, introducing a general limit on the power consumption of a device in stand-by modus to 1, possibly 2 W, is seen as sufficient.

With respect to informational impulses, inclusion of more information in the energy certificates should be considered. An energy certificate of a building should make the building's expected energy consumption transparent to the future user. The current energy certificate only offers information with respect to energy consumption of heating, hot water preparation, and power used to run for e.g. the heating system. The total energy consumption necessary for the building is not included. From this perspective, the inclusion of this remaining energy consumption, which is necessary for the use of the building, in the future energy certificates would prove to be reasonable.

Total power consumption of the building's infrastructure can be easily measured and represented in the case of the current residential building stock. The consumption is recorded with the *Allgemeinstrom* meter because it is usually transferred further on the individuals renting the dwelling.

However, *Allgemeinstrom* demand proves to be more difficult to measure in the case of new buildings or in the buildings where more significant modernization efforts were recently undertaken. At present, there are no guidelines or calculation tools which would allow to predict expected power consumption (= power demand) on the basis of available equipment (e.g. lift, pump station). Keeping this in mind, following solution is suggested:

A checkbox table listing important infrastructural elements, which strongly influence *Allgemeinstrom* consumption, could be provided in the energy certificate. This is already a

common practice used for the air conditioning facilities. An example of the suggested table and explanatory text could be following:

"In the building, there are following infrastructure devices available, which are recognized for their strong influence on power consumption:

- *Heating system of outer surfaces (stairs-, roof-, gutter-heating, heating of the entry ramp to the underground parking lots, etc.)*
- *Lift*
- *House sauna, house swimming pool*
- *Other (underground parking lot, parking lot operation system, etc.)"*

Suggestions for the funding agencies

The Federal government (*Bund*), federal states (*Länder*), and others promote the energy efficiency measures undertaken in buildings. It seems to be advisable for these agencies to support *Allgemeinstrom* energy efficiency measures in order to improve the energy efficiency with respect to *Allgemeinstrom* consumption. For example, the expansion of the KfW's CO_2 Building Rehabilitation programme could be imaginable. Within the programme, it would be possible to e.g. influence the energy efficiency of the installed lifts through defined demands on the technical specifications of these products. Lifts are often included in extensive building modernisation. Hence, there is a significant opportunity to influence the energy efficiency available.

The Federal Ministry of Economics and Technology (BMWi) own on-site consulting programme could include an obligation to perform an evaluation of the *Allgemeinstrom* use in the requirements catalogue for the multiple-dwelling residential buildings. The focal point of support "energy efficiency in power use" from BMU or BMFT could be used to support 100 demonstrative multiple-dwelling building reconstructions which would provide examples of benefits gained from *Allgemeinstrom* energy efficiency measures.

Conclusion

To sum up, there has been limited consideration given to the improvements of energy efficiency in *Allgemeinstrom* use until recently. Some impulses stemming from the discussions on climate protection and on the high energy prices in 1st half-year of 2008 could have been identified throughout the period of the project work. However, it might take several years until these easily avoidable losses will become widely recognized by producers, planners, home owners, and dwelling renters. The authors of this study hope that it will at least partly contribute in realising this stage.