Minimum energy efficiency standards for rental buildings in Germany – untapping health benefits

Sibyl D. Steuwer
Buildings Performance Institute Europe
Pfalzburger Straße 43/44
DE-10717 Berlin
Germany
sibyl.steuwer@bpie.eu

Andreas Jahn
Regulatory Assistance Project
Anna-Louisa-Karsch-Str. 2
DE-10178 Berlin
Germany
AJahn@raponline.org

Jan Rosenow
Regulatory Assistance Project
Rue de la Science 23
BE-1040 Brussels
Belgium
JRosenow@raponline.org

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Abstract

German building politics is in crisis. Despite ambitious sectoral climate protection targets in the building sector designed to reach the Paris Agreement set out in the Climate Action Plan 2050, there is no political will to establish the required new and radical policy approaches that would untap the big win-win potential of energy renovation. On the contrary, the connection of energy efficiency improvements in the building sector with multiple benefits are widely set aside – if not ignored by the German government. The paper examines beneficial health effects of energy renovation for low-income households and proposes the introduction of minimum energy efficiency standards for rental buildings to untap this potential. It draws upon a previous literature review carried out in early 2018 on the connection between energy poverty and building types as well as on health benefits of building renovation with a focus on Germany. The literature review has been followed by a stakeholder dialogue and respective feedback loop. This is used to refine and update the desktop research. Ideas for designing minimum energy standards for rental buildings are further developed based on lessons-learnt form country case studies (especially FR, UK, NL, Flanders).

Despite a considerable lack in data availability, the results show that

- Energy poverty affects health. This is also a relevant problem in Germany.
- Tenants who live in buildings constructed before 1980 that have poor energy performance are particularly affected.
- Energy poverty has structural causes that cannot be adequately addressed by social policy measures alone.
- Minimum energy performance standards for rental buildings can help increase the rate of deep renovations, reduce energy poverty and mitigate health problems associated with poor housing conditions.
- The introduction of minimum standards for rental buildings should be accompanied by a financing model and complementary measures to achieve the desired effects and prevent the displacement of tenants.

Introduction

Despite ambitious sectoral climate protection targets in the building sector designed to reach the Paris Agreement, there is no political will to establish the required new and radical policy approaches that would untap the big win-win potential of energy renovation. On the contrary, the connection of energy efficiency improvements in the building sector with multiple benefits are widely set aside – if not ignored by the German government.

The German building stock covers an area of 5.413 billion m², of which a good two-thirds (69 percent) fall on residential buildings. In the nearly 19 million residential buildings with around 40 million apartments, around 544 TWh were spent on heating, cooling, hot water and lighting in 2015 (Diefenbach 2013, iBRoad Project 2017, dena 2016). Around a

quarter of the total national energy consumption falls on residential buildings. According to the climate protection targets, emissions in the building sector have to be brought down to 70–72 million tons of CO_2-equivalent. This translates into a reduction target of around 40 percent from 2014 to 2030.

Despite ambitious national and European climate protection targets for the building sector, the national renovation rate remains at a low level. According to the latest dena building report, there has been no improvement in renovation activity, suggesting that the renovation rate remains at around one percent per annum (dena 2018). Thus, the goal of increasing the renovation rate to at least two percent per year is clearly missed. To achieve the climate protection goals, it would even need to rise to 2–3 percent (Rein 2016).

At the same time, multiple benefits are not fully acknowledged as a driver for energy renovation. This is especially true for health benefits. However, accounting for multiple benefits would provide a better argument for energy renovation.

The paper examines beneficial health effects of energy renovation for low-income households and proposes the introduction of minimum energy efficiency standards for rental buildings to untap this potential. The rental building is especially relevant in this regard. It is very difficult to tackle and at the same time would address low-income households and thus help them to profit from the benefits of renovation.

However, energy renovation of rental apartments in Germany is not perceived entirely positively: the modernization fee has been used by many landlords to increase rents, but hardly to carry out far-reaching energy refurbishment. The tenant did not benefit from the benefits of energetic renovations (savings, health aspects), but must bear the increased rental costs. Cost neutrality for tenants is also often not given, as the rent can be increased following a renovation, but the increase is often out of proportion to energy savings (Wild 2017).

Energy Poverty

A variety of energy poverty definitions are used in practice (see Rosenow 2014 and BPIE & RAP 2018 for a more differentiated analysis). According to the *10-percent-definition*, households are suffering from energy poverty if they have to spend more than 10 Percent of their income for electricity and heating. *The low-income-high-cost (LIHC)* definition has replaced the 10-percent-definition in the UK. Accordingly, individual energy costs must be above the median energy costs of all households. Second, the household, minus this individual amount, must have an income below the official poverty line (Hills 2012).

Generally, a household is affected by energy poverty if members cannot afford to heat the home sufficiently. The combination of low income, rising energy prices and inefficient residential buildings leads to energy poverty. The concept of energy poverty is useful as a specific phenomenon distinct from general poverty. It becomes energy policy relevant when structural causes behind the phenomenon can be addressed by energy policy intervention, especially energy efficiency improvements such as energy renovation.

Recently, the governing coalition decided to amend the law governing this aspect. The previously allowed increase in annual rent of up to 11 percent of modernization costs beyond the costs of maintenance has been reduced to 8 percent. However, this only applies in tight residential markets and is limited to 5 years. In addition, the monthly rent increases will be limited to a maximum of three euros per square meter within six years after the modernization. The previous regulation was an incentive to maximize the investment costs, since the rent may be increased only once after a modernization and then remained at this high level until the local comparative rent is similar (Kossmann & Gill 2016). Following the legal amendments, Germany's largest landlord has already announced plans to invest 40 percent less in energy renovation of its rental property stock in Germany in the future (Müller 2018).

This suggests that the structural problem of the user-investor dilemma (the tenant pays the energy bill while only the landlord can have energy efficiency measures implemented) (Hallof 2013) is not resolved. If the profitability of remediation measures decreases from the landlord's perspective, it can be assumed that energy measures will tend to lose their importance in the future.

Therefore, this paper proposes a new instrument that has already been used in several EU countries: minimum energy standards for rental housing coupled with financial incentives. It draws upon a previous literature review carried out in early 2018 on the connection between energy poverty and building types as well as on health benefits of building renovation with a focus on Germany (BPIE & RAP 2018). The literature review has been followed by a stakeholder dialogue and respective feedback loop. This is used to refine and update the desktop research. Ideas for designing minimum energy standards for rental buildings are further develop based on lessons-learnt form country case studies (especially FR, UK, NL, Flanders).

Beneficial health effects of energy renovation

In its well-known publication on the multiple benefits of energy efficiency, the International Energy Agency has found that building insulation measures are associated with great health benefits (IEA 2014). Taking into account the impact of health and wellbeing, energy renovations can result in a very positive cost-benefit ratio of up to 1:4. Health benefits make up 75 percent of the total benefits (IEA 2014.).

Low temperatures and poor building fabric often lead to increased moisture and mould formation, especially in the cold season. In addition to an increased susceptibility to heart attacks, strokes, flu, falls and hypothermia, especially respiratory diseases are a consequence of cold homes (Tod & Thomson 2016). It is widely acknowledged that energy efficiency improvements lead to a reduction in these health effects, especially when they reach people with chronic respiratory diseases in households that are inappropriately tempered (Thomson et al. 2013).

Recent research, both based on empirical data and on literature reviews, has confirmed that efficiency improvement, among others through thermal insulation, has a positive effect on the health and well-being, especially for fuel-poor households (Poortinga et al. 2018, Pollitt et al. 2017).

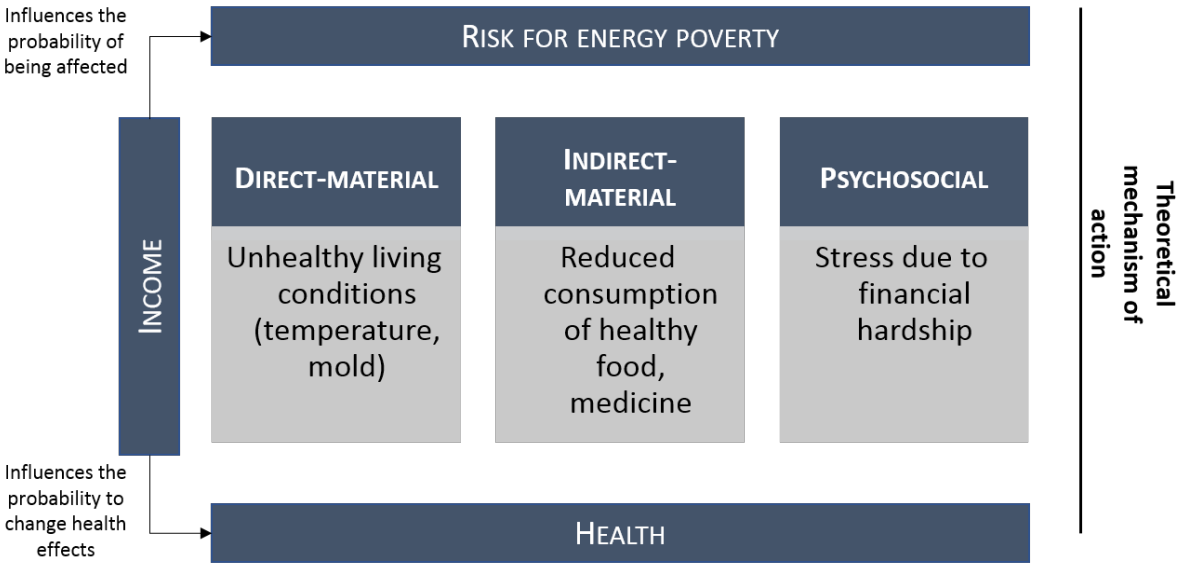

Figure 1. Impact-pathway of energy poverty (Source: BPIE & RAP based on Reibling & Jutz 2017.

This leads to the essential starting point of energy poverty, namely the structural causes. Low-income households paired with poor energy-related condition of the buildings are especially affected by an increased winter mortality and additional health hazards. In winter, people affected by energy poverty often live in rooms that are too cold. In doing so, they not only accept losses in living comfort, but also an increase in winter mortality due to cold stress. Cold stress increases thrombosis susceptibility and favors the formation of blood clots (Ekamper et al. 2009). Calculations for the development of increased winter mortality rates vary according to the underlying method. For Germany, there was an increase between 1980 and 2013 of 3–11.7 percent (Liddell et al. 2016). Within Europe, southern European countries, whose buildings and heating systems are hardly designed for cold weather (Tod & Thomson 2016), are more affected. However, Germany in the lower midfield is still considerably affected.

In addition, there are the psychological and social burdens associated with energy poverty, which are reflected in societal costs (IEA 2014, Liddell & Morris 2010). Public Health England has outlined in a graph the "Circle of Risk", which illustrates the interrelation between social/ mental stress and physical harm caused by energy poverty (Public Health England 2014) (see also Reibling & Jutz 2017). According to the Constitution of the World Health Organisation, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 2006).

Thus, energy poverty is not just a financial problem that may lead to debt or the loss of energy services. Households suffering from energy poverty are both, especially affected by the negative effects of non-renovated homes and will in turn benefit most from energy renovation.

ENERGY POVERTY IN GERMANY

In Germany, the political debate about energy poverty is still relatively young compared to other countries in Europe. It came up in the wake of the EEG surcharge increase and was mainly related to electricity prices (Tews 2013). Since it has been used as a counter-argument for the German energy transition, the debate is politically sensitive and very low on the agenda. However, we argue that looking primarily at heating – the share of heating energy accounts for around two-thirds of final energy consumption in Germany (Umweltbundesamt 2018) – tackling fuel poverty will promote energy transition and result in additional health benefits. Depending on the underlying definition, between 7.7–25.1 percent of German households suffer from energy poverty (Schreiner 2015), it is thus a considerable problem also in Germany not to be neglected.

The state of the political debate results in limited data available for research. While the connection between energy poverty, poor living comfort and the resulting health impairments is supported by research results, little, if any, research has been carried out on the magnitude of the negative health effects and the resulting costs. An exception is the publication by Reibling & Jutz in 2017 (see as well the Ecofys & Fraunhofer IBP 2018). Here, not only a theoretical model for the relationship between energy poverty and health is described (see Figure 1). The study is also based on data from the socio-economic panel and generated initial empirical results for Germany:

- The negative effects of energy poverty on mental health in lower income declines are significant.
- Poor housing conditions have a negative effect on physical and mental health (direct-material mechanism).
- Poor housing conditions are also responsible for the unbalanced state of health between income groups.

However, the authors point out that the housing conditions underlying the analysis reflect only rough estimates for the building performance. While the general negative impact of bad housing conditions on health is confirmed, the specific impact of energy poverty on health would require more research. Additional data would be needed to obtain more reliable figures and evidence on the link between energy poverty and health and the associated costs.

WHO WILL BENEFIT FROM MINIMUM ENERGY EFFICIENCY STANDARDS?

56 percent of all German households live in rented apartments – the highest proportion in Europe (Destatis 2014, Eurostat 2015). While the census 2011 provides no number for the share of population living in rented buildings and apartments, it is probably a bit lower due to the fact that the share of single-family households is higher in urban areas where also the number of rented apartments is higher. Most tenants live in multi-family houses with three or more residential units. The percentage of tenants increases with declining net household income (of households with a net income of the income groups up to €900/month, 80–85 percent are tenant/subtenant; among the income groups up to €2,000, the ratio is about ⅓ owners and ⅔ tenants, and among income groups €2,000–3,000, the share is 50 percent owners, 50 percent tenants; if the income increases at least ¾ are owners, ¼ tenant) (Destatis 2016). In the European comparison, the share of tenants among the households at risk of poverty is highest in Germany at 75 percent (BPIE 2014). Accordingly, it is assumed that the vast majority of households affected by energy poverty are tenants' households (Tews 2013). Schreiner (2015) has calculated in their study almost 100 percent of households affected by energy poverty are tenants and made visible that the distribution and share of energy poor households among building types is not congruent to the share of low-income households (Figure 2).

Taken together, most households affected by energy poverty can be found in multi-family homes with comparatively smaller living space. This statement is supported by the investigations of Schreiner (2015): Thus, over 75 percent of households affected by energy poverty live in buildings, with at least 3–4 apartments. Nearly half of all households not affected by energy poverty live in one- or two-family houses. More than 85 percent of all households affected by energy poverty live on a living space smaller than100 square meters. Of the households not affected by energy poverty, only around 50 percent live there.

The proportion of owners increases with decreasing age of the apartments. Thus, the ownership rate for buildings in the building age classes until 1978, i.e. before the heat protection regulations, is at about 40 percent. For buildings built between 1978 and 2000, it is around 50 percent, for newer even 67 percent (Destatis & WZB 2016). New buildings (built after 1980) are mainly inhabited by households not affected by energy poverty (Figure 3). Accordingly, it can be assumed that tenants tend to live in older buildings (see also Schreiner 2015). They are thus live in buildings with a lower energy standard since the energy consumption of buildings is essentially depending on the building age class (BMWI 2014, Kemmler et al. 2017: 62).

PRELIMINARY CONCLUSIONS

Energy poverty is a special phenomenon that can be distinguished from general poverty. Poor energy efficiency is one of the structural causes of energy poverty. Households affected by energy poverty often live in older apartment blocks. Single-family dwellings are not affected by the minimum energy efficiency standards for rental buildings, because they are disproportionately inhabited by owners, but energy poverty is a tenant phenomenon. Minimum energy efficiency standards for rental buildings will be beneficial for the lower income groups, especially for those suffering from energy poverty. However, this is bound to a couple of preconditions which will be elaborated further in the following sections.

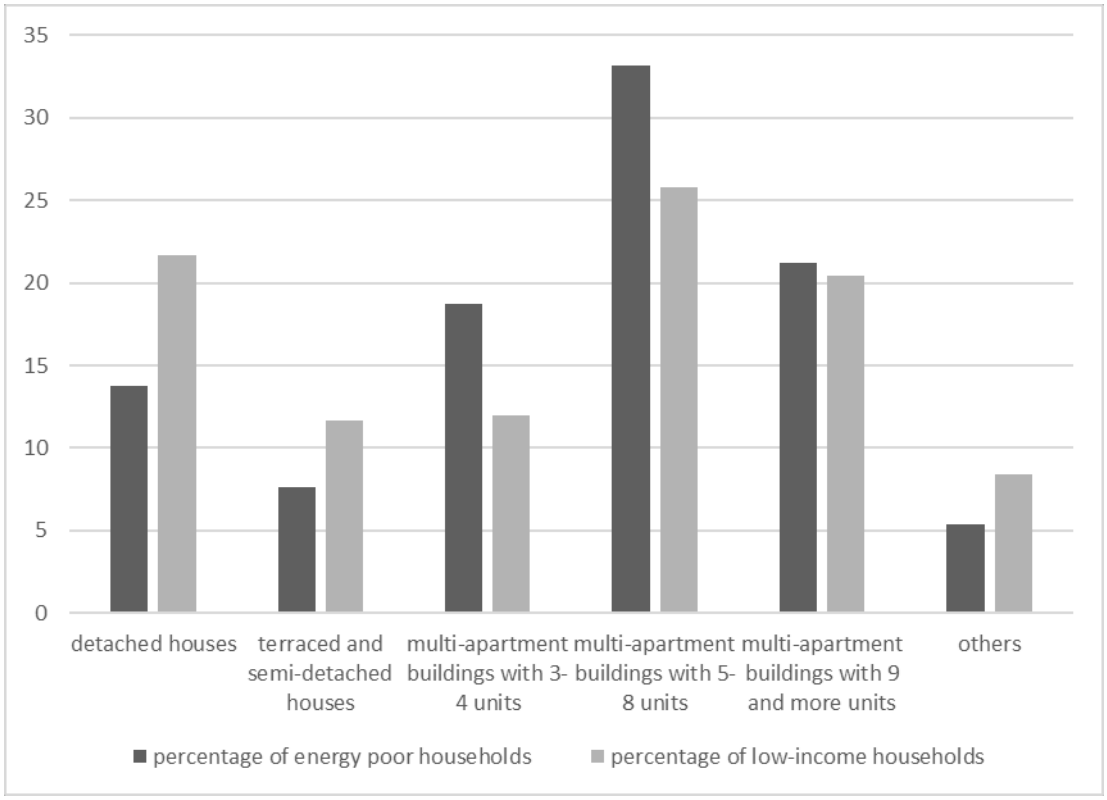

Figure 2. Energy poverty by building type (Illustration: BPIE & RAP; Source: Schreiner 2015).

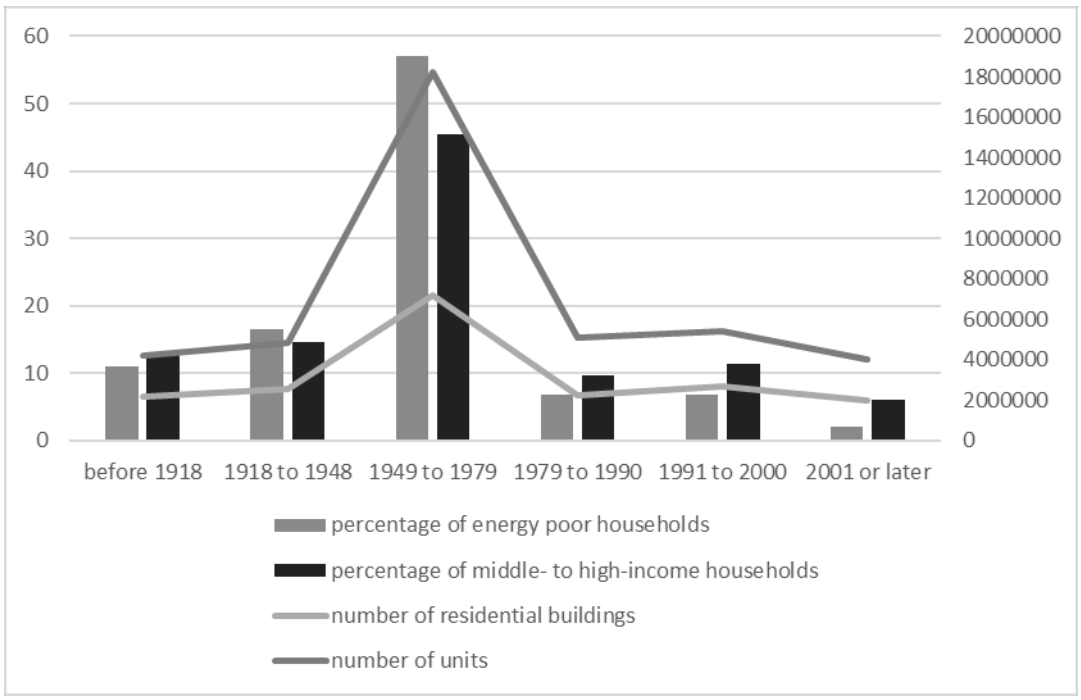

Figure 3. Energy poverty in Germany by building age class (Illustration: BPIE & RAP; Source: dena 2018, Schreiner 2015).

Minimum Energy Efficiency Standards for rental buildings

GENERAL IDEA AND MECHANISM

According to the new EU Buildings Directive Member States shall focus on refurbishing the most inefficient buildings as part of their national renovation strategies. This is exactly what the following instrument proposal aims for. Rental buildings of the most inefficient building classes will be turned progressively into more energy-efficient ones by complying to the new minimum efficiency standard. The standards may be designed in a way that only buildings with a specified maximum energy consumption per square meter or a certain efficiency class may be sold and/or re-let. In addition, these standards can be tightened at regular intervals to achieve national energy and climate goals in the building sector. The prevention of lock-in effects will have to be addressed in the design of the instrument.

Figure 4 illustrates how such a system can be designed. The efficiency classes and the timeline are indicative rather than a concrete suggestion. A more specific proposal could only be developed after careful modelling and an assessment of the existing building stock.

EXAMPLES FROM OTHER COUNTRIES

There are now several examples from other European countries where minimum standards for energy efficiency have been introduced for existing buildings. In the UK, there are minimum standards in the field of privately rented residential buildings. In France, minimum standards have been introduced for all existing buildings (residential and non-residential). Flanders obliges rental companies to implement certain energy efficiency measures or to collect penalty points which prevent the rental of residential buildings in the medium term. There are also examples from the Netherlands, which are described below and show that minimum standards already exist in different variants. In non-European countries, too, there are examples of minimum standards in the residential sector, e.g. in Canada and Boulder, Colorado (Pringle et al. 2018, Frappé-Sénéclauze et al. 2017).

UK

Design and legal anchoring

The 2015 Energy Efficiency Regulations for private rental properties set a minimum level of energy efficiency for rented properties in England and Wales. This means landlords must ensure that their properties reach at least efficiency class "E" as of April 2018 before granting new or existing tenants a new lease (leases in the UK are often limited to just 12 months). Energy Performance Certificates in the UK have efficiency classes ranging from "A" (Best Energy Performance) to "G" (Worst Energy Performance). The requirements for minimum standards then apply to all private rental properties in England and Wales – even if the tenancies have not changed – from April 1, 2020 for residential properties and from April 1, 2023 also for non-residential real estate. The monitoring is carried out by the municipalities. Apartments from social housing are excluded from the minimum standards, as significant advances have already been made in energy efficiency over the past decades (DECC 2014). The Scottish Government is in the process of establishing similar standards (Scottish Government 2017).

Financing

The current national rules are based on the principle of "no costs to the landlord". This means that landlords with "F" or "G" efficiency class are only required to make improvements to these properties if they can do so entirely through debt financing. This clause should protect landlords from exorbitant costs.

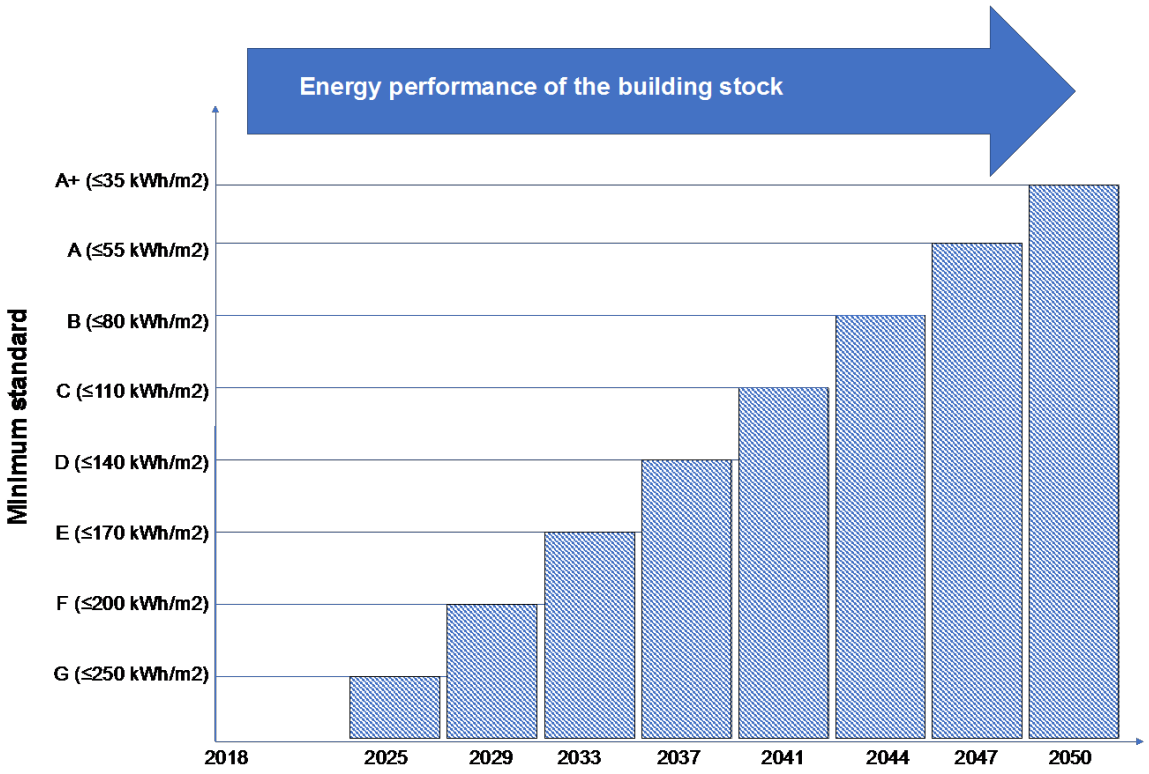

Figure 4. Schematic illustration of minimum energy standards for rental buildings (Source: RAP & BPIE; for a similar graph see e.g. Pehnt, Mellwig & Sieberg 2015).

When the original rules were drafted, it was considered that financing would be possible through the Landlords Energy Saving Allowance (a grant programme), the Green Deal (an on-bill finance scheme) and the Energy Company Obligation (an energy efficiency obligation). However, the Landlords Energy Saving Allowance was abolished in 2015 and the Green Deal has not been financially supported by the government since the summer of 2015, after demand fell far short of expectations. Thus, only the financing option remains through the Energy Efficiency Obligations, which primarily promote low-income households.

Due to the significantly lower funding options and the principle of "no costs for the landlord", it was feared that a large part of the landlord simply makes use of the exceptional case and so only a small part of the rental housing is actually rehabilitated energetically (APPG 2016). Therefore, the competent ministry removed the existing "no landlord costs" principle and instead introduce a landlord financing component if a landlord cannot obtain adequate free funding. To protect landlords from excessive costs, the government introduced a cost cap of £3,500 (about 3,850 Euros), which is a limit to the amount a landlord would have to invest in a single property.

France

Design and legal anchoring

France even goes a step further and addresses all buildings, not just rental properties: The Law on the Transformation of the Energy System for Green Growth (Loi de transition énergétique pour la croissance verte) provides that:

- by 2025, all "poorly insulated buildings" that consume more than 330 kWh per square meter (F and G energy classes) must be refurbished. The refurbishment standard should be similar to the performance of new buildings.
- By 2050, all buildings must comply with class A or B (based on the French Energy Performance Certificate) and would therefore be equivalent to the standard of a low energy building (Bâtiment Basse Consommation).

However, more specific regulation implementing the law has not been issued yet.

Financing

There is no financing model specifically tailored to the standards. Landlords and owner-occupiers have at least four different financing options:

1. Energy Efficiency Commitment/White Certificates: Under the White Certificates, utilities (electricity, gas, heating oil, heating, cooling) must meet the government's energy saving targets. Savings are achieved above all in the building sector. The utilities can freely choose the measures to achieve their goals and many of the measures include energetic improvements to the building envelope. Landlords may use the subsidies provided to them under the White Certificates for partially financing the renovation to achieve the minimum standards.
2. Tax credit: The so-called tax credit is basically an investment subsidy and independent of taxes actually paid. Since 2015, the amount of the tax credit has been 30 percent of the

investment costs for energy efficiency measures. However, the tax credit for double-glazed windows, insulating shutters and doors, as well as energy-efficient oil-fired boilers, has been reduced to 15 percent from 1 January 2018 and completely abandoned from 31 December 2018. There are also limits on the amount of expenditure that can be used to obtain a tax credit. The maximum cost for one person is €8,000 and €16,000 for a couple and is increased by €400 for each additional person in the household.

3. 0percent Loan: An interest-free loan (l'éco-prêt à taux zéro) is available for the cost of energy efficiency measures in residential buildings. The duration of the loan is usually 10 years but may be up to 15 years if at least three energy efficiency measures are implemented. The amount of the loan is up to €20,000 for two elements of energy savings and up to €30,000 for three or more. To receive the loan, one of three conditions must be met, depending on the type and age of the property:
    a. Carrying out at least two energy efficiency measures
    b. Achieving a minimum level of energy performance standard, called performance énergétique global; or
    c. Conducting work in conjunction with a land-based housing rehabilitation program.
4. VAT reduction: energy efficiency measures can also benefit from the reduced VAT rate of 5.5 percent (compared to the standard rate of 20 percent). Condensing boilers, heat pumps, thermal insulation, heating control and renewable energy systems qualify for the reduced price.

Flanders

In Flanders (Belgium), a new standard was introduced in January 2015, which sets minimum requirements for the roof insulation of residential buildings (family houses and apartment blocks) when the building is rented (R-value of 0.75 m^2K/W). If a residential building does not meet the minimum requirements, it will receive penalty points. The amount of penalty points depends on the roof area with higher penalty points being allocated for a roof area >16 m^2. Similar requirements are set up for window glazing and other aspects of the building. Penalty points will sum up. From 2020, the building (or apartment) cannot be rented out if it has received more than 15 penalty points.

The Netherlands

Design and legal anchoring

In the Netherlands, there is a minimum standard for the office building stock. Each office, which is more than 100 m^2 in size in 2023, is required to achieve energy efficiency class "C". If the building does not meet these requirements, it may no longer be used as an office. However, there are a few exceptions, including:

- Secondary office use: <50 percent user area has office function
- Monuments
- Buildings that are demolished/remodeled/expropriated within 2 years

It is estimated that more than half of the offices in the Netherlands need to take action to meet this upcoming commitment (Rijksdienst voor Ondernemend Nederland 2018). The final legislation is currently being prepared. This also applies to the implementation of the rules, compliance and enforcement.

Financing

There are already various financing options for the energy-efficient refurbishment of office buildings. These include:

- Energy Investment Allowance (EIA): This is an instrument that allows for tax depreciation of investments in energy efficiency measures. Up to 55 percent of the investment costs may be deducted from the taxable profits.
- Renewable Energy Investment Allowance (ISDE): This is investment aid for renewable energy and provides compensation for the purchase of solar thermal, heat pumps, biomass boilers and pellet stoves. The program is intended for both individuals and commercial users.

Lessons learned from experience so far

The international experience, although limited so far, provides some important lessons learned that can be considered for the design of minimum energy efficiency standards in Germany and elsewhere.

First, the implementation of minimum energy efficiency standards for the private rented sector in the UK shows that financing of measures must be closely linked to the standards. If financing mechanisms are not available resistance from landlords to invest in energy efficiency retrofits could be significant.

Second, detailed specifications of minimum standards need to be developed swiftly once there is a high-level political commitment. This has not happened in France so far and effectively means that progress has stalled.

Finally, enforcement of standards once adopted is of critical importance. The private rented sector appears to be at risk of lacking enforcement as data from the UK shows: only 26 percent of properties in the private rented sector had an Energy Performance Certificate in compliance with regulations (MHCLG 2013).

We now discuss how minimum standards could be designed for rental buildings in Germany.

MINIMUM ENERGY EFFICIENCY STANDARDS FOR RENTAL BUILDINGS IN GERMANY

Design criteria

The design of the minimum standards must meet certain criteria for the instrument to be effective.

Binding Character

For the instrument to generate the necessary energy savings and emission reductions, the design must be bindingly regulated. It could, for example, be enshrined by law for rental properties to meet a minimum standard when re-letting at a specified time (for example, January 1, 2021). The minimum standard would be increased over time and adjusted, e.g. in 5-year sections. The

standards are announced with a lead time of at least three years. Accordingly, control and sanction mechanisms would have to be designed and ensured. For existing leases, a socially acceptable restructuring plan could be developed and implemented.

Financing
To reach the desired target group without leading to additional financial burdens, a corresponding financing mechanism must ensure quasi-cost neutrality. A combination of levy and subsidies would be conceivable. The involvement of health care/health insurance funds in the financing of the renovations should also be explored, as the renovation activity will result in reduced health costs. In addition, CO_2-prices for the heating sector would make renovation more cost-effective (Agora Energiewende 2018).

Health effects
Funded renovation measures should focus specifically on those parameters that have an impact on the health of the residents. Accordingly, the renovation will not only target energy saving and the comfort temperature, but also the indoor air quality, light, ventilation and noise are considered as additional parameters.

Supporting aspects
For minimum energy efficiency standards to be introduced and effective in Germany, there are several accompanying measures that should be taken. This includes improving the data situation and reducing enforcement deficits when issuing the energy performance certificates (an extensive energy performance certificate database as required by EPBD would be an easy way to generate data on the buildings in Germany and gradually ban the building classes; clearly defined hardship regulation would be appropriate).

Linking the standard to the building renovation passport would help to ensure deep renovations in the long term and to avoid lock-in effects.

Discussion of financing options

The discussion of the financing option should be conducted openly with the stakeholders concerned. Therefore, the below mentioned aspects are meant as a stimulus for an exchange. In any case, it is important to ensure a quasi-warm-rent neutrality of the energy renovation by means of an appropriate financing model. As a prerequisite, households affected by energy poverty must benefit from the renovation. If renters are displaced due to the renovation, the overall policy target was missed.

Points for discussion

- For landlords, the investment could be facilitated by a new financing instrument (for example, through a KfW loan specifically designed for this segment, which can be combined with tax depreciation).
- A mandatory use if existing subsidies would also be conceivable.
- Connecting the standards with the building renovation passport would ensure profound and sector target compatible renovation. There are several ways to connect both instruments: the costs for the building renovation passports could be tax deductible or providing financial support if the renovation effects are in compliance with the renovation roadmap.
- CO_2 tax revenues could reduce the amount of money needed to finance the renovation.

Conclusions

Energy poverty has structural causes and can be addressed through energy efficiency policy. The health problems associated with energy poverty are evident and can be mitigated by energetic renovations. To fully understand the extent of health effects of energy poverty and the associated costs, the data basis should be significantly and rapidly improved.

Energy poverty is a tenant problem, especially in Germany. Therefore, priority should be given to redevelopment of apartment blocks built before 1980, which have poor efficiency standards.

The introduction of minimum standards for rental buildings is an important lever to carry out the necessary refurbishment and to realize the benefits associated therewith. However, the instrument should be designed with a financial mechanism and flanking instruments to ensure that there is no displacement of existing tenants and that deep redevelopment of the climate policy sector objectives is achieved.

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