Living spaces: saving energy by encouraging alternative housing options for senior homeowners

Corinna Fischer
Öko-Institut e.V.
Rheinstraße 95
64295 Darmstadt
Germany
c.fischer@oeko.de

Immanuel Stieß
ISOE – Institut für sozial-ökologische Forschung GmbH
Hamburger Allee 45
60486 Frankfurt
Germany
stiess@isoe.de

Keywords

floor space, homeowners, counselling, building design, housing, heating

Abstract

An important share of Middle European countries' energy consumption is used for space heating, which is determined by building energy efficiency, user practices, and floor space. Research and policy tend to focus on the first two factors and neglect the latter. In the German residential sector, per capita floor space has been increasing for decades, causing important rebound effects. Reducing per capita floor space by only 2 m^2 could bring 4.5 % savings in heat energy.

Senior citizens are a relevant target group. When grown-up children move out, they typically remain in the homes acquired for a family. 21.4 % of all households in Germany belong to this group. In 2014, their average floor space is 62 m^2 per capita, compared to the national average of 43.8 m^2 (Statistisches Bundesamt 2018d). Their homes are often in need of modernization, and not very energy efficient or barrier-free.

The paper first sketches the current situation with respect to living space and energy consumption, and outlines alternative space-saving housing options with their corresponding energy savings potentials. Examples are moving to a smaller place, letting out parts of the home, or rebuilding the home so it can be shared with others. In the empirical part, the paper presents first results of the transdisciplinary research project "LivingSpaces", carried out in the district of Steinfurt in Western Germany. The project's objective is to develop and assess policy instruments which support senior citizens in choosing housing alternatives that are both space-saving and suitable for their future needs – for example in terms of accessibility, convenience, or community.

Specifically, the paper will present the results of a representative survey that explores senior citizens' attitudes towards various housing options. On this basis, it will explain the communication approach that is at the heart of LivingSpaces and consists of several modules such as an awareness campaign, an innovative personal advice service "new housing in old age", workshops, and setting up a support structure that helps with practical issues such as legal, financial or organizational questions. In particular, the individual advice service will be discussed.

Background

PER CAPITA LIVING SPACE AND ENERGY CONSUMPTION

In Middle Europe, space heating is a main driver for energy consumption and hence climate impact. For example, in Germany, space heating accounted for 27.5 % of total end energy consumption on average between 2013 and 2017[1]. For the residential sector, excluding transport – which in itself was responsible for 26 % of total end energy consumption in this period – it was an impressive 69 % (AG Energiebilanzen (2018), Table 11 and 12). When we focus on this sector, three main factors influence energy consumption for space heating: building energy efficiency, user behaviour, and heated area (living space). The following observations illustrate the relevance of living space:

1. The share of THG emissions was about 13 % of total German THG emissions and in 2012 (own calculations); newer data is not available.

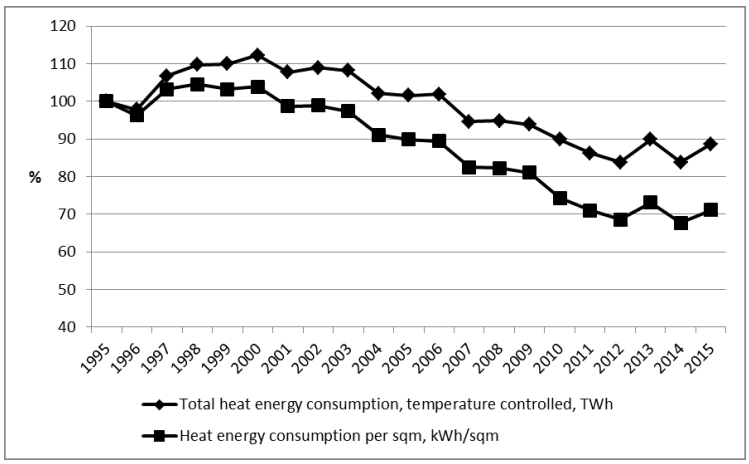

Figure 1. Heat energy consumption in Germany, total and per square meter. Source: Own calculations.

Temperature-corrected heat energy consumption per m² is a measure that shows the aggregate effect of building energy efficiency and user behaviour on heat energy consumption. According to national statistics, this figure was reduced by 29 % between 1995 and 2015 in Germany (in absolute terms, from 189 to 134 kWh/m²).[2] The bulk of this reduction is due to significant energy efficiency improvements through renovation and efficient new buildings during this period, yet the exact shares of energy efficiency improvements vs. potentially more efficient user behaviour in this total reduction are unknown. However, in the same period, total living space has grown by 27 % from 2.9 billion to 3.7 billion m² (Statistisches Bundesamt 2018a). As the population was more or less stable, this was mainly an effect of increasing per capita living space, which grew from 36 to 44.7 m² in the same period.[3]

This increase has been cancelling out a relevant part of the potential heat energy savings. In contrast to heat energy consumption per m², total heat energy consumption dropped only by 11 % from 555 to 492 TWh/year.[4] Figure 1 shows the respective trends with the 1995 value set to 100 %.

It follows that if per capita floor space had been only 2 m² lower in 2015, 4.5 % of this year's temperature corrected heat energy consumption would have been saved, all other things being equal.

However, policy approaches in the building sector have mainly focused on building energy efficiency. German policy instruments include the Energieeinsparverordnung (Energy Savings Ordinance) (EnEV), which sets efficiency requirements for new buildings and major renovations. It is complemented by a number of subsidy programmes administered by the national development bank KfW and directed at energetic refurbishment, for individual buildings or on a neighbourhood level. On the European level, the Energy Performance of Buildings Directive (EPBD) and certain Ecodesign and Energy Labelling measures (on boilers, water heaters, air conditioning, ventilation, air-based heating products etc.) address building energy efficiency. User behaviour is targeted mainly by advice programmes. Living space, in contrast, has not yet been addressed as a relevant topic in energy efficiency and climate policy, and is not targeted by policy instruments in a systematic way.

This is regrettable, as policies of living space sufficiency could bring multiple (co-) benefits by improving the availability and affordability of housing and lowering the demand for new buildings, thereby reducing land use and abating infrastructure cost (Bohnenberger 2017). One relevant target group for such a policy will be sketched in the following section.

"EMPTY NESTERS" AS A TARGET GROUP

Drivers for increasing per capita floor space are diverse (see for a compilation Bohnenberger 2017). Among them are macro-factors such as demographic change (decreasing household sizes), increasing welfare (BBSR 2015), evolving building standards, increasing mobility that favours multiple homes, and incentives from financial markets to invest in profitable, attractive large dwellings. They are complemented by individual factors such as preferences and biographic events. Consequently, per capita floor space differs greatly between social groups. Large per capita living spaces are especially found in small households, high-income groups, rural areas, homeowners, and elderly citizens (BBSR 2015).

Senior citizens are an especially relevant target group. 21.4 % of German citizens are aged 65 or older (Statistisches Bundesamt 2018c), and this group will be growing with predicted demographic change. In 2014, their average per capita living space was 62.0 m², much higher than the population average (43.8 m²). 53 % owned their home, compared to 44 % of the total population. This sub-group of home owner-occupiers aged 65 or older even had 70.6 m² per capita at their disposal (Statistisches Bundesamt 2018d and e).

One major reason is the so-called "remanence effect"[5]: After their grown-up children have left home – and often even after their partner has died – people tend to remain in the dwellings they acquired for the spatial needs of a family. In the first place, there is no obvious need for a change. Single-family homes

2. Own calculations, based on Bundesministerium für Wirtschaft und Energie (BMWi) 2018 and Statistisches Bundesamt (2018a).

3. Own calculations, based on Statistisches Bundesamt (2018a and b).

4. Own calculations, based on Bundesministerium für Wirtschaft und Energie (BMWi) 2018.

5. The term is often used in real estate industry; the correlation between age and the housing demand has been studied in economics (c.f. Mankiev & Weil 1989).

Table 1. Housing options for "empty nesters".

Remaining in one's home, no changes in living space	Remaining in one's home + densification	Moving (relocation)	
		New dwelling	Current dwelling
Doing nothing	**Separation of an in-law flat Renting out an existing in-law flat**	**Flat (purchase/for rent)**	**Renting to the family/o others**
Barrier-free refurbishment	**Enlargement, extension, creating a second flat**	**Single family home (rent or purchase)**	**Transfer within the family**
Energy efficient refurbishment	**Replacement by a building designed for more dense occupation**	**Collective living, e.g. multi-generational housing (rent or purchase)**	**Selling to others**

Source: Adapted from Rütter et al. (forthcoming).

provide the prevailing model for modern family housing. They have been propagated for decades, as a place for life-long living and as provision for one's old age (Bohnenberger 2017). Many people are attached to their homes and neighbourhoods. They might enjoy having generous space at their disposal for furnishing and decorating, storing their belongings, using it for hobbies and diverse activities, offering guest rooms to visiting friends and family, or even having a room available for a nurse, should need be. There is usually no financial pressure either: homeowners generally have fully paid their house at that time and can enjoy modest housing costs. For tenants, the financial situation may, on the one hand, deteriorate when they retire. On the other hand, the necessity of financial support for children may have decreased, providing greater financial leeway.

Still, housing needs change with age, as do neighbourhoods and buildings. Our project is based on the assumption that some of these changes might favour a decision to make a change to one's housing situation. Old age can bring physical restraints that make it more difficult to maintain a large home. Also, many older buildings pose challenges in terms of accessibility (stairs, bathrooms, etc.). Homes deteriorate over time and may be in need of (energetic or general) renovation. Many older single-family homes are located in purely residential areas that lack social infrastructure; people with reduced mobility may have difficulties in accessing shops, services, health care, etc. Also, the neighbourhood might change over time – friends and acquaintances could die or move out. On the other hand, there are also positive incentives that might trigger a change: desire to make a new start, to move closer to friends or grown-up children, to live with other people, or to be more flexible if relieved from the maintenance needs of a large home. Investigating these changes more closely, the project "LivingSpaces" sets out to identify starting points and strategies for a more efficient use of the building stock.

Rütter et al. (forthcoming) have systematized housing options that are open to people in the "empty nest" phase (Table 1, slightly adapted).

Of these options, all those highlighted in bold type offer the possibility of energy savings. The options of "densification" and "relocation" can achieve this by reducing individual living space. The reduction occurs either by sharing the existing space with others or by choosing a smaller home for oneself and offering the large home to larger households.

However, there are challenges associated with implementing such options (Kenkmann et al. 2019). First, dealing with the question of housing in old age can be difficult. The topic is often pushed aside because considering potential physical limitations or emotional changes in old age appears challenging. In addition, people are not always aware of all the options that exist. Even if they are in principle interested in change, manifold barriers exist. Any change requires time and effort that may seem overwhelming: For *relocation*, finding or planning a new home, organizing the clearing of the house and the move; for *densification*, planning and financing a reconstruction of the home, finding likeminded people and a suitable object or building lot for co-housing, etc. In addition, relevant financial barriers exist. With regard to *relocation*, a new apartment for purchase is often so expensive that it cannot be financed by the returns from selling an old house. Likewise, for rental flats, new contracts often are costlier than existing ones, even if the flat is smaller. As for *densification*, elderly people are sometimes refused bank credits. Finally, the real estate market may get in the way of relocation measures. In many regions, there is a scarcity of suitable housing for old age. There can also be difficulties in finding a purchaser or tenant for the current home, as it may not suit contemporary standards and expectations.

In view of this long list of barriers, policies, services and projects that address them are urgently needed, as suggested in Kenkmann et al. (2019). These might include:

1. For densification:
   - Individual advice (for example on transforming the home, such as provided by the Austrian "Rehabitat" or Swiss "MetamorpHouse" projects[6]);
   - Financial support programmes for refurbishment;
2. For relocation:
   - Urban planning that favours the provision of adequate housing for old age;
   - Platforms that facilitate the exchange of large for small flats (such as the platform "Tauschwohnung")[7]

6. https://rehabitatprojekt.wordpress.com/; https://www.bwo.admin.ch/bwo/de/home/wie-wir-wohnen/studien-und-publikationen/metamorphouse.html

7. www.tauschwohnung.com

– Financial incentives for changing larger flats with smaller ones (such as in Berlin, where municipal housing companies offer the possibility to change flats without increasing the rent).
– Support for communal housing projects;
– Services that address practical problems, such as clearing out the house or aid with finding a new home;

Savings potentials for selected policy instruments to stimulate densification or relocation have been calculated by Kenkmann et al. (2019) for three groups of senior citizens (altogether 8.3 million households in 2013). The size of the target groups and estimated implementation rates were taken into account. Policy instruments to stimulate densification were targeted subsidies and advice. To stimulate relocation, the creation of municipal advice and support centres was assumed. Savings in the target groups were modelled against a business as usual scenario in which per capita living space rises by 0.56 % per year. Total savings in the target groups were estimated to be about 3.9 TWh/a (0.91 million t CO_2e/a) for densification measures (creating of a separate flat, subletting of an existing flat) and 2.1 TWh/a (0.48 million t CO_2e/a) for relocation.[8] Taken together, these savings exceed by about 36 % the 4.4 TWh/a savings that could be achieved by extending existing funding programs for energy efficient refurbishment, according to the Federal Government (Bundesregierung 2017).

LivingSpaces: a transdisciplinary research project

In the empirical part of our paper, we present and discuss preliminary results and insights from the transdisciplinary research project "LebensRäume" (Living Spaces). The research project aims at exploring the actual potential for space and energy savings through policy instruments targeted at senior citizens by testing an intervention approach "on the ground".

The project is carried out in the district of Steinfurt, in close cooperation with towns and municipalities facing this pressing issue. Located in the North-Western part of Germany in the immediate vicinity of the Netherlands, the district of Steinfurt is a predominantly rural region with about 435,600 people in 24 county towns and municipalities on an area of about 1,800 km². The district comprises five towns between 35,000 and 76,000 inhabitants; most of the other municipalities have less than 12,000 inhabitants. The residential building structure is mainly characterized by private single- and two-family houses. More and more elderly people, often in single households, inhabit large per capita spaces in older, non-barrier-free buildings with poor energy standards.

The first stage of the research process was dedicated to the analysis of the status quo. The project team analysed statistical data on demography, building stock and housing market for ten municipalities. Furthermore, an empirical survey on housing conditions and needs of senior homeowners in selected municipalities was conducted.

In the second stage, the project team organized a series of co-creation workshops with stakeholders from the involved municipalities in order to develop and work out an intervention concept with concrete measures.

In the third stage, these intervention measures will be tested in selected municipalities of the Steinfurt district. Results of the intervention will be evaluated and assessed at the end of the project.

Running from 2017–2020, the research project is funded by the Federal Ministry of Education and Research (BMBF). The research team is formed by an agency of the Steinfurt district and three research institutes: Öko-Institut e.V., ISOE – Institute for Social-Ecological Research, and ifeu Institute for Energy and Environment.

In the following sections, we will present preliminary results of the statistical analysis and the empirical survey (stage 1). We will also introduce core instruments of the intervention concept (stage 2).

HOUSING SITUATION AND IDEAS ON FUTURE HOUSING: RESULTS OF A SURVEY

The statistical analysis conducted in the first stage of the project had shown that between 20 % and 25 % of all households were one- or two-person households with large living spaces (more than 80 m² for a one-person household or more than 120 m² for a two-person household). Against this background, researchers wished to explore how senior homeowners perceive their housing situation and to study relevant attitudes, perceptions and motives with respect to space-saving housing alternatives for old age. Some of the research questions included: What is the current housing situation for senior citizens? What possibilities for densification does it offer? How is the current housing situation perceived? Are respondents interested in making changes? If so, which options seem attractive? What barriers exist? Would the respondents appreciate advice and support on this issue?

The target group was defined as homeowners living in one- or two-person households, and aged at least 55 years. Homeowners were chosen as they represent the vast majority of household types in the district. The age threshold was set relatively low since it was assumed that organizing for housing for old age would entail a relatively long preparation phase, and would therefore be considered by homeowners in advance. A second target group (not reported here) comprised people potentially interested in moving to an old house.

Method

A standardized telephone survey was conducted in six municipalities in the district of Steinfurt: Emsdetten, Ibbenbüren, Lengerich, Mettingen, Saerbeck and Wettringen. Among this selection are the three municipalities[9] where the intervention concept will be implemented. The survey period ran from mid-January to early February 2018. The survey was carried out on the basis of a random selection. For this purpose, telephone

8. In the scenario, households who were assumed to be unable to implement measures (e.g. too old, house unsuitable) were subtracted from the target group. It was assumed that 1 % of the remaining households annually creates separate flats, 0.75 % sublet and 0.25 % relocates. In a sensitivity analysis, these shares were lowered to 0.5 %, 0.25 % and 0.1 % respectively, resulting in savings of 1.8 TWh/a (0.42 mio t CO_2e) for densification and 0.8 TWh/a (0.17 mio t CO_2e) for relocation.

9. Emsdetten, Ibbenbüren and Mettingen are participating in the testing of the intervention concept.

numbers for the six municipalities were randomly generated and called. If the person was willing to take part in the survey, the next step was to use screening questions to determine whether they belonged to one of the target groups. If this was the case, the interview was continued. If a person did not belong to one of the target groups, only a few additional socio-demographic questions were asked and the interview ended.

Sample

A total of 1,887 telephone interviews were conducted. Among them were 386 interviews with homeowners aged 55 and older, 172 interviews with people interested in moving, and 1,329 short interviews with people who did not belong to either of the two target groups.

The sample shows differences in socio-demographic characteristics compared to the population as a whole. Due to differences in responsiveness and accessibility, women and people with higher education are overrepresented. In order to compensate for these differences, the data were weighted which slightly changes the result for the incidence of the target groups. The proportion of older homeowners drops from 21 % to 18 % (= 341 interviews) and the proportion of those interested in moving increases from 9 % to 10 % (= 190 interviews). In the following presentation of selected results, all percentages and case numbers refer to the weighted sample size.

Results

Housing situation and potentials for densification

The biggest share of respondents (42 %) lives in houses with less than 125 m² living space. Just under a quarter have between 125 and 150 m², and a third live in more than 150 m². At the same time, the houses have a relatively large number of (presumably often small) rooms: Two-thirds of the houses have five or more rooms, 21 % even more than seven rooms. 86 % of the respondents live in houses with two or more floors.

Two-thirds of the houses were built before 1980, a majority thereof between 1949 and 1980. 27 % were built between 1980 and 2000 and only 5 % after 2000. 95 % of the homes are heated with fossil fuels.

In almost half of the houses, the staircase is separated from the living area. Almost one-third already have a self-contained flat. However, the survey results show that this potential has not yet been exploited in many cases: only 40 % of those who have a second apartment in their house have currently rented it out.

In addition, 51 % of the respondents have one or several rooms that are no longer in use. In most of these cases, two or more rooms are unused (Table 2).

Evaluation of the current housing situation

Almost half of respondents perceive their house as (slightly) too large. 9 % even perceive it as much too large, while 53 % think it is reasonable in size. However, the subjectively perceived size does not seem to be directly related to the assessment of the house's suitability for old age and any age-related restrictions. Only 16 % consider the house to be badly or very badly suited for old age, and only 10 % say that it is a burden for them to have so much living space. The vast majority of 83 % consider their home to be well or very well suited for old age. Only few respondents feel that aspects of their current housing situation are a burden (Figure 2). In addition, 96 % are happy or very happy with the area they live in, and between 70 and 85 % think that social infrastructure and public transport are good.

Openness to change and attractiveness of different options

Consequently, 94 % of the respondents "fully" or "rather" agree that they wish to stay in their homes as long as possible. Another 85 % hope that their housing situation changes as little as

Table 2. Number of rooms no longer in use.

Number of rooms not in use	1 room	2 rooms	3 room	4 and more rooms
Respondents with rooms not in use	20 %	45 %	23 %	12 %

Source: Authors' own.

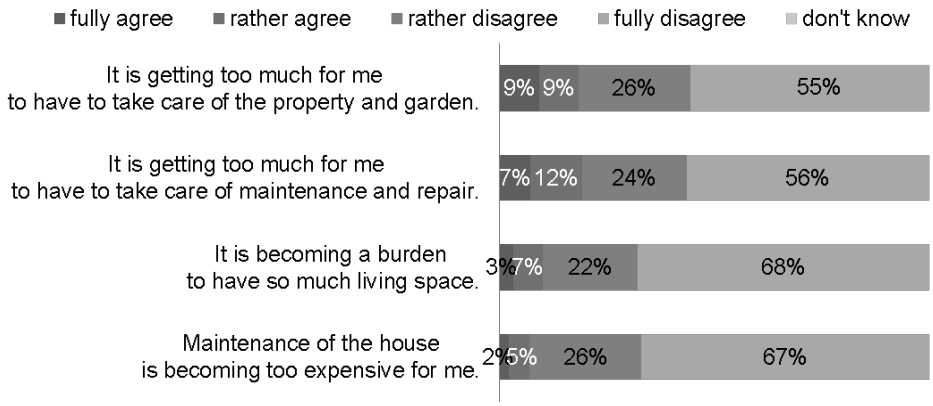

Figure 2. Perception of aspects of the housing situation as a burden. Source: Authors' own. (basis: n = 341).

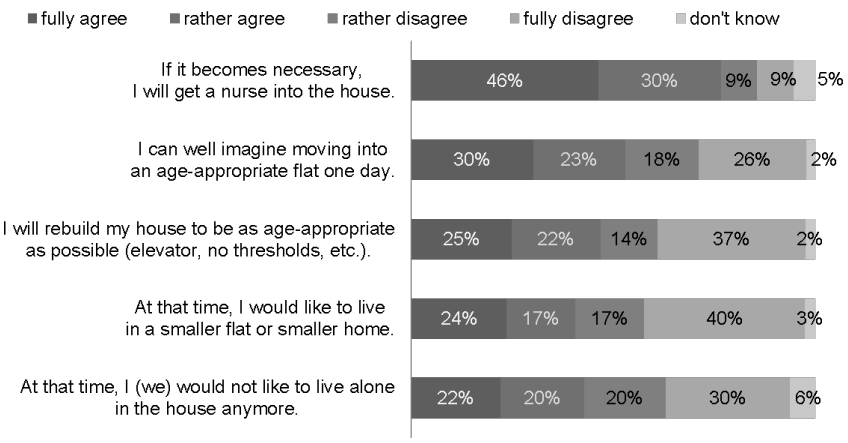

Figure 3. Acceptance of housing options for old age. Source: Authors' own (basis: n = 341).

possible. Nevertheless, it is important for about three quarters to think early about a good solution for old age and to look for a suitable option. Several options seem to be, in principle, acceptable (Figure 3). When delving deeper into the individual options, the following picture emerges:

Relocation

Half of the respondents could in principle imagine moving to an alternative home in old age. For another quarter, this is at least a thought that could possibly become a more concrete plan. For a good quarter of older homeowners, on the other hand, moving to another place of residence when they are old was not an acceptable option.

A particularly attractive alternative to the current housing situation appears to be a communal form of living, which almost half can imagine. The exchange of one's own house for an apartment suitable for the elderly also seems to be a relatively attractive option: 40 % are at least open to considerations in this direction. The vast majority (87 %) would prefer to stay in the same residential area in order not to lose social contacts. As multiple answers were possible, for 78 % it would also be acceptable to stay in the same municipality. Acceptance of moving goes down with increasing distance, and only 12 % of respondents can imagine moving out of the region (usually close to their children).

Motives that speak against moving are primarily on the emotional level: almost 70 % say they feel too connected to the house and 45 % feel it would be very difficult to part with things they are emotionally attached to and that would not fit into a smaller apartment. Practical obstacles for moving are the (at least presumed) lack of appropriate housing in the area and/or high prices. There is a lot of uncertainty at play here: 26 % are unable to assess the supply of housing. Also, just under a quarter of the respondents fear that the income from their house sale would be insufficient to finance an appropriate apartment. Nearly 20 % feel overwhelmed by the implementation of such an enterprise in various respects. Relocation costs are an obstacle for only 14 % of the respondents.

Renting out (with or without reconstruction)

Taken together, 21 % of those who have not yet rented out parts of the house can definitely or possibly imagine doing so, with or without reconstruction. The most relevant advantages they see are getting help by the tenants (49–56 %) or not being alone (42 %). Financial gains are less important (28 %).

However, there are relevant obstacles to renting out. The biggest barrier is the lack of willingness to share the house with strangers (56 %). This is mainly due to the fear of getting the wrong tenants, expressed by 42 % of the respondents, and the fear that there might be quarrels and disputes with the tenants (25 %) leading to negative emotions. In addition, 20 %–30 % of the respondents are afraid of the amount of work involved in renting, do not have a good idea on how the house could be reconstructed, feel overstrained by the planning and organization of such a project or do not have the necessary financial means for a conversion.

Still, when asked whether they are planning to change anything about their housing situation in the next five years, most respondents disagree – and even of those who agree, only half have concrete ideas (Figure 4).

Interest in advice

Respondents were also asked about their interest in an advice or support service offered by the municipality or another organization to help them in planning their future housing. About one quarter each would be "interested" or "very interested". For those interested in advice, most interesting general topics were legal advice (82 %), help in deciding what to do (79 %) and financial advice (66 %). With respect to moving, people were most interested in help with finding an appropriate dwelling (72 %). With respect to reconstruction and renting out, the topics of planning and executing the reconstruction, and help with rental contracts and conflicts with tenants were on almost equal footing with about 60 % each. Municipalities were seen as best suited to provide the advice (85 %), followed by consumer advice centres, the district, and social institutions or churches.

Implications for the design of the intervention

The empirical findings suggest that space-saving housing alternatives exist and could be economically and environmentally beneficial in many cases. However, homeowners' motivational situation is complex and ambivalent. While a relevant share of respondents can theoretically imagine making changes (with moving being seemingly easier to imagine than renting out

parts of the home), this has in most cases not led to concrete plans. It seems plausible to assume that a relevant share of respondents has not yet dealt with the subject in depth.

Reasons against relocation or renting out are primarily of an emotional nature, such as attachment to the home and neighbourhood and distrust in potential tenants. However, uncertainties and practical problems come next: the (perceived) unavailability or expensiveness of appropriate housing in the neighbourhood, the (expected) refusal of loans for the elderly and feeling overwhelmed by the challenges of such a project, or not knowing exactly what to do.

In order to promote space-saving housing alternatives some important conclusions can be drawn: Emotional factors and personal preferences are core barriers. "Soft" policies could try to address them. Advice services could be developed which remove uncertainties and provide a knowledge base. The survey shows that such services would probably be well received. Such services should address different phases of the decision-making and action process. In the beginning, basic advice should be given that helps sensitize people to the topic of housing in old age, motivate them to deal more intensely with it, and provide orientation for decision making. More advanced advice should aid with specific challenges, for example legal, financial, or architectural issues.

THE INTERVENTION CONCEPT

Based on these empirical results and the conclusions drawn from them, an integrated intervention concept focusing on "soft" advice and support policies was developed in the LivingSpaces project. It includes a combination of modules that can serve as a blueprint for municipalities who wish to implement an advice and support structure. Selected modules will be further developed and tested on ground in the course of the project.

The concept was developed in several steps in cooperation with local actors. In a first workshop with representatives of municipalities in February 2018, ideas for support and advice services were collected. Based on them, the research team drafted a rough concept that was discussed in a second workshop in May 2018 with representatives of municipalities and selected organizations that work with senior citizens or are active in the field of housing. The concept was then refined by the project team, and three municipalities were chosen for implementation. In a further joint meeting with representatives of these municipalities in June 2018, plus three individual kick-off sessions with the mayors and representatives of the administration in the three municipalities in September 2018, supported by dedicated project team sessions, a concrete work plan was drafted.

Overview

Figure 5 shows the resulting overall intervention concept. It is structured according to three phases of the decision-making and action process: sensitization, guidance and motivation, and support for action.

The aim of the **sensitization** phase is to raise public interest in the topic of space-saving housing alternatives in old age, and in the services provided by the intervention concept. This first phase consists of three modules: The aim of the **general public relations** is to alert the public to the topic, stimulate public interest and create a favourable atmosphere. Responsible actors are the district and the participating municipalities. Two other modules comprise a **specific promotion** of the individual advice service and guidance workshops described in the next section. For this phase, a communication approach has been developed in the project that will be sketched later in this paper and is currently being implemented by the district, municipalities, and multiplying organizations.

In the **guidance and motivation phase**, people are motivated to become active and receive basic orientation to help them decide which options may be suitable for them. Two tools have been developed by the project team: an **individ-**

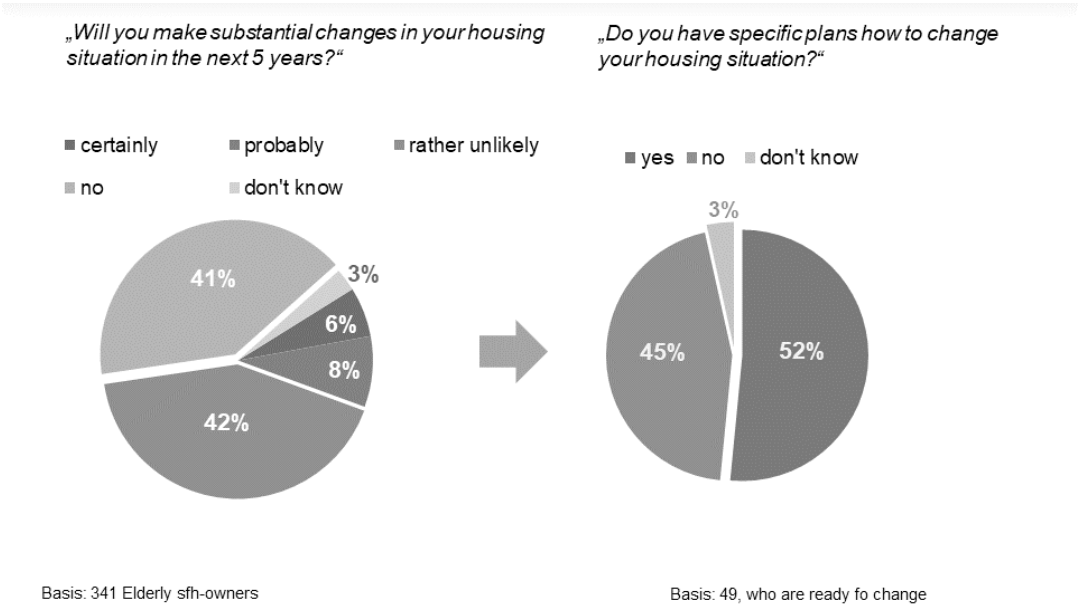

Figure 4. Concrete plans for changes in the housing situation. Source: Authors' own.

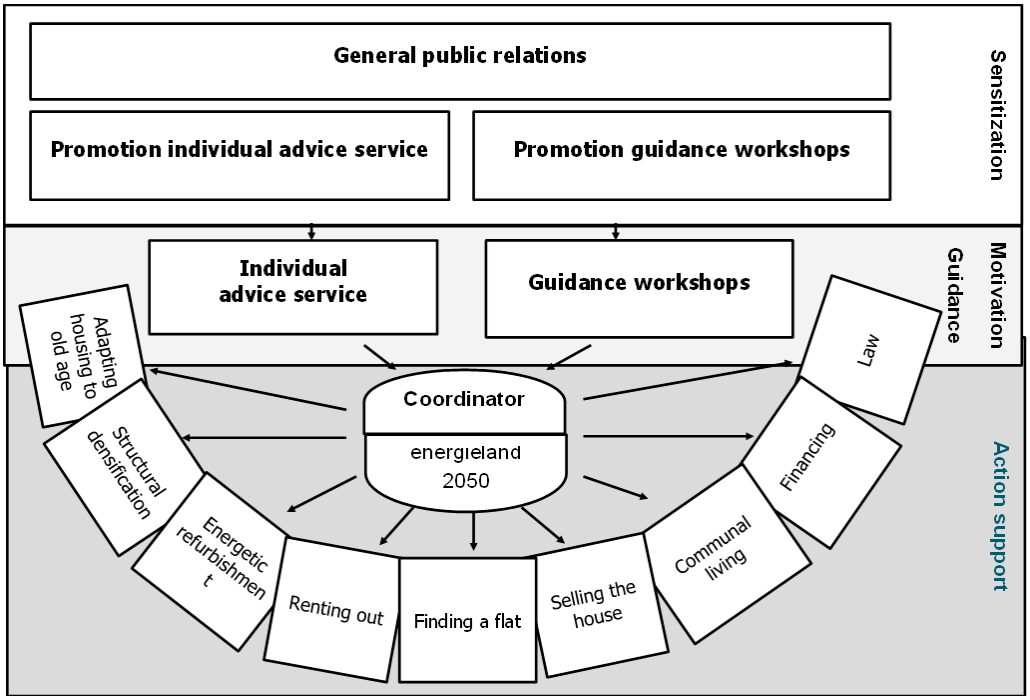

Figure 5. "LivingSpaces" intervention concept. Source: Authors' own.

ual advice service, and **guidance workshops.** Both cover the same content for the most part (various options for housing in old age with their respective preconditions, pros and cons) but use different formats: a personal face-to-face interaction between advisor and client versus an interactive format in which mutual exchange among homeowners is possible. Such workshops have been implemented successfully in Switzerland (Rütter et al. forthcoming). The two services will be implemented by contracted advisors and lecturers, instructed by the project team.

In the **action support** phase, a number of services are foreseen that deal with specific issues such as developing financing concepts for reconstruction projects, or finding legal guidance on tenancy law. They will be implemented by the respective competent actors such as banks or lawyers. Only selected modules of this phase will be set up during the course of the project. The general idea is that the district and municipalities continue the work and establish the structures after the end of the project, in case first experiences turn out to be promising.

The district of Steinfurt has set up the association "Energieland 2050" ("energy county 2050"), a network of relevant actors such as municipalities, enterprises, associations and banks in the region that have committed to promote a climate-friendly and energy-efficient future. During the course of the project, Energieland 2050 employs a **coordinator** whose task is, among others, to broker the various services and refer people to the appropriate service. In case the project is successful, this coordinative function is planned to be continued.

Individual advice service

As an example for the modules, the individual advice service is presented here in more detail. This service is a core element, as – besides the workshops – it serves as one of two alternative entry points to the decision-making and action process. The concept has been developed by the project team and discussed in an expert workshop with energy advisers and barrier-free housing advisers. Two test advice sessions with volunteer clients have provided further input. Objectives of the advice service are: a) to *raise awareness* for housing in old age, b) to *motivate* clients for personal engagement with the topic, c) to provide *guidance* by clarification of the individual situation (needs, wishes and resources), demonstrating concrete options for future housing inside and/or outside the current house in consideration of their respective pros and cons, and d) to *qualify* clients by informing them where they can find suitable support for the next step. The format is an individual face-to-face session in the client's home. The session uses interactive methods and comprises five phases:

1. In the *introductory sequence*, motivation and targets are clarified. The aims are to establish a relationship of trust, to create an open atmosphere for discussion, and a common understanding of the purposes and structure of the counselling session.
2. The aim of the *housing inventory* is to develop an understanding of the housing situation and deliver a first impulse to reflect on whether the house and the surroundings correspond to current and future needs.
3. In the discussion of *housing desires*, the client is encouraged to formulate and specify desires for future living. This process leads to the definition and prioritization of evaluation criteria for housing options.
4. Next, *housing alternatives* are presented according to the chosen criteria, and advantages and disadvantages are discussed.
5. In the *conclusion phase*, priority options are chosen, and next steps are defined.

The whole session is documented, and the client receives a short report along with individualized information material to support the chosen option.

The advice sessions will be implemented from March 2019 for 100 clients initially. After a monitoring and review session with the project team and advisers, and potential modification, another 100 sessions are envisaged.

Communication approach

In order to promote the advice sessions, a targeted communication approach has been developed. It is aimed at homeowners aged 55 and older who live alone or as a couple in a single-family home and who are thinking about their future form of living and want to change their living situation.

A further target group are relatives of older homeowners who support them in their search for information and in dealing with the topic of living in old age.

The target groups are addressed through *general public relations activities*. This takes place, for example, through information booths, presence at events and trade fairs that are attended by older homeowners, press releases and announcements on the Internet, newsletters, radio etc.as well as articles in free advertising journals.

These activities should be supplemented by *neighbourhood-based approaches*. For this purpose, targeted public relations work is carried out in demarcated neighbourhoods (mayor's letter to citizens, press event, information booth if necessary, presence at festivals and events in the neighbourhood).

In addition, the outreach to the target group is supported by *multipliers* who have a special affinity to the group. Multipliers support the public relations work, for example, by issuing flyers or by promoting the services at their own events. With the help of an actor analysis, associations, social institutions, senior citizens' institutions and advisory boards, owner associations and adult education providers were identified as potential multipliers.

Finally, potential clients are made aware of the advice services and workshops via *contacts and networks* of the local implementation partners.

The communication campaign will start in the three selected municipalities in March 2019.

Conclusion: Challenges and Opportunities

The paper has sketched reduction of per capita living space as a relevant avenue for energy savings in buildings, and has identified "empty nesters" as an important target group. The relatively old age of the houses and the prevalence of fossil fuels mean that energy consumption and greenhouse gas emissions of the houses are relatively high. Therefore, substantial savings could be gained through energetic refurbishment and more efficient use of living space. While energetic refurbishment is already being targeted by various policies, efficient use of space remains a field for action.

Several space-saving housing alternatives have been described, the two main options being relocation (moving to a smaller place and selling or renting out the previous home) and densification (creating additional apartments in an existing building or on existing property, or renting out an existing in-law flat). Results of a survey among 386 elderly homeowners have shown that relevant potential for structural densification exist. Houses with a staircase separate from the living area, or with an existing separate apartment, could potentially be used by several households without major conversions. 18 %of the study sample showed evidence of such unused potential. Extrapolated for the six investigated municipalities, about 1,400 apartments are not rented. In the entire district of Steinfurt, we estimate that there are about 5,000 apartments which could be rented. At the same time, empirical findings demonstrate that attitudes towards housing alternatives are mixed and feelings ambivalent. Many respondents have not yet dealt with the topic in depth, and a clear picture has not yet emerged. On the one hand, people are attached to their home and neighbourhood and wish to stay there as long as possible. They also mistrust the idea of sharing their home with strangers. On the other hand, about half of the respondents can imagine moving, and the desire to live in community is widespread. Policies can address barriers against moving or densification, such as financial constraints, lack of specialized knowledge or adequate alternative housing. One core task is to raise awareness for the topic, stimulate thought processes, and provide basic guidance. For this purpose, communication and advice approaches have been developed and will be tested in the project LivingSpaces.

Several conclusions for policymaking can be drawn. First, advice services could remove uncertainties and provide the necessary orientation and knowledge base, addressing different phases of the decision-making and action process. Secondly, policies could also help to remove uncertainty and build trust, for example, by providing brokering services that connect homeowners to potential tenants or buyers. Initiatives such as "homes for help", where students are given low-cost housing in exchange for help in the household could be a model[10]. Thirdly, even if less important than one would think, policies could help to provide access to finance for reconstruction projects aiming at densification, for example, by targeted subsidies.

Finally, a core task for policies is to provide the necessary physical infrastructure – in this case, adequate, accessible, space-efficient housing suitable for old age, and possibly suitable properties for space-efficient co-housing projects. As many people prefer to stay in their existing neighbourhoods, a possible pathway could be to legally allow and support differentiated building types in such areas, including small multi-family houses. Selected SFH could be replaced by such buildings. Building projects could be realized on municipal property or by obligating private investors by way of urban development contracts.

In the course of the project, opportunities and challenges for implementing such policies on the ground have been identified. During the collaborative development of the instruments with representatives from municipalities and organizations, it turned out that housing alternatives in old age are not as much of a taboo topic as the project team had suspected in the beginning. Despite the core role of the Single Family Home in German housing policies and public discourse, the project idea was generally welcomed, and municipal actors participated actively in its further development. They identified multiple synergies with urban development and policy goals such as lowering in-

10. https://www.studentenwerke.de/de/content/wohnen-f %C3 %BCr-hilfe

frastructure cost, preserving lively and socially mixed neighbourhoods, combatting housing scarcity and promoting energy savings and emission reductions.

On the other hand, the integrated tackling of multiple supply-side and demand-side barriers proved to be a huge challenge. Especially creating new, age-appropriate housing is a long-term policy task that has to deal with multiple challenges ranging from availability and price of land to conflicting urban plans or neighbourhood conflicts, e.g. when multi-family houses are built in single-family-home neighbourhoods. Furthermore, these processes need considerable time. It remains to be seen to what degree project municipalities will commit to such policies.

A challenge of the advice service itself is that, as the survey and also test advice sessions have shown, individual needs, interests and knowledge levels are extremely diverse. While one person might wish to have general guidance, another expects detailed information about the real estate market and yet another might wish to learn about co-housing projects in the region. To establish a single advice service that is adaptive enough to accommodate these different needs and interests is a huge challenge for advisors. The interim monitoring and evaluation session in the LivingSpaces project will provide evidence of the degree to which this is possible, how the service might be adapted, and which supplementary services are most required.

References

AG Energiebilanzen (2018): Anwendungsbilanzen für die Endenergiesektoren in Deutschland. Available at: https://ag-energiebilanzen.de/index.php?article_id=29&fileName=ageb_bericht_anwendungsbilanzen_2013-2017_final__2019-01-03.pdf, accessed 21.02.2019.

BBSR – Bundesinstitut für Bau-, Stadt- und Raumforschung (Hrsg.), 2015: Wohnungsmarktprognose 2030. BBSR- Analysen KOMPAKT 07/2015. Bonn.

Bohnenberger, Katharina (2017): Reconciliation of Social and Environmental Goals in German Housing Policy. A Q-methodological Study. Master thesis, University of Bremen.

Bundesministerium für Wirtschaft und Energie (BMWi) (Hg.) (2018): Energieeffizienz in Zahlen. Entwicklungen und Trends in Deutschland 2018. Berlin. Available at: https://www.bmwi.de/Redaktion/DE/Publikationen/Energie/energieeffizienz-in-zahlen.html, accessed 27.11.2018.

Bundesregierung (2017): Projektionsbericht 2017 für Deutschland gemäß Verordnung (EU) Nr. 525/2013. Available at: https://www.bmu.de/download/projektionsbericht-der-bundesregierung-2017/, accessed 21.02.2019.

Kenkmann, Tanja; Cludius, Johanna; Fischer, Corinna; Fries, Tilman; Keimeyer, Friedhelm; Schumacher, Katja et al. (2019): Flächensparend wohnen. Energieeinsparung durch Suffizienzpolitiken im Handlungsfeld "Wohnfläche". Editor: Umweltbundesamt, Dessau.

Mankiw. N. Gregory, Weil, David N. (1989): The baby boom, the baby bust and the housing market, In: Regional Science and Urban Economics (19): 235–258.

Rütter, H.; Umbach-Aniel, A.; Nathani, C.; Hässig, W.; Andreoli, L.; Hellmüller, P.; Wyss, S. (forthcoming): Energiesparpotenziale in Haushalten von älteren Menschen. Schlussbericht, Nationales Forschungsprogramm 71 "Steuerung des Energieverbrauchs". Rüschlikon/Uster.

Statistisches Bundesamt (2018a): Wohngebäude, Wohnungen, Wohnfläche: Deutschland, Stichtag, Anzahl der Wohnungen. Database genesis-online, https://www-genesis.destatis.de/genesis/online; Code 31231-0001, accessed 15.10.2018.

Statistisches Bundesamt (2018b): Bevölkerung nach Altersgruppen, Deutschland. https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/Bevoelkerungsstand/Tabellen_/lrbev01.html; accessed 15.10.2018.

Statistisches Bundesamt (2018c): Bevölkerung nach Altersgruppen, Familienstand und Religionszugehörigkeit. https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/Bevoelkerungsstand/Tabellen/AltersgruppenFamilienstandZensus.html; accessed 13.01.2019.

Statistisches Bundesamt (2018d): Durchschnittliche Wohnfläche pro Person nach Haushaltstyp in Deutschland 2014. https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/EinkommenKonsumLebensbedingungen/Wohnen/Tabellen/TabellenHaushaltsstrukturWohnflaeche.html ; accessed 13.01.2019.

Statistisches Bundesamt (2018e): Haushalte im selbst genutzten Eigentum und Mietwohnungen nach Haushaltstyp in Deutschland 2014. https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/EinkommenKonsumLebensbedingungen/Wohnen/Tabellen/TabellenHaushaltsstruktur.html; accessed 13.01.2019.

Acknowledgements

The authors wish to thank Till Burkhardt, Tanja Kenkmann, Lars-Arvid Brischke, Angelika Paar, Barbara Birzle-Harder, Georg Sunderer and Katharina Reindl from the LebensRäume project team. We are grateful for the research support we receive from the Federal Ministry for Education and Research to conduct the project. Finally, we wish to thank the reviewers for very helpful comments on an earlier version of this paper.