

Task 2.2: Data Collection and Analysis

Supporting the design of German One-Stop-Shops to foster energy efficiency renovations of residential buildings – Results and lessons from data analysis

Report

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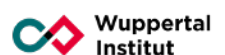
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Main lessons for the design of German One-Stop-Shops

Executive summary

The data collection and analysis during the first half of the project provide various lessons that can be of help in designing and trying the business models for the ProRetro One-Stop-Shops. In this executive summary, we sum up our main lessons from these activities in the form of ten short lessons. Basis for these lessons are the analysis of data on housing markets in the ProRetro regions, the results of an online survey of potential customers, the feedback during five focus groups and desktop research on activation strategies. More results, background information and many details can be found in the main body of this report.

Lesson 1: The five ProRetro regions are quite diverse (housing) markets

While there is no rural area with starkly shrinking population among the ProRetro regions, the regions are quite diverse with respect to some socio-economic and housing market indicators. Böblingen district is part of an economically strong region with low unemployment and high disposable income, while the other regions have above-average unemployment. In all ProRetro regions, a large share of residential buildings was built before the 1980s and are therefore in need of a deep energy renovation sooner or later. In Berlin and Wuppertal 80% or more of living units are in multi-family buildings, while in Böblingen district only about 18% of residential buildings are multi-family buildings. Berlin has seen stark increases in rent levels (more than 50% over 8 years), while the average rent level in Wuppertal has increased only by about half.

Lesson 2: Most ProRetro One-Stop-Shops can build on existing structures

In most of the ProRetro regions structures to support and incentivize energy renovations already exist. Therefore, ProRetro One-Stop-Shops can and should build on existing programmes and initiatives and do not have to start from scratch.

Lesson 3: A large share of potential customers has a positive first impression of the One-Stop-Shop idea

When we introduced the One-Stop-Shop idea to potential customers in an online survey by describing an “ideal” One-Stop-Shop, a very large share of respondents had a positive

impression of the idea as we described it. This supports the push for the establishment of One-Stop-Shop and indicates that they may in fact contribute substantially to the European renovation wave.

Lesson 4: One-Stop-Shops address many of the most pertinent challenges during an energy renovation

Our survey results back the reasoning behind One-Stop-Shops. A large share of respondents considers the coordination of construction works, deciding about renovation measures without earlier experience, assessing the profitability of measures and finding time for all the tasks associated with an energy renovation as difficult or rather difficult challenge. However, a surprisingly small share of survey respondents regards finding financing or the prospect of having to take up a loan as a difficult or rather difficult challenge.

Lesson 5: Finding qualified contractors is a particular challenge in Germany at the moment

Our survey respondents named finding qualified contractors as the most difficult challenge. This supports the notion that there is a substantial lack of qualified contractors in Germany at the moment, which may become an important obstacle for the renovation wave. While One-Stop-Shops with their existing contractor networks can help to mitigate this problem, they alone cannot solve it on a larger scale. Policymakers should consider actions that alleviate this problem.

Lesson 6: Homeowners are willing to delegate many tasks to the One-Stop-Shop

Many homeowners participating in our survey declared themselves willing to delegate many tasks associated with an energy renovation to a One-Stop-Shop. This includes the coordination of construction works, choosing energy advisers and contractors as well as quality control and approval of construction works. A majority of respondents was sceptical when it came to delegating the closing of contracts to the One-Stop-Shop. However, this might be explained by exact terms and conditions and who is liable for results being unclear to respondents. These questions are of great importance in the One-Stop-Shops' business models and will have to be discussed in more detail in the further course of the project.

Lesson 7: Many homeowners are open to pay for the One-Stop-Shop's service

Offering One-Stop-Shop services causes costs. An important question is how One-Stop-Shops can recoup these costs. Almost 90% of survey respondents were open to pay a fee for the One-Stop-Shop's service. The median willingness to pay was 4.2% of total invest, with the mean being 5.1%.

Lesson 8: When offering One-Stop-Shop services to homeowner associations, legal questions arise

The ProRetro implementing partners had the opportunity to discuss their individual business model during a focus group interview. For those One-Stop-Shops that have homeowner associations in their target group, focus group participants pointed out the obligation to obtain three quotations for the works and services offered. This can complicate the One-Stop-Shop's work massively. How to deal with this problem will be studied in more detail in the further course of the project.

Lesson 9: The One-Stop-Shop's website should be its showpiece

Focus group participants consider the One-Stop-Shop's website a very important instrument to inform about the One-Stop-Shop and advertise its services. They recommend to showcase earlier successful renovations on the website and embed videos that explain measures for an energy renovation and the One-Stop-Shop's service.

Lesson 10: Activation strategies need a lot of effort

A review of existing studies on activation strategies, i.e., measures to motivate homeowners to take part in an energy advice and tackle an energy renovation, identified various approaches. Yet, these strategies need considerable resources to have some success. For these reasons, the ProRetro One-Stop-Shops should focus their efforts on establishing and strengthening their services and networks during the trial phase. Therefore, the first customers will probably be homeowners who are already willing or easy to convince to renovate. As activating more homeowners is a prerequisite to attain the ambitious targets of the renovation wave and increase the renovation rate, activation strategies will be needed in the medium and long run. One-Stop-Shops should also cooperate with public actors in developing suitable activation measures.

1 Housing markets in the ProRetro regions

1.1 Introduction

In recent years, many German cities and regions have committed to ambitious climate protection targets and initiated corresponding policy measures. The decarbonisation of the existing building stock plays a key role in all municipalities. Many have already taken action and offer energy advice and, in some cases, regional funding programmes, which can be used in addition to financial support on national level. These are, however, mostly single measures, which are rarely implemented as part of a longer-term renovation roadmap. In addition, different specific contexts influence investment behaviour of building and apartment owners.

From an environmental perspective but also for its economic, comfort and health benefits, it is necessary to significantly improve the energy performance of residential buildings. From the property owner's point of view, however, local conditions can present challenges for energy-efficiency renovations. The rent level, the expected rent development and the possibility for property owners of passing-through the investment costs of energy efficiency measures into rents influence the payback period and rate of return of an energy efficiency investment. The social structure and the income situation may influence the willingness to pay and the acceptance of and demand for energy efficiency. For this reason, ProRetro selected cities and regions to develop One-Stop-Shops, which differ in terms of housing market, population etc. (Patton, 2014), but which are exemplary for other cities of the respective type. This follows principles of multiple case-study design (Yin, 1984).

Hanover and Berlin are federal state capitals, which have experienced significant real estate price and rent level increases in the last 10 years. In Berlin in particular, the increase in rental level takes place against a backdrop of a high share of residents with below-average purchasing power. This development is exemplary for prospering regions. On the other hand, Wuppertal and Bottrop are characterised by low rents, low dynamics in the housing market and low purchasing power. These cities are representative for many old industrial regions in Germany and Europe. As part of the automobile cluster around Stuttgart, Böblingen has long had a high rent level due to its high purchasing power. In particular the interrelationships between cities and the surrounding countryside are of interest here, which are typical for metropolitan regions.

The ProRetro selection of cities and regions not only helps to identify general, but also locally specific obstacles to refurbishment and is therefore also an indication of the extent to which national funding programmes could be regionalised.

Table 1: Basic facts on housing market in ProRetro regions

		Berlin	Hanover (Region)	Bottrop	Böblingen (district)	Wuppertal
Population	Capita	3.67 Mio. (Statistisches Bundesamt, 2021c)	1.16 Mio. (Statistisches Bundesamt, 2021c)	117,388 (Statistisches Bundesamt, 2021c)	392,898 (Statistisches Bundesamt, 2021c)	355,004 (Statistisches Bundesamt, 2021c)

		Berlin	Hanover (Region)	Botrop	Böblingen (district)	Wuppertal
Building stock	Number of dwellings	1.98 Mio. (Amt für Statistik Berlin-Brandenburg, 2021)	571,115 (2016) (Baba et al., 2019)	60,061 (NRW.BANK, 2021a)	184,890 (Statistisches Landesamt Baden-Württemberg, 2021b)	192,639 (NRW.BANK, 2021b)
	Share of dwellings built before 1978	76.3% (Statistische Ämter des Bundes und der Länder, 2019)	86.3%* *Stadt Hannover/ until 1989 (Landeshauptstadt Hannover, 2021b)	71% (NRW.BANK, 2021a)	---	84.7% (NRW.BANK, 2021b)
	Share of multi-family buildings	42.8% (Statistisches Bundesamt, 2021a)	40.6%* *Stadt Hannover (Landeshauptstadt Hannover, 2021)	---	17.6% (Statistisches Landesamt Baden-Württemberg, 2021a)	42% (Stadt Wuppertal, 2021)
	Share of living units in multi-family buildings	87% (Amt für Statistik Berlin-Brandenburg, 2021)	63% (2016) (Baba et al., 2019)	59.5% (NRW.BANK, 2021a)	---	79.6% (Stadt Wuppertal, 2021)
Housing market	Share of rented apartments	84.3% (Investitionsbank Berlin, 2021)	74.9%* *Stadt Hannover (Landeshauptstadt Hannover, 2021)	62.2% (NRW.BANK, 2021a)	---	67.5% (NRW.BANK, 2021b)
	Share of dwellings possessed by private persons and homeowner associations	69.1% (Investitionsbank Berlin, 2021)	---	63.6% (NRW.BANK, 2021a)	---	73.5% (NRW.BANK, 2021b)
	Increase in rent level	53 % (2012-2020) (empirica, 2021)	23%* (2013-2019) *Stadt Hannover (DZ HYP, 2019)	35% (2009-2019) (Immowelt, 2021)	---	21% (2009-2019) (Immowelt, 2021)
Socio-economic data	Unemployment rate (2020)	9.7%* (Bundesagentur für Arbeit, 2021)	7.5% (Statistische Ämter des Bundes und der Länder, 2021d)	8.2% (Statistische Ämter des Bundes und der Länder, 2021b)	3.7% (Statistische Ämter des Bundes und der Länder, 2021c)	10% (Statistische Ämter des Bundes und der Länder, 2021e)
	Disposable household income per capita (€)	21,327 (2019) (Statistische Ämter des Bundes und der Länder, 2021f)	22,453 (2019) (Landesamt für Statistik Niedersachsen, 2021)	21,057 (2019) (IT.NRW, 2020)	25,284 (2017) (Münzenmaier, 2020)	21,858 (2019) (IT.NRW, 2020)

		Berlin	Hanover (Region)	Bottrop	Böblingen (district)	Wuppertal
	Average living space per capita (sqm)	39.6* (2020) (Statistisches Bundesamt, 2021b)	42.34* (2019) *Stadt Hannover (Landeshauptstadt Hannover, 2021)	42.8 (2019) (NRW.BANK, 2021a)	44.1 (2020) (Statistische Ämter des Bundes und der Länder, 2021a)	43.4 (2019) (NRW.BANK, 2021b)

1.2 Berlin

Within the context of the Berlin Climate Protection and Energy Transition Act (EWG Bln), Berlin has set itself the targets of reducing CO₂ emissions by at least 40% by 2020, by at least 70% by 2030 and by at least 90% by 2040 compared to 1990. By 2045 the city wants to be climate-neutral (Senatsverwaltung für Umwelt, Verkehr und Klimaschutz Berlin, 2021b). On August 19, 2021, the Berlin House of Representatives passed a fundamental amendment to the Berlin Climate Protection and Energy Transition Act (EWG Bln). Among other things, it provides for an increase in Berlin's climate protection targets, ambitious climate protection targets for public buildings and vehicle fleets, and regulatory steps towards a CO₂-free district heating supply. The new version of the law came into force on September 10, 2021 (Senatsverwaltung für Umwelt, Verkehr und Klimaschutz Berlin, 2021a).

All of Berlin's buildings together are currently responsible for around 44% of the city's CO₂ emissions (Dunkelberg & Weiss, 2021). Especially in old buildings a large savings potential exists. By implementing renovation roadmaps, the public building stock is to be comprehensively renovated in terms of energy efficiency by 2050 (Senatsverwaltung für Umwelt, Verkehr und Klimaschutz Berlin, 2021b). Currently, about 0.6% of the exterior surfaces of buildings in Berlin are refurbished every year (Dunkelberg & Weiss, 2021). To increase the renovation rate and achieve the climate protection targets, different energy advice offers and projects (e.g., "ZuHaus in Berlin") from an initial building check to more detailed energy audits are in place (e.g., Verbraucherzentrale Berlin). Moreover, the project "Solar centre Berlin" provides advice for building owners on usage of solar energy. However, to our knowledge there is no comprehensive One-Stop-Shop in place in Berlin, which facilitates energy efficiency renovations by being a single point of contact for property owners. This is why the Berlin Energy Agency (BEA) develops a new One-Stop-Shop within the ProRetro project.

1.3 Hanover region

The Hanover region is a metropolitan area of 21 municipalities including the state capital Hanover. In 2014, the region developed its "masterplan 100% climate protection", which provides a path towards a CO₂ emissions reduction of 95% by 2050 compared to 1990. In addition, 50% of energy should be saved in the city by 2050 (Arff et al., 2014). Greenhouse gas emissions in the Hanover Region amounted to 9.8 million metric tons of CO₂ equivalents (CO₂eq.) in 2015 (e4-Consult et al., 2019). Of these emissions, 5.2 million metric tons (53%) are attributable to the city of Hanover. The building sector plays a crucial role in this strategy. The municipalities of the region have different settlement structures and therefore different

structures of building typologies and housing stocks, especially in comparison to the city of Hanover. Therefore, tailored instruments are required.

In the Hanover Region, there is already a multitude of service offers. The Climate Protection Agency (CPAH) is often the first point of contact for customers planning to renovate their homes and provides initial impulse advice. The proKlima energy pilot for the building envelope accompanies with aspects of ecology, process flow and building quality. A “heating pilot” inspects the existing system, gives recommendations for modernisation or configures new heating systems after a measurement data analysis. There are various service offers on the market, e.g., contracting offers from energy service companies. There is also a large funding landscape. Hanover Region and various municipal utilities offer local subsidies for energy efficiency renovations.

Within the ProRetro project, the Hanover Region Climate Protection Agency and proKlima - Der enerCity-Fonds plan to bundle these services in the Hanover Region and make them better known. By bundling various providers of energy renovation measures, homeowners will be supported on their way to energy-efficient renovation. The overarching goal is to increase the renovation rate in the Hanover Region and to reduce greenhouse gas emissions significantly. The development of a One-stop shop for the region within the ProRetro project should help to achieve these goals.

1.4 Wuppertal

The city of Wuppertal, located in the industrial legacy region “Bergisches Land”, joined the Klimabündnis in 1991 and thus has committed itself to halve its CO₂ emissions by 2030 compared to 1990. In the long run, the city wants to be climate-neutral by 2050 (Gertec GmbH et al., 2020). To reduce CO₂ emissions, the city established a department for climate protection, is currently preparing a climate protection masterplan and is involved in several research projects (Low Carbon Wuppertal, BESTKLIMA etc.). As part of the “Bergisches Städtedreieck Remscheid - Solingen - Wuppertal”, the city of Wuppertal is not alone in its commitment and tasks. Joint activities in the field of climate protection and climate adaptation have already been implemented – e.g., within the working group “Renewable Energies Bergisches Land” (Gertec GmbH et al., 2020).

The residential building stock is responsible for approximately 30% of the city’s CO₂ emissions. Reliable data to assess which share of buildings already attain an energy performance standard compatible with ambitious emission targets is missing. Nevertheless, it is clearly evident that many buildings still need to be renovated to save energy and mitigate CO₂ emissions. A large number of landmarked buildings does not make this task easier. At the same time, the housing market in Wuppertal is characterized by a fragmented ownership structure. Professional housing providers only own a small share of Wuppertal’s residential buildings. About 70% are owned by individuals. This group especially can benefit from a One-Stop-Shop’s service and the easing of refurbishments it brings.

To boost energy renovations, the public utility (WSW Stadtwerke GmbH) and consumer advice centre NRW (Verbraucherzentrale NRW) offer energy advice services. The city recently completed a master plan for a closer cooperation with and between contractors. Due to the Solar Decathlon Europe 22 – an architectural competition that serves as a showcase for deep

renovation and solar construction – taking place in Wuppertal in 2022, it can be assumed that the energy efficiency in buildings topic will gain importance in the next few years in the city.

1.5 Böblingen district

The district of Böblingen is located within the metropolitan region Stuttgart. The district covers an area of 618 km² and includes 26 cities and municipalities with a total of 382,000 inhabitants. Due to the good economic situation in the region and high construction activities, architects and contractors are well booked for new constructions. As a consequence, refurbishment activities which are complex in their planning, coordination and implementation are of lower interest to these experts and customers have to accept waiting periods of one year and more. The renovation backlog in the district of Böblingen is especially large in the area of condominium associations.

The district and many of its cities and municipalities have comprehensive climate protection concepts in place to significantly reduce greenhouse gas emissions in the short and medium term. The concepts are committed to the national climate protection targets (reduction of 80-95% compared to 1990). In 2009, 39% of the CO₂ emissions of the district were caused by the residential building stock (including electricity) (Hertle et al., 2013). About 78% of the total energy consumption in the private sector is used only for the provision of space heating. There are several audit and advice services for the inhabitants offered by the Energieagentur Kreis Böblingen and the local public utility company Stadtwerke Böblingen to increase the rate of energy efficiency renovations. A regional association of various contractors (“Hand-in-Hand-Handwerker”) is a first attempt to offer a variety of services from one point of sale. Advice has so far been carried out without follow-up, further guidance and help with implementation. This is perceived as an important gap to be closed with ProRetro. If the ambitious goals of the energy transition in the building sector are to be achieved in the Böblingen district, there is a great need for action. For this reason, the One-Stop-Shop of the Böblingen Energy Agency is intended to serve as a central point of contact for condominium owners' associations in the Böblingen district and to accompany and support the entire renovation process.

1.6 Bottrop

The city of Bottrop is located in the Ruhr industrial area (North Rhine-Westphalia), where the last German coal mine closed in December 2018. In 2010, the city won the "Innovation city Ruhr" competition and set itself the goal of halving CO₂ emissions by 2020. The triad of activation, advice and promotion was an important part of the numerous climate protection activities within the model project. This set important impulses for the energy renovation of residential buildings in the region. The evaluation of the model project published in June 2021 shows that the ambitious targets were achieved, i.e., CO₂ emissions could actually be reduced by around 50% from 2009 to 2020 in a pilot area with 70,000 inhabitants (Stadt Bottrop, 2021). The whole city of Bottrop has a population of about 117,000 inhabitants. Substantial savings were also achieved in the sector of private residential buildings. During the project period, the annual modernization rate in the sector of private residential buildings in the model area was on average higher than three percent. So far, 3,657 residential buildings have been modernized in the pilot area in Bottrop – that is around 36% of the total stock (Stadt Bottrop, 2021). CO₂

emissions from residential buildings fell by 19% across Germany between 2010 and 2020; in InnovationCity Ruhr, CO₂ emissions fell by as much as 47% in the same period (Stadt Bottrop, 2021). The model project ended at the end of 2020. Only the subsidies for photovoltaic systems are still available. Within the large-scale model project InnovationCity Ruhr | Modellstadt Bottrop, the city of Bottrop also provided special subsidies for energy efficient renovations of residential buildings. ICM offered free energy advice, which had been mandatory before applying for subsidies from the city of Bottrop. The connection between ICM, the city of Bottrop, energy providers and other stakeholders was strengthened through the cooperation in the project “InnovationCity Ruhr” making ICM the key actor for support of refurbishment activities.

ProRetro builds on the experience and infrastructure available to ICM. The project allows to find options for expanding and improving the service, while maintaining the fundamental character of the advice: free of charge, independent and provider-neutral.

2 Survey among potential customers

2.1 Introduction

An important building block of the research activities in the first project half was to assess what potential customers in Germany think of the idea of a One-Stop-Shop. To do this, we devised a survey in the second half of 2020. The survey was conducted between February and April 2021.

The survey’s main objective was to deepen the knowledge about potential customers’ needs and wishes. Guiding questions in the design of the questionnaire were:

- How do potential customers assess the importance of the various barriers to energy efficiency renovations? How important are information and search costs?
- What do potential customers think of the idea of a One-Stop-Shop?
- What are services they would deem most helpful in assisting a renovation project?
- To what extent are building owners willing to delegate decision during the process of an energy efficiency renovation?
- Which willingness-to-pay for a One-Stop-Shop’s service do potential customers state?

The subsequent section gives a short description of the questionnaire and how we collected responses. In section 2.3, we give a detailed overview of the survey’s results. Section 2.4 summarises the main results and gives recommendations for the further work in this project.

2.2 Survey Design and Method

We considered earlier scientific literature on One-Stop-Shops (e.g., Mahapatra, Mainali and Pardalis, 2019; Pardalis *et al.*, 2019) in developing the questionnaire. With the draft questionnaire we did a pre-test with 11 respondents in December 2020. The questionnaire was revised based on the feedback from pre-testers. An important element of the revision was to shorten the questionnaire enough for respondents to be able to answer all questions in approximately ten minutes.

The questionnaire was divided into six sections. A welcome page gave a quick summary of the project's goals without giving away too many details. Respondents had to agree to data protection declaration before continuing. The first section of the questionnaire was to identify the respondent as homeowner, landlord or renter. Renters were informed that the survey's target group are individuals owning residential buildings. If a respondent is both homeowner and landlord, a random number was generated to decide whether the following questions should be answered for the building he or she lives in or for a building he or she rents out. In the second section, respondents were asked to provide data on where the residential building is located and since when it is their property. Respondents were also asked whether they plan a renovation within the next ten years and which measures they have in mind. Depending on the answer to the preceding question, respondents were requested to give reason for (not) planning a renovation. The third section of the questionnaire dealt with challenges to overcome when planning an energy renovation and motivating factors. This included items referring to the challenges that constitute the main motivation for establishing One-Stop-Shops. That is, energy renovations being very complex and many non-professional homeowners lacking information, skill and/or time to manage one (Milin & Bullier, 2021). Subsequently, on the top of the fourth page we shortly described what a One-Stop-Shop is and asked respondents for a first impression as well as reasons for their assessment. Other topics in this section were the willingness to cede responsibility for certain decisions to the One-Stop-Shop, whether the respondents are open to commissioning a one-stop-shop and reasons why. On the fifth page, we inquired whether respondents can imagine to pay for a One-Stop-Shop's service and what the maximum fee they would be willing to pay is if the total investment of the renovation amounts to 50,000 €. The sixth section of the questionnaire was to learn some basic socio-economic facts about the respondents and their attitude regarding environmental topics.

All questions and possible answers were written in German and have been translated for this report¹.

We decided early on that the survey will be web-based. The main reason for this were resource constraints (time, but especially money). The restrictions due to the Covid-19-pandemic meant that the advantages of an online survey were even more pronounced. The questionnaire was implemented using the survey tool LimeSurvey². A link to the online survey was generated and subsequently shared by the Wuppertal Institut and the implementing partners. Table 2 gives an overview of the channels that have been used to share the link to the survey.

Table 2: Activities to distribute the survey link

Date	Type	Responsible partner	Outreach
11 February 2021	Online news on the City of Bottrop's homepage	Innovation City Management	unknown
11 February 2021	Online news by a local online newspaper	Innovation City Management	unknown
12 February 2021	Online news by a local newspaper	Innovation City Management	unknown

¹ The complete questionnaire in German is available upon request.

² <https://www.limesurvey.org/>

Date	Type	Responsible partner	Outreach
12 February 2021	Online news on the partner's homepage	Innovation City Management	unknown
12 February 2021	Tweet	Wuppertal Institut	12,000 follower
15 February 2021	Tweet	Berliner Energieagentur	1,170 follower
16 February 2021	Online news on the partner's homepage	Wuppertal Institut	unknown
19 February 2021	Various social media posts	Klimaschutzagentur and proKlima Hannover	778 subscribers (Facebook); 529 follower (Twitter); 39 follower (Linkedin)
26 February 2021	Newsletter	Klimaschutzagentur Hannover	2,000 subscribers
3 March 2021	Newsletter	Energieagentur Böblingen	570 subscribers
3 March 2021	E-mail distribution list Offensive gutes Bauen	Raumfabrik	133 recipients
4 March 2021	Internal newsletter of the district of Böblingen's administration	Energieagentur Böblingen	2,000 subscribers
8 March 2021	Post on the partner's Facebook page	Energieagentur Böblingen	11,000 follower
8 March 2021	E-mail distribution list	Energieagentur Böblingen	125 recipients
8 March 2021	Press release and news on the partners' website	Klimaschutzagentur and proKlima Hannover	unknown
8 March 2021	E-mail distribution list Immobilienverwalter NRW	Raumfabrik	25 recipients
9 March 2021	E-mail distribution list Veband privater Bauherren	Raumfabrik	200 recipients
10 March 2021	Newsletter	proKlima	190 recipients
15 March 2021	E-mail distribution list	Klimaschutzagentur Hannover	1,300 recipients
25 March 2021	Tweet	Berliner Energieagentur	1,170 follower
8 April 2021	E-mail distribution list	Raumfabrik	45 recipients
16 April 2021	Tweet	Wuppertal Institut	12,000 follower
19 April 2021	Tweet	Berliner Energieagentur	1,170 follower

As Table 2, shows we had to resort to a form of non-probability sampling, i.e., convenience sampling, to find respondents to our survey. The costs of implementing a probability sample of owners of residential buildings would have been prohibitively high. This has various consequences for our sample and the interpretation of survey results. We have asked respondents attitudinal questions and for data on some socio-economic data that helps to at least give a qualitative assessment of some biases in our sample. Nevertheless, while resource constraints were the main reason why a probability sample was not possible, the goals we had with the survey meant that the disadvantages of a non-probability sample were less detrimental

in our case. The main goal of the survey was to inform the design process of the implementing partners' One-Stop-Shops and not to identify what a representative sample of German homeowners think about integrated home renovation services or One-Stop-Shops. For the beginning of establishing integrated home renovation services in the project regions, it is sufficient that implementing partners meet the needs of some homeowners that are open to the idea and not to maximise the number of customers. Therefore, it was acceptable to first get the opinion of homeowners who already dealt with the topics of energy efficiency renovation, climate protection and renewable energies. Based on the channels we used, it can be assumed that these are overrepresented in our sample. We will discuss data on this in the results section.

2.3 Results

The survey was activated in early February 2021. We recorded the first complete response on 12 February 2021 and the last complete response on 21 April 2021. In total, we received 202 responses from persons who at least made it to the third section of the survey. We are not able to calculate an exact response rate because we do not know the number of recipients or readers for some of the channels. Furthermore, it is possible that some persons learned about the survey through more than one channel and therefore are represented more than once among the recipients. Still, the number of respondents is lower than we hoped. Together with the fact that we had to keep the survey active for longer than we originally planned, this indicates that it was rather difficult to motivate homeowners to participate in our survey.

We decided to consider every response from participants who made it that far in the survey and not only include those that complete the survey. 181 of those 202 responses are from respondents who completed the survey. This means that 90 percent of those who made it to section three also completed the survey and drop-off has not been a big problem.

2.3.1 Description of the sample

A majority of respondents is from the target groups the ProRetro One-Stop-Shops want to address. Figure 1 shows that 74% of respondents are owner-occupiers of single- or two-family homes. Together with owner-occupiers of apartments (9%) these form the main target groups of the ProRetro One-Stop-Shops. In early 2021, when the survey was conducted, the implementing partners had not decided yet which types of owners form their target group. Landlords renting out houses, single apartments or apartment buildings constitute 18% of the sample. Here, it has to be kept in mind that most landlords are also owner-occupiers but have been randomized to this group. In addition, 19 renters who do not own any residential building participated in the survey. We thanked them for their willingness to answer our questions, but informed them that they are not member of a target group of the one-stop-shop and did not ask them any more questions.

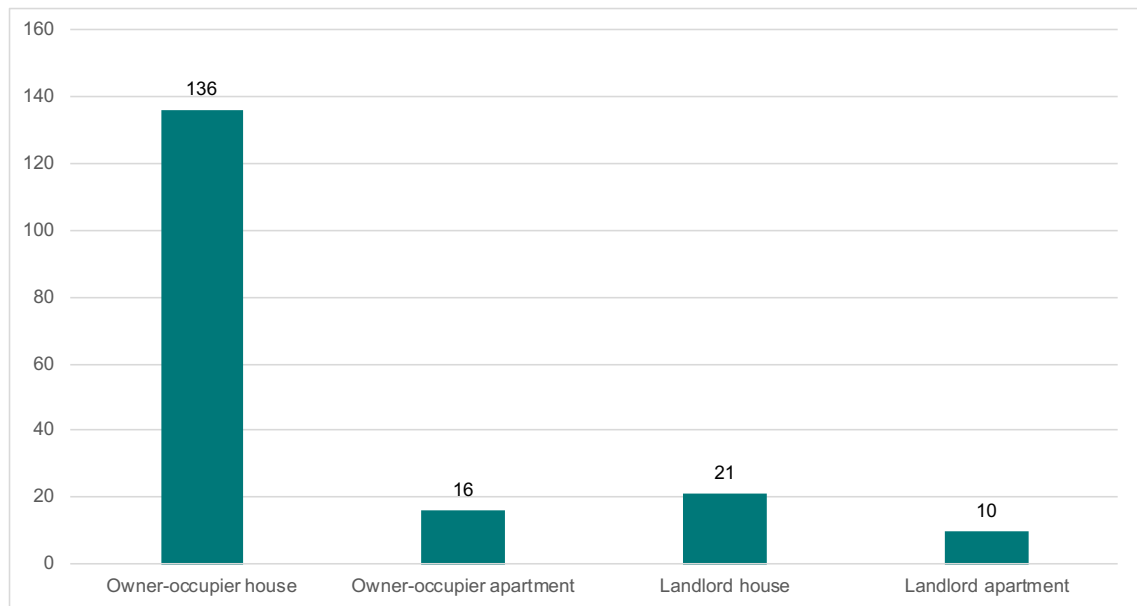


Figure 1: Survey respondents by owner status (n = 183)

Looking at the regions the respondents are from, a very uneven distribution has to be detected (Figure 2). Almost two-thirds of respondents (62%) are from the Hanover region. The next largest group is those of respondents from outside the ProRetro regions (22%). About 7% of respondents are from Böblingen county, while the share of respondents from the other ProRetro regions is below 5%. Only two respondents gave no information about the city or region they are from.

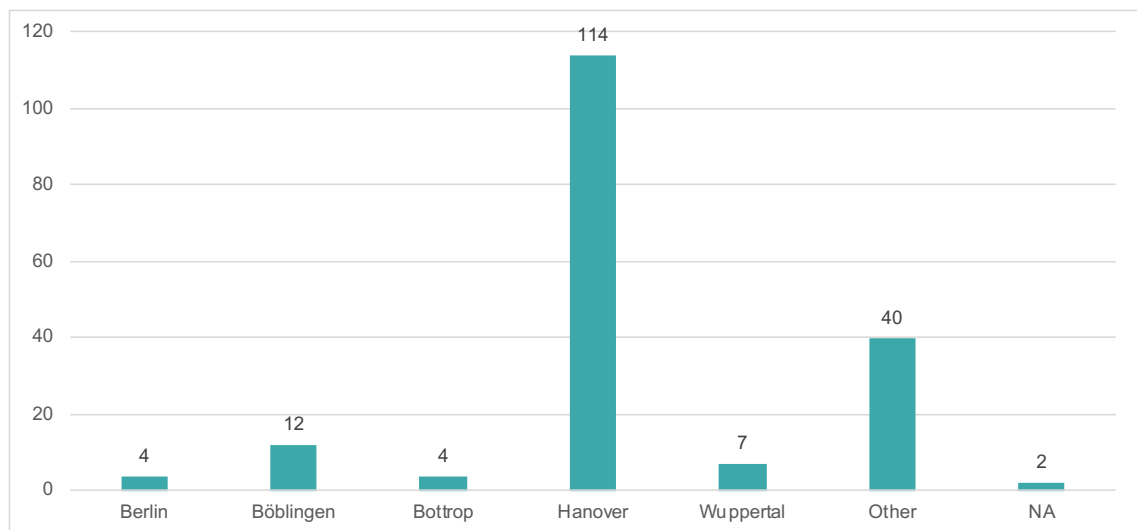


Figure 2: Survey respondents by region (n = 183)

Figure 3 relates the number of respondents to the number of inhabitants. Because the share of owner-occupiers among all residents is not the same everywhere, this is an imperfect statistic but gives a better idea of the distribution of responses between the ProRetro regions. The share of responses from Hanover region is still about three times higher than the share of the city with

the next highest value (Bottrop). Nevertheless, the differences in the number of responses are not as marked as when looking at the raw numbers.

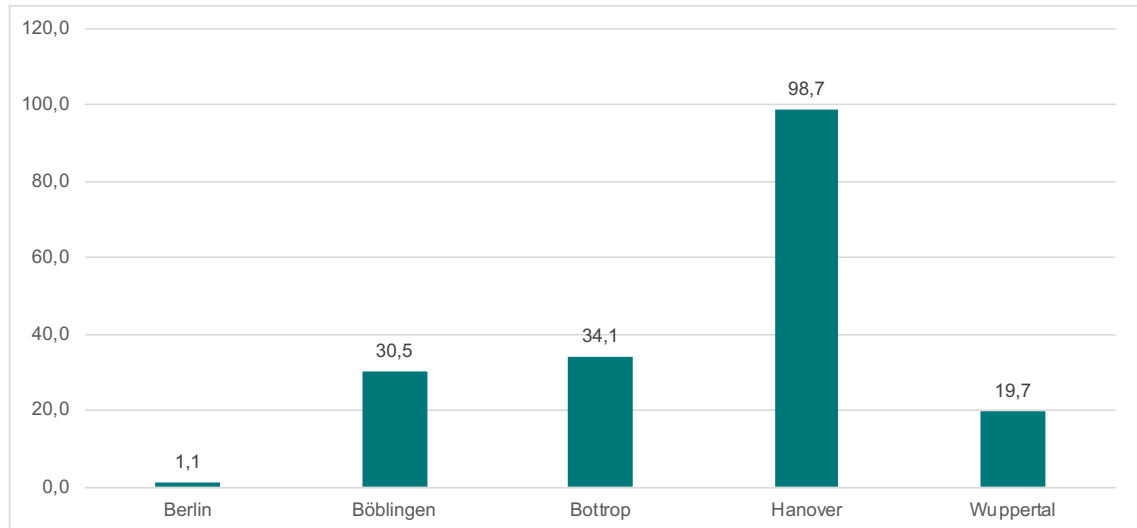


Figure 3: Survey respondents per 100,000 inhabitants by region (n = 183)

Many implementing partners used channels to inform about the survey that they also plan to use to advertise the new service during the implementation phase. Therefore, the number of responses can also be used to gauge how successful their channels are in reaching their target groups. This information can be helpful in planning public relations during the implementation phase.

The share of survey respondents holding a university degree (Bachelor, Master or Master-equivalent) is 62%, which is a much higher share than in the German population. The corresponding value in the German population aged 15 or older is about 18%. The difference with regards to doctoral degrees is even more stark. In our sample 13% hold a doctoral degree, while less than 2% of the German population do. Consequently, the share of people having received an academic education is much higher in our sample than in the German population.

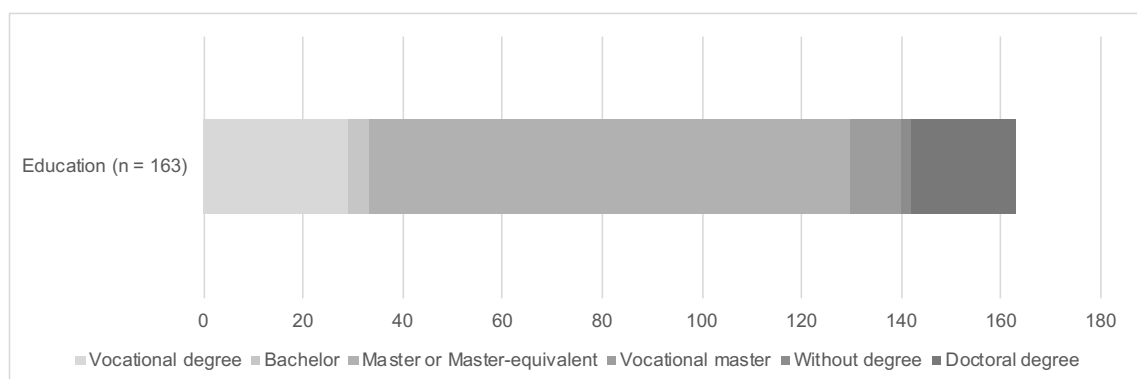


Figure 4: Education of survey respondents

The share of respondents with a monthly household income of more than 4,500 Euro is comparatively high (52%). In Germany, the share of households with a monthly income of more than 4,500 Euro is 38%. As our respondents are owners of residential buildings, it is to be

expected that the share of high-income households is larger than in the general population. Unfortunately, data for the household income differentiated by ownership status is not readily available.

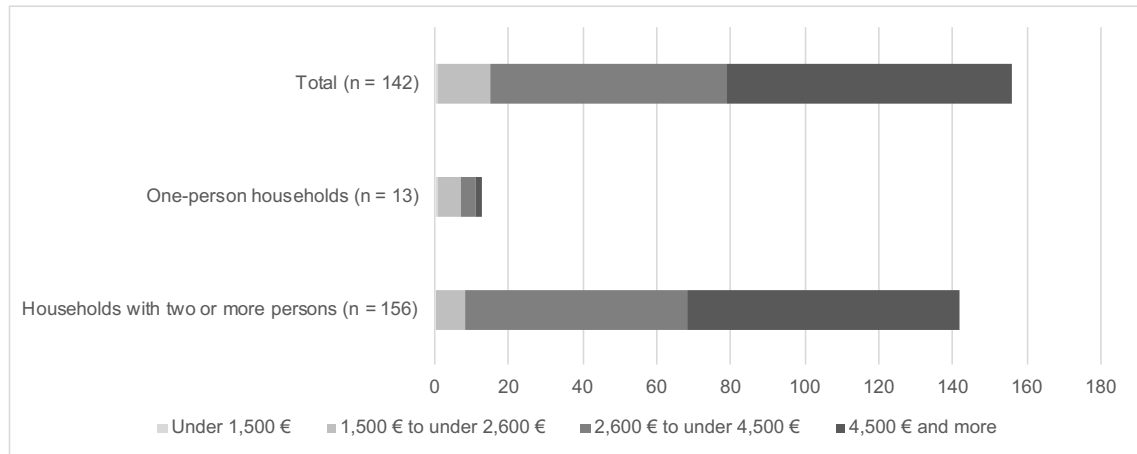


Figure 5: Survey respondents by household income

Based on this data, we have to assume that people with academic education and households with higher incomes are overrepresented. To assess whether our respondents also differ from the German population with regard to awareness for environmental problems, we inserted some questions and items from a German study on environmental awareness (Rubik et al., 2019) into our questionnaire. The first group of questions refers to attitudes regarding environmental problems (Figure 6). Most respondents affirm a positive image of environmental protection. About 98% of respondents fully or somewhat agree that more environmental protection leads to more health for everyone. Our respondents also see everyone's responsibility to ensure that we inherit a liveable environment to future generations, a statement which 97% fully or somewhat agree with. A large majority of respondents perceive our livelihood as threatened by climate change (98%). The response to the statement that others trying to prescribe them a green way of life is more mixed. We can compare the responses to the results of a random sample for Germany (Rubik et al., 2019). This shows that the share of respondents fully agreeing with the statements pro environmental protection is considerably higher among our respondents than what would have been expected based on the random sample for Germany. Contrastingly, the observed response to the statement "I am angered by others trying to prescribe me to live in a green way" is close to what could have been expected based on the random sample for Germany. Nevertheless, our respondents seem to be more in favour of environmental protection than a random sample of the German population. A chi-squared test for homogeneity leads to the null hypothesis being rejected with a p-value smaller than 0.001.

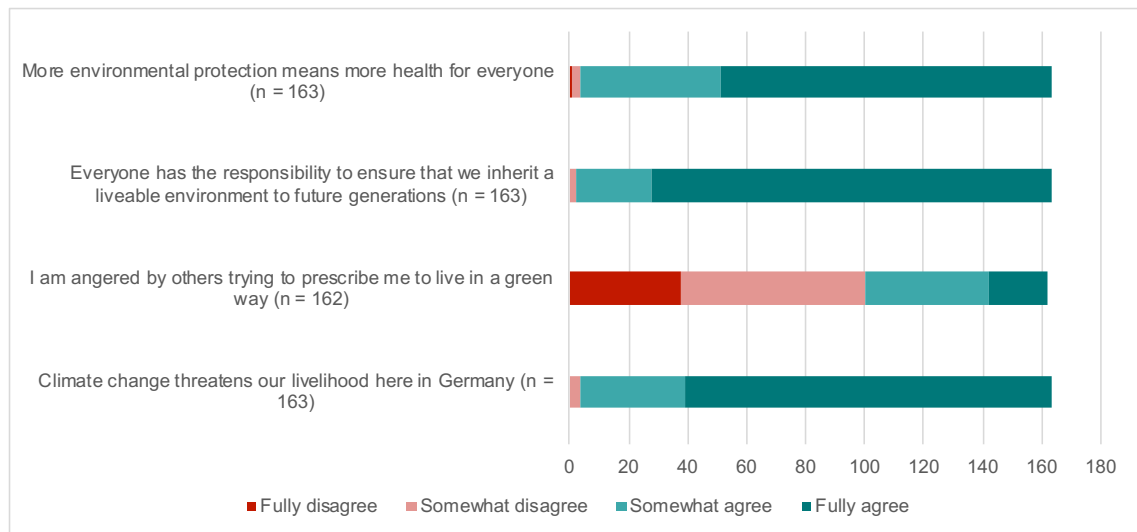


Figure 6: Statements regarding environmental protection

Respondents were also asked how often they show certain behaviours considered “green” (Figure 7). The share of respondents saying of themselves that they always, very often or often choose products with an environmental label like Blue Angel or organic certification in our sample is 65%. The respective share for walking, biking or taking public transportation for daily trips equals 63%. We can again compare these values to the values that were obtained for a random sample of the German population (Rubik et al., 2019). These shares are 62% (environmental labels) and 52% (walking, biking or taking public transportation). While this seems not like too big a difference, in a chi-squared test for homogeneity the null hypothesis is rejected with a p-value much smaller than 0.001. Particularly the share of respondents answering never or rarely to the two items is much smaller in our sample than what would have been expected based on a random sample of the German population.

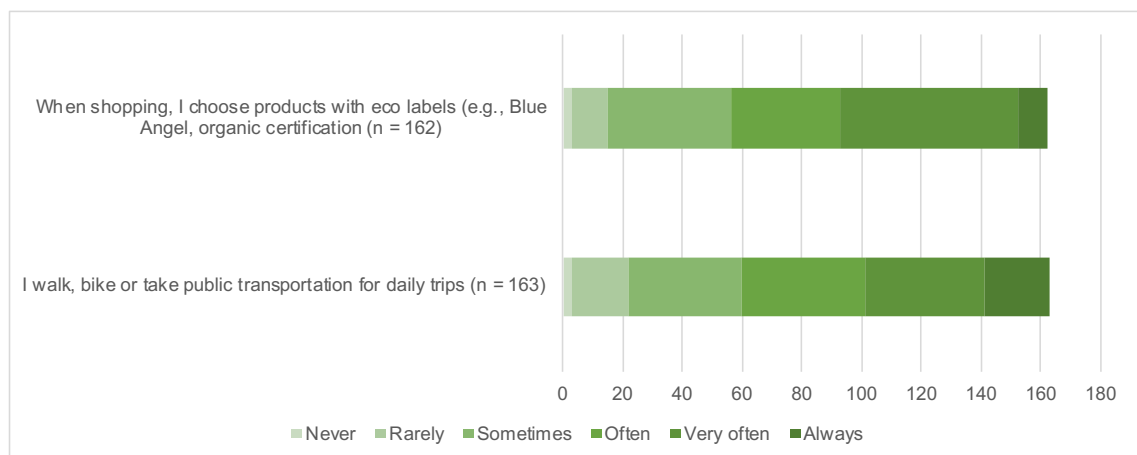


Figure 7: Statements regarding “green” behaviour

We also took two more items that could be either answered in the affirmative or negated. About 47% see themselves as activists for environmental and climate protection. In a random sample of the German population, this share stood only at 20%. About 76% of respondents in our sample purchase green power. The respective value from the study of the German population is

48%. A chi-squared test for homogeneity shows the null hypotheses being rejected with a p-value smaller than 0.001.

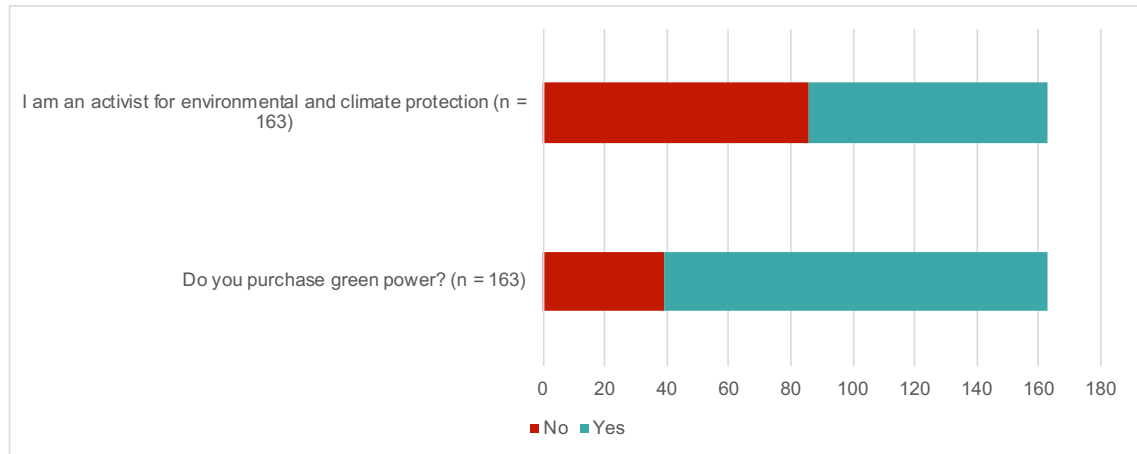


Figure 8: More statements regarding “green” behaviour

To sum up, our sample can be characterised as having a larger share of respondents with academic education, a comparatively high share of respondents with higher-than-average household income and higher environmental awareness than a random sample of the German population. These parameters have to be kept in mind when interpreting the further results.

2.3.2 Respondents’ assessment of One-Stop-Shops

After this characterization of our sample, we return to the core topic of energy efficiency renovations and the demand for One-Stop-Shops. Most of the respondents in our sample have owned their residential building for more than ten years (Figure 9). Sixty-five percent of owner-occupiers and 61% of landlords in our sample have acquired their building more than ten years ago. Only 5% of owner-occupiers and 10% of landlords owned the building in question for less than a year at the time of the survey. In general, one can hypothesise that these two groups are the ones most interested in an energy efficiency renovation either because they just bought an older building in need of renovation or the building was bought or built some time ago and now needs to be renovated.

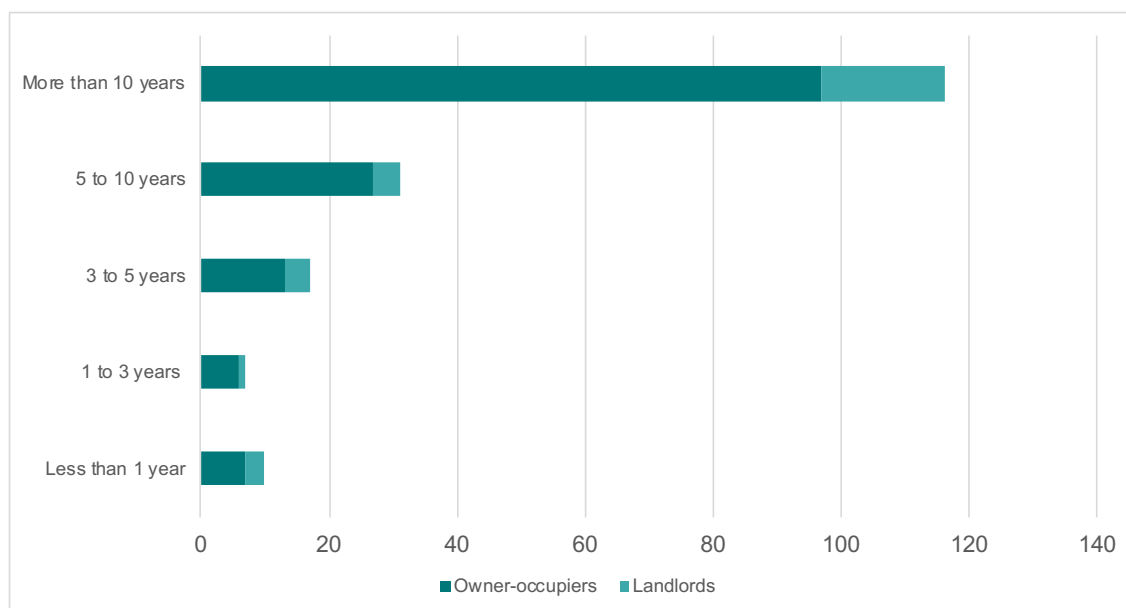


Figure 9: Length of ownership of the residential building (n = 181)

The next question was to assess if the respondent has any renovation plans for the next ten years (Figure 10). We gave ten years as concrete timeframe because we assumed that answers are more comparable than when just asking for plans for the near future or future in general. At the same time, ten years are long enough to signal a mid- to long-term timeframe. It springs to mind that the share of respondents planning renovation measures in a manner that seems to be needed in light of the ambitious goals for the building sector, is comparatively low. Only 5% of all respondents plan a deep renovation and an additional 19% want to implement single measures as part of a renovation roadmap. About 29% of respondents have no renovation plans for the next ten years or do not know yet if they want to renovate. Almost every second respondent plans single measures. The share of respondents planning a deep renovation or single measures as part of a renovation roadmap is higher for landlords. This could be due to a deeper knowledge that comes from having to deal with building-related topics more often. A chi-squared test for homogeneity results in a p-value of 0.04. Consequently, the null hypothesis of homogeneity can be rejected. Yet, observed values are very close to expected values for the most extreme categories (No and deep renovation). In general, the difference between landlords and owners-occupiers should not be overinterpreted. Furthermore, due to non-random sampling one must not draw conclusions for the population based on these results.

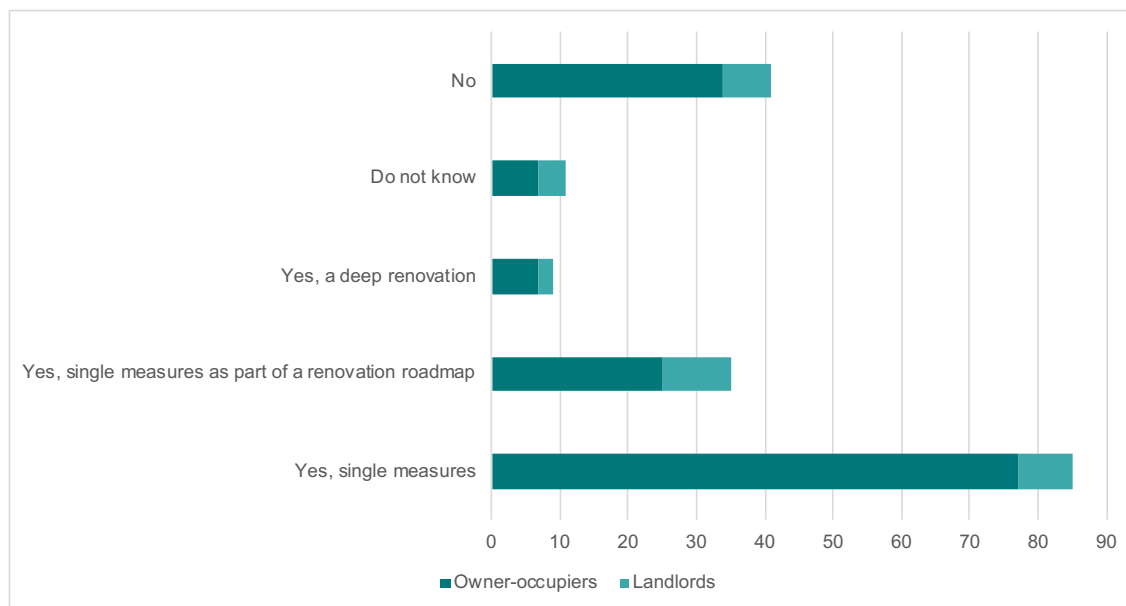


Figure 10: Survey respondent's renovation plans in the next ten years (n = 181)

Of the respondents who plan renovation measures for the next ten years, the measure that is considered by the highest share (60%) is using solar energy by installing a photovoltaic or solar thermal module. Every other measure is considered by less than 50% of this group of respondents. With more than 40% approval renovating the home interior (47%), renovating and insulating the roof (44%), the modernisation of the heating system (43%) and changing the energy source for heating (40%) are still relatively popular. Less than 20% of respondents consider the insulation of the basement or cellar ceiling (18%) and the installation or modernisation of a ventilation system (12%) even though these measures promise large energy savings.

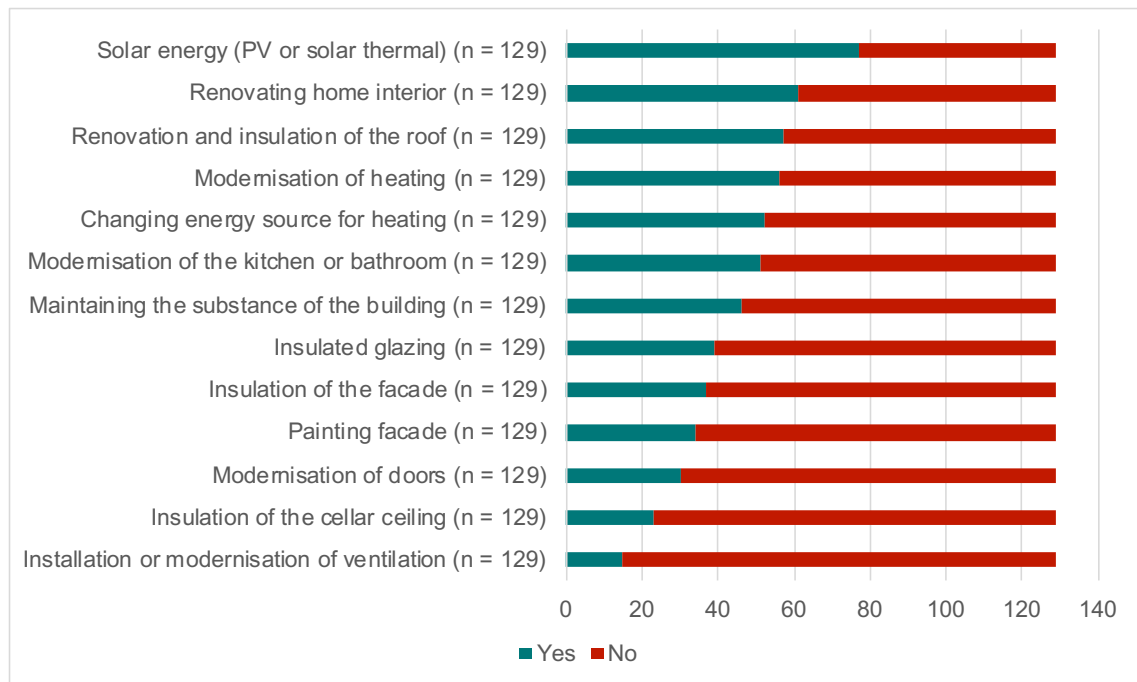


Figure 11: Measures that are considered by survey respondents

The reasons for planning a renovation that are affirmed by the highest share of survey respondents are “reducing energy and operating costs” (67%) and “climate protection” (64%). Other reasons that were approved of relatively often are “increasing the housing quality” (47%), “repairing damages” (41%) and “increasing the building’s worth” (37%). All other reasons are given by less than 30% of respondents. It has to be noted that while about two thirds of respondents give energy cost reductions and climate protection as reason, many measures well-suited to achieve these goals (like insulated glazing, insulation of the façade and cellar ceiling, etc.) are considered by a much smaller share of respondents.

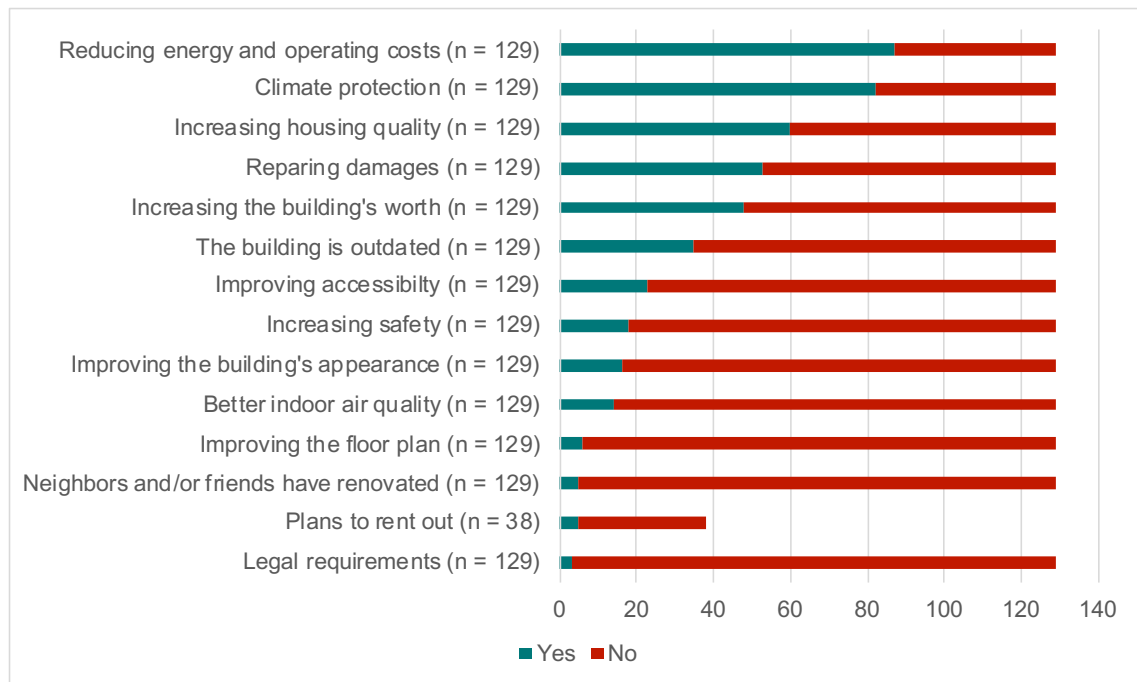


Figure 12: Reasons for planning a renovation

We also asked respondents who answered that they do not plan a renovation within the next ten years or are unsure about it for reasons for their answer (Figure 13). The most important reasons are that respondents consider the building to be in a good state (56%) and that planned renovation measures had already been implemented (46%). All other possible reasons have been chosen by less than one fourth of respondents. Among those are reasons typically thought to be major impediments to energy efficiency renovations like costs (6%), financing (6%), organisational effort (4%), information (2%) and landmark protection (2%). This implies that at least in our sample, a One-Stop-Shop alone would not make many more building owners consider a renovation. Yet, these findings should also not be overinterpreted.

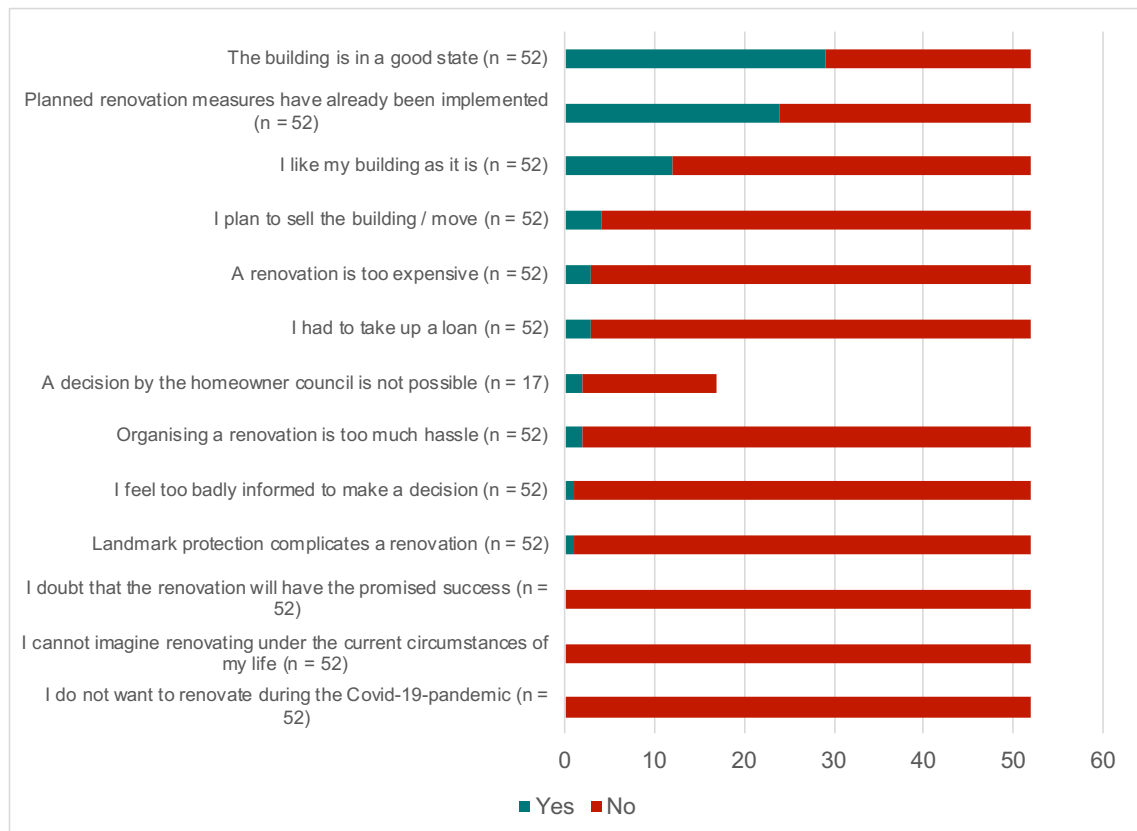


Figure 13: Reasons for not considering a renovation

In the next section of the survey, we asked the respondents how difficult they expect overcoming certain challenges during an energy efficiency renovation to be (Figure 14). Some of these challenges are addressed by a One-Stop-Shop, while others cannot be solved by a One-Stop-Shop alone. About one third of the survey respondents (35%) think that it will be very difficult to find reliable contractors. Adding respondents who expect finding reliable contractors to be very or rather difficult together, this share amounts to 85%. A second challenge that a very large majority (87%) anticipates to be very or rather difficult to deal with is assessing the quality of construction works. Both are challenges that a One-Stop-Shop is designed to overcome. Therefore, this underlines the need for One-Stop-Shops. Other challenges that more than two thirds of respondents assume to be very or rather difficult are deciding without earlier experience (77%), commissioning many different contractors (73%), assessing the profitability of measures (68%) and finding time for tasks associated with a renovation (67%). Again, these are also tasks that a One-Stop-Shop should deal with. There are three challenges which a majority of respondents think will be rather or very simple to overcome. These are finding financing (61%), dealing with impairments during construction works (57%) and having to close a long-term loan (51%). It is somewhat surprising that respondents expect financing the renovation to be rather easy. This could possibly be explained by the current very low interest rates or the respondents having a high disposable income. Nevertheless, given that dealing with the topic of financing is complex, it can be considered a data point that helps to prioritise tasks in designing the business models of the ProRetro One-Stop-Shops for Germany.

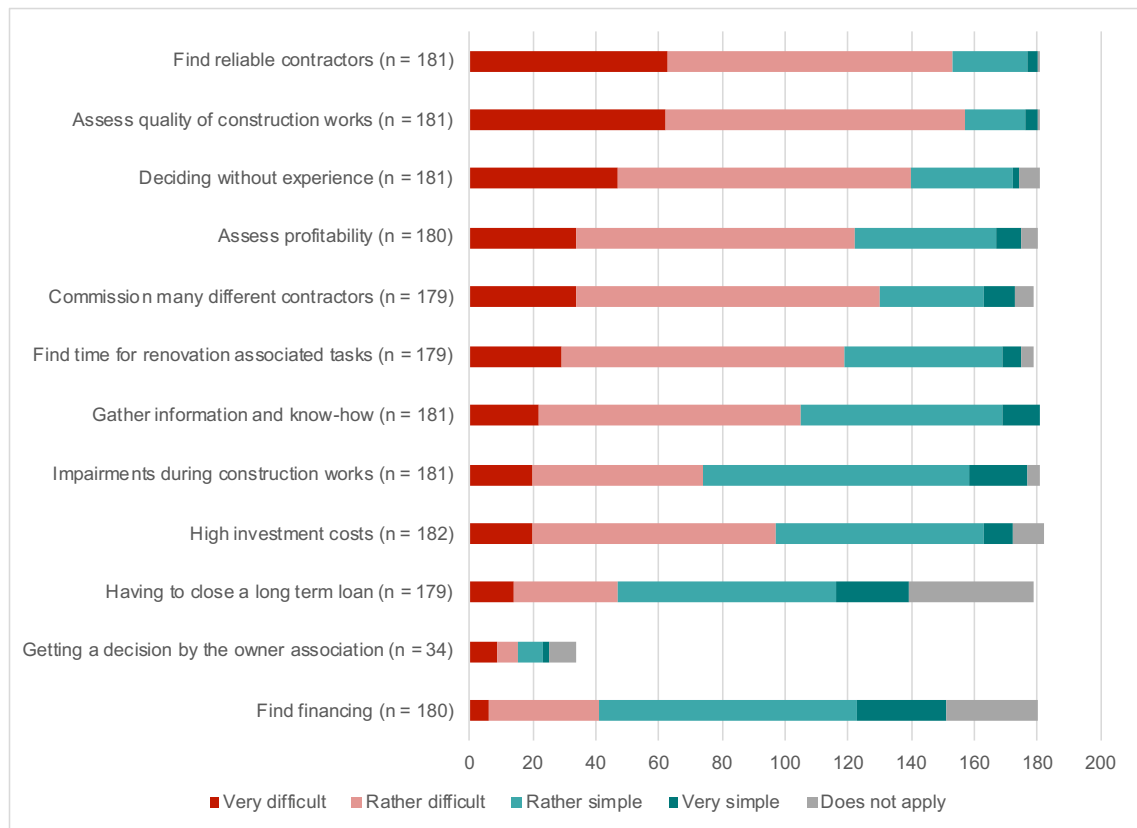


Figure 14: Expectation regarding potential challenges during an energy efficiency renovation

The next question relates to possible factors that could motivate respondents to invest in an energy efficiency renovation (Figure 15). The motivators a large majority of respondents affirm are lower energy costs (88%), climate protection (84%), improving and maintaining the building's substance (84%) and advice and support from impartial experts (83%). A One-Stop-Shop should ensure that energy efficiency renovations are optimised with respect to energy saving and emission reductions. These results are also helpful in deciding how the One-Stop-Shop should advertise its service. It can emphasize that a renovation will help to preserve the building and make it future-proof while also guaranteeing expertise and giving advice with the customer's interest in mind.

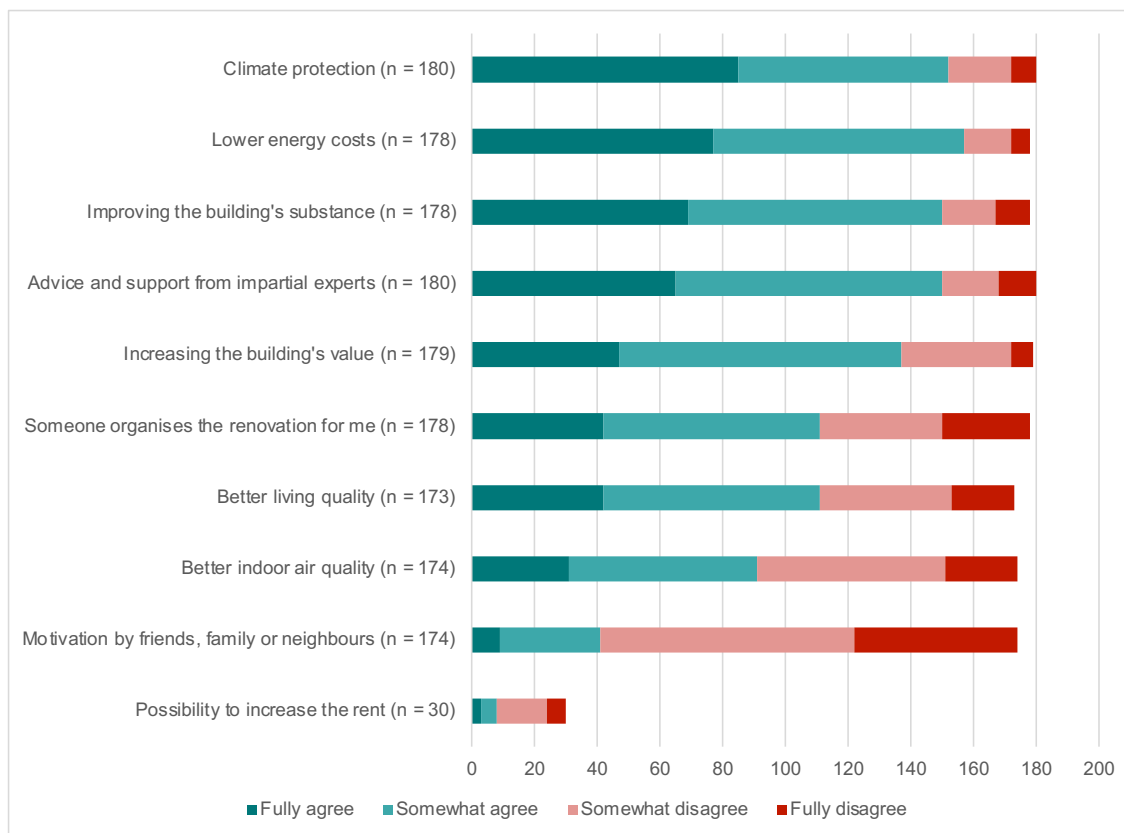


Figure 15: Possible motivators for an energy efficiency renovation

The next section of the questionnaire was introduced with a short description of the concept of a One-Stop-Shop. This description can be translated as follows: “Please imagine the following situation irrespective of whether you plan an energy renovation or not: A One-Stop-Shop has recently opened in your city. It will facilitate an energy renovation by taking over every or many tasks associated with an energy renovation. The One-Stop-Shop is your single point of contact and guides you through the renovation process. This ranges from the energy audit over planning measures, obtaining and assessing financing offers, choosing and commissioning contractors to organising, supervising and accepting construction works.” Figure 16 shows a first impression of respondents based on this short description. It demonstrates that our respondents have an overwhelmingly positive first impression of this concept. About 44% rate the idea very positive and an additional 37% positive. Only 6% are left with a negative or very negative impression, while 13% chose a neutral position.

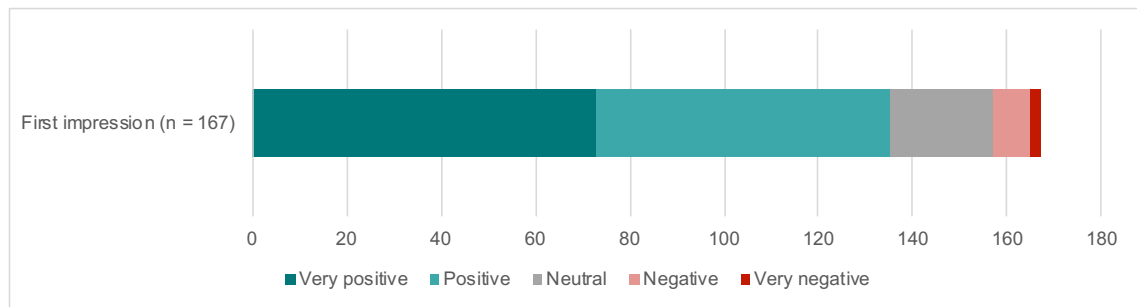


Figure 16: First impression of the One-Stop-Shop concept

When asked for reasons for their assessment, respondents with a positive impression named having little time, numerous and complicated subsidy programmes and the difficulty of finding qualified contractors as reasons. Those with a negative impression gave unclear responsibilities and questions of liabilities, the already existing services of architects and energy advisers that perform many of the One-Stop-Shop tasks and the fear that the service will be expensive and even prone to bribery as reasons.

Another important question is whether potential customers are willing to let the One-Stop-Shop make certain decisions (Figure 17). The tasks for which the largest share of respondents declare a willingness to delegate them to the One-Stop-Shop are the coordination of construction works (81%), quality control and approval (80%) and choosing and commissioning an energy adviser (71%). Respondents are more sceptical about letting the One-Stop-Shop close contracts (41% unwilling), choose construction materials and technologies (24% unwilling) and set up a financing plan (21% unwilling). While the responses give an idea of which tasks building owners would be open to delegate, the answers still have to be interpreted with care because respondents might understand the answer options differently. Especially with regard to closing contracts, it is unclear whether respondents understood that the One-Stop-Shop will close a contract in their name without being responsible and liable. If the One-Stop-Shop accepts the full responsibility and liability for the complete renovation process more respondents might be open to such a model.

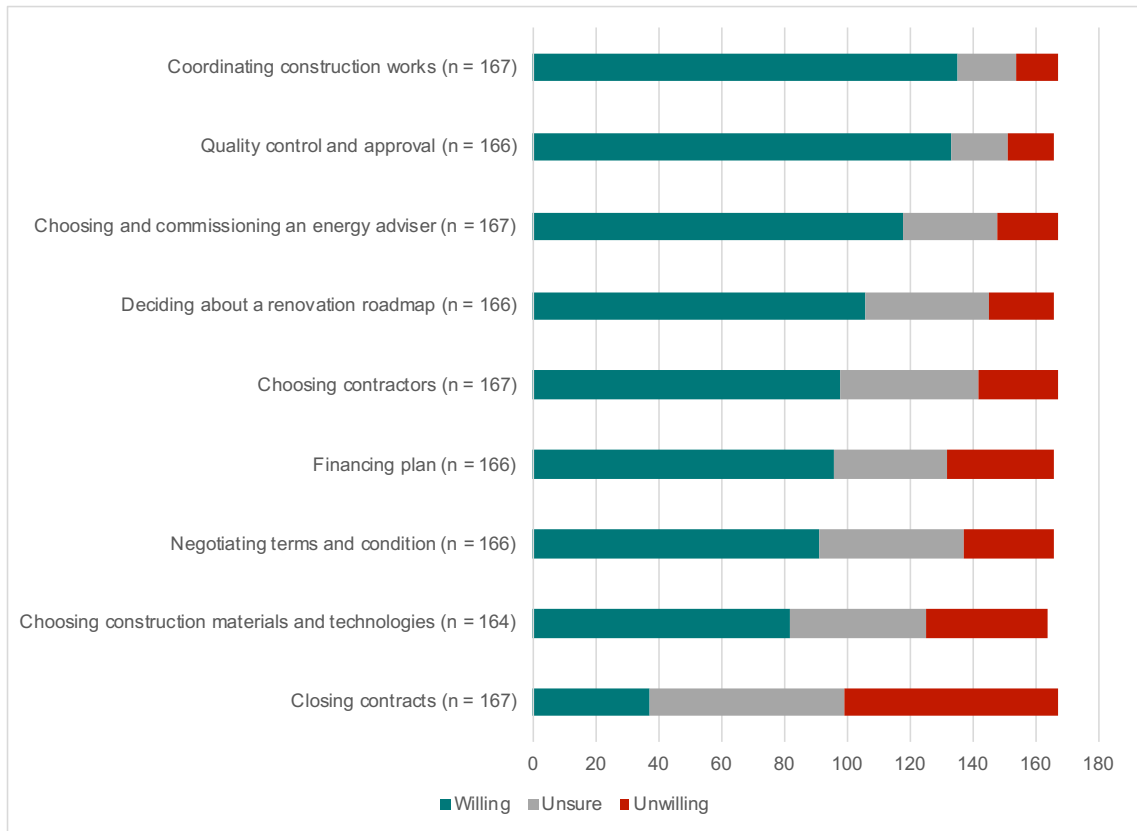


Figure 17: Willingness to delegate decision-making

Besides asking respondents for their first impression of a One-Stop-Shop in general, we also inquired if respondents can imagine to commission a One-Stop-Shop (Figure 18). The positive first impression translates into an openness to commission a One-Stop-Shop. About 19% can imagine commissioning a One-Stop-Shop with a deep renovation and additional 33% are open to commission it with single measures. Adding the 27% that are open to commissioning a One-Stop-Shop but are unsure about the measures to implement, this yields that it is conceivable to 79% of our survey respondents to commission a One-Stop-Shop. About 9% answer “do not know” and just 10% cannot conceive commissioning a One-Stop-Shop because they want to organise everything themselves.

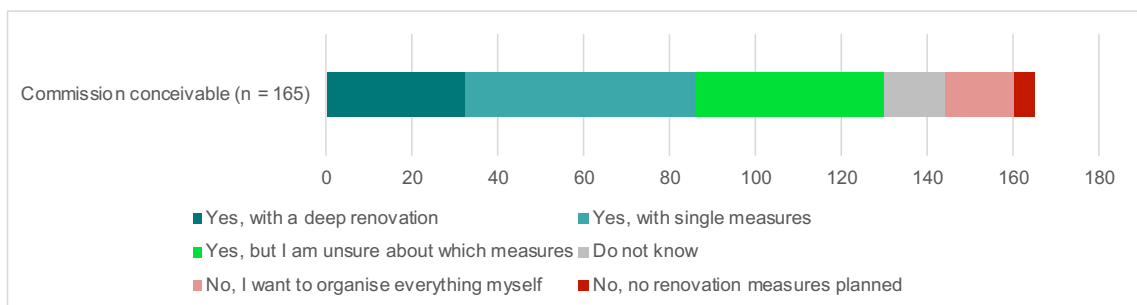


Figure 18: Commissioning a One-Stop-Shop conceivable to survey respondents

Respondents who said they are open to commissioning a One-Stop-Shop were asked which reasons they have for this openness and which hopes they associate with the One-Stop-Shop's

service. Every respondent fully or somewhat agrees with wanting to make use of the One-Stop-Shop's expertise and experience. Other important motivating factors are better planning (99%), better quality of construction works (95%), being able to make use of all expedient subsidies (92%) and getting custom-fit advice (92%). The only item a majority of respondents disagrees with is that a renovation would not be viable without the One-Stop-Shop's support (63% somewhat or fully disagree).

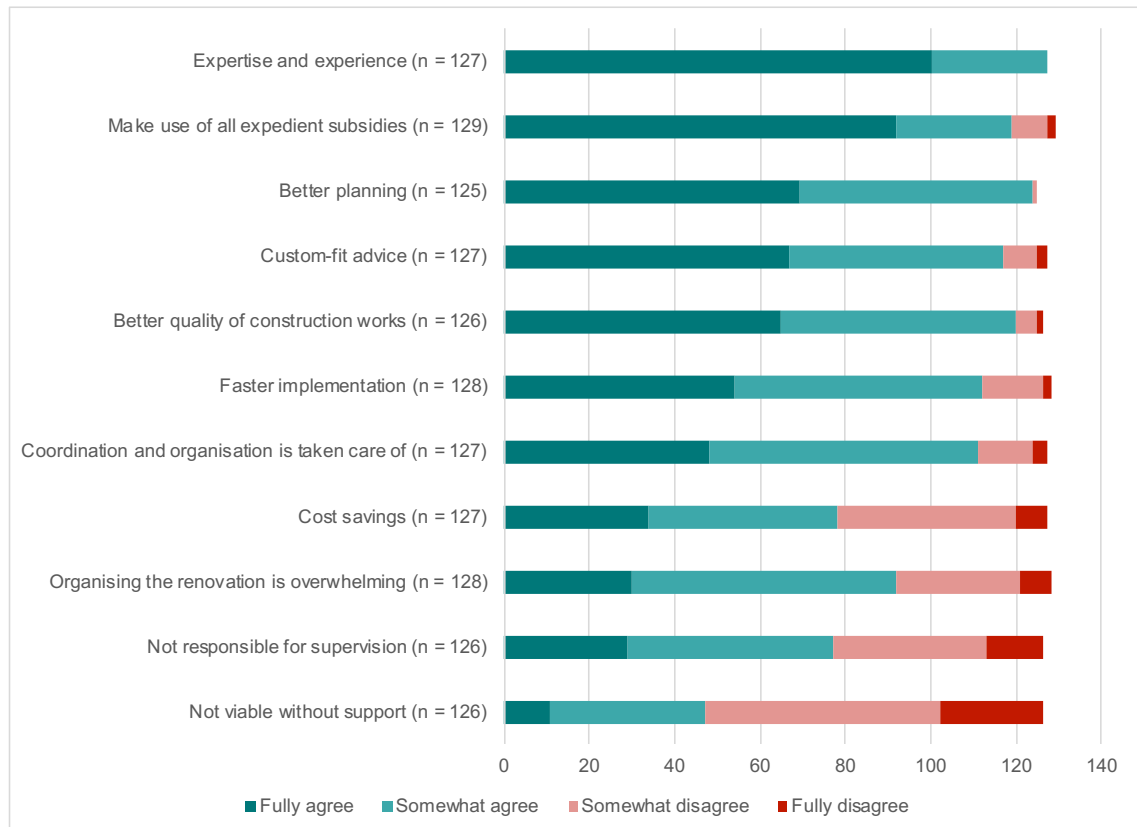


Figure 19: Reasons for being open to commissioning a One-Stop-Shop

We also asked the respondents who were not open to commission a One-Stop-Shop or unsure about it for the reasons for their assessment (Figure 20). Only 41% fully or somewhat agreed with the statement that they do not have a need for energy saving measures. About 88% of respondent fully or somewhat agreed with wanting to keep control over the renovation process. This indicates that there a group of homeowners exist how will probably never want to commission a One-Stop-Shop. Other reasons are the fear that a renovation managed by a One-Stop-Shop will be more expensive (85% fully or somewhat agree) and a lack of trust (76% fully or somewhat agree).

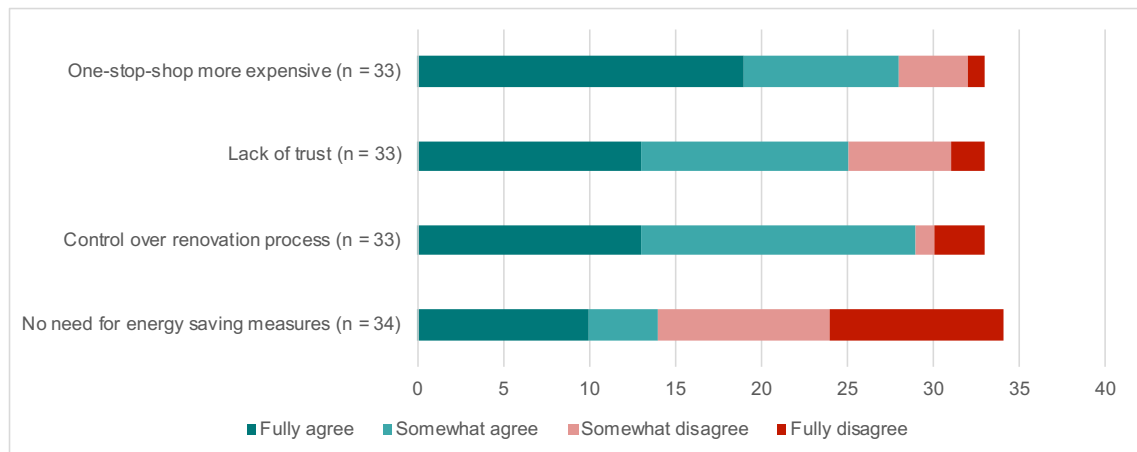


Figure 20: Reasons for not being open to or unsure about commissioning a One-Stop-Shop

Different service configurations are conceivable for One-Stop-Shops. Therefore, we asked respondents how important certain services would be to them. Advice regarding subsidies is very important to 58% of respondents and quite important to an additional 31%. That the One-Stop-Shop takes over the application for subsidies is very important to 53% and quite important to 31%. Other service that a very or quite important to more than 80% of respondents are a list of qualified contractors and advice in this regard (92%), the approval of construction works (very or quite important to 88%), support in selecting measures (87%), one and the same contact person (85%), the coordination of construction works (82%) and on-site energy advice (82%). The results for the service that are very or quite important to less than 50% of respondents mirror the results when we asked for the importance of particular challenges. Advice regarding financing is only very or quite important to 46% of respondents, while the One-Stop-Shop's own financing offer would be important to only 30% of respondents. The only service of even lower importance to respondents is a local store (very or quite important to 18% of respondents).

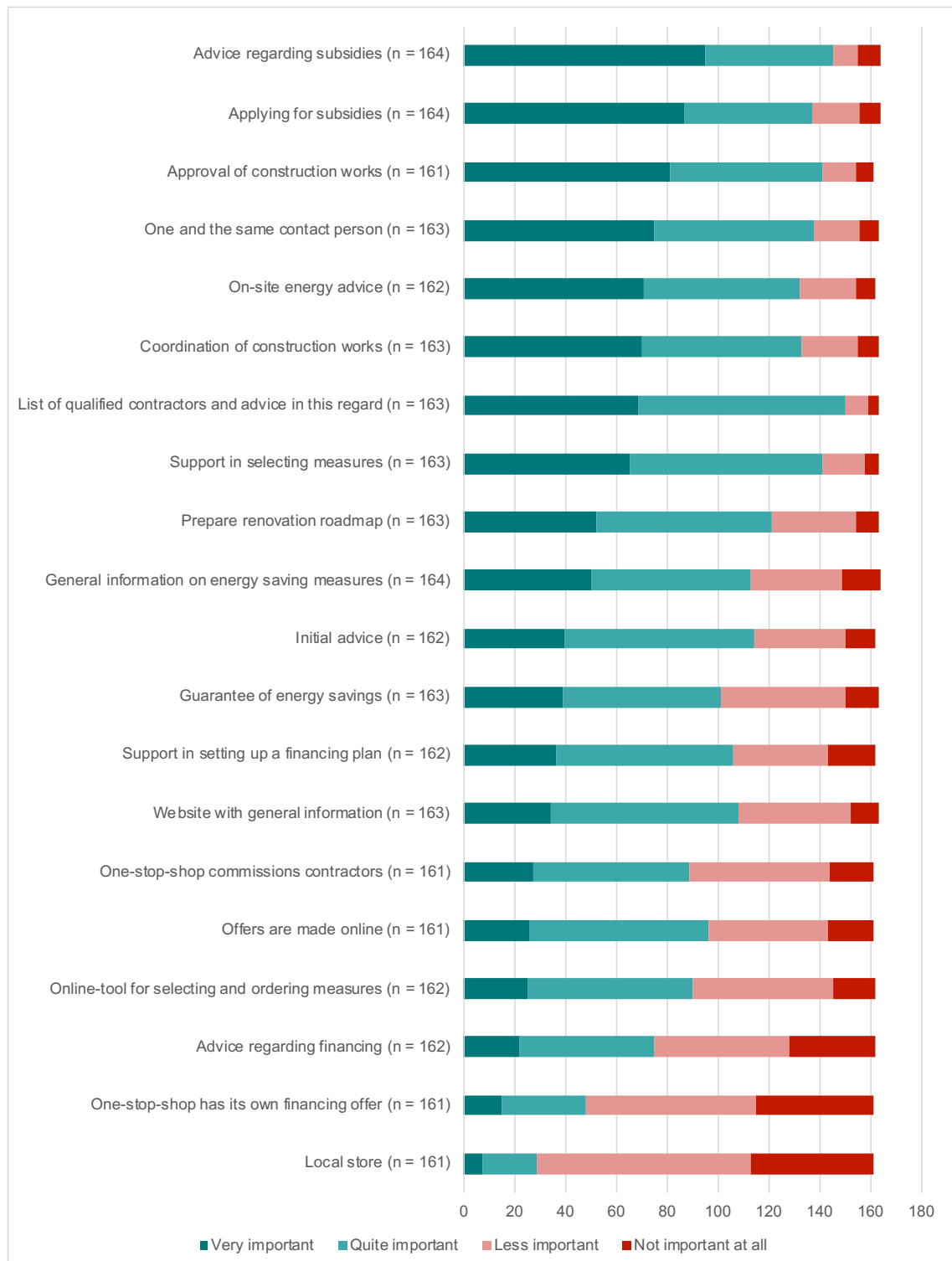


Figure 21: Expectations regarding the One-Stop-Shop's services

A very important question for the One-Stop-Shops' business models is whether customers are willing to pay a fee for the One-Stop-Shop's service or if the One-Stop-Shop has to find other sources for revenue (e.g., provisions paid by contractors, subsidies). Which revenue stream the One-Stop-Shop has to build on can also be important for how it is perceived, e.g., regarding

impartial advice that was very important to some survey respondents. Therefore, we first asked respondents whether they at all can imagine to pay a fee (Figure 22). About 87% of respondents are open to pay a fee. This result does not differ between respondents answering as owner-occupiers (87%) or landlords (86%). A chi-squared test for homogeneity yields a p-value of 0.87, i.e., we cannot reject the null-hypothesis of homogeneity.

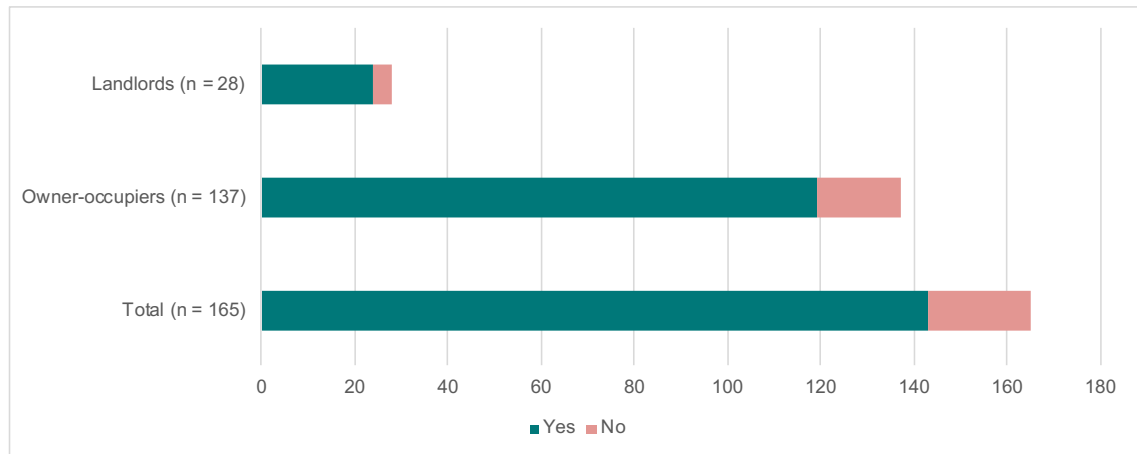


Figure 22: Openness to pay a fee for the One-Stop-Shop's service

Those respondents who showed an openness to pay a fee were requested to imagine an energy efficiency renovation that costs 50,000 Euro. With a slider they could then indicate the maximum fee they would still be willing to pay for the one-stop-shop's service (Figure 23, Table 3). The mean willingness to pay is 5.1% (equals 2,550 Euro) of total invest (i.e., 50,000 Euro in this case). The median is 4.2% with the standard deviation being 3.1%. The minimum value chosen by a respondent is 0.6% (equals 300 Euro), while the maximum value is 15.0% (equals 7,500 Euro).

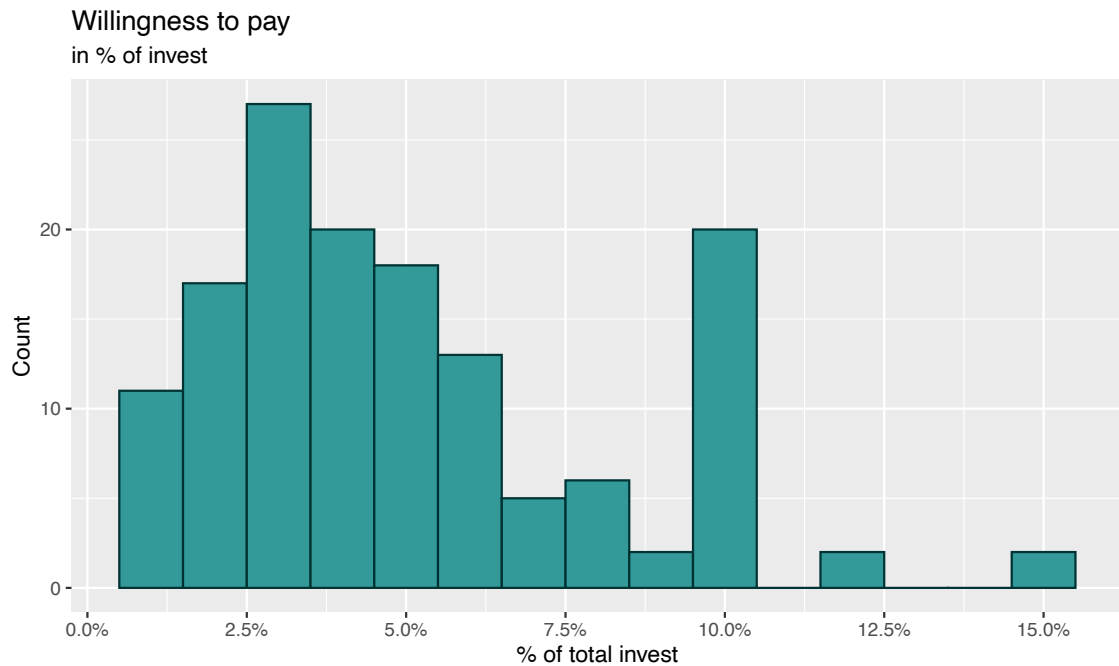


Figure 23: Willingness to pay for the One-Stop-Shop's service

Table 3: Statistics for the willingness to pay for the One-Stop-Shop's service

Mean	median	sd	max	min	n
0.051	0.042	0.031	0.150	0.006	143

Of course, these values have to be interpreted with great care and only constitute a single data point when it comes to developing business models for One-Stop-Shops. Stating a willingness to pay in a survey is cheap and as homeowners rarely, if at all, have commissioned a One-Stop-Shop or a service from the One-Stop-Shop's portfolio, familiarity with these types of services is low. In general, various models to recoup the costs of running a One-Stop-Shop can be observed in Europe (Bertoldi et al., 2021). The question of possible revenue streams and cost structures will have great importance in the further course of the project.

2.4 Conclusions and main lessons

The survey results allow us to give preliminary answers to the questions we raised in section 2.1. Yet, in doing so the various limitations of the data have to be kept in mind. We received fewer responses than we hoped and the distribution of answers between the ProRetro regions was very uneven. This hints to the channels we used for distributing the survey link being of varying success. We also had to resort to non-probability sampling, which means we cannot readily generalise from our sample to a larger population. Some of the answers to our questions allow us to characterize our sample as somewhat different from what could have been expected in a random sample from the German population. More respondents have received education at a university than would be expected from a random sample of the general population. The share of respondents belonging to the group with the highest monthly household income is also

higher than in the general population. Furthermore, our respondents report a higher degree of environmental awareness than what is to be expected based on a study for the German population. Despite this greater environmental awareness, the share of respondents planning a deep renovation or single measures as part of a renovation roadmap seems rather low compared to what would be needed if the annual renovation rate is to be raised to about 2% (European Commission, 2020). Still, the data we collected allows us to answer the questions we raised in the introduction in the following way:

- *How do potential customers assess the importance of the various barriers to energy efficiency renovations? How important are information and search costs?*
Most respondents see information and search costs as high and consider these tasks to be the most challenging (Figure 14). To our respondents, finding qualified contractors, assessing the quality of construction work and deciding without experience which measures to implement are among the challenges perceived as most difficult.
- *What do potential customers think of the idea of a One-Stop-Shop?*
Based on our description, our survey respondents have an overwhelmingly positive first impression of the idea of a One-Stop-Shop (Figure 16). While clearly in the minority, those with a negative impression are very outspoken about some fears they have regarding the concept of a One-Stop-Shop (e.g., more expensive, prone to corruption).
- *What are services they would deem most helpful in assisting a renovation project?*
Survey results demonstrate that respondents are especially looking for support with finding and choosing contractors, deciding between energy efficiency measures, finding and applying for subsidies as well as organising and approving construction works (Figure 21). Contrastingly, having an own financing offer and advice regarding financing seems to be of lower priority.
- *To what extent are building owners willing to delegate decision during the process of an energy efficiency renovation?*
Respondents declare themselves willing to delegate a number of tasks for which a One-Stop-Shop could assume responsibility (Figure 17). This includes the coordination of construction works, quality control and approval as well as choosing and commissioning energy advisers. Survey respondents were more sceptical when it comes to questions of deciding about building materials and technologies or closing contracts. Yet, the latter topic might be assessed differently once questions of liability are clarified.
- *Which willingness-to-pay for a One-Stop-Shop's service do potential customers state?*
A majority (87%) of survey respondents stated that they are also willing to pay a fee for the One-Stop-Shop's services. For those saying they are open to paying a fee, the median willingness to pay was about 4.2% of total invest. These results have of course to be interpreted in light of the limitations of eliciting willingness to pay through a survey and the general limitations we described at the beginning of the section.

Despite the limitations to consider when interpreting the survey results, we have collected interesting and valuable information and feedback for the further design and trial of the five ProRetro One-Stop-Shops.

3 Focus groups

3.1 Introduction

To identify the needs of potential customers of One-Stop-Shops and review the business models developed during the design phase, one focus group with building owners were conducted in each project city/region. This method was chosen because of its interactive approach of data collection and its common use in market research. Focus groups aim to create unique data because of the “explicit use of the group interaction to produce data and insights that would be less accessible without the interaction found in a group” (Morgan, 1988, p. 12). The main purpose of the focus group method in this project is therefore the acquisition of insights that would not be gained in individual interviews or through similar methods. Members of the focus groups were owners of different buildings and volunteered to participate.

3.2 Method

Participants of the focus groups were recruited by the project partners. Effort in recruitment varied between the project partners. While all of them used social media for the advertisement of the event, only some used newsletters of their institution and network partners or press releases. The participants had to register for the event with the partners to receive the login data for the online meeting. Originally, the focus groups were planned as physical meetings, but could only take place online due to the COVID-19 pandemic in 2021.

As focus groups aim to be heterogeneous in their attendees, the project partners tried to address owners of different building types and approached some of their former or prospective customers personally. The particular focus groups were mostly heterogeneous with owners of single-family houses, owners of apartment houses and property managers. Due to the specific target group of some project partners' One-Stop-Shops, their groups were more homogeneous (Berlin, Hanover region).

Different software was used in the online meetings, but main functions were similar in all applications: All members of the meeting could use a camera, a microphone, an integrated chat and a function to virtually raise one's hand to request to speak. The meeting programs used were Webex, Zoom, Microsoft Teams and Google Meet.

The focus group discussions were led by a moderating person and all proceeded in the same way. A presentation was shared during the online meeting to inform the participants about the planned agenda. The moderator explained the focus group method briefly to clarify the research aims of the meeting. Then the participants were asked to introduce themselves with a focus on the type of building they own and if they want to do an energy efficiency renovation. Afterwards the individual One-Stop-Shop service models were presented by the particular project partner. The participants had the chance to ask questions of understanding before the moderator started the discussion. The discussion was guided by four main questions which were asked in all groups and extended by two to four individual questions in each region, adapted to the respective One-S-top-Shop business model.

The guiding questions, developed from the ones stated in the proposal, were:

- What do participants think of the presented One-Stop-Shop's service?
- Is there anything important missing in the presented One-Stop-Shop model?
- How do the participants want to be addressed for information on the One-Stop-Shop's services and which communication channels should be used to reach them?
- Which objections do the participants have that deters them from using the One-Stop-Shop's service and what would have to change for them to seriously consider it?

Additional questions of the individual project partners were, for example:

- Which additional services do the building owners wish for in the presented One-Stop-Shop model?
- Is there something the building owners want to stay in charge of that should not be given to the One-Stop-Shop's service during a renovation?
- Would the building owners pay for the One-Stop-Shop's services?

The discussion was documented as a transcript with the possibility to identify the participants in terms of the type of building they own. No personal data such as name, age or profession or place of residence were registered.

Two approaches were used for the data analysis: First, the main statements and stances were summarized from all focus groups to get an insight into general opinions on the One-Stop-Shop service and its use, detached from the type of building owners. In the second place, each transcript of the groups was analysed with focus on the individual answers regarding the presented One-Stop-Shop model and the type of building owners. The method used for analysis was a summarizing content analysis.

First the transcripts were condensed so that the main statements and messages of the participants could be evaluated and compared more easily. Categories were created along the guiding questions and condensed text passages were allocated to these categories. The results are presented in the next section.

3.3 Results

This section presents the results of analysing the focus group discussions according to the method described in the previous section. The results are presented along the created categories during the content analysis and for different groups of participants. The categories are: additional value of One-Stop-Shop services, missing services in the One-Stop-Shop's business model, concerns, informational material and communication, paying for the One-Stop-Shop's services, additional elements and questions. The different groups of participants are: homeowner associations and property managements, single-family house owners, apartment owners and experts.

▪ 3.3.1 Comprehensive results from all focus groups

Additional value of One-Stop-Shop services

Throughout all focus groups the participants think of the One-Stop-Shop's services as a useful service in general. They mention in particular the saving of time for a building owner, who can

surrender a lot of individual work to the One-Stop-Shop instead of examining different options for energy-saving measures, deciding between them and looking for qualified contractors. Overall, the participants think that the effort of an energy efficient renovation is reduced for a building owner who commissions a One-Stop-Shop. They also mention the hope that delegating the overall task and responsibility to specialists will increase the renovation's quality.

Missing services in the One-Stop-Shops' business models

The participants did not identify particular missing services in the presented business models.

Concerns

Participants from all focus groups agreed in the consideration of who will assume liability for the One-Stop-Shop's services. It is also unclear who is responsible for the check of quality, as the project management of the One-Stop-Shop may not be in a neutral position. Regarding the specific requirements of homeowner associations and property management companies when assigning construction work, the representatives of these were doubtful of the possibility of making use of an One-Stop-Shop service, as they would need three offers from different companies.

Information material and communication

As no One-Stop-Shop service was able to present drafts for information material or advertisements the participants were asked to describe how they want to be addressed and which communication channels should be used by the One-Stop-Shops. Most participants favoured a homepage with regular updates and up-to-date information to use as a source when looking for information on energy efficient renovation and offers in their region via internet. Opinions regarding print products varied: While some participants think they are easy to handle and can be used for advertisement via the One-Stop-Shop's regional project partners, some think that print products are outdated and often contain outmoded information. The participants agreed that communication and advertisement via the cooperation partners (e.g., contractors, financial institutions, architects) would be a good way to spread information about the One-Stop-Shop's services. Another suggestion that occurred in several focus groups was to focus on persons that recently moved into the region or town and bought a building. The participants suggested those might be contacted through the municipality.

Paying for One-Stop-Shop services

The participants of all focus groups agreed in the opinion that they would pay for the One-Stop-Shop's services if there is a recognizable added value in the services they offer. They pointed out that the One-Stop-Shops should offer more information than can be easily found on the internet and especially show their value in knowing the funding options and legal framework so that their work is worth the extra money spent.

Additional elements

Most participants agreed on the extra value that would be given by best practices being shown on the One-Stop-Shop's websites. They prefer pictures from before and after the energy efficient renovation and descriptions of the implemented measures. They would also like lists and presentations of the companies and contractors which cooperate with the One-Stop-Shop.

Participants also recommend to name a person of contact on the One-Stop-Shop's website and on advertisement materials, who can be contacted and called directly. Some participants proposed integrating videos with explanations of different measures for energy efficiency renovations and explanatory videos of the One-Stop-Shop's service.

Questions

The participants of the focus group discussions asked some questions that could not be answered directly and may need further research:

- Is the One-Stop-Shop service also available during the process of buying a building or house to identify and/or plan necessary renovations for energy efficiency?
- How can property management companies and community associations make use of the One-Stop-Shop's services?
- How much would the first advice cost?
- Is the One-Stop-Shop competing with energy advisers whose services are subsidised by the government?
- Does the One-Stop-Shop's service include a possible coordination with public authorities?

▪ **3.3.2 Results from individual focus groups**

Hanover region focus group

The participants of the focus group in Hanover were all building owners of single-family houses. Some of them had already implemented energy efficiency measures and were interested in adding more while others had not renovated yet but were interested in it. They agreed in the opinion that a One-Stop-Shop is a useful service and were all willing to pay for the One-Stop-Shop's service. They expect saving time while getting support that considers the latest information on technical innovations and funding possibilities. They also mentioned that the One-Stop-Shop service should not be too expensive. A specific question arose in this group regarding the claim of the service after the commission of the One-Stop-Shop (Who is responsible in the eyes of the law?). The participants in Hanover recommended advertisements especially for new inhabitants who have bought a house that might be in need of renovation. These advertisements could be distributed via online newsletters, the service partners and financial institutions who are involved in the buying process.

Bottrop focus group

All of the participants in this group were experts as no interested citizens could be attracted to the event. The participants were working professionals from the ProRetro partner Innovation City Management (ICM) Bottrop, however they are not directly involved in the project work. They received a presentation of the planned One-Stop-Shop service model by their colleague who is working on ProRetro. This kind of peer review was very helpful though it did not cover the expectations and opinions of building owners. The colleagues gave detailed feedback and hints for the rollout of the One-Stop-Shop service in Bottrop that were helpful for the ongoing process and the internal integration into the ICM. Important points in this group were the suggestion to only offer neutral information without recommending specific companies for renovations and to draw up a list of all contractors in Bottrop that is open for everybody to find.

The experts also recommended including more than one financial institution as a partner to provide different offers. For the communication and advertisement of the One-Stop-Shop the participants recommended to register as a google shop, advertise the service on the municipality's homepage and to use printed flyers. They also suggested involving the One-Stop-Shop's cooperation partners for making the new service more widely known.

Böblingen focus group

The participants in this group were mostly property managers and experts in the field of energy efficient renovations. Most of them approved the concept of the One-Stop-Shop service and said it might help to introduce the topic of energy efficient renovations to a larger number of building owners. They also hope that the service will reduce the effort for building owners when planning a renovation. Concerns arose regarding the differences between an energy adviser's work and the work of the One-Stop-Shop. Some were of the opinion that the One-Stop-Shop needs a neutral project management, control and quality assurance structures for renovations. A number of participants were afraid of the One-Stop-Shop taking over their work as energy advisers and took up most of the speaking time by voicing this concern. Overall, the conclusion of this group is that the presented One-Stop-Shop service model might be an easy access to the topic of energy efficient renovation, especially for small homeowner associations, as long as it is for free.

Wuppertal focus group

The participants of the focus group in Wuppertal were diverse: apartment owners, owners of apartment buildings, owners of single-family houses and a representative of a property management company. They agreed that the business model already offered by the project partner in Wuppertal is a helpful service for building renovations. An additional benefit would be to expand the services by offering energy advice and energy efficiency renovation. The participants also identified the problem of using the One-Stop-Shop's service for homeowner associations and property management companies as the law requires three different offers from three companies before assigning the renovation work. This would not be possible when using the One-Stop-Shop's services. The participants also agreed on the willingness to pay for the One-Stop-Shop service as it is a piece of service with lots of benefits for building owners. Some participants also expressed the concern that a neutral quality control is missing in this One-Stop-Shop model. In terms of advertisement the participants had different opinions: some preferred printed information materials while others identified an up-to-date website as a crucial part of the One-Stop-Shop concept. The participants in this focus group also had the most ideas for additional elements that could be added to the One-Stop-Shop: Best practice pictures on the website, explanatory videos on the One-Stop-Shop's services and energy efficient renovations in general, a direct contact to the One-Stop-Shop's team and an overview of the involved construction trades.

Berlin focus group

The participants of the focus group in Berlin were potential cooperation partners of the One-Stop-Shop and property managers. The One-Stop-Shop model in Berlin has identified homeowner associations as the main target group and thus did not invite single family house owners. Important suggestions were to define the differences between the services the One-

Stop-Shop offers and the service of energy efficiency advisers. During the discussion it became clear that the One-Stop-Shop service should give initial advice on the topic of energy efficient renovations and mainly explain the procedure and possibilities for funding energy efficient renovations. All participants agreed that the One-Stop-Shop's services should be paid for by the apartment owners of a homeowner association. A participant in this group had the idea of rewarding the users of the One-Stop-Shop's service with extra funding to pay the One-Stop-Shop's service when energy efficient renovation measures are implemented, i.e., when customers do not abort the project after the first advice.

▪ 3.3.3 Results per groups of participants

The needs and wishes of the participants differed between representatives of property management companies and homeowner associations, owners of apartment buildings and single-family house owners.

Homeowner associations and property management companies

The participants representing homeowner associations and property management companies commented in all focus groups that the One-Stop-Shop's service in the presented models probably cannot be used by them, as they need to get three offers from different companies for any kind of renovations. Most of them think that the idea of a One-Stop-Shop is a good concept and may attract more building owners to implement energy efficient renovation projects, but is not useful for the property management needs in the presented models. Some property managers also expressed a concern about the extra work for them in communication with the One-Stop-Shop and the apartment owners that they do not get paid for.

Single family house owners

Single family house owners were the most represented participants in the focus groups and most attracted to the One-Stop-Shop concept. They highlighted the saving of time by using a One-Stop-Shop's service and the joint experience of the cooperation partners. As single customers they were interested in who has to assume liability for the One-Stop-Shop's services. This target group also wanted to know who will be responsible for the quality assurance, as the project managers and controllers of the One-Stop-Shop may not be in a neutral position.

Apartment building owners

Apartment building owners were less represented in the focus groups, so no valid assertions can be made here.

Experts

In some of the focus groups, interested experts from the field of energy efficiency and/or buildings (e.g., architects) took part in the discussion. For the most part they liked the One-Stop-Shop concept and the One-Stop-Shop service models that were presented. Some of them feared that a One-Stop-Shop will compete with them and reduce demand for their services, especially those who were certified as energy advisers. But as in most of the One-Stop-Shop service models energy advisers are not employed by the One-Stop-Shop but designated cooperation partners, they mostly hoped for a good cooperation with the One-Stop-Shop.

3.4 Conclusion and main lessons

The focus group participants generally had a positive opinion of the One-Stop-Shop service models presented by the project partners. Overall, the group of single-family house owners were the group most interested in the One-Stop-Shop service, while property managers and homeowner associations stated that they cannot use the service in the presented forms due to the legal regulations they have to follow (get three offers from three companies before assigning a renovation task). Apartment owners were only represented in one focus group, so no valid findings are available for this target group. Some of the property managers that took part in the focus group discussions suggested using the One-Stop-Shop service of complimentary energy advice as a starting point into the topic of energy efficient renovations for small homeowner associations (up to twenty units). The advantage would be that this cost-free service might be used by more homeowner associations than a costly energy advice. This can be a first step to convince all apartment owners of the advantages of an energy efficient renovation. Some of the property managers declared that, in general, caring for tasks associated with organising an energy renovation are additional to their daily tasks and that they are often not compensated for these. While the idea of a One-Stop-Shop is to reduce exactly these efforts, not every property manager participating in the focus groups was convinced of this and therefore the demand for a payment for their work when they are reached out to by the One-Stop-Shop team and organise appointments with the apartment owners was raised. The conflicts regarding the legal regulations in Germany for homeowner associations when it comes to renovations and energy efficiency investments should be discussed in follow-up meetings to find feasible solutions on how One-Stop-Shop services can also be made available to this target group.

It became clear that the increased quality of renovations and time that can be saved by assigning a One-Stop-Shop is the most attractive point of the concept. A better overview on funding options was also mentioned. Some participants of the focus groups mentioned legal questions such as liability for the quality and service, but the main impression of the One-Stop-Shop concepts presented was positive. This point could be stressed when advertising the One-Stop-Shops.

All participants were in general willing to pay for the presented One-Stop-Shop service models, charging fees for the services in the future is therefore conceivable. In one focus group it was discussed to develop payment models depending on the extent of One-Stop-Shop services that the customers would use. This was not specified further but could be a useful approach to the pricing. Another suggestion was to establish a special funding scheme for renovations accompanied by the One-Stop-Shop that clients receive after completing the energy efficient renovations and that can be used to pay the fees in the aftermath.

When it comes to possible additions in the presented One-Stop-Shop service models the main ideas were to present best practices on the One-Stop-Shop's websites to inspire building owners and give them a first impression of possible energy efficiency measures for different types of buildings. The participants also strongly recommended to name contact persons and show contact details directly on the front pages of websites and printed information materials.

Overall, the focus groups show that there is a need and acceptance of One-Stop-Shop services for energy efficient renovations, but that advertisement tailored to the different target groups is

one of the most important elements in making the One-Stop-Shops successful. Therefore, the different One-Stop-Shop models in this project need to clearly identify their target groups, e.g., the type of buildings their clients should own, and adjust their service models and advertisement accordingly. It is also recommended to involve cooperation partners and local organisations that are active in overlapping fields of interest (e.g., registered associations for building owners, landlords, associations of architects) for the advertisement and, if possible, establish cooperations.

Regarding cooperations with contractors, building companies and other stakeholders, transparency is a key need to prevent concerns that one takes over another's job and customers. It is also important to ensure transparency on costs and quality assurance for customers of the One-Stop-Shop, as legal structures are not clear for all of the presented One-Stop-Shop models yet.

Another question that has been raised is the possibilities to assign the One-Stop-Shop during the different stages of house ownership: Is it also possible to use the One-Stop-Shop's service before buying a house to get an overview of the possible energy efficiency measures and available funding? This topic should be addressed in follow-up meetings as many owners in Germany start renovations when buying a house. As building land is rare and many existing buildings need renovations, One-Stop-Shops could help to increase the renovation rate in Germany.

The main results of the focus groups are summarised in Table 4.

Table 4: Summary of focus group results

Region	Date	No. of participants	Types of participants	Main statements	Main points of criticism
Berlin	25.11.2021	3	Experts, Property Manager, Homeowner Association	<ul style="list-style-type: none"> - OSS services as initial advice for homeowner associations regarding energy efficient renovations -idea of rewarding the users of the OSS's service with extra funding to pay the OSS's service when energy efficient renovation measures are implemented and do not abort project after initial advice 	<ul style="list-style-type: none"> - difference between OSS services and energy advisers' work is unclear

Region	Date	No. of participants	Types of participants	Main statements	Main points of criticism
Böblingen	14.10.2021	5	Experts, Property Manager	<ul style="list-style-type: none"> - OSS can introduce the topic of energy efficient renovations to a large number of building owners - hope that the OSS service will reduce the effort for homeowners - advertisement via printed products, up to date homepage and newsletter 	<ul style="list-style-type: none"> - OSSs cannot be commissioned by homeowner associations in the current model - missing neutral project management/control and quality assurance - OSS could take over the job and customers of energy advisers
Bottrop	15.09.2021	2	Experts	<ul style="list-style-type: none"> - OSS should only offer neutral information, e.g., a list of all contractors in Bottrop and surrounding cities - ICM should involve more than one financial partner to offer different possibilities for clients - involve project partners and municipality for advertisement 	<ul style="list-style-type: none"> - current advertisement of ICM (project partner) needs improvement to also support the OSS - extra value of the service needs to be seen to make people pay for the OSS service
Hanover region	09.09.2021	5	Single-Family House Owner	<ul style="list-style-type: none"> - advertisements should especially address new inhabitants - time saving aspect and assurance of quality are main criteria for assigning an OSS - willingness to pay for OSS services - interested in best practises - advertisement via homepage, local OSS partners, municipality and financial institutions 	<ul style="list-style-type: none"> - Claim of the Service: Who is responsible in the eye of the law? - Quality assurance: who is responsible?
Wuppertal	13.09.2021	3	Apartment owner, Apartment building owner and Single-Family House owner, Property Manager	<ul style="list-style-type: none"> - OSS will save time and effort and ensure quality - advice on funding possibilities is needed and should be included - interested in best practices - up to date homepage instead of newsletters and print products 	<ul style="list-style-type: none"> -missing neutral project management and quality assurance - OSS model cannot be commissioned by homeowner associations in the current state

4 Activation strategies

4.1 Introduction

Crucial actors in the process of an energy efficiency renovation are the owners of the respective buildings. The target group of landlords is especially hard to reach (Lang et al., 2021). There are some legal restrictions and regulations to help activate owners of buildings to consider a renovation, but mostly it is necessary to motivate owners to voluntarily get advice and take first steps – or approach a One-Stop-Shop – for the renovations. Since 2020, the German “Gebäudeenergiegesetz” requires buyers of one and two family-houses to take part in a mandatory advice to evaluate the energy certificate of their property as long as the advice is free of charge (GEG 2020 §80 (4)). Since lack of opportunities to get advice itself might not be a big problem, this could possibly be a first step to help bridging the gap between good intentions and taking action.

The challenge is to guide potential customers through the pinhole from the fragmented demand side to the fragmented supply side respective the One-Stop-Shop (Boza-Kiss & Bertoldi, 2018). As different groups of homeowners have different motives to consider an energy efficiency renovation (e.g., financial triggers or environmental motivations), it is important to diversify the outreach strategies (Gillich & Sunikka-Blank, 2013).

This section provides a toolbox of possible strategies for the activation of homeowners as possible clients of One-Stop-Shops as well as communication channels to reach out and stay in touch with different groups of homeowners.

The toolbox is derived from desktop research of activation strategies utilised by other One-Stop-Shops or energy efficiency renovation campaigns, relevant initiatives, etc.

After collecting the approaches and strategies, they were inductively categorized to finally develop a typology based on good-practice examples.

4.2 Toolbox of possible strategies for the activation of homeowners

In the following section, multiple tools for raising attention for One-Stop-Shops and energy efficiency renovations are listed by different approaches and categories to give an overview of the possibilities to reach out to potentially interested homeowners.

Initial contact can be made at numerous opportunities, e.g., at district conferences which are organized in the frame of "neighbourhood management" (Soziale Stadt NRW), at trade fairs, regular meetings or personal, proactive approaches. Initial activation of owners can happen in numerous ways, e.g., via surveys and interviews or photo competitions to initially raise awareness and sharpen the view for the respective neighbourhood or district (Baba et al., 2015b). In most cases, it makes sense to highlight that the energy efficiency renovation of a building increases its attractiveness to tenants. One example for how an implementation of this idea is the IdEE-network in North-Rhine-Westphalia. The abbreviation IdEE stands for „Innovation durch EinzelEigentümer“, which translates to innovation through small-scale landlords. Their leaflets offer an overview about advice offers for multiple topics like search for tenants, shaping the quality of the neighbourhood and modernization in general. This way,

energy efficiency renovations become an opportunity for homeowners to increase the value of their buildings and actively shape their neighbourhoods.

A possible follow-up offering would be a first advice which can take place in person or through digital means. The latter gained significant relevance since the beginning of the Covid-19-pandemic (see also 5.3.5 “online channels”).

If the measures prioritise a specific neighbourhood or district, it is crucial to perform an “inventory analysis” beforehand to identify buildings which are in need of energy efficiency renovation and get information about their respective owners (Baba et al., 2015b). This analysis can vary in focus: A building inventory can point out needs for action, a survey among owners provides insights into the owners' needs and plans, and an analysis of the ownership structure (e.g., place of residence, how buildings are used) can answer the question if local activities can be successful or if the owners need to be approached via different channels as they do not reside in the district themselves (Baba et al., 2015b). An additional in-depth, small-scale property analysis can answer questions about the exact target group to adapt the activation approaches accordingly (Baba et al., 2015b).

4.2.1 Tabling events and other types of events

Information desks can be set up at various places, e.g., at trade fairs (Baba et al., 2015a, 2015b), Christmas markets or even weekly markets. They give interested visitors a chance to stop by and collect first information without further obligations. If personal attendance is too time-consuming or expensive, tabling at local events and meetings can be a way to attract attention of potentially interested owners as well. A potentially already interested target group can be found at specific events like markets around sustainable living.

Direct information in the neighbourhoods can also be provided in a display case. To facilitate access to advice, it can also be helpful to set up a – permanent or temporary – office (the longer the opening hours, the better) (Baba et al., 2015b). If there already exist tax incentives or other financial support to perform energy efficiency renovations, advisors can inform about them and assist owners with the paperwork (Baba et al., 2015b).

The “extended version” of putting up an information desk somewhere is hosting an event. The focus can be adjusted to the respective target group(s) and the topic of commissioning a One-Stop-Shop with coordinating an energy efficiency renovation can be addressed explicitly or more implicitly, depending on the setting.

Examples for such events are: themed cafés, educational seminars and workshops (in different languages), information events, exhibitions, film screenings, pop-up shows in the neighbourhood, etc.

Themed cafés or workshops or district conferences offer the opportunity to address specific target groups and cover different topics in a semi-interactive format (Baba et al., 2015b): In the context of the project “EnerTransRuhr”, the city of Dortmund, the district agency and some stakeholders hosted four impulse lectures (on the opportunities of an energy efficient renovation and the options for financing and implementing them) with subsequent opportunities for discussion with the speakers. The invited speakers were architects, a representative of Haus & Grund, contractors and representatives of the city. The event was promoted in member

magazines of "DHB Netzwerk Haushalt", the senior citizens' office and press and focused on landlords in their senior years. The event was evaluated afterwards by asking the participants to fill out a questionnaire: The promotion channels worked to attract the target group, but as there were only eight participants, the cost-benefit ratio needs to be put into perspective. However, according to the information given in the questionnaire, the event did motivate at least half of the attendees to consider an energy advice for their properties (Wuppertal Institut & Kulturwissenschaftliches Institut, 2017). The Verbraucherzentrale NRW offered workshops on energy efficiency renovations especially for women.

A similar series of events took place in Oberhausen **targeting amateur landlords** in specific districts: Potential participants were invited by mail and the events were promoted on the website of the city, by the "Verbraucherzentrale" (consumer advice centre) and the local press.

Each event had a specific topic which was potentially interesting for the target group: value retention and rentability, accessibility, façades and (front) garden design and financing investments. The topics were presented by external speakers from Haus & Grund, NRW.Bank, Sparkasse, Chamber of Crafts, real estate management, housing advice and housing promotion of the city of Oberhausen. In addition, the "Verbraucherzentrale" always gave a short presentation on the topic of energy efficiency renovations (Wuppertal Institut & Kulturwissenschaftliches Institut, 2017).

The evaluation of the questionnaires of the 22 participants showed that some participated in more than one event. Only ten of them (45%) participated in response to the 1759 invitations sent by mail, which raises the question of the cost-benefit ratio given the relatively high costs. Furthermore, the questionnaire gave insight that specialized energy advice had a relatively low significance for the target group. Alternative contact points were contractors (five nominations), local energy providers (four times) and Haus & Grund (four times). While attendees expressed satisfaction with the events and named learning effects, the events did not motivate a significant number of owners to consider an energy advice if they had not done so before (Wuppertal Institut & Kulturwissenschaftliches Institut, 2017). This could be interpreted as a sign that such events could be used as awareness-raising-measures, but are not „complete“ activation strategies with high sign-up-rates and that a more proactive approach is needed.

To reach the **target group of owners with migration history**, it can make sense to offer additional workshops (e.g., on energy saving potentials in the household or building and modernisation opportunities) both in German and other languages (Hunecke et al., 2016). Additionally, choosing places that are familiar to the communities to host events might work better than inviting people to „neutral“ places (Hunecke et al., 2016). While timing of events is crucial in general, it is important to keep in mind that for certain communities there are specific popular holiday times, times for prayers, traditions etc. (Hunecke et al., 2016).

During the project „Kooperation im Quartier“, the city of Magdeburg hosted a „day of the owner“ („Tag des Eigentümers“) in some neighbourhoods and showed good examples, e.g., through film screenings (Baba et al., 2015b). Some cities in the project also hosted **neighbourhood walks** as part of the awareness-raising measures which can also be themed and, e.g., show details about thermography (Baba et al., 2015a). Other measures taken were personal conversations to identify needs for action as well as surveys among owners and letters with information (Baba et al., 2015b).

On a neighbourhood level, it is possible to organize or join **meetings in neighbourhoods** or just meet up with neighbourhood initiatives (Boza-Kiss & Bertoldi, 2018). At some places, there are even „modernization regulars“ to enable informal information exchange, which – in the case of Arnsberg – were transferred into two groups of owners who regularly meet up independently to coordinate joint projects (Baba et al., 2015b). The IdEE-Network in Essen-Steele invites everyone who is interested to join their „Round tables“ to get to know other owners in the district and discuss their experience with renovation and modernization with each other (IdEE Steele). In Dortmund, owners can participate in regular meetings organised by the local IdEE-network and get follow-up advice from partners in the network (IdEE Nordstadt).

Another opportunity for an event, used, for example, by Reimarkt, is organizing pop-up shows in neighbourhoods to literally pick up people where they are (Boza-Kiss & Bertoldi, 2018).

4.2.2 Networks and trusted messengers

It is crucial to identify and integrate already existing networks and campaigns as well as key figures (Baba et al., 2015a, 2015b).

If the campaign or project allows it, shareholders and homeowners can even hold meetings on a regular base to evaluate the needs for action in the neighbourhood and keep in touch (Baba et al., 2015b). Additionally, there should be an opportunity for informal exchange between the meetings (Baba et al., 2015a). The „Kooperation im Quartier“-project also established a steering group which was supported by an advisory network of 15 experts (Baba et al., 2015a).

Some cities also cooperate with associations of owners of residential buildings like Haus & Grund to discuss the district development and improve the quality of buildings and their surroundings (Baba et al., 2015b). Such co-operations can also include energy efficient renovations. „Kooperation im Quartier“ also introduced the concept of „**caretakers**“ for specific neighbourhoods – ideally a person with professional expertise and/or someone who already lives in the area and serves as a trusted messenger to approach and inform owners about upcoming events as well as opportunities for advice and options to improve their buildings (Baba et al., 2015a, 2015b).

An additional relevant aspect is simply word of mouth. If owners hear about successful refurbishments from someone they trust, they might consider the option for themselves. As different target groups run in different social circles and use different kinds of communication channels, it is helpful to identify specific **multipliers**. A multiplier can be a person (e.g., a pastor), a medium (e.g., a magazine) or an institution (e.g., the neighbourhood agency). For the target group of **migrant communities**, the identification of multipliers as trusted messengers is especially important and approaches via migrant communities were found to be more effective than approaches on a neighbourhood level (Hunecke et al., 2016). If they are motivated to take the role, advisers and other employees from institutions with migrant histories can be door-openers. As any cooperation, approaching migrant communities and organizations takes time and face-to-face-communication to build trust and before implementing the approach it should be checked if there already exist similar activities in the area (Hunecke et al., 2016). As sustainability is not necessarily a focus in migrant communities, time and space for other pressing topics needs to be included as well. To build trust it is also important to keep structures of communication and contact simple and transparent. Informal experts inside the communities

should be identified and approached for information exchange. To be personally present in the community had a larger effect than representation of the institution or the project. Also, being approachable and reliably available via phone – sometimes even outside of regular office hours – has shown to help building trust and commitment (Hunecke et al., 2016).

Establishing a network of trusted advisers and service providers can help to reduce hurdles and mistrust if the source is perceived as neutral and trustworthy.

Another possibility is **neighbourhood canvassing**: literally going from door to door. In the case of the Greater Cincinnati Energy Alliance, volunteers went canvassing to facilitate discussions about energy efficiency in neighbourhoods and communities and inform their fellow residents about discounted energy audits (Gsell, 2010). Beforehand, a house in the respective area was audited to provide a good example and a point of reference.

A useful compilation of target groups and respective multipliers can be found in Freudenberg et al. (2019). They also emphasize the relevance of customizing the advice to the owners' needs and expected benefits.

Table 5: Potential multipliers by target group

Target group	Potential Multipliers
Owner-occupiers	<ul style="list-style-type: none"> • civic associations • known contractors • neighbours
thereof younger owners	<ul style="list-style-type: none"> • online information • mobile app
thereof older owners	<ul style="list-style-type: none"> • pastors
Small-scale landlords	<ul style="list-style-type: none"> • Haus & Grund • civic associations • known contractors • neighbours
Tenants	<ul style="list-style-type: none"> • tenant associations
Homeowner associations	<ul style="list-style-type: none"> • property managers • advisory council
Private housing companies	<ul style="list-style-type: none"> • local policymakers • associations
Public housing companies	<ul style="list-style-type: none"> • municipal administration

Source: Freudenberg et al., 2019, p. 14, own translation

4.2.3 Public Relations

Public Relations and further outreach via traditional communication channels can help to build trust and provide news regarding the topic of energy efficiency renovation regularly. Although these channels generate comparatively low response rates, for certain target groups **television** (advertisements or news/documentaries), **advertisements on real estate portals or (local) print media** and **regular press releases** in general can be helpful. Being reliably available via

phone or offering **advice** on the phone can also help to reach an older target group that might not use online channels.

Leaflets can also be used, especially strategically during a window of opportunity: The housing company which sold single-family homes from its portfolio during the EnerTransRuhr-project added an information flyer about the energy advice offer to its sales documents (Wuppertal Institut & Kulturwissenschaftliches Institut, 2017). This way, the window of opportunity that comes with change of ownership can be used (Baba et al., 2015b). Leaflets can help to spread general information or promote a certain event or give an overview of specific opportunities for consultation in a city or area (e.g., IdEE Steele, IdEE Altendorf). Including addresses, phone numbers and prices can help to make these opportunities more approachable and be an incentive for owners to take the next steps. In addition, **posters** can be of use for some places as well.

Other examples for the creation of a professional public presence are creating a logo and corporate design, cooperating with journalists, creating stickers and postcards, releasing an image film, printing an image brochure and banners as well as guide booklets and placing advertisements on the display of local ATMs (Baba et al., 2015b).

4.2.4 Online channels

Obviously, a frequently updated **website** with reliable information about renovations and how to reach out facilitates availability. An online flyer can be easily uploaded to present the most relevant information at first glance. Online portals like the "Altbau Neu" in Essen can help anyone at any time to gather more information and find professional points of contact. Some One-Stop-Shops also send out newsletters to keep their (potential) customers updated (Baba et al., 2015a; Boza-Kiss & Bertoldi, 2018).

Being present on **social media** like Facebook, Twitter and Instagram has also increased in relevance and can help to extend the range. The selection of the channels and the framing can vary depending on the specific target group. Placing videos on energy renovations on the own websites or popular third-party websites (e.g., YouTube) as well as sharing the videos through newsletters allows to present good examples and motivate others to replicate those.

Especially since the onset of the Covid-19-pandemic, some homeowners prefer to get an initial advice **online** rather than in person. Some One-Stop-Shops offer an initial advice via video-conferencing for free.

4.2.5 Pioneer projects

A special form of outreach takes place at the "Wissenszentrum Energie" in Ludwigsburg through a **permanent exhibition** (Stadtverwaltung Ludwigsburg, 2014): The exhibition informs citizens and interested visitors about ecological footprints, renewable energies, and building renovation. An energy show house and a model apartment make the possible improvements tangible and homeowners can get initial advice even without appointment at the exhibition building. The centre was integrated into the local library to maximize the outreach and attract even more visitors.

Municipalities, but also religious communities can become a role model by auditing their buildings and implementing measures to save energy (Delung, 2010). The city of Ludwigsburg funded the information centre through the EU-project „LivingGreen“ and carried out a deep energy renovation of a landmarked sports hall. The building was renovated according to the „house in house“-principle³ and now serves as a children's and family centre (Stadtverwaltung Ludwigsburg, 2021). **Actions and investments in public spaces** like this can help to make change visible. They also generate a point of contact to create more publicity, e.g., through opening events, street or neighbourhood festivals, or can be integrated in existing events like neighbourhood walks and on-site visits (Baba et al., 2015b).

Owners who already have finished measures of an energy efficiency renovation (or are in the process of it) can also **open their houses or construction sites** to show them to other interested homeowners and discuss the topic (Baba et al., 2015b). There can also be specific agreements with interested owners to provide an „example object“, so others will possibly follow (Baba et al., 2015a). The most challenging part of this is usually to create transparency about the costs for other interested homeowners, as most building owners prefer not to discuss costs with strangers (Baba et al., 2015a).

A good example for private pioneer projects showcased through an online channel is the SuperHomes-network in the UK, which works with a map on its website so visitors can see examples and get insights into pioneer projects nearby (National Energy Foundation, 2021). In addition, the "SuperHomers" tell their personal stories and discuss their motivations on the website, so a lot of reasons for the renovation can be found, from being Christian to "selfishly" minimizing utility bills (National Energy Foundation, 2021).

4.2.6 Multi-level advisory approach

In the following section, the general idea of a multi-level advisory approach with advice that residents can get either in a local office or on-site is illustrated with the successful concept of the „Energiekarawane“. In this concept, advice is supplemented by a subsidy programme. The campaign follows a **structured concept** and is managed in cooperation with (or mostly by) the municipality. After identifying suitable neighbourhoods with a larger number of buildings from the 1950s to 1970s that are in need of an energy efficiency renovation, the municipality sent personalised invitation letters to private households. The municipality was chosen as sender to increase credibility and create trust among sceptics. Afterwards, advisers proactively contacted the owners to offer a cost-free, initial advice on site (Baublatt, 2018). These short audits were used to point out existing weaknesses and optimization potentials and also provide information about subsidies and other support measures (Baublatt, 2018). With more than 25% of the contacted homeowners making use of the on-site advice, this approach has proven to be relatively effective and the approach can be replicated by other municipalities of different sizes (Baublatt, 2018; fesa e.V., 2021). Sixty percent of these households implemented energy renovation measures (Klima-Bündnis e.V., 2021). Checklists and other tools that can be used to replicate the approach are available (Mertz, 2019). The campaign uses the principle of „nudging“

³ In order to keep the exposed rafters of the original hall, which was too big to be used as a family centre, a wooden house was built into the old “shell” of the sports hall.

by actively approaching potential customers (fesa e.V., 2021). The concept has been replicated in different cities and municipalities like Worms, Lorsch, and München (Mertz, 2019).

While these numbers appear admirable, the Energiekarawane had access to resources (time and money) that are costly. Nevertheless, the approach achieved great results and its tools should therefore be considered for the implementation of future programs. In addition, the principle of a proactive approach of potential customers can potentially also be utilised by One-Stop-Shops if they cooperate with municipalities.

4.3 Conclusions and main lessons

In practical implementation, the best way to adjust the strategy to the target groups or the individual homeowner's needs will often be a **combination** of different approaches and a **customization** to specific questions and ambitions.

Advice for owners need to meet their specific needs and be as individual as possible to get the best results, e.g., by using photo montaging to visualize the options for the respective building (Baba et al., 2015b, 2015a). Individual approach and advice are key. **Timing** of campaigns is crucial for several target groups and involves making sure that outreach does not take place during the school holidays when many families are on vacation (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, 2017). There are also synergies if contractors cooperate with local institutions for energy advice (Wuppertal Institut & Kulturwissenschaftliches Institut, 2017) as they already provide a reliable point of contact to the homeowners.

Complimentary initial advice with a duration of approximately 30 minutes can also help to inspire owners to get more information and explore their opportunities. To turn the offer from a passive to a more active and noteworthy experience it is possible to work with coupons or coupon booklets (Baba et al., 2015a, 2015b). A fee for follow-up advice can help to express the value of the service. Creating financial incentives that are offered for a limited time can create a sense of urgency and thereby increase participation rates (U.S. Department of Energy, 2012).

In any case, it is recommendable to make a strategic plan (which can be adjusted depending on the responses) and differentiate the goals of the tools that are used (e.g., raising awareness, activation, advice) at different stages of the project or outreach (Baba et al., 2015a, 2015b).

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