Summary of the evaluation results

Funding effects BEG 2022

Evaluation of the funding programme „Federal Funding for Efficient Buildings (Bundesförderung für effiziente Gebäude, BEG)“ in the partial programs BEG individual measures, BEG residential buildings and BEG non-residential buildings in the funding year 2022

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On behalf of
Federal Ministry for Economic Affairs
and Climate Action of Germany

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1 Tasks and evaluation design

In 2021, the Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK) assigned the evaluation of the programme „ Federal Funding for Efficient Buildings (Bundesförderung effiziente Gebäude, BEG)“ in the partial programmes for residential buildings, non-residential buildings and individual measures for the funding years 2021 until 2023 to Prognos AG, the Ifeu institute, the FIW institute München (FIW) and the ITG Institute for Building Systems Engineering Research and Application Dresden (ITG). The evaluation is part of the performance review by the BMWK. In accordance with German law (§ 7 BHO), it is subdivided into target control, evaluation of effectiveness and a cost-benefit analysis. In addition, the evaluation aims to answer key questions posed by the BMWK and develop recommended actions.

The evaluation is based on specifications detailed by the BMWK[1] in the methodology guideline for evaluations within the energy efficiency sector. The analysis of factors related to primary energy and greenhouse gas emissions deviated from this methodology guideline. In addition, a comparison of demand vs. consumption in accordance with the methodology developed by the IWU institute was carried out for residential buildings.

The evaluation of the funding year 2022 is based on the analysis of funding data which had been made available by the KfW banking group and BAFA in the spring of 2023. The funding data was cleaned by a cancellation rate, which had been consolidated historically by KfW and BAFA, in order to realistically show the waiving of claims for allowances, and hence not to over-estimate the funding effects. Further data and information were collected through means of an online survey with a sample of approximately 17,000 grantees. The saving effects were evaluated through the building models designed by FIW and ITG, and the economic effects through the Input-Output-Model designed by Prognos AG.

[1] Fraunhofer ISI; Prognos, ifeu, SUER (2020): Methodikleitfaden für Evaluationen von Energieeffizienzmaßnahmen des BMWK. On behalf of the Federal Ministry for Economic Affairs and Climate Action (BMWK) (Project Nr. 63/15 - Aufstockung). Karlsruhe, Basel, Heidelberg, Würzburg.

2 BEG in the funding year 2022

The funding programme BEG has been offered since 2021. Funding with BEG in the funding year 2022 consists of the following three partial programmes:

- **BEG residential buildings** for new buildings as well as renovation measures (systemic renovations) of existing residential buildings in accordance with efficiency house standards (by means of subsidies/credit [KfW 261/264] as well as additional subsidies [KfW 461 until July 2022 and KfW 464),
- **BEG non-residential buildings** for new buildings as well as renovation measures (systemic renovations) of existing non-residential buildings in accordance with efficiency house standards (by means of subsidies/credit [KfW 263/264] as well as additional subsidies [KfW 463 until July 2022 and KfW 464]),
- **BEG individual measures** for individual renovation measures of existing residential and non-residential buildings (by means of subsidies/credit until the middle of August 2022 [KfW 262, 263 and 264] as well as additional subsidies [BAFA]).

The names of the BEG partial funding programmes describe the addressed funding targets, respectively.

Each of those BEG partial funding programmes are offered by means of one credit subsidy option and one additional subsidy option. The BEG credit models are being executed solely by the KfW banking group; in the funding year 2022, BAFA is solely responsible for the subsidy model for individual measures; the credit subsidy option for individual measures was terminated per 28.07.2022, as well as the additional subsidy option for residential and non-residential buildings.

The funding programme can be accessed by all types of carriers of investment measures (e.g., private citizens, homeowners' association (WEG), companies, other stakeholders active in the housing industry and communal entities [only funding options KfW 264/464]. The credit funding includes, in addition to the provision by KfW, a federal repayment allowance.

Funding targets are new buildings[2] and renovations complying with the efficiency house standard in accordance with different EH/EG standards. An additional bonus increasing the basic funding amount can be achieved for new buildings in accordance with the sustainability category (NH-category) and for new buildings and renovations in accordance with the renewable energy category (EE-category). Funding can be requested for individual measures targeting the building shells or heating technology. A further additional bonus increasing the basic funding amount can be achieved by means of including an integrated renovation roadmap (iSFP) (BEG residential buildings until July 2022). In most of these cases, including energy subject matter experts that are registered in the "list of energy efficiency experts for federal funding programmes" is mandatory.

Overall, the BEG funding programme has developed in a very dynamic way since 2021, also because of the changing (external) framework conditions. In the Federal Gazette (BAnz), various new guidelines (RL) and amendment announcements were published after the publication of the initial guideline. The most essential amendments were put in place with the amendment

[2] Funding of new buildings in accordance with EH/EG 40 standard until April 2022; afterwards only funding options for the sustainability standards EH/EG 40 were available.

announcement regarding RL 2022, as this particular one had a substantive impact on the funding targets (designated purpose [VZW]) and the funding intensities. These changes are being continued/carried over to a large extent with guideline RL 2023.

The most important amendments that have been implemented during the course of the funding year 2022 are: the termination of funding for new buildings except for the EH/EG standard 40 NH, the termination of additional subsidies for non-municipal applicants for BEG residential and non-residential buildings (funding option 461 and 463) and the termination of the credit funding for individual measures (funding options 262, 263 and 264). The iSFP bonus for residential and non-residential buildings was eliminated, and a bonus for Worst Performing Buildings (WPB) was introduced. In addition, the funding amounts were reduced.

With the changes in the funding elements, the BEG funding was supposed to be orientated towards a higher efficiency, and those measures were to be funded which were supposed to result in preferably high CO_2 savings. With respect to buildings, this is especially the case for renovations; therefore, BEG funding for residential (and non-residential) buildings focuses mainly on renovations by means of individual measures and complete renovations.

3 BEG funding balance in the funding year 2022

Overall, BEG and its taxonomy enjoy a high level of acceptance on the market. In the funding year 2022, around 772,000 projects were funded through it. The grantees themselves invested just short of 178 billion Euro. The contribution of federal funds amounted to about 33 billion Euro (see Table 1).

Table 1: BEG funding balance 2022

	Funding cases [number]	Residential units [number]	Usable area [in 1,000 m²]	Investments [in m Euro]	Federal funds [in m Euro]
BEG residential buildings	**77.577**	**385.823**	**–**	**71.802**	**12.238**
New buildings	50.641	265.301	–	56.004	6.561
Renovations	26.936	120.522	–	15.798	5.676
BEG non-residential buildings	**6.968**	**–**	**20.107**	**38.980**	**7.027**
New buildings	4.980	–	14.973	29.492	3.936
Renovations	1.988	–	5.134	9.487	3.091
BEG individual measures	**687.903**	**1.395.240**	**99.740**	**67.128**	**14.229**
Residential	653.297	1.395.240	1.093*	53.308	12.040
Non-residential	34.606	–	98.647	13.820	2.189
Total	**772.448**	**1.781.063**	**119.847**	**177.910**	**33.494**

Source: own representation
* only information from KfW available

About 89% of funding cases fall into the category renovations with individual measures, 4% into the category of systemic renovation measures, as well as 7% into the category of new buildings (residential and non-residential buildings). Analysed per funding cases, non-residential buildings are only of marginal importance.

When analysing investments per funded projects, funding of new buildings gains considerable value – about 48% of investments are being made in the category of new buildings (residential and non-residential buildings). Renovations with individual measures take up about 38% of the investment volume, systemic renovations (residential and non-residential buildings) cover about 14% of the investment volume. Applied funding means and their localisation reveal a different picture than that of funding cases: with 42%, the largest part of funding measures is being invested in renovations with individual measures; a further 31% of funding means are being invested in new buildings, and 26% in systemic renovations.

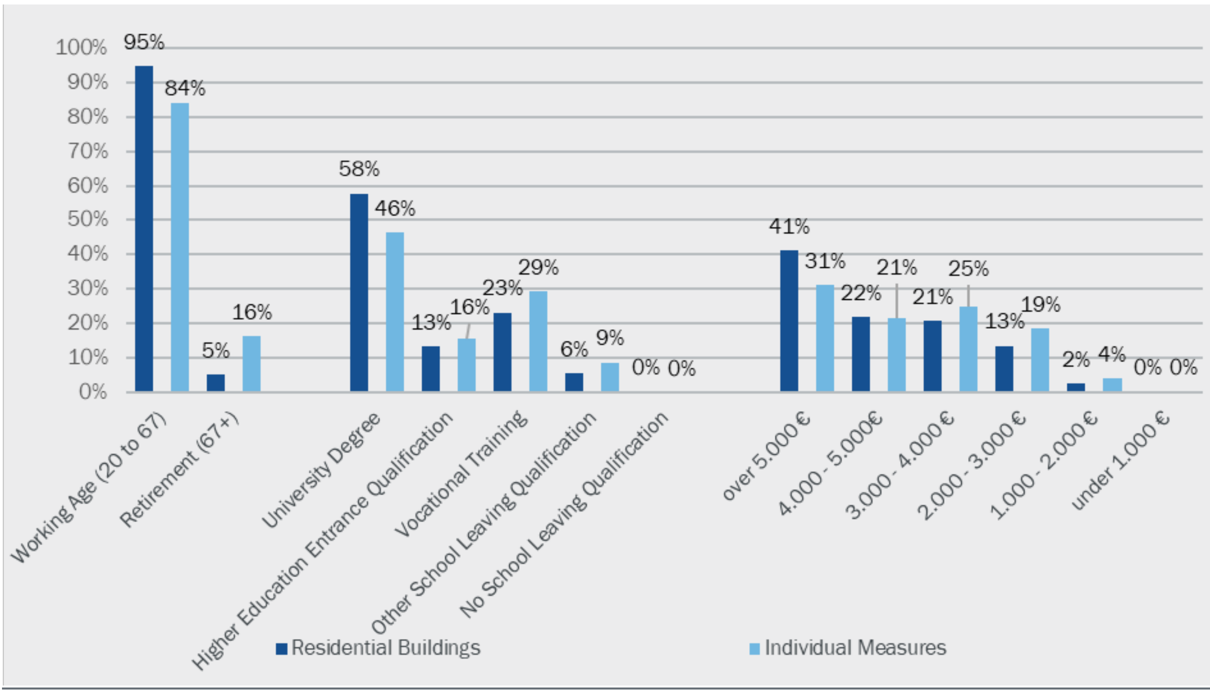
Especially in the category of new residential buildings the efficiency house standard 55 (incl. renewable energy class/sustainability class), which expired in January 2022, plays a dominant role: this standard is being chosen in 79% of the cases of new buildings, triggers 80% of investments and absorbs with about 79% the majority of funding means in the category of new residential buildings. In the category of renovations with individual measures, especially measures targeting improvements for building shell and heating technology are being executed. Those measures make out about 70% and 22% of funding cases in the category BEG individual measures; analysed per investment, these numbers look very similar. With 83%, the majority of funding means for individual measures are being invested in the category of heating measures. When analysing individual measures for non-residential buildings, plant technology plays a more important role than is the case for residential buildings.

Target groups and regional focus

The majority of applicants of the BEG programme are private building owners (89%). When investment volume and funding means are taken into account, however, their percentage is considerably lower with about 40%. Here it becomes apparent, that commercial grantees (housing companies, incl. communes/communal organisations) invest in general in bigger buildings with more residential units when renovating or building new units.

Private grantees can usually be classified as well earning private citizens of working age and with a high qualification. On average, younger and better qualified persons with a higher wage prefer the BEG residential buildings funding option for new buildings, as opposed to funding options for renovations with individual measures. The social structure of grantees is more heterogeneous when analysing individual measures of renovations of residential buildings vs. building new residential units (Figure 1). For the BEG programme for non-residential buildings, no in-depth socio-economic analyses were carried out due to the high number of commercial applicants.

Figure 1: Socio-economic characteristics for BEG residential buildings vs. individual measures 2022



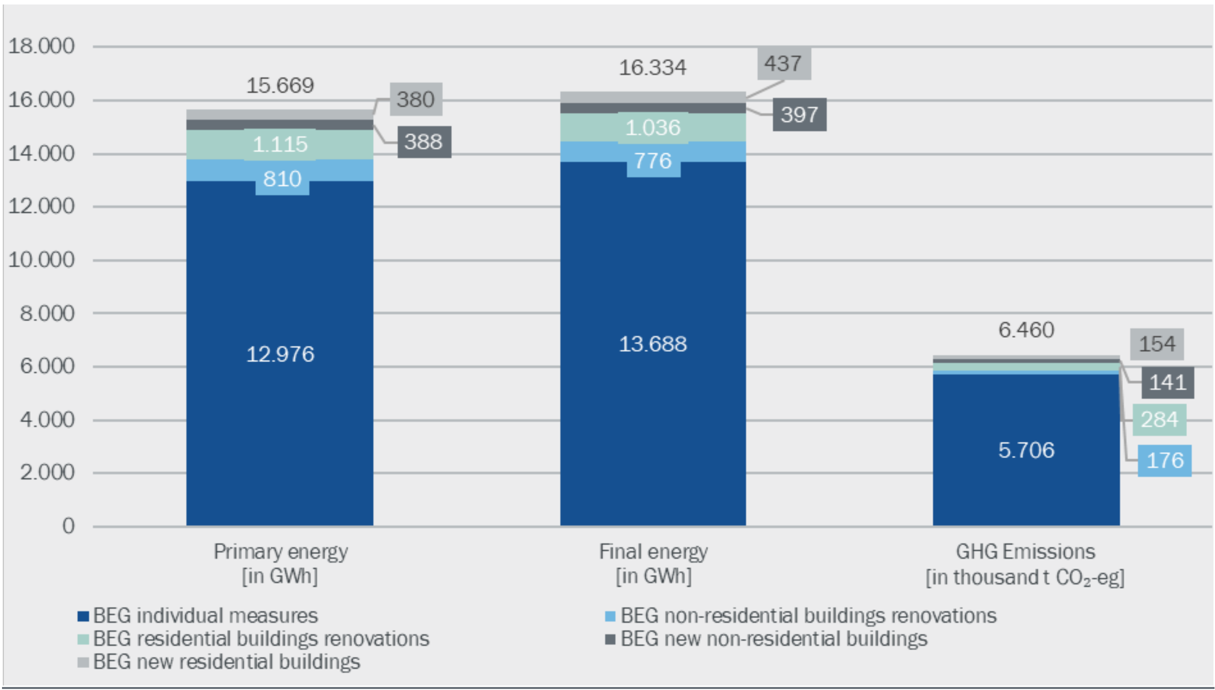
Source: own representation © Prognos / ifeu / FIW / ITG 2023

The regional focus of the funding programme is on those federal states that exhibit a dense population and economic power, namely Bavaria and Baden-Württemberg, as well as North Rhine-Westphalia. Here, most of the funding cases/residential units and the highest commitment and investment volumes are located. In the East German federal states, only a low demand for the funding programme is observed.

4 BEG achievements in the funding year 2022

With the funded measures in the year 2022, around 16 TWh of final/primary energy are being saved on average per year. This leads to a yearly reduction of GHG emissions by approximately 6.5 m t CO_2-equivalents (CO_2-eq).[3] With approximately 88%, the biggest part of GHG savings is being made in the category of renovations with individual measures. Systemic renovations account for 7% and new buildings for about 5% of GHG savings (see Figure 2). In reality, these effects can occur over a period of up to four years, depending on the time at which the measures are implemented (implementation/retrieval period).[4]

Figure 2: Average annual savings through BEG 2022



Source: own representation

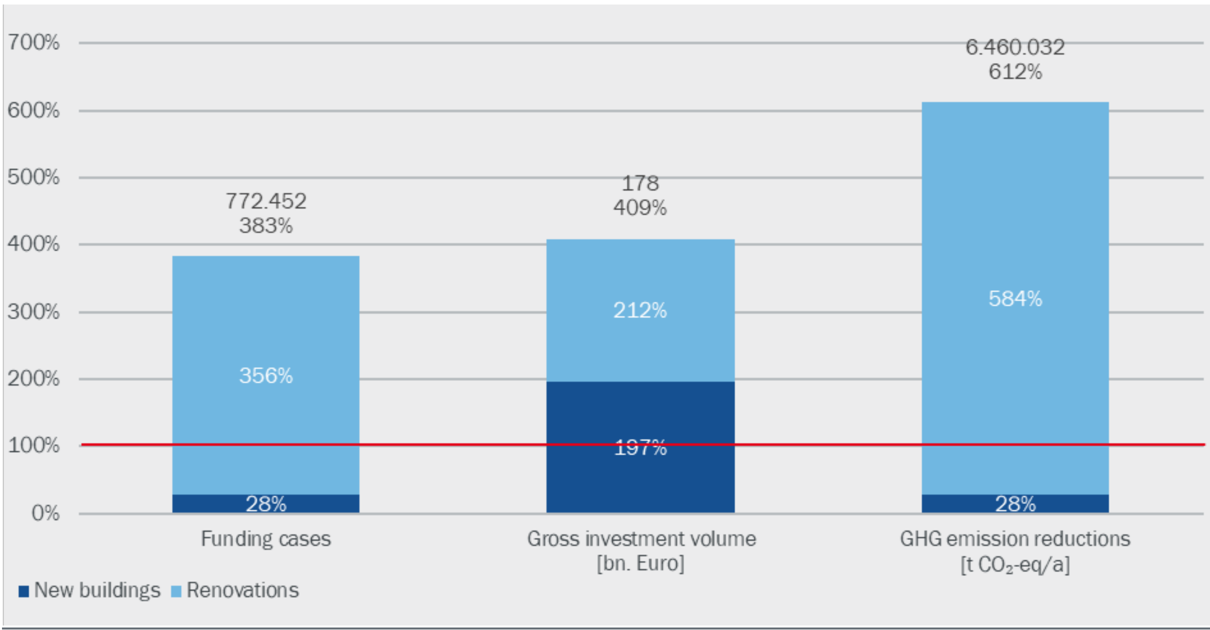
[3] Savings per methodology guideline. The accounting space for an evaluation in accordance with the methodology guideline differs from the accounting space in accordance with KSG/KSSP: With the former, all savings that can be assigned to the funding programme are being considered; with the latter, only those relevant in the respective sector (here: building sector) are being considered. Changes of energy carriers etc. therefore influence the respective effect that is to be reported/balanced. When accounting in accordance with KSG scope, about 7.3 m t CO_2-eq are being saved.

[4] This is due to methodological reasons: a final statement on the funding effects can only be made once the processes have been completed, i.e. with the existence of a proof of use. The statements in the present evaluation consider this time delay and this uncertainty in assessment through the (historically determined) cancellation rate. In contrast to the previous approach, the cases funded with BEG individual measures were assigned to the respective period according to the month of the application date and no longer the approval date, in order to be able to consider the high number of funding cases despite the backlog in processing which occurred in the funding year 2022.

With the investments of 178 billion Euro that are being triggered by the funding programme, gross value-added effects of about 149 billion Euro are achieved in Germany, and corresponding with it about 2,150 thousand full time equivalents (FTE) are secured or created. Especially small and medium-sized enterprises see these effects.

These figures show that the yearly achievement targets of the BEG programme that were described in the funding guidelines are surpassed by far. The renovation measures (systemic and individual) contribute the most to the achievement of the programme targets. When it comes to funding cases and the reduction of GHG emissions, renovation measures contribute over 90% to achieving the target; when it comes to gross investments, the contribution of renovation measures and new buildings is almost the same (see Figure 3).

Figure 3: Achievement of programme targets in accordance with funding guidelines BEG 2022



Source: own representation

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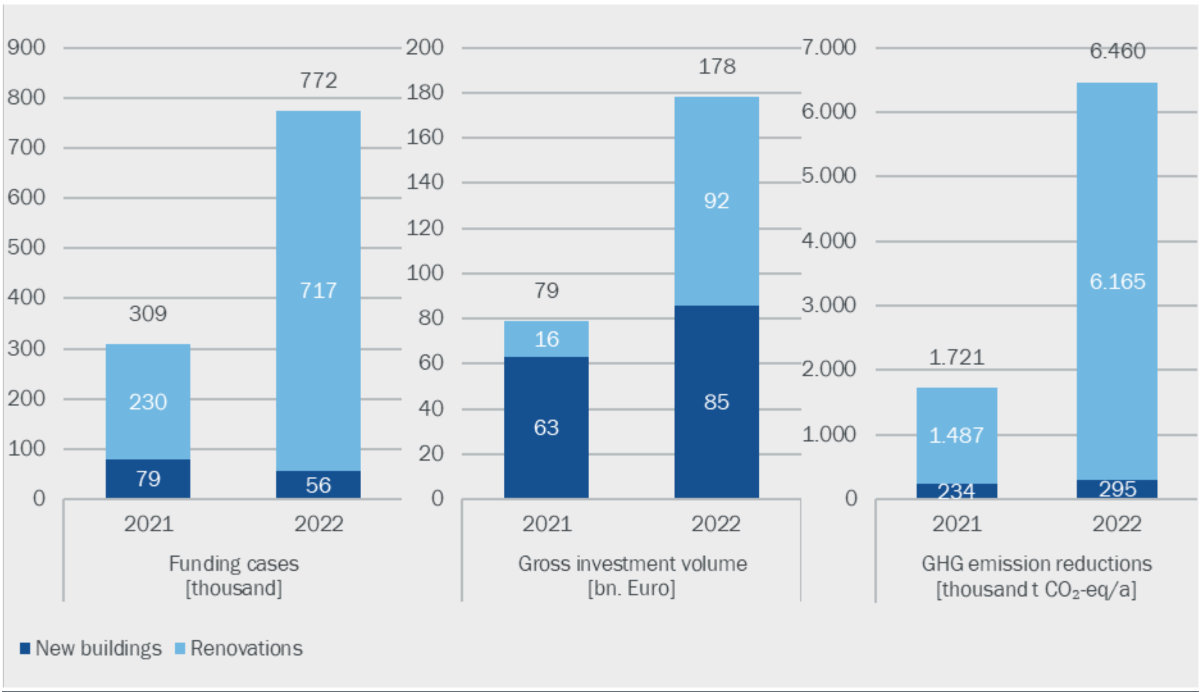
The effects in all three target areas of funding cases, gross investment volume and reduction of GHG emissions are significantly higher in the funding year 2022, compared to the funding year 2021[5] (see Figure 4). The main reason for the higher impact is the significant increase in funding cases in 2022 for individual measures. The majority of funding cases occur in the summer of 2022 and are due to strong pull-forward effects before the policy change and the associated lower funding intensities for the installation of new heating systems. In addition, a larger proportion of funding cases relate to renovation measures, which have significantly higher specific savings than the construction of new buildings.

[5] Since the funding of BEG residential and non-residential buildings as well as the credit option for BEG individual measures only launched on July 1st, 2021, the 2021 target values as per the guidelines were adopted in accordance with the shortened term.

Figure 4: Impacts achieved by the BEG in the funding years 2021 and 2022

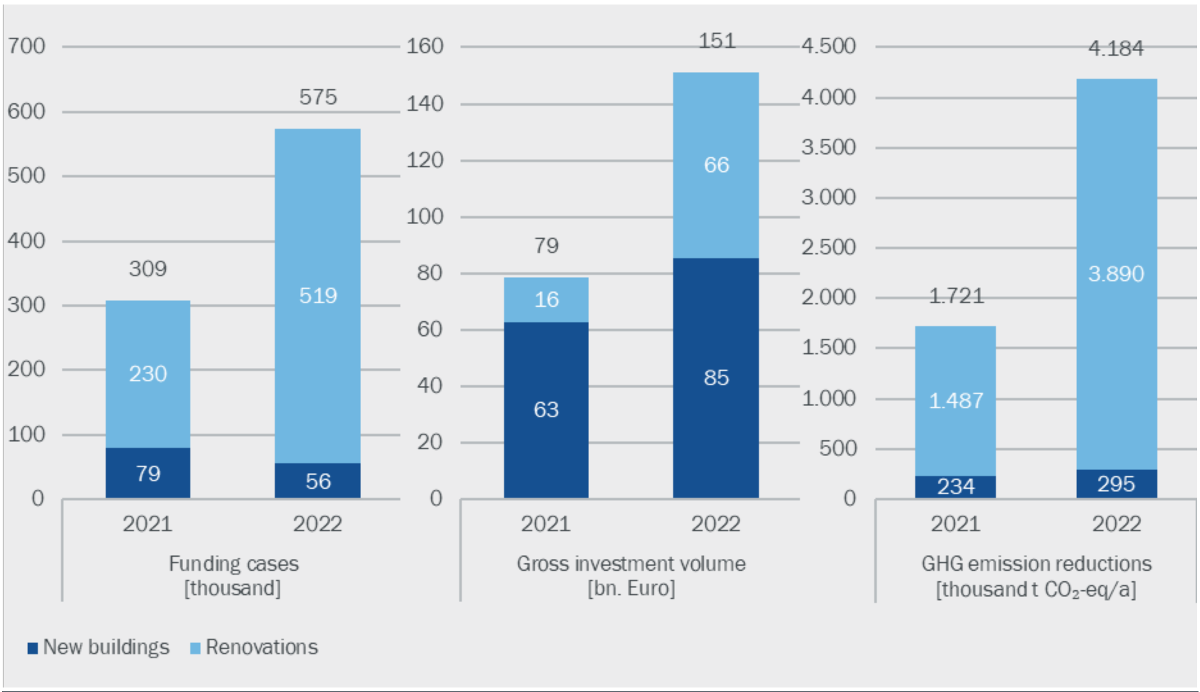


Source: own representation © Prognos / ifeu / FIW / ITG 2023

The majority of the effects in the funding year 2022 are due to applications approved in 2022. A total of around 575,000 funding cases (74% of all funding cases) were approved in the 2022 funding year. These funding cases account for around 65% of the reported GHG savings in 2022, at 4.2 m tons of CO_2 eq. In addition, around 85% of the gross investment volume, at 151 billion Euro, is attributable to the funding cases approved in 2022. The remaining effects can be attributed to applications that were handed in during the year 2022, but that had only been processed within 2023. In accounting terms, these effects are attributed to the funding year 2022 in the evaluation and are no longer considered in the funding year 2023 (see Figure 5).

The degree of target achievement will be far exceeded by the effects of the approved projects in 2022 in all three criteria of funding cases, gross investment volume and reduction of GHG emissions (around 285% for the target of funding cases, 350% for the target of investment volume and 400% for the target of GHG emission reductions). The remaining part of the target achievement can be attributed to those applications within the BEG individual measures category, which had been submitted in 2022 but were only processed within the year 2023.

Figure 5: Impacts achieved through BEG approvals in the funding years 2021 and 2022



Source: own representation

5 BEG effects in the funding year 2022

Apart from energy savings, reduction of GHG emissions and employment effects, the BEG funding programme also triggers these further effects in the funding year 2022:

- The funding programme contributes considerably to the execution of measures and the increase of renovation and new building rates.
- The scope of planned measures (e.g., higher efficiency level, number of measures) is being expanded by the funding programme.
- The energy/heating costs are being reduced by 37.9 billion Euro over the expected time of useful life; here, approximately 36.4 billion Euro fall into the category of renovations.
- The level of awareness regarding possible efficiency measures is being raised with approximately 70% of grantees.
- Investment obstacles – especially economical ones – are being reduced through the funding programme.

These effects as well as the accompanying leverage and additionality effects (leverage 5.3; around 144 billion Euro additional investments) point to the fact that the BEG funding programme seems suitable and causal for the onset of action as well as target achievement. Deadweight effects appear; however, they are being mitigated to a big extent by transmission and expansion effects. In total, the gross effect is only being reduced by about 5% to 10%. Especially for companies, this reduction is higher, i.e. in this case higher deadweight effects and in particular lesser expansion effects are observed. This can be due to planned (replacement) investments, as well as – in view of the low-interest phase - a consciously chosen investment strategy.

The funding environment of the BEG programme has a supportive effect: synergies are being generated that are often used in combination or in addition with the chosen measures. Especially, the offers for energy consulting for residential buildings as well as the funding with the expired “Energy-efficient Building and Renovation” (EBS) funding programme or for heating technologies and use of renewable energies should be mentioned. The funding for energy consulting is used particularly when there is an individual renovation roadmap which is directly and timely connected with the BEG funding programme.

Only about a third of the surveyed grantees reported that the Ukraine war and the aftereffects of the COVID-19 pandemic impacted the implementation of measures. These were mainly delays due to lockdown or a lower availability of craftspersons and building materials. However, half of those affected reported that the implementation could be expanded (higher efficiency level, more measures).

6 Profitability of the BEG in the funding year 2022

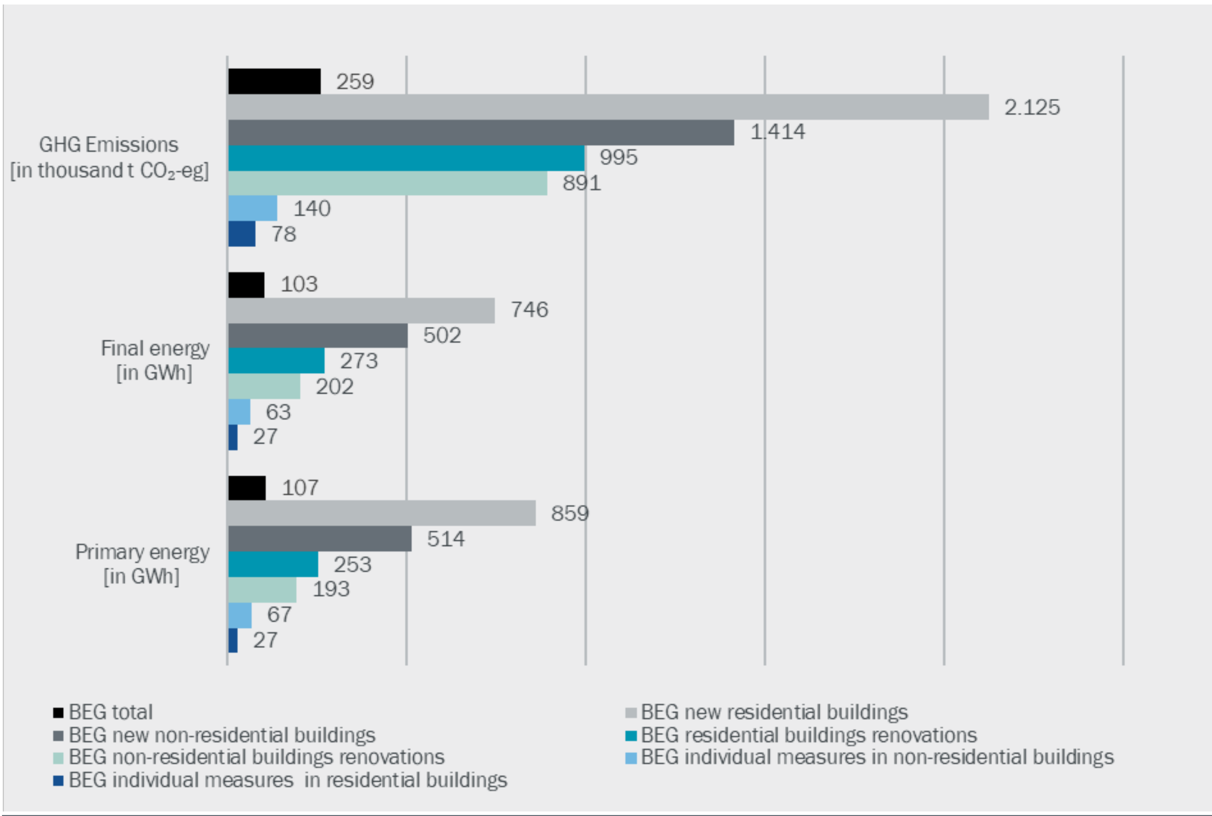
The following funding efficiencies can be observed for the BEG:

- to reduce GHG emissions by one ton annually, 5,185 Euros must be raised;
- to save one MWh of final or primary energy annually, 2,051 Euros and 2,138 Euros in funding must be used, respectively.

Calculated over the course of the expected useful life of the funded measures, the operating expenses amount to 259 Euro/t CO_2-eq and 103 Euro/MWh final energy, as well as 107 Euro/MWh primary energy, respectively.

Figure 6 shows the funding efficiencies according to the partial programmes. The new residential and non-residential buildings in particular are characterised by a low funding efficiency; renovations are significantly cheaper and more cost-efficient.

Figure 6: BEG funding efficiencies in the funding year 2022 over the course of expected useful life in accordance with NAPE



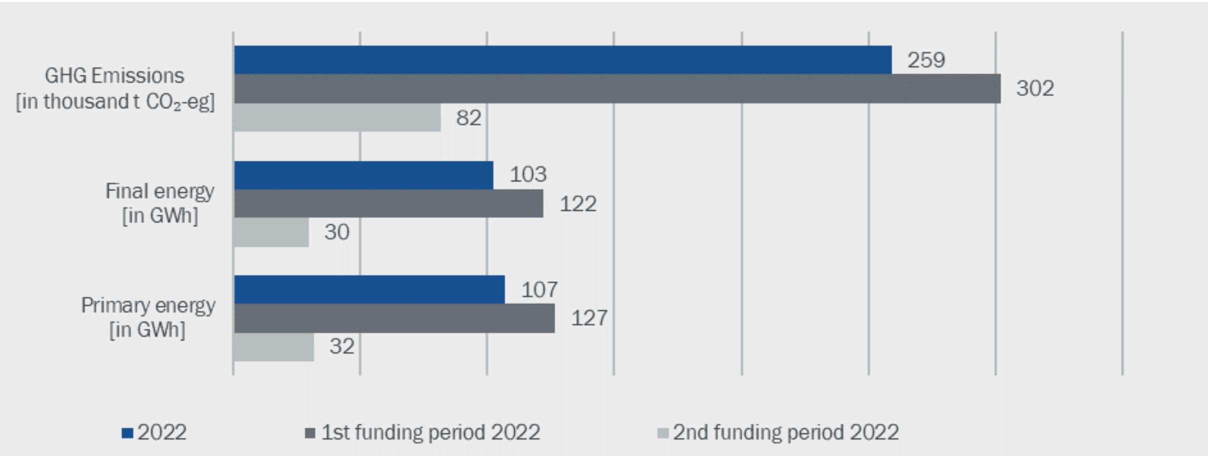
Source: own representation

Useful life according to NAPE with residential buildings 20.1 years, with non-residential buildings 19.8 years

The funding efficiency for new buildings is strongly influenced by new buildings in the sustainability class with efficiency standard EH/EG 55 EE and EH/EG 40 – here, high funding sums have to be invested to reach the same level of savings compared to new buildings without sustainability class, which leads to low funding efficiencies. When analysing the category of renovation projects with individual measures, especially measures to improve the building shell strongly influence the profitability and lead to a lower total funding efficiency.

The reduction in funding intensity with the announcement of amendments made to the BEG guidelines in July/August 2022 is clearly reflected in the funding efficiencies. These improve significantly in the second funding period (after the announcement of amendments). The first funding period, on the other hand, is characterised by the large proportion of new buildings in the funding balance (see Figure 7).

Figure 7: BEG funding efficiencies according to funding periods in the funding year 2022 over useful life according to NAPE



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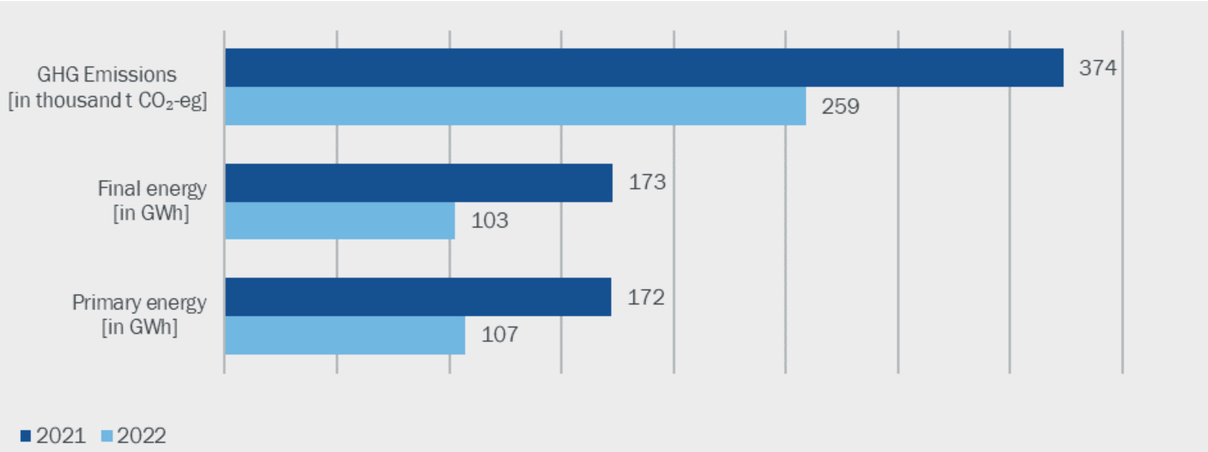
Useful life according to NAPE with residential buildings 20.1 years, with non-residential buildings 19.8 years

Compared to the previous year, the funding efficiencies have improved overall (Figure 8). In addition to the reduced funding intensities after the policy change in the summer, effects that result from changes in the subsidised building park and the energy carrier mix should be mentioned here. In a year-on-year comparison, the average size of the residential units is falling, while at the same time the size of the total buildings (number of residential units per building) is increasing - overall, commercial landlords are becoming more important.

The improvement in the funding efficiency of the overall program is essentially due to the higher share of federal funds and savings in the partial program funding individual measures, which shows a better funding efficiency, compared to the categories funding residential and non-residential buildings. When looking at the details according to the purpose of use, some significant differences can be observed.

Figure 8: Comparison of the BEG funding efficiencies in the funding years 2021 and 2022 over the useful life according to NAPE



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Useful life according to NAPE with residential buildings 20.1 years, with non-residential buildings 19.8 years

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