

## Synopsis

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# Evaluation of KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings for the funding year 2017

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Evaluation of KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings in the funding period 2015–2018



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## 1 Background: task and evaluation design

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A considerable reduction in the demand for energy in the building sector is necessary to achieve the sectoral targets for 2030 defined in the Climate Action Plan and for the goal of an almost climate-neutral building stock by 2050. Among other things, the Energy Efficiency Strategy for Buildings (ESG) indicates a need to raise the energy efficiency of non-residential buildings (NRB).

The programmes for promoting the energy-efficient refurbishment of non-residential buildings that form part of the municipal and social infrastructure, financed with federal budget funds and implemented by the KfW, have contributed to saving energy and reducing CO<sub>2</sub> emissions in buildings since 2007. These programmes are aimed at municipalities (IKK) and municipal companies and social organisations (IKU). The National Action Plan on Energy Efficiency (NAPE), adopted in 2014, led to an increase and continuation of the CO<sub>2</sub> Building Rehabilitation Programme as well as an expansion of the KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings to include promotion for commercial companies (EEP). The new promotional programme was launched on 1 July 2015. In the wake of these developments, the promotion of municipal and social infrastructure was also aligned, and a variant for new builds was added. Consequently, the promotional portfolio comprises the following KfW programmes

- 276/277/278 – KfW Energy Efficiency Programme – Energy-Efficient Construction and Refurbishment (since 1 July 2015)
- 217/218 – IKK – Energy-Efficient Construction and Refurbishment (*until 30 September 2015: IKK – Urban Energy Refurbishment – Energy-Efficient Refurbishment, 218*)
- 220/219 – IKU – Energy-Efficient Construction and Refurbishment (*until 30 September 2015: IKU – Urban Energy Refurbishment – Energy-Efficient Refurbishment, 219*)

The KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings are part of the Federal Government's energy policy. They are intended to help achieve the sectoral targets for 2030 defined in the Climate Action Plan and to make Germany's building stock almost climate-neutral by 2050. These promotional programmes have three main objectives: in addition to saving energy and reducing CO<sub>2eq</sub> emissions (climate and energy policy goals), they are also intended to support small and medium-sized enterprises (SMEs) in Germany (economic policy goal). To achieve these goals, incentives should be offered to invest in new builds and refurbishments according to KfW standards, and in single refurbishment measures (operational goals).

The Federal Ministry for Economic Affairs and Energy (BMWi) commissioned Prognos AG to evaluate the above programmes in accordance with the provisions of Section 7 of the Federal Budget Code (BHO) (analysis of target achievement, effects and economic efficiency<sup>1</sup>). KfW funding data for the funding year 2017 (as of 7 December 2018) and a survey of the promoted municipalities,

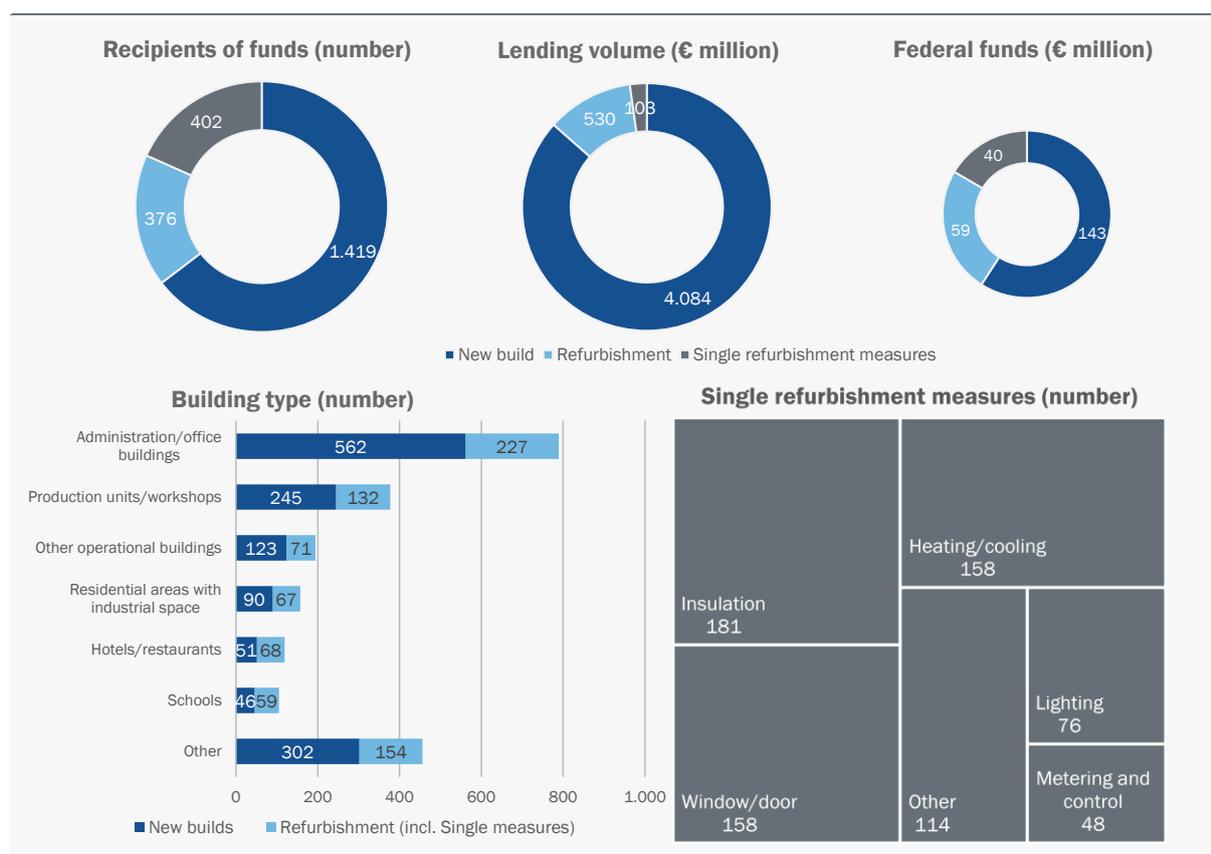
<sup>1</sup> For the analysis of economic efficiency, it was only necessary to analyse the economic efficiency of the measures.

municipal companies / social organisations and private companies, conducted in spring 2019, provided the data and information base for the evaluation.

## 2 Overview of promotion

More than 2.200 projects (recipients of funds) were promoted under the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings in the funding year 2017. Of those, around 65% were new-build projects, about 17% were refurbishments according to efficiency house standards, and around 17% were projects involving single refurbishment measures. To this end, a lending volume of around €4,7 billion and an investment volume of €5.8 billion was raised, supported by around €241 million in federal funds for repayment grants and interest subsidies.

**Figure 1: Overview of promotion under KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



Promotion primarily goes to private companies (EEP), which together invest almost three quarters of the lending volume in new builds alone. Concerning the types of use, administration and office buildings as well as production units and workshops are primarily promoted. Schools and daycare centres play an important role for municipalities (IKK) and for municipal companies and social organisations (IKU). The single refurbishment measures undertaken by all recipient groups include insulation, heating and cooling, and windows and doors. While lighting is of relevance to private companies (EEP), the refurbishment of windows/doors is of importance to municipalities, municipal companies and social organisations.

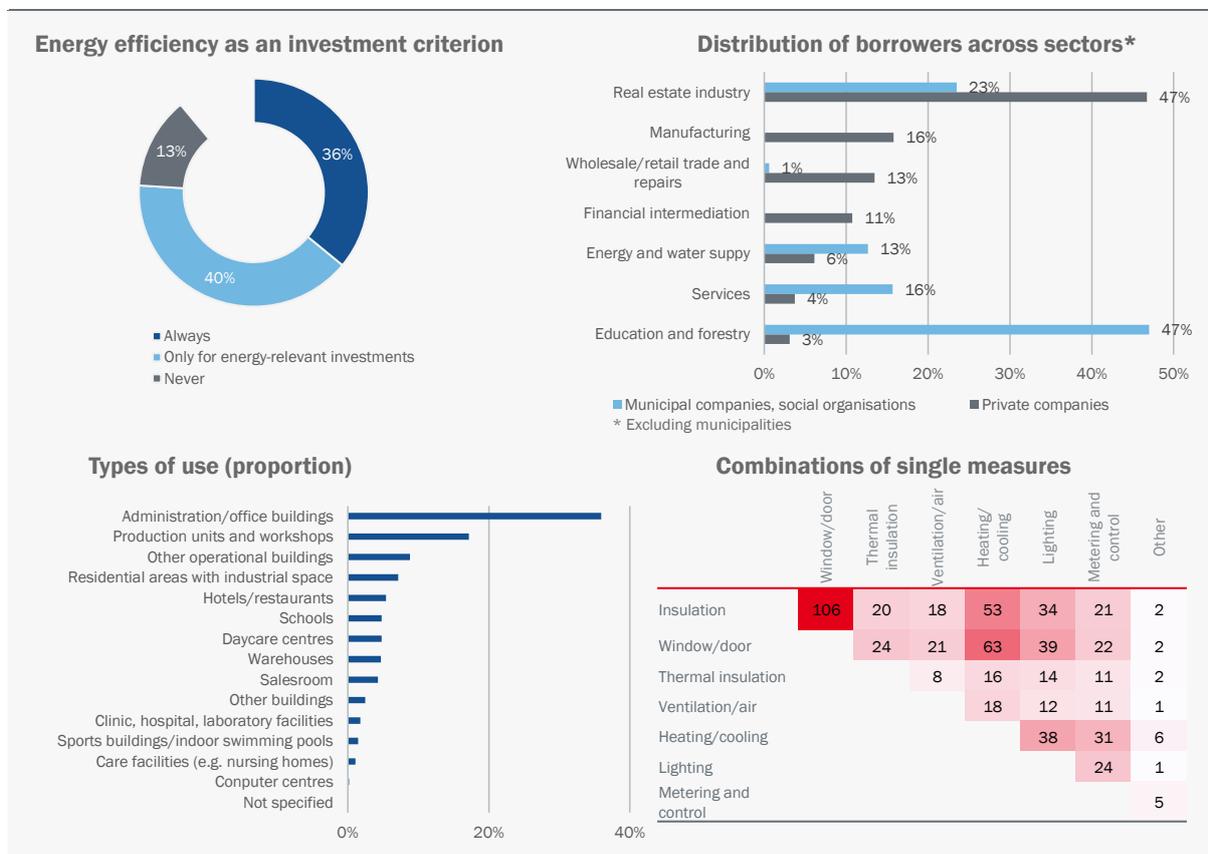
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### **3** Funding priorities

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The overview of promotion shows that the majority of recipients are private companies that invest in the construction of new non-residential buildings (EEP). The majority of borrowing municipalities and private companies are from rural areas (IKK, EEP), whereas municipal companies and social organisations (IKU) tend to come from urban areas. Energy efficiency is primarily an important investment criterion to these borrowers, whereas with municipalities (IKK), this is often only of greater significance concerning energy-intensive investments, i.e. investments in which energy consumption plays a major role.

**Figure 2: Funding priorities of the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



KfW funding data, own analysis

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Most of the private companies (EEP) come from the real estate sector; manufacturing, wholesale/retail trade and financial intermediation are also represented. In contrast, municipal companies and social organisations (IKU) focus on the fields of education and training, energy and water supply, and other (municipal) services.

It therefore comes as no surprise that the majority of refurbished or newly constructed buildings are administration/office buildings, production units and workshops, and other operational buildings. Differentiation by recipient group shows that schools and daycare centres in particular play an important role for municipalities (IKK), and slightly less so for municipal companies and social institutions (IKU). Insulation (walls, roofs, storey ceilings, floors), heating and cooling, and the replacement of windows and doors represent the technological focus of refurbishment measures. These measures are usually combined (focus: insulation / windows and doors) and complemented by lighting measures.

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## 4 Target achievement and effects

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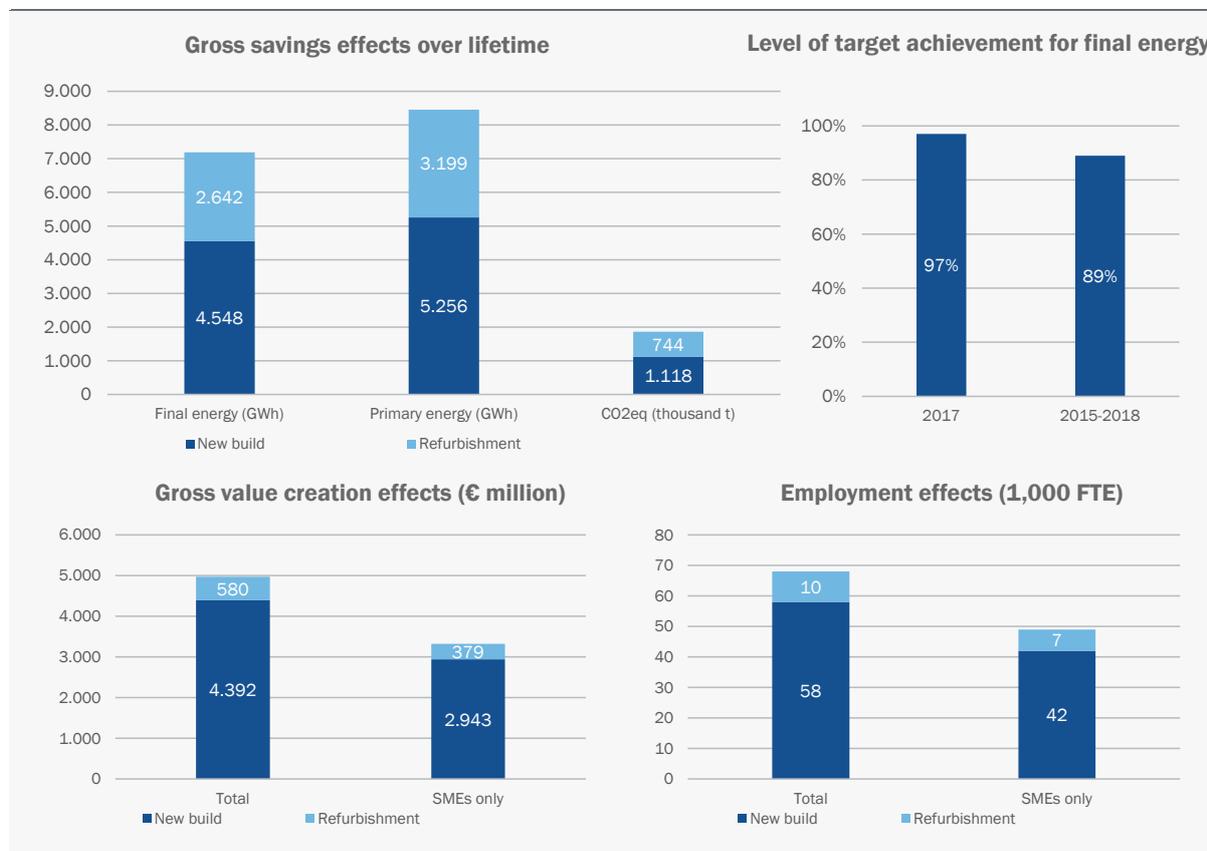
Promotion under the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings has three main objectives: to achieve energy savings, to reduce greenhouse gas (GHG) emissions, and to support the (SME) economy. Other effects that are important for society as a whole are also triggered.

### **Energy savings and emissions reductions**

In total, the funded projects will save around 7.200 GWh of final energy (adjusted for effects: 5.800 GWh) or 8.500 GWh (adjusted for effects: 6.900 GWh) of primary energy over their lifetime of almost 20 years. This leads to a reduction of about 1,9 million tonnes of CO<sub>2eq</sub> emissions (adjusted for effects: 1,5 million tonnes) over the project lifetime. The bulk of the savings arises from new builds. In relation to the relevant investment volume, however, refurbishment projects generate more leverage. This is because regulatory law for new builds already specifies high energy-efficiency requirements.

The energy savings and emissions reductions achieved under the programmes for the energy-efficient construction and refurbishment of non-residential buildings contribute about two thirds of the originally expected (plan) values specified in the National Action Plan on Energy Efficiency. At the same time, those plan values themselves are subject to uncertainty – they were estimated for a new type of promotion, based also on the level of knowledge and information at that time, resulting in a +/-20% uncertainty. On the basis of final energy savings, the level of target achievement for the funding year 2017 is 97%. Considered over the entire evaluated funding period 2015–2018 (see evaluation reports for the relevant funding years), the level of target achievement decreases to about 90%.

**Figure 3: Contributions to target achievement of the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



KfW funding data, own calculations

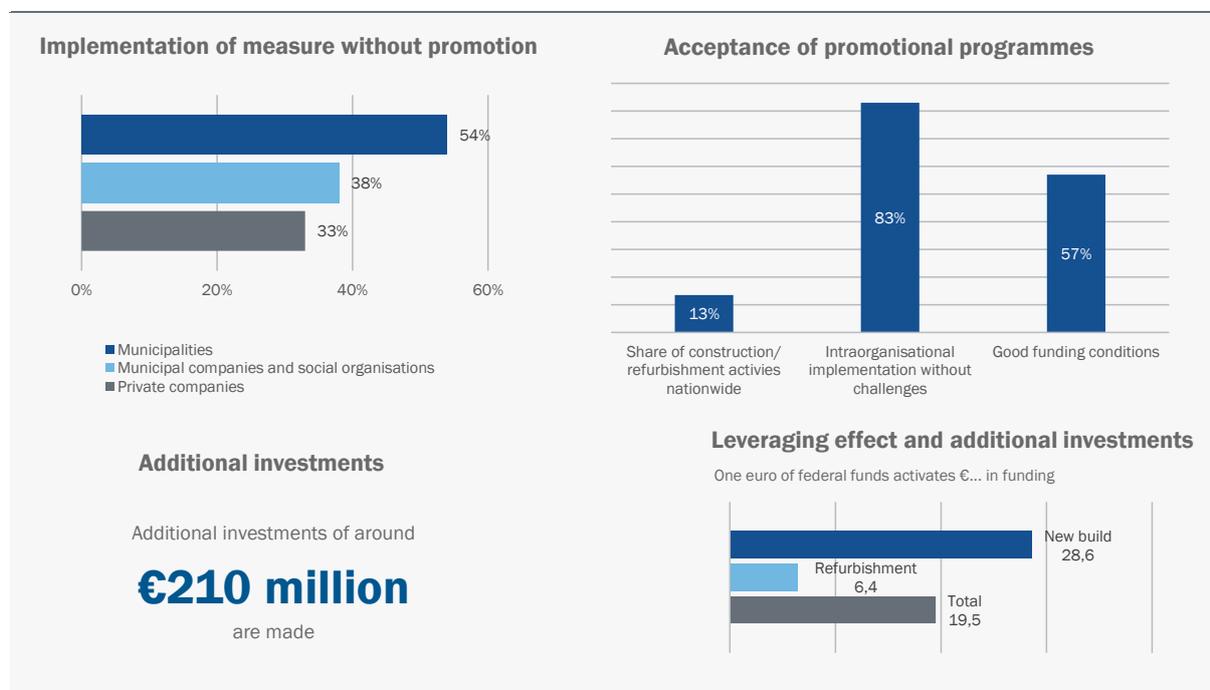
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### Economic effects and effects to society as a whole

From the point of view of the national economy, the supported projects result in gross value creation effects of around €5 billion (adjusted for effects: around €4,1 billion), with SMEs accounting for around two thirds of that amount. These gross value creation effects result in employment effects amounting to some 68.000 full-time equivalents (adjusted for effects: 57.000). Almost three quarters of these employment effects occur in SMEs.

The financial leverage effect, i.e. additional investments made by borrowers generated by each euro of funding (federal funds), is around 20. The financial leverage effect is almost five times as high for new-build projects (28,6) as for refurbishment projects (6,4). Moreover, the promotion generates additional investments totalling around €210 million, a further indication that the promotion is the reason for the effects occurring. The KfW programmes supported around 9% of new-build areas throughout Germany in 2017.

**Figure 4: Causation of the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



KfW funding data, survey conducted by Prognos in 2018; own calculation

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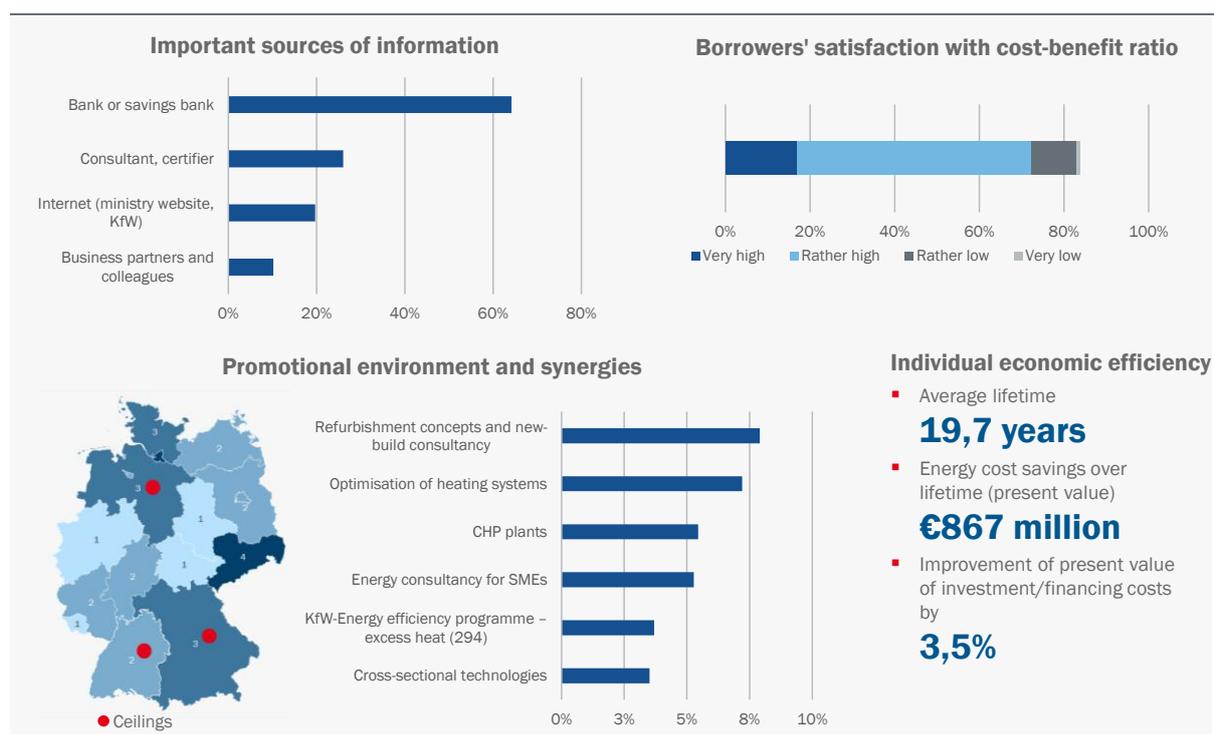
The promotion raised awareness among borrowers, resulting in a growth in knowledge of efficiency measures and their implementation, particularly among private companies. This is demonstrated by the fact that they often make additional use of promotional programmes for specific technologies (optimisation of heating systems, combined heat and power, waste heat or cross-cutting technologies), for basic energy consulting and for refurbishment concepts. A comparative examination of the funding years over the entire evaluated funding period 2015–2018 reveals a strong trend towards the implementation of higher KfW Efficiency House standards. The promotion is therefore a catalyst for a more energy-efficient building stock.

Credit institutions are of major importance when it comes to providing information about the KfW programmes, increasing the awareness and use of such schemes. In addition, especially energy consultants and energy networks play an increasingly important role in promoting a wider knowledge of efficiency potentials, systemic possibilities for implementation, and relevant options for promotion. However, investigations carried out by borrowers, such as on the internet, and tips from the professional environment also play a role. Thanks to the possibility to combine resources with federal state funding in the context of ceilings, the programmes for the energy-efficient construction and refurbishment of non-residential buildings and the energy efficiency and climate strategies of individual federal states are mutually reinforcing.

On the whole, borrowers are largely satisfied with the implementation of the programmes. Borrowers' intraorganisational decision processes were not aggravated by the programmes, indicating very high levels of acceptance of the programmes. There are no requests for an alternative design of the funding facility or its conditions; borrowers are satisfied with the funding conditions. This

results in borrowers having an overall favourable opinion of the cost-benefit ratio. Promotion under the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings reduces borrowers' investment costs by about 3,5%. Considered over the average lifetime of just under 20 years, the funded projects will lead to energy cost savings totalling around €867 million.

**Figure 5: Supplementary analysis of the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



KfW funding data, survey conducted by Prognos in 2018; own investigations and calculations

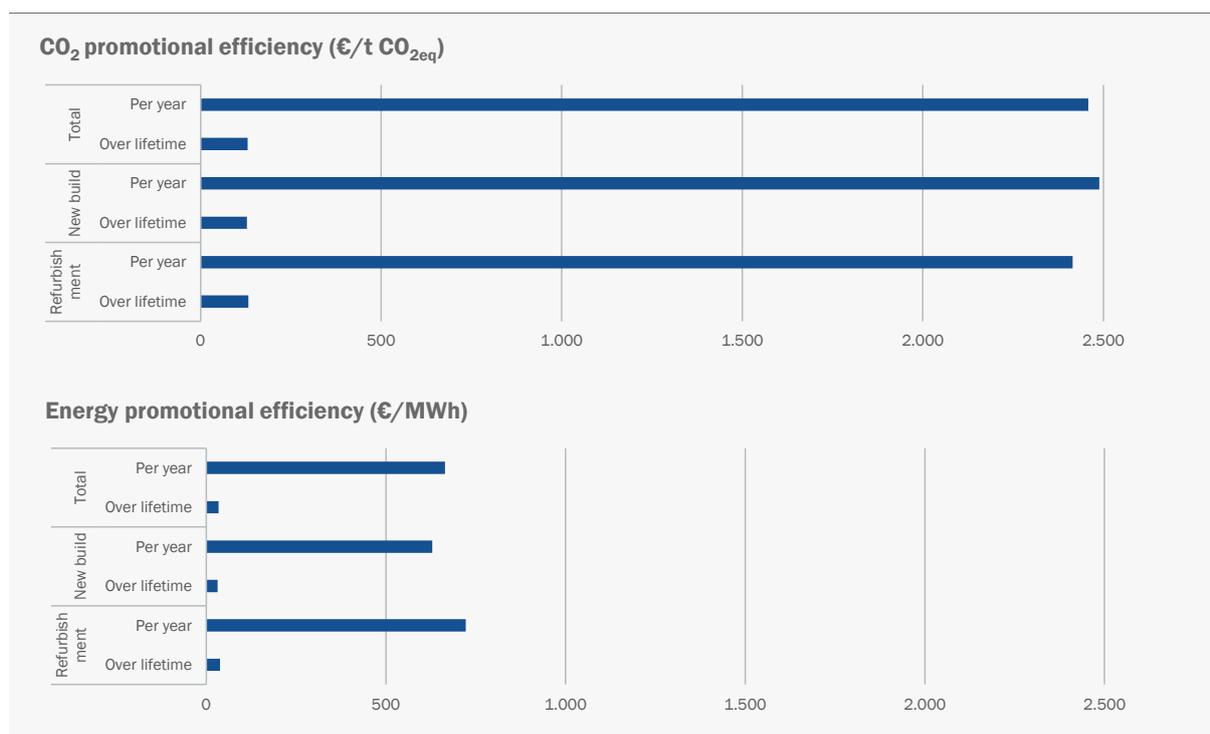
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## 5 Economic efficiency of the promotion

An initial sum of around €130 in federal funds is required for the programmes for the energy-efficient construction and refurbishment of non-residential buildings in order for the funded projects to save one tonne of CO<sub>2eq</sub> (adjusted: €159) over the average lifetime of 20 years. To save one MWh of final energy over the lifetime, an initial sum of €34 (adjusted: €41) must be raised from federal funds. New-build projects are generally slightly less expensive, requiring less federal funding than the promotion of refurbishments. On the basis of the evaluation findings, it can moreover be said that energy efficiency in non-residential buildings is more expensive compared to other building types. This can be explained by the significance of different energy consumers in the

building type or the associated investment costs and the surface geometry of the building component.

**Figure 6: Economic efficiency of the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings**



KfW funding data, own calculations

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## 6 Summary assessment

### General suitability

The analysis of the effect mechanism and of the target system of the KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings shows that the approach taken to achieve the set goals is suitable and that the promotion is the reason for the effects occurring. The overview of the promotion programmes, the analysis of target achievement and effects building on it, and the supplementary analysis show that this approach takes effect.

## Overview of promotion and funding priorities

In the funding year 2017, around 2.200 projects were promoted under the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings, activating a lending volume of €4,7 billion and an investment volume of €5,8 billion. Federal funds account for around 5% of the lending volume, and a financial leverage effect of about 19,5 is achieved.

New-build measures make up the largest part of the financed projects (65%). In contrast, refurbishments to efficiency house standards and single refurbishment measures are of lesser importance (around 17% each). Altogether, around 9% of the area for new buildings approved throughout Germany receive promotion under the programmes. The majority of new-build projects are carried out in accordance with the most efficient KfW standard at the time. In the case of refurbishments, equal consideration is given to the various efficiency house types. The longer-term perspective clearly shows an orientation towards more ambitious standards. As a result, the promotion supports the aim of achieving a largely climate-neutral building stock by 2050.

Primarily administration/office buildings, production units and workshops, or other operational buildings are constructed or refurbished. This can be attributed to the prominent role (in terms of the number of loan recipients and the lending volume) of private companies (EEP, KfW 276/277/278) in the energy-efficient construction and refurbishment of non-residential buildings. Considering only municipalities, the priority of types of use shifts to schools and daycare centres. Combinations of technologies feature strongly in single refurbishment measures, indicating that single refurbishment measures reach beyond isolated cases of refurbishment or refurbishment involving a single technology: viewing the building as an overall system tends to take centre stage, rather than isolated replacements or refurbishment measures (“low hanging fruits”). The latter do occur, for example, in the form of lighting measures. But this aspect is of comparatively low significance. The systemic view of buildings is also indicated by metering and control technology measures, which are implemented frequently. The monitoring of consumption in the functional system of “buildings” rendered possible by this development is indicative of the fact that borrowers experience a need, and therefore develop a more comprehensive view of the efficiency measures.

## Target achievement and effects

Considered over the average lifetime of around 20 years, total savings of around 7.200 GWh of final energy or 8.500 GWh of primary energy will be achieved as a result of the funding year 2017. This leads to an emissions reduction of around 1,9 million tonnes of CO<sub>2eq</sub>. In addition, the new-build and refurbishment activities generate gross value creation effects of around €4,3 billion, securing or creating some 59.000 full-time jobs.

Consequently, promotion under the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings clearly contributes to saving energy (energy policy goal), to reducing emissions (climate policy goal) and, in particular, to supporting the SME economy (economic policy goal). The expansion of the CO<sub>2</sub> Building Rehabilitation Programme to include KfW 217, 220, 276, 277 and 278 accounts for around two thirds of the plan values referred to in the National Action Plan on Energy Efficiency in the whole evaluated funding period 2015–2018. The level of target achievement for the funding year 2017 – based on final energy savings – is 97%. Considered over the funding period 2015–2018, the level of target achievement decreases to around 90%.

In particular among private companies, it is clearly apparent that the promotional programmes help raise awareness and knowledge of potential efficiency measures (for current and future investment decisions). The promotion leads to the implementation of further measures, some of which are supported by other promotional programmes at the federal and state level. There is a high level of satisfaction with the promotional programmes (and the funding conditions), and a high level of intraorganisational acceptance of the programmes. In addition, the promotion generates additional investments totalling around €210 million. In light of the above, the promotion is assessed as being the reason for the effects occurring.

### **Economic efficiency**

The KfW promotional programmes for the energy-efficient construction and refurbishment of non-residential buildings are found to be economically efficient in the funding year 2017. The programmes involve raising an initial sum of around €130 to save one tonne of CO<sub>2eq</sub> over the entire lifetime of the promoted measures, and around €34 to save one MWh of final energy. The leveraging effect of the new-build programmes is almost five times as high as that of the refurbishment programmes. Compared to other promotional programmes, it appears that the savings for non-residential buildings are more expensive than for other building types.

Borrowers view the cost-benefit ratio of using the evaluated KfW promotional in a positive light. They improve their investment/financing costs by around 3,5% and achieve energy cost savings of about €867 million (present value) over the lifetime of the funded projects. In light of the above, it is little wonder that virtually no criticism is voiced about the design of the programmes and that borrowers are generally satisfied with their implementation.

### **Summary assessment**

The overall conclusion is that the KfW programmes for the energy-efficient construction and refurbishment of non-residential buildings are suitable for helping achieve the stated objectives in the funding year 2017 in a cost-effective way and are the reason for the effects occurring. There is no need for optimisation or adjustment of the programmes based on the evaluation results.

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## Publication details

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