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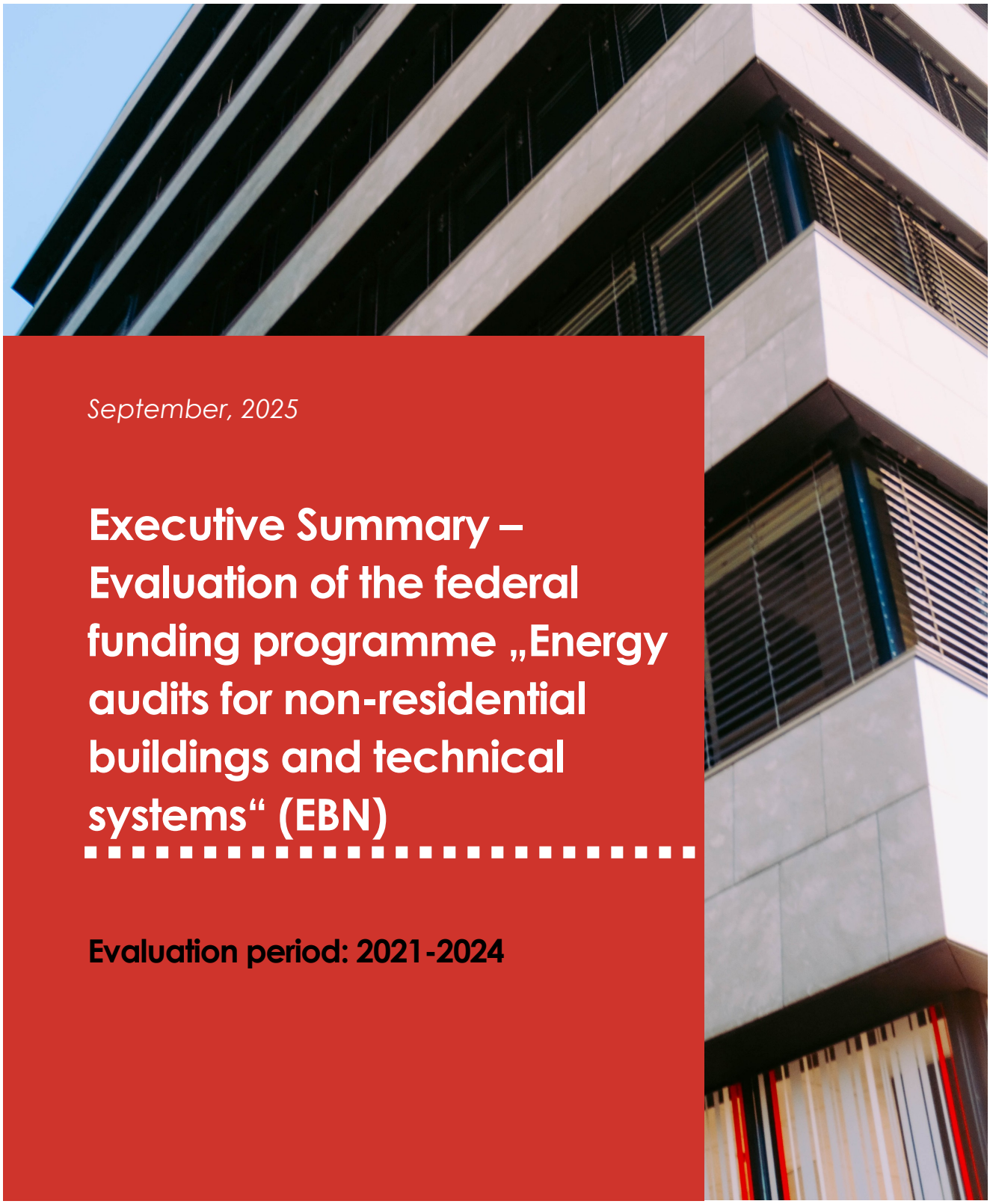

September, 2025

Executive Summary – Evaluation of the federal funding programme „Energy audits for non-residential buildings and technical systems“ (EBN)

Evaluation period: 2021-2024

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1 Background of the funding programme

The federal funding programme "Energy audits for non-residential buildings and technical systems" (*Energieberatung für Nichtwohngebäude, Anlagen und Systeme* – EBN) aims to unlock energy-saving potential in companies, municipalities and non-profit organisations. It does this by subsidising qualified energy audits in the non-residential buildings sector. The energy audits are intended to help the beneficiaries obtain an overview of the current energy performance of their buildings and technical systems, identify potential for energy savings, and develop concrete energy efficiency measures. The federal support scheme fits into the broader context of Germany's national and the EU's energy efficiency and climate goals. By identifying and utilising energy-saving potential in non-residential buildings and in technical installations and systems of small and medium-sized enterprises (SMEs), the programme aims to improve energy efficiency in these sectors and thus support the achievement of national and European targets.

The programme comprises three funding modules: Module 1 (energy audits in accordance with DIN EN 16247, primarily directed at SMEs), Module 2 (energy audits for non-residential buildings in accordance with DIN V 18599, mainly audits for building renovation but audits for new buildings are also eligible), and Module 3 (orientation consulting for energy performance contracting, EPC). Funding is limited to the provision of the energy audit services. The actual implementation of recommended energy efficiency measures is not covered under the EBN programme. The programme is administered by the Federal Office for Economic Affairs and Export Control (*Bundesamt für Wirtschaft und Ausfuhrkontrolle* – BAFA).

Between January 2021 and August 2024, grants of up to 80 % of eligible consulting costs could be claimed. Following a revision of the funding guidelines on 7 August 2024, the funding rate was reduced to 50 %, and the tiered maximum grant amounts per case were halved. As a result, the total funding amount available per case has effectively been reduced by half since August 2024. In this evaluation, with only a few exceptions, the funding effects before the reduction in funding rates are examined. This is because only energy audits that had already been completed at the time of the evaluation could be examined in detail regarding their effects.

2 Purpose of the evaluation and methodological basis

The public funding provided under the EBN programme is granted in accordance with the provisions of the German Federal Budget Code (*Bundeshaushaltsordnung* – BHO). In line with the administrative regulations pursuant to §7 BHO, regular evaluations of the programme's effectiveness are required. The evaluation of the EBN for the funding period 2021–2024 was conducted by Technopolis Group on behalf of the Federal Agency for Energy Efficiency (*Bundesstelle für Energieeffizienz* – BfEE) which is part of the BAFA. The objective of the evaluation is to provide a systematic analysis of the programme's goal achievement, impacts, and cost-effectiveness.[1]

[1] The basis for the evaluation is an export of the funding database as of January 8, 2025.

The evaluation is based on a mix of quantitative and qualitative methods. A key component was a broad online survey of funding recipients. A total of 920 recipients from Modules 1 and 2 participated in the online survey (11,911 contacted; response rate: 7.7 %). For the smaller Module 3, 19 out of 42 contacted recipients responded (response rate: 45.2 %). In addition, the evaluation draws on an analysis of the funding database, 16 expert interviews, a review of 50 randomly selected energy audit reports, and relevant literature.

The BMWE methodology guide for evaluation of energy efficiency programmes served as the methodological basis for the evaluation.[2] To better reflect the ongoing decarbonisation of the electricity system, dynamic emission factors were applied for electricity generation, deviating from the guide's original assumptions. A quantitative assessment of effects is conducted for energy audits funded under Module 1 (energy audits in accordance with DIN EN 16247, primarily for SMEs) and Module 2 (energy audits for non-residential buildings in accordance with DIN V 18599), which together account for more than 99 % of all funded energy audits. No standardised quantification of impacts could be carried out for Module 3 (orientation consulting for EPC) due to the small number of cases and the preparatory nature of the services.

Funding cases were assigned to the respective funding year based on the date on which the BAFA received proof of completion of the energy audit. The quantification of effects included energy efficiency measures that had already been implemented or were currently underway, as well as those with a sufficiently concrete implementation plan according to defined criteria.[3] In contrast, energy efficiency measures for which no concrete implementation plans exist are not taken into account.

3 Overview of the funding activity

Funding volume, number of energy audits, and application trends

Between 2021 and 2024, the EBN programme was financed by a total of approximately EUR 101 million in federal funding. Of this amount, around EUR 98 million was allocated to the direct funding of energy audits, while an additional EUR 3 million covered administrative costs incurred by BAFA in managing the programme.

- **Module 1 – Energy audits (DIN EN 16247):** 12,264 applications were submitted during the evaluation period, of which 10,367 were approved. By the time of the evaluation, 9,170 audits had been completed and were included in the impact analysis.
- **Module 2 – Energy audits for non-residential buildings (DIN V 18599):** 11,778 applications were submitted, with 9,496 approved and 6,634 completed audits included in the analysis.
- **Module 3 – Orientation consulting for EPC:** With only 71 applications and 56 approvals, this module accounted for only a small number of funded audits.

Application trends show a steady increase in demand for renovation-related audits in Module 2. Conversely, applications for Module 1 peaked during the energy crisis in 2022,

[2] Fraunhofer ISI, Prognos AG, ifeu, Stiftung Umweltenergierecht (2020). Methodikleitfaden für Evaluationen von Energieeffizienzmaßnahmen des BMWi. https://www.bmwi.de/Redaktion/DE/Downloads/M-O/methodik-leitfaden-fuer-evaluationen-von-energieeffizienzmassnamen.pdf?__blob=publicationFile.

[3] I.e., the measure was included in financial or budget planning and/or an investment subsidy was applied for.

followed by a decline from 2023 onwards. Demand for Module 3 remained low and below expectations throughout the whole evaluation period.

Beneficiaries and regional distribution

The main beneficiaries of the programme were SMEs, municipalities, and non-profit organisations. Module 1 was taken up predominantly by SMEs (97 %), with a strong focus on both micro enterprises and small enterprises utilising the qualified energy audit (together accounting for 77 %). In Module 2, support was distributed among businesses (41.6 %), municipalities (33.6 %), and non-profit organisations, religious communities, and foundations (21.1 %). Module 3 was used primarily by municipalities.

Regionally, the highest programme activity – adjusted for gross domestic product (GDP) – was observed in Lower Saxony, Saxony-Anhalt, Schleswig-Holstein, and Baden-Württemberg. Lower activity levels were noted in the city-states (Berlin, Hamburg, Bremen) and several other federal states. These patterns suggest that local structures and regional clusters play a significant role in determining programme uptake. Activity patterns also vary by module, with Module 1 particularly strong in the aforementioned northern and eastern states, and Module 2 most used in Baden-Württemberg.

Recommended energy efficiency measures and implementation status

In Module 1, audits most frequently recommended efficiency measures related to production processes, building technologies, and electricity and heat generation (in particular photovoltaic (PV) systems; these were considered separately as measures for electricity generation and were not included in the calculation of final and primary energy savings). Energy efficiency recommendations in Module 2 were mainly directed at enhancing the thermal performance of the building envelope and upgrading heating systems.

Implementation rates of recommended measures were generally higher in Module 1 compared to Module 2. For audits conducted in 2021 and 2022 (i.e., minimum of 2.5 years passed between energy audit and evaluation), approximately 60-65 % of the measures recommended under Module 1 had either been implemented, were in the process of implementation, or had reached an advanced planning stage (i.e., the measure was included in financial or budget planning and/or an investment subsidy was applied for). In contrast, the corresponding share in Module 2 was around 45-55 %. Module 1 exhibited particularly high implementation rates for the often-recommended measures targeting production processes and building technologies. In Module 2, implementation rates were comparatively lower for the often-recommended categories, especially for measures involving costly thermal improvements to the building envelope.

4 Assessment of achievement of targets

The EBN aims to trigger 530 gigawatt-hours (GWh) of newly added annual gross final energy demand savings through the implemented energy efficiency measures recommended in the audits. This target was achieved by just under 85 % over the entire evaluation period (2021–2024) through the quantified savings from modules 1 and 2. As not all approved energy audits had been completed at the time of the evaluation – in particular consultations in Module 2 from 2024 – it is expected that the savings realised in subsequent years will further close the existing gap.

Besides the target value for final energy demand savings, the target value for the number of energy audits supported as part of the EBN programme is almost achieved over the entire

evaluation period. A total of 15,804 energy audits were successfully completed in Modules 1 and 2 between 2021-2024, which is only slightly below the target value of 16,000 audits (4,000 annually). Furthermore, as with the indicator for annual new final energy savings, it should be noted that not all ongoing audits had been completed at the time of the evaluation.

At the level of individual funding cases, the annual final energy demand savings achieved to date from implemented efficiency measures averaged 120 MWh (gross) per audit in companies and 91 MWh (gross) per audit in municipalities/non-profit organisations. Thus, the target value of 140 MWh (gross) per company has not been fully reached, while the target value of 90 MWh (gross) per municipality/non-profit organisation has been slightly exceeded. A differentiated analysis by funding module shows that the final energy demand savings achieved by companies after energy audits in Module 2 are lower than the savings achieved by companies that carried out an energy audit under Module 1 (average of 102 MWh and 125 MWh new gross final energy savings per year, respectively).

5 Assessment of programme effectiveness

To isolate the effects directly attributable to the EBN programme, the evaluation applies corrections for free-rider effects and interactions with supplementary investment support programmes available for energy efficiency measures.

Two levels of potential free-rider effects were examined: (i) use of audit services that would have occurred also without funding (18.3 %), and (ii) implementation of energy efficiency measures that would have occurred without the audit (32.4 %). Combined, these adjustments reduce the gross savings effects related to the EBN by around 51 %.

In addition, interaction effects between the EBN programme (energy audit) and subsequent investment support were taken into account. This was done because of the salient link between subsidised energy audit and in some cases subsequent subsidised energy investments. Taking into account the interaction prevents double counting of energy savings and enables a more accurate attribution of the role of the energy audits in the implementation of measures. The effects of energy efficiency measures implemented without any further public investment support were fully attributed to the EBN programme. For measures that received additional investment funding, attribution was applied proportionally – based on the relative importance of the energy audit compared to investment support, as reported by beneficiaries in the online survey.

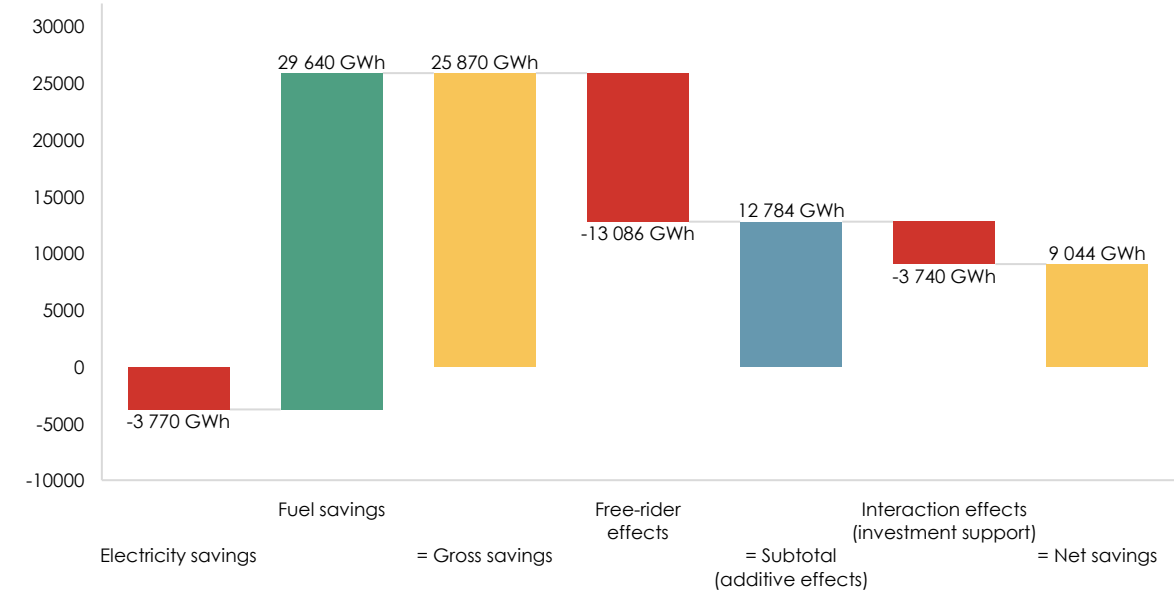
Overall, after adjusting for free-rider effects, 71.7 % of the remaining savings (intermediate total) are attributed to the EBN programme (averaged across funding modules). Following the more frequent use of investment subsidies for energy efficiency measures in Module 2, and given that the participants rated the investment support as more relevant for implementing the measures, a stronger correction is applied in Module 2 (63.4 % of intermediate total attributable to the EBN) than in Module 1 (77.7 % of intermediate total attributable to the EBN).

Annual gross final energy savings between 2022 and 2024 ranged from 509 to 598 GWh. In 2021, savings were still lower (168 GWh) due to few energy audits already completed in the same year. Module 1 involved savings in both electricity and fuel use, while Module 2 showed increased electricity consumption, primarily due to heating system conversions.

Over the entire evaluation period from 2021 to 2024, the final gross energy demand savings totalled 3,925.4 GWh. After deducting the effects corrections, this leaves 1,409.9 GWh (net), which can be directly attributed to the impact of the EBN funding programme. Since the

energy efficiency measures implemented in non-residential buildings and technical installations will remain effective over time, they will continue to generate savings in the coming years. Across their full lifetime (extending into the 2040s; average lifetime: 16 years), the implemented measures are expected to deliver cumulative final energy savings of around 25.9 TWh (gross) or 9 TWh (net).

Figure 1 Lifetime final energy savings and impact adjustment for Module 1 – Energy audits (DIN EN 16247) and Module 2 – Energy consultations for non-residential buildings (DIN V 18599) (in GWh)



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In addition, many beneficiaries – particularly following energy audits under Module 1 – invested in PV systems. As these measures relate to electricity generation rather than energy consumption, they are assessed separately from energy savings. During the energy crisis years 2022–2023, newly added PV capacity resulted in an additional 108–119 GWh of renewable electricity being self-consumed per year, based solely on the measures implemented in the respective year. In contrast, the figures were significantly lower in the non-crisis years: 33 GWh in 2021 and 58 GWh in 2024.[4]

In terms of greenhouse gas emissions (GHG emissions), new annual gross savings between 0.06 and 0.18 megatonnes (Mt) of CO_2 equivalents (CO_2e) were achieved during the evaluation period. Over the entire evaluation period from 2021 to 2024, gross GHG emission reductions amount to around 1.2 Mt CO_2e. After effects adjustment, net savings of approximately 0.45 Mt CO_2e remain, which can be directly attributed to the impact of the EBN funding programme. In the coming years, the impact of the measures will be reinforced by the ongoing decarbonisation of electricity generation. Over the entire lifetime of the measures, cumulative

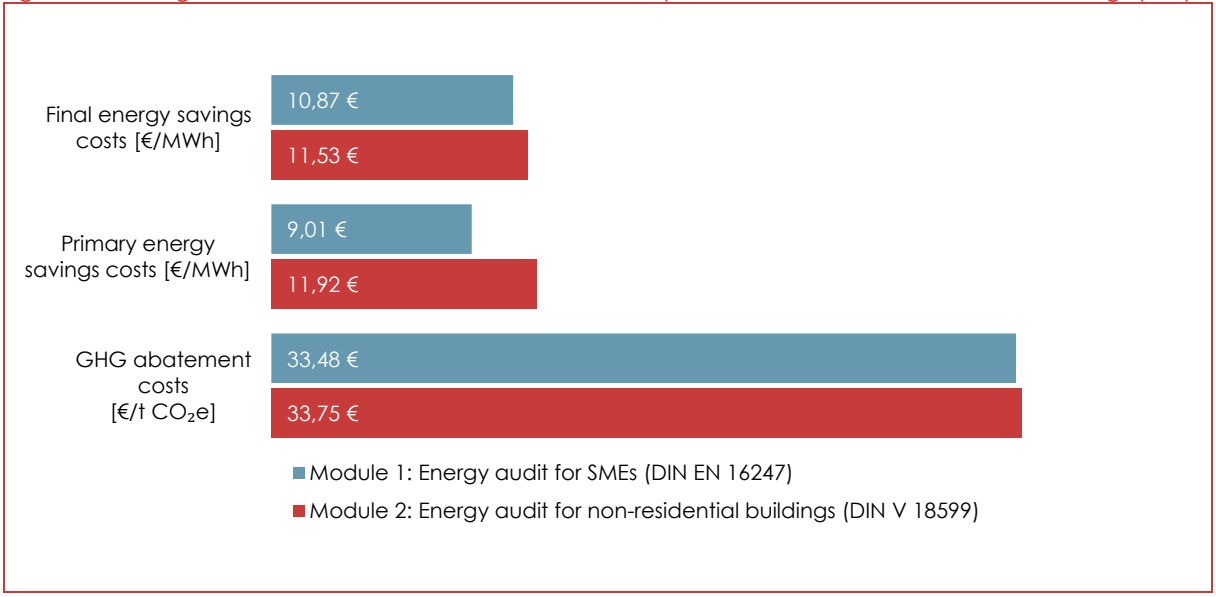
[4] Feed-in to the electricity grid was not analysed as part of the evaluation.

net GHG emission savings of slightly more than 3 Mt CO_2e are expected after adjusting for effects.[5]

6 Assessment of economic efficiency

The funding efficiency – defined as the cost per unit of energy or emissions saved – is the key indicator used to assess the programme's economic performance. It is calculated by relating the public funds used (including administrative costs) to the net savings achieved over the whole lifetime of the energy efficiency measures.

Figure 2 Funding efficiencies of the EBN in the evaluation period 2021-2024, lifetime-based savings (net)



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Despite the comprehensive correction for free-rider effects and interaction with investment support, the funding efficiencies determined show good overall results. For each megawatt hour (MWh) of final energy saved, an average of EUR 10.87 in federal funds had to be invested in Module 1 and EUR 11.53 in Module 2. In terms of GHG emission savings, approximately EUR 33-34 are required per tonne of CO_2 equivalents (t CO_2e) abated in both funding modules.[6] No funding efficiencies could be determined for Module 3.

When interpreting these results, it is important to consider that different types of public support typically exhibit different levels of cost-effectiveness. Energy audits are usually regarded as more cost-efficient. This is primarily because the level of public funding required for supported energy audits is comparatively low, while the resulting energy savings can be substantial, even if only part of the recommended measures are implemented. Subsequent public investment

[5] The effects of investments in PV systems are included in the calculation of abated GHG emissions.

[6] In determining funding efficiency, with few exceptions, only funding cases that had received the higher funding rates valid until August 2024 were considered. With the reduction in funding rates, the support per case for new applications submitted from August 2024 onward is effectively halved in most instances. Assuming that the funding effects remain at a comparable level to those quantified in the evaluation, the reduction in funding rates can be expected to lead to improved funding efficiency in the future.

support programmes, which some beneficiaries of the EBN programme have also used, and their costs, are not directly part of this evaluation. However, interaction effects with investment support programmes (e.g., BEG EM/NWG, EEW) are taken into account if used by beneficiaries to avoid double-counting savings and accurately assess the effectiveness of energy audits. Overall, the findings confirm that energy audits for non-residential buildings and technical systems are a cost-effective policy instrument that can meaningfully contribute to achieving national and European energy and climate goals.

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