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ENERGY AND RESOURCE EFFICIENCY IN THE ECONOMY: THE EVALUATION OF GERMANY'S LARGE INDUSTRIAL FUNDING PROGRAMME USING MIXED METHODS

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ABSTRACT

In Germany, the Federal Funding Scheme for Energy and Resource Efficiency in the Economy (EEE) is a central financial support scheme that aims to promote energy and resource-efficient technologies and processes in companies. Due to reporting requirements both, with regard to spending public budgets, as well as progress reporting towards the energy and climate goals, annual evaluations of the EEE are required. These evaluations include a substantial set of quantitative indicators. The indicators are analysed using a common methodology drawing on administrative data as well as survey results among beneficiaries of the support scheme. The paper illustrates the quantitative evaluation approach of the EEE in a two-fold way: First, it outlines the mixed methods approach underlying the evaluation which follows a methodological framework of nine steps. Second, it emphasises three methodological issues arising from recent modifications of the EEE and its framework conditions, which have neither been discussed methodologically nor content-wise yet.

The experience from five consecutive years of evaluation of the EEE plus the evaluation of the EEE's predecessor shows that the overall methodology ensures that the process is carried out uniformly. This helps to ensure a basis for comparability of broad multi-measure funding schemes, such as the EEE. Yet, it can be observed that there is a constant need for refinement and adaptation to changes e.g. due to changes in external conditions, shifting interests or new design elements. Therefore, the paper outlines three of the most recent methodological issues in more detail. These underline (#1) the need to be transparent about how the dynamic decarbonisation of the energy system is taken into account in the impact assessment, (#2) the need to make conscious decisions on how to consider resource efficiency in GHG accounting and (#3) that, when using funding efficiency as a criterion for the design of such instruments, the context of these values has to be sufficiently appreciated.

Keywords: energy efficiency, resource efficiency, industrial funding, energy policy, climate change, evaluation

BACKGROUND AND AIM

Energy use is a very substantial source of anthropogenic greenhouse gas (GHG) emissions. In consequence, improving the deployment of renewable energies and energy efficiency measures is crucial to limit global warming to the 1.5°C climate target of the Paris Agreement. As a response to this, energy policymaking uses a variety of regulatory, informational and financial measures to enhance the uptake of corresponding action. Publicly funded subsidy schemes aimed at promoting energy efficiency in companies serve as an important cornerstone in many countries.

In Germany, a central scheme is the Federal Funding Scheme for Energy and Resource Efficiency in the Economy (EEE). It aims to specifically promote energy-efficient technologies and processes, available on the market to support companies in improving energy efficiency. This multi-measure scheme is structured into six modules and offers grant-based, credit-based and competition-based subsidies (Figure 1). In its original setup at its initiation in 2019, it covered support for investments in four modules: 1) energy-efficient cross-cutting technologies, 2) process heat from renewable energies, 3) measurement and control equipment, sensors and energy management software and 4) energy optimizations of plants and processes. In 2021, the last module was extended to also cover resource efficiency. Furthermore, two new modules have been added in 2021 and 2023, focusing on 5) transformation plans and 6) electrification in micro and small enterprises.

According to its latest amendment, the EEE aims at facilitating the implementation of energy and resource efficiency measures in companies, thereby targeting saving of 35 TWh of final energy and 19 million tons of carbon dioxide emissions from 2022 until the end of 2028 (BMWK 2024b, 2024a). In 2023, the EEE's subsidies exceeded 1 billion Euros for the first time.

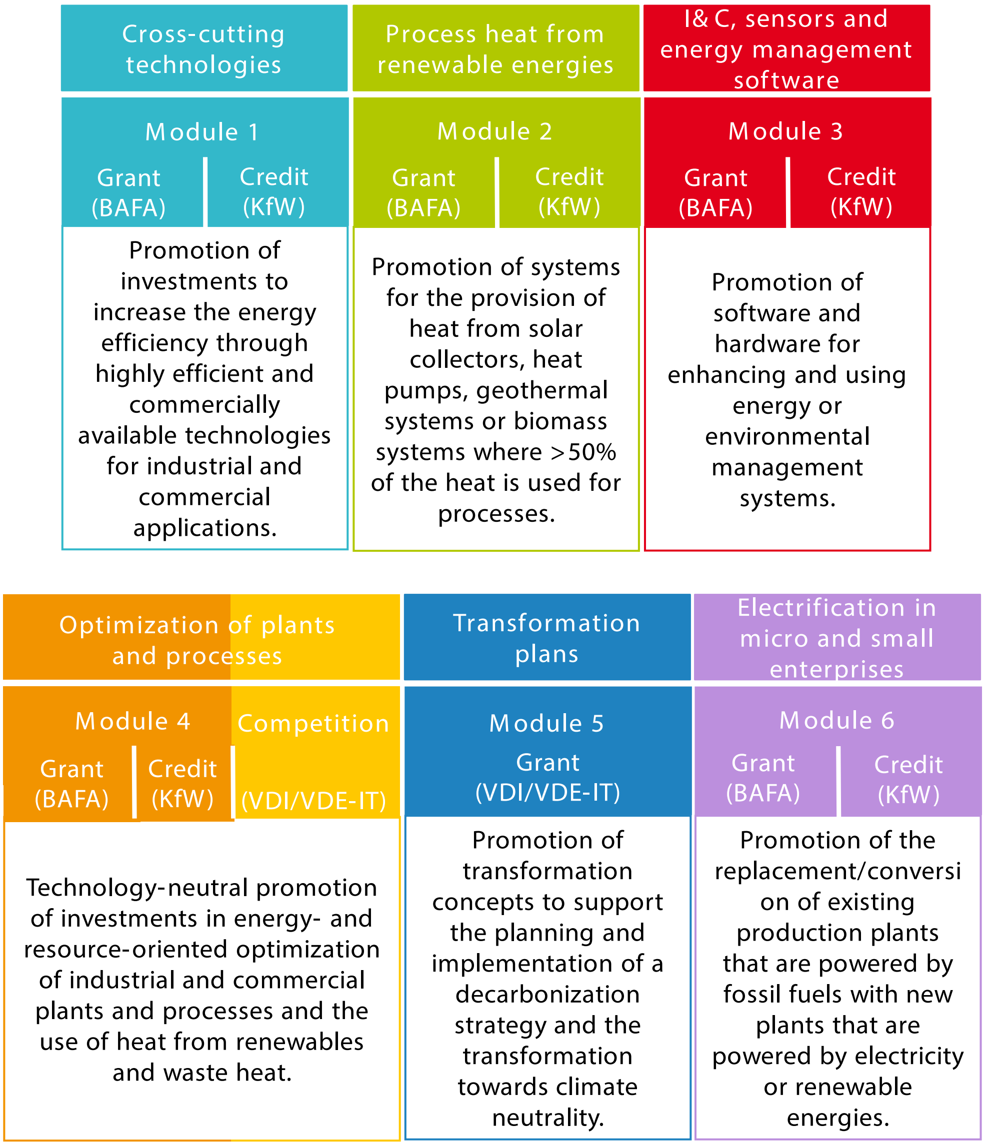

Figure 1: Overview of the architecture of the EEE (source: Neusel et al. 2024a).

Since such schemes as the EEE use public money, ex-post evaluations are regularly required to review their efficiency and effectiveness. Also, reporting requirements on measures addressing European and national energy efficiency and climate targets have increased considerably in recent years. On the European level, the most detailed ones are requirements for the communication of measures and methods for the implementation of Article 8 of the recast Energy Efficiency Directive (Directive 2023/1791/EU, Annex V).

On the level of Germany’s national energy and climate targets, an overall goal of achieving GHG neutrality in 2045 is legally required by the revised Federal Climate Change Act (KSG) of 2021 and the Energy Efficiency Act (EnEfG) of 2023. Both also include quantitative reporting requirements in several places.

This contribution illustrates such a quantitative evaluation: First, it outlines the mixed methods approach underlying the evaluation, which follows a methodological framework of nine steps. Second, it emphasises three methodological issues which arise from recent modifications of the scheme and its framework conditions. These have neither been discussed methodologically nor content-wise yet.

EVALUATION METHODOLOGY

The evaluation of the EEE covered five annual rounds between 2019 and 2023. It is based on a methodological framework formalised by Schlomann et al. 2020 within the EEE’s predecessor programme (Hirzel et al. 2019), as well as on previous expertise in energy policy evaluation. Table 1 provides an overview of prior publications related to the EEE and its underlying methodology. The purpose of this methodology is to:

- Monitor target achievement: To what extent were the objectives of the funding achieved?
- Assess impact: Is the funding the cause of the impact or suitable for triggering it?
- Control efficiency: Are both the funding provided (efficiency of implementation) and the objectives achieved (efficiency of measures) in an economical manner?

Table 1. Overview of prior publications related to the EEE and the underlying methodology

Publication	Topic
Schlomann et al. 2017	A first outline of the general methodology and its application
Voswinkel et al. 2018	An analysis of the German waste heat programme within the Fund
Voswinkel 2018	An account of eight ways for determining energy savings in evaluations
Voswinkel 2019	Catches in evaluations of multi-programme schemes like the Fund
Voswinkel 2020	Shares the experiences with an overview of an unified harmonisation methodology
Hirzel et al. 2022	Overall impact of the Fund and aggregation issues in multi-measure schemes
Hirzel et al. 2022	Comparison of the classical vs. the competitive funding line of the EEE
Brunzema et al. 2022	Ex-ante impact evaluations by the example of the EEE
Weinert et al. 2024	Resource efficiency as a new funding element in the EEE
Hirzel et al. 2024	Funding of sensors, measurement and control equipment as part of the EEE
Neusel et al. 2024	Evolution and impact of the EEE

The overall methodology consists of nine steps (Table 2). After its application for the year 2019, it was continuously refined to address methodological issues identified for the EEE. Using the EEE as an example, **selected steps** are detailed below to illustrate the methodology.

Table 2. Overview of the evaluation methodology (source: Hirzel and Schlomann 2022).

Step and purpose	Main tasks
1: Characterisation Description of the covered policy measures	▪ General **outline of the measure** covering its type, target group/sectors, budget, funding bodies/ implementation agencies, legal basis, related policy measures and the funding process ▪ Analysis of the **impact model** of the measure ▪ Consideration of potential **distortions** (e.g. overlaps, double counting, side-effects such as free-rider effects, spill-overs or follow-up-effects)
2: Framework data Definition of common data and assumptions	▪ Definition of **harmonised input data** (e.g. emissions factors, primary energy converters) ▪ Provision of **default choice lists** (e.g. lifetimes by type, energy prices)
3: Targets and requirements Identification of the targets of the overall programme, its policy measures and the specific requirements for the evaluation	▪ Description of **requirements and expectations** for the evaluation ▪ Analysis of **top-down targets** for energy efficiency improvements based on governmental documents, directives and laws ▪ Analysis of **bottom-up targets** of individual support schemes from ex-ante estimation, funding guidelines ▪ Definition of the **main areas of interest** for the evaluation
4: Indicators Setting up performance values to measure the achievement of targets	▪ Selection of **indicators that reflect progress** in the areas of interest ▪ **Operationalisation** of the indicators: choice between qualitative/quantitative type, description and delimitation, computational model, type of result, units (quantitative) or scales including interpretation rules (qualitative)
5: Data collection Identification and collection of data for establishing the indicators	▪ Establishing a **data collection concept** based on the selection and setup of the indicators ▪ Implementation of the **data collection process**
6: Data review Processing incomplete or missing information	▪ Review of data (e.g. error correction, missing parameters) ▪ Method selection and implementation of backcasting and proj**ections** of data where needed
7: Data analysis Processing of the data to measure the achievement of the target values	▪ Selection of appropriate **method of analysis** (descriptive/analytical) ▪ Computation of **gross values** for indicators
8: Net impact estimation Eliminations of distortions in the results	▪ **Identification of distortions** ▪ Computation of undistorted **net values** for indicators ▪ Conclusions for the **individual measures**
9: Overall assessment Merging individual results	▪ Determination of **areas for aggregation** and comparison ▪ **Correction for double counting** when aggregating quantitative values ▪ Computation of the **overall assessment** ▪ Formulating conclusions for the **entire scheme**

One of the initial steps, which is a part of the characterisation of the evaluated policy measures, is the development of an impact model (**step 1**). The impact model is a logical causal chain and deliberate simplification of the influences to make impact relationships manageable in the evaluation. The basic impact model follows an input-output-outcome-impact-logic: The input depicts the effort put into the program, and the output reflects the immediate result, the outcome of the content-wise changes and the impact the final result of the intervention on the level of the overall aim. For each of the six modules of the EEE, a specific impact model is used to investigate the individual impact. Figure 2 illustrates such an impact model for Module 3 in the EEE: Module 3 is a support program for measuring and controlling equipment, including support for software and training. As **input**, support is provided in three areas: hardware, software, and training. New sensors and control systems are implemented to enhance data collection, complemented by available software fully connected to this data. Comprehensive training ensures staff can effectively utilise the new systems. The **output** includes the deployment of the new sensors, established software, and trained personnel. In the **outcome**, automated data collection in daily operations is emphasised. Analysed data leads to optimised processes and identifies areas for corrective measures, initiating new strategies to enhance efficiency. Finally, the impact model depicts the logic of the overall intervention, highlighting energy savings as a key impact resulting from optimised processes and enhanced staff capabilities.

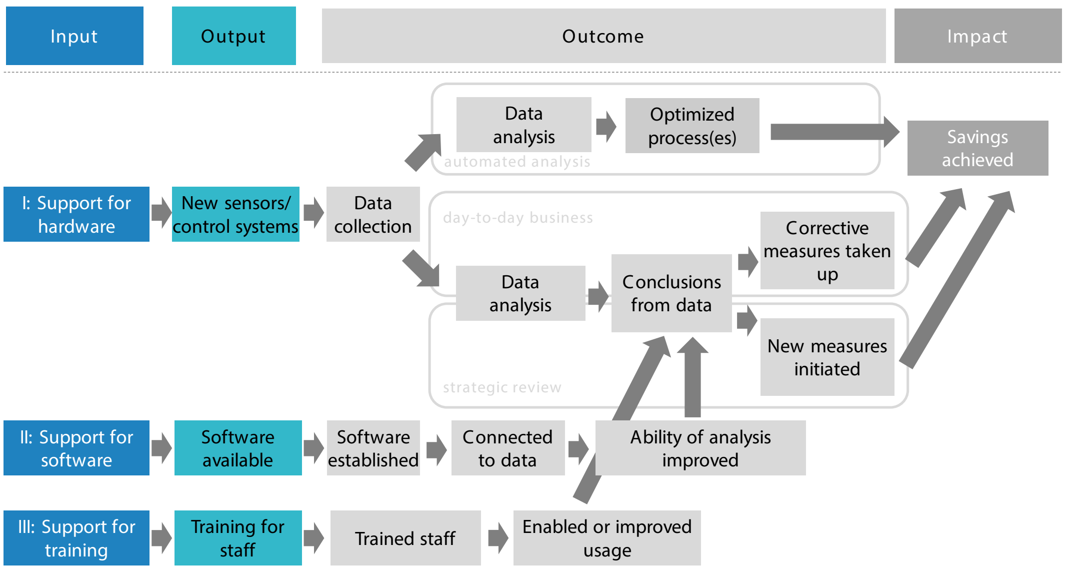

Figure 2: Illustration of an impact model at the example of Module 3 of the EEE (source: Neusel et al. 2023).

The impacts, such as energy savings but also various other aspects are mostly quantitatively assessed along a set of key performance indicators (KPI, **step 4**). For the EEE, these add up to about 100 individual indicators (including sub-indicators) across all categories. Table 3 provides an overview of the KPI chosen for the EEE's evaluation by core evaluation areas. The list includes a set of indicators of general knowledge interest (G), which serve to provide a general characterisation for each of the six funding modules. This is followed by the actual description of target achievement (A), effectiveness (B) and economic efficiency (C). Additional indicators seek to cover the quality of the procedural implementation (D), and the last category (E) contains indicators addressing module-specific and technology-specific issues and questions beyond the evaluation core objectives (e.g. the role of the module as a 'door-opener' for later participation in other modules). Most of the KPIs are quantitative values (e.g. GHG savings in tonnes of CO_2-eq.), yet some are provided qualitatively (e.g. quality of the funding process). For further details on the KPI shown in Table 3, the reader is referred to Neusel et al. 2024b.

Table 3: Overview of key performance indicators for the EEE (based on Neusel et al. 2024b).

(**G**) - **General knowledge interest:** Structural data on applications, approvals and funding
Availment by region, by type of company, by company size, by sector, by funding object, etc.
(**A**) - **Target achievement:** To what degree have the established targets been achieved?
Reduction in ▪ final and primary energy consumption ▪ GHG-emissions ▪ energy and resource costs
(**B**) - **Effectiveness:** To what degree is the measure causal to the achievements?
Total value of the effect adjustment: Gross impact - Free-rider and pull-forward effects + Spill-over and follow-on effects = Net effect
(**C**) - **Economic efficiency:** How efficient is the measure from the implementer's perspective with regard to achieving the targets and concerning the use of resources?
▪ Total costs (funding and administrative costs) ▪ Funding efficiency ▪ Total triggered investments ▪ Leverage effect (triggered investments to amount of funding)
(**D**) - **Procedural implementation:** How is the operational implementation perceived?
▪ Process from company and implementer's perspective (qualitative) ▪ Response time and complaints management
(**E**) - **Specific knowledge interest:** Module-specific questions that go beyond the specified evaluation objectives

The quantitative KPI for the EEE are determined using two sources of information (**step 5**): Data from the administration of the support scheme and data from the beneficiaries. Available administrative data contains information from the application on the beneficiary (e.g. name, location, company size) and financial and administrative information on the activity submitted for funding. For Modules 4 and 5, the competition line, information on greenhouse gas and resource savings is also partially available in the administrative data set. Complementary data and views on the funding process from the participants are collected via an annual online survey among beneficiaries. The survey consists of common questions for all modules and specific questions addressing aspects of individual modules or implementing agencies. Participation typically takes about 15 to 25 minutes. In the most recent evaluation of 2023, almost 11,000 beneficiaries were invited, with a response rate of around 20%, which is similar to previous years.

Using this data, gross KPI values are determined. For analysing the role of the EEE in triggering investments in energy and resource efficiency, an effect adjustment by calculating the category (B) indicators is carried out (**step 8**). For this, the online survey contains several control questions. These questions address the extent and role of the funding scheme for the investment by both, taking negative effects (e.g. free-riders: subtraction from gross values) and positive effects (e.g. spill-overs: addition to gross values) into account (Table 4) (Schlomann et al. 2017).

The evaluation accounts for both free-rider and spill-over effects, as shown in Table 4. Free-riders refer to investments or savings that would have occurred even without the funding scheme, including those that were already planned but brought forward due to the programme (pull-forward effect). Spill-over effects capture additional investments or savings triggered indirectly by the EEE, those that did not receive funding but were inspired by the programme, potentially leading to further energy efficiency actions.

A survey-based approach including a logic of several pre-defined questions is applied to quantify these effects. It is described in detail by Voswinkel 2018 for the EEE's predecessor programme. Net values are then calculated by subtracting free-rider effects from gross values and adding spill-over effects. For 2023, the effect adjustment reduces gross values by around 12 percentage points across all six funding modules (Figure 3). Violette and Rathbun 2017 give an account of other methods, including randomised control trials and quasi-experimental methods.

Table 4: Approach for net impact estimation of the EEE (Source: Voswinkel (2019)).

Impact / Effects	Description
Gross value	Impact before considering effects
- Free-rider and pull-forward effects	Saving that would have occurred without policy and early replacement
+ Spill-over effects	Effects trough spill-over (transfer) on third parties and other areas not directly credited to the programme
= **Net value**	Impact after adjusting for effects

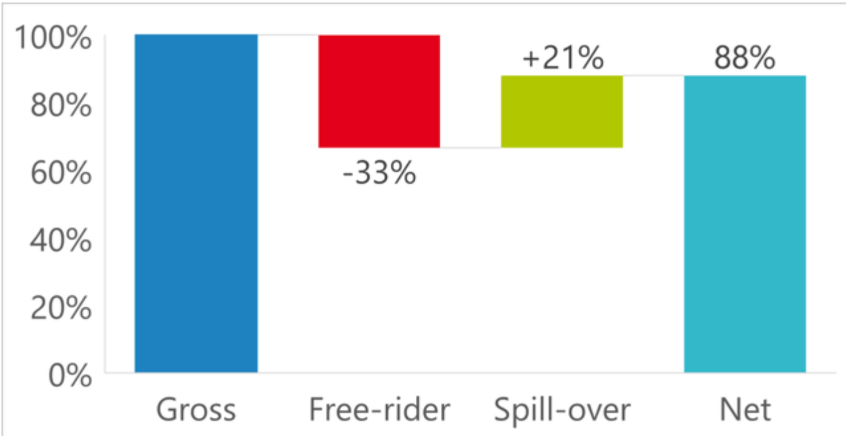

Figure 3: Effect adjustment from gross to net values as part of the EEE evaluation of 2023 (source: Neusel et al. 2024a).

DISCUSSION ON THREE METHODOLOGICAL ISSUES GAINING MOMENTUM

The foundational evaluation methodology is based on a nine-step approach, as outlined in Table 2. This methodology has been consistently applied over the years. However, the dynamic character of the EEE repeatedly poses new methodological and operational challenges to the annual evaluation. As a result, refinements or extensions of the methodology are necessary in certain areas. Summarised in Figure 4, previous publications have already covered some of these issues arising from the various changes in the EEE itself over the years, as for example described in Neusel et al. 2024b. However, three challenges of the most recent evaluation of the EEE for 2023 have not yet been addressed and are increasingly gaining momentum.

[1] Voswinkel 2020, [2] Hirzel and Schlomann 2022 [3] Neusel et al. 2024b, [4] Voswinkel 2018

Figure 4: Selection of methodological issues related to the evaluation of the EEE and its predecessor programme covered in prior publications (grey) and three novel issues (green) (own illustration).

#1 THE SUCCESSIVE DECARBONISATION OF THE ELECTRICITY SYSTEM

Some of the KPIs in Table 3 seek to project the impact of a measure on the energy and greenhouse gas (GHG) emissions over several years. This period typically spans the lifetime of the measure. Energy savings are usually expressed in terms of final energy and primary energy. Final energy refers to the energy used to operate an application, such as the amount of electricity used to operate an electric furnace. In contrast, primary energy reflects the amount of energy required to produce that final energy from the original energy source. For example, it includes the energy contained in the coal needed to generate electricity. To make this transition, a primary energy factor is used, which describes a ratio between primary and final energy. The GHG savings are determined in the same way, using an emission factor that reflects the amount of emissions per unit of final energy used. The selection of these factors can substantially influence the KPI.

While the emission factors for fuels such as coal and gas remain largely constant, the emission factor for electricity has been declining over the last couple of years. This decrease has gained momentum over the last couple of years in Germany (Umweltbundesamt 2024), and mid-term reference projections until 2030 have gained importance (Öko-Institut e.V. et al. 2023). These projections are based on consideration of the price for emission allowances in Europe, the implementation of measures in the energy industry sector including the deployment of renewable energies and hydrogen, as well as the coal phase-out. Consequently, GHG emissions from electricity generation in the German energy industry sector are expected to change significantly by 2030. According to the scenario-based projections of the

2023 projection report, it is expected that the GHG emissions from electricity generation in the German electricity mix will fall from 482 g $CO_{2\text{-eq}}$/kWh in 2023 to less than 92 g $CO_{2\text{-eq}}$/kWh in 2030 (Öko-Institut e.V. et al. 2023, with-measure scenario). Consequently, while the dynamics of the emission factors were less relevant in the first years of the EEE evaluation, the more solid projections of the emission factors become more relevant for the EEE's future impact over the lifetime.

Table 5 illlustrates the comparison of using a static vs. a dynamic emission factor on lifetime savings: This illustration assumes new measures each year with a lifetime of five years and annual energy savings of 1,000 kWh_{el} from 2021 until 2029. This adds up to lifetime energy savings of 25,000 kWh_{el}. With a static emission factor, this converts into lifetime-related GHG emission savings of 11.25 t $CO_{2\text{-eq}}$, whereas with dynamic emission factors, it converts into 8.49 t $CO_{2\text{-eq}}$. Due to the successive decarbonisation of the electricity system, lifetime emission savings are lower in the dynamic case.

To address the issue of successive decarbonisation of the electricity system, it is essential to maintain transparency in the framework data used. This is reflected in step 2 of the methodological framework shown in Table 2, where framework conditions and harmonised parameters (e.g. emission factors, primary energy factors, underlying lifetimes of the respective measures and energy prices) are defined.

Table 5: Illustrative comparison of the impact of using a static and a dynamic emission factor on lifetime savings in case of annual energy savings of 1.000 kWh_{el} with a lifetime of 5 years from 2021 to 2029.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	Lifetime savings
Energy savings in the respective year [kWh_{el}]	1,000	2,000[1]	3,000	4,000	5,000	4,000	3,000	3,000	1,000	25,000
Static emission factor* [g CO_2/kWh_{el}]	Constant at 450									-
GHG reduction in the respective year [t CO_2]	0.450	0.900	1.350	1.800	2.250	1.800	1.350	0.900	0.450	11.25
Dynamic emission factor* [g CO_2/kWh_{el}]	450	466	482	410	362	282	214	165	116	-
GHG reduction in the respective year [t CO_2]	0.450	0.932[2]	1.446	1.640	1.810	1.128	0.642	0.330	0.116	8.49

* Öko-Institut e.V. et al. 2023

#2 ATTRIBUTING SAVINGS FROM RESOURCE EFFICIENCY MEASURES

The second issue revolves around attributing savings from resource efficiency measures, i.e. emission reductions from saving material. The EEE is the first energy efficiency funding scheme in Germany to incorporate resource efficiency using a life cycle assessment (LCA) approach. Since November 2021, investments in resource efficiency measures have been eligible for funding besides energy efficiency measures. EEE evaluation results from resource efficiency projects in 2022 indicate that material saving or substitution measures are particularly substantial for savings in sectors such as cement, metal, and plastics. These projects are characterised by high absolute GHG reductions (Weinert et al. 2024). This underlines that other resources besides energy may substantially affect the EEE's target impact.

The computation of GHG savings as an effect of resource efficiency – similar to the calculation of GHG savings from energy – is based on a conversion factor, more specifically, a material-specific CO_2 conversion factor (e.g. in kg CO_2/kg) which is multiplied with the amount of savings of that material (e.g. in kg).

1 Measures implemented in 2021 with a lifetime of 5 years will save 1.000 kWh in 2022, and measures implemented in 2022 (again with a lifetime of 5 years) will save a further 1.000 kWh in 2022.

2 Measures implemented in 2021 and 2022, saving a total of 2.000 kWh in 2022, are converted into GHG emission savings using the 2022 emission factor of 466 g CO2/kWhel.

Such savings from resource efficiency can be viewed from two perspectives: The first is a climate perspective, which considers the reduction in emissions released into the global atmosphere, regardless of their origin. The second is an accounting perspective, which seeks to identify the savings resulting from of a particular measure. Care must be taken when analysing the impact of a measure from an accounting perspective, as some resources are global commodities, i.e. traded between regions. To illustrate this, Table 6 shows a simplified case with two regions which exchange resources and different regional resource conversion factors (e.g. due to different regional industries).

Table 6: Illustration of the attribution and accuracy of savings from resource efficiency measures to a Region A where the resource efficiency measure is implemented.

		Resources originating from	
		Region A	**Region B**
Resource conversion factors reflect the actual situation in	**Region A**	Savings attributable to Region A and accurate	Savings not attributable to Region A and likely over-/ underestimated
	Region B	Savings in principle attributable to the Region A, but likely over-/ underestimated	Savings not attributable to Region A and accurate

From a climate perspective, attribution errors are irrelevant as long as the conversion factors accurately reflect the actual impact (upper left and lower right quadrants in Table 6). Yet attribution errors may have two consequences for accounting: First, the average resource conversion factors used to determine GHG emission savings from resource efficiency measures may not necessarily reflect the actual impact of the respective resources. This can occur if only regional proxy values for the resource conversion factors are available (lower left quadrant). Alternatively, the correct factor may be available, but the resources could originate from a different region (upper right quadrant).

The implication points at the issue that savings cannot not be simply attributed to one region. In extreme cases, this could result in GHG savings exceeding the actual GHG inventory of a region/country if the inventory does not account for the “grey emissions” associated with imported resources. Therefore, within evaluations such as the EEE, it is essential to make conscious decisions regarding how to handle emission savings derived from imported materials. This consideration may become relevant for national reporting. It is particularly important when these savings are related to national targets or national emissions.

#3 DECISIONS THAT CONSIDER FUNDING EFFICIENCY ALONE

The third issue concerns using funding efficiency as the lead criterion for programme design only. Funding efficiency in this context is defined as the Euros expended (funding including administrative costs) per saved tonne of CO_2 over the measure's lifetime. This indicator is especially relevant in the context of limited public budgets, as it provides a straightforward metric for policymakers when evaluating effectiveness. However, relying solely on funding efficiency can be overly simplistic and may not capture the full impact of the measures. Factors that must be considered include (Schlomann et al. 2020):

- **Activation of target groups and potential:** Some target groups, such as small and medium-sized enterprises (SMEs), are more difficult to reach, i.e. with greater effort and higher funding volumes. This means that the funding efficiency of measures aimed at these groups is often lower. It should also not be neglected that it becomes more difficult to activate potential over time. This means that realising the last potential in an area of application is more complex and expensive than at the beginning.

- **Low-hanging fruits:** In that line of thought, the so-called "low-hanging fruits" with high economic efficiency are more likely to lead to an attractive funding efficiency than in-depth investments, e.g. those with a high degree of innovation and/or lighthouse character. However, addressing "low-hanging fruits" alone (particularly in the area of cross-cutting technologies) appears far from sufficient to achieve the long-term climate targets.

- **Economies of scale:** Small measures are administratively easier to implement, but they are often associated with smaller and short-term savings. Large measures are generally more expensive and administratively complex, but are usually associated with long-term and far-reaching savings, even if they may be less efficient in terms of funding. Nevertheless, such measures are also necessary in order to utilise the entire savings potential in an area.

In the EEE, there is a large variation in the funding efficiency of the six funding modules. For example, over the entire 2019-2023 funding period, the funding efficiency of Module 4 is 42 Euros per tonne of CO_2 for an assumed lifetime of 8 years, while it is 113 Euros per tonne of CO_2 (8 years lifetime) for Module 1. Among other factors, this can be attributed to the fact that Module 4 finances significantly larger projects than Module 1 due to its technology-open focus. In addition, Module 1 is mostly dominated by SMEs and funds smaller, more cost-effective cross-cutting measures. While from a purely monetary view of funding efficiency, Module 4 appears much more effective, a sole focus on this value would neglect to take the particularities of the modules.

It can be concluded that funding efficiency should not be used alone. Instead, it needs to be seen in the context of the characteristics and objectives of the measure. This includes factors such as the type and size of the measure, the type of reduction potential addressed as well as the long-term nature and depth of the effect of the induced energy efficiency measures. Therefore, it is essential to interpret funding efficiency within the specific context of each measure. This helps to gain a comprehensive understanding of their effectiveness.

CONCLUSIONS

The aim of this paper was, on the one hand, to outline the mixed methods approach underlying the evaluation of the Federal Funding Scheme for Energy and Resource Efficiency in the Economy (EEE). On the other hand, the aim was, to discuss methodological issues which arise from recent modifications of the scheme and its framework conditions.

The evaluation of energy efficiency funding schemes tends to be a complicated matter and obtaining the results of such an evaluation depends on many methodological choices along the way of the evaluation. Particularly in case of complex funding schemes- such as the EEE - which include multiple funding modules, it is crucial to rely on a standardized methodology. This ensures comparability and supports the meaningful interpretation of evaluation results. The methodology presented in this paper promotes a consistent evaluation process, while allowing flexibility to account for scheme-specific design, data availability, and contextual factors.

Experience from five consecutive years of evaluating the EEE, along with insights from the predecessor programme, demonstrates that the overall methodology, based on a nine-step approach, provides a robust and reliable foundation. Yet, it can be observed that there is a constant need for refinement and adaptation to changes such as shifts in external conditions, evolving interests or the introduction of new design elements. In this paper, three of these issues have been outlined in more detail. They underline that it (#1) requires transparency how the dynamic decarbonisation of the energy system is taken into account, that (#2) conscious decisions on how to consider resource efficiency in GHG accounting are needed and that (#3) funding efficiency can only be applied for design of such instruments if the context of these values has been sufficiently appreciated.

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