

[GERMANY] Energy Efficiency Fund

Energieeffizienzfonds

About the measure

Policy instrument	Sector	Starting date and status
Financial and information/education	General cross-cutting	[2011] – [on-going]

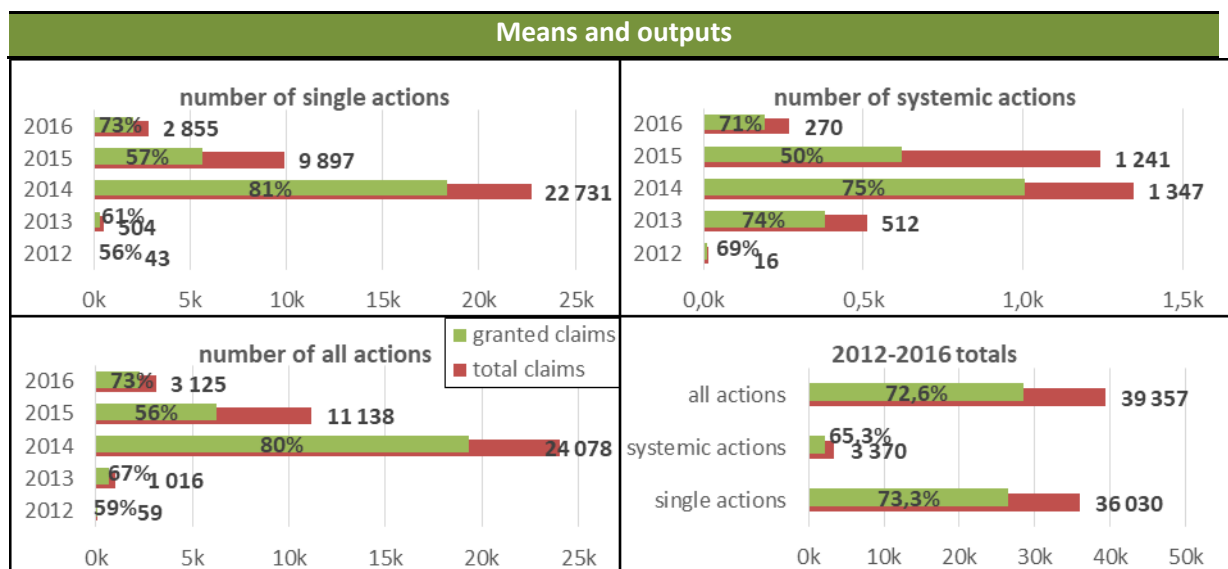
The **Energy Efficiency Fund (EEF)** is part of the German “**Energiewende**” that follows the goal to reduce **primary energy consumption** by 20% until 2020 and 50% until 2050 (compared to 2008). Furthermore, it seeks to reduce **greenhouse gas emissions** by 40% until 2020 and 80 to 95% until 2050 (compared to the Kyoto-Protocol base year 1990). The fund consists of currently **23 policy measures** including **funding schemes** and **educational activities**. A list can be found in the end of this case study. They target at contributing to a highly energy-efficient economy, the achievement of climate protection targets and

existing energy saving potentials, and the decrease of energy costs.

Funds proceed from the Federal Ministry for Economic Affairs and Energy (**BMWi**). The schemes are administered by different federal agencies or the development bank KfW. Beneficiaries are **businesses, households and municipalities**.

There is no overall quantified target for the fund. Unless otherwise stated, all quantitative data presented in this case study are about the single financial grant measure “support for highly efficient cross-cutting technologies in SMEs”. It is mostly used in the industrial sector.

Expected energy savings in 2020	Benchmark
2,260 TJ (628 GWh) per year in 2020 from actions implemented 2012-2020 (cumulated annual final energy savings) (BMWi 2016)	Equivalent to 0.9 Mt/year CO₂-eq. emissions reduction (CO ₂ -factor 1.43 t/MWh, taken from evaluation results). 0.46% of German 2020 reduction goal (- 40% relative to 1990)



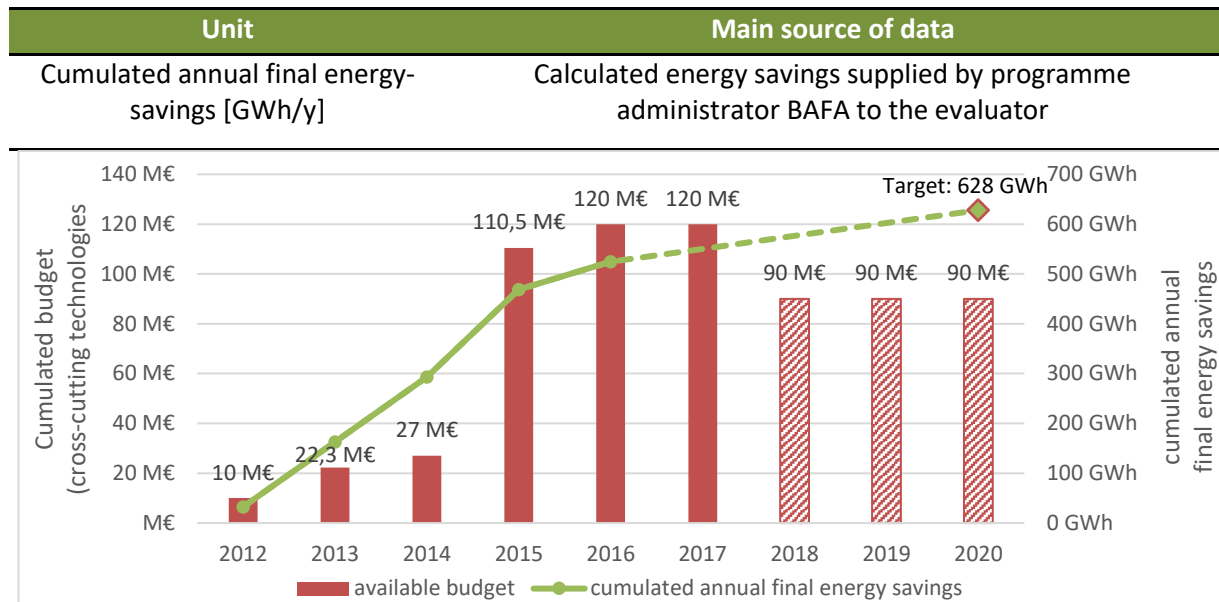
Source: BMWi, Fraunhofer ISI (2018, forthcoming)

Figure 1. Statistics on the number of actions.



- **Total claims** displays the number of all claims (granted, rejected and in process) for the two project types, single actions and systemic actions (complex actions consisting of several technologies working together with higher maximum funding), and totals.
- **Granted claims** include all granted claims, a percentage of total claims is shown. Funding can still be rejected when proof of implementation by the beneficiary fails.

Data about energy savings



Source: BMWi, Fraunhofer ISI (2018, forthcoming)

Figure 2. Budget (in M€) and cumulated annual final energy savings (in GWh/y).

- **Annual budget:** amount of money assigned to the grant measure “support of cross-cutting technologies” from the energy efficiency fund, annually cumulated.
- **Cumulated annual final energy savings:** Results available until 2016, 2020-target calculated from 900kt of CO₂-eq. emissions reductions using the CO₂-factor 1.43 t/MWh. Gross values. No yearly emissions or energy savings targets defined.

Sources of uncertainties about energy savings

- Differences in calculation **methodologies used by energy auditors** (for complex actions)
- Uncertainties of values from **product data sheets** (for simple projects, no ex-post verification)
- **Targets** defined in **emissions reductions**. Calculation based on **assumed constant emissions factors** (that can change over time in practice).
- **Effects** (e.g. free-rider effect) calculated based on **surveys** (risk of biased answers)

Evaluation of the energy savings

Calculation method(s) and key methodological choices

- Gross final first year energy savings are calculated before the physical implementation of the action based on the information provided by the beneficiaries (**Method 3 / deemed savings**) or the energy auditor (**Method 5 / scaled savings**).
- **Baseline** = “before” energy consumption
- **Free-rider effects** determined based on ex-post surveys. The whole Energy Efficiency Fund evaluation considers **interaction effects** between the different measures.

Ex-post verifications and evaluations

No ex-post verification is conducted. However, separate monitoring projects are implemented for certain measures from the EEF. The EEF is re-evaluated and updated each year until its end in 2020. The individual policy measures as well as the fund as a whole are **evaluated by independent entities** regularly using **both qualitative and quantitative** approaches depending on the measure.

Administrative cost calculated from average minutes spent for processing of each action in two action categories (simple and systemic) and weighting for cost of labour and overheads.

Other indicators monitored and/or evaluated

Indicator	Explanations
Greenhouse-gas emissions reduction	Displayed in CO ₂ -equivalents of direct emissions (IPCC scope 1) Calculated from energy savings data for separate energy sources using constant CO ₂ -factors. (for results, see blue line in energy savings figure above)
Funding efficiency	Energy savings / emissions reductions per 1000 Euro spent (funding amount + administrative cost) (average 26.74 MWh saved per 1000 € over the lifetime of the actions, in cross-cutting technologies assumed 10 years, values for actions vary)
Administrative cost per action and per final energy savings	Total administrative cost (not including grant cost) relative to number of granted actions (99,21€ per granted action) and their achieved energy and CO ₂ -savings (0.52€ per saved MWh and 1.04 € per saved t CO ₂ -equivalent)
Leverage effect	Total investment triggered by funding (Euros of total investment per Euro spent for funding) (4.05)
Programme Satisfaction	Qualitative assessment from surveys with beneficiaries and administrators
Sectoral Analysis	In the larger measures, indicators are also calculated per sector and per company size when deemed appropriate.

Source: BMWi, Fraunhofer ISI (2018, forthcoming)

Other aspects evaluated

The **first indicator** in the evaluation of each policy measure, which all other aspects relate to, is **contribution to an energy efficient economy**. It is of qualitative nature and relates to the overall appropriateness of the measure to reach the goals laid out in the national action plan for energy efficiency (NAPE) and the climate action plan of the federal government.

Energy savings data are collected for each measure as not only a whole, but also always divided into **combustibles, electricity and transport fuels**. All energy data are also given as **both final energy and primary energy** data. In the light of rapidly changing means of energy production, final energy falls short of showing these changes. The German Ministry of Economic Affairs is therefore mostly interested in primary energy data.

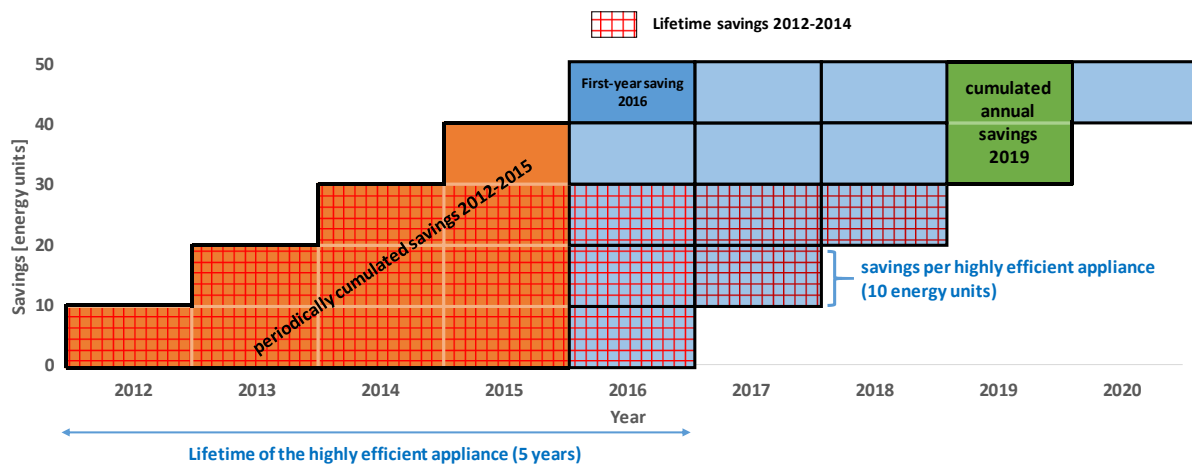
For better insights into the particularities of the programme, its strengths and weaknesses from the viewpoint of both the participating companies and the administering and funding party are evaluated using **questionnaires**. For the measure “support for highly efficient cross-cutting technologies”, 88% of respondents from the receiving companies rated the programme as a whole either very good or good. **Satisfaction with the provided information, processing times and support during the process** are of particular interest. Questions about that showed that 57 % viewed the processing times appropriate or better. However, that number is not as high as in other investigated aspects.

The **energy efficiency fund as a whole** is also evaluated as an aggregate. For that, **savings data** for both greenhouse gas emissions and energy savings, divided into combustibles, electricity and transport fuels as mentioned above are **added up**. Because the **largest policy measures are quantifiable**, the result is **significant for the overall performance** of the fund. However, **many of the 23 measures** are smaller and information or **education-based**. These are **not quantifiable** and are excluded in the aggregate analysis. Aggregate results, therefore, **systematically underestimate** the total savings from the EEF.

Focus on yearly data aggregation

In the evaluation system of the energy efficiency fund, the starting point is the **first-year final energy savings expressed in terms of savings per year**. Based on that, further aggregate values can be calculated: **cumulated annual final energy savings, periodically cumulated savings, or lifetime savings**. In cumulated annual energy savings, as given in the energy targets figure on page 2, the new annual savings are added to the annual savings achieved in the same year by the projects implemented in the previous years, whose lifetime is still running (shown in green in the figure below). The values are given in final energy savings per year (in GWh/y).

In periodically cumulated savings, the cumulated annual energy savings from all the years of an evaluation period are added up (shown in orange in the figure below). This result is not a result of savings per year (in GWh/y), but of absolute savings (in GWh) until the end of the evaluation period. The lifetime savings are adding up savings that the actions will lead to until the end of their lifetimes. Lifetimes vary for different actions and can be assumed or measured. The cross-cutting technologies measure assumes a lifetime of 10 years. The value is given in absolute savings values (in GWh). The figure below shows the methods using the example of a generic electrical appliance with dummy values for illustration purposes. Each year, one highly efficient appliance with a lifetime of 5 years replaces an old one. Each one saves 10 energy units per year.



Source: Schlomann et al. 2015

Focus on uniform data collection over all policy measures

The evaluation of an umbrella programme like the energy efficiency fund that consists of a range of policy measures is challenging because of the ambition, that **all policy evaluations follow a uniform methodology and data representation scheme**. This must also be true, when several evaluators from multiple organisations are in charge of evaluating different policy measures.

For this purpose, in the energy efficiency fund, a very detailed **methodology report** (Heinrich et. al. 2016) was elaborated first detailing which data is necessary for an aggregated evaluation. It remains unpublished, but contents were used to elaborate the scientific article by Schlomann et al. (forthcoming 2017). **Indicators are clearly defined** and numbered. Methodologies for aggregating emissions and energy savings, as shown above, are also described in detail. Furthermore, the goals of the evaluation as an integral part of the working of the energy efficiency fund are laid out in the methodology report.

In order to **aggregate the results from the quantifiable policy measures**, a **structured spreadsheet template** was elaborated that automatically calculates the above given aggregated values for all indicators. Having an identical spreadsheet with all values allows combining these sheets in an aggregation spreadsheet without the need to input the data for each measure individually.

Tables with the exact number of rows and columns from the spreadsheet are then included in the template for the report, which makes it easy to represent the data for all policy measures in a uniform way.

Experience feedback from stakeholders

1. What is your role in the implementation and evaluation of the energy efficiency fund? What is your professional background? Which policy measures are you responsible for?

I am an administrative scientist and work at the German Federal Ministry of Economic Affairs and Energy in the administration of energy efficiency policies.

In the Energy Efficiency Fund, I am responsible for measures in industry and business.

2. What is the role of evaluation in the management of the scheme?

Recommendations are frequently used for the implementation and modification of the energy efficiency support strategy. They are generally given high importance in decision-making about energy efficiency policies and serve as intellectual input for policy ideas. Apart from that, evaluations serve as a means of justification for actions taken. The Bundesrechnungshof (German Federal Court of Auditors) often uses evaluation reports for their judgement about the usage of public funding. However, recommendations that are not possible to implement or are politically not opportune, may be left out of consideration.

Sometimes, certain sentences need to be revised in their formulation or their content. In general though, discussions between the evaluators and the ministry are open and based on mutual understanding.

3. What were the main lessons learnt from the evaluation of the energy efficiency fund or from one of the policy measures? (about the impacts of the scheme and what could be improved)?

I can give an example about the evaluation of current industry related energy efficiency programmes. The evaluation strongly supports the strategy of technology-independent support schemes. They can bundle different technology categories in one programme,

reduce precise technological requirements and therefore reduce administrative costs and barriers for potential beneficiaries [sic]. That is why the programmes should serve as a benchmark for other policy measures. In the exhaust heat project, it gave the important insight, that the concepts from energy auditors that serve as the basis for the granting of aid should be more comparable. More detailed requirements should be formulated. In the end of the day, one of the important features in policy evaluation is always the reputation of the evaluator. It determines the trust we can put into the results.

4. What were the lessons learnt in terms of evaluation practices? What has proven good or not so good?

I cannot answer that. It is rather another division taking care of that. Defined indicators were taken as given in the evaluation report. The important thing is, that they are well justified. For example in the exhaust heat evaluation, the survey sample size was too small to be used for a reliable calculation of free-rider effects.

5. In parallel of the ex-post evaluations, are there other evaluations or studies that provided insights about the impacts of the scheme and/or possible interactions with other policies or drivers (or barriers) for energy efficiency?

There are many scientific projects complementing the policy measures. The big question is always how to use scientific results in practice? The scope of evaluation is very large, particularly in energy efficiency because it is so technical.

6. Do you have further remarks about experiences with the evaluation of the energy efficiency fund that you would like to share?

I do not for now.

To go further

About the measure

- BMWi webpage in English about German energy efficiency policies:

<http://www.bmwi.de/Redaktion/EN/Dossier/energy-efficiency.html>

- Webpage about the measure “support for highly efficient cross-cutting technologies in SMEs” on BAFA website (in German):

http://www.bafa.de/DE/Energie/Energieeffizienz/Querschnittstechnologien/querschnittstechnologien_node.html

- **MURE database entry:**

http://www.measures-odyssee-mure.eu/public/mure_pdf/general/GER50.PDF The Energy Efficiency Fund (EEF) was established in 2011 with the aim of further exploiting existing energy savings potential in multiple sectors (e.g., private consumers, industry, municipalities). Initial funding equalled EUR 90 million in 2011, and rose to EUR 462 million in 2017. The target groups to be addressed, and the orientation of the individual EE policies to be financed by the EEF, have already been outlined in the German federal government's Energy Concept. At the moment, 23 EE policies and programs are directly financed by the EEF (Heinrich et al. 2017). Among them are

- National funding schemes for the uptake of organizational concepts (energy audits and energy management systems).
- Further funding schemes for the implementation of energy efficient technological solutions (cross-cutting technologies as well as process technologies) in companies.
- Energy advice programs for private households and small and medium enterprises.
- An innovative pilot program using smart plugs, terminals or meters for the search of most cost-effective energy-saving technologies and business models. (Blohm 2016).
- A national energy efficiency label for existing heating installations to motivate building owners to replace old, inefficient heating systems and to raise the replacement rate.
- The National Top-Runner Initiative (NTRI) is meant to provide information, promote dialogue and inject new ideas for improving energy efficiency of electricity-using products. It aims to work alongside the value chain – from the product manufacturers, over retail trade to the consumers – in order to accelerate the market penetration of highly energy efficiency products and services (top runners).

The allocation of finances to the fund at first amounted to EUR 90 million in 2011, and most recently EUR 462 million in 2017. The target groups to be addressed by the Energy Efficiency Fund and the orientation of the measures financed from this have already been outlined in the German federal government's energy concept (BMWi and BMU 2010). The purpose of the fund is to address both private consumers as well as industry and municipalities, to increase their potential for energy and electricity savings and thus also to reduce their energy costs in the long term.

References of the evaluation(s)

- Deutsche Energieagentur (dena). 2016. Evaluation des Förderprogramms “Investitionszuschüsse für den Einsatz hocheffizienter Querschnittstechnologien im Mittelstand” https://shop.dena.de/fileadmin/denashop/media/Downloads_Dateien/esd/9186_Evaluation_des_Foerderprogramms_Investitionszuschuesse_fuer_den_Einsatz.pdf
- Heinrich., S., Paar, A., Nabitz, L., Hirzel, S., Schломann, B., Antoni, O., Jessing, D., Pehnt, M. 2017. Evaluierung und Weiterentwicklung des Energieeffizienzfonds. Bericht zum Evaluierungssystem

des Energieeffizienzfonds. Karlsruhe, Basel, Heidelberg, Würzburg: Fraunhofer ISI, Prognos, ifeu, SUER (unpublished).

- BMWi, Fraunhofer ISI - Final report of the Energy Efficiency Fund. Karlsruhe, Basel, Heidelberg, Würzburg: Fraunhofer ISI, Prognos, ifeu, SUER (2018, forthcoming)

Other useful references

- Schlomann et al. (forthcoming, autumn 2017). From Targets to Impacts: Eight Steps for Evaluating Energy Efficiency Policies Proceedings. Proceedings of the IEPEC, Baltimore 2017

How to cite this case study

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List of the 23 policy measures in the energy efficiency fund (as of 2016)

Original name	English translation	administering entity	Website
Abwärmerichtlinie	Exhaust heat guideline	KfW	https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/F%C3%B6rderprodukte/EE-Abw%C3%A4rme-(294)/
Bürgerdialog Stromnetz	Community dialogue power grid	DUH Umweltschutz-Service GmbH, Hirschen Group GmbH, IKU_Die Dialoggestalter	https://www.buergerdialog-stromnetz.de/english/
Effizienzhaus Plus mit Elektromobilität	Efficiency house plus with electric mobility	BBSR	http://www.forschungsinitiative.de/effizienzhaus-plus/
Nationales Effizienzlabel für Heizungsanlagen	National efficiency label for old heating systems	BAFA	http://www.bafa.de/SharedDocs/Downloads/DE/Energie/he_handlungsleitfaden_berechtigte.html
Energie- und Stromsparmchecks der Verbraucherzentralen	Energy and power savings checks of the consumer advise centre	BAFA	https://www.verbraucherzentrale-energieberatung.de/
Energieberatung Mittelstand	Energy consultancy for medium-sized enterprises	KfW (until 2014), BAFA (from 2015)	http://www.bafa.de/DE/Energie/Energieberatung/Energieberatung_Mittelstand/energieberatung_mittelstand_node.html
Energieeffizienz-genossenschaften	Energy efficiency cooperatives	dena	https://www.dena.de/themen-projekte/projekte/energieeffizienz-genossenschaften-strassenbeleuchtung/
Energieeinspar-Contracting	Energy saving contracting	BAFA	http://www.bafa.de/DE/Energie/Energieberatung/Contracting_Beratung/contracting_beratung_node.html
Energieeinsparzähler	Energy savings counter	BAFA	http://www.bafa.de/DE/Energie/Energieeffizienz/Einsparzaehler/einsparzaehler_node.html
Förderung von Energiemanagementsystemen	Support for energy management systems	BAFA	http://www.bafa.de/DE/Energie/Energieeffizienz/Energiemanagementsysteme/energiemanagementsysteme_node.html
EnEff.Gebäude.2050 – Innovative Vorhaben für den nahezu klimaneutralen Gebäudebestand 2050	Energy Efficiency buildings 2050 - Innovative projects for a nearly climate neutral building stock 2050	Projektträger Jülich	https://www.ptj.de/eneff-gebäude-2050
Leuchttürme Abwärme	Flagship project exhaust heat	dena, BAFA	https://www.dena.de/themen-projekte/projekte/energiesysteme/leuchtturm-abwaerme/
Unterstützung der Marktüberwachung	Support for market monitoring	BAM	https://netzwerke.bam.de/Netzwerke/Navigation/DE/Projekte/NAPE-MARKTUEBERWACHUNG/nape.html

Gesetz zur Digitalisierung der Energiewende	Law for the digitalisation of the Energiewende	BSI	https://www.bmwi.de/Redaktion/DE/Artikel/Energie/digitalisierung-der-energiewende.html
Mittelstandsinitiative Energiewende und Klimaschutz	medium-enterprise initiative for the Energiewende and climate protection	BAFA	http://www.mittelstand-energiewende.de/en/
Richtlinie Energieberatung und Energieeffizienz-Netzwerke für Kommunen und gemeinnützige Organisationen	Guideline energy consultancy and energy efficiency networks for municipalities and charitable organisations	BAFA	http://www.bafa.de/DE/Energie/Energieberatung/Energieberatung_Nichtwohng%C3%A4ude_Kommunen/sanierungskonzept_neubauberatung_node.html
Paket BMUB: „Kurze Wege für den Klimaschutz“ und „Kommunale Klimaschutz-Modellprojekte“	Environmental Ministry package: "short distances for climate protection" and "municipal climate protection model projects"	BMUB	http://www.bmub.bund.de/service/publikationen/downloads/details/artikel/kurze-wege-fuer-den-klimaschutz/
PKW-Label	Passenger car label	dena (until 2015), BAFA (from 2016)	https://www.pkw-label.de/
Energieeffiziente und klimaschonende Produktionsprozesse	Energy efficient and climate friendly production processes	Projektträger Karlsruhe	https://www.ptka.kit.edu/560.php
Förderung von Querschnittstechnologien	Support for highly efficient cross-cutting technologies	BAFA	www.bafa.de/DE/Energie/Energieeffizienz/Querschnittstechnologien/querschnittstechnologien_node.html
Schaufenster Intelligente Energie	Showcase intelligent energy	Projektträger Jülich	https://www.ptj.de/sinteg
Nationale Top-Runner-Initiative	National top-runner-initiative	BAFA	http://www.bafa.de/BfEE/DE/Effizienzpolitik/NationaleTopRunnerInitiative/nationaletoprunnerinitiative_node.html
Vor-Ort-Energieberatung	On-the-spot energy consultancy	BAFA	http://www.bafa.de/DE/Energie/Energieberatung/Vor_Ort_Beratung/vor_ort_beratung_node.html