Evaluation Plan

for the funding guideline

‘State aid for firms in sectors or subsectors in which it is assumed that there is a significant risk of displacement of CO2 emissions when considering that the costs for the EU ETS certificates are passed on in the electricity price‘

(*Electricity Price Compensation*)

1. Brief description of the funding guideline to be evaluated

a) The EU Emissions Trading System (ETS) and the risk of carbon leakage

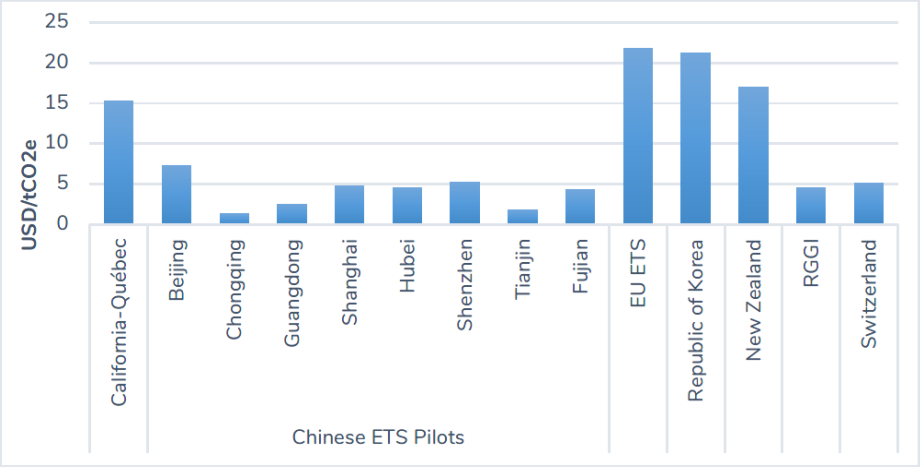
A major key driver for investment in climate-friendly, low carbon technologies is carbon pricing. Therefore, the European Union has successfully implemented a Europe wide market for carbon and other greenhouse gases, the Emissions Trading System (EU ETS), which is supposed to provide economic incentives for reducing emissions.

However, the additional costs directly and indirectly caused by emissions trading lead to an increase in production costs and affect the EU industry’s position in international market. Thus, the implementation of emissions trading involves the risk that certain sectors and subsectors are forced to transfer their production activities for financial and economic reasons to regions outside the European Union with less ambitious climate constraints or with no constraints at all (so called ‘carbon leakage‘). As a consequence, greenhouse gas emissions in those regions, where the industry does not have to comply with comparable climate standards, increases while the EU’s economy loses production.

Industries with high energy consumption processes, e. g. the steel and chemical industry, are considered to be particularly at risk of carbon leakage. As emission allowances for the production of electricity are not allocated free of charge, European electricity producers add the additional costs incurred by the purchase of emission allowances to the electricity price. This leads to an increase of the electricity price and particularly puts energy-intensive industries at a disadvantage.

Additionally, so far only few economic areas have established their own emissions trading systems. Nevertheless, the carbon prices in these systems deviate remarkably from those inside the geographical scope of the EU ETS (as shown in the graph below). The major difference of carbon prices around the world further weakens the competitive position of energy-intensive industries in the international market and increases the incentive to relocate production facilities outside the European Union.

Figure 1. Carbon prices from ETS around the world (based on data from November 2018)



Source: "Raport z rynku CO2", KOBiZE, no. 80, November 2018 (based on the International Carbon Action Partnership)

Figure 1 gives an example of the differences between the prices for emission allowances in emissions trading systems established in different parts of the world

Germany as one of the strongest industrial regions in the European Union is particularly at risk of carbon leakage. Thus, measures to avoid carbon leakage are of major importance.

b) *Concept and objectives of the funding guideline*

In the absence of a generally binding international agreement on the reduction of greenhouse gas emissions and a global 'level playing field', European state aid seeks to prevent an increase of global greenhouse gas emissions caused by the relocation of production activities to locations outside the European Union.

Therefore, Article 10a paragraph 6 of Directive 2003/87/EC determines that any EU member state may grant financial aid in favour of certain sectors or subsectors which are assumed to have a considerable risk of carbon leakage due to significant indirect costs incurred by the inclusion of costs for greenhouse gas emissions. This, however, is based on the condition that the respective financial measure complies with the European state aid rules and, in particular, does not cause unjustified distortions of competition in the internal market.

In order to reduce the risk of relocation and, consequently, the risk of carbon leakage, the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Ministry for Environment, Nature Conversation, Nuclear Safety and Consumer Protection (BMUV) developed the national funding guideline „State aid for firms in sectors or subsectors in which it is assumed that there is a significant risk of displacement of CO2 emissions when considering that the costs for the EU ETS allowances are passed on in the electricity price (electricity price compensation)“.

This funding guideline came into force on the beginning of the 3rd trading period (2013-2020) of the EU Emissions Trading System (EU ETS).

On the occasion of the beginning of the 4th trading period (2021-2030) and against the background of the adaption of the relevant state aid regulations to the increased risk of carbon leakage, the electricity price compensation shall now be revised and the funding guideline shall be amended accordingly (hereinafter: the ‘Funding Guideline‘).

The Funding Guideline aims to grant state aid as compensation for the increase of electricity prices due to the inclusion of costs for greenhouse gas emissions (‚electricity price compensation‘).

The Funding Guideline pursues the following objectives:

- First and foremost, the promotion of the international and European climate protection targets by
    - preventing a global increase of greenhouse gas emissions by reducing the (electricity costs related) carbon leakage risk,

- minimising the direct and indirect emissions intensity of production processes by supporting investments in energy efficiency and low carbon technologies.

In economic respects,

- to ensure the competitiveness of the funded sectors and subsectors in the international market,
- to secure jobs in the affected sectors and subsectors,
- to avoid an investment leakage.

In order to ensure that the granted compensation does not become a strong incentive to increase electricity consumption, the Funding Guideline includes several precautionary measures that shall help to reduce the carbon intensity and to increase the energy efficiency of the funded industries:

As compensation will mainly be calculated based on benchmarks. Only those indirect CO2 costs, which arise from the use of very efficient production processes, are recognized by those benchmarks. In case a product-related benchmark does not exist, a strict fallback benchmark will be applied. Thereby, the economic incentive for conducting efficiency improvement measures remains fully intact. Especially companies producing below the stated benchmark will be urged to invest in more efficient and climate-friendly technology.

In contrast to the original funding guideline, aid recipients will be additionally obliged to implement specific compensatory measures when being granted electricity price compensation. These measures include:

- implementing recommendations from energy audits,
- reducing the CO2 footprint of their electricity consumption or
- investing at least 50% of the granted aid in measures to reduce greenhouse gas emissions.

Finally, state aid will shall now also be granted for electricity from renewable sources This will also help to reduce the CO2 intensity of the electricity consumed.

All in all, the Energy and Climate Fund (ECF) provides a budget of EUR 14.364.298.549,00 for implementing electricity price compensation.

c) *Selection criteria and approval procedure*

Compensation is only granted to companies in certain energy-intensive sectors and subsectors that are listed in Annex II of the EU State Aid Guidelines. This annex especially includes sectors and subsectors which have production processes with particularly high electricity usage and which are considered to have a significant risk of carbon leakage due to their emission and trade intensity, *i.e.*:

- steel industry,
- chemical industry,
- non-ferrous metal industry,
- paper industry.

Besides, only actively used production facilities which are located on German territory and comply with various reporting and procedural requirements are entitled to receive the compensation.

Applications need to be submitted to the German Emissions Trading Authority (DEHSt) which is the national authority in charge of granting electricity price compensation. Application forms can be found on the authority‘s website.

Compensation will be granted for the years 2021 to 2030 and can be applied for retrospectively for the respective expired calendar year. The application deadline will be announced by the DEHSt on its website. It usually ends 31 May at the earliest and 30 September at the latest of the year following the applicant’s accounting year.

The information provided in the application form, especially the information concerning supplementary aid, needs to be certified by a public accountant or a sworn auditor.

At the end of the respective application period compensation will be calculated and disbursed.

Applicants may receive compensation for their emissions trading-related share of electricity costs in the amount of 75 %. For companies with particularly high energy consumption processes the compensation intensity may sometimes be insufficient to ensure adequate protection against carbon leakage. In those cases, companies are allowed to additionally apply for supplementary aid, which limits the CO2 costs to 1.5 percent of the company's gross value added (GVA). However, a ‘base amount’ of 5 % of the relevant EUA-price, but at least € 5 per tonne of CO2, is excluded from the additional super cap aid.

Compensation is generally calculated based on the European Commission energy efficiency benchmarks, if available. These benchmarks are intended to compensate businesses for electricity usage, based on the most efficient process for the production of the specific product. Where products are eligible for compensation but do not have specific benchmarks, e.g. due to data limitations, the aid is calculated based on the electrictity used for the production of these products. The aid is then adjusted by a uniform efficiency fallback benchmark.

In return for receiving electricity price compensation, the companies are obliged to prove that they take measures to reduce the energy efficiency or CO2 intensity of their production facilities, e.g. introducing an energy management system, receiving 30% of their electricity from renewable energies.

2. Evaluation questions

The evaluation should provide information on whether and to what extent the objectives of the Funding Guideline have been achieved and how the climatic and economic impact and the economic efficiency of the Funding Guideline are to be assessed.

Therefore, the following guiding evaluation questions have been developed:

	Evaluation question

Target achievement	• Whether and to what extent could the original objectives of the funding be achieved? • How can the effects be classified and evaluated in an overall economic view? • To what extent can the objectives of electricity price compensation be achieved with the current funding instrument?
Impact monitoring	• To what extent was the funding measure responsible for the objectives and effects that have been achieved?
Efficiency	• Are the processes for implementing the programme on target? • To what extent do the operational programme implementation and the used funding instruments meet the requirements of the aid recipients? • How appropriate and useful is the compensation rated by the aid recipients? • What are the actual administrative costs and what share do they have in the overall budget of the funding programme? • Is an adjustment of the current funding measure necessary and useful?

	• What is the benefit of the funding measure in relation to the other funding programmes? • Was the funding measure cost-effective?
Future Relevance	• To what extent is the funding programme relevant for the future?

3. Result indicators

Due to complex economic interrelationships, carbon leakage as well as environmental effects can hardly be quantified. The same applies to a quantified indication of the greenhouse gas savings achieved. Instead, the carbon leakage risk caused by indirect CO2 costs was estimated by using the indirect emission intensity as an indicator. This method corresponds to the EU-wide established methodology for considering the carbon leakage risk of individual sectors. It has been shown that the indirect emission intensity (taking into account the non-compensated electricity volumes) is lowered by the electricity price compensation and the risk is thus reduced accordingly.

Objective	Result Dimension	Result Indicators
Climate Protection	○ preventing a global increase of CO2 emissions by reducing the (electricity costs related) carbon leakage risk ○ minimising the direct and indirect emission intensity of the production processes	○ amount of annual direct or indirect production-related emissions (CO2 footprint) ○ emissions (CO2 footprint) and - derived from this - the emission intensity of production
Climate Protection	○ initiating investment activities in the reduction of production-related CO2 emissions from existing production facilities	○ annual implementation of measures within the framework of the energy and

	○ maximising gross investments in energy efficiency and climate protection measures	environmental management systems (amount of investment)
Economic Stability	Avoiding a substantial impairment of the competitiveness of the supported sectors: ○ Avoidance of electricity-cost-related losses in gross value added (GVA) or production volume, ○ Minimising the share of indirect CO2 costs remaining after compensation in gross value added (GVA), target value ≤ 1.5%	○ annual gross value added (GVA) or production volume ○ annual non-compensated CO2 cost share of gross value added (GVA)
Economic Stability	○ Avoidance of job losses in the supported companies and sectors caused by indirect CO2 costs associated with the EU ETS (> 200.000)	○ Number of jobs in assisted enterprises and eligible sectors

4. Envisaged evaluation method

The evaluation shall examine the impact of electricity price compensation on carbon leakage, the environment and the competitiveness of the supported sectors and subsectors. However, the evaluation carried out during the first term of the electricity price compensation programme (2013-2017) concluded that due to very complex economic interrelationships carbon leakage as well as environmental effects cannot be quantitively determined by the econometric methods usually used for assessing the causal impact of state aid programmes.

A company's decision to relocate its production facilities outside the geographical scope of the European Emissions Trading System (EU ETS) cannot solely be explained by the increase in indirect CO2 costs and the availability of electricity price compensation. Rather, the company’s relocation decision depends - apart from merely financial considerations - on strategic considerations and various competitive factors. Consequently, the

complex correlation between electricity price compensation, indirect CO2 costs and potential carbon leakage can only be fully assessed by taking into account all parameters that can lead to investment leakage, production leakage or relocation, e. g. the current economic situation, the international competitive pressure, the market demand or labour costs.

Therefore, the Federal Ministry for Economic Affairs and Climate Action (BMWK) is determined to closely cooperate with the evaluation committee in order to identify the most suitable evaluation method and to provide an informative and reliable basis to quantify the risk of carbon leakage and the effectiveness of electricity price compensation.

In the course of the evaluation, the extent to which analytical methods can be deployed should be examined. Bidders should be given the possibility to propose evaluation methods.

The following section shall critically examine all major methods discussed in the European Commission's working paper and shall explain why some of the proposed evaluation methods should not be applied and which evaluation methods might fit:

a) Randomised Experiments

   Randomising the process used for selecting beneficiaries is one way of making sure that the evaluation is unbiased. Due to randomisation, there is no systematic difference between beneficiaries and non-beneficiaries apart from the aid and the difference in the outcomes can be attributed to the policy. Randomised field experiments present legal and political difficulties and are not suitable for this programme. A natural experiment, which could only come about if enterprises were unable to influence any potential funding, is also not an option.

   Setting up a control group without selection bias does not seem possible. The comparison between recipients and applicants rejected for lack of funding was used by Martini and Bondonio (2012). But in this case, if the available budget is exhausted, all applicants would receive a reduced compensation in order to stay within the approved budget. Therefore, no applicant will be rejected for budgetary reasons only.

In sum, selection into the program is clearly not random but based on a set of specific eligibility criteria. Using randomisation to evaluate this programme cannot be recommended.

b) Quasi-Experimental Methods

- *Instrumental Variables*

Instrumental variables is another method for evaluating interventions and, in particular, to deal with endogeneity of explanatory variables. This method in general might useful for programmes where the set up of the compensation does not allow to withhold interventions from some applicants. Since benefiting from aid can be seen as an endogenous explanatory variable of the performance of a firm, it is natural to use an instrumental variable to evaluate the effect of aid. For the evaluation of this programme, an instrumental variable is a variable that can explain the fact of receiving the aid but has no direct impact on the other unobserved determinants of the outcome that has to be measured.

However, presence of a convincing instrumental variable that could be assumed to be uncorrelated with the unobserved determinants of the performance of firms could not be clearly identified. There are no straightforward candidates for instrumental variables available, using the carbon leakage indicator as a variable seems to be problematic.

In case the future evaluator will identify an instrumental variable, the application instrumental variables for the evaluation of the scheme is possible.

- *Regression Discontinuity Design (RDD)*

Regression discontinuity design might be another possible method for evaluation. Problematic would be that in the past, there have only been a handful of rejected applications for compensation. Still, it cannot be ruled out that a number of companies are de-facto excluded. The effort and cost associated with the application might be higher than the compensation itself for small companies. This might provide an opportunity to use these companies as a control group. Also, the recent change in eligible sectors might provide an opportunity to use the RDD method.

Yet, these possibilities are uncertain and will therefore be further examined by the future evaluator.

- *Difference in Difference*

  Another method to determine the causal impact of aid schemes is the Conditional Difference-in-Difference procedure. It combines two methods: the Difference-in-Difference procedure to monitor for unobserved characteristics, and a matching procedure to select the control group, i.e. to monitor observed characteristics.

  In this case, both determining the outcome difference over time and creating a suitable control group seem problematic.

  Since all sectors have already been eligible for compensation in the past years or will be eligible this year, the availability of data before the intervention is highly uncertain.

  Also, the quality of the control group is of crucial importance for the measurement of the causal effects. It is necessary to use the best possible control group of non-recipients in order to build the counterfactual case. The definition in the working document ‘Common methodology for State aid evaluation’ states that the control group must not consist of companies which have voluntarily decided not to benefit from the intervention.

  The approval or rejection of an application for compensation is dependent on whether or not the company belongs to an eligible sector and the conditionalities are being fulfilled. Since both the beneficiaries and the control group should be affected identically by common shocks, using different sectors companies for the control group does not seem promising. As shown above, using small companies (for which the cost associated with the application is higher than the compensation) might provide an opportunity.

c) Structural Estimation

The effectiveness of electricity price compensation might also be quantified by a structural estimation model. The future evaluator will have to assess further, if the following ideas for evaluation are feasible.

Structural econometric models of optimal behaviour basically provide an essential tool for evaluating a wide range of economic policy measures.

On the basis of general empirical values regarding the market actors‘ behaviour, environmental as well as technological knowledge and carefully created definitions of variables, a specified theoretical model could be developed in order to identify the key parameters of interest and to finally estimate whether or to which extent electricity price compensation has a relevant economic and carbon reducing effect.

By conducting different types of simulations, it could be assessed how the electricity price compensation programme needs to be designed and how much subsidy must be provided in order to achieve the best possible effect. Furthermore, the theoretical model could also be used to evaluate the effectiveness of other economic policy measures or instruments.

At the end of the funding term, the model’s predicitions could be compared with the defined result indicators, e. g. the amount of annual (in)direct production-related emissions, the annual GVA or the number of jobs in the eligible (sub)sectors, in order to draw conclusions about the funding programme’s benefits, weaknesses and risks and in order to facilitate the decision-making process concerning the continuation and further development of the programme.

Further ideas for the evaluation itself are expected to derive from the procedure inviting bids for external evaluation.

5. Sources of data

To ensure a comprehensive, precise and reliable evaluation of the Funding Guideline, the evaluation will be based on a wide range of public and non-public data.

The following section is intended to depict which sources of data will be used and how these different types of data contribute to answering the evaluation questions:

The most important public data sources used for the evaluation will be

- Eurostat,
- Destatis,
- EU Transaction Log (EUTL).

It will also be assessed to what degree micro data, e.g. at the firm level, can be used for potential microeconometric evaluation methods. When assessing the different evaluation questions, the evaluation committee will take into account that for some of the analyses carried out, e. g. for the analysis of GVA in Germany, different data sources are available. To avoid distorted evaluation results, the evaluation committee will therefore use only the most convenient data source for analysing an indicator. As the majority of the indicator analyses transcend the German economic area, Eurostat will be used as the main public data source. For analyses that are limited to the German economic area and do not depend on other indicators, however, the national data base Destatis will be consulted. If more than one data source is used to analyse an indicator, this will be explicitly mentioned by the final evaluation report.

In case data are not intended for public dissemination or are not available, data gaps will be closed by non-public data:

First of all, the German Emissions Trading Authority (DEHSt) will provide the evaluation committee with detailed data on the different aid recipients collected during the application processes.

Additionally, the Federal Ministry for Economic Affairs and Climate Action (BMWK intend to conduct comprehensive company surveys in 2025 and towards the end of the funding period in 2030 as already successfully implemented during the first funding period (2013-2017) of electricity price compensation. By means of online questionnaires and interviews shall be investigated to which extent electricity price compensation has achieved its objectives, which negative effects have been caused and finally, what can be further

improved. The questions underlying the online survey and interviews will be closely coordinated with the evaluation committee.

The feedback received from the companies is expected to generate useful suggestions and ideas for the improvement and further development of the funding programme.

6. Evaluation Procedure

The Federal Ministry for Economic Affairs and Climate Action (BMWK) will ensure that the evaluation of the implemented electricity price compensation will be as objective and precise as possible. They will also assure that the evaluation will be impartial and transparent.

The national funding programme will be evaluated for the first time in 2025. The final evaluation will be conducted at the end of the funding period in 2030.

The evaluations will be carried out by an independent body that still has to be selected. The selection of the evaluation body will be put out to public tender.

Criteria to select the evaluators will be independence, experience and the economic and methodological knowledge necessary to conduct a comprehensive and reliable evaluation.

Apart from the final evaluation at the end 2030, the German Emissions Trading Authority (DEHSt) will undertake yearly analyses of all result indicators that can be quantified.

7. Time frame

After being notified by the European Commission, the Funding Guideline will enter into force at the beginning of 2022.

Towards the end of the first application process in 2022, the first application process will be evaluated and the supplementary aid will be reviewed by the DEHSt. During the first half of the year 2023, the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Ministry for Environment, Nature Conversation, Nuclear Safety and Consumer Protection (BMUV) will then decide on the continuation and further development of the supplementary aid.

The selection of the evaluation body will be put out to public tender in 2024. After completion of the tender, the evaluation body will file a mid-term evaluation report in 2025 and a final evaluation report towards the end of the funding termin 2030.

8. Publication

Both, the mid-term and the final evaluation report will be published on the website of the Federal Ministry for Economic Affairs and Climate Action (BMWK). Personal and/or confidential data will be used in accordance with the relevant regulations. The published results of the evaluation will comply with provisions of the German statistical law and statistical secrecy. Access to third-party data will be subject to the rules imposed by these third-party bodies.

Data collected during the evaluation process will be made accessible for the purpose of replicating results or for further studies.