# Economic effects of renewable energy subsidies: How to shape a fair burden sharing at times of an energy price crisis?

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## Overview

Energy prices have risen significantly within the last year. The war in Ukraine caused a further increase in the already very high energy prices. Particularly energy-intensive companies have been affected strongly by the increased prices. In addition, private households are affected twofold. For them, both consumer goods prices and energy costs are rising, leading to high inflation that reduces households' disposable incomes after deducting everyday expenses. Although the consequences of rising energy prices significantly reduce the purchasing power of all private consumers, individual households are likely to be affected to different degrees with low-income households being most affected (Paktiknjo & Priesmann, 2022).

In order to reduce the consequences of high energy prices, several relief options have been discussed politically. With respect to electricity prices, the German government decided to abolish the financing of the renewable energy sources (RES) support levy via the electricity price (so-called EEG-Umlage). The levy had been introduced in 2003 as a measure to finance RES via feed-in tariffs. In principle, all final electricity consumers paid the same levy, however, electricity-intensive manufacturers were largely exempted. In 2021, the levy accounted for around 20% of the electricity price for private households and the abolition, therefore, represented a sharp reduction in end-user electricity prices.

While the price-reducing effects of the levy abolition are straightforward in qualitative terms, it remains unclear to what extent individual consumers benefit from this regulatory measure. Within the framework of an input-output analysis, we address the question as to how the abolition of the levy affects individual sectors and demand groups. In addition, we propose alternative reform mechanisms for the levy, which is now no longer financed via the electricity price but from the general tax budget, and discuss and analyze them with regard to the impact on the different consumer groups. Our investigations show that the abolition of the levy has a dampening effect on the currently high electricity prices but cannot fully compensate for them. Moreover, we show, that depending on the design of the relief measure, the distributional effects differ considerably.

## Method

In our analysis, we estimate the effects of current electricity prices and regulatory relief measures on four different evaluation criteria: (1) Private consumption, (2) federal consumption, (3) investments, and (4) exports. Figure 1 shows an overview of the methodology.
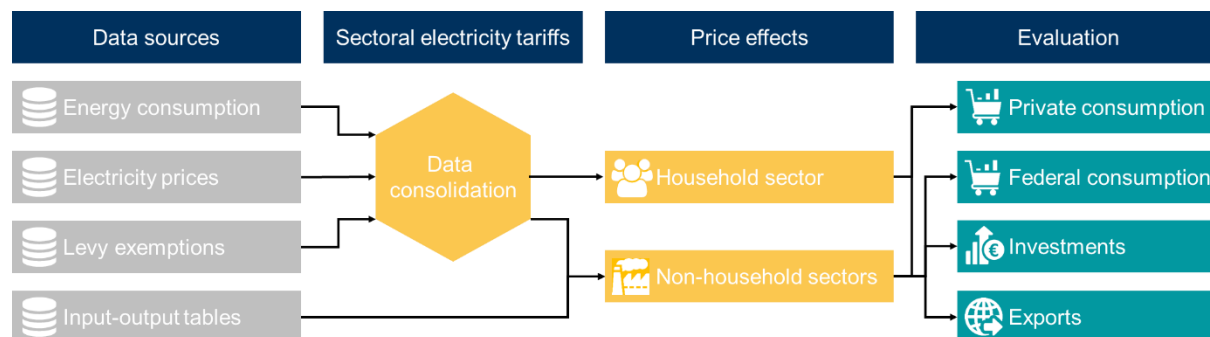


**Figure 1: Overview of the methodological approach**

In order to be able to account for production interdependencies between different sectors, input-output calculations were carried out for Germany. In the present case, it was of interest to examine the influence of price changes of primary inputs (e.g. taxes) on output prices. The Leontief price model was applied as a feasible method to investigate the economic impact of energy policies (Oosterhaven, 1996).

The model takes price changes of primary inputs as exogenous and calculates the changes in output prices which are necessary to fulfill the equilibrium condition of input-output accounts, in which total costs equal total revenues in every sector. Actors of an economy are linked to price changes via their demand. Therefore, weighting price changes of output prices by the demand of a particular demand group results in a price change for the total demand of the respective group. In the case of the demand of private households, this is known as a change in the consumer price index.

Within our analysis, multiple different scenarios and relief measures are evaluated. First, three different levels of the RES support levy and their effect on sector output prices have been investigated (7.84 €-ct/kw, 3.72 €-ct/kw and 0 €-ct/kw). Furthermore, three alternative reform options for the RES support levy were analysed:

Option 1: An equally distributed RES support levy for all consumption sectors,
Option 2: an RES support levy that is only charged to non-residential sectors, and
Option 3: an RES support levy that is only charged to the residential sector.

## Results

The average cost of electricity that final consumers have to pay has risen substantially since 2017. From 2017 to April 2022, the average costs have risen by 25% in inflation-adjusted values for private households and by 61% for industrial consumers. The abolition of the RES support levy partially counteracts the price increase in all sectors but is not able to completely compensate for the overall increase in electricity prices. Furthermore, different sectors benefit unevenly from the reduced or abolished levy. Generally, electricity-intensive industries like the chemical or manufacturing industry experience the highest reduction in output prices. However, the biggest beneficiaries are sectors whose production is very electricity-intensive and which did not fall under the exemptions for reduced levy rates, such as mining and quarrying.

In addition to the sectoral analysis, the effects of the levy reduction on different demand groups were also examined. A reduction or abolition of the RES support levy has a particularly strong effect on private consumption and export by reducing costs, while cost reductions for federal consumption and investments are lower.

Looking at the three alternative reform options, Option 1 decreases overall costs for private and governmental consumption, while capital investments and exports become more costly. For Option 2, costs for private consumption decrease significantly. Reduced expenditures due to the abolition of the RES support levy overcompensate additional expenditures for their basket of goods due to output price increases in the non-residential sectors. Private households are the only demand group that benefits from this reform option. All other demand groups suffer from price increases, exports in particular. In the case of Option 3, private consumption expenditures rise sharply. Additional expenditures due to the increase in RES support levy of the households overcompensate reduced expenditures for their basket of goods due to a decrease in output prices in the non-residential sectors. The trade-off between private households and exports becomes particularly clear in this scenario. Therefore, Option 3 can be seen as an extreme scenario to strengthen international competitiveness but is most disadvantageous for private households.

## Conclusion

Our analysis demonstrates the effects of abolishing the financing of the RES support levy via the electricity price on different sectors and demand groups within the framework of an input-output analysis. We show that the previous levy mechanism was designed in favor of capital investments and exports at the expense of private and government consumption. Thereby, as well as by examining alternative reform proposals, it becomes clear that the design of the financing mechanism of the RES support levy, which is now paid out of the general tax base, has strong distributional consequences. Should the financing of the RES expansion be organized again in the future by means of a levy, in addition to the sectoral burdens shown here, intra-sectoral burdens should also be considered - for example, between households with different income and capital situations.

## References

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