

Auctioning revenues to foster energy efficiency: status quo and future potential within the European emissions trading system

Catharina Wiese
Technical University of Denmark
Produktionstorvet 424
DK-2800 Kongens Lyngby
Denmark
catwi@dtu.dk

Richard Cowart
The Regulatory Assistance Project
Rue de la Science 23
B-1040 Brussels
Belgium
rcowart@raponline.org

Jan Rosenow
The Regulatory Assistance Project
Rue de la Science 23
B-1040 Brussels
Belgium
jrosenow@raponline.org

Keywords

EU Emission Trading Scheme (EU ETS), auctioning revenue use, energy efficiency programme

Abstract

Auctioning revenues in the European Union's Emissions Trading System (EU ETS) are likely to increase in the future. This projection is driven by recent changes within the system's framework, addressing the current surplus of emission allowances and reducing the overall cap. More specifically, the Market Stability Reserve starts operating in 2019 and the linear reduction factor increases from 1.74 percent to 2.2 percent annually from 2021, increasing scarcity and allowance prices. Considering the growing amount of auctioning revenues projected, it becomes ever more important to assess the use of these revenues and their potential contribution to accelerate decarbonisation efforts. While there are various opportunities to invest auctioning revenues to drive emission reductions, we argue that strategic investments in energy efficiency programmes provide opportunities for realising multiple dividends: additional emission reductions from both ETS and non-ETS sectors, lower economic and societal decarbonisation costs, and support for the political process to further tighten the ETS cap. Our assessment of the status of auctioning revenue use at EU Member State level shows that Member States have made only limited use of these multiple dividends in recent years. In 2017, no more than 22.4 percent of total revenues have been strategically invested in energy efficiency programmes, as Member States have officially reported to the European Environment Agency's reporting obligations database. However, evidence from efficiency programmes funded by auctioning revenues in Ireland, Germany and Czech Repub-

lic illustrate that these programmes deliver energy savings and emission reductions, cost savings to consumers, tax revenue to the national budgets, employment and economic growth. We conclude that the EU carbon price can provide important signals to investors and energy users, but auctioning revenues can also be a powerful tool in the energy transition and the strategic use of revenues needs to be accelerated in all Member States.

Introduction

Without ambitious energy efficiency targets and a significant increase in energy efficiency investments, the EU will most likely miss even its current 2030 climate target of reducing greenhouse gas (GHG) emissions by 40 percent based on 1990 levels, let alone deliver on the commitments made in Paris (Rosenow et al. 2018). On a global scale, the International Energy Agency (IEA) recently concluded that improvements in end-use energy efficiency could deliver at least 35 percent of the total emission reductions needed by 2050 to avoid drastic global climate disruption (IEA 2018). Thus, capturing the existing untapped and cost-effective potential for end-use energy efficiency improvements (IEA 2018, Thema et al. 2018) should logically be a major goal of climate policy. However, the EU ETS, Europe's key tool to reduce GHG emissions, is not able to overcome the various non-price barriers to energy efficiency because a carbon pricing instrument alone does not address lack of information, behavioural failures and liquidity constraints (e.g. Cowart 2011). These barriers are commonly considered a major reason why households and businesses largely fail to invest in cost-effective energy efficiency improvements (Jaffe and Stavins 1994; Gillingham et al. 2009).

The political discussion on the EU ETS still puts a larger emphasis on the carbon price and its potential to incentivise low-carbon investments, with less focus on how the revenues generated through the auctioning of EU allowances are spent. Considering that auctioning revenues are an increasing source of income for EU Member States, we propose that now is the time to assess the potential contribution of strategic revenue investments to accelerate decarbonisation efforts and to align the EU ETS with the most cost-effective opportunity to deliver emission reductions through energy efficiency.¹

Total auctioning revenues have increased by around 46 % from 2016 to 2017.² This increase is driven by recent changes within the ETS framework and the revision of the EU ETS Directive (Directive (EU) 2018/410)³:

- The ETS *Market Stability Reserve* (MSR) starts operating in January 2019 and the *linear reduction factor* (LRF) will increase from 1.74 to 2.2 percent annually from 2021. Addressing the surplus of emission allowances in the EU carbon market and reducing the cap respectively, both the MSR and the LRF will have an increasing effect on the EU carbon price. Indeed, already in anticipation of the future changes, allowance prices have increased by around 180 percent from as low as 5 Euros per tonne in 2017 to around 20 Euros per tonne at the end of 2018.⁴
- The *share of free allocations* will reduce to 30 percent until 2026 and reduce to 0 percent by 2030 (for sectors not at risk for carbon leakage). A reduction in the number of allowances allocated for free increases the number being auctioned and, thus, has a positive effect on revenues generated through auctioning.
- Discussions on introducing a *carbon floor price* (CFP) in some Member States (see e.g. Simon 2018) – The direct price control mechanism of a CFP would ensure a certain price level and increase ETS revenues in the implementing states.

All of the above affects the volume of auctioning revenues that EU Member States receive. The exact effect depends on the price increase opposed to the reduction in allowances available. Yet, projected auctioning revenue developments show a future increase up to 20 billion Euros per year before 2030 (Ecologic Institute and WWF 2016), which also the most recent trends of prices and revenues from 2016 to 2017 confirm. Strategically investing this growing opportunity into energy efficiency programmes would reinforce the ETS and deliver multiple dividends:

- Additional emission reductions from sectors both covered by, and outside, the ETS;
- Lower economic and societal decarbonisation costs, capturing a larger fraction of cost-effective emission reduction potential, which may remain untapped if not additional funding for energy efficiency (from auctioning revenues) is made available, and reducing energy bills for end-users.
- A wide range of non-energy benefits from energy efficiency improvements and the resulting demand reduction. Among those benefits are improvements in health, comfort, air quality, public housing and welfare costs, job creation, and economic growth; and
- Support for the political process to further tighten the EU ETS cap. An increase in the political will and social acceptance, as a result of the previous benefits, can enable more ambitious long-term decarbonisation targets.

The paper is structured as follows: Section 2 introduces why investing auctioning revenues in energy efficiency would further reduce emissions at lower economic and societal costs. In Section 3, we present our assessment of auctioning revenue use at the EU Member State level and show promising examples of Member States that have used their auctioning revenues for energy efficiency in recent years. Section 4 discusses interactions between energy efficiency improvements and the EU ETS, and Section 5 concludes.

The economic case for investing auctioning revenues in energy efficiency

Strategically investing auctioning revenues in energy efficiency measures can make a relevant contribution to achieve emission reductions at the lowest economic and societal costs.⁵ Some economists would strictly disagree with this proposition; defining external costs of GHG emissions as the only market failure to address. In a first-best setting, a single carbon pricing instrument as the EU ETS would, in theory, internalise the externality and effectively incentivise emission reductions, while any policy on top, would distort market forces (e.g. Baranzini et al. 2017).

However, others acknowledge the existence of second-best problems, e.g. market failures and/or exogenous real-world constraints, which rationalise the use of multiple policies with a common policy target (e.g. Bennear and Stavins 2007). Also the EU has taken a different position, adopting mandates for renewable energy and efficiency in addition to the EU ETS. Investing auctioning revenues to further strengthen EU energy efficiency policy would reinforce the ETS and reduce the economic and societal costs of GHG emission reductions, because:

1. **Investing auctioning revenues in energy efficiency can help to realise a larger fraction of cost-effective emissions reduction potential.** Recent evidence shows that in all EU Member States there exists a large and untapped potential for cost-effective energy efficiency improvements (Thema

1. The policy mix for reaching decarbonisation targets cost effectively is not limited to energy efficiency policies but also includes, e.g., renewable energy support, research and development for clean technologies, and others, which also overcome some of the limits to carbon pricing and the reliance on a single pricing instrument. However, the economic and societal cost advantages of energy efficiency and the need for funding to stimulate efficiency investments among a large number of end-users make it a particularly important resource to utilise. These are principal justifications for the policies adopted by the EU and many other jurisdictions that call for implementing the “energy efficiency first principle”.

2. This increase compares the total auctioning revenues in 2016 and 2017 for all EU Member States but France, which has not reported revenues for 2017 yet, and Bulgaria, which has locked its report for public view in 2016 and 2017. 2016 total revenues without France and Bulgaria amount to 3.47 billion euros. 2017 total revenues amount to 5.09 billion Euros.

3. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0410&from=EN> (Accessed 18/12/2018).

4. E.g.: <https://markets.businessinsider.com/commodities/co2-emissionsrechte/euro> (Accessed 18/12/2018).

5. The strategic use of revenues from carbon cap-and trade schemes to achieve emission reductions at lowest economic and societal cost has also been named ‘carbon revenue recycling’ by e.g. Cowart (2011).

et al. 2018). Realising this potential would accelerate GHG emission reductions and, because it is cost-effective and would save more than it would cost in many instances, reduce the economic cost of reaching decarbonisation targets. The potential remains untapped due to various barriers to energy efficiency, which include imperfect and asymmetric information, principal agent problems, behavioural failures, and limited access to capital. It is well established that in the markets for energy efficiency, market failures and barriers beyond the negative externality of energy production and consumption exist. These barriers keep energy end-users from investing in cost-effective energy efficiency improvements and are a major justification for public policy interventions implementing multiple policies (Jaffe and Stavins 1994; Gillingham et al. 2009). By definition, non-price barriers to energy efficiency cannot be overcome by a pricing policy alone; i.e., due to other real-world constraints, a carbon price cannot unlock all long-term, cost-effective energy saving and thus GHG emissions reduction potential. Therefore, energy efficiency programmes that address the behavioural, financial, and legal barriers to energy efficiency are needed in order to make use of a greater fraction of the cost-effective emissions reduction potential. While there are many opportunities to invest auctioning revenues to accelerate decarbonisation, energy efficiency investments provide opportunities that save more than they cost and therefore should be used first (see footnote 1).

2. **Investing auctioning revenues in energy efficiency would reduce the energy bill impacts of carbon pricing on energy end-users.** The EU allowance price paid by power and heat generators has a disproportionate and negative effect on consumer energy bills. A calculation of the consumer cost per tonne of abatement in competitive power markets shows that the cost to consumers per tonne of carbon reduced can be several times larger than the market price of carbon allowances (Coward 2011). According to a study from Cambridge Econometrics and the Energy Centre of the Netherlands (2013), at a carbon price of 20 Euros per tonne, the impact on the merit order of dispatch in wholesale power markets yields a cost to power consumers amounting to 248 Euros per tonne avoided, assuming nil price elasticity.⁶ The study furthermore shows that greater support for investments in end-use energy efficiency would reduce energy demand, which a pricing instrument alone would only

achieve to a limited degree considering low energy price elasticities, specifically in the short run. These elasticities have been found to be larger in the long run, and, considering both time horizons, heterogeneous across end-use sectors, however, overall results show an inelastic response to price changes (e.g. Gillingham et al. 2009, Labandeira et al. 2017). The reduction in energy demand due to greater support for investments in end-use energy efficiency would further reduce GHG emissions, and consumer energy bills due to reduced prices on wholesale power markets.⁷

Both rationales make clear why using auctioning revenues to support energy efficiency measures complementary to the EU ETS would reduce the economic and societal costs of decarbonisation. Considering that the major goal of carbon pricing is to achieve emission reductions at the lowest costs, it is logical to use the ETS carbon price and the resultant auctioning revenues to incentivise end-use energy efficiency. Energy efficiency is a key to capturing the most cost-effective energy and emission reduction potential, while minimising rate and cost impacts.

Status quo of auctioning revenue use at the EU Member State level

Article 10(3) of the EU ETS Directive 2003/87/EC recommends that Member States should use at least 50 percent of auctioning revenues or the equivalent in financial value of these revenues for energy- and climate-related purposes. These purposes are specified in Art. 10(3) and Art. 3d(4) (for aviation allowances) and include a range of options: further GHG emission reductions in EU and third countries, the development of renewable energies, measures to increase energy efficiency, shift to low emission and public forms of transport, and administrative policy expenses.⁸

Since 2013, a mechanism for reporting on the use of auctioning revenues⁹ requires Member States to report annually (for the first time by July 2014) on the amounts of revenue generated through the auctioning of allowances and the use of these revenues, or the equivalent in financial value. Member States shall specifically report the purpose and type of revenue use for energy- and climate-related programmes, domestic and international.¹⁰ The following section assesses the national reports submitted by 31 July 2018, reporting the use of auctioning revenue for 2017.¹¹

6. Considering the following effects of carbon pricing on wholesale power markets adds further clarification to this point: First, a carbon price increases the marginal cost of fossil-based generation. This cost increase may change the merit order of power markets, which ranks generation units and determines the order of dispatch based on short run marginal generation cost from cheapest to most expensive. Thus, generators that emit most GHG emissions and consequently have the highest cost increase may not be dispatched in order to meet electricity demand, when they are required to pay a carbon price. This potential change in the merit order of dispatch would lead to a reduction in GHG emissions from power generation. However second, a carbon price also increases the price paid by consumers, whenever the marginal generation unit, i.e. the last unit dispatched, is fossil-based. In that case, the clearing price on wholesale power markets increases and finally this price increase is passed through to consumers. Calculations based on power price increases, i.e. the extra cost to consumers, and the avoided tonnes of GHG emissions due to the impact on the merit order of dispatch yield the cost to consumers of 248 Euros per tonne avoided emissions (Coward 2011). Note: Although the modelling timeframe in the study from Cambridge Econometrics and the Energy Centre of the Netherlands (2013) was set to 2020, the analysis of interactions between cap reductions, carbon prices, emissions and end-use energy efficiency are still relevant and provide meaningful results at all timescales.

7. The wholesale power price is lower due to the demand reduction for energy and EU allowances. Both demand reductions have a lowering effect on the clearing price on competitive power markets.

8. Art. 10(3) and Art. 3d(4) of Directive 2003/87/EC provide a more detailed list of eligible purposes. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0087-20140430&from=EN>.

9. Specified in Art. 17 of Regulation (EU) No 525/2013. Retrieved from: <https://publications.europa.eu/en/publication-detail/-/publication/4bf8306c-dab2-4fa0-8c83-8d44d760b31f/language-en>.

10. International use comprises funding of multilateral (e.g., United Nations Framework Convention on Climate Change (UNFCCC) Green Climate Fund) or bilateral programme support.

11. Member states submit their reports to the European Environment Agency's reporting obligations database (ROD), part of the European Environment Information and Observation Network (EIONET). Deliveries are available at: <http://rod.eionet.europa.eu/obligations/698/deliveries> (Accessed at 09/01/2019).

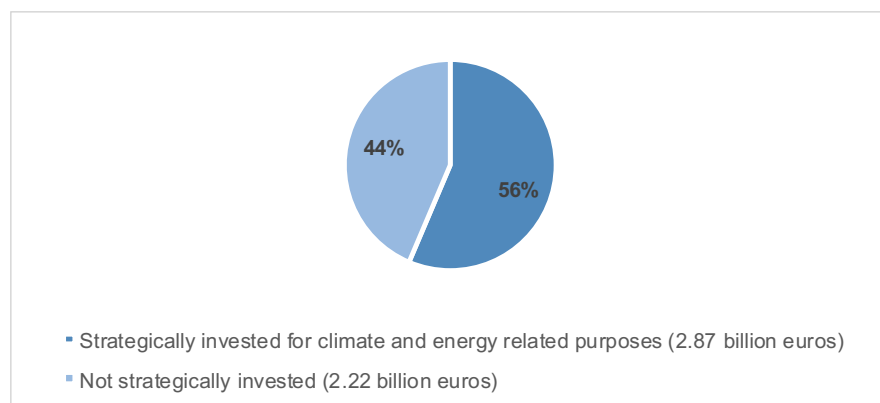


Figure 1. Use of 2017 auctioning revenues as a share of total revenues: 5.09 billion Euros.

ASSESSMENT OF THE MEMBER STATES' REPORTING ON THE USE OF 2017 AUCTIONING REVENUES

In 2017, EU Member States received 5.09 billion Euros through the auctioning of emission allowances in the EU ETS.¹² Altogether, the reporting reveals that Member States used or plan to use 4.07 billion Euros (80.0 percent) of the total amount of 2017 revenues or the equivalent in financial value for energy- and climate-related purposes. This relatively high share is consistent with the findings of reports on the use of auctioning revenues from previous years (Ecologic Institute and WWF 2016; Le Den et al. 2017; Wiese et al. 2018). However, it is worth noting that the calculation *includes Member States that do not earmark auctioning revenues for specific uses* but still report the equivalent in financial value used for energy and climate purposes from their national budgets.

Strictly speaking, these Member States do not *strategically invest* their auctioning revenues, i.e., they do not *directly use* them for energy and climate purposes. Excluding Member States that do not earmark auctioning revenues for specific uses, the reported strategic investments reduce to 2.87 billion Euros, equivalent to 56.4 percent of total 2017 revenues, shown in Figure 1. The share of revenues not strategically invested in energy and climate purposes includes the use of auctioning revenues that Member States do not specify (0.60 billion Euros) and all revenues from Member States that do not earmark (1.62 billion Euros). These amounts are not strategically reinvested, but allocated to the national budgets. The further assessment of auctioning revenue use therefore excludes Member States that do not earmark. For 2017 revenues, the national reports submitted by 31 July 2018 from Austria, Denmark, Finland, Luxembourg, the Netherlands, Poland, Sweden, and the United Kingdom indicate that these Member States do not earmark auctioning revenues for specific uses.

All other Member States, except Romania, report to invest some share of their total revenues for domestic or international energy- and climate-related purposes ranging from 12 percent in Cyprus to 116 percent in Malta.¹³ Assessing the

Member States' official reporting, a significantly larger share of strategically invested revenues is used domestically (126.4 percent), while only a smaller share is spent for international use (6.1 percent). The assessment of domestically invested revenues reveals the challenge of heterogeneity among Member States' way of reporting auctioning revenues use: Germany indicates to use 100 percent of its total 2017 revenues for energy- and climate-related purposes (1.15 billion Euros). However, it reports the total spending of its national energy and climate fund for different domestic types of use (2.05 billion Euros). Thus, only 56 percent of the fund's total spending is financed through auctioning revenues. Germany's way of reporting largely explains why more than 100 percent of total auctioning revenues are reported to be used domestically (126.4 percent). In order to make Germany's domestic use of auctioning revenues comparable to the other Member States' reporting and to total auctioning revenues, we adjusted its domestic use, setting it equal to 100 percent total revenue in 2017, and applied the ratios of domestic types of use to this amount.¹⁴ Also Lithuania reports a higher amount as domestic use than the amount indicated to be used for energy- and climate-related purposes. However, the difference is small and the associated impact on comparability is limited.

Figure 2 shows, on an aggregate level, how Member States use their auctioning revenues domestically as a share of the Member States' total domestic use, distinguishing different types of use.

The largest share of total domestic use (41.9 percent = 1.14 billion Euros) finances energy efficiency measures, followed by the promotion of renewable energy (31.2 percent = 0.85 billion Euros), other domestic/EU uses (9.2 percent = 0.25 billion Euros), and the shift to low-emission and public forms of transport (7.9 percent = 0.22 billion Euros). Putting it into perspective with total auctioning revenues, these shares correspond to 22.4 per-

12. This amount of 2017 auctioning revenues and the further assessment of the Member States' reporting does not include France, which has not reported its revenues for 2017 yet, and Bulgaria, which has locked its report for public view.

13. Romania reports to use zero percent of their 2017 auctioning revenue for energy- and climate-related purposes, while Malta reports to use a higher amount for energy- and climate-related purposes than their total auctioning revenue. This difference might occur due to the use of carryover revenues from years before 2017. However, the reported data provides no further explanation.

14. We are aware that this approach only gives an approximation of Germany's auctioning revenue use, however, the available data does not allow for more detailed conclusions. The analysis of domestic use required the following additional data processing: (1) Interpretation of committed versus disbursed spending on a country-by-country basis. Some Member States report both committed and disbursed amounts, with the disbursed amounts being included in the committed amounts, while other Member States report both amounts separately. (2) Where Member States report ambiguous domestic types of use or the reported type does not match the purpose of revenue use (i.e., specific programme support), we took a further look at the individual programmes, if provided, to categorise the Member States' domestic use.

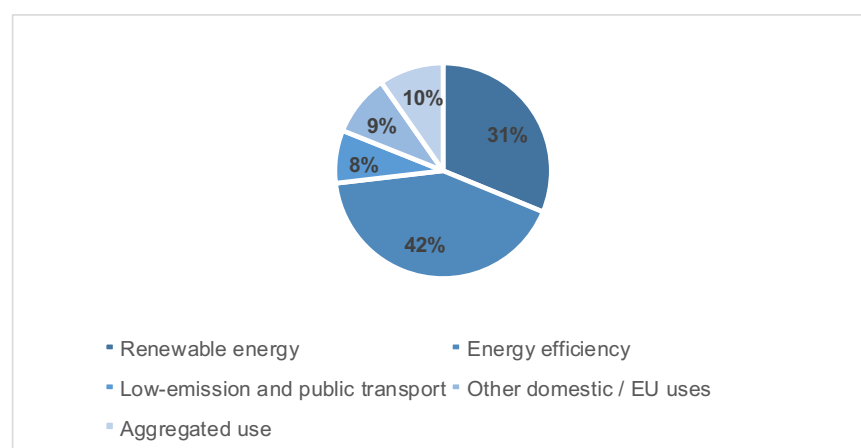


Figure 2. Domestic types of use as a share of total domestic use.

Table 1. The use of auctioning revenues for energy efficiency in Ireland, Germany and Czech Republic.

Member State	Domestically invested revenues for energy efficiency	Energy efficiency investment
Ireland	52,298,000 Euros; 98 percent of total domestic use	Better Energy Homes Scheme: provides grants to all homeowners, including property owners of dwellings built prior to 2006, to improve the energy efficiency of their homes through insulation measures, heating upgrades and solar thermal.
Germany	0.64 billion Euros (adjusted); 56 percent of adjusted domestic use	Energy and Climate Fund: supports various energy efficiency programmes, such as the KfW support scheme in the building sector, energy-saving measures implemented through the <i>Energieeffizienzfond</i> (energy efficiency fund), the tender scheme STEPup! for industrial energy-saving investments, and the <i>Anreizprogramm Energieeffizienz</i> (energy efficiency incentive programme) for the replacement of heating and ventilation systems.
Czech Republic	99,888,000 Euros; 50 percent of total domestic use	New Green Savings Programme: a financial support scheme designed to promote energy savings in single-family and multifamily buildings (only in November 2016 the Czech government approved to also include public sectors buildings), focusing on the renovation of existing buildings, construction of new buildings with low-energy standard, and utilisation of low-emission or renewable sources for heating. EFEKT Programme: a financial support scheme designed to promote energy-saving measures and renewable energy sources among small customers, focusing on energy efficiency improvements, energy management, and awareness raising through education.

cent, 16.7 percent, 4.9 percent and 4.2 percent, respectively. The aggregated use category includes: Funding of research and development (R&D) for clean technologies and energy efficiency (1.0 percent), of R&D and demonstration projects for reducing emissions and for adaptation (0.1 percent), other reductions of GHG emissions (0.2 percent), forestry sequestration in the Union (0.1 percent), adaptation to the impacts of climate change (1.0 percent), cross-cutting measures (2.0 percent), and coverage of administrative expenses of the management of the ETS scheme (0.3 percent).¹⁵

15. These investment categories are officially listed as energy- and climate-related purposes in the EU ETS Directive. We have added the category "cross-cutting measures", in case multiple purposes have been reported for the same amount of spending, and aggregated the categories for which only a small share of domestic revenues is used in order to ensure a clearer presentation in Figure 2.

56.5 percent of the total domestic use for energy efficiency comes from German auctioning revenues (with adjustment). Yet, Germany is not the only country devoting a large share of their domestically reinvested revenues to increase energy efficiency. Belgium, Czech Republic, Croatia, Germany, Hungary, Ireland, Italy and Latvia report to strategically invest between 50 and 100 percent of their domestic use of auctioning revenues in energy efficiency.

Ireland has, in 2017, devoted the largest share of auctioning revenues to energy efficiency, with 98 percent funding the country's Better Energy Homes Scheme. Germany reports the highest 2017 auctioning revenue of all EU Member States, 1.15 billion Euros, and thus with a high share supporting energy efficiency measures, it contributes significantly to the total reported use for energy efficiency. In the Czech Republic, the strategic use of auctioning revenues is a well-established

practice. The Czech New Green Savings Programme has been funded by auctioning revenues since its programme launch in 2013, and auctioning revenues are considered a major source for energy efficiency finance in the Czech Republic. Drawing on these exceptional cases and the availability of evaluations of the Member States' funded energy efficiency programmes, we provide further insights for Ireland, Germany, and the Czech Republic in Table 1 and the following paragraphs.

THE USE OF AUCTIONING REVENUES FOR ENERGY EFFICIENCY IN IRELAND, GERMANY AND CZECH REPUBLIC

Ireland's Better Energy Homes Scheme

Better Energy Homes is a financial support scheme that provides grants (covering around 30 percent of the total investment costs) to homeowners, including landlords of dwellings, to invest in energy efficiency actions, e.g. attic and wall insulation, renewable heating technology upgrades and installations of heat pumps. Since 2016, special grants for deep retrofits are available within the Deep Retrofit multi-annual pilot programme.¹⁶ All actions must be installed by contractors registered by the Sustainable Energy Authority of Ireland (Broc 2017). In 2016, the scheme spent 17 million Euros in grants, which resulted in over 15,000 homeowners undertaking 36,000 energy efficiency measures in their homes. The measures installed in 2016 are estimated to deliver new annual energy savings of 84.26 GWh and 2877 kilo tonnes of CO₂ per year. Since the start of the scheme, over 202.4 million Euros worth of grants has been paid to homeowners. These funds have supported the upgrade of 191,338 homes, with a total 475,190 individual energy efficiency measures undertaken (Department of Communications, Climate Action & Environment 2017).¹⁷

Germany's Energy and Climate Fund

The largest proportion of financial resources allocated to the Energy and Climate Fund and invested in energy efficiency programmes in Germany contributes to the KfW support programme Energy-efficient Refurbishment.¹⁸ In 2017, the refurbishment programme allocated financial support to modernise around 275,000 dwellings. The supported refurbishment projects delivered 1,441 GWh annual end-use energy savings¹⁹ and GHG emission reductions amounting to 479,804 tonnes of CO₂ equivalent per year. Annual heating costs to consumers will be reduced by approximately 136 million Euros; considering total lifetime energy savings, heating cost savings are expected to

reach approximately 4.8 billion Euros (discounted net present value over 30 years assumed average lifetime for the applied energy savings measures). The total investment stimulated by the programme – 10.9 billion Euros, including value-added tax—are estimated to deliver 118,000 person-years of employment²⁰ and, taking into account second order investment effects outside the building industry, a net turnover of 16.1 billion Euros. Of the total investment sum, 1.8 billion Euros return directly back to the national budget through value-added tax (Diefenbach et al. 2018).²¹

The Czech Republic's New Green Savings and EFEKT Programme

The Czech New Green Savings Programme, which is estimated to provide 700 million Euros in funds to owners of single-family or multifamily houses, is in its entirety financed through auctioning revenues (phase 3 auctions, 2013–2020). The financial support scheme for investments in energy-efficient building infrastructure is estimated to deliver 650 TJ energy savings for every 38 million Euros invested (Hrbek 2018). Referring to the programme's subsidy rate, it is expected that every Czech crown (CZK) spent in the programme initiates an additional investment of two to three crowns by building owners. Thus, the public investment returns to the national budget through value-added tax, income tax, and social and health insurance of the workers. Indeed, a 1 million CZK (approximately 40,000 Euros) public investment in enhanced energy efficiency in buildings is expected to induce 2.13 to 3.59 million CZK (83,000 to 140,000 Euros) growth of gross domestic product, on average 2.06 additional persons employed, mainly in small- and medium-sized enterprises in the construction sector, and 720,000 CZK (28,000 Euros) in total tax revenues (Zámečník and Lhoták 2012).

In 2016, the EFEKT Programme paid out 81.55 million CZK (3.2 million Euros) in subsidies (50 million CZK, 2.0 million Euros, financed through auctioning revenues) supporting 188 energy-saving projects for increasing the energy performance of public lighting, replacing heating systems, providing energy audits, introducing energy management systems (ISO 50001), and supporting education- and awareness-raising measures. The payments initiated a total investment sum of 146.28 million CZK (5.7 million Euros). The improved energy performance of public lighting and the replacement of heating systems delivered direct energy savings of 13,896 GJ per year and an annual reduction of 3,596 tonnes of CO₂. The average cost per GJ saved amounts to 7870 CZK²² (307 Euros), 3880 CZK supported through state subsidies (Ministry of Industry and Trade 2017).

16. Further information available at: <https://www.seai.ie/grants/home-energy-grants/> (Accessed 09/01/2019).

17. According to Ireland's National Energy Efficiency Action Plan 2017, the budget allocation for the Better Energy Homes Scheme changes from year to year. 2017 is the first year that Ireland reports to have allocated auctioning revenues to the scheme (Department of Communications, Climate Action & Environment 2017).

18. According to Germany's official reporting, auctioning revenues largely support building refurbishments. Within the programme Energy-efficient Construction, KfW also supports the energy-efficient construction of new dwellings. This programme supported approximately 54,000 building projects in 2017. With that number of supported construction projects, the programme reached a share of around 39 percent of all new residential constructions in Germany. The end-use energy savings of the supported construction projects in 2017 amount to 295 GWh per year and GHG emissions reductions are estimated to add up to 138,522 tonnes of CO₂ equivalent annually (Diefenbach et al. 2018).

19. Because building renovation programmes deliver savings across multiple fuel types, the assessment converts all savings to a common metric (GWh/yr) using each fuel's energy content.

20. Person-year = Employment of one person for one year with the average weekly working hours of the respective industry.

21. It is worth noting that this tax revenue is close to the total amount allocated to the Energy and Climate Fund from all sources in 2017. The German experience thus reveals that, although treasury departments might be reluctant to "lose" income by dedicating auctioning revenues to efficiency programmes instead of to general funds, in relatively short order those auctioning revenues could well be replaced by taxes received due to the positive economic activity stimulated by the efficiency programme.

22. These costs are expected to decrease in the future of the programme, due to changes in the programme design. Until 2016, structural investments related to public lighting improvements were eligible for programme support, which will not be the case from 2017. In general, the programme aims to focus on information, education and awareness raising measures, for which the energy saving impact is difficult to measure.

CRITICAL REVIEW OF MEMBER STATES' AUCTIONING REVENUE DATA

Our assessment uses the EU Member States' official reporting on the use of 2017 auctioning revenues. As mentioned before, the reporting is mandatory; however, it is the Member States' own responsibility to report, and there is no external verification of the reported numbers. Thus, the assessment requires some degree of reliance on the Member States' submissions. For Ireland, Germany, and the Czech Republic, we could find and use further information on their use of auctioning revenues, while for other Member States that reinvest revenues for energy efficiency, only limited information on the exact use and/or the effectiveness of the support is available.

Overall, the quality of reporting improved since the introduction of the mandatory reporting scheme, with more Member States specifying their use of auctioning revenues. The following points should still be discussed:

- Although the level of detail has improved over time, it still varies among Member States. Different inconsistencies exist, most often the summation of reported domestic and international use yields an amount higher or lower than the amount reported to be used for energy- and climate-related purposes. Furthermore, for both domestic and international use, Member States shall distinguish between committed funds and funds actually disbursed for use and provide a definition for both. However, many Member States do not provide the required definition and different Member States apply it differently. There is a clear need for more transparent and granular reporting, which should ideally also include a requirement for independent monitoring and verification of the reported uses.
- Ireland, Germany, and the Czech Republic strategically invest their auctioning revenues in energy efficiency programmes and thus realise some of the potential multiple dividends of the EU ETS to further abate GHG emissions, achieve cost savings and non-energy benefits. However, the official reporting does not allow to draw conclusions whether the use of auctioning revenues for energy efficiency in these countries and other Member States has led to *additional* programme support and incremental energy efficiency investments, as it would require a counterfactual without the revenue income stream. Future research could estimate the additional impact of auctioning revenues on efficiency programmes by comparing trends in funding levels before and after the revenues were assigned to certain programmes and by studying their political and administrative histories. There are two important issues to consider. First, auctioning revenues will not be reducing emissions if they are merely replacing other funding sources for efficiency programmes. Second, decision-makers should not assume that auctioning revenues alone will be adequate to finance all of the cost-effective efficiency investments that will need to be undertaken to meet Europe's climate and energy targets. In fact, total investments in programmatic efficiency measures should often be higher than the auctioning revenues in a particular state.
- Slovakia, Belgium, Greece and Germany report to use a substantial share of total domestic use for electricity price compensation to energy-intensive industry at risk for carbon leakage (48.9 percent, 29.6 percent, 15.0 percent and

14.1 percent, respectively). This use counts as an energy- and climate-related purpose, although certainly decreasing the beneficiaries' motivation to reduce their energy consumption. Using these revenues to improve energy efficiency at such industries would improve their competitiveness, while also reducing emissions, and should therefore be preferred. Unless process improvements are not feasible, and even in that case revenues could be used to fund energy- and climate-related R&D for process innovation to make them feasible in the future, using auctioning revenues to subsidise continued emissions, rather than reducing emissions, should not be eligible to count as use for climate and energy purposes.

- The recently released economic report of Germany's energy and climate fund (for 2017) shows that a large fraction of money (approximately 40 percent) committed to support energy and climate programmes was not disbursed for actual use (Zeitung für Kommunale Wirtschaft 2018). This case shows that the use of auctioning revenues for energy efficiency programmes faces the common barriers for a successful implementation, not only in Germany. The provision of financial resources is one important step; however, it does not solve the challenge to overcome all other barriers to energy efficiency. Strategically investing revenues is a means to an end, not an end in itself, and requires further engagement to achieve energy demand reductions cost effectively.

Discussion on interactions among the EU ETS, auctioning revenue use, and energy efficiency improvements

The recent changes within the ETS framework and the revision of the EU ETS Directive are addressing the current surplus of emission allowances and reducing the overall cap (MSR and LRF, respectively). These changes are intended to increase future EU allowance prices and the incentive to reduce emissions. The impact on auctioning revenues is not straightforward: In the first instance, lowering the number of allowances available in the system would, all else equal, lower total available revenues. On the other hand, a tighter market should increase the carbon price, and the gradual elimination of free allocations will also tend to drive up total auctioning revenues. Indeed, projections indicate that total auctioning revenues across the EU might increase up to 20 billion Euros per year before 2030 (Ecologic Institute and WWF 2016), as mentioned before. If Member States were to continue to devote the same fraction of auctioning revenues to efficiency programmes as reported in 2017, higher revenues would increase the amount of revenues used for energy- and climate-related purposes and increase the income stream available for energy efficiency programme support.

The interaction between the EU ETS and improved energy efficiency, expecting higher (and ideally incremental) support for complementary energy efficiency measures funded by auctioning revenues, is more complex and often debated among researchers and policy advisers.²³ If energy efficiency

23. This debate is not limited to energy efficiency improvements, but even more established with respect to increased adoption of renewable energy sources (e.g. Del Río González 2007) and starts to include policy changes on the national level, e.g. coal-phase out proposals (Ecofys 2016).

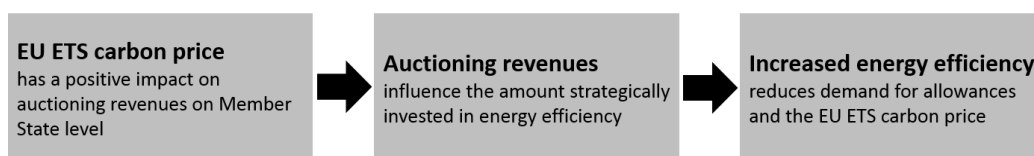


Figure 3. Linkage among the EU ETS carbon price, auctioning revenues and energy efficiency within the ETS sectors. Source: authors' illustration.



Figure 4. End-use efficiency improvements outside the EU ETS. Source: authors' illustration.

programmes have the effect of lowering demand for allowances by reducing energy consumption and generation (covered by the ETS, i.e. electricity), the carbon price would reduce, illustrated in Figure 3. Freed-up allowances would be banked for later use or sold to other emitters, meaning that the efficiency programmes would not achieve emission reductions under the cap-and-trade system but only reduce the price and thus the cost to businesses and consumers of complying with the cap. The carbon price reduction would furthermore hamper the capacity of the EU ETS to incentivise low-carbon investments.

While critics have frequently used this “waterbed effect” to argue against the implementation of measures that would reduce emissions additional to the EU ETS, we start with the argument that the overriding rationale of carbon cap-and-trade systems is, indeed, to uncover the lowest-cost opportunities to reduce emissions and therefore to reduce the price of carbon. Thus, any action to reduce emissions within a cap-and-trade system will intentionally release emissions allowances into the market and reduce pressure on the carbon price without directly reducing the cap. In other words, the “waterbed effect” is an essential design element of cap-and-trade systems. It is therefore inconsistent with cap-and-trade theory to criticise additional policies, such as efficiency programmes, merely because they may reduce carbon prices under a cap.

We emphasise three further interactions between energy efficiency improvements and the EU ETS, taking into account where revenues are currently invested, why the revised ETS framework “punctures the waterbed” and how future revisions could further reinforce the major objective of the EU ETS to reduce emissions cost effectively:

- Some Member States use their auctioning revenues to improve the thermal efficiency in buildings and add insulation to homes, reducing energy consumption of natural gas, fuel oil, or district heat systems that are largely outside the ETS. E.g., both the German KfW support schemes and the Czech New Green Savings Programme incentivise building efficiency improvements, to name just two EU examples. In this way, the cap-and-trade scheme can drive reductions even outside, and in addition to, the reductions mandated by the cap, as shown in Figure 4. This approach is especially useful when it would be impracticable or politically infeasible to bring those sectors into the cap regime.

- Considering the large amount of surplus allowances built-up in the EU ETS and the new implementation of the MSR, the “waterbed effect” argument is punctured (Sandbag 2017; Perino 2018). From 2019 to 2028, the MSR is expected to take in approximately 1.8 billion allowances (additional to the initial transfer of unallocated and back-loaded allowances from phase 3). Moreover, the latest EU ETS reform implemented that these allowances are limited in their validity and a substantial number of allowances, up to 2.4 billion, is expected to be cancelled in 2023 (Marcu et al. 2018). With the MSR in operation, complementary measures, which reduce the demand for allowances, increase the current surplus, of which a large proportion will eventually be cancelled, which is taken into account in Figure 5. Thus, freed-up allowances and finally emissions are not simply shifted in space and time, as supposed by the “waterbed effect” argument, but added to the existing surplus of allowances on the EU carbon market. The cancellation mechanism and the MSR in general are intended to increase the carbon price, and reduce overall emissions.²⁴
- With respect to future revisions of the ETS framework, another approach is to use success in the strategic use of auctioning revenues for energy efficiency, which lowers energy bills along with emissions, to support the political process to tighten the cap further in later rounds of cap administration. This approach has notably succeeded in the nine states comprising the RGGI cap-and-trade scheme in the northeastern United States (Acadia Center 2017), and it could help to drive lower cap levels in Europe and elsewhere, as well. The recent ETS reform, increasing the LRF and introducing the MSR, are both long-needed improvements to the system, but they are only a starting point. Ideally, the cap should reflect changing circumstances and market conditions.²⁵ Suc-

24. The ability of the MSR to absorb the impact of complementary policies on the supply and demand imbalance, and the carbon price effect are however still uncertain and rely on potential adjustments after the MSR reviews scheduled for 2021 and 2026. The opposite MSR mechanism to release allowances to the market when a lower threshold of allowances in circulation is reached is not expected to be utilised before 2030 (Marcu et al. 2018).

25. For a detailed discussion on options for dynamic cap adjustments and its benefits, see Cowart et al. (2017), who refer to this opportunity as “A ‘virtuous cycle’ of emissions reductions and allowance retirements”.

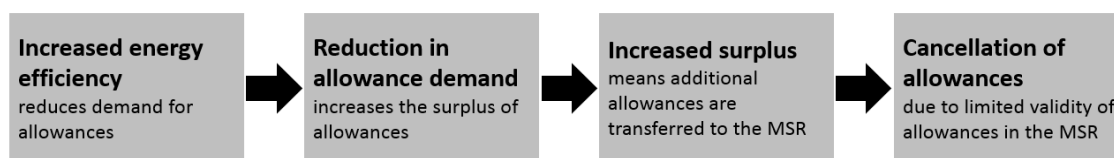


Figure 5. Interaction between the EU ETS and complementary energy efficiency measures, taking into account the MSR mechanisms.

Source: authors' illustration, adapted from Whitmore (2017).

successfully investing auctioning revenues in end-use energy efficiency could increase the political will and wider social acceptance for more ambitious, long-term decarbonisation targets within the ETS.

These three interactions show that the strategic use of auctioning revenues for energy efficiency has the potential to reinforce the EU ETS. Complementary, energy efficiency programmes funded by ETS revenues, additional to the main carbon pricing instrument, can lead to further emission reductions in ETS and non-ETS sectors, at lower costs for consumers and society. Beyond that, energy efficiency improvements provide multiple non-energy benefits and, finally, the opportunity for tighter cap regulation. Thus, the EU ETS can yield multiple dividends, but in order to realise them, the strategic use of auctioning revenues needs to be accelerated in all Member States.

Concluding remarks

Strategically investing auctioning revenues in end-use energy efficiency provides an increasing opportunity for Member States to reinforce the EU ETS. Support for complementary energy efficiency programmes can yield multiple dividends because energy efficiency improvements help to deliver cost savings and emissions reductions, reduce the upward pressure on consumer energy bills, and realise the energy and non-energy benefits of end-use efficiency. Furthermore, in practical political terms, the multiple dividends can be substantial. To achieve the targets of the Paris agreement and avoid drastic global climate disruption, climate policies must deliver GHG emission reductions sustainably over decades of progress, which, in modern democratic societies, requires sustained political support. Public support for climate policies will be easier to maintain when the consumer costs of carbon pricing are moderate, and the policy is seen to deliver costs savings to end-users, not primarily higher prices across the board.

In the EU ETS, the potential to use these benefits is to a large extent still untapped. Some Member States strategically invest their auctioning revenues for energy- and climate-related programmes. However, the fundamental understanding that both the carbon price and the strategic use of revenues can help to achieve the EU's decarbonisation targets cost effectively is limited. The analysis of the Member States' use of auctioning revenues shows that in 2017, 43.6 percent of total revenues are strategically invested for energy- and climate-related purposes and no more than 22.4 percent in energy efficiency programmes. To further establish the strategic use of auctioning revenues, EU Member States need to become aware of the multiple dividends they could achieve. The energy efficiency programmes partially funded by auctioning revenues in Ireland, Germany, and the Czech Republic directly illustrate that these programmes deliv-

er energy savings and GHG emissions reductions, cost savings to consumers, tax revenue to the national budgets, employment, and economic growth. Thus, in expectation of a future increase in EU ETS auctioning revenues, making the case for their strategic use becomes ever more relevant.

References

- Acadia Center (2017). Outpacing the Nation: RGGI's environmental and economic success. Retrieved from: <https://acadiacenter.org/document/outpacing-the-nation-rggi/>.
- Barranzini, A., van den Bergh, J., Carrattini, S., Howarth, R., Padilla, E., and Roca, J. (2017). Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *WIREs Climate Change*, 8 (4).
- BenNer, L.S., and Stavins, R.N. (2007). Second-best theory and the use of multiple policy instruments. *Environmental and Resource Economics*, 37 (1), 111–129.
- Broc, J.S. (2017). Better Energy Homes scheme (Ireland). Case study prepared by IEECP for the EPATEE project, funded by the European Union's Horizon 2020 programme. Retrieved from: <https://epatee.eu/case-studies>.
- Cambridge Econometrics and the Energy research Centre of the Netherlands (2013). *Investing EU ETS auction revenues into energy savings*. Retrieved from: <https://www.ecn.nl/docs/library/report/2013/e13033.pdf>.
- Cowart, R., Buck, M., and Carp, S. (2017). Aligning Europe's Policies for Carbon, Efficiency, and Renewables: Creating a "Virtuous Cycle" of Performance and Emissions Reduction. Retrieved from: <https://www.raponline.org/knowledge-center/>.
- Cowart, R. (2011). Prices and policies: Carbon caps and efficiency programmes for Europe's low-carbon future. eceee 2011 Summer Study. Retrieved from: https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2011/.
- Del Río González, P. (2007). The interaction between emissions trading and renewable electricity support schemes. An overview of the literature. *Mitigation and Adaptation Strategies for Global Change*, 12 (8), 1363–1390.
- Department of Communications, Climate Action & Environment (2017). National Energy Efficiency Action Plan for Ireland 2017–2020. Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/ie_neeap_2017.pdf.
- Diefenbach, N., Stein, B., Loga, T., Rodenfels, M., and Jahn, K. (2018). *Monitoring der KfW-Programme „Energieeffizient Sanieren“ und „Energieeffizient Bauen“ 2017*. Retrieved from: [https://www.kfw.de/KfW-Konzern/Service/Download-Center/Konzernthemen-\(D\)/Research/Evaluationen/Evaluationen-Energieeffizient-Bauen-und-Sanieren/](https://www.kfw.de/KfW-Konzern/Service/Download-Center/Konzernthemen-(D)/Research/Evaluationen/Evaluationen-Energieeffizient-Bauen-und-Sanieren/).

- Ecofys (2016). The waterbed effect and the EU ETS: An explanation of a possible phasing out of Dutch coal fired power plants as an example. Retrieved from: <https://www.ecofys.com/files/files/ecofys-2016-the-waterbed-effect-and-the-euets.pdf>.
- Ecologic Institute and WWF. (2016). *Smart Cash for the Climate: Maximising Auctioning Revenues from the EU Emissions Trading System*. Retrieved from: https://www.ecologic.eu/sites/files/publication/2016/2596-smartcash-forclimate-full-report_0.pdf.
- Gillingham, K., Newell, R. G., and Palmer, K. (2009). Energy Efficiency Economics and Policy. *Annual Review of Resource Economics*, 1 (1), 597–620.
- IEA (2018). *Energy efficiency 2018: Analysis and outlooks to 2040*. Paris, France: International Energy Agency. Retrieved from: <http://www.oecd.org/publications/energy-efficiency-2018-9789264024304-en.htm>.
- Jaffe, A.B. and Stavins, R.N. (1994). The energy-efficiency gap: What does it mean?. *Energy Policy*, 22 (10), 804–810.
- Labandeira, X., Labeaga, J. M., and López-Otero, X. (2017). A meta-analysis on the price elasticity of energy demand. *Energy Policy*, 102, 549–568.
- Le Den, X., Beavor, E., Porteron, S., and Iliescu, A. (2017). *Analysis of the use of Auction Revenues by the Member States*. Retrieved from: https://ec.europa.eu/clima/sites/clima/files/ets/auctioning/docs/auction_revenues_report_2017_en.pdf.
- Marcu, A., Alberola, E., Caneill, J.-Y., Mazzoni, M., Schleicher, S.P., Stoefs, W., Vailles, C., and Vangenechten, D. (2018). 2018 State of the EU ETS Report. Retrieved from: <https://www.ictsd.org/themes/climate-and-energy/research/2018-state-of-the-eu-ets-report>.
- Ministry of Industry and Trade (2017). *Vyhodnocení: Státního programu na podporu úspor energie a využití obnovitelných a druhotných zdrojů energie za rok 2016* [Evaluation: State programme to promote energy savings and the use of renewables and secondary energy sources for 2016]. Retrieved from: <https://www.mpo-efekt.cz/upload/62d0d69c2bcb052223969e1a31d35403/vyhodnoceni-statniho-programu-2016.pdf>.
- Perino, Grischa (2018). New EU ETS Phase 4 rules temporarily puncture waterbed. *Nature Climate Change*, 8 (4), 262–264.
- Rosenow, J., Graichen, J., and Scheuer, S. (2018). *Destination Paris: Why the EU's climate policy will derail without energy efficiency*. Retrieved from: <http://www.raponline.org/knowledge-center/>.
- Sandbag (2017). An agenda for strategic reform of the ETS. Retrieved from: <https://sandbag.org.uk/reports/>.
- Simon, F. (2018, March 22). France to push for EU carbon price floor and border tariff. *Euractiv*. Retrieved from: <https://www.euractiv.com/section/energy/news/france-to-push-for-eu-carbon-price-floor-and-border-tariff/>.
- Thema, J., Rasch, J., Suerkemper, F., and Thomas, S. (2018). *Multiple impacts of energy efficiency in policy-making and evaluation*. D8.2 Policy report on COMBI results.
- Whitmore, A. (2017, November 15). The case for additional actions under the EUETS has never been stronger. Retrieved from: <https://onclimatechange.org/policydotorg.wordpress.com/>.
- Wiese, C., Cowart, R., and Rosenow, J. (2018). *Carbon leverage: Investing Europe's carbon revenues in energy efficiency*. Retrieved from: <https://www.raponline.org/knowledge-center/>.
- Zeitung für Kommunale Wirtschaft (2018, April 20). Mittel des EKF werden nicht abgerufen. Retrieved from: <https://www.zfk.de/politik/deutschland/artikel/mittel-des-ekf-werden-nicht-abgerufen-2018-04-20/>.
- Zámečník, M., and Lhoták, T. (2012). *Should the government invest in energy efficiency of buildings? Macroeconomic impact assessment* [Executive Summary]. Retrieved from: <http://www.buildup.eu/en/practices/publications/should-government-invest-energy-efficiency-buildings-macroeconomic-impact>.

Endnotes

Some parts of this paper build on the non-peer reviewed work by Wiese et al. (2018).

After the paper deadline, personal communication with the Department of Communications, Climate Action and Environment in Ireland revealed that Ireland does not earmark auctioning revenues for specific uses. Thus, the reported investment in the Better Energy Homes Schemes does not represent a strategic use of auctioning revenues but only serves to accord with the Commission's recommendation to use at least 50 percent of auctioning revenues or the equivalent in financial value of these revenues for energy- and climate-related purposes.

Acknowledgments

The research has been financed by the Innovation Fund Denmark under the research project SAVE-E, grant no. 4106-00009B.