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Research Report

KfW/ZEW CO2 Barometer 2015 – Carbon Edition. Ten years of emission trading: strategies of German companies

KfW/ZEW CO2 Barometer

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KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

››› Ten years of emission trading: strategies of German companies

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KfW/ZEW CO2 Barometer 2015 – Carbon Edition

Ten years of emission trading: strategies of German companies

1. Executive Summary

The objective of the KfW/ZEW CO_2 Barometer is to closely monitor firm behaviour in carbon markets in order to provide detailed information to policymakers, businesses and the research community. The survey addresses a broad spectrum of topics related to company behaviour in carbon markets such as expectations regarding carbon and commodity prices, carbon trading strategies, abatement activities and impacts of the regulatory framework on companies' competitiveness. The main findings of the KfW/ZEW CO_2 Barometer 2015 – Carbon Edition are:

- Two major initiatives by the EU currently set the stage for the future of the EU ETS, aiming at a temporary reduction of allowances to reduce oversupply; namely the back-loading amendment and the proposal of a market stability reserve. Currently, the calculated oversupply amounts to 2 billion allowances, which corresponds to ca. 125 % of verified emissions in 2014.
- In 2014, the market for European Union Allowances (EUAs) was characterised by a weak but constant increase in prices. With approximately EUR 8.00 per tCO_2 in August 2015, the price reached its highest level since November 2012.
- In 2014, the verified emissions of installations regulated by the EU ETS decreased by 14 % compared to 2013. One important reason for this decrease may have been the relatively mild winter. The European-wide decrease has been mirrored in Germany. Here, large-scale combustion installations are the most important emitters and drive the development of total emissions in Germany.
- A binding international agreement is considered to be significantly less harmful for companies' competitiveness than Europe-wide climate actions. Unilateral (i.e. national) climate policies are deemed most harmful to competitiveness compared with Europe-wide or global actions. However, only 15 % of the respondents see it as likely that an international climate agreement will be reached at the upcoming United Nations Climate Change Conference in Paris.
- More than half of the surveyed companies expect electricity prices to increase by 2016, while the prices of coal, oil and gas are mostly expected not to increase.
- In previous years the regulated companies in Germany increased their emission allowance trading activity. This trend was reversed in 2014 – companies decreased their trading activity. Fifty-nine per cent of firms were engaged in the carbon market in 2014. The main reason not to trade emission allowances was the possession of a sufficient number of emission allowances.
- Most of the companies (76 %) have carried out investments or made changes in the production process in order to reduce carbon emissions. Process optimisations and investments in energy efficiency measures were the main abatement activities. The EU ETS generated only weak incentives for firms to implement carbon abatement measures. The reduction of carbon emissions was the primary objective behind abatement activities for only around 10 % of the respondents.
- When asked about how high the price for emission allowances has to be in order to set incentives to abate emissions, the surveyed companies stated, on average, EUR 30 per tCO_2.

- Price expectations for EUAs were corrected upwards and depict a positive trend for the medium and long term. On average, firms expect EUA prices adjusted for inflation to be 7.82 per tCO_2 in December 2015 and to increase to EUR 15.92 until 2020 and EUR 25.45 until 2030. By remaining below EUR 30, however, the estimated increase in EUA prices is expected to be insufficient to generate incentives for substantial carbon abatement measures. This is mirrored by the fact that only a tiny share of respondents reported abatement activities motivated by high emissions costs in the past.
- In a recent agreement on the further development of the "Energiewende", or energy transition, in Germany, policymakers have decided to decommission some emission-intensive power plants. However, it is unclear whether a corresponding retirement of emission allowances is planned. Hence, unless the allowances will be retired, the current proposal will not impact on CO_2 emissions in Europe and possibly lower EUA prices further.

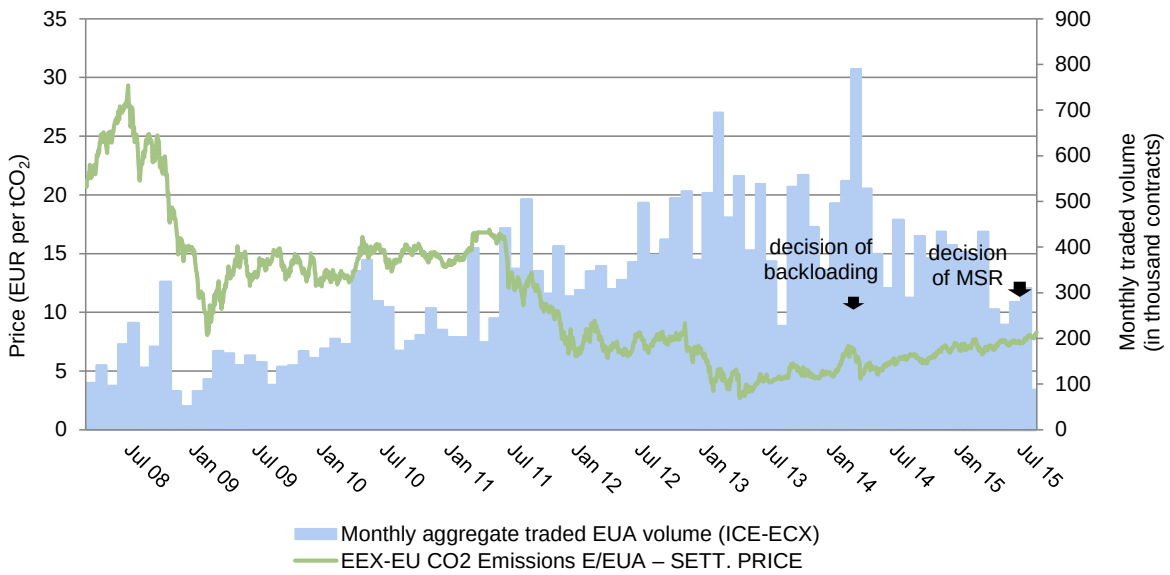
The KfW/ZEW CO_2 Barometer is a cooperative project of KfW Bankengruppe and the Centre for European Economic Research (ZEW). It has been analysing the situation of German companies regulated under the European Union Emissions Trading Scheme (EU ETS) on an annual basis since 2009. German firms regulated under the EU ETS are invited annually to participate in the survey. This year about 120 companies have participated in the survey.

The KfW/ZEW CO_2 Barometer 2015 – Carbon Edition is structured as follows: A review of the recent market developments is given in Section 2. The development of CO_2 emissions in the EU and especially in Germany is described in Section 3. Section 4 analyses the impact of climate policy regulations on the competitiveness of regulated companies. Section 5 describes the companies' trading behaviour in the EU ETS. Price expectations are analysed in Section 6 and carbon abatement measures in Section 7. Finally, Section 8 offers a conclusion.

2. Recent Market Developments

In the second half of 2014 and the first half of 2015, the EUA price showed a slight but stable positive trend (Figure 1). With approximately EUR 8.00 per tCO_2 in August 2015, the price reached its highest level since November 2012. However, the price is still deemed far too low to set significant economic incentives for ambitious abatement activities and low-carbon innovation (EC 2015a, see also Section 7).

EUA trading volumes stayed on a relatively high level since 2013. On average, 21,200 contracts were traded per day in 2014 (for comparison: 21,900 in 2013 and 11,200 in 2010). One possible reason for the high level is the constantly high share of auctioned allowances in 2013 and 2014 (see Section 3). However, in the first half of 2015, the average daily traded volume decreased to 15,700 contracts. This change in the trend is mirrored in the survey data as presented in Section 5.



Source: Thomson Reuter Datastream

Figure 1: EUA price and trading volumes (March 2008 to August 2015)

One main reason for the constantly low EUA prices is an oversupply of allowances in the market, amounting to ca. 2 billion allowances (EC 2015a).1 This corresponds to ca. 125 % of the total verified emissions in 2014. In order to reduce this oversupply, the European commission launched two major initiatives in order to temporarily reduce emission allowances available on the market; namely the back-loading amendment (EC 2014) and the proposal of a market stability reserve (EC 2015a). Finally decided in February 2014, the back-loading programme was put into action for the first time in 2014. In Europe, 400 million allowances were temporarily removed from the market by withholding them in 2014 although they were previously scheduled for auctioning. A volume of 300 million additional allowances will be held back in 2015 and 200 million in 2016 (DEHSt 2015). The plan is to auction the 900 million allowances in 2019 and 2020 instead. The final decision on the back-loading may be the reason for the short-term price peak in February 2014. The fact that the allowances will be reinjected

[1] The calculated oversupply is the sum of the cumulated allowances and international credits since 2008, minus the cumulated verified emissions, retired allowances and allowances in the reserve.

into the market at the end of the trading period and the quick price drop after February 2014 triggered discussions about more rigid structural reforms of the EU ETS. As a result, in July 2015 the EU Parliament adopted a proposal of the Commission for a market stability reserve (MSR) that withdraws allowances from the market if the calculated oversupply reaches an upper threshold, and reinjects them into the market gradually via auctioning if the oversupply surpasses a lower threshold.2 Importantly, the proposal provides that the back-loaded allowances will not be auctioned in 2019 and 2020, but transferred to the stability reserve. Hence, they will be auctioned only if the oversupply of allowances is lower than the threshold. The same holds for allowances that are dedicated for allocation, but could not be allocated, e.g. because the corresponding installations had been closed. These allowances are estimated at an additional 700 million tCO_2 (Ferdinand M. and H. Fjellheim 2015). The process of political negotiations on the market stability reserve was accompanied by a slow but steady increase of EUA prices.

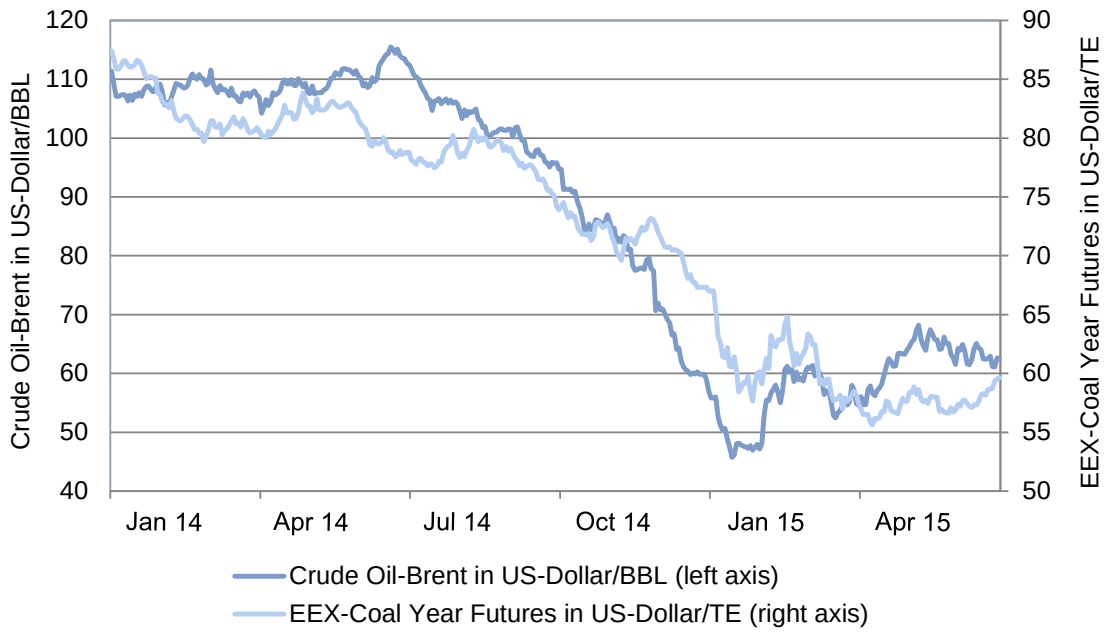
A second relevant development is the beginning review of the ETS for the fourth trading period, which will start in 2021. Although the political discussion has just begun, some of the major features of phase IV are already foreseeable (European Council 2014 and EC 2015b).[3] Firstly, the cap will probably be further reduced by an annual rate of 2.2 %. Secondly, there is broad consensus that the market stability reserve – as described above – is going to be in operation and will effectively reduce the oversupply of allowances in the medium term. Thirdly, the Council and Commission have proposed to completely exclude international carbon credits from the EU ETS in the fourth trading period, which will further reduce oversupply of allowances. Finally, free allocation will probably be continued and maintained on the same level after 2020, particularly in trade-exposed industry sectors which are at high risk of carbon leakage.

Major uncertainties in the design of the EU ETS in phase IV relate to the exact rules of free allocation and the definition of industries with high exposure to international competition and high carbon leakage potential. Consequently, while the overall supply of carbon allowances (which is a predominant driver of prices) is already quite well-known, major uncertainties remain over the exact distribution of these allowances to the sectors and installations (Ferdinand M. and H. Fjellheim 2015).

In 2014, carbon markets might have been affected by the strong decline of energy input commodity prices, i.e. oil and coal (see Figure 2). Lower input prices for combustion activities could trigger higher production by emitters and hence a higher emission volume. No such effect was observed for the year 2014, but the decline of energy prices will likely have consequences in future years as will be discussed in the following section.

[2] If the oversupply exceeds an upper threshold (833 million allowances) 12 % of the oversupply will be transferred from the market into the stability reserve. If it falls below a lower threshold (400 million allowances) 100 million allowances will be reinjected into the market. Currently the calculated oversupply is approximately 2 billion allowances (EC 2015a). The market stability reserve is scheduled to operate from 2019.

[3] The Commission began the legislative process of the review in 2015. The completion date is not yet foreseeable.



Source: Thomson Reuter Datastream

Figure 2: EEX Coal Future Price and Crude Oil (Brent) Price (January 2014 to June 2015)

Finally, the carbon market in Germany could be influenced by the recent political agreement on the future development of the "Energiewende" (BMWI 2015). One main pillar of this agreement refers to the instruments for reaching national emission targets. The German CO_2 target implies a reduction by 40 % in the power sector by 2020 – making it more ambitious than the reduction path provided for within the EU ETS (which is designed in such a way that this reduction will be reached by 2030). In order to reach this national target, the leaders of the three governing parties have agreed to implement measures that are expected to reduce CO_2 emissions in the power sector by 22 million tCO_2. The main instrument is decommissioning emission-intensive brown coal-fired power plants between 2017 and 2020 and transferring them into a capacity reserve. In the current state of the political discussion, there is no indication that a corresponding retirement of emission allowances is planned. Hence, unless the 22 million allowances will be retired, it is noteworthy that the current proposal of the enhancement of the "Energiewende" will have no impact on CO_2 emissions in Europe. While the national targets may be reached, the unused emission allowances will be sold on the secondary market and used elsewhere in Europe, leading to rising emissions outside Germany offsetting the national reductions. Moreover, if the decommissioning of emission-intensive power plants does have a price effect, it will be a negative one.[4] Consequently, the effects of the new agreement on the enhancement of the "Energiewende" on European greenhouse gas emissions are – at best – neutral. Regarding the EU ETS, the discussed measures can result in unintended pressure on the EUA price and hence lower incentives for abatement on the European level as long as the additional EUAs are not retired.

[4] If the power supply of the decommissioned brown coal-fired plants is replaced by less emission-intensive installations or not replaced at all, the unused EUAs would enter the market and increase the existing oversupply. By tendency, this would result in lower prices.

3. CO_2 Emissions in Europe and Germany

In 2014, the EU ETS regulated the GHG emissions of almost 12,000 stationary installations in the EU28, Iceland, Norway and Liechtenstein. In addition, it includes approximately 1,300 entities from the aviation sector. The total number of verified emissions of stationary installations in 2014 amounted to 1,616 million tCO_2 equivalent. Approximately 53 % of the emission allowances were allocated freely to the emitters. Compared to 2013, the verified emissions of stationary installations in Europe dropped by 279 million tCO_2 equivalent, which means a decrease by more than 14 % (EC 2015c).[5] Total emission data of 2012 and before are not directly comparable to the current situation, as with the introduction of the third trading period in 2013 the EU ETS increased its regional coverage (Croatia was included as a new member state) and scope of regulated gases and industries.

The overall decrease of verified emissions was mirrored in the development in the German section of the EU ETS. The 1,905 regulated stationary installations in Germany emitted 461.2 million tCO_2 equivalent (2013: 480.9 million, corresponding to a decrease by 19.7 million tCO_2 or 4.1 %). This is the greatest decline so far in verified emissions with the exception of 2009, the year of the economic crisis. Table 1 depicts the development of the verified emissions under the EU ETS in Germany.

Table 1: Verified emissions in Germany

	2005	2006	2007	2008	2009	2010	2011	2012	2013*	2014*
Verified emissions (tCO_2 in millions)	475.0	478.1	487.2	472.6	428.3	454.9	450.4	452.6	480.9	461.2
Change on the previous year		+0.6 %	+1.9 %	-3.0 %	-9.4 %	+6.2 %	+1.0 %	+0.5 %	+6.3 %	-4.1 %

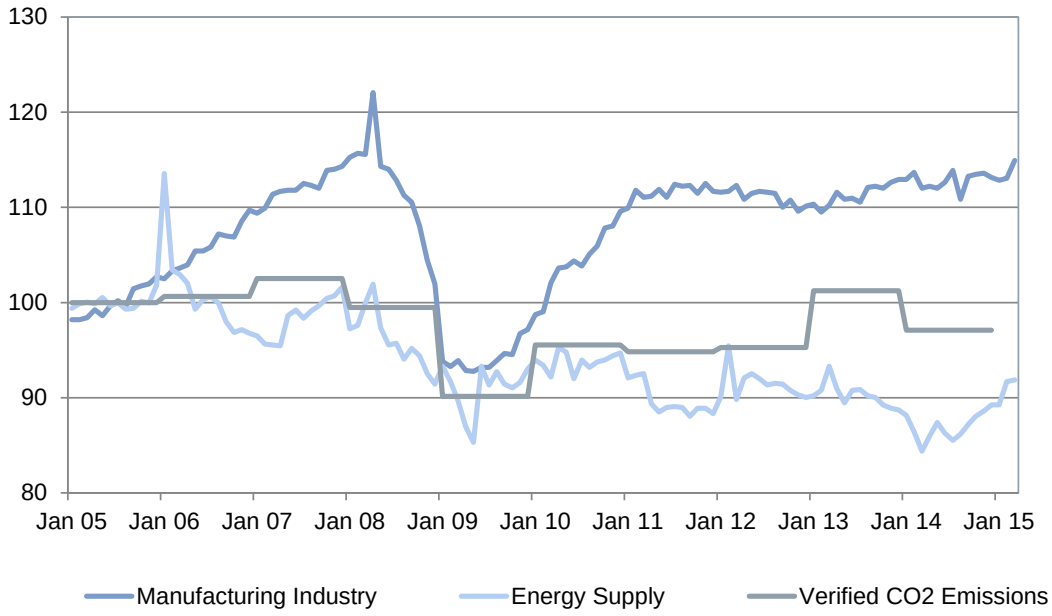
Notes: * Includes verified emissions of newly regulated installations after scope extension in 2013.

Source: DEHSt (2015)

Figure 3 depicts production indices of the manufacturing industry (without construction) and the energy sector as well as the corresponding verified emissions. The rise of emissions in 2013 is mainly due to the scope extension of the EU ETS. The graph shows a decline of verified emissions across a slightly growing production index for the manufacturing industry, while the index for energy supply dropped in the first half of 2014 and recovered later.

The energy sector, accounting for 73 % of total emissions, was the main source of the emissions decline. Here the verified emissions dropped by 5.5 % compared with 2013, while there was virtually no change in the aggregate of energy-intensive industries (DEHSt 2015). However, since mid-2014 there has been a positive trend for the energy supply index, accompanied by the decrease of energy input prices described in Section 2. Hence, if falling and constantly low energy commodity prices trigger energy production growth in 2015, emissions are likely to rise again in 2015. In other words, a negative impact of energy commodity prices on GHG emission levels (as presumed in Section 2) could not be observed in 2014, but a delayed response via increased energy supply activities is indeed possible for 2015.

[5] Since there was no change in scope or regional coverage of the EU ETS between 2013 and 2014, a direct comparison of verified emissions is possible.



Note: Energy supply covers the production of installations that generate, distribute or trade electricity, gas or thermal energy. Production data are based upon the economic value of the produced units, adjusted for inflation.

Source: DEHST (2015) and Destatis (2015)

Figure 3: Industrial production, production in the energy supply sector and verified emissions in Germany, (2005=100)

Table 2 provides a more detailed overview of the emissions by various regulated industries for 2014. Large-scale combustion installations are by far the most important emitters, accounting for more than 70 % of total emissions. Their decrease in emissions by 5.4 % is driving the development of total emissions in Germany. Possible reasons for the drop of these emissions are the lower production of fossil-fueled power (which is increasingly replaced by power from renewable energy sources), as well as the mild winter in the beginning of 2014. In Germany, 2014 was by far the warmest year on record (DWD 2015). With an average annual temperature of 10.3°C, this value surpassed the 10°C average for the first time.

Table 2: Sector development of verified emissions in Germany in 2014

Type of activity	Verified emissions in $ktCO_2$	Share of overall emissions	Change on previous year	Long- /short position** in $ktCO_2$	Number of plants
Energy Sectors					
Large-scale combustion installations (> 50 MW FWL*)	331,057	71.79 %	-5.39 %	-305,318	492
Small-scale combustion installations (20–50 MW FWL*)	5,609	1.22 %	-8.68 %	-1,384	429
Non-Energy Sectors					
Main engines / turbines	1,266	0.27 %	-17.25 %	-163	56
Combustion	2,085	0.45 %	-1.93 %	-49	73
Refineries	24,984	5.42 %	-4.26 %	-4,244	24
Iron and steel industry	36,302	7.87 %	+1.80 %	+14,085	126
Non-ferrous metals	2,481	0.54 %	+2.48 %	+64	38
Mineral industry	35,443	7.69 %	+1.83 %	-3,519	353
Pulp / paper	5,408	1.17 %	-2.42 %	+1,406	153
Chemicals	16,536	3.59 %	-1.09 %	+2,027	161
Total	461,173	100.00%	-4.11 %	-297,095	1,905

Notes: * Rated thermal input, ** incl. redistribution for byproduct gases (blast furnace gas)

Source: DEHSt (2015)

Given the overall decrease of emissions in the power sector, the decrease of emissions from brown-coal-fired combustion installations was disproportionately low (emissions from hard-coal-fired installations dropped by 11 % and from gas-fired plants by 13 %, whereas brown-coal-fired installations emitted only 3 % less than in 2013). Moreover, this decline can be explained by technical revisions of some power plants (DEBRIV 2015). In other words, the emission decrease of fossil-fueled power installations implied by weather conditions and the feed-in of renewables is mainly observable for hard-coal- and gas-fired combustion installations. So far, the relatively emission-intensive power production from brown coal has hardly been affected by these factors.

Regarding the energy-intensive industry's emissions covered by the EU ETS, the development in 2014 was rather diverse. Decreasing emissions are observable mainly for refineries (main reason: decreasing production), pulp and paper (increase of energy efficiency) and, to some extent, the chemical industry. Other sectors with significant emission shares reported higher emissions than in 2013. These are mainly iron and steel industries (main reason: higher production of oxygen steel) and mineral industries, including cement and lime.

For the 461.2 million tonnes of CO_2 emitted in Germany, 164 million allowances (35 %) were allocated freely, mainly to energy-intensive industries (DEHSt 2015). The share of freely allocated emissions varies greatly between the regulated sectors, as summarised in the fifth column of Table 2, where the

difference between free allocation and verified emissions is reported by sector. Negative numbers correspond to a free allocation share of less than 100 % (industry is “short”), and positive numbers show an allocation of allowances in the aggregate industry that is higher than the total verified emissions (industry is “long”).

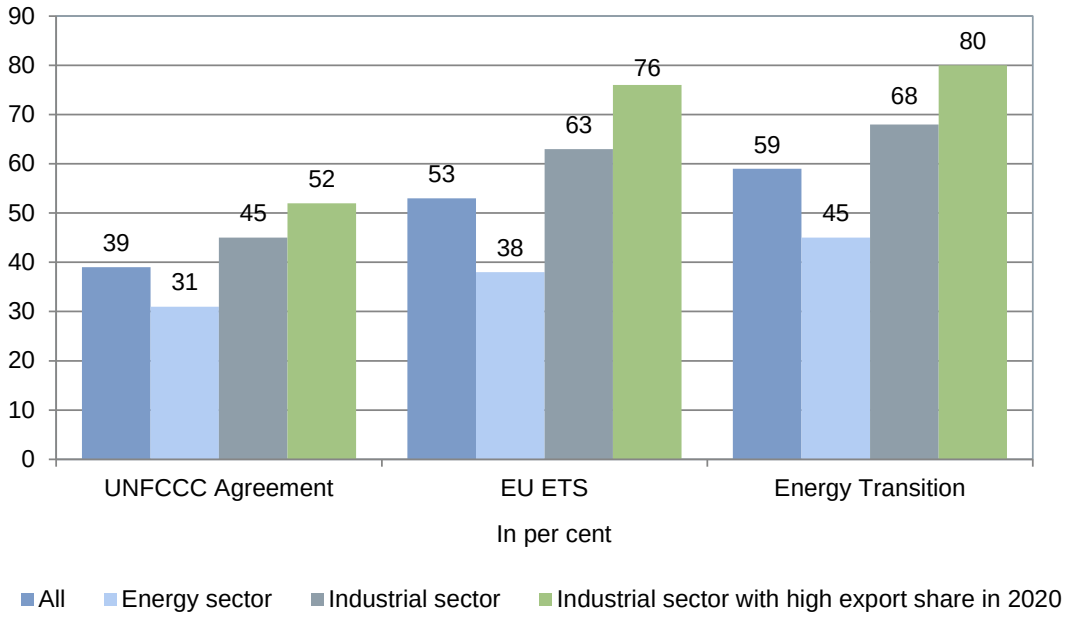
Emitters from the energy sector normally have to purchase their emission allowances and have been “short” for several years. The “short” positions of the various energy industries amount to 307 million allowances, which is the same order of magnitude as in 2013. The aggregate of non-energy sectors has a surplus of allocated allowances of ca. 10 million allowances, which is also virtually unchanged since last year.

Free allocations have decreased slightly since 2013 (from 169 million to 164 million). As the overall level of emissions has decreased faster, the aggregate of non-freely allocated allowances has decreased as well (from 312 million in 2013 to 297 million in 2014).

4. Competitiveness

The objective of the upcoming United Nations Climate Change Conference (UNFCCC), which will be held at the end of 2015 in Paris, is to achieve a legally binding global agreement on climate protection measures. While a global agreement would be the most efficient climate action (Weimann 2013), the political hurdles are huge and strong free-riding incentives complicate the process of negotiations. Against this background, participants of this year's survey were asked to assess the prospects for an international climate agreement to be reached at the upcoming Conference in Paris. The majority of the respondents are rather pessimistic. Only 15 % of the companies perceive an international agreement as likely. Survey participants were also asked to assess the expected competitiveness effects of climate policies on various political levels. Specifically, expectations were elicited regarding (a) the achievement of a legally binding global climate agreement at the Paris conference in 2015, (b) the EU ETS, and (c) the energy transition in Germany.

Figure 4 depicts the share of companies expecting a negative impact of the respective policies on their competitiveness. The debate over climate protection measures is closely connected to the regulated companies' concerns about their international competitiveness. Thus, the assessment of companies with a strong focus on international markets is explicitly reported.



Note: Survey participants were asked to assess the competitiveness effects of a legally binding global agreement (UNFCCC agreement), the EU ETS, and the energy transition in Germany. Depicted is the share of companies expecting a negative impact of the respective policies on their competitiveness.

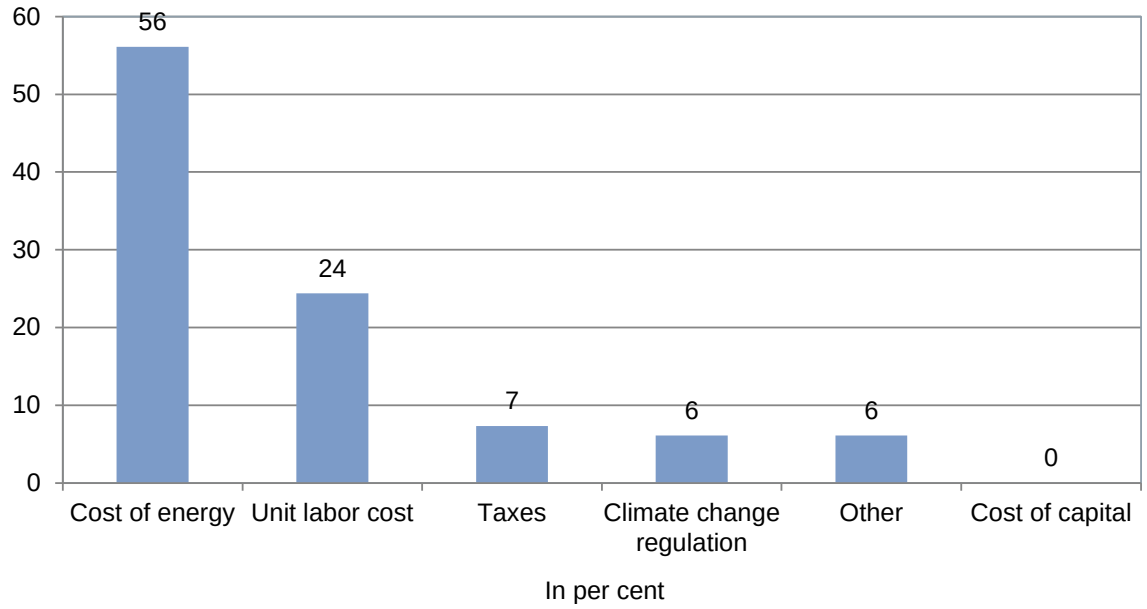
Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 4: Climate policy regulations and negative impact on competitiveness

A binding international agreement on climate change is considered to be significantly less harmful than Europe-wide or national climate actions. Across all companies, 39 % reported that a binding international agreement on climate change would have a negative impact on their international competitiveness, while 14 % more state that an exclusive Europe-wide approach, i.e. the EU ETS, is detrimental to their competitiveness. In total, 59 % of all companies, and thus the highest share, reported that a unilateral approach, i.e. the energy transition in Germany, interferes with their

international competitiveness. Companies belonging to the industrial sector in particular reported a competitive disadvantage from climate protection measures regardless of the political level of implementation. This is particularly the case for companies of the industrial sector which expect a high share of international sales markets in 2020. If direct competitors expect the same regulation on competitors (as in the case of the energy sector and domestically marketing companies), competitiveness effects are perceived as relatively mild. In contrast, if companies may be affected more than their competitors, as is the case of industrial companies with a focus on exports, their assessment of competitiveness effects is more pessimistic and turns significantly more negative if climate measures are located on a national level.

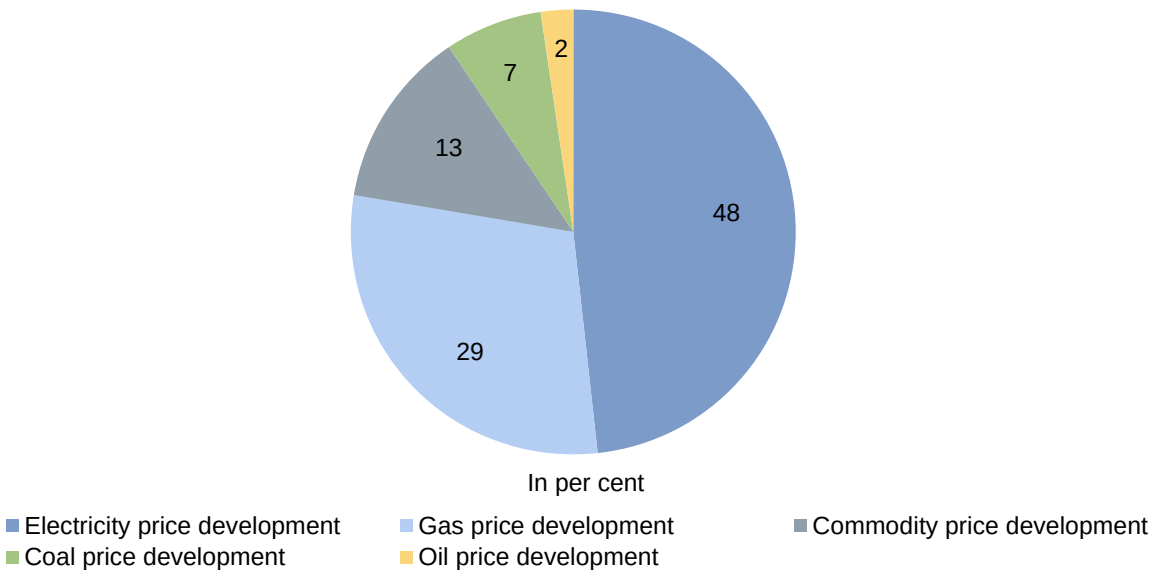
Obviously, the competitiveness of regulated companies does not hinge on climate policy measures alone. In order to evaluate the relevance of climate policy relative to other aspects, companies were asked to elicit the single cost factor which is deemed most important. A distinction was made between (i) costs associated directly with climate policy regulation, such as the purchase of EUAs or the costs ofcomplying with various climate-relevant regulations, and (ii) energy costs that may be indirectly linked to climate policy measures, e.g. from rising energy prices. Compared with other cost factors presumably not linked to climate policy, energy costs were seen as the most important cost driver by a majority of 56 % of the surveyed companies (see Figure 5). Not surprisingly, this shows that climate policies have a potentially very high relevance for the competitiveness of firms regulated under the EU ETS, albeit mainly via the channel of energy prices.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 5: Which cost factor is most important for your company's competitiveness?

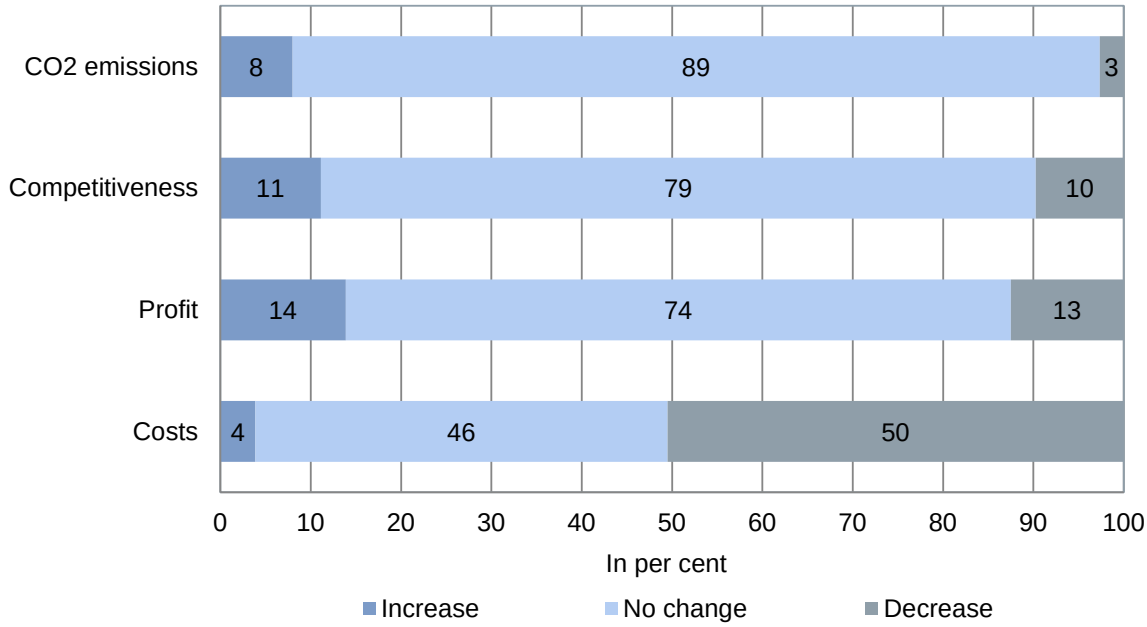
Electricity prices in particular are perceived as determinants of companies' competitiveness (see Figure 6). Almost half of the surveyed companies name electricity price as an important factor for their competitiveness. The gas price development is mentioned by 29 % of the companies. The current development of oil and coal prices (see Section 2), in contrast, appears to be of less importance with respect to competitiveness.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 6: Which price trend most strongly influences the competitiveness of your company?

These results are consistent with other responses regarding the recent fall of the oil price. Firms were asked how they perceive the impact of the recent oil price development on their company's competitiveness (see Figure 7). Only about 11 % of the respondents reported that the fall of the oil price has a positive impact on their competitiveness. Competitiveness effects of the oil price are perceived as comparatively mild because competitors face the same trend. The impact on other dimensions, e.g., carbon emissions and profits, is also expected to be moderate. Low oil prices may only reduce costs, but presumably without a considerable impact on overall profits.

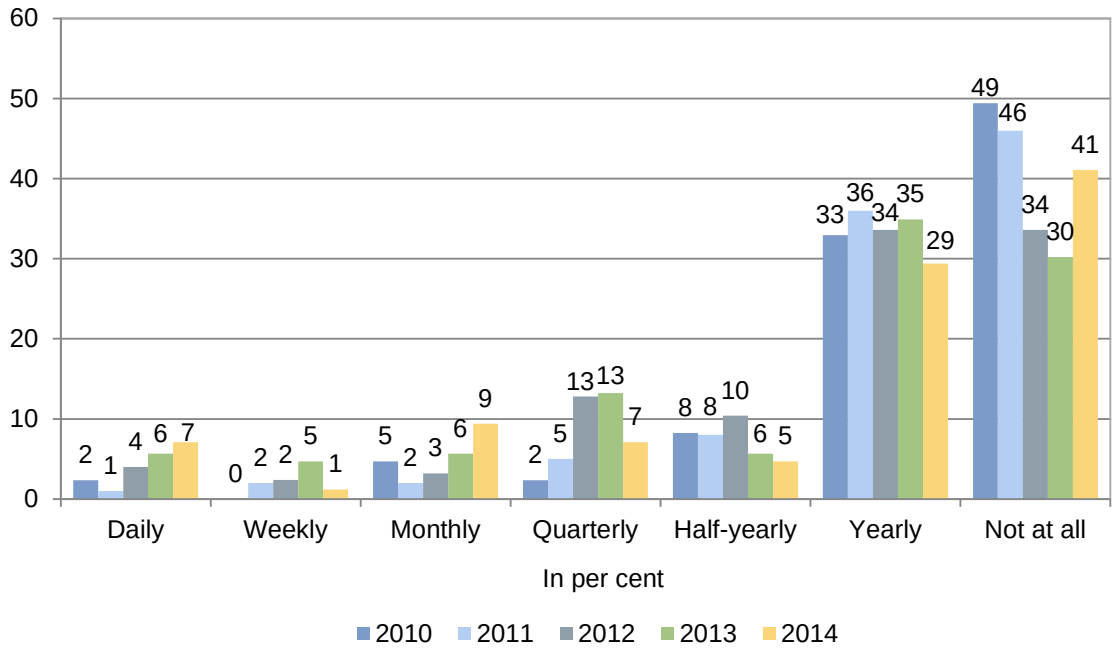


Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 7: How does the falling oil price influence the development of your company?

5. Trading of Emission Allowances

During the previous years, the share of surveyed firms reporting that they were actively participating in the European carbon market increased steadily to 70 % in 2013 (share of firms who have not traded at all decreased to 30 %, see Figure 8).

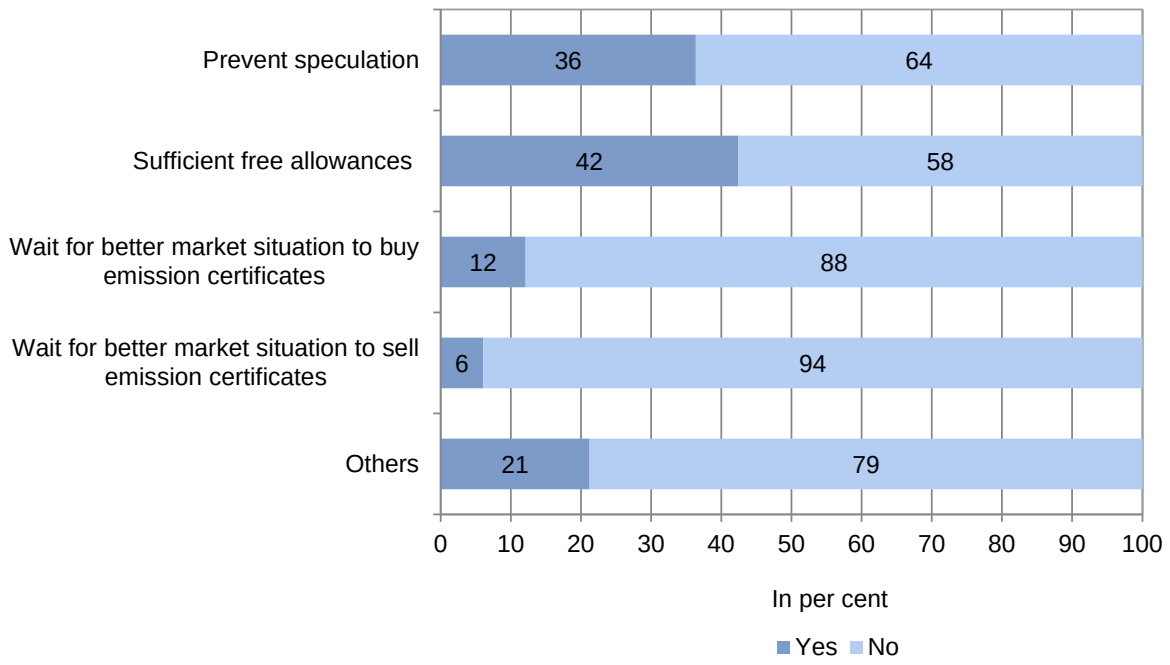


Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 8: How often has your company traded emission allowances (EUAs, CERs or ERUs) during the last year?

This development reversed this year. In 2014, 59 % of the companies stated that they had been trading emission allowances. The decrease in the amount of companies actively participating in the carbon market is consistent with the outlook of last year's survey. Last year, only two-thirds of the firms planned to trade emission allowances during 2014.

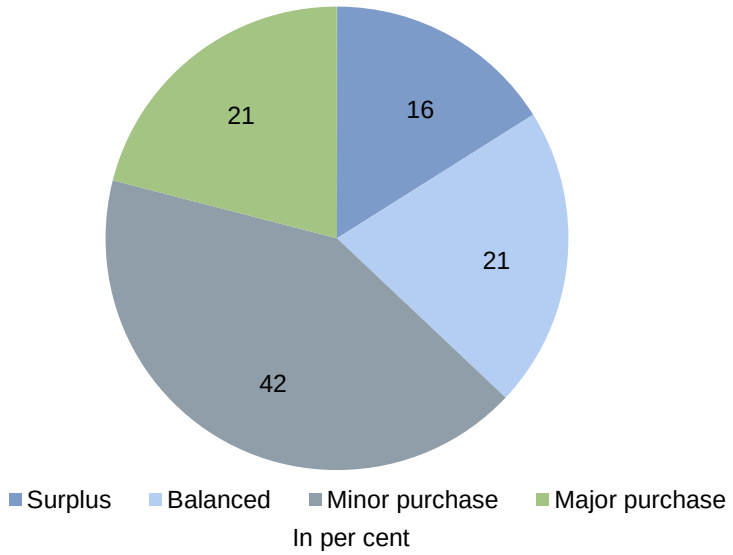
The results of the survey show that two primary factors prevented firms from trading emission allowances: possession of a sufficient number of freely allocated emission allowances (42 %) and prevention of speculation (36 %) (see Figure 9). Only a small fraction of the companies reported that they were waiting for better market conditions to either buy or sell emission allowances at 12 % and 6 % respectively. Compared to last year's survey, these figures have hardly changed.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 9: Reasons why companies did not trade emission allowances in 2014

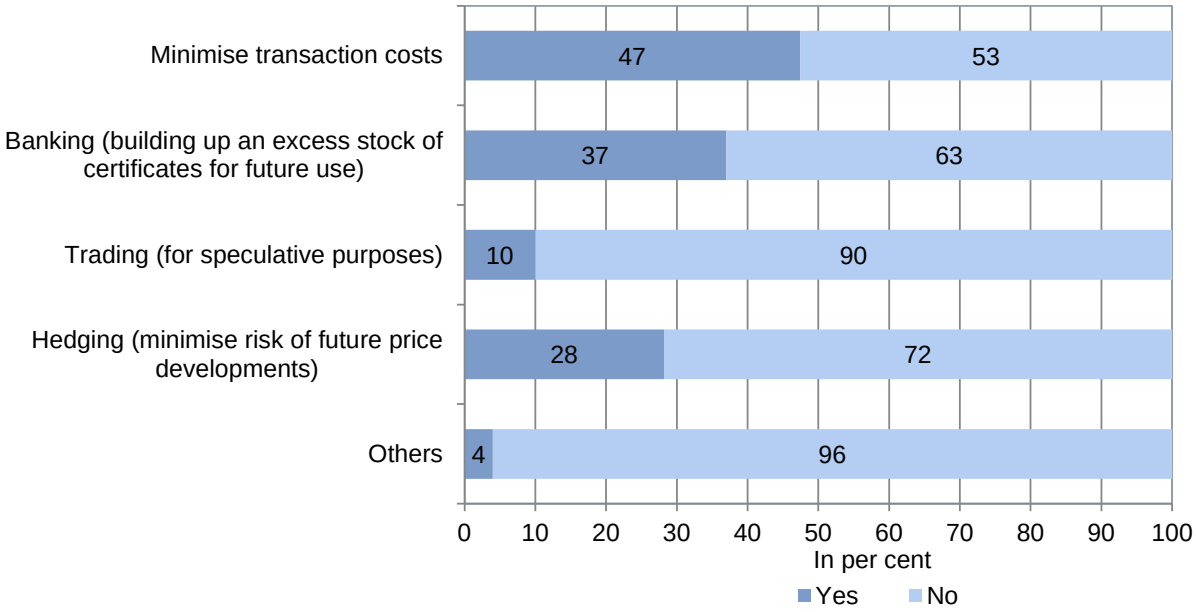
Concerning the general situation of companies in the EU ETS, this year's survey revealed that only 21 % of the companies need to purchase higher additional amounts of emission allowances in order to be compliant (see Figure 10). Forty-two per cent of the surveyed firms need to do minor purchases. The rem4aining companies reported no need for purchasing emission allowances at all. These results are very similar to last year's survey.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 10: How would you describe the situation of your company in the EU ETS?

One key reason for regulated companies to become active in the carbon market is to ensure compliance, e.g. to cover at least the verified emissions. Besides this essential prerequisite, the market participants were asked for further strategies guiding their trading behaviour. In 2014, the minimisation of transaction costs was the leading strategy applied by 47 % of the firms (see Figure 11). Banking, i.e. the accumulation of emission allowances for future use, was the second most frequently pursued trading strategy. Furthermore, 28 % of the firms participating in the survey traded in order to minimise the risk of future price developments (hedging). Noteworthy is that only a minority (10 %) of the surveyed companies reported that they were trading emission allowances for speculative purposes.



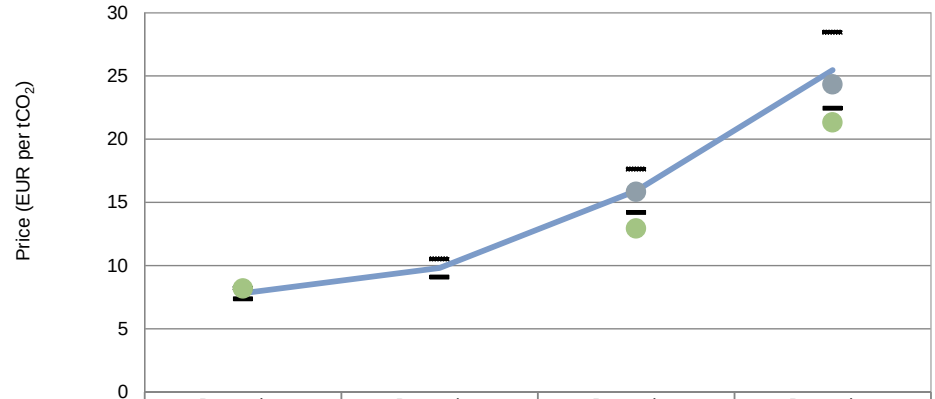
Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 11: Which strategy has your company pursued regarding trading of emission allowances since the end of February 2014?

6. Price Expectations

In the survey of the KfW/CO_2 Barometer 2015 – Carbon Edition, participating firms were asked about their short, medium and long-term expectations of EUA prices. Figure 12 depicts the results.

Against the backdrop of a slight but stable positive price trend, the surveyed firms expect EUA prices to be EUR 7.82 per tCO_2 in December 2015 on average and to increase gently to EUR 9.82 until December 2016. Accompanied by recently decided initiatives aimed at reducing the amount of emission allowances available on the market and emerging discussions about essential features of the ETS for the fourth trading period (see Section 2), firms expect that this positive trend will continue in the medium and long term. On average, companies expect EUA prices to rise to EUR 15.92 in 2020 and EUR 25.45 in 2030. Contrary to the previous year, surveyed companies corrected their medium and long-term expectations for future EUA prices upwards. Last year, firms expected EUA prices to be EUR 12.93 in 2020 and EUR 21.32 in 2030. Still, the (current and future) prices could be too low to incentivise substantial carbon abatement activities, as will be discussed in the next section.



	December 2015	December 2016	December 2020	December 2030
Lower Conf. Int. (95 %) 2015	7.39	9.11	14.21	22.45
Price Expectations 2015	7.82	9.82	15.92	25.45
Upper Conf. Int. (95 %) 2015	8.25	10.53	17.64	28.44
Price Expectations 2014	8.18		12.93	21.32
Price Expectations 2013			15.82	24.31

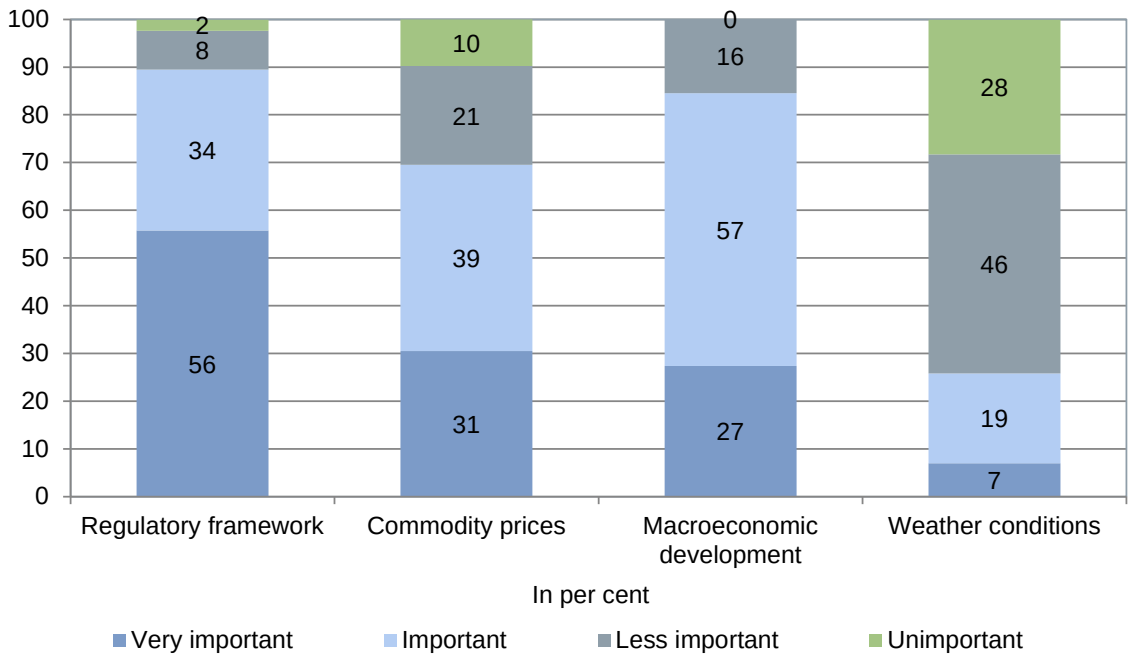
Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 12: Price expectations for EUAs (inflation-adjusted)

The companies were asked to evaluate the impact of different factors on EUA prices. More than half of the participating firms (56 %) believe the regulatory framework to be the most important EUA price determinant (see Figure 13). As discussed in Section 2, the European Commission pursues two strategies to reduce oversupply of emission allowances (back-loading and the market stability reserve) to recalibrate the regulatory framework.

Commodity prices were ranked as the second most important influencing factor. Thirty-one per cent of the firms view this factor as very important. However, as discussed in Section 2, this relationship could not be observed in the market situation of 2014, where energy commodity prices dropped significantly. Emissions of combustion installations did not grow in the short term and hence have not yet triggered an increase of EUA prices. Besides the regulatory framework and commodity prices, participating firms believed the macroeconomic development was influencing EUA prices. The percentage of firms

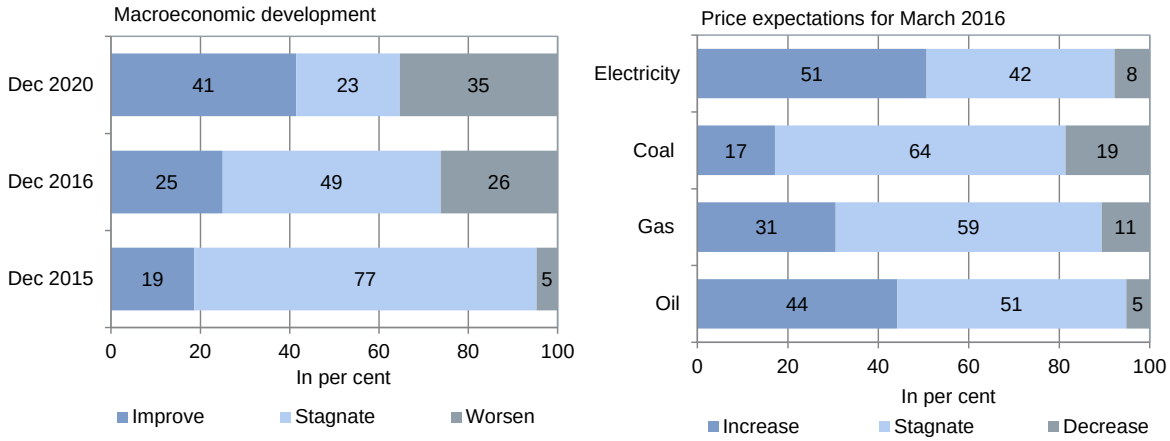
identifying the macroeconomic development as one of the most important factors influencing the price of emission allowances was 27 %. Counting the firms that believe this factor to be simply important, the percentage increases to 85 % and is comparable to the aggregate percentage for the regulatory framework (90 %). Weather conditions as an influencing factor on EUA prices were only viewed by 7 % of the participating firms to be very important.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 13: What are the most important factors that influence the EUA price?

When asked about their expectations concerning the macroeconomic development, firms do not expect substantial changes (see Figure 14, left panel). Seventy-seven per cent of the companies believe that the situation will not change until December 2015 and almost half of the firms expect this to be true until December 2016. While 41.5 % of the participating firms expect an improvement in the long term, 35.4 % expect the economic situation to worsen. Figure 14 (right panel) depicts price expectations for selected commodities. An increase in electricity prices is expected by more than half of the firms. Forty-four per cent expect the oil price to increase until March 2016. A majority of companies expect stagnating prices for coal and natural gas.



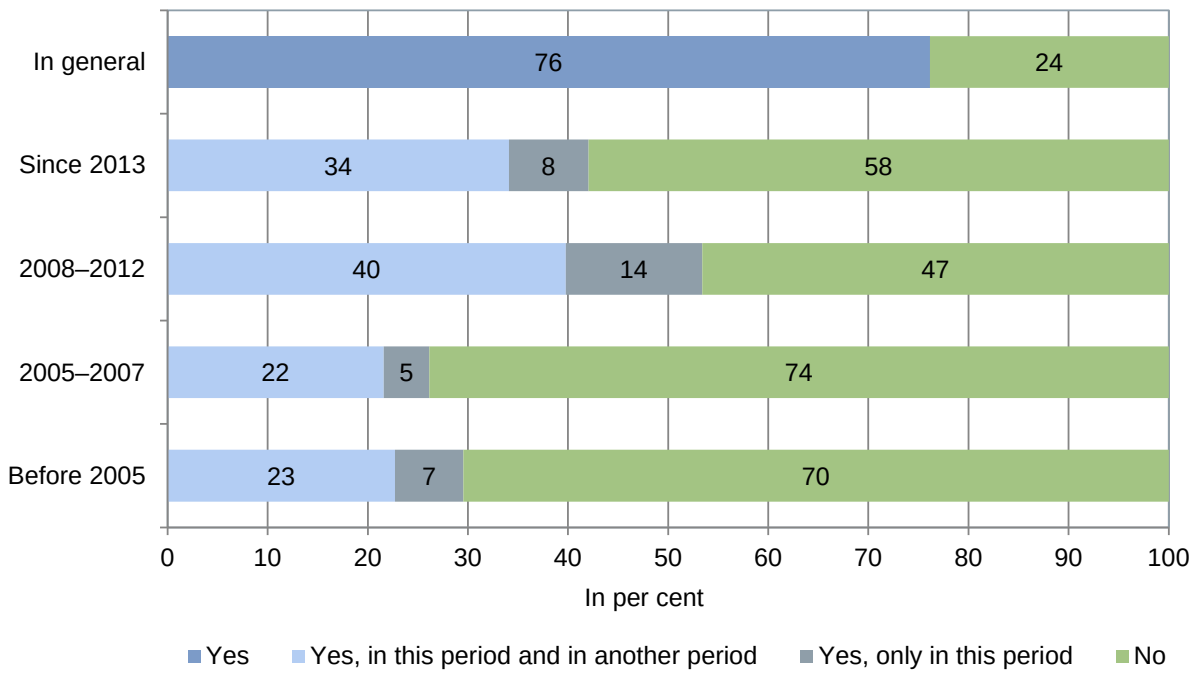
Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 14: How would you assess the development of the macroeconomic situation and energy prices in the EU until March 2016?

7. Abatement

In order to assess the influence of the EU ETS on companies' attempts to reduce carbon emissions, firms were asked about their abatement activities. Three-quarters (76 %) of the respondents have already reduced CO_2 emissions (Figure 15).

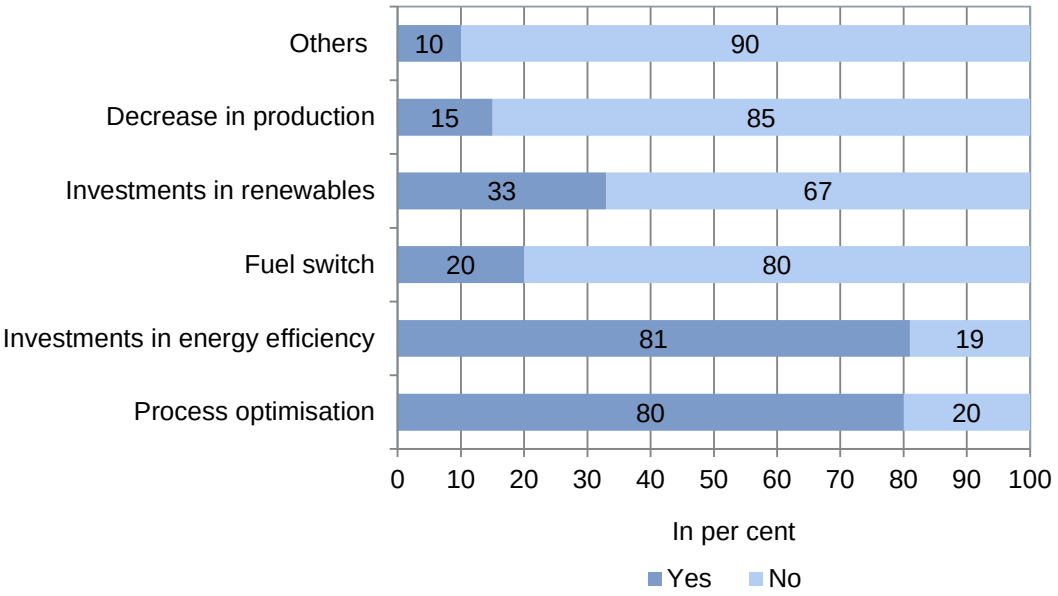
Regarding the time of their abatement activities, 30 % of the surveyed firms stated that they had already intervened in the production process or invested in order to reduce CO_2 emissions before the EU ETS was launched in 2005. Around one quarter (27 %) of the respondents conducted CO_2 abatement measures between 2005 and 2007, in the first phase of the EU ETS. The second phase of the EU ETS shows the highest level of abatement activities so far. Over 50 % of the respondents conducted CO_2 abatement activities from 2008 until 2012. In the current third phase of the EU ETS, which started in 2013, already 42 % of the companies have intervened in the production process or invested in order to reduce CO_2 emissions. This shows that several companies (57 % of companies that implemented general abatement activities and 43 % of all surveyed companies) have engaged in abatement activities in more than one phase of the EU ETS. Sixteen per cent of abating firms reported CO_2 reduction efforts in each of the four time periods.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 15: Share of companies that have conducted CO_2 reductions and time of the carbon abatement activity.

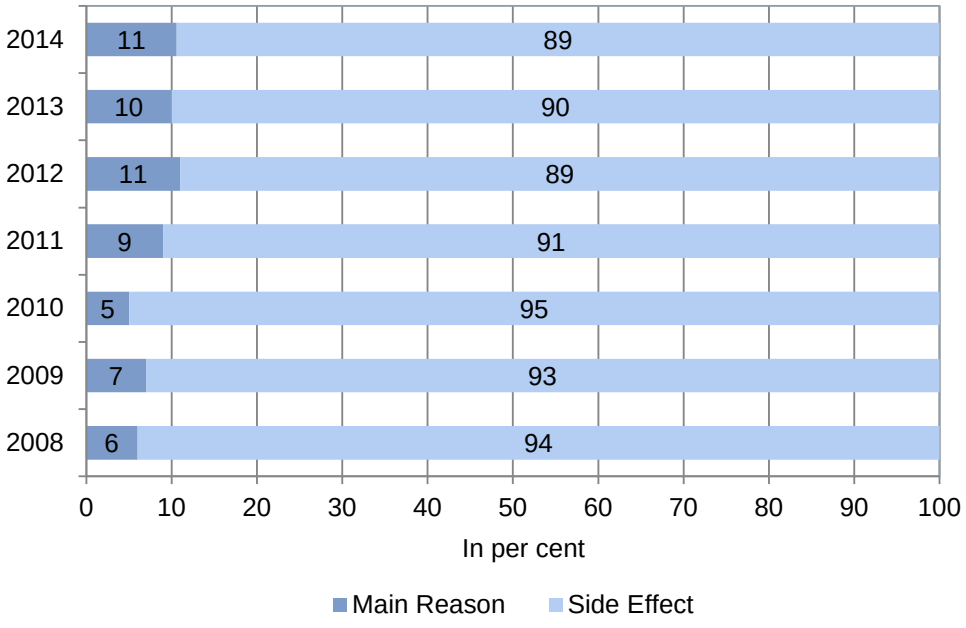
In line with previous surveys, companies named process optimisation and investments in energy efficiency as main abatement activities (see Figure 16). While the proportion of companies investing in energy efficiency measures remained constant since last year (about 80 %), process optimisations have become increasingly important (in 2014: 80 %, in 2013: 68 %).



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 16: What kind of abatement activity was conducted?

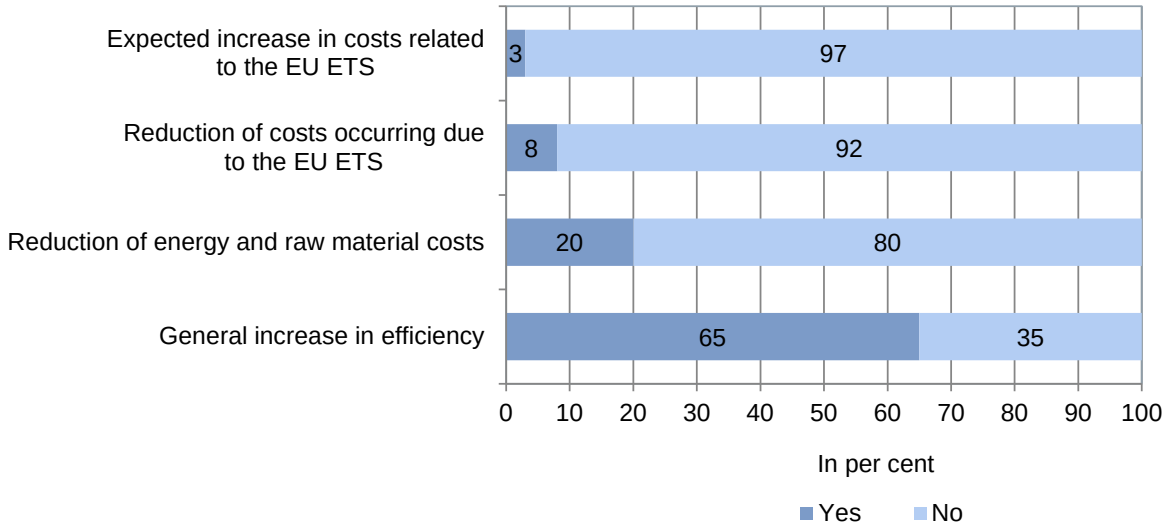
Regarding the main drivers for the conducted CO_2 abatement activities, the survey reveals that the actual reduction of carbon emissions plays only a subordinate role. As in the previous years, it was for only around 10 % of the respondents that the reduction of carbon emissions was the primary objective behind their abatement activities (see Figure 17).



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 17: Carbon abatement as the main reason or a side effect?

As the previous surveys have shown, in most cases the reduction of carbon emissions remains a side effect of efficiency measures. Most companies (65 %) named a general increase in efficiency as the main driver of their carbon abatement measures (see Figure 18). Only a minority of companies stated that current costs (8 %) and expected increases in costs (3 %) resulting from the EU ETS have motivated their carbon abatement activities. When asked about how high the price for emission allowances has to be in order to set incentives to abate emissions, surveyed companies stated EUR 30 per tCO_2 on average. Last year, companies indicated a slightly higher price (EUR 32 per tCO_2 on average). This illustrates that for most of the companies even the expected long-term price increases (see Section 6) are not sufficient to set a carbon price that could be considered a significant driver for carbon abatement measures.



Source: KfW/ZEW CO_2 Barometer 2015 – Carbon Edition

Figure 18: If your company conducted activities contributing to carbon abatement, please name the main reasons for their implementation.

8. Conclusive Summary

In response to the persistently low EUA price, the European Commission launched two major initiatives in 2014, namely the back-loading amendment and the proposal of a market stability reserve. In order to temporarily reduce the emission allowances available on the European carbon market, the back-loading programme was put into action in February. This may explain the short peak in the EUA price in February 2014. The quick price drop that followed, however, underlined the need for a more ambitious structural reform of the EU ETS. Against this background, the EU Parliament adopted a proposal from the Commission for a market stability reserve. Along with these initiatives and proceedings the EUA price showed a slight but stable positive trend in the second half of 2014 and the first half of 2015. In August 2015, the price reached its highest level since November 2012, with approximately EUR 8.00 per tCO_2. In light of this trend, companies in Germany have revised their price expectations for EUAs upwards. Firms expect EUA prices adjusted for inflation to be EUR 7.82 per tCO_2 in December 2015 and to increase to EUR 15.92 until 2020 and EUR 25.45 until 2030.

Despite the fact that most of the companies have carried out investments or made changes in their production process in order to reduce carbon emissions, carbon abatement remains a side effect in most cases given the current price level. In line with the previous years, only one out of ten respondents stated that the reduction of carbon emissions was the primary objective of their abatement activities. Process optimisations and investments in energy efficiency were the main abatement drivers. Even the estimated increase in EUA prices until 2020 and 2030 is expected to be insufficient to set substantial incentives for the reduction of carbon emissions.

In recent years, the number of companies actively participating in the carbon market has increased continuously. In 2013, more than two thirds of all respondents were trading emission allowances. Contrary to this positive trend, regulated companies decreased their allowance trading activities in 2014. In most cases, the possession of a sufficient number of emission allowances kept companies from trading emission allowances. This is consistent with the results of the previous surveys which showed that the majority of the surveyed companies accumulated a substantial reserve of emission allowances in order to assure compliance.

Although the EU ETS appears to generate moderate incentives for taking measures to reduce carbon emissions, climate policies have a high relevance for the competitiveness of firms regulated under the EU ETS. Direct climate policy costs such as the purchase of EUAs play a subordinate role. However, a majority of firms regard indirect climate policy costs, e.g. from rising energy prices, as the most important cost driver. The results of the survey further show that a binding international agreement on climate change is considered to be significantly less harmful for the companies' competitiveness than Europe-wide actions. Unilateral (i.e. national) climate policies are deemed as most harmful to competitiveness compared with Europe-wide or global actions. However, a majority of the respondents are pessimistic about the prospects for an international climate agreement and expect that no binding agreement will be reached at the upcoming UNFCCC in Paris in December 2015.

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Appendix: Structure of the KfW/ZEW CO_2 Barometer – Carbon Edition

The KfW/ZEW CO_2 Barometer has been analysing the situation of German companies regulated under the EU ETS since 2009. The objective is to closely monitor firm behaviour in carbon markets in order to provide detailed information to policymakers, businesses and the research community. The survey addresses a broad spectrum of topics related to company behaviour in carbon markets such as expectations regarding carbon and commodity prices, carbon trading strategies, abatement activities and impacts of the regulatory framework on companies' competitiveness.

Almost all German companies regulated under the EU ETS were invited to participate in the survey in March and April 2015. Only one person responsible was contacted per company in order to avoid contacting a company multiple times. This is particularly important, as almost 36 % of the contacted companies monitor more than one installation regulated under the EU ETS. In 2015, 875 companies were contacted and 120 responded to the questionnaire, which corresponds to a response rate of 14 %. Emission data from the Community Independent Transaction Log (CITL) and the European Union Transaction Log (EUTL) were aggregated and merged with the responses. Table A.1 summarises the response rates according to different dimensions.

Table A.1: Response rates

	Population	Survey
Companies	875	120 (14 %)
Installations covered by firms	1.941	442 (23 %)
Verified emissions in 2014	436 Mio. tCO_2	170 Mio. tCO_2 (39 %)

Note: The number of installations and verified emissions are based upon data of EC (2015c) as of 1 April 2015. The slightly different figures reported in section 3 draw from updated data as of 4 May 2015.

Source: KfW/ZEW CO2 Barometer 2015 – Carbon Edition

The participating firms operate around 23 % of the German installations and cause 39 % of the verified emissions. The type of activity that is contained in the CITL/EUTL data base does not allow conclusions about sector classification, so the study surveyed the main goods or services produced by the firm. The surveyed companies were asked to classify themselves according to their type of business. Forty-four per cent of the respondents classify themselves as belonging to the energy sector (see Table A.2).

Furthermore, companies are categorised according to their emissions. Companies emitting less (more) than 25,000 tCO_2 are classified as small (large) emitters according to EU Directive 2009/29/EC (EU 2009). Sixty-five per cent of the firms participating in this year's survey qualify as large emitters. The participation rate among large emitters was roughly 17 %, while not even 10 % of the small emitters participated in the survey.

Table A.2: Sector classification of responding firms (NACE)

Sector	NACE-Rev.	Share
Energy and/or heat generation (e.g. power supply companies)	40.1	43.6 %
Food and animal feed, beverage industry	15	7.3 %
Textile, clothing, leather and leather goods	17, 18, 19	0.9 %
Pulp and paper, paper products, printing and publishing	21, 22	9.1 %
Manufacture of coke, refined petroleum products and nuclear fuel	23	0 %
Chemical industry	24	7.3 %
Rubber and plastic products	25	0.9 %
Manufacture of other non-metallic mineral products (glass, ceramics etc.)	26	14.5 %
Steel and non-ferrous metal production	27	5.5 %
Metal products	28	0 %
Manufacture of machinery and equipment	29	0.9 %
Automotive industry (incl. suppliers)	34, 35	1.8 %
Office machinery, computers, electrical and optical equipment	30–33	0 %
Other	–	8.2 %

Source: KfW/ZEW CO2 Barometer 2015 – Carbon Edition

In addition, the survey classifies the companies according to their size: small and medium enterprises (SMEs) and large companies. According to the European Union definition, SMEs are enterprises with fewer than 250 employees (EC 2003). This criterion for SMEs was met by 27% of the participating firms. Sales revenues should in general be taken into account to distinguish SMEs from large companies. However, data on sales revenues could not be assessed for all participating companies. Therefore, this criterion was left out.