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EU Emissions Trading Scheme: UK Results 2006 Report

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SCOTTISH EXECUTIVE

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1.1 Executive summary

Introduction

The European Union's Emissions Trading Scheme (EU ETS) commenced on 1 January 2005. This ambitious scheme is the world's largest emissions trading scheme covering around 50% of the EU's carbon dioxide emissions (CO_2). Across Europe over 12,000 installations take part in the scheme, each one is required to monitor its CO_2 emissions and surrender the equivalent number of allowances on 30 April each year[1].

The results of the first year were released in 2006 and represented a key milestone for the EU ETS. Defra published a series of summary reports focusing on the UK 2005 results across each sector[2] . In April 2007 the European Commission released provisional results for 2006. This paper summarises the results for UK installations in the second year of trading. It begins by reporting the results for the UK and the key factors that influenced emissions and sector surpluses/deficits in 2006. It then goes on to outline the results for other Member States, and finally it discusses preliminary conclusions both from industry and Government.

This report aims to provide background information on the scheme and examples that may be useful for further policy development. Detailed information about the UK plans for Phase II (2008-2012) and developments for post 2012 is available on the Defra website[3].

UK results

During 2006, EU ETS installations in the UK emitted a total of **251.0 million tonnes (Mt) of CO_2**. This was **33.3 $MtCO_2$** higher than the total number of allowances allocated to them in 2006 (**217.7M**). In comparison to 2005, UK installations covered by the EU ETS increased emissions by **8.7$MtCO_2$** and the shortfall of allowances by **6.2M**. This deficit was mainly due to the power stations sector emitting **45.9$MtCO_2$** more than their total allocation. The remaining industry sectors emitted **12.6$MtCO_2$** less than their total.

Sixty-three per cent of the installations in the scheme during 2006 had a surplus of allowances and therefore could sell or retain them for the remaining year in Phase I; 37 per cent had fewer allowances than emissions and therefore were required to purchase or borrow allowances from the remaining Phase I allocations. A small number of installations had zero emissions.

EU-wide results[4]

Results from the European Commission's central processing hub for the trade in

[1] One allowance = 1 tonne of CO_2.
[2] Please see: http://www.defra.gov.uk/environment/climatechange/trading/eu/operators/compliance.htm for the 2005 reports.
[3] Phase II: http://www.defra.gov.uk/environment/climatechange/trading/eu/operators/phase-2.htm
Future of EU ETS: http://www.defra.gov.uk/environment/climatechange/trading/eu/future/review.htm
[4] The data used can from the CITL in May 2007, so may have been updated since then.

allowances – the Community Independent Transaction Log (CITL) indicated that installations in the 25 Member States emitted **2,027** $MtCO_2$ in 2006. This was around **51.7$MtCO_2$** below the total number of allowances[5] issued to them in 2006.

Nineteen out of the 25 Member States experienced a surplus of allowances in 2006. Poland had the highest surplus in absolute terms, followed by France, Germany, The Czech Republic and The Netherlands. The highest surpluses in percentage terms came from Lithuania, Estonia, Latvia and France. The UK, Italy, Spain, Denmark, Ireland and Slovenia all had deficits of allowances.

Conclusions

The main factor influencing the UK emissions covered under the EU ETS in 2006 was the increase in electricity generation from coal-fired powered stations. This was caused by the positive price differential compared to gas-fired generation. Although coal use produces more emissions, the cost of gas has been too high and the cost of carbon too low to produce a price that will lead to fuel switching. In 2006 the gas price after the first quarter began to decrease but the annual average price was greater than that of 2005.

The key factor in the shortfall in allowances was the required reduction from business as usual projections for the power sector. Across industry there are a range of factors influencing EU ETS emissions: energy and electricity prices, product demand, plant closures, new entrants not yet operating at full capacity, the number of opt-out installations, projections not reflecting annual fluctuations and improvements to monitoring and reporting emissions are the main factors.

[5] The CITL does not show allowances given to new entrants.

1.2 General UK information and statistics

1.2.1 Projections, allocations and verified emissions

Projections

UK emissions from installations covered by the EU ETS in 2006 were projected to be 267.3MtCO_2. Phase I (2005-07) follows a continuous downward trend in projected emissions with the 2006 figure being the total annual average projected emissions during Phase I.

Cap

The total cap for UK installations was set so that all sectors (other than power stations) would receive sufficient allowances to cover their projected business-as-usual emissions (taking into account existing measures for reducing emissions). The power stations sector is required to deliver an additional 67Mt of carbon savings over Phase I (approximately 22MtCO_2 per year).[6]

The total Phase I UK cap is therefore **245.4MtCO_2/yr**. A total of **15.6M/yr (6.4** per cent**)** was put into the New Entrant Reserve (NER), of which 4.6M/yr were set aside for Good-Quality combined heat and power plants (GQCHP), and 0.5M/yr was set aside for late or missing installations. Therefore, the total cap for incumbent installations in the EU ETS is **229.8M/yr** allowances (93.6 per cent of the total UK cap).

Allocations

In 2006, a total of **217.7M** free allowances were issued to UK installations in the EU ETS. Incumbent installations received **205.3M**. New and late entrants that joined the scheme in late 2005 received **12.4M** of 2006 allowances. A total of **24.0M** allowances that would have been issued to opted-out installations were cancelled.

Opted-out installations

The European Commission have approved two types of opt-out for the UK: one for installations with Climate Change Agreements (CCAs) and the other for installations that were already in the UK Emissions Trading Scheme (UK ETS). Within the UK, a total of 389 installations chose to opt out, 330 on the basis of their CCAs and 59 on the basis of their involvement in the UK ETS.[7] The CCAs are able to opt out for the whole of Phase I, which means these installations will not enter the scheme until 1 January 2008, whereas the UK ETS opt-outs were required to enter the scheme on 1 January 2007, when the UK ETS ended.

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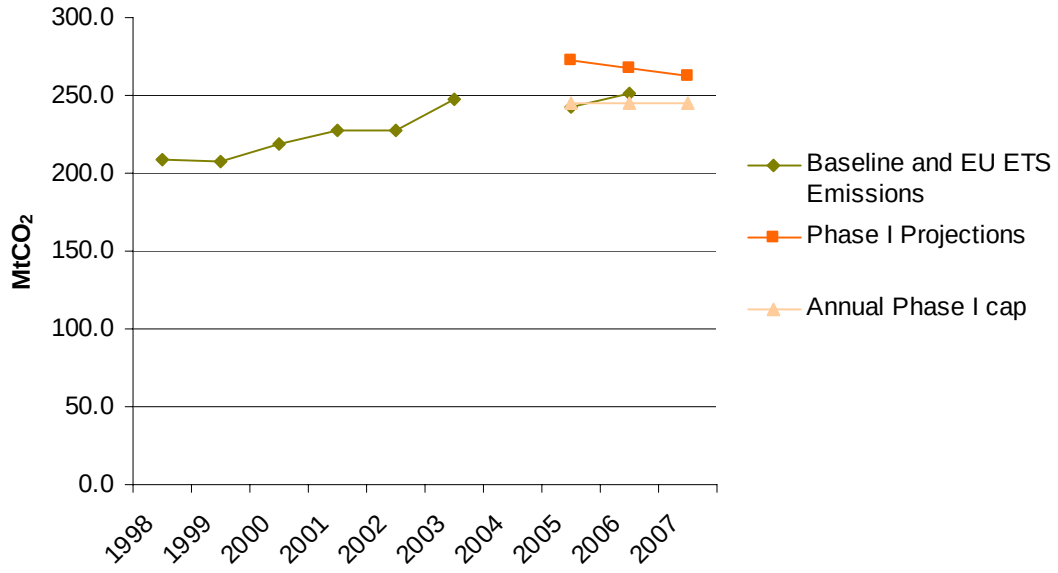
[6] This reduction was required following the Commission's rejection of the UK's amended National Allocation Plan (NAP), and subsequent appeal, based on updated projections, which would have resulted in a further 19.8M allowances being issued to the power stations over Phase I.

[7] Seven cement installations were partly opted-out under CCAs and partly under the UK ETS. These have been counted as seven installations in each group.

Figure 1. Phase I verified baseline emissions, total EU ETS emissions, projections and cap for all eligible installations.



Estimated total emissions (including opt-outs)

CCA sectors report over two year target periods, with 2006 being the end of the 3rd target period (2004-2006). Therefore all CCA sectors reported on their total energy use[8]. This includes both EU ETS opt-outs and installations not covered by the scheme. We are unable to disaggregate sector energy use down to an installation level and so cannot provide an emissions figure for 2006 for all the CCA opt-out installations. A comparison of the CCA sectors[9] where all installations are covered by the EU ETS shows that in 2006 these installations emitted 7.18MtCO_2. The same installations emitted 7.34MtCO_2 in 2005.

UK ETS opt-outs emitted 8.9MtCO_2 in 2006. The emissions data we have gives a total of 267.18MtCO_2 . As the remaining missing CCA installations emitted around 11MtCO_2 in 2005, it is reasonable to estimate that if the missing CCA installations are included in 2006 then we would have emitted above our projected emissions.

Verified EU ETS emissions

The total emissions from EU ETS installations (incumbent and new entrants) was 251.0MtCO_2 in 2006 . Emissions from EU ETS installations in 2006 were therefore 33.3MtCO_2 more than their allocations in 2006.

[8] Estimated emissions for CCAs are based on total sub-sector energy use. This figure is therefore not directly comparable with EU ETS data. Target units may comprise a number of facilities that may not all be in the EU ETS and we cannot isolate EU ETS emissions. The emissions include both direct and indirect sources. In addition, the EU ETS includes process emissions whereas generally CCAs do not. The scope of a CCA target unit is likely to be different to the corresponding EU ETS installation because the eligibility requirements are different. However, this represents the best available estimate of 2006 CCA emissions at this time.

[9] The sectors we are unable to disaggregate emissions from are the glass, chemical, mineral wool and paper sectors.

1.2.2 Nature of installations

Number of installations

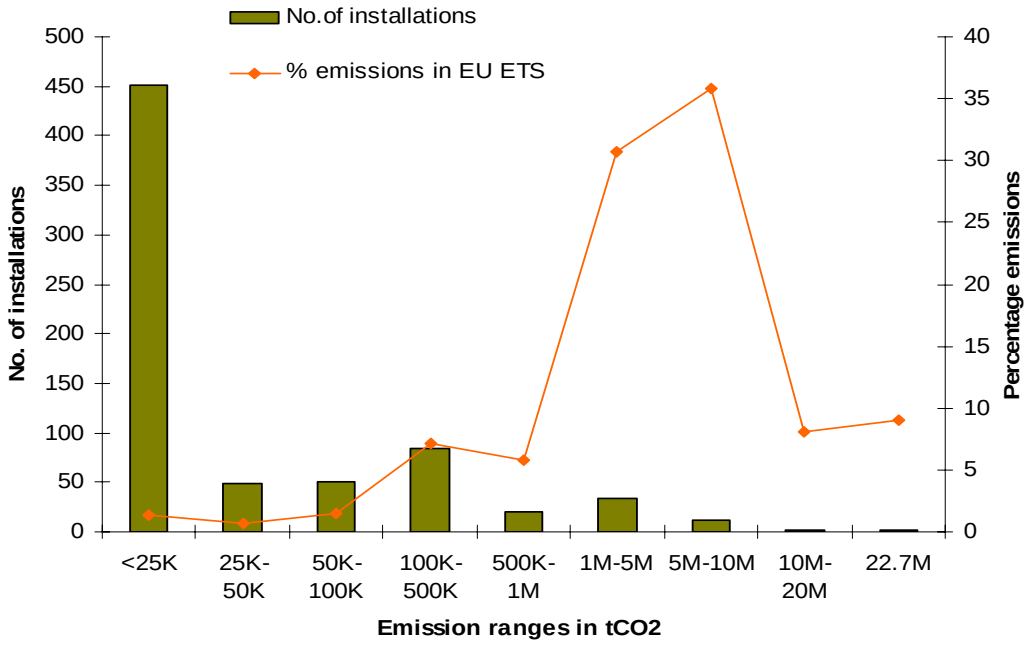
On 1 January 2006, 690 UK-based installations were taking part in the EU ETS. During 2006 28 entered the scheme as new or late entrants, and 15 surrendered their permits and dropped out of the scheme, either through closure or by falling below Annex 1 thresholds.

At the end of 2006 there were therefore 703 installations in the EU ETS in the UK.

Scale of installations

Figure 2 shows the number of EU ETS installations emitting CO_2 within specific emission ranges, based on their 2006 emission figure, and the percentage contribution of that range to overall EU ETS emissions in 2006 (these are not the same as the emission categories used in the Commission's *Monitoring and Reporting Guidelines)*.

Figure 2. Number of installations in the EU ETS and their percentage of emissions in categories



Around 452 (64 percent) installations in the scheme each emitted less than 25ktCO_2 in 2006, 99 (14 percent) emitted between 25 and 100kt, 84 (12 percent) emitted between 100 and 500ktCO_2, and 68 (10 percent) installations emitted more than 500ktCO_2. One installation emitted more than 20MtCO_2 in 2006.

The 452 (64 percent) installations emitting less than 25ktCO_2 accounted for only 1.3 percent of the total EU ETS emissions in 2006. By far the largest percentage of emissions (66 percent) came from 45 (6 percent) EU ETS installations emitting between 1

and 10MtCO_2 per year. The one installation emitting more than 20MtCO_2 accounted for around 9 percent of total EU ETS emissions.

1.2.3 New and late entrant reserve allocations

One hundred and five installations received a total of 12.4M allowances from the NER in 2006. These included incumbent installations granted allowances for new eligible units on their site, new eligible installations that commenced operation in 2006, and late entrants.

In the first two years of Phase I 21.8M allowances were issued out of a total NER of 46.75M allowances. Allowances designated for closed installations in future Phase I years were also put back into the NER.

A total of 0.11M allowances were issued to 23 late entrants in 2006. These included installations that were not included in the Phase I NAP because they did not submit verified baseline data on time, or were unaware of the scheme's requirements and had not applied for a Greenhouse Gas Permit. These installations received reduced allocations (by 10 per cent or 25 per cent) as a penalty for not meeting previous deadlines and requirements.

1.3 UK results

This section reports the emissions from installations covered by the EU ETS in the UK. It focuses on installations that did not opt out of the scheme, although for completeness and comparison with projections, emissions from opted-out installations are provided in section 1.3.1. Results for each industry sector (as used in the Phase I NAP) are then summarised, followed in section 1.4 by a brief discussion of the key general factors affecting emissions from installations in the scheme and the UK's overall deficit of allowances in 2006.

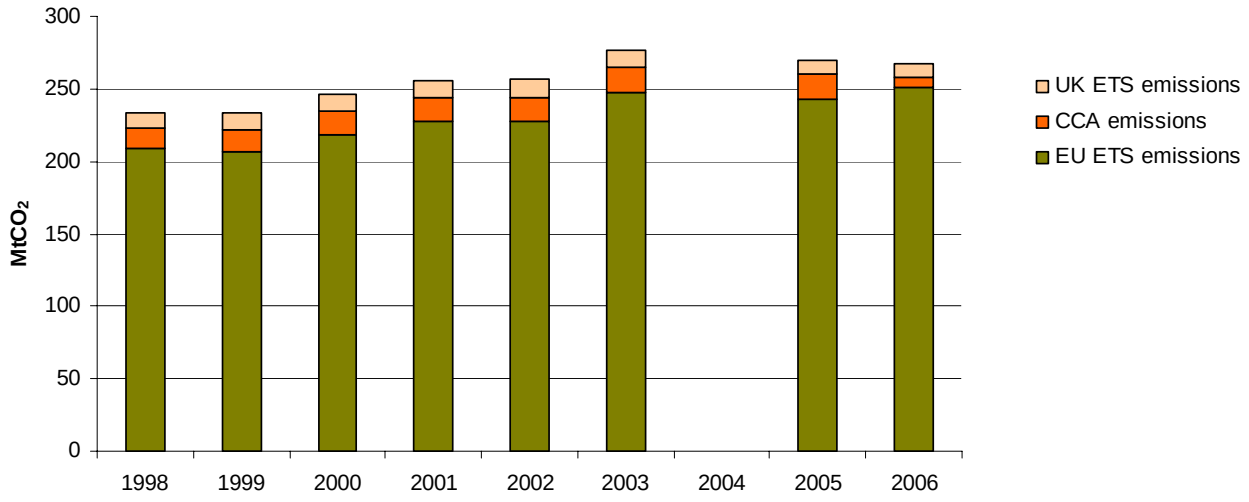
The assessment prioritises those factors that were a major influence through to those that had a relatively minor influence. It is difficult to generalise findings for the large range of different industries covered by the scheme, but the factors discussed here have generally played a role in all or most of the sector results.

1.3.1 Trends in total emissions

Total emissions from all UK installations covered by the EU ETS increased from 234MtCO_2 in 1998 to 276.6MtCO_2 in 2003 (see Figure 3). Emissions then decreased to an estimated 269.6MtCO_2 in 2005 but emissions from EU ETS incumbents increased in 2006. As discussed above, we cannot provide an overall 2006 figure because we do not have disaggregated emissions data for all the CCA opt-outs.

The increase over the 1998-2003 period is likely to be partly due to the increasing amount of annual emissions data available for the installations, and new installations commencing operation, but emissions from incumbent installations are also thought to have increased over this period. As we do not have comparable data for 2004 it is difficult to assess what caused the decline in emissions from 2003 to 2005. The reasons for the increase in 2006 are discussed further in this report.

Figure 3. Baseline emissions for all installations, verified 2006 data for EU ETS and UK ETS opted-out installations, and estimated disaggregated 2006 data only for CCA opt-outs



Emissions from the EU ETS installations increased during the baseline years,[10] but decreased by **5.2MtCO$_2$** between 2003 and 2005 from **247.5MtCO$_2$** to **242.3MtCO$_2$** (this includes emissions from new installations that commenced operation in 2004 and 2005). In 2006 emissions from EU ETS installations increased by **8.7MtCO$_2$** to **251.0MtCO$_2$**.

Emissions from UK ETS opt-outs decreased by around 3.1MtCO$_2$ from a total of 12MtCO$_2$ in 2003 to 8.9MtCO$_2$ in 2006.[11]

Emissions from CCA opt-outs increased gradually during the baseline period from 13.9MtCO$_2$ in 1998 to 17.1MtCO$_2$ in 2003, and then again to the estimated figure of around 18.1MtCO$_2$ in 2005, there was a slight decrease in emissions from the sectors where data could be disaggregated in 2006.

Emissions from installations that remained in the EU ETS therefore accounted for around an estimated 90% of the total emissions in 2006, CCA opt-outs accounted for around 6.8% (estimated) and UK ETS opt-outs accounted for 3.2%. While opted-out emissions represented a relatively minor amount of total EU ETS emissions (there are no opted-out installations in the power sector), they played a significant role in influencing some of the sector surpluses, as discussed below.

1.3.2 Sector EU ETS emissions[12]

The majority of total EU ETS emissions in 2006 came from the power stations sector, which emitted 181.5MtCO$_2$ (73 percent). The second highest was the iron and steel sector with 20.2MtCO$_2$ (8 percent) and then refineries with 17.7MtCO$_2$ (7 percent).

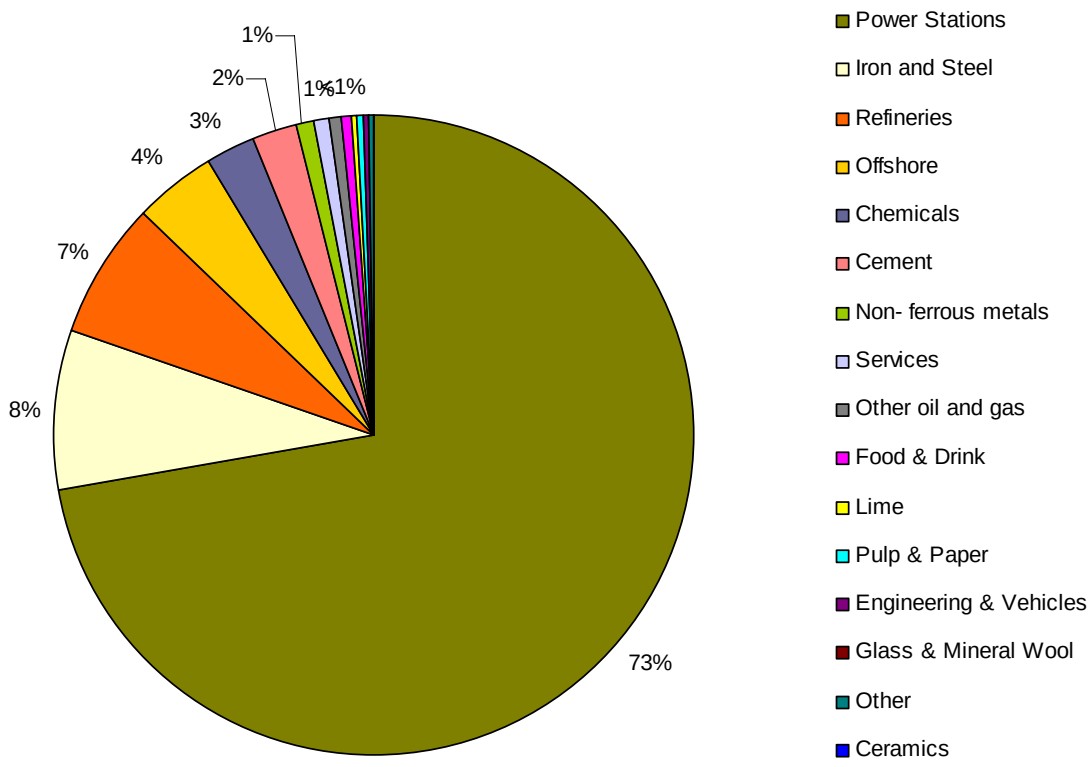
The smallest proportion of emissions came from the ceramics sector, which emitted a total of only 0.13MtCO$_2$ in 2006 (0.05 percent). As in 2005 ceramics, other, glass, engineering and vehicles, pulp and paper, and lime all emitted less than 1MtCO$_2$ each (<0.4 percent of the total). These results do not include emissions from opted-out installations. Sector proportions for those influenced by opt-outs therefore may change once these installations enter the scheme.

[10] The number of EU ETS installations with emissions data for 1998 was 454, increasing to 656 in 2003 and then to 690 in 2005. Therefore, while there was an increase during the baseline period, it may not be as steep as it appears on the chart.

[11] UK ETS opt-outs monitor and report emissions in accordance with the Commission's *Monitoring and Reporting Guidelines*, so their data are comparable to EU ETS emissions data.

[12] Please see pg 20 of UK Phase I NAP for details of which installations are in each sector: http://www.defra.gov.uk/environment/climatechange/trading/eu/nap/pdf/0505nap.pdf

Figure 4. Percentage contribution of each sector to the UK's 2006 EU ETS emissions



1.3.3 Sector results – deficits and surpluses

UK installations in the EU ETS emitted more than their total allocations in 2006, and in aggregate the UK had a deficit of 33.8M European Union Allowances (EUAs, or allowances) in 2006.

Annual reports show that the deficit came from the 63 per cent of installations that emitted more CO_2 than their free allocation (mainly in the power stations sector). The other 37 per cent of installations emitted less than their total allocations and therefore had a surplus.

The results for each high-level industry sector used in the Phase I NAP are shown in Figure 5. The graph shows the total surplus or deficit in millions (M) of allowances (given next to the sector title) and the percentage of the sector's allocation that made up the surplus or deficit of allowances (including new entrant allocations).

A positive result indicates that the sector emitted less CO_2 than its allocations and therefore had surplus allowances to sell or retain for future years.

Only the power stations sector emitted more than their free allocation in 2006, emitting 45.9Mt (33.9 per cent) over their allocation. All the other industry sectors together emitted a total of 69.5MtCO_2 compared with their total allocation of 82.1M allowances in 2006. They therefore experienced an overall surplus of around 12.6M allowances (15.3 per cent).

Of the industry sectors with surpluses, the iron and steel sector had the greatest total surplus of allowances (3.10M) in 2006, which accounted for around 13 per cent of their total allocation in 2006, and around 26 per cent of the total 12.1M surplus within 'other' industries.

The engineering and vehicle sector had the highest percentage of surplus allowances (50 per cent) compared with their allocation, but the surplus was only 0.55M allowances in total and therefore had little effect on the overall 'other' industry surplus. Please see section 1.4.4 on allocation rules for further analysis on possible reasons for the engineering & vehicles sector surplus.

The long positions within certain industry sectors need to be considered with caution also because of the influence of opted-out installations – in some sectors more than in others. The sectors that are likely to have been strongly influenced by opted-out installations (i.e. >50% of the sectors' allocation was cancelled in 2006) include: pulp and paper; cement; food, drink and tobacco; lime; and ceramics and glass. Further information on the potential influence of opted-out installations is discussed in section 1.4.6.

Consequently, the UK was a net purchaser or borrower[13] of 33.8M allowances in 2006.

Figure 5. Sector surpluses, $MtCO_2$ and percentage of the total allocation to the sector.

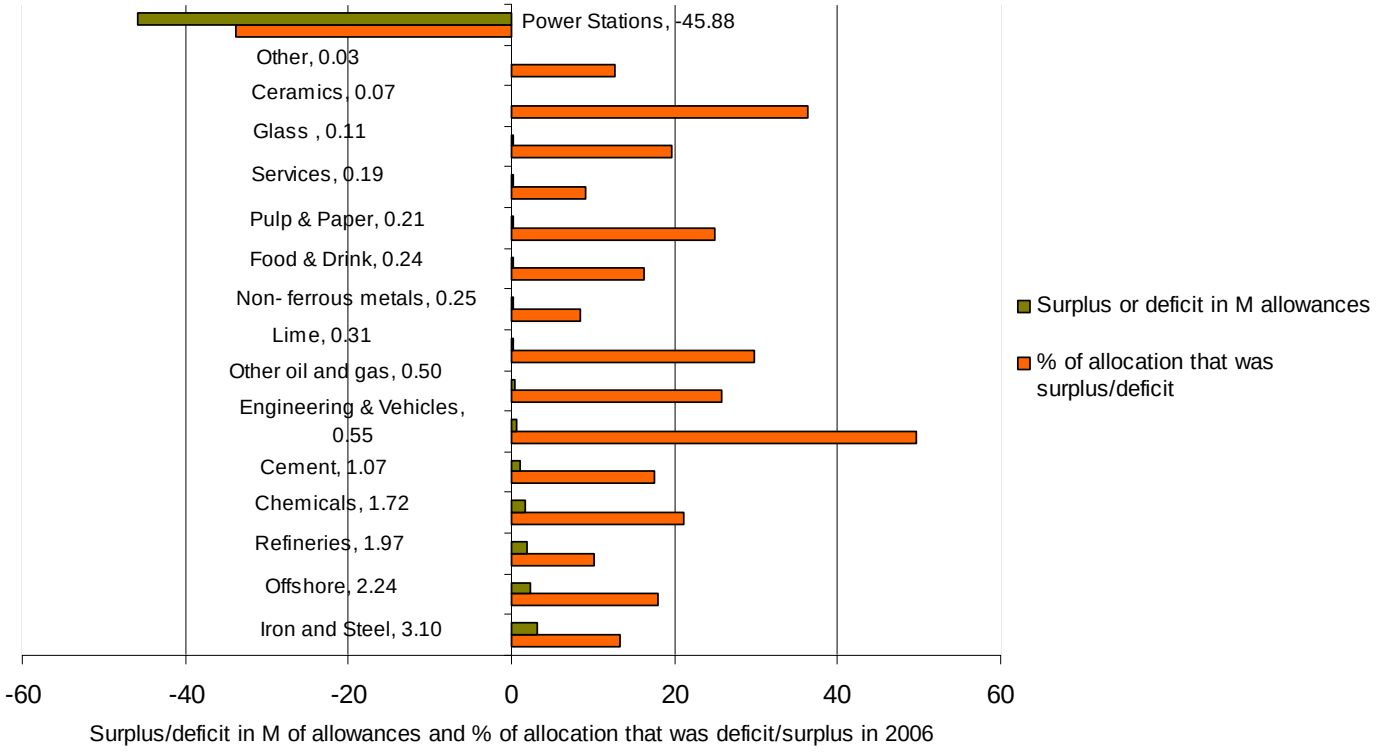


Table 1 gives a comparison across the sectors between 2005 and 2006. In terms of the overall impact on the UK emissions, the increase in the power sector emissions is the most significant. The iron and steel sector was the only other sector to increase its emissions (when the figures are rounded up to 0.1M). The services sector moved into a surplus position in 2006. This sector was the only one whose surplus/deficit position changed in 2006. The sectors with the largest reductions in emissions were the offshore, refineries and chemicals sectors. Further discussion of the differences between the sectors is provided in sections 1.7 and 1.8 of this report.

[13] Installations can borrow from future years' allocations in Phase I, but cannot borrow from Phase II allocations.

Table 1. Comparison of sector details between 2005 and 2006.

Sector	Change in no. of installations	Change in actual emissions($MtCO_2$)	% change in emissions	Change in surplus/deficit of allowances ($MtCO_2$)	% change in surplus/deficit of allowances
Power stations	0	+9.3	+5.1	-9.4	-20.5
Iron and steel	0	+1.4	+6.9	-0.6	-19.3
Refineries	0	-0.4	-2.2	+0.4	+21.0
Offshore	-1	-0.6	-5.8	+0.9	+40.9
Chemicals	0	-0.3	-4.7	+0.2	+11.8
Cement	0	-0.3	-11.8	-0.1	+5.1
Non-ferrous metals	0	0	0	0	0
Services	+9	-0.1	-5.3	+0.2	+100.0
Other oil and gas	+1	-0.2	-14.3	+0.4	+80.0
Food and drink	-7	-0.1	-8.3	+0.1	+33.3
Engineering and vehicles	+1	-0.1	-16.7	+0.1	+20.0
Lime	0	-0.1	-14.3	+0.1	+33.3
Pulp and paper	-3	-0.2	-13.3	0	0
Glass	0	0	0	0	0
Ceramics	-1	0	0	0	0
Other	0	0	0	0	0

1.4 Key influencing factors

1.4.1 Sector caps

As discussed above, the Phase I cap was set so that all sectors (other than the power stations sector) would receive sufficient allowances to cover their projected business-as-usual (BAU) emissions.

BAU emissions were calculated for the UK's updated energy projections. These took into account numerous factors (including estimated growth rates and existing emissions reduction measures such as CCAs) to project emissions for each sector over Phase I and to determine the total sector cap.

Power stations sector cap

The power stations sector cap was set to require power stations to deliver approximately **22MtCO_2** of emissions trading savings per year below their projected BAU emissions (67MtCO_2 over Phase I). The Government considered that the sector faced limited international competition and had a relatively large scope for low-cost abatement opportunities.[14] Consequently, the power sector total cap has been set at **136.9M** per year (including estimated allowances to cover emissions from potential new entrants).

The cap for power stations in the UK is intended to drive abatement and emissions reductions (either in the UK or elsewhere in Europe) in Phase I. However, it takes time to implement abatement measures, and reductions are unlikely to occur immediately in response to the EU ETS. The UK power sector so far in Phase I (2005/2006) has needed to purchase allowances from installations in the UK and/or other member states with surpluses, or had to borrow them from their next year's allocation. This is the main reason for the UK's total deficit in 2006. Fifty-seven installations, 44.8 per cent of the total number of installations in the power sector had a total deficit of 53.7M allowances.

Many factors influenced the decisions that affected CO_2 emissions from the power sector in 2006, some of which played a greater role than EU allowance prices (EUAs), such as gas prices (see section 1.4.2).

BAU sector caps for 'other' industry

The cap for sectors calculated on a BAU basis was **84.5M** allowances per year. This includes estimated allowances required by potential new entrants that were put into the NER (9.2M), but excludes incumbent opted-out allocations that were cancelled in 2006 (24M).

In 2006 a total of **82.1M** free allowances were issued to incumbents and new entrants (75.3M to incumbents and 6.8M from the NER) in these sectors. Emissions in 2006 were **69.5MtCO_2**, resulting in a surplus of **12.6M** allowances.

Numerous factors influenced the reasons for industry sector surpluses in 2006, and these are discussed in general terms further on in this report.

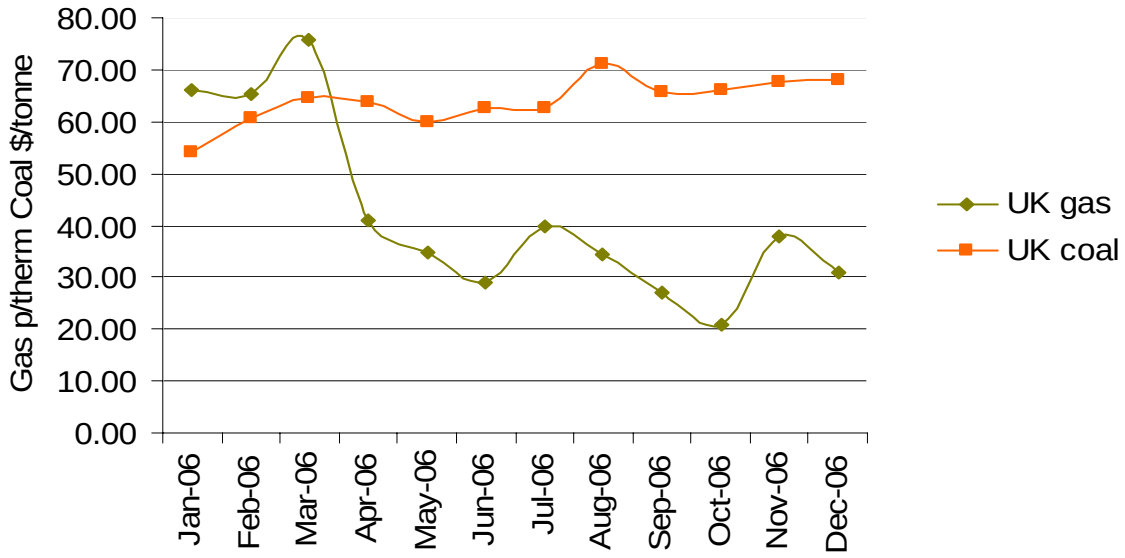
[14] Approved NAP 2005–2007, UK Government, May 2005.

1.4.2 Energy Prices

Gas and coal prices

Figure 6 shows the fuel retail prices in 2006. Gas prices have continued on their upward trend from 2005 throughout the first quarter of 2006 but have decreased over 2006 back down to the level seen in 2005 before the price rose. The coal price has increased gradually over 2006.

Figure 6. Gas and coal prices during 2006[15].



Fuel prices influenced decisions regarding the type of fuel used in electricity generation. The 2006 emission results and figure 8 indicate that more electricity was being generated from coal combustion. The amount of electricity produced from gas and nuclear decreased in 2006. Since coal generates around twice the amount of CO_2 than gas (per kWh), total emissions from electricity generation increased above those expected in the projections used in the Phase I NAP. Figure 7 shows the average annual price paid for gas and coal by electricity generators. The power sector have commented that the overall average annual price for 2006 was higher than that of 2005.

[15] Source: coal price – Platts; gas price - Heren

Figure 7. Annual average gas and coal prices paid by electricity generators[16]

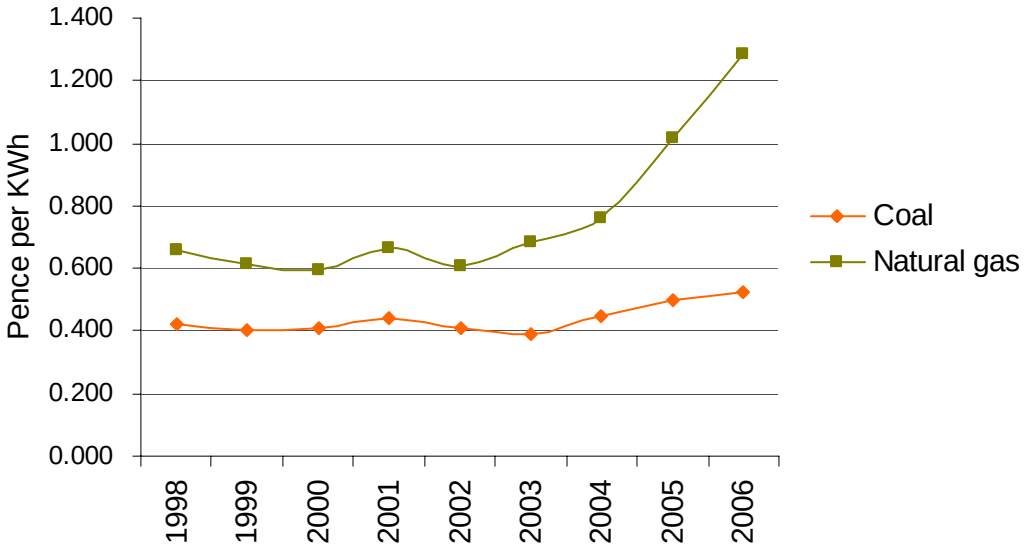


Figure 8. Fuels used in electricity generation[17]

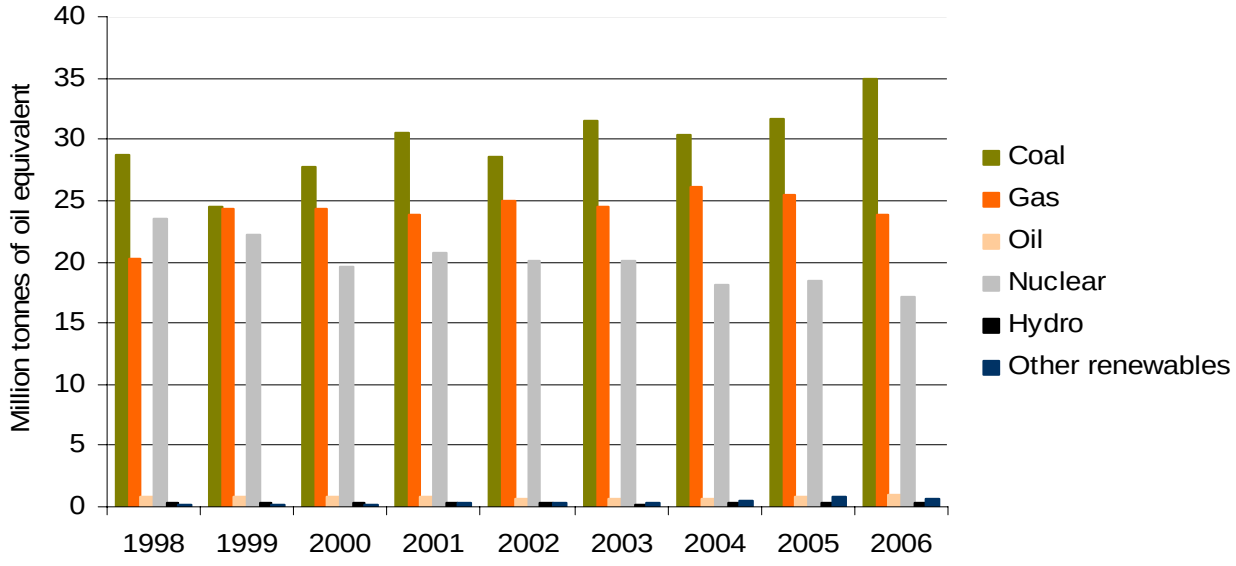


Figure 9 shows the average annual fuel prices paid by manufacturing industry. Coal is the only fuel not to have shown a price increase in 2006. Some industries are able to switch fuel in response to changing prices. Other industries are constrained by their manufacturing processes as to which fuels they can use. Industry have reported that fuel costs in 2006 seemed higher than usual.

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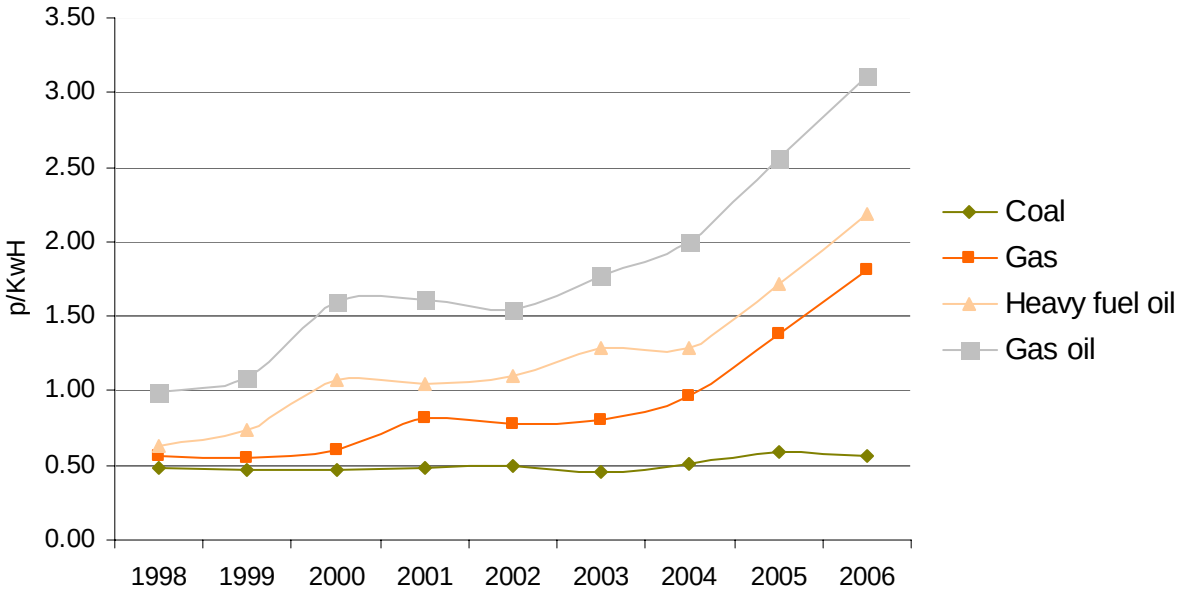
[16] Source: DTI/BERR
[17] Source: DTI/BERR
[18] Source: DTI/BERR
[19] Source: Platts
[20] Source: DTI/BERR

Figure 9. Average annual fuel prices paid by manufacturing industry[18]



Electricity prices

Figure 10 shows the average monthly electricity prices over 2006. There is a close relationship with the gas prices seen in figure 6 as can be seen in the three price peaks on both datasets. A proportion of the increase in wholesale electricity prices can be attributed to the cost of carbon which has been factored into the marginal operating cost of fossil fuel plants. Passing on costs is a natural pricing response from the industry, and one that is necessary to ensure electricity prices reflect the cost of carbon.

For industry the impact of fuel prices generally plays a more significant role in energy-making decisions (and therefore emissions) than electricity prices alone. For sites with combined heat and power (CHP) operators may increase the use of CHP in response to high electricity prices. This will depend on the price spread between purchasing electricity from the grid and the cost of the fuel needed for the CHP unit. Installations may for example turn off their CHP overnight and use grid electricity. The use of CHP will increase emissions from these sites, but decrease the demand on power stations.

Figure 10. Electricity prices during 2006[19]

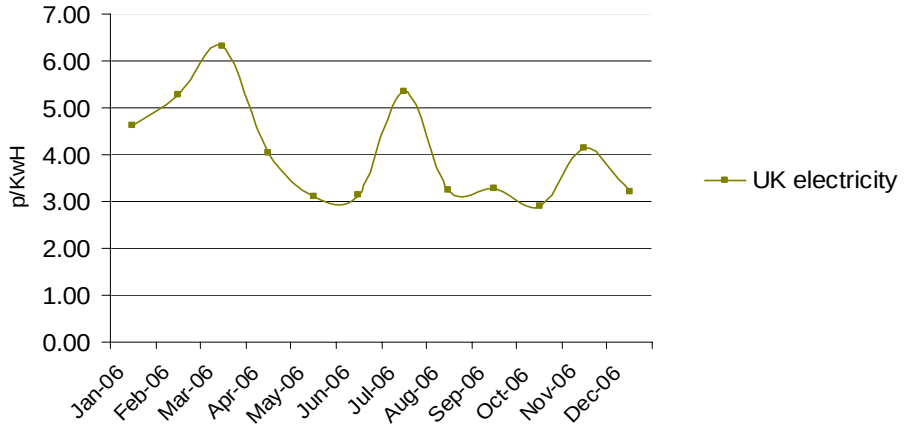
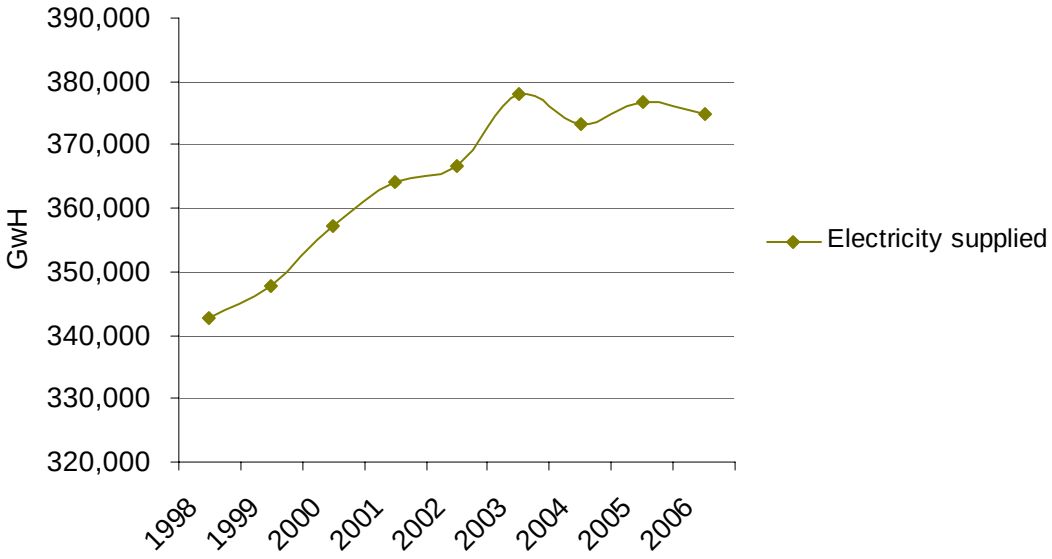


Figure 11 shows the net electricity supplied in the UK. The level has dropped slightly in 2006. Looking at these results in conjunction with the emissions and fuel price data would suggest that it is the gas-fired power stations which that reduced their output in response to high gas prices.

Figure 11. Electricity supplied from UK power generators[20]



1.4.3 Projections

Total projected emissions for EU ETS installations (including opt-outs) were estimated to decrease from 271.9MtCO_2 in 2005 to 262.8MtCO_2 in 2007. This predicted reduction is largely because of decreases in emissions expected in the power stations sector. Other industry sectors' projections generally showed a gradual increase in emissions over Phase I.

The total emissions to date from EU ETS installations (242.3MtCO_2 in 2005, 251.0MtCO_2 in 2006) have been higher than projected emissions for the power sector and lower in the other industry sectors. In the power sector this is because of the higher than anticipated gas price, which has led to increased electricity generation from coal use. The power sector have commentated that projections were about 8% below actual emissions. In the other industries there are a number of possible reasons why emissions are below projections. These will be discussed in sections 1.7 and 1.8 of this report. Figures 13 and 14 show how the Phase I projections have differed from actual emissions.

Figure 13. Power sector emissions, and NAP I and NAP II projections

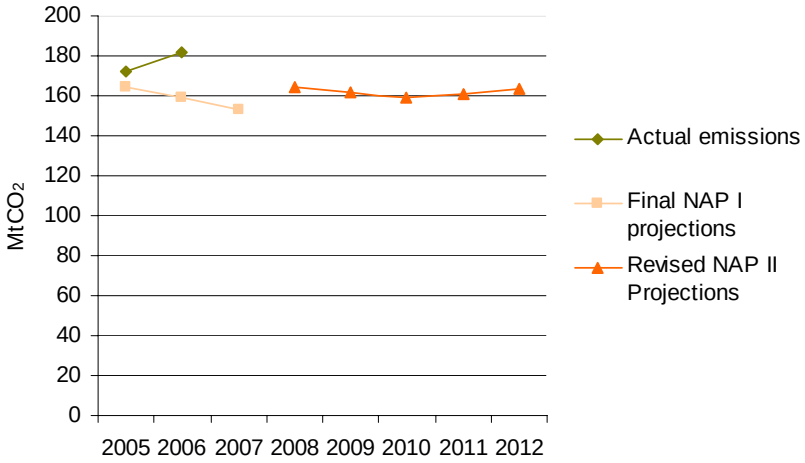
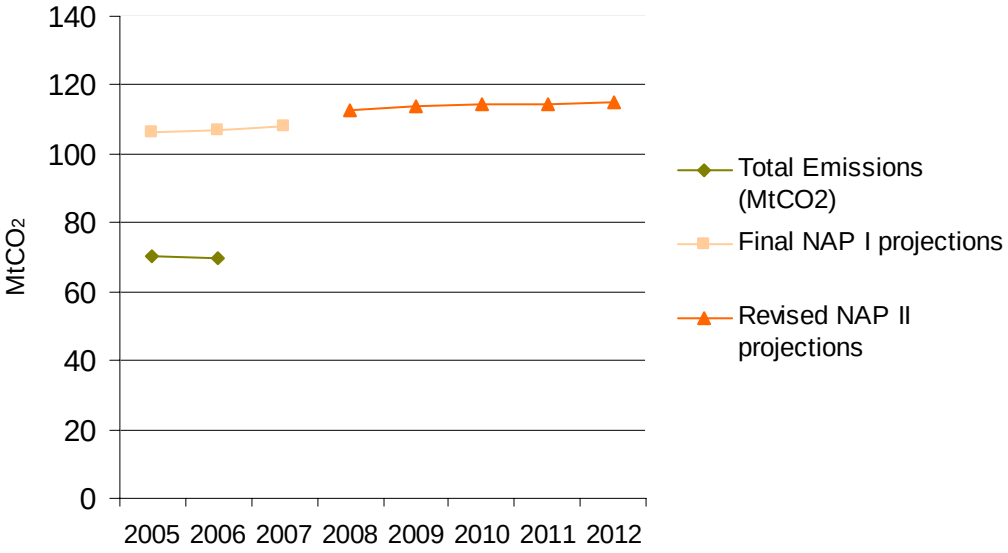


Figure 14. Other industry sector emissions, and NAP I and NAP II projections[21]



It is important to note that the UK projections are compiled using a long-term model (with five-yearly intervals), which is not intended to capture short-term, year-on-year fluctuations. Any comparisons should therefore take this into consideration and future analysis will be required to draw firmer conclusions about key differences.

[21] Projections include opt-out installations. The actual emissions excludes opt-out installations

1.4.4 Allocation rules

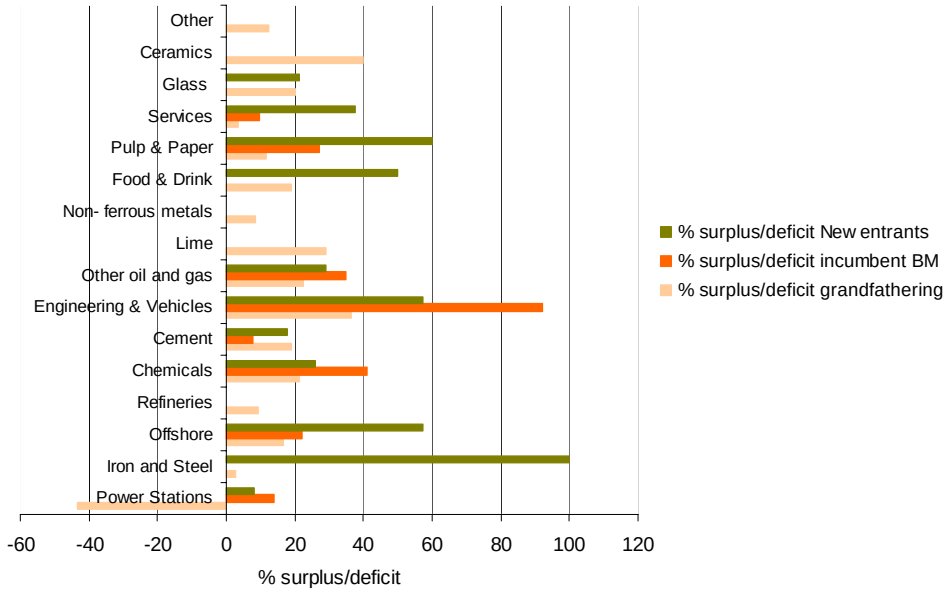
The allocation each installation receives comes from its sector cap. The level of allocation is based on various rules. In most cases, average historical emissions (dropping the lowest year) were used to determine the proportion of allowances issued to an installation (this methodology is known as 'Grandfathering')[22]. Where there were insufficient historical data, or the installation was new, expected emissions were calculated using benchmarks[23] and used in the allocation calculation. Other rules, such as baseline changes and commissioning rules, were used to calculate allocations for eligible installations where the operator had specifically provided information and applied for their use.

The allocation methodology used has shown to affect installation surpluses and, in some cases, sector surpluses. This is evident when comparing different allocation methodologies within a sector. For Phase I benchmarked installations were given their allocation first from the sector cap, the remaining allowances in the sector cap were then divided up between the grandfathered installations on the basis of their relevant emissions figure. This can result in the grandfathered installations receiving a lower proportion of the sector cap than they would have had there been no benchmarked installations within the sector. To address this issue in Phase II benchmarked incumbents will use the benchmarked allocation as a relevant emissions figure.

Benchmarking

Figure 15 shows a sector comparison between the grandfathering and benchmarking methodology. In this comparison installations that used a mixture of both methodologies e.g. extensions to existing sites were not included.

Figure 15. Comparison of allocation rules

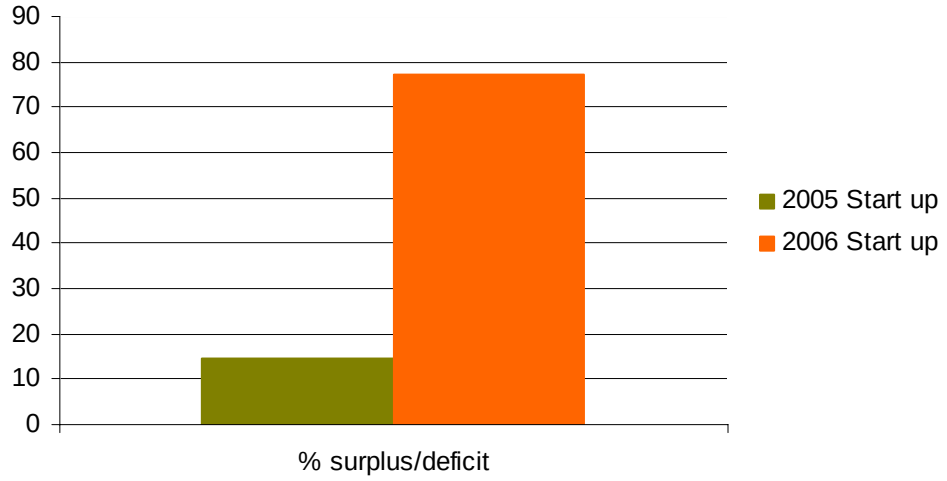


[22] Full details on the allocation methods used are described in the *Final Approved National Allocation Plan 2005–2007*.

[23] Benchmarks calculate expected emissions based on best available techniques and factors such as equipment type, capacity, and expected utilisation rates and fuel consumption.

Figure 15 shows that in all but one sector where both methodologies have been used the largest % surplus comes from the benchmarking methodology and the lowest from the grandfathering approach. This distinction between the methodologies was also seen in 2005. For new entrants it was deemed that these installations were not yet operating at full capacity in 2005. Figure 16 compares 2006 % surpluses/ deficits from new entrants starting in 2005 and in 2006.

Figure 16. New entrants surplus/deficit



2005 new entrants installations had 14.79% more allowances than allocated. In 2006, new entrants installations have a significantly greater surplus of allowances but this is due to an anomalous single installation. If this anomaly was to be removed the remaining 2006 new entrants installation's surplus would be 28.81%.

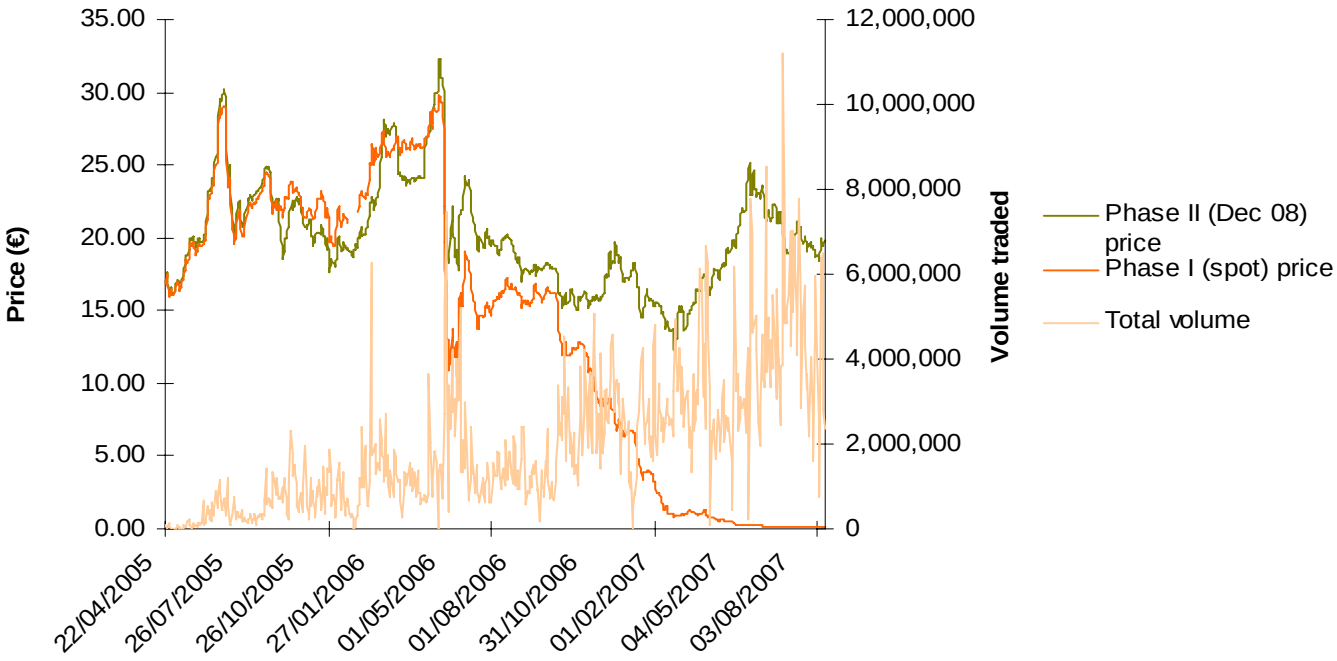
1.4.5 Carbon (EUA) prices

The price of carbon is the main determining factor in fulfilling the aim of the EU ETS, which is to 'promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner'[24]. The release of the 2005 results revealed a large surplus of allowances in the market and saw the price of Phase I allowances drop. Although there was some recovery in price, the further increase in surplus across the EU, revealed when the 2006 results were released, decreased the price even further. It is difficult to draw firm conclusions on whether cost-effective reductions are occurring as a result of the EU ETS. There is a time-scale involved in implementing new abatement technology, so it is likely that there will be a delay before the impact of the EU ETS is seen. Also many installations are carrying out ongoing programs of improving energy efficiency that began before 2005. There will be further discussion of this in sections 1.7 and 1.8. Academic studies[25], surveys by the Commission[26] and Point Carbon[27] provide some evidence that the EU ETS has already resulted in emission reductions and is influencing future behaviour. However it is still too early to give a full assessment of the impact of a carbon price on reducing emissions.

[24] Article 1 of the EU ETS Directive.
[25] D Ellerman and B Buchner, *Over-Allocation or Abatement? A Preliminary Analysis of the Eu Ets Based on the 2005 Emissions Data*, Fondazione Eni Enrico Mattei, November 2006
[26] http://ec.europa.eu/environment/climat/emission/pdf/etsreview/results.pdf
[27] www.pointcarbon.com published 13/03/2007

Figure 17 tracks the price and volume traded of both Phase I and Phase II allowances.

Figure 17. EUA price data[28]

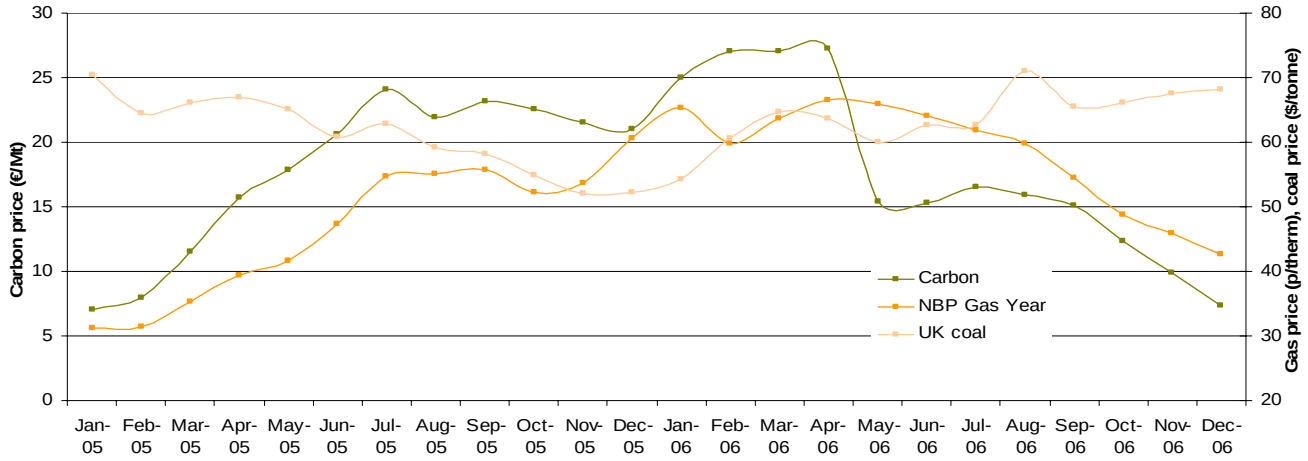


A primary driver behind movements in the carbon price is thought to be the relative cost of coal and gas. The power generators generate a significant proportion of all carbon emissions across the EU. The most significant cost of production for a power generator is fuel price, and so a power generator's decision to generate electricity from coal or gas is based on the relative price of these fuels (see also figure 12). The least-cost form of power generation will be called on first to meet demand; this is known as the plant's place in the 'merit order'.

Since the introduction of the EU ETS, power generators have had to integrate the cost of carbon into operating decisions. The higher the emissions of the fuel source, the higher the generator's carbon cost. Because gas generates around half the emissions of coal, switching will decrease the demand for allowances, suppressing the carbon price.

[28] Source: www.europeanclimateexchange.com

Figure 18. EUA price and fuel price



1.4.6 Monitoring and Reporting methods

All operators have been monitoring and reporting emissions in accordance with the Commission's *Monitoring and Reporting Guidelines*[29] (the Guidelines) and any specific conditions of their Greenhouse Gas Permit for two years.

Further details of how these guidelines apply to operators are available in the UK summary report for 2005[30]. Each year operators are required to submit an improvement plan to their regulator. Therefore the accuracy of monitoring & reporting should improve each year.

Industry have commentated that their emissions reporting has improved, for example with the installation of new gas metering. Some installations in the iron and steel sector were able to move to the use of site-specific emission factors and reach the highest (most accurate) tier monitoring method. Some combined cycle gas turbines (CCGT) have installed gas chromatographs to improve the accuracy of reporting.

[29] Full title: European Commission Decision of 20/01/2004 Establishing Guidelines for the Monitoring and Reporting of Greenhouse Gas Emissions Pursuant to Directive 2003/87/EC of the European Parliament and of the Council.

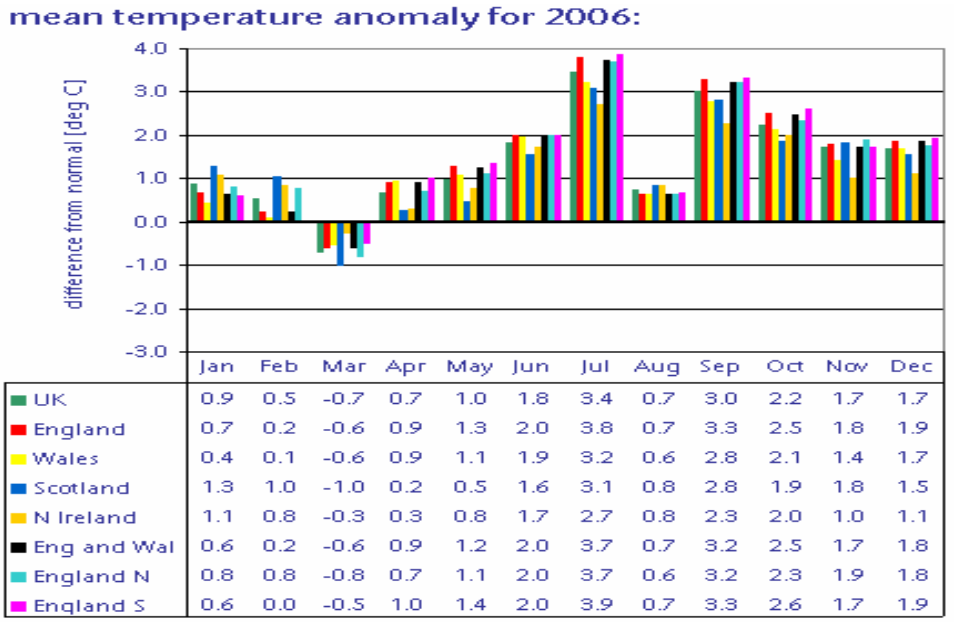
[30] http://www.defra.gov.uk/environment/climatechange/trading/eu/operators/compliance.htm

1.4.7 Weather

Temperature

Figure 19 shows the mean temperature anomaly across the UK for 2006.

Figure 19. 2006 temperature anomaly in UK



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
UK	0.9	0.5	-0.7	0.7	1.0	1.8	3.4	0.7	3.0	2.2	1.7	1.7
England	0.7	0.2	-0.6	0.9	1.3	2.0	3.8	0.7	3.3	2.5	1.8	1.9
Wales	0.4	0.1	-0.6	0.9	1.1	1.9	3.2	0.6	2.8	2.1	1.4	1.7
Scotland	1.3	1.0	-1.0	0.2	0.5	1.6	3.1	0.8	2.8	1.9	1.8	1.5
N Ireland	1.1	0.8	-0.3	0.3	0.8	1.7	2.7	0.8	2.3	2.0	1.0	1.1
Eng and Wal	0.6	0.2	-0.6	0.9	1.2	2.0	3.7	0.7	3.2	2.5	1.7	1.8
England N	0.8	0.8	-0.8	0.7	1.1	2.0	3.7	0.6	3.2	2.3	1.9	1.8
England S	0.6	0.0	-0.5	1.0	1.4	2.0	3.9	0.7	3.3	2.6	1.7	1.9

Cold temperatures, particularly colder-than-normal winter temperatures, can increase energy demand and hence electricity production. Figure 19 shows the mean temperature anomaly for 2006 (i.e. whether temperatures were above or below the norm for the month).

Monthly temperatures in 2006 were higher than normal for every month except March, on average 1.6°C hotter than typical for the month. In July and September the temperature rose 3°C above the average for those respective months. Warmer temperatures during summer can also increase emissions through demand for electricity to power air conditioning units. Although this is relatively minor compared with energy demand in cold periods, emissions from the other stations can increase above expected levels when higher demand coincides with summer down times for maintenance.

As the winter months, with the exception of March all had warmer than average temperatures, temperature seems not to have greatly affected the overall emissions figure.

1.5 UK compliance

1.5.1 Verified emission reports and surrender of allowances

The vast majority of UK operators submitted their verified emission reports for 2006 by the deadline of 31 March 2007. All installations in the UK surrendered sufficient allowances for their 2006 emissions by the 30 April 2007 deadline.

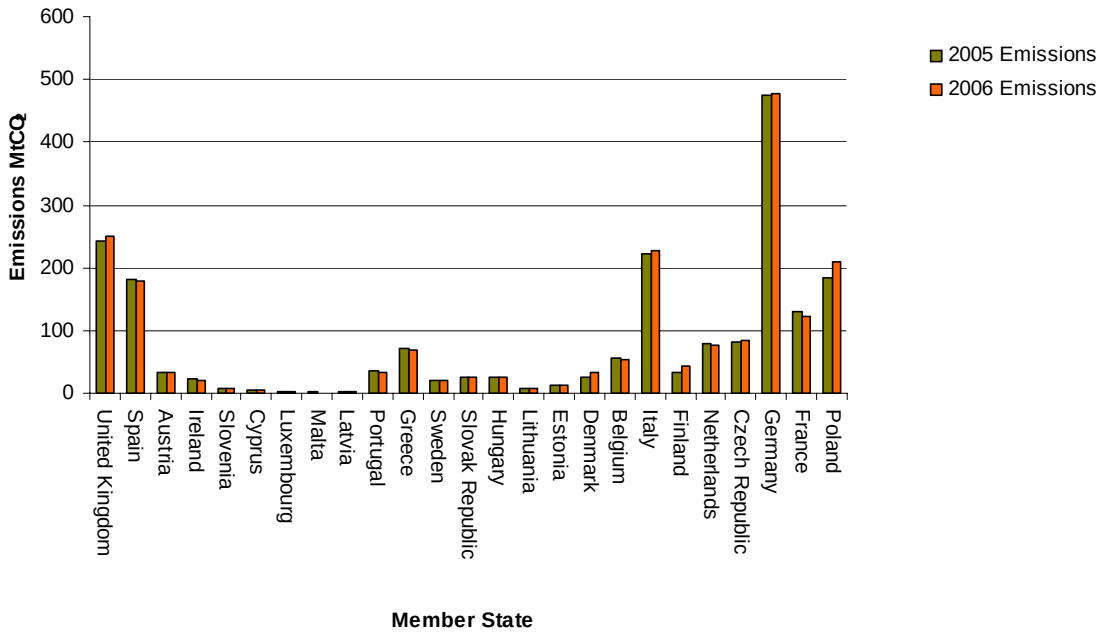
1.6 Other Member States Results

1.6.1 Emissions and allocations

Figures 19, 20 and 21 provide an overview of the 2006 results across the EU, and also a comparison with 2005. These figures were taken from the CITL in May 2007[31]. There are some restrictions to the type of allocations shown on the CITL. For example new entrant allocations are not shown in the figures (with the exception of the UK). The CITL data can also get updated on a regular basis and some Member States may not issue allocations in three equal annual allocations.

The data shows that there was a surplus of 51.7M allowances in 2006. This means that since 2005, the overall surplus from the EU ETS is 224.7M allowances (5.3 percent of the total allocation).

Figure 19. Member State comparison of emissions



[31] 2006 data from Malta was unavailable

Figure 20. Actual comparison of surplus/deficit between Member States

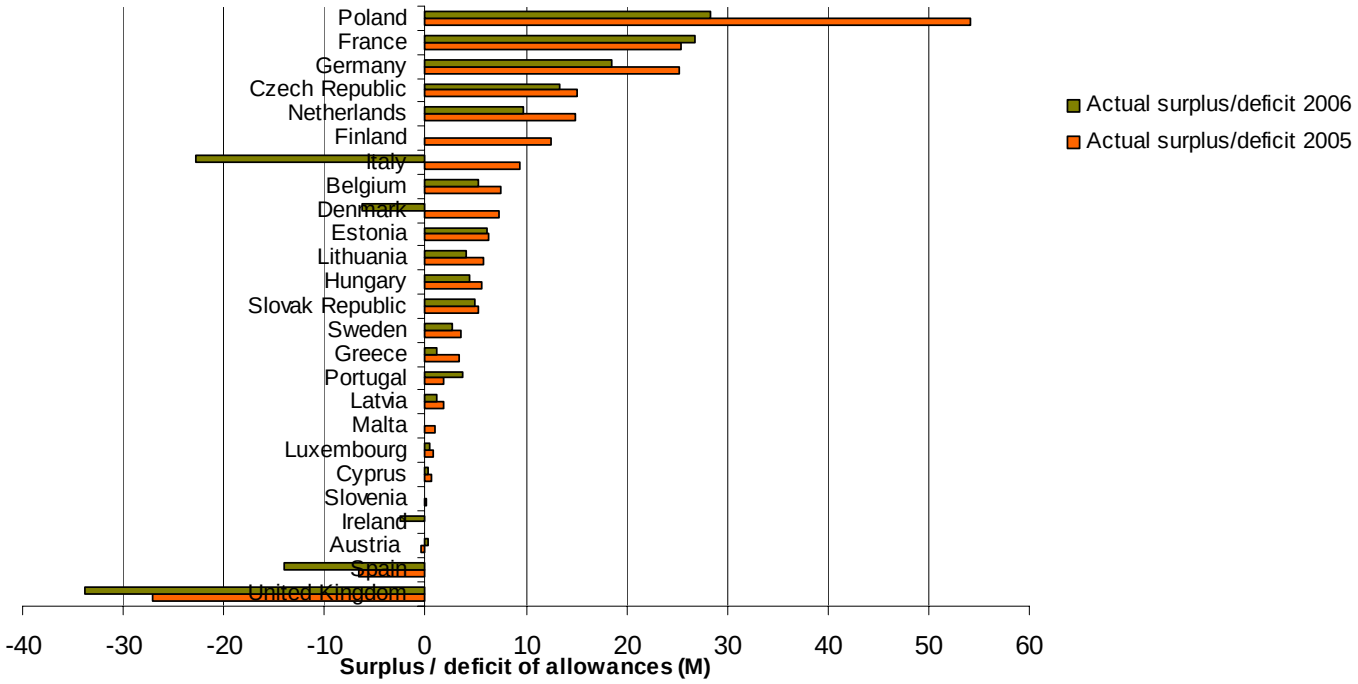
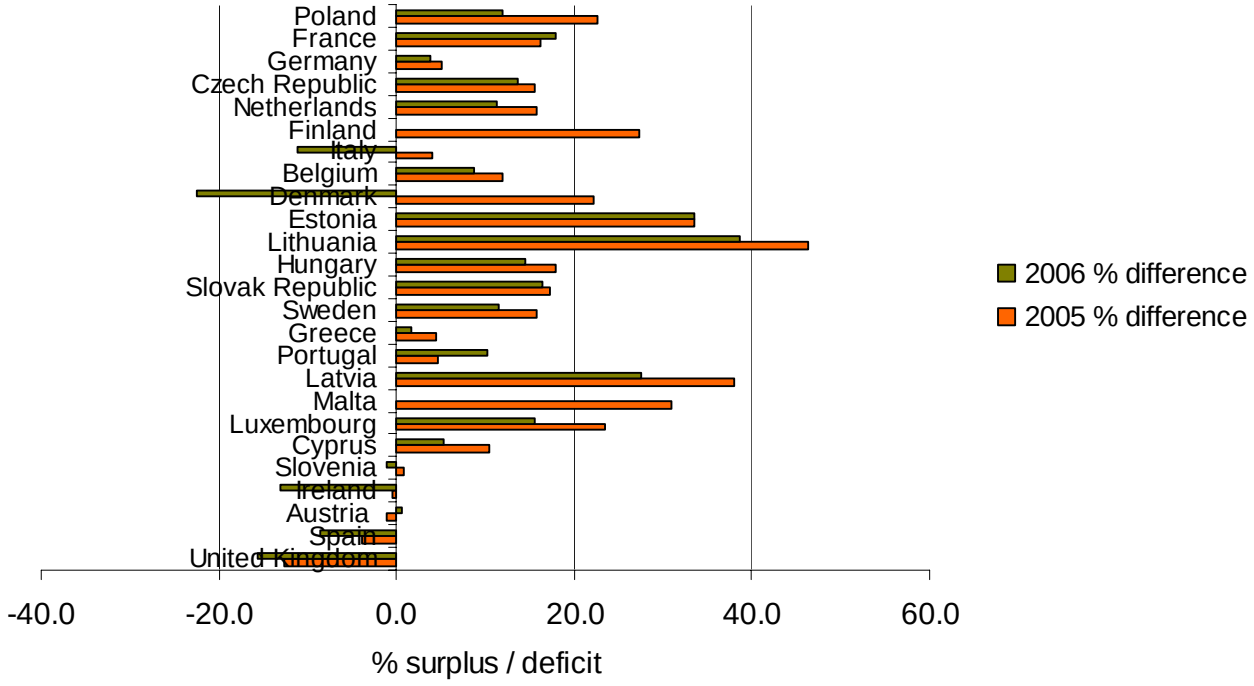


Figure 21. Percentage comparison of surplus/deficit between Member States



1.7 Emissions Abatement

In producing this report Defra have asked industry about what emissions abatement they are carrying out or are planning to implement in the future. As stated in section 1.4.5 the aim of the EU ETS is to deliver emission reductions in a cost effective manner. The establishment of a carbon price is intended to incentivise investment in abatement technologies. In pure economic terms investment will be made in emissions reductions where the marginal cost of abatement is below the cost of carbon. This marginal cost of abatement is dependent on a range of factors. This section will look at the different EU ETS sectors and how they are reducing emissions. It will also look at some other key factors industry have commented on.

Power sector[32]

This sector have commented that the increase in emissions intensity as a result of increased coal-fire generation was the main reason for the 2006 emissions. This was because of the positive price differential between coal and gas plant encouraging increased coal-fired generation.

In terms of investment there has been plant efficiency improvements, particularly at coal-fired power stations, and in renewable energy projects. There has also been investment in a number of R&D projects in low carbon technologies including Carbon Capture and Storage (CCS), renewable technologies and nuclear power.

Iron and Steel sector

This sector has expressed concerns over the pass-through of carbon costs into electricity prices. This was particularly evident in the first quarter of 2006 when gas prices where peaking and the EUA price had yet to fall. 2006 also saw significant unforeseen production problems, which meant emissions were lower than projected.

In terms of abatement technology the iron and steel sector have approached the thermodynamic limit for the manufacturing process and they therefore believe that they are limited in the steps they can take to reduce emissions. However they are investing in a long term CO_2 abatement research project – Ultra-low CO_2 steelmaking (ULCOS). They are also improving energy efficiency and where relevant process gas utilisation.

Refineries

The 2006 emissions in this sector were influenced by several factors. There was a lower throughput of crude and the cessation of a particular oil product at one refinery. These factors would have reduced energy use. This was counterbalanced by an increase in imports of heavier crude material and the move to reduce the sulphur in fuels.

The sector has invested in increased CHP capacity and other projects to reduce fuel burn by increased heat integration. They have commented that the long term carbon price is an influential factor in future investment decisions.

[32] Please note as this sector is the most significant in terms of emissions many of the comments from them are within the main text of the report sections 1.4.2 and 1.4.3.

Cement sector

This sector attribute the slight emission reductions seen for 2006 (including opt-out installations) to an increased use of alternative fuels and efficiency improvements at newly installed kilns. These new kilns were part of a £200 million investment completed in 2004/05 where the CO_2 benefits are now starting to be seen.

The sector saw an increase in electricity demand. This was a consequence of increasing the use of alternative fuels, which require additional handling and processing. In terms of the carbon price the industry have commented that cement manufacture is one of the most carbon intensive industries and the cement product is of a relatively low value. Therefore profit margins are low, so that even if the cost of carbon is low it will still increase the price of cement manufacture.

Chemical sector

This sector saw production reduce in 2006. This was particularly evident at the start of 2006 when the gas price was high. High gas prices also resulted in less CHP utilisation.

In terms of investment this sector are carrying out energy efficiency programs, which began in order to meet CCA targets. They have commented that the carbon price is being factored into future investment decisions, but post 2012 planning is inhibited due to uncertainties.

Food and drink sector

A Scotch Whisky distiller installed a CHP plant at its grain distillery prior to the start of Phase I. A key driver for this investment was the savings to be achieved by improving energy-efficiency and reducing emissions of Carbon Dioxide. The CHP plant provides energy for the distillery and generates electricity, some of which is exported to the National Grid. Production within the Scotch Whisky industry has continued to increase to meet the growing demand for Scotch Whisky in both traditional and emerging markets around the World.

Glass sector

This sector had a slight increase in CO_2 emissions due to fuel switching from gas to oil. This was due to fuel prices and fuel security issues. There was high product demand, a proportion of which was due to Government initiatives in construction and thermal glazing.

Ceramics sector

This sector has a high number of opted-out installations. The installations remaining in the EU ETS generally choose to do so because they had more favourable free allocations. Therefore this sector had a surplus of allowances in 2006. Allocations based on benchmarks were also more favourable as these were based on industry best practice, while the grandfathering allocation methodology is not.

Lime sector

Industry have commented that lime production is one of the most carbon and energy intensive industries, and so the lime sector has long had a strong focus on energy efficiency programmes and investments. As lime is a relatively low cost product it is highly impacted by even a low cost of carbon.

Five of the nine eligible lime installations opted out of Phase I (representing approximately 60% of the sector's CO_2 emissions) on the basis of their Climate Change Agreements. Consequently, the 2006 EU ETS results only reflect the performance of a part of the sector. Changes in product mix have further contributed to energy savings in 2006.

Engineering & Vehicles sector

The sector have commented that the further rise in energy prices sharpened the need to make energy efficiency gains and enabled some additional efficiency projects to become viable. The run-out and closure of Peugeot's Ryton plant and zero output from Nanjing at Longbridge (formerly MG Rover) also played a role in reducing emissions.

However, the key reason for the surplus of allowances in the engineering and vehicles sector remains the over-allocation of allowances to two sites via the benchmarking allocation methodology. These two non-automotive sites received significant over allocation which reduced the allocation available to other incumbents in the engineering and vehicle sector.

Pulp & Paper sector

Over 95% of the pulp and paper sector was opted out of EUETS for Phase I. In 2006 the EUETS sector comprised two incumbent paper mills and one new - entrant mill. High energy prices ensure a close focus on energy efficiency and this flows directly into emissions reductions. Further emissions reductions are following significant current and planned investment in Biomass CHP plants.

1.8 Discussion

Defra and the Devolved Administrations' comments

Phase I of the EU ETS has been defined as a learning phase. Emissions trading on this scale has never been tried before. So it is important that we assess progress on the scheme's success.

- The second year has continued to demonstrate that the trading mechanisms work. This can be seen in the improvements in registry functioning and the excellent level of compliance.
- The carbon market has continued to grow in volume and value. A recent assessment[33] stated that €22.7 billion worth of carbon was traded in 2006 and in the first half of 2007 has seen €15.8 billion traded.
- Operators are improving the accuracy of their monitoring and reporting. This will improve the quality of emissions data.
- The EU ETS is seen by industry as a key factor in making investment decisions. Energy efficiency programs are taking place in many sectors in an effort to reduce emissions.
- Market scarcity remains a key factor for the carbon price. The Phase I EUA value has decreased dramatically as a result of the surplus of allowances across the EU.
- The UK was one a few EU MS to verify baseline emissions, thereby contributing closely to the relative accuracy of subsequent allocations of emissions.
- Actual emissions have been shown to be generally below projections made before the beginning of the phase. This suggests that all projections should be thoroughly tested and an appropriate margin of error factored into the final figures.
- Industry have raised concerns about the impact the EU ETS is having on competitiveness and pass through costs reflected in electricity prices. This demonstrates a need for robust evidence of these effects, possibly leading to greater harmonisation across the EU and a more effective allocation methodology such as auctioning for the power sector.

[33] Point Carbon assessment – in FT article 16 Aug 2007.