



ICPIA – Coping with Complexity in the Evolving International Climate Policy Institutional Architecture

Multi-Country Sectoral Approaches: Potential for Reducing Competitiveness and Leakage Impacts in Austria's Energy-intensive Industries

**Peter Wooders, Marius Keller, Barbara Anzinger,
Tom Moerenhout (IISD)**

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June 2012

Austrian Institute of Economic Research, Climate Strategies

The project "ICPIA – Coping with Complexity in the Evolving International Climate Policy Institutional Architecture" was funded by the Austrian "Klima- und Energiefonds" and carried out within the research programme "ACRP".

Abstract

The detailed analysis of the energy-intensive sectors in Austria starts with reference to the cost and decision-making drivers, and then considers how climate change policies and measures could affect them relative to other drivers faced by the industries. The report assesses carbon costs relative to financial indicators for the Austrian cement, steel and paper and pulp sectors. It finds no compelling evidence that the EU ETS has already had an impact on competitiveness and leakage in the sectors analysed. As carbon costs to European producers may increase after 2012 due to changes in the design of the EU ETS, a reduction in competitiveness and leakage could however be expected, with a likely first impact being reductions in investment in new capacity (noting that such investments have already been limited in the EU over the past decade). The report asks how effective sectoral approaches, agreements and measures (SAAMs) might be in reducing competitiveness and leakage impacts. Six possible variants are described from a wide range of types, and their impacts assessed.

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2012/165/S/WIFO project no: 2809

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Medieninhaber (Verleger), Herausgeber und Hersteller: Österreichisches Institut für Wirtschaftsforschung, 1030 Wien, Arsenal, Objekt 20 • Tel. (+43 1) 798 26 01-0 • Fax (+43 1) 798 93 86 • <http://www.wifo.ac.at/> • Verlags- und Herstellungsort: Wien

Verkaufspreis: 30,00 € • Kostenloser Download: <http://www.wifo.ac.at/wwa/pubid/44534>



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Abstract

Energy-intensive sectors remain a key blockage, and perhaps also an opportunity, to reducing GHG emissions across the world. The characteristics of Austrian energy-intensive sectors have much generic application in industrialised countries: they are mature; have long supply chains; feature large numbers of employees at concentrated sites; and, closure costs would be high to the national economy.

This report is an attempt to move the debate on these sectors forward by analyzing them in detail, within a single country. The analysis starts with reference to the cost and decision-making drivers, and then considers how climate change policies and measures could affect these *relative* to other drivers faced by the industries.

The report assesses carbon costs relative to financial indicators for the Austrian cement, steel and paper and pulp sectors. It finds no compelling evidence that the EU ETS has already had an impact on competitiveness and leakage in the sectors analysed. As carbon costs to European producers may increase after 2012 due to changes in the design of the EU ETS, a reduction in competitiveness and leakage could however be expected, with a likely first impact being reductions in investment in new capacity (noting that such investments have already been limited in the EU over the past decade).

The report asks how effective sectoral approaches, agreements and measures (SAAMs) might be in reducing competitiveness and leakage impacts. Six possible variants are described from a wide range of types, and their impacts assessed. The analysis shows that only standards and labels, and particularly standards, are likely to have a significant impact on competitiveness and leakage concerns. The implementation issues with standards are significant, but this is not different from any other SAAM. One of the key factors that has held SAAMs in general back has been the 'devil being in the detail' required if we are to go beyond a concept and into a scheme which can be discussed and negotiated around.

The SAAMs discussed could help move countries contemplating membership of the EU to improve their performance in anticipation of the closer union and policies this would bring. Perhaps this should also be seen as one of their main purposes: SAAMs developed with partners outside the EU's borders would help generate trust and joint activities which would be mutually beneficial.

None of the SAAM options presented would be easy to implement, there is no momentum behind any of them at the present time and there may be strong political and legal challenges to their implementation. It is difficult to imagine any of the options being implemented in the short-term. The need to reduce emissions from energy-intensive industries is paramount for the successful achievement of ambitious climate change goals. This study recommends that further



work to detail sectoral approaches, agreements and measures which could be implemented with the EU's near neighbours is undertaken, and that more detailed consultation exercises as to the support such schemes might generate are conducted.

Keywords: competitiveness, leakage, paper and pulp, cement, steel, Austria, sectoral approaches, empirical analysis



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Abbreviations and Acronyms

APP	Asia-Pacific Partnership
BCA	Border Carbon Adjustment
CCAP	Centre for Clean Air Policy
CCS	Carbon Capture and Sequestration
CDM	Clean Development Mechanism
CEO	Chief Executive Officer
CER	Certified Emission Reduction (trading unit generated by CDM projects)
CITL	Community Independent Transaction Log
CO ₂	Carbon Dioxide
ERU	Emission Reduction Unit (trading unit generated by JI projects)
EU	European Union
EUA	European Union Allowance (trading unit for EU ETS)
EU ETS	European Union Emission Trading System
Eurofer	European confederation of iron and steel industries
FAO	Food and Agriculture Organisation (UN body)
GSEP	Global Superior Energy Performance Partnership
GHG	Greenhouse Gas
GVA	Gross Value Added
GWh	GigaWatt hour
JI	Joint Implementation
LCFS	Low Carbon Fuel Standard
MWh	MegaWatt hour
MtCO ₂	Million tonnes (metric) of Carbon Dioxide
NAMA	Nationally Appropriate Mitigation Action (under UNFCCC)
NMS	New Member State (of the EU)
OECD	Organisation for Economic Cooperation and Development
RDD&D	Research, Development, Demonstration and Dissemination
SA	Sectoral Approaches
SAAM	Sectoral Approaches, Agreements and Measures
SCM	Sectoral Crediting Mechanism



SNLT	Sector No-Lose Target
t	tonne (metric)
tCO ₂	tonne (metric) of Carbon Dioxide
TBT	Technical Barriers to Trade (WTO agreement)
ULCOS	Ultra-Low CO ₂ Steel-making
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
VA	Value Added
WBCSD	World Business Council for Sustainable Development
WP	Work Package
WTO	World Trade Organisation



1 Background

1.1 Objectives of this report

Energy-intensive sectors remain a key blockage, and perhaps also an opportunity, to reducing GHG emissions across the world. The characteristics of Austrian energy-intensive sectors have much generic application in developed world: they are mature; have long supply chains; feature large numbers of employees at concentrated sites; and, closure costs would be high to the national economy.

This report is an attempt to move the debate on these sectors forward by analyzing them in detail, within a single country. The analysis starts with reference to the cost and decision-making drivers, and then considers how climate change policies and measures could affect these *relative* to other drivers faced by the industries.

The report focuses on answering five main questions:

1. Has the EU ETS already had an impact on competitiveness and leakage?
2. Would we expect larger impacts in the future?
3. Could Sectoral Approaches, Agreements and Measures (SAAMs), implemented in a multi-country framework, mitigate some or all of these competitiveness and leakage impacts?
4. Could SAAMs be implemented, in the short- to medium-term?
5. Based on these considerations, the paper then asks which of the SAAM options considered Austria might favour and consider supporting.

1.2 Scope

This paper considers the economically most important energy-intensive sectors in Austria: pulp and paper, cement and iron and steel. Refining and (basic) chemicals are natural analogues although they are not considered within this paper.

The base case for all analyses is the assumption that the EU's existing policies and measures, including the EU ETS, will continue as planned. A full description of the scheme and its impacts to date is given in Kettner et al. (2011a) and Kettner et al. (2011b).

Electricity generation is also a major cause of GHG emissions but raises different issues. Differences in electricity prices are an important cause of competitiveness differences, and the EU ETS and Renewables Directive have added further drivers of differences between countries within and without the EU. Analysis of electricity price differences is included as an input to the three energy-intensive industries considered rather than electricity generation being a separate sector for individual analysis.



The possible typology of SAAMs is interpreted in a wide sense but the focus is on those which have the highest chance of implementation.

Non-carbon policies and measures are outside the scope considered.

The paper builds on existing literature and focuses on only those options that it may be realistic to implement within the economic and political framework. It uses specific Austrian data and industry characteristics as far as possible. Discussions with Austrian government, industries and European Commission have been used to inform the analysis and conclusions.

1.3 Structure of this report

Section 2 reviews the three industries, with a focus on Austria. It firstly provides a sector overview, characterising the sectors and what is driving decision-making within them. Detailed financial data has been collected and collated, along with data on GHG emissions and investment (including in Research & Development). Key indicators for each sector are next presented, including what impact a carbon price could have on financial indicators. Trade is a key driver of competitiveness and leakage, and trade patterns and partners, and how they have been developing, are discussed. Section 2 presents analyses for each sector, focusing on the first two questions that the report aims to answer: (i) Has the EU ETS already had an impact on competitiveness and leakage? (ii) Would we expect larger impacts in the future?.

Section 3 reviews the considerations to date of sectoral approaches, agreements and measures (SAAMs) in a multi-country framework. It then presents a suite of options that Austria may be able to take forward, with particular respect to those that may include its near neighbours (which are often its key trading partners). The section briefly notes that there are alternatives to SAAMs, which may prove more effective or easier to implement.

Section 4 analyses the potential impacts of candidate SAAMs on competitiveness and leakage in the three sectors, with reference to the financial and other data as far as is possible (and noting that SAAMs may or may not increase carbon price differentials between jurisdictions). Conclusions are then made and next steps identified.

2 Review of industries: focus on Austria

2.1 Data and information availability

The original intention of the study was to look at plant-by-plant financial data, and to see whether the increase in costs from carbon pricing would significantly change the situation of



plants in a world production curve.¹ Such a method was applied successfully to energy-intensive industry by the Grattan Institute (Daley, 2010) and there are similarities between Austria and Australia in so far as they have relatively few plants in energy-intensive industries as a share of the world total.

Plant-level GHG emissions figures are available for CO₂ from the EU ETS inventories (CITL) for those installations large enough to be covered. Some financial and economic data are also available, but not readily. For publicly-quoted companies, annual reports (financial and corporate social responsibility) are a good source of information. However, many Austrian plants in the sectors considered are owned by private interests and the level of public information available on them is limited. This includes official economic statistics: for the industries considered, many statistics on value added and other key factors are not reported, generally because of concern over commercial confidentiality or similar concerns. Sectoral level data often had to be used rather than the original intention to look at financial impacts on an individual plant or company level.

Previous analysis, for example Wooders (2009), Wooders and Beaton (2011), has shown that income and profitability in the sectors considered are highly cyclical across the economic cycle. Assuming that a single year would be representative of an industry's position or prospects is not a recommended approach. Data has been collected as far as possible for the decade 2000-2009. This 10-year period started with commodity markets at low price levels, saw very high increases to a peak around 2008 and then led into the financial crisis. Industries are aiming to be profitable across the economic cycle, although strategies do change in the short-term as demand expands or contracts.

2.1.1 Consultation on data, analysis and conclusions

The lack of publicly available data required consultation to be undertaken from the beginning of the study. All major producers in the three sectors in Austria were contacted, along with Austrian and European industry associations. While asking for data, discussions were held to ask about methodology. Not all organisations contacted responded by any means, but the authors believe that the data set generated is sufficiently robust for the analysis conducted and is significantly in advance of that which can be derived from Austrian official statistics and other readily searchable publicly-available materials.

¹ A world production curve builds up cumulative production in order of increasing production cost. World markets clear at a certain price: If a plant's production costs were below this clearing price without a carbon price and above it with these prices, we would conclude that carbon pricing would have a major impact on competitiveness and potentially leakage. Conversely, a plant whose position in the production curve remained essentially unmoved would be unaffected.



Consultations on the findings of the study and on its conclusions were held throughout the project. Individual telephone calls were held, but also a number of events were used to present initial findings (for example on the characterisation of the sectors) and the final conclusions. In addition to the project meetings held in Vienna and attended by representatives of Austrian industry and government, events at which the study formed at least a part of materials presented by Peter Wooders from IISD in Berlin, Brussels and Paris are summarised in Table 2.1.

Table 2.1: Selected events at which findings of the study were presented

Event	Date	Organiser and Location	Audience
68 th and 69 th meeting of the OECD Steel Committee. Environment agenda item	6-7 May 2010, 2-3 December 2010	OECD Steel Committee. Paris	OECD Steel Committee delegates, supported in some cases by companies
Sector specific activities in industrial energy and carbon efficiency - From data and analyses to action	11 December 2010	ZEW and the Oeko Institute	Industry representatives (companies and associations), EU and national government officials, researchers
SBB Green Steel Strategies 2011	5-7 April 2011	SBB	Industry representatives, media
Carbon pricing, leakage and competitiveness: sectoral impacts and policy approaches. Final Project Workshop	12 May 2011	Climate Strategies and SWP. Berlin	Industry representatives (companies and associations), EU and national government officials, researchers
Deepening Understanding of Energy-Intensive Industries ²	26 September 2011	IISD, Climate Strategies and SWP. Brussels	Industry representatives (companies and associations), EU and national government officials, researchers

2.2 Paper and pulp

2.2.1 Sector overview

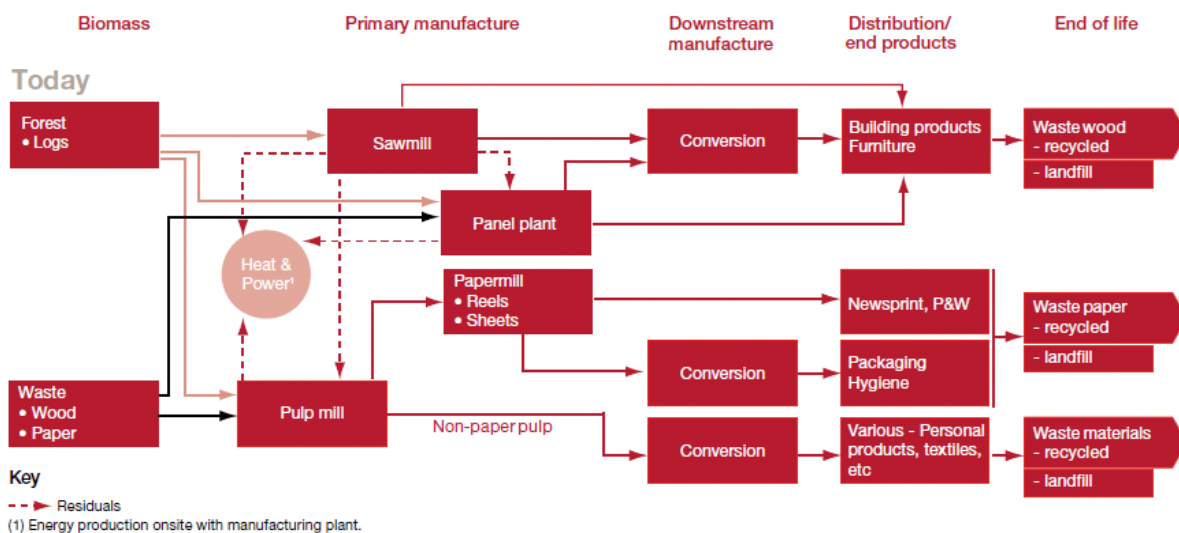
2.2.1.1 Global industry trends

In 2009, 377 Mt of paper and 174 Mt of pulp were produced worldwide (FAO, 2011). In the same year, the 100 largest forest, paper and packaging companies accrued sales revenues of

² Note that the European Commission held a workshop on modelling energy-intensive industries the following afternoon, to which IISD was invited.

US\$ 318 billion, of which companies based in North America had the largest share (US\$ 114 billion), followed by Europe (US\$ 102 billion), Asia (US\$ 72 billion) and Latin America (US\$ 17 billion) (PWC, 2010a). Europe accounted for around 27% of worldwide paper production, whereas Asia, North America and Latin America contributed 43%, 23% and 4%, respectively. For pulp, the respective shares stood at 26%, 22%, 37% and 11% (FAO, 2011). The biggest ten firms by sales revenue included six European, two Japanese and two American companies (PWC, 2010a).

Figure 2.1: Paper and pulp value chain

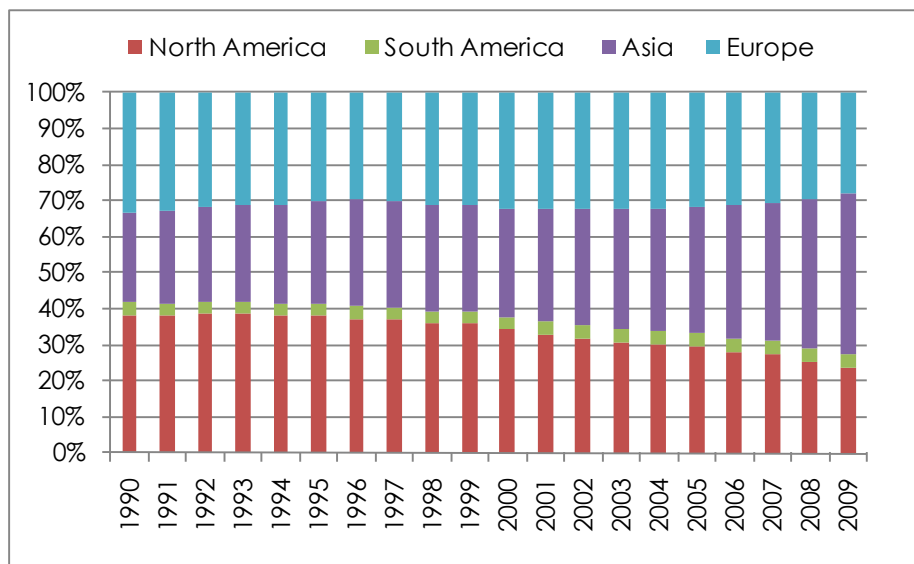


Source: PWC (2010a).

Global paper production rose relatively steadily from 239 Mt in 1990 to 392 Mt in 2008. Pulp production increased also from 166 Mt in 1990 to a peak of 196 Mt in 2007. Since then, the global economic crisis has taken its toll on the industry. Worldwide production of both paper and pulp plummeted by over 10% from 2008 to 2009. The Top 100 companies' net income slid into the red as early as 2008 (PWC, 2009). Total turnover in Europe was reduced by over 20% in 2009 (CEPI, 2010). Even though the market for most products had been expanding before the crisis, many industry leaders fear that demand may now decline more permanently in several market segments. Newsprint is seen as particularly affected by the shift towards electronic media (PWC, 2010b). Technological innovations render production of different paper grades more and more blurred (Berg and Nordstrom, 2006).

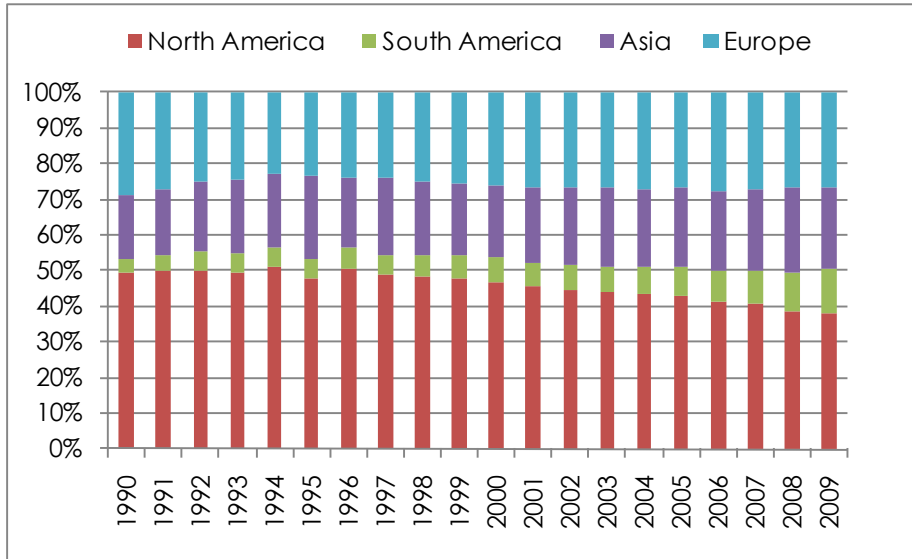
Therefore, the key concern in mature markets such as Western Europe is overcapacity (PWC, 2010a). Even though consumption in emerging markets is increasing rapidly, it has not allowed Western producers to solve these issues, as Asian and Latin American capacity is catching up quickly. China in particular has been “aggressively promoting the development of a domestic wood pulp industry, integrated with a plantation” (Barr and Cossalter, 2004). Since 2004, China has added 26% of new capacity on average every year and is now the largest producer of paper and paper products in the world (EPI, 2010). Accordingly, the regional shares in global paper production have changed dramatically. In 2002, Asia took over both Europe and North America and produces now twice as much as North America and 50% more than Europe respectively. The picture is different for pulp. Here, the main trend is the increasing share of South America, largely at the expense of North America, which however remains by far the largest producer (see Figures 2.2 and 2.3).

Figure 2.2: Shares of global paper production, 1990-2009



Source: FAO (2011).

Figure 2.3: Shares of global pulp production, 1990-2009



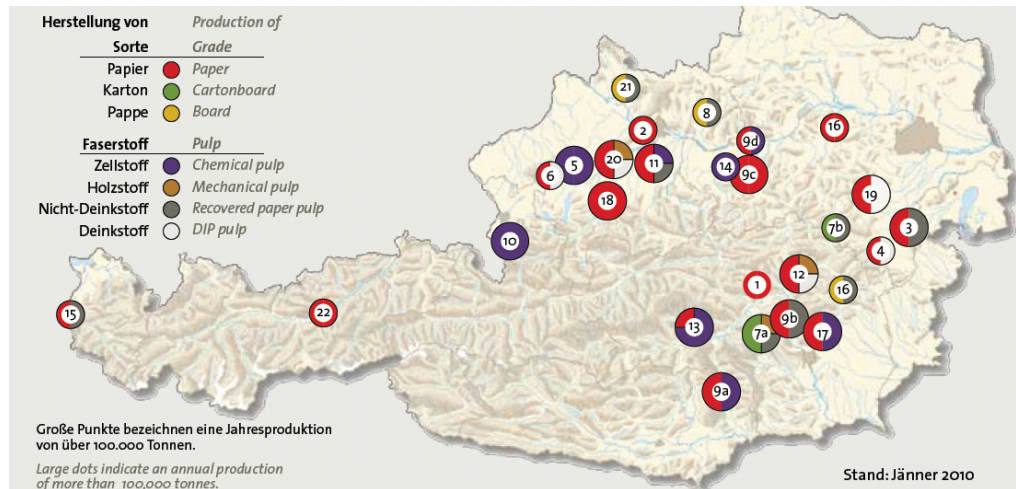
Source: FAO (2011).

It is worth noting that Chinese capacity growth has mainly helped to satisfy domestic demand. However, it will still affect Western producers as China will import less from them. Furthermore, many of the new emerging market mills produce at low costs and can be competitive across the globe, despite transportation costs (Berg and Nordstrom, 2006). A comparison of reinvestment ratios confirms this picture. Between 2005 and 2009 the ratio of capital investment to depreciation has been varying between 2.5 and 4.5 in China. Japan's ratio has exceeded 1 each year whereas Europe's has been oscillating around 1 and North America's has consistently been lower than 1 (PWC, 2010a). Western companies are participating in emerging market growth, as they recognise the need for capacity shifts. Nevertheless there remains the expectation that Asian companies will grow more quickly and be more competitive: a recent survey finds that Asian CEOs are much more optimistic than their Western counterparts (PWC, 2010b).

2.2.1.2 The industry in Austria

According to the Austrian Paper and Pulp Industry Association *Austropapier* (Austropapier, 2010a), 26 mills were in operation in January 2010, of which 3 were pulp mills, 6 paper mills, and 17 integrated paper and pulp mills. They produced 4.6 Mt of paper and 1.5 Mt of pulp, contributing 4.5% and 3.5% to total European production, respectively (FAO, 2011). Total turnover was € 3.1 billion. The mills were operated by 22 companies, of which almost half were owned by foreign, mostly European, companies.

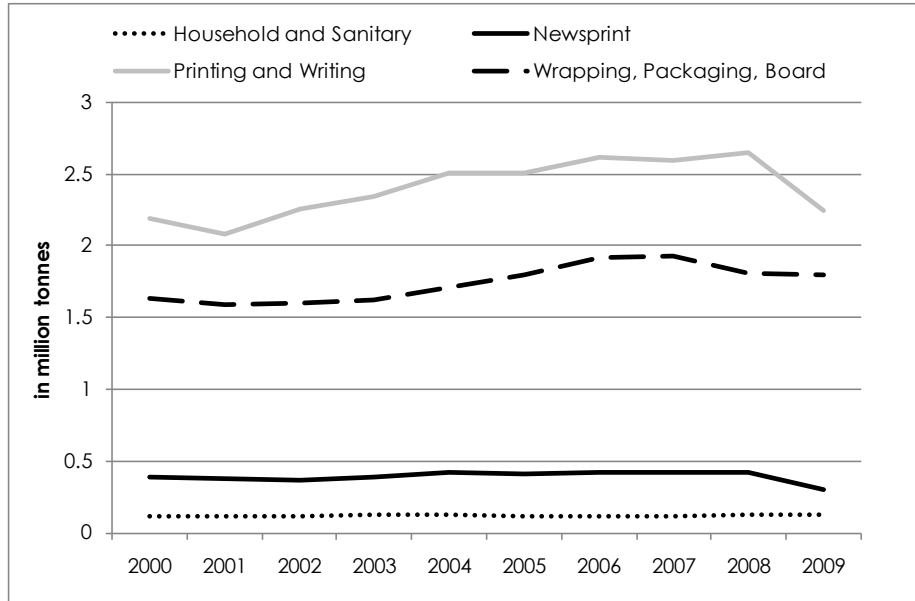
Figure 2.4: Location and products of Austrian paper and pulp industry sites



Source: Austropapier (2010a).

Around half of the Austrian paper production has been in printing and writing paper over the past decade. Wrapping, packaging and board are another important category, which makes up around a third of total production. Growth has almost only occurred in these two categories. Two mills are specialized in newsprint, and a further two in household and sanitary paper (FAO, 2011; Austropapier, 2010a).

Figure 2.5: Production of main paper types in Austria, 2000-2009

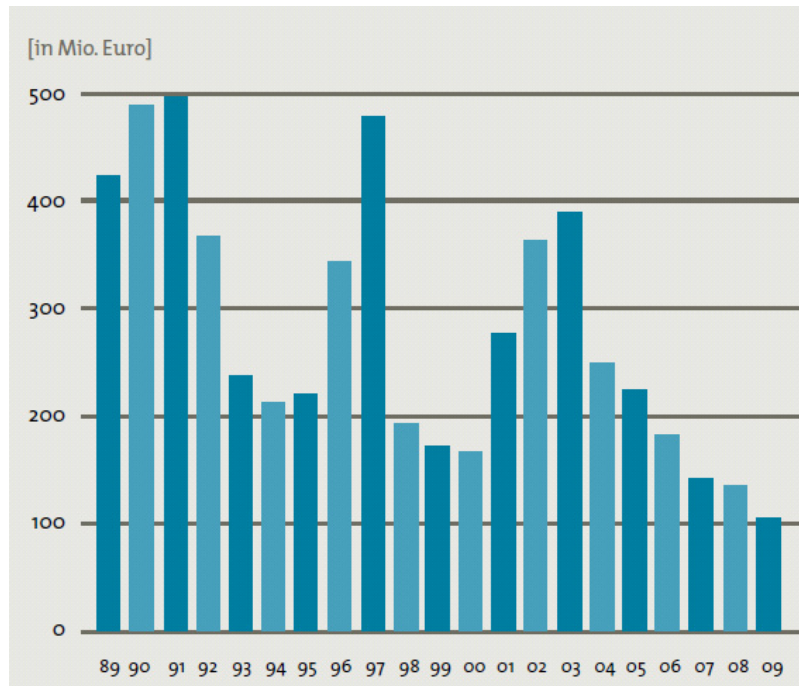


Source: FAO (2011).

Average earnings per tonne have oscillated around € 550 since 1990, but dropped to € 488 in 2009, indicating downward price adjustments to counter lower demand. Investment has been on a downward trend. In 2009, € 108 million were invested, compared with almost € 500 million per year in the early 1990s. Annual rates have fluctuated heavily (Figure 2.6), but the negative trend is clear (note that the displayed figures are nominal, meaning that the real value of investment has dropped even more rapidly). Most of the recent investments have aimed at increasing the efficiency of production and energy use. Larger Austrian companies have added new capacity abroad, but not in Austria (Austropapier, 2010a).³

³ Austrian companies with capacity abroad are: Prinzhorn Holding, Delfortgroup, MayrMelnhof.

Figure 2.6: Investment in Austria's paper and pulp industry (nominal figures)



Source: Austropapier (2010a).

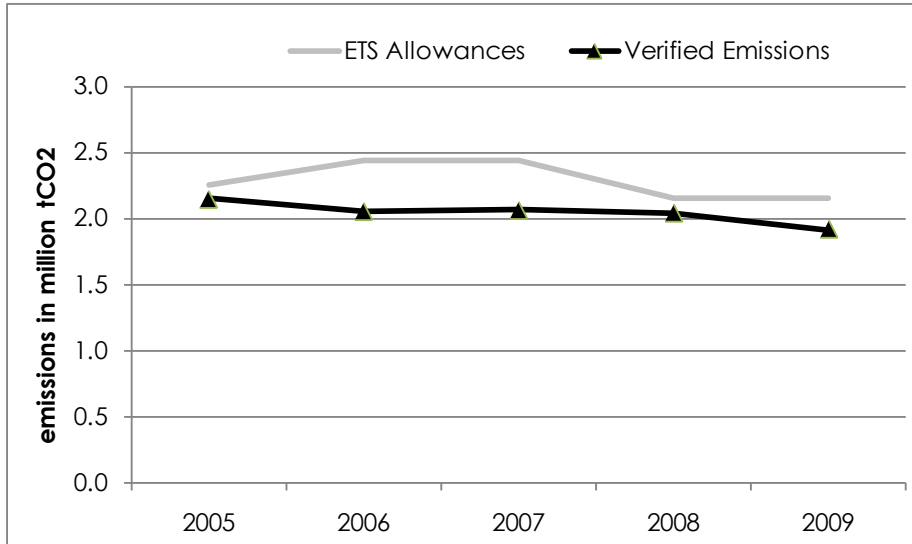
2.2.2 Key indicators

Key indicators for the sector are shown in Figures 2.7-2.10. These show:

- EU ETS allowances exceeded verified emissions in all years 2005-2009, with the peak surplus being around 400,000 tCO₂ (25% of verified emissions) in 2006 and 2007;
- Taking averages for 2002-2009, we see little variation in the sales price of paper and pulp (all years are within a band 10% around the average). Production and revenue grew steadily to 2008, before sharply declining in 2009;
- Investments in environmental protection measures have been maintained in the range € 50-100 million in all years. Investments in other fixed assets declined very significantly between 2002 and 2009;
- If the sector paid € 15 / tCO₂ without any free allowances, this would represent 1% of the value of sales. At € 30 / tCO₂, it would represent 2% of the value of sales. Given that the sector received more allowances than its verified emissions in all years in the period 2005-2009, actual costs to date have been negative.

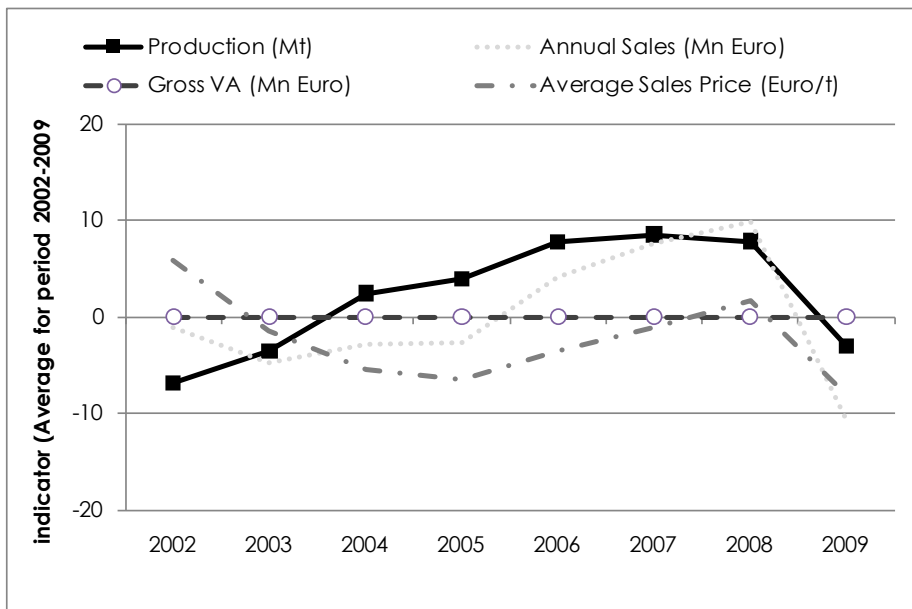


Figure 2.7: Allowances and verified emissions under EU ETS, 2005-2009



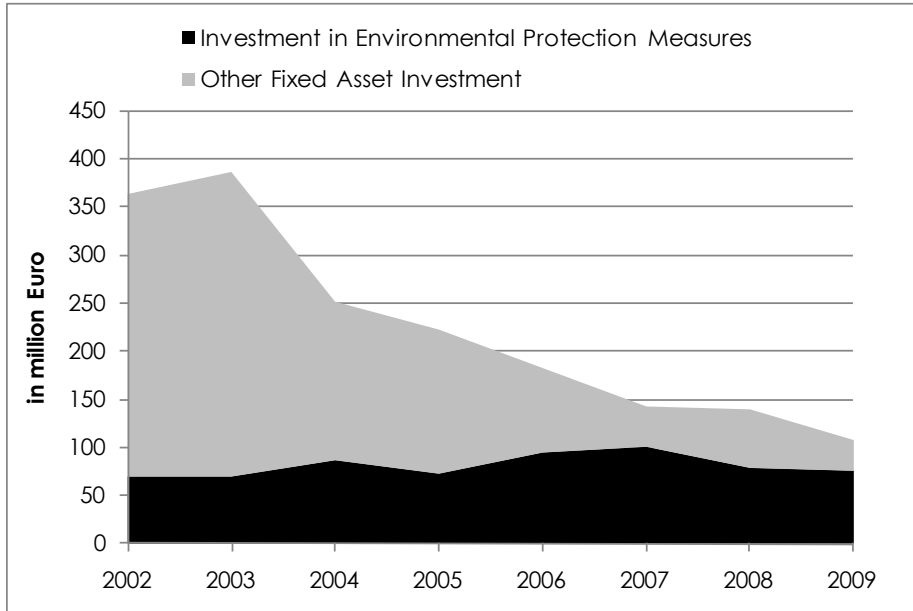
Source: CITL.

Figure 2.8: Variation in key indicators, % change compared to the average 2002-2009



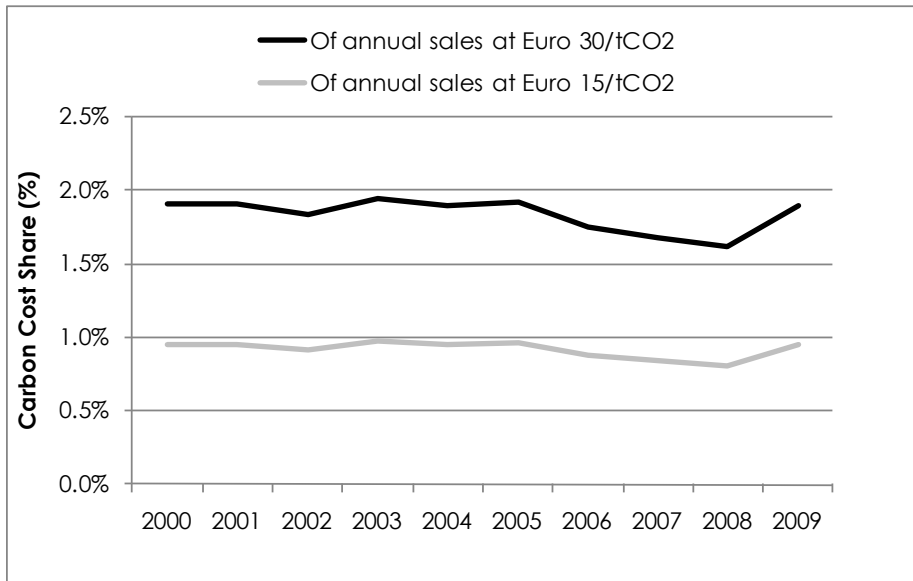
Source: CEPI and Austropapier (2011).

Figure 2.9: Investment and R&D expenditure, 2002-2009



Source: Austropapier (2011).

Figure 2.10: Carbon cost compared to annual sales, 2000-2009



Source: Carbon emissions from energy use statistics from Austropapier, multiplied by generic IPCC emission factors; sector sales from Austropapier (2011).

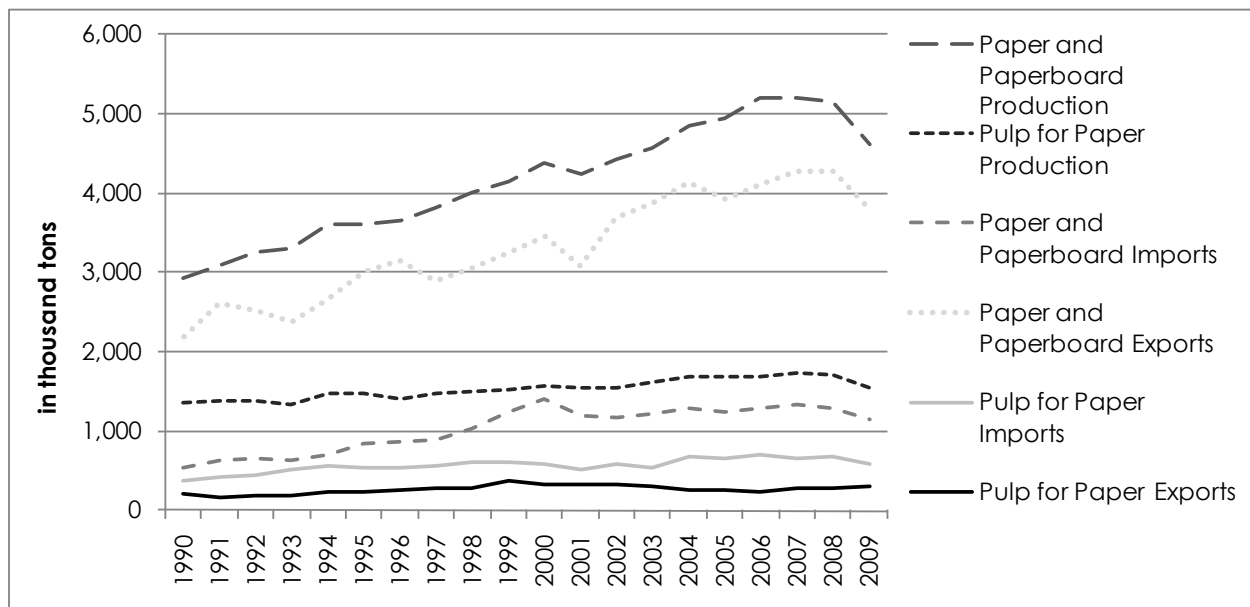


2.2.3 Trade

The sector paper and pulp is very exposed to trade (see Figure 2.11 and Figure 2.12). 85% of the paper production and 23% of the pulp production are exported. Over 80% of these exports go to other European countries. The rest goes to Asia (7% of paper exports and 12% of pulp exports) and America (7% and 0%, respectively). On the other hand, 64% of all paper consumption and 44% of all pulp consumption is met through imports (Austropapier, 2010a). Imports from Asia are very low, however. Austria does get, on the other hand, almost one third of its pulp from America. For paper, imports are almost all from Europe (Austropapier, 2010a).

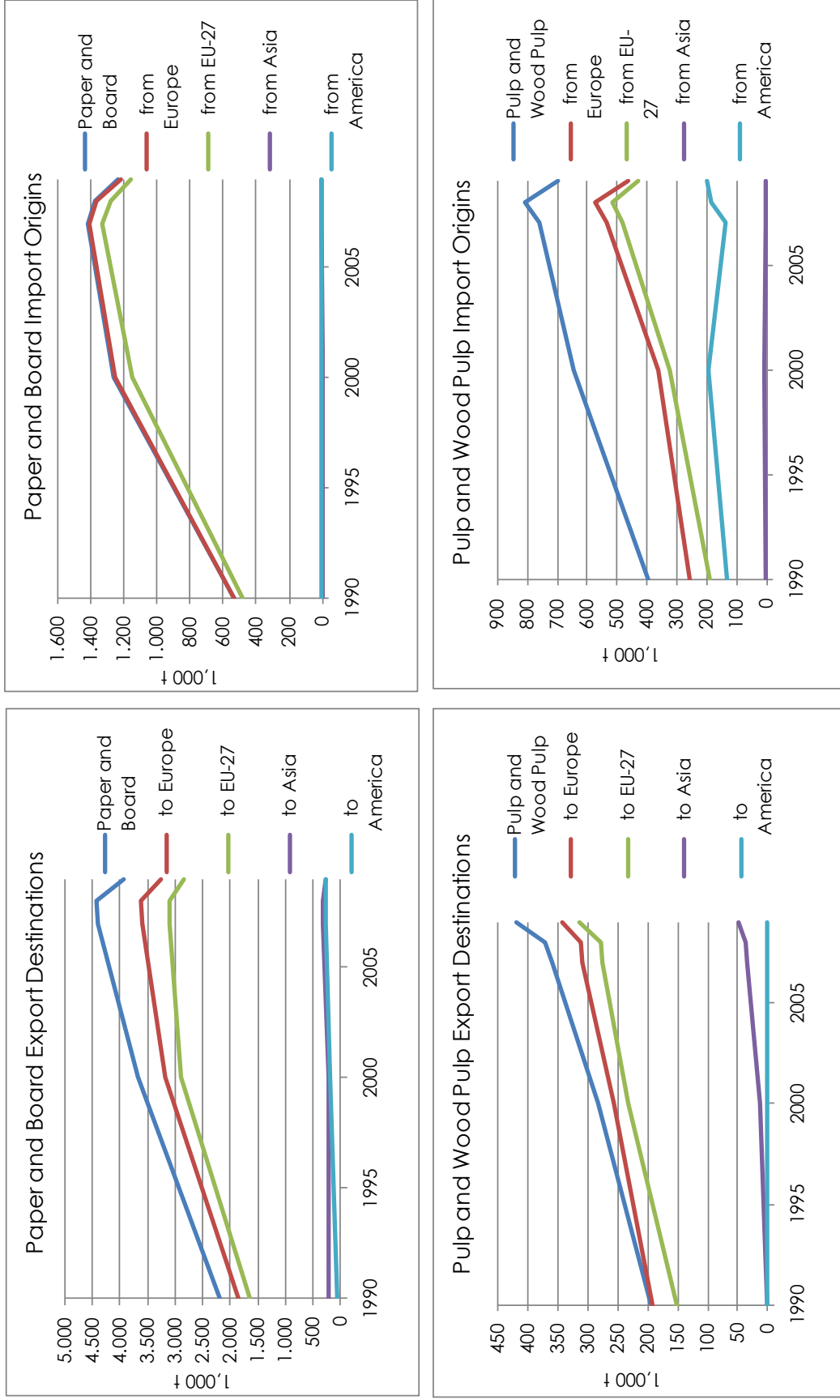
Over the last two decades, Austrian paper and paperboard production has expanded rapidly, despite a 10% reduction in total production from 2008 to 2009. Most of this growth was in exports, which have almost doubled between 1990 and 2008. Imports have increased, too, although on a much lower level. This situation is reversed for pulp, where imports have been higher than exports and where total production has expanded at a much slower and less consistent pace (FAO, 2011).

Figure 2.11: Production, exports and imports of paper, paperboard and pulp in Austria, 1990-2009



Source: FAO (2011).

Figure 2.12: Trade in paper and pulp between Austria and the world, 1990-2009



Source: Austropapier (2011).



2.2.4 Analysis

Section 2.2.2 concluded that if the sector had paid € 15/ tCO₂ for its direct emissions without any free allowances in the period 2005-2009, this would represent 1% of the value of sales. At € 30/ tCO₂, it would represent 2% of the value of sales. Given that the sector received more allowances than its verified emissions in all years 2005-2009, actual costs to date have been negative.

Section 2.2.4.1 assesses what the emissions costs of buying allowances under Phase 3 of the EU ETS would be for Austrian paper plants, for both direct and indirect emissions (those arising from electricity). Again these are presented relative to the value of sales from the sector.

Carbon prices also have impacts other than the costs of emissions allowances, for example changes to costs of fibre and of transport. Section 2.2.4.2 assesses these other impacts of increased carbon prices; section 2.2.4.3 compares them to the costs of buying allowances.

Finally conclusions are drawn, as answers to the first two questions posed in this report.

The first two questions which this report seeks to answer are:

1. Has the EU ETS already had an impact on competitiveness and leakage?
2. Would we expect larger impacts in the future?

2.2.4.1 Scale of potential carbon charges with respect to key financial indicators

Section 2.2.2 showed that net carbon costs under the EU ETS 2005-2009 have been negative, and that if the sector had paid € 15 /tCO₂ for all its allowances, this would represent less than 1% of the value of its sales.

Phase 3 of the EU ETS will reduce the average number of allowances per tonne of product granted for free. Analysis of what costs this could impose on the sector is now presented.

Direct emissions cost

In order to calculate potential future emission costs, both direct emissions and indirect emissions have to be considered. Direct emissions costs refer to the allowances the industry has to buy in order to cover emissions caused directly on their production sites. In the past, the industry has benefitted from grandfathering which has led to an over-allocation of emission allowances (Ausli, 2008)⁴, but the upcoming third phase of the ETS, covering the 2013-2020 period, will see a gradual reduction the overall emissions cap which would be expected to increase prices and render allowances scarcer for all industries, albeit with large variations. The paper and pulp industry received special status as a sector threatened by carbon leakage for the third ETS

⁴ See for example Kettner et al. (2011a).

phase and will therefore continue to benefit from free allowances which are to be allocated according to a benchmark set at the average of the 10% most efficient mills in terms of carbon emissions per tonne of produced pulp or paper. Applicable benchmark levels were published in late 2010 (European Commission, 2010). They vary by product group. In the paper and pulp sector, the rules distinguish 3 types of pulp and 8 types of paper. Table 2.2 shows the pulp and paper categories as well as the benchmark values.

Table 2.2: EU Benchmark factors for free allocations to the paper and pulp sector

Product		Product Description	Benchmark value (allowances/t)
Pulp	Short fibre kraft pulp	Wood pulp with short fibre length produced by sulphate chemical process; used for smooth paper	0.12
	Long fibre kraft pulp	Wood pulp with long fibre length produced by sulphate chemical process; used e.g. for packaging paper	0.06
	Sulphite pulp/ thermo-mechanical pulp	Wood chips cooked in pressure vessel with bisulphite liquor; mechanical pulp	0.02
	Recovered paper	Pulp made from recovered paper and other sources of fibrous cellulosic material	0.039
Paper	Newsprint	Paper used for printed newspaper usually made from ground wood, mechanical pulp and/or recycled fibres	0.298
	Uncoated fine paper	Made from mechanical or wood free pulp; e.g. office paper, packaging, graphic purposes, magazines	0.318
	Coated fine paper	Made from mechanical or wood free pulp; e.g. publication paper, graphic purposes, magazines	0.318
	Tissue	Hygienic papers	0.334
	Test liner and fluting	Paperboard for the packaging industry in corrugated board; mainly made from recycled papers and partly from chemical or semi-chemical pulp	0.248
	Uncoated carton board	Wide range of products, mainly used for strong and stiff packaging materials; made from virgin and/or recovered fibres	0.237
	Coated carton board	Wide range of products, mainly used for commercial packaging for food, pharma, cosmetics and the like; made from virgin and/or recovered fibres	0.263

Source: European Commission, (2010).

For illustrative purposes, we calculated actual emissions factors of all Austrian paper and pulp mills currently registered in the EU ETS based on verified emissions (EU, 2011) and published production data (Austropapier, 2011). We then assigned each mill to one category in order to



estimate the number of allowances the industry would have had to buy in 2009, the latest year for which we have data. Our calculations (see Table 2.3) showed the Austrian industry would have a total shortage of 293,591 EUAs (for comparison, total direct emissions of Austrian paper and pulp mills included in the ETS were 2.041 MtCO₂ in 2008). The industry would therefore have to buy allowances to cover around 14% of its total emissions. The burden is not distributed equally among producers. Some mills are below the benchmark value and will be able to sell excess allowances, whereas others will have to buy a substantial number of credits. Taking the first row of the table, the plant Papierfabrik Wattens produced 50,000 tonnes of paper in 2009, and emitted 27,234 tCO₂ in 2008. Assuming that the data is consistent across the two years, the emissions intensity is 0.545 tCO₂/t paper. The plant would only receive 0.318 tCO₂/t paper under the EU ETS Phase 3 benchmarking rules. Multiplying the shortfall by the tonnes of production shows that the plant would need to buy 11,340 EUAs, resulting in the costs shown at allowance prices of € 15, € 30 and € 50 (per tonne CO₂).



Table 2.3: Calculation of allowances which would be granted to 2009 production using EU ETS Phase 3 rules

Plant	Product	Product type (EU ETS cat)	Emissions 2008	Tonnes Produced (2009)	Actual emission factor	EU ETS emission factor	Delta	Costs		Free allowances	
								at 15 €	at 30 €		
1	Papierfabrik Wattens	Tobacco Paper	27,234	50,000	0.54	0.32	0.23	€ 170,010	€ 340,020	€ 566,700	15,900
2	Smurfit Kappa Neithingsdorfer	Corrugated board: unbleached Kraft pulp	74,893	406,000	0.18	0.30	-0.11	-€ 685,335	-€ 1,370,670	-€ 2,284,450	120,582
3	Sappi Gratkorn	Coated woodfree paper: bleached chemical pulp	420,065	800,000	0.53	0.44	0.09	€ 1,044,975	€ 2,089,950	€ 3,483,250	350,400
4	M-real Hallerin	Spruce sulphite pulp	69,760	150,000	0.47	0.00	0.46	€ 1,041,900	€ 2,083,800	€ 3,473,000	300
5	Mayr Melnhof Karton (alle)	Cartonboard	146,615	490,000	0.30	0.24	0.06	€ 457,275	€ 914,550	€ 1,524,250	116,130
6	Norske Skog Bruck GmbH	Newsprint	220,644	403,000	0.55	0.30	0.25	€ 1,508,250	€ 3,016,500	€ 5,027,500	120,094
7	Papierfabrik Hamburger Pflten	Corrugated paper and liner Uncoated fine paper:	172,316	400,000	0.43	0.25	0.18	€ 1,096,740	€ 2,193,480	€ 3,655,800	99,200
8	Mondi Packaging Frohneiten	Unbleached kraft pulp	45,753	160,000	0.29	0.24	0.05	€ 117,495	€ 234,990	€ 391,650	37,920
9	Brigl & Bergmeister Niklasdorf	Fine paper	3,246	70,000	0.05	0.32	-0.27	-€ 285,210	-€ 570,420	-€ 950,700	22,260
10	Feinpapier Feurstein Traun	Thin paper, tobacco paper Sulphate pulp, Kraft paper, packaging, corrugated paper	35,780	60,000	0.60	0.32	0.28	€ 250,500	€ 501,000	€ 835,000	19,080
11	Framsach St. Gertraud	Board	32,331	295,000	0.11	0.30	-0.19	-€ 829,260	-€ 1,658,520	-€ 2,764,200	87,615
12	Merckens Schwertberg	Board	4,398	15,000	0.29	0.24	0.06	€ 12,645	€ 25,290	€ 42,150	3,555
13	Neusiedler	Sulphite pulp, Uncoated fine paper	150,933	356,000	0.42	0.34	0.09	€ 459,075	€ 918,150	€ 1,530,250	120,328
14	Paul Hartmann GmbH	Cellulose wadding	4,728	10,000	0.47	0.33	0.14	€ 20,820	€ 41,640	€ 69,400	3,340
15	Rondo Ganahl Frastanz	Corrugated board, liner	26,408	100,000	0.26	0.24	0.03	€ 40,620	€ 81,240	€ 135,400	23,700
16	SCA Laakirchen	Gravure and offset paper	2,428	495,000	0.00	0.32	-0.31	-€ 2,324,730	-€ 4,649,460	-€ 7,749,100	157,410
17	SCA Ortman	Household and hygiene paper Newsprint, uncoated fine paper, magazines	76,174	121,500	0.63	0.33	0.29	€ 533,895	€ 1,067,790	€ 1,779,650	40,581
18	Steyermühl AG Steyermühl	Bleached long-fibre sulphate pulp, kraft paper	234,457	500,000	0.47	0.30	0.17	€ 1,281,855	€ 2,563,710	€ 4,272,850	149,000
19	Zellstoff Pöls	Long-fibres sulphate pulp, Coated carton board	52,411	401,000	0.13	0.07	0.06	€ 383,160	€ 766,320	€ 1,277,200	26,867
Totals / Averages			1,800,574	5,282,500		0.272	0.082	4,294,680	8,589,360	14,315,600	1,514,262

Source: Austropapier, 2010a; company websites; CITL.



Note that these estimates will change in the future due to changing production levels, emissions factors and also due to a reduction factor on freely allocated allowances applied by the EU in order to ensure that the overall emission cap is attained. This factor will increase (i.e. the number of free allowances will decrease) over the course of the third trading period.

The industry will also face indirect carbon costs passed through by power utilities, which will face full auction of permits in the third EU ETS trading period. In 2008, the industry used 1,403 GWh of grid electricity, but also fed 297 GWh into the grid. There has thus been a net demand of around 1,106 GWh (Austropapier, 2010a). According to data presented in Austropapier (2010b), for every € 1 rise in the EUA price, electricity costs for the industry rise by 50 cents per MWh, which corresponds to an emissions factor of 0.5 tonnes of CO₂ per MWh of electricity. The authors' own calculations, based on average emissions of electricity generation in Austria (using Eurostat statistics), however, yield an emission factor of only 0.285 tonnes of CO₂ per MWh of electricity.

Multiplying net electricity demand by these emissions factors result in 315,210 tonnes or 553,000 tonnes of indirect CO₂ emissions. There is a general consensus in studies (e.g. Sijm, 2008) that increased costs of electricity due to the EU ETS are essentially passed through, and there does not appear to be a compelling reason why they would not be in the future.

Costs from direct and indirect emissions

Based on these calculations, we can estimate the total cost imposed by the third phase of the EU ETS on the Austrian paper and pulp industry. The total amount of allowances to be paid by the industry equals the 293,591 EUAs for direct emissions, plus 315,210 or 553,000 for indirect emissions. The costs will also depend on the EUA price. The following table shows total carbon costs for three different price scenarios: € 15 /tCO₂ is indicative of the EU ETS Phase 2 average price level for EUAs; € 30 /tCO₂ is a higher, but realistic scenario, and has been used by the EC in its assessment of which sectors are vulnerable to competitiveness and leakage effects; € 50 /tCO₂ is a high price scenario.⁵

Table 2.4: Illustrative calculation of total industry carbon costs for Phase 3 of the EU ETS

Underlying emission factor (t CO ₂ eq/MWh)	Emissions allowances to be paid by the industry	Certificate Price		
		€ 15 /tCO ₂	€ 30 /tCO ₂	€ 50 /tCO ₂
0.285	608,801	€ 9.1m	€ 18.2m	€ 30.4m
0.5	846,591	€ 12.7m	€ 25.4m	€ 42.3m

⁵ The future price of allowances in the market may be affected by many factors, including the availability of banked allowances from the second trading phase (certain analysts have stated that there will be no shortage until 2017).



According to these illustrative calculations, the total costs imposed by the third EU ETS phase on the paper and pulp industry in Austria could range from € 9 million to € 42 million, representing 0.3%-1.4% of the value of sales in 2009. One critical limitation to this calculation is the correction factor the ETS administration will apply in order to ensure the achievement of the overall emission cap. Furthermore, it is not known to what extent these costs can be passed through to customers.

In order to gain an understanding of what these numbers mean for the paper and pulp industry, we compare them to industry statistics. In 2009, total production of paper and pulp was 6,423 Mt. Average earnings per ton stood at € 488. The total turnover amounted to € 3,132 million. Applying the carbon costs above to this data yields a cost increase per ton of production of between € 1.4 to € 6.6, which corresponds to 0.3 to 1.4% of current earnings per ton.

2.2.4.2 Other impacts of increased carbon prices

Production costs in the paper and pulp industry are mainly driven by the cost of fibre, energy, chemicals, transport, human resources and capital costs. Foreign exchange rates can change the costs to meet demand in foreign countries. For each cost factor, Table 2.5 presents a general description and explains ways in which climate policies can affect them. The potential of climate policy to affect the cost structure depends not only on the impacts on each category but also on their share in total production costs.

Climate policies are most likely to affect the cost structure of pulp and paper mills through energy prices, and to some extent through fibre demand. While some effects may be direct, such as higher electricity prices, others may be less straightforward to assess. If transport costs increase, for instance, trade may be negatively affected, which may in turn shield higher cost industries from competition to some extent (depending on the location and the modes of transport used, e.g. road and shipping). If the use of biomass as an energy source is encouraged, mills using bioenergy may benefit from subsidies or from higher feed-in tariffs, whereas others may suffer from higher fibre prices due to increased competition for wood mass.



Table 2.5: Paper and pulp industry cost drivers and potential impacts of climate policies

Cost Factor	Description	Potential impacts of climate policy
Fibre	For most paper and pulp products, fibre is the most important cost item. Fibre as a term is used for everything ranging from raw logs to recycled pulp and paper and is the main input in papermaking. Fibre costs are quite volatile. Global pulp prices, for instance, have ranged between US\$ 400 and US\$ 900 per ton approximately in the last 5 years. These prices have mainly varied with demand for finished paper products. In this context, paper and pulp firms have to ensure long-term access to virgin fibre and/or recovered fibre resources in order to remain competitive (PWC, 2009).	Climate policies may encourage the use of wood as an energy source and thereby increase competition and procurement costs for fibre (Ausli, 2008).
Energy	For most paper and pulp mills energy use is an important cost item. Mills use energy both in the form of electricity (grid or off-grid supply) and fuel (fossil fuels and/or biomass). They vary greatly regarding both energy efficiency and mix, depending on technology. Many mills already use CHP and biomass, and thus have limited room for improvement. Chemical pulping, for instance, requires more energy than mechanical pulping. Some mills use heat generated in the pulping process to meet part of their energy demand. Furthermore, energy costs can be very volatile. Due to these pressures, companies have tried to increase efficiency and to use biomass as a source for heat and power (Ausli, 2008).	Climate policies are likely to affect the cost of energy in several ways: <ul style="list-style-type: none"> • Direct impact of a carbon price on fossil fuel costs. • Indirect impact of higher fossil fuel costs on electricity costs. • Fostering the use of bioenergy can increase competition for those and make it pricier. • Some mills can benefit from higher energy prices if they produce and sell excess energy in the form of heat or steam.
Chemicals	Chemicals are used in chemical pulp making and in other stages of the production process. Their price tends to track energy and crude oil prices, which can vary significantly (PWC, 2009).	The cost of chemicals is affected to the extent that climate policies increase the costs of crude oil and energy.
Transport	The paper and pulp industry is becoming more and more globalized, yet trade intensity varies along the supply chain. As a rule, downstream trade is geographically more limited, i.e. pulp is much more globalized than paper products (PWC, 2010a). To the extent that products are traded, their transport cost can be significant. They depend mainly on oil prices (PWC, 2009). Note that transport costs are a feature of all commodities, and are more significant for heavy, low value products (for example steel).	By increasing the cost of oil and energy, climate policies may make transport more costly. This could reduce trade.

Table 2.5 ctd.: Paper and pulp industry cost drivers and potential impacts of climate policies

Cost Factor	Description	Potential impacts of climate policy
Human Resources	Labour costs vary a lot between countries. Employment has been reduced massively over the past decades, with European companies decreasing staff levels almost by half between 1991 and 2009 (CEPI, 2010).	Labour costs are unlikely to be significantly affected by climate policies. ⁶
Capital Costs	Paper and pulp is a very capital-intensive industry (Ausli, 2008). The investment cost of a recently inaugurated paper mill with a capacity of 350,000 tonnes in Hungary amounted to € 200 million (Hamburger, 2009). This is significantly more than the total annual investments of Austrian plants. But it should be noted that there has been little demand for investment in new capacity in Europe recently.	While climate policies may change the actual investment costs through increasing cement prices, for instance, such impacts are likely to be minor and the key impact of the high capital intensity may be that uncertainty about future climate policy and their impact on other cost factors may deter expensive investments that the sector might be planning (if any).
Foreign Exchange	Fluctuations in currency exchange rates can change the actual costs of serving demand in a foreign country. Recent fluctuations were found to have profound impacts on industry profits (PWC, 2010a). Similar impacts can be seen in other sectors, and may be more or less significant on competitiveness.	Climate policy on the current and expected scale is unlikely to have a significant influence on exchange rates.

2.2.4.3 How important are potential carbon charges compared to other drivers in the sector?

Previous sections have concluded that the industry is highly exposed to trade, but that this is mostly with the EU. Imports from Asia are currently very low. Mills are most exposed to trade when they are upstream; only one of Austria's mills is a pure pulp mill, the rest are integrated. Competition with low-cost Asian producers is strongest for products which do not have short turn-around times (Berg and Nordstrom, 2006). Newsprint, the type of paper most exposed to competition, is only produced by two Austrian mills (although these are large ones).

Energy costs will increase with ETS vis-à-vis non-European states. Even with no cost pass-through of increased costs to consumers of paper and pulp products (very unlikely) the effect is small with an increase of no more than 0.3% to 1.4% of revenue per tonne (see calculations above). It should also be noted that a large proportion of these costs may already be felt, and electricity companies generally pass-on their increased EU ETS costs.

There has been little variation in either the sales price of paper and pulp (all years in the period 2002-2009 are within a band 10% around the average). Investments in environmental protection

⁶ Revenue recycling through labour related taxes (either from an ecological tax reform or auctioning revenues) could affect labour costs.



measures have been maintained in the range € 50 million to € 100 million in all years, although investments in other fixed assets declined very significantly between 2002 and 2009.

The impacts of climate policies have to be compared to other drivers of competitiveness. Considering the cost factors laid out above, these include secured access to reasonably priced fibre resources (virgin pulp or recycled fibres) and energy (PWC, 2009), high productivity through economics of scale or specialisation in customized high quality products (Berg and Nordstrom, 2006), closeness to customers (especially for downstream products), political stability and access to finance as well as protection from foreign exchange rate fluctuations (either by serving customers in the same currency area, or through hedging). Expanding on these:

- Fibre Costs:

Competition for wood fibre will be fierce (PWC, 2010a) – “Standing natural forests will become more valued for their carbon, climate regulation and broad ecosystem benefits, than for an alternative use of the land. In fact, all forests can be expected to be valued for a broader range of benefits than they are today.” The implication is that fibre will become more expensive everywhere. Furthermore, China continued to face fibre deficits in 2008 (without secondary fibre sources it could only cover about half of its demand for virgin fibre from domestic sources (PWC, 2009)). Pressure to secure access to fibre will grow for all countries (PWC, 2010a): in Austria, around a third of the total production is from mills owned by Nordic companies with good access to fibre (Austropapier, 2011). Secured access to inexpensive fibre is a huge asset - mainly for producers in South America and Southeast Asia, where trees grow fast and wages are low. Producers in these regions are expanding pulp production capacity rapidly and also think about going into uncoated paper production, where they will be hugely competitive (Berg and Nordstrom, 2006).

- Capital costs

Capital costs are uncertain everywhere, and do not appear to confer an advantage on any region.

- Exchange rates

Exchange rates fluctuate strongly, significantly affecting competitiveness: Berg and Nordstrom (2006) note that competitiveness of North American mills tends to swing with the dollar's exchange rate; Heinzl Pulp (2009) note the large fluctuations in pulp prices due to exchange rates. Over the past 5 years, exchange rates quoted by oanda.com for the Euro have varied between $\pm 14\%$ of the mean against the US dollar; $\pm 25\%$ against the Japanese yen and $\pm 15\%$ against the Chinese Yuan.



2.2.4.4 Conclusions

To be competitive, mills need access to competitive fibre sources or need to meet specific local market demand (PWC, 2010a). Compared to other drivers – notably fibre costs and exchange rates – the potential for the EU ETS Phase 3 to have significant impacts on the competitiveness and leakage of the Austrian paper and pulp industry appears low. Fibre costs impose more uncertainty and are important for industry location. Of note is that EU policy may affect fibre costs through renewable energy minimum quota rules.

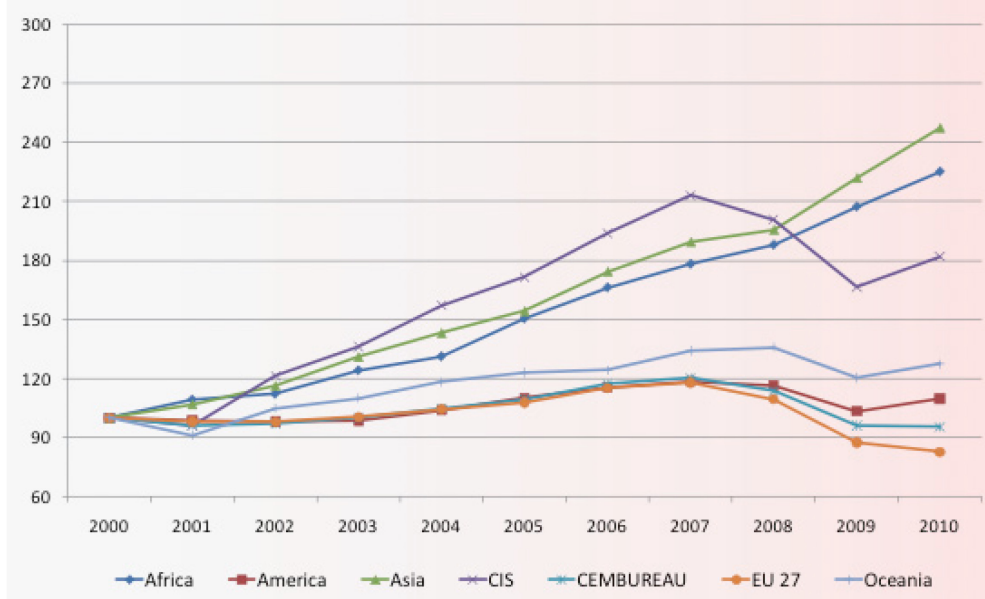
2.3 Cement

2.3.1 Sector overview

2.3.1.1 Global trends

The cement industry is mostly local, with production and consumption generally located close to one another. The sector is mainly exposed to trade with neighbouring countries, rather than being in global competition (see below). Globally, 3.3 billion tonnes of cement were produced in 2010. The main producer was China, with 1.87 billion tonnes. China's cement production has constantly increased since 2000 (597 Mt). EU countries are together the third largest producer in the world, and produced 210 Mt in 2010 (up from a little over 100 Mt in 2000).

Figure 2.13: World cement production by region, 2000-2010 (Index 2000 = 100)



Source: CEMBUREAU Activity Report (2010).



2.3.1.2 European trends

Within Europe, cement production declined in 2009 and 2010. While the fall was less sharp in 2010, it still reached about 5.4%. Total 2010 cement and clinker exports of the CEMBUREAU member countries⁷ did grow by 5.3%, whilst imports decreased by 6.7%. About 20% of this trade (both exports and imports) is in clinkers. National sales, however, fell in CEMBUREAU countries by 3% (7.2% for all 27 EU countries). These more positive numbers for CEMBUREAU member states are because of the relatively strong position of Turkey. Without Turkey, production fell by 5.2% in the other countries. With Turkey, CEMBUREAU production only fell by 0.7%.

2.3.1.3 Austrian production and consumption

Nine companies control the cement industry in Austria, of which four are Austrian and four international; one company is jointly Austrian and internationally owned. Production of cement rose from 4 Mt in 2002 to a peak of 5.3 Mt in 2008, after which a downturn occurred in line with the global recession. Annual sales of cement followed a similar pattern. Between the start of the ETS and the start of the global financial crisis, production and sales grew steadily. We witness a similar pattern in cement consumption. It rose until 2008 and then declined. Austria has a production deficit. Most demand in Austria is met by domestic production. In 2009 about 10% was met by net imports (see Figure 2.20). Throughout the decade a more or less constant consumption surplus is observed. In 2004, consumption and production levels were the closest, with 264,000 tonnes of cement consumed more than produced. This difference reached a maximum in the next year because of a sudden steep increase in cement consumption. Then Austria consumed 764,000 tonnes more than the almost 4.6 Mt it produced. Because of the financial crisis, consumption fell by about 15%, as did production. The difference in consumption and production has remained relatively constant, (except in 2004 during the consumption boost), despite Austria's increasing investment in environmental protection equipment.

2.3.2 Key indicators

Key indicators for the sector are shown in Figures 2.14-2.18. These show:

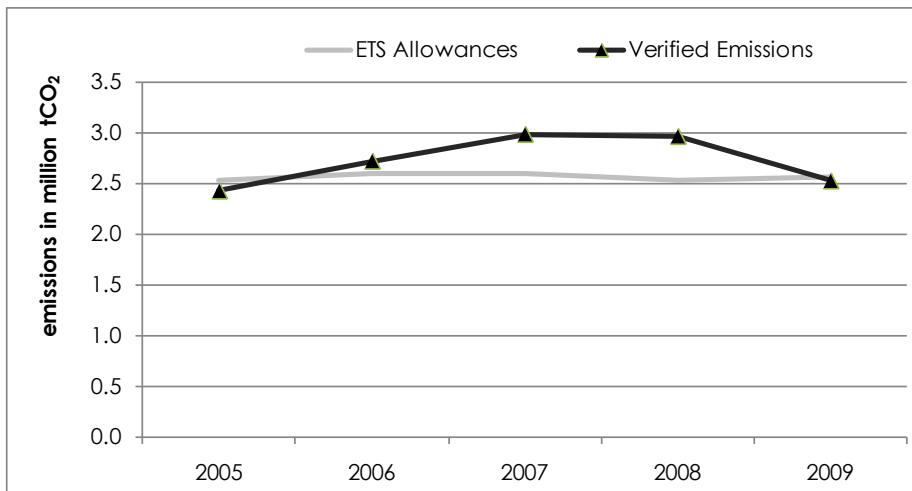
- Verified emissions and EU ETS allowances granted were very close in 2005, 2006 and 2009. In 2007 and 2008, verified emissions exceeded allowances by around 400,000 tCO₂ (13% of verified emissions);
- Taking averages for 2002-2009, we see a steady rise in the sales price of cement, by about 20% over the period 2002-2008. Production increases were similar, leading to an increase in

⁷ CEMBUREAU is the European Cement Association. Its member countries are Turkey and all EU Member States except for Cyprus, Malta and the Slovak Republic.

sales revenue of over 40% over 2002-2008. There was a significant downturn in all indicators in 2009;

- Total investment grew steadily over the period, in line with sales revenue. Investment specifically in environmental protection measures grew more strongly, in absolute and relative terms. Environmental protection investment doubled from € 10 million to € 20 million over the period;
- If the sector paid € 15 /tCO₂ without any free allowances, this would represent 10% of the value of sales. At € 30 /tCO₂, it would represent 20% of the value of sales. Similarly, paying € 15 /tCO₂ without any free allowances would represent 30% of gross value added (GVA), and paying € 30/tCO₂ without any free allowances would represent 60% of GVA. In reality, the sector did not have enough free allowances to cover its emissions in 2007 and 2008. In these years, paying for excess emissions at a price of € 15/tCO₂ would have cost 5% of sectoral GVA (noting that this cost could have been reduced in practice through transfers of allowances between installations and buying CERs or ERUs at prices below those of EUAs).

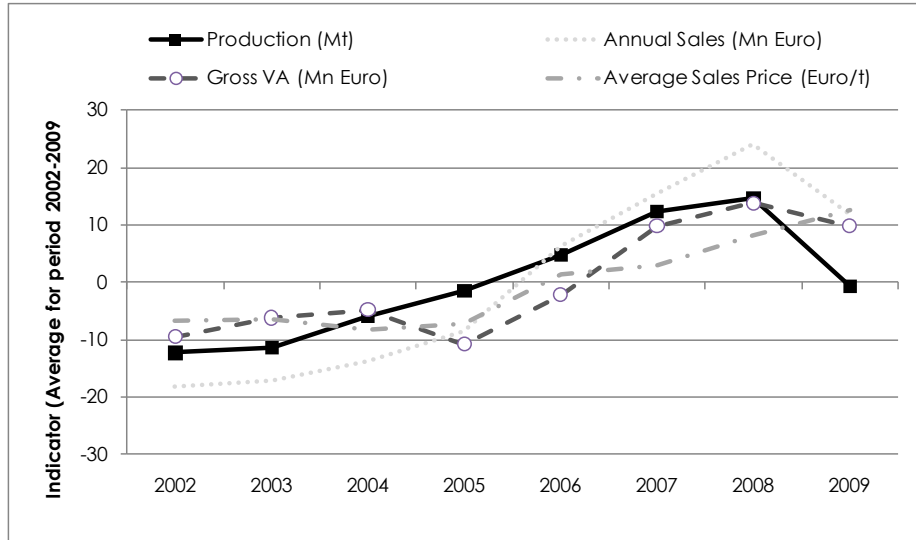
Figure 2.14: Allowances and verified emissions under EU ETS, 2005-2009



Source: CITL.

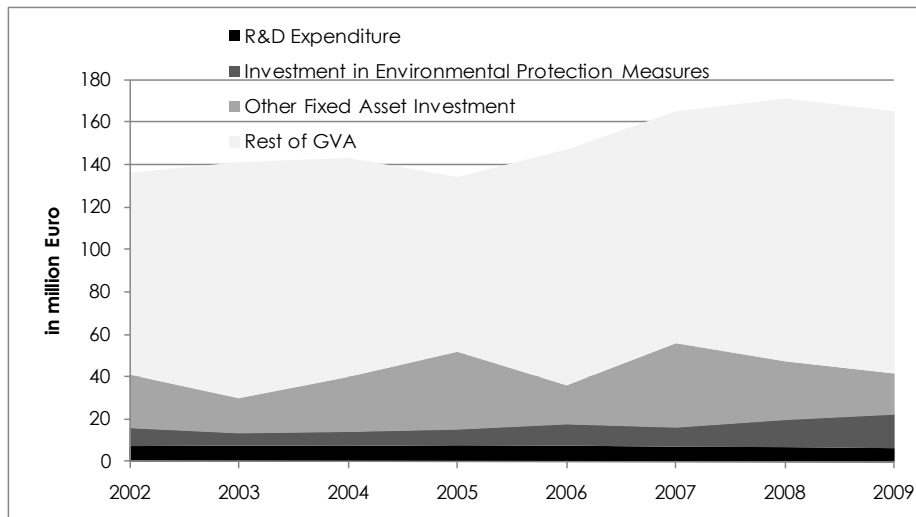


Figure 2.15: Variation in key indicators, % change compared to the average 2002-2009



Source: VÖZ Sustainability Reports.

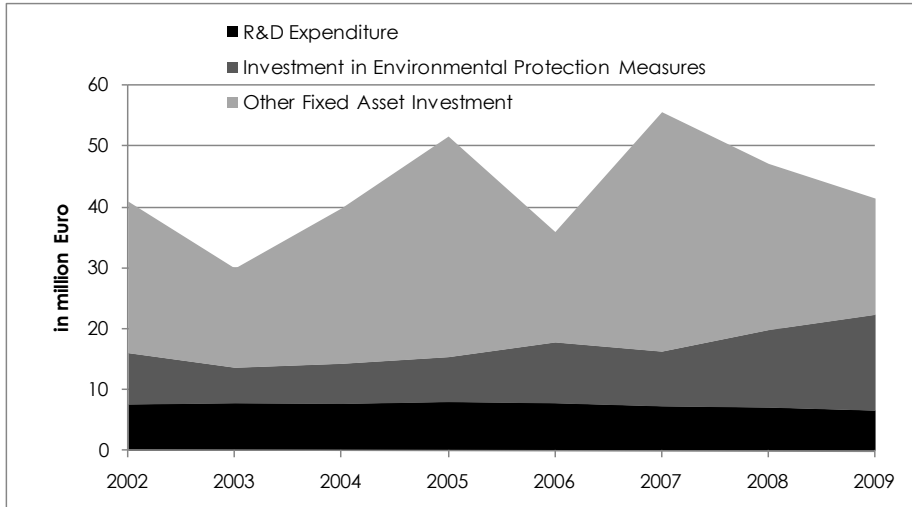
Figure 2.16: Investment as a share of Gross Value Added (GVA), 2002-2009



Source: VÖZ Sustainability Reports.

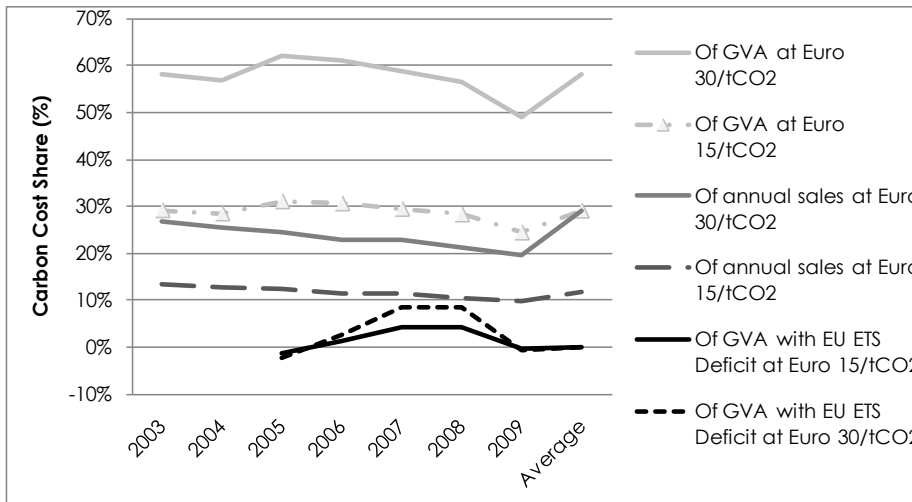


Figure 2.17: Investment and R&D expenditure, 2002-2009



Source: VÖZ Sustainability Reports.

Figure 2.18: Carbon cost compared to sector annual sales and GVA, 2003-2009



Source: VÖZ Sustainability Reports.

2.3.3 Trade

2.3.3.1 Austrian trade patterns

Imports and exports to and from the CEMBUREAU region have been relatively steady over the past 15 years (see Figure 2.19). Data on cement production and consumption in Austria shows no strong trend toward increased reliance on imports to meet cement consumption (see Figure



2.20). Cement and clinker exports increased to a level of 676,000 tonnes in 2008. Afterwards, exports declined to 447,000 tonnes in 2009 and 337,000 tonnes in 2010. Cement and clinker imports reached a maximum of 1.2 Mt in 2008, after which they decreased to about 1.1 Mt in 2009 and 2010 (see Figure 2.21). Austria's net imports in 2007 and 2008 were 645,000 and 559,000 tonnes of clinkers and cement. This increased to 661,000 and 801,000 tonnes in 2009 and 2010. This difference is relatively small compared to the levels of consumption (> 5 Mt between 2007 and 2009).

2.3.3.2 Austrian trade partners

Austria's main trading partners are its European neighbours. Between 2007 and 2010, Austria exported 2 Mt of clinkers and cement (see Figure 2.22), of which 337,100 tonnes of cement to Slovenia, 297,200 tonnes to Germany, 225,600 tonnes to Italy, 189,400 tonnes to Hungary, 150,700 tonnes to the Czech Republic, 96,000 tonnes to Switzerland and 37,000 tonnes to the Slovak Republic. In addition, it exported 578,700 tonnes of clinkers to Italy. These exports to neighbouring countries and Croatia reach 1.91 Mt out of a total of 2 Mt of exports.

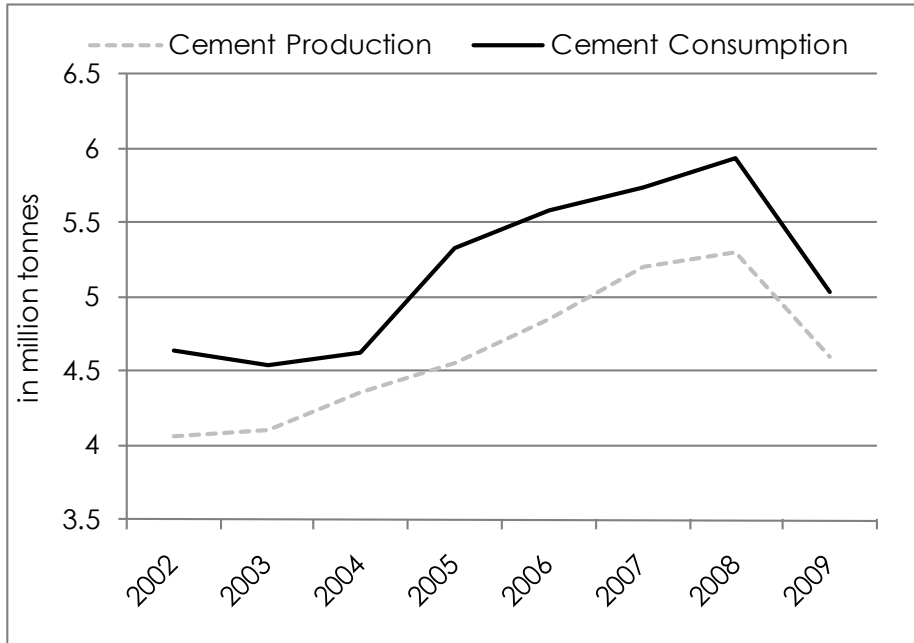
Austria mainly imports clinkers and cement from the same trading partners (see Figure 2.23). Between 2007 and 2010, it imported almost 4.7 Mt of clinkers and cement. Cement imports from its neighbours totalled 2.8 Mt, of which 1,563,500 tonnes from the Slovak Republic, 701,400 tonnes from Germany, 240,900 tonnes from the Czech Republic, 184,800 tonnes from Italy, 84,800 tonnes from Switzerland, 33,700 tonnes from Slovenia and 20,300 tonnes from Hungary. Clinker imports from its neighbours totalled 1.7 Mt, of which 1,423,900 tonnes came from Germany and 267,500 tonnes from Switzerland. All imports taken together, more than 4.5 out of 4.7 Mt of imports came from Austria's neighbours.

Figure 2.19: CEMBUREAU (the European Cement Association) trade, 1977-2010 (in Mt)



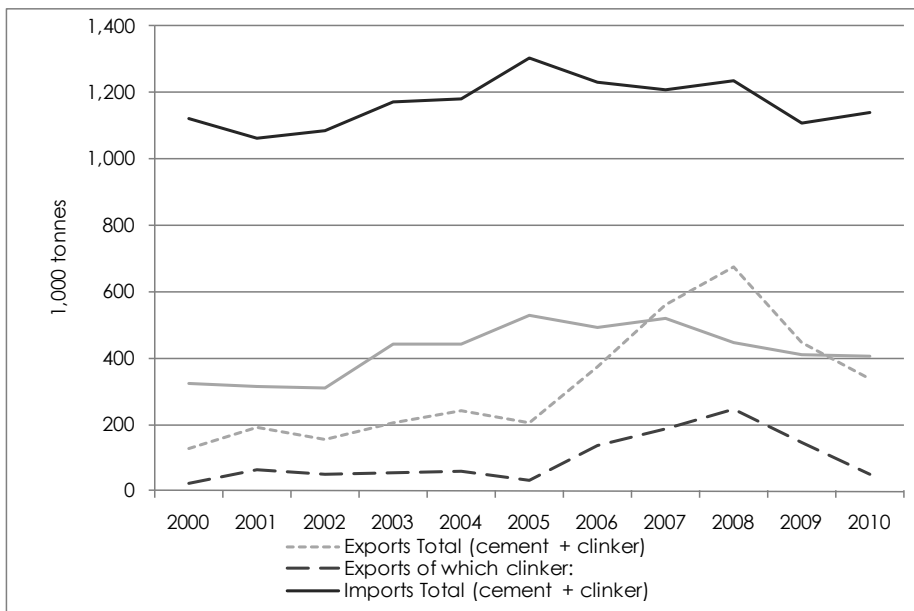
Source: CEMBUREAU Activity Report (2010).

Figure 2.20: Cement production and consumption in Austria, 2002-2009



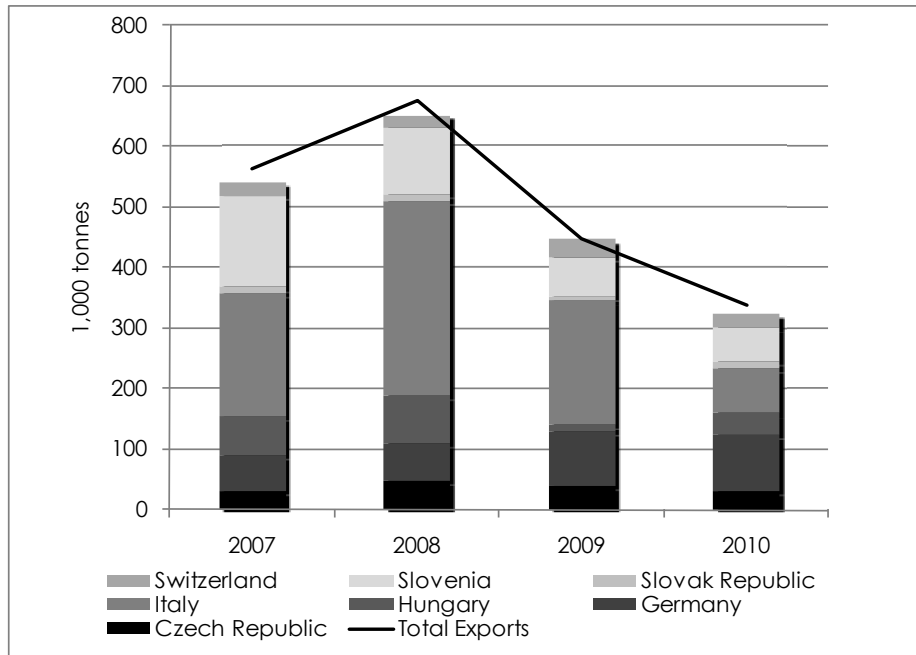
Source: VÖZ, Sustainability Reports, CEMBUREAU Activity Report (2010).

Figure 2.21: Import and export of cement and clinkers in Austria, 2000-2010



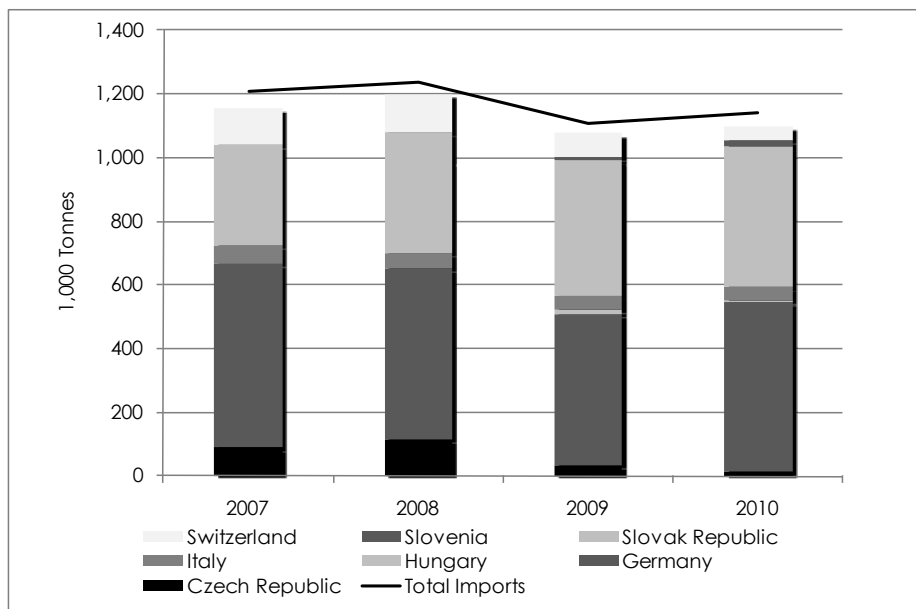
Source: Based on data retrieved via e-mail from CEMBUREAU (August 2011).

Figure 2.22: Cement and clinker exports from Austria to neighbouring countries, 2007-2010



Source: Based on data retrieved via e-mail from CEMBUREAU (August 2011).

Figure 2.23: Cement and clinker imports to Austria from its neighbouring countries, 2007-2010



Source: Based on data retrieved via e-mail from CEMBUREAU (August 2011).

2.3.4 Analysis

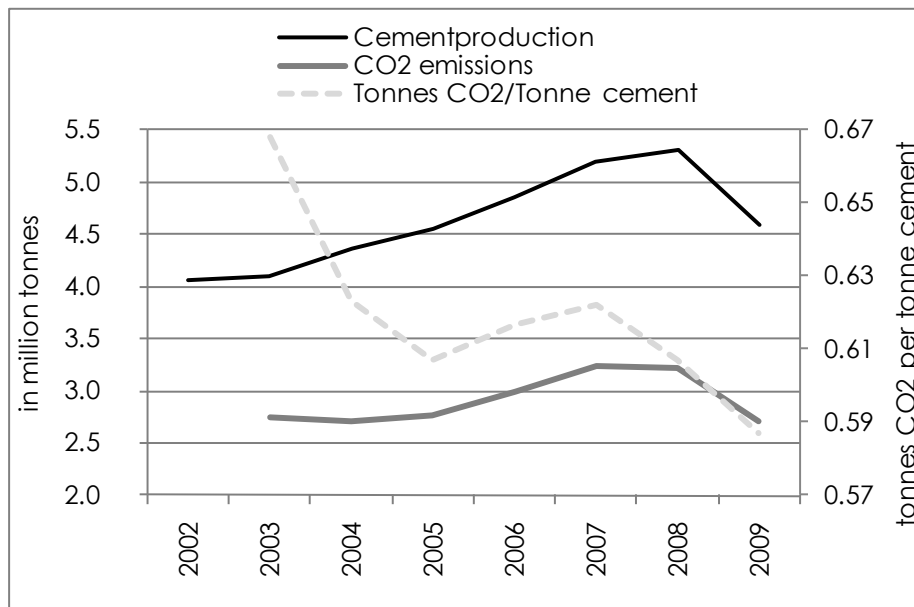
The first two questions which this report seeks to answer are:

1. Has the EU ETS already had an impact on competitiveness and leakage?
2. Would we expect larger impacts in the future?

The trends for the past decade presented above do not appear to have been strongly affected by the EU ETS. Cement prices have continued to rise, continuing the trend already in place prior to 2005. The consequent rises in sales revenue led to more investment, including in environmental investments (where growth was stronger than for all investment, but remained at a low share). Austria has remained a net importer of cement, with the level of net imports roughly constant over the period 2002 to 2009.

Since 2003, the rate of CO₂ per unit of cement production has decreased. In 2003, 0.668 tonnes of CO₂ were emitted each time one tonne of cement was produced. In 2009, CO₂ intensity further decreased to 0.587 tonnes (see Figure 2.24).

Figure 2.24: Emissions per unit of cement production in Austria, 2002-2009



Source: Cement production and CO₂-emissions from Vöz sustainability reports; tonnes CO₂/tonne cement is own calculation.

One might expect trade partners to have changed as the EU ETS has come in, but again there is little evidence that trends have changed since 2009. Austrian trade continues to be dominated



by its near neighbours some, but not all, of whom are also member of the EU. Trade from further afield remains very low.

The conclusion that trends are not affected is consistent with the relatively low impact that meeting emissions shortfalls has had on the sector. Only in 2007 and 2008 were there net costs, at around 5% of gross value added if all excess allowances had to be purchased at € 15 /tCO₂.

Concerning other drivers, this report has previously noted how important exchange rate fluctuations can be, with the Euro showing a variation of at least ±14% over the last around its mean value against the US dollar, Japanese yen and Chinese Yuan. Such variations are more significant than net carbon costs. Transport costs are also hugely important determinants of cement trade economics, and high prices in the period 2005-08 have served to dampen trade (Cook, 2009).

Despite there being little evidence of competitiveness and leakage impacts to date, this does not mean that the trend will necessarily continue. The EU ETS Phase 3 will see companies needing to progressively pay for more of their allowances. The initial impact is likely to be on investment, with Europe becoming a relatively less attractive location in which to build new plant or refurbish existing ones. Models do not yet allow such trends to be projected with accuracy, but if the industry is exposed to paying all its carbon costs and other countries do not, then a reduction in gross value added of 30% at a carbon price of € 15 /tCO₂ is highly likely to cause a major impact on competitiveness and leakage, certainly when global investment location decisions are made.

2.4 Iron and Steel

2.4.1 Sector overview

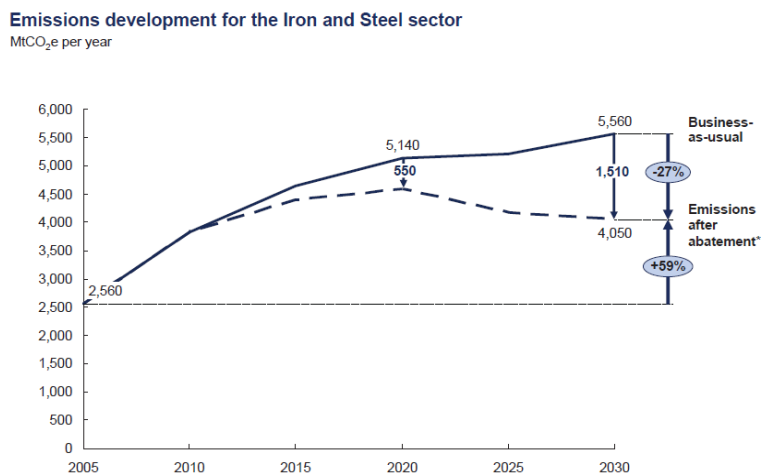
2.4.1.1 Global Trends

China drives demand and production in the iron and steel sector (see Figure 2.26). Similar to its rise as a global leader in industries such as wind turbine manufacturing, a high steel demand has allowed China to build a strong production industry. Since 2003, steel imports started to decrease. Chinese exports, however, rose significantly to over 65 Mt in 2007. That year, it produced 489 Mt of crude steel. The difference between exports and production indicates the high domestic steel demand. Pre-crisis production levels point out that other countries or regional economic integration organizations ran far behind in terms of production. In 2007, the EU produced 210 Mt of crude steel, Japan 120 Mt, the US 98 Mt and Russia 72 Mt (World Steel Association, 2008). These five countries have been the largest crude steel producers in the last decade. These numbers, however, do not necessarily reflect the countries' trade position.

In 2005, China became a net exporter. These exports can meet significant shares of demand in other countries. In 2009, during a period of reduced global demand, China exported 24 Mt, making it the one of the five largest exporters in the world along with Japan (22 Mt), the EU (32 Mt), Russia (27.6 Mt) and Ukraine (24 Mt). In the same year, China was the world's largest importer with 22.4 Mt. Because of this high demand, it was only the 14th largest net exporter in the world with 1.6 Mt, the first four again being Japan (30 Mt), Russia (24 Mt), Ukraine (23 Mt) and the EU (11 Mt) (World Steel Association, 2011)⁸.

The environmental challenge faced by the iron and steel sector globally is clearly illustrated in Figure 2.25: Under business as usual conditions, carbon dioxide emissions are projected to more than double between 2005 and 2030. Taking up all cost-effective abatement options identified would reduce projected emissions in 2030 by 27%, but would still leave the sector globally with emissions 59% higher in 2030 than in 2005.

Figure 2.25: Projected emissions for iron and steel



Source: McKinsey and Company (2009).

2.4.1.2 European trends

Crude steel production in the EU (27) was not consistently growing before the financial crisis. In 2005 it dropped by 7 Mt from the 202 Mt the region produced in 2004 (see Figure 2.28). After that, it continued growth for two years to reach the decade's maximum production level of 210 Mt in 2007. However, growth already declined during that year. Because of the crisis, steel

⁸ Please note that in this year the steel industry felt the impact of the financial crisis the most, and trade was therefore lower than would be expected in more 'normal' years.



production dropped significantly to less than 140 Mt in 2009. The EU started to recover in 2010 and raised its crude steel production to 172 Mt, still well below pre-recession levels (World Steel Association, 2011b). In 2006, the consumption level in the EU overtook its production level. That same year, imports of semi-finished and finished steel products overtook exports and the EU became a net importer of such products. This only changed during the financial crisis when the region's consumption level dropped more than its production. This trend has been withheld during the 2010 recovery, making the EU a net-exporter of semi-finished and finished steel products in 2009 and 2010. As mentioned above, in 2009, it even reached the top 5 net exporters of crude steel.⁹

The share of EU output in global crude steel production was 12% in 2010, down from almost 16% in 2007 (see Figure 2.27). Production recovery was mainly due to the improvement of steel market fundamentals. According to the European confederation of iron and steel industries Eurofer (2011), producers of flat products especially were able to improve capacity utilisation rates. Russia and Ukraine covered about half of total steel imports. China was an important flat steel exporter to the EU. It covered 25% of such imports (Eurofer, 2011). Before the crisis, China was the main exporter of total steel products to the EU (about 30%). In 2007, the EU ran a trade deficit of about 11.5 Mt. This was similar to 2006 (Eurofer, 2008). Eurofer reported at the end of 2006 that increased imports from China could have been disastrous for the production industry if EU demand had not been high enough. This trend was thus already well under way at the same moment the industry was expressing concerns about the EU cap on output levels, rather than production efficiency driven policies (Eurofer, 2007).

2.4.1.3 Austrian production and consumption

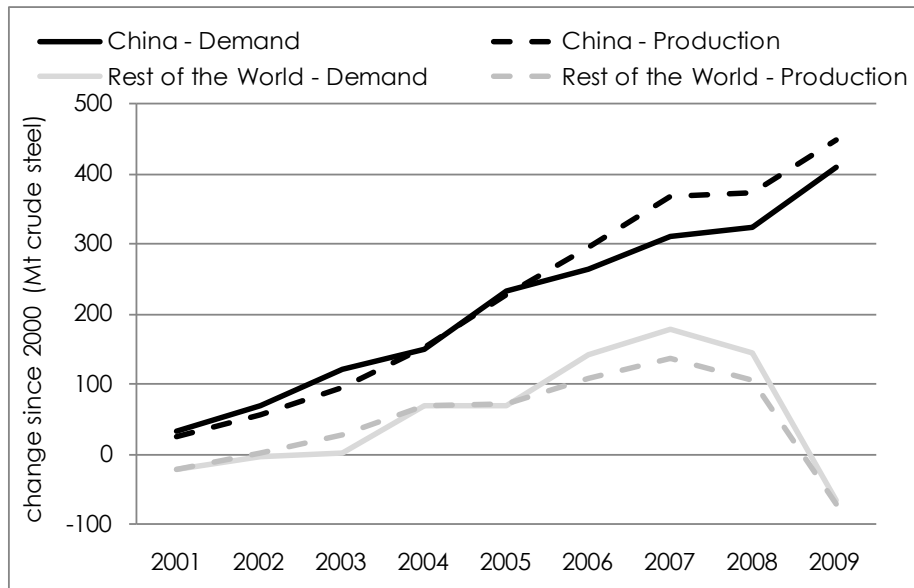
Austrian steel production is dominated by voestalpine. In 2008 and 2009, all installations subject to the EU ETS were owned by the company.

Between 2000 and 2008, Austrian crude steel production increased steadily from 5.7 Mt to 7.6 Mt (see Figures 2.29, 2.30 and 2.31). Because of the financial crisis, output shrank to 5.6 Mt in 2009. Despite not reaching pre-recession production levels yet, the industry is recovering fairly well. An increase to 7.2 Mt by the end of 2010 was reported (World Steel Association, 2011b). Austria was the 23rd largest producer in the world in 2010 and the 21st highest producer in 2009 (World Steel Association, 2011a). Apparently, the crisis struck other producers more at an early stage. More than 95.5% of Austria's crude steel production has been continuously cast steel. Crude steel was mainly (>90% of total) produced in Oxygen blown converters (World Steel Association, 2011b).

⁹ Variation in numbers might be due to what European countries were included in the region's analysis or/and due to the difference between crude steel trade and its indicator (export/import of semi-finished and finished steel products).

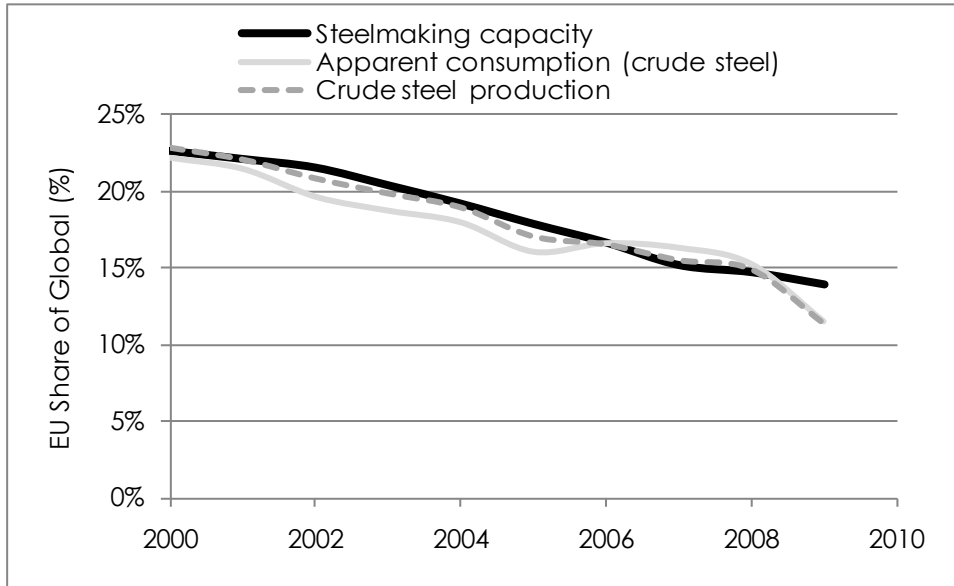
Consumption is indicated by apparent steel use (crude steel equivalent). Between 2002 and 2007, Austria has increased consumption slightly from 3.9 Mt to a maximum of 4.7 Mt in 2007. Consumption declined slightly in 2008 to 4.6 Mt. Because of the recession, a strong decline to 3.7 Mt was reported for 2009. Similar to the production recovery, consumption rose again in 2010 to 4.2 Mt. When apparent steel use is indicated by metric tonnes of finished steel products, a similar trend can be reported. In this scenario, Austrian consumption was 3.1 Mt in 2002, reached a maximum of 4.1 Mt in 2007 and decreased to 3.2 Mt during the crisis in 2009. The slow recovery was indicated by a rise in finished steel products to 3.7 Mt in 2010 (World Steel Association, 2011b).

Figure 2.26: Change in production and demand, 2001-2009



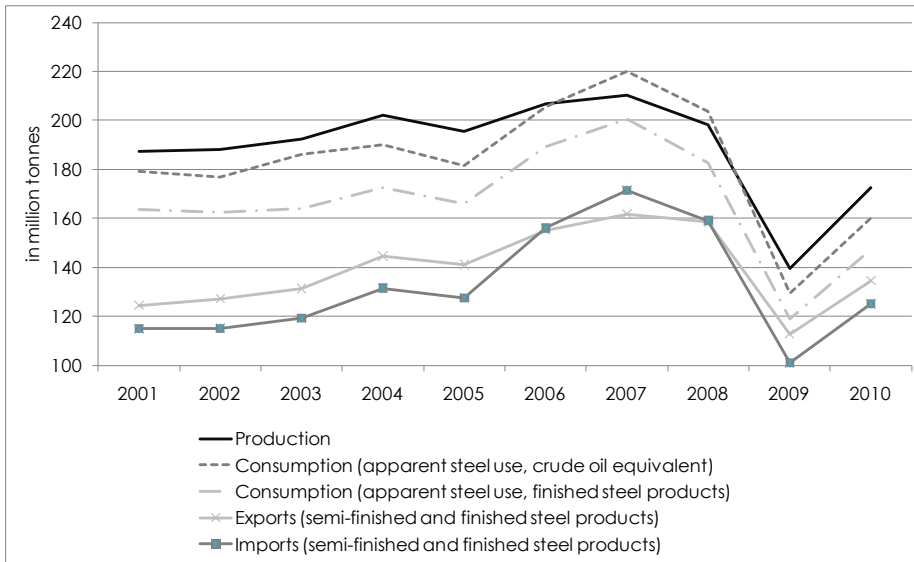
Source: OECD Steel Committee (2011).

Figure 2.27: EU share of steel market, 2002-2010



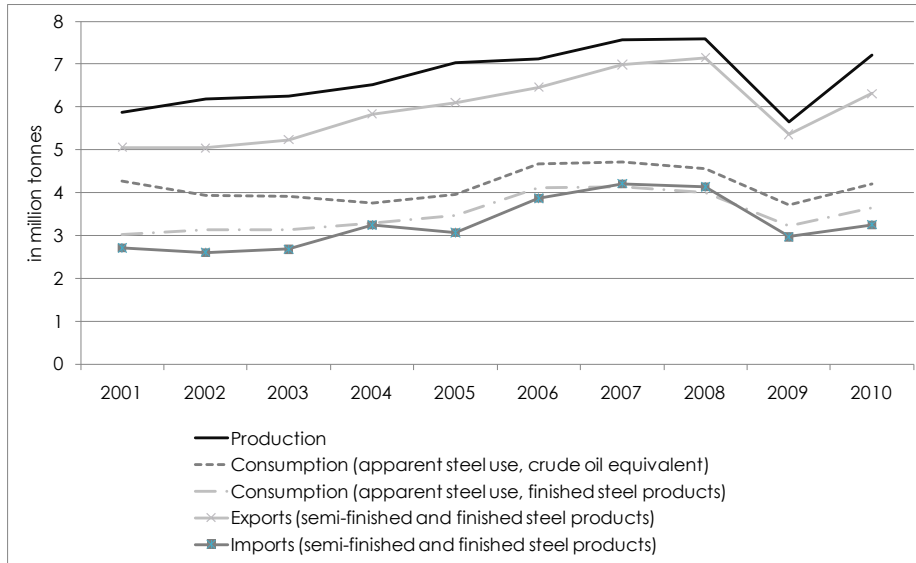
Source: OECD Steel Committee (2011).

Figure 2.28: Key data of the steel industry in the EU, 2001-2010



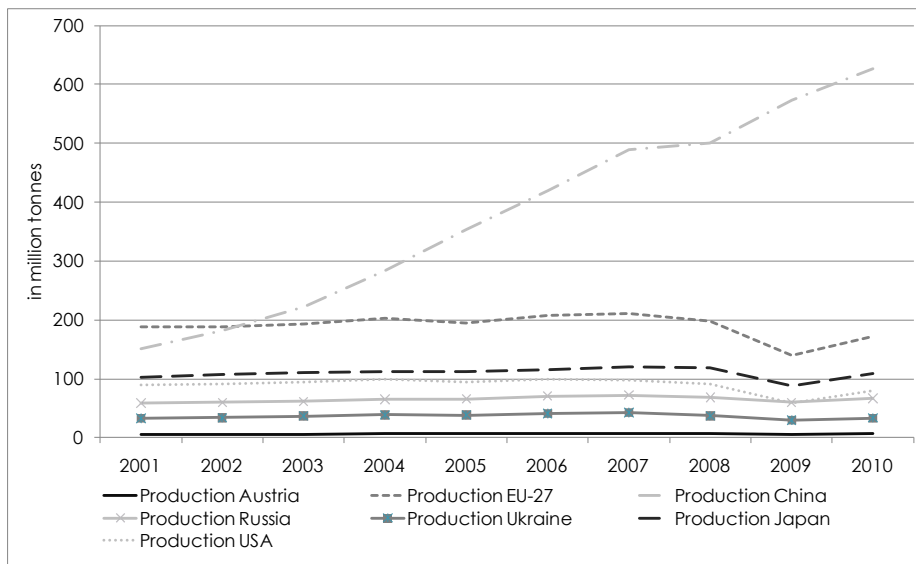
Source: World Steel Association (2011a, 2011b).

Figure 2.29: Key data of the steel industry in Austria, 2001-2010



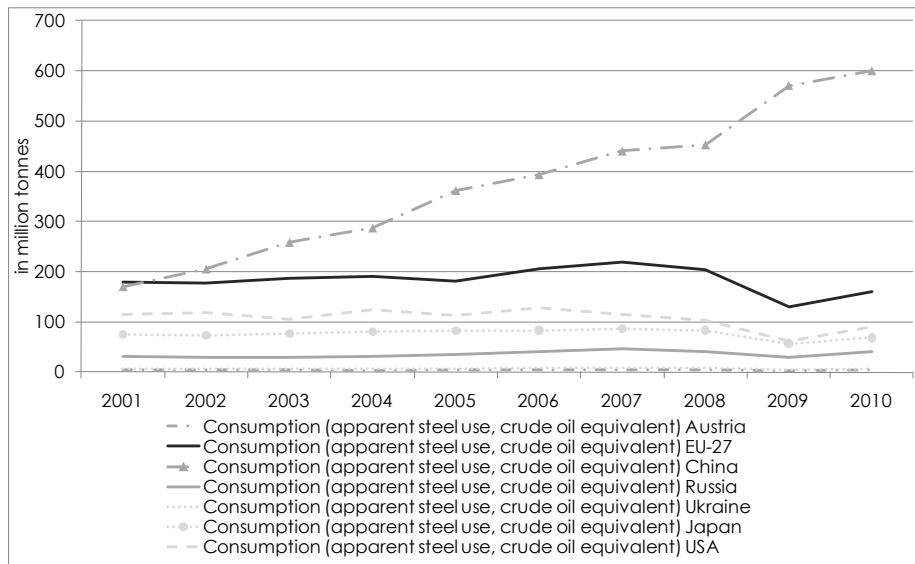
Source: World Steel Association (2011a, 2011b).

Figure 2.30: Production of crude steel, 2001-2010



Source: World Steel Association (2011a, 2011b).

Figure 2.31: Consumption of crude steel (apparent steel use, crude steel equivalent), 2001-2010



Source: World Steel Association (2011a, 2011b).

2.4.2 Key indicators

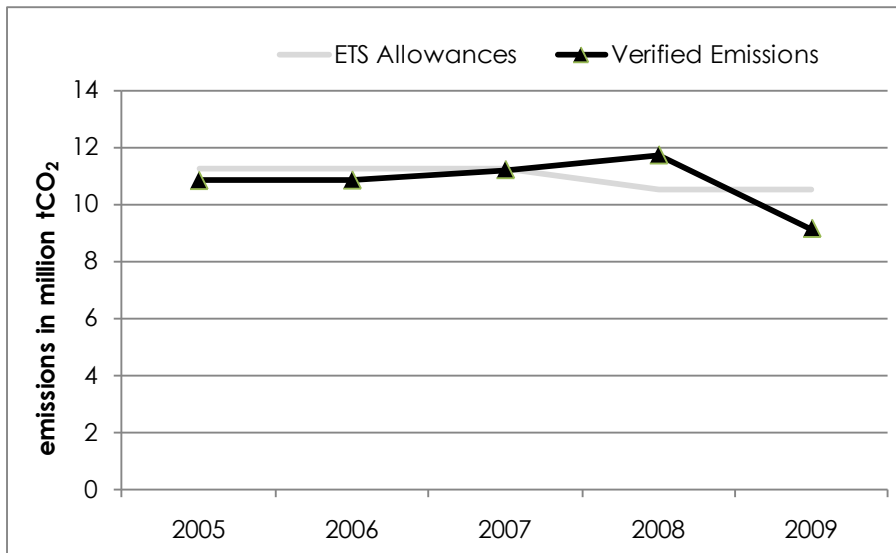
Key indicators for the sector are shown in Figures 2.32-2.36. These show:

- Verified emissions and EU ETS allowances granted were closely matched in 2005-2009. The boom year in production of 2008 saw emissions exceed grandfathered allowances, with the situation reversed in 2009 due to the financial crisis and fall off in demand;
- Financial indicators change widely across the economic cycle. Based on an average over the period 2002-2009, we see little change in the production of Austrian steel. However the price rose from 40% below the average in 2002 to 20% above in 2008. Revenues and value added grew even more strongly, from 40% below the average in 2002 to 80% above in 2007 and 2008, before collapsing in 2009 back to the average for the period;
- Taking averages for 2002-2009, we see a steady rise in the sales price of steel, by about 20% over the period 2002-2008. Production increases were similar, leading to an increase in sales revenue of over 40% over 2002-2008. In 2009 there was a significant downturn in all indicators;
- Total investment has tracked sales revenue. There was a peak for a voestalpine acquisition. Investment specifically in environmental protection measures is relatively low and has been steady over the period;
- If the sector paid € 15 /tCO₂ without any free allowances, this would represent around 2% of the value of sales. At € 30 /tCO₂, it would represent 4% of the value of sales. Similarly, paying



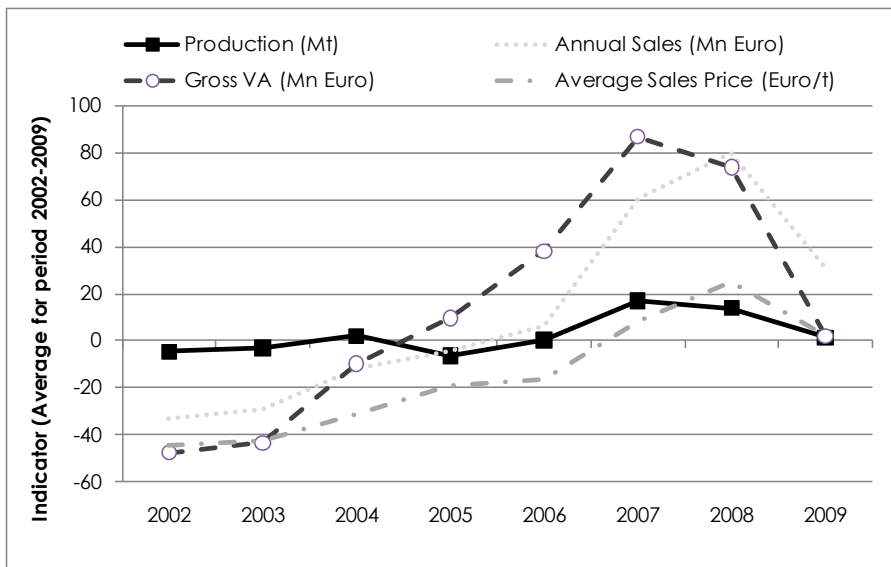
€ 15 /tCO₂ without any free allowances would represent 12% of gross value added (GVA), and paying € 30 /tCO₂ without any free allowances would represent 25% of GVA. In reality, the sector has not experienced net costs over the period 2005-09.

Figure 2.32: Allowances and verified emissions under EU ETS, 2005-2009



Source: CITL.

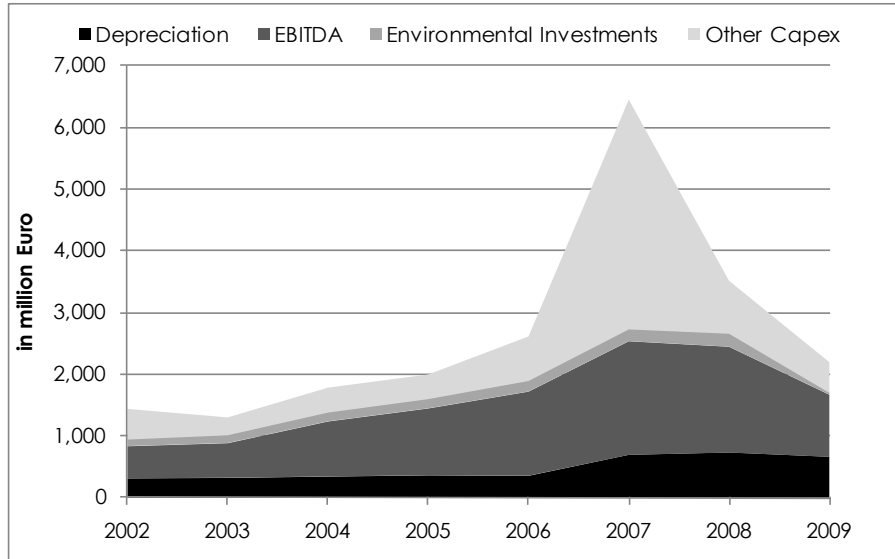
Figure 2.33: Variation in key indicators, % change compared to the average 2002-2009



Source: voestalpine (2011a), voestalpine (2011b).

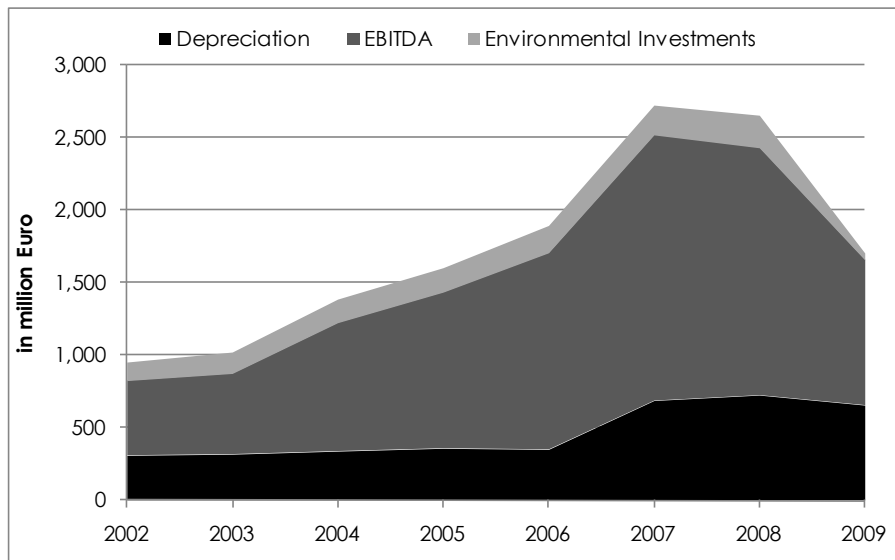


Figure 2.34: Investment as a share of Gross Value Added (GVA), 2002-2009



Source: voestalpine (2011a), voestalpine (2011b).

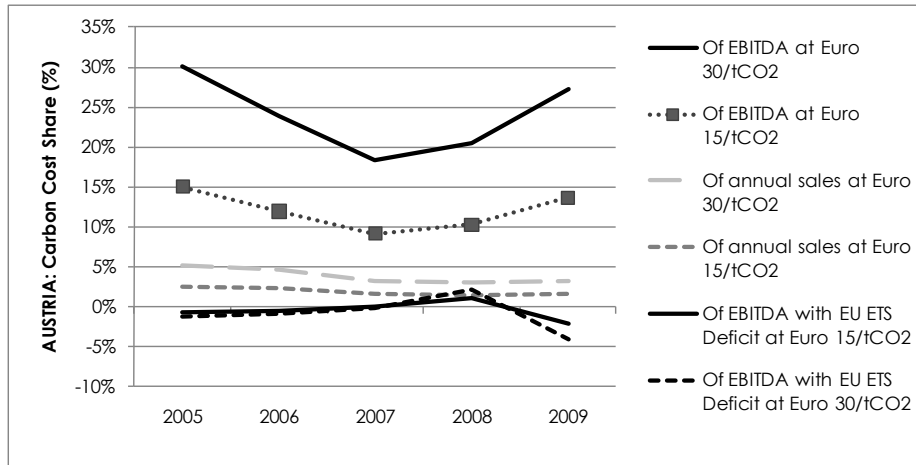
Figure 2.35: Investment and R&D expenditure, 2002-2009



Source: voestalpine (2011a), voestalpine (2011b).



Figure 2.36: Carbon cost compared to sector annual sales and EBITDA, 2005-2009



Source: voestalpine (2011a), voestalpine (2011b), CITL.



2.4.3 Trade

2.4.3.1 Austrian trade patterns

Austria is the 19th largest steel exporter in the world (see Table 2.4 and Figure 2.37); during the recession in 2009, it still exported 5.4 Mt of crude steel (semi-finished and finished steel products). That year, it imported 3 Mt of crude steel, making it the 10th largest net exporter with 2.4 Mt (the EU is included as a whole in this list, in fourth place). Up until the financial crisis, Austria's exports had been rising, reaching a peak of 7.6 Mt in 2008. Between 2003 and 2008, the difference between steel exports and imports has been consistently higher than 2.5 Mt. After a decrease in net exports to 2.3 Mt in 2009, Austria recuperated and exported 3.06 Mt more than it imported in 2010. This was its highest net export value of the last decade. It seems that this can be attributed to a faster recovery in production (represented through a steeper recovery rate) than consumption.

2.4.3.2 Austrian trade partners

Most of Austria's steel trade is intra-EU (see Figures 2.37 and 2.38). With regards to steel imports, consistently more than 90% has come from within the European Union in the last decade. The major extra-EU exporters of steel to Austria are Switzerland, Belarus and Serbia. Despite being globally traded, Austrian steel imports thus mainly come from within the region. Imports from China rose from 5,000 tonnes in 2006 to 26,000 and 27,000 tonnes in 2007 and 2008 respectively. In 2009 and 2010, China's exports to Austria dwindled to 4,000 tonnes per year. A similar trend can be observed for Brazil (from 31,000 tonnes in 2008 to 600 tonnes in 2009) and Russia (31,000 tonnes in 2008 to 8,000 tonnes in 2009). Even before the crisis, these numbers are close to negligible when compared to overall Austrian imports.

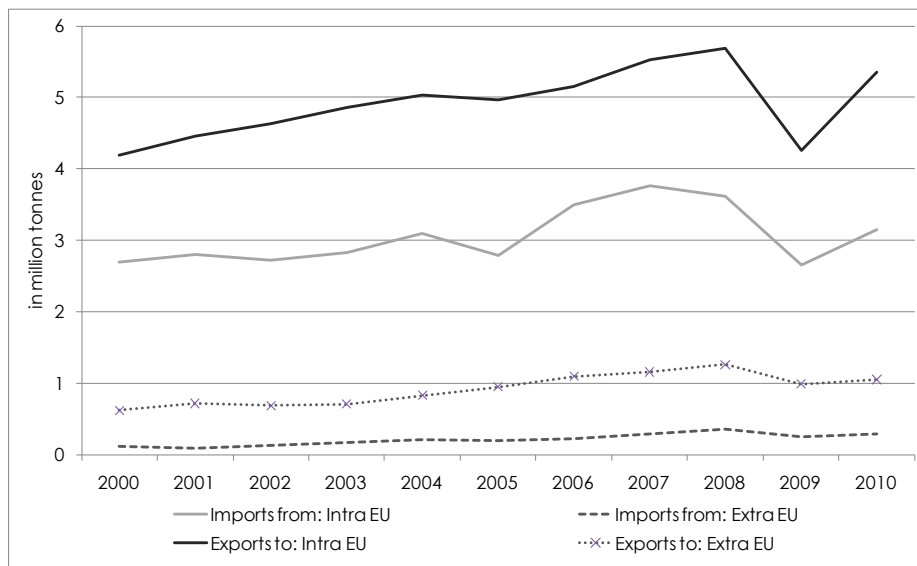
Austria exports steel mainly to EU countries. More than 80% of exports were intra-EU. Main extra-EU importers can be found within the region (Switzerland, Turkey and Croatia) as well as more remote. The United States is the main importer of Austrian steel outside the EU. Also Russia, India and Saudi-Arabia, and to a lesser extent Brazil, South Africa and China are important extra-EU steel export destinations for Austria.

Table 2.6: Top exporters, importers and net exporters of crude steel, 2009

Rank	Total Exports	mmt	Rank	Total Imports	mmt	Rank	Net Exports (exports - imports)	mmt
1	Japan	33.3	1	China	22.4	1	Japan	30.3
2	European Union (27) ⁽¹⁾	31.6	2	European Union (27) ⁽¹⁾	20.8	2	Russia	24.0
3	Russia	27.6	3	South Korea	20.3	3	Ukraine	23.0
4	Ukraine	24.0	4	Germany ⁽²⁾	17.7	4	European Union (27) ⁽¹⁾	10.8
5	China	24.0	5	United States	15.3	5	Turkey	7.2
6	Germany ⁽²⁾	20.8	6	Italy ⁽²⁾	12.6	6	Brazil	6.3
7	South Korea	20.2	7	France ⁽²⁾	11.4	7	Belgium-Luxembourg ⁽²⁾	4.6
8	Turkey	17.4	8	Belgium-Luxembourg ⁽²⁾	10.8	8	Taiwan, China	3.4
9	Belgium-Luxembourg ⁽²⁾	15.4	9	Turkey	10.2	9	Germany ⁽²⁾	3.1
10	Italy ⁽²⁾	12.7	10	Viet Nam	9.1	10	Austria ⁽²⁾	2.4
11	France ⁽²⁾	12.0	11	Thailand	9.0	11	South Africa	2.2
12	Taiwan, China	10.0	12	India	8.3	12	Slovakia ⁽²⁾	2.0
13	United States	9.2	13	Iran	8.0	13	United Kingdom ⁽²⁾	1.9
14	Brazil	8.6	14	Spain ⁽²⁾	7.0	14	China	1.6
15	Spain ⁽²⁾	8.2	15	Taiwan, China	6.5	15	Netherlands ⁽²⁾	1.4
16	Netherlands ⁽²⁾	7.7	16	Netherlands ⁽²⁾	6.3			
17	United Kingdom ⁽²⁾	6.3	17	Canada	6.2			
18	India	5.6	18	United Arab Emirates	5.8			
19	Austria ⁽²⁾	5.4	19	Indonesia	5.7			
20	Canada	4.9	20	Egypt	5.5			

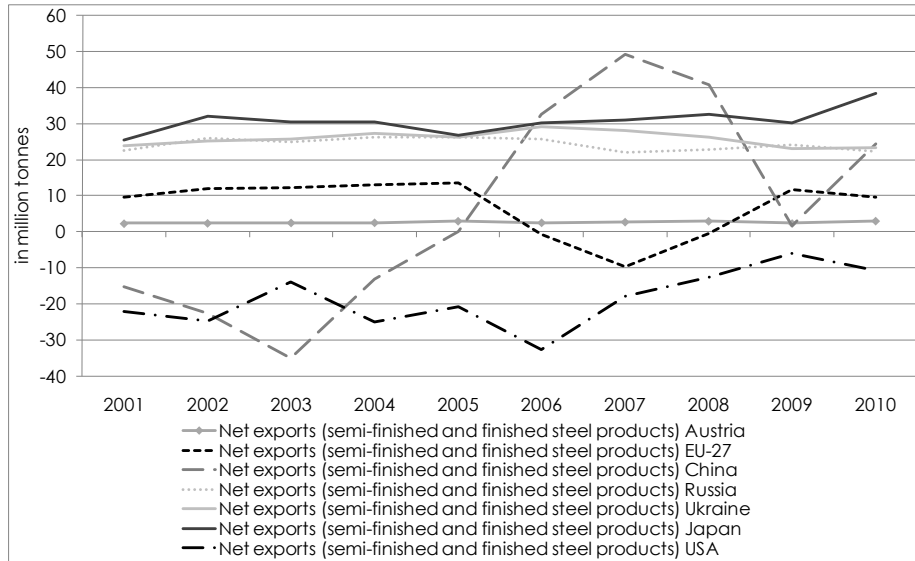
Source: World Steel Association (2011a).

Figure 2.37: Austrian total steel trade partners (intra v. extra EU), 2000-2010



Source: Eurostat – Comext.

Figure 2.38: Net exports of semi-finished and finished steel productions, 2001-2010



Source: World Steel Association (2011a, 2011b).

2.4.4 Analysis

The first two questions which this report seeks to answer are:

1. Has the EU ETS already had an impact on competitiveness and leakage?
2. Would we expect larger impacts in the future?

Perhaps the key trend over the past decade in the industry worldwide has been the growth of Chinese demand and production. With production increasing more strongly than demand, China has recently become a net exporter and, given the sheer scale of the industry in China (around half of all world production); these exports can have significant impacts on smaller markets. Here, smaller markets can even include the EU, whose share of world production and consumption continues to decline, and is now less than 15%.

Austrian production and demand have held up well, and Austria remains an important steel producer. voestalpine has consolidated production, and has made a major investment in capacity and upgrades of its Linz plant. It has invested in environmental management and has reduced its emissions per output. In Linz the most environmentally advanced waste gas treatment system available for sintering plants was opened in 2007.¹⁰ Also a plastic waste system to substitute fossil fuels (heavy oil and coke) was opened that year. In 2004, a new research centre was opened, also in Linz. It is one of the most research-intensive groups in the EU. In 2008,

¹⁰ See Box 2.1 for a brief description of the evolution of voestalpine in the last decade.



it ranked 10th worldwide among steel producers. voestalpine has received numerous environment and safety awards.

voestalpine invested more than € 3 billion in the modernization and development of the Linz site (voestalpine, 2011b). In 2006/2007, environmental protection investments reached € 34 million; operating costs for environmental protection systems totalled € 155 million. voestalpine does not assess these costs as harming their competitiveness. That year, Linz was producing at full capacity within its physical constraints. The CEO reported that plans at the Black Sea simply followed demand. At the time, plans for a new facility at the Black Sea included the same stringent environmental standards as the ones used at Linz. The major concern is – as mentioned – the emissions trading system, of which voestalpine believes that the system design for the third trading period (2013-2020) could harm the company in the future (voestalpine, 2008). How much the company has factored in free allowances that would remain under benchmarking in Phase 3 is not clear.



Box 2.1: Evolution of voestalpine during the last decade (voestalpine, 2011a)

Pre-2000: Privatization of Voest-Alpine Stahl AG began in 1995. Böhler-Uddeholm AG was also listed that same year. In 1998, Voest-Alpine Krems Group acquired the British company METSEC plc. In 2001, it acquired the Dutch automotive industry supplier Polynorm. The important railway division acquired the German TSTC.

During the second half of the 1990s, investments lead to modernization, expansion and growth in output.

2001: The employee shareholder scheme was implemented. Employees owned 4% of the shares. The corporate structured was altered with a breakdown into the divisions Steel, motion, Railway Systems and Profilform. The name of the Group was changed to voestalpine AG.

2002: voestalpine starts a € 2 billion investment programme ("Linz 2010") at the Linz site. This is the biggest investment program within Austrian industry at the time. It started its last phase ahead of schedule in 2007. The results were increased infrastructure, production and employment.

The 45.3% share of VAE, held by Vossloh AG, was acquired. The remaining 9.4% of free-float shares were acquired as well. Hence, in 2003, voestalpine Bahnsysteme GmbH became the sole owner of the world's leading manufacturer of turnouts.

2003: In September voestalpine was fully privatized. A convertible bond for the remaining 15% of government-owned shares was issued.

2005: These bonds were converted in 2005, making the company fall under complete private ownership.

2006: Technological development at sites increases efficiency.

2007: voestalpine Grobblech GmbH - a company of the steel division - received the largest order in its history: 200,000 tonnes of quality heavy plates. These were acquired to serve the North Stream gas pipeline project in the Baltic Sea.

voestalpine acquires a majority of the shares in Böhler-Uddeholm AG. This was integrated as the Special Steel Division.

voestalpine enters the last stage of its Linz 2010 programme, earlier than expected.

2008: voestalpine acquires the remaining shares of Böhler-Uddeholm AG. voestalpine's revenues peak to € 11.7 billion, making it the best business year in its history so far.

Up until 2008, voestalpine keeps on establishing the company in multiple parts of the world. For example in 2004, the Group made some acquisitions in India, thereby assuring it keeps its leading global production of switches and turnout systems in one of the world's fastest growing rail markets. By the end of 2010, it had sales companies in more than 60 countries on all continents.

2008-2010:The financial crisis hit VoestAlpine as well. Demand started falling at the end of 2008. A cost cutting and efficiency improvement programme were implemented. In 2010/2011, VoestAlpine started recovering from the most serious downfall in decades in 2009. Employees currently hold 13.3% of VoestAlpine's shares. The Group has 40,000



Has the EU ETS had an impact on steel? There is little evidence that it has changed trends at the global level. But it is appropriate to look at the EU in more detail. The EU, in common with most other regions

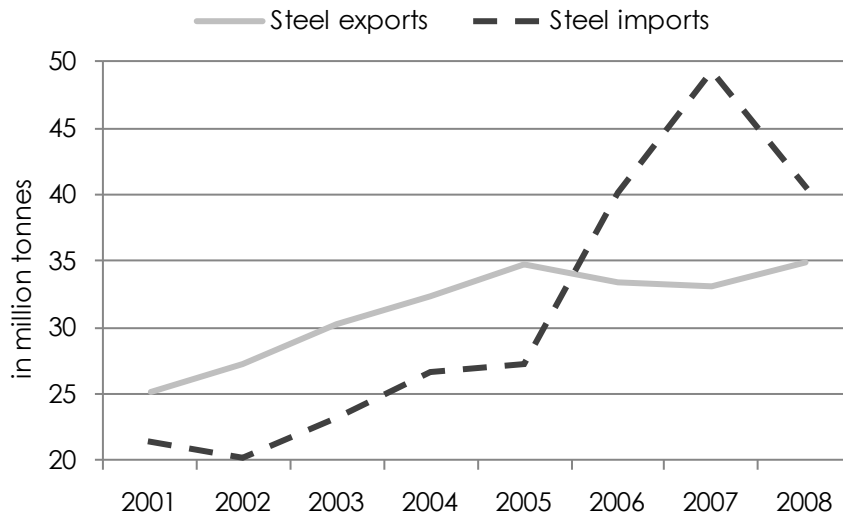
- was unable to increase its net exports in the boom years 2006-2008 (see Figure 2.39). Exports were steady in the period 2004-08, whilst imports increased;
- saw 2006-08 demand boom met largely by China, which moved to being a significant exporter during this period (see Figure 2.40).

Austria's trade of steel – both imports and exports – remains very much intra-EU.

EU ETS impacts are almost certainly minor compared to other market trends. For example, the price of iron ore (raw material for steelmaking) is set by a few industries, such as BHP Billiton and Rio Tinto PLC. In the last decade iron ore prices have risen significantly, due to a steep increase in demand from China and other emerging economies. Iron ore companies have been merging at the same time, leaving only a few players in the market. voestalpine and Eurofer, the European-wide steel producers lobby, have indicated they would contest future mergers (Dalton, 2011).

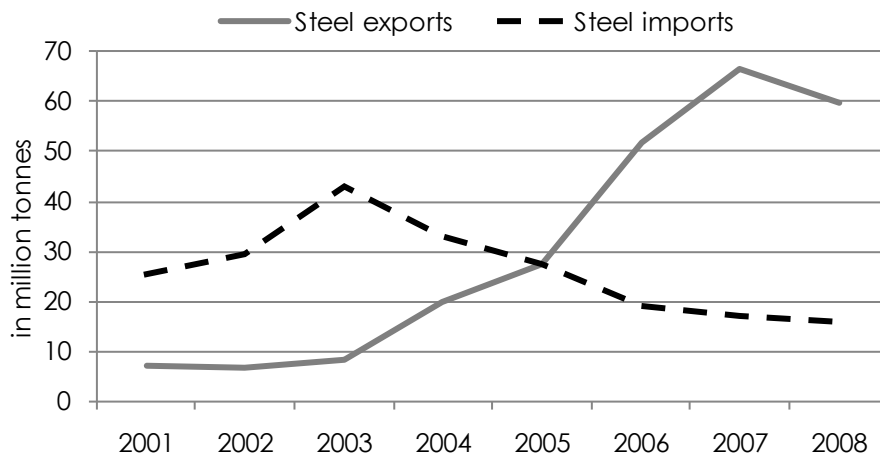
Similarly to the analysis of the cement sector presented in Section 2.3.4, trends may alter when the iron and steel sector starts paying net costs for its EU ETS allowances, and the first impact may be felt in terms of reduced or delayed investments in new plants and in plant refurbishment. The EU's near neighbours, but also other world producers may be in a position to exploit their competitive advantage: the transport costs of steel do not act as the same constraint on trade as do those for cement.

Figure 2.39: EU steel imports and exports, 2001-2008



Source: OECD Steel Committee statistics, personal communication.

Figure 2.40: Chinese steel imports and exports, 2001-2008



Source: OECD Steel Committee statistics, personal communication.



3 How could competitiveness and leakage impacts be affected by sectoral approaches, agreements and measures (SAAMs) in a multi-country framework?

Sectoral approaches have been much discussed but details on their possible forms and impacts on competitiveness and leakage remain largely unavailable.

This section reviews the discussions around multi-country sectoral approaches – and the agreements and measures which may avoid the negative connotations some associate with the term 'sectoral approaches'. Using a wide definition of possible options, it identifies three main classes which could be implemented, discussing their possible forms and the impacts they may have on competitiveness and leakage.

Sectoral approaches, agreements and measures (SAAMs) are not the only options available to deal with competitiveness and leakage: Section 3.5 summarises the other main options which could be employed.

It is notable that SAAMs may provide leverage for countries outside the EU to improve their emissions performance, notably as a bridge in a period leading up to a country's, or one or more sectors' within in, accession to the EU.



3.1 Options considered

3.1.1 Status of discussions on Sectoral Approaches (Agreements and Measures)

SAAMs mean different things to different people: a brief history is presented in Box 3.1.

Box 3.1: A Brief History of SAAMs

SAAMs have been discussed for over a decade within the UNFCCC. The rationale given by proponents to support them has evolved. Prior to COP-15 in Copenhagen (December 2009), the idea of a sector “carve-out” (as promoted by Japan amongst others), which would have meant emissions being allocated to worldwide sectors rather than countries, was much discussed, particularly during the early years of the UNFCCC. The concept did not gain widespread support amongst countries¹¹.

SAAMs were also looked at as a response to competitiveness and leakage. To have a major impact, this would require international trading of allowances. Again, there has been little country support for such trading.

Sectoral Crediting and/or NAMAs now considered a more practical approach. Post-Copenhagen saw “Co-operative sectoral approaches” introduced into the UNFCCC process. Such sectoral approaches remain undefined, and could be very wide in scope. The NAMA process in particular, and progress of the UNFCCC negotiations more generally, point to the expectation of bottom-up and fragmented domestic policies and measures rather than any top-down, internationally agreed solution. Developed countries may be able to agree to common actions within their block, which could give a basis for trading, but even this is nothing more than a theoretical consideration at the present time.

“Sectoral Approaches discussions always break down at the point where money is needed” (Climate Strategies Workshop in Tokyo, October 2009)

One idea remains pervasive: that a specific industrial sector would be someone carved out from the international climate change agreement, and would operate freely across international borders. Trading of emission allowances between countries is generally part of such a regime, either explicitly or implicitly. Such trading would be needed if a sectoral approach were to

¹¹ But note also that the EU burden-sharing work can be looked as a sectoral approach – the EU used this method to define caps for the system and countries within it. Japan looks at SAs in this way – as a method for allocating between sectors and, in their understanding, between countries. The method remains technical in nature and foundation rather than being an economic solution (Spencer et al., 2011)



significantly reduce competitiveness and leakage concerns. SAAMs of this type are looking increasingly unlikely to be implemented. International agreement on carbon trading remains elusive, and national issues still predominate within energy-intensive industry discussions. Box 3.2 summarises recent work on SAAMs (Wooders, 2011).

Box 3.2: Exploding the Myths of Sectoral Approaches: Key Messages

- 1 Renaming of 'SA' (Sectoral Approaches - pejorative term) to 'SAAM' (Sectoral Approaches, Agreements and Measures) is advised.
- 2 There is little or no enthusiasm for an internationally agreed common solution. National schemes could be recognised under the UNFCCC as NAMAs.
- 3 There is no strong momentum behind SAAMs. If they are to be implemented, they need further defining, selling and promoting, firstly at the domestic level and then at the international one.
- 4 Whilst opportunities for SAAMs are strong in the energy-intensive sectors with internationally-traded products, there are also good opportunities for SAAMs in other sectors, including those that have little or no trade of products.
- 5 There are both political and practical reasons why SAAMs and Emission Trading Schemes/Carbon Taxes should co-exist.
- 6 SAAMs would be unlikely to have more than a marginal impact on competitiveness; this marginal impact could even be negative.
- 7 There are good reasons for holding more detailed discussions at the sector-specific level, and setting up a specialised forum -potentially within the UNFCCC – and providing it with technical expertise.
- 8 Two options for SAAMs could be taken forward in China: Sectoral crediting (SCM) on the basis of emissions intensities -sector no-lose target (SNLT); and Technology Crediting, both ex-post.
- 9 India wishes to strongly assert its sovereignty over climate change policies and measures. The Indian "PAT" scheme can be considered as a domestic SA.
- 10 Ensuring that breakthrough technologies and/or CCS are developed and implemented as quickly as possible would provide a good basis for a Japanese SAAM, with a fully-resourced plan of RDD&D a good candidate.



3.1.1 Types of Sectoral Approaches, Agreements and Measures (SAAMs) considered

For this project, we keep the definition as broad as possible. One major conclusion is that SAAMs could take many forms, and are not restricted to schemes involving the trading of emission allowances, or restricted to the UNFCCC process. Three main types of SAAMs can be distinguished in the literature and the discussions:

1. Transnational approaches: Industry-led approaches aiming to engage a sector internationally
2. Top-down (UNFCCC): (reformed) CDM, Sectoral Crediting Mechanism, etc.
3. Bottom up (country commitments): NAMAs, with no-lose targets, etc.

Politically, the key conclusion from a Climate Strategy study (Wooders, 2011) was that any SAAM would start with a *national* level approach for a sector. Internationalising the approach would still be advantageous, but there seems little prospect that top-down agreements would be implemented. Rather, we could see a scheme in a country (or, in the case of the EU, a region) extended into other countries. The EU ETS provides a model:

- Norwegian accession to the scheme as a whole was voluntary, based on Norway agreeing to the terms of the approach already agreed by the EU's members;
- The inclusion of aviation into the EU ETS is mandatory to all external countries whose flights land in the EU.

It is this model – an approach being agreeable to the EU and then the possibility of this including or being extended to neighbouring countries, under a voluntary or mandatory basis – which the report now focuses on. We look at three neighbouring countries of key interest to the EU's trade in energy-intensive products: Russia, Turkey and Ukraine. We note that, even though there are differences in attitudes and policy aims between the EU-15 and the New Member States (Spencer et al., 2011), the New Member States (NMS) are much more closely aligned on energy and industrial policy issues with the EU-15 than with the three 'near neighbour' countries. That said, the NMS in Eastern Europe are more heavily dependent on energy supplies from Russia than are the EU-15 (Spencer et al., 2011).

Based on a full review of the literature, we consider the following SAAM types to be candidates for further analysis:

- Technological agreements;
- Standards and labels, potentially linked to technological agreements and also potentially driven by sustainable public procurement (SPP) schemes;
- JI and Other Offsets into the EU ETS.



How might these SAAMs lead to a reduction in competitiveness and leakage impacts, notably for Austria? Following analysis of the potential forms that SAAMs could take, it is this question that the paper now turns to.

3.2 Technological Agreements

3.2.1 *Potential forms of agreements*

Before looking at the potential for technological agreements, it is necessary to assess whether the technologies used in the three industries in Austria considered are different to those used in other countries and regions. European technology does tend to be more advanced on average than in many other countries and regions, but this hides a range of plants: for example in the Indian and Chinese iron and steel and cement sectors, there is a combination of the most modern plants, mixed with some small, old and very inefficient plants sometimes using outmoded or alternative technology, and then a range of plants in between (Cook, 2009; Wooders, 2009). Taking average emissions across these plants does not tell the full story. For trade, it is the most modern plant which tends to produce export quality product, with smaller, obsolete plants producing for local markets and applications, see for example Wooders (2009).

The aims of technology agreements would be to:

- increase the deployment of the better currently-available technologies; and/or
- to perform research, development, demonstration and dissemination (RDD&D) activities aimed at new technologies and techniques.

Within energy-intensive sectors there have been, and are currently, a number of technology initiatives and agreements. A major multinational effort was made by the Asia Pacific Partnership (APP) of countries, whose membership includes China, India, Japan and the US and whose production is the majority of the world's production of both cement and iron and steel. The Asia-Pacific Partnership on Clean Development and Climate (APP) has recently been wound down and replaced by the Global Superior Energy Performance Partnership (GSEP). A full review of the programmes can be seen in (Wooders and Beaton, 2011). The programmes adopted a pragmatic approach and the major achievements were a handbook of good practice on technology, the exchange of information and the increase of trust to allow the countries to more easily invest in each other's economies. Specific targets on technology implementation or emissions reductions were not part of any agreements, and enforcement was voluntary.

Within the EU, policy-makers have focused on the EU ETS rather than on technology agreements. A further constraint on the EU instigating any technology agreement scheme is that the EU represents a relatively small, and declining, share of world production, with the vast majority of investment in new capacity happening outside the EU.



3.2.1.1 Increasing the deployment of the better currently-available technologies

Looking at the first potential form of technology agreement, a scheme could focus on support and/or regulations that would result in the increased closure rate of small, obsolete plant in non-EU countries would improve the efficiency of existing plant or would ensure that new plant is built with the best available technology (Wooders, 2009). One avenue for such schemes is the UNFCCC, but many years of discussions and considerations of sectoral approaches have not led to any detailed discussions or the proposal of any detailed schemes (Wooders, 2011). Debates around technology continue, and the Clean Development Mechanism (CDM) has helped to finance the adoption of energy efficiency measures at many industrial plants in developing countries. In general, these have focused on recovery waste heat and gases, adopting technologies and techniques that are standard practice in new plant and in most developed countries.

Agreements would thus be most likely to come from outside the UNFCCC. There are a wide number of actors aiming to promote and finance energy efficiency improvements, from the policy research community to those providing capital such as the European Bank for Reconstruction and Development (EBRD) and the development banks. Energy-intensive industries have consolidated significantly over the past decade, and there are now many examples of foreign ownership, cross-holdings, etc. A technology agreement would therefore need to come from a group of countries representing a large share of world production. Forums such as the OECD Steel Committee, the World Steel Association and the WBCSD's Cement Sustainability Initiative appear the best candidates, since they involve the industry and/or governments in expert discussion. A technology agreement could be mooted within these forums, but such a process would take a significant period of time and would then need to garner government support. A more limited approach, taking in just key European neighbours such as Russia, Ukraine and Turkey, would be less ambitious but it is not the case that these neighbour countries are looking only to Europe – markets for commodities are now truly global and China is a country whose presence it is not possible to ignore.

It is too early to specify what such an agreement may look like, but it would ideally contain three elements: closing down obsolete, inefficient plants; improving the efficiency of existing plants; and setting minimum standards for new plants. Such agreements would be unlikely to have much impact on competitiveness and leakage (see Section 3.2.2). For Austria, the most important result might come from using technology improvement as a precondition to EU Accession for the neighbouring countries, noting that these countries would need to join the EU ETS on their Accession.



3.2.1.2 RDD&D aimed at new technologies and techniques

The development and implementation of new technologies and/or CCS is essential if energy-intensive sectors will continue to play a role within a low carbon economy without radically reducing their current levels of production. Schemes such as ULCOS in Europe, and COURSE 50 in Japan, have seen companies collaborate at European and Japanese levels respectively – for further details see Wooders and Beaton (2011). The study by Wooders and Beaton demonstrates that the level of financial resources required to finance research, development and demonstration schemes in the Japanese steel sector is small (typically less than 1% of the resources available to the sector measured in terms of its turnover, value added or the tax it pays). We would expect the same conclusion for other sectors and other countries and regions. It is the deployment phase – for example the requirement that carbon capture and storage (CCS) was mandatory for all new industrial plants – where the costs to industries in a country with the requirement would be potentially much higher than in those without.

Given that the markets and ownership structures of energy-intensive industries are now so globalised, national RDD&D efforts may be becoming outmoded. While the current method for industrial research and development remains largely in the hands of companies and single organisations, the voice of industry is almost unanimous in asking for government assistance to finance demonstration projects for new technologies and CCS. Similar requests can be expected if governments set policies asking for stringent reductions or the implementation of new technologies.

The cooperation that more international RDD&D schemes would generate would be in the interests of European and Austrian organisations. Common technologies (and hence some of the costs of production) and contributions to RDD&D would remove some of the potential cost differential between European and non-European producers. It may also encourage a more cooperative attitude towards international discussions of policies which would significantly reduce carbon price differentials between countries which have carbon pricing and those that do not. Incorporating the EU's near-neighbour countries into joint RDD&D programmes for new technologies and techniques would appear to be a very positive step.

3.2.2 Potential impacts on competitiveness and leakage

Technology agreements are no market-based instruments and thus do not attack the key driver of competitiveness and leakage: that some countries are pricing carbon and others are not.



Going even further, the experience of the CDM has been criticised by certain countries¹² as giving developing countries not only better technology but also paying them for it.

Equalising the technologies used between countries through technology agreements may cause some equalisation of costs, but this is a second order effect when compared to differential carbon pricing.

The most promising area appears to be extending European consortia working on RDD&D of new technologies and techniques to the EU's near neighbours, and potentially to other countries too. The increased trust this would lead to may allow policies which would significantly reduce competitiveness and leakage impacts – such as border carbon adjustment (BCA) – an easier political passage towards implementation.

3.3 Standards and labels

3.3.1 Potential forms of agreements

Standards and labels are increasingly being used by both governments ('public' standards and labels) and 'private' interests (for example retailers such as Tesco, Carrefour and WalMart, or initiatives such as the Forestry Stewardship Council). The distinction is an important one: The WTO does not at present rule on private standards and labels, whereas it does rule on public ones (those with government involvement of any kind). Often within these rulings, such standards and labels are found to be trade-distorting, under the WTO's agreement on TBT¹³. Vangelis Vitalis, then of the OECD Round Table on Sustainable Development, entitled his 2002 paper for a Round Table: "*Private Voluntary Eco-labels: Trade Distorting, Discriminatory and Environmentally Disappointing*" (Vitalis, 2002). Vitalis now works for the New Zealand government, whose views on labelling are shown in Box 3.3.

¹² For example Japan, see (Wooders & Beaton, 2011), notably the bilateral scheme that Japan is now implementing as an alternative to the CDM.

¹³ Technical Barriers to Trade; for an introduction to the agreement see:
http://www.wto.org/english/tratop_e/tbt_e/tbtagr_e.htm



Box 3.3. New Zealand government views on labelling¹⁴

Labelling for Environmental Purposes

Environmental labelling schemes are a potentially effective method of informing consumers about environmentally friendly products; however they can also be misused for the protection of domestic markets. The increasing number of environmental labelling schemes poses problems for developing countries in particular, which may be at a disadvantage due to a lack of full participation in the processes for setting environmental standards and regulations.

New Zealand has an interest in ensuring that any work on this issue balances legitimate environmental objectives on the one hand, and principles of transparency, non-discrimination and equal participation in standards-setting and access to labelling schemes on the other.

Rise of Private Labelling Standards

Private labelling schemes and private standards have been around for many years. The first private eco-label, the German Blue Angel programme, was established in 1977. Another well-known private labelling standard, Global G.A.P, was launched in 1997 (by its predecessor EUREP-GAP) that certifies agricultural products around the globe. Since then other labelling schemes and private standards have evolved to address issues such as fair trade, sustainable marine and forestry harvesting, and animal welfare. More recently private labelling schemes have been established to provide information on the carbon or GHG footprint of products and services. The proliferation of private labelling schemes and standards based on environmental, social and animal welfare standards has occurred predominantly in European and North American markets, however many standards now also apply in Asia markets.

One of the reasons given in Vitalis' paper and other parts of the literature is that it can be very difficult in practice to capture benefits of different production process and methods (PPMs in the WTO jargon) within standards and labels: simple measurement, with food miles perhaps the most-often used example, can lead to perverse incentives and may not fully reward or incentivise good or improving performers.

Whatever the efficacy of such standards and labels, their use is increasing (again see Box 3.3). Thus far, this use has not been extended to commodities such as cement and steel in their raw forms: there are clearly common standards and labels for cars, buildings and many other uses of the commodities. Agricultural products have been a focus for many initiatives. Paper and pulp has also received attention, with a wide variety of standards and labels relating to inputs to the

¹⁴ <http://www.mfat.govt.nz/Trade-and-Economic-Relations/NZ-and-the-WTO/Trade-Issues/0-environment.php#LabellingEnvironmental>



process (pulp), production (mill) and to the product (see Box 3.4 for an example of the publicity material of an Australian mill).

Box 3.4: Standards used by an Australian paper mill¹⁵

Environmental Accreditation

A paper mill that has internationally recognised environmental standards and an ongoing commitment to the conservation of natural resources. The paper mill has established an environmental management system with standards in excess of legal requirements that operate in tandem with their product quality controls.

Responsible Forestry Practices

Fibre used in the production of paper is sourced from pulp suppliers who practice responsible forestry techniques and use pulp from managed plantation Sustainable forests.

Acid Free

No free acids are present due to care taken in the manufacture of the pulp to eliminate any active acid.

Only uses alkaline additives. Acid Free papers are used for wrapping or storing jewellery, china or photographs.

Elemental Chlorine Free (ECF)

No chlorine gases are used in the bleaching process .

The ECF process uses chlorine dioxide - when the bleaching process is complete, the chlorine atom leaves the process as chloride or salt.

ISO 9706 Long Life

Papers displaying this symbol are guaranteed by international standards to last up to 100 years.

So what sort of standards and labels might we see resulting for energy-intensive industries? There appear to be two possible classes:

- labels, imparting information which consumers may choose to act upon;
- mandatory standards, which have the potential to exclude certain products from accessing markets.

3.3.1.1 Labels

Whilst we could conceive of many possible labels, the one which would have most impact on competitiveness and leakage impacts resulting from the EU ETS would be to label goods and products as having been “made under the EU ETS” or some similar formulation. Coupled with

¹⁵ http://newcastlepaper.com.au/page/paper_and_the_environment.html



information campaigns explaining why the EU ETS is important, its potential impacts and the potential for competitiveness and leakage, such labels could have the potential to have a significant impact.

There are perhaps three major challenges. The first is that consumers would need to act upon the labels. When looking at the products of energy-intensive industry, the final customer may be a large wholesaler, major construction company or a large retailer. There are likely to be relatively few, powerful and sophisticated customers rather than the general public or a large number of small consumers. Corporate sustainability practices and government sustainable procurement schemes may offer the potential for major uptake of labelling. The second challenge is legal – would such labels be considered a barrier to free trade, under the WTO or elsewhere? The level of government involvement here appears to be key – if the label is purely private, then there do not seem to be any realistic grounds to challenge it. The third challenge concerns practicalities around implementation: we would need to be able to identify the commodity (and hence its carbon footprint) as having originated fully within the EU or fully outside it. The granting of free allowances under the EU ETS clearly complicates the picture, as it dilutes (or may even fully offset) the implied cost difference that the label is referring to. Conversely, the impact of such labels would become more if European producers were subjected to the requirement to implement CCS and/or if the price of allowances under the EU ETS were to rise significantly.

3.3.1.2 Mandatory standards

Representatives of the domestic industry in the US proposed that carbon intensity standards (CIS) on basic manufactured products should be established as an alternative to the cap-and-trade regimes included in Lieberman-Warner and Waxman-Markey (Verrill, Carbon Intensity Standards, forthcoming). CIS would be levied on a carbon emissions per unit production basis, and were recently adopted in California as a fuel intensity standard (Low Carbon Fuel Standard, LCFS). Under the proposal, the standard would be applied equally to both domestic and imported products, with products above the standard excluded from the market. Exceptions would be available on a national treatment basis. Benchmarking the standards would present a challenge, but could follow the LCFS method of using an expert group. California's LCFS is complex and, "was developed after an exhaustive study" requiring "detailed study, analysis, and regulatory design".

Verrill (Carbon Intensity Standards, forthcoming) concludes that, "there are very good arguments that carbon intensity regulation would be consistent with the WTO Technical Barriers to Trade Agreement (TBT)", and notes further that, "if a measure is consistent with the TBT, both in adoption and application, then it is WTO consistent even if it is arguably inconsistent with GATT



provisions". Clearly a CIS would need to fit with the criteria governing the application of the TBT (i.e. that it is a technical regulation), but the author argues that this is certainly a possibility. A key consideration is that TBT allows PPMs (Process and Production Methods) explicitly within Annex 1.1, i.e. the method of production can be used as a distinguishing factor even if the final products are "like". The TBT process would require that any international standards were considered, but there are no such standards governing the production of commodities.

We could also conceive of standards which would require certain sets of technology to have been fitted or other criteria. Each has the same key characteristic: they would exclude certain products from a market. Another key characteristic they share is that they would be very complex to monitor – see for example the discussion on the California LCFS above and Wooders et al. (2009). Given the large potential impact on trade patterns, it is very difficult to see that they would not be thoroughly tested by political and legal actions.

3.3.2 *Potential impacts on competitiveness and leakage*

Standards which exclude products from markets could have a major impact on competitiveness and leakage. Labels would create the same patterns, but their informative nature would be expected to result in lower impacts, potentially very significantly so.

The scale of impact would however depend on both incentives and changes in practices. If a certain country placed a restriction on products with, for example, a carbon intensity over a certain value, then the exporting country would be incentivised to redirect its lower intensity products to this market and use others at home or to export to other markets. This may not result in any environmental gains from the policy. The environmental efficacy of the policy would also be hindered by the use of a standard or label not allowing rebates as a way of levelling the field for exporters from the EU.

Encouraging the EU's near neighbours to adopt equivalent labels and standards would be beneficial for EU producers in general and Austrian ones in particular, but it is difficult to see why they would wish to do so unless they were able to see Accession to the EU or another important benefit. Another lever could be an exemption for imports from near neighbours if they agreed to take other actions to reduce their emissions or reduce their carbon price differential in some other way.

3.4 **JI and other offsets into the EU ETS**

3.4.1 *Potential forms of agreements*

The first option is that SAAMs will be developed within the UNFCCC, resulting in a sectoral crediting mechanism (SCM), potentially through the NAMAs (nationally appropriate mitigation



actions) under which developing countries can register their domestic policies and measures, under the Copenhagen Accord. A very wide literature has been developed around SAAMs of this type, for example the “no lose” sectoral targets first proposed by CCAP. The Carbon Trust recommended “carbon-cost reflective global sectoral approaches” in 2010. The analysis of these options is not repeated within this report: what must be borne in mind is the lack of success that ‘top-down’ international approaches have had in defining and detailing schemes despite a large period for discussions and much academic interest.

Joint Implementation is already available under the Kyoto Protocol, and allows credits (ERUs) to be transferred from projects undertaken in energy-intensive industries in Russia, Ukraine and other Annex I countries into the EU. Other non-EU countries can similarly benefit from the CDM.

As discussed earlier in this report, Japan is a country which no longer believes that the CDM is meeting its aims (Wooders and Beaton, 2011). Japan questions the additionality of the scheme but also asks why Japan is paying to make its competitors more competitive, making payments to the financial sector and other intermediaries and also taking money out of its own energy-intensive sectors which could have been used to make investments, including in new technology. Japan has set up its own bilateral scheme¹⁶, with modalities including setting benchmarks and MRV processes. One of Japan’s reasons is to support its own industries in maintaining their position as technology leaders, including as suppliers to other countries in the world market.

The EU could similarly institute a bilateral scheme or equivalent (see Box 3.5 for the key mechanism). The EU ETS allows linking to other carbon regimes judged similarly stringent. The EU has also chosen to impose constraints on the provenance (geographic and by type of project) of allowances (CERs) generated under the CDM. An EU bilateral scheme could be focused on near neighbours, and could be focused on energy-intensive sectors. It is of course worth noting that ideas of this sort have not been discussed in detail in the EU and that they fly somewhat in the face of more normal EU thinking. Implementation would almost certainly be many years away.

¹⁶ Official information on the bilateral scheme and other market mechanisms is provided by the Japanese Ministry of Environment (MOEJ) at: <http://www.mmechanisms.org/e/index.html> (last downloaded 24 September 2011).



Box 3.5: Possibility of alternative offsets into the EU ETS (Clause 11a, paragraphs 5-6)

5. To the extent that the levels of CER and ERU use, allowed to operators or aircraft operators by Member States for the period from 2008 to 2012, have not been used up or an entitlement to use credits is granted under paragraph 8 and in the event that the negotiations on an international agreement on climate change are not concluded by 31 December 2009, credits from projects or other emission reducing activities may be used in the Community scheme in accordance with agreements concluded with third countries, specifying levels of use. In accordance with such agreements, operators shall be able to use credits from project activities in those third countries to comply with their obligations under the Community scheme.

6. Any agreements referred to in paragraph 5 shall provide for the use of credits in the Community scheme from project types which were eligible for use in the Community scheme during the period from 2008 to 2012, including renewable energy or energy efficiency technologies which promote technological transfer and sustainable development. Any such agreement may also provide for the use of credits from projects where the baseline used is below the level of free allocation under the measures referred to in Article 10a or below the levels required by Community legislation.

3.4.2 Potential impacts on competitiveness and leakage

The same criticisms that Japan has made of the CDM might apply to a bilateral EU scheme: that it could assist other countries become more competitive technologically, whilst also transferring money to them (and away from domestic producers). In this respect, the impacts on competitiveness and leakage could be low or even negative.

Once again we come to the conclusion that the major benefit of a sectoral approach may be the leverage it generates to bring countries towards Accession to the EU, and to its ETS.

3.5 Options other than Sectoral Approaches

To the three SAAMs presented above a range of other options to deal with the impacts of competitiveness and leakage can be added. These are summarised in Table 3.1, along with notes on the potential impacts: Many of the options could deal more directly and more strongly with these impacts than the sectoral approaches developed and discussed in sections 3.2-3.4.

The non-sectoral approach options are not developed further in this report, but comparing policy options should form part of national decision-making.



Table 3.1: Options other than Sectoral Approaches

Option	Notes (focusing on impacts on competitiveness and leakage)
Border Carbon Adjustment (BCA)	Potentially strong impact as it acts directly to reduce price differential caused by carbon policy. Notable that the literature tends to show that leakage from other channels (notably the fuel price channel) and negative impacts on sectors of the economy not covered by the BCA can offset gains to the sector in question.
Reducing energy price differentials	Removing energy subsidies (including dual pricing), integrating energy grids and allowing virtual energy trading ("wheeling") and perhaps allowing the trading of renewable energy certificates would all reduce production cost differentials between Europe and some other countries (including near neighbours). The impact could be significant, but dealing with energy price differentials has to date proven to be largely beyond the WTO and other forums. One positive move has been the EU's bilateral negotiation with Russia as part of Russia's Accession to the WTO, which included the removal of gas dual pricing (i.e. lower prices to domestic consumers than foreign ones) to certain industrial customers.
Accession to the EU	When countries join the EU, they would also need to join the EU ETS, removing any carbon price differential. But the prospect of joining the EU may act as sufficient incentive to see improvements in the GHG emission performance of countries looking to accede (Spencer et al., 2011).



4 Potential impacts of SAAMs, conclusions and next steps

Answers to the first two questions posed in this report can be summarised as follows:

1. Has the EU ETS already had an impact on competitiveness and leakage?

The report finds no compelling evidence for any of the three energy-intensive sectors analysed;

2. Would we expect larger impacts in the future?

If the cement and iron and steel sectors were to start paying for a significant share of their emission allowances, this would result in a significant reduction in their gross value added (before taking into account the ability of producers to fully or partially pass through their increased costs). A reduction in competitiveness and leakage could be expected, with a likely first impact being reductions in investment in new capacity (noting that such investments have already been limited in the EU over the past decade). Impacts on the competitiveness and leakage of the paper and pulp sector may not become significant compared to other drivers, for example access to low cost sources of fibre.

Answers to questions 3-5 are now developed:

3. Could Sectoral Approaches, Agreements and Measures (SAAMs), implemented in a multi-country framework, mitigate some or all of these competitiveness and leakage impacts?
4. Could SAAMs be implemented, in the short- to medium-term?
5. Based on these considerations, the paper then asks which of the SAAM options considered Austria might favour and consider supporting.

4.1 Potential impacts of SAAMs on competitiveness and leakage

Analysis in section 2 showed the potential impact on key sectoral financial indicators – gross value added and revenue – that paying for allowances at carbon prices of € 15 /tCO₂ and € 30 /tCO₂ would have. The impact that differential carbon prices due to the EU ETS have had on competitiveness and leakage is generally considered to have been minor to date, with no studies providing compelling evidence that impacts have been in any way significant. A number of studies, using both partial and general equilibrium models, have projected what competitiveness and leakage impacts could be, at various carbon prices and under various assumptions. A review is contained in Wooders and Cosbey (2009), which includes references to the key studies. The review shows that models do project competitiveness and leakage impacts.



The scale of the impacts varies widely, partially because of differences in the scope of models and in their design and the assumptions they make. Some of the studies assess how border carbon adjustment would reduce both competitiveness and leakage. They tend to show that competitiveness impacts would be reduced for the sectors being protected, but at the cost of welfare losses to the rest of the economy in the country or region imposing border carbon adjustment, and in other countries. One very important observation from the general equilibrium models is the strength of the 'fossil fuel channel', where leakage comes from carbon reductions in a regulated country or region lowering prices for fossil fuels (and hence raising demand) in other countries.

The starting point for assessing the ability of SAAMs to fully or partially mitigate competitiveness and leakage impacts is to understand whether they would reduce the carbon price differential between countries subject to a carbon price (for this report, the EU) and those without (assumed for this report to be all others). The only two SAAMs from the six considered which would have a direct impact on the price are those which allow JI or other offsets into the EU ETS. Here, the impact is likely to be negative, as money for carbon credits would flow to producers outside the EU, improving their financial positions. They may choose to use this money to reduce their prices, increase investment or any other option. The money received would not necessarily be reinvested in the sector. In terms of scale, neither JI nor other offsets would be expected to reach the price of EUAs, and there may be a very significant discount. It is far from clear whether prices of offsets, which are currently (December 2011) not higher than € 10 /tCO₂, would significantly improve the competitiveness position of producers external to the EU. Some of the income would almost certainly be needed to finance the reduction in GHG emissions for the JI or offset project to be eligible for credits (i.e. to be considered additional to business as usual operations). But the producer receiving the income from credits is not bound to sell its product to the European market – the net income from credit sales can be seen as a windfall which would be spread across the producer's entire portfolio of production, covering all sales to all markets. It should also be noted that the producer would probably only have a small fraction of its production eligible for credits of some form. What we get in conclusion is that the net income from credits would be likely to be only a small amount per tonne of product across the portfolio. It would therefore be unlikely to have more than a very small impact on improving the competitiveness of the producer receiving it.

Technological agreements are similarly unlikely to have a significant impact on competitiveness and leakage (see Section 3.2.1 for a discussion). It is difficult to say what the scale of any impact might be, but we do know that such agreements do not reduce the difference in carbon prices between jurisdictions. What they may do is to increase the cost base of producers which do not as yet have the technologies being agreed to. Such producers are more likely to be outside the EU than within it, particularly in some developing countries (at least for that part of production



plant which is not modern). We would expect the costs of investment to lead to negative cash flow in the short term, but the technologies proposed generally have reasonable payback periods and thus would be likely to yield financial gains in the longer term. Protection against competitiveness and leakage impacts would only be afforded in the short term, and then is likely to be relatively minor – countries would be unlikely to agree to technology agreements that burdened their producers with very high investment requirements. As a first order assumption, we can assume that competitiveness and leakage impacts will be low in magnitude, whether they are positive or negative to producers in the EU.

Labels, and particularly standards, represent a different and more interesting case. Standards have the potential to restrict market access, although implementing standard schemes would present technical and political challenges. If we assume that the EU could protect its markets from some imports, then we would expect to see the price of the good in question increase, along with profits to the suppliers still eligible within the market. Quantifying such impacts is extremely difficult, particularly as we have no clear idea what the details and conditions would be of the standard. There would be a new equilibrium of world trade, with importers who are eligible more attracted to the EU as a market. This would reduce the price increase below what we would expect if we just assumed that ineligible imports were excluded. It must be borne in mind that world markets for goods produced by the steel, cement and paper and pulp industries are mature and liquid. A market restriction, or other change in conditions, at one point will be likely to lead to a rapid re-equilibrium, significantly diluting the impacts of the market restriction. Such effects are seen in studies which model border carbon adjustments when these are applied in only a relatively small number of countries (again see Wooders and Cosbey (2009) for the full review and references). The impact on the prices of goods in countries outside the jurisdiction where the BCA is applied tends to be very low in these cases. It is difficult to say more than that the impact of standards schemes could be high, but only if the standard is very restrictive across a wide range of imports. The impact of labels will be lower as they only give information to buyers of goods rather than being a definitive restriction on market access.

Consideration of the impacts of SAAMs on competitiveness and leakage are summarised in the third column of Table 4.1

4.2 Conclusions

Even if competitiveness and leakage are not problems now, they could be in the future. The threat of them may be sufficient to affect investment and production decisions within energy-



intensive industries.¹⁷ In the opinion of certain industries within the EU, such decisions are already being made.¹⁸

Three types of SAAMs, each with two separate forms, have been considered in this report. These are summarised in Table 4.1, along with their potential impacts on competitiveness and leakage, applicability to the three 'near neighbours' to the EU, and implementation issues.

It is firstly clear that only standards and labels, and particularly standards, are likely to have any significant impact on competitiveness and leakage concerns. The implementation issues with standards are significant, but this is not different from any other SAAM. One of the key factors that has held SAAMs in general back has been the 'devil being in the detail' required if we are to go beyond a concept and into a scheme which can be discussed and negotiated around.

The SAAMs discussed could help move countries contemplating membership of the EU to improve their performance in anticipation of the closer union and policies this would bring. Perhaps this should also be seen as one of their main purposes: SAAMs developed with partners outside the EU's borders would help generate trust and joint activities which would be mutually beneficial.

None of the options presented would be easy to implement, there is no momentum behind any of them at the present time and there may be strong political and legal challenges to their implementation. It is difficult to imagine any of the options being implemented in the short-term.

The analysis does not give a clear 'winner' i.e. one option which should be pursued more strongly than the others. In the opinion of the authors, two options show a good balance between utility, impacts and implementability:

1. a "Made under the EU ETS" label, perhaps to be promoted by consumers of energy-intensive products within the EU;
2. joint international RDD&D aimed at new technologies and techniques, to develop the breakthrough technologies and/or carbon capture and storage (CCS) needed for energy-intensive industries to take their place in a low carbon future.

4.3 Further work

In order to implement either of these options, it will be necessary to define them in detail, in collaboration with Austrian and other stakeholders. An influencing strategy would then be

¹⁷ See for example the results of IISD's workshop, "Deepening Understanding of Energy-Intensive Industries", Brussels, 26 September 2011 (report forthcoming).

¹⁸ As stated at IISD's workshop and elsewhere, industries including certain subsectors of non-ferrous metals already consider that investment in the EU has declined because of the EU ETS. Empirical evidence to support this view is largely absent at the current time.



needed, including the political steps necessary to move towards implementation. The first stage would be to consult with stakeholders in Austria, notably in industry and government. An 'Austrian view' could then be presented to an EU audience, and to the near neighbour countries which would be target partners. There would then be the need to identify collaborators and champions for the proposals, which might be radically changed as they went through the political process.

The need to reduce emissions from energy-intensive industries is paramount for the successful achievement of ambitious climate change goals. This study recommends that further work to detail sectoral approaches, agreements and measures which could be implemented with the EU's near neighbours is undertaken, and that more detailed consultation exercises as to the support such schemes might generate are conducted.

Table 4. 1: Summary of Sectoral Approaches, Agreements and Measures considered and Competitiveness and leakage impacts

Type of SAAM	Form of SAAM	Potential Impact on Competitiveness and Leakage	Possibility to include Russia, Turkey and Ukraine	Implementation issues
Technological Agreements	Increasing the deployment of the better currently-available technologies	Low	Technological improvement could be a precondition to EU Accession	Precise specification and identification of scheme
	RDD&D aimed at new technologies and techniques	Low direct impact, but may build trust and cooperation with key non-EU countries	High – technology development is a world issue in increasingly globalised industries	National and international cooperation is a big change from current technology model
Standards and Labels	"Made under the EU ETS" label	Depends on how key consumers of EI products are influenced	Existence of labelling may leverage actions in near neighbours	Who would develop and promote the label?
	Carbon intensity standard excluding access	Potentially high, but incentives may be unclear and system may be subject to gaming	Existence of standard may leverage actions in near neighbours	Difficult to set standard benchmarks, may be strong political and legal challenges
Jl and Other Offsets into the EU ETS	UNFCCC SCM and/or NAMA	Low or even negative	Applies only equally to all countries	Much discussed and studied but progress has been very slow
	EU Bilateral Offset Scheme	Low or even negative	Could be made specific to countries and/or sectors	EU has shown no desire to follow an approach of this type



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