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THE EFFECT OF THE ACTIONS OF THE THIRD CONFERENCE OF THE PARTIES TO THE FRAMEWORK CONVENTION ON CLIMATE CHANGE ON STEEL INDUSTRY COMPETITIVENESS

The attached document is for consideration by the Steel Committee at its meeting on 29 May 1998.

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SUMMARY

Background

1. At its meeting on 13-14 November 1997, the Steel Committee agreed to discuss the results of the Third Conference of the Parties to the Framework Convention on Climate Change at its Spring 1998 meeting. In support of the discussions, an expert would be invited to provide a report to the Committee [DSTI/SI/SC/M(97)2, paragraph 37]. Consistent with this decision, the attached report was prepared[1]. The report has been edited by the Secretariat, but in no way which alters the information, arguments or conclusions contained in the original draft.

Report conclusions

2. The Third Conference of the Parties (COP-3) to the United Nations Framework Convention on Climate Change (FCCC) was held from 1 - 11 December 1997 in Kyoto, Japan. Parties to the FCCC formally adopted the Kyoto Protocol on 11 December, whereby Parties in Annex 1 of the FCCC agreed to commitments with a view to together reducing their overall emissions of six greenhouse gases (GHG's) by at least 5 per cent below 1990 levels between 2008 and 2012.

3. Individual signatories will adopt a variety of mechanisms and policies to achieve their obligations under the Protocol. To date, few Governments have defined what these will be, although there is an obvious requirement to reconcile new mechanisms with existing legislation. Undoubtedly a proportionate burden will be placed on the iron and steel industry to achieve a share in the reductions of GHG. There are strong concerns in the sector that disproportionate environmental investment burdens on signatories will favour developing countries and non-signatories which are exempt from mandatory reductions. This could lead to unfair competition and a distortion in the world market due to direct impacts on costs of production.

4. Whilst the iron and steel sector is a large consumer of energy, and therefore a significant generator of CO_2 emissions, technical developments have facilitated large reductions in energy consumption in developed countries since 1980. This rate of innovation and investment is now meeting with diminishing returns. Additional environmental investment burdens aimed at energy efficiency are anticipated, at best, to meet with marginal returns.

5. Without consideration of differentials in the current state of the environmental performance and investment in the iron and steel sector, there is potential for the development and implementation of inappropriate mechanisms and regulation. This could significantly impact the structure of the industry, the competitive position of encumbents, and the ability of these encumbents to sustain innovation.

ACTION

6. The report will be considered at the Committee's meeting on 29 May 1998

RELATED DOCUMENT

DSTI/SU/SC(98)12

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1. The report was prepared by three consultants: Ms. Alison Cavey, Dr. Alison Simpson, Mr. Edmund Mangan.

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THE EFFECT OF THE ACTIONS OF THE THIRD CONFERENCE OF THE PARTIES TO THE FRAMEWORK CONVENTION ON CLIMATE CHANGE ON COMPETITIVENESS

1. Introduction

1. This paper has been prepared for the Steel Committee of the OECD to develop on the preceding work undertaken by Dr Alison Simpson and Mr Edmund Mangan relating to the effects of government environmental policy on the competitiveness of the iron and steel sector. This paper specifically focuses on the potential impact of the policies and mechanisms adopted by national governments to achieve the targets and objectives set by the 'Kyoto Protocol'.

2. The Third Conference of the Parties (COP-3) to the United Nations Framework Convention on Climate Change (FCCC) was held from 1 - 11 December 1997 in Kyoto, Japan. The conference was attended by over 10,000 participants, including representatives from governments, intergovernmental organisations, Non-Governmental Organisations (NGO's), and the press. The purpose of the conference was to achieve an unprecedented, legally binding mechanism for limiting and reducing global greenhouse gas (GHG) emissions.

3. Parties to the FCCC formally adopted the Kyoto Protocol on 11 December, 1997, whereby Parties in Annex 1 of the FCCC agreed to commitments with a view to together reducing their overall emissions of six GHG's by at least 5 per cent below 1990 levels between 2008 and 2012. The Protocol also establishes the basis for emissions trading, joint implementation, and a 'clean development mechanism'.

4. The previous paper [DSTI/SI/SC(97)46] addressed issues relating to both developed and developing countries. By definition, the Kyoto Protocol excludes the latter from mandatory reductions in GHG emissions. The potential impact of the Kyoto Protocol on competition in global markets, based on comparative cost bases associated with varying environmental burdens, has yet to be determined. This paper aims to present a preliminary discussion of the potential issues involved.

5. The OECD has been increasingly involved in the analysis of climate change, in part in response to recommendations from the High Level Advisory Group on the Environment. A programme of work involving several directorates, the International Energy Agency and the Nuclear Energy Agency is underway. It is hoped that the content of this paper may be reviewed and updated once some of the projects, including those on potential macroeconomic impacts and mechanisms for implementation, have been completed.

6. This report provides a general discussion of the potential impact of the Kyoto Protocol on the iron and steel sector, with detail provided for the European Union (EU), the United States, and Japan, where considered appropriate for illustrative purposes. The focus of the paper is on the traditional processes of blast furnace for pig iron production, and basic oxygen furnace and EAF for steel making. These account for the majority of production world-wide, in both developing and developed countries.

7. The findings of this paper are based on a detailed review of available literature, supplemented by discussion with representatives of various trade and business organisations.

2. Summary of the Third Conference of the Parties to the United National Framework Convention on Climate Change

2.1 Background to the Kyoto Conference

8. The first meeting of the Conference of the Parties to the FCCC (COP-1) took place in Berlin in April 1995, with the purpose of reaching agreement on the adequacy of future commitments in regard to climate change, the so called Berlin Mandate. The meeting also began moves towards the development and adoption of a legal instrument or protocol relating to reductions in emissions of GHG. A total of eight subsequent meetings of the Ad Hoc Group on the Berlin Mandate (AGBM) reviewed the types and nature of mechanisms that could be appropriate, and ideas for the structure and form of a possible protocol.

9. The final session of the AGBM was held in October 1997 in Bonn, immediately prior to COP-3, in Kyoto.

2.2 What was achieved at Kyoto

10. The opening speech of COP-3, delivered by COP-2 President Chen Chimutengwende, made it clear that delegates must agree on: a fair system of apportioning emission limits; a globally agreed reduction pathway; and projected sustainable and equitable future emission levels. It was acknowledged that it was not realistic to expect developing countries to take on new commitments under the new instrument, although financial provision should be made to facilitate their catch-up and acquisition of clean technologies.

11. In total, 166 governments participated in the Conference, together with a large number of NGO's. The adopted Kyoto Protocol, which was subject to considerable negotiation, contains a preamble, 28 articles and two annexes. The following articles are particularly pertinent to the current discussion:

- **Article 2** describes policies and measures that each Annex 1 party shall implement or develop in achieving its quantitative emission limitation and reduction objectives (QELROs). Measures identified include: energy efficiency; protection and enhancement of sinks; sustainable agriculture; new and renewable forms of energy; phasing out of subsidies and incentives that run counter to the FCCC objective; GHG emission limitation and reduction; and methane recovery and use. Specifically, emissions from aviation and marine bunker fuels were highlighted for emission reduction.

- **Article 3** presents the QELROs, including a minimum global reduction of 5 per cent in emissions of carbon dioxide, methane, and nitrous oxides, from 1990 levels between 2008 and 2012. Annex A lists the six GHG's, carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, to which reduction or limitation targets should apply. General GHG source categories and sectors identified in Annex A include: energy; fuel combustion; manufacturing industry; industrial processes and metal production.

Annex B to the Protocol presents each of the 38 Annex 1 country's commitment targets. Combined these equal a 5.2 per cent reduction of the six GHG's. Developing nations are subject to voluntary limits. Emission targets set for industrialised nations for changes to 1990 levels of GHG emission levels to be achieved by 2008 - 2012 (averaged over the five year period) include:

- Australia +8 per cent
- Canada - 6 per cent
- European Community - 8 per cent
- Japan - 6 per cent
- Russian Federation 0 per cent
- United States - 7 per cent

- **Article 10** describes activities all parties shall undertake in reaffirming and advancing implementation of existing commitments. Parties shall formulate, implement, publish and update programmes containing mitigation and adaptation measures. The programmes would, *inter alia*, concern: energy; transport; industry; agriculture; forestry and waste management.

- **Article 12** defines the clean development mechanism (CDM), with the purpose of assisting non-Annex 1 parties in achieving sustainable development and contributing to the FCCC objective.

- **Article 16** relates to the mechanisms for emissions trading between parties.

12. The Protocol was officially opened for signature in Bonn on 16th March 1998. Signature to the Protocol indicates recognition of the text, and intention to complete the procedures in a legally bound manner. As of 20 March 1998, 10 nations had signed the Protocol.

13. The Protocol will enter into force 90 days after ratification by a minimum of 55 nations representing 55 per cent of CO_2 emissions. In reality, this is anticipated to occur at some point early in the next century. The first benchmark will be 2005, when participating parties have to demonstrate progress in respect of the reduction targets.

14. The 4th Conference, to be held in Buenos Aires in November 1998, will advance the design of various implementing mechanisms, and methods of encouraging the voluntary participation of developing countries.

2.3 The international response

15. There was a significant difference in opinion between the various parties ahead of the Kyoto Conference regarding what were realistic and achievable objectives and targets. Specifically, there was a major dichotomy of opinion between the US and the European countries. Whilst the EU provided the impetus for the adoption of the numerical targets of the agreed Protocol, the US played an influential role in shaping the institutional approach to its implementation, notably with emissions trading (ENB, 1998).

16. The EU was aiming for more ambitious reductions in GHG's in line with the commitments of the Rio Conference in 1992, specifically a 15 per cent reduction below 1990 levels within 15 years. The EU presented the case that public opinion was in favour of more stringent controls, and the relatively buoyant world economies could withstand such action. Generally, Europe is considered to foster a receptive political climate, and since it also experiences relatively higher energy taxes, the awareness of the general public of energy consumption issues is high.

17. The US, in contrast, argued that because of its relatively faster economic growth, even low reductions in emissions would be significant in absolute terms. They originally argued for no reductions below the 1990 emission levels.

18. In addition, the US required developing countries to be mandated to achieve reductions, rather than being encouraged to impose voluntary improvements. Europe was of the opinion that the developed countries should set the scene by achieving reductions within the first ten years, and thereby take the opportunity to develop cleaner technologies and experience that could subsequently be transferred to the developing nations.

19. The US Senate has indicated that it will refuse to ratify the Protocol. European Governments, on the other hand, are slowly moving towards ratification. At a meeting of European Environment Ministers in Brussels in March 1998, it was agreed that clarification on certain aspects of the Kyoto Protocol was required ahead of ratification. Specifically these were:

- a ceiling on emissions trading
- details of CDM
- assurances that joint implementation of reductions would not result in loopholes.

20. However, it was stressed that the European Union would be looking for early ratification to the Protocol, although there is still no outline as to how the European Union's 8 per cent cut in emissions of GHG's will be shared out amongst Member States.

21. The Ministers also expressed some concern that emissions trading talks currently underway between Canada, the US, Japan and Russia were taking on a 'cartel-like' appearance (Environment Business, 1998).

3. Greenhouse gas emissions from the iron and steel industry

3.1 Main sources

22. The potential environmental impacts and liabilities associated with the operation of the iron and steel industry are well documented (Simpson and Mangan, 1997; HMIP, 1993). Emissions vary on a local and regional basis depending on the manufacturing methods employed [i.e. integrated iron and steel manufacture (including coke manufacture and iron-making) versus direct manufacture of steel from scrap in an electric arc furnace].

23. There are a large number of potential point sources of atmospheric emissions from iron and steel manufacture, varying specifically with the nature of operations undertaken at each facility, and technical parameters including:

- the quality of raw materials
- the age and specification of equipment
- operational efficiency
- maintenance programmes
- the presence or otherwise of end-of-pipe abatement equipment.

24. In addition, significant, and typically unquantified emissions, may arise from uncontrolled, fugitive emissions within the workplace.

25. Typically, the installation and maintenance of air pollution abatement equipment can represent a significant portion of the cost burden of environmental protection of any iron and steel plant. For air emission control, pollutants of most significance are particulate matter (which includes heavy metal dusts), sulphur dioxide (SO_2) and nitrous oxides (NOx). Where coke making, blast furnaces and power generation facilities are present, emissions of carbon dioxide (CO_2) may also be significant.

26. Within the context of the Kyoto Protocol, the two main emissions of concern generated by the iron and steel industry are NOx and CO_2; the latter being of most significance in terms of magnitude.

3.1.1 Nitrous oxides (NOx)

27. The main sources of NOx at an integrated iron and steel plant are summarised in Table 1. The reheating furnaces (used in finishing) and the boilers are the main sources of this gas.

Table 1. Point Sources of NOx from Iron and Steel Processing

Process	Per cent of total NOx	Comment
Sintering/pelletising	0.7	Other pollutants include CO_2
Coking	9.7	
Basic oxygen process	9.0	
Hot rolling	45	Depends on fuel used in preheating and annealing furnaces.
Other	3.6	Including cold rolling and forming
Boilers	32	Other pollutants include CO_2

Source: Simpson and Mangan, 1997

28. Levels of NOx emissions depend largely on fuel type, combustion temperature and burner design, and are estimated to range between 100 and 1 500 mg/Nm^3 for significant sources (boilers and reheating furnaces). Emissions may total up to 2 kg/tonne steel, depending on the process.

29. In most countries, NOx emission levels are controlled by careful selection of fuel and raw materials. In addition, low emission burners and modern combustion systems can be used to control NOx emissions. Pollution control technologies are not common, but could include reduction (catalytic, non-catalytic) and adsorption. Costs of this equipment are site specific, and depend on the design specifications and degree of removal required.

30. Japan is one of the few countries where NOx emissions are controlled because of the strict regulations regarding these compounds. Here adsorption processes have been installed after electrostatic precipitators to remove NOx. These systems are expensive to erect and operate. In particular they consume huge quantities of electricity, providing little net benefit once emissions from energy generated at the power stations are taken into consideration (HMIP, 1993).

31. In conclusion, in most countries, in-process controls generally suffice in reducing NOx concentrations to acceptable levels. If required, capital and operating costs for end-of-pipe NOx removal equipment are high, perhaps unjustified, and determined by the level of removal required.

3.1.2 Carbon Dioxide (CO_2)

32. The iron and steel industry is a significant generator of CO_2 emissions. Total emissions of CO_2 from the iron and steel industry in developed nations range between approximately 5 and 10 per cent of total emissions (Japan Steel Homepage, 1998).

33. Overall, the iron and steel industry is moving away from accounting for CO_2 emissions on the basis of point source emissions from a given plant, and moving towards adoption of a 'life cycle analysis' approach. This method is considered to give a more realistic picture of the contribution of the industry to the global problem of atmospheric emissions.

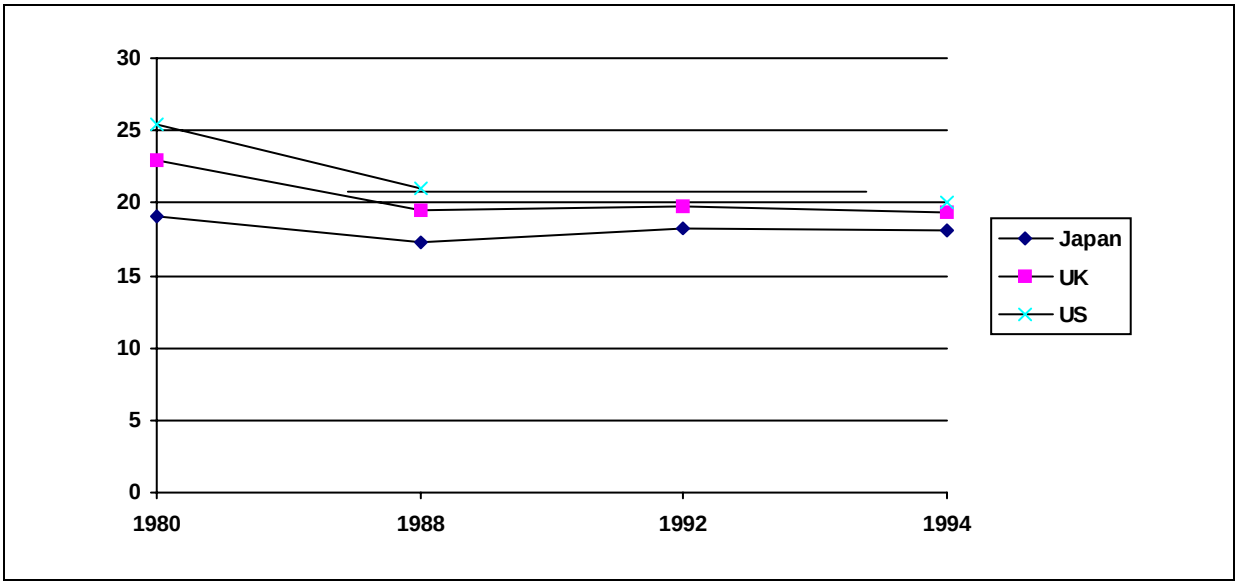
34. Recent work undertaken by the International Iron and Steel Institute (IISI) has involved the detailed analysis of environmental emissions associated with the 'cradle to gate' production of 12 major types of steel at 55 plants across the world. Whilst including both developed and developing countries in the study, the results revealed surprisingly low variation, with typical CO_2 emissions for product from an integrated BOF plant ranging between approximately 1.8 and 2.4 kg CO_2/kg steel (discussion with industry expert, 1998).

35. The traditional process of ironmaking with coke or coal products generates large quantities of CO_2 from the use of carbon as a reducing agent. Steelmaking and subsequent processing also generate CO_2 emissions to a lesser extent. However, the main source of emissions likely to be targeted by the Kyoto Protocol is that associated with energy consumption, whether that energy is generated directly on site, or obtained from a central or regional supply.

36. Traditionally, the iron and steel sector has been classed as a high energy consumer, specifically in terms of the percentage of total national energy use. In many developed nations, the industry has been working towards significantly reducing specific energy requirements, and thereby CO_2 emissions. However, in transition and developing countries, with a rapidly expanding industrial base, often utilising old and inefficient technologies, energy consumption within the iron and steel sector is higher. The overall contribution of the iron and steel sector to total energy consumption is a function of variations in the relative performance of other sectors of the economy, for example transportation.

37. As may be expected, different parts of the iron and steel process have different energy requirements depending on the technology employed. In the developed world, the steel making industry (excluding cokemaking) has generally decreased specific energy requirements (net energy consumption divided by crude steel production) over the last 20 years, but the trend is meeting with diminishing returns, as indicated in Figure 1. During the period of 1980 - 1994, the average improvement in energy consumption has been 3.6 GJ/tonne crude steel, 80 per cent of which was achieved between 1980 and 1988 (Meunier, 1997).

Figure 1. Net Energy Requirements of Steel Making (GJ/tonne crude steel)



38. The gross energy recovery ratio (the proportion of total energy recovered to gross consumption of energy) has improved consistently, up to a maximum of approximately 30 per cent.

39. Important factors in energy reduction have included: optimisation of pig iron charging in blast furnaces; trends towards use of increased pellet and/or lump ore as opposed to sinter; and increased waste heat recovery. Significant reductions in coke consumption have been very important to overall energy reduction, for example through direct injection of coal or oil. However, by 1994, technical improvements became harder to achieve.

40. Therefore, whilst it is recognised that CO_2 emissions may still be significant in absolute terms, by virtue of its size, the iron and steel sector in developed countries has made considerable improvements in energy consumption through technical advancement. This has resulted in a situation where energy consumption in developed nations is at a relatively low, well-controlled level. In addition, data from the IISI indicates that because of technology convergence, emissions from industry in many developing and transition economies are not significantly higher.

3.2 Current regulation

41. The control of atmospheric emissions is regulated by a plethora of legislation at both a national and international level. This has been well documented elsewhere (Simpson and Mangan, 1997). Specifically, there are a number of important legislative instruments, either already in force or in draft form, which have been developed to address, in part, the issue of GHG's. The status of such legislation within a given country will be important for future decisions regarding the nature of likely targets and mechanisms that may be adopted to meet the objectives and targets of the Kyoto Protocol. In turn, this will have a direct impact on future additional environmental investment burdens which may be placed on the iron and steel industry.

42. For example, the existing European regulatory framework governing the emission of GHG's is complex, and some would argue prescriptive. The EU has introduced a number of key legislative instruments, which are being considered for adoption and implementation by the Member States to complement their existing legislation.

43. Specific recent European legislation, in part aimed at controlling emissions of GHG's includes the 1996 EC Directive on integrated pollution prevention and control (IPPC). The iron and steel sector would be controlled within the scope of this instrument, and will be required to consider energy efficiency in manufacturing and the adoption of Best Available Technology (BAT) in relation to reduction of atmospheric emissions. Some European organisations are suggesting that this instrument be used as the keystone for high energy consuming industries to meet reduction targets in line with the Kyoto Protocol requirements.

44. In addition, in 1992, the Commission proposed a directive for a tax on carbon dioxide/energy. Although members were unable to reach a consensus as to the form of the tax, options are being considered, such as extending existing excise duty to cover fuels. Some individual Member States are giving consideration to the introduction of the carbon tax as an economic instrument in line with the model originally proposed by the Commission.

45. Work by Oxford Economic Forecasting (1998) suggests that, in order to stabilise CO_2 emissions at the 1990 level, the carbon tax (in 1997 US dollars) would vary from $25/tonne for Germany to $105/tonne for the United Kingdom and $685/tonne for France. Germany's advantage in reducing emissions to 1990 levels has been its ability to close inefficient East German factories. These carbon taxes compare with a figure of $210 for the United States, $660 for Japan and $0 for China. The model used also predicts the impact of emissions stabilisation on actual gross domestic product (GDP). By 2010, the cost of emissions stabilisation will affect developed countries most and will change GDP by the following percentages:

- Germany -0.2
- United Kingdom -0.7
- United States -1.4
- Japan -1.1
- China 0.3

46. Growth of energy intensive industries in developed countries will be most affected by emissions stabilisation policies.

47. In the United States, the Clean Air Act, as recently amended, is the main instrument regulating atmospheric emissions from industry. This legislation specifically introduced the 'Operating Permit Programme', which consolidated air pollution control requirements. The programme also covers significant operations in terms of energy generation and consumption, including large coal burning boilers.

48. In Japan, there are a number of important regulatory instruments which have been developed in recent years. In July 1996, the Federation of Economic Organisations issued a 'Declaration on Voluntary Action', which included a set of directions for active efforts to combat the problem of global warming. In

December 1996, 29 industries, including manufacturing sectors, produced voluntary action programmes for the reduction of GHG's.

49. In addition, the Government of Japan has formulated several instruments including the Basic Environmental Law, the Action Programme to Arrest Global Warming, the Basic Environmental Plan and the Lead Action Plan, under which government agencies have defined measures to reduce emissions of GHG's. Specifically, the Action Programme sets goals for the emissions of CO_2 to be achieved by the year 2000. In the fiscal year of 1995, it was reported that a total of 406 projects were in progress as part of the programme (Ministry of Foreign Affairs, 1998). A key component of many of these programmes is promotion of reductions in energy consumption.

50. Once the full obligations and reduction targets have been identified by the individual signatories to the Protocol, there will be a need to carefully reconcile existing legislation and programmes with additional environmental investment burden, and reconcile mechanisms for implementation which will complement those already in place.

4. Potential impact of Kyoto on competitiveness

4.1 Environmental regulation, costs and competitiveness

51. The previous work undertaken by Dr. Simpson and Mr. Mangan was based on the premise that competitiveness is maximised where production costs are minimised, and that because of the globalisation of the iron and steel market, competitiveness is related to overall production costs and profitability. The definition is taken to encompass success on both the domestic and international market, and reflects costs of production against sales. Lower unit specific production costs are assumed to enhance profit, and thereby competitiveness.

52. Past investigations on behalf of the OECD have concluded that pollution control costs comprise a small proportion of total costs in most industrial sectors, including the iron and steel industry, and that environmental regulations have not been the source of significant manufacturing cost differentials between countries (Stevens, 1993).

53. The previous work concluded that it is not possible to link the imposition of environment regulations with competitiveness, since attempts to correlate the former with production costs directly are impossible without the consideration of other critical factors.

54. Whilst international comparison of environmental standards will provide a semi quantitative comparison of the potential costs of compliance, actual costs will be influenced by a series of other important factors, including the innovative efficiency and adaptability of the business response. This in turn will depend on the general aspects of governmental environmental policy and quality of business strategy. There are fundamental differences in political and philosophical climate between nations, resulting in the imposition of varying mechanisms to achieve regulatory compliance. In turn, this has the potential to create a range of commercial environments which may either enhance or restrict competition.

55. The potential impact of specific environmental policy on the iron and steel sector will therefore be a function of the economic and political regime within which it operates, superimposed on the patterns of the world market.

56. By virtue of the nature of the industry, the iron and steel sector is subject to cyclical changes in production, reflecting changes in economic cycles. It is also an highly competitive industry, with an increasing contribution to total production from the developing nations. The five key iron and steel producing regions are: Western Europe, Central and Eastern Europe, Japan, the United States and China.

57. The current pattern of international trade is complex, in part due to the global integrated nature of the market. Consequently, it will be sensitive to any changes which result in differential production cost bases between nations. For example, there was an upward trend in EU exports to the United States between 1991 and 1994, the United States representing the European Union's largest export market (27 per cent in 1994). This trend could potentially be affected by increased environmental investment burdens within the EU, at the expense of international competitiveness.

58. Recent years have seen a rapid growth in the steel production capacities of a number of countries, including China, Korea and India. In addition, regions with low cost bases, including Central and Eastern Europe, entered the global market, resulting in increased competition.

59. Therefore, the international iron and steel sector is currently highly competitive, and sensitive to changes in relative production costs. The industry structure is potentially vulnerable in the short term to significant environmental investment burdens which directly affect the bottom line.

4.2 Mechanisms for Implementation of the Kyoto Protocol

60. To date, only a small number of countries have signed the Kyoto Protocol. None is considered to be a major industrial nation (except Switzerland). In addition, few governments have shown their hand regarding how they intend to split the burden of reduction, or by what mechanisms they intend to achieve their targets. As discussed in Section 3.2, consideration of the existing legislative and policy framework will be a key factor in determining the most effective routes forward.

61. Most nations are currently in the process of on-going consultation with industry representatives. 'Think tanks' are reviewing the available options, whilst attempting to reconcile new mechanisms to meet the Protocol targets with those already in place, or about to be implemented, in line with existing obligations.

4.2.1 The European Union

62. As discussed in Section 2.3, the European Union has yet to determine how the burden for reduction will be divided amongst Member States, or how they will agree to the ratification of the Protocol. However, it seems that the European Union is keen to ratify as soon as is practicable, so as to encourage other nations to follow it. Whilst the Member States will undoubtedly target sectors such as energy production and transport for reductions, there seems to be no doubt that the iron and steel sector, along with other industrial sectors, will be provided with targets for reductions in energy consumption/CO_2 emissions.

63. There is some scepticism regarding the methodology to be used to achieve reduction targets, with some questioning the appropriateness of adopting emission reduction targets for the sector based on projections of past performance, or based on best practice. It is considered that given the highly variable nature of iron and steel production both over time, and between products, such methods are flawed. It is

considered that future reduction programmes for GHG emissions would most effectively be left to industry to develop on the basis of traditional investment cycle analyses.

64. Similarly, the industry is opposed to setting a cap on emissions, as this is likely to be inefficient and highly restrictive on the potential future growth of the sector.

65. There is also some concern that the proposals for reduction targets do not take into account the benefits associated with production of improved steel products, and Life Cycle Analysis, which would reveal longer term reductions in GHG's. Potential incentives for innovation and new product development with environmental advantages may therefore be lost.

66. In general, there is a view that additional burdens placed on the European iron and steel industry to reduce GHG emissions further will not be cost effective to implement, at best achieving marginal financial benefits. Whilst the sector is still recognised as being a high consumer of energy, further reductions are considered to be associated with diminishing returns, and may add directly to costs.

67. Thus, there is some concern that the need for further investment in Europe could reduce competitive advantage, in favour of those countries which are less affected by the Kyoto Protocol.

4.2.2 The United States

68. Several State Senates in the United States have passed resolutions urging the Government not to implement any GHG reduction strategies under the Kyoto Protocol. It is argued that the lack of participation by developing countries would put the United States at an economic disadvantage in foreign markets.

69. Whilst currently opposed to the ratification of the Protocol, the US Government has introduced a five year, $6.3 billion package of financial incentives aimed at meeting the obligations of the Protocol.

70. To date, the Government has not provided any detail as to how ratification to the Protocol could impact US industry, should it proceed. However, initial signs indicate that the Government may be moving to meet a significant proportion of its obligation via the mechanism of emissions trading, as opposed to mandated reductions on specific emission sources. This free market approach will allow companies to seek out the most cost effective emission reduction, substantially reducing the associated costs for the USA.

71. The USA has reached a conceptual agreement with a number of countries, including Australia, Canada, Japan, New Zealand and Russia, to form an umbrella group to trade emissions permits.

4.2.3 Japan

72. To date, little has been published on the Japanese response to COP-3, although the Government has produced two National Communications for the FCCC, containing some reference to the types of measures which may be taken. As discussed in Section 4.2.2, the Government is exploring options for meeting part of its obligations by means of emissions trading.

73. In Japan, the iron and steel industry's level of energy consumption has remained largely unchanged since the 1980s, whilst production has increased. According to the Ministry of Foreign Affairs, the Japanese steel industry has already set the goal of cutting back energy consumption by 17 per

cent below the 1990 level by the year 2010: 10 per cent by reducing the volume of energy consumed in the production process, 3 per cent by recovering plastic waste and other unused energy from the local community, and 4 per cent by supplying energy-saving products.

74. The Japan Iron and Steel Federation's Environment and Energy Department, have stated that the Japanese industry is setting the world standard for energy efficiency and hopes to extend Japan's energy-saving technology overseas.

75. Representatives of the industry have stated that imposition of targets higher than those already in place could only be enforced by legal action to reduce production (Japan Steel Homepage, 1998). This would be in opposition to the current strategy aimed at sustained development with minimum environmental impact. There are also concerns that if reduction targets were applied to developed countries in isolation, this could result in leading companies shifting their production bases to other countries to maintain competitiveness.

4.3 Critical Factors

76. In the future, selection of appropriate mechanisms for meeting obligations under the Kyoto Protocol will need to take account of a number of important factors if adverse impacts on the competitiveness of certain parts of the iron and steel industry are to be minimised. These should include consideration of the following:

- Flexibility in the measures and policies implemented by individual nations to allow the iron and steel sector to innovate and adapt improvement practices on the basis of cost benefit. An approach based on the phased reduction targets would appear to be a favoured mechanism by industry. Further significant reduction of CO_2 emissions from the iron and steel sector in developed countries is likely to require significant technological innovation, as opposed to the installation of end-of-pipe abatement plant. These changes require an appropriate time scale for the development and investment cycles.

- Adoption of voluntary reduction targets for industry are seen as being favoured in Europe.

- Targets should not provide any barriers to expansion of the sector as and when market opportunities arise.

- Adoption of economic instruments, for example a carbon tax, should be carefully developed and set at levels appropriate to the current cost base of the industry so as to not significantly affect competitiveness. There is strong opposition to their adoption by the industry (IISI, 1998).

- Funding should be made available centrally, to facilitate research and development into new, energy efficient, technologies.

5. Conclusions

77. Parties to the Kyoto Conference readily acknowledge the potential ineffectiveness of their commitments to alter energy and economic patterns and thus prevent harmful changes in the climate system. The Kyoto Protocol is therefore considered by most observers to be a first step, with the main

effect of raising international awareness of the issues of climate change. To date, developing nations and non-signatories are excluded from mandatory reductions.

78. CO_2 is a major contributor to GHG emissions, most commonly resulting from the anthropogenic burning of fossil fuels, including oil, solid fuels and natural gas. Emission levels are therefore directly correlated with energy consumption, and it has been recognised by many participating bodies, that to meet the objectives of the Kyoto Protocol, it will be necessary to make the transition to a lower carbon economy. Quantitatively, CO_2 is the main GHG of concern generated by the iron and steel sector.

79. Achieving the objectives and targets of Kyoto will require integrated national programmes which focus on achieving efficient reductions in emissions across all sectors including manufacturing, transport, renewable energy/CHP, and the commercial/domestic sector.

80. To date, few countries have published detailed proposals of how they intend to meet their obligations under the Kyoto Protocol. However, undoubtedly, industry will be targeted for significant reductions to contribute to national targets, although the size of the burden, and the nature of the mechanisms by which it will be achieved, will vary significantly on a national basis. There is a strong likelihood that the iron and steel industry will be targeted for further reductions in energy consumption.

81. The iron and steel industry in developed countries has already achieved significant reductions in specific energy consumption, and any further reductions will not be achieved without a major change in technology. This in turn will take time to develop. The rate at which this process may occur will depend on the national polices and regulatory mechanisms in place. Where the industry is forced to achieve significant reductions within a short time frame, there would be significant effects on industry profitability. Until the precise details of reduction targets are produced, it will not be possible to estimate the potential direct costs to the industry.

82. Differentials in investments required within the international iron and steel industry could result as a direct result of variations in:

- national reduction targets imposed by the Kyoto Conference, and whether a nation chooses to ratify the Protocol;
- the individual burden for emissions reduction placed on the national iron and steel sector;
- the time frame within which reductions are to be achieved;
- existing environmental performance and investment burdens; and
- the mechanisms and regulations implemented to support achievement of reduction targets.

83. Differentials may be anticipated to favour those producers in developing and transition economies with low production costs, negligible or no reduction targets, or non-signatories, with a relatively lower investment burden. They may be expected to disfavour signatories, in particular those already operating diminishing returns on environmental investment.

84. To be effective, and not unduly distort competitiveness among steel-producing countries, there would need to be a firm baseline of international agreement in which the existing operating conditions of the iron and steel industry in each country would be given due consideration. On-going negotiations between parties ahead of ratification, and further discussions due to be held at COP-4, may facilitate this.

85. It is clear that, regardless of the actual reduction targets set by individual nations, and the precise burden placed on the sector, the most critical factors for the industry will be the policy and regulatory mechanisms adopted by national governments to achieve these targets. The mechanisms chosen will have an important role in encouraging innovation and new technologies, whereby the sector may achieve reductions in GHG's in a cost effective manner.

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