Energy and the Environment: A review of policy developments within the EU and its Member States

June 1996

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A review of policy developments within the EU and its member states.

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1 EXECUTIVE SUMMARY

This paper discusses recent developments in energy and environmental policy in the EU and its Member States. Although it is largely based on interviews in Brussels with MEPs, Commission officials and national representatives, the conclusions reached are entirely those of the authors.

The Fifth Environmental Action Programme (5EAP) identifies energy as one of the five priority areas in which consideration of the environment and the requirement for sustainable development will need to be fully integrated into all future policy proposals. The White Paper on Energy Policy, approved by the Commission in December 1995, states that the objectives which are most relevant with regard to energy policy are competitiveness, security of supply and environmental protection. It is the contention of this paper that the need to tackle environmental problems will be at the centre of most EU policies in the energy sector over the next 5 years.

To date the most significant environmental measures affecting energy production have been the limits on emissions into air from combustion of fossil fuels. The major environmental concerns with regard to these emissions are the damage caused by acidification , the deterioration in air quality and global climate change.

1.1 Acidification Strategy

There is no easy or inexpensive solution to the problem of acidification. Future legislation in this area is likely to call increasingly for the use of Best Available Techniques (BAT) based on an integrated assessment of environmental impacts. There is however a growing awareness of the costs of environmental measures, and the need to balance expenditure on control measures against the benefits gained from reducing acidification. The critical loads approach recognises that the impacts of acid deposition vary according to the sensitivity of the environment and tries to identify the threshold or critical load for deposition, below which long term damage will not occur. Increased awareness of the trans-boundary nature of the acidification problem could well lead to increased investment by the EU to promote emission reductions outwith the current EU member states.

1.2 Air Quality

An EU framework Air Quality Directive is likely to come into force before the end of 1996 and a number of daughter directives will be proposed by the Commission over the next few years to establish limit values for each of the pollutants which affect air quality. The Commission recognises the need to balance costs and benefits in setting limit values. Nevertheless it is likely that air quality considerations will drive down the energy sector's permitted emission levels in future.

1.3 Carbon/Energy Tax

Global climate change has moved up the political agenda over the past decade as scientific evidence grows. Political opinion has reached a broad consensus that policy action is required now on an international scale. Attempts at reaching agreement to limit emissions have focused strongly on CO_2, which is responsible for 51% of the global impact. The UN Framework Convention on Climate Change has been the main vehicle for international action. Within the EU, after several years of debate, it is now widely accepted that agreement on a Europe-wide carbon / energy tax is unlikely for some time to come. Nevertheless the idea that the burden of taxation should be shifted from employment to environmental pollution is one which may prove increasingly attractive as concern over environmental issues and unemployment within Europe continues to grow. Over the next 2 to 5 years progress on reducing CO_2 emissions is likely to depend heavily on measures to increase renewable energy production and on improvements in energy efficiency.

1.4 Renewable Energy Production

Positive promotion of renewable energy production has broad support throughout the Member States of the EU. It has been generally accepted that the potential for renewable energy development will vary significantly among and even within Member States. Further integration of the internal market should increase the pace at which technology developments and competencies are disseminated within the EU. As the technology matures, the EU will also play an important role in facilitating export of renewable technologies throughout a wider Europe and beyond.

1.5 Energy Efficiency

Improvements in the efficiency with which energy is used can make a significant contribution towards reducing the environmental impact of energy production. The International Energy Agency has estimated that overall savings of 15 to 20% in electricity end-use could be achieved by energy saving investments with pay back periods of 3 years or less. However, EU policy on energy efficiency has suffered from lack of a clear legal basis or a consistent strategy. Initiatives undertaken at Member State level, will need to be given higher priority if they are to achieve real progress in reducing energy intensity. It has been estimated that investments in energy-demand reduction create 3 to 4 times the number of jobs as equivalent supply side measures. Given the continued concern over

unemployment rates across Europe, this could well prove a significant factor in favour of increasing energy efficiency measures over the next few years.

1.6 Energy Market Liberalisation

The supply of gas and electricity has historically been regarded as a natural monopoly. In the UK**,** the first steps towards creating a competitive market in electricity were taken in 1990 when the Electricity Supply Industry was transferred to private ownership. Liberalisation of the electricity supply market has also been undertaken in the Scandinavian countries. The Norwegians (not a member of the EU) established an electricity market in 1992 and have now been followed by Finland on 1 June 1995 and Sweden at the beginning of 1996. The idea of allowing competition in the supply of electricity and gas has gained considerable support across Europe during the 1990s.

While most Member States are now committed to some liberalisation in electricity supply, the pace of change and the extent of competition is likely to vary significantly. France, Belgium, Greece and Ireland are among the countries which have expressed most reservations about full market liberalisation and are therefore likely to restrict the extent of competition in supply. Nevertheless, the progressive opening of energy supply markets in those countries which are slow to introduce competition may well provide the best business opportunities for companies which have learned to prosper in a competitive energy market.

2 INTRODUCTION

This paper discusses recent developments in energy and environmental policy in the EU and its Member States. Particular emphasis is given to the electricity sector where issues such as the control of emissions and support for renewable energy production indicate the growing influence of environmental objectives on energy policy. In fact the paper argues that, for the foreseeable future, the overriding objective of European Union policy towards the energy sector will be to reduce its impact on the environment. Other policy objectives will also come into play, in particular the desire to open up the gas and electricity supply industries to some degree of Europe wide competition, but in the main EU energy policy will be a sub-set of environment policy. At least in the short to medium term (the next 2-5 years), there is unlikely to be any great desire on the part of the EU Member States to have the EU take a strategic role in planning for energy security. Member State views on the need for such planning are widely divergent and in any case few people currently see energy security as a pressing political issue.

As well as reviewing the EU policies likely to have a major impact on the electricity sector over the coming years, the authors attempt to draw some conclusions about these policies' consequences for Scotland.

This paper is largely based on interviews with MEPs, Commission officials and national officials carried out by Alex Brennan, Planning and Settlements Manager of ScottishPower during a six week secondment to Scotland Europa in Brussels. Given this time constraint the authors cannot claim that their interview sample was anything like comprehensive, but they do hope that it was at least representative of the Brussels policy making community. The conclusions reached are entirely those of the authors.

The authors would like to thank everyone in Brussels and elsewhere who contributed towards this paper and who took time to discuss these important issues. Particular thanks go to Peter Asell of the Swedish Power Association, Wilhelma N Kip of EnergieNed, Jim Harrow of ScottishPower, Samuele Furfari and Friedrich W Kindermann of the European Commission DGXVII who provided constructive and extremely helpful comments on the draft paper. Finally the authors would like to acknowledge the expert guidance and advice provided by Fred Dinning, ScottishPower's Corporate Environment Advisor.

2.1 The EU Energy Policy Context

The European Union has since it very earliest incarnation always had some sort of involvement in energy policy. It is worth remembering that the whole process of European integration began with the 1952 Treaty of Paris in which France, Germany, Italy, Belgium, the Netherlands and Luxembourg created the European Coal and Steel Community (ECSC). In 1958 in Rome when the same six countries signed the treaty creating the European Economic Community (EEC) they also signed a treaty establishing a European Atomic Energy Community (the Euratom Treaty). As the EEC expanded and developed its Institutions - the Commission,

the European Parliament, the Council of Ministers - took over the running of Euratom and the ECSC and began looking at energy policy consideration beyond nuclear power and coal. Nonetheless, they have never had a particularly clear legal basis for these measures.

The European Commission has been carrying out energy analyses and running programmes to develop and to demonstrate non-nuclear energy technologies since the 1970s. In the 1980's and 1990's the European Community has been involved in funding pipelines to supply natural gas to Greece, Portugal and parts of Spain. There have been miscellaneous programmes and regulations on energy efficiency, studies on the potential of renewable energy sources and a major directive limiting SO_2 and NOx emissions from power stations[1]. However, all of these actions have either been taken on the basis of European Community powers in areas such as environmental policy or regional policy or without a clear legal basis.

There is no chapter of the EU Treaty setting out the role of the EU in the field of energy policy, nor is there likely to be one in the near future. At the time of writing, the inclusion of a chapter on energy policy does not appear to be a priority for the Inter-Governmental Conference reviewing the EU Treaty. This is partly because a number of Member States are strongly opposed to anything which would extend the powers of the EU in the energy sector and partly because of lack of consensus as to what an Energy Chapter should entail.

This lack of consensus concerns the extent to which energy policy should be left to the free market and the extent to which long term energy planning is necessary. Given the large differences between Member States and given that the need for a Europe wide strategy on energy security is much less evident now than it was during the oil crises of the 1970s and 1980s, energy policy is likely to remain primarily the responsibility of national governments for some time to come.

Nonetheless while there may be no "EU Energy Policy" in the form of an agreed, overarching strategy, there are still likely to be decisions taken in Brussels over the coming years which have a significant impact on the energy sector. The Commission's White Paper on Energy Policy[2] sets out the agenda which it will pursue. How much of this agenda is likely to be accepted by the EU Member States is another question, and not one which this paper will be able to fully answer. The paper largely focuses on the prospects of the Commission achieving its aim of creating a Single Market in the electricity sector and the impact of environment policy on the energy sector.

2.2 The Environment Policy Context

Though protection of the environment as such was not mentioned as an objective in the original EEC Treaty by the late 1960s it was becoming apparent that many environmental problems could only be addressed at European, and indeed international level. It was also becoming apparent that divergent national environmental rules, especially in areas such as product safety and transportation

[1]The Large Combustion Plant Directive, Directive 88/609/EEC
[2]COM(95) 682 final

of dangerous goods, could become barriers to trade. In 1972 the European Community adopted its First Environmental Action Programme[3] setting out policies and objectives for the years 1973-1977. This has been followed by a further four action programmes including the current Fifth Environmental Action Programme[4] (5EAP) which has recently been revised[5] by the Commission and runs up until the year 2000.

Protection of the environment and the pursuit of "renewable development" have been written into the EU Treaty as one of the objectives of the European Union[6], and much environment legislation is determined by Qualified Majority voting in the Council of Ministers. There is no serious body of opinion other than that the EU will continue to play an important role in environment policy. It is one of the few areas where all Member States agree that action needs to be taken at European level: the only debate is over the extent of such action and the level of protection it should aim for.

The European Community's environment policy has developed in line with a growing understanding of the environmental problems facing Europe. In particular, it has moved away from trying to tackle pollution on an individual pollutant, individual industry basis towards a broader view of how the impact of human activity can be made environmentally sustainable. This new philosophy on environment policy is articulated in the Fifth Environmental Action Programme[7] (5EAP) subtitled Towards Sustainability, which has as its core themes the integration of the environment into other areas of policy and "internalisation of external costs" (building the cost of environmental damage into the prices of goods and services).

2.3 Energy and the Environment

The Fifth Environmental Action Programme identifies Energy as one of the five priority areas in which consideration of the environment and the requirement for sustainable development will need to be fully integrated into all future policy proposals (the other four are industry, agriculture, transport and tourism). It identifies the major impacts of the Energy sector as CO_2 emissions, leading to global warming and SO_2 and NOx emissions, contributing to the problems of acid rain and urban smog and sees the promotion of energy efficiency and renewable energy sources as the way to reduce these impacts.

The fact that EU policy sees SO_2, NOx and CO_2 as major impacts of the energy sector does not mean that other impacts are regarded as unimportant. There are EU policies and legislation covering issues such as nuclear safety, fuel quality and waste which are of great importance to the energy sector. However, due to the need to limit the scope of their enquiry , the authors have chosen to focus on the agenda set out in the Fifth Environmental Action Programme.

[3] see OJ C112 of 20 December 1973
[4] see COM(92)23 Vol II
[5] see COM(95)647
[6] see in particular Article 8A and Articles 130 R to S of the Treaty on European Union
[7] see notes 4 and 5

The European Union and its Member States are all, in principle, committed to tackling these problems - not just through European policy decisions but also by international treaties such as the Rio Convention on Climate Change and the UNECE Convention on Long Range Trans-boundary Air Pollution (CLRTAP). It is the contention of this paper that the need to tackle these problems will be at the centre of most EU policies in the energy sector over the next 5 years.

3 CONTROL OF EMISSIONS

To date the most significant environmental measures affecting energy production have been the limits on emissions into air from combustion of fossil fuels. The major environmental concerns with regard to these emissions are the damage caused by acid rain, the deterioration in air quality (summer and winter smog) and climate change.

3.1 Acidification

Concern over the effects of acidifying substances in the atmosphere has grown since the 1970s. The most important pollutants have been identified as sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3). Power generation is the major source of SO_2; transport accounts for most NO_x emissions and most NH_3 is produced by agriculture.

In 1979, under the United Nations Economic Council for Europe (UNECE), the Geneva Convention on Long Range Trans-boundary Air Pollution (CLRTAP) recognised the international dimension of the acidification problem and set the scene for future emission reduction agreements. Following the 1985 Helsinki Protocol on SO_2 reductions and the 1988 Sofia Protocol on NO_x., the EU adopted the Large Combustion Plants Directive (LCPD) on 24 November 1988.

While the EU has been successful in significantly reducing its SO_2 emissions and stabilising its NO_x emissions, acidification remains a problem. It is clear that more needs to be done.

3.1.1 The Large Combustion Plants Directive (88/609/EEC)

This directive set limits for total emissions of SO_2 and NO_x from existing combustion plants with a rated thermal input of at least 50 MW. The directive set target figures to be achieved by 1993, 1998 and 2003 for each of the 12 member states which formed the European Community at that time (EU12). Taking 1980 as a base year, the LCPD requires the EU12 to reduce SO_2 emissions by 59% by the year 2003 and NO_x by 30% by 1998.

The emission ceilings and reduction targets for the UK's stock of existing combustion plants[8] is as follows:

[8]"existing plant" is defined as plants for which the original construction licence or, in the absence of such procedure, the original operating licence was granted before 1 July 1987". See Article 2 of the Directive.

		1980	1993	1998	2003
SO_2	ktonnes/year	3883	3106	2330	1553
	% reduction		(-20%)	(-40%)	(-60%)
NO_x	ktonnes/year	1016	864	711	
	% reduction		(-15%)	(-30%)	

The 1993 emissions from the large plants in the UK were well within the targets set in the LCPD. For SO_2 the figure of 2329 kt was marginally above the target set for 1998 and for NO_x actual emissions of 636 kt was well below the 1998 target. The LCPD also defined limits for SO_2, NO_x and dust emissions for new plant, based on the best available technology not entailing excessive cost (BATNEEC). Article 4(2) of the directive called on the Commission to review limit values before 1 July 1995 "*in light of the state of technology and environmental requirements."*

In practice the time scale for the review of the LCPD has slipped somewhat and at the time of writing consultations with Member States and industry on draft proposals are still underway. It looks unlikely that the Commission will present formal proposals for the review of the LCPD before the autumn.

At this stage it is difficult to predict the exact content of these proposals, other than that they will seek to tighten emission limits for both new and existing plant. Nonetheless, it would be fair to suggest that the Commission will conduct the review of new plant standards using the methodology of the Integrated Pollution Prevention and Control Directive (discussed in more detail below). This would involve consideration of all environmental impacts including solid waste, emissions into water, CO_2 as well as SO_2 and NO_x . The review may also include a second round of emission ceilings for SO_2 and NO_x up to the year 2010. Figures currently under consideration are a 60% reduction in SO_2 and a 40% reduction in NO_x taking 1990 as a base year.

3.1.2 Critical Loads

During negotiations at the UN Economic Commission for Europe's Convention on Long Range Trans-boundary Air Pollution (CLRTAP), the UK argued for an effects based approach to setting limits for SO_2 and NO_x emissions. This means analysing the sensitivity to acid deposition of the soil and ecosystems where emissions from different sources were being deposited. The critical loads approach recognises that the impacts of acid deposition vary according to the sensitivity of the environment and tries to identify the threshold or critical load for deposition, below which long term damage will not occur. The UNECE has instigated a major mapping exercise to identify critical loads throughout Europe. There have been difficulties with this approach as some countries have adopted more stringent criteria than others. Computer models which use the critical load data to determine emission limits have proved to be very sensitive to minor changes in the critical load assumptions. Nevertheless it is estimated that more than one third of the identified critical loads were exceeded in 1993 and that on

latest assumptions that figure will still be around 25% by 2000. Based on these figures it seems inevitable that pressure for further reductions in emission limits will increase.

3.1.3 CLRTAP Protocols

The Second Sulphur Protocol to the CLRTAP was prepared under the auspices of the executive body and signed by a number of countries including the EU15 in May 1994 in Oslo. It goes beyond the 1985 Helsinki Protocol and recognises for the first time in an international agreement, the importance of critical loads. Article 2(1) of the Protocol states that "*The Parties shall control and reduce their sulphur emissions in order to ... ensure as far as possible, without entailing excessive costs , that deposition of sulphur compounds in the long term do not exceed critical loads for sulphur..."* The emission ceilings and reduction targets agreed by the UK are given below:

		1980	**2000**	**2005**	**2010**
SO_2	ktonnes/year	4898	2449	1470	980
	% reduction		(-50%)	(-70%)	(-80%)

It is possible that the SO_2 reduction targets already agreed by the EU Member States in the context of the Second Sulphur Protocol could serve as the basis for the new national ceilings in the review of the LCPD. However, at the time of writing it appears that there may be a will to go beyond these and agree more stringent limits.

Work is underway on a new CLRTAP Protocol focusing on nitrogen pollutants. These negotiations are at an early stage and it is too soon to predict what impact they will have on NOx emission ceilings. Nonetheless the scientific and political debate surrounding this Protocol is likely to feed in to the EU's Acidification Strategy and the LCPD review. It will generally add to the pressure for lower NOx emission ceilings.

3.1.4 Forthcoming EU Legislation

To date EU environmental policy has dealt separately with emissions into the three receiving media; air, water and soil. This has led Member States to adopt unconnected legislation which is often implemented by different administrative bodies. This tendency is changing with a number of countries and the EU itself adopting an integrated approach to pollution control.

The Commission produced its initial proposal for an **Integrated Pollution Prevention and Control Directive (IPPCD)** in 1994 and the Council agreed a common position in January 1996. It is currently going through its second reading in Parliament and is likely to come into force later this year. The IPPCD aims to provide a framework through which the competent authorities in the Member States can develop a system for issuing permits for plant based on the use of the best available techniques to achieve integrated prevention and control of pollution to air, water and soil.

The IPPCD attempts to strike a balance between the need to take into account local environmental conditions in issuing a permit and the need to ensure that emission standards throughout Europe are set on a similar basis. It may take several years of application of the Directive before it becomes clear just how this balancing act will work, however at this stage it is worth observing that:

- Over time the logic of IPPCD is to continually tighten emission limits for new plant towards those achievable by Best Available Techniques;

- The IPPCD requires that existing plant be upgraded to new plant standard within 8 years of the Directive coming into effect (NB it will probably come into effect in 1998).

This last provision of the IPPCD will mean that around the year 2006 existing large combustion plants will have to be re-permitted in line with IPPCD standards. While the Directive does allow national pollution control authorities to take into account cost/benefit analysis of upgrading old plants, implementation of the IPPCD is likely to lead to a tightening of emission limits on existing plant irrespective of whether this is needed to meet national emission ceilings under LCPD.

The emphasis of the IPPCD is on harmonising the procedures for regulating industrial emissions rather than harmonising emission limits themselves. Nonetheless the Directive does contain the possibility of the EU passing IPPCD "daughter Directives" harmonising emission limits in specific industrial sectors. At the time of writing, the Commission is in favour of putting forward some of its LCPD review proposals (those concerning new plant standards) as such a "daughter Directive".

At the Environment Council of Ministers in March 1995, the Swedish delegation called for a Community **strategy to combat acidification**. The Commission welcomed this initiative and undertook to consider what further action should be taken within the EU and externally to assist other countries to meet and go beyond their commitments under UNECE protocols. The Commission has since estimated what progress would be made in reducing acidification under different scenarios reflecting different levels of future Community legislation to control emissions. The conclusion is that even with the most strict legislative program requiring BAT standards to be applied to existing plant, a significant degree of critical load exceedances would remain beyond 2010. If the EU is to make substantial progress beyond 2000 towards the ultimate aim of no critical load exceedances, then structural measures would be needed in addition to increasingly strict emission limits. This study is currently no more than a Commission Working Paper: there is no immediate prospect of it being acted, but its findings are likely to feed into the LCPD review.

3.1.4 Conclusions

In summary there is no easy or inexpensive solution to the problem of acidification. Future legislation is likely to call for stricter control of emissions

and increased use of BAT. There is however a growing awareness of the costs of environmental measures, the law of diminishing returns and the need to balance expenditure on control measures against the benefits gained from reducing acidification. An integrated approach to emissions control, based on an effects based assessment of alternative measures is likely to evolve. In the long run this could well involve increased investment by the EU to promote emission reductions outwith the current EU member states.

3.2 Air Pollution and Quality

As described in Section 3.1 SO_2, NO_x and NH_3 have been identified as the major pollutants affecting acidification. NO_x and to a lesser degree SO_2 are also among the main pollutants affecting air quality. Summertime smog occurs when nitrogen oxides and hydrocarbons react in the presence of sunlight. Wintertime smog consists mainly of SO_2, NO_x and particulate matter which becomes trapped at ground level by a layer of cold air above towns and cities. Concern over air quality relates to the harmful effects of air pollution on human health as well as the environment as a whole.

3.2.1 Ambient Air Quality Assessment and Management Directive

Proposed by the Commission in July 1994 this Directive is currently completing its second readings in European Parliament and Council and should come into force later this year. The Directive will establish a framework through which air quality information can be obtained and standards defined for a number of pollutants. Article 4 of the Directive states that the Commission will submit proposals setting out limit values and, where appropriate, alert thresholds for SO_2, NO_x, fine particulate matter, suspended particulate matter and lead before 31 December 1996. The Council will addopt this through qualified majority voting in accordance with article 148(2) of the Treaty. Working groups have already been established to produce position papers on the various pollutants affecting air quality. Article 7 of the Directive requires Member States to take the necessary measures, taking into account an integrated approach to the protection of air, soil and water, to ensure compliance with the limit values once they have been established. Member States are also required to draw up action plans indicating measures to be taken in the short term where there is a risk of alert thresholds being exceeded.

3.2.2 Conclusions

Following the framework Air Quality Directive described above, a number of daughter directives will be proposed by the Commission over the next few years to establish limit values for each of the pollutants which affect air quality. The Commission recognises the need to balance costs and benefits in setting limit values for the various pollutants which affect air quality. It has therefore called on the working groups, in their position papers which will form the basis of future directives, to include a chapter which provides estimates of the costs of measures required to reduce pollution and a description of the costs of lack of action. It is likely that for some installations, the impact on air quality will determine future permitted emission levels.

3.3 Climate Change

Climate change from global warming has been identified as one of the key environmental themes to be tackled under the 5EAP. This issue has moved up the political agenda over the past decade as scientific opinion has reached a broad consensus that the greenhouse effect is real and requires policy action on an international scale. The main greenhouse gases have been identified as carbon dioxide ($CO_{2)}$, methane (CH_4), nitrous oxide (N_2O) and chlorofluorocarbons (CFCs). The continued emission and accumulation of these gases in the atmosphere could result in an overall rise in the global mean temperature, a rise in sea level with serious consequences for many coastal regions, and increased frequency of droughts and flooding which would affect agriculture, forests and biodiversity. It is estimated that CO_2 is responsible for 51% of the global impact with CH_4 contributing 34%. Attempts at reaching agreement to limit and reduce emissions have focused strongly on CO_2. To date no EU policy measures or targets have been set for CH_4 emissions.

3.3.1 Plans for Reductions in CO_2 Emissions

The Commission's 1990 paper entitled "Energy and the Environment" began the debate on a Community response to the greenhouse effect. At the same time Member States were involved in the Intergovernmental Negotiating Committee set up by the United Nations (UN) in 1990 to prepare a Framework Convention on Climate Change (FCCC). This eventually led to the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in May 1992 at which individual states made various commitments under the FCCC to reduce or stabilise emissions of CO_2. Sweden and the UK for example are both committed to stabilise their emissions at the 1990 level by 2000, while Germany has undertaken to achieve a reduction of at least 25% from the 1987 levels by 2005. In Spain and Portugal per capita CO_2 emissions in 1990 were well below the EU average. These countries have indicated that they expect their CO_2 emissions to increase.

The Commission signed the FCCC on behalf of the EU and undertook to bring forward policies which would allow total CO_2 emissions for the EU12 to be stabilised at 1990 levels by 2000. This decision was finally agreed by the Council in December 1993 enabling the Community to ratify the Convention. Although it is recognised that the EU commitment will not be achieved through uniform reductions across all Member States, agreed targets for individual Member States have not been established. In May 1992 the Commission proposed a comprehensive strategy to deliver the proposed EU commitments on CO_2 emissions by combining measures on energy efficiency, renewables and a carbon / energy tax.

3.3.2 Carbon / Energy Tax

The Commission's proposals envisaged a 50:50 energy and carbon tax which would be phased in from ECU 17.75 /toe in the first year, equivalent to approximately $3 /bbl, and increased each year by one third of the initial rate to reach $10 /bbl within 7 years. The proposal allowed some tax relief for energy intensive industries in order to protect their competitive position in global markets.

The Commission estimated that by 2000, CO_2 emissions would be almost 4% lower with the tax than they would be without it. The carbon / energy tax was seen by the Commission as an essential element in the strategy aimed at stabilising overall EU CO_2 emissions at 1990 levels by 2000.

The Commission's proposal met strong opposition within the Council and despite several attempts to find a compromise, no legislation has been agreed. The issue has often been portrayed as one in which the UK is isolated in its opposition to any form of Community wide tax. In fact there is a range of views within the Community which can be summarised as follows. A majority of EU members are in favour of a carbon / energy tax. Within this group Denmark, Finland, Sweden and the Netherlands have already introduced the tax at a national level. Germany is not in favour of allowing variations in the level of tax and would only agree to uniform tax rates throughout the EU to ensure a level playing field. The group of countries known as the cohesion 4 (Spain, Portugal, Greece and Ireland) would support a tax provided they do not need to apply it. These countries argue that they should be exempt at least for a number of years for economic development reasons. France is in favour of a carbon tax but argues against the energy component of the tax. A purely carbon tax would have little impact on the French ESI since only 3% of French electricity production is now derived from fossil fuels (80% nuclear, 17% Hydro in 1994).

The UK position is that application of such a tax should be a matter for Member States and should not be imposed by the EU. The UK has pointed out that it can meet its commitments under the FCCC without the need to impose a carbon / energy tax. The UK is willing to agree to enabling legislation which would allow member states to introduce a carbon / energy tax if they so wish. This idea is unlikely to be acceptable to Germany.

3.3.3 Progress on Reducing CO_2 Emissions

It is not yet clear whether the stated aim to stabilise overall emissions of CO_2 at the 1990 level by 2000 will be achieved. Eurostat information indicates that for 1993 emissions from fossil fuel combustion was 3180 million tonnes which was 2.3% below the 1990 level. The EEA report for the 1995 review of the 5EAP states that estimates vary from a 10% increase to a 5% reduction but gives a preliminary estimate of a 1% reduction. The report points out that the outcome depends heavily on the reduction achieved by Germany which accounted for about 30% of the EU emissions in 1990. The EEA report also estimates that if no further policy measures are agreed then beyond 2000, CO_2 emissions could rise by 1% per year as a result of continuing growth in production.

3.3.4 Conclusions

After several years of debate and discussion, it is now widely accepted that no progress will be possible on carbon / energy tax at EU level for some time to come. Although the Labour Party has made no formal statement on this issue, it is unlikely that a future Labour Government would immediately alter the UK position, given their strong opposition to the imposition of VAT on domestic fuel consumption. Nevertheless the idea that the burden of taxation should be shifted

from employment to environmental pollution is one which may prove increasingly attractive as concern over environmental issues and unemployment within Europe continues to grow. Therefore while an EU wide carbon / energy tax is unlikely to be introduced in the immediate future, it cannot be ruled out, particularly if scientific evidence on global warming becomes even more certain.

4 SUPPORT FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY

With little prospect of agreement on a common carbon/energy tax in the near future, further progress on reducing CO_2 emissions is likely to depend heavily on measures to develop and increase renewable energy production and on improvements in energy efficiency. On each of these issues, the EU has adopted a similar approach in line with the principle of subsidiarity. Both the ALTENER (renewable energy) and SAVE (energy efficiency) programmes are aimed at supporting and complementing Member State initiatives while the JOULE and THERMIE programmes support the research and technological development efforts of companies in the energy sector, but only where these efforts have a European dimension.

4.1 Renewable Energy

In 1990 renewable energy accounted for 10.1% of electricity demand, 3.3% of heat demand and 4.3% of total primary energy demand in the EU12. Of the 191 TWh of renewable electricity output that year, the vast majority (86%) was produced from hydro sources. The Member States who have joined the EU since 1990 are better placed in terms of renewable generation. In 1990 output from hydro power stations in Sweden, Finland and Austria totalled 115 TWh which was 46% of total electricity production in those countries. Estimates of the maximum potential contribution from renewables vary up to 25% of primary energy demand, depending on the assumptions made regarding the political commitment and financial support given to developing renewable energy technologies.

4.1.1 Member State Initiatives

Most Member States have introduced policies, independent from the EU, to encourage the development of renewable energy production. Some national government initiatives are described below.

In **Denmark** the national government has set objectives on installation of wind capacity and made grants available for up to 50% of the investment costs of new wind generators. As a result, wind-power production in the eastern part of the country, the region served by Elkraft, reached 290 GWh in 1994, which was 2.4 % of total electricity consumption in this region. The Danish government also provides subsidies for combined heat and power (CHP) schemes and in 1993 the Parliament decided that Danish power plants must burn a minimum of 1.2 Mt of straw per year from the year 2000. In **Germany** a 1991 law requires utilities to purchase electricity from renewable sources at a rate based on the average tariff charged to final customers. In 1993, solar capacity in Germany totalled 1,318

MW, 1% of the total installed capacity of 122,875 MW. Hydro capacity at 8,691 MW accounted for a further 7% of the total in Germany. In the **Netherlands**, agreements between the Government and the regions call for the installation of 3,000 wind turbines per year, amounting to 1,000 MW by 2000. There was more than 3,400 MW of CHP capacity in the Netherlands in 1994 and this is expected to increase to 8,000 MW (39% of total capacity) by 2000. **Sweden** has allocated 2500 million SEK (290 million ECU) to support wind power and biomass-fuelled CHP over a 5 year period from 1991. As a result 200 wind generators (50MW) and 55 biomass CHP plants had been developed in Sweden by 1995.

In **Spain**, legislation will allow renewable generation to be remunerated at a special rate to be determined by the government, taking into account its contribution to protection of the environment. In **Portugal**, subsidies amounting to 60 million ECU will be used to promote independent renewable generation projects between 1994 and 1999. Part of the subsidy is being provided from European Regional Development funds. In the **UK** 1,000 MWe of CHP was installed between 1990 and 1993 and this figure is expected to grow to 5,000 MW by 2000. Renewable generation has been promoted through Non Fossil Fuel Orders (NFFO) in England and Wales and in Northern Ireland and Scottish Renewable Orders (SRO) in Scotland. In England and Wales, the 4 Renewable Orders which have been announced between 1990 and 1996 have resulted in over 1000 MW of renewable capacity coming on load, using various technologies including wind, landfill gas, waste combustion and small hydro.

4.1.2 EU Initiatives

Member States have tended to use command and control mechanisms which require utilities and electricity suppliers to purchase electricity generated from renewable sources. By contracts, EU policy in this area has been limited to support for research and demonstration projects and to promote exchange of information.

The ALTENER Programme which runs from 1993 to 1997 will provide funds of around 40 million ECU (£32 million) to aid research and support Member State initiatives. Among the indicative objectives set out in the ALTENER programme are that the capacity and annual output from renewable electricity generation (excluding large hydro) throughout the EU12 should approximately treble from 8 GW and 25 TWh in 1991 to 27 GW and 80 TWh by 2005. A further objective is to secure a market share for biofuels of 5% of total fuel consumption by motor vehicles by 2005.

The approach described above in which EU initiatives are designed to complement and support those of the national governments is seen as appropriate in this context and is generally perceived as having been successful. The Commission will soon be making proposals for ALTENER 2 which will run from 1997 and is likely to have a budget of perhaps three times that of ALTENER 1. In addition to the ALTENER programmes which are targeted specifically at renewable energy, the EU also provides support through its Fourth Framework Programme (4FP) for Research and Technological Development. Under the 4FP which runs from 1994

to 1998, over 1 billion ECU (£800 million) has been allocated to the JOULE-THERMIE programmes for research, development and demonstration projects in the field of non nuclear energy. While the bulk of these funds has been allocated to the development of fossil fuel technologies, renewable energy is one of 4 areas identified for support from the JOULE-THERMIE programmes.

4.1.3 Conclusions

Positive promotion of renewable energy production has broad support throughout the Member states of the EU. It has been generally accepted that the potential for renewable energy development will vary significantly among and even within Member States. Consequently there has been no attempt to impose EU wide solutions in this area. Nevertheless the EU has made a significant contribution in support of renewable energy, particularly in relation to sharing of information, research and technology development. This role is likely to increase as we approach the end of the century. Within the EU, the evolution and further integration of the internal market should increase the pace at which technology developments and competencies are disseminated. Given that a prime reason for promoting renewable energy is to reduce global emissions, the EU will have an important role in facilitating export of renewable technologies throughout a wider Europe and beyond.

4.2 Energy Efficiency

Policies aimed at promoting energy efficiency have been advocated for more than 20 years and were originally driven by concerns over security of supply, following the first oil crisis of 1973. While these concerns have diminished over the past decade, the Commission has not lost sight of the fact that the EU currently depends on imports for around half of its total energy consumption and this dependency is expected to increase in the long term. It has been estimated that world energy consumption could double by 2020 and that the EU would require to import as much as 70% of its total energy requirements by that time.

In the 1990s energy efficiency has been promoted primarily as a means of reducing the environmental impact of energy production. In this role it is potentially as important as the development of renewable sources of energy production. The International Energy Agency has estimated that overall savings of 15 to 20% in electricity end-use could be achieved by energy saving investments with pay back periods of 3 years or less. There is however little evidence of improvements in energy efficiency during the 1980s and early 1990s and this is often associated with the fact that energy prices to consumers have reduced in real terms during that period.

4.2.1 EU Policy on Energy Efficiency

EU policy on energy efficiency has suffered from lack of a clear legal basis or a consistent strategy. Without the market pressure which would result from substantial increases in energy prices, progress on improving energy efficiency must depend primarily on regulations or voluntary agreements on efficiency standards. This approach is necessarily complex since it involves defining standards in several sectors covering a wide range of products and applications.

e.g. household appliances, commercial and industrial equipment, transport, building regulations etc. EU strategy on the promotion of energy efficiency had to be adjusted to take account of the subsidiarity principle which emerged from the Maastricht negotiations. As a result the Commission abandoned several draft directives which were near completion early in 1992. Also, those directives which have been pursued, such as the Directive on efficiency standards for domestic refrigerators, have been subject to the usual difficulties; with the European Parliament attempting to stiffen the Commission's proposals, the Council tending to weaken the legislation in order to reach an agreed common position, leaving the Commission to find the best compromise acceptable to all parties. This process typically takes 2 to 3 years from the original Commission proposals to adoption by the Council of the final directive. Another piece of energy efficiency legislation which is likely to prove difficult to progress is the proposed directive on Integrated Resource Planning.

4.2.1.1 Integrated Resource Planning (IRP)

The purpose of the IRP Directive which was proposed by the Commission on 20 September 1995 is to require electricity and gas distribution companies to consider on an equal basis in their planning decisions, investments aimed at reducing demand as an alternative to increasing supply. IRP, sometimes referred to as least-cost planning, has been applied by a number of utilities in the USA where the regulatory regime often requires that investment plans are submitted to and approved by a Commissioner before the costs of the investment can be recovered from the prices charged to customers. In 1994 Denmark passed an Integrated Resource Planning Act as part of the Danish government's plan to promote environmentally friendly utilisation of energy.

The proposed IRP Directive has encountered a great deal of opposition, particularly from within the electricity and gas supply industries. Opponents of the Directive point out that it does not recognise environmental benefits which can sometimes be obtained from switching to electricity or gas from other forms of energy. Others fear that the Directive will impose an unnecessary and costly administrative burden on utilities with little or no benefit in terms of improved planning decisions. Perhaps a more fundamental problem with IRP is that it assumes an integrated and centrally planned energy supply infrastructure which is out of step with the development of liberalised energy markets and freedom of choice for customers. It can be argued that initiatives such as Third Party Financing (TPF), being pursued under the SAVE programme, are more appropriate to liberalised markets than IRP.

4.2.1.2 The SAVE Programmes

The original SAVE programme which was approved by the Council in October 1991 allocated 35 million ECU (£28 million) to support a series of energy efficiency measures between 1991 and 1995. It should be succeeded by SAVE II, which will run from 1996 to 2000, with an initial budget of 45 million ECU (£36 million) and the possibility of an upward revision after 2 years. The SAVE II budget will be used to support specific actions and pilot projects in energy management and co-ordination, development of energy efficiency infrastructures

in Member States and regions where these are relatively under-developed (cohesion), monitoring of progress on energy efficiency improvements and information exchange. SAVE II will also incorporate the aims of earlier programmes in this field; namely PACE (rational use of electricity) and PERU (energy management in regions and cities).

Another initiative which is being pursued as part of the SAVE programme is Third Party Financing (TPF) of energy efficiency investments. Under this scheme the European Commission offers to act as project superintendent for contracts involving Energy Service Companies (ESCOs) who provide investment funds, and private companies or public institutions wishing to reduce their energy costs by means of identified energy saving investments. Also, in support of the SAVE II objectives the Commission has pointed out the contribution which investments in energy saving can make to other EU objectives such as regional development and employment.

4.2.2 Member State Actions

Among Member States, the level of investment and support for energy saving measures is variable, but in general the promotion of energy efficiency has not been a major priority in the energy policies of national governments. Some examples of the actions taken by different Member States are given below.

Denmark has possibly seen most activity in this area with its 1990 law which empowered the Energy Minister to set efficiency standards for appliances and in 1994 its Integrated Resource Planning Act. In the **UK**, the recent supply price controls announced by the Electricity Regulator included an allowance of £1 per franchise customer to be spent on energy efficiency measures. In **Holland**, according to the Environmental Action Programme 1990 to 2000, energy distribution companies are allowed to charge a levy of up to 2.5% on consumer bills to support expenditure on environmentally friendly production or demand side measures (DSM). **Sweden** has adopted a 5 year plan (1991 to 1996) which will provide a 1000 million SEK (116 million ECU) subsidy for energy efficiency measures. In **Ireland** the government has announced a 6 year energy efficiency programme with a budget of 42.2 million ECU (£33.8 million) of which 20 million ECU (£16 million) was provided by European Regional Development Fund. The above examples are not an exhaustive list of Member State initiatives in this area. They are given only as an indication of the type of action and level of support which is currently being provided to improve energy efficiency at national level in the Member States.

4.2.3 Conclusions

Improvements in the efficiency with which energy is used can make a significant contribution towards reducing the environmental impact of energy production within the EU. For various reasons, most of the potential improvements have not yet been realised and consequently the objective set by the Council in September 1986, that energy intensity in the EU12 should be reduced by at least 20% by 1995, was missed by some margin. Figures published by the Commission in its 1993 Annual Energy Review show very little reduction in energy intensity

between 1986 and 1992. As an example, energy consumption for the EU12 in the domestic and tertiary sectors, only reduced from 0.93 toe per inhabitant in 1986 to 0.89 toe/inhabitant in 1992.

Recently, concern on environmental matters, and in particular global warming, has given new impetus to energy efficiency policies. Initiatives undertaken at Member State level, will need to be further developed and given higher priority if they are to achieve real progress in reducing energy intensity. It has been estimated that investments in energy demand reduction create 3 to 4 times the number of jobs as equivalent supply side measures. Given the continued concern over unemployment rates across Europe, this could well prove a significant factor in favour of increasing energy efficiency measures over the next few years.

5 LIBERALISATION OF ELECTRICITY MARKETS

5.1 Actions By Member States

The supply of gas and electricity has historically been regarded throughout the world as a natural monopoly. Although for many years there has been trading in electricity among utilities, particularly in the US, it was not until the mid 1980s that the idea of true competition for supply to final customers began to be considered seriously.

In the **UK**, the first steps towards creating a competitive market in electricity were taken in 1990 when the Electricity Supply Industry was transferred to private ownership. This introduced competition in generation and supply to customers with a peak demand of at least 1 MW. The threshold for competitive supply was lowered on 1 April 1994 to include customers with demand of at least 100 kW and the entire market will be open to competition in 1998. In gas there is already competition for supply to customers with an annual consumption of at least 2,500 therms (73,250 kWh) per annum. The UK gas supply market will also be completely open to competition from 1 April 1998. Competition in both the electricity and gas supply markets has resulted in substantial price reductions for customers funded by cost reductions achieved by the utilities. In the electricity market customers were reported to be paying between 5 and 15% lower prices in real terms than they were before market liberalisation. Early indications are that further substantial price reductions have been achieved by customers for 1996/7 as the industry gears up to full liberalisation in 1998.

Liberalisation of the electricity supply market has also been undertaken in the Scandinavian countries. The Norwegians (not a member of the EU) established an electricity market in 1992 and have now been followed by **Finland** on 1 June 1995 and **Sweden** at the beginning of 1996. Sweden decided to give all customers the right to change supplier from the beginning of 1996, rather than phase in competition over a number of years. Sweden, Finland and **Norway** are developing a common electricity market founded on independently regulated transmission and distribution grids and already several large customers from Sweden have signed

contracts with Norwegian suppliers. In December 1995 the government of the **Netherlands** published an energy policy paper which calls for liberalisation of the electricity market by 1998. **Denmark** is actively considering options for electricity market liberalisation although it has not yet been decided how this should be achieved. **Portugal** has encouraged external investment in generation capacity, but the extent to which the supply market will be opened is still unclear. In **Spain** a two tier approach is being adopted so that the existing electricity supply systems will continue, but with provision for independent generation and supply based on freely negotiated contracts. It is unclear whether the alternative independent system proposed for Spain will grow to become a significant proportion of the national electricity supply market.

By contrast **France** has consistently opposed radical liberalisation of energy markets and has argued that central planning is essential to ensure public service requirements are met, proper long term investment decisions are made and security of supply is maintained. Liberalisation appears more likely in **Italy** which already has a significant and growing private sector. Italy abandoned nuclear power following the 1987 national referendum and in 1993 almost 16% of Italy's electricity consumption came from imports, mainly from Switzerland and France. Plans to restructure and privatise the state owned utility ENEL have stalled since the collapse of the Berlusconi government at the end of 1994. Nevertheless, further liberalisation of electricity and gas markets in Italy is expected and could well be linked to privatisation of the state owned utilities.

Germany exchanges electricity with eight other countries (Austria, the Czech Republic, Denmark, France, Luxembourg, Netherlands, Sweden and Switzerland). In addition, an undersea interconnection is planned with Finland. At government level, Germany has argued in favour of market liberalisation across the EU and is anxious to ensure fair competition across national boundaries with reciprocity among Member States. The German ESI is less enthusiastic about market liberalisation. The local municipalities have exclusive rights on electricity distribution and supply. This monopoly has been used to increase electricity prices, equivalent to a local tax based on electricity consumption. In many cases this has been achieved by means of agreements through which the municipality grants a utility exclusive rights to supply electricity in exchange for a fee. However, these agreements have been challenged by the German competition authority, the Bundeskartellamt, and new legislation has recently been announced to introduce third party access to electricity networks.

5.2 European Union Policy

There is clearly a diversity of views among the member states on the extent to which energy markets should be liberalised. Against this background, EU policy has made very little progress since the first draft proposals on market liberalisation were produced in 1988. The Commission maintains that, while security of supply and public service criteria need to be considered, these should not be used to restrict competition within the internal market of the EU. There have been several unsuccessful attempts at producing a compromise directive which would set a path and timetable for introduction of competition, while meeting the objections of

those countries who are concerned that public service standards would be compromised by complete liberalisation.

The current debate on EU legislation proposals concerns the differences between a market model based on negotiated third party access (TPA) as proposed by the Commission and the alternative Single Buyer (SB) model promoted by France. The negotiated TPA model allows the existing owners of transmission and distribution grids to negotiate terms and conditions for access to their networks. There is a strong argument that regulated and transparent pricing of the electricity transport system is essential to ensure effective competition. Since this is not a feature of the current Commission proposals, there are strong doubts regarding the effectiveness of the proposed legislation. It is likely that any further weakening of the Commission's proposals would not be acceptable to the UK, Germany or the Scandinavian countries. Those who are in favour of liberalisation may prefer to have no EU legislation rather than accept measures which they feel would restrict the pace and extent of competition.

The Commission and the Italian Presidency have given a high priority to their attempts to broker an agreement on electricity market liberalisation before the Florence European Council meeting at the end of June. At the 7 May Energy Council meeting the Member States unanimously agreed that there should be some opening of the electricity markets to competition throughout the EU. However, there is still considerable divergence of views on the extent and pace of liberalisation. Following lengthy bilateral negotiations with the French industry minister prior to the Council meeting, the German industry minister Mr Rexrodt reported that the French position had moved and that the 40 GWh threshold for competitive supply was "*no longer topical*". Discussions between Member State officials are continuing and it is still possible that a special Energy Council meeting may be convened on 16 June to try to finalise agreement.

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5.3 Conclusions

Most member states of the EU are committed to introducing some measure of competition in energy supply although the pace of change and the extent of competition is likely to vary significantly among member states. This will be true irrespective of whether agreement is reached on EU legislation. Some countries may limit competition to a section of the market with no clear commitment or timetable for full liberalisation. This is likely to lead to complaints to the European Court of Justice from customers who do not qualify for inclusion in the competitive market. The countries which are already committed to full liberalisation are the UK, Sweden, Finland and the Netherlands. France, Belgium, Greece and Ireland are among the states which have expressed most reservations about full market liberalisation and are therefore likely to restrict the extent of competition in supply. Nevertheless, the progressive opening of energy supply markets in those countries which are slow to introduce competition may well provide the best business opportunities for those companies who have learned to prosper in a competitive energy market.

6 CONCLUSIONS FROM A SCOTTISH PERSPECTIVE

EU policy towards the energy sector is important to Scotland as Scotland is the most energy rich economy in the European Union. Around two thirds of the UK reserves of natural gas which are estimated at between 2200 and 4800 billion cubic metres, and almost all of the oil reserves estimated at between 3.7 and 8.8 billion tonnes are situated in North Sea oil and gas fields, off the coast of Scotland. Sour gas from BP's Miller field provides the principal fuel for the 1284 MWso electricity generating station at Peterhead. The vast majority of the UK hydro generating capacity (1.2 GW) is located in Scotland. Scotland also has substantial reserves of coal (in excess of 200 million tonnes) which provide fuel for ScottishPower's two large coal-fired stations at Longannet (2304 MWso) on the Firth of Forth and at Cockenzie (1152 MWso) near Edinburgh. Nuclear power from Scottish Nuclear's advanced gas-cooled reactors at Torness (1250 MWso) and Hunterston (1150 MWso) provides 50-60% of total electricity demand in Scotland. In 1995/6 electricity exports from Scottish generating companies (ScottishPower, Scottish Hydro Electric and British Nuclear Fuels at Chapelcross) to England and Wales were just over 10 TWh, which is approximately one third of total electricity demand in Scotland. In short, energy is a vital export sector for Scotland.

Scotland's oil, gas and electricity sectors have all been opened up to competition to such an extent that EU legislation in this field would be unlikely to have much of an impact: liberalisation is already a fact in Scotland. The big changes in the structure of the Scottish electricity and gas sectors will be driven by the UK national initiative to introduce a competitive market for domestic customers by 1 April 1998.

EU environment policy, on the other hand, has had and will continue to have a very major impact on the Scottish energy sector. The original LCPD compelled the Scottish electricity generators to make significant investments to reduce their SO_2 and NO_x emissions and Scottish Power has continued to invest in emission abatement technology in anticipation of the LCPD review. For example, in order to reduce emissions from its coal-fired power stations, ScottishPower has already installed low NO_x burners at its largest station at Longannet and in 1996 a new design of burner, which will reduce NO_x emissions by up to 60%, will be fitted to one of the four units at Cockenzie. Also this summer, ScottishPower will be installing a demonstration gas reburn system at Longannet, partially funded by a £5.5 million grant under the EU's Thermie Programme. As well as making a significant contribution to reducing emissions from Longannet, the gas reburn project will provide valuable information and experience which can be used to help reduce emissions from coal-fired stations throughout the world.

APPENDIX 1

ABBREVIATIONS

BATNEEC	Best Available Technology Not Entailing Excessive Cost
BP	British Petroleum
CHP	Combined Heat and Power
CH_4	Methane
CLRTAP	Convention on Long-Range Trans-boundary Air Pollution
CO_2	Carbon Dioxide
DSM	Demand Side Measures
EEA	European Environment Agency
ENEL	Ente Nationale per L'Energia Electrical
EU12	The 12 member states of the EU until the end of 1994.
EU15	The 15 member states of the EU (EU12 + Austria, Finland and Sweden)
GWh	Gigawatt hours
IPPCD	Integrated Pollution Prevention and Control Directive
LCPD	Large Combustion Plant Directive
MWe	Megawatt electrical
MWso	Megawatts sent out
NO_x	Nitrogen Oxides
SEK	Swedish Krona
SO_2	Sulphur Dioxide
toe	tonnes oil equivalent
TPF	Third Party Financing
TWh	Terawatt hours
UNECE	United Nations Environmental Committee for Europe
5EAP	Fifth Environmental Action Programme

APPENDIX 2

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