SUSTAINABILITY AND THE FUTURE OF EUROPEAN ELECTRICITY POLICY

A policy paper by

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CONTENTS

FOREWORD

The liberalization of energy markets has fundamentally changed the general conditions for energy policy in all European states. Although energy policy remains within the jurisdiction of individual Member States, all measures are subject to the proviso of economic and legal compatibility with the liberalized energy market. A number of policies, realized at a national level with the objective of environmental protection, the safeguarding of jobs and the securing of energy supply, have now come under the pressure of competition. The question arises, as to what extent fair competition can prevail in a market in which externalized costs and hidden subsidies distort prices.

At the same time the EU has adopted ambitious goals in the area of climate protection and the introduction of renewable energy sources. The EU is called upon to take the initiative in negotiations concerning the UN Framework Convention on Climate Change.[*] As the Earth Summit (Rio + 10) in 2002 approaches, it is already apparent that the theme of sustainable energy supply will play a decisive, and potentially very positive role. Faced these challenges the EU cannot afford failure.

Despite certain inconsistencies, there can and ought to be no return to monopolized energy markets. Instead, all possibilities must be exhausted to utilize the dynamism of markets and their unique role of encouraging innovation and increasing efficiency for the achievement of environmental protection goals and to get rid of existing contradictions. A regulatory framework is required for competition, that is effective in this direction, instead of playing off "sustainability" against "profitability".

These themes are the subject of this Policy Paper. It does not claim to provide definitive answers to the numerous questions raised, but rather to point out the challenges and to outline fundamental strategies for a sustainable electricity system. The implementation of these strategies in precise policy is then elaborated upon in a number of key fields of action.

Does a common energy market not also require a common energy policy and, in consequence, a chapter on energy in the EC Treaty? In the opinion of the authors this is not absolutely essential, although it could accelerate the targeted horizontal integration of environment policy in this area of policy.

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[*] cf. Hermann Ott, Sebastian Oberthür (1999): Breaking the Impasse: Forging an EU Leadership Initiative on Climate Change. Heinrich Böll Foundation, Documentations, Papers and Reports. No. 2, Berlin

The Heinrich Böll Foundation commissioned this Policy Paper because the European dimension represents an essential extension to national sustainability-orien-tated energy policy. In an earlier paper we showed how this can be pursued in Germany, now that a start has been made with the phasing out of nuclear energy and the ambitious promotion of renewable energy sources.[**] There is still a long way to go until an energy supply is achieved, that deserves the name "sustainable". Policy at municipal, national, European and global levels is called upon to proceed along this path.

We thank the authors from the Öko-Institut for their commitment and co-operation. Stephan Singer, from the WWF European Policy Office, provided advice both in the design and realization of the project. Important inspiration was also provided by a discussion of experts in July 2000, to which Antony Froggatt, Rob Bradley and Betty Gebers contributed.

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[**] cf. Felix Chr. Matthes, Martin Cames (2000): Energiewende 2020 - Der Weg in eine zukunftsfähige Energiewirtschaft. Heinrich-Böll-Stiftung, Berlin

1 INTRODUCTION

Recent energy policy in the European Union has been increasingly characterized by fragmentation, a result of very different trends and framework conditions.

The liberalization of electricity and gas markets has fundamentally changed this sector. On the initiative of the Commission it is intended to bring the entire sector into line with the system of competition. This ambitious project raises two varied problems. Considering the initial situation, characterized by strong monopolies in most of Member States, the transition to a competitive system with a wide variety of innovative players is a crucial issue. It is still unclear how much and what type of regulation is needed to further real competition and avoid large horizontal and vertical concentrations of capital and power following the transitional process. Aside from the question of electricity market structures concerning the players and capital distribution, the ecological effects of the process gain increasingly in importance. Because the electricity sector will continue to be of great relevance to the environment, its streamlining in favour of economic efficiency will have counter-productive effects.

A *consistent energy policy* is therefore urgently needed, that reflects the energy market on the one hand and external effects on the other hand. Whereas competition policy, as a horizontal policy, has been quite successful in encompassing the energy sector, the integration of environment policies in the energy sector has not gone far enough. Furthermore, energy policy continues to be based on intervention strategies that increasingly come into conflict with the internal market.

This dilemma of different degrees of penetration of horizontal policies into energy policy is compounded by a structural problem concerning the EU. At a formal level energy policy is left largely to the Member States, because the EU has no sphere of authority concerning energy. On a factual level, however, the activities of Member States are limited more and more by EU regulations, derived mostly from competition policy but, looking to the future, also from the EU's environment policy within the framework of international agreements. Against this background, increasing demand for energy policy on the part of Member States is in line with growing uncertainties about whether these policies and measures will fit into the EU framework.

And finally in this context, a new approach to energy policy has to overcome fixation on the supply side. If demand-side activities are to play an increasing role, a whole range of national circumstances have to be taken into account. Balancing the need for significant progress in several energy-policy fields, the demand for fewer uncertainties concerning the activities of Member States through the creation of a consistent EU framework for relevant policies and the broadest possible consideration of national circumstances, is a

major challenge. As a consequence, the extension of the internal market to the energy sector may require the redefinition of the subsidiarity principle in energy policy.

In considering this complicated situation, this paper proposes certain activities at EU level to overcome dilemmas and obstructions concerning two main goals of EU policy, namely, securing an innovative energy market that increases the economic efficiency of the sector and at the same time follows the path towards sustainable development.

The analysis begins with a brief description of the new challenges facing the electricity sector. Certain strategic issues are then outlined, that are of particular interest within the context of sustainable development. Based upon this the analysis highlights a set of key issues for the further development of policy for the electricity sector, that require action at the EU level.

Because of the limited resources made available for analysis, this paper has had to focus on some key issues. Apart from the electricity sector, other sectors of energy policy could therefore not be considered. Furthermore, the fields of research and development, including the EU's energy funds (SAVE, ALTENER, etc.), have not been tackled. This limitation does not mean, however, that the interrelation between those topics and electricity-sector policies is of less importance, but so far as this paper is concerned, another point of emphasis has had to be set.

The intention of the paper has not been to develop proposals for the different issues in detail, but rather to draft a broader picture of policies that will have to be created in a coherent and consistent manner, if the goal of an efficient and sustainable supply of energy services is to be met.

2 NEW CHALLENGES

2.1 LIBERALIZATION AND GLOBALIZATION

2.1.1 Challenges related to the liberalization of the electricity market

The establishment of the internal market for electricity has completely changed the legal and structural framework of the electricity sector in most EU Member States. Apart from the UK and the Scandinavian countries, where liberalization already began several years before the pressure for market opening created a new framework for decision-making both for the electricity-supply industry and electricity consumers in 1998.

The debate on the ecological and other consequences of this new framework is generally impeded by being focused on just a few aspects of the process. Liberalized electricity markets produce varying results, that can represent a reversal in certain respects. The key problem for current reflection on this issue, is that it is nearly impossible to identify net effects from the recent range of experiences. Although experiences are available from countries that have already begun the process of energy-market liberalization, different points of departure, as well as varying stages of development in terms of market saturation and infrastructure, all raise numerous questions about how such experiences might be applied in the EU. The following analysis therefore attempts merely to identify additional challenges associated with the further development of the liberalization process.

It is useful to make a distinction between the incentives which will have an effect in the long run, and those developments that in the course of the next few years will probably dominate the transformation from a heavily-monopolized system to a liberalized market, that can be expected. While long term developments seem to be rather clear, short- and medium-term trends rely strongly on the pathway selected for the market-opening process. Furthermore, it should be borne in mind that certain of the short- and medium-term effects could also influence long-term developments.

Firstly, the liberalization of electricity markets leads to much higher risks for investors in the electricity-supply industry. Whereas in the monopolistic market there was a strong incentive to engage in capital-intensive projects in order to secure a guaranteed return on investment, investments that are less capital intensive are now preferred. Some of the major European players in the electricity markets have significantly increased the required rate of return on capital employed to 20 per cent or more.[1]

[1] For instance, the German concern RWE has announced a 16 per cent return on investment for its energy subsidiary (RWE, 1999).

Different analyses show that this provides a strong incentive for investment in gas-fired, combined-cycle power plants, that are less capital intensive and highly efficient.[2] Against the background of a power-generation mix, which is dominated by coal and nuclear sources, this aspect of liberalization will generate significant environmental benefits. Some empirical evidence for this trend is provided by the development of the power sector in the UK, where power generation from natural gas grew by a factor of 10 in the 1990s, and electricity production from coal decreased by about four-fifths.

Secondly, however, certain more eco-efficient but capital-intensive technologies are running into the same problems as new coal or nuclear power plants. Cogeneration, as well as hydro, solar and wind energy, are generally facing significant problems in competing with conventional energy on the free market. The position of some of these environmentally-sound technologies will seriously deteriorate, if high returns on investment are required. Although gas-fired, combined-cycle power plants are also available for cogeneration, the risk of competing on two different markets (heat and power) can result in additional disadvantages for this form of electricity generation. As a consequence, the securing of environmental benefits by means of these technologies turns out to be more complicated, because of the new incentives created by the market-liberalization process.

Thirdly, since a more efficient energy supply resulting in lower electricity prices is the key objective of electricity-market liberalization, the impact on customer calculations has to be taken into consideration. Evidence shows that lower price levels will reduce incentives for investment in energy efficiency. This situation is intensified by the fact that, at least in part of the industry, the general trend towards globalization and, related to this, growing opportunities for alternative capital investments, do not very much favour energy efficiency measures. From the perspective of the national economy this need not necessarily lead to diminishing potential for electricity savings where positive economic performance prevails, but the attractiveness for investors is very often reduced. In short, these incentives will bring about environmental disadvantages.

Fourthly, customers will have a new role in the market. Because electricity is doubtless a strong, homogeneous model for comparison, its price will play an considerable role in the liberalized market. This puts extra pressure on margins, which could encourage efforts to add value to the homogeneous product. There is a chance that ecological characteristics of generation or energy services could here play a role. But whether this will become reality, or to what extent consumers will demand it, remains uncertain at the moment.

Fifthly, the structure of market players will change. The initial situation varies widely in different EU Member States. On the one hand there are countries, where the electricity-

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[2] For details see OECD/IEA (1998) or Öko-Institut (1998). The efficiency of new coal-fired power stations can be estimated at 45 per cent for the next years, whereas the efficiency of natural-gas-fired, combined-cycle power plants will reach 60 per cent very soon.

supply industry is characterised by a large number of utilities (Denmark, Germany, etc.), whereas other countries are dominated by one monopolistic utility. Assuming that a certain variety of players is a prerequisite for market innovation, the liberalization process could result in more innovative structures, especially if non-utility players enter the market. If market opening is successful in breaking the predominance of single utilities, the benefits could outweigh the disadvantages resulting from a potential loss of variety in historically more heterogeneous structures. Whatever happens, the entrance of a new kind of player will create a much more innovative market environment, which in turn will often lead to environmental progress. Nevertheless, the dangers of a process of horizontal and vertical concentration ending in an oligopolistic structure should be taken seriously. Considering ongoing merger and acquisition activities in the European power sector, the question arises as to which strategy ought to be chosen to check this trend and ensure a competitive environment for electricity in the long run. The decision as to whether the future electricity market will be dominated by a few major players with considerable political influence, or encompass a broad range of different, innovative players, will be made in the coming years during the transition phase.

Furthermore, shortcomings are still to be found in the analysis of the liberalization process for energy markets. On the one hand, the question of employment effects of liberalization requires more in-depth analysis. Falling employment in the power sector will increase demands for proof of net employment gains from liberalization for the economy as a whole. On the other hand, the consequences for local and regional economies remain unclear, a factor that also requires more-detailed analysis.

Finally, the fact that external costs are not taken account of in the free market is nothing new for the energy sector, but the problem will be intensified by liberalization. Considering that there are still huge differences in estimates of external costs regarding climate change and nuclear power, the internalization of externalities will have to rely on second-best solutions.[3]

Taking into account reverse trends initiated by the liberalization of electricity markets, four major challenges have to be met:

1. Compensating the additional burden on investors of environmentally-sound technologies that require considerable capital investment, or have to compete on the electricity and heat market.
2. Extending incentives for energy efficiency in an economic environment characterized by strong competition in terms of energy prices.

[3] Depending on methodological approaches and assumptions, quantified external costs for nuclear power differ by a factor of up to 1000. See DG XII (1995), Hohmeyer et al., (1995) and Prognos (1992) for more details of the discussion on externalities.

3. Strengthening the influence of customer choice both on the electricity-generation sector and on the energy-services business.
4. Ensuring a market structure with numerous players and thus creating equal opportunities.

Apart from the very general mechanisms described above, the *transitional phase* from a monopoly system to a liberalized market throws up additional problems.

Against the background of significant surplus capacities[4] in Europe, during the *first phase* the market will be determined by the most competitive power plants, in terms of short-term marginal costs. This will cause significant environmental disadvantages, should these be coal-fired or nuclear power plants. Furthermore, incentives could be created for extending the lifetime of existing plants, which would hamper investment in new, cleaner and more-efficient plants. In the absence of additional supportive measures, adverse environmental consequences of the liberalization process will have to be expected, until an equilibrium of supply and demand is reached, providing incentives for new investment, which could be cleaner and more-efficient technologies. The timeframe for this phase is rather uncertain, but, bearing in mind the plant-life structure of the European energy sector, it could cover the next decade.

Furthermore, if liberalization begins with large customers and spreads to other customer groups only gradually over a period of several years, this will strengthen those players in the market who are able to compete for large customers and at the same time pass on their costs, in part, to captive customers. These players could establish such a strong hold on the market, that the development of market structures offering a variety of players could be obstructed. In theory this could be compensated by effective regulation, but there is no evidence that the regulatory authorities have solved the problems which hampered such regulation in the past and at least led to strong pressure for liberalization. The prevention of intrinsic concentrations presents the liberalization process with a major challenge, especially in the transitional phase.

2.1.2 Lessons from the implementation of the internal electricity market

The EU Directive on common rules for the internal market in electricity[5] has set step-by-step targets for the opening-up of markets: In 2000, consumers representing 30 % of total electricity demand have to be granted access to the market; for 2003 the target is 35 %. All Member States have adopted legislation to implement the Directive at na-

[4] Depending on the respective definitions, estimates for recent surplus capacities in Europe range from about 30,000 to 60,000 MW.

[5] Directive 96/92/EC of the European Parliament and of the Council from December 19, 1996, concerning common rules for the internal market in electricity.

tional level. Belgium and Ireland have been granted an extension of one year for implementation of the targets, Greece for two years.

Table 1 Implementation of the internal electricity market directive

	Market opening (2000)	Future steps planned	Unbundling (generation / transmission / distribution)	Network access
Austria	30%	100% in 10/2001	Legal	Regulated
Belgium	35%	49% in 2003	Legal	Regulated
Denmark	90%	100% in 2003	Legal	Regulated
Finland	100%		Ownership	Regulated
France	30%	33% in 2003	Management	Regulated
Germany	100%		Management	Negotiated
Greece	30%	33% in 2003	Management	Regulated
Ireland	30%	33% in 2003	Legal	Regulated
Italy	30%	40% in 2002	Legal	Regulated
Luxembourg	40%	75% in 2005	Management	Regulated
Netherlands	33%	100% in 2007	Legal	Regulated
Portugal	30%	33% in 2003	Legal	Regulated
Spain	45%	100% in 2007	Legal	Regulated
Sweden	100%		Ownership	Regulated
UK	100%		Ownership	Regulated

Sources: COM(2000) 297 final, second report from the Commission on the state of liberalization of the energy markets, diverse national energy laws

Most Member States have, at a formal level, far exceeded the target for *market opening* set by the Directive. But the formal degree of market opening alone is not a sufficient indicator of the real market situation: The *conditions for grid access* differ significantly in terms of transmission tariffs and transaction costs. All Member States except Germany have chosen a regulated third-party access (rTPA) system for the implementation of market opening. Larger differences exist with regard to the *unbundling* of the transmission and distribution system from generation and trade, which is a major cornerstone of fair network access. In this respect the Directive stops short of setting appropriate standards for all Member States. Only three Member States have separated the ownership of the network from interests of generation and trade; eight States have chosen legal separation.

Recent developments in Germany show that the only negotiated TPA system in Europe is shifting slowly towards a partially-regulated system. Although there are still no general system of tariffs; every system operator is obliged to publish his own tariffs. But

system access still has to be negotiated individually in most cases. The shortfalls of German voluntary agreements in guaranteeing fair and easy system access also demonstrate the necessity of effective regulation of transmission and distribution systems, which are the only remaining monopolies in the European electricity industry.

In its recent communication on progress in creating the internal electricity market[6], the Commission states that the issues of unbundling and regulation of TPA have to be re-examined in order to create a functioning internal market.

The liberalization of energy markets can be supported under the Directive by *public service obligations (PSOs)* for the market players. Besides security of supply and consumer protection, environmental issues are one major reason for these obligations. Most Member States use PSOs for the realization of support schemes for electricity from renewable energy sources or combined heat and power. On the other hand, almost no Member State has established PSOs for demand-side management. The PSO instrument represents an outstanding basis for environmental regulation of the electricity market. At the same time, however, uncertainty has to be addressed concerning the extent to which PSOs are seen to be in line with the Directive and state-aid rules.

Market liberalization has influenced *electricity prices* significantly. For residential as well as commercial and industrial consumers energy prices in most EU Member States have decreased significantly.[7] A clear relation between the degree of market opening and prices can be confirmed for the industrial sector. In Germany, Sweden, Finland and the United Kingdom industrial prices have dropped 10 to more than 20 per cent on average. In most other countries the price drop has been much less. A more heterogeneous pattern results for the residential sector. In Finland and Sweden price cuts have been significantly higher than in other countries.

Even if market liberalization is at an early stage an increasing trend towards *horizontal and vertical concentration* can be observed. Mergers and acquisitions throughout the electricity-supply industry have reached a high level of intensity, including growing cross-border involvement on the part of major European players. The fact that national cartel authorities are required to take increasing account of the dimensions of the EU internal market, raises the hurdle for intervention. Nonetheless, certain cartel authorities have intervened to limit the concentration process. Whether such interventions remain sufficient, remains to be seen. There is some evidence to suggest, that up to now success on the part of new market players is very limited.

The Commission is currently examining possibilities to *speed up the electricity liberalization process*. The Commission will prepare a report for the Stockholm Council in March 2001 with proposals in this regard. Under discussion is the complete opening and

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6 Recent progress in creating the internal electricity market (COM(2000)297 final)

7 The analysis is based on Eurostat data (Eurostat News Release No. 82/2000, 18.07.2000).

integration of the EU electricity market by 2004. It can be expected that environmental considerations will play only a minor role in this process. On the other hand, developments so far have shown that at least the major effects of liberalization, namely lower electricity prices and higher uncertainties for investors in generation capacities, have a negative impact on environmentally-sound technologies such as renewables, CHP and efficient use of energy. Any policy to accelerate market opening should therefore not only aim at dismantling impediments, such as vertical integration of the electricity industry, but should also foster environmental regulation of the electricity sector. The importance of common environmental standards in line with EU environmental policies - such as the distribution of the Kyoto target - is growing with current plans of the Commission to foster cross-border electricity trade.

2.1.3 Liberalization in a global context

Liberalization of the electricity supply industry is only part of a more comprehensive trend towards more competitive elements in many spheres of society. This trend marks the growing role of economic efficiency in the general debate. However, the focus on instruments that primarily challenge the economic efficiency of pursuing certain targets, fundamentally underlines the need for improvements in efficiency. In this context two aspects should be highlighted for policy-making.

Firstly, within the framework of sustainability, market pressure for lower prices for goods and services that generate significant externalities (e.g. environmental or social damage) could create contradictory effects. Besides the internalization of external costs, this requires growing pressure on economic efficiency for complementary and more sustainable goods and services. Stronger elements of competition should therefore be adopted in relevant policies.

Secondly, the trend for more competition forces a much more transparent formulation of *targets* and their ranking. Whereas in the past the focus was often directed at certain technologies, that were expected to create some benefits, these benefits should now be targeted directly and the resulting technology mix increasingly determined by the market. Taking into account the manifold imperfections of markets, that, in part, are not yet mature (lacking long-term shortage signals, poor consideration of innovation processes etc.), this does not necessarily mean that policies focusing on particular technologies are obsolete. Nevertheless, in future such policies will have to be much better founded than before.

At least for the sphere of energy and environmental policy, the formulation of clear targets and more competitive elements will fit best into the general economic and political environment.

But stronger orientation towards market-based instruments will also create new problems for traditional framework regulations for the market. A key issue in this field is the

European Union's state-aid policy. If policy ought to rely much more on flexible, market-based instruments (tradable emission permits, quota obligations for clean technologies etc.) state-aid regulations will have to allow for this type of instrument.

2.2 SUSTAINABILITY

Although sustainable development is widely accepted as a model of development for the European Union, aspects of operationalization of the environmental, economical and social dimensions of sustainability, and their interaction, are still lacking.

With regard to the electricity sector, a broad consensus exists on two major environmental challenges towards sustainability: climate change and nuclear energy. On the one hand, the growing evidence of global warming requires considerable action in lowering greenhouse-gas emissions, especially from combustion of fossil fuels. On the other hand, the risks of a nuclear disaster, the generation of large quantities of long-life radioactive waste, as well as permanent radioactive pollution from the nuclear fuel chain, demand renunciation of this technology.

Greenhouse-gas emissions from the European Union account for a significant share of global GHG emissions. About 20 per cent of the world's carbon dioxide emissions and approximately 25 per cent of the total greenhouse-gas emissions from industrialised countries come from Member States of the European Union.

A detailed analysis of the contributions of different greenhouse gases in the EU illustrates the dominant role of carbon dioxide on the one hand, and emissions from electricity generation on the other.

In the period from 1990 to 1998 the share of carbon dioxide in total greenhouse-gas emissions[8] grew from 80 to 82 per cent in the EU average. Only in a few countries was this share significantly less. In some EU Member States the importance of carbon dioxide is even greater.[9] The contributions of other greenhouse gases, such as methane and nitrous oxide, as well as HFC, PFC and SF6, are not insignificant, but of much less importance.[10] If carbon dioxide is the most important greenhouse gas in the EU, electricity

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[8] For this comparison non-CO_2 greenhouse-gas emissions were expressed in carbon dioxide equivalent.

[9] The analysis is based on data from the European Environmental Agency as well as own estimates and calculations. In 1998 the share of carbon dioxide was 77 % in France, 74 % in Spain, 72 % in Portugal and 63 % in Ireland. In Italy carbon dioxide contributed 85 %, in Germany 87 % and in Luxembourg 88 %.

[10] Only in a few EU member states do the contributions of methane or nitrous oxide exceed 10 per cent in 1998 (*methane* in Austria and Spain – 12 %, in Ireland – 21 %, in Portugal – 19 %; *nitrous oxide* in Sweden – 11 %, in Denmark and Spain – 12 %, in France – 13 %, in Ireland – 16 %). The share of new gases (HFC, PFC and SF_6) grew about 50 per cent from 1990 to 1998, but they still contribute only 1 per cent of total greenhouse-gas emissions.

generation is the largest emitting sector, accounting for about 30 per cent of total carbon dioxide emissions, even if this share has slightly decreased since 1990.[11]

Within the framework of the Kyoto Protocol the European Union has committed itself to a reduction in greenhouse-gas emissions of 8 per cent for the first period from 2008 to 2012, compared with the 1990 level. Based upon this commitment the burden-sharing agreement between EU Member States sets differentiated targets for each country, as shown in Table 2.

The table also illustrates the preliminary outcome of this commitment. This has a sobering effect eight years before the first commitment period begins. Only three EU Member States have achieved a reduction in emissions.[12] Five countries still record increasing emissions, although they should at least achieve an emission reduction. Furthermore, two EU members, who were given stabilization targets much higher than 1990 emission levels, have already exceeded their assigned amounts.

[11] Direct emissions from industrial energy consumption and industrial processes amount to 17 per cent, transport to 26 per cent, residential energy consumption to 15 per cent and other sectors to 12 per cent.

[12] Data provided in the forth and fifth columns of Table 2 illustrate the different trends. 70 per cent of greenhouse gas *reductions* in EU member states with decreasing emission trends were achieved in Germany. More than one third of growing emissions in the EU is provided by Spain.

Table 2 Greenhouse gas emission trends and commitments, European Union

	Assigned Amount (Burden Sharing)	Emission Trend 1990-1998	Share in emission decrease[a]	Share in emission growth[b]
	1990=100		%	
Austria	87.0	106.4		3
Belgium	92.5	106.2		5
Denmark	79.0	109.5		4
Finland	100.0	104.7		2
France	100.0	101.2		4
Germany	79.0	84.5	70	
Greece	125.0	114.4		8
Ireland	113.0	119.1		6
Italy	93.5	105.4		15
Luxembourg	72.0	41.8	3	
Netherlands	94.0	108.3		10
Portugal	127.0	117.5		6
Spain	115.0	121.0		36
Sweden	104.0	103.3		1
Utd. Kingdom	87.5	90.4	27	
EU-15	92.0	97.9	100	100

Notes: [a] as of the total of all countries with decreasing emissions – [b] as of the total of all countries with increasing emissions

Sources: European Environmental Agency, Öko-Institut estimates and calculations

If the Kyoto commitment is understood to be a first step on the path towards sustainability, that also requires much stronger follow-ups, then additional efforts in greenhouse-gas emission reductions have to be made. Bearing in mind its outstanding role, the electricity sector will necessarily represent a key area for climate policy. Otherwise emission reduction targets for the period to 2012 and beyond can hardly be met.

The assessment of problems related to *nuclear energy* differs widely. Nuclear energy plays a significant role in EU power generation. Eight of the 15 EU Member States operated 145 nuclear reactors with a net capacity of around 120,000 MW in 1999, which is about one fifth of EU total generation capacity. Taking into account that no reactor is under construction in the EU, as well as problems of competition affecting nuclear power generation, nuclear capacities will exhaust their technical service life and be shut

down without nuclear replacement. As a consequence, recent projections assume slow phasing-out, even in the absence of an active shut-down policy.[13]

Nevertheless, a slow phasing-out seems also to be unacceptable, for two reasons especially. Firstly, because a major nuclear disaster, which could destroy the societies and economies of countries or complete regions, cannot be excluded. Secondly, because the generation of radioactive waste, which has to be safely handled for tens of thousands of years, has to be limited to an absolute minimum.

Table 3 Nuclear power in the European Union

	Net Capacity	Grid Connection		Nuclear Electricity Generation		
		First	Last	Total share[b]	Cumulative[b]	Nuclear Waste[c]
	MW	Unit[a]	Unit[a]	%	TWh	t HM
Belgium	5,712	28.08.74	15.06.85	58	784	2,970
Finland	2,656	08.02.77	04.11.80	33	382	1,447
France	63,103	13.12.73	24.12.99	75	5,377	20,367
Germany	21,122	29.10.68	03.01.89	31	2,942	11,144
Netherlands	449	04.07.73	04.07.73	4	96	364
Spain	7,470	14.07.68	23.05.88	30	835	3,163
Sweden	9,432	19.08.71	05.03.85	47	1,324	5,015
United Kingdom	12,968	27.08.56	14.02.95	26	1,650	6,250
EU-15	122,912	27.08.56	24.12.99		13,390	50,720

Notes: [a] of operational power stations; [b] as of 1999; [c] raw estimate for high-level radioactive waste

Source: International Atomic Energy Agency, Eurostat, Öko-Institut calculations and estimates

Some argue, on the other hand, that nuclear energy is the only way to confront the global-warming problem, and that a choice has therefore to be taken between the risk of global warming and the problems of nuclear energy.[14] But this approach could only be accepted if all other options to combat global warming were to be seen as insufficient, which is not very likely from the perspective of current knowledge.

Recent developments in the nuclear sector are dominated by two different trends. On the one hand, Austria, Denmark, Greece, Luxembourg and Portugal have renounced the use of nuclear energy, Italy stopped nuclear generation in 1986 and Germany, Belgium as well as Sweden have set up a phasing-out policy. On the other hand, the Commission

[13] See E3M-Lab (2000) for details.

[14] This is the key message from the "Dilemma Study" initiated by the Commission (ERM Energy 2000).

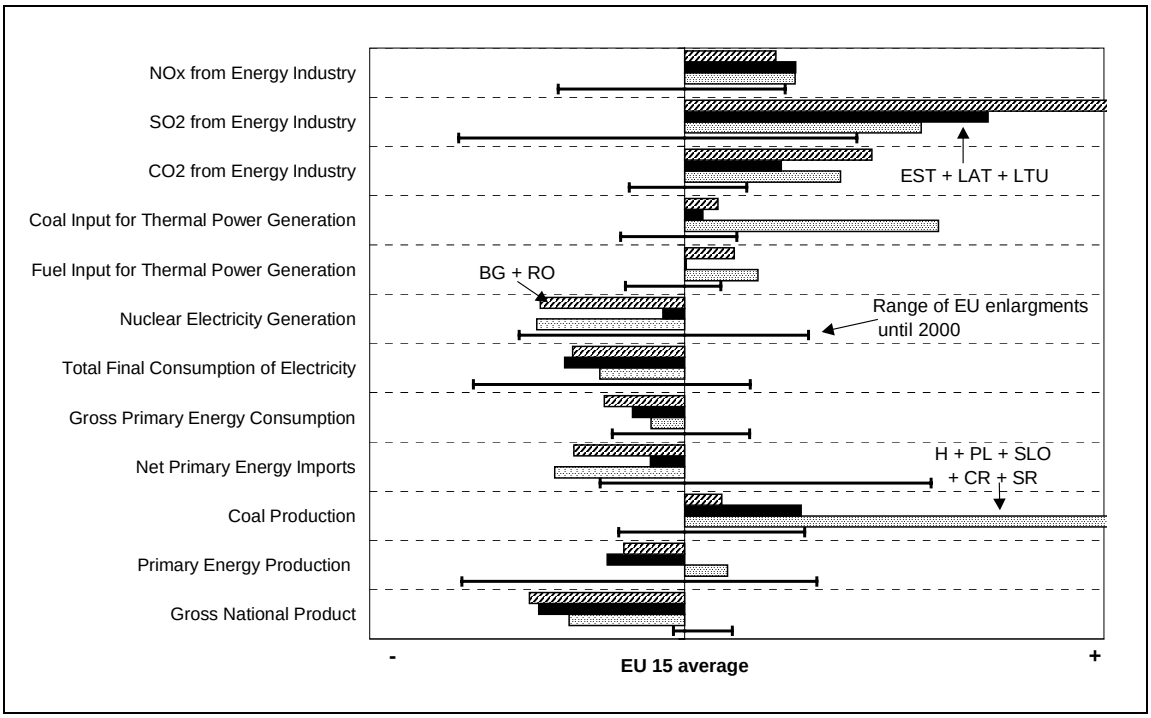
and some Member States (for example, France) seem to be still very much in favour of a new nuclear approach.

Against this background, sustainability in the electricity sector should be understood as overall risk minimisation: a significant reduction in greenhouse-gas emissions and at the same time, and as soon as possible, the phasing-out of nuclear energy. Meeting these two targets is ambitious, but without alternative if necessity requires that both problems be taken seriously.

2.3 ACCESSION PROCESS

The enlargement of the European Union through the accession of Central and Eastern European countries represents a major challenge for the coming decade, mainly for two reasons. First, the accession countries are undergoing a process of system transformation covering all spheres of society, and at the same time they have to fit into a EU framework, that was developed for quite different needs. Second, enlargement can only be successful if the EU succeeds in realizing an extensive process of internal reform, which will also be partly determined by the different structures and demands of the new Member States.

Figure 1 Indicators for different stages of EU enlargement



Sources: Eurostat, UNFCCC, Öko-Institut's calculations and estimates

Figure 1 presents certain indicators that help to identify crucial points.[15] Compared with previous EU enlargement, the Central and Eastern European as well as the Baltic countries highlight certain significant differences. The first aspect, that makes the upcoming enlargement unique, is the large differential in gross domestic product (GDP). Enlargement with all ten candidates would increase the EU population by at least 28 per cent, but GDP by only 11 per cent.[16] A relation such as this has not previously been experienced in EU enlargement. This means that the energy market will be greater, but purchasing power undoubtedly limited to a level much lower than that in the EU at present. Primary energy production is within the range of other EU countries. A major problem will result from the dominant role the coal-mining sector plays in certain accession countries (Poland, Czech Republic, etc.). Current coal production in the group of countries with the best chance of early entry to the EU amounts to roughly the same as that of total EU production today. Import dependency is slightly lessened by enlargement, but will increase again if the energy-sector restructuring process in the accession countries initiates the switch from coal to gas. Energy consumption is within the EU range, but remains relatively high bearing in mind the low level of GDP. So the improvement of energy efficiency should remain an important issue for the accession countries.

Coal plays a much more dominant role in both the primary energy balance and the electricity sector than in the EU. The restructuring of the coal sector is therefore the first major challenge from the perspective of industrial and environmental policy. Emissions of conventional air pollutants and carbon dioxide from the energy industry were much higher in all accession countries than the EU range in the late 1990s. Adjustment to better emission standards is consequently a key issue for the electricity sector.

As can be seen from Figure 1, on average thermal-power generation plays a much bigger role than nuclear power in the group of EU aspirants, which is in turn less important than in the EU-15.

Nevertheless, in some countries nuclear power contributes substantially to power supply. In the seven candidate countries 24 nuclear power reactors are in operation, representing a total capacity of about 13,000 MW. Three units are under construction in the Czech Republic and Romania; the erection of seven further units has been abandoned. No plans for additional plants exist in the Central and Eastern European or the Baltic states at the moment.

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[15] The data are the latest available and comparable, and mainly from 1998 and 1997. The static analysis presented here ignores possible development processes. Developments driven forward by the accession process might be underestimated, as might also be the impetus given to Member States that were part of past enlargement. Nevertheless, for a first and rough assessment this approach seems to be acceptable.

[16] GDP is expressed here in purchasing power parities. Were it to be calculated with exchange rates, the difference would be even larger.

With the exception of the Romanian reactors, all nuclear plants are of the Soviet type. In the absence of common safety standards the EU has classified 8 units as high-risk reactors, which should be shut down as soon as possible. The respective countries have scheduled the closure of some plants; for other plants there are indications of subsequent shut down.

The safety standards of other Eastern European nuclear-power stations are therefore also a permanent issue in an ongoing debate. Probability assessments of safety factors for Soviet-designed reactors show that the predicted frequency of damage is 10 to 50 times higher than for Western pressurized water reactors.[17]

But the safety standards of nuclear-power reactors are not the only problem. The electricity market in most of the countries that operate nuclear-power stations is characterised by heavy surplus capacities. In the light of weak domestic demand a significant and increasing number of nuclear-power stations are targeting exports to EU countries. Especially Czech nuclear-power generators intend to export large quantities of electricity to Western countries.

[17] See Enconet (1997) for details.

Table 4 *Nuclear-power stations in Central and EasternEuropean and the Baltic States*

		Type	Net Capacity MW	Grid Con-nection	Remarks
Bulgaria	Kozluduy-1	WWER	408	24.07.1974	High-risk reactors, closure
	Kozluduy-2	WWER	408	27.09.1975	Scheduled for 2003
	Kozluduy-3	WWER	408	17.12.1980	High-risk reactors, closure
	Kozluduy-4	WWER	408	17.05.1982	Expected for 2006
	Kozluduy-5	WWER	953	29.11.1987	
	Kozluduy-6	WWER	953	02.08.1991	
Czech Republic	Dukovany-1	WWER	412	24.02.1985	
	Dukovany-2	WWER	412	30.01.1986	
	Dukovany-3	WWER	412	14.11.1986	
	Dukovany-4	WWER	412	11.06.1987	
	Temelin-1	WWER	912	01.12.2000[a]	Under construction
	Temelin-2	WWER	912	01.03.2002[a]	Under construction
Hungary	Paks-1	WWER	430	28.12.1982	
	Paks-2	WWER	433	06.09.1984	
	Paks-3	WWER	433	28.09.1986	
	Paks-4	WWER	433	16.08.1987	
Lithuania	Ignalina-1	LWGR	1,185	31.12.1983	High-risk reactors, closure
	Ignalina-2	LWGR	1,185	20.08.1987	Expected for 2005 and 2009
Romania	Cernavoda-1	PHWR	650	11.07.1996	
	Cernavoda-2	PHWR	650	04.12.2004[a]	Under construction
Slovak Republic	Bohunice-1	WWER	408	17.12.1978	High-risk reactors, closure
	Bohunice-2	WWER	408	26.03.1980	Scheduled for 2006 and 2008
	Bohunice-3	WWER	408	20.08.1984	
	Bohunice-4	WWER	408	09.08.1985	
	Mochovce-1	WWER	388	04.07.1998	
	Mochovce-2	WWER	388	20.12.1999	
Slovenia	Krsko	PWR	632	02.10.1981	
Notes: [a] planned					

Source: International Atomic Energy Agency, European Commission

The challenge in the electricity sector is primarily one of preserving and developing high environmental and safety standards. Whereas the Directive on large combustion plants provides a sufficient basis concerning a reduction in air pollution, the accession process

has again illustrated that the absence of common EU safety standards for nuclear-power stations is a flaw in the legal framework for fair competition in an opening electricity market.

If adaptation periods are requested for the fulfilment of environmental and safety requirements, the second challenge of the EU enlargement will be to find a coherent strategy of adaptation and market opening to avoid market distortions arising from cheap, pollutive generation.

The third challenge of the accession process is related to ownership structures in the electricity supply industry. The privatization of utilities has reached varying levels in different accession countries. But experience from countries with extensive privatization (Hungary, for example) has shown that the major EU-15 market players tend to dominate business in those countries too.[18]

Last but not least, a very general objective of the accession process is related to the time factor. If the accession countries are required to undertake strong efforts to meet EU requirements, many opportunities could be lost - especially in the electricity sector, which is characterized by long-life assets - if long-term demands are not taken sufficiently into consideration. Coping with this sphere of conflict between fast accession to the EU, as it exist today, and the EU's own long-term restructuring needs, arising from the necessity for sustainable development, is a key issue for the whole enlargement process.

2.4 CONCLUSIONS

With the developing process of liberalization of the electricity market, environmental regulation is becoming more important. Market players need to be given rules to ensure that possible negative effects of liberalization on environment policy targets are avoided, and the benefits of competition enjoyed.

Within the triangle of European energy policy targets -

- competitiveness
- environmental protection
- security of supply

- great progress has been made during the last few years with regard to competitiveness and security of supply. A main focus of EU energy policy should now be directed at environmental aspects.

Considering the huge significance of greenhouse-gas emissions from electricity production, the risk of nuclear accidents and the problem of radioactive waste from nuclear-

[18] See Froggatt (2000) and Öko-Institut/FFU/Ecologic (2000) for details.

power generation, the introduction of additional environmental incentives for the electricity sector will be crucial for the realization of sustainable development.

Furthermore, sustainable development should also be a target for market players. Developments in the last decades have shown that environmental innovations in the electricity industry, such as demand-side management (DSM), integrated energy services, third-party financing, distributed generation from renewable energy sources and CHP, were often developed and introduced by small and medium-sized players. A variety of independent market players of varying size, ownership and business activity, can therefore be regarded as a prerequisite for future innovation. Recent merger activities, together with the increasing integration of the European electricity industry, demonstrate that numerous players are not a matter of course in liberalized markets. Anti-trust control is thus not only a matter of (economic) competition policy, but is also in the interest of an environmentally-innovative electricity sector. Moreover, electricity markets, as well as possibilities for market access, should be structured in such a way that different types of players can take part.

Without a doubt, security of supply has lost its priority in the liberalization process. Apart from regulations directed at short-term interruptions in oil or natural gas supply, provisions on technical standards or on strategic diversification are today left up to the supply industry. The Commission has recently been in the process of preparing a Green Paper on the security of energy supply. The main challenge facing this strategic approach will be to ensure consistency with the liberalization process, on the one hand, and with environmental and safety requirements on the other.

A strategy for securing energy supply, that limits or distorts competition on the electricity market, and is also not in line with the strategy of environmental-risk minimization, would represent a setback for the process as a whole. In particular, there should be no new approach favouring nuclear power, based on the supply issue, before all other options for lowering demand and diversifying energy supply have been adequately addressed at the EU level.

And finally, the shortcomings of European energy policy will continue to be highlighted in the EU enlargement process. The challenge of overcoming the weakness of common European standards and regulations regarding reactor safety, radioactive waste management, greenhouse-gas emissions, etc., which must necessarily complement the internal electricity market, will become increasingly relevant, not only for the enlargement process.

3 STRATEGIES TOWARDS A SUSTAINABLE ELECTRICITY SYSTEM

3.1 ENERGY EFFICIENCY

The electricity sector, as already mentioned, is a key field of action for both climate policy and problems related to nuclear power. All efforts to improve the environmental performance of this sector face a structural problem. In contrast to other sectors, where the source of emission is very closely-related to the use of energy, these two aspects are decoupled in an extreme form in the electricity sector.

The large potential for reductions of both emission and risk in the electricity-supply industry often results in policies and measures being solely concentrated on the supply side. This approach underestimates the enormous increase in electricity consumption, that is forecast for the European Union in the business-as-usual scenario. The recent European Union Energy Outlook predicts overall growth in electricity consumption of about 40 per cent for the next twenty years. Only in a few countries (Germany, Sweden) is the increase expected to be about 25 per cent or less, and for a number of countries (Greece, Ireland, Portugal, Spain) electricity demand is expected to rise by 60 per cent and more. Whereas the elasticity between economic growth and energy consumption for other fuels has become much lower in the last decades, the rise in electricity demand seems to be unfailing.

Even if some of the basic assumptions and the methodological approach of the EU Energy Outlook raise certain questions, if no effort is made to break the trend of continually-growing consumption, emission reduction on the supply side will lead to a very unbalanced fuel mix (dash for gas) or to high costs (renewables). Furthermore, models show that concentrating on the supply side in order to reach emission reductions is only efficient in the short run. If more ambitious emission reductions are to be achieved, the exploitation of the electricity-saving potential is obligatory.[19]

Many studies at the European as well as the national level have shown an impressive potential for electricity savings. The technological options range from efficient household and office appliances, to lighting technologies, electric motors and smart standby applications. Single technologies can save 80 per cent; the general consensus is that the total electricity-saving potential, that could be realized economically, is about 20 to 30 per cent. What is more, there is a large potential of electricity applications, where a shift to other fuels (gas or renewables) could represent a quite attractive option (heating applications).

[19] For details see E3M-Lab (1999, pp. 68).

The implementation of energy efficiency in the electricity sector is to some extent more complicated than with other fuels, mainly because of the diversity of applications. Apart from research and development, two general approaches can be identified for the realization of potential savings in this field. Firstly, lowering the transactional cost of the decision-making process on the customer side. The possibilities range from labelling standards and motivation campaigns to special rebate programmes. Secondly, some measures target market transformation, for example. by addressing the producer side, the wholesale sector or research and development.

Specific action in the field of electricity savings should consequently be given a high priority in policies and measures focusing on sustainable development.

Stabilization of electricity demand would account for an emission reduction of 180 million tons by 2010 and 360 million tons by 2020, compared to the projected emission trend. If a reduction of electricity consumption could be achieved in absolute terms, the emission reduction would be much larger.

3.2 RENEWABLE ENERGY

With all fossil and nuclear energy resources being non-renewable, and therefore limited in absolute terms, renewable energy sources (RES) can help to preserve other resources for coming generations. At the same time RES are an important element of any climate-change strategy. Although there are options for greenhouse-gas reductions at lower cost in the short and medium term, it is clear that RES have a significant role to play in any long-term strategy. In order to make these technologies available at reasonable cost at the appropriate time, it is necessary to develop them progressively, drawing them closer to the market.

Additionally, RES have significantly-less environmental impact than fossil and nuclear energy, and represent a domestic energy resource that helps to reduce the Community's dependence on energy imports. Moreover, RES contribute to the creation of new jobs in an industry with prospects of sustainable growth and excellent export potential.

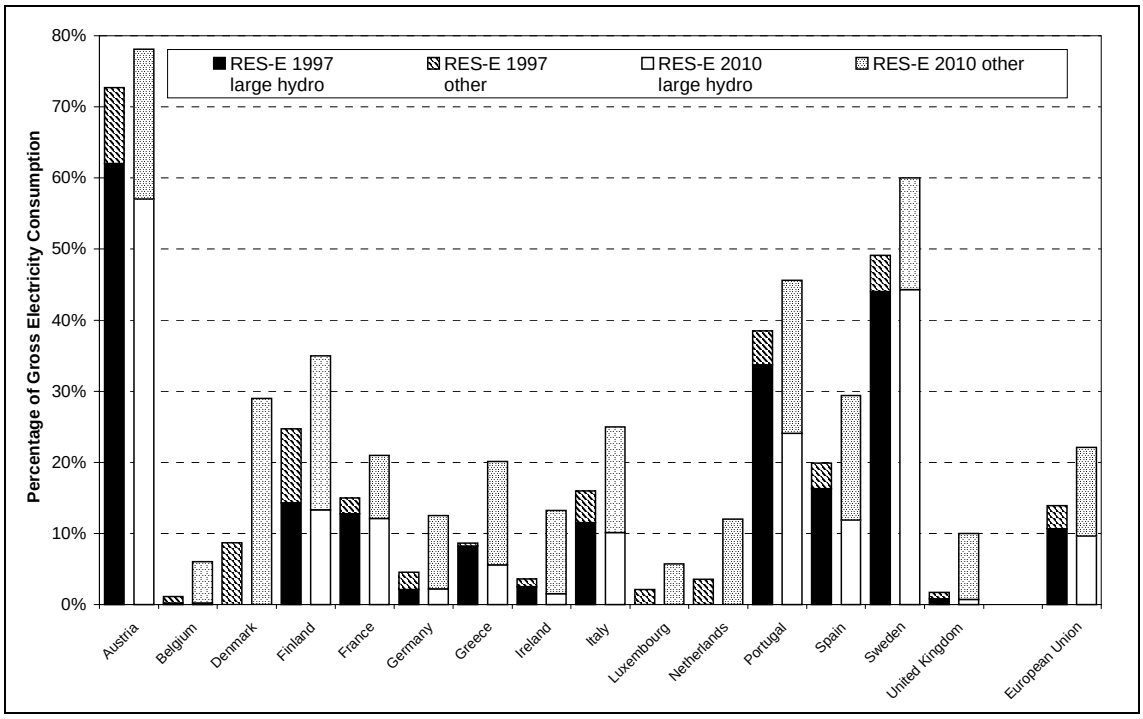
In the long run, therefore, any sustainable energy system has to rely mainly on RES. Comparison of this vision with the current contribution of RES to gross inland energy consumption, amounting to 6 %, highlights the huge task facing renewable-energy policy in the coming decades.

Bearing in mind other aspects (securing and diversifying energy supply, reasons of social and economic cohesion), the EU should give high priority to this matter, not only for environmental reasons.

The current technical potential of RES has been estimated at 29 % of the Community's total primary-energy demand.[20] In its White Paper on RES policy[21] the Commission has set an indicative target of raising the contribution of RES to gross inland energy consumption to 12 % in 2010. For the electricity sector this translates into a target of 22.1 % for electricity from RES in 2010, compared to 13.9 % in 1997.[22] The Commission itself calls these targets "*ambitious but realistic*". The major part of the targeted increase in RES use is expected to come from biomass. Recent developments, for example in the field of wind power, indicate that the target could even be exceeded, if incentives remain in force for electricity from RES.

Figure 2 shows the share of electricity from RES in EU Member States in 1997 (large hydropower and other renewable sources) in comparison with the indicative targets suggested by the Commission in the draft Directive.

Figure 2: Indicative targets for electricity from RES as proposed by the Commission, compared to 1997 values



Source: Proposal of the Commission for a Directive on the promotion of electricity from renewable energy sources in the internal electricity market, May 2000

[20] DG XVII (1998)

[21] Energy for the Future: Renewable Sources of Energy. White Paper for a Community Strategy and Action Plan. COM(97)599 final (26.11.1997)

[22] In its White Paper the Commission has set a target of 675 TWh/a for electricity from RES, which was translated into a share of 23.5 % of projected gross electricity consumption in 2010. In the draft Directive consumption is assumed to be higher; the generation target from RES therefore translates into a lower share of 22.1 %.

Doubling the share of RES by 2010 corresponds to an emission-reduction potential of 200-300 million tons of CO_2, which is a significant contribution towards fulfilment of the EU's Kyoto commitment, as well as to other long-term sustainability goals.

3.3 CLEANER AND MORE EFFICIENT USE OF FOSSIL FUELS

A key technology for the efficient use of fossil fuels is cogeneration (combined production of heat and power – CHP). Compared with condensing power plants, which have an efficiency of 35 to 55 % (with values above 48 % only being reached by new combined-cycle gas turbines – CCGT), the utilization of heat and power in cogeneration plants leads to efficiencies of up to 90 % and more. CHP can therefore offer fuel savings of between 10 and 40 % in comparison to separated generation in boilers and condensing power plants.

According to Eurostat figures, the share of CHP in gross electricity generation in the EU-15 was 9 % in 1994. COGEN Europe estimates the share to be 10 % in 1999. There is a large difference between Member States in this respect: Denmark (50 %), the Netherlands and Finland (both 40 %) have the highest share of CHP in power production, while Ireland, Greece, France and Belgium provide values below 5 %.

Cogeneration is mainly employed in district heating networks or in industrial plants with a high demand for power and heat, or steam. In some Member States monopoly utilities have been discriminating against cogeneration by demanding high prices for backup power, while offering only very low prices for excess power fed into the grid. The liberalization of the electricity market has gradually removed this barrier. Some of these former monopolies are now building CHP plants in co-operation with large industrial customers in order to bind these customers to their companies. Cogeneration also benefits from gas liberalization. A large share of CHP plants is gas-fired and now offering competitive prices.

On the other hand, the sharp current drop in electricity prices make investments in new CHP plants unattractive. In several countries considerable cogeneration capacities have been shut down because their costs exceed market prices.[23] Although it is expected that electricity prices will again gradually increase after some of the excess capacity has disappeared, a significant loss in CHP capacity can be expected unless supportive measures are taken.

The Commission estimates the technical potential of CHP in the EU-15 at 900 to 1.000 TWh/a, corresponding to 29 % to 33 % of projected gross electricity demand in 2010. Recent developments in CHP technology might lead to an even higher potential: CCGT technology (power range 5 to 400 MWe), as well as smaller gas motors (0.1 to 5 MWe),

[23] COGEN Europe reports a 15 per cent closure in the Netherlands, in Germany during the last year every month 200 MW capacity was closed down.

offer significantly higher power-to-heat ratios than older plants, and can therefore generate more electricity with a given demand for heat or steam. Within a few years fuel cells might enter the market with even better parameters.

Apart from cogeneration in the district heating sector, it is expected that in industrial and decentralised applications CHP, in particular, will demonstrate dynamic performance. The Commission has suggested a target of doubling the share of cogeneration to 18 % by the year 2010.[24] This could result in a CO_2 emission reduction of 150 Mt/a, corresponding to approximately 5 % of the Community's total emissions in 1990.

[24] A Community strategy to promote combined heat and power (CHP) and to dismantle barriers to its development, COM(97) 514 final. This Communication was endorsed by the Energy Council in December 1997.

4 KEY ISSUES FOR THE FURTHER DEVELOPMENT OF THE ELECTRICITY SECTOR

4.1 PRELIMINARY REMARKS

The internal market for electricity has brought about a major change in the electricity supply industry. For ecological reasons in particular - but not exclusively - certain effects of market liberalization have to be improved or adjusted.

In the following sections some projects and ideas are presented, which could play a role in this process. The framework for development and implementation differs widely. Whereas discussion on certain issues has already begun, other ideas are at an early stage.

In some cases immediate action is required to influence projects that are already in progress; other issues have still to be put on the political agenda.

Some of the issues or instruments are relevant not only for the path to sustainable energy. However, where discussed the sole focus is provided by the energy perspective.

4.2 A LEVEL PLAYING FIELD

The creation of fair market conditions for all sources of electricity is an essential basis for an effective market process.

On the one hand, existing subsidies should be made transparent for all market players and regulators, and be checked against the energy- and environment-policy objectives of both the Community and Member States. Estimates on the amount of subsidies that thwart environmental goals range from tens of billions to more than € 100 billion annually. The enumeration of subsidies that are environmentally counter-productive has still to be tackled in the EU. To some extent this is amazing, bearing in mind the Commission's strong focus on state aid in other fields.

On the other hand, the electricity-supply industry should be subject to the same basic environmental and safety requirements in all Member States. Whereas the directive on large combustion plants established a level playing field for thermal-power generation, on some important issues concerning nuclear-power generation great distortions still exist.

Within the conventional electricity sector especially, direct and indirect support of nuclear-power generation, resulting in significant free-market distortions, deserves closer investigation. For the *nuclear-power sector* these distortions derive from three factors of major relevance.

Firstly, within the last few decades huge subsidies from national and EURATOM budgets have been awarded to *technology research, development and demonstration*. This

encompasses nuclear fission and fusion technology, reactor safety research and all supporting processes from fuel enrichment, handling and transport to the handling, reprocessing and final storage of nuclear waste.

Secondly, differing national regulations on *decommissioning and nuclear-waste funds* can have large impacts on the cost of generation of nuclear power. In-depth analysis carried out for different EU countries demonstrates the wide range of special-purpose reserves that nuclear operators have set aside.[25] Three reasons can be found for this empirical finding:

- The catalogue of services, that nuclear-power plant (NPP) operators have to provide, highlights significant differences. In some countries nuclear operators are not required to contribute sufficiently to the development of final storage facilities for radioactive waste; in other countries the decommissioning of plants is not fully-covered. Furthermore, in some countries there is a debate on the reliability of cost assumptions for back-end costs of the nuclear fuel chain.[26]
- The realization period differs widely. In some countries final dismantling is assumed to take place some 70 years or more after shutdown. Because of the significant effect of cost-discounting, this has a major influence on reserves for decommissioning, that have to be set aside.
- The economic efficiency of back-end management might differ widely. Excess capacity of final storage facilities here plays an important role, because of past expansion plans for nuclear energy.

Whereas these factors are related to the back-end of the nuclear fuel chain and its cost, other distortions can also arise, because decommissioning funds are freely availability for investment, a factor clearly demonstrated in the German case study.

In Germany, funds set aside by NPP operators for decommissioning and disposal of nuclear waste amounted to more than 35 billion Euro in 1998, and are expected to exceed 40 billion Euro within the next two decades:[27] NPP operators can use such reserves for internal financing of investments and acquisitions, and can therefore save interest payments on external capital. With the help of reserves for nuclear decommissioning and waste, large German NPP operators have been able to transform themselves into diversified business concerns during the last decade. The size of this indirect subsidy depends heavily on the period of time the funds are at the disposal of operators, and the manner in which exchange-rate fluctuations and future cost increases are included in appropriate calculations. A very rough estimate shows that the subsidy for German NPP operators is

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[25] For more details see EWI (1997) and Drasdo (2000).

[26] For the related debate in the United Kingdom see Sadnicki/MacKerron (1997).

[27] For details see Wuppertal Institut/Öko-Institut (2000).

equivalent to c€ 1.2 per kWh generated.[28] As planning periods for nuclear-waste disposal cover several decades, the indirect subsidy is effective over a long period.

Thirdly, the requirements for *third-party liability insurance* on the part of NPPs are still inadequate. Detailed studies on the possible damage caused by a severe accident in a NPP in densely-populated areas in Europe indicate that costs of up to 5,000 billion Euro would result from such a disaster.[29] This is nearly twenty times the annual federal budget of Germany.

No NPP in the world is able to cover these sums by insurance. In Germany, for example, each reactor has to be covered with liability insurance of 250 million Euro, which is only 0.005 % of the possible damage from a severe accident.[30] Even where all the assets of nuclear operators are deemed to provide cover for liability, a major portion of ensuing costs has in fact to be covered by society, which represents a significant subsidy of NPP operations.

Bearing in mind the significant role nuclear power plays in the internal market, these distortions have to be abolished. In summary, it can be concluded that a level playing field for the power-generation sector can only be achieved if common technical and economic standards for nuclear power are established at EU level. Even if this is not yet covered by the Treaty, it marks an important challenge in the creation of a fair internal market for electricity.

4.3 GENERAL POLICY ISSUES

4.3.1 Energy product taxes and emissions trading

The Commission and a majority of Member States have attempted on several occasions to lay down minimum standards for energy product taxes, or combined energy and carbon taxes. Although internalization of external costs was identified as a general goal for environment policy, all attempts at harmonizing taxes on energy failed, because of the resistance of a minority of Member States.

Nevertheless, the EU should continue to pursue the path of energy product taxes and, in view of the fact that some of the problems concerning state-aid policy on environmental

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[28] Funds amounting to € 35 billion provide, at an interest rate of 6 per cent, an income of € 2.1 billion per year. On the basis of annual generation of 170 billion kWh this represents additional income of c€ 1.24 per kWh. This rough estimate ignores exchange-rate fluctuations and future increases in costs, which tend to reduce the additional economic benefit; on the other hand, it also neglects the fact, that interest accrued can produce revenue for the NPP operator for several decades after plant closure.

[29] For details see Prognos (1992).

[30] The German government is preparing legislation to raise required liability insurance to € 2.5 billion. This would still represent only 0.05 % of possible damage. Estimates show that this measure will result in additional costs of € 10-20 million for each reactor, or approximately c€ 0.1 per kWh generated.

protection result from the unsatisfactory tax regime, undertake all efforts to lay down minimum standards.

A harmonized energy tax scheme might also provide the basis and incentive for the development of a system of tradable emission permits at the EU level. The pressure for such a scheme results from different trends:

- Among the flexible mechanisms listed in the Kyoto Protocol to the Framework Convention on Climate Change a prominent role is played by emissions trading.
- Some major players from the industrial sector (BP Amoco, Shell) have introduced emissions-trading systems into their emission-reduction programmes.

In the spring of 2000 the Commission presented a Green Paper on an emissions-trading system for the EU[31], which is intended to start in 2005. Many questions were raised, that have still to be tackled, among them fundamental issues:

- Should an emissions-trading scheme be designed wholly complementary to energy-product taxes, or should it form an additional option within the general tax system?
- To what extent can an emissions-trading regime substitute other policies and measures directed at different technologies (RES, for example) with respect to long-term innovation processes?
- How might other policies and measures be linked to an emissions-trading scheme?
- What supportive measures have to be provided, to avoid counter-productive incentives that lead to an overall increase in risks (for example, with nuclear power)?

Interaction with other policies and measures on climate change, as well as limitations set by competition policy, will also demand a lot of further analysis and political negotiations. Nonetheless, the move towards an emissions-trading scheme should be seriously pursued. In contrast to other pollutants, no possibilities currently exist to control greenhouse-gas emissions from the power-generating sector. Taking into account, that the power sector will definitely be part of an emissions-trading system, the opportunity could be taken to control its greenhouse-gas emissions. Bearing in mind this sector's significant role concerning greenhouse-gas emissions, an emissions-trading scheme provides some additional opportunities to adjust some of the environmental effects of electricity-market liberalization.

4.3.2 State aid policy

The need for action resulting from the commitments of the Kyoto Protocol and other agreements, as well as from the use of new market-based instruments, such as fixed-price systems, tradable emission permit schemes and minimum-quota systems, requires

[31] Green Paper on greenhouse-gas emissions trading within the European Union (COM (2000) 87)

a new approach to state-aid policy in the energy and environmental sector. Increasingly-new policy approaches on the part of Member States come into conflict with the state-aid provisions of the EU Treaty. At the present time most of these problems are solved in a case-by-case approach, which causes significant uncertainties for the policy-making process and hampers the development of adequate policies.

In general terms the debate on state aid for environmental aspects of the energy sector must consider the fact that internalization of external costs is a long-term project, and that second-best solutions, including state aid, will be required for an as yet indeterminable period.

Firstly, this concerns the interpretation of policy measures, or parts thereof, as state aid. Aid granted directly by a Member State, or through state resources, doubtless represents state aid. But if Member States create support schemes for energy efficiency, or clean-energy schemes, which do not include state grants, they should not be interpreted as state aid, as the DG Competition presently does. Although certain clarifications are to be expected from recent legal proceedings, much more transparency should be created in this respect, in order to establish a more stable basis for policy-making processes, both in Member States and the EU.

Secondly, if particular schemes are interpreted as state aid, the Commission could declare, by means of regulation, that certain categories of aid are compatible with the common market.[32] This option could be employed if the Commission has sufficient experience to define general compatibility criteria. Since such experience may perhaps be lacking at the present time, this option should be carefully considered for the further development of environment policies in the energy sector, for instance with regard to the Kyoto mechanisms, or support schemes for renewable energy sources.

So long as these two options are not available, adequate, comprehensive and transparent *guidelines* for state aid in respect of environmental regulations in the energy sector have to be established. The 1994[33] guidelines on state aid for environmental protection no longer reflect current requirements. In an update of these guidelines, that has recently been under discussion, a series of problems in the electricity sector are addressed from the perspective of sustainable development:

1. Measures to support energy efficiency, renewable energy sources as well as other clean-energy production (CHP, highly-efficient power plants) should be covered by the guidelines. Considering the special characteristics of the sector, the guidelines should include sector-specific rules.

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[32] Council Regulation (EC) No 994/98 of 7 May 1998 on the application of Articles 92 and 93 of the Treaty establishing the European Community to certain categories of horizontal state aid (OJ L 142, 14.05.1998, p. 1).

[33] Community guidelines on state aid for environmental protection (OJ C 72, 10.03.1994, p.3).

2. State aid in this context should be accepted as a second-best solution so long as other appropriate EU policies on the internalization of external costs are not implemented.
3. As a consequence, limitations on time-related aid (for example, depreciation periods) should not apply. Commitments for a degressive aid structure should be established very cautiously, to exert pressure on economic efficiency on the one hand, but also to ensure positive effects regarding external costs.
4. Operational state aid should be given priority for clean electricity generation, in order to create incentives for avoiding external costs as much as possible.
5. Considering historical developments in the electricity-generation sector, tax exemptions for clean fuels and highly-efficient technologies should be accepted
   (a) to avoid distortions, and to ensure incentives with results similar to those achieved by the internalization of external costs (relative internalization)[34],
   (b) not only for new environmental taxes but also for existing taxes, relying on the concept of relative internalization.
6. New approaches for policy instruments (tradable emission permits and minimum quota obligations, as well as flexible Kyoto mechanisms) should be made possible, taking particular account of the practical problems of phasing-in such new instruments.

Designing an appropriate state-aid policy for energy-related environmental issues, and especially for those of the electricity sector, is a main challenge for future policy towards sustainable development. The development of Community guidelines on state aid for environmental protection, in particular, demands short-term action.

4.4 STRENGTHENING ENERGY EFFICIENCY

Because an increase in the energy efficiency of electrical appliances represents an important part of climate protection policy, it should be focused in the same way as the RES or CHP sector.

In contrast to other sectors, electricity-market liberalization confronts this sphere with two problems:

- The decrease in electricity prices has reduced economic incentives for efficiency measures.

[34] In most Member States there is traditionally no taxation of coal and nuclear fuel in the electricity-generation sector. In contrast, hydrocarbons are subject to taxation in many Member States, simply because of past EU policy to limit power generation from these fuels. Considering the fact that introducing new taxes is in many cases more difficult than abolishing taxes, "relative internalization" could represent a pragmatic option for the short term.

- Electricity utilities have begun to play a significant role in electricity savings in some Member States, partly on a voluntary basis and partly because of regulatory requirements. Most of these players have withdrawn from this activity after market opening.

Against the background of new pressure to promote energy efficiency, the Commission recently published an action plan.[35] So far as electrical appliances are concerned this action plan focuses mainly on the removal of transactional barriers to customer choice, as well as on negotiated agreements on minimum efficiency standards for certain electrical appliances.[36] A Directive was also announced, that should raise the targets of negotiated agreements and facilitate the adoption of mandatory minimum efficiency standards, should this prove necessary.

The EU should redouble its efforts regarding market transformation towards more energy-efficient electrical appliances. In this respect, measures concerning producers or importers of electrical appliances are of particular importance. The EU should strive to set up rules, or reach agreements, on minimum efficiency standards, adapted on a regular basis, for a broad range of electrical appliances (motors, household and office appliances, etc.). In view of recent economic developments, where electrical appliances increasingly represent only a small part of more comprehensive services, market transformation on the part of producers will become more and more important.

Apart from this action, which is a unique function of the EU, a common framework should be established in order to support the internal electricity market with end-use energy efficiency. This should stimulate energy efficiency and also help to establish new forms of energy-service business. As with the internal electricity-supply market, the internal market on energy efficiency should also rely on competition.

To establish coherent development of demand-side management (DSM) services, a Directive on DSM in the electricity sector should be enacted[37]:

- It should address the creation of a supportive framework for energy efficiency DSM for various market players, such as independent energy-service companies, utilities, etc.
- It should require Member States to secure a certain minimum level of improvement through energy efficiency DSM, especially with regard to electrical appliances.
- It should be left to Member States to decide how minimum targets should be achieved, and which areas should be focused upon.

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[35] Action Plan to Improve Energy Efficiency in the European Community (COM (2000) 247final).

[36] The action plan lists water heaters, air conditioners, dishwashers, dryers, consumer electronics (stand-by mode), electric motors, pumps, fans and commercial refrigeration equipment.

[37] The outline for a DSM Directive essentially follows the proposal of WI/ACE/ADEME et al (2000).

- It should require Member States to assess the effects and efficiency of the measures taken and to provide appropriate reports on an annual basis.

Because implementation is governed by the subsidiarity principle, numerous supportive measures could be laid down, reflecting historical experiences, the structure of the policy arena and other country-specific circumstances. Funding of measures could come from the respective state budget, public service obligations related to different types of utilities, or be based on voluntary agreements. The only precondition would be the possibility to evaluate both effect and efficiency on the basis of standardized evaluation methodologies. In this connection, numerous experiences from the integrated-resource-planning debate in the 1990s could be quite valuable.

The minimum requirement for energy-efficiency improvements in the end-use consumption of electricity should be set at 1-2 per cent annually, as compared with a baseline developed by standardized methodology.

4.5 STRENGTHENING KEY TECHNOLOGIES

In the power generation sector two key technologies should be targeted for support: renewable energy sources (RES) and combined heat and power production (CHP).

The electricity Directive provides options for giving priority to these technologies in generation dispatching. Additionally, Member States can define public service obligations for undertakings in the electricity sector. Other measures of indirect support can be implemented directly by Member States.

4.5.1 Renewable energy sources

Discussion about a Directive for the promotion of electricity from RES has been going on for several years. Based on consideration of former drafts and a resolution of the European Parliament,[38] the Commission issued a draft Directive in May 2000.[39]

An evaluation of the draft Directive and the subsequent discussion highlights the following:

- *Binding targets* for the market share of electricity from RES in the Member States would be an important step, providing electricity from RES with a determined role within the process of compliance with the Kyoto targets, and would allow regular review of progress made by Member States. Up to now only few Member States have set binding national targets.

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[38] European Parliament resolution on electricity from renewable energy sources and the internal electricity market, March 2000.

[39] Commission proposal for a Directive on the promotion of electricity from renewable energy sources in the internal electricity market, May 2000.

- Given the diversity of *schemes for the promotion of electricity from RES* currently employed in Member States (fixed feed-in prices, tendering systems etc.), and the limited experience with new schemes, such as Green Certificates, the definition of national support schemes should be left to subsidiarity. Stronger harmonization can be striven for after sufficient experience has been made. A thorough evaluation of the different approaches will have to take into account the complex interaction of incentive schemes with other framework conditions (such as tax reductions or refunds for electricity from RES), the complexity of licensing procedures, direct and indirect costs for system access etc.
- The current review of *state aid regulations* on environmental protection should bear in mind that current price-support schemes for electricity from RES are aimed at making electricity generation from RES competitive with conventional sources in the long term (cf. section 4.3.2).
- The streamlining of *licensing procedures*, and the definition of geographic priority areas for the generation of electricity from RES, can greatly assist the spread of renewable electricity.
- Equitable regulations for *conditions and prices for system access* still have to be created through the regulation of transmission and distribution-system operators in most Member States. Some progress can be expected here from the "Florence process", but this may be insufficient to create non-discriminating system access for electricity from RES.
- *Voluntary purchase of "Green Power"* can be an instrument of support in developing electricity from RES, but it will be insufficient to achieve a major part of the EU target because of the limited response of consumers to Green Power products. Furthermore, obliging *all* electricity consumers to contribute to the costs of expanding generation from RES through a general support scheme is useful in setting a priority in terms of the polluter-pays principle.

4.5.2 Combined heat and power production

The debate of the last few years on the promotion of CHP has not been as intensive as that for energy from RES. This applies both to policy at the European level and to national energy policies in a majority of Member Sates. Some Member States have however developed a quite successful set of policies and measures for the promotion of cogeneration.

In its communication on cogeneration[40] from 1997, the Commission formulated a European CHP strategy. Key elements of this strategy are:

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[40] A Community strategy to promote combined heat and power (CHP) and to dismantle barriers to its development, COM(97) 514 final.

- increased funding for CHP technology and RD&D under different EU programmes, including district heating and cooling;
- possible agreements with industrial sectors on efficiency targets and technology procurement initiatives;
- enhanced co-operation and exchange of information between Member States and the Commission;
- monitoring of the impact of liberalization of the European energy markets on CHP and district heating;
- support of financing schemes such as third-party financing; and
- introduction of energy taxes, that could reflect fuel savings by CHP

In its Draft Communication on the Energy Efficiency Action Plan the Commission has underlined the importance of CHP. The Commission proposal for a revision of the Council Directive on pollutant emissions from large combustion plants, aims at requiring new plants to employ CHP where feasible.[41]

The current situation shows that initiatives so far taken are not promoting the spread of CHP to the desired extent, bearing in mind the Community's environmental objectives. In particular, the liberalization of the electricity market – concurrent with a surplus generation capacity estimated at 40,000 MW in the EU-15 – has led to a sharp decrease in wholesale electricity prices in several countries, that in most cases do not reflect the long-term marginal cost of electricity generation. As a consequence, the overall development of CHP is very low.

A set of policies and measures should therefore be established to get back on track to reach the 18 % target set by the Commission and the Energy Council:

- As a basis for all future CHP policy, a general *definition of cogeneration* should be laid down by the Member States. This definition should draw a clear line between CHP and condensing plants, taking into account the range of efficiency achievable in condensing plants with different fuels. The Commission should monitor a harmonized definition in all Member States.
- Similar to the discussion on electricity from RES, *binding targets* for the market share of electricity from CHP in Member States would be an important step in underlining the important role of CHP in energy policy during the coming decade.
- Each Member State should set up a *national action plan*, laying out policies and measures to be taken to achieve the targets. Progress made should be monitored very closely (for instance, every two years) and additional action taken if necessary.

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[41] 88/609/EEC

- Systems for *direct price support* or minimum quota schemes for CHP, aimed at compensating the effects of current price dumping on the electricity market, should be considered by the Member States and reflected in guidelines governing state aid for environmental protection.
- The practical conditions for *access to the electricity system* need to be fair and transparent. The Member States should support the development of a market for backup power for CHP generators, if necessary.
- Technology *RD&D and dissemination* should be supported by the Commission and Member States. The Commission should support the development of a network of agencies for the promotion of CHP in the Member States and other countries.
- The Commission should take an active role in *co-ordinating national efforts* for the expansion of CHP generation.

These issues should be focused upon in a Directive on the promotion of combined heat and power production in the internal market.

4.6 STRENGTHENING CUSTOMER CHOICE

One of the major advantages of a liberalized electricity market in terms of sustainability, is that customers have the possibility to choose their supplier. This decision can be based on price, on additional services provided (e.g. local presence of the supplier, advice on energy conservation, bundles with telecommunication services, etc.), or on ecological standards of electricity generation. The product “electricity”, which used to be standardised to a large extent within highly-integrated European transmission networks, can thus become a diversified product with many features.

But the different features of electricity products are not easily determined by the customer. The simplest feature is price, which is fairly transparent to the customer, although it is usually divided into fixed and variable components, that themselves may vary during peak-load and base-load times of the day and the year. A second step in customer information might include contractual details, such as minimum contract duration, and flexibility of contract prices in relation to market price developments. A third step might cover additional services provided by the supplier.

The most difficult information to obtain concerns the environmental impact of electricity generation. As of today, it is usually only special “green suppliers” who provide information about their generation mix. In the draft Directive on the promotion of electricity from renewable energy sources in the internal electricity market, from May 2000, the Commission suggests a mandatory certification system for electricity from RES. This would form a solid basis for Community-wide support schemes, as well as for the disclosure of electricity from RES to customers.

There is no reason, however, why certification should be limited only to electricity from RES. Were there a certification system for all electricity, then all suppliers would be able to specify the generation portfolio of their products.

In principle, a system of disclosure could be realized either on a voluntary or a mandatory basis. A voluntary system of electricity disclosure would be quite easy to realize, and would provide those suppliers, who choose to use this instrument, with the opportunity to prove the environmental benefits of their products. On the other hand, a voluntary disclosure system would probably lead to market divergence, where all “dirty” generation is assigned to those products that are not "disclosed". Any system of disclosure should therefore aim - at least in the medium and long term - at an obligation on all suppliers to disclose their generation mix.

In fact, only a mandatory system of electricity disclosure would give “green power” from RES or from CHP the high esteem it deserves, because every consumer is then provided with information about the characteristics of alternative electricity products.

In the U.S., regulatory authorities in several states have set up mandatory disclosure systems. In most participating states not only the generation mix is disclosed, but also information provided on the related emissions of CO_2, SO_2 and NO_x , and on the production of nuclear waste.

In the EU, the new Austrian Energy Liberalization Act (July 2000) obliges all traders and suppliers of electricity to disclose the fuel mix of their power portfolio.[42] A similar provision is under discussion with the new Swiss Energy Market Law. These are first moves towards national systems of disclosure in Europe.

Because electricity is, and will remain a product traded across borders in Europe, minimum standards for the certification of electricity generation as a formal basis for disclosure, and for national disclosure systems, should be set up at the European level. This would form an important additional instrument for the liberalization of the electricity market.

A legal framework for a European standard for disclosure of all electricity sources should therefore be established as soon as possible. On this basis the Commission should initiate a process for establishing an electricity disclosure system in all Member States. The first step might be the setting-up of a certification system for electricity, starting with electricity from RES and CHP, which would subsequently be extended to conventional and nuclear fuels. Standards for a voluntary disclosure system for all electricity sources could form the second step in this process. This would provide the opportunity to test all requirements for data collection, computing and formats for con-

[42] Austrian Energy Liberalization Act of 19. July 2000, Article 7, § 45.

sumer information. The introduction of a mandatory disclosure system would be the third step, which should be achieved within a period of three years.

4.7 SHOULD THE LIBERALIZATION PROCESS BE SPEEDED UP?

One of the key issues concerning the further development of the internal market is whether market opening is to be speeded up, or not. In this connection it has to be considered, that the broad range of approaches to implementation in the electricity Directive has created significant differences in terms of the share of the market, that is to be opened up, and the applicable time-frame (cf. table 1).

Differences with respect to the extent and period that captive customers will exist in national electricity markets, lead to major distortions amongst competitors in the EU. The focus of competitors on large-customer segments, and on a few countries that have fully-liberalized their markets, will strengthen only a few major players. This will create additional obstacles for newcomers, and could result in an oligopolistic market structure. Aside from strong intervention on the part of the cartel authorities, expanding electricity markets is the only way to preserve in the long run a competitive market structure with numerous players.

Growing distortions between different Member States, and ongoing mergers and acquisitions in the electricity sector, might suggest an acceleration of the liberalization process. A revision of the Directive on the internal market for electricity should consequently target full market opening for all Member States in the next five years.

Furthermore, because details of regulations have turned out to be very important regarding effective competition, mandatory standards for the liberalization process should be extended. For example, because the majority of Member States chose regulated third-party access, this should be laid down as a new minimum requirement for the internal market. In addition, requirements on unbundling of generation, transmission and distribution should be more determinedly pushed ahead towards legal and ownership unbundling.

It should be pointed out that such an acceleration of the liberalization process will overcome certain major distortions in the electricity market from the point of view of competition. But this will clearly not be sufficient, so far as environmental aspects of the liberalization process are concerned. Nonetheless, acceleration of the liberalization process will create common ground for measures completing the internal market with respect to energy efficiency, CHP and RES.

Against the background of the widely-varied status of market opening, some Member States have implemented very different policies and measures favouring energy efficiency, CHP and RES. This might not fit well into a co-ordinated EU policy, that in turn

could stimulate more synergic effects, and would encounter less conflict with internal-market rules.

Although full liberalization of electricity markets will not automatically lead to a stronger role for energy efficiency, CHP and RES, it would create a much more stable basis for long-term action in these fields. The earlier experiences are made regarding such activities within the new framework of competitive markets, the more sustainability will be strengthened in the long-term.

Because it can be expected, that a dilemma will arise between the speeding-up of market opening and the growing gap to implementation of the supportive measures mentioned above, a strong policy link should be created between these two paths.

4.8 CROSS-BORDER ELECTRICITY TRADING

The opening-up of EU electricity markets does not only affect electricity trading in the EU. Within the framework of Trans European Networks (TEN) the EU also supports projects that target infrastructure improvements, in order to extend electricity trade with countries that are currently not scheduled to enter the EU.[43] Considering that in most of these countries there are large surplus capacities and low environmental and safety standards, concerns have been raised about electricity imports from such countries.

Different approaches have been developed, or are under discussion, to deal with the problem of "dirty" electricity imports. Austria and Luxembourg have legislated the possibility of import bans on electricity from sources with low standards of emission and safety. The European parliament has called upon the Commission to come forward with proposals to regulate third-party access to the internal market for gas and electricity, taking social and environmental standards into consideration.[44] Several options are available:

- The Commission and Member States should reach a special agreement on minimum standards for immissions, radioactive waste and liability in respect of imports from non-EU countries, in order to avoid dumping.
- Electricity imports should cease, if it can be shown that electricity is being imported at dumping prices and from sources with significantly lower environmental standards. This should also apply to the accession countries.

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[43] A major issue is the so-called Baltic Ring, which should connect Smolensk in Russia with Germany, and which could be extended to a transmission capacity of several thousand megawatts.

[44] Report on the Commission's second report to the Council and the European Parliament on the state of liberalization of the energy markets (COM (1999) 198 – (COM (1999) 164 – COM (1999) 612 – COM (2000) 297 – C5-0163/2000-2000/2097 (COS)). Final A5-0180/2000. 22nd June 2000.

- Support within the framework of Trans European Networks should be strictly limited to those regions that can demonstrate, that their environmental and safety standards comply with EU standards.
- The Commission should negotiate agreements with industry on a Code of Conduct, that commits the electricity-supply industry to abstain from such "dirty" electricity imports.
- A disclosure scheme for all electricity sources should be introduced, that makes the environmental quality of electricity imports from non-EU countries transparent for consumers.[45]

Since discussion on this issue is quite new, an in-depth analysis should be initiated to develop appropriate measures at the EU level, and to provide advice to Member States on how to draw up appropriate regulations or agreements.

4.9 ACCESSION PROCESS

The EU's electricity market rules will clearly have a far greater impact on the accession countries than the enlarged market will have on EU Member States. The accession countries have to comply with existing EU rules, although there exists some flexibility, as has been demonstrated during current negotiations. Although the density of EU regulations is relatively low in the energy sector, compared to other areas, some issues concerning the enlargement process will be highlighted in the following.

Firstly, the economic problems facing most of the accession countries, in adjusting to the environmental standards of electricity generation, will most likely lead to special arrangements, above all special adjustment periods. Some countries could request slower market opening and longer adjustment periods, for example with respect to the Directive on large combustion plants. Such concessions should be strictly controlled in relation to the development of electricity exports. A steady process of coherence, avoiding environmental dumping, should be a key issue for negotiations and appropriate agreements. Where it can be shown that limited market opening and prolonged adjustment periods for environmental regulations result in a significant expansion of electricity exports, the appropriate agreements should provide an option for the revision of adjustment periods.

Secondly, enforcing new EU policies on energy efficiency, cogeneration and RES requires a high degree of co-operation with the accession countries at a very early stage, because they will be affected in different ways. On the one hand, additional demands could create added burdens for the accession countries, while on the other hand, some of

[45] If the specification of sources or the labelling of single sources should not be possible in such countries averages for the whole country could be used.

their initial positions (for instance, in the field of cogeneration) could increase the options for sustainable energy-use in the EU.

Thirdly, considering the pressure for electricity-market liberalization and privatization, ownership structures in the accession countries should be carefully observed. There is strong evidence that major utilities from the EU-15 will dominate the privatization process in the accession countries. This trend should be reflected in the deliberations, cooperative actions and decisions of the cartel authorities.

Fourthly, if the market-opening process is accelerated, and comes into force for the gas and electricity sectors in the spring of 2001, the consequences for the accession countries will have to be taken into account. Such changes will have a significant impact upon the accession countries, which are struggling, in part, to implement current timetables. This impact upon accession countries needs to be considered in the course of revision of market-opening timetables.

4.10 IS THERE A NEED FOR A NEW LEGAL FRAMEWORK?

The EC Treaty does not contain a chapter on energy. Nevertheless, certain Treaty regulations have a strong influence on the energy sector. The internal market, as well as competition and state aid regulations, are prime examples. Although environmental protection is regularly interpreted as horizontally-integrated policy, progress in this field is rare. This characterizes a quite complicated situation. The need for energy policy is based increasingly on environmental issues, but energy policy is formally left to the Member States, though at the same time, from a practical point of view, energy policy is dominated by other policies established at the European level. This represents a major obstacle to sustainable development.

Considering the Commission's recent proposal not to renew the ECSC Treaty, but rather to include its provisions in the EC Treaty, the same could be done with the EURATOM Treaty. The provisions of the EURATOM Treaty, that still hold good, could be included in an energy chapter in the EC Treaty. This energy chapter could also cover other energy-policy issues indirectly related to environment topics. Furthermore, if aspects, such as the security of supply, should ever again demand political attention, the problem could only be solved at the European level, and this would require a legal framework in the Treaty.

As already stated, an energy chapter is not necessarily needed for environmental provisions related to the energy sector. But since horizontal integration of environmental policy will take a longer time, an energy chapter in the Treaty could be regarded as a pragmatic way to speed up such integration. If other good reasons already mentioned brought are added together, numerous arguments can be put forward in favour of an energy chapter in the Treaty.

5 SUMMARY AND OUTLOOK

The liberalization of electricity markets in the EU has fundamentally changed the basis of energy policy and related environmental policy. Although the first step towards market liberalization was relatively successful in terms of increasing the efficiency of the electricity-supply industry, a couple of important issues are still pending. As a result some processes can be identified, that have adverse environmental effects and will hamper an innovative market structure with numerous players. If electricity market liberalization is not complemented with additional policies and measures, the goal of sustainable development in the European Union can hardly be met.

Firstly, focusing upon economic efficiency on the supply side highlights only a part of the problems facing the energy sector. A framework ensuring high environmental and safety standards, as well as a level playing field, is still lacking at the European level. In the next steps of the liberalization process this fragmentation of European policy in the electricity sector must be overcome as a matter of urgency.

The key areas for action have been identified in several EU documents, and a part of the required basis for action has also been satisfactorily developed. Considering the differing status of discussion, activities for different time-frames can be defined.

In the short term the following activities seem to be both necessary and feasible:

- the draft for a Directive on the use of renewable energy sources in the EU should be reviewed and adopted as soon as possible;
- based on the Commission communication on CHP, the effects of market liberalisation should be evaluated very soon, and a Directive for a consistent EU CHP policy introduced as early as possible;
- the role of energy efficiency in the liberalized market should be highlighted in a comprehensive analytical document, which should lead to a comprehensive framework directive on a minimum level of demand-side management activities in Member States;
- transparency should be achieved on subsidies in the energy market, and on their environmental and economic impacts. Furthermore, especially in the field of nuclear energy a comprehensive strategy to overcome market distortions through different schemes of waste management, handling of third-party liability obligations and other technical or financial aspects should be developed;
- the new guidelines on state aid for environmental protection should take account of energy efficiency, CHP and RES, as well as of new instruments (flexible mechanisms), in a non-prohibitive manner;

- introducing many more environmental issues into different aspects of the EU enlargement process will avoid additional obstacles to an environmentally-sound reform of the electricity sector;
- in this context an environmentally more ambitious approach to electricity imports from third countries should be adopted.

In the *medium-term perspective* additional policies and measures are needed:

- an emissions-trading system, encompassing the electricity-generating sector, could become the most important scheme complementary to market liberalization;
- strengthening customer choice through a transparent and mandatory disclosure scheme, is an elementary prerequisite for a comprehensive approach to competition.

Since most of these issues are related to climate change, the European Climate Change Programme (ECCP) could serve as a common framework for the most important measures listed above.

Secondly, apart from the supportive measures already mentioned, and against the background of experiences made in the liberalization process, market opening should be accelerated, both to avoid further market distortions and to allow an innovative market structure with numerous players. This new approach should not be limited to speeding up market opening, but should also set higher mandatory standards on implementation with regard to system access, unbundling etc.

Last but not least, in order to overcome the fragmentation of energy policy in the EU a new legal framework should be created through the inclusion of an energy chapter in the EC Treaty. This would be an important step in determining separate energy-policy priorities aside from competition policy, and in adopting inputs from environmental policy with respect to the special demands of the energy sector and its considerable importance for sustainable development in the EU. Within this framework the EURATOM treaty should also be transformed into more adequate, transparent and democratic structures. Those provisions of the Treaty, that are not outdated, could be adopted in an energy chapter of the EC Treaty.

EU energy policy is at a crossroads. Either the important impulse provided by market liberalization will lead to economic efficiency *and* environmental progress within a common European framework, or the electricity sector will be subject to counterproductive incentives resulting from the continuing fragmentation of energy policy.

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The Foundation's primary objective is to support political education both within Germany and abroad, thus promoting democratic involvement, sociopolitical activism, and cross-cultural understanding. The Foundation also provides support for art and culture, science and research, and developmental cooperation. Its activities are guided by the fundamental political values of ecology, democracy, solidarity, and non-violence.

By way of its international collaboration with a large number of project partners – currently numbering about 130 projects in 56 countries – the Foundation aims to strengthen ecological and civil activism on a global level, to intensify the exchange of ideas and experiences, and to keep our sensibilities alert for change. The Heinrich Boell Foundation's collaboration on sociopolitical education programs with its project partners abroad is on a long-term basis. Additional important instruments of international cooperation include visitor programs, which enhance the exchange of experiences and of political networking, as well as basic and advanced training programs for committed activists.

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Ralf Fücks, Dr. Claudia Neusüß, and Petra Streit comprise the current Executive Board.

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