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The Liberalisation of Europe's Electricity Markets -

Is the environment paying the price for cheap power?

May 2000

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A report commissioned for Greenpeace International

GREENPEACE

EXECUTIVE SUMMARY:

The key finding of this report is that the process of liberalizing the EU electricity market is introducing certain trends that are detrimental to the environmental objectives of the European Union. In particular, the expansion of renewable energy and the reduction of CO_2 emissions are being hampered by the liberalisation process as it is currently being allowed to develop.

In terms of volume of transactions, Europe has become a focus for the process of electricity liberalisation globally. Therefore Europe must also become the proving ground for integrating environmental considerations into this new model of electricity markets.

The emergence of consumer choice that allows for Green Power schemes is so far appears to have been small compensation for some of the more worrying trends for human health, the environment and the wider economy that the process of liberalisation has set in motion. The problems arise from the inadequacy of current regulations in safeguarding clean production methods, efficient energy use and energy security. Strengthened regulation is needed to balance the adverse effects of the purely commercial, competition-based rules that are currently in place.

These key trends of concern identified in the report are:

1. **End user price reductions - which will tend to drive increased consumption**
2. **Price volatility - which weakens position of clean energy industry**
3. **Market domination by major retailers regardless of environmental integrity of supply**
4. **Legally challenged renewable energy promotion mechanisms**
5. **Energy insecurity - projected increases in fossil fuel concentration and import levels**
6. **Persistent inherent subsidising of non-sustainable energy generation**

1. Price reductions

The domestic and industrial consumer price of energy is dropping. This provides a disincentive to use energy more efficiently. In fact, the energy providers' ability to sell power at low cost reflects the fact that the polluter is still not required to pay for the damage to the environment that their use of conventional energy causes. The true cost of power must be reflected in the new market electricity production is to be de-coupled from rising CO_2 emissions and other environmental degradation.

> **Recommendation 1:** As competition generates various savings in the industry, there is more room for the incorporation of external (and currently under-acknowledged) environmental factors and costs. Mechanisms must be introduced which allow these currently external costs to be recouped from generators. This should have the effect of promoting renewable energy, Combined Heat and Power, and the switching to low carbon and non-nuclear fuel sources. It will also provide the necessary financial incentives for end-of-line consumers to increase efficiency. The recommendation is designed to create a more universal demand for clean, energy-efficient production and consumption.

2. Price volatility

So far, there has been inadequate protection at a European level for small but growing sustainable energy industries such as the renewable energy sector. Starting industries are considerably more vulnerable than established sectors and are currently exposed to short-term energy price volatility and price wars. This volatility is a predictable effect of the transition from captive (static) customers to contestable customers, and the simultaneous transition from many small and medium-sized suppliers to only few large suppliers. Adequate provisions for assisting vulnerable industries to manage the transition into the liberalised market have so far not been made, leaving Member States to individually fill the gap and protect their promising growth industries in isolation.

> **Recommendation 2:** Priority energy industries such as renewable energy developers must be provided with access to 'hedging' systems or other buffer mechanisms and funds to be able to secure contracts through years of severe price volatility.

3. Market Domination

The dominance of Electricité de France (EdF) clearly demonstrates the vulnerability of the European market to national monopolies which use their secure home base to build regional monopolies. The degree to which a handful of players has come to dominate the current system indicates the degree of market dominance that can be anticipated, and the concentrations of financial and political influence that will result if this trend continues unchecked. In the light of inadequate environmental regulations, control and enforcement mechanisms at EU level, it can be expected that the shareholder demand for dividend in a competitive market will dominate any potential margin for environmental responsibility, unless that responsibility is legally imposed.

> **Recommendation 3**: The European Commission must consider establishing EU-wide environmental performance standards for electricity generators and retailers that include greenhouse gas emission and clean production criteria. Such regulation must specifically isolate any avenues for 'regulatory flight' which would otherwise allow retailers to trade from countries with the lowest environmental standards.

4. Threatened renewable energy promotion mechanisms:

The European Commission appears to be at odds with itself in how to deal with the renewable energy sector. On the one hand, for the Commission's plans require this sector to supply 22.1% of electricity consumed by 2010. On the other hand, the European Commission is challenging the German renewable energy feed-in law. In light of this discrepancy it cannot be discounted that the up-coming guidelines on State Aid for environmental protection may also be used undermine the basic aim of the EU Directive on Renewable Energy (to boost renewable energy generation in the EU). The German feed-in law case may give an insight into the Commission's ambivalence towards actually promoting renewables: this lack of policy co-ordination is very damaging to Europe's new clean energy generation industries.

> **Recommendation 4**: Under current conditions in which the single electricity market is still heavily distorted by subsidies and where there is a lack of internalisation of environmental and human health costs, there is a need for mechanisms at an EU level to compensate the renewable energy industries that are adversely affected by this situation. At the very least, those schemes that currently exist at Member State level must be fully endorsed by all relevant parts of the European Commission until such time as these market distortions have been removed.

5. Energy insecurity: Increased fossil fuel concentration and import levels

Predictions of a gradual increase in Europe's fossil fuel imports show that the issue of energy security has not been addressed as part of the liberalisation process. Leaving Europe with a high-risk energy supply, and moved away from, rather than towards, increasing indigenous energy production through renewable resources.

> **Recommendation 5**: a) Disclosure : Regulations must be incorporated into the market that monitor, track and disclose fuels that are used for energy generation, and the source of those fuels. b) Containment : Legally binding mechanisms for limiting carbon-intensive and nuclear fuels and prioritising clean indigenous production of electricity must be adopted - the proposed Renewable Energy Directive is a suitable vehicle.

6. Persistent inherent subsidising of non-sustainable energy generation

There is significant cause for concern when substantial national subsidization of the conventional energy sector is combined with international liberalisation. Subsidies can be used to allow energy producers from non-sustainable sources (predominantly fossil fuels and nuclear) to undercut other players that use more environmentally sound energy generation methods. The fact that both the European Commission and the European Parliament are only now attempting to quantify subsidies in the electricity sector, shows that this issue has not been seriously considered to date.

> **Recommendation 6:** The European Commission must immediately call for the suspension of the billions of Euros that are currently given in annual (national as well as EU) subsidies to the conventional energy sector. Until such time as the Commission can prove that these subsidies have been removed from the market, compensatory mechanisms need to be introduced for small but growing priority industries like the renewable energy sector.

CONCLUSION

Many of these recommendations can be addressed by the European Commission within the process of refining and adopting the Renewable Energy Directive and State Aid Rules, and should thus be acted upon forthwith. The European Council will assess the progress of the electricity market at its March 2001 summit in Stockholm. That summit will be a key opportunity to assess the success or failure of addressing the environmental holes in the single electricity market and applying appropriate corrective measures where necessary.

Dr. Karl Mallon
Director of Energy Solutions
Greenpeace International

Introduction:

"*Thus, history may consider the past decade as the "Golden 1990s" of the EU energy system for two reasons: a successful outcome of energy policy, in particular with regard to the internal market and the liberalisation of electricity and gas supply; and the coincidence of other factors such as the closer co-operation with the countries in economic transition, and major technical advantages in energy production, energy conversion and end-use efficiency*."[1]

So says a recent report published by the European Commission. However the same page of this report refers to the need to adapt the EU's energy policy to the requirement of the Amsterdam Treaty to contribute to sustainable developments. It is further noted that in the light of the Amsterdam Treaty the EU has changed its energy policy to include sustainability as one of its three core principles, which are: -

- Security of supply - which aims to minimise risks and impacts of possible supply disruption on the EU economy and society.
- Competitive energy systems - to ensure low cost energy for producers and consumers to contribute to industrial competitiveness and wider social policy objectives.
- Environmental protection - which is integrated in both energy production and energy use to maintain ecological and geophysical balances in nature.

Therefore the protection of the environment has become a key criteria by which to judge the long-term stability, and therefore success, of the Union's Energy policy. For the past few years much of the political and industrial focus has been on the emerging European energy market, with the introduction of the EU's electricity (96/92/EC) and gas market (98/30/EC) Directives. This briefing looks at the electricity market and has two objectives.

Firstly, it reviews the status of the electricity markets in Member States one year after the Directive has entered into force. It highlights what mechanisms have, or have not, been introduced to comply with the requirements of the Directive.

Secondly, it aims to show the consequences of a fully or more liberalised electricity market from an environmental perspective. At the time of the introduction of the Directive the European electricity market was rapidly changing. While it is difficult to make a clear assessment of the specific impact of legislation introduced under the Directive, certain trends are becoming clear. The importance from the environmental perspective is the impact these trends are having on the long-term stability of the planet. The report highlights some of these trends.

At the Lisbon Summit in March 2000, the final declaration called upon the Commission to prepare by the Spring of 2001 a report which assessed the impact of speeding up the liberalisation of a number of sectors including the gas and electricity. This will be discussed at the March 2001 summit in Stockholm and is likely to amongst other things to highlight some of the problems that the current liberalisation process has brought.

[1] Energy in Europe, Economic Foundations for Energy Policy, The Shared Analysis Project, December 1999, European Commission, ISBN 92-828-7529-6, page 8.

Part I: Impact of Market Liberalisation:

The huge structural and legal changes that have occurred in the electricity markets in Member states have not surprisingly affected the functioning the electricity industries. These changes can be seen in a variety of different fields, some of which are outlined below.

Ownership.

It has been noted – by *PriceWaterhouseCooper* amongst others[2] - that the limited transmission capacity and the relatively high cost of transmission make large-scale exchange of electricity relatively unlikely. In particular the trade in electricity may play a relatively minor role when compared to that in electricity companies. The extent of this trading can be seen on a global and European level. Another analysis by *PriceWaterhouseCooper* concluded that in 1998 global cross-border electricity company deals were worth around $50 billion in 89 separate transactions[3].

Analysis undertaken for *the Shared Analysis Project, Electricity Industry and Market Dynamics*[4] showed that in the years 1996-8, there were 180 international transactions involving European firms, with a total transaction cost of $84 billion. It is interesting to note the movement by European investors away from the Asia Pacific region back to their home markets. In 1996 Asia Pacific accounted for 43.7% of the total investment, but only 7.2% in 1998. However, Western Europe as a site for investment rose from 18.4% in 1996 to 35.8% in 1998, making it the most popular region for investment.

Somewhat surprising is the relative lack of investment in Eastern Europe from 1996 onwards. It can be assumed that the majority of the investment had already occurred in the more central states, e.g. Czech Republic, in the years prior to 1996 when their electricity industries were being privatised. In addition the lack of investment in the former Soviet Union is likely to be an indication of investor caution, given the slow progress of reforms and low cash payment rates for electricity.

[2] Power Revolution, PriceWaterhouseCoopers, November 1999, page 5.
[3] Utility News, March 1999, PricewaterhouseCoopers, [recheck source].
[4] The Shared Analysis Project, Economic Foundation for Energy Policy, Volume No 8, Prepared for the European Commission, DG XVII, Electricity Industry and Market Dynamics, prepared by Instituto de Economia della Fonti di Energia and the Science Policy Research Unit, Sussex University, October 1999.

Figure 1: Cross-Border Electricity Deals Involving European Firms By Target Region

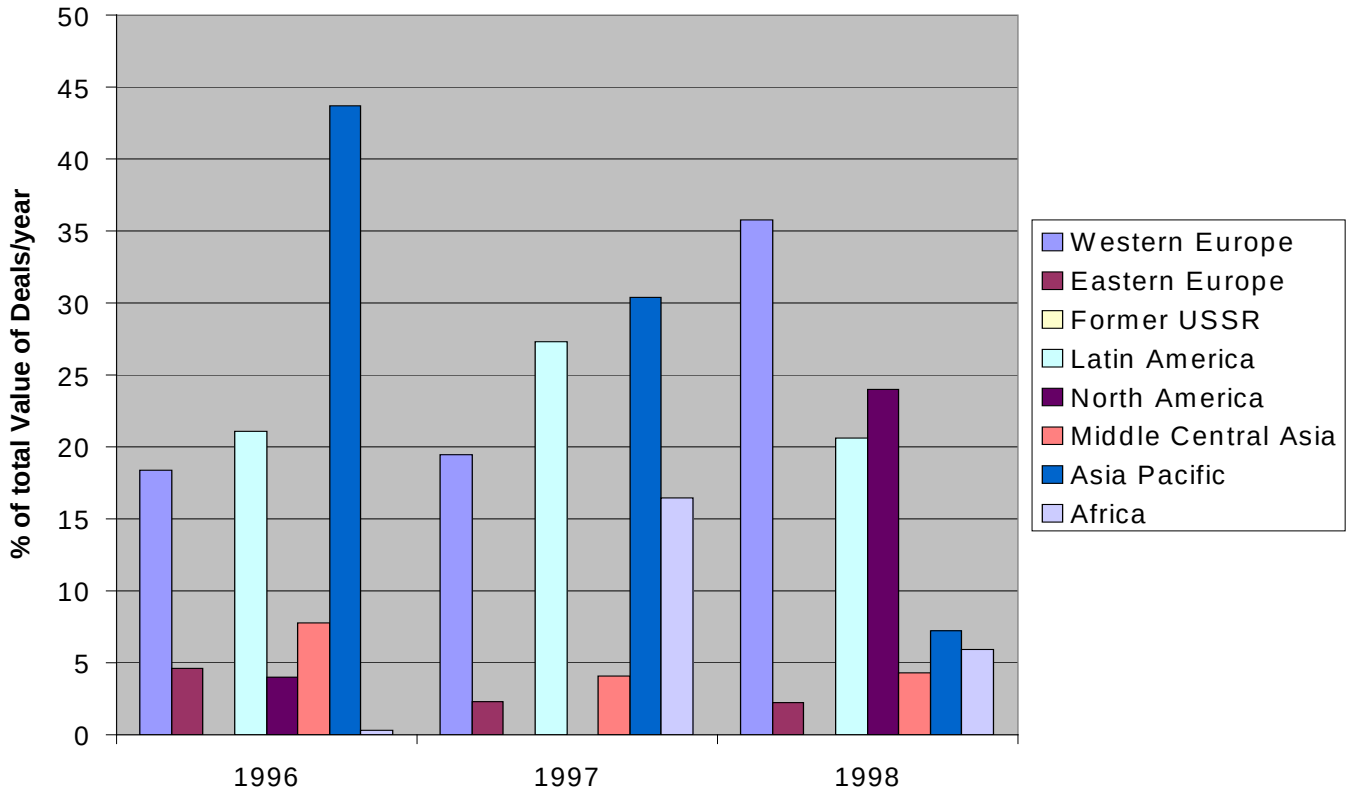


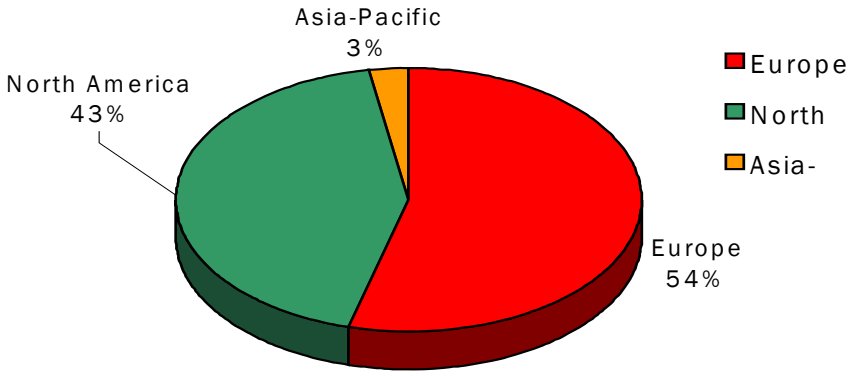
Table 1 shows the domination of the European market by a small number of firms. Only six firms have been involved in more than ten transactions during the three years monitored by the Shared Analysis Project.

Table 1: Cross-Border Deals Involving European Firms 1996-8	
Company	Number of Transaction
Electricité de France	20
National Power	18
Tractebel-Electrabel	18
Imoatran Voima Oy	15
ENDESA Grou	8
IBERDROLA	9
Union Fenosa	8
RWE Energie	8
PowerGen	7

In 1999 a larger number of transactions are expected to be recorded, including a significant number of take-over deals. Interestingly the Electricité de France is now the largest supplier of domestic electricity in the UK, following its take-over of London Electricity and the South West Electricity Board.

The trend for increasing investment into and by European utilities was confirmed in a recent briefing prepared by Pricewaterhouse Coopers and published in the Financial Times in April 2000[5]. The analysis showed that in the there was increased activity in the Global cross border electricity market in the first quarter of 2000 over the same period in 1999, an increase from 20 deal and $8.6 billion in 1999 to 37 deals worth $10.5 billion in 2000. As can be seen in the graph below the most active companies were the European's which secured 54% of all deals – however, firms from the US secured the largest share of the deals by value.

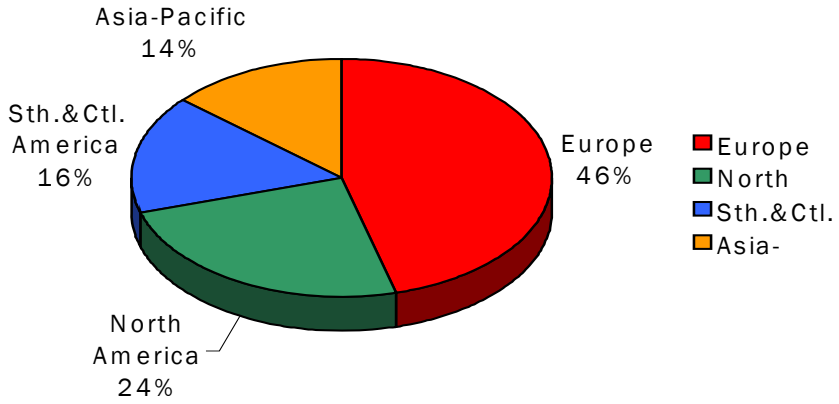
Figure 2: Cross Border Electricity transactions by Bidder Continent: Number of Transactions in the first quarter 2000.



The Pricewaterhouse Coopers analysis also showed that Europe remains the most active area of the world for the transactions to occur, as can be seen in the graph below. Although, once again, if the transactions are analyses by value, the US is the most attractive region with $3.8 worth of deals compared to $3.1 in Europe.

[5] Acquisitions rise in global electricity sector By Andrew Taylor, Utilities Correspondent, Financial Times, April 27 2000

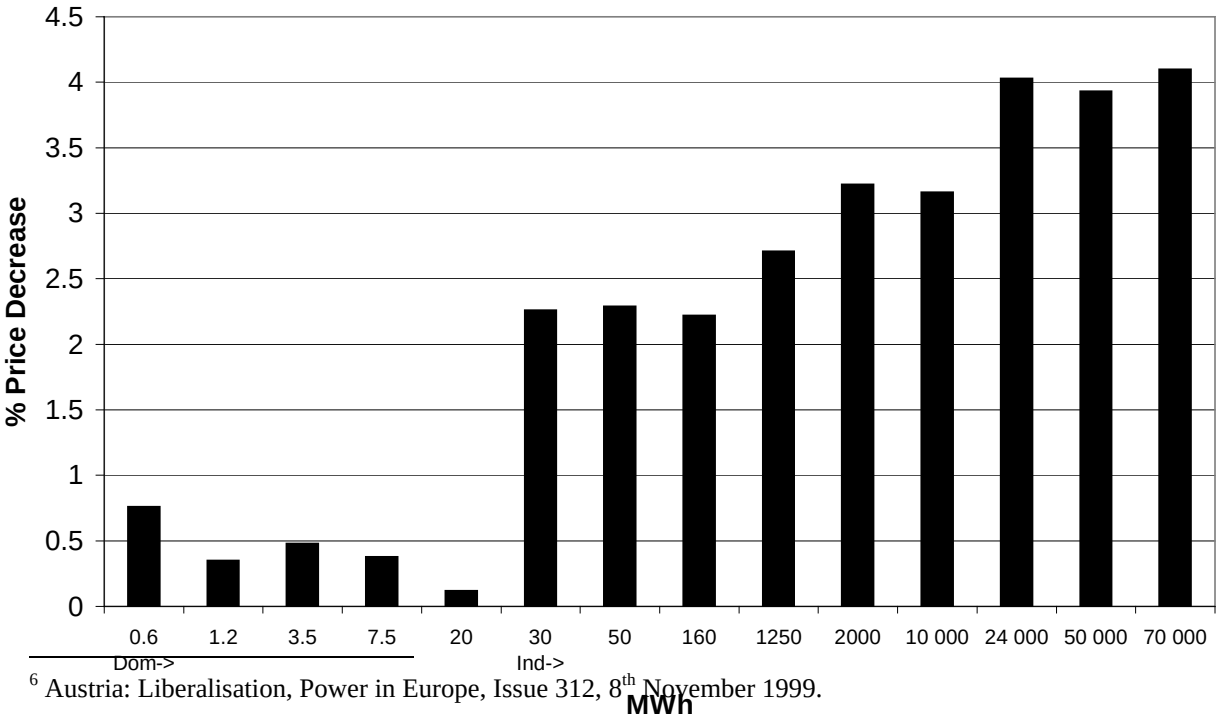
Figure 3: Cross-Border Electricity transactions by Target Continent Number of Transactions in the first quarter 2000.



Impact on Price

Research undertaken by the European statistical office, EUROSTAT, shows that on average electricity prices have fallen in Europe over recent years. Figure 2 shows the decrease in prices over the period July 1998-January 1999 according to the size of consumer. The savings have been greatest amongst large-scale consumers in the industrial sector. In a questionnaire reviewed in the Financial Times publication Power in Europe, 80% of the community utilities felt that the prices would fall by 5% and two thirds of these utilities expected a lowering of their revenues[6].

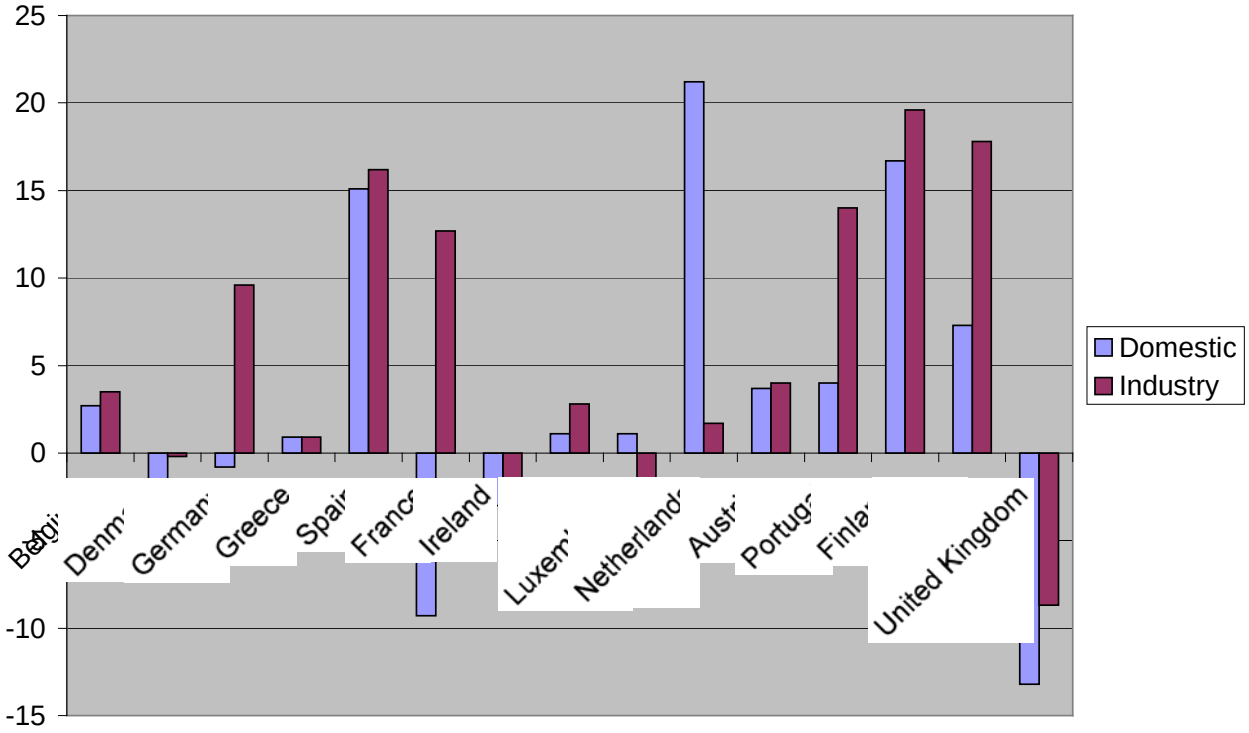
Figure 4: Decrease in Electricity Prices in EU between July 1998-January 1999



[6] Austria: Liberalisation, Power in Europe, Issue 312, 8th November 1999.

Some countries have seen an even more rapid decrease in prices as great as 20% but on average prices have fallen by around 6% between 1996-9 according to the European Commission, as can be seen below[7].

Figure 5: Decrease in Electricity Prices between 1996-9 for Individual Member States.



Source: European Commission.

How long prices will continue to fall is of fundamental importance for the investment plans of the industry. In January 2000 the Veba chairman, Ulrich Hartmann, said in an interview published in the investors' magazine Teleboerse: "I think we'll reach bottom this year and we can expect electricity prices to start rising again next year" [in Germany].

New Capacity.

Analysis for the European Commission has been undertaken to predict the replacement power needed through until 2030. It is assumed that the current EU will require 600 GW of new capacity, which is roughly the same as the current installed capacity. Half of the new capacity will replace power plants to be retired, and the other will meet an expected increase in demand. Table 2 summarises the findings of the Commission's analysis, which is based on the PRIMES database[8].

[7] Communication from the Commission to the Council and the European Parliament, Recent progress with building the internal electricity market. Commission of the European Communities, 27th April 2000, page 3.
[8] European Union Energy Outlook to 2020, Energy in Europe. The Shared Analysis Project, page 173, based on the Primes data-base, November 1999.

Table 2: Predicted Installed Capacity of Different Generating Capacities in Current EU States (MW)

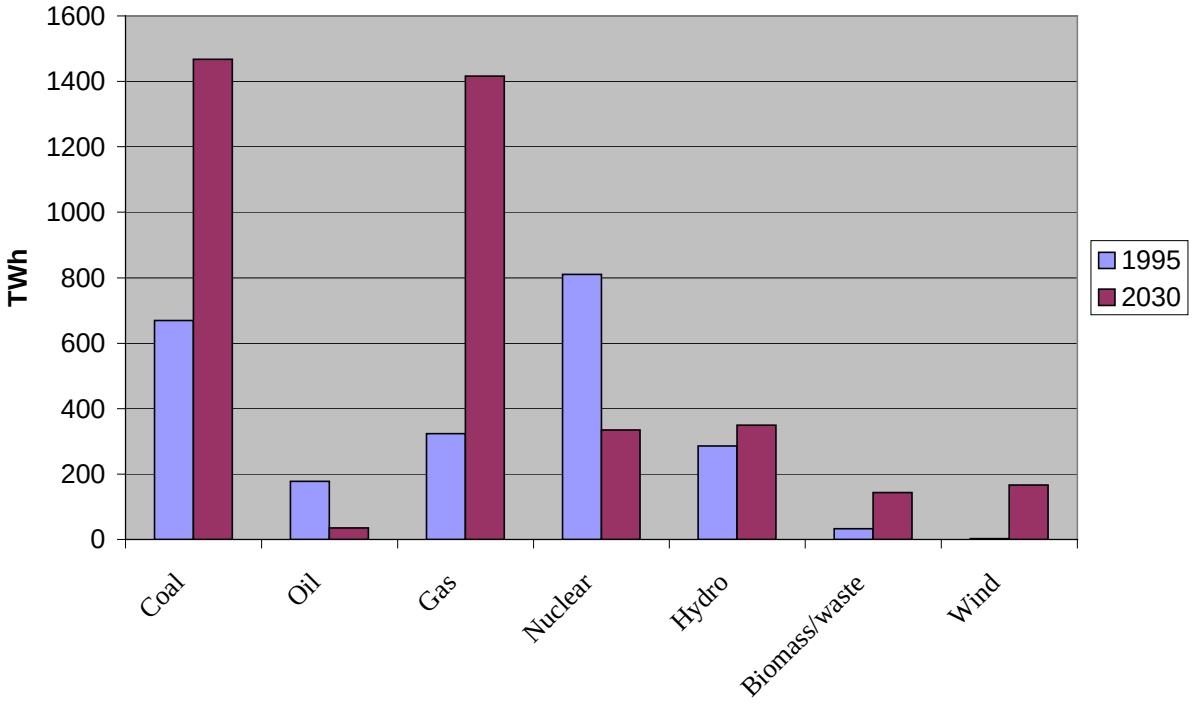
	2000	2010	2020	2030
Nuclear	136.4	135.1	117.2	45.6
Coal and Lignite	166.1	101.1	36.9	9.5
Open Cycle multi-Fired	68.7	60.2	122.3	244.6
Open Cycle IPP	33.1	25	20.5	15.1
GTCC	59	208.7	305	354.3
Small GT	25.2	45.2	79.2	96.6
Clean Coal and Lignite	0.5	3.4	26.6	37
Biomass-Waste	4.4	4.7	6	6.5
Fuel Cells	0	0	0	1.3
Hydro-Renewables	119.2	133.7	158	170.7
TOTALS	**612.6**	**717.1**	**871.7**	**981.2**

Notable is the rapid decrease in nuclear generated electricity after 2020. This is because the PRIMES analysis is based on the assumption of a forty year operating life for existing nuclear stations in which case a large percentage of the reactors will shut down during 2020-30. The analysis assumes that new reactors will not replace the existing reactors, except in France. The predicted increase in the use of gas will be further augmented as gas fired, and in particular CCGT, stations will replace the decommissioned nuclear power plants.

A similar fate is expected for the solid fuel powered stations and it is assumed that they will also be replaced by gas stations. However, the PRIMES analysis does suggest that so-called "clean-coal" stations will become prolific after 2010. Natural gas clearly is the fuel of choice over the coming decades, as it has been shown to produce cheaper electricity and gas power stations are quicker to build, with an increase in gas power stations from 45 GW in 1995 to 380GW in 2020.

These predicted changes would have a significant impact on the fuel use by current EU states. The graph below shows that gas is the only conventional fuel which is set for a substantial increase in use in the coming decades. Although the PRIMES analysis does suggest that coal will increase in use –due to the introduction of "clean-coal" technology – its use is only marginally above the overall increase in energy use (between 1995-2030 it is predicted that electricity use will increase by a factor of 1.7). Therefore coal's market share will only marginally increase. While nuclear will significantly decrease. The currently non-conventional technologies, such as wind and biomass/waste incineration are set to substantially increase.

Figure 6: Predicted Fuel Use in EU Electricity Production[9]



Impact on Renewables.

The path of business as usual compared to agreed energy policy appears at odds on the issue of renewable energy. There are also signs that the mechanisms used to drive the renewables industries to commercial viability in the past are being targeted by the Commission on the grounds of competition law.

The 1997 White Paper on Renewables called for, and outlined the progress needed for the introduction of renewable energies so that in 2010 they would contribute 12% of the EU's energy requirements, amounting to 23.5% of the Union's electricity. The breakdown of the electricity sector requirements as reported in the White Paper is given in Table 3. However, Table 4 shows figures published in the Shared Analysis Project, which give predictions based on a "business as usual" scenario. As can be seen under the base-case scenario, renewables are not expected to meet the targets of the White Paper, largely due to shortfalls in the growth of biomass and hydro. Consequently, by 2020 it is predicted that renewables will contribute to less than 7% of primary energy.

What this highlights is the anticipated inability of the current market to drive commercialization of new clean production. Taking the success of the wind power sector in Europe as an example, the success has almost exclusively been due to the types of targeted renewable energy support schemes employed by the Danes, Germans and more recently the Spanish instituted prior to the process of deregulation.

[9] Table 9-26, Production of Electricity by energy Form, European Union Energy Outlook to 2020, The Shared Analysis Project, November 1999, page 176

Table 3: Renewable Electricity Targets In the EU White Paper[10].				
	Actual in 1995		Projection for 2010	
Type of Energy	TWh	% of Total	TWh	% of Total
Total	2,366		2,870 Pre-Kyoto	
Wind	4	0.2	80	2.8
Total Hydro	307	13	355	12.4
Photovoltaics	0.03	-	3	0.1
Biomass	22.5	0.95	230	8.0
Geothermal	3.5	0.15	7	0.2
Total Renewable Energies	**337**	**14.3**	**675**	**23.5**

Table 4: Renewable Electricity Targets Shared Analysis Project[11].				
	Actual in 1995		Projection for 2010	
Type of Energy	TWh [e]	% of Total	TWh	% of Total
Total	2,306		3024	
Wind	3	0.1	60	2.0
Total Hydro	286	12.4	334	11.0
Biomass/waste	33	1.4	66	2.2
Other renewables	2	0.1	6	0.2
Total Renewable Energies	**324**	**14.5**	**466**	**15.4**

An important development however, is that the European Commission has now challenged the legitimacy of such schemes by initiating "non-notification proceedings" against the German government for its failure to clear the latest renewable feed-in law with the Commission's anti-trust regulations. This appears to highlight a policy void in the deregulation process due to the failure to provide a mechanism by which fledgling energy industries can gain access to the market in an atmosphere of sharp price competition. Currently this void is being filled by the domestic mechanisms that have now come under challenge. Unless the void is addressed it is unclear how the success of wind power – which has consistently achieved growth rates above 30% - can be repeated for the other renewables like solar photovoltaics, small hydro, biomass and wave power which are waiting in the wings.

The tension between renewable energy promotion and the liberalisation process is perhaps at is sharpest in German where the country major utilities association, *Vereinigung Deutscher Elektizitaeswerke* has stated of the new renewable energy feed-in law, "The draft law will plunder the pockets yet again. Consumers are being cheated of the fruits of liberalisation in the power sector."

It would appear then that the renewable industry is being caught in a Catch 22. In principle a market friendly mechanism for increasing the share of renewable energy in the union was to be provided by the above mentioned renewable energy directive. However, the draft disclosed on May 10th provided allows current Member State mechanisms to be maintained only for the time being, without providing either for full legitimization of such mechanisms or for additional EU-wide drivers. The only possibility for the current draft to provide such drivers would be for the stated national targets for renewable energy to become legally binding, rather than dependent upon the good will of the Member States. See Figure 6.

[10] White Paper, table 3, page 50
[11] Shared Analysis Project, table 9-26, page 176

			Member States 1997 official EUROSTAT RES-E compared with indicative targets in 2010			
Country	**Percentage***	**TWh**	**RES-E % 1997**	**RES-E % 2010**	**RES-E % 1997 (without large hydro)**	**RES-E % 2010 (without large hydro)**
Austria	78.1	55.3	72.7	78.1	10.7	21.1
Belgium	6.0	6.3	1.1	6.0	0.9	5.8
Denmark	29.0	12.9	8.7	29.0	8.7	29.0
Finland	35.0	33.7	24.7	35.0	10.4	21.7
France	21.0	112.9	15.0	21.0	2.2	8.9
Germany	12.5	76.4	4.5	12.5	2.4	10.3
Greece	20.1	14.5	8.6	20.1	0.4	14.5
Ireland	13.2	4.5	3.6	13.2	1.1	11.7
Italy	25.0	89.6	16.0	25.0	4.5	14.9
Luxembour	5.7	0.5	2.1	5.7	2.1	5.7
Netherlands	12.0	15.9	3.5	12.0	3.5	12.0
Portugal	45.6	28.3	38.5	45.6	4.8	21.5
Spain	29.4	76.6	19.9	29.4	3.6	17.5
Sweden	60.0	97.5	49.1	60.0	5.1	15.7
UK	10.0	50.0	1.7	10.0	0.9	9.3
EU	**22.1%**	**674.9**	**13.9%**	**22.1%**	**3.2**	**12.5%**

Figure 6: National targets as stated in the draft Renewable Energy Directive. * RES-E consumption as % of total gross electricity consumption of 3.058 TWh as forecasted in the baseline scenario

Finally, given the current market distortions in favour of conventional power sources, renewable energy sources will need support if they are to reach the White Paper target of 23% by 2010. One option open to Member States is to build into their national legislation the possibility of taking reciprocal action against those Member States that fail to reach their renewable energy targets, thus blocking the importation of electricity from those countries that do not support the community objectives. In light of the current bias towards market based solutions this action is likely to result in the possible unilateral system of promotion of renewables.

Impact on Nuclear Power

The decline of the nuclear power industry within the EU began before the introduction of a liberalised electricity market either in Member States or in the Union. On the 4th March 2000 the 2nd reactor at the Civaux nuclear power plant in France was permanently connected to the electricity grid. The connection of the 1450 MW reactor brings the total number of reactors in France in operation to 59 and in Europe to 146. However, as can be seen below this was the last reactor under construction within the European Union. 2000 will be the first year since the founding of the European Atomic Energy Community – Euratom- in 1957 that there was no nuclear reactor under construction in at least one of its Members. Furthermore, with no reactors on order and the delay on a decision on whether or not to proceed with the

European Pressurized Water Reactor announced by the French Government in late 1999, it is extremely unlikely that another reactor will be completed this decade.

Table 5: Status of Nuclear Reactors in European Union at the end of 1999

	Reactors in operation		Reactors under construction		Nuclear electricity supplied in 1999		Total operating experience to 31 Dec. 1999	
Country Name	No. of units	Total MW(e)	No. of units	Total MW(e)	TW(e).h	% of total	Years	Months
Belgium	7	5712			46.6	57.74	163	7
Finland	4	2656			22.07	33.05	83	4
France	59	63103			375	75	1110	2
Germany	20	22282			160.4	31.21	590	7
Netherlands	1	449			3.4	4.02	55	0
Spain	9	7470			56.47	30.99	183	2
Sweden	11	9432			70.1	46.8	267	2
United Kingdom	35	12968			91.19	28.87	1203	4
Total	146	124102	0	0	825.23			

Source: International Atomic Energy Agency.

The bleak outlook for the further construction of reactors in the millennium follows a decade of slowdown in the 1990s, with only one reactor being ordered (Civaux 2) and the completion of only another nine (eight in France and one in the UK). Consequently, the average age of the Europe's reactors is increasing and clearly unless the situation changes nuclear power will become a minor contributor to Europe's energy supply within twenty years or so.

The current liberalisation of the electricity markets in Europe is said by one nuclear company to possibly "represent an even bigger threat to the future of nuclear power than anti-nuclear ideologues"[12]. Nuclear power, with its large up front construction costs and economic uncertainties over waste management and decommissioning costs, is clearly less attractive than other conventional energy sources, such as gas power stations. With little prospect of new construction, the fundamental question is how long with the existing reactors operate.

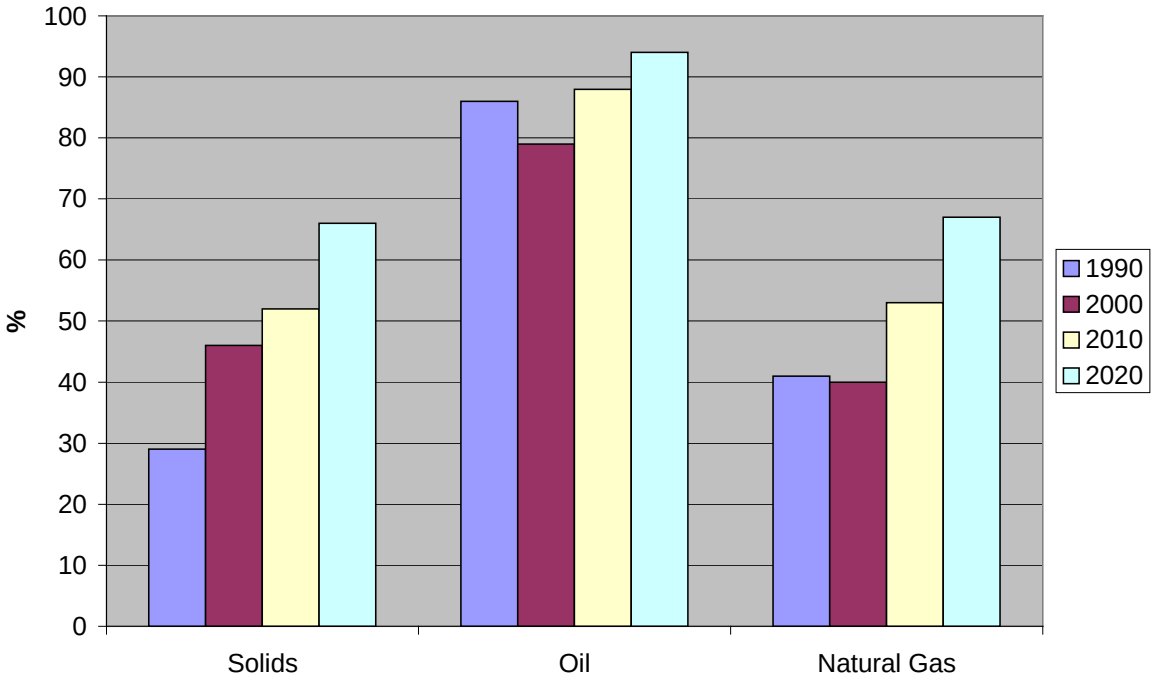
Energy Security.

It was stated in the 1996 Energy White Paper that "*the external dimension of energy policies is generally considered to be the most important vehicle for action of the European Union*". Despite this it is predicted that dependence on imported energy will significantly increase in the coming decade. Currently, the EU imports approximately 40% of its gas (mainly from Russia, Norway and Algeria), an increase from 6% in 1974. As can be seen in Figure 5, dependence is expected to increase in all fossil fuel sectors, rising to 67% for natural gas, 66% for coal and 94% for oil.

Furthermore, as the main exporters of gas to the Union are not amongst its proposed new members, enlargement will only increase this dependence on energy import. In particular, the introduction of the electricity market in Central and Eastern Europe (CEE) is likely to have the same short term results as in the Union and lead to an increase in gas use. According to the Commission, gas imports to the CEE, mainly from Russia, are expected to double by 2020[13].

[12] Plant Life extension: Is there life after 40 for Western Europe's nuclear Plants? Nukem Market Report, August 1997.
[13] ibid, page 43.

Figure 8: EU Dependency on Imported Energy



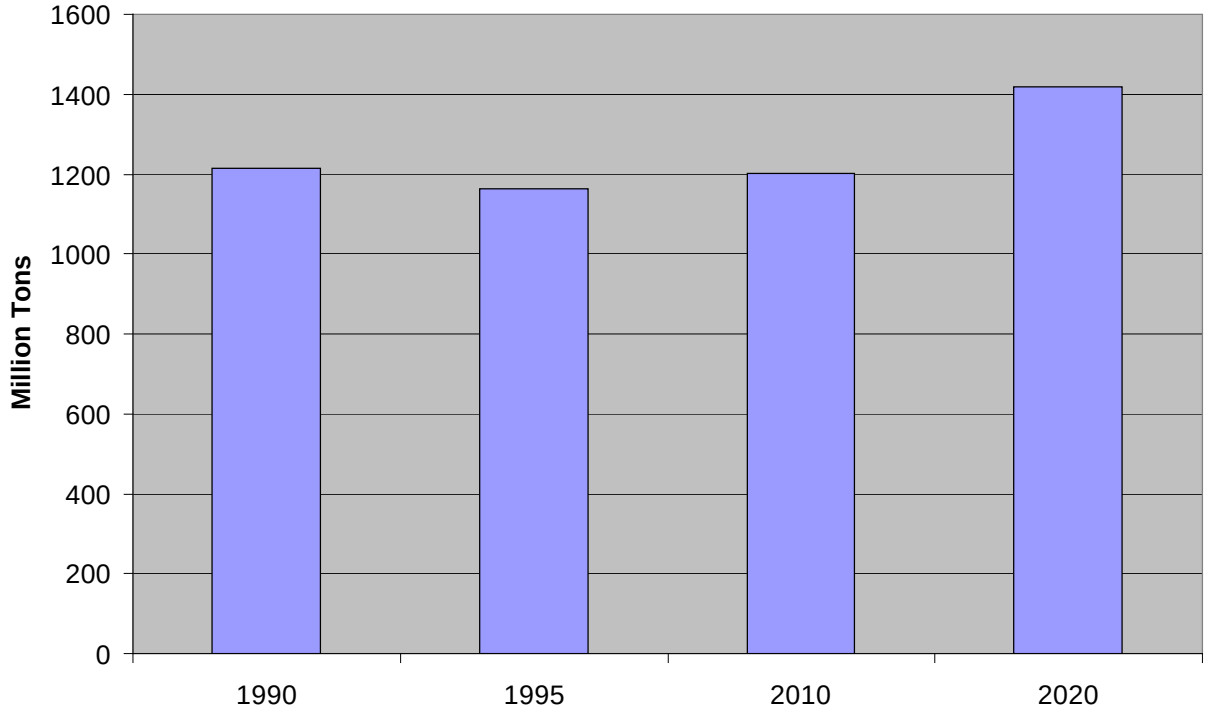
Source: Economic Foundation for Energy Policy.[14]

Kyoto Targets and Co2 Emissions:

The emission scenarios put forward in Energy Outlook to 2020 do not bode well for the world's climate. Under their base line scenario the share of fossil fuels is projected to increase from the 1995 figure, even "despite the significant pro-environment assumptions adopted in the baseline"[15]. This predicted increase in the use of fossil fuels, including use by the power sector, would imply a failure to meet Kyoto targets. The report predicts that the EU will increase its emissions by 7% between 1990-2010, compared to a target of an 8% reduction in emissions as agreed at Kyoto. Within the power sector (Figure 6), Co2 emissions are expected to be stable until 2010 and then increase until 2020, 17% above 1990 levels. This rise is above the 14% average increase predicted across all sectors: only the transport sector is predicted to have greater increases in Co2.

[14] Economic Foundation for Energy Policy, figure 6.1, page 88.
[15] Energy Outlook to 2020, Chapter 3, page 63.

Figure 9: Co2 Emissions by Electricity-Steam Sector in EU



The study further notes "the crucial role that electricity and steam generation may be called to play in reducing emissions. Orchestrating this role may prove quite difficult in the circumstances of liberalised, mostly privately owned and competitive markets"[16].

Subsidies

There is very little comprehensive data on the total levels of direct and indirect subsidies to the electricity sector. However, in March 2000 the European Parliament has issued a call for tender for a study into energy subsidies in the Europe.

The most recent study by the Free University of Amsterdam in 1997 estimated approximately 15 billion dollars in annual subsidies to the nuclear and fossil fuel sectors. See table below.

Direct Subsidies (million USD)	Member States	European Union	Total
fossil fuels	9681	531	10247
nuclear energy	4178	428	4675
renewables	1247	131	1488

[16] Energy Outlook to 2020, Chapter 4, page 95.

Consumer Choice and Green Electricity

The introduction of the Directive has also created significant opportunities for renewable energy. Most importantly it gives the right to some consumers to choose their electricity source. In countries that have fully opened up their electricity markets or those where domestic users have preferential access to renewables, individual households can now choose electricity from renewable energy sources. This has added to the repertoire of mechanisms currently being deployed to support renewable energy sources. Annex 1 contains a list of these mechanisms.

In most EU countries, Green Electricity tariffs or companies are of relatively recent importance, generally only in the last twelve months. There are little data on the effectiveness or uptake of these programmes. However, it is clear that throughout the EU programmes have been established and there is clear commercial optimism that a share of the market will seek renewable energy. See Annex 2 for a summary of EU Green Electricity Programs.

Part II: Status of Electricity Markets in the Members States of EU.

In December 1996 the Electricity Market Directive (96/92/EC) was adopted. This was a further stage of the Commission's measures to liberalise the electricity market following two other Directives, which harmonised pricing (90/377/EEC) and transit (90/547/EEC) regulations respectively. The Market Directive proved much more difficult to reach agreement on and took over four years from the original drafting to adoption. After adoption on the 19 December 1996, the Directive entered into force on 19 February 1997 and should have been implemented by all EU Member States by 19 February 1999.

The Directive's objective is to open up each national electricity industry to provide competition within each national market, and ultimately to create one European electricity market – as opposed to fifteen national ones. In order to reach this objective changes are needed in seven main areas[17]: -

- Market Opening.
- Access to the Networks
- Transparency of Accounts
- Public Service Obligations
- Independent Transmission and Distribution System Operation
- Competitive Electricity Generation.
- Reciprocity.

The national laws enacted by each Member State to reflect the EU Directive are given in Table 6.

[17] Presentation by Paul Butleel, Secretary General of UNIPEDE/EURELECTRIC, "Challenges and Opportunities ahead for the European Supply Industry" 11th November 1999 and presentation of Karen Prins, Dealing with Trade in the Internal Electricity market, Euroelectric Conference, Cross Border Trade of Electricity in Europe, 20th January 2000.

Table 6: Summary of Legislation applying to each Member State[18].

	Name of law	Date of law/entry into force
Austria	Elektrizitätswirtschafts- und – organisationsgesetz (ElWOG)	18 August 1998
Belgium	Law on the organisation of the electricity market	29 April 1999
Denmark	• Energy Law, L486 • Political agreement on new Energy Law. • Bill on CO_2 quotas for electricity production	June 1996 March 1999 2 June 1999
Finland	Electricity Market Act	June 1995
France	Government bill "Modernisation and Development of the Public Electricity Service".	February 2000
Germany	• Gesetz zur Neuregelung des Energiewirtschaftsrechts (New Energy Act) • "Erneuerbare-Energien-Gesetz (EEG) - "Renewable Energy Law"	29 April 1998
Greece	• Electricity Law • Law 2244/94 on RES-E • Draft law	1985 1994 1998
Ireland	Electricity Regulation Bill	1 December 1998
Italy	• Guidelines for the new Regulation of the National Energy System • Tariffs for Dispatch and Distribution of Electricity • Quality of Service of the Electricity Distribution Market • Legislative Decree (implementation of Directive)	1997 1998 1998 31 March 1999
Luxembourg	Draft Bill	Expected Spring 2000
Netherlands	Elektriciteitswet (Electricity Act)	1 August 1998
Portugal	• 313/95 (IPP and autoproducers law) • 182/95-185/95 (Framework law, production, distribution, transport)	24 Nov. 1995 14 March 1997
Spain	• 2366/1994 (RES-E) • Electricity Act 54/1997 (special regime)	9 Dec. 1994 27 Nov. 1997
Sweden	Electricity Trade Act 1	January 1998
UK	Electricity Act	1989

Market Opening:

The Directive gradually opens up the EU's electricity market to competition starting with large scale consumers. Table 8 sets out the lowering thresholds over the years 1999-2003, together with the minimum percentage of the market that will be opened given this threshold.

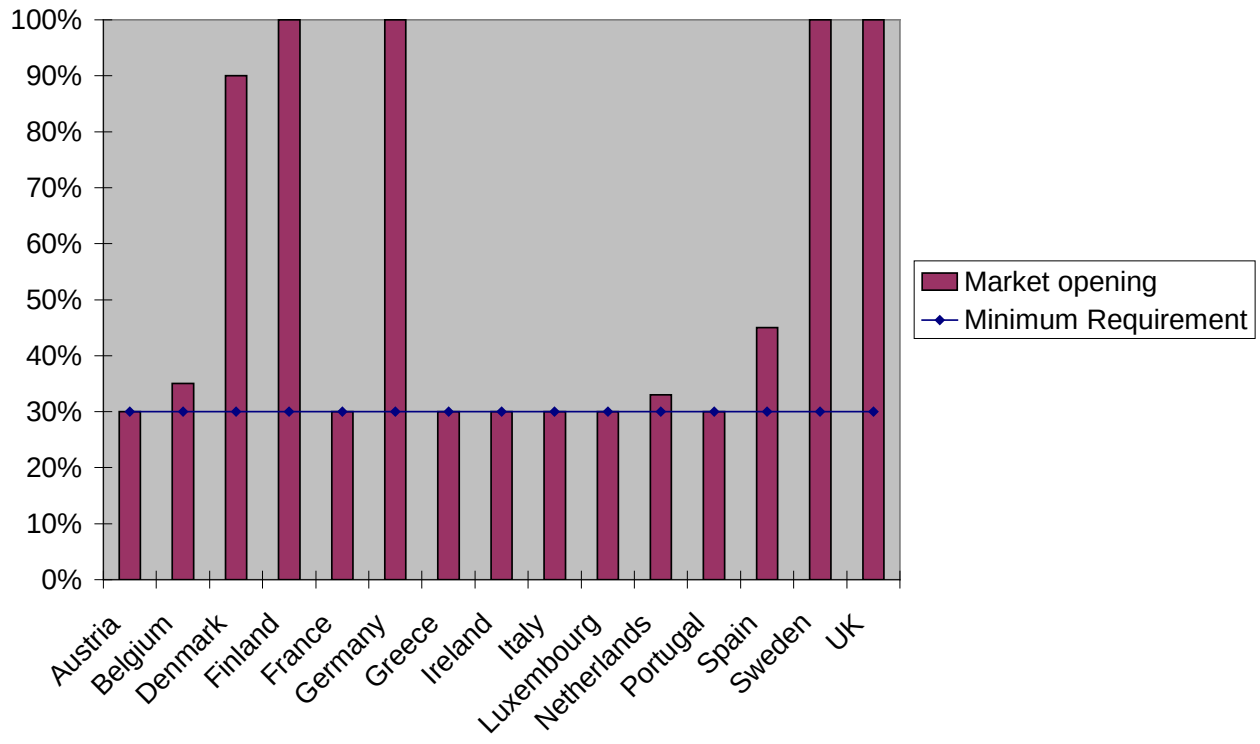
[18] The Implications of Tradable Green Certificates for the Deployment of Renewable Electricity, Mid Term Report, Öko-Institut, Science Policy Research Union; G.J.Schaeffer, M.G.Boots, T.Anderson, C.Mitchell, C.Timpe, M.Cames, ECN (Netherlands Energy Research Foundation) http://www.ecn.nl/. ECN-C—99-072 – with some alternations (France and Luxembourg).

Table 8: Minimum Liberalisation Thresholds for EU Markets

Year	Threshold	Minimum Market Opening %
1999	40 GWh	26
2000	20 GWh	28
2003	9 GWh	33

Although the Directive is only mandatory for very large users, it has set a precedent for freer movement of electricity on a European level and has encouraged more radical market reforms on a national level. Many countries are now adopting a faster timetable for competition within their electricity markets. Figure 1 shows the extent of this variation, with Finland, Germany, Sweden and the UK opting for a fully open market, while others are only implementing the minimum requirements of the Directive. However, nearly 70% of the market is now estimated as open (as of the beginning of 2000), far in excess of the 28% mandated by the Directive.

Figure 10: Current and Predicted Market Opening in Individual Member States.



Source: European Commission[19].

[19]Communication from the Commission to the Council and the European Parliament Recent Progress with building the internal electricity market. Commission of the European Communities. Brussels 27th May 2000

Austria[20]:

The Austrian implementation of the Directive follows its policy of a gradual opening of the market. The timetable is part of the federal electricity law (Elektrizitätswirtschafts - und - organisationsgesetz - "E1WOG"), which was published in August 1998 and entered into force on 19th February 1999. The nine Länder (local regional) electricity laws were also scheduled to enter into force by the February 1999 deadline.

The E1WOG gives final customers and distributors access to the open market in the following stages:.

- By 19th February 1999, all distributors that also have a transmission system and those consumers of 40 GWh/year or over.
- By 19th February 2000, the threshold for consumers is lowered to an annual consumption of 20 GWh.
- By February 2002, distributors - without transmission networks- with more than 40 GWh sales to final customers.
- By February 2003, all customers and all distributors above 9 GWh.

However, a poll undertaken in 1999 November of small and medium size enterprises both requested and expected that the liberalisation process would move much faster than the Government had outlined.

Belgium:

Belgium has been given an extra year by the Directive for its transposition into national legislation. The new Government appointed an expert group to review the liberalisation of the electricity market, who reported in December 1999. One of the objectives of the report was to study how the market opening could be speeded up and the following timetable was recommended for the introduction of thresholds for users: 20 GWh/year , by July 1st 2000, reducing to 10 by January 1st 2001, to 1 by January 1st 2003 and with all consumers eligible by January 1st 2006.

Denmark:

The Electricity Supply Act (ESA) of 1996 regulates the Danish market. The main parts of the Directive were included in the ESA though amendments made in January 1998. In addition, an agreement was reached in March 1999 between the Danish Government and the majority of political parties on further regulation of the industry

Since 1st January 1998, distribution companies with an annual supply of electricity above 100 GWh and consumers with an annual intake of 100 GWh have had access to open markets. However, a decision has been taken to open the market fully, by the end of 2002. In the build-up to this the threshold will be reduced to 10 GWh by 1st April 2000 and then to 1GWh by 31st December 2000.

Finland:

The Electricity Market Act of March 1995 is the foundation of the liberalisation of the electricity sector. Initially this allowed consumers with an annual requirement of more than 500 kW to choose suppliers.

[20] Country profiles are largely based on the Member State reports published on DGXVII web site, December 1999 (http://europa.eu.int/en/comm/dg17/elec/implgrid.htm).

From the beginning of 1997 the threshold was abandoned and all consumers have been given access to the open market.

France:

The French electricity market is still governed by the 1946 Law that nationalised the electricity industry and created Electricité de France.

To date the French market has not followed the rules and requirements of the Directive. The European Commission in November 1999 wrote to the French Government over the lack of progress, requesting a reply within two weeks. Although the situation in both France and Luxembourg (see below) raise concerns over lack of respect for agreements and the distortion of the markets, France's failure to implement the Directive has resulted in a number of individual countries making complaints. The Spanish government has threatened to block French companies from its power market as long as France refuse to open up to foreign competition. The Netherlands has indicated they may halt electricity imports from France, for some consumers[21].

At the December Council of Ministers meeting, the French Energy Minister, Christian Pierret, was reported to be optimistic that the Directive would finally be transposed by the end of February 2000, a year behind the deadline. However even if the Directive is finally adopted fast action will still be required for the French to catch up in order to meet the Directive's target of a threshold of 20 GWh by February 2000.

Greece:

Greece has been given a two-year extension to transpose the Directive. Large-scale consumers (100 GWh) will only be able to choose their supplier from 19th February 2001. It is expected that the market will follow the minimum requirements for opening.

Ireland:

Ireland has been granted an additional year to transpose the Directive and will apply its obligations from February 2000. An Electricity Regulation Bill was published in late 1998 establishing the framework for competition and creating the "Commission for Electricity Regulation".

The initial threshold for competition will be 4GWh, representing 28% of the market. It is expected that the threshold will be further lowered so that by 2003, 32% of the market will be open for competition. However, all electricity consumers will be entitled to purchase electricity that it produced from renewable or alternative energy sources.

[21] Brussels Starts Legal Action In French Power Dispute The Independent (London) November 25, 1999.

Germany:

The transposition of the Directive is mainly covered in the April 1998 law "Gesetz zur Neuregelung des Energiewirtschaftsrechts). The law proves for an immediate opening of the market, with zero thresholds for all consumers and distributors.

Italy:

The implementation of the Directive has been realised through the adoption of a Government Decree in March 1999. The market will be opened for consumers of 30 GWh or more, giving access to 30% of the market. From 1st January 2000 the threshold will be lowered to 20 GWh, 35% of the market, and from 1st January 2002, to 9GWh, 40% of the market.

Luxembourg:

The Parliament is currently discussing amendments to existing laws on rational use of energy and telecommunications in order to transpose the Electricity Directive. To date this process has not been completed and the European Commission has written to the Government seeking an explanation for the lack of progress and enquiring about the subsequent fulfilment of the Directive's requirements. The legislation is expected to be approved by the Parliament in April 2000.

If adopted the legislation will allow up to 45% of the market to be opened by 2006. However, various parties have proposed amendments that would require the introduction of a more rapid schedule to open up the market, some to allow full market opening by 2003.

The Netherlands:

The original proposal for the opening of Dutch market assumed three stages. From 1st January 1999, all consumers with an available capacity of 2 MW per connection may choose their supplier; customers of over 20 GWh are eligible in any event. From the beginning of 2002 all consumers with a total maximum transmission of more than 3-80 A. From 1st January 2007, all consumers are to be free to choose their electricity supplier.

However it became clear in 1999 that the Government, industry and consumer groups were keen to accelerate these plans. It is now expected that the market will be fully open in 2003 and that the opening of the market for medium sized customers will be brought forward by a year.

Portugal:

Since 1995 consumers with an annual consumption of over 100 GWh have been eligible to choose their supplier. From 15th February 1999, this threshold was reduced to 9 GWh.

Spain:

The Electricity Directive was implemented in Spanish law in November 1997. The Act reorganised the electricity market paving the way for full liberalisation. The threshold for eligible consumers was initially set at 15 GWh/year, reducing to 5 GWh/year in 1999, to 1 GWh/year by 2000, and leading to full market opening by 2007. However, in 1999 it became clear that the Spanish Government wanted to revise the timetable to allow full market access by 2004.

Sweden:

The electricity market has been fully liberalised since 1st January 1996.

United Kingdom:

The electricity market system of England, Wales and Scotland was created by the Electricity Act, which entered into force in 1990, and achieved 100% market opening in 1999.

Access to the Networks:

A key element and one of the most controversial parts of the Directive was the mechanism for allowing alternative producers to have physical access to the grids. Originally the European Commission wanted to have compulsory Third Party Access (TPA). Under TPA producers and consumers may negotiate with each other for contracts, but may not negotiate transmission or distribution costs, which are fixed. However, this was not popular amongst industry and some Government representatives and it was revised to allow negotiated Third Party Access (nTPA). nTPA allows producers and consumers to negotiated directly with each other and then to negotiated access to the distribution network with its operator. In the event of lack of capacity, the system operator is able to refuse access and is not obliged to construct new capacity. However, this compromise was not sufficient for some countries that proposed another mechanism, the Single Buyer mechanism. A single buyer is a responsible within the system for the unified management of the transmission system and/or for centralised electricity purchasing and selling. This was also accepted as an alternative mechanism provided that it did not lead to monopolisation of the networks by individual concerns. The current mechanisms preferred by the Member States of the EU are listed below.

Table 9 Member States Choices for Network Accessibility[22].

Third Party Access	Negotiated Third Party Access	Single Buyer
Austria	Belgium – international	Italy
Belgium – domestic	Denmark – international	Portugal
Denmark – domestic	Germany	
Finland	Sweden	
France		
Greece		
Ireland		
Italy		
Luxembourg		
Netherlands		
Portugal		
Spain		
Sweden		
UK		

Note: Some countries allow more than one system.

Unbundling[23]

Two different approaches have been taken to ensure the separation of different parts of the electricity industry, either by formal - legal- separation or by ensuring separate management and accounts. Table 4 shows the approach taken by each Member State.

Table 10: Methods Deployed by Member States for Separation of Accounts.	
Separation of Accounts and Management	Legal Separation
Austria	Denmark (West)
Belgium	Finland
Denmark (East)	Italy
France	Netherlands
Greece	Portugal
Germany	Spain
Ireland	Sweden
Luxembourg	United Kingdom

[22] UNIPEDE/EURELECTRIC, Paul Bulteel, 1999 – In the Presentation given by Katrine Prins in January 2000, only Greece and Germany were stated to currently being employing nTPA.
[23] UNIPEDE/EURELECTRIC, Paul Bulteel, 1999.

Public Service Obligations (PSOs)[24]

Article 3 of the Directive states: -

"Having full regard to the relevant provisions of the Treaty, in particular Article 90, Member States may impose on undertakings operating in the electricity sector, in the general economic interest, public service obligations which may relate to security of supply, regularity, quality and price of supplies and to environmental protection".

Consequently, Member States can decide not to comply with the articles of the Directive if they can show that their public service will be compromised. This is in many ways a "catchall clause" has been used to justify a wide range of activities that might otherwise contravene the Directive. Despite its loose definition, it is clear that many countries have on paper proposed to use the opportunity created by the PSO to support renewable energy sources, energy efficiency measure and combined heat and power plants. However, in some cases these proposed support mechanisms are not currently being introduced, such as for the CHP stations in Germany, while others may be less necessary with the introduction of additional EU legislation, such as a Renewable Energy Directive. However, the range of PSOs currently proposed is listed below.

Austria:

The E1WOG lays down six explicit PSOs: -

- Non-discrimination and equal treatment of customers and system users.
- Obligation to connect and supply final customers under specified tariffs and general conditions.
- Requirement to honour legally imposed obligations on electricity undertakings in the public interest.
- Priority dispatch for power generation from renewables, waste and combined heat and power (CHP) plants.
- Purchase of electricity only from generators that respect the environmental standards of the EU
- reduction of energy imports from third parties subject to not contradicting international obligations,.

Belgium:

The Economic Affairs Minister sets maximum prices for the country and ensures that domestic customers receive electricity at an accessible price and a guaranteed minimum supply.

Denmark:

The Electricity Supply Act has three main areas that fall under the PSO. These are: -

- Maintenance of security of supply.
- Consumer protection.
- Securing environmentally benign electricity production, in particular through the support of CHP and renewable energy sources.

[24] Country profiles are largely based on the Member State reports published on DGXVII web site, December 1999 (http://europa.eu.int/en/comm/dg17/elec/implgrid.htm).

The support for renewables will ensure that by 2004 all users will have to ensure that 20% of their electricity comes from renewables.

Finland:

In Finland, operators are under several PSOs:

- A network operator must maintain, operate and develop the network and the connection to other networks in accordance with the reasonable needs of the customers.
- A network operator is obliged to connect consumption sites and generating installations - failing which, they must pay reasonable compensation.
- A network operator is obliged to transmit electricity; in the event of failure they must pay reasonable compensation.
- A network operator is obliged to apply a tariff system, which is independent of customers' geographical location.
- A network operator must ensure that equal types of customers pay the same tariff for the transport of the electricity.
- The distribution operator has the sole right to construct a distribution network within its area.
- An electricity retailer in a dominant position has an obligation to deliver electricity at reasonable prices to customers unable to buy electricity via the market.

France:

There are three major PSOs.

- Supplying electricity, including selection of the primary energy sources and production techniques to safeguard supply, competitiveness and environmental protection.
- Developing and operating the networks as a universal service.
- Guaranteeing a supply to all consumers through geographical equalisation of tariffs and assistance for cases of hardship.

Greece:

As Greece is 2 years behind the other Member states in implementing the Directive, its definitions of PSOs are yet to be drawn up. The Greek Minister for Development will issue them.

Germany:

The Energy Law has no specific or explicit provisions concerning PSOs. However there are expected to be certain requirements which will mirror the Directive's objectives, namely: -

- a general obligation for electricity supply and connection to final customers
- the potential to refuse access in order to protect production based on CHP and renewables.

- an obligation for distributors to purchase electricity from renewable sources according to regulated Feed-in tariffs – a Feed-in tariff subsidies the renewable electricity by guaranteeing a price in combination with an obligation on the utility to purchase.

Ireland:

The PSO in Ireland is likely to be used to ensure that peat is continued to be used as a primary energy source and that electricity is used from renewable and CHP sources. Furthermore, measures will be promoted that encourage the effective and efficient use of electricity.

Italy:

Three areas are particularly noted as falling within public obligations:
- Management of the networks.
- Supply to captive customers.
- Environment. This aims to ensure priority by the transmission system operator for electricity produced by renewable energy and CHP plants. Furthermore, operators that produce and import more than 100 GWh are obliged from 2001 to feed into the network at least 2% of electricity from renewable energy sources from new (as opposed to existing) power plants that have been built or re-powered since the Directive entered into force.

Luxembourg:

The Government has defined four areas in which it wishes to impose a PSO, these are:
- Implementation of the regime which is suitable to be based on renewable energy sources or co-generation.
- Implementation of energy conservation programmes or measures.
- Charging of fair and equalised tariffs for captive customers.
- Connection and supply obligation towards captive customers.

The Netherlands:

The concept of PSOs as such does not exist in the Electricity Act. However there are three areas that are thought to fall within this framework:
- Management of networks.
- Supply to captive customers.
- Environment. This covers efficient use of energy, obligations to purchase green electricity and the introduction of a green certificate scheme.

Portugal:

Although the notion of PSOs does not exist in the Portuguese legislation, it could include: -
- a provision concerning quality of service.
- an obligation to buy electricity produced by renewable sources.

- distributors required to supply consumers and fulfil their legal requirement to be supplied.

Spain:

The Spanish Law currently recognises and imposes PSOs in a broad range of potential areas, including security and quality of supply, safeguarding safety conditions, the promotion of universal service and the protection of the environment through supporting renewables and CHP plants.

Sweden:

The Swedish Government has made public its desire to see PSOs in the following areas:
- the introduction of network tariffs.
- the connection of all final customers to the national grid.
- requirement for holders of a supply concession to supply customers in its allocated area (unless they wish to have electricity from a third party).
- requirement for concession holders to purchase electricity from small -often renewable - energy sources at a fair price.

United Kingdom:

PSOs mostly appear in the supply sector and include: -
- universal service and obligation to supply.
- pricing
- customer Service
- Environment protection.

Independent Transmission and Distribution Systems[25]

Countries have taken different steps to ensure that their transmission and distribution systems function separately, either through the establishment of separate companies or separation of functions and accounts.

Austria: The only national electricity company (Verbundgesellschaft) is legally unbundled between generation and transmission. However the regional distribution companies (Landesgesellschaften) remain mostly vertically integrated and have to ensure sufficient management independence between the separate functions.
Belgium: The network operator is bound not to undertake any commercial activities other than those necessary to fulfill its tasks. In particular, it may not have interests in electricity producers or distributors.
Denmark (east): The transmission system remains part of the vertical structure of Elkraft - with the same board and owners, but separated accounts.
Denmark (west): The operation of the transmission and production systems in the Western part have been separated. However, the operation of the transmission and distribution companies will be legally unbundled following a decision in March 1999.

[25] Country profiles are largely based on the Member State reports published on DGXVII web site, December 1999 (http://europa.eu.int/en/comm/dg17/elec/implgrid.htm).

Finland: The transmission system is owned and operated by Fingrid PLC. Although its shareholders are the power companies the company is organized separately and may not be involved in production or distribution activities.
France: The department within EdF responsible for transmission is said to be independent of the management of EdF. EdF's transmission director is appointed directly by the Minister of Energy, but at the proposal of EdF's chairman. However, some believe that the transmission division is still too connected to the main body of EdF to such an extent that high transmission costs have deliberately been introduced to discourage competition.
Greece: The Greek Public Power Corporation (PPC) will remain vertically integrated and will continue to own the transmission system as a separate company.
Germany: The energy law does not require any change in ownership of the electricity industry. Many of the regional and municipal distributors are also involved in generation.
Ireland: The status of the separation of the transmission and distribution functions is unclear at present.
Italy: At present the ENEL is a vertically integrated public company, responsible for import, transmission and distribution. A new utility company will be created to act as the transmission operator.
Luxembourg: Luxembourg is a relatively special case due to its limited transmission network (91 Km). The transmission lines are considered to be part of the distribution network and the whole system is operated by the distribution network operator.
Netherlands: The Electricity Act requires the legal separation of the activities of the network from both the suppliers and producers of electricity. In October 1998 a separate entity was established to operate the transmission system.
Portugal: The operator of the transmission system, Rede Electrica Nacional (REN) is part of Electriciddade de Portgal but is a separate entity.
Spain: The Electricity Act provides for the legal separation of the entities involved in the system management, transmission and distribution. The companies involved in these activities are barred from involvement in electricity generation.
Sweden: The Electricity Act bars the operators of the transmission and distribution companies from being involved in generation or trade of electricity. The transmission operator, Svenska Kraftnät, is a state agency.
United Kingdom: The English and Welsh system is legally unbundled with restrictions that prevent the distributors from being engaged excessively in the production of the electricity they distribute. The National Grid Company, the transmission operator, is a separate legal entity. In Scotland there are only two vertically integrated companies that have to ensure sufficient management unbundling.

Competitive Electricity Generation.

There are two main mechanisms adopted by Member States when increasing their electricity supply. The first, Authorisation, allows new power plants to be built by any party provided that national and local criteria are respected. Under the second, Tendering, whereby the Government assesses the need for new capacity and organises a tendering process for the companies to bid for the allocated new generation capacity.

The majority of Member States have opted for the Authorisation process, including Austria, Belgium Finland, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, and UK.

The Tendering process has been adopted by Portugal.

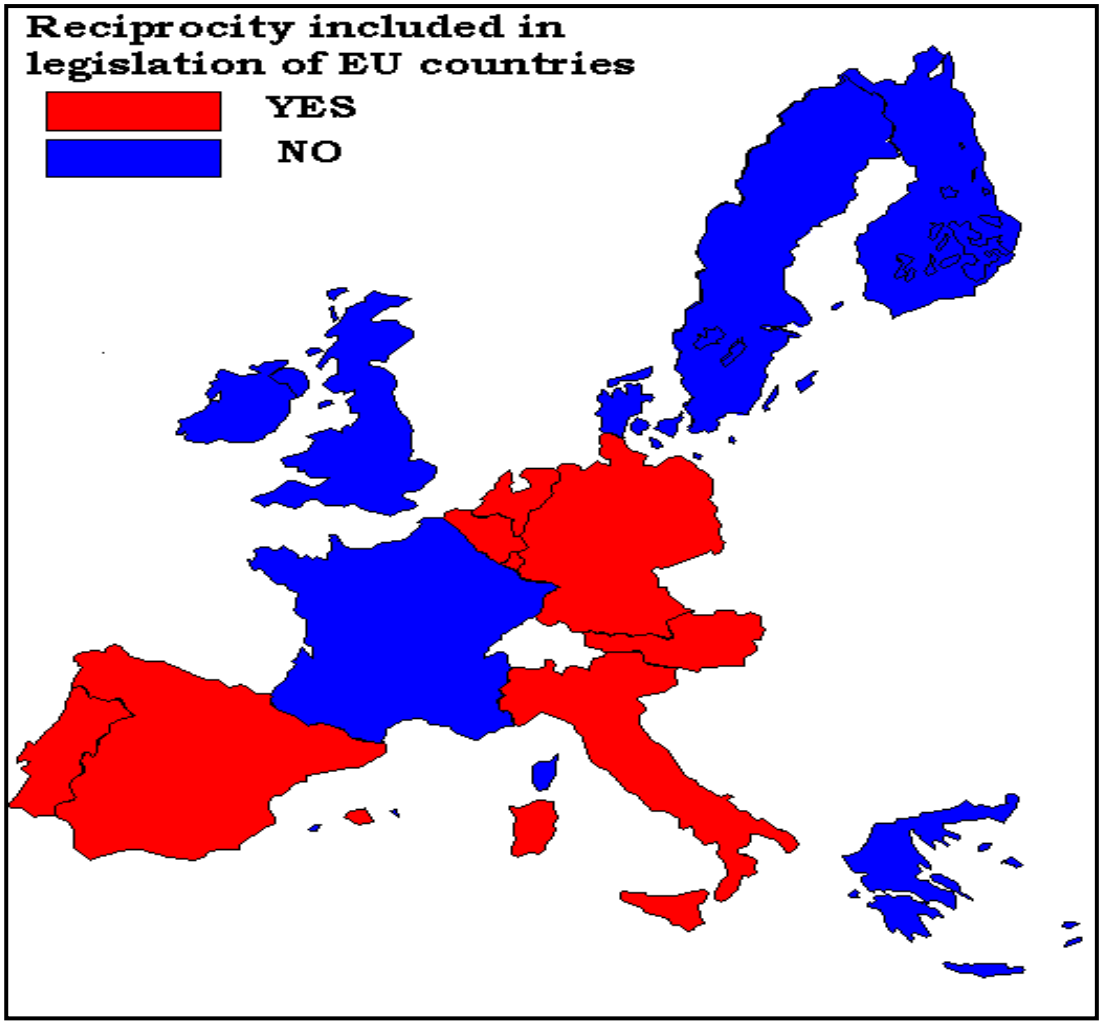
Some countries have opted for a mixture of the two processes. Denmark assumes an Authorisation process, except for the construction of some CHP plants and some renewable energy projects (offshore

wind). France has adopted an Authorisation process, except where production capacities do not meet the objectives of the multi-annual investment programme, when a Tendering process is used. Germany is said not to have any energy specific Authorisation or Tendering procedures.

Reciprocity.

The Directive allows countries to insist that prior to access to their domestic markets a country where a utility originates must have applied and abided by the rules of the Directive. Unless a reciprocal market opening is obtained, the countries concerned can deny access to their own markets. In particular the Dutch Government has been particularly keen to ensure reciprocity within the electricity market and has threatened to refuse EdF access to its market. The map below shows those countries that have built into their national legislation the ability to require reciprocity.

Figure 11: Map Showing Countries in EU with Reciprocity Legislation



The lack of reciprocity has also been used to block the importation of electricity from non-member states. In late 1999, electricity from the Hungarian grid was blocked from being directly imported into Austria as it was claimed access to the Hungarian grid was denied to Austrian companies. Although it is clear the Electricity Market Directive allows such action to be taken, it is unclear whether lack of reciprocity is sufficient to refuse access to a country's market under the framework of the European Energy Charter and the associated World Trade Organization Agreements (GATT and GATS).

Conclusion and Recommendations

The entering into force of the electricity market Directive a year ago has resulted in a relatively rapid increase in electricity trade. The targets for market opening have been exceeded. Some countries e.g. Germany and the UK have near 100% market opening, while others e.g. Netherlands and Spain are now proposing to accelerate the reforms in the market to increase market opening. However, not all countries have fully embraced the Directive: both France and Luxembourg have yet to comply with the initial requirements. The Commission has been forced, with encouragement from a number of Member States, to take France to the European Court for failing to comply with the Directive. There is particular concern about France's failure to conform to the most basic market conditions, as its state owned monopoly Electricité de France, is actively exploiting other consequences of the Directive in acquiring utilities in other European countries. In the UK EdF is now the largest supplier of domestic electricity.

EdF is not unique in its activities. The opening of the markets has attracted the interest of EU power companies back from Asia and Latin America to Europe. The rate of these EU acquisitions increased in 1999 and this trend is likely to continue into the next century. These transactions are likely to have brought considerable financial benefits for the company directors and shareholders. In addition, prices for consumers have in general fallen. Therefore, there have been many short-term financial benefits of the market Directive.

However, not all sectors have benefited from the Directive. In particular the environment is and will continue to be adversely affected by conditions brought about by the Directive, specifically for the following reasons: -

- The reduction in final electricity prices reduces the financial incentive to save energy and increase energy efficiency.
- Some renewable energies such as wind are at a pivotal time in their development. Although they are proven technologies, they require market stabilisation to become widespread mainstream generators. Rapid price decreases at this crucial time may negatively impact on the technology's development.
- The reduction in electricity prices and the general price instability make it difficult for emerging technologies to become established.
- A reduction in energy efficiency and a decreased input from renewable energies will lead to an increase in Co2 emissions. This will make it unlikely that the EU will conform to its Kyoto Targets.

However, the changes in the electricity market do potentially have some benefits for the environment. Consumers will be able to choose to get their electricity from renewable sources, so-called green power. The Directive's strategy of gradually opening up the market means that initially only very large scale consumers of power e.g. railways will be in a position to choose green power. As the chief motivation of such consumers is likely to be price and because renewables are not currently the cheapest option available, it is debatable how many will become green energy consumers. In some of the countries where the market has been opened to all consumers, green power schemes are rapidly being established. In the UK there are 13 while in Germany there are 69. It is too early to predict how such schemes will develop and what the final uptake will be. If they are to succeed, there will need to be both consumer confidences

This price difference will initially be determined by mechanisms used to facilitate the widespread introduction of renewables. As has been described in Annex 1, there are many mechanisms currently being employed, with varying decrees of effectiveness. In particular, Feed-in tariff programs have been employed very successfully, especially in Denmark and Germany, although there are some disadvantages of these mechanisms. The success of such programs makes them a benchmark against which other schemes should be judged.

Whatever mechanism is chosen it is clear that, given the current market distortions in favour of conventional power sources, renewable energy sources will need support if they are to reach the White Paper target of 23% by 2010. One option open to member States is to build into their national legislation the possibility of taking reciprocity action against those member States that fail to reach their renewable energy targets, thus blocking the importation of electricity from those countries that do not support the community objectives. In light of the current bias towards market based solutions this action is likely to result in the most effective promotion of renewables.

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Annex 1:

October 1999 ECN-C--99-072

The Implications of Tradable Green Certificates for the Deployment of Renewable Electricity

Mid-Term Report

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Renewable energy instruments

All Member States support RES in one or more ways, via research and development, tax reductions/exemptions, guaranteed prices, investment subsidies and the like. The magnitude of the support varies largely between the Member States. Given the national situations, both policy priorities and the presence of natural resources differ between countries. Thus, there is a variety of incentive schemes for renewables within the EU Member States.

Investment subsidies

The most widespread instrument to stimulate renewable energy sources has been subsidies. In general, they can be divided into subsidies on renewable energy capacity and subsidies on renewable energy output. Subsidies on installed capacity only stimulate supply but not demand of renewable electricity. Moreover, subsidies on installed capacity might be unfairly distributed if the total amount of subsidy is limited, and they have to be abolished if the technology that is stimulated becomes too widespread (Schaeffer et al., 1999). In general, relatively higher levels of subsidy are given to promote the technological development of the as yet less economical technologies, such as rooftop PV systems. Technologies closer to the market, such as wind, do also in many cases profit from subsidies, albeit at relatively lower levels (European Commission, 1999).

Austria

Subsidy programmes for wind, hydropower, landfill gas, biomass and bio-gas systems. Subsidies were about 30% of investments.

Belgium

Subsidies of 15% (Walloon Region) and 25% (Flanders) of investment costs in RES apply.

Finland

Investment subsidy to heat and power plants when there is an opportunity for increased use of biomass (peat or wood). Maximum percentages apply on a case-by-case basis for new technologies: wind power 40%, other investment in renewable energy 30%.

France

A maximum subsidy of 30% of investments in biomass projects applies. For photovoltaic, small wind power and small hydropower projects in remote areas subsidies of 95% apply.

Germany

Investment subsidies used to be in place, e.g. during the 250 MW wind power programme.

Greece

Special framework for RES: capital investment subsidies up to 40%, interest subsidy up to 40%, subsidy for leasing up to 40%. Tax deduction up to 100% and interest subsidy up to 40% for investments in RES.

Luxembourg

First five wind power schemes subsidised with 3000 LUF/kW (75 Euro/kW). Private homes and other projects receive 25% of investment costs when installing photovoltaic systems.

Netherlands

Investors in renewable energy projects are eligible for a capital subsidy funded by a Green Fund at reduced interest rates (about 1.5%). In addition, accelerated depreciation and a tax credit, equalling to 15-20% of subsidy is applicable.

Sweden
Since mid 1997, new wind power plants receive a 15% subsidy of total investment costs for plants larger than 200 kW. New biomass facilities receive an investment subsidy of up to 25% of the investment costs (3000 SEK/kW or 344 Euro/kW). New small-scale hydropower (100 – 1500 kW) is also eligible for subsidies.

Feed-in tariffs (mainly based on Cerveny and Resch, 1998)
Subsidies on output, in the form of guaranteed prices in combination with a purchase obligation by the utilities, have proved to be very successful in promoting the deployment of renewable energy sources. The levels of guaranteed prices vary considerably from country to country. On average, regulation in Germany, Denmark, Spain and Italy offer the highest prices (European Commission, 1999). The appropriate regulatory authority to reflect falling prices due to technological progress may modify the fixed tariff. However, this may be resisted by existing RES-E generators. The tariff may also be supplemented with subsidies from the State, as e.g. in Denmark where a subsidy per kWh delivered to the grid is paid to independent producers (European Commission, 1999).

Austria
In Austria, the feed-in tariffs have seasonal (winter/summer) and time-of-day differentiations (day/night and weekends). For wind and photovoltaic systems, the average feed-in tariff over a year varies from 0.56 and 0.68 ATS/kWh (0.040 to 0.049 Euro/kWh).

Table 1 *Austrian feed-in tariffs in 1998*

		night/weekend [ATS/kWh]	day [ATS/kWh]	night/weekend [Euro/kWh]	day [Euro/kWh]
Wind and	Summer	0.40	0.55	0.029	0.040
Photovoltaic	Winter	0.61	1.08	0.044	0.078
Biomass	Summer	0.38	0.55	0.028	0.040
	Winter	0.59	0.90	0.043	0.065

Until early 1998, additional to the regular feed-in tariffs, utilities paid a bonus to independent producers for a period of three years after the construction of a new plant (‘three-year agreement’). The bonus for wind and photovoltaic systems has been 100% and for biomass systems 20%.

Belgium
RES-E fed into the grid for a constant period of 24 hours a day receives an average of 2.26 BFR/kWh (0.056 Euro/kWh). RES-E supplied for only 10 hours a day during peak load and daytime hours, producers receive an average of 2.92 BFR/kWh (0.073 Euro/kWh). Discontinuous generation (i.e. photovoltaic and wind power) receives 1.98 BFR/kWh (0.050 Euro/kWh).

Denmark
A state subsidy of 0.07 DKK/kWh (0.009 Euro/kWh) applies for electricity production based on natural gas and renewable sources. Additionally, 0.17 DKK/kWh (0.023 Euro/kWh) is granted for RES-E.

Electricity from biomass systems is paid on the basis of avoided cost of the utilities and averages 0.27 DKK/kWh (0.036 Euro/kWh). In addition the energy/carbon tax is reimbursed and a government subsidy applies, which bring the total average feed-in tariff for biomass based electricity to 0.54 DKK/kWh (0.073 Euro/kWh). For wind power systems, the price is fixed at 85% of the net price for a consumer of

20000 kWh /year, and averages 0.31 DKK/kWh (0.042 Euro/kWh). In addition, a government subsidy for feed-in tariffs and reimbursement of the energy/carbon tax applies to wind power, totalling 0.27 DKK/kWh (0.036 Euro/kWh). This brings the total annual average price for wind power to 0.58 DKK/kWh (0.078 Euro/kWh). For photovoltaic systems feed-in tariffs are the same as for biomass.

The political agreement on electricity reform (March 1999) provides for a settlement price of 0.33 DKK/kWh (0.045 Euro/kWh, corresponding to the 85% rule) and a 0.10 DKK/kWh (0.014 Euro/kWh, 'CO_2 10 ore') tax refund for wind power until a well functioning market for renewables has been established. In addition, a 0.17 DKK/kWh price subsidy for wind capacity up to 200 kW for the first 25000 full-load hours will be paid. For wind capacity between 201-599 kW the first 15000 full-load hours and for capacity of 600 kW and above the first 12000 full-load hours the 0.17 DKK/kWh also will apply. The CO_2 10-ore tax refund and 0.17 DKK/kWh price subsidy also will apply for other private RE-plants. For biogas plants the settlement price will be 0.33 DKK/kWh (0.045 Euro/kWh). Existing RE-systems financed by these rules will not get RE-certificates.

New wind turbines constructed up till the end of 2002 will receive the settlement price of 0.33 DKK/kWh (0.045 Euro/kWh) for a period of 10 years. Other new RE-plants will get 0.50 DKK/kWh (0.068 Euro/kWh) for a 10 year period. Special provisions for the replacements of old wind turbines will also be implemented.

France
EdF is obliged to purchase independent power production at a rate based on the avoided cost for EdF, which is about 0.3 FRF/kWh (0.046 Euro/kWh). This tariff is mainly used for small hydropower. For CHP from biomass and waste an average value of 0.4 FRF/kWh (0.060 Euro/kWh) applies.

Germany
The Stromeinspeisungsgesetz (Electricity feed-in law) in Germany provides for a fixed price that all renewable generators receive and operators of the grid are forced to accept renewable electricity produced in their area. To protect the operators of the grid for high financial loads, a toughness condition is included in the new act. A regional limit of 5% renewable electricity is set. If the renewable electricity production increases this threshold in a supply area, the operator is exempted from the obligation to purchase and refund.

The price is fixed on the basis of average revenues during the last but one year, i.e. the value for 1995, as published in the official federal statistics, is the starting point for the 1997 calculation of the fixed price. In 1997 the fixed tariff amounts to 0.1906 DM/kWh (0.098 Euro/kWh). The rate for hydro and biomass systems totals at least 80% of the average revenue (1997: 0.1524 DM/kWh or 0.078 Euro/kWh). For hydro with an output of more than 500 kWh, the rate is 80% for the deliveries up to 500 kWh and 65% for the additional supply (1997: 0.1238 DM/kWh or 0.063 Euro/kWh). For solar electricity and wind power the rate is at least 90% of the average revenue (1997: 0.1715 DM/kWh or 0.088 Euro/kWh).

Greece
Feed-in tariffs in Greece are based on the selling price of electricity and depend on the grid type (high/low voltage). For autoproducers that sell their surplus power produced with renewable sources to the Public Power Corporation (PPC) the tariff is 70% of the selling price (depending on the voltage and peak zone 4.91 to 18.08 GDR/kWh or 0.015 to 0.054 Euro/kWh). For Independent Power Producers (IPPs) it is 90% of the selling price, i.e. 6.31 to 18.79 GDR/kWh (0.019 to 0.057 Euro/kWh). In addition, the IPPs receive a capacity credit that varies with the type of renewable system (wind and solar, small hydro, biomass) and the voltage of the interconnected system.

Italy
Feed-in tariffs in Italy are based on avoided cost and higher investments cost for RES-E projects, and apply for eight years. A distinction is made between IPPs and autoproducers. IPPs production from biomass and photovoltaic systems receive 270.5 L/kWh (0.141 Euro/kWh). After eight years the rate is reduced to 89.9 L/kWh (0.047 Euro/kWh). Electricity from wind turbines receive 183.7 L/kWh (0.096 Euro/kWh). For autoproducers the feed-in rates differ for peak load (days) and off-peak (nights, weekends and August) deliveries. In addition the rate depends on the regularity of their deliveries. The average annual rate for biomass and photovoltaic systems is estimated at 225 L/kWh (0.117 Euro/kWh). After eight years the rates are reduced. For wind power the rate for peak deliveries is 232.9 L/kWh (0.122 Euro/kWh), the low rate is 47.9 L/kWh (0.025 Euro/kWh) and a bonus is granted for regular deliveries.

Luxembourg
For non-utility electricity, feed-in rates differ between small and large producers. Producers of up to 500 kW of electricity from wind and photovoltaic systems (and some biomass) received 4.03 LUF/kWh (0.100 Euro/kWh) in 1997. The rate for producers in the category 501 to 1500 kW amounts to 2.30 LUF/kWh (0.058 Euro/kWh) during the day and 1.20 LUF/kWh (0.030 Euro/kWh) during night hours. A bonus of 4500 LUF/kW (112 Euro/kW) is granted for average peak load deliveries.

Portugal
RES-E producers are guaranteed to receive 90% of the income received by applying the prices in the start-up year.

Spain
Feed-in tariffs for six different categories (according to size and technology) of electricity generation from renewables and CHP are based on avoided costs. The average feed-in tariff for biomass-based electricity is about 10.56 PTA/kWh (0.065 Euro/kWh). For wind, photovoltaic and small hydro projects the rate is about 12 PTA/kWh (0.074 Euro/kWh). Since 1997 a special regime for producers of up to 50 MW, using co-generation and renewable sources, applies. The feed-in tariff in this special regime is set at 80-90% of the average price (excl. any tax) of electricity.

Sweden
Small generators (<1.5 MW) have to receive a price that is in line with the average household tariff minus the costs for administration and the profit mark-up. The average rate for wind power was 0.27 SEK/kWh (0.031 Euro/kWh) in 1996. In addition, a governmental environmental bonus of 0.125 SEK/kWh (0.017 Euro/kWh) applies. Biomass plants do not receive the environmental bonus.

Bidding systems
One way to give all players an equal opportunity that includes a mechanism to drive down costs is to provide a limited subsidy on output that is awarded to only a limited number of investors. These investors will have to compete for the subsidy through a bidding system. For each bidding round only the most cost-effective offers will be selected to get the subsidy. The RES electricity is sold at market prices, while the difference between sale and purchase price is financed through a non-discriminatory levy on all domestic electricity consumption. The Member State decides on the desired level of RES, the mix between different renewable energy sources, their growth rate over time and the level of long-term security offered to producers over time.

Bidding or tendering systems currently prevails in the United Kingdom and Ireland. France and Austria also use this instrument on a small scale.

Austria

In May 1998, investors in wind turbines were invited to submit their offers. Contracts were awarded to the most cost-effective projects. Information on the capacity and winning bids is lacking.

France

A bidding process was introduced in 1996 under the national wind power programme EOLE 2005. In the final stage, to be reached in 2005, a total output of 250 to 500 MW is to be achieved. For the first stage of 15 MW, a feed-in tariff of 0.38 FRF/kWh (0.058 Euro/kWh) during 15 years has been achieved. For the next stage of 35 MW, the tariff is expected to reduce to 0.34 FRF/kWh (0.052 Euro/kWh).

Ireland

The principal support instrument for RES-E in Ireland is the Alternative Energy Requirement (AER). It is a competitive bidding system and guarantees the successful developers a 15 year power purchasing contract with ESB at the amount of their bids which is indexed. Additionally, developers can get capital subsidies. Since 1994, there have been 4 AER rounds. In the first AER round feed-in tariffs were fixed in advance amounting to 6.1 to 6.6 p/kWh for day hours and 2.4 to 2.5 p/kWh for night and weekend hours. The 111 MW had to be completed at the end of 1997, however, only 75 MW was actually completed at that time. The second round focused on biomass and waste-to-energy projects. The project must be completed by the end of 1999 and will receive a subsidy of 9.3 million Euro. The third round treated the technologies separately in the competition with an additional small wind (<5 MW) and pilot wave energy plant included. The bidding cap for the wave plant was 5 p/kWh. Additional capital subsidies of 80000 Euro per MW installed (1.24 million Euro for the wave plant) were offered.

Table 2 *Results of the Irish AER rounds [MW]*

	AER 1 (1994)	AER 2	AER 3 (1997)	AER 4
Wind	73	-	101 large 36.5 small (<5MW)	
Biomass and biogas (and waste)	12	30	17	
Hydro	4	-	4.4	
CHP	22	-	-	
Total	111 (end of 1997)	30 (end of 1999)	160	
Completed	75			
Bidding cap	-	3.6 p/kWh	3.9 p/kWh	
Successful bids	4 p/kWh (0.051 Euro/kWh)	3.2 p/kWh (0.014 Euro/kWh)	2.21-3.9 p/kWh (0.028-0.05 Euro/kWh)	

United Kingdom

Renewable energy is supported in the UK by a market mechanism known as the Non-Fossil Fuel Obligation (NFFO). The previous Government's renewable energy policy was to award five NFFO Orders, the last of which was recently announced. The NFFO obliges the current Regional Electricity Companies (RECs) to buy a certain amount of renewable electricity at a premium price. NFFO contracts are awarded as a result of competitive bidding within a technology band on a pre-arranged date. This means that wind projects compete against other wind projects but not against, for example, waste to energy projects. The cheapest bids per kWh within each technology band are awarded contracts, and these are announced as an Order by the Secretary of State (for example, NFFO1).

The NFFO generators are paid their (premium) bid price per kWh. The Non-Fossil Purchasing Agency (NFPA), a wholly owned accounting body of the RECs, reimburses the difference between the premium price and the pool selling price to the RECs. This difference is paid for by a Fossil Fuel Levy on electricity, paid for by electricity consumers. Renewable energy projects received around £137 million in 1997/98 from the fossil fuel levy (FFL), with £116 going to the NFFO in England and Wales. NFFO1 and NFFO2 contracts were until the end of 1998, while NFFO3 to NFFO5 contracts are for 15 years, following a maximum 5 year development period.

Table 3 *NFFO prices [p/kWh]*

Technology Band	NFFO1 Cost-justification	NFFO2 Strike Price	NFFO3 Average Price	NFFO4 Average Price	NFFO5 Average Price
Wind	10.0	11.0	4.43	3.56	2.88
Wind sub-band	-	-	5.29	4.57	4.18
Hydro	7.5	6.0	4.46	4.25	4.08
Landfill Gas	6.4	5.7	3.76	3.01	2.73
M&IW (mass burn)	6.0	6.55	3.89	-	-
M&IW (fluidised bed)	-	-	-	2.75	2.43
Sewage Gas	6.0	5.9	-	-	-
EC&A&FW (gasification)	-	-	8.65	5.51	-
EC&A&FW (residual)	-	5.9	5.07	-	-
EC&A&FW (AD)	6.0	-	-	-	-
M&IW with CHP	-	-	-	3.23	2.63
Average price	7.0	7.2	4.35	3.46	2.71
Total contracted [MW]	152.12	472.23	626.91	842.72	1177
Total completed/commissioned [MW]	144.53	173.73	652.39	847.42	n.a.

M&IW = Municipal and Industrial Waste
EC&A&FW = Energy Crops and Agricultural and Forestry Waste
AD = Anaerobic Digestion

Voluntary green pricing

Green energy in the form of green electricity has been offered as a product to customers since 1995, first in the Netherlands and later on also in other European countries (e.g. Finland, Sweden, UK, and Germany). Customers that buy green electricity pay a premium on their electricity price. Their utility guarantees that the same amount of electricity for which they pay a premium price has been produced at a renewable basis. This is monitored by an independent organisation, often NGO's such as the World Wildlife Fund. Green electricity pricing is a voluntary market initiative of the electricity sector.

Table 4 Overview of voluntary green pricing systems

	Organisation/accreditation	Name of label	Price difference
Finland	• Nature Conservation Society New hydro, peat and waste are excluded • Various utilities	• Eco label • Various 'flavours' of electricity	• 0.05 FIM/kWh • 0.05 FIM/kWh
Germany	• Approx. 15 nation-wide schemes • Large number of local schemes		
Netherlands	Various utilities: • NUON • ENW/Remu (World Wildlife Fund) • Pnem/Mega	• Natuurstroom • Ecostroom • Groene stroom	
Sweden	• Nature Conservation Society • Vattenfall	• Bra miljöval • Elvira fund	
UK	Various utilities • Green Electron • The Renewable Energy Company • WRE		

Fiscal instruments

Some EU countries support renewable electricity via the tax system. These schemes may take different forms. These forms range from rebates on general energy taxes, rebates from special emission taxes, proposals for lower VAT rates, tax exemption for green funds, to fiscal attractive depreciation schemes.

Finland

In 1990, Finland was the first country to impose a carbon-based tax. Renewable energy sources were exempted from this tax, peat has been taxed at a lower rate because it is considered as a 'slowly renewable'. Later on, the focus of taxation shifted from input fuels to the end-product, i.e. electricity. For private consumers, the service sector, farmers and the public sector the tax on electricity was 31 FIM/MWh (5.4 Euro/MWh) in 1997 and 33 FIM/MWh in 1998. For industries and greenhouses the tax was 16.75 FIM/MWh (2.8 Euro/MWh) in 1997 and 20.2 FIM/MWh in 1998. Electricity produced with wood-based fuel, wind and small hydropower is refunded as a subsidy to the producer.

Greece

Tax deduction for costs involving the purchasing and installation of renewable energy applications since 1995 (75-100% deduction).

Italy

Consumers pay a thermo levy and a renewable new plants levy to the national compensation electric fund. This fund pays the avoided fuel costs and a subsidy to the RES-E producers.

Netherlands
Since 1997 domestic consumers pay a Regulatory Energy Tax (REB) on their electricity consumption (above a level of 800 kWh/year)of 3.5 cents/kWh, including 17.5 % VAT (appr. 1.6 Eurocents/kWh). The aim of this tax is to stimulate energy conservation. The tax is paid by the consumers to the utilities, which have to transfer it to the treasury. An exception is made for electricity generated by renewables. This rule of exception increases the profitability of renewables. Currently the exception rule applies to all renewables, except waste incineration.

Another fiscal incentive is to so called VAMIL scheme (Accelerated Depreciation of Environmental Investments) This allows investors in environmental technologies (defined explicitly by a VAMIL-list) to freely offset their investments against taxable profits, resulting for the investor in an interest benefit. All renewable technologies are included in the VAMIL-list.

Since January 1997 there exists an Energy Investment Relief Scheme. Investments technologies that are explicitly defined on a qualifying list (including renewable energy technologies) may be offset against taxable profit at a rate varying from 40% to 52% of the total investment (with a maximum of Dfl 50 million (= appr. Euro 22.5 million) per investment).

Last but not least there are green funds. Private persons investing in a green fund are exempted from tax on the interest income from that fund. Under the current tax system in the Netherlands this comes down to return on investments criteria that can be about 50% lower than for other investments.

Table 5 Instruments for stimulating electricity generation from RES

	Investment subsidy	Feed-in tariff	Tender	Fiscal or tax	Voluntary schemes	Green certificates
Austria	o	+	o			
Belgium		o		o		+
Denmark		o		o		+
Finland	+			o	+	
France	+	o	o			
Germany	+	+			o	
Greece	+	+		o		
Ireland	+		+	o		
Italy		o		o		
Luxembourg		o				
Netherlands	+			o	o	+
Portugal		o				
Spain		o		o		
Sweden	+	o			o	
UK			+		o	

+ = main instrument
o = additional instrument

Annex 2: Overview : examples of labelling of clean electricity in the EU

There are already a number of labels for green/clean electricity on the market or under development.

Germany

TÜV PS/MS-Zertifikat
[German standards authority label]

Criteria for energy mix

Certificate EE01 approves wind energy, biogas, landfill gas, geothermal energy, biomass and hydro power. Certificate EE02 permits only hydro power. 50 per cent renewables plus 50 per cent CHP can obtain UE01 for full supply and UE02 if supply incomplete.

Other criteria

Capacity must be expanded to be at least 25 per cent of the total supply tendered (for EE01 and UE01). Sources of energy must be identifiable. Outside suppliers must be encompassed in the certification. Corporate polices should support additional building up of production capacity for power from renewables. Energy management. Energy balance must be neutral in not later than ½ year (EE01, UE01) / one year (UE02). Supplies must be guaranteed for longer than minimum length of contracts. Annual minimum degree of utilisation of CHP plants 70 per cent.

Ökoinstitut-Zertifikat (Grünstrom) [eco institute label (green power)]

(Logo draft)

General

The Öko-Institut has developed a certification procedure for *Grünstrom* [green power] on behalf of the *Bremer Energie-Konsens GmbH* company (25 per cent of which belongs to Preussen-Electra!), and went public with this in

Criteria for energy mix

Grünstrom regenerativ renewable energy comprises electricity products which only use renewable energy to produce electricity. *Grünstrom effectiv* allows up to 50 per cent of its electricity mix to come from CHP plants. Both these products must include one per cent photovoltaic production. 25 per cent of *Grünstrom effektiv* must in addition come from newly built plants using renewable sources of energy. There are no restrictions on the origin of renewable energy where this comes from solar, wind or geothermal power, or, where hydro power is concerned, from running water or reactivated or renovated hydro power. There are restrictions in the use of biomass (e.g. growing only renewable raw materials which have agricultural or forestry eco seal). Facilities which primarily pursue goals in the waste or water industry, or which use landfill gas, are completely barred from this seal of approval.

Other criteria

Reduction in greenhouse gas emissions (-75 per cent with *Grünstrom regenerativ*, -50 per cent with *Grünstrom effektiv*). Only contributions from newly built plants may be taken into account. It is left open whether electricity from renewable energies is paid for in accordance with the law on feeding power into the grid or is marketed as "Grünstrom" with the supplier of ecological power paying the producer higher

remuneration. Full supply was called for in the first draft, but this was dropped after extensive lobbying by the *Grüner Strom Label e.V.*

Grüner Strom Label eV [green power label organisation]

General

Greenpeace was a member of this association since its first meeting in April 1998. We left in September 1998 because it was becoming increasingly clear that the label was only being developed for an existing company (*Naturstrom*, founded by people who formerly worked at EUROSOLA ially founded by several organisations at the beginning of 1999. The criteria for the label were set down on 21 July 1999. Certification concerns itself with suppliers of ecological power and their credibility. It began in August 1999. The *Naturstrom* company has been labelled. Under certain conditions the association also gives those receiving green electricity the opportunity to apply for the label themselves. A "green supplier" is defined as one who supplies only *Grüner Strom* and guarantees that this green electricity is supplied more or less simultaneously (with special rulings where electricity supply companies are involved).

Criteria for energy mix

Certificates are given in two categories – for electricity wholly from renewable sources of energy (the *Goldenes Label*) and for electricity at least 50 per cent of which comes from renewable sources of energy and the remaining amount from CHP plants (*Silbernes Label*).
Renewable energies are permitted to have their source in photovoltaic production, wind power, biomass including the conversion of biogenic residues, hydro power up to 10 MW, solar thermal energy, geothermal energy, or wave and tidal power. Photovoltaic production must account for at least one per cent of the electricity produced. In the case of CHP plants, brown coal and nuclear power are excluded. Power from waste incineration plants and large-scale hydro power plants are also barred from certification.

Other criteria

For CHP plants, an annual minimum degree of utilisation of 75 per cent is expected. Companies closely linked to nuclear power plant operators in company law are barred from being labelled. Suppliers of *Grüner Strom* must supply only this electricity product. Those possessing a *Grüner Strom* Label are bound to expand their existing supply to have a production capacity which, in accordance with the law on power fed into the grid as this now stands, could not be commercially operated from remuneration alone.

WWF-Zertifikat / Grüner Tarif / BEWAG-ÖkoPur
[WWF / green rate / Bewag "eco pure"]

ÖkoPur Der Umweltstrom
(trademark)

General

The WWF in Germany has been collaborating with Bewag[26] since 1998 in order to "analyse and monitor" its solar programme. As part of this project Bewag and the WWF produced a *Grüner Tarif* scheme, an idea which was already supported by the WWF in other European countries under the name *Grüner Strom*. Bewag's *Grüner Tarif* consists of a voluntary charge to customers for electricity of at least 20

[26] translator's note: Berlin light and power company (Berliner Kraft und Licht AG)

German marks a year, with the same amount being matched by Bewag. The total sum is then supposed to be used to set up photovoltaic plants. Eurosolar was critical of the project. The *Grüner Tarif* was only used by 620 of Bewag's customers, and has now been superseded by the *Energie 2000* project (Bewag and WWF). In the *SolarStrom* project customers can receive an amount upwards of 30 kWh per year for 76 pfennigs per kWh of solar power with a guarantee that in future precisely the fraction of power they decide themselves will come from a solar power plant. Since 1 November 1999 Bewag has offered an *ÖkoPur-Tarif*, which is "only from renewable energies" and is certified in accordance with the WWF's standards. The WWF's certificate is not at present being developed further. The WWF in Austria has drawn up a list of criteria which are in contradiction to the German WWF's proposal, with WWF Austria only supporting small hydropower plants going into operation and calling for the revitalisation of specific dams.

Criteria for energy mix

Electricity mix of renewable energies (wind, solar, biomass from residues and cultivation, limited hydro power) and CHP (including coal-fired).

Other criteria (see above)

Grüner Tarif: Investments in PV plants (obsolete); solar power; minimum amount supplied; ÖkoPur has no contractual minimum period

"Blauer Engel" [blue angel eco label]

Greenpeace called on the German Department of the Environment to develop a *Blauer Engel* for clean power on 1 October 1998. The criteria used for this will be published in May 2000. It is not clear if the Environment Department will adhere to all the criteria Greenpeace listed. What is certain is that 50 per cent CHP (based on gas), full supply and new plants will be called for.

General

The criteria are undergoing final discussions at the Environment Department at this time (January 2000), and are due to be presented to a hearing by experts in April and be submitted to the eco label jury in May. As a result it is not possible to publicly give an account of the criteria as they now stand. Insiders are now not sure if agreement over the criteria (and thus approval of them) for the Department's label for eco power can be achieved.

Criteria for energy mix

According to the Department's October 1999 position paper, energy mix is 50 per cent renewables and 50 per cent from gas-fired CHP plants; the final criteria are not yet clear, however (see above).

Other criteria

Still unclear, see above.

Sweden

Green Buy Electricity (Bra Miljöval)

General

The Swedish SSNC label has been awarded since 1996. Over 22 TWh were given the label from 1996 to 1998. 60 Scandinavian suppliers and 17 per cent of total Swedish power consumption is now certified.

Criteria for energy mix

Hydro power (only old plants), wind power, PV and biomass (not turf) are allowed.

Other criteria

The guidelines for awarding the label are based on the given circumstances in Scandinavian countries.

UK

Future Energy

General

Label by EST at commission of UK government. 11 enterprises at present accredited.

Criteria for energy mix

Future Energy permits energy from the sun, wind, biomass, water and waste (including CHP). Friends of the Earth have criticised allowing energy from domestic waste.

Other criteria

Reinvestment of profits in EE.