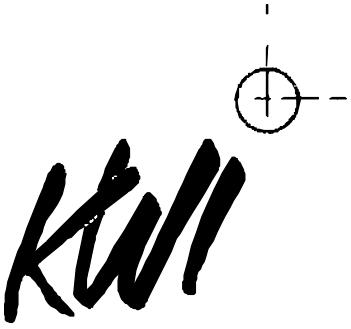
ANNEX 2

RECerT country report - Austria

Prepared by



Section 1 – General and renewable energy – statistics

Section 1.1 – General energy supply and demand statistics

a) Historical information

	1990*	1993**	1994**	1995**	1996**	1997**	1998**
Total primary energy consumption (PJ)	1116	1096	1090	1120	1169	1193	1186

Sources: *WIFO, 1998, reproduced by Energieverwertungsagentur, 1999.
**Statistik Österreich

Final energy consumption by fuel (PJ)	**1990**	**1995**	**1997**	**1998**
Coal	71,4	56,2	69,0	66,7
Oil	336,9	363,2	358,0	362,2
Gas	129,7	157,0	173,8	183,6
Heat	24,5	32,2	44,6	44,9
Others	128,5	122,1	121,0	117,0
Electricity	152,6	164,3	175,7	179,9
Total consumption	**843,6**	**895,1**	**942,2**	**954,3**

Source: Energieverwertungsagentur

Final energy consumption by sector (PJ)	**1990**	**1995**	**1997**	**1998**
Industry	269,3	240,8	270,3	269,3
Transport	204,9	236,5	230,0	243,5
Residential	215,1	280,9	263,1	259,9
Agriculture	73,1	63,3	32,2	30,6
Tertiary/others	80,8	81,4	146,6	151,0
Total consumption	**843,2**	**902,9**	**942,2**	**954,3**

Source: Energieverwertungsagentur

Total Electricity consumption (in GWh)	**1990**	**1995**	**1997**	**1998**
	49954	54117	56083	57274

Source: Bundeslastverteiler

Public Electricity Consumption (in GWh)

Electricity consumption	**1990**	**1995**	**1997**	**1998**
Households	11197	12707	12920	12965
Tertiary sector	5737	6553	7113	7415
Agriculture	1319	1442	1561	1510
Total private consumers (low voltage)	**18253**	**20702**	**21594**	**21889**
Industry	14222	12698	13254	13721

Public services	3949	5136	5295	5458
Transport (excl. ÖBB)	980	1244	1303	1371
Industrial consumers with special contracts	**19151**	**19078**	**19852**	**20550**
Own consumption	1317	1256	1291	1220
Transmission losses	2575	2925	2757	2900
Domestic consumption excl. PST	**41297**	**43961**	**45494**	**46560**
Energy used for pumped storage	1425	1511	1472	1575
Total domestic consumption	**42722**	**45472**	**46966**	**48135**

Source: Bundeslastverteiler

Public gross electric supply (in GWh)

Gross electricity supply	**1990**	**1995**	**1997**	**1998**
Run-of-River Stations	21413	24831	23803	26333
Storage power plants	8683	10936	10898	10508
Total hydro power generation (utilities)	**30096**	**35794**	**34702**	**36841**
Hard coal	3982	3275	4064	3089
Lignite	2278	1461	1214	782
Fuel oil	1264	1073	1942	2217
Natural gas	5872	6285	5641	6106
Other fuels	32	15	66	62
Total thermal power generation (utilities)	**13428**	**12109**	**12929**	**12412**
Industrial deliveries from hydro power	447	712	749	789
Industrial deliveries from thermal power	78	224	308	283
Industrial deliveries	**525**	**936**	**1057**	**1072**
Total domestic generation	**44048**	**48839**	**48688**	**49254**

Source: Bundeslastverteiler

Total gross electricity supply 1998		Generation GWh	Maximum Capacity MW
1	Hydro power plants< 10MW	4.150,4	856,5
2	Solid biomass	510,9	67,1
	Biogas	45,6	1,0
	Sewage & Landfill Gas	43,2	7,0
	Solar	0,1	2,9
	Wind	38,9	29,5
3=1+2	total „Renewables“	4.789,1	964,0
4	Hydro power	38.715,6	11.672,0
5	Thermal power	18.721,3	6.352,0
6= 4+5	total	57.436,9	18.024,0
7= 3/6	share „Renewables“	8,3%	5,35%

Source: Bundeslastverteiler

Electricity Imports/Exports (GWh)

	1990	**1995**	**1997**	**1998**
Imports	6839	7287	9007	10304
Exports	7298	9757	9775	10467

Source: Bundeslastverteiler

b) Projections to 2010

b) Projections to 2010

	1990	2010	2020
Primary Production (PJ)	**380,3**	**431,6**	**380,3**
Solids	25,6	12,8	8,5
Oil	59,8	34,2	0,0
Natural Gas	47	38,5	21,4
Nuclear	0,0	0,0	0,0
Hydro	115,4	141	141
Biomass and Waste	132,5	200,8	200,8
Wind and Other Renewables	0,0	4,3	8,5
Renewables in Primary Energy (PJ)	**247,8**	**350,4**	**354,7**
Hydro	115,4	141	141
Biomass	132,5	200,8	200,8
Wind	0,0	4,3	8,5
Solar and others	0,0	0,0	0,0
Geothermal	0,0	0,0	0,0
Electricity Generation ($TWh_{e)}$	**49,4**	**68,3**	**77,3**
Nuclear	0,0	0,0	0,0
Hydro & Wind	31,5	39,8	41,2
Thermal (incl. biomass)	17,9	28,6	36,1
Final Energy Demand by fuel (PJ)	**841,8**	**1042,6**	**1089,6**
Solids	72,6	42,7	38,5
Oil	337,6	388,8	397,4
Gas	106,8	158,1	162,4
Electricity	158,1	230,7	260,7
Heat (incl. industrial steam)	64,1	106,8	119,6
Other	102,6	115,4	111,1
Final Energy Demand by sector (PJ)	**841,8**	**1042,6**	**1089,6**
Industry	235	264,9	264,9
Residential	239,3	307,7	333,3
Tertiary	136,7	175,2	183,7
Transport	230,7	299,1	307,7
CO_2 Emissions (Mt of CO_2)	**55,0**	**54,8**	**59,8**
Electricity and Steam production	16,5	13,5	18,4
Energy Branch	1,2	0,6	0,4
Industry	9,7	9,3	8,8
Residential	3,0	2,3	2,3
Tertiary	9,3	9,5	9,7
Transport	15,3	19,5	20,1

Source: PRIMES, European Union Energy Outlook to 2020

	Hydro power	Solar power	Wind power	Biomass Solid	Biomass Gas
Theoretical potential in TWh/a	118	92 200	139	200	8
Theoretical electricity generation potential in TWh/a	118	26 000	82	132	3
Technical „offer“ potential in TWh/a	50.3	20.0 – 53.5	3.0	7.5	1.0
Technical „demand“	44,5	2,2	2,6	7,5	1,0

potential in TWh/a					
actual use of source in TWh/a	38,7	0,0012	0,048	1,1	0,12

Source: Neubarth/Kaltschmitt: Stand und Perspektiven regenerativer Energien in Österreich

Section 1.2 Renewable energy supply and demand statistics

1.2.1 Total production of renewable energy

Renewable energy have a share of 23,2% (1998) of the Austrian energy supply, i.e. 142 PJ out of 1186 PJ. Hydropower has a share of 11,3%, and the so-called other energy sources (especially biomass) about 12%.
Source: Energieverwertungsagentur

1.2.2 Total production/consumption of renewable electricity

Electricity generation in Austria is mainly by hydropower with fossil fuels balancing in winter time for heat supply. The development of electricity consumption and the contribution from renewable energies are shown in the following table.

Gross values	Electricity consumption	Electricity generation from renewables Only hydro gen.	”Renewable electricity” as % of consumption	RES generation excl. large hydro	RES excl. hydro > 10 MW in consupmtion
	GWh	GWh	%	GWh	%
1990	49 954	32 492			
1995	54 117	38 477			
1996	55 787	35 580			
1997	56 083	37 293			
1998	57 274	39 355*	68,7	4789*	8,4

*including 639 GWh “Ökostrom” (fluid + solid biomass, biogas, sewage + landfill gas, wind, solar, geothermal energy, waste containing high biogradable fractions, see Art. 40 *Elektrizitätswirtschafts- und organisationsgesetz – ElWOG*); Source: Bundeslastverteiler

Hydropower

Austria is endowed with a significant amount of hydropower resources. Having a hydropower potential of around 56,200 GWh, only two-thirds are presently harnessed by large and small hydro power plants. Although the expansion planning for using this resource is still in place, it seems rather unlikely that significant new large hydro power plants will be on stream in the next decade, apart from those presently under construction. The type of hydropower plants, their respective maximum capacity along with gross geration as per 31 December 1998 are given below:

1998	number of plants	maximum capacity (MW)	gross electricity supply (GWh)
Run-of-river	1.095	3,836	21.655
Pondage power station	74	1,405	6.034
Daily storage	35	438	1.467
Weekly storage	14	296	872
Annual storage	60	5,668	8.688

Source: Bundeslastverteiler Note: utilities > 200 kW or electricity generation > 500 MWh

Windpower

In 1998 a total of 66 wind turbines having an installed capacity of 29 MW generated 45 GWh. The development since 1990 is shown in the following table.

	Number of units	Installed capacity	Electricity generated
		MW	GWh
1990	n.a.	n.a.	n.a.
1995	5	0.745	0.5
1996	35	12	3
1997	51	20	17
1998	66	29	45

Source: Interessensgemeinschaft Windkraft Österreich (IGW)

Bioenergy

The supply of electricity and heat from biomass fuelled plants is provided by a variety of plants. The resources being used: wood waste, municipal solid waste, other solid waste, and biogas. The situation in 1998 is shown below:

	Primary production	Electricity production	Heat production
	TJ	GWh	TJ
Wood waste	42,743	1,481	10,872
Municipal solid waste	5,066	75	3,288
Other solid waste	5,360	82	5,365
Biogas	1,664	61	227

Source: Statsitik Österreich

Wood chop-fired heating systems:

	Small units		Medium units 100-1000 kW		Large units > 1 MW	
	Installed capacity	Number of units	Installed capacity	Number of units	Installed capacity	Number of units
	MW		MW		MW	
1985-1992		10,235		1,272		154
1993		1443		134		15
1994		1479		151		20
1995		1,579		172		23
1996		2,280		214		34
1997		2,452		256		45
1998		3,236		280		50
1999		4,186		159		42
total	**1075**	**26890**	**762**	**2638**	**831**	**383**

Source: Niederösterreichische Landwirtschaftskammer, June 2000

District heating using biomass

	Number of units	Installed capacity
		MW
1991	150	225
1996	310	430
1997	359	490
1998	444	562
1999	501	649

Source: Schneeberger; E.V.A.; Stockinger

Solar energy

	Photovoltaic
	kW (peak)
1990	255
1991	346
1992	524
1993	768
1994	1063
1995	1361
1996	1739
1997	2208
1998	2861

Source: Fanninger/Bundesverband Photovoltaik

In 1998, electricity in the order of 1.8 GWh/a was generated by photovoltaic cells having an installed capacity 2861 kWp.

Section 1.3 – General and renewable energy – statistics

In addition to the large **hydropower stations** of the major energy utilities, Austria has a great number of small and very small power plants. According to a survey of all small plants which are connected to the grid of regional utilities, there were about 1,650 small hydropower stations (< 10 MW) with a maximum capacity of about 850 MW and a generating capacity of 4,100 GWh in 1998. This represents about 11% of the total annual inland hydropower capacity. There are another estimated 3000 small stations in Austria which are not covered by the statistics as they are not connected to the public grid.

Several projects have focused on the utilisation of **biomass to generate electricity**. So far, these projects are more oriented toward research, but 2 coal-fired plants (in total: 261 MWe)are substituting coal for biomass (17 MWe).

Geothermal potential in Austria amounts to 2,000 MW thermal energy and about 7 MW electricity. The construction of 20 to 40 pants is considered realistic. 6 have been built to date.

By the end of 1998, **PV installations** generating a total of 2,861 kW (peak) were operating. About 58% are grid-connected, 42% are self-supported.

Preliminary calculations undertaken in the early 80's showed a technically utilisable **wind energy** potential of 6 to 10,000 GWh annually. By the end of 1998, as many as 66 installations representing an overall rated capacity of 29 MW were operating, producing approximately 45 GWh per year."

Section 2 – Electricity markets – liberalisation and the role of different players

2.1 Electricity market liberalisation

In June 1998, the Austrian Parliament adopted the so-called *Elektrizitätswirtschafts- und organisationsgesetz – ElWOG* (reflecting the EC directive for developing an internal market of electricity) governing the electricity industry along with its organisational setup and regulating the transitional steps from regional monopolies to competition. In fact, since February 1999, companies with more than 40 gigawatt hours of energy consumption annually (since February 2000: 20 GWh, February 2003: 9 GWh) and utilities with their own transmission grid are for the first time able to freely choose their energy provider. In July 2000, the Austrian parliament adopted a series of amendments to ElWOG, resulting in full market opening by 1st October 2001 (see 3.2 „Renewable energy policy, targets and timetables" for details).

For the extent of customer switching, so far, Austrian electricity companies seem to have lost a relatively small number of large customers (13) to foreign competitors. Of 7.290 GWh consumed by elegible customers, only 7% have been provided by foreign electricity companies.

2.2 Number of players, their size and market share

2.3 Electricity trading arrangements

2.4 Market volumes and values

2.5 The green market

There is a number of operators of small wind, solar and biomass installations which seek to encourage potential customers to invest in the development and the building of new installations (by offering co-ownership) as well as buying electricity generated at their sites. In one incident, even one of Austria's major „traditional" players, one of the country's nine provincial suppliers „Energie AG Oberösterreich" launched an experiment.

In 1997, Energie AG Oberösterreich started to invite customers (via newsletters, advertisements in newspapers and supplements to electricity bills) to „order" and hence, promote electricity from renewable energy sources. Customers which agreed to participate in this „experiment" were given a choice between buying electricity from solar power, wind or biomass. „Green" electricity was sold at 0,87€/kWh (solar), 0,25€/kWh (biomass) and 0,11€/kWh (wind). In 1998, 0,08% of the company's customers decided to participate in the programm. Each „Euro" paid by these customers was doubled by Energie AG Oberösterreich and invested in the development and the building of new installations. In fact, 52,6% of customers choose to buy electricity from wind power, 24,3% from biomass and 23,1% from solar power. By 2000, and against the background of increasing liberalisation of electricity markets, the programm was stopped as it's marketing proved to be too expensive and marketing efforts increasingly focused on elegible customers.

As for hydro power, various companies – especially Austria's biggest player in the electricity supply business „Verbund" – make considerable efforts with regard to the creation of a brand name along with a positive public image by marketing the company as an enterprise that cares about the environment (measures: eco-audit has been introduced, environmental protection targets are beeing developed, environmental management system has been put in place**),** generating electricity from environmentally friendly hydro-power (terms used: „green electricity", „clean electricity produced in Austria", „environmentally friendly electricity of highest quality without extra costs") and supporting sustainable development. Verbund's research activities, for example, also focuses on renewable energy sources like biomass and windpower.

Section 3- Energy and environment policy – legislation and targets for renewable energy

3.1 Kyoto targets

According to the fifth State of Environment Report by the Austrian Environment Agency the picture differs depending on the respective area of environmental policy. Significant improvements were achieved e.g. with regard to conventional air pollutant emissions (in particular SO2). One of the main problems is certainly the rise in CO2 emissions, in particular from the transport sector. In energy policy further improvement with regard to renewables is needed. Ground-level ozone also constitutes a significant problem where target values are regularly exceeded, in particular in bigger cities. The quality of running waters has significantly improved, while groundwater quality is endangered mainly by nitrate and pesticide pollution.

Austria does not have one comprehensive environmental law, but a broad range of acts of environmental legislation. Since 1 April 2000 the environmental administration is part of the larger ministry for agriculture, forestry, environment and water management. Most executive environmental competence is now within this ministry, significant exceptions are biotechnology (responsibility of the Ministry of Social Affairs and Health) and nature protection (responsibility of the federal provinces - Länder).

Austria has ratified most important international environmental accords, including the Convention on Biodiversity, the UNFCCC, the Montreal Protocol, CITES, the ECE-LRTAP Convention and related protocols etc., and is actively engaged in the activities of these international instruments. Austria has signed the Kyoto Protocol together with other EU Member States in spring 1998.

Austria has not ratified the Kyoto Protocol up to now. The plan is that Austria will ratify the Protocol together with the European Community and all member states of the European Union in 2001. Important elements for the ratification process are:

- acceptable decisions at COP 6
- a national programme, defining measures and policies for achieving the Austrian target
- decision on common and co-ordinated policies and measures

Currently the legal procedures of ratification of the Protocol are not a focus of discussion in Austria; discussions are mainly concentrating on the options for national measures in the field of climate change.

Until recently, the Ministry of Agriculture and Environment has put all its emphasis on the preparation of national measures to reach the target of a 13% reduction. A study was carried out to investigate the options, involving all major players in Austria. Due to a projected considerable increase in emissions from traffic and small consumers over the next years, the reduction target can only be reached by the implementation of a comprehensive strategy involving all sectors and comprising strong measures.

The following table shows Austria's green house gas emissions according to the structure of IPCC for the reference years of 1990 and 1998. It shows stable emissions in industry and increasing emissions especially of the transport sector.

Draft „Klima-Strategie“ (January 2001)	emissions 1990 [Mt-$CO_{2\ äquiv.}$]	emissions 1999 [Mt-$CO_{2\ äquiv.}$]	emissions 2010 **trend** [Mt-$CO_{2\ äquiv.}$]	emissions 2010 **target** [Mt-$CO_{2\ äquiv.}$]	reduction [Mt-$CO_{2\ äquiv.}$]
Room heating	13,83	13,40	15,00	10,0	-5,00
Energy supply	14,52	14,03	14,50	12,0	-2,50
Electricity generation	9,9	9,5	9,8	7,8	-2,04
Heat production	2,5	2,0	2,2	1,5	-0,75
Refineries	2,1	2,5	2,5	2,5	-0,10
Waste	6,04	5,33	5,0	3,7	-1,30
Transport	13,90	18,23	19,50	15,8	-3,70
Industry	21,15	21,44	21,55	20,25	-1,25
Agriculture	5,59	4,96	5,00	4,5	-0,50
H-FKW, PFKW, SF_6	1,74	1,63	2,50	1,3	-1,20
Others	0,20	0,22	0,2	0,5	0,55
Total	**76,97**	**79,24**	**83,25**	**68,05**	**-16,00**

Source: BMLFUW/Klima-Strategie 2000, Draft January 2001)

3.2 Renewable energy policy, targets and timetables

The „new“ ElWOG of July 2000 focuses on the promotion of electricity from renewable energy sources (RES). In fact, 4% (increasing from 1% in 2001 to eventually 4% in 2007) of all the electricity fed into the grid has to originate from RES including biomass, biogas, solar, wind, geothermal energy, „disposal site-gas“ or „sewage plant-gas“. In addition, 8% of electricity supplied has to stem from small hydro power plants (with a capacity up to 10 MW) for which certificates are issued. Traders/ suppliers are obliged to clearly state on electricity bills the share of each primary energy source used for generation, allowing customers to chose their supplier according to the energy mix used. Transmission System Operators, domestic Traders and end-customers will be fined, if they can‘t prove to have bought/sold the required share of electricity (mentioned above) from RES. This revenue is to be used for the promotion of new RES-plants.

3.3 Specific renewable energy support mechanisms and schemes

Obligations
According to the federal organisation, the Ministry for Economy prepares the framework of the law and directives, and the regions are in charge of their execution. It seems that only one region (Ober Österreich) has implemented penalties for non compliance of the market rules.

Taxation
“As a first step in the direction of reducing CO_2 emissions and ensuring a higher penetration of renewable energy sources on the market, an energy tax on gas (0.0435 €/m^3 + 20% VAT) and electricity (0.0073 €/kWh + 20% VAT [until 31st May 2000], 0,015 €/kWh+20% VAT [since 1st June 2000]) was introduced on 1 June 1996. This tax applies to small-scale as well as industrial users. Approximately 12% of the tax revenue is made available to the Federal Provinces for the implementation of energy saving and environmental protection measures, including measures for the promotion of renewable energy sources.” (“Renewable energy sources in Austria”, Energieverwertungsagentur, Fed. Ministry of Economic Affairs, 1998

Feed-in tariffs (from feed-in tariffs and regulations concerning renewable energy electricity generation in European countries, Energieverwertungsagentur, August 1998.

“In accordance to the current regulations regarding feed-in tariffs, independent producers of electricity from wind and photovoltaic systems receive between 0.029 (minimum tariff at night and weekends) and 0.040 €/kWh (maximum tariff during the day) in the summer for the electricity they feed into the greed. In winter the tariffs vary over a range of 0.044 to
0.078 €/kWh. The annual average feed-in tariffs vary between 0.044 to0.049 €/kWh.

Feed-in tariffs for electricity from power plants based on biomass range from 0.028 to
0.04 €/kWh in summer and 0.043 to 0.065 €/kWh in winter.

An important measure to step up the production of “green electricity, especially from wind power, has been the so-called “three-year agreement”: in a voluntary act between the Ministry of Economic Affairs (Energy Ministry) and the energy utilities it has been agreed that the utilities, in additional to the regular feed-in tariffs, pay a bonus to independent producers for a period of 3 years after the construction of a given plant. The additional bonus for electricity from wind turbines and photovoltaic systems has been 100%, and for electricity from biomass (biogas) 20%. The bonus has been paid to all new power plants constructed before 31/12/96.

It is important to mention that this subsidisation scheme was extended for several projects until early 1998 by some energy utilities. In addition to the subsidisation of feed-in tariffs, investment subsidy programmes have been –and still are- in place in Austria.

The Ministry of the Environment has established subsidisation programmes for wind, hydropower, landfill gas, biomass and biogas energy systems. In May 1998, a new market-oriented scheme for wind energy was implemented. Potential investors in wind turbines were invited to submit their offers. The contracts were awarded to the most cost-effective projects, in accordance with the best-bidder principle. Previously, 30% investment subsidies were paid. In addition to the subsidies in place at the national level, some Bundesländer have launched their own programmes."

Section 4 – Tradable Green Certificates developments

Austria has not yet begun any development of green certificate systems, and the awareness of this system is still very limited. It is premature to draft an operational framework

ANNEX 3

Country Review Belgium

The European Renewable Electricity Certificate Trading Project – Task 1.2.

Version April 2000

Updated June 2001

Contractant : European Commission
Author : Geert Palmers
Date : 23/04/00

Section 1 - General and renewable energy - statistics[1]		
Section		**Requirements**
Section 1.1 - General energy supply and demand statistics		
1.1.1	Total primary energy consumption	• 47.09 Mtoe (1990) • 57.21 Mtoe (1999)
1.1.2	Of which, total electricity consumption	• 76,23 TWh (1999)
1.1.3	Total primary energy production	• 11.48 Mtoe (1999)

1.1.4	Total electricity production	• 80,83 TWh (1999)
		• Breakdown fuels (1999) :
		• Solid fuels : 10 211 (12.6 %)
		• Oil : 793 (7,8 %)
		• Natural Gas : 21 672 (26.8 %)
		• Nuclear Energy : 46 662 (57.73 %)
		• Pumping : 1 145 (1.42 %)
		• Renewable Energy :
		  • Hydro : 338 (0.4 %)
		  • Wind Energy : 13 (0.02 %)

Primary energy and electricty consumption and production – Renewable energy and electricity consumption							
		1993	1994	1995	1996	1997	1998
Primary Energy Consumption	PJ/year	2.061	2.130	2.205	2.346	2.352	2.400
	MJ/cap.y	204.441	210.520	217.705	230.633	230.842	235.027
Electricty Consumption	TWh/y	26.099	27.113	27.897	28.438	29.027	29.842
	MWh/cap.y	2.589	2.679	2.754	2.796	2.849	2.923
Primary Energy Production	PJ/year	421	404	412	428	465	453
	MJ/cap.y	41.789	40	41	42	46	44
Electricity Production	TWh/y	25.302	25.697	26.450	26.955	27.872	29.350
	MWh/cap.y	2.510	2.539	2.611	2.650	2.735	2.875
Renewable Energy Production	PJ/year	2	2	2	2	2	2
	MWh/cap.y	198	198	197	197	196	196
Renewable Electricity Consumption	TWh/y	8	9	8	7	8	11
	MWh/cap.y	1	1	1	1	1	1
Population	Millions	10,08	10,12	10,13	10,17	10,19	10,21

References : MEZ-Adminstratie Energie 2000

[1] Note that figures of 1999 are given. This figures are still to be confirmed in the next months.

Section 1.2 - Renewable energy supply and demand statistics		
1.2.1	Total production of renewable ***energy***	• see table above
1.2.2	Total production / consumption of renewable ***electricity***	• see table above

Section 2 - Electricity markets – liberalisation and the role of different players		
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	Belgium got until 19/02/2000 to implement the liberalisation directive. However, Belgium did not wait this deadline, and implemented the directive by the federal lax of 29/04/1999, which partially entered into force on June 2nd 1999.
2.1.2	Timetable for market opening	Electrabel has given access to its network for customers > 100 GWh/year per site since 1/1/99, corresponding to 33%,. It has lowered the threshold to 40 GWh/year per site since May 2000 (38%). Futher openings are not yet known. Customers accounting for about 4% of the total electricity consumption have switched.
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market	The federal law requires the transmission grid operator to be a seperate company. The regional draft decrees (Flemish, Wallon for the time being – awaiting the decree from the Brussels Region) foresee a legal unbundling of network operation and supply
2.2.2	Number, size and market share of players	The market in Belgium is characterised by 2 generators, many autoproducers, 1 transmission grid operator and about 30 distributors.

Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	No pool is foreseen in the electricty trading in Belgium ; the trading happens on the European market (APX, Spanish pool and others). Renewable energy has suffered from a lack of clear framework in the past decades. However, these disadavantages will probably be turned into market advantages in the new regional decrees of the Flemish and Walloon Regional governments, and possibly by initiatives of the Federal governement
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• Clients for the equivalent of 4% of the electric consumption in Belgium have switched from Electrabel to other supply companies.
2.4.2	Values	• No information is yet available on the value of the (limited) trade, due to the recent liberalising market

Section 2.5 - The green market		
2.5.1	Current	• Currently, the consumers have no possibility to choose for green electricity
2.5.2	Future	• No reliable information is available about the interest of consumers to choose for green power. • No projections are available with respect to the growth of the future green power market.

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• Target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 2008 – 2012 : 7,5% reduction • Generally, the 7,5% is considered as very ambitious, and the current evolution indicates that Belgium will become more likely a net importer of carbon credits.
3.1.2	Carbon emissions from the electricity sector	• 29 249 Gg CO2 emissions (1997) • Table of evolutions 1990 : 31 896 1991 : 33 836 1992 :33 602 1993 :32 417 1994 :28 664 1995 : 30 014 1996 : 30 505

Section 3.2 - Renewable energy policy, targets and timetables

Note :

In Belgium, the Regions are competent for the renewable energy policy. Therefore, as distinction will be made in the following items for the Flemish Region (FL), the Walloon Region (W) and the Brussels Region (B). A limited number of issues still falls under the competence of the Federal Governement (FED).

Competences of Federal and Regional governments with respect to RES :

Regions (W, FL, B)

- *distribution of electricity on grid < 70kV*
- *RES and RUE*

Federal

- *Tariffs*
- *Offshore wind energy (concessions)*

The items below describe the situation of April 2000 based on the available draft decrees.

3.2.1	Renewable ***energy*** target	• Indicative targets are avaible for energy consumption from renewable sources ; clear targets for electricity consumption from renewables are put forward by the Walloon and Flemish governments, as part of the respective decrees liberalising the electricity market within their competences (< 70 kV). See table 'Regional and Federal targets for Renewable energy'. • Targets are set as %'s of consumptions (see next boxes), with indicative values based on predictions of absolute values.
3.2.2	Renewable ***electricity*** target	• Targets are indicated in the table 'Regional and Federal targets for Renewable energy'. • The targets for electricity are integral part of the proposed decrees by the Walloon and Flemish governments. These are used as objectives in a green certificate market with penalties for non-compliance for supply companies. • Specify whether target is for consumption, production or generation capacity of renewable electricity, and whether the target is absolute (TWh/year for production, or MW_e for generation), or relative (% of national generation or supply or similar). • The targets are not split for different sources ; • green certificates from incineration of the organic fraction of municipal waste are not counted for, but can be traded outside Belgium.
3.2.3	Renewable energy and electricity policy	FL : • The Flemish government has agreed upon a decree with respect to the liberalisation of the regional electricity market. This decree has still to be approved by the Flemish parliament. With respect to renewable electricity, a tradable green certificate system is proposed with the following characteristics : • Penalty growing from 0.05 euro/kWh to 0,125 euro/kWh in 2004 • Obligation set at 3% in 2004, put on supply companies • Green consumers immediately eligible • Penalties will be paid to a renewable energy fund

		• "On top off" principle with respect to voluntary market
		• Free transport of green electricity
		• Combustion organic fraction of MSW not accounted for ; however, certificates can be traded internationally.
		• Only certificates from Flemish origin are taken into account in meeting the target, awaiting EU harmonisation or bi-lateral agreements
		
		W :
		• The Walloon government prepares a decree which is based on a combined system of a fixed feed-inn tariff and a tradable green certificate system. The characteristics – as proposed in the latest drafts presented (April 2000) can be summarised as follows
		
		  • RES installations limited to 20 MWh, incineration of MSW excluded
		  • Establishment of fund for RUE and RE, feeded by transport tax
		  • Green consumers immediately eligible
		  • Green electricity certificates, based on avoided CO2 – for electricity on kWh's
		  • Quota fixed at 3% in 2001, growing to 12% at 2010
		
		B :
		• The Brussels Region prepares a decree but it is not yet known how renewable energy will be treated. It is however likely that a similar system as in the other 2 Regions will be proposed.
		
		FED :
		For the electricity volume supplied at a voltage > 70 kV, the federal government is competent. This is also the case for the main aspects offshore wind energy, as it will be built on federal territory, and connected to voltages above 70 kV.
		It is likely that the federal government will also require minimum volumes of renewable energy supply by supply companies on this section of the market. However, no specific proposal has been made.
		At this moment a fixed feed-inn tariff is in place, decided in a consensus between the sector and the different competent governments.

Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• Obligations for renewable electricity will be put on the electricity supply companies in FL and W. • Monetary penalties are proposed in the draft decrees, mounting to 0,125 euro • The regional energy adminstrations are in charge of monitoring and imposing the targets. • Evolution of the obligations : FL : $C = G \times (E_v - E_{wkk} - E_g)$ • C = number of green certificates in the obligations of supply companies, expressed in MWh, in year n • E_v = total supplied electricity to end users via distribution grid in year n-1 • E_{wkk} = the electricity owned by the supplier produced by qualitative CHP • E_g = Electricty owned by the supplier produced from renewables in year n-1 • G = the minimum percentage to be used G : • 0,96 % in 2001 • multiplied by 1.46 in 2002 and 2003 • fixed at 3% for 2004 • from 2005 to 2009 multiplied by a factor >= 1.09 • fixed at 5% in 2010 W (for CHP and RES): • 4% in 2002 • 5% in 2003 • 6% in 2004 • towards 12% in 2010 FL and W : • No obligations are proposed for renewable energy as a whole.
3.3.2	Taxation	• NA
3.3.3	Voluntary demand	• The targets are only based on the quota based part of the market ; the decrees include the possibility to build a voluntary market. The “on-top-off” principle is followed. • There are no specific measures taken to stimulate the voluntary market.

3.3.4	Direct subsidies	Direct support to renewable energy and electricity : FED : • fixed feed inn tariffs for renewable electricity VL : • investment subsidies of up to 35% for demonstration of innovative technologies • subsidies of 10% for certain ecological investment, among which renewable installations. • 75% investment subsidy for photovoltaics under certain conditions, paid for 50% by Flemish government, for 25% by the electricity producers. • 25 000 investments subsidies for solar domestic hot water systems by electricity supply companies W : • 25 000 investments subsidies for solar domestic hot water systems by electricity supply companies • investment subsidies of up to 35% for demonstration of innovative technologies subsidies of 10% for certain ecological investment, among which renewable installations.
3.3.5	Other support mechanisms	• Research and development budgets are available on regional level, but the yearly budgets are small compared to the European averages.

Section 4 - Tradable Green Certificates developments				
Characteristic	**Flemish Region (FR)**	**Walloon Region (WR)**	**Brussels Region (BR)**	**Federal State (FS)**
Legal basis	Decree July 2000	Draft Decree approved 12 April 2001	Draft Decree in preparatory phase	Federal Law April 29th 2001 article 7
Market competence level	< 70 kV, Flemish territory	< 70 kV, Walloon territory	< 70 kV, Brussels territory	> 70 kV Belgian territory and all in belgian territorial sea
Definitions				
• Renewable energy sources	All energy excluded that generated from fossil or nuclear, which can be applied in a sustainable way	All energy sources other than those generated by fossil or nuclear, as long as its use does not prevent its use in the future (incl. Organic, biodegradable fraction of municipal waste)		
• Green electricity	Electricity produced from renewable energy sources	Electricity from renewable sources or high quality cogeneration generating at least 10% CO_2 emission reduction compared with CO_2 emission produced by a CCGT (idem TGV?). Hydroelectricity or Cogeneation installation with installed capacity below 20 MW.	Electriciyty generated by Hydroelectricity (<10MW), wind energy, soalr energy, geothermal, biogas, organic waste from agrciculture & tree plantations	
• Green certificate	a tradable immaterial good expressing the amount of green electricity produced in a specific year	a tradable immaterial good issued to producers of green electricity . Distinction is made between green certificates "RES" and green certificate "Cogeneration"	A tradable & transmittable immaterial good garanteeing the origin & quality of green electricity, by indicating a.o. the energy source	
Issuing				
• Issuing body	VREG (regional regulator)	CWAPE (Commission Wallonne pour l'Electricité, i.e. the regional Regulator)	Le Service (?) est chargé de la délivrance des certificats verts de manière objective et non discriminatoire, aux conditions et selon la procédure arrêtées par le Gouvernement	
• Origin	VREG issues certificates for green electricity produced in the FR or in the belgian territorial sea	CWAPE issues certificates for green electricity produced in the WR		
Trade registration				
• Organisation	ANRE (Energy administration) in test phase, VREG in later phase			
• registered information	Finally, dedicated trade offices might be appointed content certificate, identity of owner			

Characteristic	Flemish Region (FR)	Walloon Region (WR)	Brussels Region (BR)	Federal State (FS)
Quota obligation				
• Subject				
• Level	Licensed suppliers and system operators C = G*(Ev-Ewkk-Eg) with Ev = Electricity supplied to final users ; E wkk = CHP generated electricity ; Eg = green electricity produced 2000 : 0,96 % 2002 - 2003 : growth factor 1,46 2004 : 3%	Licensed suppliers and system operators 2,9% between oct 2001 and sep 2002 3,4% between oct 2002 and sep 2003 4,1% between oct 2003 and sep 2004 5% between oct 2004 and sep 2005 6% between oct 2005 and sep 2006 7,2% between oct 2006 and sep 2007 8,6% between oct 2007 and sep 2008 10,2% between oct 2008 and sep 2009 12% between oct 2009 and sep 2010		
• Automatic upward adaptation	2005 - 2009 : growth factor >= 1,09	beyond 2010 the quota grows by 10% a year		
• Flexibility	Upward adaptation if quota more quickly reached			
• Evaluation	Settled by decree: will be evaluated by Flemish gov. in 2002 ; possibility to increase the growth factor 2002-2004 and to propose objective post-2010	to be settled by execut		
Unit size of certificate	1MWh	1MWh/annual ratio of CO2 saving		
Banking	Allowed for lifetime of certificates (3 years)	not yet defined		
Auditing and control	Not yet foreseen	not yet foreseen		
Lifetime of certificate	Production year + subsequent years	5 years (double-check)		
Redemption procedure				
Additionally principle	Contributions from voluntary purchase of green electricity by final clients cannot be accounted for in the obligation			

Characteristic	Flemish Region (FR)	Walloon Region (WR)	Brussels Region (BR)	Federal State (FS)
Penalties				
• authority	Fixed by Decree	to be fixed by Arrêté d'execution	Le Service (?)	
• level	2001 : 2 BF/kwh	3 BF/kWh (to be confirmed)	Administratvie penalty between 3.000 & 5.000 BEF/missing certificate	
	2002 : 3 BF/kWh			
	2003 : 4 BF/kWh			
	2004 : 5 BF/kWh			
Contents of green certificate	Minimum content foreseen			
• name of the owner of the green certificate		Yes		
• earmarked for state aid				
• unique number of the trade act	Yes	Yes		
• originator	Yes	Yes		
• production period	Yes	Yes		
• quantity of energy	Yes			
• country and region	Yes			
• resource classification	Yes			
• technology	Yes		Yes	
• installed capacity	Yes			
• issuing body				
• date of issuing				
International trade	Flemish gov.can decide upon acceptance of foreign certificates ; not foreseen at the moment Voluntary demand can be met by foreign certificates	The Walloon government can define conditions to extend the systems for electricity produced outside the WR.		
Renewable energy fund				
• origin of funds	Income from concessions, and penalties from certificate system			
• objective	Renewable energy policy - not yet detailed			
Co-existence with subsidy on production		Attributed for depreciation period, maximum for 10 years. Not cumulative in general, except for promising emerging technologies	Subsidy on production is phasing out	Subsidy on production is continued

ANNEX 4

Country Review - Denmark

Prepared by
Technical University of Denmark

Section 1 - General and renewable energy - statistics

Section 1.1 - General energy supply and demand statistics

1.1.1 Total primary energy consumption

The energy consumption for Denmark is given in both real numbers and adjusted numbers that corrects for climatic change and net import of electricity. There is a strong tradition in Denmark to do this as the adjusted numbers gives a better indication of the structural change in the energy system. National goals of CO_2-reductions and renewable energy production are always set as the adjusted numbers.

The Scandinavian electricity nets are so closely connected that the marginal electricity production in Norway and Sweden can be considered Danish Coal fired electricity production. In wet years, the surplus production in these two countries is exported to Denmark resulting in low electricity production and thus CO_2-emissions in Denmark. In dry years Denmark export electricity to meet the demand in the other Scandinavian countries.

1990 was a wet year in Scandinavia, resulting in low CO_2-emissions.

Total energy consumption

PJ	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Total energy consumption	**751**	**831**	**792**	**815**	**844**	**837**	**945**	**877**	**855**	**839**
MJ/cap										
Oil	344	350	341	344	359	370	400	386	378	379
Natural gas	76	86	90	103	114	132	155	165	180	188
Coal	255	346	288	302	325	271	374	278	235	200
Renewable energy etc.	51	55	59	62	63	66	71	75	77	81
Net import of electricity	25	-7	13	4	-17	-3	-55	-26	-16	-9

*Numbers for 1999 are not final.
The term Renewable energy etc. includes organic waste and heat pumps (The electricity input to the heat pumps are calculated as electricity consumption)
Sources: Danish Energy Agency:
http://www.energistyrelsen.dk/statistik/98/Filer/Energistat_98x.xls
http://www.energistyrelsen.dk/statistik/99/energistat_foreloebig.htm

Corrected for climatic variations and net export of electricity

PJ	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Total energy consumption	**819**	**829**	**827**	**819**	**829**	**836**	**837**	**846**	**839**	**842**
Oil	357	354	347	342	348	372	377	383	381	383
Natural gas	83	88	95	102	117	133	148	167	183	194
Coal	327	331	325	313	301	264	242	221	197	183
Renewable energy etc.	53	56	60	61	64	66	69	75	78	82

*Numbers for 1999 are not final.
The term Renewable energy etc. includes organic waste and heat pumps (The electricity input to the heat pumps are calculated as electricity consumption)
Sources: Danish Energy Agency:
http://www.energistyrelsen.dk/statistik/98/Filer/Energistat_98x.xls
http://www.energistyrelsen.dk/statistik/99/energistat_foreloebig.htm

1.1.2 Of which, total electricity consumption

Direct energy cotent in TWh	1990	1991	1992	1993	1994	1995	1996	1997	1 998
Actual Consumption									
Total Electricity Consumption	28,34	29,27	29,83	30,37	30,69	30,93	31,70	31,88	31,98
Climate-Adjusted									
Total Electricity Consumption	28,63	29,36	30,04	30,33	30,83	30,97	31,41	31,96	32,07

1.1.3 Total primary energy production

PJ	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Total production	**423**	**500**	**542**	**583**	**634**	**654**	**742**	**849**	**854**	**995**
Crude oil	256	299	331	353	389	392	432	479	492	622
Natural gas	116	146	152	168	182	197	239	295	286	293
Renewable energy etc.	51	55	59	62	62	66	70	74	77	80

Source: Danish Energy Agency:
http://www.energistyrelsen.dk/statistik/98/Filer/Energistat_98x.xls
http://www.energistyrelsen.dk/statistik/99/energistat_foreloebig.htm

1.1.4 Total electricity production

Direct Energy Content [PJ]	1990	1991	1992	1993	1994	1995	1996	1997
Actual Fuel Consumption	222,3	311,3	260,2	276,1	329,4	292,7	427,3	338,8
Oil	8,3	11,0	11,4	11,1	24,5	31,5	52,0	48,1
Natural Gas	4,8	5,8	6,0	8,7	14,2	20,8	29,7	35,6
Coal	205,8	290,1	237,0	249,2	282,8	231,7	334,7	241,7
Renewable Energy etc	3,3	4,5	5,7	7,2	8,0	8,7	10,8	13,4
Conversion Loss	135,6						243,7	188,0
Net Production	86,6						183,6	150,8

Source: Danish Energy Agency:
http://www.energistyrelsen.dk/statistik/98/Filer/Energistat_98x.xls

Section 1.2 - Renewable energy supply and demand statistics

1.2.1 Total production of renewable *energy*

Direct Energy Content in PJ	1990	1991	1992	1993	1994	1995	1996	1997	1 998
Actual production									
Renewable Energy etc	**51**	**56**	**59**	**62**	**62**	**66**	**70**	**74**	**77**

Source: Danish Energy Agency:
http://www.energistyrelsen.dk/statistik/98/Filer/Energistat_98x.xls

Section 2 - Electricity markets - liberalisation and the role of different players

Comments		This section requires some commentary and interpretation. The intention of this section is to present renewable electricity in the context of the current and future electricity market. Of particular importance is the ability of individual (ie, commercial and domestic) consumers to choose supplier, and the existence and success of any voluntary green tariffs. We are looking for brief explanations only, focusing on just the most important points.
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	The liberalisation of the Danish Electricity market is formally going faster than the minimal requirement of the European Commission, but is criticised for not in reality being liberalised due to large shares of prioritised power that the system operator has to take at rates higher than spot market price. The prioritised electricity is from combined heat and power plants and from renewable energy sources. Around 40% of the Danish electricity production stem from CHP-plants.

2.1.2	Timetable for market opening	• The Electricity Supply Act of 1999 gave the following timetable for market opening.
		• Full market opening for consumers of more than 10 GWh/y before 1 April 2000
		  • Full market opening for consumers of more than 1 GWh/y before 1 January 2001
		  • Full market opening for all consumers before 1 January 2003
		• Due to the high energy and environmental taxes and the consumer obligation of buying (or at least pay for) their share of prioritised electricity (CHP and RE) it is the general impression that the savings of changing supplier is relatively small and thus may only be attractive to large consumers.

Section 2.2 - Number of players, their size and market share		

2.2.1	Extent of dis-aggregation (unbundling) of the electricity market	• The Danish electricity utilities have been vertically-integrated with the distribution companies as the primary companies mostly owned by the consumers or municipalities. These companies have been broken up into four types of companies:
		  • Production and trading companies that are ordinary commercial companies.
		  • Grid companies that take care of the distribution to customers and give access to the grid at non-discriminatory rates. These are regulated to make them unattractive to investors. They should be controlled by the consumers.
		  • Supply obligation companies and
		  • System operators – one for eastern (Elkraft System) and one for western Denmark (Eltra).
		• After the liberalisation a horizontal integration has taken place and decreased the number of both distribution/grid companies and the number of production companies. A number of trade companies have been established and some with international ownerships. The production companies have merged into two companies covering west and east Denmark respectively.
		• There have been announcements towards companies in other sectors including oil companies and retail companies to also offer electricity to their customers. As the liberalisation has not yet gone through to the private households, this trend has yet to show its power.

2.2.2	Number, size and market share of players	• Having only two remaining production companies (on in each of the two system areas) the market shares naturally are high in their respective areas. Independent producers have their small shares though.
Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• The Danish electricity systems are linked up to and form a part of the Scandinavian Nordpool trading system with a spot and long-term market. The companies are though free to trade electricity by a bilateral basis. • The situation for renewable electricity is uncertain in the future system and awaits further studies and decisions. A transition period for existing plants has been established. The current uncertain situation has led to a sudden fall in the private investments in wind energy, as literally no new orders for wind turbines have been given from private investors in the last 18 months.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	
2.4.2	Values	
Section 2.5 - The green market		
2.5.1	Current	• Some small distribution companies have given their customers opportunity to buy green electricity at premium prices. It has been announced that the additional price is used for investment in new capacity. The success of this programmes have been very limited as renewable electricity generally is considered a public obligation and thus already paid for by all customers through their normal tariff. The general way to indicate a green image in Denmark is by buying shares in wind farms or single wind turbines. The market size for such programmes is thus considered very small.
2.5.2	Future	• It is not envisaged that the situation described above will change as the only result will be free riders and not more capacity.

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Comments		The purpose of this section is to understand the current and planned policy environment for renewable electricity. It will be necessary to provide a commentary to many of the answers, though some (such as information on targets) can be single number answers only. Comments and interpretation should be brief.
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• Within the EU bubble Denmark has agreed to reduce emissions by 21 pct. as compared to an import ajusted 1990 emission level. • It is unclear if Denmark is allowed to adjust for import of electricity when complying to the target. As 1990 was an extremely wet year in Norway and Sweden the import of electricity from these countries was large and the emission thus extremely low. It is assumed that Denmark will have troubles in achieving the target if adjustment for import is not permitted. In this case Denmark will be a net importer of carbon credits.
3.1.2	Carbon emissions from the electricity sector	**[1000 tons]** **1980** **1988** **1990** **1997** **1998** **1999**

		Actual Emissions
		Emissions total
		64,344
		57,343
		53,047
		63,510
		59,738
		56,664
		Power Production
		24,038
		23,299
		20,741
		29,260
		25,719
		22,712

Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	• There are no official targets for overall renewable energy but the emission targets and the predictions of energy consumption in the future can deduct the targets. The indicative targets is an overall increase of the share of renewable energy at 1% each year to reach 12-14% in 2005 and app. 35% in 2030. Targets for individual technologies are subjects to change according to the technology developments. • It is indicated that a failure of reaching the efficiency target so that the energy consumption is higher than estimated should be followed by an increase in the use of renewable energy. • The targets are national targets.
3.2.2	Renewable ***electricity*** target	• There is an official target of 20% renewable electricity in 2003 and an indicative target of 50% in 2030. • The target is relative although there has been set absolute targets for wind energy at 1500 MW established in 2005. In 2030 an indicative target of 4000 MW offshore wind capacity has been announced. • Other targets on renewable electricity are small compared to this contribution.
3.2.3	Renewable energy and electricity policy	The overall policy on renewable energy and renewable electricity is to have a balanced production amongst sources and technologies where costs, environmental impact and resource situation is taken into account. The support system is se up to promote the development of the technologies to encourage demand pull when it is considered possible that economy of scale can improve the costs of the technologies. Renewable energy is considered both a means of reaching the Kyoto target but also a strategic technology area that has significant impact on the foreign trade.
Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• There are no obligations on renewable energy other than those that apply for renewable electricity. • Using a feed-in system for renewable electricity this actually forces all consumers to take their equal share of the additional costs that RE imposes on the system. Costs of public obligations like RE are covered by all consumers outside even if the electricity is bought from e.g. Sweden.
3.3.2	Taxation	• *Carbon tax*. A general carbon tax is levied on all forms of energy in Denmark. For renewables it affects the price in the same way as the production subsidy. This means that the producers of wind power are refunded the environmental tax, which amounts to 0.10 DKK per kWh, corresponding to approx. 1.3 cEUR. • *Tax credits for wind turbines*. Different forms of ownerships have different tax arrangements. The formation of a *co-operative* is a traditional way of owning a wind farm in Denmark. Each member can own up to 30 shares (corresponding to 30 MWh per year) and pays tax of 60% of gross income above a certain bottom limit. For *personally owned* turbines (e.g. owned by a farmer) a marginal tax of approx. 59% is paid of net income (after deducting interest on loans, operation/maintenance costs and depreciation).
3.3.3	Voluntary demand	• There is nearly no voluntary market in Denmark as RE i considered a public obligation and a responsibility for the society and not the individuals. A green image is rather obtained by investments in RE.

3.3.4	Direct subsidies	• *Power purchase agreements.* Utility companies are obliged to buy all power produced by wind turbines, at a rate equal to 85% of the consumer price of electricity in the given distribution area. On average this buy-back rate is approx. 0.32 DKK per kWh, corresponding to 4.3 cEUR. • *Production subsidy.* To promote the development of wind power a general production subsidy is given to all power produced by wind turbines (and most other renewable technologies). The subsidy amounts to 0.17 DKK per kWh or approx. 2.3 cEUR.
3.3.5	Other support mechanisms	• Danish Energy Agency runs an Energy Research Programme for focussed research and development to solve specific problems with technologies or implementation. Beside this direct support is given to research and development at certain institutions for basic R&D. Support is mainly given to the following technologies: Wind, PV, Biomass gasification, Wave power.

Section 4 - Tradable Green Certificates developments		
Comments		
Section		**Requirements**
Section 4.1 - policy and legislative background		
4.1.1	Policy support	• The renewable electricity certificate trading systems is required by the Electricity Supply Act of 1999 to take over the function of the feed in tariffs and state subsidy that have been used so far. • The driver of this system will be a obligation on consumers of 20% in 2003.
4.1.2	Legislative framework	• The renewable electricity certificate trading systems is required by the Electricity Supply Act of 1999. • The certificates will cover all non-fossil generation except for nuclear and waste incineration.
Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	• It was originally stated that the TGC-system should be started in 2001. That has been postponed to at least 2002.
Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	• The system operator will have the responsibility of regulation and control with the certification system
4.3.2	Certificate 'issuing' authorities and executive bodies	• There has not yet been taken any decision on certification bodies. A number of potential bodies have been identified and maybe all of them will be on the market to ensure competition and independence from the producer. The certification will be based on standard procedures known from other certifications. • The overall system design is to be decided.
4.3.3	Trade registration / trade registrar	• The trade registrar is expected to be the system operator. • The reason for this choice is that they will handle information on actual physical electricity production anyhow. • Accreditation bodies or procedures have not been decided yet.

Section 4.4 - rules and scope of certification		
4.4.1	Scope	• The certificates will only cover electricity. • In a transition period plants that are considered to exist before the implementation of the system will continue under this system and wil be omitted from the TGC-ssytem. • To level the costs of certificates across technologies a subsidy will apply to costly technologies that are considered important. • Autoproducers are eligible for all the same arrangements as others. This includes both receiving certificates for RE and obligations to buy certificates corresponding to demand of electricity.
4.4.2	Certificate information content	• The certificates will include all the information available that can give credibility to the system. The information will be taken from the information already at hand to handle subsidies etc.
Section 4.5 - trading and intervention		
4.5.1	National	• A Renewable Energy Fund will buy remaining quotas for 0.1DKK and sell quotas for 0.27 DKK to consumers that have failed to comply with their obligation. This effectively forms a floor and cap on the market. • It is envisaged that the trade of certificates will be managed by the stock exchange, NordPool or other equivalent organisations in the future. • There has been established a selling company by the association of Danish Wind Turbine owners to increase their negotiation power in the market.
4.5.2	International	• The certificate trading system will be designed to comply with the coming EU-wide system. As the system is designed to encourage further domestic RE-capacity it is assumed that strong emphasis will be put on fulfilling national goals rather than opening the market for international trade.
Section 4.6 - Other information		
4.6.1	Other information	

ANNEX 5

RECerT

The European Renewable Electricity Certificate Trading Project

European Commission FP5 Project Reference NNES-1999-00051

Country Reviews - Finland

1.1.1 Total Consumption of Primary Energy

year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Mtoe	27,2	26,8	26,4	27,2	29,0	28,5	29,8	30,6	31,0	31,3
PJ	1139	1122	1105	1139	1214	1193	1248	1281	1298	1310

year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PJ	1315	1329	1343	1357	1371	1385	1399	1413	1427	1441	1455

Source: Statistics, Finland; Energy Market Scenario: Ministry of Trade and Industry
Population 5.1 million

1.1.2 Total Consumption of Electricity

year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
TWh	62,3	62,3	63,2	65,5	68,3	68,9	70	73,6	76,6	77,9

year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TWh	80,0	80,8	81,6	82,4	83,2	84,0	84,8	85,6	86,4	87,2	88,0

Source: Statistics, Finland

1.1.3 Total Primary Energy Production (= primary energy consumption minus imported plus exported primary energy)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Mtoe	6,45	6,44	6,65	7,02	7,59	8,01	8,30	8,88	9,29	9,03
PJ	270	270	278	294	318	335	347	372	389	378

1.1.4 Total Electricity Production

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
TWh	51,6	55,1	55,0	58,0	62,2	60,5	66,4	66,0	67,3	66,8

Year 1999, split by means of production

	Hydro	wind	CHP in industry	CHP in distr. heat.	Condens. power	Nuclear	Sum= Product.	Import	Export	Sum= consumpt.
TWh	12,61	0,05	12,18	1,94	0,92	22,07	66,77	11,36	0,23	77,89

Year 1995, split by primary energy

	Hydro	Nuclear	Wood, bio	Peat	Nat. gas	Oil	Coal	total
TWh	12,9	18,1	6,5	5	6,5	1,5	10	60,5

1.2.1 Total Production of Renewable Energy (the use of peat has been excluded, althoug the status of peat is still unsettled)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Mtoe	3,31	3,16	3,12	3,59	3,98	4,10	4,20	4,67	4,90	5,03
PJ	139	132	131	150	167	172	176	196	205	211

Potential, 2010		Technical	Market
Hydr<10 MW	TWh/a	8	1,2
Wind	TWh/a	60	1
Bioenergy	PJ	230	117
Solar energy	TWh/a	n.a.	0,08

Source: National Promotion Program for Renewable Energy

1.2.2 Total Production of Renewable Electricity

TWh/v	1999*	2010	2025
On-shore wind	0,045	1,3	5,2
biomass	7,65	12,5	22,9
PV	0	0,05	0,6
Small hydro	1,17	1,3	1,5
Large hydro	13,67	14	15
Total	22,535	2039,15	2070,2

Source: National Promotion Program for Renewable Energy

Section 2 - Electricity markets - liberalisation and the role of different players		
Comments		This section requires some commentary and interpretation. The intention of this section is to present renewable electricity in the context of the current and future electricity market. Of particular importance is the ability of individual (ie, commercial and domestic) consumers to choose supplier, and the existence and success of any voluntary green tariffs. We are looking for brief explanations only, focusing on just the most important points.
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	The electricity market in Finland is fully liberalized. Any customer, large or small, can freely choose the supplier of his/hers electricity.
2.1.2	Timetable for market opening	• Market opening is 100%. Any customer has a free choice between suppliers. • All is done • For industrial customers 30%, for households 10%. Industrial customers watch prices at a continuous level. Households are not expected to change much more that this 10%.
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market	• Vertically-integrated state-owned electricity utilities have all been broken up into separate generation / transmission / supply / distribution businesses. • Horizontal integration within smaller distribution utilities is taking place, i.e. fusions between ex. municipal utilities. • Notable was the fusion of ex state power company IVO and ex state oil company Neste into Fortum. First signs of merging activities with other retailing are visible.
2.2.2	Number, size and market share of players	• Number of generators: 30, the market share of 5 largest is 70%. Number of transmission companies: 1 - state owned, serving everybody at equal conditions, Number of distributors: 250, mostly local municipal owned • There is a trend visible that mergers will dominate in the future, and that the number of distributors will decrease appreciably.

Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• There is a Scandinavian pool Nord Pool, which takes care of appr 10% of sales of electricity. Most of the electricty is sold by direct contacts between the seller and the customer. The contracts are short termed, a year or less, and the next contract may very well be done with a different supplier. The market is international, but mainly between Scandinavian countries. • Producers of renewable energy are strongly disadvantaged by the high price. Production of renewables is supported only by the return of electricity tax, Euro 0.007/kWh. State renewables support is for investments, e.g. 35% for wind power. • How is the market for physical electricity expected to evolve through time (unable to answer)
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• 10% within the Nord Pool, 90% outside. • 100% unregulated • If available, indicate the volume of renewable electricity that is traded across different elements of the market. Distinguish between the regulated and unregulated market. (unable to answer)
2.4.2	Values	• Total consumption was 72 TWh in 1999. The tariffs vary widely depending on the type of customers (large industrial, small industrial, household with electric heating with/without storage, households with other type of heating, public customers. For electrical energy, lower limit is Euro 0.02/kWh and upper limit Euro 0.05/kWh • It is impossible to provide estimates of future prices of bulk electricity. • The amount of renewable electricity was appr 14 TWh in 1999, 70% hydro and 30% biomass
Section 2.5 - The green market		
2.5.1	Current	• Every customer is able to choose wind power, hydro power, biomass energy, or a mixture of them - "green electricity". There is more on sale than is demanded • National Nature Preserving Association gives licence to "green electricity" on demand of the generators, and collects a fee for it. • Appr 10 GWh in 1999 was sold as "green electricity" • At the start of it, 1998 and 1999 there was some advertising campaigns. Today the marked is strongly demand limited • The premium is appr Euro 0.007/kWh • A clear majority. Most of the providers by it from elsewhere to cover the demand
2.5.2	Future	• The demand for "green electricity" is not increasing, or is increasing only very little. The first phase of the campaign seemed to cover the needs of this almost nonincreasing segment of customers

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Comments		The purpose of this section is to understand the current and planned policy environment for renewable electricity. It will be necessary to provide a commentary to many of the answers, though some (such as information on targets) can be single number answers only. Comments and interpretation should be brief.
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• Target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 2008 - 2012. Target for Finland 0% • The target is achievable, although demanding. Finland is likely to be neutral in export/import of carbon credits.
3.1.2	Carbon emissions from the **ENERGY !!!** sector	• 1990 59 Mt CO2 • 1995 65 Mt • 1999 64 Mt • Projection: 2008 - 2012 53 Mt
Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	• An increase of 3 Mtoe, 50%, in 2010 as compared to 1995 • An increase of 6 Mtoe, 100%, in 2025 as compared to 1995 • Action Plan for Renewable Energy Sources by the Government • The targets are set for the country
3.2.2	Renewable ***electricity*** target	• An increase of 8.35 TWh by the year 2010, an increase of 31% as compared to 1995 • This increase has the following breakdown: Bioenergy 6.2 TWh, hydro 1.0 TWh, wind 1.1 TWh, PV 0.05 TWh. • Action Plan for Renewable Energy Sources by the Government
3.2.3	Renewable energy and electricity policy	In the Finnish Energy Strategy, approved by the Finnish Government in 1997, the emphasis is laid on the importance of bioenergy and other renewable energy sources for the creation of such prerequisites for the Finnish energy economy that the supply of energy can be secured, the price of energy is competitive and the emissions from energy generation are within the limits set by the international commitments made by Finland. In 1998, the European Union Meeting of the Ministers of Energy adopted a resolution taking a positive attitude to the Communication from the Commission "Energy for the Future: Renewable sources of energy" - White Paper for a Community Strategy and Action Plan. National measures play a key role in the achievements of the objectives set in the White Paper. This Action Plan for Renewable Energy Sources is a national programme in line with the EU´s White Paper. It comprises all renewable sources of energy available in Finland. It encompasses even peat, which in Finland has traditionally been considered to be a solid biofuel but is internationally classified as one of the non-renewable sources of energy. In the Action Plan, objectives are set for the volume of renewable energy

		sources used in the year 2010 including a prognosis on the development by the year 2025. The goal is that by the year 2010 the volume of energy generated using renewable energy sources has increased 50% compared with the year 1995. This would mean an increase by 3 Mtoe, which is about 1 Mtoe more than anticipated in the outlook based on the Finnish Energy Strategy. A further goal is to double the use of renewable energy sources by the year 2025. The aggregate use of renewable energy sources depends to a large extent both on the development of the price on energy produced using other energy sources and on possible changes in the production volume of the Finnish forest industry. The most important objective stated in the Action Plan is to improve the competitiveness of renewable energy sources in relation to other energy sources. The objective in the long term is to make them as competitive as possible in the open energy market. Among those measures of crucial importance included in the Action Plan, we can mention development and commercialisation of new technology as well as several financial measures, of which taxation and investment aids are considered to have the greatest effect. In addition, the Action Plan presents several administrative measures for the promotion of renewable energy sources. A separate assessment of the environmental impact of the Action Plan has been made resulting in an environmental impact statement (EIS) that contains a detailed account of the environmental impacts of the use of renewable energy sources and the use of peat in energy production. The most important environmental impact of the implementation of the Action Plan will be a reduction in greenhouse gas emissions. As a result of the intensified measures to be taken in accordance with the Action Plan, carbon dioxide emissions are estimated to be reduced at least by 2 million tons per year compared with the outlook presented in the Energy Strategy. Further, the use of waste, which otherwise would have been transported to tips, in energy production is estimated to reduce methane emissions by 1 million ton per year (CO2 equivalent). The reduction might be even much bigger in the next few years. To ensure that the objectives of the Action Plan will be achieved, the contribution by the State (tax subsidies, investment aid and other forms of aid) should be approx. FIM 500 million on an average per year in the next ten years. In 1998, the State´s contribution exceeded FIM 300 million. Further, financing amounting to approx. 200 million is channelled to the research on and the development of energy production technology, which in the future to a larger extent than now will be channelled to the development of such forms of energy production technology that are using renewable energy sources.
Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• No obligations exist, nor are any suggested
3.3.2	Taxation	• Producers of renewable electricity will get their electricity tax, Euro 0.007/kWh, refunded (It will first be collected, then, once a year, refunded)
3.3.3	Voluntary demand	• Voluntary demand is not counted on reaching the targets

3.3.4	Direct subsidies	• Wind power developers get investment subsidies from the Government. The amount is set on a case-by-case bases. Typically it is 35% of total turn key investments
3.3.5	Other support mechanisms	• R&D for renewables is funded by the government Euro 5 000 000 annually.

Section 4 - Tradable Green Certificates developments		
Comments		For countries that have not begun any development of green certificate systems, this section will be largely redundant. However, in this case, the RECerT partner should use this section to indicate whether a Tradable Green Certificate system could be made to work in the context of the electricity sector market structure and the legislative framework for renewable energy. Specifically, comments are required on the existence of any 'voluntary green market', ie electricity consumers motivated by environmental concerns, and the extent to which a certificate trading system could be used to evidence the supply of 'greenness' to such customers. For countries that have begun discussions or development of green certificate systems, this section should be used to record in detail the decisions and progress so far. Where there are uncertainties over future development, please indicate these clearly, and make predictions of future development where possible.
Section		**Requirements**
Section 4.1 - policy and legislative background		
4.1.1	Policy support	• There is no certificate system in Finland now, but the Government policy is well in line with such
4.1.2	Legislative framework	• No such law, no expectations for such a law • Renewable energy includes on-shore wind, off-shore wind, biomass (all forms), PV, small hydro (<10MW), large hydro (>10MW), solar heat, heat pumps. • Wave power, tidal power or geothermal OK, but not relevant for Finland
Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	• No time table for a certificate system exist, or is in sight
Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	• Unable to answer
4.3.2	Certificate 'issuing' authorities and executive bodies	• Not applicable for Finland, no timetable, there are some "natural candidates" for possible issuing bodies.
4.3.3	Trade registration	• No authority defined, no definition in sight

	/ trade registrar	
4.3.4	Certificate 'issuing' authorities and executive bodies	• No authority defined, no definition in sight
Section 4.4 - rules and scope of certification		
4.4.1	Scope	• Not applicable for Finland
4.4.2	Certificate information content	• Not applicable for Finland
Section 4.5 - trading and intervention		
4.5.1	National	• Not applicable for Finland
4.5.2	International	• Green certificate trading shemes have attained wide interest within relevant industry and government bodies. Their importance and role is understood, and if international trading arrangements will emerge, joining them seems probable.
Section 4.6 - Other information		
4.6.1	Other information	• Tradable green certificates may well be present in Finland, too. There are no hints in the renewable energy policy of the Government, which would suggest the contrary. However, nothing has happened so far, and it is not possible to give meaningful guesses on any particular issues as concerns these.

ANNEX 6

RECerT Country report - France

As no French country report has been made for the RECerT project the following report is a draft version of the InTraCert country report on France.

Introduction

The information in this report is gained and often excerpted from the following sources :

IEA – International Energy Agency (1998): Renewable Energy Policy in IEA Countries. Volume II: Country Reports. OECD, Paris. (= Energy and Environment. Policy Analysis Series)

Schaeffer, G.J./ Boots, M.G./ Anderson, T./ Mitchell, C./ Timpe, C./ Cames, M. (1999): The Implications of Tradable Green Certificates for the Deployment of Renewable Electricity. Final Report of an Altener Project. Netherlands Energy Research Foundation, Petten.

Where other references were used, it is indicated in the text.

General overview of the energy sector

In France, primary energy consumption is dominated by **nuclear power** (40% in 1997) and oil (35%). In 1997, gas contributed 12%, coal 6%, hydro 2%, biomass and waste 4%, and geothermal, solar, wind power, etc. only accounted for roughly 0.1% of primary energy consumption. The emphasis on nuclear power is a result of the extremely limited indigenous reserves of fossil fuels and concerns about security of supply. The CO_2 emissions per capita are with approximately 6 tons per inhabitant below EU average (about 8 t/inhabitant).[2]

Main Policies

The French energy sector is ruled by the philosophy of the **"Service Public"** saying that providing the French population with energy is a task of the public sector. Accordingly, the electricity sector as well as the gas sector have each been controlled by one big state-owned monopolist and efforts to liberalise the markets have been progressing very slowly.

Following the two oil crises, France set its train programmes to increase its level of energy independence. It did this in two main ways:

- A strong push on the nuclear power front, resulting in over-capacity and over-production of electricity in terms of meeting national demand.
- Energy Efficiency measures, which resulted in a 22% drop in energy intensity between 1973 and 1997.

Liberalisation Process[3]

Over the years, subsequent French governments did all in their power to keep the effects of the European Directives to a minimum for their companies, Electricité de France (EdF) and Gaz de France. Together with Belgium, Italy and Luxembourg the country was soon among the latecomers on the deregulation front. In December of 1998, the French government put forward a first draft for the national implementation of the Single Electricity Market Directive. Market opening was certainly to be oriented to the minimum stipulations of the Directive and the state was under no circumstances willing to let go of the entrepreneurial reins. In contrast, the government allowed the monolith to further expand its already extensive foreign activities in the run-up to deregulation. The EdF is the by far largest European electricity utility (sales of more than 450 TWh) and has already in the past been the largest electricity exporter with an export surplus of 65 TWh in 1997.

In the course of 1999, many EU member states (the UK, Spain, the Netherlands, Germany, etc.) were expressing their frustration at the deadlock over France's delay with electricity sector liberalisation. 20% of France's market has been opened from February 29, 1999 on, with eligibility confined to 100 GWh customers, but only as Community Law became the immediately applicable legislation. Five companies were said to receive their power supply

[2] Refer to Annex 1 for further information.

[3] Sources: 'Frankreich öffnet Strommarkt minimal', Stromthemen 1/2000 and 3/2000; 'France: Minimum Competition by February', EU Energy Policy, 16.12.1999, http://www.uk.ftenergy.com/news.asp.

from elsewhere. EdF published a transitional tariff for grid access on its website, which 100 GWh+ consumers could use to shop around for their power.

On **February 1st, 2000**, France finally transposed the EU electricity directive, almost exactly one year after the official deadline. The news came at the Council of Ministers in Brussels on 2 December, 1999 when French energy minister Christian Pierret expressed the "firm determination" of his government to table new proposals before the Assemblee nationale on 18 January. Pierret's announcement came just one week after the European Commission launched infringement proceedings against France and Luxembourg for failure to transpose the electricity directive. The Commission wrote letters of formal notice –the first stage in the procedure– on 24 November. The offending member states have two weeks from receipt of the letter to reply with detailed information before the Commission decides whether to proceed to the next stage. The Commission was concerned with certain details of the draft law, particularly the independence of the grid operator.

The French 'Act for the transformation and development of the public electricity supply' does not go further than the minimum requirements of the EU directive. Because of the delay in transposition, France has to meet both the 1999 minimum market opening (customers consuming more than 40 GWh/y or 26.48%) and the 2000 minimum (more than 20 GWh/y or 30%) at the same time. In theory this throws open to competition 115 TWh of industrial consumption. France has a total net consumption of about 390 TWh. French estimates showed that the 40 GWh threshold would create 400 eligible customers. As it is, the market opened immediately to 20 GWh, releasing around 800 customers. The third threshold (9 GWh/y or 33%), coming into force by 2003, will enable some 2,500 customers to shop around.

The law creates a **single regulatory entity for both power and gas**, the Commission de Regulation. Thus, setting grid tariffs will be the job of the ministry on advice from the regulator. It may be surprising that the French law opts for regulated third party access (rTPA), and not for a single buyer model, since France was strongly pushing the latter during the lengthy negotiations of the Single Market Directives.

State of Renewable Activities & Policies

Renewable energy policy is formulated by the Ministry of Industry and implemented through the Agence de l'Environnement et de la Maîtrise de L'Energie (ADEME).

Reported use of non-hydro renewable energy and wastes in France amounted to **4.2% (10.7 Mtoe) of total primary energy supply in 1996** –higher than the IEA average (3.9%), due mainly to the contribution of solid biomass (particularly wood), by far the largest non-hydro renewable source. **Almost all of the biomass used is exploited for residential heating**. Moreover, it should be mentioned here that France gives a high priority to the development of biofuels, largely for agricultural reasons. Municipal and industrial wastes are being applied to generate growing quantities of electricity and heat. Only small amounts of geothermal heat, solar energy and, increasingly, wind have bee utilised so far. **Hydropower** accounted for 12.8% of total electricity production, equivalent to an additional 2.2% of total energy supply.

Relevant Policy

In 1996, national government expenditure on renewable energy source accounted for **1% of the total energy R&D budget**. This was the **lowest reported proportion** of any OECD country's energy R&D budget that is spent on renewable energy. The majority of the money is spent on biomass, PV and geothermal.

Nevertheless, government supports renewable energy in several ways, including direct funding of local and regional projects, joint EdF/ADEME agreements, financial incentives

(such as favourable tax treatment for renewable energy investments, reduced VAT on renewable energy equipment, and premium buy-back rates for successful projects under national tender programmes)[4] and information/education programmes.

At a very recent press conference, the Union of Renewable Energies said that France will remain among the least dynamic countries for this industry, if authorities do not give incentives to the renewables sector in France. In no sub-sector – solar, wind, biomass, wood, geothermal, small hydro-power generation – has France showed **any sign of development** (*europe environment*, n° 565 of April 4, 2000, 16). The Union is calling for incentive measures such as a higher feed-in tariffs – 0.40-0.50 FF.

RES Potential

Table 1:

FRANCE **Technical Potential** TWh				
wind speed	*7,5m/s*	*6,5m/s*	*5,5m/s*	*4,5m/s*
Wind: onshore	0	2	8	0
water depth	*10m*	*20m*	*30m*	*40m*
Wind: offshore	102	130	135	110
Large Hydro	0			
Small Hydro	0			
	50% of building integrated solar potential			
Photovoltaics	58,75			
Solar heating	117,5			
Solar thermal electricity	0			
Biomass electricity	*10% solids substitution*			
Fuel switch	2,1			
Biomass CHP *(complementary to fuel switch)*	*fuel eff.: 65%*	*electricity: 33%*	heat: 67%	
Wood (residues)	12,7	4,2	8,5	
Biogas	38,4	12,8	25,6	
Crops	35,7	11,9	23,8	

Source: Bräuer and Kühn (2000): RECerT report on market volume and market value of Tradable Green Certificates. (forthcoming)

A significant contribution from geothermal to electricity supply is not expected for a least 10 years. There are no plans for noteworthy short-term expansion of geothermal energy use. Development of energy from wastes is set to increase as legislation prohibits landfilling of household wastes after 2002.

The majority of large hydro potential is already exploited. An additional 4 TWh/y mostly from small hydro projects has been identified. Limits on the development of small hydro sites are generally due to flow requirements under water use regulations.

[4] Also a tax on municipal waste was introduced in 1993 to encourage energy recuperation from waste. It was fixed at 30FF/ton in 1996, and was planned to be raised to 35FF/t in 1997 and 40FF/t in 1998.

Table 2:

COST Development (c€/ kWh)	2000 low	2000 high	2005 low	2005 high	2010 low	2010 high
Wind: onshore						
7,5m/s	2,5	4,5	2,0	4,0	1,8	3,5
6,5m/s	3,5	7,0	3,0	5,5	2,5	5,0
5,5m/s	5,5	9,5	3,5	7,0	3,0	6,0
4,5m/s	8,0	15,0	5,0	11,0	4,0	9,0
Wind: offshore						
10m	3,3	6,0	2,7	5,3	2,3	4,7
20m	4,7	9,3	4,0	7,3	3,3	6,7
30m	7,3	12,7	4,7	9,3	4,0	8,0
40m	10,7	20,0	6,7	14,7	5,3	12,0
Large Hydro	3	6	3	8	3	8
Small Hydro	5	17	5	17	5	17
Photovoltaics						
North	60	90	48	72	38,4	57,6
Central (FR, AT)	50	75	40	60	32	48
South (GR, IT, PO, SP)	40	60	32	48	25,6	38,4
Solar heating (EU-north)	15	25	12	20	10	15
Biomass electricity						
Fuel switch	5,5	5,5	5,5	5,5	5,5	5,5
Wood	2	20	2	20	2	20
Biogas	6,5	100	6,5	100	6,5	100
Crops						
Biomass heat						
Wood	1	4	1	4	1	4
Biogas	6	8	6	8	6	8
Crops	2	6	2	6	2	6

Source: Bräuer and Kühn (2000): RECerT report on market volume and market value of Tradable Green Certificates. (forthcoming)

Electricity Sector

The majority of electricity is currently generated by non-fossil sources: in 1996, 78% of electricity was produced in nuclear power plants and 13% in hydropower plants. Yet, 1996 was a dry year and normal hydro contribution is close to 15%. From a greenhouse gas perspective, there are therefore few incentives to promote growth in new renewable electricity and the contributions from these sources to electricity supply are therefore expected to remain insignificant in the short term. This is reflected in the small renewable R&D budget. However, other environmental considerations, notably regarding waste disposal have increased interest in electricity generation or heat production from waste, while employment and agricultural considerations provide an impetus for the development of biomass.

Table 3: Electricity Supply in France between 1997 and 1999 (in TWh)

	1997	**1998**	**1999**
Combustible Fuels	37.1	51.9	45.0
Nuclear	375.9	368.5	374.4
Hydro/Other	67.6	65.4	74.2
Domestic Production	480.7	485.8	493.5
+ Imports	3.8	4.2	4.8
– Exports	69.6	66.1	71.1
Total Consumption	414.9	423.9	427.3

Source: IEA Monthly Electricity Survey, January 2000

Structure of the Electricity Sector.

EdF is the epitome of the state power monopoly. Centrally planned and controlled, it has a huge workforce and displays little transparency in its accounting systems. The rise of nuclear power came about largely as a result of EdF's response to the oil shock of the 1970s –a shock felt more keenly in France than in other countries as it simultaneously lost control of its oil interests in Algeria which was further exacerbated by the decline of the French coal industry.

France is one of Europe's largest exporters of electric power. Its main customers are Switzerland (which bought almost 23 TWh in 1996) followed by the UK, Italy, Benelux and Germany. It is reported that most of this power is sold at a rate which is less than half the average EdF tariff and that it does not cover the cost of generation.

State of the Electricity sector Liberalisation Process

In early February 2000 the French Parliament passed a law that enables about 800 industrial consumers to buy electricity from other generators than the EdF. The law implements the EU electricity market directive with a **one year delay** and at the **lowest possible level** (only 30 per cent of the electricity market have been opened for competition).

The law makes the first move towards unbundling the electricity supply industry in France, by setting out conditions under which EdF can operate the high voltage transmission grid. It will, however, maintain its monopoly on this activity and more or less continue to be an integrated company. The law proposes a new regulator for the sector which is responsible for administering the authorisation of all new generating capacity, including that based on RE. The law also proposes the set-up of a 'Public Service' fund which would cover the cost of connecting isolated users (especially in rural areas), favourable tariffs for RE projects etc. This will be funded by a levy on all electricity producers. Electricity consumers eligible for picking their supplier are forced to complete three-year contracts. Trade is restricted to few players, an electricity exchange is not intended.

Electricity from Renewable Energy

The capacity of *hydropower* plants has been stable at 20.5 GW since the early 1990s. Weather variations lead to considerable variations in generation from year to year (77.3 TWh in 1994, and 65.2 TWh in 1996). Large hydro dominates both renewable electricity and total hydro output, with small hydro (>8 MW) contributing approximately 10% of hydro's total.

Wind capacity is small, but has been expanding over the last few years, and should continue to do so due to the commissioning of the plants under the EOLE programme – a government support scheme to be described below. Capacity was 900 kW in 1992, 3.4 MW in 1995 and around 10 MW at the end of 1997; generation stood at 0.009 TWh in 1996. Only a small percentage of total *biomass* exploitation (8.8 Mtoe) was used to generate 0.714 TWh of electricity in 1996. Both *municipal and industrial wastes* are used, in approximately equal amounts, for electricity generation estimated at 1.4 TWh in 1996.

Photovoltaics has been employed in remote areas, but is not widespread. National estimates for the capacity of installed PV systems were 2.5 MW in 1996, when generation was estimated at 0.002 TWh. Electricity production from *geothermal* energy is being explored via a joint German/French/UK geothermal project on hot dry rocks underway at Soultz in Alsace. France is one of two IEA countries with installed *tidal power*. A large scale tidal installation (210 MW) delivers approximately 550 GWh/y. No expansion of tidal power is planned.

Main Specific Policies

France has a substantial population that are not connected to the main electricity grid. The higher cost of electricity supply to these areas would in theory make renewable electricity supply an economically attractive option, particularly as these sites have significant solar and wind resources. However, EdF is legally obliged to supply low-voltage electricity at equal rates to consumers wherever they are located in metropolitan France or in overseas departments and whatever the cost to EdF. The resulting sale of some electricity at prices lower than its production cost effectively removes a niche market for (independent) renewable electricity production, and is therefore at odds with the proclaimed aim to promote renewables where they are competitive.

Under current legislation EdF must purchase all power produced by IPPs from renewable energy sources (**purchase obligation**), but EdF is free to negotiate the contract with each IPP. The price EdF pays for 'green' generation is usually based on some measure of avoided cost. Independent small hydro producers benefit from a purchase price guaranteed for 15 years. As a result of this, RE has made more headway in the island of Corsica and French overseas territories than in France in general.

Since 1996, France has a programme for the promotion of wind power (**EOLE 2005**) launched by the Ministry for Industry. The target is to achieve 250-500 MW installed wind power capacity by 2005. In order to do this the government (in co-operation with EdF and ADEME) has set up a system of competitive bidding for 15 year contracts with EdF. It is run in a similar fashion to the UK's NFFO. There are several criteria which projects must pass in order to be considered for a contract. These include carrying out an Environmental Impact Assessment (EIA), receiving local support, etc. Projects have to be between 1.5 and 8 MW capacity – the legal limit for independent power producers. Successful bids are chosen on cost grounds. Projects totalling 77.5 MW of capacity had submitted successful bids by the end of 1997, and in theory these turbines should be installed by the turn of the century, as developers are given at three-year period in which to construct winning bids. The first call for proposals resulted in the selection of a first band of 4 projects with a total capacity of 13 MW at an average purchase price of 0.337 FF/kWh. The second band, selected in October 1997, brought about a further capacity of 64.5 MW. EOLE aims to drive costs down to a competitive 0.25 FF/kWh by 2005. A further round of bidding for 100 MW (of which 25 MW is to be in France's overseas territories and departments) was initiated in early 1998, and another series of bids will be held before 2005. The new climate action plan of the French government is aiming to achieve an installed wind power capacity of 3,000 MW by 2010.

The EOLE programme is the largest programme available for promoting renewable electricity. A similar policy to encourage installation of 10 MW of biomass electricity capacity was announced in February 1998.

Financial support is not currently available for grid-connected PV systems. However, from 1993 until the introduction of the Amortisation of Electrification Costs scheme (**FACE**), such systems benefited from a subsidy equivalent to 25% of the capital cost: 10% from ADEME and 15% by EdF. This subsidy was not high enough for many PV systems to be built. The FACE fund is a source of finance for investments in renewables and demand-side management in rural areas. The annual budget for FACE is 100 million FF. The majority of funds are spent on PV systems in rural areas, and aim to reduce either grid extensions or grid strengthening, via reducing peak demand or increasing stand-alone generation capacity. However, without further incentives for solar electricity, it is unlikely to take off in the medium term, except in remote, rural, metropolitan districts and in overseas departments.

Tradable Green Certificates

EdF seems to have no interest whereas Total Fina might become a European player in this field.

Gas Sector

Similar as in the electricity sector the French gas sector is dominated by one big state-owned company –the **Gaze de France (GdF)**. One question that now arises is whether or not France can transpose the gas directive, which sets August 2000 as a start-date for competition, any easier than the electricity directive. The French government has indicated it intends to execute the first slice of competition on time, to avoid embarrassing its presidency of the EU from August. However, according to the draft law, Paris envisages opening 20% of the gas market

for competition from August 2000, while some of its partners have established fully open markets already.

Recuperation of *landfill gas* for greenhouse gas mitigation purposes is expected to increase energy production from landfill gas, which has not been developed to a great extent until now.

A policy similar to the EOLE tender for wind installations was announced in February 1998 10 MW for *biogas* electricity plants.

Heat Sector

Solid biomass (mainly wood) contributed an estimated 8.8 Mtoe to France's total energy supply in 1996. The majority of this, 7.1 Mtoe, was used for heating purposes in the residential sector. Thus, the use of wood for heating is widespread in France, with more than 3 million households using wood to fulfil their main heating requirements, and a further 4 million applying wood heating occasionally. An extra 1.5 million homes are estimated to infrequently use wood for heating purposes. District heat production from *waste incineration* is increasing, and was reported as 47,500 TJ in 1996.

Solar collectors installed provide 17 ktoe of heat (largely for hot water in residential buildings and for swimming pools), and 4,000 solar water heaters were installed in 1996. *Geothermal energy* is exploited via 41 low enthalpy geothermal heat plants around Paris and 15 in the Aquitaine region, estimated to supply around 121 ktoe heat in 1996.

There are solar thermal and biomass initiatives to offset the demand for fossil fuels in generating primary heat. Promotion of wood energy for heating (of apartment blocks) was being strengthened via a **Wood Energy Plan**, initiated by the Ministry of Industry. The total budget for the plan was 215 million FF and the plan ran between 1995 and 1998. The plan aimed to create 500 additional jobs by 2000 and should also result in fossil fuel savings of 60 ktoe. In support of this plan, France's 1997 budget lowered the VAT rate of 5.5% on wood used for home heating. Subsidies are allocated on a case-by-case basis. In the framework of a government programme of early 1996, 20,000 solar water heaters are to be installed in French departments by 2000.

Cross-cutting GHG Emissions Sector

General Overview

National regulatory measures

Targets; both Kyoto as national (e.g. Denmark has a more strict national target than their Kyoto target)

Relevant Data (Use of UNFCCC)

Emissions data

CO2 Abatement costs. Only the margin

CO2 equivalent per kWh produced. Also for heat and gas; maybe the latter should be per technology

CO2-emissions: "land use change and forestry" (As pointed out by Zew, This info is needed to deal with country compliance status concerns - UNFCCC)

ANNEX 7

RECerT country report Germany

Prepared by

ZEW

Section 1 General and renewable energy statistics for Germany

Total Primary Energy Consumption (in PJ)										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Oil	5.237	5.548	5.627	5.744	5.692	5.659	5.800	5.750	5.724	5.586
Coal	2.307	2.330	2.195	2.139	2.139	2.060	2.078	2.043	2.037	1.905
Lignite	3.200	2.506	2.178	1.984	1.861	1.735	1.685	1.591	1.509	1.468
Natural gas	2.292	2.409	2.383	2.520	2.567	2.799	3.133	2.992	3.004	3.028
Nuclear	1.665	1.609	1.732	1.673	1.650	1.682	1.764	1.858	1.764	1.852
Hydro and wind	59	53	62	64	67	82	70	70	76	91
Others	152	155	138	182	208	249	211	205	205	270
Total	**14.912**	**14.610**	**14.314**	**14.308**	**14.185**	**14.267**	**14.742**	**14.510**	**14.320**	**14.200**
(MJ per capita)	**(188)**	**(183)**	**(178)**	**(176)**	**(174)**	**(175)**	**(180)**	**(177)**	**(174)**	

*preliminary

Sources: BMWi (1999), p. 21; Schiffer (2000)

Total Electricity Consumption (in TWh)									
	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total el. prod.	539,4	537,1	525,7	526,8	534,9	550,3	549,7	552,0	552,5
Import	30,4	28,4	33,6	35,9	39,7	37,4	38,0	38,6	40,5
Export	31,0	33,7	32,8	33,6	34,9	42,7	40,4	39,1	39,5
Net	-0,6	-5,3	0,8	2,3	4,8	-5,3	-2,4	-0,5	1,0
Total	**538,8**	**531,8**	**526,5**	**529,1**	**539,7**	**545,0**	**547,3**	**551,5**	**553,5**
(MWh per capita)	**(6,8)**	**(6,6)**	**(6,5)**	**(6,5)**	**(6,6)**	**(6,7)**	**(6,7)**	**(6,7)**	

Sources: Schiffer (1999), p. 185; Schiffer (2000)

Total Primary Energy Production (in PJ)										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Coal	2.090	1.981	1.958	1.735	1.556	1.594	1.433	1.392	1.228	1.187
Lignite	3.142	2.462	2.128	1.937	1.829	1.709	1.659	1.571	1.483	1.451
Oil	156	149	141	129	123	126	120	117	123	117
Natural gas	589	580	589	589	615	633	663	674	659	700
Hydro and wind	59	53	62	62	64	79	70	73	79	91
Others*	188	135	135	155	158	199	202	196	246	237
Total	**6.224**	**5.360**	**5.013**	**4.607**	**4.345**	**4.340**	**4.147**	**4.023**	**3.818**	**3.783**
(MJ per capita)	**(78)**	**(67)**	**(62)**	**(57)**	**(53)**	**(53)**	**(51)**	**(49)**	**(47)**	

* including nuclear

Sources: BMWi (1999), p. 20; Schiffer (2000)

Total Electricity Production (in TWh)									
	1991	1992	1993	1994	1995	1996	1997	1998	1999*
Nuclear	147,4	158,8	153,5	151,2	154,1	161,6	170,3	161,6	169,5
Oil	13,6	11,9	8,9	8,7	7,8	6,8	5,9	5,2	4,5
Coal	149,8	141,9	146,2	144,6	147,1	152,7	143,1	153,4	144,0
Lignite	158,3	154,5	147,5	146,1	142,6	144,3	141,7	139,4	135,0
Natural gas	36,3	33,0	32,8	36,1	41,1	45,6	48,0	50,8	53,5
Hydro	18,5	21,1	21,4	22,5	24,2	21,7	20,9	21,2	23,5
Other	15,5	15,9	15,4	17,6	18,0	17,6	19,8	21,8	22,5
Total	**539,4**	**537,1**	**525,7**	**526,8**	**534,9**	**550,3**	**549,7**	**553,4**	**552,5**
(MWh per capita)	**(6,7)**	**(6,7)**	**(6,5)**	**(6,5)**	**(6,5)**	**(6,7)**	**(6,7)**	**(6,7)**	

* preliminary

Sources: Schiffer (1999), p. 185; Schiffer (2000)

Contribution of Renewable Sources of Energy to PEC*
in PJ

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydro**	59	53	62	62	64	79	70	73	79	91
Wood	45	50	48	49	47	...	...	...	...	...
Waste, Sewage sludge	91	97	100	117	123	...	...	...	...	...
Sewage gas	14	12	12	12	13	...	...	...	...	...
Total	**208**	**211**	**220**	**240**	**246**	**302**	**299**	**296**	**284**	**...**

* PV, biogas, and landfill gas are not included. Estimates on the contribution of solar collectors and heat pumps.
** from 1995 on, wind energy is included
Source: BMWi (1999)

Electricity Production based on RENs (grid-connected)
in GWh

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hydro	16.714	18.340	18.221	19.600	20.928	18.268	18.468	17.572	19.700
Waste*	n.a.	2.260	n.a.	2.100	n.a.	2.097	2.113	2.460	3.800
Biomass*	n.a.	295	n.a.	570	n.a.	804	879	1.050	
Wind	215	291	674	1.428	1.712	2.078	3.034	4.593	5.500
PV	n.a.	3	n.a.	7	n.a.	12	18	24	20
Total		**21.189**		**23.705**		**23.259**	**24.512**	**25.699**	**29.020**

Sources: StaBu (2000), *VDEW (2000)

Installed Capacity
in MW

	1991	1992	1993	1994	1995	1996	1997	1998	
Hydro	3.266	3.395	3.385	3.365	3.364	3.373	3.382	3.443	
Waste*	464	550	564	499	509	551	527	540	
Biomass*	n.a.	227	n.a.	275	n.a.	357	400	409	
Wind	110	183	334	643	1.137	1.546	1.966	2.672	4.444
PV	n.a.	5	n.a.	10	n.a.	17	25	34	
Total		**4.360**		**4.792**		**5.844**	**6.300**	**7.098**	

Sources: StaBu (2000), *VDEW (2000)

Population

1990	1991	1992	1993	1994	1995	1996	1997	1998
79,4	80,0	80,6	81,2	81,4	81,7	81,9	82,1	82,1

Section 3 Energy and environment policy – legislation and targets for renewable energy		
Section 3.1 Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• According to the EU-Burden-Sharing Agreement and the Kyoto Protocol, Germany is obliged to reduce GHG emissions by 21% in the commitment period 2008-2012. • In 1995, the German Federal Government has furthermore adopted a more ambitious target to reduce emissions by 25% by 2005. This national target was confirmed by Chancellor Schröder as well as by Jürgen Trittin, the Minister for the Environment, during COP 5. • Germany is one of the few countries that is in fact on a reduction path. Between 1990 and 1999 energy-related CO_2 emissions in Germany fell by about 15.5%. In relation to GDP, CO_2 emissions have fallen by 25% within the same period. The energy-related emissions per capita decreased from 12.8 t CO_2 in 1990 to 10.5 t CO_2 in 1999, still 2.5 times higher than the world average. • The reasons for these positive trends are extremely varied. First of all, the economic reconstruction and reduced use of CO2 intensive lignite in the new Länder has played a significant role. Secondly, the link between economic growth and CO2 emissions continued to be cut off in the old Länder. However, the trend was overlaid by population migratory movements within Germany, by immigration and by an increased utilisation of the production capacity in the old Länder. Projections made by Prognos/EWI (1999) doubt that the existing implemented policies and measures will be sufficient to achieve the 25%-reduction target in 2005.
3.1.2	Carbon emissions from the electricity sector	• Million tonnes CO2 emitted by the power sector (Source: Schiffer 2001) 1990 – 397 1995 – 349 2000 – 337 • In 2000, temperature-corrected CO_2 emissions increased for the first time since 1990 by an estimated 1% (+9 Mill. T CO_2). The main reason is augmented use of lignite and coal for electricity production. CO_2 emissions increased by 5% and 1.5% respectively. Between 1990 and 1999, CO_2 emissions caused by lignite combustion had decreased by more than 50%.
Section 3.2 Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	• The target to at least “double” the share of renewable sources of energy by 2010 was stated in several national programmes of the 90ties. It is also mentioned in the explanatory text to the Renewable Energies Law (REL) of April 1, 2000. The target is indicative only. • The doubling target (4%) was last laid down in the 18 Oct. 2000 Resolution of the Federal Government on a National Climate Protection Programme (5th IMA-Report). The target remains indicative.
3.2.2	Renewable ***electricity*** target	• Several years ago, the Federal Ministry for the Environment (BMU) set the target to double the share of renewable sources of electricity to 10% by 2010. The current government continues to aim at a doubling of the “green” share to 10-12%.
3.2.3	Renewable energy and electricity policy	• Germany’s Electricity Feed Law (EFL) first enacted in 1991 was replaced by the Renewable Energies Law (REL) on April 1, 2000. The REL continues with the practice of fixed feed-in tariffs, though, several important changes have been included. (An English version of the REL is e.g. available on http://www.wind-energie.de)
Section 3.3 Specific renewable energy support mechanisms and schemes		

3.3.1	Obligations	• Renewable Energies Law of April 1, 2000: The instrument chosen to increase the share of renewable electricity is a purchase obligation for grid operators and electricity suppliers at legally fixed feed-in tariffs.
		• Electricity produced with the following renewable energy technologies is supported under the REL:
		  • hydropower, sewage gas and landfill gas plants up to 5 MWel,
		  • biomass plants up to 20 MWel,
		  • all wind and solar power installations.
		  • Geothermal power is now also included.
		  • It is unlikely that the German government will accept non-organic waste as renewable source of energy.

3.3.2	Taxation	• On April 1, 1999, the first stage of the German Ecological Tax Reform was implemented. The general objective of this reform is to relieve pressure from the cost factor employment and in return to increase cost pressure on energy. Yet, the taxable bases and the tax rates differ, and the law knows many exceptions. • The basic elements of the eco-tax reform include an increase of the tax on mineral oil (gasoline is taxed an additional 6 German Pfennig per litre and year, heating oil an additional 4 Pf/l once, natural gas an additional 0.32 Pf/l once), and the initiation of a general electricity tax (2 Pf/kWh in 1999 plus additional 0.5 Pf/kWh at the beginning of 2000, 2001, 2002 and 2003, respectively).
3.3.3	Voluntary demand	• Green electricity has been marketed since the full opening of the market on April 29, 1998 (and even before). Far more than 150 electricity companies are meanwhile offering green power. However, demand is rather low. Less than 0.5% of the customers subscribe. • Reasons lie in the fact that the REL is making green power selling very difficult. There are no other regulatory policies supporting voluntary demand (e.g. the electricity tax also applies to renewable based electricity). Finally, the marketing efforts of the majority of companies is very low.
3.3.4	Direct subsidies	• Directive for the promotion of PV installations (300 MW) by a 100,000-roofs solar electricity-programme of January 1, 1999: • Directive for the promotion of measures for renewable energy sources (200-million-DM market incentive programme) of September 1, 1999. • Etc.
3.3.5	Other support mechanisms	• Several state governments and utilities have additional programmes in place.

Section 4 Tradable Green Certificates (TGC) developments

On the political level, there is no discussion on the introduction of a system for renewable electricity certificate trade. Therefore, the following questions are not applicable to the German situation.

On the other hand, a CHP obligation in combination with certificate trading has been high up on the political agenda until February of 2001. In the last minute, the big German electricity companies managed to prevent such a scheme by designing an "alternative" on how to reduce CO_2 emissions in the energy sector. The proposed scheme is based on fixed output subsidies for CHP plants for a certain period of time.

However, more than 10 German companies – big and small – are a Member of RECS. Their participation in the RECS Test Phase for international green certificate trading is being carried out on a voluntary basis and thus with the least 'infrastructure' necessary. The German team is ready to start. Issuing and Execution Bodies have been determined more than a year ago.

The German voluntary scheme follows the RECS Basic Commitments, the RECS system and TGC design since there is no other (TGC) regulation the German team has to follow. As there has been a voluntary green power market in Germany for more than 3 years, accreditation infrastructure is available as well.

Section 4.1 Policy and legislative background		
4.1.1	Policy support	•
4.1.2	Legislative framework	•
Section 4.2 Timetable for starting a system		
4.2.1	Timetable	•
Section 4.3 Institutional infrastructure		
4.3.1	Regulation and control	•
4.3.2	Certificate 'issuing' authorities and executive bodies	•
4.3.3	Trade registration / trade registrar	•
4.3.4	'Issuing' authorities and executive bodies	•
Section 4.4 Rules and scope of certification		
4.4.1	Scope	•
4.4.2	Certificate information content	•
Section 4.5 Trading and intervention		
4.5.1	National	•
4.5.2	International	•
Section 4.6 Other information		

ANNEX 8

Country review - Greece

Prepared by

HELIOSTAT LTD

SECTION 1 - General and renewable energy - statistics

Sources : -Hellenic Public Power Corporation
-European Commission, Energy in Europe, special issue, November 1999

Section 1.1 General energy supply and demand statistics

(i) Absolute values

			Actual		Forecasted		
		Units	**1990**	**1995**	**2000**	**2005**	**2010**
1.1.1.	Total primary energy consumption	PJ/year	954	1,034	1,201	1,364	1,498
1.1.2.	Of which, total electricity consumption	Twh/year	34.9	41.4	52.2	61.4	71.4
1.1.3.	Total primary energy production	PJ/year	406	427	423	444	444
1.1.4.	Total electricity production	Twh/year	34.8	41.3	52.2	61.4	71.3
	-Coal	70.7%					
	-Oil	18.3%					
	-Natural Gas	0.5%					
	-Hydro	10.4%					
	-RES	0.1%					
	-Nuclear	0.0%					

(ii) (per capita specific values)

			Actual		Forecasted		
		Units	**1990**	**1995**	**2000**	**2005**	**2010**
1.1.1.	Total primary energy consumption	MJ/capita/ year	93,529	98,476	113,302	125,138	134,955
1.1.2.	Of which, total electricity consumption	KWh/capita/ year	3,422	3,943	4,925	5,633	6,432
1.1.3.	Total primary energy production	MJ/capita/ year	39,804	40,667	39,906	40,734	39,643
1.1.4.	Total electricity production	KWh/capita/ year	3,412	3,933	4,925	5,633	6,423

Section 1.2. Renewable energy supply and demand statistics

(i) Absolute values

			Actual		Forecasted		
		Units	**1990**	**1995**	**2000**	**2005**	**2010**
1.2.1.	Total production of renewable energy	PJ/year	67	75	71	71	71
1.2.2	Total production / consumption of renewable electricity	Twh/year	1.8	3.6	5.3	6.5	7.1
	Installed capacity (total)	MWe		2.2	2.8	3.4	3.5
	-Hydro	MWe		2.2	2.7	3.0	3.0
	-Wind, solar and geothermal	MWe		0	0.1	0.4	0.5

(ii) (per capita specific values)

			Actual		Forecasted		
		Units	**1990**	**1995**	**2000**	**2005**	**2010**
1.2.1.	Total production of renewable energy	MJ/capita/ year	6,569	7,413	6,698	6,514	6,396
1.2.2	Total production / consumption of renewable electricity	KWh/capita/ year	176.5	342.9	500	596.3	639.6

OTHER INDICATORS

	Units	**1990**	**1995**	**2000**	**2005**	**2010**
Population	Million	10.2	10.5	10.6	10.9	11.1
GDP	10^9 Euro'90	348.6	349.2	345.1	323.5	300.7
Energy import dependency	%	60.8	64.6	68.7	70.9	73.4

2.1.1. After special negotiations with the European Commission, Greece has postponed the electricity market liberisation up to 19 February, 2001. Until this date, the Public Power Corporation has the exclusive right of generating, transporting and distributing electricity, except the cases where a consumer generates electricity for self-consumption. However, even in this case, the possible extent of electricity production is obliged to be sold to PPC against a pre-defined price.

2.1.2. Market will open on 19/02/2001. Currently, only PPC supplies electricity.

2.2.1. Not relevant.

2.2.2. The trends seen over the next ten years in the evolution of the market, lead to the conclusion that a small number of large actors will dominate the sector.

2.3.1. We can comment only on renewable electricity generators. Under the current situation, PPC buys electricity from RES generators in a price equal of 90% of the corresponding selling price. In conjunction, this percentage is only 60% for electricity generated from cogeneration.

2.4.1. Not relevant.

2.4.2. Not relevant.

2.5.1. Not relevant.

2.5.2. Not relevant.

Update July 2001.

1. Legal Status

Since 19/02/2001, the electricity production market in Greece has been liberised. The regulation of Energy policy issues has been published on the official Gazette 1498B, 8 December 2000, as Law 2773/99. The major procedures foreseen in this law are the following :

- The right to apply for an electricity generation authorisation can be given to persons having the citizenship of a member state of the European Union or to legal entities or consortia registered in any European Union member state.

- An application for an authorisation must be submitted to RAE (Regulatory Authority for Energy) in the form set out in the Regulation. It must be accompanied by the documents and particulars prescribed in the Regulation and by a receipt showing that the appropriate fee has been deposited in RAE' s account.

- In formulating its opinion to the Minister of Development whether to grant or refuse an application for an authorisation, as well as on the terms and conditions for such authorisation, RAE takes into consideration in particular:

  (a) the security and protection of the System, the Network, the generation installations and the connected equipment;

  (b) the protection of the environment;

  (c) the efficient generation and use of electricity;

  (d) the primary energy source and the proposed technology for energy conversion;

  (e) the technical, economic and financial capabilities of the applicant;

  (f) the maturity of the project in the case of a generation authorisation;

  (g) public service obligations;

  (h) the long-term energy planning of the country;

  (i) the protection of consumers;

  (j) any concerns relating to national security raised by other ministries or authorities.

2. Application for authorisation

On 19/02/2001 the first call for authorization was expired. Over 900 requests were submitted, asking the authorization to construct electricity generation installations for over 20GW capacity. From them, over 2/3 refer to wind energy plants.

It is worth mentioning that the peak electricity demand in Greece is around 8GW.

Up to date (July 2001), 6 authorisations have been issued for large combined cycle power stations (over 300MW each) operating with natural gas.

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	The target for Greece is not reduction in CO_2 emissions, but limit the increase to 25%. The achievability of this target is very difficult. The country is likely to be a net importer of carbon credits.
3.1.2	Carbon emissions from the electricity sector	According to PPC's development perspectives and the most recent data on energy demand, electrical energy production will increase by 28% for the time period 1997-2002, while the respective CO_2 emissions will increase by only 14%. Also, for the time period 1997-2005 the electrical energy production will increase by 40% while the respective CO_2 emissions will increase by only 21% (Tables 1,2, and 3).

TABLE 1 : Electricity production and CO_2 emissions for the year 1997

FUEL	Net Productoin (GWh)	CO_2 Emissions (KT)
Lignite	27518	39120
Natural Gas	216	128
Diesel (Interconnected)	4270	3475
Diesel (Islands)	3174	2594
Hydros	4071	-
Renewables	33	-
Total	**39282**	**45317**

Average system CO_2 emission coefficient (kg/kWh) : 1.15

TABLE 2 : Electricity production and CO_2 emissions for the year 2002

FUEL	Net Production (GWh)	CO_2 Emissions (KT)
Lignite	29730	42172
Diesel (Interconnected)	3625	2808
Diesel (Islands)	4144	3276
Natural Gas	8175	3370
Hydros	4163	-
Renewables	490	-
Total	**50326**	**51626**

Average system CO_2 emission coefficient (kg/Kwh) : 1.03
Energy increase 1997-2002 28%
CO_2 emission increase 1997-2002 14%

Decrease of average CO_2 emission coefficient 1997-2002 (%) : 11%

TABLE 3 : Electricity production and CO_2 emissions for the year 2005

FUEL	Net Production (GWh)	CO_2 Emissions (KT)
Lignite	31235	43924
Diesel (Interconnected)	3670	2856
Diesel (Islands)	4966	3795
Natural Gas	10325	4110
Hydros	4244	-
Renewables	664	-
Total	**55104**	**54685**

Average system CO_2 emission coefficient (kg/kWh) : 0.99
Energy increase 1997-2005 : 40%
CO_2 emission increase 1997-2005 : 21%

Decrease of average CO_2 emission coefficient 1997-2005 (%) : 14%

This important limitation of CO_2 emissions compared to the increase of the energy produced, is due to PPC's strategy measures (included in the PPC's development plan), and they refer mainly to :

- introduction of natural gas, as a new fuel, in power generation
- exploitation of hydropower potential
- development of renewable energy sources
- conservation and rational use of electricity
- implementation of efficient lignite technologies

Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	Not existing
3.2.2	Renewable ***electricity*** target	Not existing
3.2.3	Renewable energy and electricity policy	

Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	No obligations exist
3.3.2	Taxation	No taxation or tax exceptions exist
3.3.3	Voluntary demand	N.R.

3.3.4	Direct subsidies	There are two kind of subsidies provided for renewable generation plant. i) The Energy Program of the Ministry of Development, which supports 50-60% of the eligible investment cost. This program is based on periodic calls. ii) The development Law of the Ministry of National Economy, which supports from 15 to 40% the investment cost, depending on the geographical location of the project, i.e. the less developed areas receive more funds compared to the urban regions. This program is continuously open. In both programs, the renewable energy generated, should be sold to PPC against a predefined feed-in tariff. However, the investor has the possibility to propose a discount in this tariff, so there is a degree of competition.
3.3.5	Other support mechanisms	–

Concerning **section 4**, it is not relevant for Greece. However, it must be said that the Tradable Green Certificate system could be made to work in the context of the electricity sector market structure, as there is no any legal or administrative obstacle to prevent it.

ANNEX 9

RECerT

The European Renewable Electricity Certificate Trading Project

European Commission FP5 Project Reference NNES-1999-00051

Country Review - Ireland

Section 1 - General and renewable energy - statistics		
Comments		It should be possible to complete this section quickly, on the basis of published statistics. In all cases please quote the source of statistics or projections of future demand.
Section		**Requirements**
Section 1.1 - General energy supply and demand statistics		
1.1.1	Total primary energy consumption	• Quote the most recently available year, (probably 1998) • Historical information - go back to 1990 (use annual statistics if available) • Projections - to 2010 (please use as many sources / studies as possible, and comment on the range of projections) Units - PJ/year for absolute consumption, and MJ / capita / year for specific consumption
1.1.2	Of which, total electricity consumption 11.99TWh 1990 17.77TWh 1998 29.9TWh 2010	• Quote the most recently available year, (probably 1998) • Historical information - go back to 1990 (use annual statistics if available) • Projections - to 2010 (please use as many sources / studies as possible, and briefly comment on the range of projections) • Units - TWh/year for absolute consumption, and MWh / capita / year for specific consumption Ref:Green Paper on Sustainable Energy. Dept of Public Enterprise sept. 1999
1.1.3	Total primary energy production 9.42Mtoe 1990 12.68Mtoe 1998 17.34Mtoe 2010	• Quote the most recently available year, (probably 1998) • Historical information - back to 1990 (use annual statistics if available) • Units - PJ/year for absolute production, and MJ / capita / year for specific production See 1.1.2
1.1.4	Total electricity production 3.16Mtoe 1990 4.63Mtoe 1998 6.07Mtoe 2010	• Quote the most recently available year, (probably 1998) • Historical information - go back to 1990 (use annual statistics if available) • Distinguish fuel sources (if statistics allow, use: coal, oil, natural gas, nuclear, large hydro, renewables) • Units - TWh/year for absolute production, and MWh / capita / year for specific production See 1.1.1

Section 1.2 - Renewable energy supply and demand statistics		
1.2.1	Total production of renewable ***energy*** 0.17Mtoe 1990 0.26Mtoe 1998 0.48Mtoe 2010	• Quote most recently available year, (probably 1998) • Historical information - go back to 1990 (use annual statistics if available) • Do not distinguish between energy sources • Approximate technical potential (ie theoretical maximum without institutional or market constraints) and market potential (ie realistic potential taking into account market and institutional constraints) for production of renewable energy. Make comments on whether these potentials are likely to change through time. Use and quote as many sources or studies as possible to back up these potentials. • Units - PJ/year for absolute, MJ/capita/year for specific See1.1.2
1.2.2	Total production / consumption of renewable ***electricity*** ***308MW / 1177GWh*** ***1998*** ***937MW / 3487GWh*** ***2005***	• Quote most recently available year, (probably 1998) • Distinguish fuel sources (if statistics allow, use: on-shore wind, off-shore wind, tidal power, wave power, biomass (all forms), solar (to include solar thermal electric generation and PV), geothermal, small hydro (<10MW), large hydro (>10MW), wastes (include all wastes in this category) • Historical information - go back to 1990 (use annual statistics if available) • Approximate technical potential (ie theoretical maximum without institutional or market constraints) and market potential (ie realistic potential taking into account market and institutional constraints) for production of renewable electricity. Make comments on whether these potentials are likely to change through time. Use and quote as many sources or studies as possible to back up these potentials. • Units - TWh/year for consumption / production, also quote installed capacity of renewable electricity generation plant (MWe) if available, and MWh/capita/year for specific production See 1.1.2

Section 2 - Electricity markets - liberalisation and the role of different players		
Comments		This section requires some commentary and interpretation. The intention of this section is to present renewable electricity in the context of the current and future electricity market. Of particular importance is the ability of individual (ie, commercial and domestic) consumers to choose supplier, and the existence and success of any voluntary green tariffs. We are looking for brief explanations only, focusing on just the most important points.
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general	Give general comments on the extent of liberalisation of the electricity market. For example, have any special dispensations been negotiated with the European Commission to delay market opening?

	comments 100% green electricity 28% conventional	
2.1.2	Timetable for market opening 19th Feb.2000 100% green, contional~350 largest customers 100% in 2005 Two companies Marketing green <1%	• What is the current extent of market opening - which categories of customer are currently able to choose between suppliers? • What is the timetable (if relevant) for the opening of the whole electricity market, down to the level of individual households • For markets that have already opened, what is the extent of customer switching that has already taken place (ie, customers switching from a traditional to a new supplier)? How far is the switching expected to continue?
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market State monopoly nominally broken into generation+ distribution+ semi-independent Transmission,assets still owned by orginal monopoly Up to six companies intend to generate+s	• Have vertically-integrated state-owned electricity utilities been broken up into separate generation / transmission / supply / distribution businesses? • For countries that have broken up state-controlled assets, what is the extent of re-integration of separate businesses? (ie, are separate businesses tending to re-form into vertically integrated or horizontally-integrated businesses?) • What is the extent of 'convergence' of companies - ie electricity sector companies merging activity with other businesses, such as gas, telecomms, other retailing etc. • Make other relevant comments on this area.

	upply. None have built generation yet. Some power to be auctioned to allow some trading	
2.2.2	Number, size and market share of players ~7 players, including supplier from Northern Ireland.	• What is the current composition (number of actors, size, market share) of the electricity market, in each business area (ie, generation, transmission, supply and distribution) • What trends are seen over the next ten years (to 2010) in the evolution of the market? - ie is there an expectation that mergers and take-overs will dominate the sector, leading to a small number of actors in each sector, or even a small number of actors in the whole industry?

Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading Only being set up, details to be set by Commissio n for Electricity Regulation	• Briefly describe the current and future arrangements for electricity trading. For example, will there be a single pool system, or will there be a bilateral market facilitated by one or more power exchanges? Is the market limited to the country concerned, or is it an international market? • Specifically, comment on the requirement on renewable electricity generators - will they be disadvantaged in any way under the current or proposed trading arrangements? • How is the market for physical electricity expected to evolve through time • Give any further relevant details • Leave any discussion of 'green certificate' systems to section 4
Section 2.4 - Market volumes and values		
2.4.1	Volumes Small amount to be sold through interconecto r to/from Northern Ireland	• If the information is available, briefly indicate what volumes of electricity are presently traded under each element of the market (for example, if a pool system, what fraction of trades are 'on-market' and what fraction 'off-market'). • Indicate what volume of electricity is traded in the regulated (ie, un-liberalised) market and the unregulated (ie, liberalised) market • If available, indicate the volume of renewable electricity that is traded across different elements of the market. Distinguish between the regulated and unregulated market. • Units - GWh / year or TWh / year

2.4.2	Values	• If the information is available, briefly indicate the value (Euros) of electricity traded. Where possible, distinguish between the unregulated and regulated markets, and distinguish between different trading routes (ie bilateral contracts, pool, etc) • Provide estimates of future prices of bulk electricity, and quote the sources of these estimates • If available, indicate the value of renewable electricity traded in each part of the market (ie regulated and unregulated markets). • Give any further relevant details • Units - millions Euro

Section 2.5 - The green market		
2.5.1	Current 28% of market (conventional) 100% for green electricity. No green tariff yet. May be one offered by largest conventional player.	• Indicate the current ability of electricity consumers of all sizes to choose different offerings, specifically 'green electricity' tariffs, from suppliers • Where such offerings exist, what types of generation are included in the tariff, and what are excluded. Are there any national 'standards' or similar means of ensuring quality for consumers? • Where such offerings exist, what has been the scale of take-up by consumers? What volume of electricity is sold on green tariffs? (units - GWh / year or similar) • How strongly have these offerings been marketed by suppliers? Is the market currently supply-limited or demand-limited? • What premiums, if any, are charged by suppliers for 'green' tariffs? (units - euros / MWh or euro cents / kWh) • How many suppliers offer such 'green' tariffs? • Give any further relevant details, but note that specific government support for green tariffs is covered in section 4 below.
2.5.2	Future Green on offer. Households :same price Small commercial/ industrial, up to 105 reduction	• Where market opening is not yet complete, indicate the interest that consumers are likely to show in choosing between suppliers, and specifically choosing green tariff offerings. What evidence is there of consumers' interest in renewable electricity? • Indicate projections for the growth of the voluntary green market segment (number of consumers, volume of electricity, monetary value of the market), and quote the sources of these projections.

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Comments		The purpose of this section is to understand the current and planned policy environment for renewable electricity. It will be necessary to provide a commentary to many of the answers, though some (such as information on targets) can be single number answers only. Comments and interpretation should be brief.
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target Plus 13% ref 1990 level, will be met with difficulty already exceeded by 1999	• Target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 2008 - 2012 • Comment on the 'achievability' of this target, and whether the country is likely to be a net importer or exporter of carbon credits.
3.1.2	Carbon emissions from the electricity sector 10.608Mt 1990 14.639Mt 1998 16.669Mt 2010	• Quote most recently available year, (probably 1998) • Historical information - back to 1990 (use annual statistics if available) • Projections - to 2010 (please use as many sources / studies as possible, and comment on the range of projections) • Units - quote both absolute (Tonnes CO_2 / year) and specific (Tonnes CO_2 / TWh) as appropriate See 1.1.2

Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	• If targets are set only for electricity, and not for energy, leave this section blank • Target dates and levels for renewable energy (eg, 2003, 2010 etc). Go as far in the future as targets have been set (do not stop at a 2010 target) • Explain the official (or other) nature of the targets - are they stated in legislation, or merely 'indicative'?, are they fully endorsed by government, or voluntarily adopted by industry? • Specify whether the targets are set for the country, or are broken down by regions • Specify whether the target is for consumption or production of renewable energy, and whether it is absolute (PJ/year) or relative (% of gross inland consumption or similar).

3.2.2	Renewable ***electricity*** target 500MW for electricity production additional, 2000-2005, mainly wind	• If targets are set only for energy, and not for electricity, leave this section blank. If electricity targets are calculated from a general energy target, explain this calculation. • Target dates and levels for renewable electricity (eg, 2003, 2010 etc). Go as far in the future as targets have been set (do not stop at 2010) • Explain the official (or other) nature of the targets - are they stated in legislation, or merely 'indicative'?, are they fully endorsed by government, or voluntarily adopted by industry, or some other manner of target? • Specify whether target is for consumption, production or generation capacity of renewable electricity, and whether the target is absolute (TWh/year for production, or MW_e for generation), or relative (% of national generation or supply or similar). • State whether the target is flat (ie, includes all renewable electricity sources equally) or whether it is broken down into individual targets for different generation options / sources (ie, on-shore wind, off-shore wind, tidal power, wave power, biomass (all forms), solar (to include solar thermal electric generation and PV), geothermal, small hydro (<10MW), large hydro (>10MW), wastes (include all wastes in this category) • State whether any categories of generation are excluded from the target(s)
3.2.3	Renewable energy and electricity policy. Policy on meeting Kyoto targets+ mechanisms in draft form., not finalised. Expect soon.	Describe the overall renewable energy and electricity policies, and their state of development, in the context of the country's overall energy balance and electricity generation mix. Reference policy documents where possible. Explain how far the government has been motivated to promote renewable energy / electricity by the Kyoto CO_2 targets. Explain whether the government has any additional justification in setting policy - ie local environmental effects, rural development and employment, industrial development, export promotion etc. Where policy is not yet in place, or is being amended, explain the timetable for this, and whether it is likely that specific targets will be adopted. Briefly mention the policy instruments that have been (will be) adopted, but leave the detail to section 2.3.

Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations None.	• Describe any obligations for renewables that are in force or in preparation. Is the obligation to produce or consume renewable energy? Which economic actors are obligated? (ie, electricity suppliers, consumers etc) • Is the obligation system designed to induce competition between market players, or will each market player react to the obligation in isolation? • What penalties are (will be) in force for non-compliance - are they monetary or other penalties? • Which institutions / bodies are responsible for setting / monitoring / enforcing the obligation(s) • For how long is the obligation(s) set? (ie, rolling one year, 20 years etc), and will the obligation increase through time? If so, is this increase planned and published, or is the industry unaware of the details of future increases? • Distinguish between obligations for renewable energy and renewable electricity, if such distinction exists. • Give any further relevant details
3.3.2	Taxation Corporate tax allowance. Stopping next year.	• Describe all fiscal arrangements that directly or indirectly support renewable energy/ electricity production / consumption • Define who the taxes / tax exemptions apply to (ie, particular categories of electricity consumer, electricity generators) • Define the quantities being taxed (or exempted) - is it energy, electricity, all forms of renewable electricity or just certain technologies etc • Distinguish between direct taxes / exemptions on production / consumption, and indirect taxes / exemptions that give favourable treatment to renewable energy through rateable value, VAT rates, treatment of business taxes etc • Give any further relevant details
3.3.3	Voluntary demand	• Explain to what extent the renewable energy policy relies on voluntary demand to reach targets • Describe any voluntary demand stimulation / facilitation measures, or any legal promotion of or obstacles to the voluntary demand market • Explain whether the voluntary market is in conflict with other policy measures

3.3.4	Direct subsidies Up to present competitive scheme similar to NUFFO, banded for technologies, under review by Renewable Energy Strategy Group set up by Minister /Government	• Define the nature of any subsidies provided - are they on investment cost for renewable generation plant, feed-in tariffs etc • What is the size of the subsidies available for renewables (quote in Euros or Euro-cents, per kWh or per other quantity), and what restrictions apply to the subsidies - ie are some technologies not included in the schemes • Who is responsible for paying the subsidies - immediately (for example electricity supply or distribution companies), and ultimately (for example central government, or all electricity consumers, or some sub-set of electricity consumers) • Is there any degree of competition in allocating the subsidies (for example the NFFO scheme in the UK had a competitive element because developers had to bid to receive a contract), or are the subsidies available to any and all qualifying schemes (such as the typical 'feed-in tariff') • Give any further relevant details
3.3.5	Other support mechanisms	• Define any other support mechanisms or schemes that do not fall into the above categories. Examples would be support for renewable energy commercialisation or research and development. These are worth mentioning only very briefly, but they are not the primary focus of this project.

Section 4 is not relevant for Ireland.

ANNEX 10

RECerT

The European Renewable Electricity Certificate Trading Project

European Commission FP5 Project reference NNES-1999-00051

Country Review - ITALY

Prepared by

SERVEN S.r.l.

Alessandro Brusa

Section 1 - General and renewable energy - statistics

Comments	List of Sources of statistic (1): ISTAT - Italy (2): National Conference on Energy and Environment - Rome 25 - 28 November 1998 - Source of Ministry of Industry (3): Dati Statistici sull'Energia Elettrica in Italia 1996-1997-1998 - ENEL (4): Italian White Paper on Renewable Energy Sources - CIPE - 1998 (5): 1998 - Annual Energy Review - EC - Special Issue - December 1998

Section 1.1 - General energy supply and demand statistics							**Comments**
		Units	1990	1997	2001	2010	
	Country population	Unit	56.700.000	57.600.000		57.000.000	(1)
1.1.1	Total primary energy consumption	PJ/year	6.844,1	7.534,8		7970,1	(2) (5)
	Total specific primary energy consumption	MJ/capita/year	120.707	130.813		139.826	
1.1.2	Total electricity consumption	TWh/year	83,6	96,8		115,9	(2) (5)
	Total specific electricity consumption	MWh/capita/year	1,5	1,7		2,0	
1.1.3	Total primary energy production	PJ/year	1.188,8	1.444,2		1.239,0	(2) (5)
	Total specific primary energy production	MJ/capita/year	20.966,9	25.072,4		21.736,8	
	Electricity production (gross)	TWh/year					(3)
	coal		32,0	23,3		n.a.	
	oil		107,3	110,3		n.a.	
	natural gas		39,1	70,2		n.a.	
	nuclear		0,0	0,0		0	
	large hydro		34,3	33,5		32,9	
	renewables		12,3	13,0		14,0	
1.1.4	Total electricity production (gross)		**225,0**	**250,3**			
	Specific electricity production (gross)	MWh/capita/year					(3)
	coal		0,6	0,4			
	oil		1,9	1,9			
	natural gas		0,7	1,2			
	nuclear		0,0	0,0		0,0	
	large hydro		0,6	0,6		0,6	
	renewables		0,2	0,2		0,2	
	Total specific electricity production (gross)		**4,0**	**4,3**		**0,8**	

Section 1 - General and renewable energy - statistics							
Comments		List of Sources of statistic (1): ISTAT - Italy (2): National Conference on Energy and Environment - Rome 25 - 28 November 1998 - Source of Ministry of Industry (3): Dati Statistici sull'Energia Elettrica in Italia 1996-1997-1998 - ENEL (4): Italian White Paper on Renewable Energy Sources - CIPE - 1998 (5): 1998 - Annual Energy Review - EC - Special Issue - December 1998					
Section 1.2 - Renewable energy supply and demand statistics							**Comments**
		Units	1990	1997	2001	2010	
	Country population	Unit	56.700.000	57.600.000		57.000.000	(1)
1.2.1	Total production of renewable **energy**	PJ/y	349,1	488,4		847,9	(4)
	Total specific production of renewable **energy**	MJ/capita/year	6.157,0	8.479,6		14.875,7	
1.2.2	Production of renewable **electricity**	TWh/y					(3) (4)
	on-shore wind		0,0	0,2		5,5	
	off-shore wind		0,0	0,0		0,0	
	tidal power		0,0	0,0		0,0	
	wave power		0,0	0,0		0,0	
	biomass		0,1	0,3		13,8	
	solar		0,001	0,006		0,3	
	geothermal		3,2	4,2		5,9	
	small hydro (< 10 MW)		5,9	8,3		12,3	
	large hydro (> 10 MW)		25,7	32,9		35,7	
	wastes		0,1	0,9		4,0	
	Total production of renewable **electricity**		**35,0**	**46,9**		**77,5**	

Section 1.2.2

Market Constraints

The market penetration of renewable energy technologies in the past few years has increased thanks to the energy price support policy for RE plants. This mentioned price support program is now ending with the start-up of the last plants whose selling price of energy to the national grid will be guaranteed for a eight-years period.
In the meantime RE technology costs have decreased and several RE technologies are now very attractive (e.g. wind power, biogas, etc.)

Of course RE technologies are not competitive yet, if compared with gas combined cycle plants or other similar plants, thus they need a price support mechanism in order to be more competitive: this mechanism is the mechanism of RE Certificates, recently issued by the Italian Government with the Law: “Decreto 14 novembre 1999 – M.I.C.A.”.

Solar technology (PV) (7.5 M€ / MW), Waste to energy (4 M€ / MW) and Hydropower (2.5 M€ / MW) (4) are the most expensive technologies: this RE technologies could find great difficulty to enter the liberalised market without a REC mechanism or similar.

Institutional Constraints

There are environment constraints (hydropower, biogas & biomass and windpower) and institutional constraints (licence and authorisation issued from town Council and long time period to get it) that represent a barrier for RE technology to enter the market.

References

The statistics and data elaboration of the present report have been gathered from the following sources:

(1): ISTAT – National Statistics Institute - Italy
(2): National Conference on Energy and Environment - Rome 25 - 28 November 1998 - Source of Ministry of Industry
(3): Dati Statistici sull'Energia Elettrica in Italia 1996-1997-1998 - ENEL
(4): Italian White Paper on Renewable Energy Sources - CIPE – 1998
(5): 1998 – Annual Energy Review – EC – Special Issue – December 1998

Section 2 – Electricity markets – liberalisation and the role of different players		
Section		**Requirements**
Section 2.1 – Electricity market liberalisation		
2.1.1	Liberalisation general comments	Italy, with the issue of the law “Decreto Legislativo n. 79/99”, since the 1st March 1999 has achieved the liberalisation of the electricity market, according to the EU act n. 96/92/CE. No delay in market opening has been introduced, if compared to the EU act.
2.1.2	Timetable for market opening	• Nowadays customers with electricity consumption level upper 20 GWh are eligible customers; Companies each with electricity consumption level upper 1 GWh can join in a consortium, altough the whole electricity consumption of the consortium should be bigger than 20 GWh; • Since 2002 are eligible customers the consumers with electricity consumption greater than 9 GWh (the same level for the consortium, with individual electricity consumption greater than 1 GWh); the new Ministry of Industry is involved in a wide-opening process of liberalisation of the electricity market to consumers with a minimum level of 100.000 kWh/year (not yet ratified); • A large amount of eligible costumers has already switched in new supplier, both Italian and foreign, but the limited grid connection trough the boundaries doesn’t allow a concrete supply of new electricity suppliers.

Section 2.2 – Number of players, their size and market share		
2.2.1	Extent of disaggregation (unbundling) of the electricity market	• The once state-owned electricity utility (ENEL) has been broken up into different companies, each separately responsible for production (ENELPOWER), transmission, supply (ENEL Distribuzione) and trade (ENEL Trade); • In Italy the traditional utilities such as ENEL, EDISON, etc. are getting a new asset organized like a horizontally-integrated businness (gas distribution, tlc, water supply, etc.); • See above; • Utilities operating on the whole country are moving to the multiutility asset; municipal multiutilities are reinforcing their asset on the spot.
2.2.2	Number,size and market share of players	• The market is currently opening so that a evaluation is difficult to arrange, but at the moment on the side of the generation the following companies are present: ENEL Trade (IT), Edison (IT), Sondel (IT) plus eight Municipal Utilities (IT), Alpenergie (CH/B), Verbund (AUT), Electrabel (B), EdF (France), RWE (D), Union Fenosa (ESP). Only one operator is responsible for the transmission system (Gestore della Rete Nazionale di Trasmissione S.p.A.); the supply and distribution systems are going to be settled as local or district monopoly, where just one operator (ENEL Distribuzione or the local Utility) is responsible for the service. • The expected scenario should foresee three new utilities (coming from the selling-off of 15.000 MW from ENEL to investors, according to the law “Decreto Legislativo n.79/99” wich doesn’t allow to any utility to own more than 50% of the whole domestic electricity capacity), ENEL as a holding, plus the municipal utilities plus mergers between national and foreign utilities.
Section 2.3 – Electricity trading arrangements		
2.3.1	Electricity trading	• Currently occurs bilateral agreement between eligible costumers and electricity producers or brokers; in the next two years a system like a pool or stock exchange (?) should be established, where an independent operator (Gestore del Mercato GME) will play a role as Market Operator; bilateral agreement will not a priori set aside; • The renewable electricity generators will have the certainty the electricity production will be accepted from the System Operator. Moreover, plants built since the 1st April 1999 will issue green certificates for a period of eight years, tradable on a green market; • It is foreseen a growth on electricity cunsumption ranging about 2,5%-3%; • No detail

Section 2.4 – Market volumes and values		
2.4.1	Volumes	• Domestic consumption electricity in 1999: 267 TWh/year – Bilateral agreement on-market: 67 TWh/year • See above • Not available
2.4.2.	Values	• 100,1 TWh is the amount of electricity traded in bilateral agreements during the year 2000, with a share of 35,9% of the overall electricity consumption; a pool has been not yet set on; • Bulk electricity price is set on 4 €cents/kWh (Autorità per l'energia elettrica ed il gas – Italian Regulatory Authority for Electricity and Gas); • Renewable electricity prices have been supported with a mechanism set on in 1992. This mechanism has lasted the overall tariff system. This mechanism is not anymore used in the new plants (construction since the 1st April 1999), for whom a green certificates mechanism will be introduced; • No details
Section 2.5 – The green market		
2.5.1	Current	• At the moment a green price mechanism for the consumer has been introduced; no suppliers offer such green tariffs yet; • No details
2.5.2	Future	• Data not available: green pricing schemes to the end-consumers are going to be introduced as soon as a green certificate system has been introduced .
Section 3 – Energy and environment policy – legislation and targets for renewable energy		
Section		**Requirements**
Section 3.1 – Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• Italy: target on 6,5 % reduction in CO_2 equivalent by 2010; • Italy, because of the quite good efficiency of their plants, should be a importer of carbon credits
3.1.2	Carbon emissions from the electricity sector	• Year 1996: Tonnes CO2/year: 122.000 – Tonnes CO2/TWh 0,50 • Year 1995: Tonnes CO2/year: 125.000 – Tonnes CO2/TWh 0,52 • Year 1990: Tonnes CO2/year: 118.000 – Tonnes CO2/TWh 0,54 • Year 2010: Projection Tonnes CO2/year: 104.000 - Tonnes •

<table>
<tr><td colspan="3">Section 3.2 – Renewable energy policy, targets and timetable</td></tr>
<tr><td>3.2.1</td><td>Renewable energy target</td><td>
The Ministry of the Industry has recently issued two Decree concerning “Energy Efficiency Target” for electricity and gas suppliers, to be achieved within the period 2002-2006. (Decree 24/04/2001 “Identification of energy saving national targets and renewable sources development, as application of art.16.4 of Law Decree 164/00” (for electricity distributors) and Decree 24/04/2001 “Identification of energy saving national targets and renewable sources development, as application of art.16.4 of Law Decree 79/99” (for gas distributors).
Electricity and Gas Distributors (with more than 100.000 customers) are obliged to achieve the energy efficiency targets by means of energy efficiency measures, as indicates from the Regulatory Authority for the Electricity and Gas (AEEG). Alternatively the same targets are achievable by the distributors by means of energy efficiency certificates assigned to companies which invest in energy efficiency actions.
The following targets concern the thermal energy targets from renewable sources set on in the “Conferenza Nazionale Energia e Ambiente” held in Rome on 25th – 28th November 1998;
Target for Gas Distributors
2002 0,20 Mtep
2003 0,40 Mtep
2004 0,70 Mtep
2005 1,00 Mtep
2006 1,30 Mtep

Target for Electricity Distributors
2002 0,30 Mtep
2003 0,60 Mtep
2004 0,90 Mtep
2005 1,20 Mtep
2006 1,60 Mtep

These targets refer to primary energy. The measures to be adopted to achieve these targets are listed within the above mentioned Decrees. Trading of Energy Efficiency Certificates is allowed to reach the annual targets.
</td></tr>
</table>

3.2.2	Renewable **electricity** target	• The following targets concern the **capacity** targets from **renewable** sources set on in the "Conferenza nazionale Energia e Ambiente" held in Rome on 25th – 58th November 1998; Typology 1997 2002 2006 2010 MWe MWe MWe MWe Hydro > 10 MW 13942 14300 14500 15000 Hydro ≤ 10 MW 2187 2400 2600 3000 Geothermal plants 559 650 700 800 Windpower 119 700 1400 2500 PV 16 25 10 300 Biomass & biogas 192 380 800 2300 Waste 89 350 500 800 These targets refer to **generation capacity** of renewable electricity plants, set for the whole country. These goals should be supported from the Italian Government trough the issuing of tools (laws, acts,

		etc.) adopted to achieve these results. No tidal and wave power.
3.2.3	Renewable energy and electricity policy	• In the electricity sector the Government recently approved a law ("Decreto 11 novembre 1999") where a green certificate policy will be set in charge since 2002; this will be the main instrument in electricity sector to support the renewable sources; a former price support program for renewable energy plants (introduced in 1992 for a selection of plants with criteria of efficiency) will be substituted from the green certificate mechanism. • A similar program has not been yet introduced by the Government for **thermal** energy; the volunteered agreement between Industry and Government are at the moment the only tool in charge.
Section 3.3 – Specific renewable energy support mechanism and schemes		
3.3.1	Obligations	• Producers and importer of more than 100 GWh/year of electricity shall certificate that a rate of 2 % of the whole electricity produced come from renewable sources. If this goal is not achieved from the utilities, it is possible to buy an amount of green certificates on the market, in order to fulfil their achievements. • A market of producers of renewable electricity will introduce competition between the producers theirself; • Because this system will be introduced since 2002, a penalty mechanism and a penalty body has not been yet introduced; • Probably the System Operator (Gestore della Rete di Trasmissione Nazionale - G.R.T.N.) will be the body in force for monitoring and enforcing the obligations; • The obligation has not expiration time and probably the rate of 2 % will be increased; • No details
3.3.2	Taxation	• The tariff structure for every customer (both industrial and resident costumers) accounts a percent of the whole price to renewable energy development policy; • The taxation of electricity is allocated to the final consumer; • The electricity as a whole has being taxed, without distinguishing between electricity sources; it is expected in the next year a new taxation mechanism for electricity; • No taxation mechanism have been yet introduced in order to facilitate renewable energy producers (with exception of producers with capacity not exceeding 30 kW : they don't pay any taxes).
3.3.3	Voluntary demand	• A voluntary market is going to be introduced in the Italian market. This concern is based on a voluntary demand market and will certify the electricity consumption from RES-E. There are not yet demand forecast; the production of electricity certified as green energy should arise to 10 TWh within the next two years.
3.3.4	Direct subsidies	• Regional subsidies are to be shared between appliers, with contribution on investment costs of different percent; • The concern of subsidies – except for Regional subsidies – has been introduced as above mentioned in 1992 ("Deliberazione CIP6/1992) as feed-in tariff; this mechanism since the issuing of "Decreto Legislativo n.79/99" is going to be removed in order to let the market (trough green certificates) be the responsible for

		successful.
3.3.5	Other support mechanism	• No details
Section 4 – Tradable Green Certificates developments		
Section		**Requirements**
Section 4.1 – policy and legislative background		
4.1.1	Policy support	• The production of green electricity shall achieve the obligation quota of 2% of the whole electricity production; • No support mechanism has been yet introduced in order to encourage certificate trading; it should be quote that distribution and transmission costs of renewable electricity are a few percent cheap;
4.1.2	Legislative framework	• Renewable energy certificates system is required by law ("Decreto 11 novembre 1999") and will be in charge since 2002; • Certification and certificate trading
Section 4.2 – Timetable for starting a system		
4.2.1	Timetable	• The green certificates system will start on 2002; the Ministry of Industry, according to "Decree n.79/99" is preparing a schedule with the main step.
Section 4.3 – Institutional infrastructure		
4.3.1	Regulation and control	• A institutional Body has been yet designed: it is expected that the System Operator (Gestore della Rete di Trasmissione Nazionale – GRTN) will be responsible for the monitoring and issuing of green certificates; it is to remember that the GRTN is involved in RECS Program, as Institutional Issuing Body
4.3.2	Certificate "issuing" authorities and executive bodies	• The Italian System Operator (GRTN) will be responsible for the issuing of certificates
4.3.3	Trade registration / trade registrar	• The trade registrar role will be performed by the Italian System Operator (GRTN)
4.3.4		•

Section 4.4 – Rules and scope of certification		
4.4.1	Scope	• Certification will cover electricity production • Plants included: o Hydro < 10 MW (>10 MW is not sure yet) o Windpower o Biogas & Biomass o PV o Geothermal o Waste (Incineration is not sure yet) o Tidal and Wave • From next year producers, in order to fulfil the obligation of 2% of renewable electricity, will issue green certificates useful in the market starting on 2002; • Autoproducers are allowed to produce, trade, buy green certificates.
4.4.2	Certificate	• No details

	information content	
Section 4.5 – trading and intervention		
4.5.1	National	• A clear procedure for redemption of the certificate has been foreseen by the GRTN; • A cap is not introduced, but the GRTN could regulate the level of the price of certificates by issuing a number of certificates in arrears, i.e. a certificates related to a expected production (a kind of future); Anyway a cap will be the penalty that will be introduced for non compliance with the quota obligation; • A “floor” is not defined; • It is expected a green certificate price between 5,7 – 7,2 €cent/kWh; • It is expected a green certificate exchange, within the electricity exchange; • Broker not yet operating; • A future or forward contracts are going to be presented; • No details; • No details; • No details; • The matter of taxation and VAT concerning the GC has not been introduced yet;
4.5.2	International	• The matter of international trading of GCs has not been handed by the Government, although GRTN, ENEL, SERVEN, UNAPACE, SONDEL take part to the RECS Program
Section 4.6 – Other information		
4.6.1	Other information	• No detail

ANNEX 11

RECerT Country Reviews - Luxembourg

Prepared by

Energie et Environnement

Section 1 - General and renewable energy - statistics
Section 1.1 - General energy supply and demand statistics

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010	comments
1.1.1 Total primary energy consumption	absolute consumption (PJ/year)	148,0	154,8	157,5	160,4	155,3	138,8	141,7	139,4	136,7	144,5	151,7	266,1	A new plant will operate from the end of 2001 (with natural gaz, 350 MW)
	specific consumption (GJ/capita/year)	384,9	397,1	398,5	400,2	381,9	336,3	338,7	329,1	318,6	332,3	344,5	531,1	
1.1.2 Of which, total electricity consumption	absolute consumption (TWh/year)	4,2	4,1	4,2	4,4	4,7	5,0	4,9	5,1	5,3	5,5	5,6	6,3	The consumption of hydro pumped storage plant is not included
	specific consumption (MWh/capita/year)	11,0	10,6	10,7	11,0	11,4	12,1	11,8	12,0	12,4	12,7	12,7	12,5	
1.1.3 Total primary energy production	absolute production (PJ/year)	0,4	0,3	0,4	0,4	0,6	0,4	0,3	0,4	0,5	0,5	0,6	0,9	In Luxembourg, it is no primary energy production except for the electricity production from renewable sources like hydro, wind wastes and biomass
	specific production (GJ/capita/year)	0,9	0,8	0,9	0,9	1,4	1,0	0,7	1,0	1,1	1,2	1,4	1,9	
1.1.4 Total electricity production	absolute production (TWh/year)	0,6	0,6	0,6	0,6	0,6	0,5	0,4	0,4	0,3	0,3	0,4	3,2	The pumped storage plant of the SEO is not included in this production. A new plant (TGV 350 MW, 2800GWh) will operate from the end of 2001.
	specific production (MWh/capita/year)	1,5	1,6	1,6	1,6	1,4	1,1	1,1	0,9	0,7	0,8	0,9	6,4	

Section 1.2 - renewable energy supply and demand statistics

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2010
1.2.1 Total production of renewable energy	absolute production (PJ/year)												
	specific production (MJ/capita/year)												
1.2.2 Total production of renewable electricity	absolute production (TWh/year) of wich :	0,098	0,087	0,099	0,102	0,154	0,117	0,084	0,114	0,130	0,148	0,177	0,261
	wind	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,003	0,005	0,017	0,030	0,105
	biomass	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,001	0,002	0,010
	solar	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
	small hydro (<10 MW)	0,050	0,042	0,055	0,050	0,095	0,063	0,050	0,067	0,074	0,075	0,090	0,090
	large hydro (>10MW)	0,017	0,010	0,013	0,015	0,022	0,020	0,009	0,015	0,021	0,021	0,021	0,021
	wastes	0,032	0,035	0,030	0,037	0,038	0,034	0,025	0,029	0,030	0,035	0,035	0,035
	specific production (MWh/capita/year)	0,256	0,224	0,249	0,254	0,380	0,284	0,201	0,268	0,303	0,341	0,402	0,521
	installed capacity(MW)	38,8	38,8	38,8	38,8	38,8	38,8	40,8	41,8	45,8	54,2	68,5	85,2
	wind	0,0	0,0	0,0	0,0	0,0	0,0	2,0	2,9	6,8	15,0	28,0	50,0
	biomass	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,2	0,2	0,3	1,5	3,0
	solar	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,2	0,4
	small hydro (<10 MW)	20,8	20,8	20,8	20,8	20,8	20,8	20,8	20,8	20,8	20,8	20,8	20,8
	large hydro (>10MW)	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0	11,0
	wastes	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	7,0	0,0
population		384400	389800	395200	400900	406600	412800	418300	423700	429200	434771	440415	501043

Section 2 - Electricity markets - liberalisation and the role of different players

Section 2.1 - Electricity market liberalisation

2.1.1	Liberalisation general comments	
		According to the law about the transposition of the directive 96/92/CE, the electrical market has been liberalised for consumers above 20 Gwh/year, since january 2001 The timetable for the opening of the market is: 01.01.2003 : The market will be opened for the customers with an electricity consumption of 9 GWh. 01.01.2005 : Liberalisation of the electricity market for consumers above 1 Gwh/year. This moment, the market will be opened for 75 % of the inland consumption.
2.1.2	Timetable for market opening	
		For the moment no decision has been taken to open the market to the whole electricity market, down to the level of individual households.
Section 2.2 - Electricity market liberalisation		
2.2.1	Extent of disaggregation (unbundling) of the electricity market	
		In Luxembourg, there is no vertically-integrated state owned electricity utility. CEGEDEL, the company who distributes electricity on the public grid is vertically integrated (transport and distribution) and has participations in other businesses like gas distribution and telecomms.
2.2.2	Number, size and market share of players	
	Generation	In generation area, there are a lot of independant producers and autoproducers. The SEO (Société Electrique de l'Our S.A.) is owner of the hydro pumped storage power plant at Vianden (1096 MW) and of 7 run-of-river power plants on the Moselriver (about 28MW). The State has 2 hydropower plants (11MW and 6 MW) The thermal power plants in Luxembourg are industrial and domestic cogeneration plants (with a total of 48MW installed in 1999) and a waste burning plant of 7 MW. Other independant producers have installed wind turbines (about 15 MW in 1999).
	Supply	The supply is guaranted with importation contracts, from Electrabel (Belgium) for the grid of the steel industry and from RWE E (Germany) for the public grid. The importations represent 96% of the total consumption of the country. The balance is covered with the inland production.

	Transmission	The transmission of electricity is hold from the two grid owners, CEGEDEL for the public grid and SOTEL for the grid of the steel industry.
	Distribution	The 2 main distributed companies are CEGEDEL and SOTEL. 8 other companies are owned from cities (city of Luxembourg, city of Esch/Alzette, city of Diekirch, ...) and districts.
Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	
		The electricity trading will be founded of a bilateral market. The customer will negociate directly with the producer or the distributer. In the legislation, the wholesale electricity dealers are not accepted. The renewable electricity generators are remunerated with a reglemented tariff. The distributing companies have the obligation to buy the electricity produced by the renewable sources about 1500 kW. For the plants with a capacity higher than 1500kW, the tariff will be negociated between the producer and the buyer.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	Actually there is no pool system for electricity trading. The importations of electricity are based on long term contracts and the production inside the country is marginal. The renewable electricity is no traded actually.
2.4.2	Values	The price of renewable electricity in the reglemented tariff is now about 0,1 Euro/kWh (for solar and wind energy up to 500 kW), up to 1500 kW, the tariff depends on the power given by the plant at peak hour demand. For the other sources of renewable electricity (hydropower, biomass, ...) the tariff is of 0,025 Euro/kWh lower.
Section 2.5 - The green market		
2.5.1	Current	For the moment only six industrial consumers have the ability to choose the supplier. There is no green tariff proposed from suppliers in Luxembourg.
2.5.2	Futur	In the future, CEGEDEL could propose a green tariff.

Section 3 - Energy and environment policy - legislation and targets for renewable energy

Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector	
3.1.1	Kyoto target
	Reduction of the CO2 emissions of 28% by the period 2008-2012 (Year of reference : 1990)
3.1.2	Carbon emissions from the electricity sector
	4.000.000 tCO2
Section 3.2 - Renewable energy policy, targets and timetables	
3.2.1	Renewable energy target
3.2.2	Renewable electricity target
	Target for the total production of renewable electricity in % of national consumption of electricity : 5% in 2010 (it was 2,5 % in 1997) This target is stated in the "Plan national pour un développement durable"(National plan for sustainable development).
3.2.3	Renewable energy and electricity policy
	The main law in this context is "Loi du 5 août 1993 concernant l'utilisation rationnelle de l'énergie" Through this law, the governement wants among other things to promote the use of renewable energy. One justification in setting this policy is to increase the indepedence of the country in the energy supply. This law was completed by regulations about electricity production based on renewable energy and cogeneration "Règlement grand-ducal du 30 mai 1994 concernant la production d'énergie basée sur les énergies renouvelables ou sur la cogénération"
Section 3.3 - Specific renewable energy support mechanisms and schemes	
3.3.1	Obligations
	The law about the transposition of the directive 96/92/CE includes obligations to take off electricity produced by renewable energy. The process is as follows: • The grid operators have to connect the plants based on renewable energy and cogeneration systems and to buy the electricity produced at a reglemented tariff. • The financial contribution of the grid operator to buy this energy will be fairly distributed between all the grid operators in the country. This finance system will occur through the so called "fonds de compensation".
3.3.2	Taxation
	The law about the transposition of the directive 96/92/CE establishes a tax on electricity consumption. This tax doesn't support renewable energy, because it's no exemption apply to the electricity based on renewable energy.
3.3.3	Voluntary demand
	The volontary market could be in conflict with the law about the liberalisation of the electricity market.

3.3.4	Direct subsidies
	Subsidies on tariffs: The electricity production based on renewable energy is payed with a reglemented tariff : *For plants with a capacity lower than 50 kW :* 0,055 Euro /kWh + 0,075 Euro/kWh for solar only *For plants with a capacity lower than 3000 kW :* 0,075 Euro/kWh + 0,025 Euro/kWh for wind 0,025 Euro/kWh for water Subsidies on investment cost: . A new regulation is on it's way. In summary, it will provide the following subsidies: *For all solar plants* 50% of investment costs for solar, with a limit being fixed *For plants with a capacity higher than 500 kW* 75 Euro / installed kW for wind, with a limit being fixed
3.3.5	Other support mechanisms
	It's no other support mechanism for renewable energy (inclusive commercialisation, research and development).

Section 4 - Tradable Green Certificates developments	
Comments	
	As a matter of fact, the idea of tradable green certificates has not yet been adopted on a broad level. However, a certain interest in the matter actually exists, as is proven by the success of the ReCerT Workshop, held in Luxemburg last autumn.
	Due to the size and geographical location of the country, offering moderate wind, solar and hydro capacity, politics tend to prefer acting locally, offering more and more substantial subsidies providied on renewable energy. Within an open market system, local development of renewable energy would rather be slowed down then accelerated, as investors would turn abroad, where higher profits could be made.

ANNEX 12

RECerT

The European Renewable Electricity Certificate Trading Project

European Commission FP5 Project Reference NNES-1999-00051

Country Review - The Netherlands

Prepared by ECN

Section 1 - General and renewable energy - statistics		
Section 1.1 - General energy supply and demand statistics		
1.1.1	Total primary energy consumption	• The total primary energy consumption is about 2900 PJ in 1999. With a population of 16 million people, this means an average consumption of 181250 MJ/capita in 1999. • Using the projections made by the CPB and RIVM in 1995, and adapted by ECN in 1998, we quote the 3 well-known and still exploited scenarios: Divided Europe (lowest economic growth), European Coordination and Global Competition (highest economic growth). Then, three results can be given for 2010 (which are until 1999 based on real data): • 3120 PJ for Divided Europe; 3600 PJ for Global Competition with something in-between for European Coordination. (The correspondingly used growth percentages are 0.3; 1; and 1.4.) The actual economic situation, i.e. considering the year 1998 to 2001, resembles far more that of the assumptions of Global Competition.
1.1.2	Of which, total electricity consumption	• The total electricity consumption is a little above 100 TWh in 2000. This is, with a population of 16 million people, 6.25 MWh/capita. • The total electricity consumption was 73.1 TWh in 1990, progressively growing to 85 TWh in 1996 and 100 TWh in 2000. This was 4.9 MWh/capita in 1990, and 5.5 MWh/capita in 1996. ("Nederlandse Energie Huishouding 1998", CBS) • Using the same studies as referred above, we find a total electricity consumption in 2010 of 99 TWh for the lowest scenario and of 114 TWh for the highest (assumed that the proportion electricity to total energy remains the same).
1.1.3	Total primary energy production	• The total primary energy production is about 2632 PJ in 1998 and this is 167643 MJ/capita.
1.1.4	Total electricity production	• The total net electricity production is about 86.6 TWh in 1998 (it is 90.1 TWh minus 3.5 TWh used as input), which is an average of 5.5 MWh/capita. • The total electricity production was 69 TWh in 1990, which was an average of 4.6 MWh/capita in that year, very progressively growing to the data given above for 1998. • The total input for gross electricity production of 1998 can be divided in coal (all together): 70.8 TWh; oil: 16.2 TWh; natural gas: 136.5 TWh; nuclear: 10.8 TWh; electricity: 3.5 TWh; waste incineration and renewables and other sources: 15.7 TWh. The total is 253.5 TWh in 1998. To match these inputs, one has to add, besides the gross electricity production (of 90,1 TWh) also the gross steam 'production' (of 56, with a total of 146.1 TWh. Accordingly, the overall efficiency is about 58%, which is with decentral electricity and heat production plants. (The efficiency of the central electricity generation plants would be 42%.)

Section 1.2 - Renewable energy supply and demand statistics		
1.2.1	Total production of renewable ***energy***	• The annual renewable energy production is about 19 PJ primary energy equivalent (or 34,3 including 100% waste), using the substitution principle, which is about 1190 MJ/capita and 0.65 % of the total energy consumption. • The particularity is that most of the renewable energy is produced from waste incineration in The Netherlands, and this means that very much 'renewable heat' is produced (50% of the heat produced in 11 installations that have enjoyed investment subsidies in the past). However, up to 2001, no subsidy was given for 'renewable heat', while renewable electricity (and renewable gas) are exempted from the Regulating Energy Tax (REB; a tax that stimulates energy conservation). The effect seems to have been to discourage the use of this heat and to optimise installations for (renewable) electricity production. • This has also consequences for the technical and market potentials, as, if the circumstances remain as such, there is no need to expect a greater participation of other sources than electricity as electricity is the only one included in the recently started TGC system (see section 4). The implementation of REB-exemption regulations for renewable heat in the future could have changed this situation. But it has not be the case.

1.2.2	Total production of renewable ***electricity***	• The annual renewable electricity production in 1999 is about 2.25 TWh; this includes the organic part of electricity from waste. In former years' definitions 100% of electricity from waste was included. In that case about 4 TWh would have been produced by renewable electricity sources. 2.25 (4) TWh corresponds to 8.1 (14.4) PJ output and 19.3 (34.3) PJavoided fossil fuel input when using the substitution principle. • The regional electricity distribution companies, which supply residential and tertiary consumers, have had a target of 3.17% renewable electricity to be delivered in 2000, which would have equalled 1.7 TWh. This target excluded electricity from waste. This target has not been reached. 1.5 TWh has been produced in 2000 of which more than 6 TWh has been sold to voluntary green electricity consumers. So, only about 50% of the target have been met. • On-shore wind production: 645 million kWh (or 2.3 PJ) in 1999. this is 0.65% of the electricity production. On-shore wind capacity was 445 MWe in 2000 (and 445 MWe wind corresponds with an electricity production of about 875 million kWh), which is below the target of 1000 MWe for that year (Rapport ECN-C-99-053). • Solar production (PV): 3.5 million kWh (or 0.13 PJ) (Energy Monitoring, CBS, 1999). • Small hydro: only 5 installations (together 37 MWe installed capacity); 106 million kWh (or 0.38 PJ); is 0.12% electricity (Energy Monitoring, CBS, 1999). • Waste + fermentation gas: 2860 + 264 million kWh (or 11.25 PJ) (Energy Monitoring, CBS, 1999). • No electricity from off-shore wind, tidal power, wave power, geothermal. **Technical potentials** have been given for 2010 by EnergieNed (the data is based on facts until 1995) and by ECN (ECN-C-99-53). This last also gives potentials for 2020. Both studies are, however, also concerned by market potentials; by giving purely technical potentials, potentials would have been found higher. • On-shore wind production: 3000 million kWh in 2010 (approximately 900 in 2000) with installed capacity 1500 MWe (EnergieNed); 3500 million kWh in 2010 with 1750 MWe in 2010 and with 3000 MWe in 2020 (ECN). • Off-shore wind: 5000 MWe in 2010 (EnergieNed) and only 1750 MWe in 2010 (ECN), but 3750 MWe in 2020 (ECN). • Solar production (only PV): 32 million kWh (EnergieNed) and 79 million kWh (ECN in an almost purely technical study). • Small hydro: 5 + 2 new = 7 installations (together 70 MWe installed capacity) with 265 million kWh in 2010 (EnergieNed and ECN). • Waste + fermentation gas: the data should increase for waste and decrease for fermentation, both as a result of changed regulation. However, the data for fermentation may remain similar due to increased efficiency. For waste, we can not foresee the situation. EnergieNed (in their study in 1996) seems the data on waste to be quite similar, but it is not clear why. ECN gives very dissimilar results. The data increase somewhat when one looks at the technical side (increased efficiency) but is still based on a transformation in electricity of still most of the renewable heat, in spite of the relatively low efficiency. • However, the biased situation, as described in 1.2.1., could have been completely reversed by an adaptation of the REB that benefit the waste incineration installations

		and by the installation of a workable system of tradable green certificates that may benefit renewable heat too. In this situation, which is economically speaking not very far, one might prefer to exploit the produced heat instead of optimising the installations for electricity production. Then and only then, the data would, already in 2010, show increased share of renewable heat in the renewable energy production.

Section 2 - Electricity markets - liberalisation and the role of different players		
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	Even when implementing the Directive no.96 in 3 phases, the extent of liberalisation of the electricity market may be said to be fast. The increase in speed of the second and third phases has been a mere signal of changing ideas with regard to the role of the market in electricity supply.
2.1.2	Timetable for market opening	• The current extent of market opening is 33 % (since 1998) and the 650 customers currently able to choose between suppliers are those with an annual use higher than 2 MW (first tier). • The timetable for the further opening of the electricity market is a second phase of 29%, with 54,350 customers (second tier: with a connection of 3x80 Amperes but a capacity less than 2MW), (advanced) in 2002. The third phase refers to the remaining 38%, with 6,720,000 customers (third tier: 760,000 business connections and almost 6,000,000 small-scale users), thus down to the level of individual households, (advanced) in 2004. It is as well to mention here that the situation is different for green power, and that all consumers of green electricity are already 'free' to choose their suppliers starting at the 1st of July 2001. • As the market opening is relatively recent, a comment on the low extent of customer switching would not be satisfactory. Most important to know is that the possibility of horizontal shopping already existed for large end users. While switching is expected to increase (when the second and the third tiers become free), the extent is expected to depend on ostensibly important limitations in the import capacity. At the moment, the direction of the border exchanges is well known: electricity import has increased from 12% in 1998 to 19% in 2000.

Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market	• Since the 1989 Electricity Law, supply and production companies were separated. Only then, tariff structures were introduced that allowed for price differences between the companies in both groups. At that moment, these electric utilities remained owned by local authorities at the municipal and the provincial level. • The four utilities that produced non-decentral electricity (for about 60% of Dutch electricity as Netherlands has a high decentral production) collaborated on the national level in the Dutch Electricity Generation Board (SEP). An attempt to transform the SEP into one national electricity production company that would be strong enough for the European market failed in 1998. As a result 3 of the 4 producers were taken over by international companies. The probability of re-integration of these separate businesses (into a horizontally-integrated business) is very small. • The majority of the shares of the fourth producer are owned by the biggest Dutch supplier; the result is a vertically-integrated state-owned electricity utility, but one that is broken up into separate generation / transmission / supply / distribution businesses. • Local distribution companies, which were about 70 in the late 1980s, have merged to 23 companies in 1998, and mergers have continued since then. Currently more than 95% of the market is served by 5 companies: Essent, Nuon, Eneco, Remu and Delta. • The extent of 'convergence' of companies – i.e. electricity sector companies merging activity with other businesses, such as gas, telecomm, other retailing etc. is not very important at the moment (a few mono-gas utilities still exist), but it is expected to increase quickly. It must be said that the Netherlands already has a tradition of multi-utility public companies. • The grid administrators are appointed under the Electricity Act 1998. The section Electricity Grid Administrators deals with matters relating to the management of the electricity grid and DTe (first the Dutch Electricity Regulatory Service but from 2001 on the Dutch Energy Regulatory Service), and provides services for and represents the interests of members. It is the central consultative body for grid administrators jointly appointed under the above-mentioned Act. The section develops proposals and decides on issues concerning the joint responsibilities of grid administrators. It represents the interests of members, particularly to DTe and during consultations on government policies that affect the position of grid administrators. The section supports members by providing services (jointly and for individual members), especially in relation to joint and individual statutory tasks of grid administrators, and by offering a platform for facilitating consultation and exchange of know-how between members. • Out of Sep a new organisation (TenneT) has been created in 2000. TenneT is responsible for the management of the high-voltage electricity transmission system (TSO). Middle- and low-voltage distribution networks will be operated by split-offs of the traditional distribution companies, and are regionally bounded.
2.2.2	Number, size and market	• Large-scale electricity generation and imports have covered two thirds of the Dutch electricity demand in recent years. This share has remained relatively constant. The increased demand is covered by a growth in decentralised capacity, especially from co-generation plants. The energy distributors control one part of this. Another part is

	share of players	managed by customers. The total installed production load in the Netherlands in 1998 amounted to more than 20,000 MW. The liberalisation of the electricity market has created a break in the distribution trend of volume generated. As said, the electricity imported from abroad has increased and as expected the growth in co-generation has decreased due to the somewhat lower electricity prices. As a matter of fact, the situation has become worse due to the high gas price from the end of 1999 on, and some (new) co-generation installations have closed their doors at the beginning of 2000. • Four generating companies have carried out the large-scale production of electricity in the Netherlands up to the end of the year 2000. These companies combined have about 60% of the market share (a market with a high percentage decentral production, namely almost 30%). Three of these companies are under foreign ownership or will be shortly. UNA has been taken over by Reliant from the U.S., and EZH by Preussen Elektra from Germany. Electrabel from Belgium will, together with ING, take over EPON. The energy distributor Essent is majority shareholder of the fourth generating company, EPZ. Essent is striving, together with EPZ, for a vertical integration with its distribution activities. The market share for decentralised capacity (almost 30%, but decreasing in 2001) consists largely of electricity generated from co-generation plants, which are owned by energy distributors and customers. • Two large energy (thus also electricity) distributors have arisen by way of mergers. Essent came originated from a merger between the Pnem/Mega-group with Edon and Nuon, which came from a merger including itself with ENW, Gamog, and EWR. Nuon and Essent are, in terms of number of connections, the largest energy distributor in both the gas and electricity markets. Eneco came out of a merger with six smaller energy distributors (Energie Delfland, Nutsbedrijf Amstelland, Zuid-Kennmerland utility, Gasbedrijf Midden Kennemerland, Gasbedrijf Noord-Oost Friesland and Nutsbedrijven Weert). This group of companies forms the third largest player in the Dutch energy market. Remu, the fourth player, has merged with GCN. The fifth player is Delta in Zeeland. • In terms of the size of its electricity supply in 1998, Essent, with a 37% share of the market, is the biggest player, followed by Nuon with 32%, the Eneco group with 15%, Delta with 7%, Remu with 5% and the remaining companies with 2%. • Before there was talk of liberalisation of the energy market, the number of distributors under the government's influence was already greatly reduced. The liberalisation process has accelerated their concentration in the Dutch energy market. However, Dutch energy distributors in a European context seem to have the disadvantage of a small internal market. Considering the rules currently employed by the NMa (the Dutch Competition Authority), there is ultimately only room in the Netherlands for three big, for Dutch standards, energy distributors. (The Competition Authority assessing the market positions in the relevant geographic market seems to wait until after the second tier to expand the frontiers.) On a European scale, however, these companies remain relatively small players, even if they would increase their profits by adapting a multi-utility strategy. A logical follow-up step would also be for Dutch energy distributors to orient themselves towards possible acquisitions or to seek foreign partners.
Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• In the international trade of electricity use is made of long-term, annual, monthly, weekly and spot (or 'day-ahead') contracts. The bulk of trade takes place via bilateral contracts (for a week and longer). Spot trade via bilateral contracts or the APX

		covers short-term surpluses and deficits. • Foreign providers try in different ways to join the Dutch energy market. To give three examples, Preussen Elektra has succeeded in contracting half of the power needs of the Dutch Railways (NS); the corporate contract between all Parenco's branches in Europe and RWE from Germany makes it clear what advantages of scale and internationalisation can provide; and Electrabel will provide electricity to sixteen branches of Philips in the Netherlands. Furthermore, just as a number of large-scale customers have done, it could be attractive for medium-sized free customers to buy energy together and establish a co-operative. The strong market position that would arise from the increase in volume will have an effect on the price and conditions that can be specified. Such a movement crystallises in the year 2001. • It is expected that companies which were previously inactive in the Dutch energy market now go there to focus on the consumer market: consumer organisations and housing corporations, supermarkets, banks and insurance companies. These organisations will exclusively serve as a marketing channel for the sale of energy. • In the Dutch energy market, meanwhile, there are also different brokers and agents who have had experience with the English and Scandinavian energy markets (for example, Prebon Energy and Bergen Energi Brokers). Trade in short-term contracts, in which brokers and agents play a role, increases in 2001, because the Protocol between electricity producers and energy distributors has terminated. And as the second tier of customers become free in January 2002, these customers can also make use of brokers and agents. • In the Dutch market, in addition to energy distributors, internationally-oriented companies such as Enron and Petroplus Power are also active as energy traders (purchasing energy for a relatively low price and then sells it for the highest price). Enron is particularly interested in trade with distributors, while Petroplus Power orients itself more towards industrial customers. Reliant has also opened its first European trade and sales office in the Netherlands and from there will trade UNA's production. • This all is partly made possible, and will further be enhanced, by the creation of The Amsterdam Power Exchange. This exchange was set up like the Scandinavian model, with no purchase obligations of electricity via the Exchange. And besides physical contracts, there is a role set aside for the APX to cover those types of risks that can arise when concluding physical contracts. Indeed, to reduce risks, the above-mentioned new traders will attempt to make use of financial trade products such as options and futures. The APX needs to take account of increasing competition. The founding of the European Energy Exchange in Frankfurt and an energy exchange in Paris could form a threat. A quick start for the German exchange, in particular, could slow the further growth of the APX. Meanwhile, the APX is in discussion with the European Energy Exchange about possible co-operation.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• The distribution of the total import capacity of 3,500 MW in 1998 is approximately 25% of the total demand for public supply (after Switzerland and Austria, the largest import capacity in Europe). With the gradual termination of the SEP import contracts with VEW, Preussen Elektra and EDF, the free import capacity has become even larger. • Until and including the year 2000 the Dutch energy sector had made agreements that the distribution companies would buy their electricity mainly from the producers, and the producers would deliver in the first place to the distribution companies. These agreements were known as 'The Protocol'. From 2001 on (the end of the Protocol) the wholesale market has become really free and volumes traded at the APX have increased substantially. The limits may, however, be physical. In the years 1998 to 2000, import capacity clearly formed an impediment in the free trade of electricity. This has resulted in the demand to expand capacity. TenneT will therefore expand the capacity by 2002 to 5,000 MW of which 4,700 MW will be available (300 MW being the UCTE-demanded security reserve).

		• Besides expanding capacity, it is also possible to reconsider the order of priority for the use of capacity. By allocating import capacity, TenneT applies the rule that long-term contracts (usually, over one year) have priority over short-term ones. Requests for transmission capacity need to be substantiated when considering contracts. For bilateral spot contracts, however, this is not the case. As a result, requests for spot capacity, as a precaution, are greater than are really necessary (so-called 'gaming'). In order to reduce the pressure on import capacity that results from 'gaming', TenneT has decided that a request for bilateral spot capacity may not exceed 250 MW. • The volume of (regulated and liberalised) electricity that has been traded in 1998 (respectively 1999) is 87460 (89975) GWh, as 11831 (11601) is auto-consumption that is not put on the grid. This is including the net import of 11814 (18440) GWh. • The distribution for 2000 is 1500 for SEP contracts, 300 MW reserved for exchange within the UCTE (the European joint coordinating body for generating and transporting electricity), 800 MW for annual contracts (with a serious shortage), and 900 MW awarded to spot contracts from the APX. • On average RE may make use of a higher fraction of short-term exchange (even if also bilateral) instead of long-term exchange, mainly due to some intrinsic difficulties to predict output in advance for sale on bilateral contracts.
2.4.2	Values	• Even based on voluntary participation, the exchange is expected to play an important role in price-making in the large-users market. At the APX, a spot market has developed for temporary surpluses and deficits. For the time being, the volume of energy traded at the APX appears too small to play this leading role. The price signals that have been given so far are also distorted by the limitation that the market experiences due to import restrictions and Protocol agreements. • In the liberalised market he transmission tariffs remain subject to regulatory processes (determined together with the DTe). For the year 2000, the transport tariffs are based on the costs in 1996. (For the subsequent years, the tariffs will be determined using the so-called CPI-x method, which means that the annual percentage of decrease in the transport tariffs is legally determined.) This encourages a more appropriate operational management among the grid managers. The difference between the realised and the 'required' efficiency improvement can, namely, be viewed as profit for the grid manager. • The market determines the price for the commodity, with the exception of the prices for the captive customers. The development of the average end-user price for electricity for households, excluding the VAT, has been from around the 19 cents guilders in the period 1985 to 1995, to around the 23 cents in the three years after. The development of the average end-user price for electricity for the industry, excluding the VAT, has been from around the 10 cents guilders in the period 1985 to 1995, to around the 12 cents in the three years after. How the level of the commodity prices will develop in the future is difficult to predict, seeing as they are dependent upon many vacillating factors. Electricity can, for example, be purchased in more than one way. As far as the contracts are concerned, the commodity price will usually be based on average production costs. On the spot market, the commodity price is equal to the marginal costs, at least if such phenomena as price dumping and strategic behaviour are not taken into account. The price on the spot market will vary per hour because the marginal costs for the producer of electricity are time-dependent. • In Energy Market Trends 2000 (ECN) the construction of the new end-user prices for electricity (the expected prices of 2000 together with assumed developments) is compared with the construction before liberalisation (the actual prices in 1998). (One of the assumptions for the new end-user prices is that all the consumers are free.) The prices before liberalisation have been divided into fuel, distribution, RTE and FT components. The prices after liberalisation

		have been sub-divided into fuel, trade margin and transmission components, as well as RTE and FT. A portion of the difference between the 'old' and the 'new' prices is caused by changes in the (higher) taxes and in the fuel prices and are, therefore, not the result of changes in the structure. The new electricity prices has indeed worked out to be higher than in the old situation for most consumers and lower for some others. The electricity prices will increase for the small-scale user, primarily because of the increase of the RTE. (The exemption for this taxe for the first 800 kWh is also not any more from Januari 2001.) The developments in the fuel component, the trade margin and, especially, the RTE will be the determining factors for the end-user prices of electricity for small-scale users. The RTE has increased to 12ct/kWh, as the government planned, and the share of the RTE has increased from approximately 17% in 1999 to 40% in 2001. The VAT level is also important for the energy prices for small-scale users. VAT is also levied on the RTE. The increase in the VAT to 20% and the above-mentioned RTE increase have together resulted in an increase in the total portion of the government tax in the end-user price from approximately 25% to 50%. Alongside of the uncertainty in both the fuel prices and the share of the imported electricity, the spread in the transport tariffs in the new situation is larger than the spread of the distribution component in the old situation. Therefore, the electricity prices for large-scale users could go either higher or lower. The influence of the RTE for most large-scale users is considerably smaller than for the small-scale users. For very large-scale consumers, the difference between the old and the new price is, for the most part, determined by the changing commodity price.
Section 2.5 - The green market		
2.5.1	Current	• Since 1995, energy utilities have been offering 'green electricity' to their customers, though under different names depending on the company. Since 1 January 1998 the so-called 'zero tariff' has applied to consumers of 'green' electricity. They do not have to pay the REB (see above: green trade values). This means that energy utilities can offer 'green' energy at prices that are barely higher than the prices for conventional energy. As the REB has grown within the three last years, this premium has become even smaller (i.e., the "premium" is really marginal but not negative) • However, the current ability of electricity consumers of all sizes to choose different offerings, specifically 'green electricity' tariffs, from suppliers is underprovided as it appears that the green market is supply-limited. To remove the bottlenecks on the supply side, the Dutch government has indicated a number of possible measures. It has the intention of abolishing the obligation to have a permit for solar energy installations in the built environment. Additionally, the permit procedure for wind turbines will be relaxed: once it is decided to grant a permit, no further objection can be raised. However, the current practice has not yet shown the effects of these announcements.
2.5.2	Future	• Market research (in 1999) suggests that 40 % of domestic consumers would be willing to pay slightly more for green energy. However, mainly due to a shortage in the green market (see later on: green labels), actual uptake has been limited to less than 1% in 2000. If demand really grows significantly, the green market will remain supply-limited, even after the obligation for green labels for the suppliers has stopped at the end of 2000. However, in 2001, many of the companies supplying green electricity to their customers have had projects installed abroad, where the permit procedures for example have proved to be quick enough. It is expected that more than half of the green electricity sold in the Dutch market in 2001 come from foreign sources. • A green image for energy utilities may be very important to capture a good starting

		position in the small-users market, because, at first, (1 July 2001) only 'green' consumers will be 'free' (non-captive), but then in 2004 all consumers will be. Not only Dutch companies will operate in this market. Foreign companies that already have a lot of renewable generating capacity from way back, and new (international) companies that are specialised in selling renewable energy, will also address themselves to the Dutch market, including small-scale users. Moreover, if Dutch companies may buy green power as part of their climate change strategy, interest in renewable energy could increase substantially. • Even when the volume of this market would not be important, the market for renewable energy will be colourful and diverse. Many green energy 'products' are already available in the Dutch market. There is both competition in terms of price and competition in terms of quality. Some companies have placed more expensive products in the market that is, as 'completely natural' as possible -- for example, one where use has only been made of solar, wind, water and tidal energy. Independent bodies, such as the World Wildlife Fund or a certification institute, such as Kema, ascribe quality labels to these products.

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• The target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 2008 – 2012 is 6% for the Netherlands. This represents something like 50 CO_2 Mton of which half is expected to be implemented with JI and CDM. Even when the country is likely to be a net importer of carbon credits, it will still be difficult to achieve the promised reductions (about the concrete implementation points, see “de uitvoeringsnota klimaatbeleid”, EZ, 1999). For example, replacement of coal with natural gas, which would mean an appreciable reduction in greenhouse gases, is not in the interest of electricity producers who must compete internationally. Just as well, in a liberal market, co-generation units face considerable competition from large-scale electricity generation. As a result, the contribution that co-generation makes to energy savings is decreasing, and compliance with international agreements regarding greenhouse gases is also.
3.1.2	Carbon emissions from the electricity sector	• Electricity generated in the Netherlands comes almost entirely from fossil fuels; nuclear and renewable energy together make up about only 5% of the total. This leads to a relatively high specific CO_2 emission per kWh of 0.6 kg CO_2/kWh. Total CO_2 emissions and CO_2 emissions from electricity production can also be given for 1998: 178 CO2 ton of which 28% (50 ton) for the generation of electricity (Emissies jaarverslag, 1999). The total CO_2 emissions for the previous years were (in Mton): 159 (1990), 165 (1991), 163, 166, 166, 172 (1995), 181 (top-year 1996), and 179, and 178 (still an estimation) for 1998. • The projections for 2010 are made depending on the same reference scenarios as used above (but in another document: “Nationale Milieuverkenningen 1997-2020, RIVM, 1997): Divided Europe (DE), Global Competition (GC), and European Coordination (EC). The total CO_2 (all sectors) are for DE 187 Mton, for GC 202, and for EC 210. In 2020, the same differences will subsist and become greater.
Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy***	• In the Netherlands, there has been some interest in renewable energy for several decades already. This interest originally arose

	target	from the idea that fossil fuel reserves are finite. Attention has shifted in the last few years to the prevention of environmentally harmful emissions, especially CO_2. Initially, political interest for renewable energy was especially expressed in the promotion of R&D activitities. Concrete implementation objectives came later. In spite of this, the share of renewable energy in the Netherlands' energy supply is marginal. It lies for years already at about 1%. According to current policy, the intention is to increase this share starting with 3% in the year 2000 to 5% in 2010 to 10% in 2020. This last objective corresponds, as an indication only, with a 17% share of the electricity supply being generated from renewable sources. It is not broken down by regions. And it is also not broken down into individual targets for different generation options or sources The target is by no means 'flat', as this would not correspond to the government's spirit. • The following options are not considered to be renewable in the Netherlands: non-organic waste and industrial heat pumps. (This last option is looked upon as efficient use of fossil fuels.) They will not be eligible for RE certificate consumption and will not benefit from governmental demand support. Large hydro (>10 MW) is not expected to be included in the definition of renewable (is furthermore not relevant for the Netherlands).
3.2.2	Renewable ***electricity*** target	• There has been the establishment of the 9% target in the context of the EU agreement. This target corresponds very closely to the 5% renewable energy target, which would imply 8.5% renewable electricity. The Ministry of Economic Affairs has adopted the 9% renewable electricity consumption target as the official target for 2010.
3.2.3	Renewable energy and electricity policy	• Based on experience, it appears that even if investments in renewable energy as a result of previously-mentioned stimulus measures are cost-effective, there are still important bottlenecks in providing a sufficient supply. Domestic sources of biomass do not all appear to be easily found to arrange contracts with, and biomass plants must comply with strict emission requirements. In the case of wind turbines and solar boilers, it is often difficult to get all the required placement permits. Application procedures often fail, especially at the local level. City councils are sometimes not willing to permit the placing of wind turbines and, if they do want to, protests are often made by a segment of the the people living in the neighbourhood or by nature organisations who fear the harmful effects on the local ecology. Recently, agreements were made with provincial governments regarding the placement of wind turbines, the effects of which still have to be seen. • To some extent, the government has been motivated to promote renewable energy / electricity by the Kyoto CO_2 targets. The target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 50 CO_2 Mton of which half is expected to be implemented with JI and CDM, will be achieved to some extent with renewable energy. The reduction of 4 CO_2 Mton will be due to this switch.
Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• Attention has been bestowed on renewable energy in both the new Electricity Act of 1998 and the Gas Bill. Therein, the government retains the right in both laws, if necessary, to mandate customers to use a certain minimum percentage of electricity and/or gas from renewable energy sources. • Fulfilment of this obligation could have been demonstrated by introducing (in January 2001) such an obligation in the planned system of tradable green certificates. But, it has not (yet) been the case (see later on). A simultaneous obligation for consumers to purchase a minimum amount of renewable energy is still under discussion. The Lower House declared that it supports an obligation. • However, for the time being, the ministry does not want to introduce any; but it announced that it would reconsider it in 2002. It wants anyway to focus on promoting the matter of voluntary demand (by

		increasing the RTE). The government finds freedom of choice to be better suited to a liberal market. It may be said that the government is not ready to place any obligation also because it would mean a significant lag to implement a renewable energy policy (see also section 4).
3.3.2	Taxation	• In the last few years, in the framework of 'greening' the tax system, a number of tax measures have been added that can also benefit the renewable energy sector: • In 1997, the Regulatory Energy Tax (REB), also well known as 'ecotax', was introduced. This tax is collected by the energy utilities and then passed on to the government. A payment of 4.27 ct/kWh must be given to the generator of renewable energy.
3.3.3	Voluntary demand (and taxation)	• Since 1995, energy utilities have been offering 'green energy' to their customers, though under different names depending on the company. Since 1997, the REB has increased considerably. (In the Energy Report presented by the the Ministry of Economic Affairs at the end of 1999, it was announced that this increase would continue in the coming years.) • Since 1 January 1998, the so-called 'zero tariff' has applied to consumers of 'green' energy. They do not have to pay the REB. This means that energy utilities can offer 'green' energy at prices that are barely higher than the prices for conventional energy. As the zero tariff is maintained, it signifies a substantial financial support for renewable energy. • At the moment, the preference appears to be for promoting voluntary demand by lowering prices. The advantages of this are that it is a clear, simple and transparent system. However, the size of the voluntary market is uncertain. As long as the zero tariff is combined with a high REB, there is a reasonable degree of certainty for potential investors. However, political uncertainty about this structure remains, and is also felt due to the European directives for state support, which proclaim that more environmentally benign products may not be made less expensive with subsidies. (They should remain, at most, equally expensive as the alternative). • One of the specific questions when focusing on tradable green certificates is how voluntary demand relates to an international market in green certificates. Other countries with green certificate systems and obligations will not be quick to accept Dutch certificates to fulfil their country's 'obligation'. There is, namely, no guarantee that extra renewable energy will then be generated in the Netherlands. Besides, confidence in voluntary demand does not satisfy the principle that 'the polluter must pay' (i.e., for those involved, there is no equitable burden distribution). An advantage of the price support of renewable consumption (instead of production) in combination with green certificates is that the international trade price of the certificates are not affected. The level of the price support is in fact the minimum price of the certificate. As long as this remains sufficiently under the market price, the certificate market will not be disturbed. Currently, however, this is happening because the price support is considerable (12.85 ct/kWh (zero tariff REB) and the 4.27 ct/kWh, which is above foreign markets for green electricity). The more famous, big disadvantage of a sizeable support via a price subsidy is that there is no incentive to reach the objectives while keeping the prices as low as possible, or to strive towards cost savings for the generating technology.
3.3.4	Direct subsidies	• There is in general no governmental price support per unit of renewable energy generated (except for the tax credit of 4,27 cent/kWh already mentioned) or per renewable energy certificate, nor in the form of a production subsidy neither in the form of a fixed feed-in price/ feed-in surplus for renewable energy. • There is no substantial governmental investment aid in the form of investment subsidies. However, there is an investment tax benefit (accelerated depreciation and tax deduction) for renewable energy production. Investments in renewable energy can profit from the regulation for accelerated depreciation (VAMIL), the energy investment deduction (EID), and can be financed from tax-free green funds.

3.3.5	Other support mechanisms	

Section 4 - Tradable Green Certificates developments		
Section		**Requirements**
Section 4.1 - policy and legislative background		
4.1.1	Policy support	• As said above, the Dutch government chooses for a voluntary system, since demand is no bottleneck at the moment. RE-demand is stimulated by the government through an exemption for the Ecotax (the RTE but 'REB' in Dutch), which is imposed on conventional energy use. On top of this, renewable energy production costs are lowered by fiscal advantages for generators. • The green certificate topic is very much under discussion in The Netherlands at the moment. Nevertheless it is possible to give an impression of likely developments.
4.1.2	Legislative framework	• In the electricity law of 1998 and in the gas law of 2000, the possibility for the government to implement a system of green certificates is incorporated. In the Energy rapport in October 1999, the Minister of Economic Affairs elaborate on how to implement such a green certificate system. • The "Regeling groencertificaten Electriciteitswet 1998" of 7 may 2001 organises further the details of the Tradable Green Certificates system in the Netherlands. It gives the various definitions, the required qualifications for certifications and the like. Certification is made easy (administrative only) but the installations are possibly controlled, quite often in the case of bio-mass renewable electricity. • The Dutch TGC system has been notified at DG-4 (competition rules) of the European Commission. See under point 3.2.1.
Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	• The system will be implemented in July 2001 together with the market opening for renewable energy. To some, the first design has been pragmatic and waiting for later adaptations as for example the possibility to import green certificates.
Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	The responsibilities for the Green Certificate system has been distributed by the Government among three (groups of) organisation. The main responsible party within the Government is the Ministry of Economic Affairs. But also the Ministry of Finance is involved.
4.3.2	Certificate 'issuing' authorities and executive bodies	• The grid operators will be responsible for adequate metering of renewable energy output. • Verification of this will be done by the Tax Service. • The TSO TenneT will act as the Central Monitoring Office, or as it is phrased in the Dutch situation, a 'certificate bank'. • Redemption is done by transferring the certificates to the certificate account of the Tax Service. The redeemed certificates are eligible, if they are redeemed together with showing contracts between suppliers and final customers of the sales of a corresponding amount of green electricity, for the REB tax breaks.

4.3.3	Trade registration / trade registrar	• Transfers of certificates will be registered by TenneT, the certificate bank. • The certificate trade price level is free. The Dutch government does not intend to set a specific lower or upper limit for the trade price. • There are no operational exchanges for renewable energy at the moment. The Amsterdam Power Exchange is in principle interested in renewable energy certificate trade and is preparing for it. APX is owned by TenneT. • There already has been a renewable energy broker (SKM) which traded green labels (the predecessor of renewable energy certificates in The Netherlands). Other brokers, like the London/New York company NatSource are also active on the Dutch market. • There are no futures for renewable energy certificates in The Netherlands yet. • There are no national or regional commercial trade registrars for renewable energy certificates yet, although several organisations have indicated that they are interested to play this role. So far, the regulation does not yet foresee the possibility of commercial trade registrars.
Section 4.4 - rules and scope of certification		
4.4.1	Scope	• The certificate system includes only renewable electricity, and no renewable gas or renewable heat. • Existing installations have also been incorporated in the certificate system. It is just a matter of definition of renewable sources.. • Auto production is not incorporated in the certificate system. It is not possible to predict when other than only grid connected systems will be incorporated, mainly because many practical (metering) problems have to be overcome. • There is no minimal supply level per year for generators. But, generators have to overcome the costs made for certification and the like. • Certificates will be valid until after one year that they have been issued.
4.4.2	Certificate information content	• All certificates issued under the national certificate system will have an individual and unique number identification. • Certificates will identify the Generator. • Certificates will identify the site of production. • Certificates will identify the unit of production • Certificates will identify the period of production. The reference period of production is expected to be one month. • Certificates will identify the related number of MWhs. 1 MWh is the minimum quantity per certificate. • Certificates will identify the type (source) of renewable energy. They will also differentiate the different sources of biomass. • Certificates will identify the production technology. • Certificates will identify the date of issuing. • Certificates will identify the date of realisation of production unit. • Certificates will not, at least they don't currently, identify the related CO_2-credits. • Certificates will not identify related governmental support. • Certificates will identify the period of validity of the certificate, but it is always one year, which probably has something to do with the clear relationship with the tax system.

Section 4.5 - trading and intervention		
4.5.2	International	• The Ministry decided to start with a national TGC system, which is therefore not open for foreign green certificates. This, of course, does not mean that import of green electricity is not possible any more; actually, import is expected to grow very quickly, this is needed to supply the growing demand for green electricity. The Dutch ministry estimated that it should first assess what these consequences would be before to include import in the green certificate system. What is even more in the eyes of the Ministry, is that the use of foreign green certificates would not mean the guarantee that additional generation of green electricity is installed, as there is no serious possibility to monitor foreign (green) power generation. • The Dutch government starts before summer 2001 to investigate internationalisation of its TGC system. It will not support/ allow international certificate trade under all conditions. Trade transactions will probably be subject to reciprocity clauses. Before the actual internationalisation, the national system still has to crystallise and obtain approbation of DG-4 (in principle).
Section 4.6 - Other information		
4.6.1	Other information	•

ANNEX 13

Country review - Norway

Prepared by PWCGlobal

<table>
<tr><th colspan="3">Section 1 - General and renewable energy - statistics</th></tr>
<tr><td colspan="2">Comments</td><td>It should be possible to complete this section quickly, on the basis of published statistics. In all cases please quote the source of statistics or projections of future demand.</td></tr>
<tr><td colspan="2">Section</td><td>Requirements</td></tr>
<tr><td colspan="3">Section 1.1 - General energy supply and demand statistics Source: Statistics Norway</td></tr>
<tr><td>1.1.1</td><td>Total primary energy consumption</td><td>• 805 PJ/yr (1998)
• 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
695 700 700 715 725 740 775 780 805 815
• Data not available. Projections in the Norwegian Public Study NOU 1998:11 indicate variations between 140 and 173 TWh (four scenarios) for stationary energy consumption in 2020.
• Units - PJ/year for absolute consumption, and MJ / capita / year for specific consumption</td></tr>
<tr><td>1.1.2</td><td>Of which, total electricity consumption</td><td>• 120,4 TWh/yr (1998)
• 1990 1991 1992 1993 1994 1995 1996 1997 1998
97,7 100,0 100,5 101,9 102,9 104,9 104,1 n.a. netto
105,9 108,2 108,7 112,2 113,1 116,4 113,7 115,4 120,4 brutto
• Projections to 2020 based on NOU 1998:11 (four scenarios):
Business as usual The long way up Climate threath Green brain power
2005 139,3 147,9 121,6 124,7
2010 128,0 124,3 119,4 113,2
2020 123,1 118,4 113,4 102,3
• Units – TWh/year for absolute consumption, and MWh / capita / year for specific consumption</td></tr>
<tr><td>1.1.3</td><td>Total primary energy production</td><td>• 8853 PJ/yr (1998)
• 1990 1991 1992 1993 1994 1995 1996 1997 1998
5146 5603 6241 6529 7230 7748 8787 9086 8853
• Units - PJ/year for absolute production, and MJ / capita / year for specific production</td></tr>
<tr><td>1.1.4</td><td>Total electricity production</td><td>• 117 TWh/yr (1998), close to 100% large hydro power
• 1990 1991 1992 1993 1994 1995 1996 1997 1998
121,8 111,0 117,5 120,1 113,2 123,0 104,7 n.a. 117
• Distinguish fuel sources (if statistics allow, use: coal, oil, natural gas, nuclear, large hydro, renewables)
• Units – TWh/year for absolute production, and MWh / capita / year for specific production</td></tr>
</table>

Section 1.2 - Renewable energy supply and demand statistics Source: Statistics Norway		
1.2.1	Total production of renewable ***energy***	• 543 PJ/yr (1998) • The total production of renewable energy will almost be identical to the total production of electricity (large hydro power). Additional renewable energy from biomass (51 PJ in 1998), but statistics for 1990-97 are not available. • Approximate technical potential: Wind power 12 TWh Biomass 30 TWh Source: Norwegian Energy Agency Potential to be realised with electricity price up to Euro 0,085: Wind power 6 TWh Biomass 22 TWh Solar energy 8 TWh Geothermic 0,1 TWh Ocean waves 0,5 TWh Hydrogen 10-12 TWh Source: NOU 1998:11 Market potential will depend on support scemes from the Government and the development of a European market for renewables.
1.2.2	Total production / consumption of renewable ***electricity***	• 117/120,4 = 0,97 (1998) – brutto included losses, close to 100% large hydro power • <u>1990 1991 1992 1993 1994 1995 1996 1997 1998</u> 1,25 1,11 1,17 1,18 1,10 1,17 1,00 n.a. n.a. netto 1,15 1,03 1,08 1,07 1,00 1,06 0,92 n.a. 0,97 brutto • Technical potential and market potential is described above • Units – TWh/year for consumption / production, also quote installed capacity of renewable electricity generation plant (MWe) if available, and MWh/capita/year for specific production

Section 2 - Electricity markets - liberalisation and the role of different players	
Comments	This section requires some commentary and interpretation. The intention of this section is to present renewable electricity in the context of the current and future electricity market. Of particular importance is the ability of individual (ie, commercial and domestic) consumers to choose supplier, and the existence and success of any voluntary green tariffs. We are looking for brief explanations only, focusing on just the most important points.

Section		Requirements
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	The Norwegian electricity market was deregulated in 1991. A power exchange market with Sweden was established, and a Nordic electricity market with NordPool as a market place was developed.
2.1.2	Timetable for market opening	• All Norwegian consumers, including individual households, can freely choose electricity suppliers. The market is fully opened. • In Norway 200-250.000 of the customers, or 12 %, has switched from one supplier to another. The switching is not expected to increase so much.
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market	• Vertically-integrated state-owned electricity utilities have to a certain extent been broken up into separate generation / transmission / supply / distribution businesses. The 340 electricity utilities are currently owned 57% of the municipalities or the counties, while 30% are state-owned and only 13% private owned. 158 of those 340 are generating electricity. The distribution of the utilities into generation/ transmission/ supply/ distribution can be summed up like this: - Generation 24 - Generation/ transmission 22 - Generation/supply 28 - Supply 71 - Supply/transmission 57 - Transmission 54 - Generation/transmission/supply 84 The central transmission is state-owned. • Activities take place in Norway where separate businesses are tending to re-form into vertically integrated or horizontal-integrated businesses. • There are examples where electricity sector companies are merging with other businesses, such as gas, telecomms, other retailing etc. They are offering energy instead of oil or electricity. The smarthouse concept is one of the drivers.
2.2.2	Number, size and market share of players	• Number of actors, size and market share (Ministry of oil and energy 1999): - Generation 158 The ten biggest: Statkraft SF 33828 GWh (30,4%) 8736 MW (32,0%) Hydro Energi AS 8000 GWh (n.a.) 2000 MW (n.a.) Oslo Energi AS 6912 GWh (6,2%) 2098 MW (7,7%) BKK AS 5911 GWh (5,3%) 1500 MW (5,5%) Lyse Energi AS 5061 GWh (5,4%) 1484 MW (5,4%) Trondheim Energi 2922 GWh (2,6%) 725 MW (2,7%) Hafslund ASA 2653 GWh (2,4%) 545 MW (2,0%) Vest-Agder Energi 2547 GWh (2,3%) 614 MW (2,2%) Opplandskraft 2462 GWh (2,2%) 522 MW (1,9%)

		SKK AS 2432 GWh (2,2%) 581 MW (2,1%) - Transmission 217 Eight biggest: Viken 303726 customers 8552 GWh BKK 128719 " 3349 GWh Østfold Energi 8642 " 2144 GWh Trondheim Energi 83119 " 2216 GWh Nord-Trøndelag E-verk 74412 " 1991 GWh Asker/Bærum Nett 72183 " 2282 GWh Troms Kraft Nett 60439 " 1947 GWh Vest-Agder E-verk 57402 " 1353 GWh - Suppliers 240 - Brokers 21 • Over the next ten years (to 2010) a large amount of mergers and take-overs is expected, leading to a small number of actors in each sector, each part of the country and even a small number of actors in the whole industry.

Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• There is a Nordic market for electricity on spot, and also a bilateral market facilitated by power exchanges. NordPool and Scandinavian Power Brokers (SKM) are the dominating actors. The volume of financial derivates is about 3 times larger than the psysical trading. There is no discrimination of renewable electricity generators currently except for the differencies in the taxation system between the Nordic countries. Both NordPool and SKM are paying interest to facilitate power exchange for certified renewable electricity. It is a discussion about divorcing certificates from large hydro power from new renewable energy sources. How is the market for physical electricity can be expected to evolve will depend on the further integration of the Nordic Market into an European market. A sharpened competion between the Nordic power exchanges and other European power exchanges can be expected.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• About 25% of the Nordic volume of electricity are presently traded on spot at NordPool. The rest is bilateral trading. In addition there is trading with financial derivates (3 times larger). • The volume of renewable electricity traded in the Nordic market is about 1000TWh.
2.4.2	Values	• The value of electricity traded can be estimated to the range Euro 15-40/ TWh. • Estimates of future prices of bulk electricity (all renewable) for spot, bilateral and financial, daily prices from NordPool are valid (www.nordpool.com)

Section 2.5 - The green market		
2.5.1	Current	• All electricity consumers of all sizes are free to choose different offerings from suppliers, but because of the dominating hydro power production, there are not so much demand for other kind of renewable energy. • Wind power and eco-labelled (Bra miljöval) electricity is offered. In the criteria of Swedish eco label Bra Miljöval only electricity from hydro power plant built before 1996 can be given liscense (certificate). There are no national standards. The criteria are defined from the Swedish Society for Preservation of the Nature. • The take-up by consumers is in a very small scale. To the households 70000 kWh is sold as wind power (not certified) and ca 50000 kWh as “environmental electricity” (certified by “Bra miljöval”). • The marketing has not been strong. One of the suppliers has been critizised for eco -labelling hydro power without documentation of the difference to the rest of the electricity production in Norway. They also marketed that their production was eco-labelled. The consumers were more interested in the electricity they were selling. The market is currently demand-limited. • The suppliers are charging a premium of less than 0,1 cent/kWh for “Bra miljöval” electricity and 0,6 cent/kWh for wind power. • Two Norwegian suppliers offer 'green' tariffs to individual households. In addition six suppliers have certfied power plants from “Bra milöval” and are capable to offer green tariffs to engros customers in other countries.
2.5.2	Future	• The growth of the voluntary green market segment (number of consumers, volume of electricity, monetary value of the market) can be expected to be very little. No studies about this are known.

Section 3 - Energy and environment policy – legislation and targets for renewable energy		
Comments		The purpose of this section is to understand the current and planned policy environment for renewable electricity. It will be necessary to provide a commentary to many of the answers, though some (such as information on targets) can be single number answers only. Comments and interpretation should be brief.
Section		**Requirements**
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• Increase of 1% in CO_2 equivalent emissions by the Kyoto compliance period, 2008 – 2012, related to the 1990 emissions. • Norway is facing great problems in achieving the target by the Kyoto period. Projections indicate that the emissions will increase 13 % by 2010 (Statistics Norway). It is likely that Norway will be a net importer carbon credits.
3.1.2	Carbon emissions from the electricity	• There are no carbon emissions from the electricity sector.

	sector	

Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	• In the Report to the Storting number 29 (1998-99) some quantitative targets are outlined. Quantitative targets are set for wind power and heating using water. Within 2010 the energy consumption by heating water should grow to 4 TWh/ year in the country as whole.
3.2.2	Renewable ***electricity*** target	• Within 2010 the electricity production of wind power shall exceed 3 TWh/ year.
3.2.3	Renewable energy and electricity policy	Stortinget (the parliament) discussed "Report to the Storting number 29 (1998-99) this winter where the overall renewable energy and electricity policies in reality was settled. Norway is no longer supposed to be self-sufficient with electricity from renewable sources. The majority in the Storting welcomes gas-fired power plants to keep a balance between supply and demand of electricity. Introduction of gas-fired power plants is a hot political issue. Waterbased heating systems should be more used instead of electricity. The saving of energy will be organised by establishing of a new body. New renewable energy sources like wind and bioenergy will be stimulated, but their market share is still expected to be small. Due to the dominance of large hydro power the motivation for the energy politics is more the lack of remaining waterfalls than the Kyoto CO2 targets. If gas-fired power plants are built the Norwegian CO2 emissions will increase. A justification for the gas power is the need of an industrial development. Gas-fired power plants will increase the value of natural gas related to export. In the international negotiations about following-up of the Climate Change Convention Norway has been a spokesman for using emission trading, joint implementation and clean development mechanism to achieve the targets in the Kyoto protocol in a cost-effective way. In December 1999 the Public Commission on Emission Trading presented a report to the Government, and Norway is likely to start emisson trading in 2005 in line with the starting up of the EU market.

Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• There are no obligations for renewables in Norway. But there are targets for the electricity production from new renewable energy sources. Quantitative target is only set for wind power (3TWh/ year). • There is competition between market players. • There are no penalties in force for non-compliance.
3.3.2	Taxation	• The following renewable energy sources are excempted from investment tax: Wind power, bioenergy, micro and mini hydro power, tide water. • In addition the electricity tax is only 50%.

3.3.3	Voluntary demand	• The voluntary demand for new renewable energy is negliable. • The environmental non-governmental organisations recommend new renewable energy sources, but there are local resistance to most of the wind mills projects. • Consumers have problems to understand why they should pay more for environmental friendly renewable electricity. The official policy is to use green taxes. Thus the use of clean energy sources should have lower taxes than the use of electricity from energy sources with severe environmental impact.

3.3.4	Direct subsidies	• Subsidies are given on investment cost for renewable generation plant • The generation of wind power recieves financial support to the investment and to the generation. The financial support is in the range 5-35/40%, most of the projects between 15 and 25%, with an average of 20%. Financial support to investments are also given to bioenergy, heating pumps, biogas, and electricity generation from larger installations of sun cells. • The Norwgian Energy Agency is responsible for paying the subsidies. The task will be transmitted to a new independent body. • Investing companies has to apply the Energy Agency, and the projects are considered individually.
3.3.5	Other support mechanisms	

Section 4 - Tradable Green Certificates developments		
Section 4.1 - policy and legislative background		
4.1.1	Policy support	• The current energy, renewable energy and environment policy in Norway does not support the use of renewable energy certificates, or certificates of origin of renewable electricity generation. But the Ministry of Oil and Energy has shown a growing interest in the issue. • The certificate trading is not disallowed in the context of the current policy mechanisms. The Ministry of Oil and Energy is playing a role as observateur in RECS.
4.1.2	Legislative framework	• Renewable energy (or electricity) certificate trading systems is not required by law. However the Norwegian Parliament (Stortinget) has asked the government to deliberate the proposal of that all energy producers are obliged to sell a certain amount of renewable energy by the year 2010. There were no signals from the government when an obligatory system for TGC will be implemented. • The definition of renewables is not agreed upon. Many suppliers wish to include large hydro power, some of them even gas generated electricity. The discussion about waste combustion will surely show up.

Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	• The Association of Energy Suppliers (EnFo) has together with utilities companies (among others Hydro Energy), traders and issuing bodies taken an initiative to start a voluntary pilot certified renewable energy trading system in Norway within the RECS project. It is likely that the system can start up within this year.

Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	• In the pilot project is not defined any arrangements for regulation and control, but for the purpose of a test phase all necessary arrangements have been made. The pilot project will make it visible what kind of national measures are needed, and a body og accreditation will be proposed. Experiences achieved through the pilot project will make Norway well prepared for an international trading with certified renewable energy. • In the future the regulation and control will probably be taken care of international bodies.
4.3.2	Certificate 'issuing' authorities and executive bodies	• In the pilot project the certification and the issuing of certificates will be provided of Det norske Veritas (DnV) or another body. DnV has no legal status, but is very reputed as certification body.
4.3.3	Trade registration / trade registrar	• In the pilot project NordPool will have the responsibility for the trading. NordPool was the first market place for electricity in Europe.

4.3.4	Certificate 'issuing' authorities and executive bodies	• DnV or another body will be the certificate issuing authority and executive body in the pilot project.
Section 4.4 - rules and scope of certification		
4.4.1	Scope	• The pilot project will have focus on new renewable energy sources and small hydro power. The use of large hydro power will be limited.
4.4.2	Certificate information content	• The information content of certificates is not yet defined

Section 4.5 - trading and intervention		
4.5.1	National	• Details about the framework of the trading are not decided on.
4.5.2	International	• Rules for international certificate trading is not yet settled.
Section 4.6 - Other information		
4.6.1	Other information	

ANNEX 14

RECerT Country review - Portugal

Prepared by

TEE-Consult

Section 1 - General and renewable energy – statistics

Section 1.1 - General energy supply and demand statistics

1.1.1 Total primary energy consumption

	1990	1991	1992	1993	1994	1995	1996
Total primary energy consumption (Mtoe)	17.2 * 16.4 #	16.6 #	18.73 * 17.8 #	18.38 * 17.5 #	18.98 * 18.1 #	19.1 #	18.9 #
toe/inhab.	1.74 *		1.9 *	1.86 *	1.92 *		

* Source: DG XVII 1996 Annual Energy review
# Source: DGE

	1990	1991	1992	1993	1994	1995	1996
Total electricity production (TWh)	28.49 *		30.08 *	31.20 *	31.37 *	31.80 #	33.35 #
nuclear	0	0	0	0	0		
Hydro & wind *	9.3		5.08	8.75	10.72		
Thermal *	19.19		25	22.45	20.66		

* Source: DG XVII 1996 Annual Energy review
# Source: DGE

Section 1.2 - Renewable energy supply and demand statistics

1.2.1 Total production of renewable ***energy***

- Quote most recently available year, (probably 1998)
- Historical information - go back to 1990 (use annual statistics if available)
- Do not distinguish between energy sources
- Approximate technical potential (ie theoretical maximum without institutional or market constraints) and market potential (ie realistic potential taking into account market and institutional constraints) for production of renewable energy. Make comments on whether these potentials are likely to change through time. Use and quote as many sources or studies as possible to back up these potentials.
- Units - PJ/year for absolute, MJ/capita/year for specific

1.2.2 Total production / consumption of renewable ***electricity***

- Quote most recently available year, (probably 1998)

- Distinguish fuel sources (if statistics allow, use: on-shore wind, off-shore wind, tidal power, wave power, biomass (all forms), solar (to include solar thermal electric generation and PV), geothermal, small hydro (<10MW), large hydro (>10MW), wastes (include all wastes in this category)
- Historical information - go back to 1990 (use annual statistics if available)
- Approximate technical potential (ie theoretical maximum without institutional or market constraints) and market potential (ie realistic potential taking into account market and institutional constraints) for production of renewable electricity. Make comments on whether these potentials are likely to change through time. Use and quote as many sources or studies as possible to back up these potentials.
- Units - TWh/year for consumption / production, also quote installed capacity of renewable electricity generation plant (MWe) if available, and MWh/capita/year for specific production

Estimate of renewable energy capacity and energy production, 1996

	Large Hydro	Small hydro	Geothermal	Biomass	Solar thermal	Wind
Number of installations			-		300,000 m^2 #	13 wind farms
Electrical installed capacity (MW_e/MW_t)	4,428	240	13			49
Electricity generation (TWh)	14.761	0.52	-		-	0.137
Annual heat output	-	-	-	900 ktoe		-

# of which ~33% are out of order

Small hydro

In 1996, all hydro plant generated 14.76 TWh of electricity, 43% of all generation. Total hydropower production (including small hydro) varies from 5.6 to 15.8 TWh/year, depending on the weather conditions. The average production is 10.8 TWh/year, corresponding to a contribution of about 6% in the final energy balance.

The installed capacity for hydro rose from 2,516 MW in 1980 to 4,428 MW in 1996 of which the contribution from small hydro was estimated at 240 MW in 1996. There was a significant expansion over the 1990s in small hydro (40 plants have been built between 1990 and 1997). The adoption of the law on independent power production together with the implementation of the VALOREN program was responsible for this market boom.

The additional potential for small hydro capacity is estimated at approximately 100 MW by 2000 and an additional 250 MW above that in the longer term. Total hydro capacity is forecast to increase to 5,489 MW by 2010. Deliveries to the grid from

independent hydropower producers increased from 336 GWh in 1995 to 520 GWh in 1996.

Solar Thermal Heating

Solar energy is a major renewable energy resource in Portugal. Solar energy varies from 1500 to 1900 kWh/m^2/year and the number of hours of sun varies from 2400 to 3100 hours per year. Solar radiation is about equivalent to that of Greece.

The solar thermal market in Portugal is still underdeveloped and Portugal's Energy Department (DGE) estimated that at the end of 1996, the installed (working) capacity was approximately 200,000 m². A major constraint to its development is the relative cost of the technology in comparison with either gas or electrical equipment - the payback time varies between 3 years (electric boiler alternative) and 6 years (gas boiler alternative).

There has also been a loss of credibility for this technology, caused by installations, which were badly set up during a period of massive expansion in the 1980s. This market boom, which led to low quality control, was aided by fiscal incentives.

Photovoltaics

Approximately 98% of dwellings are connected to the grid. Consequently, the market for rural electrification in the domestic sector remains small. However, some rural electrification projects (~417 kW_p) have been developed as demonstration plant. The major market potential for PV systems is for telecommunications.

Biomass

Biomass is by far the largest source of renewable energy in Portugal, with an energy supply of 1.1 Mtoe in 1996. This accounted for 5.7% of total primary energy supply. The vast majority of this (87%) was used in the residential sector in rural areas (wood), or in the industrial sector (wood wastes). The remainder was used to generate 960 GWh of electricity, produced solely from CHP plant. With the improvement of the living standards and the consumer's preference for "modern" gas and electric appliances, this use is decreasing very quickly in the residential sector.

Biomass electricity production has increased rapidly over the last few years, up 39% since 1990. This is largely due to incentives available for CHP partially fired by biomass. Biomass electricity generation is likely to continue to increase in the short term, given the continuation of the incentives. There is also a 10 MW electricity plant using forest residues under construction.

Some public transport fleets are currently being supplied with biodiesel (Lisbon and Évora) and a small biodiesel plant is under construction, with a capacity of production of 5,000 litres per day.

Municipal Solid Waste and Biogas

The potential for biogas production for energy purposes is increasing every year. An increasing number of houses are being connected to the waste water treatment plant (ETAR system), and an increasing number of ETARs are recovering biogas for

energy production. In parallel with these waste treatment improvements, increasing volumes of solid waste are being sent to controlled landfills, as opposed to alternative methods of waste dumping. Consequently, the landfill gas potential is also increasing significantly.

The total potential of production of biogas in the agriculture and agro-food sectors has been estimated at 2.5 million m^3 per day. More than 50% of the manure produced in Portugal could also be used for biogas production, depending on the type of exploitation (cow-shed, pasture), against current use close to zero.

Wind energy

Despite its large Atlantic coastline, Portugal has a relatively poor wind resource compared with countries such as the United Kingdom and Ireland. However, there is still plenty of scope for significant wind developments in the country, which has encouraged increasing several developments over the last few years.

Wind capacity had risen from 2.1 MW in 1990 to 51 MW in 1998. The potential total capacity has been estimated at 400 MW, although this reduces to 240 MW and approximately 2% of total electricity generation if siting and other environmental restrictions are taken into account.

Current regulations favour wind farms of less than 10 MW capacity, which means that none of the planned sites are larger than this size. This regulation has ultimately slowed down the take-up for wind power as more economic larger wind farms have not been exploited. However, without this regulation, it is unlikely that many sites would have been developed at all.

Geothermal

There are some low enthalpy geothermal resources in Lisbon, on the north of Lisbon and in the Trás-os-Montes region (north-east Portugal). In Chaves, water gets to the surface at 75°C. A project was developed for the Lisbon Air Force Hospital in 1992, with an estimated payback time of 10 years.

The Azores Islands, with some active volcanic areas, concentrate most of the high enthalpy geothermal resource. A geothermal power plant installed in the São Miguel Island (Ribeira Grande) with a total capacity of 13 MW produces 50% of the island's electricity consumption. Generation was 49 GWh in 1996, up from 4 GWh in 1990.

Wave energy

An on shore project developed by the INETI/IST in the Azores (Ilha do Pico) will soon be operational. The turbine (Wells type) will have a capacity of 400 kW_e and is expected to produce around 1 GWh/year.

Section 2 - Electricity markets - liberalisation and the role of different players

Section 2.1 - Electricity market liberalisation

2.1.1 Liberalisation general comments

The Directive requires Member States to open up 26,48% of their electricity market to competition on February 1999 and 33% on February 2003. Portugal has chosen to limit the opening to the minimum of 26,48% and is not planning to go further than the 33% required by the Directive.

2.1.2 Timetable for market opening

- What is the current extent of market opening - which categories of customer are currently able to choose between suppliers?
- What is the timetable (if relevant) for the opening of the whole electricity market, down to the level of individual households
- For markets that have already opened, what is the extent of customer switching that has already taken place (ie, customers switching from a traditional to a new supplier)? How far is the switching expected to continue? NOT RELEVANT

Since January 2000 consumers with electricity consumption higher than 20 GWh are free to choose their power supplier in any of the EU Member States. This is one of the major results of the application of the EEC directive 96/92/CE that establishes rules for the internal market of electricity. By January 2001 this limit will be reduced to 9 GWh. In Portugal this represents 189 consumers totalling 25% of the total electricity consumption.

Section 2.2 - Number of players, their size and market share

2.2.1 Extent of dis-aggregation (unbundling) of the electricity market

- Have vertically-integrated state-owned electricity utilities been broken up into separate generation / transmission / supply / distribution businesses?

The energy industry in Portugal has a long way to go in the process of liberalisation, as the market is still dominated by one vertically integrated monopoly, Electricidade de Portugal (EDP). The company was split into divisions in 1994 to create 19 more discrete companies operating on a more commercial basis across generation transmission and distribution, but still under the umbrella of the EDP group. This change in the structure of EDP has enabled the introduction of a number of IPP's and auto-generators into the market and this has been growing quite rapidly. The market is however still dominated by the EDP group and in 1998 their market share was 85%.

At present the whole system has been divided into 2 sectors: the Public Electrical System created through the scission of EDP (SEP – Sistema Eléctrico de Serviço Público) and the Independent Electrical System (SEI – Sistema Eléctrico Independente) with the following structures:

SEP	*Company name*	Installed capacity
Power production	CPPE (member of EDP group) Tejo Energia Turbogás	6.495 MW 584 MW 990 MW
Transport	REN (member of EDP group)	
Distribution	North: EN (member of EDP group) Centre: CENEL (member of EDP group) Lisbon area: LTE (member of EDP group) South: SLE (member of EDP group)	

SEI – Sistema Eléctrico Independente		
SENV - Sistema Eléctrico Não Vinculado	Productores Independentes (Independent power producers)	
	renewables	cogeneration

- For countries that have broken up state-controlled assets, what is the extent of re-integration of separate businesses? (ie, are separate businesses tending to re-form into vertically integrated or horizontally-integrated businesses?) NOT RELEVANT
- What is the extent of 'convergence' of companies - ie electricity sector companies merging activity with other businesses, such as gas, telecomms, other retailing etc.

The EDP group together with the GDP (Gás de Portugal) group has joined a consortium to create a new telecommunication company called ONI to take advantage of the recent market liberalisation.

2.2.2 Number, size and market share of players

- What is the current composition (number of actors, size, market share) of the electricity market, in each business area (ie, generation, transmission, supply and distribution)

See point 2.2.1

- What trends are seen over the next ten years (to 2010) in the evolution of the market? - ie is there an expectation that mergers and take-overs will dominate the sector, leading to a small number of actors in each sector, or even a small number of actors in the whole industry?

No change is expected in the current market structure over the next ten years.

Section 2.3 - Electricity trading arrangements

2.3.1 Electricity trading

- Briefly describe the current and future arrangements for electricity trading. For example, will there be a single pool system, or will there be a bilateral market facilitated by one or more power exchanges? Is the market limited to the country concerned, or is it an international market?

There is a single pool system in Portugal controlled by ERSE (Entidade Reguladora do Sector Eléctrico).

- Specifically, comment on the requirement on renewable electricity generators - will they be disadvantaged in any way under the current or proposed trading arrangements?

The regulation adopted in September 1998 introduced the following changes:

- **commercial bounds between SEP companies (created through the scission of EDP) are submitted to transparent and of public knowledge rules.**
- **contracts are established between the Rede Nacional de Transporte (Electricity Transport Grid) and independent power producers to guarantee the supplies. These contracts are particularly relevant at a stage in which total number of power producers is relatively small and consequently the risks of unavailability of the supplies is important.**
- the legal framework related to the connection to the grid is simplified and admits the possibility for the consumer to build by himself the section that will be of his exclusive use. The mechanisms of supply of the required information by the independent producer are formalised and published in the “Acordo de Aceso às Redes” (Grid Access Agreement).
- The bounds between SEP and SENV, the power sector and foreign actors are defined together with the role of the new agents of the Rede Nacional de Transporte.
- The market is re-organised through a system of supplies and bilateral contracts.

- How is the market for physical electricity expected to evolve through time
- Give any further relevant details
- Leave any discussion of 'green certificate' systems to section 4

Section 2.4 - Market volumes and values

2.4.1 Volumes

- If the information is available, briefly indicate what volumes of electricity are presently traded under each element of the market (for example, if a pool system, what fraction of trades are 'on-market' and what fraction 'off-market'). NOT AVAILABLE

- Indicate what volume of electricity is traded in the regulated (ie, un-liberalised) market and the unregulated (ie, liberalised) market. NOT AVAILABLE
- If available, indicate the volume of renewable electricity that is traded across different elements of the market. Distinguish between the regulated and unregulated market. Units - GWh / year or TWh / year. NOT AVAILABLE

2.4.2 Values

- If the information is available, briefly indicate the value (Euros) of electricity traded. Where possible, distinguish between the unregulated and regulated markets, and distinguish between different trading routes (ie bilateral contracts, pool, etc). NOT AVAILABLE
- Provide estimates of future prices of bulk electricity, and quote the sources of these estimates. NOT AVAILABLE
- If available, indicate the value of renewable electricity traded in each part of the market (ie regulated and unregulated markets). NOT AVAILABLE
- Give any further relevant details

Units - millions Euro

Section 2.5 - The green market

2.5.1 Current

- Indicate the current ability of electricity consumers of all sizes to choose different offerings, specifically 'green electricity' tariffs, from suppliers NOT RELEVANT
- Where such offerings exist, what types of generation are included in the tariff, and what are excluded. Are there any national 'standards' or similar means of ensuring quality for consumers? NOT RELEVANT
- Where such offerings exist, what has been the scale of take-up by consumers? What volume of electricity is sold on green tariffs? (units - GWh / year or similar) NOT RELEVANT
- How strongly have these offerings been marketed by suppliers? Is the market currently supply-limited or demand-limited? NOT RELEVANT
- What premiums, if any, are charged by suppliers for 'green' tariffs? (units - euros / MWh or euro cents / kWh) NOT RELEVANT
- How many suppliers offer such 'green' tariffs? NOT RELEVANT

Give any further relevant details, but note that specific government support for green tariffs is covered in section 4 below.

2.5.2 Future

- Where market opening is not yet complete, indicate the interest that consumers are likely to show in choosing between suppliers, and specifically choosing green

tariff offerings. What evidence is there of consumers' interest in renewable electricity?

As shown in point 2.1.1 in February 2003 Portugal will not open up more than 33% of its electricity market to competition. Households and many SMEs will not choose freely their electricity supplier. In what concerns those who will be given the choice there is no indication at all that there is an interest in renewable electricity.

- Indicate projections for the growth of the voluntary green market segment (number of consumers, volume of electricity, monetary value of the market), and quote the sources of these projections.

Section 3 - Energy and environment policy - legislation and targets for renewable energy

Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector

3.1.1 Kyoto target

- Target for percentage reduction in CO_2 equivalent emissions by the Kyoto compliance period, 2008 – 2012

Portugal is a signatory to the Kyoto Protocol under the UNFCCC and as a result of the Kyoto negotiations has been given permission to increase greenhouse gas emissions by 27% on 1990 levels during the commitment period 2008-2012. This allocation was granted as a measure towards progressive development and will obviously lead to an increase in fossil fuel use. Unlike many other EU countries, the reduction of greenhouse gas emissions is therefore not a major policy driver for renewable energy. The introduction of natural gas fired power plants will certainly aid in meeting this commitment, however this alone may not be enough due to the rate of growth in energy demand.

- Comment on the 'achievability' of this target, and whether the country is likely to be a net importer or exporter of carbon credits.

3.1.2 Carbon emissions from the electricity sector

- Quote most recently available year, (probably 1998) NOT AVAILABLE
- Historical information - back to 1990 (use annual statistics if available) NOT AVAILABLE

- Projections - to 2010 (please use as many sources / studies as possible, and comment on the range of projections) NOT AVAILABLE
- Units - quote both absolute (Tonnes CO_2 / year) and specific (Tonnes CO_2 / TWh) as appropriate NOT AVAILABLE

Section 3.2 - Renewable energy policy, targets and timetables

3.2.1 Renewable ***energy*** target

- If targets are set only for electricity, and not for energy, leave this section blank
- Target dates and levels for renewable energy (eg, 2003, 2010 etc). Go as far in the future as targets have been set (do not stop at a 2010 target)

In the past few years there have been a number of targets imposed upon the renewable energy market. There has however been no specific measures put in place to achieve these goals.

- Explain the official (or other) nature of the targets - are they stated in legislation, or merely 'indicative'?, are they fully endorsed by government, or voluntarily adopted by industry?

The official targets are merely indicative. Unfortunately very few economic actors are aware of their existence.

- Specify whether the targets are set for the country, or are broken down by regions
- Specify whether the target is for consumption or production of renewable energy, and whether it is absolute (PJ/year) or relative (% of gross inland consumption or similar).

3.2.2 Renewable ***electricity*** target

- If targets are set only for energy, and not for electricity, leave this section blank. If electricity targets are calculated from a general energy target, explain this calculation.
- Target dates and levels for renewable electricity (eg, 2003, 2010 etc). Go as far in the future as targets have been set (do not stop at 2010)

The *Energy Programme,* which co-financed until the year 2000 medium to large size renewable electricity investments, set up the following short-term targets for renewable electricity: 90 MW for small hydro, 70 MW for wind and 10 MW for biomass capacity in place by 2000. The Programme has had most success with small (<10 MW) hydro plants and wind farms. There are now 270 MW of mini and micro hydro schemes, 75 MW of wind and 10 MW of biomass.

It is expected that the share of renewable electricity will increase in the next decade. The table below (source: Infopower – Jan 2000) gives an indication of the expected

evolution in terms of electricity generation (these values do not constitute official targets).

Production in %	1990	1995	2000	2005	2010
Thermal	62	95	43	37	28
Hydro	33	25	26	22	19
Natural Gas	0	0	16	23	35
Cogeneration	5	10	12	13	13
Renewables	0	0.2	3	5	5

- Explain the official (or other) nature of the targets - are they stated in legislation, or merely 'indicative'?, are they fully endorsed by government, or voluntarily adopted by industry, or some other manner of target?

Although the new legislation mentions the need of developing the use of the renewables it does not introduce any specific targets.

- Specify whether target is for consumption, production or generation capacity of renewable electricity, and whether the target is absolute (TWh/year for production, or MW_e for generation), or relative (% of national generation or supply or similar).
- State whether the target is flat (ie, includes all renewable electricity sources equally) or whether it is broken down into individual targets for different generation options / sources (ie, on-shore wind, off-shore wind, tidal power, wave power, biomass (all forms), solar (to include solar thermal electric generation and PV), geothermal, small hydro (<10MW), large hydro (>10MW), wastes (include all wastes in this category)
- State whether any categories of generation are excluded from the target(s)

3.2.3 Renewable energy and electricity policy

- Describe the overall renewable energy and electricity policies, and their state of development, in the context of the country's overall energy balance and electricity generation mix. Reference policy documents where possible. Explain how far the government has been motivated to promote renewable energy / electricity by the Kyoto CO_2 targets. Explain whether the government has any additional justification in setting policy - ie local environmental effects, rural development and employment, industrial development, export promotion etc. Where policy is not yet in place, or is being amended, explain the timetable for this, and whether it is likely that specific targets will be adopted. Briefly mention the policy instruments that have been (will be) adopted, but leave the detail to section 2.3.

Portugal's rapid energy growth and heavy reliance on imported fuels, especially oil, has shaped its priorities for the future energy development. Portugal's Energy Policy was defined most recently in the 1994 *Energy Programme* created under the

Community Support Framework. This programme is designed to achieve a number of objectives in terms of renewable energy sources (see 3.2.2).

Portugal uses a range of measures to promote renewable energy. These include guaranteed markets and favourable prices for renewable electricity and CHP, direct capital investment subsidies, other market stimulation incentives such as interest free loans, information campaigns, and research and development.

The government is also working to increase information dissemination and education about renewable energy in Portugal, with publicly available information on existing subsidies and how to apply for them. Additionally, a biomass centre for energy has operated since 1989, co-ordinating and promoting demonstration projects in the areas of biomass production, collection, transformation and use.

The law (168/99 18.05.1999), which introduces a “green” tariff for environmental friendly power production, has created conditions for a self sustained development of the renewables in Portugal.

Recently the government has announced simpler and clearer rules concerning the connection to the grid for independent power producers. These rules have not yet been implemented.

Section 3.3 - Specific renewable energy support mechanisms and schemes

3.3.1 Obligations

- Describe any obligations for renewables that are in force or in preparation. Is the obligation to produce or consume renewable energy? Which economic actors are obligated? (ie, electricity suppliers, consumers etc) NOT RELEVANT
- Is the obligation system designed to induce competition between market players, or will each market player react to the obligation in isolation? NOT RELEVANT
- What penalties are (will be) in force for non-compliance - are they monetary or other penalties? NOT RELEVANT
- Which institutions / bodies are responsible for setting / monitoring / enforcing the obligation(s) NOT RELEVANT
- For how long is the obligation(s) set? (ie, rolling one year, 20 years etc), and will the obligation increase through time? If so, is this increase planned and published, or is the industry unaware of the details of future increases? NOT RELEVANT
- Distinguish between obligations for renewable energy and renewable electricity, if such distinction exists. NOT RELEVANT
- Give any further relevant details

3.3.2 Taxation

- Describe all fiscal arrangements that directly or indirectly support renewable energy/ electricity production / consumption
- Define who the taxes / tax exemptions apply to (ie, particular categories of electricity consumer, electricity generators)

- Define the quantities being taxed (or exempted) - is it energy, electricity, all forms of renewable electricity or just certain technologies etc
- Distinguish between direct taxes / exemptions on production / consumption, and indirect taxes / exemptions that give favourable treatment to renewable energy through rateable value, VAT rates, treatment of business taxes etc
- Give any further relevant details

Purchases of renewable energy equipment (such as solar panels for residential use) benefit from the reduced VAT rate of 5% under the 1992 Budget Law. It is also possible to deduct the investment cost in renewable end-use technology from personal taxable income (subject to a ceiling).

3.3.3 Voluntary demand

- Explain to what extent the renewable energy policy relies on voluntary demand to reach targets
- Describe any voluntary demand stimulation / facilitation measures, or any legal promotion of or obstacles to the voluntary demand market
- Explain whether the voluntary market is in conflict with other policy measures

3.3.4 Direct subsidies

- Define the nature of any subsidies provided - are they on investment cost for renewable generation plant, feed-in tariffs etc
- What is the size of the subsidies available for renewables (quote in Euros or Euro-cents, per kWh or per other quantity), and what restrictions apply to the subsidies - ie are some technologies not included in the schemes
- Who is responsible for paying the subsidies - immediately (for example electricity supply or distribution companies), and ultimately (for example central government, or all electricity consumers, or some sub-set of electricity consumers)
- Is there any degree of competition in allocating the subsidies (for example the NFFO scheme in the UK had a competitive element because developers had to bid to receive a contract), or are the subsidies available to any and all qualifying schemes (such as the typical 'feed-in tariff')
- Give any further relevant details

The renewable part of the Energy Programme (1994-1999) was run by the General Directorate of Energy under the Ministry of Economics, with almost a third of the total estimated financial requirements of 182 billion ESC provided by the EU FEDER programme. The form of support for renewable energy projects under the Energy Programme depended on the nature of individual projects, with projects benefiting from a grant of up to 60% of eligible costs if they were demonstration projects, up to 50% if they were dissemination (commercialisation) projects, and loans (that could possibly be transformed into grants if the project is considered "excellent") up to 40% for projects aiming to increase the deployment of mature technology. The subsidies per project were capped at 50 million ESC, except for CHP systems where the cap was 150 million ESC. The exact level of support for an individual project varied

depending on its size (projects under 10 MW received most help), and its regional and environmental impacts. At present no financing program has replaced the Energy Programme in Portugal.

3.3.5 Other support mechanisms

- Define any other support mechanisms or schemes that do not fall into the above categories. Examples would be support for renewable energy commercialisation or research and development. These are worth mentioning only very briefly, but they are not the primary focus of this project.

Section 4 - Tradable Green Certificates developments

This point will be discussed in my next meeting with EDP responsibles.

ANNEX 15

RECerT Country review - Sweden

Prepared by

General and renewable energy statistics for Sweden

1.1.1 Total primary energy consumption

Absolute consumption of energy (PJ/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	Projection to 2010*
Industry	504	489,6	478,8	489,6	507,6	525,6	532,8	540	540	594
Internal transports	302,4	295,2	306	302,4	309,6	313,2	313,2	313,2	320,4	360
Residential services	514,8	547,2	547,2	554,4	558	568,8	597,6	561,6	561,6	576
Losses	140,4	133,2	136,8	129,6	158,4	151,2	180	154,8	158,4	170
Foreign transports	111,6	100,8	111,6	118,8	126	129,6	126	133,2	151,2	154
TOTAL (PJ)	1573	1566	1580	1595	1660	1688	1750	1703	1732	1854

*Source of information: Climate report 1997, The Swedish National Energy Administration.

The projection to 2010 is based on the prognosis on economic growth and political decisions made regarding the energy sector, emissions and tax systems.

Specific consumption of energy (GJ/capita/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (PJ)	1573	1566	1580	1595	1660	1688	1750	1703	1732
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
MJ/capita	183	181	182	182	188	191	198	192	196

1.1.2 Total electricity consumption

Absolute electricity consumption (TWh/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	Projection to 2010*
Industry	53,3	50,9	49,8	49	50,2	51,7	50,7	52,6	53,7	58,8
Transports	2,5	2,5	2,5	2,5	2,6	2,5	2,5	2,4	2,5	3,5
Residential, services	63,3	68,5	68,5	71,3	71,2	72,3	74,7	70,3	70,3	75,3
District Heating	10	9,9	10	9,7	6,9	7,5	6,4	6,8	6,7	7,0
Distribution losses	10,7	9,4	8,7	8,2	8	8,3	7,9	10,4	10,7	7,7
Total (TWh)	139,8	141,2	139,5	140,7	138,9	142,3	142,2	142,5	143,9	152,3

*Source of information: Climate report 1997, The Swedish National Energy Administration.

Specific use of energy (MWh/capita/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (TWh)	139,8	141,2	139,5	140,7	138,9	142,3	142,2	142,5	143,9
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
MWh/capita	16	16	16	16	16	16	16	16	16

1.1.3 Total primary energy production

Absolute energy supply (PJ/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Crude oil/oil products	673,2	651,6	676,8	669,6	738	730,8	781,2	727,2	745,2
Natural gas	25,2	25,2	28,8	32,4	32,4	32,4	36	32,4	32,4
Coal and coke	111,6	100,8	97,2	97,2	100,8	100,8	111,6	97,2	93,6
Biofuels, peat	234	252	255,6	273,6	280,8	306	309,6	324	331,2
Heat pumps in district heating etc	28,8	28,8	28,8	32,4	28,8	28,8	28,8	32,4	32,4
Hydro power (gross)	262,8	230,4	270	270	216	248,4	187,2	252	273,6
Nuclear power (gross)	244,8	280,8	226,8	219,6	262,8	252	270	248,4	259,2
Electricity import minus export	-10,8	-3,6	-7,2	-3,6	0	-7,2	21,6	-10,8	-39,6
TOTAL (PJ)	1570	1566	1577	1591	1660	1692	1746	1703	1728

Specific energy supply (GJ/capita/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (PJ)	1570	1566	1577	1591	1660	1692	1746	1703	1728
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
GJ/capita	183	181	181	182	188	191	197	192	195

1.1.4 Total electricity production

Absolute electricity production (TWh/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Hydro power	71,5	62,3	73,2	73,9	58,5	67,1	51,1	68,2	74
Wind power								0,2	0,3
Nuclear power	65,3	73,5	60,8	58,8	70,1	67	71,4	66,9	70,5
Industrial back-pressure power	3,1	3,1	3,3	3,5	3,8	3,8	4,5	4,2	4,5
Combined heat and power	2,1	3,2	3,5	4,8	5,2	5,5	5,4	5,3	5,1
Cold condensing power	0,3	0,3	0,6	0,4	0,9	0,4	3,6	0,4	0,3
Gas turbines	0,1	0,1	0,1	0,1	0,1	0,1	0	0	0
TOTAL (TWh)	142,4	142,5	141,5	141,5	138,6	143,9	136	145,2	154,7
Import minus export	-2,5	-1,4	-2,1	-0,8	0,3	-1,7	6,1	-2,7	-10,7

Specific electricity production (MWh/capita/year)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (TWh)	142,4	142,5	141,5	141,5	138,6	143,9	136	145,2	154,7
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
MWh/capita	17	16	16	16	16	16	15	16	17

1.2.1 Total production of renewable energy

Absolute renewable energy supply (PJ/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Biofuels, peat	234	252	255,6	273,6	280,8	306	309,6	324	331,2
Heat pumps in district heating etc	28,8	28,8	28,8	32,4	28,8	28,8	28,8	32,4	32,4
Hydro power (gross)	262,8	230,4	270	270	216	248,4	187,2	252	273,6
TOTAL (PJ)	525,6	511,2	554,4	576	525,6	583,2	525,6	608,4	637,2

Specific renewable energy supply (GJ/capita/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (PJ)	525,6	511,2	554,4	576	525,6	583,2	525,6	608,4	637,2
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
GJ/capita	61	59	64	66	60	66	59	69	72

Technical Potential

The technical potential for hydro power is not available due to political decision of no more extension and exploitation of the large rivers in Sweden.. The heat pumps that are used in district heating is most commonly used on low temperature heat losses from the industry and residential areas. The potential is small due to an increase of energy efficient measures being implemented in the industry.

The largest potential is for biofuels and wind power. The technical potential for biofuels is estimated to approximately 120 TWh/year or 432 PJ/year. Wind power installations is increasing rapidly and the potential is hard to estimate.

Market Potential

The market potential for renewable energy sources is depending on prices (supply and demand), taxes and regulations. In Sweden electricity from the already existing large scale hydro power keeps the prices on electricity low due to low production costs. The deregulation of the electricity market has also lowered the prices.

The biomass market in Sweden is well developed and the potential is depending on transport distance between the forest residues and the buyers. There is a new market in refined biomass, i. e. wood pellets and briquettes that decreases the importance of transport distance. The refined fuels also reach new markets in the small scale sector with no possibilities of large investments in fuel handling systems and cleaning systems. The use of biomass is estimated to increase annually with 4 TWh.

The market potential for other renewables as solar energy and wind power is depending on subsidiaries. Wind power is growing rapidly in Sweden, however the potential is small in compare to biomass.

1.2.2 Total production/consumption of renewable electricity

Absolute production of renewable electricity (TWh/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Hydro power	71,5	62,3	73,2	73,9	58,5	67,1	51,1	68,2	74
Wind power								0,2	0,3
Industrial back-pressure power	3,1	3,1	3,3	3,5	3,8	3,8	4,5	4,2	4,5
Combined heat and power	1,26	1,92	2,1	2,88	3,12	3,3	3,24	3,18	3,06
TOTAL (TWh)	75,86	67,32	78,6	80,28	65,42	74,2	58,84	75,78	81,86

Installed capacity of renewable electricity in 1998

Capacity	Hydro power	Wind power	Industrial back-pressure power	Combined heat and power	*TOTAL*
MW	16204	174	841	1348	18567

Specific production of renewable electricity (MWh/capita/year)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
TOTAL (TWh)	76,7	68,6	80	82,2	67,5	76,4	61	77,9	83,9
Inhabitants	8590630	8644119	8692013	8745109	8816381	8837496	8844499	8847625	8854322
MWh/capita	9	8	9	9	8	9	7	9	9

Technical Potential

The largest potential is for biofuels and wind power. The technical potential for biofuels is estimated to approximately 120 TWh/year or 432 PJ/year. However most use of biofuels is for heat. Wind power installations is increasing rapidly and the potential is hard to estimate.

Market Potential

In Sweden electricity from the already existing large scale hydro power keeps the prices on electricity low due to low production costs.

The use of biomass is estimated to increase annually with 4 TWh. Only a part of this will be used for electricity production.

The market potential for wind power is depending on subsidiaries. Wind power is growing rapidly in Sweden.

Source of Information

Energy in Sweden, Facts and Figures 1999; The Swedish National Energy Administration

Annual Report 1998; The Swedish Power Association

Climate Report 1997; The Swedish National energy Administration

Section 2 - Electricity markets - liberalisation and the role of different players		
Section		**Requirements**
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	• **Give general comments on the extent of liberalisation of the electricity market. For example, have any special dispensations been negotiated with the European Commission to delay market opening?** The electricity market in Sweden was reformed five years ago and accordingly to the new Electricity Act, a corporate body that generates and trades in electricity is banned from also engaging in the transmission of electricity. This corporate situation is aimed at setting a clear demarcation between competitive operations and monopoly operations, thus counteracting the occurrence of cross-subsidies, and also at facilitating electricity trading and network activities, so that these can be developed independently of one another in terms of structure and ownership. The electricity market has been characterised by major structural changes in the ownership of major power utilities, and also municipality owned electricity trading and network companies. Ownership changes has also taken place across national borders. Several major power utilities in Norway, Germany, France and Finland have acquired holdings in Swedish utilities. Swedish companies has also taken over or purchased shares in power utilities abroad. The New Electricity Act came into force on 1 January 1998. The Act includes rules for consumers protection in the purchase of electricity, provisions for damages in the event of disturbances and interruptions and trade with other countries. The rules concerning the supervision of the electricity market have been clarified regarding terms for network services and electricity deliveries.
2.1.2	Timetable for market opening	• *What is the current extent of market opening - which categories of customer are currently able to choose between suppliers?* The electricity market was deregulated in 1996 and all customers where able to choose between suppliers. However, for small users a certain meter had to be installed that monitored the use hour by hour. The requirement for this typical type of electricity meter functioned as a barrier for the small users to entering the deregulated market. In November 1999 the requirement for hour by hour monitoring where abolished. • *For markets that have already opened, what is the extent of customer switching that has already taken place (ie, customers switching from a traditional to a new supplier)? How far is the switching expected to continue?* The extent of switching suppliers is depending on the category of the customers. The industry, private enterprises and public bodies that are

		large users of electricity most often changes suppliers by procurement. This depending on the relatively small share of total costs for network fees, tax and VAT. The small users like individual households and SME´s does not switch suppliers as often regarding to the relatively high share of the costs of electricity. The actual price of electricity is only 25-30% of total costs for the individual households, remaining part is network fees, tax and VAT. However the switching of suppliers are increasing due to information and advertising and the new option of joint procurement for households etc through Internet enterprises.
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling) of the electricity market	• *Have vertically-integrated state-owned electricity utilities been broken up into separate generation / transmission / supply / distribution businesses?* The organisation of all utilities, not only the state-owned, has been broken up in different companies where generation, transmission, distribution and trading of electricity has been divided into different businesses. However the company group can still be the same for the different types of companies. • *For countries that have broken up state-controlled assets, what is the extent of re-integration of separate businesses? (ie, are separate businesses tending to re-form into vertically integrated or horizontally-integrated businesses?)* The largest utility in Sweden, Vattenfall which is state-owned has during the recent years been an active part in the restructuring of the electricity market as well as in new business opportunities in telecom and Internet solutions. This has been done by a horizontally-integrated reorganisation of the company where generation, transmission, distribution and trading of electricity has been divided into different businesses areas. • *What is the extent of 'convergence' of companies - ie electricity sector companies merging activity with other businesses, such as gas, telecoms, other retailing etc.* All major power utilities and electricity trading companies in Sweden has own activities in other business areas like telecom, gas and consulting. Joint ventures or co-operation with other enterprises is common to interact in new business opportunities in the so called new economy with Internet solutions, eBusiness, eTrading and shopping etc. • *Make other relevant comments on this area.* The deregulation of the electricity market has been one major share of the decreasing prices on electricity in Sweden the recent years. This has made the utilities more keen on finding new businesses and opportunities. Their know-how and competence in the electricity,

		networks, and marketing has been a major part of the new areas and co-operation and merge with other enterprises in the telecom industry and Internet solutions.
2.2.2	Number, size and market share of players	• *What is the current composition (number of actors, size, market share) of the electricity market, in each business area (ie, generation, transmission, supply and distribution)* The number of actors in Sweden in generation and transmission is relatively small. The largest actor is the state-owned company Vattenfall followed by Sydkraft which is partly owned by the Norwegian company Statkraft and German Preussen Elektra. The third largest electricity generation and transmission company is Birka Energi AB which is owned by the Finnish IVO. Electricity is generated in plants owned by the state, the municipalities and industrial and independently owned companies. In total, the state owns almost 505 of the generation capacity, the municipalities almost a quarter. The rest is owned by foreign companies, independent and insurance companies and pension funds. The supply and distribution of electricity is carried out both by he large utilities as well as municipality owned delivers and suppliers as well as smaller new enterprises that supplies electricity. Also major oil and gas companies like Shell, Statoil and the Swedish OK is new suppliers of electricity. • *What trends are seen over the next ten years (to 2010) in the evolution of the market? - ie is there an expectation that mergers and take-overs will dominate the sector, leading to a small number of actors in each sector, or even a small number of actors in the whole industry?* The trend in the electricity market is a merge between several large utilities which will have more foreign owners and will also be more active on the international and in particularly the European market. The smaller municipality owned companies will be bought by the larger companies or will be forced to merge or co-operate with similar companies. Large oil and gas companies will be strong and active players in the future electricity market.

Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• *Briefly describe the current and future arrangements for electricity trading. For example, will there be a single pool system, or will there be a bilateral market facilitated by one or more power exchanges? Is the market limited to the country concerned, or is it an international market?* Trade in electricity takes place between various types of players. Generation utilities sell electricity to distributors, to end customers and to other generators. Distributors sell electricity to end customers , to other distributors and , in certain cases, to generators. Electricity is sold to players in Sweden, and also to players in countries with which Sweden has transmission links. In January 1996, the existing electricity exchange in Norway, i. e. Statnett Marked AS, was made available to Norwegian and Swedish players on equal terms. In April 1996 the Svenska Kraftnät authority purchased 50% of the shares and the company name was changed to NordPool, the Nordic Electricity Exchange. As a result of free access to the transmission links in Finland players can trade in all of three countries. The number of players and the volume traded via NordPool have increased substantially. The number of players was 258 in the end of December 1998. 45 of these where Swedish. The players include power generation utilities, distributors, industrial companies, dealers and traders. NordPool turns over electricity on the spot market(24-hour market) and the forward market (weekly market). The spot market handles contracts for delivery during the next 24 hour period. The forward market is a financial market and handles contracts with a time horizon of up to three years. In 1998 , the physical market turn over was 56.3 TWh of electricity, which represent an increase of 29% on 1997. Trade on forward market increased with more than 68% to 89.1 TWh. Moreover 352.2 TWh where cleared in bilateral contracts. Clearing of bilateral contracts involves NordPool acting as the opposite party to sellers and buyers in bilateral forward contracts. In January 1998 the Finnish grid utility took over the Finnish electricity exchange and concluded an agreement with NordPool for co-ordinating trade on the exchange and for opening an office in Finland. This was conditional on Finland forming it own price area and spot trading between countries being pursued without border tariffs. Since the 1997/98 turn of the year, Denmark is also a partner in NordPool, and discussions are in progress that could enable Danish power to be purchased on the NordPool exchange. • *Specifically, comment on the requirement on renewable electricity generators - will they be disadvantaged in any way under the current or proposed trading arrangements?* Already installed renewable electricity generation capacity in form of large scale hydro power is one of the largest resources on the electricity market. New renewable electricity is mainly from cogeneration with biomass and wind power installation.

		The trading arrangements has lead to decreasing prices on the spot market as well as the forward market. This is an disadvantage for new renewable electricity. On the other hand the deregulated and functioning electricity market gives the buyers opportunity to buy electricity from suppliers and generators that uses renewable energy resources. • *How is the market for physical electricity expected to evolve through time* The market for physical electricity in the Scandinavian countries is well developed and has lead to decreased electricity prices as well as a more competitive market. In the future the electricity market will increase with new transmission links to other European countries and partnership with other electricity exchanges. The Swedish market and it's players are well evolved and stabile. The price on electricity will be more depending on weather conditions and forth coming tax regulations.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• *If the information is available, briefly indicate what volumes of electricity are presently traded under each element of the market (for example, if a pool system, what fraction of trades are 'on-market' and what fraction 'off-market').* In 1998 , the physical market turn over was 56.3 TWh of electricity, which represent an increase of 29% on 1997. Trade on forward market increased with more than 68% to 89.1 TWh. Moreover 352.2 TWh where cleared in bilateral contracts. • *Indicate what volume of electricity is traded in the regulated (ie, un-liberalised) market and the unregulated (ie, liberalised) market* The Swedish electricity market is totally deregulated. • *If available, indicate the volume of renewable electricity that is traded across different elements of the market. Distinguish between the regulated and unregulated market.* The volume of traded electricity is depending on generation from hydro power, industrial and district heating CHP with biomass and others renewable electricity generators. Of the total Swedish electricity generation of 144 TWh/year usually more than 50% is renewable i.e. large scale hydro power. Almost all electricity generated, in total 120-125 TWh/year, in Norway is hydro power. In Finland 20% of the total electricity generation of 65 TWh/year is from hydro power, the rest is nuclear power and fossil fuelled power. In Denmark almost all electricity generation is fossil fuelled except a small amount from wind power.
2.4.2	Values	• *If the information is available, briefly indicate the value (Euros) of electricity traded. Where possible, distinguish between the unregulated and regulated markets, and distinguish between different trading routes (ie bilateral contracts, pool, etc)*

		In 1998 , the total electricity market turn over including bilateral contracts where almost 500 TWh. The average price on the exchange in 1998 was 0.016 Euro/kWh. The total value of the electricity traded on the market in 1998 was 7 800 million Euro. • *Provide estimates of future prices of bulk electricity, and quote the sources of these estimates* The spot price on electricity on the exchange is depending more on weather conditions than actual competition on the market. The market has stabilised during the five year after deregulation. In the future most probably the annual average electricity prices on the spot market will increase slightly due to the actual costs for power generation. In some cases the actual costs for generation is higher than the spot market prices, especially for new installations. • *If available, indicate the value of renewable electricity traded in each part of the market (ie regulated and unregulated markets).* The amount of renewable energy in the Scandinavian electricity market is 230 TWh/year depending on weather conditions for the hydro power. The value in 1998 calculated on average price on the exchange was 3 300 million Euro.

Section 2.5 - The green market		
2.5.1	Current	• *Indicate the current ability of electricity consumers of all sizes to choose different offerings, specifically 'green electricity' tariffs, from suppliers* As a result of the deregulation of the electricity sector, it has become possible for consumers to choose their supplier. This has also made it possible to set environmental requirements when buying electricity. All electricity consumers can purchase “green electricity” through a ecolabelling system. BRA MILJÖVAL is the ecolabel of the Swedish Society for Nature Conservation (SSNC). It is referred to as "Good Green Buy" or "Good Environmental Choice" in English. Currently the system covers 13 product areas. SSNC’s ecolabelling of electricity delivery contracts started at the very beginning of 1996. Both supply and demand of the labelled services are expanding rapidly, also geographically. Since May 1998, the same criteria are working in Norway and Finland in co-operation with SSNC’s sister organisations. The companies that has a license to use the ecolabel are annually controlled through a revision. This means that authorised revision firms controls that the company has fulfilled their obligations against SSNC and their customers.

		• *Where such offerings exist, what types of generation are included in the tariff, and what are excluded. Are there any national 'standards' or similar means of ensuring quality for consumers?* In order to use the Good Environmental Choice eco-label electricity generation must be based on renewable sources. Hydroelectric plants built before 1996, solar power, wind power and biofuel are all regarded as renewable energy sources by the Swedish Society for Nature Conservation. • *Where such offerings exist, what has been the scale of take-up by consumers? What volume of electricity is sold on green tariffs? (units - GWh / year or similar*) The amount of licensed organisation has increased from 11 in 1196 to 50 in 1998 and is now 72 of totally 172 Swedish suppliers. The sales has increased from 2.5 TWh in 1996 to 7,3 TWh in 1998. • *How strongly have these offerings been marketed by suppliers? Is the market currently supply-limited or demand-limited?* The market is demand-limited due to the very high part of renewables of the Scandinavian electricity market i.e. large scale hydro power in Sweden and Norway. • *What premiums, if any, are charged by suppliers for 'green' tariffs? (units - euros / MWh or euro cents / kWh)* There is first application charge of 300 or 600 Euro depending on turn over. The license fee is based on annual turn over and sales of green electricity. The turn over based fee is between 150 and 15 000 Euro/year. The fee based on actual sales is 0,18 Euro/MWh. • *How many suppliers offer such 'green' tariffs?* 42% of all suppliers offer green electricity or 47 of 172 in total.
2.5.2	Future	• *Where market opening is not yet complete, indicate the interest that consumers are likely to show in choosing between suppliers, and specifically choosing green tariff offerings. What evidence is there of consumers' interest in renewable electricity*? According to the SSNC more governmental organisations and municipalities is choosing green electricity by procurement requirements. Industrial companies through their environmental strategies and work in accordance to ISO 14001 is choosing green electricity as a measure to decrease their environmental impact. • *Indicate projections for the growth of the voluntary green market segment (number of consumers, volume of electricity, monetary value*

		of the market), and quote the sources of these projections. According to SSNC the volume traded has increased from 1996 to 1998 with almost 300%. According to preliminary figures for 1999 the trend is the same. The number of licenses and actors on the market are most variable. Companies are merging, initiating new sales companies and new companies starts. Most of the larger utilities and suppliers entered the market in an early stage. The amount of licensed and sold green electricity has a stabile increasing trend.

Section 3 - Energy and environment policy - legislation and targets for renewable energy

Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector

3.1.1	Kyoto target	Sweden is allowed, in compliance with the Kyoto Protocol, to increase their emissions of CO_2 by 4% relative to the level of 1990. This is due to the decommissioning of several nuclear reactors. However Sweden has a national target on stabilising the emissions to 2010 in regards to the emissions of the year 1990. The targets, both accordingly to the Kyoto Protocol and the national is highly achievable. Sweden has however already implemented measures to decrease CO_2 emissions like subsidies and CO_2- emission tax. This have lead to large decreases of emissions during the 1970 and 80-ies. Sweden has decreased there CO_2-emissions with 30% from 1980 to 1997. The half of Sweden's energy supply is not from fossil fuels like oil, coal and gas. A major part of the use of oil products is used for transports, which is increasing. It is not likely that Sweden will be a exporter of carbon credits over long periods, however certain years or seasons with good water supply and warm weather some exports may be likely.
3.1.2	Carbon emissions from the electricity sector	The carbon emissions from the electricity sector in Sweden 1998 was 2 million tonnes. The emissions has been relatively stabile round 2 million tonnes per year back to 1985. Small changes depends on the weather conditions and water supply for the hydro power. <u>According to the Climate Report 1997 (NUTEK)</u> A forecast of carbon dioxide emissions prepared by the Swedish Environmental Protection Agency is presented in table below. **Year** **1995** **2000** **2005** **2010** Fuel combustion, energy and transformation industries, million tonnes CO_2: 10.5 12.5 12.9 13.8 Emissions in 1995 refer to actual emissions in 1995, while the forecast for other years assumes that these years are normal with respect to e.g. temperature and availability of hydropower.

		Total emissions of carbon dioxide (not including international transport) are projected to increase by about 11 % between 1995 and 2010. The emissions increase comes largely from plants for the electricity production and district heating. Emissions from these plants is projected to increase by approx. 30 %. This can be explained by the fact that some of the nuclear power production is replaced with other electricity production that generates carbon dioxide emissions, and that the expected increased demand for electricity has to be met. It should however be noted that the change in emissions is dependent on how the additional electricity that is projected to be needed is generated. In the forecast, the Swedish Environmental Protection Agency has assumed that the average emission factor for the additional power requirement is equivalent to emissions from natural gas combined—cycle plants. The forecast of future carbon dioxide emissions is contingent upon the assumptions that are made regarding national energy policy, economic growth and technological development etc. The most important determining factors for the results of the forecast are the assumptions concerning economic performance (GDP growth, change in industrial production and composition) and the assumption as to when nuclear power will be phased out. Assuming faster economic growth and an industrial structure with a larger proportion of heavy industry would lead to a faster growth in the demand for energy that we have figured on.

Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	In the 1997 years energy political decision a programme for a economical and ecological sustainable society where assessed. The work where initiated in January 1998. The objectives of the Swedish energy policy are to • Secure the short- and long-term electricity supply, as well as supply of other energy, on terms which are competitive in relation to the rest of the world; • Create conditions for efficient energy use and a cost-efficient energy supply with low negative impact on health, the environment and the climate; • Create stable conditions for a competitive business sector. The programme consists of a seven-year RTD-programme and a five-year programme targeted on influencing the energy markets through stimulation of new renewable production of electricity, decreased use of electricity and energy efficiency. A key objective of the strategy is to improve the competitiveness of renewable energy and energy efficiency. An energy system that is built upon subsidies is not sustainable. A part of the strategy is to create tools for analysis and models for system analysis. The co-operation between actors that effect the supply and use of energy, both national and international, is also a key objective in the long term strategy. *Long-term targets and research priority's* A targeted action on RTD is the basis in the long-term strategy for a sustainable energy system. The overall aim of the RTD is to decrease the

		costs for renewable energy resources so that they can be competitive alternatives to nuclear power and fossil fuels. During the next ten to fifteen years the share of renewables for electricity and thermal energy shall be increased. Priorities for the RTD are; - Cogeneration with biomass - Bioenergy supply including ash recycling - New processes for ethanol production based on cellulose resources - Alternative fuels for vehicles - New technology for large-scale use of wind power and offshore wind power - Photovoltaics electricity production - Energy efficiency in the residential and service, industry and transport sectors *Short-term targets* The overall short-term target is to compensate the decrease of electricity production that follows from the Parliaments decision of decommissioning of the Barsebäck nuclear power plant. A condition for the closing of the second reactor is that the dispensed electricity production can be compensated by supply of new electricity production and decreased use of electricity. The objective is to increase renewable electricity production and conversion of electricity heated buildings compensate the dispense of approx. 3 TWh. Additional objectives are set for measures regarding energy efficiency. The objectives is to from the year 2002 is to supply new electricity production with 1,5 TWh/year where of; - biomass cogeneration 0,75 TWh/year - wind power 0,5 TWh/year - small-scale hydro power 0,25 TWh and also improve energy efficiency by; - decrease use of electricity for heating with at least 1,5 TWh - measures for energy efficiency taken for approx. 1 TWh/year The targets are indicative but are fully endorsed by the government and the Parliament. The specific energy targets are national. However the overall 15 environmental targets stated by the government, where the energy related environmental problems is a part, is broken down on regional level. The regional targets are assessed by the regional authorities in accordance to size, population, industry and transport sector etc.

3.2.2	Renewable ***electricity*** target	**The supply of electricity in Sweden should be based on preferably indigenous and renewable energy sources. Nuclear power should thus be replaced by renewable energy, and fossil fuels should be kept at a low level. The existing natural gas network in the south west of Sweden should be utilised as efficient as possible. The two first nuclear reactors, the Barsebäck-reactors close to Denmark, will be taken out of service until July 2001. This implies a reduction of production capacity between 6 and 8 TWh.** The Swedish energy programme includes measures aimed at; • decreasing the consumption of electricity for heating purposes; • utilising the existing electricity system more efficiently; • increasing the supply of electricity and heating from renewable sources of energy. Investment support will be granted (see below) over a five-year period i.e. to year 2002. Support for research and development will be increased over the next seven years, with emphasis on renewable energy and efficient energy technologies. Measures aimed at increasing the supply of electricity The target is to increase electricity production from renewable energy with 1.5 TWh until year 2002. Investment support is granted to: • investments in biofuel-based CHP (30% of investment costs); • investments in wind power plants (15%); • procurement of new electricity generating technologies. The objectives is to from the year 2002; - supply new electricity production with 1,5 TWh/year where of - biomass cogeneration 0,75 TWh/year - wind power 0,5 TWh/year The targets are indicative but are fully endorsed by the government and the Parliament. The specific energy targets are national. However the overall 15 environmental targets stated by the government, where the energy related environmental problems, is a part is broken down on regional level. The regional targets are assessed by the regional authorities in accordance to size, population, industry and transport sector etc. The targets for increased renewable energy is not applicable to new large-scale hydro power installations. A governmental decision is taken that the remaining rivers without hydro power reservoirs shall remain unexploited. However the existing power plants has a target of increased efficiency.

3.2.3	Renewable energy and electricity policy	The policy mentioned in 3.2.1 and 3.2.2 and the steering instruments involved like subsidies, tax, information and legislation is currently implemented. The short-term targets are most likely to be reached. However several forecasts are showing that the long-term targets as well as the targets in compliance with the Kyoto Protocol will not be reached. This is mainly due to the increased economic growth and an increasing transport sector but also on the decommissioning of the nuclear reactors. In April 2000 the Climate Committee delivered a proposal for a Swedish climate strategy that involves objectives how Sweden shall fulfil their national and international targets and a connected work programme. The target is a 50% emission decrease of climate gases in regards to 1990. The short-term target is a 2% decrease to the year 2008-2012. During April 2000 an official report suggest that Sweden together with EU implements a system for trade of emission quotas to 2005. When the system is implemented it should replace the $C0_2$-taxes. The 25th of May 2000 the government wrote a proposition for the Parliament regarding the economic conditions for electricity production with renewables with aim of implementation in 2003. The system shall built on trade with certificates combined with obligations to include a assessed share of renewable electricity in deliveries or purchase. A Government bill will be completed in the autumn 2001 describing measures for reaching the climate targets.

Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	There are no obligations, and thereby penalties for non-compliance, for renewable electricity are in force. However the proposed climate strategy by the Climate Committee and the official report from the government regarding climate targets as well as the proposition from the government to the Parliament of the 25th of May 2000 all suggest obligations and/or flexible mechanisms to give the economical conditions for increased renewable electricity production. The system shall built on trade with certificates combined with obligations to include a assessed share of renewable electricity in deliveries or purchase. The trade with certificates will on sight replace the daily support for renewable and small scale electricity production. The size of the share shall be possible to change. Hereby is a further investments in new renewable electricity production stimulated at the same time as the system gives the dynamics of the market and creates competitiveness and technology improvements without disturbing the function of the electricity market. The implementation of the new system shall be done in a way that reasonable prerequisites for competitiveness for the renewable electricity production can be achieved in the long run. A Government bill will be completed in the autumn 2001 describing measures for reaching the climate targets.
3.3.2	Taxation	**Taxes and charges on electricity is taken out on production and consumption. More over the utilities is paying income taxes as all other companies. The difference between tax and charges should be noticed. Money taken by the government**

		through taxes can be used for all kind of purposes. Money from the charges e.g. the NOx-fee is allocated for specific use. The NOx-fee is repaid to the charged organisations that has the lowest emissions to improve the impact. **Taxes on renewable electricity production** *NOX-fee* The NOx-fee is paid for emissions on nitrogen oxides from all combustion installations with a production of >25 GWg/year. The charge is 40 SEK/kg NOx-emissions. The main part of the paid charges is returned in proportion to their share of the total energy production. The sulphur taxes or CO_2-taxes does not effect renewable electricity production. Taxes on consumption of electricity *Energy tax on electricity* The energy tax for electricity is depending on user and location. The tax is as follows; **Northern part of Sweden** **The rest of Sweden** Electricity, gas, heat and water supply 0,125 SEK/kWh 0,158 SEK/kWh Electric boilers >2MW During 1 Nov – 41 March 0,148 SEK/kWh 0,181 SEK/kWh Industry 0 0 Others 0,181 SEK/kWh 0,181 SEK/kWh The VAT is the same for all types of electricity and users. For electricity produced by wind power no energy tax is paid. The energy tax is repaid in form of an environmental bonus ie 0,181 SEK/kWh.
3.3.3	Voluntary demand	The voluntary demand for renewable electricity is driven by environmental interest groups and associations. An example is the SSNC`s (Swedish Society for Nature Conservation) eco-labeling scheme of renewable electricity (except new hydro power). This eco-labeling system can be a future complement to the suggested certification of renewable electricity from the government. However there are some discrepancies regarding the view upon small scale hydro power. The government is stimulating the voluntary demand by subsidising information activities on renewable energy sources and energy efficiency as well as a municipal support for energy advisors (250 million SEK during five years).

3.3.4	Direct subsidies	Investment support is granted to investments in: • biofuel-based CHP (30% of investment costs), in total 450 million SEK during five years • wind power plants (15%), in total 300million SEK during five years • procurement of new electricity generating technologies, 100 million SEK during five years For electricity produced by wind power no energy tax is paid. The energy tax is repaid in form of an environmental bonus ie 0,181 SEK/kWh. There is also support of local programmes for investments for environmental measures. The programmes shall be managed by the municipalities but involves all parties, industry, service etc. The measures can be energy related e.g. new electricity production. Support is granted with maximum 30% if it is a private organisation or project and up to 100% if it is a public project or an information action.
3.3.5	Other support mechanisms	A temporary support to small scale electricity production installations (capacity < 1500 kW) during 2000 are currently under evaluation of the European Commission. The total support of 200 million SEK are in form of reduced grid fee. The support level of 0,09 SEK/kWh is based on a procurement of small scale electricity production. The financing of the support is based on a grid fee of 0,002 SEK/kWh for the main regional grid owners. The support runs until 2002.

Section 4 - Tradable Green Certificates developments		
Section		**Requirements**
Section 4.1 - policy and legislative background		
4.1.1	Policy support	No policy support is currently established for renewable energy certificates. The voluntary demand for renewable electricity is driven by environmental interest groups and associations. An example is the SSNC`s (Swedish Society for Nature Conservation) eco-labeling scheme "Good Environmental Chioce" of renewable electricity (except new hydro power). In order to use the "Good Environmental Choice" eco-label electricity generation must be based on renewable sources. Hydroelectric plants built before 1996, solar power, wind power and biofuel are all regarded as renewable energy sources by the Swedish Society for Nature Conservation. This eco-labeling system can be a future complement to the suggested certification of renewable electricity from the government (see below). However there are some discrepancies regarding the view upon small scale hydro power. In April 2000 the Climate Committee delivered a proposal for a Swedish climate strategy that involves objectives how Sweden shall fulfil their national and international targets and a connected work programme. The target is a 50% emission decrease of climate gases in regards to the level of 1990. The short-term target is a 2% decrease to the year 2008-2012. During April 2000 an official report suggest that Sweden together with EU implements a system for trade of emission quotas to 2005. When the system is implemented it should replace the CO_2-taxes. The 25th of May 2000 the government wrote a proposition for the Parliament regarding the economic conditions for electricity production with renewables with aim of implementation in 2003. The system shall built on trade with certificates combined with obligations to include a assessed share of renewable electricity in deliveries or purchase. There are no obligations in force, and thereby penalties for non-compliance, for renewable electricity. However the proposed climate strategy by the Climate Committee and the official report from the government regarding climate targets as well as the proposition from the government to the Parliament of the 25th of May 2000 all suggest obligations and/or flexible mechanisms to give the economical conditions for increased renewable electricity production. The system shall built on trade with certificates combined with obligations to include a assessed share of renewable electricity in deliveries or purchase. The trade with certificates will in the long run replace the current support for renewable and small scale electricity production. The size of the share shall be possible to alter. Hereby is a further investments in new renewable electricity production stimulated at the same time as the system gives the dynamics of the market and creates competitiveness and technology improvements without disturbing the function of the electricity market. The implementation of the new system shall be done in a way that reasonable prerequisites for competitiveness for the renewable electricity

		production can be achieved in the long run. A Government bill will be completed in the autumn 2001 describing measures for reaching the climate targets.
4.1.2	Legislative framework	There are no legislative framework in operation yet. The proposition mentioned in 4.1.1 suggest that an investigation shall be made. One of the parts of the forthcoming work will be to assess how the trading shall be controlled and which categories of renewable energy sources and sizes on installations that will be involved in the trade with certificates. One objective will also be to assess which types of organisations that will be issuing and register the certificates.
Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	The system is suggested to be implemented at the 1st of January 2003. The trade with certificates will in the long term replace the current support for renewable and small scale electricity production.
Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	There are no legislative framework in operation yet. The proposition mentioned in 4.1.1 suggest that an investigation shall be made. One of the parts of the forthcoming work will be to assess how the trading shall be regulated and controlled and which categories of renewable energy sources and sizes on installations that will be involved in the trade with certificates. One objective will also be to assess which types of organisations that will be issuing and register the certificates. Accordingly to the official report from April 2000, suggested bodies for regulation and control will be established through new organisations and/or already existing authorities like the Swedish Environmental Protection Agency. The issuing of certificates is suggested to take place by an auction. The regulations and control instruments shall be worked out in accordance to the Kyoto Protocol's Flexible mechanisms and Joint Implementation The trading system before 2008 and the implementation of the Kyoto Protocol shall also involve trade with the neighbouring countries and parts of the EU. The Swedish system is therefor suggested to be worked out in accordance to the European Commission's proposal for a trading system within the union. This system is calculated to be implemented in 2005. Sweden should be a initial part of the system and an instigator. The standard for reporting of annual national emissions of CO_2 is suggested to be in accordance with the IPCC guidelines.
4.3.2	Certificate 'issuing' authorities and executive bodies	See 4.3.1

4.3.3	Trade registration / trade registrar	See 4.3.1
4.3.4	Certificate 'issuing' authorities and executive bodies	See 4.3.1

Section 4.4 - rules and scope of certification		
4.4.1	Scope	**Accordingly to the official report from April 2000** The certificates shall be monitored in carbon dioxides equivalents and each certificate shall give the owner the right to 1 ton of emissions during a restricted time period. The carbon dioxide equivalents shall be based on the GWP-factor for the greenhouse effect on the six gases mentioned in the Kyoto Protocol in the long run. Initially will the certificates only regards the CO_2-emissions. This system can also be implemented in the EU from 2005, even though it's only regards CO_2-emissions. The certificates shall be able to be traded on the free market and the not used certificates shall be able to be saved over periods for obligations and in between the obligation periods. The government shall be able to purchase certificates to stimulate actions in compliance with the Kyoto Protocol. During certain circumstances the government will also be able withdraw , revoke or modify the certificates. However, this has to be made under regulated conditions with long-term planning. One of the parts of the forthcoming work will be to assess how the trading shall be regulated and controlled and which categories of renewable energy sources and sizes on installations that will be involved in the trade with certificates. The trading system for certificates shall replace the current subsidies for renewable electricity production. A Government bill will be completed in the autumn 2001 describing measures for reaching the climate targets.
4.4.2	Certificate information content	See 4.4.1

Section 4.5 - trading and intervention		
4.5.1	National	Regulations and control mechanisms and organisations for an national trade of certificates are not yet settled.
4.5.2	International	Regulations and control mechanisms and organisations for an international trade of certificates are not yet settled. However the proposals and official report all suggests that international trade with certificates shall be able. The certificates shall also be able to use in accordance to the Kyoto Protocol's Flexible mechanisms and Joint Implementation.
Section 4.6 - Other information		
4.6.1	Other information	No other information available.

ANNEX 16

RECerT

The European Renewable Electricity Certificate Trading Project

European Commission FP5 Project Reference NNES-1999-00051

Task 1.2 - Country Reviews - UK

May 2000

Updated July 2001

Section 1 - General and renewable energy - statistics

1.1 General energy supply and demand statistics

1.1.1. Total primary energy consumption

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
PJ/year	9004	9226	9130	9268	9193	9252	9763	9503	9591
MJ/capita/year	156,319	160,174	158,507	159,793	158,500	157,884	166,604	162,167	163,532

From: DUKES, 1998 p47 (inland consumption of primary fuels and equivalents for energy use)& UK Energy in Brief, 1999: 8

Projections for primary energy demand

	2000	2005	2010
Low GDP growth – low fuel prices			
PJ/year	9599	9905	10,106
MJ/capita/year	161,872	165,913	168,153
Low GDP growth – high fuel prices			
PJ/year	9490	9733	9909
MJ/capita/year	160,034	163,032	164,875
Central GDP growth – low fuel prices			
PJ/year	9612	10,006	10,270
MJ/capita/year	162,091	167,605	170,882
Central GDP growth – high fuel prices			
PJ/year	9503	9821	10,077
MJ/capita/year	160,253	164,506	167,671
High GDP growth – low fuel prices			
PJ/year	9616	10,098	10,433
MJ/capita/year	162,159	169,146	173,594
High GDP growth – high fuel prices			
PJ/ye	9511	9905	10,228
MJ/capita/year	160,388	165,913	170,183

From: Energy Projections for the UK, Working Paper, March 2000, DTI (p43 Primary Energy Demand Projections)

1.1.2 Total primary energy consumption, of which total electricity consumption

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
TWh/year	284.42	290.84	291.45	295.75	291.78	302.23	314.29	317.49	340
MWh/capita/yr	4.94	5.05	5.06	5.10	5.03	5.16	5.36	5.42	5.80

(From: DUKES, 1998 p168)

Total projected electricity consumption

Electricity Generation (from EU Energy Outlook to 2020: 216)

Year	1990	1995	2000	2005	2010
TWh/year	316.9	332.8	380.2	431.0	482.9
MWh/capita/yr	5.5	5.7	6.41	7.2	8.0

1.1.3 Total primary energy production

57.6 57.6 57.6 58 58 58.6 58.6 58.6

58,649

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
PJ/year	9193	9499	9490	9842	10,752	11,300	11,807	11,812	12,041
MJ/capita/year	159,600	164,913	164,757	169,690	185,379	192,832	201,485	201,570	205,306

(DUKES, 1998: 48 and 'in brief')

Total electricity production (electricity generated, i.e. before all losses)

58m 58m 58.6 58.6 58.6 58.6

	1993	1994	1995	1996	1997	1998
Coal TWh/year MWh/capita/year	170.3 2.9	161.7 2.8	157.2 2.7	145.8 2.5	119.8 2.0	
Oil TWh/year MWh/capita/year	20.0 0.34	14.1 0.24	12.5 0.21	13.9 0.23	8.1 0.14	
Gas TWh/year MWh/capita/year	32.9 0.56	49.5 0.85	63.3 1.1	82.1 1.4	107.5 1.8	
Nuclear TWh/year MWh/capita/year	89.4 1.5	88.3 1.5	89.0 1.5	94.7 1.62	98.1 1.67	
Natural flow Hydro TWh/year MWh/capita/year	4.3 0.07	5.1 0.08	4.8 0.08	3.4 0.06	4.1 0.07	
Pumped storage hydro TWh/year MWh/capita/year	1.44 0.02	1.47 0.03	1.55 0.03	1.56 0.03	1.49 0.03	
Renewables other than hydro						

TWh/year MWh/capita/year	1.58 0.03	2.21 0.04	2.4 0.04	2.7 0.05	3.21 0.05	
Other fuels TWh/year MWh/capita/year	3.19 0.05	2.59 0.04	3.25 0.05	3.33 0.06	3.06 0.05	
TOTAL TWh/year MWh/capita/year	323.1 5.6	324.9 5.6	334.0 5.7	347.4 5.9	345.3 5.9	351.5 6.0

(DUKES, 1998: 158 and RECS, 2000)

1.2 Renewable energy supply and demand statistics

1.2.1 Total production of renewable energy

Year	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
PJ/year	65.36	87.15	90.09	88.41	96.79	111
MWh/capita/year	1,127	1,503	1,537	1,509	1,652	1,893

(Total use of renewable sources (used to generate electricity and heat), DUKES, 1998: 232 and RECS, 2000)

Total electricity from renewable sources (DUKES, 1998: 233)

	1993	**1994**	**1995**	**1996**	**1997**	**1998**
Onshore wind Generation TWh Declared Net Capacity (MWe)	0.22 55.2	0.34 65.7	0.39 85.1	0.49 113.0	0.67 135.4	
Small scale hydro Generation TWh Declared Net Capacity (MWe)	0.16 42.2	0.16 42.2	0.17 44.3	0.09 50.8	0.16 55.8	
Large scale hydro Generation TWh Declared Net Capacity (MWe)	4.14 1,383	4.94 1,383	4.67 1,383	3.28 1,406.2	3.97 1,438	
Biofuels: **Landfill gas** Generation TWh Declared Net Capacity (MWe)	0.45 78.7	0.52 84.9	0.57 99.8	0.71 142.7	0.88 168.4	
Sewage sludge digestion Generation TWh Declared Net Capacity (MWe)	0.38 88.4	0.36 87.1	0.37 86.9	0.40 92.6	0.40 92.7	
Municipal solid waste combustion						

Generation TWh Declared Net Capacity (MWe)	0.40 49.8	0.71 86.8	0.75 86.8	0.78 115.0	0.93 115.0	
Other Generation TWh Declared Net Capacity (MWe)	0.14 45.6	0.28 45.6	0.33 45.5	0.33 45.5	0.34 45.5	
TOTAL Generation TWh Declared Net Capacity (MWe)	5.88 1,743	7.31 1,795.3	7.24 1,831.4	6.06 1,965.7	7.34 2,050.9	

The approach used here for estimating future renewable electricity markets in the UK analyses market prospects via the application of a structured computer model, run against a variety of future scenarios. A key input to this type of analysis is the presentation of the estimated resource that could be supplied by technologies as a function of the economic cost of exploitation. This information is contained within the resource cost curves that have been developed and regularly updated under the New and Renewable Energy Programme. This data is then used as an input to the MARKAL energy systems model which is configured to mimic the UK energy economy. The model is then used in conjunction with a suite of future energy price and demand scenarios to evaluate the future prospects for the various technology options.

Contribution by Scenario

	Central-Low			Central-High		
	2000	2010	2025	2000	2010	2025
8% Test Discount Rate TWh/year	16.22	21.89	56.94	16.22	41.24	115.21
MWh/capita/year	0.27	0.36	0.93	0.27	0.69	1.89
15% Test Discount Rate TWh/year	16.22	16.02	26.00	16.22	24.50	79.70
MWh/capita/year	0.27	0.27	0.43	0.27	0.41	1.31

Two scenarios (Central-Low) and (Central-High) have been used as a basis for assessing the future prospects of renewable energy technologies. Under the terminology used by the DTI to describe their scenarios, the first term (Central) refers to the rate of economic growth (and hence energy demand) and the second term (Low or High) describes the fuel prices. Thus, the two scenarios used for analysing renewables have the same growth in future energy demand. But different assumptions about the price of fossil fuels. The analysis has been carried out at two test discount rates of 8% and 15% (ETSU, 1999: 236-239).

1995 RES-E technical potential for renewable electricity production
Source: SAFIRE, ESD May 2000

GWh	Band 1 Resource (TWh)	Band 1 Cost (c/kWh)	Band 2 Resource (TWh)	Band 2 Cost (c/kWh)	Band 3 Resource (TWh)	Band 3 Cost (c/kWh)	Band 4 Resource (TWh)	Band 4 Cost (c/kWh)	Total Technical potential (TWh)
Wind onshore	30.356		24.424		12.106		4.666		71.6
Wind offshore*	9.034		0.000		0.000		0.285		9.3
Small hydro (<10 MW)	0.12		0.3		3.48				3.9
Large hydro (>10 MW)	10		1.725		5.175				16.9
Photovoltaics	5.728		11.457		5.728				22.9
Solar thermal electricity									
Power stations & CHP									
- Solid fuels	3.500		1.900						5.4
- Solid wastes	3.806		15.247						19.1
- Liquid wastes	0.733								0.7
Farm slurries	0.208								0.2
Municipal Solid Waste	6.345								6.3
Sewage sludge	1.042								1.0
Landfill gas	28.600								28.6
Geothermal electricity	0.000		0.000		150.000				150.0
Wave	1.533		75.884		0.000				77.4
Tidal	61.320		30.660		30.660				122.6
Total	**162.33**		**161.6**		**207.1**		**5.0**		**536.0**

* within 10km of land and <10m depth

Note: cost information not available yet.

Total contribution in TWh/yr of renewables to UK electricity supply

Year	2000	2010	2025
Minimum 10% of electricity from renewables in 2010, rising to 20% in 2025, 15% discount rate	16 (TWh/yr)	38 (TWh/y)	92 (TWh/yr)

Source: New and Renewable Energy, Prospects in the UK for the 21st Century, Supporting Analysis, March 1999, ETSU for the Dti, page 239

References:

New and Renewable Energy: Prospects in the UK for the 21st Century, Supporting Analysis, ETSU, March 1999: UK

UK Energy in Brief, Department of Trade and Industry, December 1999: UK

Energy in Europe, European Union Energy Outlook to 2020, Special Issue, November 1999: EC

Digest of United Kingdom Energy Statistics, Department of Trade and Industry, 1998: UK

Energy Projections for the UK Working Paper, EPTAC Directorate, Department of Trade and Industry, March 2000: UK

New and Renewable Energy, Prospects in the UK for the 21st Century, Supporting Analysis, March 1999, ETSU for the Dti

SAFIRE model for REBUS burden sharing project (5FP DG Research contract number 001), ESD, 2000.

Section 2 - Electricity markets - liberalisation and the role of different players		
Section 2.1 - Electricity market liberalisation		
2.1.1	Liberalisation general comments	Fully liberalised. Generation, transmission, distribution and supply privatised through Electricity Act 1989.
2.1.2	Timetable for market opening	Both electricity and gas markets are fully liberalised - all consumers of any size may choose between competing suppliers. Existing UK electric suppliers are expected to retain 80% of supply market.
Section 2.2 - Number of players, their size and market share		
2.2.1	Extent of dis-aggregation (unbundling)of the electricity market	'Unbundling' of the distribution / supply / generation functions of companies is now underway. This will require separate business accounting in order to prevent cross-subsidisation between these business functions. • Some vertical reintegration now taking place through mergers and acquisitions. • There has also been some convergence of gas and electricity markets. E.g. British Gas offering electricity. Electricity is also being supplied linked to other projects e.g. supermarkets.
2.2.2	Number, size and market share of players	• One national (natural monopoly) grid company, with responsibility for supply security etc. There are approximately four or five major generators (nuclear, fossil) - some are dedicated generation companies, others are vertically-integrated utilities with large generation assets. There are 12 regional (natural monopoly) distribution companies, that will be regulated. There are a variable number of supply companies - there is much take-over / merger activity, and a number of smaller niche suppliers - probably about 15 overall. • Some projections show that there will ultimately be room for only about 5 large vertically integrated electricity or multi-utilties and numerous smaller niche players. The large companies will be multi-nationals, not necessarily of British ownership.
Section 2.3 - Electricity trading arrangements		
2.3.1	Electricity trading	• New electricity trading arrangements (NETA) come into effect late 2000. • Wholesale pool market being replaced by a 3 tier market: (1) bilateral over-the-counter market (2) Power exchange (3) Balancing market. • NETA is likely to benefit large generators most and there have been strong concerns raised overt the potential impact on small and renewable generators. In particular the uncertainty faced by intermittent generators such as wind, reduces power sale revenues. Aggregation of small generators output is proposed as solution to reduce power sale risks and hence improve power sale returns. • Special provisions are currently being discussed for recognising and rewarding the benefits of embedded generation such as reduced transmission losses and reduced use of system. • In summary, whilst the full specification of NETA has yet to be finalised, NETA has been described as “a trading system designed by accountants for 1980s power systems”. Meaning that it appears to be designed more for large centralised conventional power systems than an increasingly distributed power system with greater renewable energy and CHP penetration.
Section 2.4 - Market volumes and values		
2.4.1	Volumes	• Currently about 10% (36TWh/yr) traded on pool, the rest bilateral agreements (324TWh/yr) • Under NETA an estimated 70% will be sold on the OTC market (250TWh/yr), 20-25% on the power exchanges (after 3 years) (72-90TWh/yr) and 5-10% on the balancing market (18-36TWh/yr). • On average renewable energy will probably have a higher fraction traded on the bilateral and balancing markets compared to nuclear and fossil generation due to the

		difficulties of accurately predicating output in advance for sale on the power exchanges.
2.4.2	Values	• Currently pool = approx. 1,160 Million Euro/yr • Currently bilateral = 10,433 Million Euro/yr Once NETA is established: • Over-the-counter market = 8,000 Million Euro/yr • Power exchanges = 2,250-2900- Million Euro/yr • Balancing Market = 580-1,160 Million Euro/yr Total 11,600 Million Euro, assuming a wholesale electricity price of 1.9 pence/kWh and 1Euro = £0.59 Of this, large hydro accounts for approx. 1.5% and other renewables 1% (this is ignoring any green premium on the electricity sale and is based on the current generation mix of the UK).
Section 2.5 - The green market		
2.5.1	Current	• There are about 20 green tariffs to choose from. Almost all supply companies offer green tariffs and there are 2 independent dedicated 'renewables only' electricity supply companies (REC and Unit-e). REC does not have government accreditation because of energy-to-waste in the generation mix. • Renewable energy is accredited by the Energy Saving Trust's (a government-recognised body) 'Future Energy' scheme. Energy-from-Waste and hydro > 10MW is excluded. • Number of UK green tariff customers (estimated) = 11,000 domestic (40MWh/yr) and <1000 business (1460GWh/yr). Maybe 12,000 in total. • Cost premium for accredited schemes = about 10% extra. The unaccredited supplier has a much smaller premium because of the use of waste-to-energy. • Domestic green tariffs have only been marketed to a limited extent and mostly by the 2 new independent suppliers (Unit[e] and to a lesser extent REC). Green tariffs to business have been marketed more by the unaccredited 'light-green' supplier (REC) with cheaper tariffs –hence perhaps explaining the higher green power sales to business than domestic customers in the UK. Business green tariffs have also been marketed by PowerGen and others. • There is currently some uncertainty in the market as it is not clear whether utilities will be able to market their obligated quota (see later) of renewables as green tariffs. If they can, then the market for independent green sales will be significantly reduced.
2.5.2	Future	• Interest in renewable energy could increase (especially in the business sector) if the Kyoto protocol is ratified. Companies may buy green power as part of their climate change strategy. • Projections for growth of the green market are difficult to come by. Market research suggests that large percentages of domestic consumers would be willing to pay slightly more for green electricity, but actual uptake is limited to sub-1% of the market. In the UK the green market will be supply-limited (ie, if demand grows significantly, there will be insufficient generation to serve this).

Section 3 - Energy and environment policy - legislation and targets for renewable energy		
Section 3.1 - Kyoto targets, historic and projected carbon emissions from the electricity sector		
3.1.1	Kyoto target	• UK Kyoto binding target is to reduce GHG emissions by 12.5% by 2008-2012. • The UK government have furthermore adopted a more stringent, but not binding, target to reduce emissions by 20% by the commitment period. • The UK should meet it's Kyoto targets in the first commitment without problem and the country could be feasibly be a net exporter of carbon credits. Further commitment periods could conceivably be more difficult to achieve due to gently rising energy demand and the decline of nuclear generation. Natural gas may not be able to replace nuclear, becomes by that time North Sea resources are likely to be depleted and imports may not be strategically desirable or economic.
3.1.2	Carbon emissions from the electricity sector	• million tonnes carbon emitted by the electricity and steam production sector, absolute: (source European Energy Outlook to 2020, European Commission, November 1999 1990 - 68.3 1995 - 57.7 2000 - 53.8 2005 - 54.8 2010 - 56.8 2015 - 61.7
Section 3.2 - Renewable energy policy, targets and timetables		
3.2.1	Renewable ***energy*** target	N/A. see renewable electricity target, below.
3.2.2	Renewable ***electricity*** target	• 5% of national electricity supply from renewables by 2003 • 10% by 2010, then maintained through to 2025 • Targets include the existing 1.5% large hydro. • These targets will not be set in law, but are policy statements only.
3.2.3	Renewable energy and electricity policy	The Utilities Bill is a new piece of legislation that is in an advanced stage of development, passing through various House of Commons committees now, and will probably be adopted by the end of 2000. **Confirmed - the Bill became the Utilities Act 2000.** The Bill will place an obligation on electricity supply companies to source an increasing percentage of their electricity from renewable sources (see targets section above). supply companies will be able to use green certificates as evidence of this renewable generation. The Bill has been developed in the overall context of Kyoto targets, but the obligations on suppliers is defined in terms of kWh of renewable electricity, not tonnes of CO2 avoided or some other carbon measure. In the pre-amble to the policy documents the various non-carbon benefits of renewable energy are cited (local development, security of supply etc). The Bill will replace the existing legislation that put in place the NFFO arrangements. There will be no more NFFO 'orders', but support for existing NFFO contracts will continue, and be integrated into the new obligation-based support arrangements. There has been extensive public consultation and consultation with the electricity industry since the Act was passed, which will lead to the writing of detailed legislation to enact the Renewables Obligation. This obligation will probably pass into law around late 2001
Section 3.3 - Specific renewable energy support mechanisms and schemes		
3.3.1	Obligations	• An obligation will be placed on electricity suppliers (see 3.2.3) • There will be competition amongst suppliers to secure renewable electricity at the lowest possible cost to meet the obligation. • The penalty for non-compliance has yet to be determined. It is likely that the penalties will be recycled in some manner to those suppliers who have complied with the obligation, so providing an additional incentive to suppliers to meet the obligation. The penalty will take the form of a buy-back rate for that part of the obligation that has not been met - ie suppliers will have the option of paying a buy-back price instead of sourcing renewable electricity. This has the same economic effect as a cap price. The penalty for non-compliance is very likely to be set at about 3p/kWh (30 pounds / MWh)

		• The Office of Gas and Electricity Markets (OFGEM), the energy regulator, has overall responsibility for administering the scheme. The obligation is likely to start in December 2001 • The obligation will be in force until 2025. The rate of the obligation is expected to rise to 10% by 2010, but stay at this level thereafter. • The obligation is uniquely for renewable electricity. There is no obligation or target for other forms of renewable energy.
3.3.2	Taxation	• Business users of energy are charged 0.43 pence/kWh (0.73 euro/kWh) through the 'Climate Change Levy' (CCL) energy tax on all electricity. Such consumers can claim an exemption from this tax by buying renewable electricity or using on-site renewables generation. • The CCL applies to all energy carriers, but is levied only on commercial consumers of energy.
3.3.3	Voluntary demand	• The proposed UK renewable policy does not rely on voluntary demand. What is unclear however is whether voluntary consumer demand for renewables will be additional to the 10% target, or whether electricity companies will be able to sell their obliged quota of renewables as premium green tariffs (see section 2.5.1).
3.3.4	Direct subsidies	• Government support (fiscal or otherwise) is proposed for 'non-competitive' (or non-price convergent, ie non-convergent with conventional power prices) renewables such as off-shore wind and biomass, to ensure the 10% target is met. Details have not yet been decided, but are likely to be based on capital grants.
3.3.5	Other support mechanisms	• Limited but growing government R&D programme.

Section 4 - Tradable Green Certificates developments		
Section 4.1 - policy and legislative background		
4.1.1	Policy support	• The Utilities Bill states that tradable green certificates may be used by supply companies to evidence the origin of supply for the purposes of claiming compliance with the Renewables Obligation. However, green certificates are only optional. Supply companies may choose to use contractual evidence for this. UPDATE: Green certificates will be called Renewable Obligation Certificates (ROCs). They are not optional - they are the only evidence that OFGEM will accept as proof of compliance.
4.1.2	Legislative framework	• See 4.1.1
Section 4.2 - Timetable for starting a system		
4.2.1	Timetable	• Design phase Spring / Summer 2000 • Testing probably during late 2000 / early 2001. (Update: Testing of the ROC registry built for OFGEM will be taking place late in 2001) • Provisional planned launch of system: April 1 2001, but possibly later. (update: will be launched probably in December 2001, but could even be later)
Section 4.3 - institutional infrastructure		
4.3.1	Regulation and control	• OFGEM (the electricity and gas market regulator) will have overall responsibility for regulation and control of the TGC market. (Update: Ofgem will not be concerned with market regulation and control, but rather with control of certificate issuing and redemption only)
4.3.2	Certificate 'issuing' authorities and executive bodies	• No certificate issuing authority or executive body have yet been defined, but OFGEM has overall responsibility. It is quite likely that OFGEM will choose to contract-out some of all of the administrative functions connected with green certificate issuing etc. • Ofgem will be responsible to the Government in carrying out this role. • It is not yet defined what duty of reporting Ofgem will have. • It is too early to say what will be the limits to the functioning of Ofgem. Certain functions such as generator accreditation and certificate issuing could well be undertaken by a third party who is appointed by Ofgem.

		• What is the geographical responsibility of these bodies - is one issuing body assigned to a region or the whole country? • **In terms of geographic coverage, Ofgem covers the markets of England, Wales and Scotland. Northern Ireland is covered by OFREG – the Office for the Regulation of Electricity and Gas. At the present time it seems likely that a single issuing body will cover the whole of England, Scotland and Wales.**
4.3.3	Trade registration / trade registrar	• Not yet defined. (Update: It is possible that this service could be provided by the private sector)
4.3.4	Certificate 'issuing' authorities and executive bodies	• Not yet defined. OFGEM may appoint private body as issuing body or do it themselves.
Section 4.4 - rules and scope of certification		
4.4.1	Scope	• Certification will cover just electricity. • Eligible renewable sources under the obligation will be the same as those currently defined by the DTI - ie, all renewable generation options excluding hydro over 10MW installed capacity and energy-from-waste. (Update: it is still too early to say exactly what technology / resource exclusions will apply. Some 'large' hydro may be permitted as long as the plant has been refurbished.) • All existing NFFO contracts that are live and which have been offered will be honoured (i.e. including those contracts that have been offered for schemes that have not yet been built or started generating). This means that some (most, in the first years) green certificates will come from schemes directly supported by NFFO. The exact details of how NFFO contracts will be bought into the green certificates have yet to be worked out. It seems likely that capacity from current NFFO schemes will be auctioned off. (This is happening) • It is likely that on-site renewable generation will be eligible to receive certificates.
4.4.2	Certificate information content	The details of the certificates are not yet defined, but it is likely that will contain: • A unique serial number • The denomination of the certificate (not yet decided, but probably 10MWh per certificate) • The period of production and / or the date of issue - ie identifying the period over which production took place, and the allocation of date for the purposes of certificate trading and tax treatment. This could have a resolution of one month. • The status of government or other financial support for the production, but it is unclear how this will be achieved at present. • The renewable energy resource used (wind, hydro etc) • Possibly the location of the production site UK green certificates are UNLIKELY to contain: ▪ An identification of specific technology of production (ie wind farm of specific size, size of hydro installation etc) as the UK system is meant to leave technology choice to the generation market. ▪ The issuing body as there will probably be only one issuing body in the UK so no need to state. Issues yet to be determined include: • Generator identification • Information on related CO_2 benefits or quantities. • The period of validity of the certificate

Section 4.5 - trading and intervention		
4.5.1	National	• Is there no clear procedure for the 'redemption' of certificates yet. • An effective cap will be imposed on the certificate market price by statutory order. The level is being determined during the summer of 2000. At the moment the suggested price cap is 2 pence/kWH (approx. 0.034 Euro/kWh). (now 3p/kWh) • No 'floor' or minimum price for certificates is likely to be imposed in the market. • Since no trade has yet taken place, there is no information on prices that certificates are traded at. However, we can observe that it is likely that certificates will rise to the cap price quickly, since there will be a relative under-supply of renewable energy in the early years of the project. • No certificate exchange or other single trading environment been created for the certificates. It is presently unclear whether such a market place will be created. • There is some evidence that certificate brokers are beginning to operate in the market. • No forward contracts, futures contracts, or other derivatives have been offered yet. • No generators or suppliers have yet grouped together to take a stronger position in the certificate market alone. • It is still too early to state whether certificates will be acceptable as evidence of green production, for green power consumers. • The VAT situation for certificates is unclear at present. The CCL tax has been explained elsewhere.
4.5.2	International	• International certificate trading is being fully considered at the design stage of the UK domestic certificate scheme. • It is too early to say under what conditions international trading of certificates will be allowed. However, it seems likely that basic reciprocity will be required between the UK and the trading partner. • It is much too early in the UK to say whether internationally-sourced green certificates would be acceptable as evidence of green production for green power consumers.
Section 4.6 - Other information		
4.6.1	Other information	