September 2003

HSBC

European Utilities

Pathfinder II

- **A comprehensive guide to the European Utilities sector**
- **A deconstruction of the value chain by country and by company**
- **Analysis of key renewables issues**

A comprehensive guide to the European Utilities sector
This updated document is both a reference tool and an essential guide to the European Utilities sector. It offers detailed information on a country-by-country and company-by-company basis. Topics covered include, key historical milestones, macro-level forecasts, commodity pricing, key issues, outlook and company-specific operational and financial analysis. The guide separates the European Utilities sector into 7 country sections, covering a total of 22 companies, and has been designed to provide the reader with an 'at your finger tips' user-friendly reference tool.

A deconstruction of the value chain by country and by company
Macro level details are given of market share in generation and supply. In addition, there is an explanation of the regulatory structure in each country. At a company level, the guide provides detailed information on operational structure and key strategic issues.

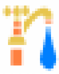
Analysis of key renewables issues
We examine the commercial implications of global warming, acid rain, and nuclear waste production on the electricity industry, analysing the key environmental issues and the policy responses that countries have proposed or adopted.

Contents

Key

The companies covered in this booklet have business activities that are classified as sub-sectors within the utilities universe. For quick reference, we provide a picture key using symbols to indicate the sub-sectors companies operate in. In addition, we have grouped the sub-sectors according to their respective points on the value chain.

Key to symbols

Symbol	Meaning
	Electricity generation – upstream
	Electricity transmission/distribution – midstream
	Electricity supply – downstream
	Gas transmission/distirbution – midstream
	Gas supply – downstream
	Water
	Telecoms/communications

Source: HSBC

UK

Introduction

Electricity

The UK electricity and gas markets were among the first in Europe to be unbundled (ie the separation of generation, transmission and distribution assets) and 100% liberalised. The England and Wales market was liberalised before the markets in Scotland and Northern Ireland; as a result, the UK markets have diverse structural and regulatory characteristics.

Generation – upstream

- England and Wales 100% liberalised
- BETTA scheduled to be introduced in April 2005, effectively bringing Scotland into NETA

In March 2001, the wholesale pricing system in England and Wales was changed from a pool system (instituted in 1991) to a pay-as-bid structure – the New Electricity Trading Arrangements (NETA). Under NETA, wholesale electricity is traded between generators, suppliers and traders through bilateral contracts and on power exchanges. Wholesale electricity pricing in Scotland and Northern Ireland shadows prices in England and Wales. Wholesale electricity prices have fallen substantially following the introduction of NETA, with energy traded at c40% below 1998 prices; however, prices now appear to be trending upwards.

The decline in prices between the pool system and NETA reflects the degree of excess capacity, but also the high levels of vertical integration in the system. The weak wholesale prices have resulted in financial difficulties at British Energy, TXU Europe and AES Drax.

The introduction of the government's new British Electricity Trading and Transmission Arrangements (BETTA) is planned for April 2005. BETTA aims to introduce wholesale electricity trading and transmission arrangements for the whole of Great Britain, allowing competitive markets to develop further. The BETTA agreement is currently in the consultation stage.

The Energy White paper (March 2003) reaffirmed the government's intentions to develop the country's renewable energy portfolio. The aim of the plan is to ensure greater stability and security of energy supply and to meet the emission targets set by the Kyoto protocol.

UK

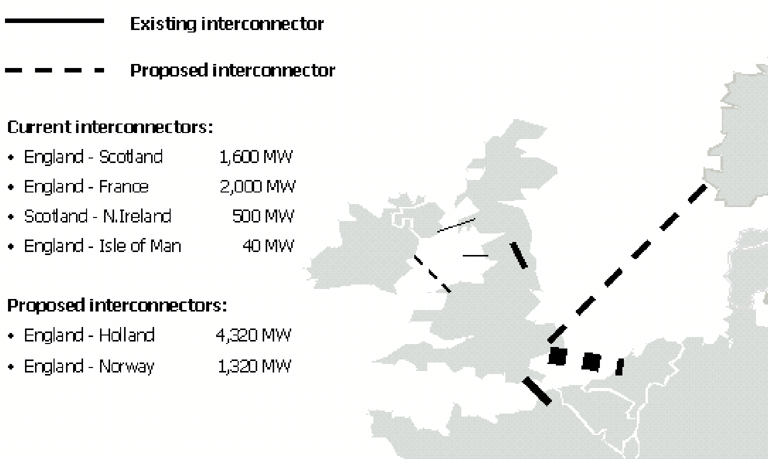
Networks – midstream

- Natural monopolies – regulated by Ofgem (E&W, Scotland) and Ofreg (NI)
- Price controls typically take two years, including extensive consultation

Ownership of the UK's electricity transmission grid is split between four companies. The England & Wales transmission grid is 100%-owned and operated by the National Grid (National Grid Transco). ScottishPower and Scottish & Southern Energy manage the transmission grids in their respective 'lowland and highland' regions in Scotland and Northern Ireland Electricity (NIE), a subsidiary of the Viridian Group, operates the Northern Irish grid. Transmission is a natural monopoly and is regulated by Ofgem through five-yearly price reviews. The current period expires in 2005.

Interconnectors are in operation between England and France, England and Scotland, and Scotland and Northern Ireland. Each interconnector is jointly owned and operated by the respective transmission companies.

UK interconnector capacity

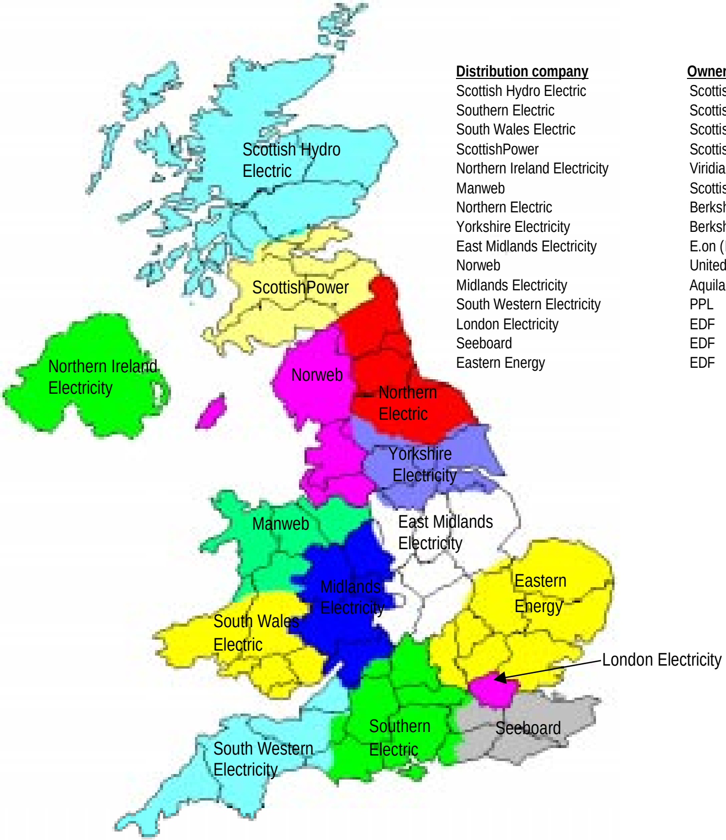


Source: HSBC, Electricity Association

UK

Regional Electricity Companies (RECs) own and operate the regional distribution networks; there are currently 12 RECs. Distribution is a natural monopoly and hence is regulated by Ofgem through five-yearly price reviews.

Distribution Network Operators (DNOs)



Distribution company	Owner
Scottish Hydro Electric	Scottish & Southern Energy
Southern Electric	Scottish & Southern Energy
South Wales Electric	Scottish & Southern Energy
ScottishPower	ScottishPower
Northern Ireland Electricity	Viridian Group
Manweb	ScottishPower
Northern Electric	Berkshire Hathaway
Yorkshire Electricity	Berkshire Hathaway
East Midlands Electricity	E.on (Powergen)
Norweb	United Utilities
Midlands Electricity	Aquila
South Western Electricity	PPL
London Electricity	EDF
Seeboard	EDF
Eastern Energy	EDF

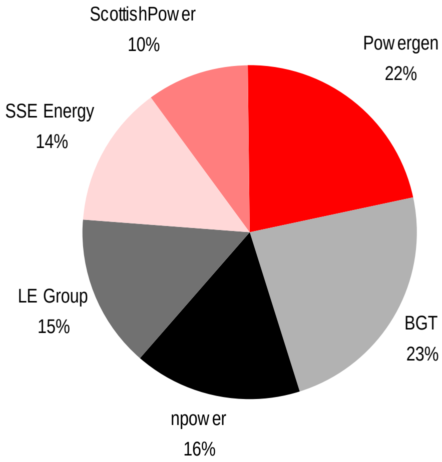
Source: HSBC

UK

Supply/retail – downstream

- Supply 100% liberalised
- High churn rates characterise Europe's most competitive retail market

UK domestic electricity supply – market shares – March 2003



Source: HSBC, Ofgem, MPAS providers

The supply market is 100% liberalised. Relative to liberalised European retail markets, the UK is highly competitive, with a large number of participants and a high level of customer switching. First-time switchers benefit from the greatest reduction in prices. It is worth highlighting a growing trend of multiple switchers (customers who have switched more than once). This could have a detrimental impact on companies that made heavy investments in acquiring new customers. As at March 2003, 11m customers had switched from their original electricity supplier (38% of customers).

UK

Gas

Production/storage – upstream

- Centrica must place 80% (increasing to 85%) of Rough Storage capacity up for auction

- UK to become net importer of natural gas

Centrica's purchase of Rough Storage facility (the UK's largest gas storage facility, with a capacity of 100 bcf and a delivery rate of 1.5bcf a day) in November 2002 was referred to the Department of Trade and Industry on competition grounds. The DTI ruled that Centrica must allow 80% (climbing to 85% by 2010) of storage capacity to be placed up for auction. However, the company will be permitted to keep any additional capacity that it develops.

Transmission/distribution – midstream

- Transco is the monopoly transporter of gas and owner and operator of National Transmission System and Regional Distribution Networks

- Current price controls applicable to 2007

Transco (owned by National Grid Transco) is the monopoly transporter of gas in the UK and is regulated by Ofgem. In July 2002, Ofgem set out the rationale for introducing separate price controls for each of Transco's eight regional distribution networks. Ofgem claims that separate price controls will provide a consistent regulatory approach, increase transparency and encourage efficiency. A separation of Regional Network formula is expected by April 2004.

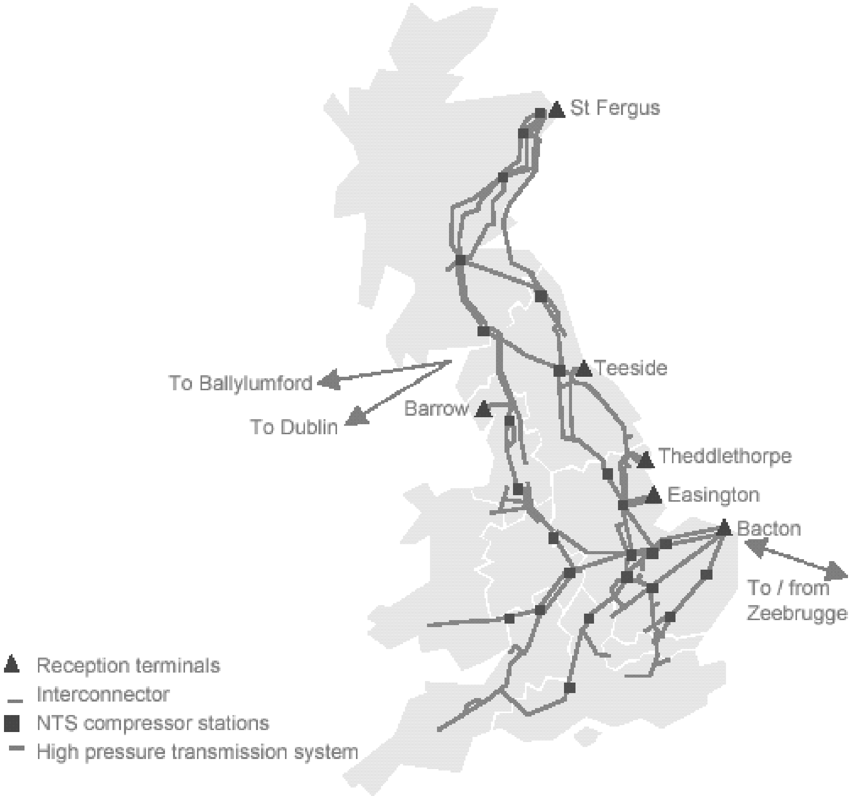
Gas is delivered into the 6,300km National Transmission System, the high pressure pipeline network, through seven gas beach terminals, an interconnector with Europe and from nine major gas storage sites.

Gas transmission is subject to a five-yearly price review and an RPI-X price control formula (X=2 in the current period) based on a Regulatory Asset Value of GBP13.9bn. The current price control is applicable until March 2007.

After transmission, gas is transported to the regional distribution network, consisting of 268,000km of lower pressure pipelines. The distribution price control set allowed revenue of cGBP2bn for 2002-03.

UK

Gas transmission system



Source: Transco, HSBC

UK

Regional distribution networks

Source: Transco, HSBC

UK

Supply – downstream

- The main player is Centrica, through the British Gas brand. Other suppliers include London Electricity, npower, Powergen and EdF

- 7m customers have switched suppliers since market opening

Gas markets were fully opened in May 1998, allowing users to switch suppliers. Since liberalisation, over 7m customers have switched. Centrica operates c70% of the UK gas supply network ‘to the door’, largely under the British Gas brand.

Water

- Natural monopolies – regulated by Ofwat

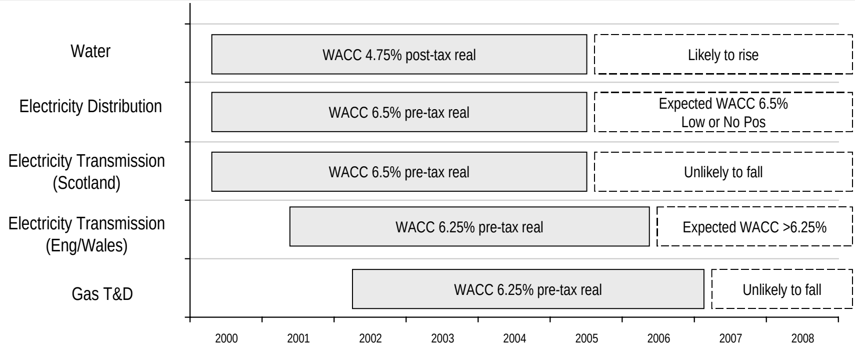
- Next price review in 2004

UK water companies were privatised in 1989 and are subject to regulation by Ofwat. Regulated water services are subject to price limits, which are set every five years by the regulator. The next period of price limits will be set in 2004 for the period 2005-06 to 2009-10. Water companies are able to apply for interim determinations (IDoK) for price increases in between price-setting periods.

Average household water bills are expected to be GBP235 for 2004-05; however this is expected to range significantly from GBP209 in the Thames region to GBP380 in the South West.

UK

Regulation timetable



Source: HSBC

UK

England and Wales

Generation	
Regulation	
	▸ NETA is the wholesale electricity pricing system in England and Wales.
	▸ Wholesale energy is traded between generators, suppliers and traders through bilateral contracts and on power exchanges.
Key dates	
	▸ The UK was the first European market to privatise its power generation industry.
1989 – July	▸ Electricity Act 1989 receives Royal Assent. The Electricity Act splits the generation market between two companies – National Power and Powergen.
1989	▸ All nuclear assets are withdrawn from the privatisation process.
1991 – March	▸ 60% of National Power and PowerGen floated.
1991 – June	▸ Hydro Electric and ScottishPower floated.
1993 – June	▸ Northern Ireland Electricity floated.
1995 – March	▸ Second tranche (40%) of National Power and PowerGen floated.
1996 – July	▸ British Energy floated.
2001 – March	▸ New Electricity Trading Arrangements (NETA) go live in England and Wales.
2001 – December	▸ Consultation paper published on expanding NETA to include the Scottish market (BETTA).
2002 – November	▸ British Energy applies for government support.
2002 – October	▸ Collapse of TXU Europe leaves Drax power station in financial difficulty. Powergen acquires TXU Europe's retail operations.
2003 – February	▸ Energy White Paper disappoints in its renewables commitment. Later in the year, the government announces plans for up to 6GW of offshore wind generation. The large-scale offshore wind farm development currently appears to be uneconomic.
2003 – August	▸ AES leaves Drax in the hands of creditors after its restructuring proposals are rejected. International Power enters exclusive negotiations with Drax for a stake in power plant.

Source: HSBC

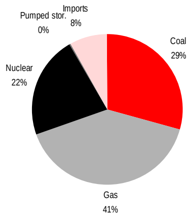
UK

Generation (cont'd)

Market structure	
Energy portfolio	▶ Generation in England and Wales has evolved from a highly concentrated market with a few portfolio players to a market with many diverse generating companies, including merchant generators often owning only one plant.
Fuel mix	▶ Coal accounts for 38% of installed capacity, gas for 33%, nuclear for 15%, interconnectors for 6%, oil for 4% and others, including pumped storage and renewables for the remaining 6%.
Oversupply to 2005	▶ The UK generation market is substantially over-supplied – current reserve margin c20%. Industry forecasts indicate that this supply/demand imbalance will tighten by 2005.
	▶ Factors that will influence this reversal include: ▶ NETA and its perceived lack of signalling capability. ▶ Emission restricitions.
Outlook	
Prices	▶ Due to persistent overcapacity (see following section) we expect prices to be stable at around cash cost of GBP16-17/MWh
Renewables	▶ The Energy White Paper published in February 2003 outlined strategic plans for the future of energy supply in the UK. The paper disappointed by only informally setting a target of 20% of energy supply from renewables sources and carbon emission cuts of 60% by 2050.
BETTA	▶ BETTA expected to come into force April 2005 (Government deadline of October 2005).

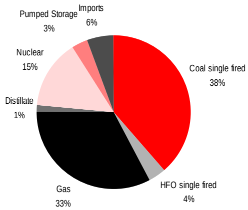
Source: HSBC

2002 generation output: total 308TWh



Source: Powerink/HSBC

2002 capacity by fuel type: total 67,548MW



Source: Powerink/HSBC

UK

Installed capacity breakdown MW

Fuel type	Coal	HFO	Gas	Nuclear	Distillate	Pumped storage	Imports
Capacity MW	25,997	2,492	22,240	9,984	911	2,088	3,836
%	38	4	33	15	1	3	6

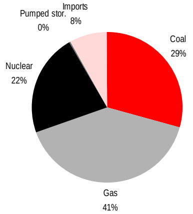
Source: HSBC

2002 capacity margin for England & Wales

Capacity margin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand: GW	50.96	52.28	52.75	53.23	53.70	54.19	54.68	55.17	55.66
Capacity available GW	63.66	67.89	67.55	64.56	64.96	65.81	64.46	62.75	62.08
Capacity margin: %	25%	30%	28%	21%	21%	21%	18%	14%	12%

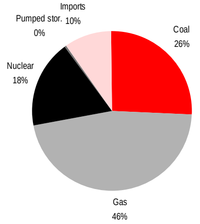
Source: Powerink/HSBC

UK generation mix 2002



Source: Powerink/HSBC

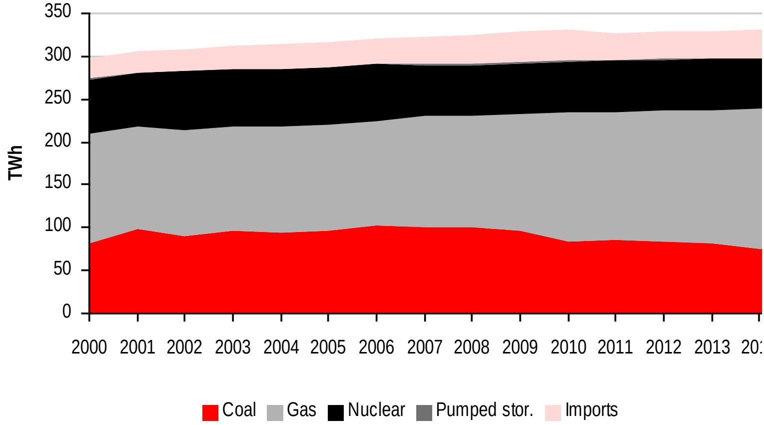
UK generation mix 2012



Source: Powerink/HSBC

UK

Projections for the UK power sector by fuel type



Source: Powerink/HSBC

Interconnection capacities England and Wales 2002 (MW)

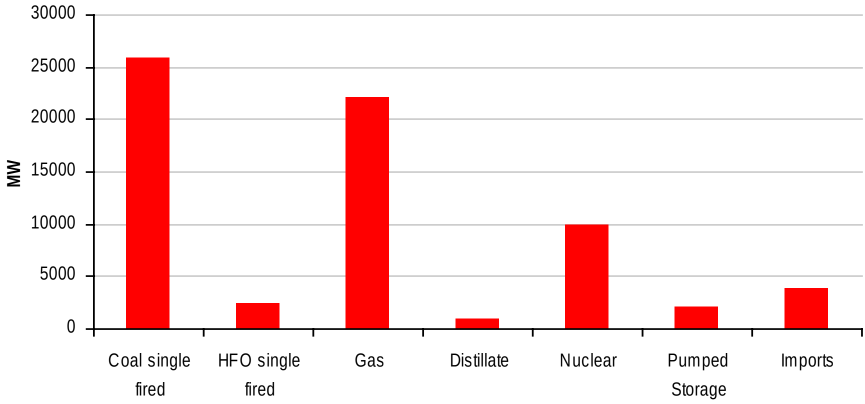
Scotland	France	MANX
1600	2000	40
44%	55%	1%

Source: Powerink/HSBC

UK

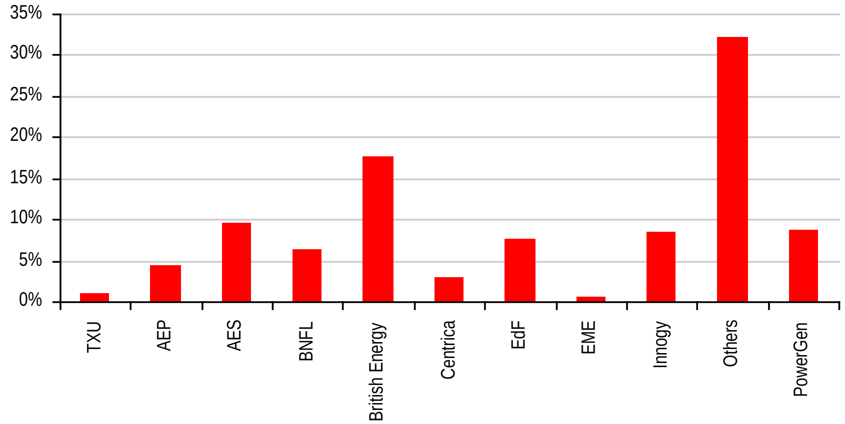
Market players

England & Wales capacity by fuel type: 67,548MW (2002)



Source: Powerink/HSBC

England & Wales generation output by company: 308TWh (2002)



Source: Powerink/HSBC

UK

2002 installed capacity by company (England and Wales) – total 67,548MW

Company	MW	%
British Energy	9225	14%
Innogy	8186	12%
PowerGen	8138	12%
EdF	5784	9%
AES	4425	7%
AEP	3921	6%
BNFL	2915	4%
TXU	2607	4%
Edison Mission Energy	2385	4%
Centrica	1847	3%
Others	18115	27%

Source: Powerink/HSBC

2002 installed capacity by company (Scotland) – total 11,746MW

Company	MW	%
ScottishPower	4785	41%
SSE	3476	30%
British Energy	2539	22%
BNFL Magnox	196	2%
BP	130	1%
El Paso/Global Energy	120	1%
Others	500	4%

Source: Powerink/HSBC

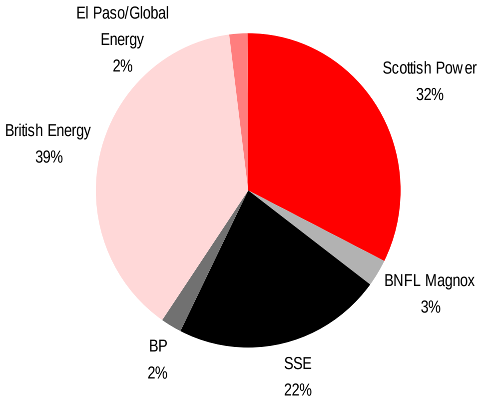
2002 installed capacity by company (N. Ireland) – total 2,269MW

Company	MW	%
Premier Power	866	38%
Nigen	698	31%
Coolkeeragh Power	178	8%
Various Renewables	27	1%
Others	500	22%

Source: Powerink/HSBC

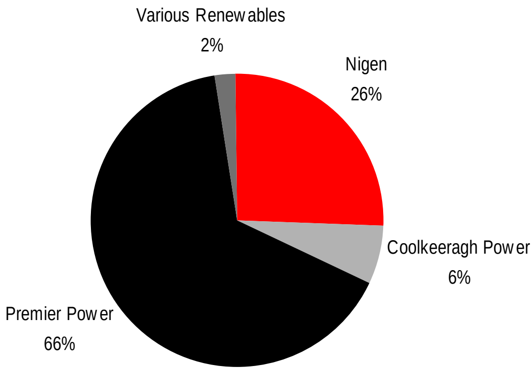
UK

Scotland generation output by company: 49TWh (2002)



Source: Powerink/HSBC

Northern Ireland generation output by company: 8.6TWh (2002)



Source: Powerink/HSBC

UK

Transmission

Regulation	
	▸ Ofgem regulates the English, Welsh and Scottish electricity network companies. ▸ Electricity transmission is subject to a five-yearly price review; the current price control is applicable until March 2006.
Key dates	
1990 – March	▸ ScottishPower and Scottish & Southern Energy privatised.
1995 – December	▸ National Grid privatised after RECs demerge shareholdings in the company.
2002 – October	▸ National Grid merges with Lattice to form National Grid Transco.
Market structure	
England and Wales	▸ The transmission system in England and Wales is owned and operated by National Grid Company (National Grid Transco).
Scotland	▸ The transmission system in Scotland is owned and operated by ScottishPower and Scottish and Southern Energy in the south/north of Scotland, respectively.
N. Ireland	▸ Northern Ireland Electricity (100% owned by the Viridian Group) owns and operates the Northern Ireland grid.
Regulated by Ofgem	▸ Transmission is a natural monopoly – all operators are regulated by Ofgem. ▸ The companies face five-yearly regulatory reviews. ▸ Transmission system operators have a statutory duty to develop and maintain an “efficient, co-ordinated and economic transmission system” and to facilitate competition in supply and generation. ▸ They must also ensure that the systems in England and Wales, Scotland and N.Ireland are balanced, taking into account and resolving any constraints on the transmission network.
Interconnectors	▸ Currently, National Grid Transco is investigating the possible development of three other interconnectors with the Republic of Ireland, Norway and the Netherlands. ▸ The interconnectors are jointly owned and operated by the ‘regional’ players. For example, the interconnector between Scotland and England is jointly managed by ScottishPower, Scottish and Southern Energy and the National Grid Company, while the England/France interconnector is jointly owned and operated by National Grid and French grid operator RTE.
Outlook	
BETTA	▸ Ofgem is working to extend NETA to customers in Scotland. This will lead to the creation of a UK-wide Electricity Trading and Transmission Arrangements. Both Ofgem and the Department of Trade and Industry (DTI) are now working to implement the new arrangements by April 2005.

Source: HSBC

UK

Distribution	
Regulation	
	▶ Ofgem regulates the English, Welsh and Scottish electricity network companies. ▶ Electricity distribution is split into14 Distribution Network Operations (DNOs).
Key dates	
1990 – December	▶ Regional Electricity Companies (RECs) floated.
1995 – March	▶ Government's 'golden share' in the RECs disposed.
2000 – July	▶ Utilities Act calling for the legal seperation of the distribution and supply activities of companies receives royal assent.
Market structure	
	▶ Electricity distribution is a natural monopoly – all operators regulated by Ofgem.
Five yearly reviews	▶ The companies face five-yearly regulatory reviews. ▶ Under the Utilities Act 2000 it has become a separately licensable activity. ▶ During 2001, the electricity companies separated their distribution and supply businesses into legally distinct companies, as called for by the Utilities Act. ▶ See Distribution Network Operators (DNOs) – see distribution owners map for a breakdown of who owns whom.
Outlook	
Ofgem consultation	In October 2002, consultation opened on distribution charges. Ofgem is seeking to: ▶ Review the way charges are set. ▶ Establish a more transparent approach to charging for connection to and use of network. ▶ Develop a better framework for distributed generators, such as CHP, wind and hydro.

Source: HSBC

UK

Supply

Regulation	
	▶ The UK supply market is 100% liberalised
	▶ As of March 2003, 38% of all domestic electricity customers had changed from their incumbent supplier.
Key dates	
1990-98/99	▶ Competition phased in over eight-year period.
1990 – April	▶ Customers with annual demand >1MW eligible to choose supplier.
1994 – April	▶ Customers with annual demand between 100kV-1MW eligble to choose supplier.
1998-99	▶ Remainder of market (residential + small businesses) eligible to choose supplier.
2000 – July	▶ Utilities Act calling for the separation of the distribution and supply activities of companies receives royal assent.
Market structure	
	▶ During 2001, the electricity companies separated their distribution and supply businesses into distinct companies, as called for by the Utilities Act.
	▶ Any company holding an electricity supply licence can sell electricity, without statutory obligation; however, it is worth noting that supply licensees have a duty to offer terms on request; in other words, they must supply electricity to any customer within their designated territory at request.
	▶ Suppliers are entitled to supply customers nationwide using other companies' distribution networks and by paying Distribution Network Operators (DNOs) for the use of the system.
	▶ Suppliers have to ensure that they have sufficient electricity sources at their disposal to meet their customer requirements.
	▶ Balancing demand can be achieved through bilateral contracts with generators, buying on power exchanges or by establishing proprietary generation.
	▶ A number of the major generators are active in the supply market.
Outlook	
	▶ Margins continue to be relatively high in the supply market, particularly to households. There may be political pressure to see a reduction in these prices, subsequently leading to a fall of margins from c10% to c5%.

Source: HSBC

UK

UK retail – market share (March 2003)

Company	Electricity customers (%)	Gas customers (%)
Powergen (E.ON)	22%	12%
BGT (Centrica)	23%	63%
npower (RWE)	16%	9%
LE Group (EdF)	15%	5%
SSE Energy (SSE)	14%	6%
ScottishPower (SPW)	10%	5%

Source: HSBC, Ofgem

UK

Gas transmission and distribution

Regulation	
	▸ Ofgem is governed by the Gas and Electricity Markets Authority and its powers are provided for under the Gas Act 1986, the Electricity Act 1989 and the Utilities Act 2000.
	▸ December 2002 – draft proposals for separate controls published, which aim to ensure: ▸ Consistent regulatory approach. ▸ Effective regulation. ▸ Encourage **efficiency, security of supply and quality** of service.
Key dates	
1997 – February	▸ UK gas market 100% liberalised.
1997	▸ British Gas plc demerged into Centrica and BG plc
2000 – October	▸ BG plc demerged into BG Group plc and Lattice.
2002 – April	▸ 12 Local Distribution Zones (LDZs) reorganised into eight regional networks.
2002 – July	▸ Ofgem publishes consultation document setting out rationale for introducing separate price contols for Transco's eight regional distribution networks.
2002 – October	▸ National Grid mergers with Lattice to form National Grid Transco plc.
Market structure	
	▸ Gas producers deliver gas to the beach terminals (seven in total) from c100 offshore gas fields.
	▸ Other gas supply sources come from LNG terminals and gas interconnectors from Belgium and the Republic of Ireland.
	▸ The National Transmission System 'NTS' supplies gas to 40 power stations, a small number of large industrial consumers and eight regional distribution networks, which eventually supply the consumer.
	▸ The eight distribution networks are: Scotland, North of England, North-West, West Midlands, East of England, Wales & the West, South of England and London
	▸ The transmission and distribution of gas in the UK was unbundled from supply as part of the market liberalisation process in 1997.
	▸ Transco operates the regulated (by Ofgem) gas transmission and distribution pipeline network.
	▸ Transco undergoes a regulatory review on a five-yearly basis
	▸ Distribution charges account for c30% of the average domestic gas bill.
Outlook	
	▸ National Grid Transco is currently reported to be interested in the sale of a number of its gas distribution networks. Each of the distribution networks have a RAV value between GBP800m-GBP2bn.

Source: HSBC

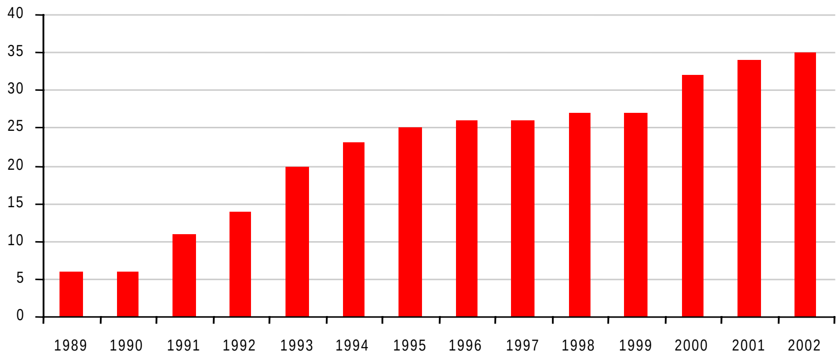
UK

Gas supply	
Regulation	
	▶ Ofgem licences and monitors the gas and electricity companies.
Key dates	
1997 – February	▶ UK gas market 100% liberalised.
1997	▶ British Gas plc demerged into Centrica and BG plc
1999 – January	▶ The roles of the Office of Electricity Regulation and the Office of Gas Supply merged. Called Ofgem (Office of Gas and Electricity Markets), this body regulates the UK electricity and gas markets.
2000	▶ October BG plc demerged into BG Group plc and Lattice.
2000 – July	▶ Utilities Act 2000 received royal assent.
Market structure	
	▶ There are c90 gas supply companies (known as shippers) in the UK, whose gas is transported through Transco's gas transportation system.
	▶ All suppliers must be licensed by Ofgem (formerly Ofgas) to sell gas.
	▶ Centrica controls c70% of the gas supply market (residential and commercial). Centrica supplies gas through its brand, British Gas.
	▶ Ofgem is governed by the Gas and Electricity Markets Authority and its powers are provided for under the Gas Act 1986, the Electricity Act 1989 and the Utilities Act 2000.
Outlook	
	▶ A poison pill exists, such that if Centrica is acquired by another company, then ownership of the British Gas brand will revert to BG Group.

Source: HSBC

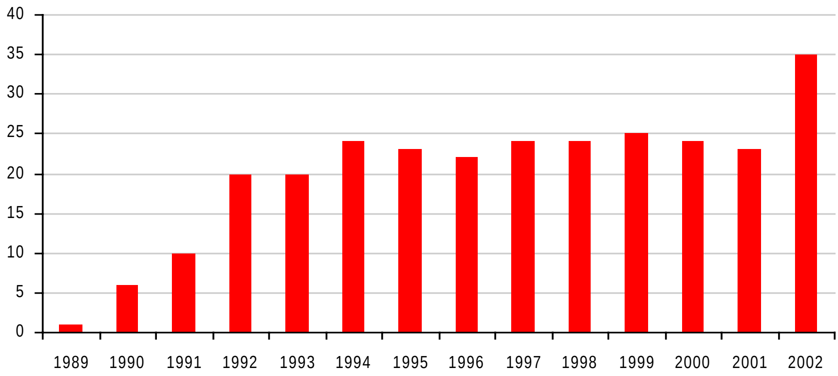
UK

Number of major electricity power producers



Source: HSBC, Department for Trade and Industry

Number of major industrial gas suppliers

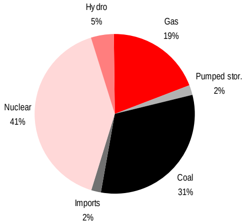


Source: HSBC, Department for Trade and Industry

UK

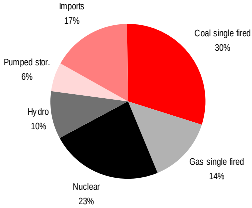
Scotland

2002 generation output: total 49TWh



Source: Powerink/HSBC

2002 capacity by fuel type: total 11,746MW



Source: Powerink/HSBC

Installed capacity breakdown MW

Fuel type	Coal	Gas	Nuclear	Hydro	Pumped storage	Imports
Capacity MW	3513	1612	2735	1186	700	2000
%	30	14	23	10	6	17

Source: Powerink/HSBC

Capacity margin

Capacity margin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand: GW	5.03	5.09	5.15	5.21	5.27	5.34	5.40	5.47	5.53
Capacity available GW	9.21	9.53	10.17	10.85	10.87	10.87	10.87	10.87	10.87
Capacity margin: %	83%	87%	98%	108%	106%	104%	101%	99%	96%

Source: Powerink/HSBC

UK

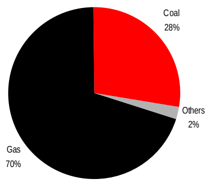
Scotland	
Regulation	▸ Ofgem regulates the English, Welsh and Scottish electricity network companies ▸ Scottish and Southern Energy and ScottishPower are subject to regulatory controls in their regulated businesses.
Key dates	
2001 – December	▸ Consultation paper published on expanding NETA to include the Scottish market (BETTA)
2005 – April	▸ BETTA expected to come into force (Government deadline of October 2005).
Gas market	▸ ScottishPower and Scottish and Southern Energy both have gas supply businesses. ▸ ScottishPower supplies gas to c70,000 customers. ▸ Scottish and Southern Energy supplies gas to c1m customers. ▸ Centrica is the retail market leader in Scotland supplying c70% of the population.
Generation	▸ The Scottish electricity market is still, to a large extent, vertically integrated across generation, transmission, distribution and supply. ▸ British Energy is the third major player in Scotland. ▸ Under the Nuclear Energy Agreement (NEA), a pre-privatisation agreement dated June 1990, ScottishPower & SSE take 74.9% and 25.1%, respectively, of British Energy's Scottish output from Hunterston B and Torness; the agreement runs for 15 years.
Transmission	▸ The Scottish transmission grid is owned and operated by ScottishPower and Scottish & Southern Energy in their respective regions. ▸ Ofgem regulates the transmission network, setting an allowed rate of return (RAB) on a five-yearly basis.
Distribution	▸ The Utilities Act 2000 called for the legal seperation of the distribution and supply networks across the UK. ▸ Subsequently, the Scottish distribution networks have been legally unbundled. ▸ Ofgem regulates distribution in Scotland, setting an allowed rate of return (RAB) on a five-yearly basis.
Supply	▸ The supply market in Scotland is fully liberalised. ▸ The Utilities Act 2000 called for the seperation of the distribution and supply networks across the UK. ▸ Third parties have access to the Scottish transmission and distribution systems on a non-discriminatory basis. ▸ Currently 10 suppliers are licensed to supply electricity in Scotland. ▸ SPW and SSE are the major electricity supply companies.

Source: HSBC

UK

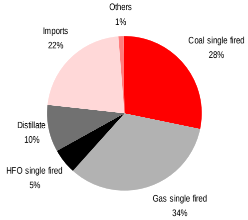
Northern Ireland

2002 Generation output: total 8.6TWh



Source: Powerink/HSBC

2002 Capacity by fuel type: total 2,268MW



Source: Powerink/HSBC

Installed capacity breakdown MW

Fuel Type	Coal	Gas	HFO	Distillate	Imports	Others
Capacity MW	640	750	120	232	500	27
%	28	33	5	10	22	1

Source: Powerink/HSBC

UK

Northern Ireland	
Regulation	▸ Responsibility for the regulation of the industry is in the hands of OFREG – the Office for the Regulation of Electricity and Gas – which oversees the development of competition and protects the interests of customers in Northern Ireland.
Key dates	
1931	▸ The Electricity Act 1931 establishes the Electricity Board for Northern Irland (EBNO) along with the Corporation Electricity Departments and the Joint Electricity Authority.
1973	▸ The three bodies are amalgamated to form the Northern Ireland Electricity Service (NIES).
2002 – July	▸ Virdian's NIE and Ofreg reach an agreement on NIE's Transmission and Distribution Price Review. The price control period will run through April 2002 and March 2007.
Gas market	▸ Natural gas in Northern Ireland is transported and sold by Phoenix Natural Gas Ltd. ▸ Phoenix has been granted the exclusive licence to allow it time to develop the network; however, large gas customers will be able to choose their suppliers within 3 years and domestic customers will have a choice within 8 years.
Generation	▸ Northern Ireland has four major power stations: Ballylumford, Kilroot, Belfast West and Coolkeeragh with a total generating capacity of 2,253MW. ▸ Ballylumford and Kilroot account for c90% of all Northern Ireland's generation output. ▸ NIE (subsidiary of Viridian) is also the sole procurer of power from the generating companies in Northern Ireland. ▸ Power companies in Northern Ireland are required (under a series of power procurement agreements and generating unit agreements – GUAs – at privatisation) to sell all their output to NIE.
Transmission	▸ NIE is Northern Ireland's independent system operator. It is responsible for the transmission and distribution of electricity, through a subsidiary company, SONI. ▸ In 1998, Northern Ireland Electricity (NIE) was split into two businesses: one to focus on the regulated business (NIE) and a non-regulated division (Viridian plc). ▸ NIE acts as the Independent System Operator with responsibility for transmission and as the role of 'sole' power procurer. ▸ In 2001 the Northern Irish system was re-connected with the Electricity Supply Board (ESB) system in the Republic of Ireland. ▸ A new interconnector link with Scotland is currently being commisioned; it is expected that the new interconnector will meet c20% of future demand.

UK

Northern Ireland (cont'd)	
Supply	▸ NIE is Northern Irelands Independent System Operator. It is responsible for the transmission and distribution of electricity through a subsidiary company, SONI. ▸ Second-tier licences enable other licensed suppliers to sell electricity to final customers in Northern Ireland, so as to ensure competition. ▸ From April 2001 all customers with a maximum demand over 1MW or consuming at least 0.79GWh a year (c35% of total) are eligible to purchase electricity from generators either directly or through second-tier suppliers. ▸ Viridian Group plc, through its 100% ownership of Northern Ireland Electricity has the majority of the Northern Irish supply market.

Source: HSBC

UK

Electricity pricing

Wholesale electricity prices rise in the colder months as demand for heating rises, but falls to lower levels in the summer months as this demand is lower. In 2002, average wholesale electricity prices were highest in January and lowest in August.

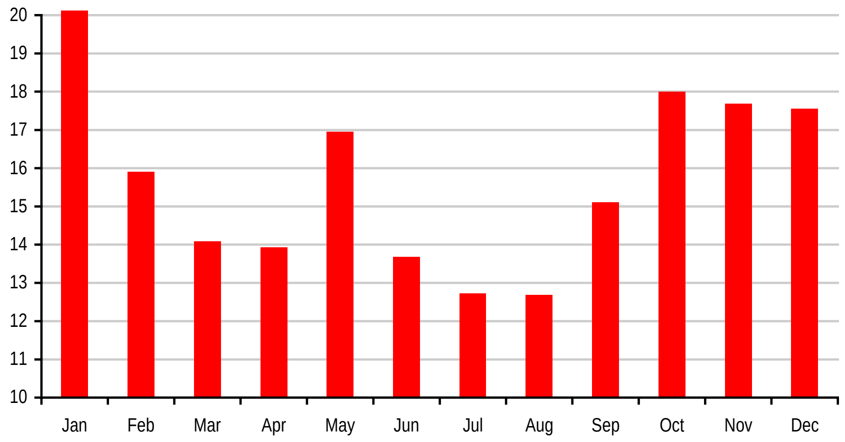
England & Wales

TWA prices for 2002 (GBP/MWh)

	All-year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	15.71	20.18	15.91	14.09	13.93	16.95	13.68	12.72	12.68	15.10	18.00	17.69	17.56

Source: Thomson Financial Datastream

Prices for 2002 (GBP/MWh)



Source: HSBC

UK

Major issues

Generation	
Overcapacity	Current reserve margin of 20% not expected to decline markedly in the next two-three years. This has led to the financial difficulties experienced by a number of unhedged generators.
Renewables	The UK must have 10.4% of its electricity generated from renewables by 2010, with the 2003-04 target set at 4.3%. However, the UK has consistently missed this target. This has led to an increase in prices received by renewable generators, acting as an incentive for renewable development. However, the Government's white paper failed to provide the visibility required to achieve sufficient investment. A 2003 announcement to develop up to 6,000MW of offshore wind energy appears to be over-optimistic as the economics do not appear to make such development economical.
Carbon trading	Carbon emitters will also be given a carbon emission allowance. Excess carbon rights can be traded on a market once the system is established in 2005. A shortfall in rights can be rectified through the purchase of credits from the market; however, this would represent a higher cost of electricity generation and could cause a slight uplift to underlying eletricity rates.

Source: HSBC

UK

British Energy

Key data

RIC code Market cap

BGY.L GBP43m

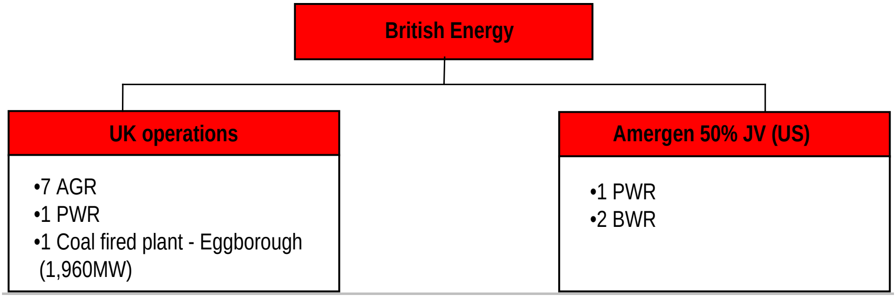
Analyst:

Bruce Bromley

Business description

Electricity generation (nuclear power generator) and coal.

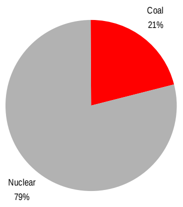
Ownership structure



Source: HSBC

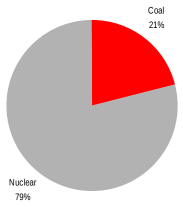
UK

2002 generation type breakdown 54.4TWh



Source: Powerink /HSBC

2002 company capacity 9,225MW



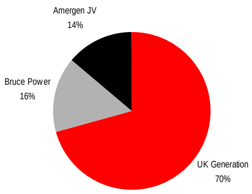
Source: Powerink/HSBC

Capacity breakdown by fuel and region MW

Country	Nuclear	Coal
England & Wales	7,265	1,960
Scotland	2,539	
%	83	17

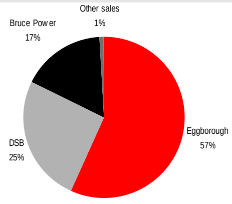
Source: Powerink/HSBC

EBITDA by division (2002a GBP268m)



Source: HSBC

Revenue by division (2002a GBP2,049m)



Source: HSBC

UK

British Energy

Key dates	
1990	▸ NE plc and Scottish Nuclear become the owners and operators of the principal nuclear power stations in England, Wales and Scotland, respectively.
1996 – March	▸ NE plc (now Magnox Electric) transfers the business of its five AGR stations and its PWR station to Nuclear Electric, a newly incorporated company, while retaining its Magnox stations.
	▸ Scottish Nuclear transfers its Magnox stations to NE plc.
1996	▸ Under this restructuring, British Energy becomes the parent company of Nuclear Electric and Scottish Nuclear.
1997	▸ British Energy begins an international expansion programme by forming a US JV, AmerGen, with PECO Energy of Philadelphia, now part of Exelon Corporation.
2001 – May	▸ British Energy completes the agreement on an 18-year operating lease of an eight-unit nuclear facility in Ontario (Canada) – Bruce Power.
2002 – November	▸ British Energy announces a restructuring plan in an attempt to secure the company's future. UK government loan facility granted.
2002 – February	▸ Bruce Power stake disposed as part of restructuring plan.
2003 – March	▸ UK government loan facility reduced but extended until 2004
2003 – July	▸ European Commission inititates a formal investigation into the UK Government's state aid to British Energy
Generation	
UK	▸ British Energy is the largest generator in the UK with 14% share of the total national installed capacity and an 18% share of national generation (differential in installed capacity and actual generation is attributable to the baseload characteristic of nuclear generation).
US	▸ Generation assets in US (AmerGen)
	(See flow diagram for generation breakdown)
Value drivers	
	BGY strategy is dominated by restructuring plans and asset disposals. The group intends to reduce its exposure to UK wholesale prices.

Source: HSBC, Company

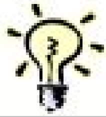
UK

ScottishPower

Key data

RIC code	Market cap
SPW.L	GBP7.2bn
Analyst	
Bruce Bromley	

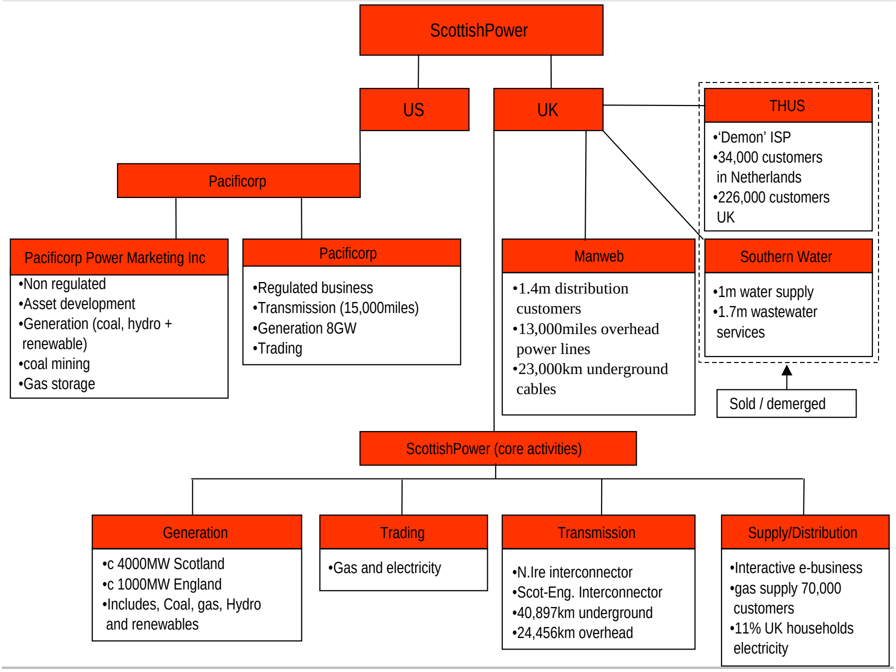





Business description

Electricity generation, transmission, gas and electricity supply, wholesale trading, coal mining, gas storage

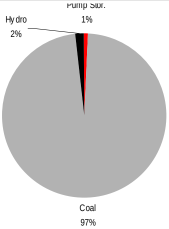
Ownership structure



Source: HSBC

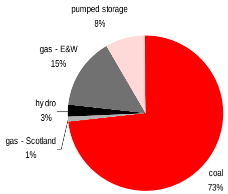
UK

2002 generation type breakdown: total 15.6TWh



Source: Powerink/HSBC

2002 installed capacity 4,803MW



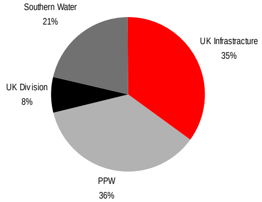
Source: Powerink/HSBC

Capacity split by country and fuel type MW

Country	Gas	Coal	Hydro	Pumped storage
England & Wales	719			
Scotland	49	3,513	122	400
%	16	73	3	8

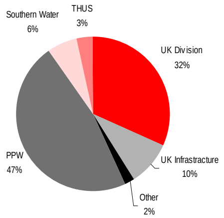
Source: Powerink/HSBC

EBITA by division (2002a GBP944m*)



Source: HSBC
**total EBITA figure inc -GBP64m for Thus and -GBP9m for other*

Revenue by division (2002a GBP6,718m)



Source: HSBC

UK

ScottishPower

Key dates

1990 – March	ScottishPower privatised. Orginally the South of Scotland Electricity Board, SPW represented one half of the privatised power market in Scotland.
1991 – June	ScottishPower (SPW) floated on the stock market in June 1991.
1995 – October	ScottishPower acquires (REC) Manweb.
1996	ScottishPower purchases Southern Water.
1996 – December	The government divests its remaining shareholding in SPW. Government still retains a 'golden share' in SPW (a legacy of privatisation).
1999 – November	ScottishPower acquires US-based PacifiCorp.
1999 – November	ScottishPower places 50% of its stock in telecoms arm Thus.
2002 – March	ScottishPower demerges remaining 50% of its stock stake in telecoms arm, Thus, to ScottishPower shareholders.
2002 – April	ScottishPower completes the sale of water management subsidiary Southern Water.
2002 – December	PacifiCorp acquires Katy gas storage facility for USD162m.
2003	ScottishPower awaits technical approval for two renewable sites – Blacklee and White law.
2003 – March	PacifiCorp granted a USD9m general rate case in Wyoming.
2003 – May	ScottishPower wins contract to manage Longannet Power Station, estimated to generate GBP70m over seven years.
Generation	Predominantly a coal-fired generator, ScottishPower also operates gas-fired plant in England and is embarking on a renewable expansion programme, both in the UK and through its US subsidiary, PacifiCorp.
Transmission	ScottishPower operates the transmission system in southern Scotland ScottishPower jointly owns and operates the England-Scotland interconnector and the interconnector with Northern Ireland ScottishPower owns and operates c 15,000 miles of transmission network in the US through its US subsidiary PacifiCorp (Western US states)

Source: HSBC

UK

ScottishPower (cont'd)	
Supply/distribution	▶ Total of 3.5m customers in the electricity and gas business (UK) – 2.6m electricity and 0.8m gas. ▶ ScottishPower owns and operates distribution assets in southern Scotland. ▶ ScottishPower also owns and operates the Manweb distribution network (see map)
Gas	▶ Supply c0.9m gas customers. ▶ ScottishPower has gas storage assets through US subsidiary Pacificorp.
Current strategy	▶ Strategic priorities include achieving PacifiCorp ROE target, enhancing margins and growing customer numbers in the UK division. ▶ GBP500m of investment into 785MW of wind generation expected by 2010.

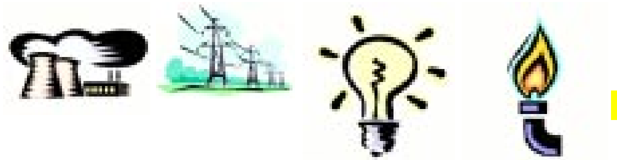
Source: HSBC

UK

Scottish and Southern

Key data

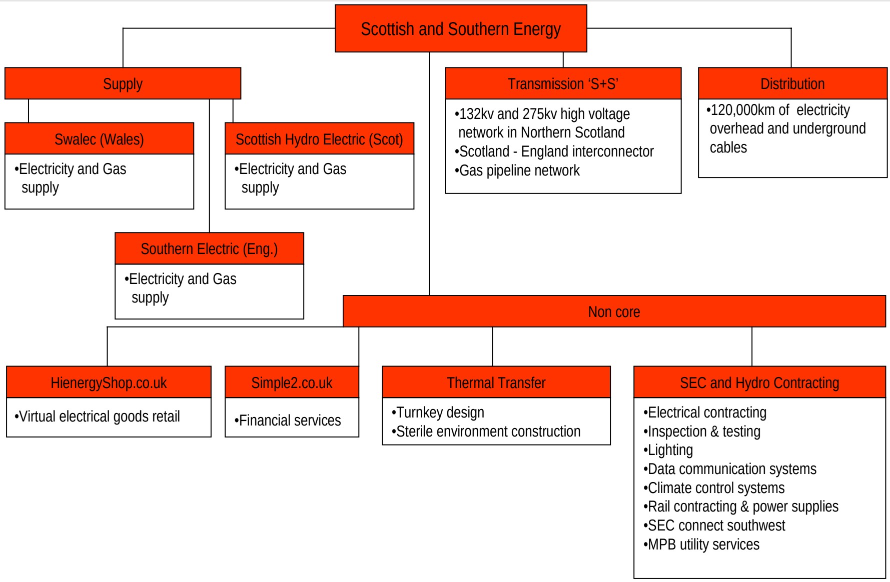
RIC code Market cap
SSE.L GBP5.2bn
Analyst:
Bruce Bromley



Business description

Generation, transmission, distribution and supply of electricity to industrial, commercial and domestic customers; energy trading; gas marketing; electrical and utility contracting and telecommunications.

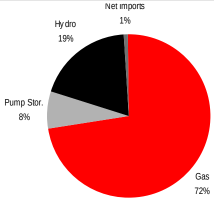
Ownership structure



Source: HSBC

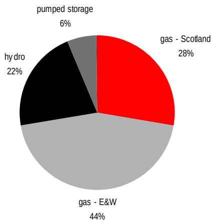
UK

2002 generation type breakdown: total 11TWh



Source: Powerink/HSBC

2002 installed capacity 4,886MW



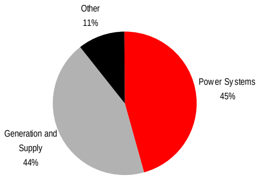
Source: Powerink/HSBC

Capacity breakdown by fuel and region MW

Country	Gas	Hydro	Pumped storage
England & Wales	2,160		
Scotland	1,362	1,064	300
%	72	22	6

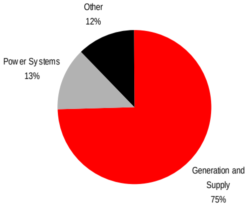
Source: Powerink/HSBC

EBIT by division (2002a GBP678m)



Source: HSBC

Revenue by division (2002a GBP4,604m)



Source: HSBC

UK

Scottish and Southern Energy

Key dates

1998 – December	Scottish and Southern Energy (SSE) created as the result of a merger between Scottish Hydro-Electric and Southern Electric (nil premium).
1990 – December	Southern Electric floated.
1991 – June	Scottish Hydro-Electric floated.
1999	SSE's multi utility model incorporates; 'hienergyshop', a virtual electrical goods retailer set up.
1999	SSE purchases turnkey design and construction of sterile environment business, Thermal Transfer.
2000 – May	Simple2.co.uk, a financial services subsidiary, established.
2000 – May	SSE Contracting Group' brought together, a subsidiary that incorporates electrical contracting, inspection and testing, lighting, hydro contracting, data communication systems, climate control systems, railway contracting and power supplies, SEC connect southwest and MPB utility services.
2002 – September	SSE acquires Dynegy Hornsea Ltd for GBP129m. Dynegy Hornsea adds a gas storage facility to SSE's portfolio.
2002 – November	Cambridge gas and electricity customers acquired, adding 80,000 to the existing 5m customer portfolio.
2003 – March	SSE sets up a JV with Weir Group to invest in the development of renewable power generation and control systems.
2003 – April	SSE telecom acquires Neoscorp Ltd for GBP13.4m.
2003 – May	SSE bids for Midlands Electricity. The purchase is subject to approval from the bondholders.

Generation

- SSE is the eighth-largest generator in the UK.
- Primarily renewable (hydro and pumped storage) and gas-based, SSE also has the UK's largest renewable installed capacity base and produces just under 50% of the total UK's renewable based electricity.

Transmission

- SSE operates the transmission system in the North of Scotland.
- Scottish and Southern also owns and operates with jointly ScottishPower and the National Grid Company the England-Scotland interconnector.

Supply/Distribution

- Through regional brands. Southern Electric, Scottish Hydro-Electric and SWALEC, SSE supplies over 5m customers. Each brand offers both electricity and water.

Source: HSBC

UK

Scottish and Southern Energy (cont'd)	
Gas	
	▸ SSE owns and operates gas transmission in Scotland. ▸ SSE acquired gas storage facilities from Dynergy, with a capacity of 325m cubic metres.
Current strategy	
	▸ Focus on building a vertically integrated, UK-focused energy company. ▸ Deliver sustainable earnings growth for generation, transmission and supply. ▸ Enhance dividends. ▸ Completion of the acquistion of Midlands Electricity.

Source: HSBC

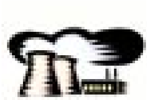
HSBC

UK

International Power

Key data

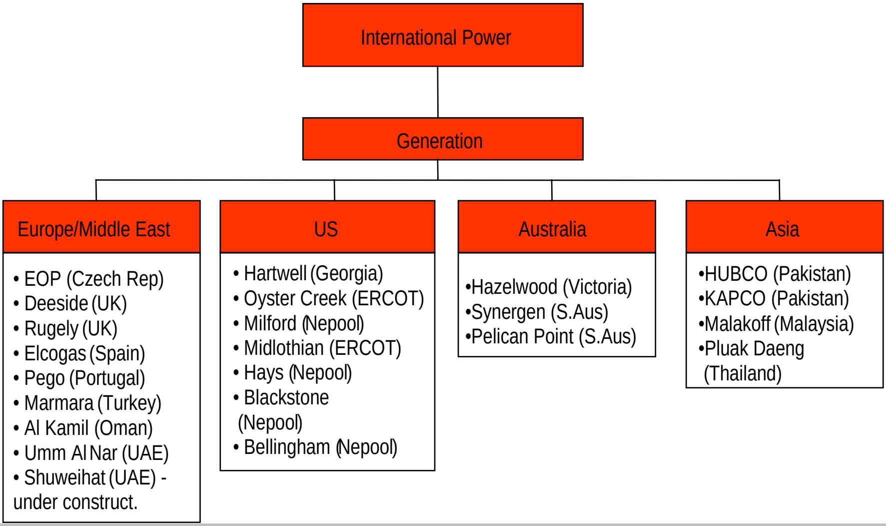
RIC code	Mkt cap
IPR.L	GBP1.5bn
Analyst:	
Bruce Bromley	



Business description

Electricity generation

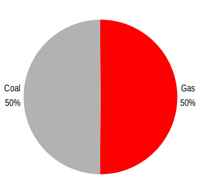
Company structure



Source: HSBC

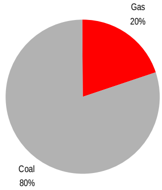
UK

2002 generation type breakdown:



Source: HSBC

2002 installed capacity 1,500MW



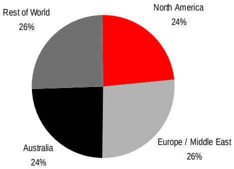
Source: International Power, HSBC

Capacity breakdown by fuel and region (MW)

Country	Gas	Coal
England & Wales	500	1,000
%	33	67

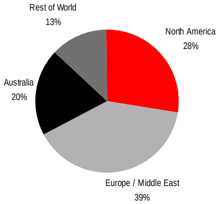
Source: International Power/HSBC

EBIT by division (2002a GBP388m*)



Source: HSBC
**total PBIT figure inc -GBP28m for corporate costs*

Revenue by division (2002a GBP717m*)



Source: HSBC
**total revenue figure inc -GBP122m for JVs and -GBP290m for associations*

UK

International Power

Key dates	
2000 – October	▸ National Power demerges its operations into two separate businesses. Innogy holdings (the UK business) keeps the 'Npower' brand name and International Power (IPR), the international operations.
2001 – November	▸ International Power's Rugeley Power Station left exposed when TXU Europe goes into administration. The 1000MW of capacity is later successfully placed.
2002 – March	▸ International Power mothballs half its Deeside Power Station, UK, reducing capacity by 250MW, due to the uneconomic wholesale electricity prices in England & Wales.
2003 – April	▸ International Power-led consortium acquires 40% of Umm Al Nar (UAE) power and water plant.
2003 – July	▸ International Power makes an offer to Drax for 15% of its outstanding debt and up to 36% of its equity and subsequently enters exclusive negotiations with the power station.
Generation	
	▸ At the time of demerger, International Power had a extensive international portfolio of operational assets (6,363MW) with power plants in 10 countries: US, UK, Spain, Portugal, Czech Republic, Turkey, Kazakhstan, Pakistan, Malaysia and Australia.
	▸ In addition, IPR had power plant interests in operation and in development/advanced planning that amounted to 18,678MW, with the inclusion of projects in Oman, India, Thailand and China.
	▸ 2002 has c9,100MW of operational installed world capacity.
	▸ IPR splits its businesses into four regions: Europe/Middle East, North America, Australia and Rest of World.
Current strategy	
	▸ Acquisition of stake in Drax.

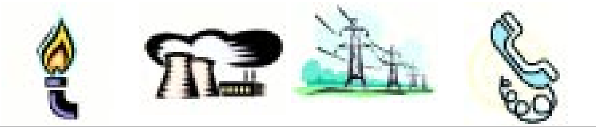
Source: HSBC

UK

National Grid Transco

Key data

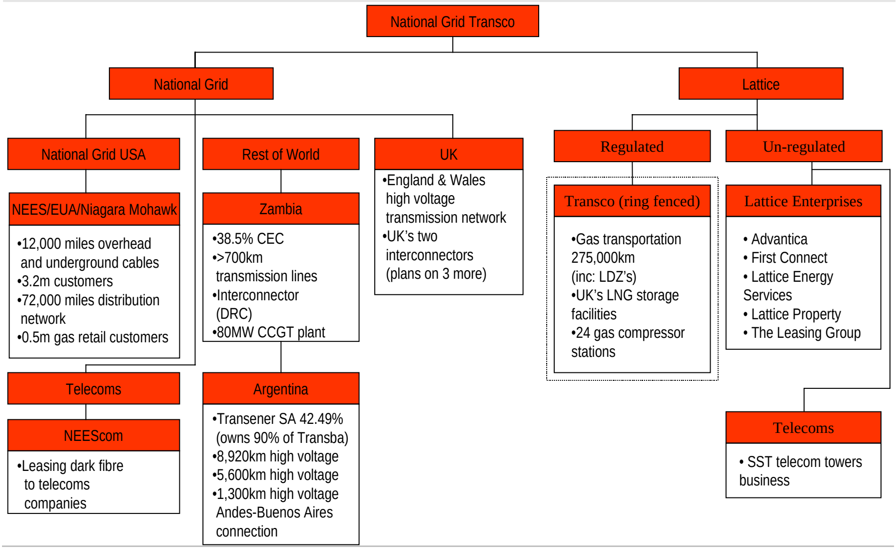
RIC code	Market cap
NGT.L	GBP11.6bn
Analyst:	
Bruce Bromley	



Business description

High-voltage electricity transmission & gas transmission, distribution, Telecoms, Generation, interconnector.

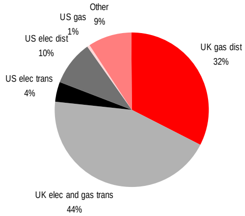
Company structure



Source: HSBC

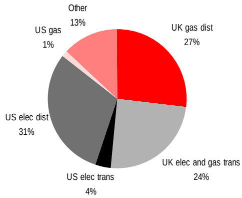
UK

EBIT by division (2002a GBP1,556m)



Source: HSBC

Revenue by division (2002a GBP7,471m)



Source: HSBC

UK

National Grid Transco

Key dates	
1990 – March	The National Grid Group established following the privatisation of the UK electricity market. Responsible for operating and maintaining England & Wales high voltage electricity transmission network and the two interconnectors between England and France/Scotland.
1995 – December	Floated after a number of RECs demerge their shareholdings in the company.
1999 – December	BG plc restructured and refinances itself with the intention of separating Transco (by ring fencing) from the company's other businesses, so giving these divisions the scope to grow and giving the company's regulated business a clear framework to operate within.
2000 – October	BG Group plc demerges its Transco and Telecoms businesses from the parent company and creates a new entity, Lattice, which has the Transco division as its principal business, and a number of other small businesses.
2002 – October	National Grid merges with Lattice to form National Grid Transco.
2002 – November	New England Power (NGT subsidiary) divests nuclear assets, marking an end to NGT's exposure to nuclear generation.
2003 – August	NGT's US subsidiary, NiMo denies liability for blackouts that occur across North-East US.
Transportation	
	Gas transportation – c6,400km of high-pressure transportation pipes
	GB's LNG storage facilities
	24 gas compressor stations
Supply/distribution	
	LDZs – Local Distribution Zones (c275,000km)
US	
	In 2000, National Grid acquired the US companies, NEES and EUA.
	Now operating as National Grid USA, the subsidiary has electricity transmission and gas and electricity distribution businesses operating in Massachusetts, Rhode Island, New Hampshire and New York.
	In addition, the company has a telecom division called NEEScom that leases high-speed dark fibre to telecoms companies.
	The acquisition of Niagara Mohawk in early 2002 further expanded the company's US operations.
	National Grid Group now has the largest transmission (12,000 miles of overhead and underground power lines) and distribution (3.2m customers, 72,000 miles of network) networks in the New England/New York market.
	In addition National Grid USA distributes gas to 500,000 retail customers.

Source: HSBC

UK

National Grid Transco (cont'd)

International

- In 1997, National Grid jointly purchased (38.5%) the power division of Zambia Consolidated Copper Mines (ZCCM), now Copperbelt Energy Corporation (CEC).
- National Grid is responsible for the distribution of power to the Zambian copper industry.
- National Grid operates over 700km of transmission line, the interconnector with the Democratic Republic of Congo and an emergency 80MW CCGT plant.
- In 1994, National Grid, as part of a consortium, became joint owner of Argentinean Transener SA, the principal electricity transmission system in the country.
- National Grid consolidated its position in Argentina in 1997 with two acquisitions.

Telecoms

- In addition to NEEScom, the National Grid group has telecom operations in five other regions. These include 32.5% of Energis (UK) an IT services and telecommunications solutions provider, 50% of Silica networks, a carriers' carrier, 100% of infrastructure business Gridcom (UK), 50% of Intelig (Brazil) and 30.1% of Manquehue Net (Chile) with over 81,000 active lines and over 10,000 active internet subscribers.

Current strategy

- National Grid Transco is to focus largely on expanding its integrated gas and electricity base in the US.

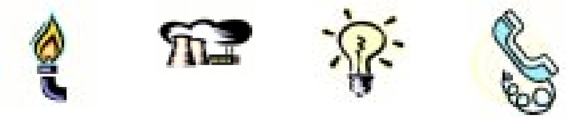
Source: HSBC

UK

Centrica

Key data

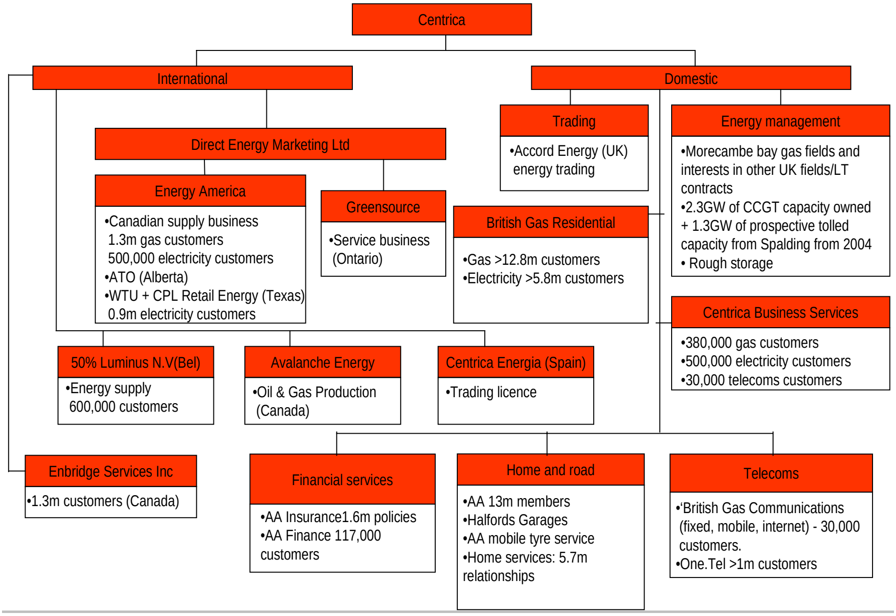
RIC code	Mkt cap:
CNA.L	GBP7.8bn
Analyst:	
Verity Mitchell	



Business description

Gas and electricity supply, trading & production, energy management , roadside and additonal automobile services, home-related services and telecoms. Markets of operation: UK, US, Canada, Belgium and Spain.

Ownership structure



Source: HSBC

UK

Centrica

Key dates

	▸ Since inception, the group has diversified its operations in both the domestic and international markets, adopting a multi-service corporate model.
1997 – February	▸ Centrica formed as a result of its demerger from British Gas plc.
	▸ On demerger the Centrica group inherits the gas supply and retail services of British Gas (including the brand name in the UK – Nwy Prydain in Wales and Scottish Gas in Scotland) as well as the gas production business of the Morecambe North Sea gas fields.
	▸ Shortly afterwards, Centrica takes operational control of Accord Energy, a gas trading company in the UK, (a JV between British Gas and NGC Corporation (US)).
1997 – December	▸ Centrica enters the financial services market (in partnership with HFC Bank) with the launch of its Goldfish credit card.
1998 – September	▸ Centrica begins to supply electricity to customers, taking advantage of the full liberalisation of the UK's electricity markets that fully opened in May 1999. It has since built up a 40% market share of the UK's residential electricity market.
1999 – September	▸ Centrica purchases the transport services company, AA.
2000 – April	▸ Centrica enters the telecoms market through a strategic alliance with Vodafone, Torch Telecom and Cable & Wireless to provide fixed line and mobile services nationwide.
2000 – July	▸ Centrica purchases Direct Energy Marketing Ltd, a Canadian energy supply business that had a 27.5% interest in Energy America. Centrica acquires the remaining 72.5% six months later.
2000 – September	▸ Centrica launches British Gas Communications.
2000 – December	▸ Centrica acquires Avalanche Energy, a Canadian gas and Oil production company to complement its growing Canadian operations.
2000 – December	▸ Centrica establishes a JV with LloydsTSB to develop a whole range of banking products under the Goldfish brand and has since acquired a banking licence.
2001 – May	▸ Centrica enters the UK electricity generation business, purchasing 60% of Humber Power Ltd (792MW CCGT operator – 2.4TWh generation output 2001), further consolidating this position with purchasing the operating leases for CCGT plants at Kings Lynn and Peterborough in October 2001.
2001 – June	▸ Centrica purchases 50% of Luminus N.V, a Belgian energy supply business, marking its entry into the continental European market.
2001 – June	▸ Centrica purchases the National Homecare electrical servicing business to extend its Home Services product offering.
2001 – July	▸ 1m customers purchased via One.Tel.

Source: HSBC

UK

Centrica (cont'd)

2002 – April	▶ Centrica acquires 800,000 customers in Texas through the purchase of CPL and WTU.
2002 – May	▶ Embridge Services added to North American portfolio, bringing 1.75m customers for GBP434m.
2002 – November	▶ Centrica acquires Rough storage facility for cGBP315m (referred to the Competition Commission).
2003 – April	▶ Centrica acquires Roosecote 229MW CCGT plant from Lakeland Power for GBP26m.
2003 – July	▶ Centrica acquires 240MW Barry power station from AES for GBP40m. This increases Centrica's total generation capacity to 2,174MW.
2003 – August	▶ Goldfish credit card and personal loan businesses sold to LloydsTSB for a premium of GBP112.5m.
	▶ DTI rules on Centrica's ownership of Rough Storage facility. Centrica is permitted to keep the asset under the condition that it auctions 80% of its capacity (falling to 85% by 2010). Centrica is permitted to retain any need capacity it develops.
Generation	
	▶ UK plants: King's Lynn, Peterborough (lease), Humber Power (lease). Glanford Brigg, Roosecote, Barry.
	▶ WTU Retail Energy and CPL Retail Energy (Texas).
Supply/distribution	
	▶ Centrica has a c64% market of the UK residential gas supply market.
	▶ 12.8m gas customers.
	▶ 5.8m electricity customers.
	▶ 1.3m Canadian gas customers.
	▶ 0.5m Canadian electricity customers.
	▶ 0.6m electricity customers (Belgium).
	▶ 1.5m electricity customers (US).

Source: HSBC

UK

Centrica (cont'd)	
Gas	
	▸ Interests in a number of UK gas fields, including Morecambe Bay. In North America it has interests in Alberta (Canada) and fields as part of Avalanche Energy (Canada).
Current strategy	
	▸ To be strongly cash flow positive in 2003 and beyond, improving margins and returns. ▸ Develop the profitablity of its UK gas and electricity retail business. ▸ Protect and develop its upstream gas assets and access to long-term contracts hedging 26% of its gas needs. In electricity, to hedge its exposure contractually to electricity prices and buy generation to hedge 26% of its peak electricty demand requirements. ▸ The US management has confirmed that it will fail to meet its target of 10m customers by the end of 2003, but will grow the business as liberalisation continues. In the US, Centrica has that it is not prepared to compromise customer growth for lower ROIC – unclear whether growth strategy will be achieved organically or through acquisition.

Source: HSBC

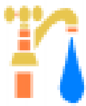
UK

AWG

Key data

RIC code **AWG.L** Mkt cap: GBP910m

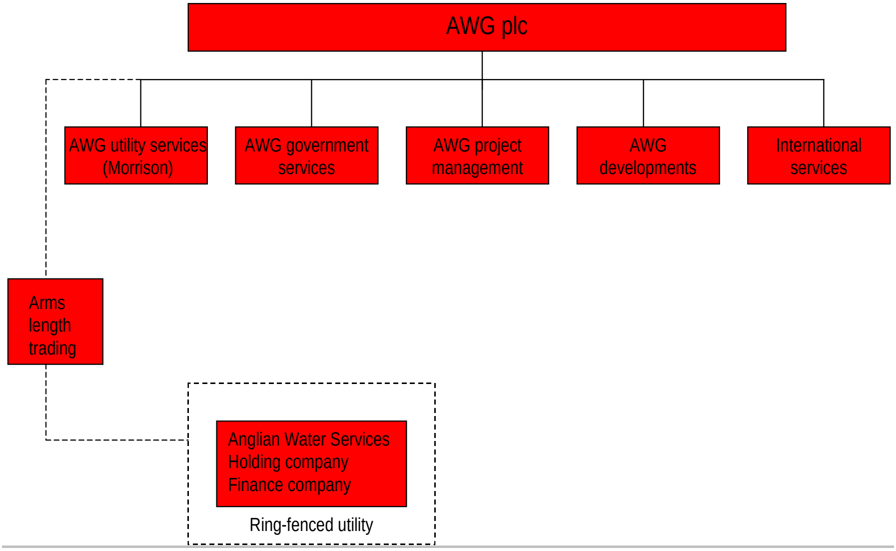
Analyst :
Verity Mitchell



Business description

Regulated water, waste water management and infrastructure management company based in East Anglia.

Organisational structure



Source: HSBC

UK

AWG

Key dates	
1989	Anglian Water formed as part of water company privatisation serving 2.6m properties.
1992	Anglian Water International formed.
1993	Anglian Water International begins investing overseas.
2000 – September	AWG buys Morrison Construction for GBP262.5m.
2002 – March	AWG affects a corporate restructuring. Ring fencing and increasing the leverage of the utility – renamed Anglian Water Services to 83% of debt/regulatory capital value.
2002 – October	GBP501m of value is returned to shareholders as part of restructuring.
2003 – January	AWG receives a verbal approach from WestLB for an offer for 510p per share. The board rejects the approach on the basis of being undervalued.
2003 – June	Consortium bidding for AWG fails to make a formal bid by the deadline.
2003 – July	GBP177m of value is returned to shareholders as part of restructuring
Water	Anglian Water Services provides water to 5m domestic and commercial customers in the east of England and Hartlepool, supplying 1bn litres of water a day.
Waste water	Anglian Water Services provides waste water to five million domestic and commercial customers in the east of England and Hartlepool, with 1074 sewage treatment works.
Other services	AWG is involved in construction, property development, facilities management, highway maintence services, UK PFI project investment, rail services, utility services and vehicle leasing.
Current strategy	Outperforming its water efficiency targets in the utility.
	Continued divestment of non-core activities – international and property development portfolio.
	Seeking higher margins in the infrastructure businesses.

Source: HSBC

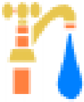
UK

Kelda Group

Key data

RIC code | Mkt Cap:
KEL.L | GBP1.6bn

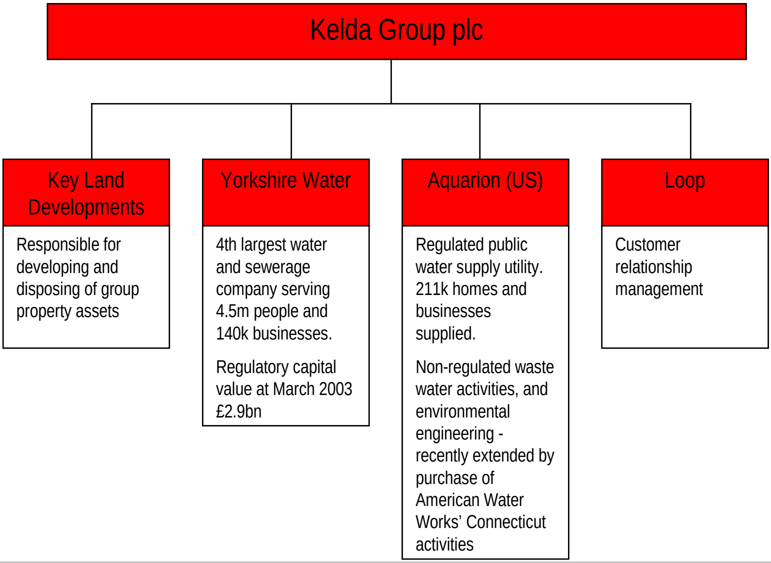
Analyst name
Verity Mitchell



Business description

Water, waste water, stake in waste management company

Organisational structure



Source: HSBC

UK

Kelda Group

Key dates	
1989	▶ Yorkshire Water Group formed as part of water company privatisation. ▶ Kelda acquires a range of environmental service companies as part of its diversification strategy.
1998	▶ Kelda (Holding company renamed) sells its Yorkshire-based waste company to WRG and gains a 46% stake in WRG in return.
2000 – January	▶ US utility, Aquarion, acquired.
2002 – May	▶ A change of management as Kelda focuses on its core strategy.
2002 – May	▶ Five American Water Works subsidiaries acquired.
2002 – November	▶ Preferred bidder for two US O&M contracts.
2002 – December	▶ Kelda wins Package A of the MOD Aquitrine Package.
2003 – July	▶ Kelda sells its stake in WRG to TerraFima for a 5.5x EV/EBITDA multiple.
Regulated water	
	▶ Yorkshire Water manages the collection, treatment and distribution of water to 1.7m households and 140k businesses – fourth-largest WASC in the UK. ▶ Aquarion Water Company, one of the 10 largest investor-owned water utilities in the US, serving 211,000 homes and businesses, or c677,000 people, in Connecticut, New York, Massachusetts and New Hampshire.
Regulated waste water	
	▶ Yorkshire Water collects c1bn litres of waste water a day, processing it through 612 waste water treatment works.
Non-regulated water	
	▶ In the US, Aquarion's Services Company has contracts for municipal and private water and waste water operations and maintenance, specialty services water, management consultancy, engineering consulting services, and, under Safety Valve, consumer water line protection plans.

Source: HSBC

UK

Kelda Group (cont'd)	
	▶ Kelda operates a number of water and waste water concessions in Scotland, the US and will run a part of the MOD's water requirements in England.
Other services	
	▶ In the UK, Loop specialises in customer relationship management, primarily to Yorkshire Water, but also with a number of third-party contractors. It also offers clients a full financial collection service, from billing and payment processing to reminders and in-house debt recovery services.
Current strategy	
	▶ Focus on water and waste water.
	▶ Drive for service and quality enhancements on a sustainable basis in both the UK and US.

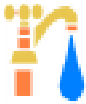
Source: HSBC

UK

Pennon Group

Key data

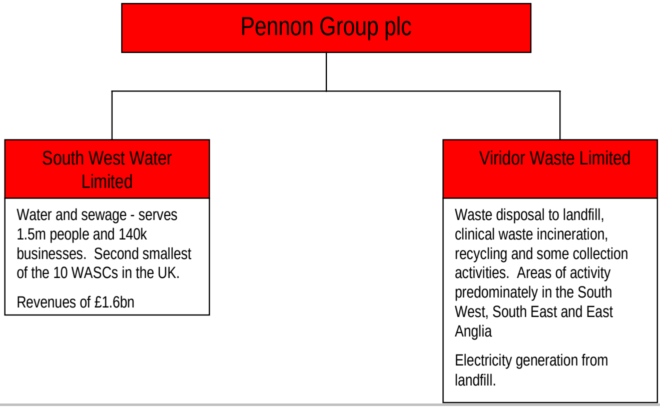
RIC code	Mkt Cap:
PEN.L	GBP716m
Analyst :	
Verity Mitchell	



Business description

Water, waste water, waste management

Organisational structure



Source: HSBC

UK

Pennon Group

Key dates	
1989	South West Water formed as part of water company privatisation.
1993 – Feb	Haul Waste bought – beginning of growth of Viridor Waste businesses.
1993 – May	(ELE Instrumentation bought) – beginning of growth of Viridor Instrumentation businesses.
1998 – December	Orbisphere (instrumentation) bought.
2001 – December	Sale of Viridor Instrumentation Limited for GBP103m.
2002 – April	Richardson Ltd, a glass reclaimation business, is acquired for GBP11.9m.
2002 – July	Viridor Waste buys Roseland, a waste business, for GBP9.5m.
2002 – October	Parkwood Holdings Limited, a landfill, recycling and liquid waste treatment group is acquired for GBP20.6m.
Water	
	Operating in Devon, Cornwall and parts of Dorset and Somerset. South West Water Limited provides water and sewerage services to c1.5m customers.
Other services	
	Viridor Waste Limited is one of the largest landfill-based waste disposal businesses in the UK. It is also active in recycling, clinical waste incineration and electricity generation from landfill gas. The company owns 75m cubic metres of consented landfill void space and 50m cubic metres of unconsented void space.
Current strategy	
	Outperformance of the regulatory contract for the period to 2004-05.
	Continued growth and diversification of Viridor Waste in the waste value chain - Increasing pre-treatment, waste handling and recycling.

Source: HSBC

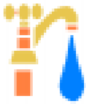
UK

Severn Trent

Key data

RIC code | Mkt Cap:
SVT.L | GBP2.3bn

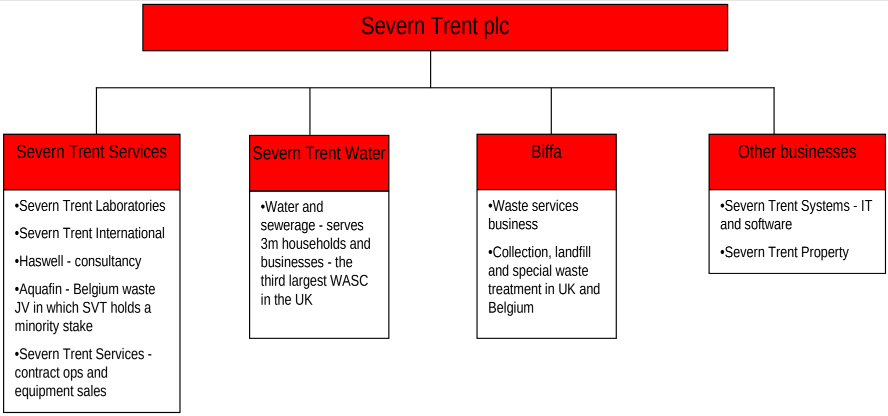
Analyst:
Verity Mitchell



Business description

Water, waste water, utility services

Organisational structure



Source: HSBC

UK

Severn Trent

Key dates

1974	▶ Established in the course of the 1974 reorganisation to cover the Severn and Trent river basin.
1989	▶ Severn Trent privatised as one of the ten major WASCs.
1990	▶ Capital Controls Company bought in the US, marking the beginning of US expansion.
1993	▶ Severn Trent acquires Biffa
1995-98	▶ Severn Trent Services busineses bought in the UK and US.
2001	▶ Severn Trent buys UK Waste for a post synergies multiple of 6.9x
2003	▶ Severn Trent buys Hales Waste from RMC for a 5.5x EV/EBITDA multiple post synergies

Water

- Severn Trent Water serves over 8m people, supplying water through 43,000 km of mains.

Waste water

- 53,000km of sewers and 1,000 sewage works.

Other services

- Biffa handles c10% of total UK waste, important collection business also owns 33 landfill sites.
- Severn Trent Services undertakes contract operations in the US, provides water equipment sales and services in the US and operates a long-term concession in Belgium, Aquafin, in which it owns a minority stake.
- Severn Trent Laboratories provide environmental analytical testing with over 30 labs.
- Aseriti supplies IT services and software solutions to utilities.
- Severn Trent Water International provides management and consultancy services in water, wastewater and environmental services.
- Haswell provides engineering and project management consultancy.
- Severn Trent Property develops facilities from its property portfolio in the UK.

Current strategy

- Increase shareholder value by establishing Severn Trent as a leading integrated environmental services business.
- Developing BIFFA by consolidating Hales Waste and growing UK sales in the industrial and commercial sector and by winning integrated (unitary) muncipal waste contracts.

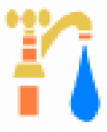
Source: HSBC, Company

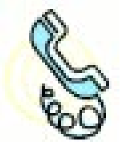
UK

United Utilities

Key data

RIC code	Mrkt cap
UU.L	GBP 2.6bn
Analyst name	
Verity Mitchell	

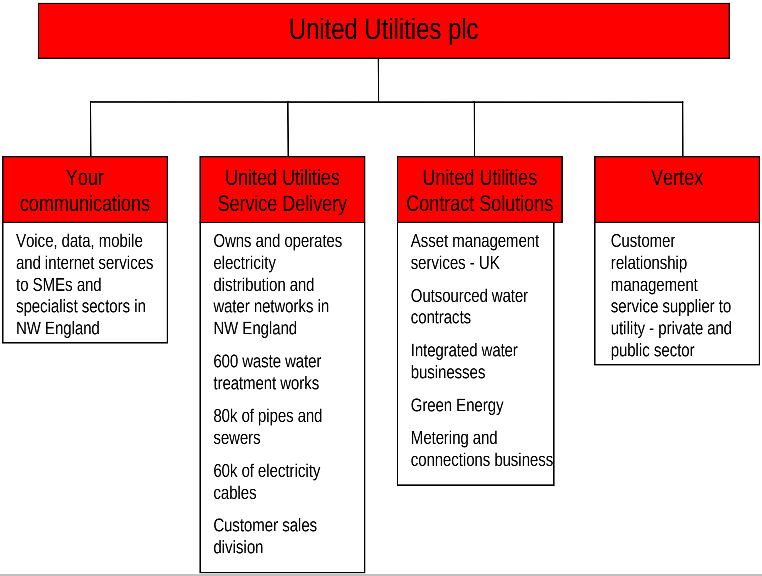




Business description

Water, waste water, electricity distribution, asset management services, customer management outsourcing and telecoms.

Organisational structure



Source: HSBC

UK

United Utilities

Key dates	
1989	North West Water formed as part of water company privatisation.
1994	United Utilities develops international water portfolio.
1996	United Utilities formed following a merger of North West Water plc and Norweb plc.
1996-00	Telecom business developed organically.
1998	Vertex established as a provider of CRM to third parties.
2000	United Utilities buys water services businesses and industrial service from Hyder.
2000	United Utilities wins first outsourced contract for Welsh Water.
2001	United Utilities sells energy supply to TXU.
Water	
	Water distributor to c3m homes and 200,000 businesses in the North West of England.
Waste water	
	39,000km of sewers, 600 treatment works and 1,500 pumping stations in the North West.
Distribution	
	Electricity distributor with 2.2m customer relationships and a network covering 12,000 sq km.
Other services	
	Asset management services: operations management in water in Scotland, utility services, metering and connection contracts, green energy and network management (Welsh Water Contract).
	Customer management outsourcing: Vertex, a customer relationship management service supplier to UK utilities, private and public sector entities and recently providing services in the US.
	International portfolio of water concessions.
	Telecomms: data, mobile and internet services to SMEs and specialist sectors primarily in the NW of England.
Current strategy	
	Developing the non-regulated utility activities.
	Growing support services businesses.
	Maximising efficiencies from synergies at the multi-utilty operator level.

Source: HSBC

UK

Other company capacity data

Other market players – capacity MW 2002

Company	Fuel type	England and Wales	Scotland	Northern Ireland
AEP	Coal	3,921		
AES	Coal	3,960		
	dist	215		
	Gas	250		
BP	Gas		130	
Centrica	Gas	1,847		
Coolkeeragh Power	Dist			58
	HFO			120
EdF	Coal	3,980		
	Gas	804		
Edison Mission Energy	Dist	68		
	Gas	229		
	Pumped Stor.	2,088		
El Paso/Global Energy	Gas		120	
Innogy	Coal	4,415		
	dist	412		
	Gas	2,217		
	HFO	1,142		
Nigen	Coal			640
	Dist			58
PowerGen	Coal	3,855		
	Dist	126		
	Gas	2,807		
	HFO	1,350		
Premier Power	Dist			116
	Gas			750

Source: HSBC

Germany

Introduction

In 1998, the German electricity market was 100% liberalised and all classes of customer became eligible to switch supplier. All activities in the electricity and gas value chain have been unbundled. There are four major operators in the market: E.ON, RWE, EnBW and Vattenfall.

German wholesale pricing is set in a 'pool' based system, whereby generators submit bids, and a median spot price is set.

The fuel mix in terms of generation in Germany is predominantly nuclear, lignite and coal-based (28%, 26%, 24% in 2002, respectively). Imports account for 8% of consumption. An agreement reached between the government and nuclear operators will result in all nuclear stations closing by 2021.

The transmission of electricity is split between the four major operators and local municipalities (Stadtwerke), while the big four own and operate nearly 100% of Germany's generation assets. Local municipalities operate in c30 cities.

Distribution is principally split between the four large network operators and the Stadtwerke in their respective geographic zones.

All customers in Germany are entitled to switch supplier. However, despite efforts by the government to increase competition in the German retail market, there has been a very low level of switching among customers. This has drawn criticism from new entrants who claim that in the current market structure, it is virtually impossible to grow to critical mass in order to compete with the incumbents.

Germany's location at the centre of Europe enables access to a diverse array of interconnectors. With nine different borders, it has a total interconnector capacity of 19,650MW with five countries having significant market share (Switzerland, France, the Netherlands, Austria and the Czech Republic).

The German gas market is also 100% liberalised. Ruhrgas (now part of E.ON) is the largest operator, transporting and supplying gas to merchant companies (64.6% of total volumes), industrial users (10.5%) and Stadtwerke (24.9%).

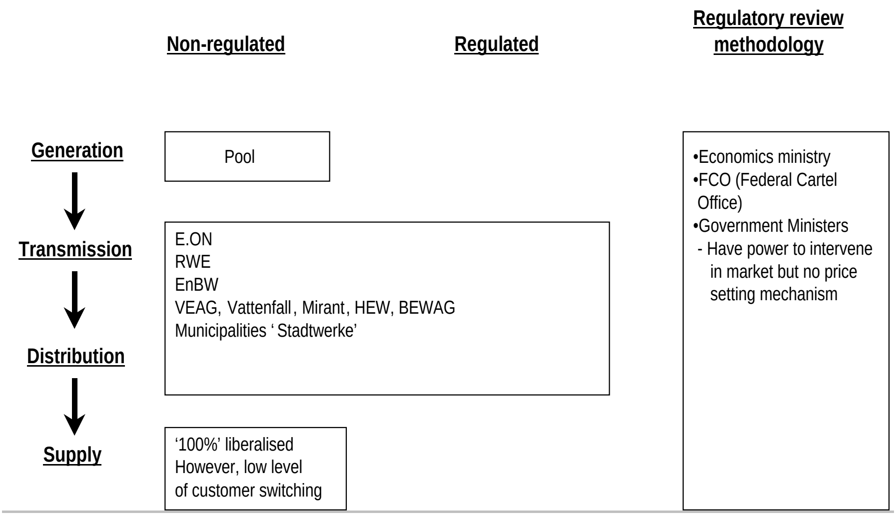
Germany

The Stadtwerke supply gas to approximately seven million household customers, which account for 50% of the German market. Other major players include Thyssengas, GVS and EVG.

Germany has largely been a self-regulated energy market. However, a new regulatory body is to be installed by mid-2004 for transmission and distribution only. Regulation of the German market relates only to the midstream aspect of the value chain. The new regulator will only have power over third-party agreements unlike the UK regulatory system where the regulator is allowed to set rates of returns and prices for network businesses.

Schematic

German electricity market schematic



Source: HSBC

Germany

Deconstructing the value chain

Germany electricity value chain

Regulation

- The Economics Ministry, Federal Cartel Office and government ministers all have the power to intervene in the German electricity and gas markets but they do not have the power to set prices.
- In March 2003, the German government reached an agreement to set up a new regulatory body by mid-2004. Following discussions with all companies, the actual regulatory powers given to this new body look unlikely to change the status quo greatly. In an additional development, the German government agreed to legalise the existing association agreement (VVII).

Key dates

1989	East and West German energy markets merge.
1998	German power market fully liberalised.
2000	Merger of VIAG and VEBA creates E.ON.
2001	Merger of RWE and VEW.
2002	Merger of VEAG, Vattenfall, HEW, BEWAG, Mirant German operations.

Market structure

Generation

- A few major players dominate the German generation market.
- Principal participants include RWE, E.ON and EdF/EnBW and Vattenfall
- Since liberalisation in 1998, surplus capacity, a high degree of cross-border interconnection and the reduction of tariffs has sharply reduced wholesale electricity prices.
- 2002 nuclear power represented 28% of total generation.
- Coal and lignite contributed 24% and 26%, respectively.
- At the installed capacity level, Germany is also relatively well diversified, with significant additional capacity available from gas-fuelled plants at 12% of the total.
- German imports accounted for 8% of energy consumption in 2002.

Transmission

- The transmission market is split between the four major market players and the local municipalities (Stadtwerke).
- The major players are responsible for the operation, management and maintenance of the high voltage grid and the lower voltage distribution networks in their respective territories.
- Government ministers, the Economics Ministry and Federal Cartel Office all have the power to intervene in this market, although they do not have the power to set pricing policy.

Germany

Germany electricity value chain

Supply/distribution

- The supply and distribution activities of the German electricity market have been unbundled.
- In reality there has only been a low level of switching between suppliers.
- The distribution and supply markets are principally split between the four major network operators and the local municipalities (Stadtwerke).
- The major players are responsible for the operation, management and maintenance of their respective networks.
- The government, the Economics Ministry and the Federal Cartel Office all have the power to intervene in the market.

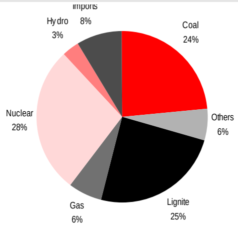
Outlook

- A new regulatory body will be set up in 2004 although regulation will only apply to the midstream (transmission and distribution) aspect of the value chain.
- Continued consolidation of assets as part of the concessions required for the approval of the E.ON/Ruhrgas merger. However, many of the divestments have now been achieved.
- No new capacity required in Germany until 2010, when new capacity is expected to start replacing retiring nuclear capacity.
- Germany's has Europe's largest installed capacity of wind turbines (c12,000MW). There is an inherent risk that low availability could dramatically impact electricity supply.

Source: HSBC

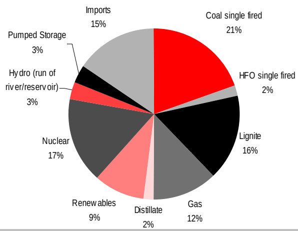
Germany

2002 generation by fuel type: total 572TWh



Source: Powerink, HSBC

2002 capacity by fuel group: total 126,961 MW



Source: Powerink, HSBC

Germany

2002 German installed capacity by fuel type (MW)

Fuel type	Coal	HFO	Gas	Dist.	Renew.	Nuclear	Hydro	Pumped storage	Imports
Installed capacity (MW)	45694	2265	15493	2619	11770	20975	4054	4440	19650
%	36%	2%	12%	2%	9%	17%	3%	3%	15%

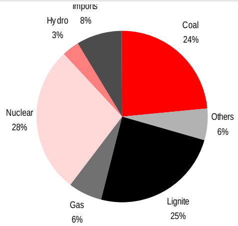
Source: Powerink, HSBC

German reserve margin

Capacity margin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand (GW)	74.00	75.15	75.34	75.72	76.09	76.48	76.86	77.24	77.63
Capacity available (GW)	106.01	106.67	106.75	105.84	106.37	107.60	109.46	110.89	110.87
Capacity margin (%)	43.2%	41.9%	41.7%	39.8%	39.8%	40.7%	42.4%	43.6%	42.8%

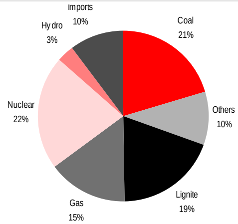
Source: Powerink, HSBC

German generation mix 2002a



Source: Powerink, HSBC

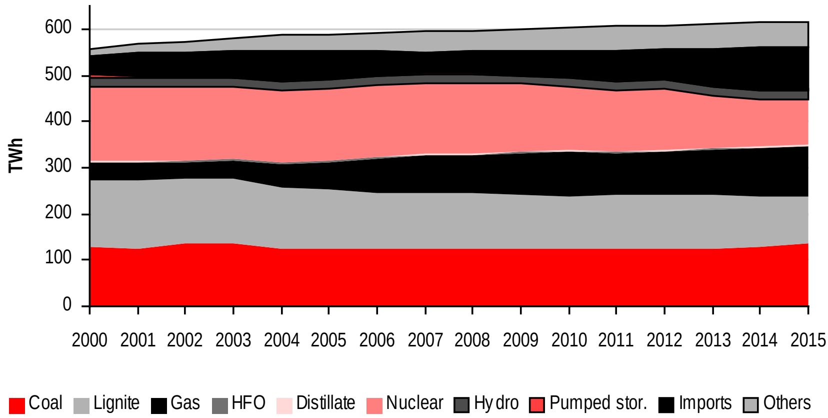
German generation mix 2012e



Source: Powerink, HSBC

Germany

Projections for the German power sector by fuel type



Source: Powerink, HSBC

Interconnection capacities 2002 (MW)

France	Switzerland	Austria	Luxemburg	Holland	Denmark	Poland	Czech Republic	Sweden
3,000	5,000	2,000	1,000	5,000	1,000	500	1,550	600
15%	25%	10%	5%	25%	5%	3%	8%	3%

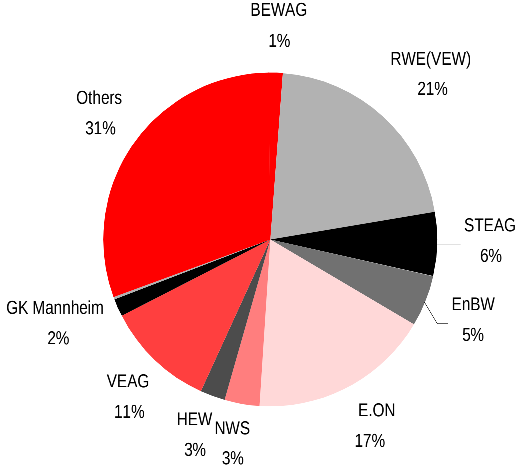
Source: Powerink, HSBC

Germany

Market players

The industry is dominated by a small number of large companies. RWE and E.ON are the largest generating companies with a share of the generation market of 21% and 17%, respectively. Other major players in the market include VEAG (Vattenfall) and STEAG with 11% and 6%, respectively.

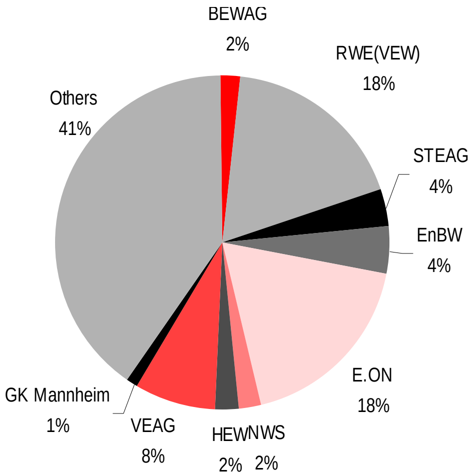
2002 generation by company: total 572TWh



Source: Powerink, HSBC

Germany

2002 capacity by company: total 127,342(MW)



Source: Powerink, HSBC

Installed capacity by company (MW)

Company	Installed capacity (MW)	% of market
RWE(VEW)	23,079	18%
E.ON	22,840	18%
VEAG (Vattenfall)	9,686	8%
EnBW	5,729	4%
STEAG	4,461	4%
HEW (Vattenfall)	3,026	2%
NWS	2,819	2%
BEWAG (Vattenfall)	2,468	2%
GK Mannheim	1,541	1%
GEW Koln	616	0%
Others	51,694	41%
Total	127,342	100.0

Source: Powerink, HSBC

Germany

German energy customer accounts 2001*

Company	Electricity customers (m)	Gas customers (m)	Total customer accounts (m)
E.ON	15.2**	5.3	20
RWE	8.9	3.9	12
EnBW	4.2	–	4.2
Vattenfall, VEAG, Mirant, HEW, BEWAG	3.2	–	3.2
Total	**31.8**	**7**	**37.9**

Source: HSBC
** excluding Stadtwerke figures*
*** 6.2m directly, 9m joint shareholdings*

Germany

Gas market

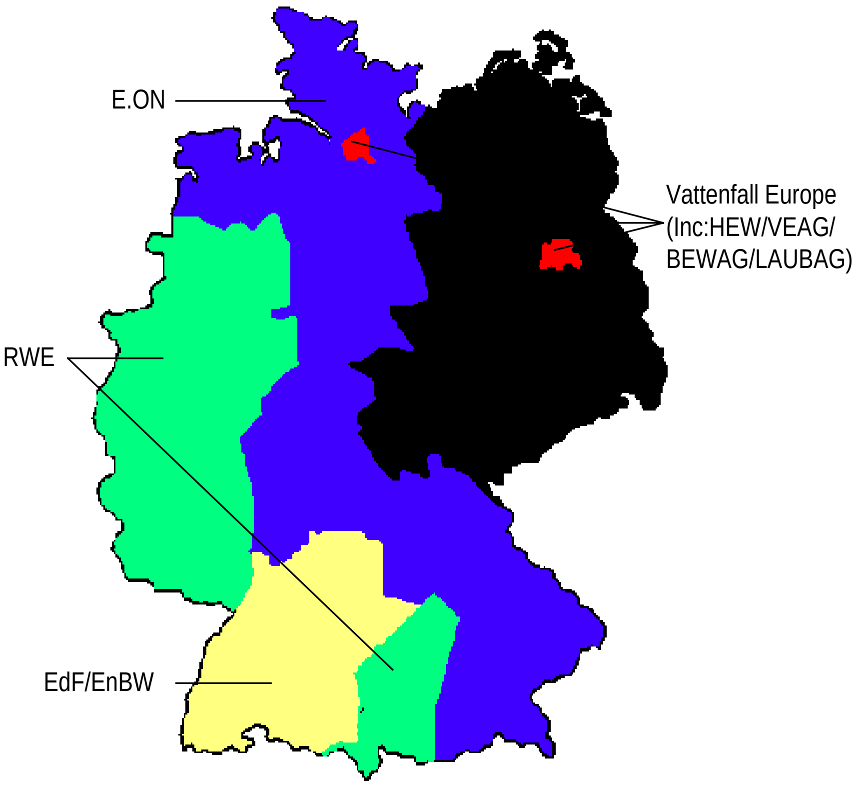
Regulation	
	▶ In March 2003, the German government reached an agreement to set up a new regulatory body by mid-2004. Following discussions with all companies, the actual regulatory powers given to this new body look unlikely to change the status quo greatly. In an additional development, the German government agreed to legalise the existing association agreement (VVII). ▶ The Economics Ministry, Federal Cartel Office and government ministers all have the power to intervene in the German electricity and gas markets although they do not have the power to set prices. ▶ Other regulatory influences stem from EU directives.
Key dates	
1998	▶ The gas market was 100% liberalised.
2003	▶ E.ON's acquisition of Ruhrgas completed.
Market structure	
	▶ Ruhrgas (E.ON) is the dominant player in the German gas market with a supply system that consists of nearly 10,748km of pipeline, 12 underground storage facilities and 26 compressor stations. ▶ Ruhrgas (E.ON) operates predominantly in western Germany, with a major gas pipeline to Berlin. ▶ Other players include local municipalities (Stadtwerke), which supply c7m (50% of German total) residential customers with gas and companies such as Thyssengas, EVG and GVS. ▶ Germany imports c79% of its natural gas requirements. ▶ Some 44% is imported from west European sources (Norway, the Netherlands, Denmark, and the UK) and 37% from Russia. ▶ In 2002, 48% of total gas consumed was by residential and commercial users, 25% by industrial users, 13% by power stations, and 14% by 'others'.
Outlook	
	▶ German gas companies have failed to reach a voluntary gas infrastructure access agreement and as a consequence the gas industry will be regulated by an independent regulator which will be set up by July 2004.

Source: HSBC

Germany

Geographical representation of operations

Regional utilities



Source: HSBC

Germany

Electricity pricing

2002 German marginal wholesale electricity prices (E/MWh)

	Q1 2002	Q2 2002	Q3 2002	Q4 2002
Base	23.28	23.31	21.99	21.99
Near base	23.28	23.31	21.99	21.99
Mid base	24.29	24.24	23.15	23.17
Mid load	24.41	24.39	24.23	24.33
Mid peak	24.88	25.02	24.81	24.87
Near peak	25.87	25.87	25.87	25.87
Peak	32.61	32.61	32.61	31.65

Source: Powerink, HSBC

Germany

Major issues

Topic	Comment
Liberalisation	▸ The timetable for EU-wide energy market liberalisation has been set: ▸ Full market opening on 1 July 2007 ▸ Legal unbundling of transmission on 1 July 2007 ▸ Legal unbundling of distribution on 1 July 2007
Regulator	▸ In March 2003, the German government reached an agreement to set up a new regulatory body by 2004. Following discussions with both companies, the actual regulatory powers given to this new body look unlikely to change the status quo greatly. In an additional development, the German government agreed to legalise the existing association agreement. ▸ The body will fall under three possible departments: 1. The Federal Cartel Office – negative as the cartel office has previously attempted to force cuts in tariffs. 2. The Federal State (already has a role in retail tariff agreements) – this would be the best scenario for the companies. 3. Economics Ministry – view likely to be neutral. This is the favourite currently.
Renewables/security of supply	▸ Nuclear electricity production will continue to decline following government policy to decommission all nuclear power stations by 2015. ▸ To meet the shortfall in energy demand and adhere to the targets set at Kyoto, Germany will have to increase dependence on renewable sources of energy and gas (ie, low emission fuel) over the course of the next decade. New legislation is forcing generators to invest in cleaner technologies, eg, The Co-Generation Act, which requires electricity suppliers to procure an increasing share of power from combined heat and power (CHP) stations. This is expected to curb CO_2 emissions by 23 million tonnes over the next decade. ▸ Germany now has the largest installed capacity of wind turbines in Europe. There is a concern from the dominant generators E.ON and RWE that the security of supply offered from wind generation is limited. While both companies have significant portfolios of wind capacity, it was proven in the summer of 2003 that excess dependence on inconsistent wind generation can lead to supply issues.

Source: HSBC

Germany

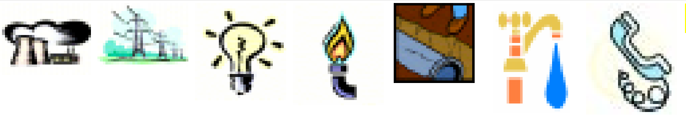
E.ON

Key data

RIC code **EONG.DE**

Mkt cap: EUR31bn

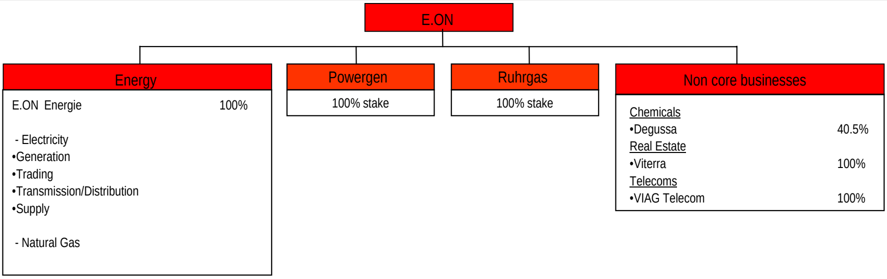
Analyst **Alexandra Perricone**



Business description

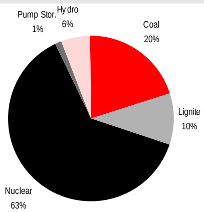
Electricity generation, transmission & distribution, trading and supply, gas supply, chemicals, real estate, telecoms

Company structure



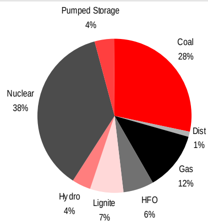
Source: HSBC

2002 generation output: total 112TWh



Source: Powerink, HSBC

2002 installed capacity: total 22,840MW



Source: Powerink, HSBC

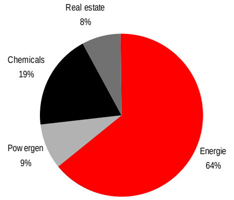
Germany

E.ON: installed capacity by fuel type (MW)

Fuel type	Coal	Dist	Gas	HFO	Lignite	Hydro	Nuclear	Pumped storage
Installed capacity (MW)	6,441	279	2,780	1,470	1,570	900	8,445	955
%	28	1	12	6	7	4	37	4

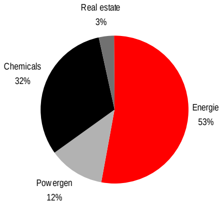
Source: Powerink, HSBC

2002 EBITA by division: EUR4,732m*



Source: HSBC
** includes losses of EUR197m for other/consolidation*

2002 revenue by division: EUR37,059m



Source: HSBC

Germany

E.ON

Key dates

1923	▸ VIAG founded.
1929	▸ VEBA founded.
2000 – June	▸ VIAG and VEBA merge to create E.ON.
2000 – August	▸ Electronics division sold.
2000 – November	▸ Swiss mobile operations sold to France Telecom.
2001 – January	▸ Holding in VIAG Interkom sold.
2001 – August	▸ Klöckner sold.
2001 – October	▸ MEMC sold.
2002 – January	▸ VAW (aluminium company) sold.
2002 – June	▸ 49% Veba Oel stake sold to BP.
2002 – July	▸ UK's Powergen acquired for EUR8.1bn, adding UK and US presence to E.ON's portfolio.
2002 – October	▸ Powergen acquires TXU Europe's retail business and three generators for GBP1.37bn. The deal adds 5.5m customers to Powergen.
2003 – January	▸ E.ON divests its 16% holding in Bouygues Telecom.
2003 – March	▸ Ruhrgas acquisition completed after months of injunctions and potential court cases. Cost of acquisition EUR10.7bn.
2003 – April	▸ Viterra Energy Services divested for EUR930m.
2003 – July	▸ Divestment of 22% stake in Bayerngas.
2003 – July	▸ Gelsenwasser sold to local municipalities for EUR835m.
2003 – August	▸ Total 4.8% holding in HypoVerinsbank placed for EUR390m.

Generation

- E.ON is the second-largest generator in Germany by total installed capacity (22,840MW).
- However, by actual generation, E.ON was the second-largest generator in 2002, contributing 99TWh of power compared with RWE (120TWh).
- It is also the largest producer of electricity through coal use with 6,441MW of coal-generating capacity.

Supply/distribution

- Around 20m electricity customers of which:
- 7m in Germany
- 2.3m in the UK
- 2.15m in Scandinavia
- 3.4m in the Czech Republic
- 3.7m in the rest of Europe
- 1.2m in the US

Germany

E.ON	
Transmission	
	▸ 5,300km of 380kV lines
	▸ 5,500km of 220kV lines
	▸ 21,800km of 110kV lines
Gas	▸ Ruhrgas – post-acquisition E.ON is expected to supply 13m natural gas customers
Water	▸ 100% E.ON Aqua
Strategy	▸ Refocus towards Europe. No near-term acquisitions in the US
	▸ Reorganisation of businesses:
	▸ Gas procurement, transport, storage and trading on a European basis
	▸ Electricity in:
	▸ Central Europe
	▸ The UK
	▸ The Nordic region
	▸ Mid-west US
	▸ Increase group EBIT to EUR6.7bn by 2006 from EUR4.7bn in 2002
	▸ 'Double-digit' dividend growth through to 2006
	▸ Continuation of non-core divestments
	▸ 'on-top' plan to focus on fine tuning organisational structure and performance improvements
	▸ ROCE target of 10.5% in 2005 from 9.3% in 2002

Source: HSBC

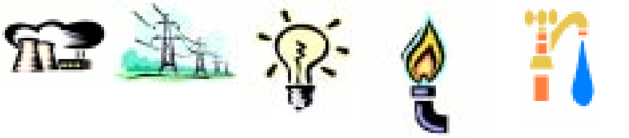
Germany

RWE

Key data

RIC code
RWEG.DE
Analyst:
Verity Mitchell

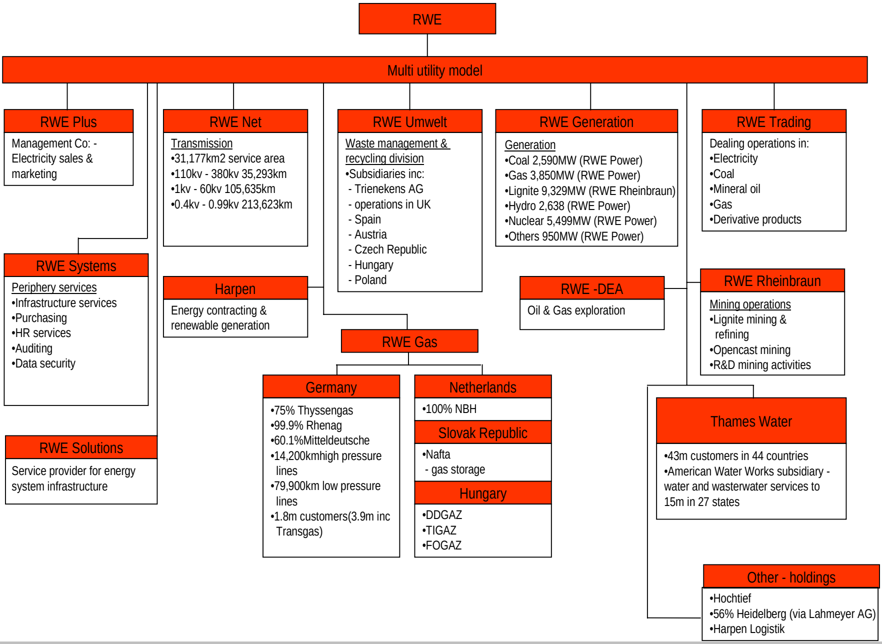
Mkt cap:
EUR14.1bn



Business description

Electricity generation, transmission & distribution, supply, trading; gas exploration, supply & transmission, trading; water services, waste services and infrastructure services.

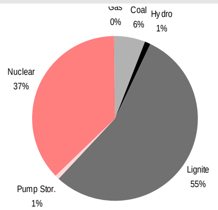
Ownership structure (will change in autumn 2003)



Source: HSBC

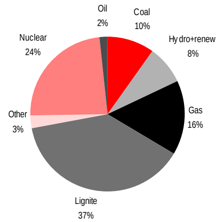
Germany

2002 generation output: total 121TWh



Source: HSBC

2002 installed capacity: total 23,079MW



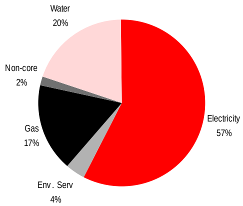
Source: Powerink, HSBC

RWE: installed capacity by fuel type (MW)

Fuel type	Coal	Hydro + renewable	Gas	Lignite	Nuclear	Oil	Other
Installed capacity (MW)	2,300	1,877	3,580	8,833	5,499	366	624
%	10	8	16	37	24	2	3

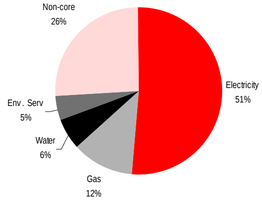
Source: Powerink, HSBC

2002a EBITDA by division: EUR7,241m



Source: HSBC

2002a revenue by division: EUR46,663m



Source: HSBC

Germany

RWE

Key dates	
1898	▸ RWE originated as Elektriziteets-AG (formerly W.Lahmeyer and Co) to set up the first power plant in the city of Essen
1990s	▸ RWE reorganised its operations into five principal units, responsible for energy, mining, raw materials, petroleum & chemicals, water & waste management, and engineering activities.
1994	▸ RWE acquires equity stake in East German power producer and operator VEAG
1995	▸ RWE consolidates its telecoms operations into the group
1995	▸ RWE acquires further stakes in utilities in the Czech Republic, Portugal and Croatia, and acquires new interests in Hungary
1997	▸ RWE merges its telecoms operations with VEBA, through the creation of a JV o.tel.o
1999	▸ RWE begins a strategic policy of concentrating on its core utilities businesses, and divesting non-core operations (especially exiting the telecoms and chemicals sectors)
1999	▸ RWE disposes of its fixed line operations and o.tel.o brand name to Mannesmann in April, its cable business to Deutsche Bank in July and its cellular radio operations to France Telecom in the October
1999	▸ RWE merges with Lahmeyer AG (equity holder of other RWE operations, eg, Heidelberger)
2000 – December	▸ RWE acquires Thames Water
2001 – December	▸ Transgas acquired
2002 – May	▸ Acquisition of Innogy (UK) completed
2003 – January	▸ RWE completes its acquisition of American Water Works

Generation

- RWE is the largest generator in Germany by total installed capacity (23,079MW in 2002)
- RWE was the largest generator in 2002, contributing 121TWh of power compared with E.ON (99TWh)

Supply/distribution

- RWE has a complete mix of generating plants including lignite power and associated mining activities.
- 8.9 million electricity customers
- 3.9 million gas customers
- Distribution assets in regional territories

Transmission

- 31,177km2 service area
- 220kv – 380kv 11,903km
- 110kv – 13,709km
- 0.4kv – 30kv 158,233km

Germany

RWE

Gas	
	▶ 75% Thyssengas
	▶ 99.9% Rhenag
	▶ 60.1% Mitteldeutsche
	▶ 14,200km high pressure lines
	▶ 79,900km low pressure lines
	▶ 1.8m customers in Germany, 3.9m including Transgas
	▶ Gas assets in the Netherlands, Hungary and the Slovak and Czech Republics
Water	
	▶ RWE Water German water activities.
	▶ RWE Water (UK): 43m customers in 44 countries. RWE Water is the world's third-largest water and wastewater service company
	▶ 50% Trienekens AG (environmental sector)
	▶ 100% American Water Works
Waste	
	▶ RWE Umwelt has waste management activities in the UK, Spain, Austria, the Czech Republic, Hungary and Poland
Current strategy	
	▶ Growth in shareholder value through:
	▶ Consolidating its core businesses of energy/water and environmental services, by reorganising itself in energy on a geographically focused basis in Germany
	▶ Sustaining cost cutting to achieve continued efficiency savings and generate positive returns

Source: HSBC

Germany

Other major market players

Company	Fuel type	Generation (TWh)	Capacity (MW)
VEAG	Coal	3.92	508
	Lignite	54.54	6,005
	Pumped storage	1.01	1,650
EnBW	Coal	3.64	1,366
	Lignite	3.36	327
	Run of river	1.27	200
	Nuclear	19.39	2,691
	Pumped storage	0.76	675
STEAG	Coal	34.3	4,534

Source: Powerink, HSBC

Spain

Introduction

Spain is the fifth-largest market in Europe. Currently there are five major generators in Spain; they are, in order of market share, Endesa, Iberdrola, Union Fenosa, Hidrocantabrico (EnBW and EDP) and Viesgo (Enel).

Electricity generation, transmission, distribution and supply have been unbundled. Generation and supply to eligible customers is not regulated and is split principally between the five major players. Distribution remains a regional monopoly and is regulated. The transmission network is regulated and operated by an independent transmission operator, Red Electrica. Endesa, Iberdrola, Union Fenosa and Hidrocantabrico each have a 3% equity holding in REE.

The Spanish electricity supply market became 100% liberalised on 1 January 2003, theoretically allowing 21m electricity users to switch suppliers. Despite the government's push for liberalisation, this has not necessarily been followed by full acceptance on the part of consumers, given that the government introduced a system that allows industrial and residential customers to remain in the regulated system until 2007 and 2010, respectively.

The wholesale pricing mechanism operates on a 'pool' system, implemented in 1998, whereby generators submit bids and a marginal price is set. In addition, Spanish generators are entitled to cost of transition to competition (CTC) payments. These are theoretically guaranteed payments agreed by the government at liberalisation in 1998 and set in reference to an assumed wholesale price of EUR36/MWh.

Electricity prices increased significantly in 2002 compared with the year before, largely driven by the adverse impact of dry weather on Spain's hydro generation, halving hydro's contribution to the energy pool. This was further compounded by the forced outage of nuclear capacity. The situation has reversed in 2003 with hydro reserves benefiting significantly from wet weather.

Spain has limited interconnection with the rest of Europe and in recent years has seen its reserve margin deteriorate significantly with blackouts in winter 2001. However, it has recently announced plans to increase its interconnector capacity to Morroco, which will add to Spain's existing interconnections with France and Portugal. Electricity demand growth is forecast at 3.5-5.0% pa for the medium term.

Spain

As a result, the country is involved in a major push to build new CCGT and renewable plants as part of its National Energy Plan.

The gas market is principally operated by Gas Natural, which (31% owned by La Caixa and 25% by Repsol) transports, stores and supplies the bulk of Spain's gas. Gas regulation allows a recognised rate of return on regulatory asset base (RAB) for transmission and distribution assets and sets TPA fees. Gas Natural's share of the Spanish gas market is c70%.

Liberalisation of the market has obliged market incumbents to reassess their current market positions. In March 2003, Gas Natural made a failed bid attempt for Iberdrola. The deal was blocked primarily on competition grounds.

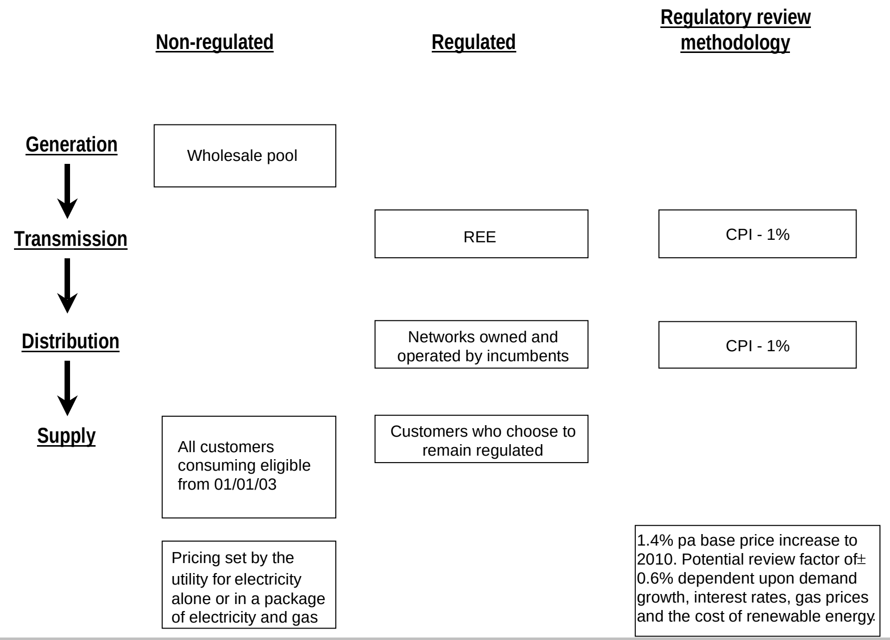
The long awaited creation of MIBEL – the single Iberian energy market, is expected in January 2004. Under MIBEL, the Portuguese energy market will be combined with that of Spain, creating an Iberian wholesale energy pool. Ahead of the creation of MIBEL, the two countries have been working on network integration to ensure smooth operation. Equally, Portugal is introducing major regulatory changes.

The Spanish Secretary of State for Energy is expected to announce a review of the renewables model and this could include changes to the way in which renewables are remunerated.

Spain

Schematic

Spanish electricity market



Source: HSBC

Spain

Deconstructing the value chain

Spanish electricity value chain

Regulation

- New regulation aims to establish a stable and permanent regulatory environment that allows accurate estimates of the required investments and the expected returns from them.
- Tariff increase for 2003 has been set at +1.69%.
- The new tariff framework sets a base case price rise of 1.4% pa until 2010 and recognises potential tariff reviews with +/- 0.6% limit – in case estimates deviate from actual evolution on four key variables of:
  - Gas prices.
  - Cost of energy produced by the Special Regime generators.
  - Evolution of demand.
  - Evolution of interest rates.
- The recovery of tariff deficits for 2000-02 has been recognised in new regulation and the funds could be securitised in the near term.
- The higher cost of CCGT power generation is recognised, with costs for conventional plants recognised at EUR36MW/h while CCGT are recognised at EUR43MW/h.

Key dates

1998	Wholesale pool initiated, in operation ever since.
2003	Full supply market liberalisation.

Market structure

Generation

- Managed by independent company, Omel.
- Participants in the pool include electric power producers, external agents, qualified consumers, resellers, self-producers and renewables producers, and electric power distributors.
- There are five major vertically integrated electricity companies in Spain: Endesa, Iberdrola, Union Fenosa, Hidrocantabrico (EdP/EnBW), and Viesgo (Enel).
- Collectively they represent more than 90% of the country's total installed capacity, with the remainder generated by Independent Power Producers (IPPs).
- Spanish demand for electricity has grown by an average rate of 5.5% pa since 1996.
- Current forecasts suggest that a robust trend is set to continue. Iberdrola is forecasting growth rates of 3.5-5.0%.
- Limited cross-border interconnection and supply-demand constraints imply that new capacity is needed to reinstate an acceptable reserve margin. Plans have been annouced to increase interconnection to Morocco to 1,000MW from the current 300MW.
- There are currently congestion problems with the interconnector with France.

Spain

Spanish electricity value chain (cont'd)

- Spain's National Energy Plan (2002) set out a number of targets for meeting the country's energy targets and environmental obligations for 2011, including:
  - Increasing wind capacity tfrom 4,000MW to 13,000MW.
  - Doubling mini-hydro capacity to 2,400MW.
  - Adding 14,800MW of CCGT capacity.

Transmission

- Created in 1985, 'Red Electrica' (REE) is the Spanish independent transmission operator.
- In March 2003, REE completed the purchase of transmission assets from Endesa and Union Fenosa, giving REE control of 84% of the transmission grid. REE is set to take control of the transmission lines owned by CVC Capital Partners, which will increase REE's control to 99% of the grid.
- Red Electrica operates 15,745km of 400kV, 11,186km of 220kV transmission and 26,966 of transformer capacity (MVA).
- Transmission is a regulated business, subject to a price cap methodology (CPI-x).
- Endesa, Iberdrola, Union Fenosa and Hidrocantabrico each have a 3% equity holding in REE.

Supply/distribution

- The three largest utilities have 95% of the supply and distribution market between them.
- Endesa has the largest customer base in Spain overall, with c10m customers; Iberdrola has c9m and Union Fenosa c3m.
- The national network is spread over 14 regions on the Spanish mainland.
- Electricity operations in the Balearic and Canary Islands are managed exclusively by Endesa.

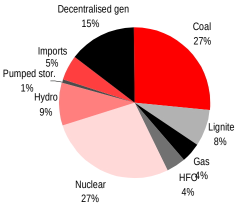
Outlook

- MIBEL (Single Iberian electricity market) is set to come into operation on 1 January 2004, having been delayed by a year. Spain and Portugal are currently working together to integrate the two systems. The Portuguese PPA system will be abolished in order to allow Portuguese generation assets to compete in the Spanish wholesale market and develop a single Iberian spot market. The spot market is to be managed in Spain. An Iberian forward market is expected to be created in Portugal.
- The CNE's blocking of Gas Natural's bid for Iberdrola rules out large-scale Spanish consolidation.

Source: HSBC

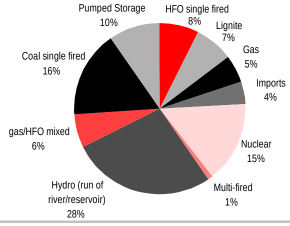
Spain

2002 generation by fuel type: total 228TWh



Source: Powerink/HSBC

2002 capacity by fuel group : total 51,080MW



Source: Powerink/HSBC

Spanish capacity by fuel type 2002 (MW)

Coal	Gas	Gas/HFO mixed	HFO	Hydro	Imports	Lignite	Multi-fired	Nuclear	Pumped storage
8334	2657	3262	3848	13998	2150	3733	320	7816	4963
16%	5%	6%	8%	27%	4%	7%	1%	15%	10%

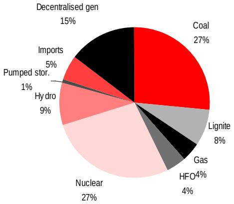
Source: HSBC

Spanish reserve margin

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand: GW	30.07	33.67	34.40	35.38	36.69	37.96	39.26	40.42	41.72
Capacity available GW	35.29	35.68	34.70	39.05	40.73	43.49	47.47	49.15	49.92
Capacity margin: %	17%	6%	1%	10%	11%	15%	21%	22%	20%

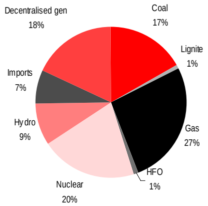
Source: Powerink/HSBC

Spanish generation mix 2002



Source: Powerink/HSBC

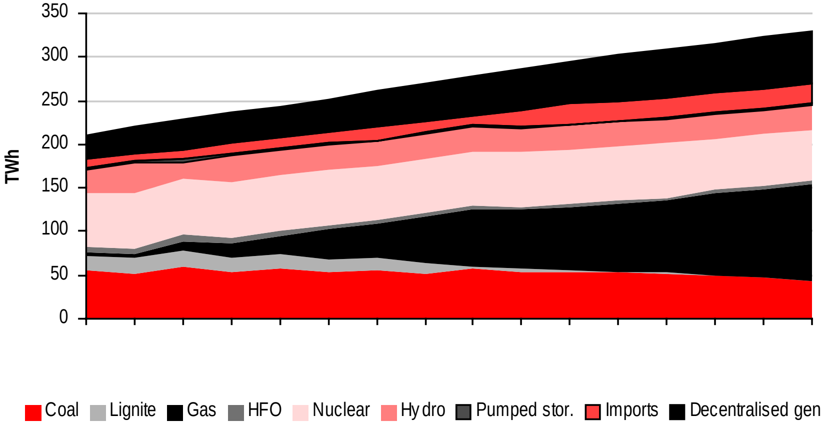
Spanish generation mix 2012e



Source: Powerink/HSBC

Spain

Projections for the Spanish power sector by fuel type



Source: Powerink/HSBC

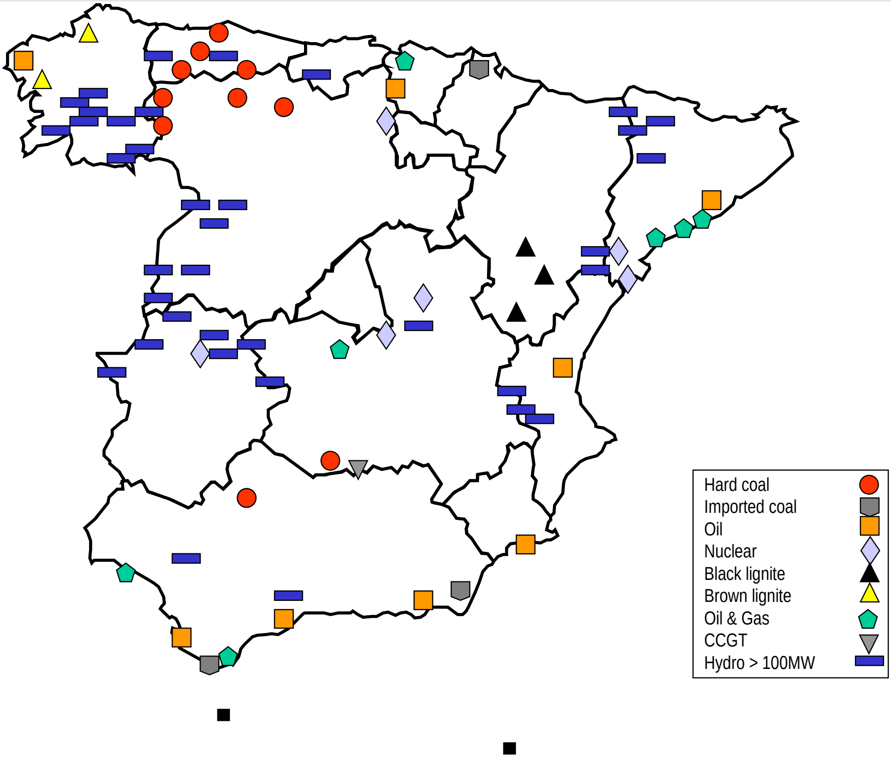
Import capacity MW

France	Portugal	Morocco
1,100	650	400
51%	30%	19%

Source: Powerink/HSBC

Spain

Power plant locations (2001)



Source: Red Electrica

Spain

Spanish customer numbers (millions)

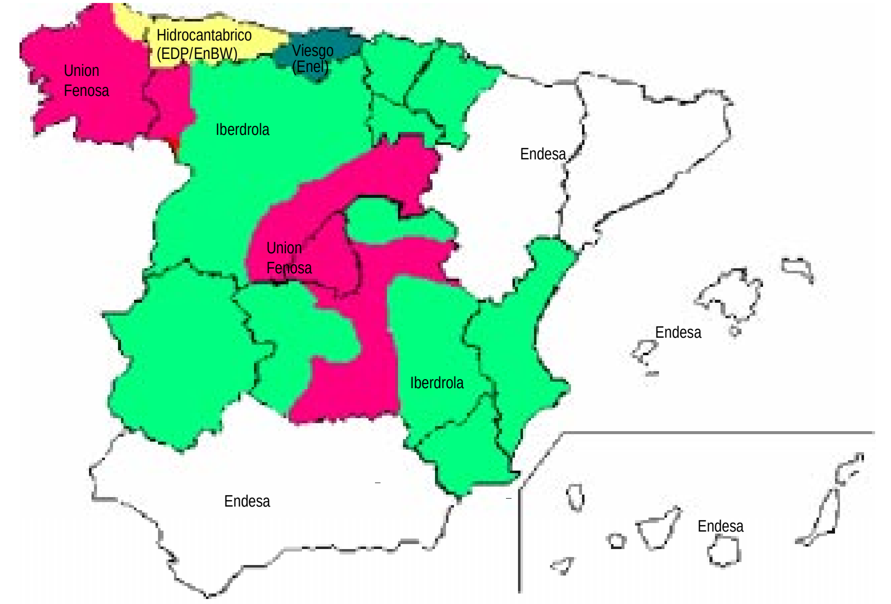
Company	Electricity customers (m)	Gas customers (m)	Total customer accounts (m)
Endesa	9.9	0.5	10.4
Iberdrola	9.2	0.2	9.4
Union Fenosa	3.1	0.1	3.2
Hidrocantabrico	0.6	0.5*	1.0
Viesgo	0.5	n/a	0.5
Gas Natural	<0.1	4.2	4.5
Total	**23.4**	**5.5**	**29**

Source: HSBC
**takes account of Naturcorp acquisition*

Spain

Geographical representation of operations

Regional electricity suppliers



Source: HSBC

Spain

Spanish gas value chain

Regulation

- The new regulation is governed by the principles of:
  - Recovery of investments
  - Fair return on invested capital
  - Encouragement of the search for efficiency and cost reduction through the remuneration system.
- Price increases will be based on a formula of Hydrocarbons Price Index (IPH) x F , where F = 0.85.
- New investment recognised via new retail connections (60%) and volume growth (40%).
- January 2003, the Spanish supply gas market became 100% liberalised.

Key dates

2003 – January	Gas market 100% liberalised.
2003 – March	Gas Natural makes an unsolicited bid for competitor Iberdrola. The bid is subsequently blocked on competition grounds.
2003 – April	EDP-owned Hidrocantabrico wins bid for Basque gas company, Naturcorp.

Market structure

- Gas Natural is the main gas company in Spain, supplying, transporting and distributing natural gas.
- Supplies are brought through two gas pipelines (Lacq-Calahorra and Maghreb (Morocco) – Europe) and LNG also arrives at the re-gasification plants at Barcelona, Huelva and Cartagena. Bilbao LNG terminal due to start operations in H2 2003.
- Underground storage sites are used to improve and ensure the reliability of supplies.
- In June 2002, Gas Natural sold 59% of its holding in gas transmission and storage/regasification company, Enagas, via an IPO. Enagas operates under a regulated TPA system.

Outlook

- The introduction of MIBEL will form an integrated electricity Iberian market with implications for freer gas trade.
- Possible construction of second sub-sea pipeline from Algeria to Almeria (Medgaz project) with 8-10 bcm pa capacity.
- Increase in capacity at Maghreb-Europe pipeline from 6.57 bcm pa to 9.6 bcm pa at end-2004.

Source: HSBC

Spain

Major issues

Topic	Comment
MIBEL	▶ MIBEL (Single Iberian electricity market) will be created on 1 January 2004, a year after the Spanish market became fully liberalised.
New tariff	▶ Determination of new tariff framework for Special Regime generation (renewables and CHP) is still pending. Ministerial commitment to maintain a premium price for this type of energy and improve visibility
Interconnection	▶ Feasibility of additional 2,900MW of interconnection capacity with France. Plans have been annouced for an interconnector to Majorca and an upgrade to 1,000MW from 300MW to Morocco.
Securitisation	▶ Securitisation of tariff deficit funds of EUR1.4bn.
Divestments	▶ Gas Natural still has to sell another 6% of Enagas to comply with regulatory decree forbidding ownership of more than 35%.

Source: HSBC

Spain

Electricity pricing

2002 Spanish marginal wholesale electricity prices: euro/MWh

	Q1	Q2	Q3	Q4
Base	29.79	26.14	25.60	25.55
Near base	31.29	26.51	25.96	26.74
Mid base	36.64	30.13	29.41	27.93
Mid load	35.05	31.33	31.76	30.34
Mid peak	43.45	36.69	35.35	33.70
Near peak	59.37	54.73	48.93	46.97
Peak	82.54	82.40	72.25	69.63

Source: Powerink/SBC

TWA prices 2002 (assumes 100% load factor)

	Q1	Q2	Q3	Q4	All yearTWA prices /MWh
2002	41.69	34.75	33.81	33.09	35.84

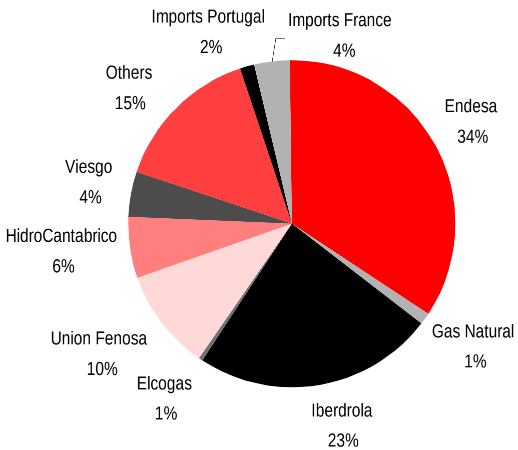
Source: Powerink/HSBC

Spain

Market players

There are five major players in the Spanish electricity generation market, Endesa (34%), Iberdrola (23%), Union Fenosa (10%), Hidrocantabrico (EDP and EnBW) (6%) and Viesgo (Enel) (4%). With a package of energy-related measures enacted by the government in June 2000, it was stipulated that Endesa could not add any net new capacity in Spain for five years and Iberdrola for three over and above any new projects that had been authorised at that date. Endesa subsequently circumvented this restriction through the disposal of more than 2.0GW of capacity through Viesgo.

Generation by company: total 228TWh (2002)

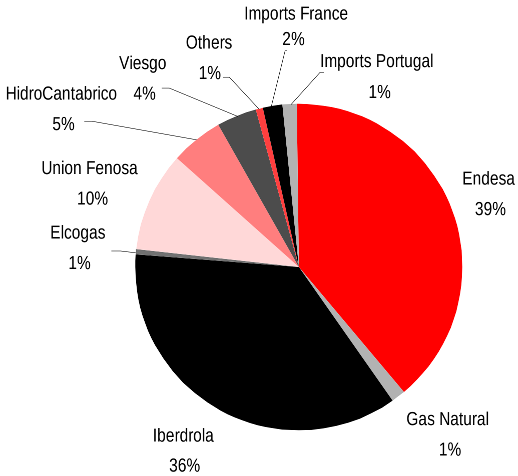


Source: Powerink/HSBC

Gas Natural is the dominant player in Spanish natural gas with c70% of the total market.

Spain

Capacity by company: total 51,080MW (2002)



Source: Powerink/HSBC

Installed capacity by company MW

Company	Installed capacity	%
Endesa	19,807	39
Iberdrola	18,330	36
Union Fenosa	5,033	10
HidroCantabrico	2,688	5
Viesgo	2,018	4
Gas Natural	734	1
Elcogas	320	1
Imports France	1,100	2
Imports Portugal	650	1
Others	400	1

Source: Powerink/HSBC

Spain

Endesa

Key data

RIC code	Market cap
ELE.MC	EUR14.9bn
Analyst:	
Alexandra Perricone	

Business description

Electricity generation, supply & distribution, telecoms, gas distribution, water supply. Sizeable assets in Latin American electricity.

Ownership structure

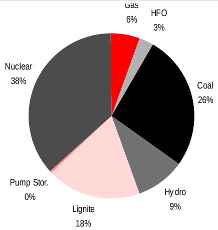
Endesa

- **Spain**
  - Generation
    - 19,807MW installed capacity
  - Transmission
    - 3% REE
  - Supply
    - 8.1m household
    - 1.8m Commercial
    - 8,250 deregulated
- **Latin America**
  - Brazil
    - Generation
      - 99.5% Cachoeira Douada
      - 80% Cerj 64MW
    - Transmission
      - 100% CIEN 1,000km
    - Distribution
      - 80% Cerj 1.7m customers
      - 58.9% Coelce 2m customers
  - Colombia
    - Generation
      - 85.6% Betania
      - 48.5% Emgesa
    - Distribution
      - 48.5% Condesa 1.8m
  - Peru
    - Generation
      - 60% Etevensa
      - 60% Piura
      - 63.6% Edegel
    - Distribution
      - 60% Edelnor 0.9m customers
  - Chile
    - Generation
      - 65% Enersis (Endesa Chile)
    - Distribution
      - 65% Enersis (Chilectra) - 1.3m customers
  - Dominican Republic
    - 40% Cepm
  - Argentina
    - Generation
      - 69.8% Dock Sud
      - 51.9% Costanera
      - 65.2% El Chocon
    - Transmission
      - 22.2% Yacylec 282km line
    - Distribution
      - 99.5% Edesur 2.1m
- **Europe**
  - Italy
    - 45% Elettrogen
  - France
    - 30% SNET
    - 25% SOPROLIF
  - Amsterdam
    - 10% APX
  - Portugal
    - 35% Tejo Energia
  - Morocco
    - 18% Lydesc
  - Poland
    - 10% Gielda Energii
- **Other**
  - Gas distribution
    - Iberia 500,000 customers
  - Water
    - 11.8% Agbar
    - 39.95% of Interaqua
- **IT**
  - Auna
    - 29.9% >8m customers
  - Smartcom
    - 100% customers 0.95m

Source: HSBC

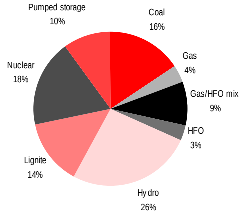
Spain

2002 generation output: total 78.3TWh



Source: Powerink/HSBC

2002 installed capacity: total 19,807MW



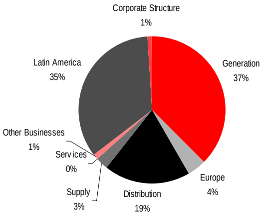
Source: Powerink/HSBC

Endesa: installed capacity by fuel type MW

Fuel type	Coal	Gas	Gas/ HFO mix	HFO	Hydro	Lignite	Nuclear	Pumped Storage
Capacity (MW)	3141	734	1818	580	5171	2770	3621	1972
%	16	4	9	3	26	14	18	10

Source: Powerink/HSBC

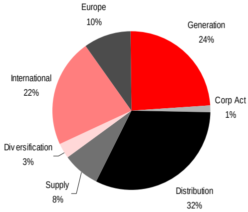
EBITA by division (2002a EUR3,582m*)



Source: HSBC

* total EBITA figure inc; -EUR27m for Corporate activities

Revenue by division (2002a EUR17,238m*)



Source: HSBC

* total revenue figure inc -EUR929m for unallocated adjustments

Spain

Endesa

Key dates	
1988	▸ Endesa founded.
1988	▸ Endesa ceases to be a 100%-state owned utility.
1988-98	▸ The government begins a programme of progressive privatisation: first IPO of 24.4%, 8.71% in 1994, 25% in 1997 and 33% in 1998 (Endesa becomes a private company).
1991	▸ Endesa purchases 87.6% of Electra de Viesgo, 40% of Fecsa, 33.5% of Sevillana de Electricidad and 24.9% of Nansa.
1992	▸ Endesa purchases 61.9% of Carboex and capital in Electricidad de Argentina and Yacylec.
1993	▸ Endesa acquires 55% of the firm, Hidroeléctrica de Cataluña (Hidruña), and purchases stock in the Portuguese company, Tejo Energia.
1995	▸ Endesa acquires 7.2% of the second largest Spanish mobile phone operator, Airtel.
1996	▸ Endesa increases its holding in Fecsa and Sevillana de Electricidad to 75%.
1999	▸ Endesa completes the acquisition of 65% of Latin American group Enersis, and 10% of cable TV station Menta.
1999	▸ Endesa sells Airtel stake for significant capital gain.
2000	▸ Endesa launches a failed bid attempt for Iberdrola.
2000	▸ Endesa, along with Telecom Italia and Union Fenosa signs an agreement to create the company AUNA, which is a grouping of all their shareholdings in Spanish telecommunications operators.
2000 – August	▸ Endesa raises its stockholding in Brazilian company, Cerj to 80%, while in November it acquires 30% of French operator, SNET.
2001 – July	▸ A consortium led by Endesa (45%) purchases Elettrogen, while, in September, Endesa sells Viesgo to Enel.
2002 – October	▸ Endesa announces Financial Strengthening Plan for Enersis and Endesa Chile, with focus on debt reduction through asset sales and refinancing of USD2.3bn of debt, and debt for equity swap accounting to USD1.5bn.
2003 – March	▸ Enersis arranges USD2.3bn debt refinancing.
2003 – March	▸ Moody's downgrades Enersis and Endesa Chile debt to junk status.
2003 – March	▸ Enersis sells Rio Maipo and Canutillar assets in Chile.
2003 – June	▸ Endesa sells Made Tecnologias Renovables to Gamesa for EUR120m.
2003 – June	▸ The sale of 7% of REE (required under legislation) raises EUR102.5m.

Generation	
	▸ With 19,807MW of total installed capacity and 78.3TWh of actual generation in 2002, Endesa is the largest genco in Spain.

Spain

Endesa (cont'd)

Supply/distribution

- 10.5m regulated electricity customers in Spain
- Access to 12m electricity customers in Latin America
- Access to distribution networks throughout Europe via commercial agreements in Portugal, France, Italy and Germany

Transmission

- 3% holding in Spanish transmission company, Red Electrica
- Transmission operations in Argentina and Brazil

Gas

- Gas distribution 0.5m customers in Iberia

Water

- 'Endesa Water' 0.38m water customers

Current strategy

- Endesa sets free cash flow generation and the stregthening of its balance sheet as a priority
- Focus on consolidation and profitability of core businesses
- Planned divestitures of EUR 6.5bn in the period 2002-06
- Plans to invest EUR2.2bn in Andalucia by 2007
- Reduced investment budget for 2002-06 from EUR13bn to EUR9.7bn
- Reduce Enersis Group debt levels by USD2.6bn – sigificant progress has been made to date

Source: HSBC

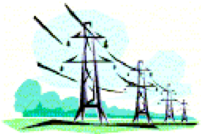
Spain

Iberdrola

Key data

RIC code
IBE.MC
Analyst:
Alexandra Perricone

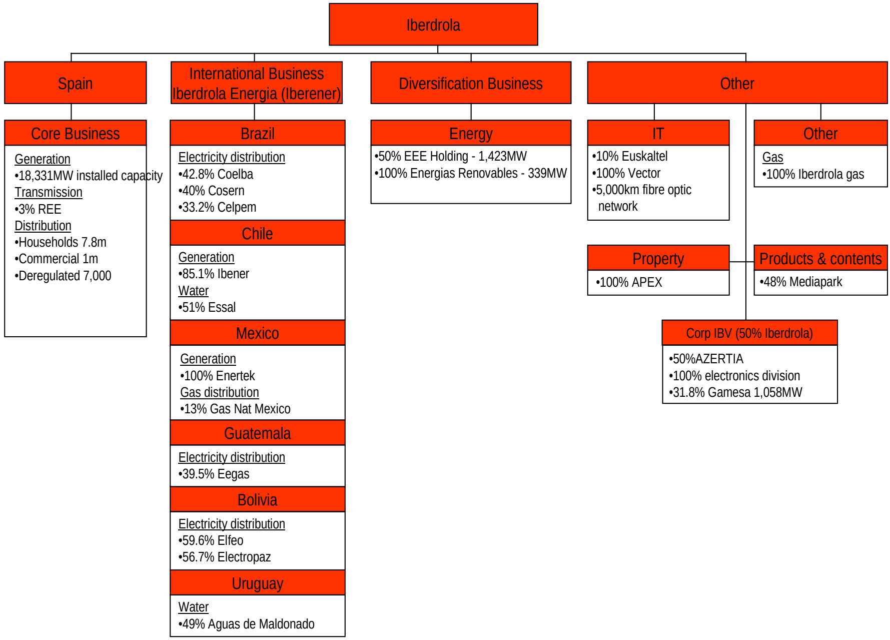
Market cap
EUR13.8bn


Business description

Electricity generation, supply & distribution, gas distribution, wind generation, property, electronics

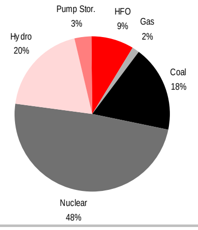
Ownership structure



Source: HSBC

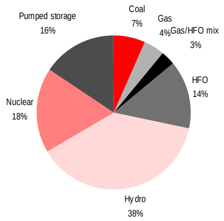
Spain

2002 generation output: total 53TWh



Source: Powerink/HSBC

2002 installed capacity: total 18,331MW



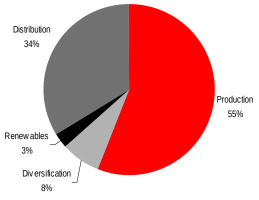
Source: Powerink/HSBC

Iberdrola: installed capacity by fuel type MW

Fuel type	Coal	Gas	Gas/ HFO mix	HFO	Hydro	Nuclear	Pumped Storage
Capacity (MW)	1,243	796	534	2,641	6,971	3,270	2,876
%	7	4	3	14	38	18	16

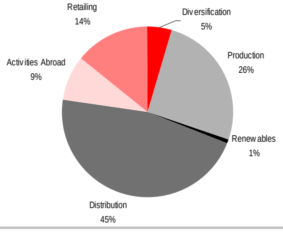
Source: Powerink/HSBC

EBITA by division (2002a EUR1,564m*)



Source: HSBC
*total revenue figure inc -EUR53m for unallocated revenues and non-regulated losses

Revenue by division (2002a EUR9,594m*)



Source: HSBC
*total revenue figure inc -EUR206m for unallocated revenues

Spain

Iberdrola

Key dates	
1901	With its origins dating back to 1901 with the foundation of Hidroelectrica Iberica, Iberdrola is today the result of the merger between Hidroeléctrica Española and Iberduero concluded in November 1992.
Domestic	
1993	Iberdrola signs an agreement selling Hidroeléctrica de Cataluña to Endesa.
1996	Iberdrola enters the telecommunications market, signing a strategic telecommunications alliance with Telefónica.
1997	Iberdrola, in conjunction with Telefonica, founds the company Utilitel Comunicaciones.
1998	Iberdrola and EDP announce the formalisation of a strategic alliance, in an effort to expand operations in the Iberian penninsular without breaching anti competitive constraints. A cross-shareholding is created.
2000	Endesa launches a failed bid attempt for Iberdrola.
2000	Iberdrola purchases 4% of the Portuguese gas company GALP, while, in the same year, reaching agreement with EDP regarding the joint operation of the company's Iberian fibre optic network.
2001 – May	Ignacio Sanchez Galan is appointed the new CEO of Iberdrola. Sanchez Galan (former head of Airtel) launches a new strategy in September 2001 called "Iberdrola: x2+".
2002 – September	IbeRenova and Gamesa sign strategic alliance in the renewable energy area in Spain and abroad.
2002 – November	Iberdrola reaches friendly split of stakes in renewable companies with EHN.
2002 – November	Iberdrola finalises the sale of its high-voltage transmission assets to CVC Capital Partners.
2003 – March	Spanish competitor, Gas Natural, makes a unsolicited bid for Iberdrola, offering EUR6.8 cash + 0.58 Gas Natural shares per IBE share. Gas Natural withdraws when the bid is blocked by the Spanish Energy Watchdog, CNE.
2003 – March	The sale of 7% of REE (required under legislation) raises EUR102.5m.
International	
1992	Since the 1992 merger, Iberdrola has adopted a strategic policy of expanding international operations based on the multi utility model.
1992	Iberdrola begins its foray into the Latin American market with the takeover of Litoral Gas and the Güemes Thermal Power Station in Argentina. Since then, Iberdrola has expanded its international operations via the following acquisitions.
1995	Acquisition of the electricity distribution companies, Electropaz and Elfeo in Bolivia.
1996	Iberdrola purchases Tocopilla and Colbún, electric generation utilities in Chile.

Spain

Iberdrola (cont'd)	
1997	▸ Iberdrola entered a JV (with Gas Natural and Repsol) to acquire Gas Natural ESP in Colombia and gas companies, Riogas and CEG in Brazil.
1997	▸ Iberdrola acquires Brazilian electricity distribution company, Coelba.
1998	▸ Iberdrola, EDP and Tampa Energy, acquire 80% of Eegsa.
1999	▸ Iberdrola purchases the Chilean water company, Essal.
2001	▸ Iberdrola acquires 13% of Gas Natural Mexico.
Generation	
	▸ With 18,331MW of total installed capacity and 53TWh of actual generation in 2002, Iberdrola was the second largest genco in Spain.
Supply/distribution	
	▸ 9.2m customers (Spain)
	▸ 7m customers (Latin America)
	▸ 40% share of the electricity end-market
	▸ Key regions are the Basque country, Valencia and Madrid.
	▸ Gas and electricity distribution assets in Latin America
Transmission	
	▸ Owns 3% of Red Electrica
Gas	
	▸ Latin American gas distribution assets
	▸ Iberdrola Gas
Current strategy	
	▸ The company's 2002-06 strategic plan outlines a number of key targets, including:
	▸ Expanding generation
	▸ CCGT 1200MW (2002) to 4000MW (2006e)
	▸ Renewables 1387MW (2002) to 3834MW (2006e)
	▸ Divestments of up to EUR3bn (expected to be completed by 2005)
	▸ Redundancy of up to 3,168 employees by 2006 (approval from unions granted)

Source: HSBC

Spain

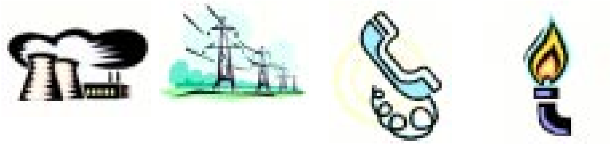
Union Fenosa

Key data

RIC code **UNF.MC**

Market cap EUR4.7bn

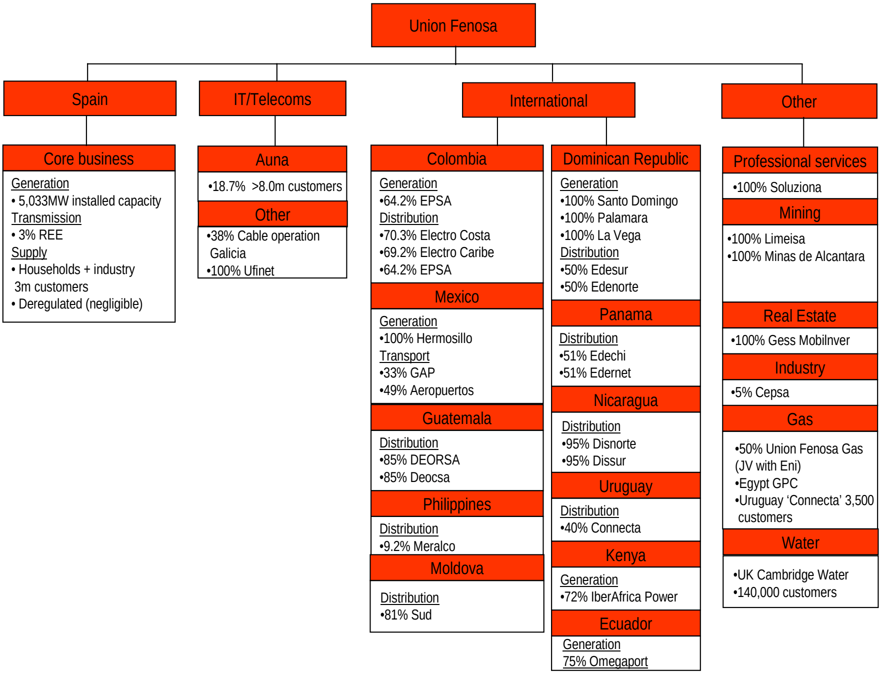
Analyst: **Alexandra Perricone**



Business description

Electricity generation, supply & distribution, telecoms, professional services, gas distribution, mining, real estate.

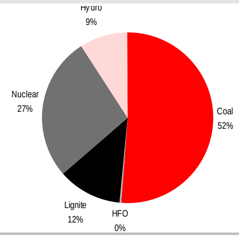
Ownership structure



Source: HSBC

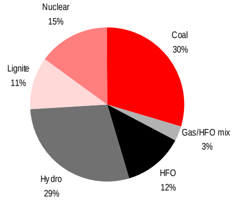
Spain

2002 generation output: total 23TWh



Source: Powerink/HSBC

2002 installed capacity: total 5,033MW



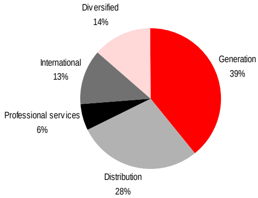
Source: Powerink/HSBC

Union Fenosa: installed capacity by fuel type MW

Fuel type	Coal	Gas/HFO mix	HFO	Hydro	Lignite	Nuclear
Capacity (MW)	1498	157	627	1439	563	749
%	30	3	12	29	11	15

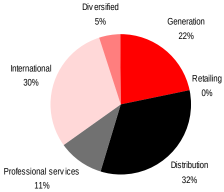
Source: Powerink/HSBC

EBITA by division (2002a EUR764m*)



Source: HSBC
total figure inc -EUR47m for unallocated revenues

Revenue by division (2002a EUR6,290m*)



Source: HSBC
total figure inc -EUR333m for unallocated revenues

Spain

Union Fenosa

Key dates

1889	Founded in 1889 as the Madrid General Electricity Company and in 1900 as the General Electricity Company of Galicia. The two companies merge in 1982 to create Union Fenosa.
1995	Purchases stake in Emdersa (Argentina).
1996	Acquires stake in Iberafrica Power (Kenya).
1997	Purchases stake in TDE (Bolivia) and Meralco (Philippines).
1998	Acquires stake in Edemt Edechi (Panama) and F.E Hermosillo (Mexico).
1999	Acquires stakes in Deocsa (Guatemala), Edenorte, Edesur (Dominican Republic), GAP (Mexico) and increased stake in Meralco (Philippines).
1999	Purchases Cambridge Water (UK).
1999	National Power acquires 25% equity stake in Union Fenosa Generacion (UFG).
1999	Union Fenosa sells Airtel stake for a significant capical gain.
Early 2000	Union Fenosa launches abortive takeover bid for Hidrocantabrico.
2000	Acquires stakes in Conecta (Uruguay), Palamara La Vega (Dominican Republic), Naco-Nogales (Mexico), Tuxpan (Mexico), Disnorte-Dissur (Nicaragua), ESPA (Colombia), La Joya (Costa Rica) and Electrocosta Electricaribe (Colombia).
2000 – January	Launched 'Soluziona' (professional business subsidary).
2000 – February	Acquires distribution assets in Moldova.
2000 – May	Constitution of Auna.
2000 – September	Acquires distribution assets in Nicaragua.
2000 – October	Acquires of generation and distribution assets in Colombia.
2001	International Power sells its 25% holding in UFG back to Union Fenosa.
2002 – May	Chairman and Chief Executive, Victoriano Reinoso y Reino, dies unexpectedly, aged 53.
2002 – October	New CEO, Honorato Lopez Isla, launches new strategic guildlines.
2002 – December	Union Fenosa announces the sale of 50% of gas business to Eni.
2003 – March	Union Fenosa completes sale of its transmission assets to REE. Total payment for the assets is EUR430m.
2003 – June	Sale of 80% renewable energy unit and part-constructed CCGT plant to Enel.
2003 – June	The sale of 7% of REE (required under legislation) raises EUR102.5m.
2003 – June	Shareholders vote to scrap the 10% voting cap on shares.

Spain

Union Fenosa (cont'd)

Generation

- With 5,033MW of total installed capacity and 23TWh of actual generation in 2002, Union Fenosa is the third largest genco in Spain.
- By fuel type, Union Fenosa has the third-largest nuclear nameplate capacity of 749MW, which represents 27% of total generation and the second-largest installed capacity of coal/lignite fired generation (behind Endesa) with 2,061MW.

Supply/distribution

- 3m household customers (Spain).
- Distribution assets in Latin and Central America.

Transmission

- Owns 3% of Spanish transmission company, Red Electrica.

Gas

- Egyptian LNG liquefaction/shipping/regasification (SEGAS) (50/50 with Eni).

Water

- Union Fenosa owns Cambridge Water in the UK, but no waste management or water assets in the core Spanish market.

Current strategy

- Strengthen core energy business.
- Expansion plans in Spanish energy sector, critical to which is Egyptian natural gas contract, where Union Fenosa has secured a long-term supply of LNG (Liquified Natural Gas). Development of 2000MW of CCGT.
- Possible flotation of Latin American operations Union Fenosa Latinoamericana.
- Flotation of telecoms asset Auna expected.
- Flotation of professional services unit Soluziona expected.
- Its 2003-07 strategic plan targets:
  - Reducing net debt to EUR6.5bn (63% gearing).
  - Maintain its 13% share in the Spanish gas market.
  - Limit investment to EUR3.3bn.
  - Divestments worth EUR2.4bn.

Source: HSBC

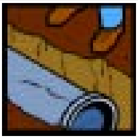
Spain

Gas Natural

Key data

RIC code	Market cap
GAS.MC	EUR7.6bn

Analyst:
Alexandra Perricone

Business description

Gas distribution, supply & trading, electricity generation and supply & trading, telecoms.

Ownership structure

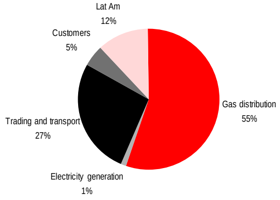
Gas Natural

- **Spain**
  - **Core businesses**
    - Gas supply
      - 4m households + industrial customers
      - Industrial
    - Generation
      - 81% Agrupacion (cogen)
      - 800MW CCGT
    - Gas Transmission
      - 40.9% Enagas 6,326km
      - 100% Gas Nat pipeline exc Enagas 28,451km
- **International**
  - **Brazil**
    - Transmission
      - 29% CEG
      - 38% CEG Rio
    - Distribution
      - 100% Gas Nat Sao Paolo Sul
      - 38% CEG Rio
      - 29% CEG
  - **Colombia**
    - Transmission
      - 67.3% Transporta Col de Gas
      - 60% Gas Nat ESP
    - Distribution
      - 60% Gas Natural ESP
  - **Mexico**
    - Transmission/distribution
      - 100% Metrogas
      - 87% Gas Nat Mexico
  - **Argentina**
    - Transmission/distribution
      - 50.4% Gas Natural BAN
  - **Trinidad & Tobago**
    - 33.3% BP Amoco reserves - Trinidad & Tobago
  - **Other**
    - 72.4% Mahgreb pipline
    - 100% Gas Natural Ireland
- **Communications/IT**
  - **Fibre Optic Network**
    - 100% Desarollo del Cable
- **Other**
  - **Spanish electricity**
    - Distribution
      - 100% Gas Nat Electricidad
    - Generation
      - 100% San Roque
    - Trading
      - 100% Gas Nat Trading
  - **Financial stakes**
    - 43% Kromschroeder - Meters

Source: HSBC

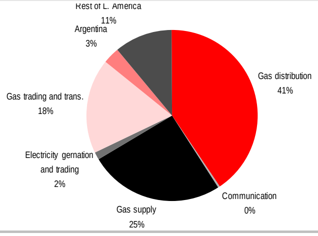
Spain

EBITDA by division (2002a EUR1,200m*)



Source: HSBC
**total figure excludes Enagas*

Revenue by division (2002 EUR5,268m)



Source: HSBC

Spain

Gas Natural

Key dates

1991	▸ Catalana de Gas merges with Gas Madrid and incorporates the piped gas distribution assets of Repsol. This merger gives rise to Gas Natural SDG.
1992	▸ Gas Natural begins investing in the Latin American markets starting with Argentina.
1994	▸ Gas Natural SDG purchases Enagas, a company that, at that time, is responsible for gas supplies and the management of the basic gas pipeline network in Spain.
2002	▸ Repsol cuts its stake in Gas Natural from 46% to 23%. La Caixa becomes the principle shareholder.
2002 – March	▸ Gas Natural's first CCGT, the 400MW plant at San Roque (Cádiz) becomes operational, followed in June by the 400MW plant in Besòs (Barcelona).
2003 – March	▸ Gas Natural launches an unsolicited bid for Iberdrola.
2003 – March	▸ The CNE (Spanish Energy Commission) rejects Gas Natural's bid for Iberdrola. Gas Natural subsequently withdraws its bid.
2003 – July	▸ Gas Natural wins the final auction for Enron's assets in Ecoelectrica de Puerto Rico.

Generation

- 800MW of CCGT generation with a further 4,000MW planned by 2007. (Gas Natural standalone).

Supply/distribution

- 4m gas household customers (Spain).
- 3.9m gas customers in Latin America.
- 100% of Gas Natural Electricidad (Spain).
- Gas distribution assets in Central and Latin America.

Transmission

- Gas transmission assets in Spain, Central and Latin America.
- Gas Natural owns 100% of Sagane, the coSmpany operating the section of the Maghreb-Europe pipeline running from the Moroccan-Algerian border to the straits of Gibraltar.

Current strategy

- Gas Natural will now focus on its organic growth strategy following its failed acquistion attempt for Iberdrola.

Source: HSBC

Spain

Other company generation and capacity data

Other market players

Company	Fuel type	Capacity MW
Hidrocantabrico (EDP and EnBW)	Coal	1,587
	Gas	393
	Hydro	417
	Nuclear	176
	Pumped storage	115
	Total	**2,688**
Viesgo (Enel)	Coal	865
	HFO-gas mix	753
	Lignite	400
	Total	**2,018**

Source: Powerink/HSBC

Portugal

Introduction

The Portuguese electricity market is more than 45% liberalised. In practice, one company, EDP, operates a virtual monopoly across the entire value chain, ie from generation through to supply. The electricity market has an independent regulator, ERSE.

In generation, EDP accounted for 77% of total Portuguese power capacity in 2002. Other market players include independent power producers (IPPs), Tejo Energia and Turbogas, in which EDP has 10% and a 20% holdings, respectively.

As a consequence of EDP's dominance in the generation market, the government had agreed Power Purchase Agreements (PPAs) with EDP's plants that guarantee the acquisition of c90% of EDP's output.

The transmission grid is 100% owned and operated by REN. Previously 100% owned by EDP, REN was forcibly unbundled from the EDP in 2000. EDP currently retains a 30% equity holding in REN.

At the beginning of 2000, EDP's four distribution companies (EN, CENEL, LET, SLE) were merged as part of a wider restructuring to form EDP Distribuiçao

MIBEL, the single Iberian electricity market, is scheduled to be implemented on 1 January 2004, following a delay to its original 2003 scheduled opening. One of the largest hurdles to the creation of MIBEL is that of moving from Portugal's PPA system to that of a liberalised Iberian wholesale pool market. The Portuguese Government has announced that EDP will be financially compensated for the abolition of its PPAs via a stranded cost system to ensure no net loss as a result of a move to a wholesale pool.

The Portugese energy regulator, Entidade Reguladora dos Serviços Energéticos (ERSE) has been keen to push through tariff reductions. On average, electricity prices have fallen by 4-6% pa for the past six years. However, Portuguese end-user prices remain relatively high within the European context.

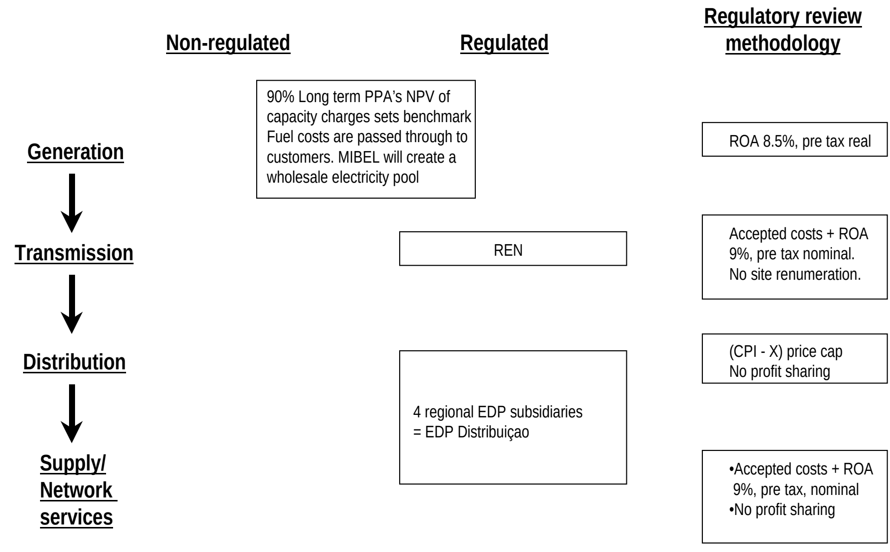
The Portuguese gas market is dominated by state-owned company GALP, in which EDP holds a 14% stake. GALP operates across the entire gas value chain from transportation and storage through to supply, but this is set to change.

Portugal

In April 2003, the Portuguese Government unexpectedly announced a restructuring of the domestic energy sector. This restructuring will involve the break-up of the unlisted business, GALP, the integrated oil and gas group that was originally created in 1999 via the integration of Gas de Portugal (gas distribution), Transgas (gas transportation) and Petrogal (oil supply/trading, refining and marketing).

Schematic

Portuguese electricity market



Source: HSBC

Portugal

Deconstructing the value chain

Portuguese value chain

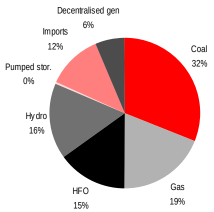
Regulation	
	▸ Electricity is regulated by the independent entity, ERSE.
	▸ From an historical perspective, EDP endured a major regulatory shock at the end of 1998 when the independent regulator announced unexpected nominal tariff cuts of 6.4% on average for 1999, 0.2% for 2000 and 2% for 2001, reversing previous commitments.
	▸ In the event, the 2001 proposed cut turned into a 1.2% rise following a divergence from the 2000 forecasts.
	▸ Nonetheless, Portuguese electricity tariffs remain relatively high.
	▸ In the 2002-04 period, ERSE imposed harsh new targets for EDP's distribution business. In 2002, these translated into a 7.6% decline in EDP Distribuiçao's allowed gross profit. The regulator did not recognise the costs relating to headcount reduction/early retirement within this figure and, as a result, EDP's distribution profitablity suffered significantly as it restructured. The inclusion of headcount restructuring costs for the 2003-04 period, starting from 2005 via a pass-through to the electricity tariff (applicable for 20 years) has been approved recently by ERSE and is a major regulatory turnaround. The maximum amount to be recovered in this way is EUR485.7m. However, ERSE refused to allow retroactive pass-through of restructuring costs incurred in 1998-02.
	▸ MIBEL – the single Iberian market – is scheduled to be launched January 2004. The Portuguese Government has confirmed that it would recognise stranded costs for EDP Produçao, ensuring no net loss as a result of a transfer from the current PPA system to a wholesale pool.
Key dates	
1997	▸ EDP privatised as the de-facto monopoly integrated electricity group
2004	▸ Creation of single Iberian market – MIBEL. A wholesale spot market to be based in Spain while a forward market to be developed in Portugal.
2004-07	▸ EU liberalisation laws are to open up all non-households by 2004 and the entire EU energy market by 2007. Portugal has tended to adhere to the minimum requirement.
Market structure	
Generation	▸ The market is split between the SEP (Public System) acounting for close to 90% of total output and the SEI (Independent System) accounting for 10% of total output.
	▸ Predominantly hydro (c40% of total national capacity) with most output c90% sold directly through Power Purchase Agreements (PPAs) until start of MIBEL.
	▸ The main player is EDP, which is still c30% state-owned and has c60% of the total generation market.
	▸ Others market participants include independent power producers, Turbogas and Tejo Energia. EDP has minority stakes in both.

Portugal

Portuguese value chain (cont.)	
Transmission	▸ In 2000, EDP was forced to sell 70% of its holding in transmission subsidiary, Rede Electrica Nacional (REN), back to the government. ▸ Currently the Portuguese Government still holds this 70% stake in REN. ▸ EDP still holds a 30% equity stake in REN. ▸ Under proposals for the break-up of GALP, REN is to merge with gas transmission company Transgas, which is currently 100% owned by GALP. Transgas is deemed to represent 18.3% of GALP's total value.
Supply/distribution	▸ Portugal's distribution and supply networks were split between four regional subsidiaries of EDP that were integrated into EDP Distribuiçao in 2000. ▸ 45% of the market is now free to choose supplier (all connections 1kV or more). ▸ The electricity market is expected to become 100% liberalised from January 2004 ▸ A price cap is set (CPI-X) for regulated customers.
Outlook	
	▸ In April 2003, the Portuguese Government unexpectedly announced a restructuring of the domestic energy sector. This restructuring will involve the break-up of the unlisted business, GALP, the integrated oil and gas group that was originally created in 1999 via the integration of Gas de Portugal (gas distribution), Transgas (gas transportation) and Petrogal (oil supply/trading, refining and marketing). ▸ The creation of MIBEL will see the abolition of PPA contracts, which have previously guaranteed a price for c90% of EDP's generation output. The creation of a wholesale pool and forward market in addition to improved integration between Portuguese and Spanish networks are all set to dominate the outlook for the Portuguese energy market in the near term.

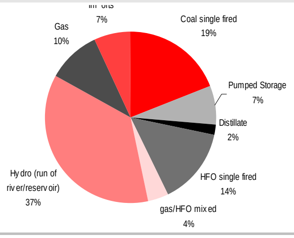
Source: HSBC

2002 generation output: total 47TWh



Source: Powerink/HSBC

2002 capacity by fuel type: total 10,043MW



Source: Powerink/HSBC

Portugal

Portuguese capacity by fuel type 2002 MW

Coal	HFO	Gas	Gas/Hydro mixed	Distillate	Hydro	Pumped storage	Imports
1922	1440	990	375	199	3680	738	700
19%	14%	10%	4%	2%	37%	7%	7%

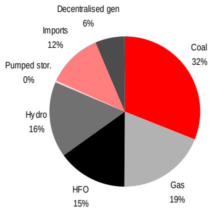
Source: Powerink/HSBC

Portuguese reserve margin

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand: GW	6.09	6.39	6.52	6.71	6.94	7.14	7.35	7.57	7.80
Capacity available GW	8.41	8.62	8.07	8.66	9.26	10.20	10.42	10.74	10.90
Capacity margin: %	38	35	24	29	33	43	42	42	40

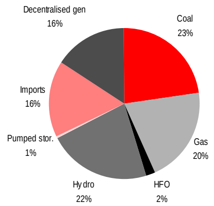
Source: Powerink/HSBC

Generation mix 2002



Source: Powerink/HSBC

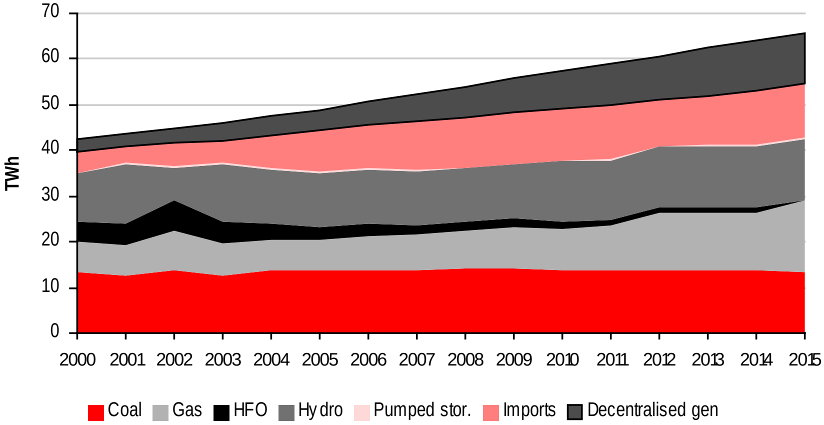
Generation mix 2012



Source: Powerink/HSBC

Portugal

Projections for the Portuguese sector by fuel type



Source: Powerink/HSBC

2002 import capacity MW

Spain	700

Source: Powerink/HSBC

Portugal

Gas market

Regulation

- Currently, 33% declared market opening but not yet implemented
- Independent gas regulator - ERSE
- Portugal is an emerging market with infrastrucuture under development and qualifies for exemption under gas directive

Key dates

1999
- Creation of GALP via integration of Petrogal, Transgas and Gas de Portugal

April 2003
- Portuguese Government announces restructuring of domestic energy sector

Market structure

- Fully regulated with independent gas regulator.
- GALP is the predominant gas operator. Key shareholders in GALP are the Portuguese Government with 35%, ENI 33%, EDP 14%, Iberdrola 4%. However, following April 2003 restructuring plans, the current structure of the Portuguese market is set to change.

Outlook

- In April 2003, the Portuguese Government unexpectedly announced a restructuring of the domestic energy sector. This will involve the break-up of the unlisted business GALP, the integrated oil and gas group that was originally created in 1999 via the integration of Gas de Portugal (gas distribution), Transgas (gas transportation) and Petrogal (oil supply/trading, refining and marketing). We are assuming the following:

  1)The oil component will remain the core of GALP and we believe this may largely stay with ENI

  2)The midstream gas transportation asset, Transgas will be sold to the Portuguese electricity grid company, REN, for a subsequent merger along the lines of National Grid/Lattice. This will be effected via the sale by the Portuguese Government of 18.3% of its GALP stake to REN, equating to roughly the estimated value of the infrastructure assets of Transgas within GALP. The unbundling of Transgas is to be completed by the end of 2003 and no later than mid-2004.

  3)The downstream gas business, ie the supply of natural gas to final customers, carried out by Gas de Portugal (GDP) will be integrated into EDP. The unbundling of GDP is to be completed by the end of 2003 and no later than mid-2004.

Source: HSBC

Portugal

Major issues

Topic	Comment
MIBEL	▶ MIBEL, the single Iberian electricity market is scheduled to be implemented on 1 January 2004, following a delay to its original 2003 scheduled launch. One of the greatest hurdles to the creation of MIBEL is that of moving from Portugal's PPA system to that of a liberalised Iberian wholesale pool market. The Portuguese Government has announced that EDP will be financially compensated for its loss of PPAs to ensure no net loss as a result of a move to a wholesale pool.
Restructuring	▶ Following the April 2003 announcement of the restructuring of the domestic energy sector, Iberian consoildation is gaining momentum.
Liberalisation	▶ The timetable for full market opening has been set. The electricity market is expected to become 100% liberalised by January 2004 and the gas market by July 2004.

Source: HSBC

Portugal

Electricity pricing

2002 Portuguese marginal wholesale electricity prices: Euro/MWh

	Q1	Q2	Q3	Q4
Base	55.69	54.52	55.66	57.81
Near base	54.54	54.54	55.69	58.16
Mid base	38.21	35.27	35.80	37.05
Mid load	52.04	43.85	44.53	50.71
Mid peak	54.54	54.54	55.69	58.16
Near peak	54.54	54.54	55.69	58.16
Peak	83.55	76.24	76.24	83.55

Source: Powerink/HSBC

TWA prices 2001 (assumes 100% load factor)

	Q1	Q2	Q3	Q4	TWA prices: /MWh
2002	51.90	50.67	50.36	52.47	51.35

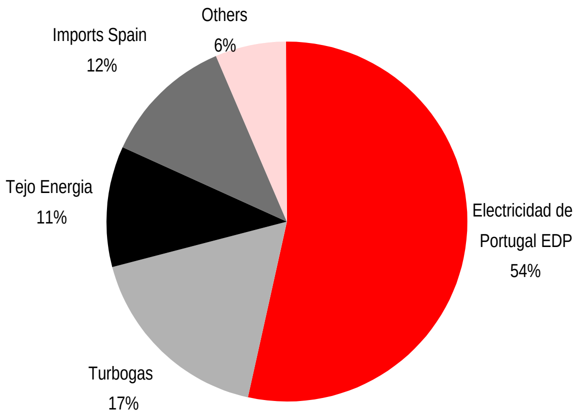
Source: Powerink/HSBC

Portugal

Market players

The largest operator in the Portuguese power market is the c31% state-owned Electricidade de Portugal (EDP). Previously, it owned the majority of all parts of the power chain, namely generation, transmission and distribution, but in 2000 it sold 70% of Rede Electrica Nacional (REN), the Portuguese transmission grid, back to the government.

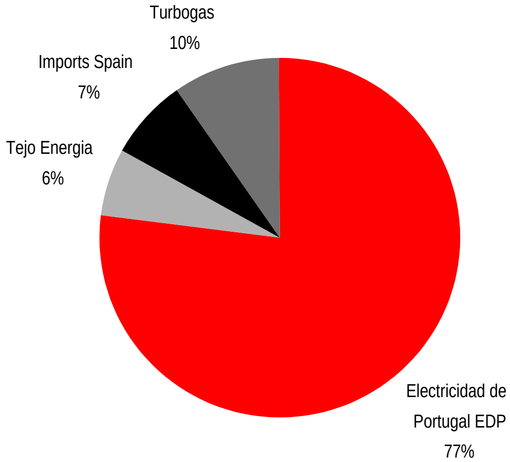
Generation by company: total 44.7TWh (2002)



Source: Powerink/HSBC

Portugal

Capacity by company total 10,044MW (2002)



Source: Powerink/HSBC

Installed capacity by company MW

Company	Installed capacity MW	%
Electricidade de Portugal EdP	7,738	77
Turbogas	990	10
Tejo Energia	616	6
Imports	700	7

Source: Powerink/HSBC

Portugal

EDP

Key data

RIC code **EDPP.IN**

Mkt cap: EUR 4bn

Analyst name **Alexandra Perricone**

Business description

Electricity generation, distribution and supply, water, telecoms, gas.

Ownership structure

EDP

Iberia

Core businesses

Generation (Portugal)
•7,738 MW installed capacity
Transmission
•30% REN
Distribution
•5.4m customers

Generation (Spain)
•40% Cantabrico
- Nuclear 163MW
- Coal 1,587MW
- Hydro 402MW
Distribution
•40% Cantabrico
- Electricity 0.5m
- Gas 1.5m customers

International

Brazil

Generation
•11% Investco
Distribution
•96% Bandeirante
•100% Iven
- 52% Escelsa
- 65% Enersul
•19% Cerj
- 21% Coelce

Guatemala

Distribution
•17% EEGSA

Rest of World

Distribution
•22% CEM (Asia)
•31% Electra (S.Africa)
Generation
•22% CEM (Asia)

Communications/IT

Telecoms/IT

•56% ONI SPGS (telco + IT)
- 68% ONI Way Mobile
•100% ONI Telecom
- 100% ONI Solutions
- 69% ONI Madeira
•100% EDINFOR
•100% Comunitel

Other

Water & Sewage

•100% EDP Aguas
•50% Valoragua

Gas & Oil

•14% Galp Energia
•62% Naturcorp (through Hidrocantabrico)

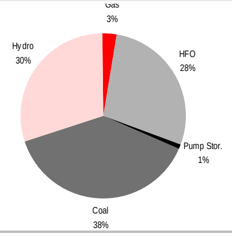
Holdings

•4% BCP
•3% Iberdrola
•11% Valorsul
•40% Portsines
•30% Tanquipor
•10% Tejo Energia
•20% Turbogas

Source: HSBC

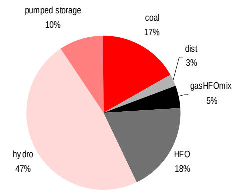
Portugal

2002 generation output: total 23.8TWh



Source: Powerink/HSBC

2002 capacity: total 7,738MW



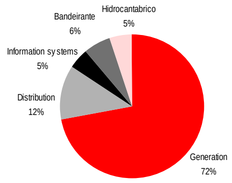
Source: Powerink/HSBC

EDP: installed capacity by fuel type MW

Coal	Dist	Gas/HFO mix	HFO	Hydro	Pumped storage
1306	199	375	1440	3680	738
17%	3%	5%	19%	48%	10%

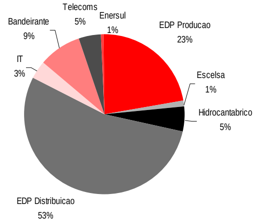
Source: Powerink/HSBC

EBIT by division (2002a EUR645m*)



Source: HSBC
**includes losses of 117m for Telecoms and negative adjustments of 1.1m*

Revenue by division (2002a EUR6,381m*)



Source: HSBC
**includes negative adjustments of 70.3m*

Portugal

EDP

Key dates	
1997-00	▶ Privatisation began in 1997, with subsequent tranches in 1999 and 2000.
2001 – January	▶ EDP ends strategic partnership agreement with Iberdrola.
2001 – December	▶ Agreement on ownership of HidroCantabrico reached between EDP, EnBW and Cajastur.
	▶ EDP sells 25.5% stake in ESSEL, Chile to Thames Water.
2002 – December	▶ Agreement on the sales of Oni Way's assets and share capital.
2002 – March	▶ EUR315m raised from the sale of OPTEL (telecommunications).
2003 – March	▶ Hidrocantabrico wins the privatisation of Basque Gas company Naturcorp.
2003 – April	▶ GALP restructuring announced.
2003 – May	▶ Joao Talone (formerly of BCP and architect of the GALP break-up) named new CEO by the government to replace Francisco Sánchez.
Generation	
	▶ With 7,738MW of total installed capacity and 24TWh of actual generation in 2002, EDP is the largest genco in Portugal.
	▶ EDP also owns 10% of Tejo and 20% of Turbogas.
	▶ Although EDP has 1,440MW of installed HFO capacity, its usage fluctuates, due to the fuel's peak-load characteristic. It was used to generate 28% of actual power in 2002.
Supply/distribution	
	▶ 5.6m household customers in Portugal.
	▶ Owns 40% of Hidrocantabrico, which has 0.5m Spanish electricity customers.
	▶ Distribution assets in Latin America and North Africa (see organisational chart).
Transmission	
	▶ 30% REN (Portuguese transmission company).
Gas	
	▶ 14% GALP Energia.
	▶ Hidrocantabrico owns 62% of the combined Naturcorp – Gas Asturia's gas business. The new gas group has more than 500,000 customers in Spain (c10% market share).
	▶ Merger with GDP would see an additional 600,000 customers.
Water	
	▶ 100% EDP Aguas.

Portugal

EDP (contd)

Current strategy

- Focus on cost cutting in the domestic business to improve efficiency, mainly in distribution.
- Integration of Hidrocantabrico.
- Expansion in Spanish generation/supply through Hidrocantabrico.
- Consolidation of Brazilian assets.
- The planned restructuring of the domestic energy sector will see the break-up of GALP. This will see the downstream gas business, currently carried out by GDP, integrated within EDP. The unbundling of GDP is to be completed by the end of 2003 and no later than mid-2004.
- Ahead of the creation of MIBEL, EDP will be working closely with the regulator to ensure smooth transition into an Iberian-wide energy market.
- It is likely that the government may look to place its remaining holiding in EDP as soon as the opportunity arises. This will drive changes within EDP in preparation for an eventual government exit.

Source: HSBC

Other market players

Installed capacity/generation output

Company	Fuel Type	Generation TWh	Capacity MW
Turbogas	Gas	8	990
Tejo Energia	Coal	5	616

Source: Powerink/HSBC

Italy

Introduction

The Italian electricity market is the fourth-largest electricity market in Europe, behind France, Germany and the UK.

The dominant player in the Italian electricity market is Enel. Other market players include Eurogen (Edipower consortium), Endesa Italia, InterPower, Edison, API Energia, Enipower and municipalities.

The electricity and gas sectors in Italy are regulated by the independent 'Autorita per l'Energia e il Gas' (AEG). The AEG sets wholesale generation prices which aim to cover fixed and variable costs of generation. In 2001, the review incorporated a significant cut in the fixed component. A mandatory wholesale power pool covering five sub-markets – day ahead, adjustment, congestion, reserve and balancing – expected to be introduced in January 2004.

The transmission network was unbundled from Enel's managerial control in February 1999 with the implementation of the Bersani decree. Enel still retains ownership of the physical high-voltage grid via its 100% subsidiary, Terna; however the government manages and regulates the grid via state-owned transmission grid company GRTN.

All consumers, except residential customers, are free to choose supplier. Enel is the dominant market player (market share of 35% of unregulated customers), with the remainder of the market split between municipalities and minor players.

Italy's gas market is 100% liberalised. As regulated by the AEG, no entity can currently have more than a 75% market share of gas imports and production. A share of this size would be reduced by 2% pa in order to reach a 2009 target of 61%. Similarly, in the supply to final customers market, as of January 2003 no entity can have a market share in excess of 50%.

The gas transmission network is owned and operated by Snam Rete Gas – of which 40% was listed via an IPO in late 2001. The dominant distributor of gas is Italgas (100%-owned by upstream oil and gas company, Eni); however, other minor players and municipalities also operate in this market. Enel, through a recent acquisition, has built a 10% market share in gas distribution.

Italy

The Sblocca Centrali decree, passed in 2002, has streamlined the permitting process for large power plants. Under the decree, all power plants with a capacity greater than 300MW are granted automatic authorisation after six months' delay, unless there is explicit refusal stated. In 2002, permission for 8.2GW of generating capacity was granted, with 3.6GW being refused. At year-end 2002, another 25GW of generating capacity was still awaiting approval. Despite this legislation, few power stations have been completed, and the delays are causing problems with supply and discouraging future investment.

In summer 2003, a tight capacity margin, increasing demand and a heat-wave were blamed for black-outs across the country and breaks in supply to many 'interruptible' clients. The country has also experienced a shift in the dynamic of the market, with annual peaks in energy usage occurring in the summer, due to the growth in air conditioning, compared with a historic winter peak.

Italy

Schematic

Italian electricity market

	Non-regulated	Regulated	Regulatory review methodology
Generation ↓		•Fixed wholesale prices •Stranded cost via A6 tariff component to cover difference between price determined and set by authority •Plans to introduce pool in 2004	Subject to determinations made by 'Autorita per l'Energia Elettrica e il Gas'. Stranded costs and hydro penalty undergoing legislative review
Transmission ↓		•Terna owner physical high-voltage assets •GRTN state owned TSO (Transmission System Operator)	2001-2003 CPI - 4% price cap mechanism 100% profit retention until 2004
Distribution ↓	Enel dominant player Various others + Municipalities		
Supply	45% liberalised 2001 >20GWh 2002 >9GWh (0.1GWh threshold 90 days after Enel divests of 15,000MW production capacity)		The authority determines regulated user tariffs, but Enel Distribuzione has freedom to offer special alternative tariffs

Source: HSBC

Allowed regulatory returns in Italy

	Generation	Transmission	Distribution	Gas	Water
Regulatory authority	AEG	AEG	AEG	AEG	Ministry of public works
Formula	Price cap	RPI – X (X = 4%)	RPI – X (X = 4%)	RPI – X (X = 4.5%)	Cost plus
Allowed pre-tax return	7.90%	5.60%	7.40%	7.94%	7.00%

Source: HSBC

Italy

Deconstructing the value chain

Italian electricity value chain

Regulation

- The Italian Regulatory Authority for Electricity and Gas ('l Autorita per l'Energia Elettrica e il Gas' – AEG) is an independent body, established under Law 481 of 14 November 1995 to regulate and control the electricity and gas sectors.
- The AEG's regulatory powers include the setting of tariffs and the definition of service quality standards and the technical and economic conditions governing access and interconnections to the networks.
- The Government draws the Authority's attention to any developments concerning the public utilities that it sees as in the country's general interest to promote.
- In March 1999, nearly 40 years after the electricity system was nationalised, the Government liberalised the sector in accordance with the criteria laid down by European Directive 96/92/EC. In May 2000, a second legislative decree implementing Directive 98/30/EC set out the schedule for the opening up of the natural gas market.
- In February 2001 parliament adopted a 0.1GWh threshold to be introduced 90 days after Enel has divested 15,000MW of production capacity. In 2003, the threshold was further reduced such that all non-residential customers are now able to choose their supplier.
- From 2003 no single entity is allowed to produce or import more than 50% of total Italian electricity.

Key dates

1962	Enel established
1973	Energy crisis – Italian Government adopts policy of exploring alternative fuel sources to oil – notably nuclear.
1986	Nuclear policy abandoned following Chernobyl disaster. Enel subsequently reimbursed.
1992	Enel becomes joint stock company.
1995	Chamber of Deputies passes law no.481, outlining rules for future competition and regulation of public utilities and establishing an electricity and gas energy regulator 'l'Autorita per l'Energia Elettrica e il Gas'.
1995	Enel and Ministry of Industry agree framework for regulating the operation of the electricity sector – in generation, calls for the establishment by Enel of a special, fully owned affiliate.
1996	EU Directive requires that at least 26.48% of electricity sales in member countries be open to competition, beginning February 1999.
1999 – February	Bersani Decree ratified, setting out structure and timeline of energy liberalisation in Italy. Enel required to sell 15GW of plant to reduce market share to 50% by 2003.
1999 – March	Liberalisation of energy sector laid down by European Directive 96/92/EC.

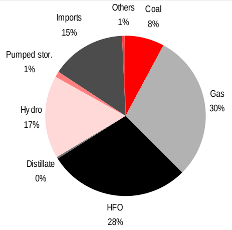
Italy

Italian electricity value chain (contd)	
1999 – November	▸ Enel offering 3.8bn shares.
2000	▸ EU liberalisation requirement increases to c28% in February 2000 and to 45% in 2003.
2001 – July	▸ Enel sells generating company ‘Elettrogen’ to Endesa (Spain).
2001 – September	▸ Enel acquires Spanish utility, Viesgo.
2002 – March	▸ Enel sells generation company ‘Eurogen’ to Edipower consortium.
2002 – November	▸ Enel sells generation company ‘Interpower’ to Electrabel/Acea consortium.
2003	▸ Marzano Decree begins passage through parliament.
Market structure	
Generation	▸ Enel currently represents approximately half the generation market. ▸ Other players include, municipalities, Edison, Endesa (Elettrogen), Edipower consortium (Eurogen), Interpower (Electrabel/Acea), Enipower and Mission Energy.
Transmission	▸ February 1999 Bersani decree unbundled the transmission network from Enel’s control. ▸ Enel maintains ownership of the physical high voltage grid via its 100% owned subsidiary, Terna. ▸ The grid’s transmission and dispatching of electrical energy and management was, however, spun off to the Transmission Network Manager, GRTN, a company wholly owned by the government. ▸ GRTN operates in the guise of both the Single Buyer (Aquirente Unico) and Market Operator (Gestore del Mercato Elettrico). The former purchases power on behalf of regulated customers, the latter conducts the financial management of the electricity market (it will eventually manage the pool). ▸ Regulatory Authority responsible for mechanism by which import capacity is allocated.
Supply/distribution	▸ February 1999 Berscani decree sets out structure and timeline for energy liberalisation in Italy. ▸ Distribution and supply of electricity regulated by ‘l Autorita per l’Energia Elettrica e il Gas’. ▸ The market is 45% liberalised, with customers consuming more than 9GWh pa free to choose supplier. Enel is again the dominant market player, with 85% of the energy distributed to final customers, with the remainder of the market split between municipalities and minor players/new entrants.
Outlook	
	▸ A wholesale pool is scheduled to commence trading January 2004. This could have a significant impact on electricity prices in Italy, particularly given the current tight capacity margin due to reduced supply from power plants taken off-line to be repowered and continued delays in approving new construction. We forecast this to reverse by 2006. ▸ Monopoly electricity transmission company, Terna, will face an IPO in order to satisfy the demands of the Marzano Decree.

Source: HSBC

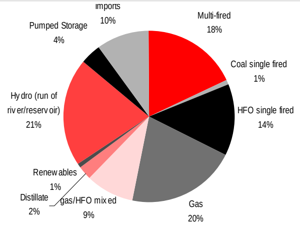
Italy

2002 generation output: total 322TWh



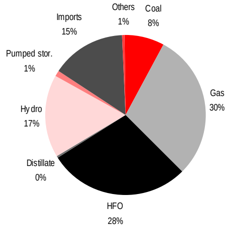
Source: Powerink/HSBC

2002 capacity by fuel group: total 79,100MW



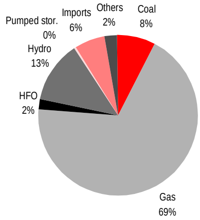
Source: Powerink/HSBC

Italian generation mix 2002



Source: Powerink/HSBC

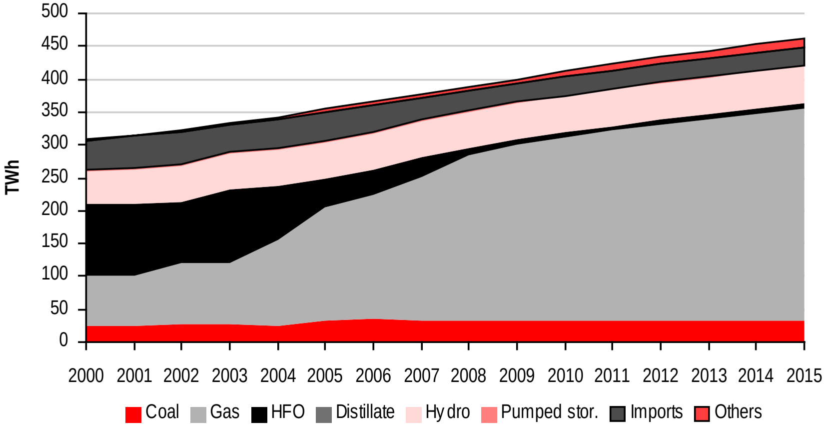
Italian generation mix 2012e



Source: Powerink/HSBC

Italy

Projections for the Italian sector by fuel type



Source: Powerink/HSBC

Italian interconnector capacity

(GW unless stated)	Capacity	As % of total
Potential import flows		
France	3.1	52
Switzerland	2.3	38
Austria	0.3	4
Slovenia	0.4	6
Total	**6.0**	**100**
Potential export flows		
France	2.0	63
Switzerland	0.5	16
Austria	0.2	6
Greece	0.5	16
Total	**3.2**	**100**

Source: HSBC

Italy

Italian gas market

Regulation	
	▸ No entity should sell >50% of national consumption to final clients.
Key dates	
1999	▸ The reform of tariffs for methane gas distributed over urban networks launched, with a review of the method for setting the raw material tariff element.
2000-01	▸ The tariff reform completed in 2000 and 2001 in accordance with the principles and criteria of the liberalisation decree, no. 164/2000.
2000 – May	▸ Second legislative decree implementing Directive 98/30/EC sets out the schedule for the opening up of the natural gas market.
2000 – December	▸ Distribution and supply tariffs for customers defined
2002	▸ Italian Electricity and Gas Authority added to 2001 regulatory framework
2003	▸ All customers are allowed to choose a gas supplier
Market structure	
	▸ As regulated by the AEG, from 1 January 2002, no entity can have more than a 75% share of natural gas imports and production destined for the domestic market. A share of this size would be reduced by 2% pa in order to reach a 2009 target of 61%.
	▸ 100% of customers have the right to choose supplier from 2003. No single supplier can have a market share in excess of 50% of sales to final customers, also from 2003.
	▸ Snam Rete Gas is the monopoly gas transmission company and is subject to regulatory price reviews. Guarantees regarding free access of operators to the gas transmission network are in force.
Outcome	
	▸ The Italian energy watchdog is currently asking gas companies to submit proposals on the introduction of a gas hub in the country. The hub is likely to boost competition and bring down energy prices.

Source: HSBC

Italy

Geographical representation of operations

380kv mainland grid and power stations (2001)

Source: GRTN

Italy

Electricity pricing

2002 Italian marginal wholesale electricity prices: (EUR/MWh)

	Q1	Q2	Q3	Q4
Base	56.98	57.65	57.65	57.65
Near base	57.21	57.68	57.76	57.71
Mid base	57.50	57.85	57.89	57.86
Mid load	57.71	58.03	58.06	58.06
Mid peak	57.97	58.40	59.04	59.04
Near peak	59.35	60.28	60.58	60.91
Peak	67.27	72.97	75.90	78.76

Source: Powerink/HSBC

2002 Generation prices in the regulated market (EUR/MWh)

	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec
Fixed component of tariff	20.6	20.6	20.6	20.6	20.6	20.6
Variable component of tariff	37.2	35.1	36.4	39.4	39.4	39.4
Total	**57.8**	**55.7**	**57.0**	**60.0**	**60.0**	**60.0**

Source: Enel, HSBC

Italy

Major issues

Topic	Comment
Creation of a wholesale pool	▸ A wholesale pool is scheduled to commence trading in January 2004. This could have a significant impact on electricity prices in Italy, particularly given the current tight capacity margin as a result of reduced supply from power plants taken off-line to be repowered and continued delays in approving new construction. However, we forecast this situation to reverse by 2006.
Further divestment of ENEL	▸ The government currently retains a 68% stake in ENEL. While there has not been a firm time set for a second tranche of stake sales, we believe this is likely in the medium term and represents an overhang risk.
Terna	▸ Monopoly electricity transporter, Terna, could face an IPO under plans speculated recently. An alternative to an IPO is the issue of shares in Terna, which are then given to Enel shareholders.
Creation of a gas hub	▸ The Italian energy watchdog is currently asking gas companies to submit proposals for the introduction of a gas hub in the country. The hub is likely to boost competition and bring down energy prices.

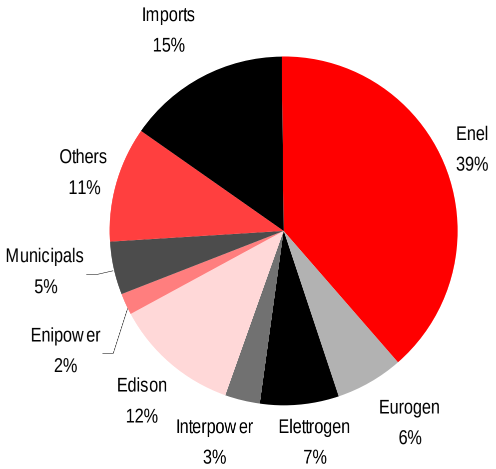
Source: HSBC

Italy

Market players

Enel, the 67.6% state owned entity, is the dominant player in the Italian electricity market. To comply with an EU directive (Bersani decree) stating that no single company may generate more than 50% of total domestic electricity by 2003, Enel had to sell at least 15GW of its capacity (just over 25% of its total). Other Italian electricity operators include Edison (69% owned by Italenergia Bis) and the municipal utilities, AEM (Milan) and ACEA (Rome).

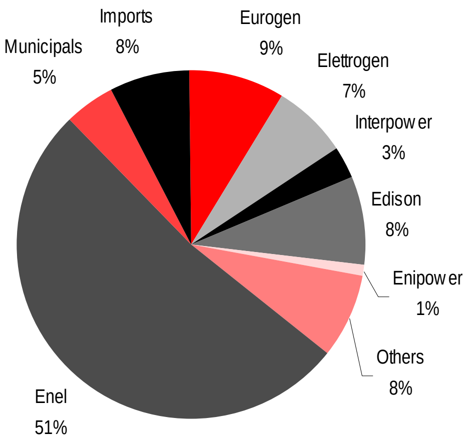
Generation by company 2002 total 334TWh



Note: Total is before eliminations for system losses, auxilliary services and consumption for pumping
Source: Company data, HSBC

Italy

Capacity by company total 79,100MW



Note: Total is before eliminations for system losses, auxilliary services and consumption for pumping
Source: Company data, HSBC

Main generation market participants

Company	2002 Capacity	% of Total	2002 Production*	% of Total
Enel	41.1	51	129	39
Eurogen	7.0	9	20	6
Elettrogen	5.4	7	24	7
Interpower	2.6	3	11	3
Edison	6.2	8	39	12
Enipower	1.0	1	6	2
Municipals	3.7	5	17	5
Others	6.0	8	36	11
Imports	6.0	8	51	15
Total	**79.1**	**100**	**334**	**100**

Note: Total is before eliminations for system losses, auxilliary services and consumption for pumping
Source: Company data, HSBC

Italy

Enel

Key data

RIC code	Mkt cap
ENEI.MI	EUR33bn
Analyst:	
Bruce Bromley	

Business description

Electricity generation, energy management, infrastructure and networks, telecommunications, business serviecs and other activities.

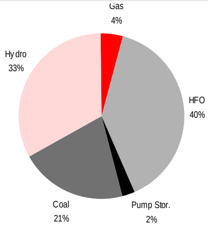
Ownership structure

- **Enel**
  - **Italy**
    - **Generation**
      - •41.1 GW installed capacity
    - **Distribution**
      - •Electricity 20.35m customers
      - •Gas 0.65m customers
      - •40% Camuzzi Gas 0.35m customers
      - •40% in 3 ATO's (water) 1.6m customers
    - **Transmission**
      - Terna (Italian grid)
  - **International**
    - **Viesgo**
      - Generation
      - •Coal, Hydro, Oil/Gas generation
      - Distribution
      - •0.5m customers
  - **Telecoms**
    - **'New' Wind**
      - •Fixed
      - •Mobile
      - •Internet
      - •100% UMTS licence
  - **Other**
    - **Real estate & services**
      - •100% SEI
    - **Engineering and Contracting**
      - •100% Enel Power
    - **IT & e-business**
      - •100% Enel.it
    - **Fuel**
      - •100% Enel.FTL
    - **Other**
      - Includes
      - •public lighting
      - •R&D
      - •Hydro engineering

Source: HSBC

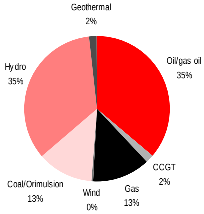
Italy

2002 generation output: total 102TWh



Source: Powerink/HSBC

2002 capacity: total 41,140MW



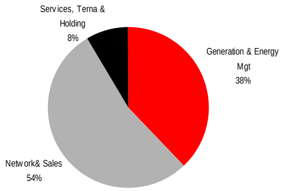
Source: Enel/HSBC

Enel: installed capacity by fuel type MW

Fuel type	CCGT	Coal / Orimulsion	Gas	Oil / gas oil	Hydro	Geothermal	Wind
Installed Capacity (MW)	790	5,200	5,300	14,840	14,281	666	63
%	2	13	13	35	35	2	0

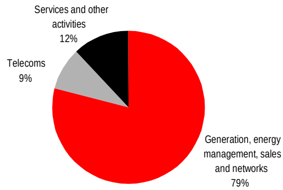
Source: Powerink/HSBC

EBIT by division (2002a EUR2,880m*)



Source: HSBC
**after telecom losses of EUR 1,019m and other losses/adjustments of EUR 104m*

Revenue by division (2002a EUR29,977m*)



Source: HSBC
**after negative adjustments of EUR11,982m*

Italy

Enel

Key dates

1962	▸ Enel created through the merger of regional electricity companies.
1960s/70s	▸ Enel developes the distribution network, connecting Italy's islands to the grid, while creating the 380 kV trunks that transport electricity throughout the peninsula, connecting Italy with foreign countries.
1973	▸ As a consequence of the energy crisis the Italian Government adopts a policy of exploring alternative fuel sources to oil, with a particular focus on nuclear energy.
1986	▸ The nuclear energy policy abandoned after the disaster at Chernobyl. The Italian Government subsequently reimburses Enel for losses incurred.
1990	▸ Enel takes first steps towards privatisation, becoming a joint stock company in 1992.
1992 – July	▸ An agreement, valid for 40 years from July 1992 confirms Enel's role in the transmission and distribution of electric energy as 'universal', while, with regard to production and in view of the future liberalisation of the industry, it calls for the establishment by Enel of a special, fully-owned affiliate.
1995 – November	▸ The Chamber of Deputies passes law no. 481 outlining the rules for future competition and the regulation of public utilities, and establishing the Regulatory Authority.
1995	▸ Enel reaches an agreement with the Ministry of Industry with regard to regulating the operating concession for the electrical sector.
1995	▸ Enel quickly developes a policy of growth by acquisition so that by the end of 1995 the company has absorbed 1,270 separate electric companies.
1998	▸ Enel embarks on a policy of internal reorganisation through separating the production, import, export, purchase and sale of electrical energy functions into single operating entities.
1998	▸ During the late 1990s Enel also adopts a 'multi utility' business model, and in June 1998, Wind, its telecommunications subsidiary (owned at that time by Enel, France Télécom and Deutsche Telekom), wins a tender for a mobile telephone concession, becoming Italy's third operator in the sector. Subsequently, Enel buys Infostrada and merges it with Wind, to create 'New Wind', a telecommunications company that has fixed line, mobile and internet operations.
1999 – February	▸ 'Bersani' decree ratified – sets out the structure and time line of energy liberalisation in Italy calling for the separation of production, transmission, distribution and sales and for the reduction of Enel's presence in its core businesses – a process that is still underway.
1999 – November	▸ Enel listed on the Milan stock exchange. The free-float is currently 32%, unchanged since the IPO.
2001	▸ Enel acquires Electra de Viesgo in Spain
2001 – September	▸ Sale of Elettrogen to Endesa for EUR2.6bn.
2002 – February	▸ New Wind has 25.2m customer accounts.
2002 – May	▸ Enel sells Eurogen generation assets, raising EUR3bn + EUR751m debt to Edipower.

Italy

Enel (cont'd)	
2002 – May	▸ Appointment of new CEO, Paolo Scaroni, formerly of Pilkington.
2003 – January	▸ Enel complete sale of Interpower assets for EUR551m + EUR332m debt to Acea/Electrabel.
2003 – March	▸ Enel marks its new international expansion policy with the purchase of generation assets in Bulgaria.
2003 – March	▸ Enel purchases France Telecom's 26.6% stake in Wind for EUR1.33bn.
2003 – June	▸ Enel acquires 80% stake in Union Fenosa's renewable business – UFEE and a part complete CCGT plant for EUR168m.
Generation	▸ With 40,144MW of total installed capacity and 102TWh of actual generation in 2002, Enel is the largest genco in Italy. ▸ By fuel type, Enel generates electricity from three main sources: gas/HFO/coal mixes 63%, hydro 29%, renewables (pumped storage) 7%. ▸ However, HFO and coal are both costly (direct purchase price/emission costs) fuel types, providing partial explanation as to the comparatively high costs borne by the consumer for electricity.
Transmission	▸ 100% Terna – Italian grid company (owner not operator).
Supply/distribution	▸ 23.2m household customers, 29.9m customers in total (Italy). ▸ 0.5m electricity customers in Spain through Viesgo (see Spanish map).
Gas	▸ 0.67m own gas customers (Italy). ▸ 40% of Camuzzi gas customers; Enel's share equates to 0.38m (Italy).
Water	▸ 40% of three ATOs, Enel's share eqates to c1m water customers (Italy).

Current strategy	▸ Enel plans to convert 5GW of its existing capacity into coal generation, reducing the dependency on natural gas through improving the generation mix.
	▸ Group intends to focus on its core energy businesses (electricity and gas), reviewing its diversification policy case by case and devoting strong attention to efficiency improvements. Growth opportunities will be carefully evaluated and taken into consideration only when deemed strategically important and individually profitable.
	▸ Specifically, Enel targets:
	  ▸ EUR1bn cost reduction by 2005
	  ▸ EBITDA CAGR of 8% to 2005
	  ▸ EUR9bn capex savings, 8% of which from non-core activities
	  ▸ EUR14bn of free cash flow generated in period 2003-07
	▸ Enel said that Wind will be financially independent by end of 2004 however this will require an additional equity injection of EUR1bn.

Source: HSBC

Belgium

Introduction

Belgium is a net importer of electricity, historically trading with the Netherlands, Germany, Luxembourg and France. Typically, power is imported from France and the Netherlands and exported to Luxembourg.

Electrabel controls the Belgian power generation market and generates 76% of the electricity consumed in Belgium, the majority of which is supplied by nuclear generation. The Public Electricity Company (SPE) generates 4% of national consumption, while auto-producers, renewables, imports and others account for the remainder generated.

In 2001, grid operator, Elia, was formed out of CPTE (91.5% owned by Electrabel and 8.5% owned by smaller Belgian utility SPE). In October 2001, it was agreed that 30% of Elia would be sold to a grouping of municipalities named Publi-T. This initial sale was a precursor to the IPO of 40% of Elia, as demanded by EC electricity market liberalisation rules to keep the grid operator independent from the main power supplier.

End-users consuming more than 10GWh/year in Wallonia and Brussels have been free to choose their electricity supplier since 1 January 2003. In the northern region of Flanders, the electricity and gas markets will became open to competition from 1 July 2003. With the Flemish market open, the entire Belgian electricity market is now 80% liberalised and the entire Belgian natural gas market is 83% liberalised.

The Electricity and Gas Regulatory Commission (CREG) published transmission tariffs in March 2003, CREG published national tariffs for distribution effective 1 July 2003, in line with the complete liberalisation of Flanders.

Unlike transmission, low-voltage distribution and supply are regional competencies and Belgium's three regions, Flanders, Wallonia, and Brussels, regulate supply over power lines below 70,000 volts. Around 90% of power distribution is carried out by mixed municipal utilities in partnership with Electrabel. Overall, Electrabel controls 80% of distribution through long-term contracts with the municipalities that are due to expire in 2011.

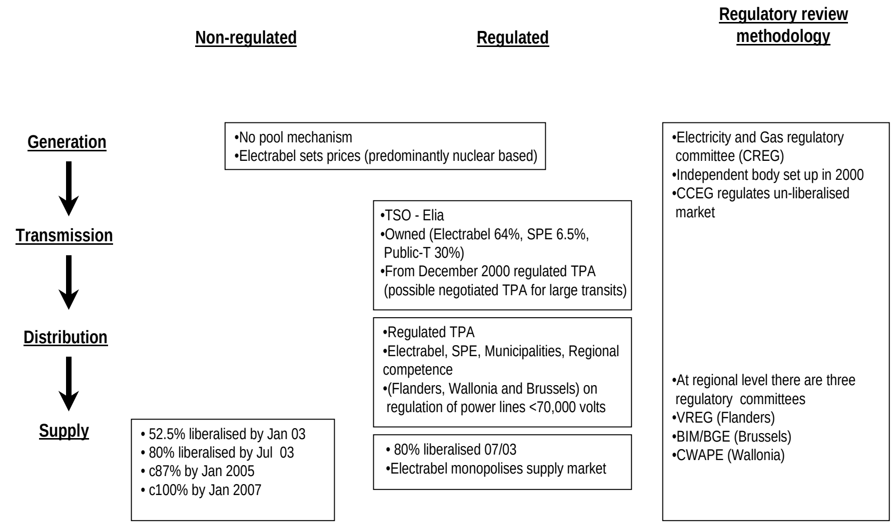
The CREG is in charge of regulating the liberalised supply market. The ineligible part of the market remains regulated by the Electricity and Gas Monitoring Committee. (CCEG).

Belgium

Distrigas and Fluxys dominate the Belgian gas market. Fluxys concentrates on natural gas transportation, while Distrigas focuses on gas supply to more than 2m customers in Belgium and on international gas trading.

Schematic

Belgian electricity market



Source: HSBC

Belgium

Deconstructing the value chain

Belgian electricity value chain

Regulation

2003 – January	End-users consuming more than 10GWh/year in Wallonia and Brussels free to choose their electricity supplier.
2003 – July	In the northern region of Flanders, the electricity and gas markets fully opened to competition.

Key dates

1937	CPTE – the co-operative company for the co-ordination of power generation and transmission founded.
1951	UCPTE – the union for the co-ordination of power generation and tranmission founded for European level co-operation.
1950s	GECOLI set up to construct transmission network.
1990	Ebes, Unerg and Intercom merge to form Electrabel.
1995	Electrabel and SPE decide to co-operate via CPTE. Electrabel takes a 91.5% stake and SPE takes the remaining 8.5% stake.
2001 – June	Elia forms to operate high-voltage grid.
2002 – September	Elia nominated the Belgian System Operator.
2003 – July	Electrabel and SPE dissolve CPTE, ending eight-year partnership.
2003 – July	Electrabel buys 22.22% stake in CNR from EdF, increasing Electrabel's stake to 47.82%.

Market structure

Generation

- The Belgian generation market is dominated by nuclear power, with nearly 50% of electricity produced in 2002 from nuclear plant.
- The government has taken the decision to shut down nuclear power stations with all reactors due to close between 2015-25 after a 40-year useful life.
- Electrabel is the main electricity generator in Belgium, generating c71% of total domestic demand.
- Electrabel is 44% directly owned by Tractebel, the energy arm of French diversified industrial group, SUEZ. If indirect holdings are included, SUEZ/Tractbel's stake rises to c50%.
- Electrabel dominates generated electricity, with output split as follows:
  - Electrabel 76%
  - SPE 4%
  - Imports/others 20%

Transmission

- CREG is responsible for regulating Elia; TPA tariffs were published in December 2000 to encourage access to the grid.
- In October 2001 CPTE sold 30% of Elia to municipalities, Publi-T, thus Electrabel/SPE now have a 70% combined holding.

Belgium

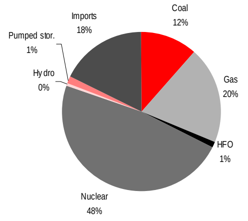
Belgian electricity value chain (contd)

Transmission (contd)	▸ No company may hold a controlling stake in Elia from 2004, thus a MOU between the municipalities, Secretary of State for Energy and Electrabel should see 40% of Elia floated on the market. An IPO is expected some time in 2003, after which Electrabel/SPE (through CPTE) will hold less than 30% of the TSO. ▸ The Federal Council of Ministers officially designated Elia System Operator as the Belgian Transmission System Operator in September 2002.
Distribution & supply	▸ CCEG is the single regulator for captive consumers. ▸ Electrabel controls the majority of the Belgian distribution market through partnerships with the regional municipalities (30-year supply contracts expiring at the latest 2011). ▸ Distribution is regional and in Flanders, Wallonia and Brussels, the municipalities regulate supply over power lines <70,000 volts. ▸ As part of the further deregulation of the market, the regional authorities have imposed unbundling of the distribution network and sales activities, where today the intermunicipal companies manage both activities. ▸ Sales to eligible customers of mixed intermunicipal companies have been brought within a new company, Electrabel Customer Solutions, in which the municipalities can acquire a minority stake of 30-40%. ▸ As for the network activities, the intermunicipal companies, currently appointed as joint network manager, will remain the owners of the networks. The municipalities will eventually acquire a majority stake of 60-70%, with Electrabel holding the balance. ▸ Electrabel will continue to be responsible for the technical operation of the networks, for which it will conclude operating agreements with the network managers via a company called Netmanagement. These operating activities will be taken care of by three subsidiaries, one for each region. ▸ By January 2007, the Belgian electricity market will be entirely deregulated.
Outlook	
	▸ Electrabel has committed to making 1,200MW of virtual capacity available for auctioning during a transition phase until 2008. ▸ It is speculated that EdF will raise its stake in CPE to 49% in October 2003.

Source: HSBC

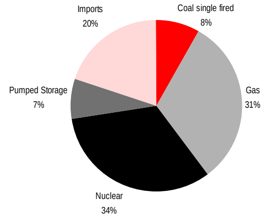
Belgium

2002 generation output: total 93TWh



Source: Powerink/HSBC

2002 capacity by fuel type: total 17,696MW



Source: Powerink/HSBC

Capacity by fuel type breakdown MW

Fuel type	Coal single fired	HFO single fired	Gas	Nuclear	Hydro (run of river/ reservoir)	Pumped Storage	Imports
Capacity MW	1433	161	5494	5713	87	1308	3500
%	8	1	31	32	0	7	20

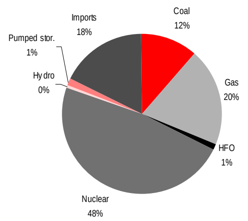
Source: Powerink/HSBC

Belgian capacity margin

Reserve margin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand: GW	12.02	12.12	12.14	12.20	12.26	12.32	12.39	12.45	12.48
Capacity available GW	16.67	16.11	16.11	16.58	16.80	17.33	17.56	17.74	17.92
Capacity margin: %	38.6%	33.0%	32.7%	35.9%	37.0%	40.6%	41.8%	42.5%	43.6%

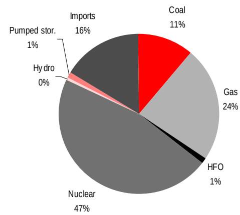
Source: Powerink/HSBC

Generation mix 2002a (93TWh)



Source: Powerink/HSBC

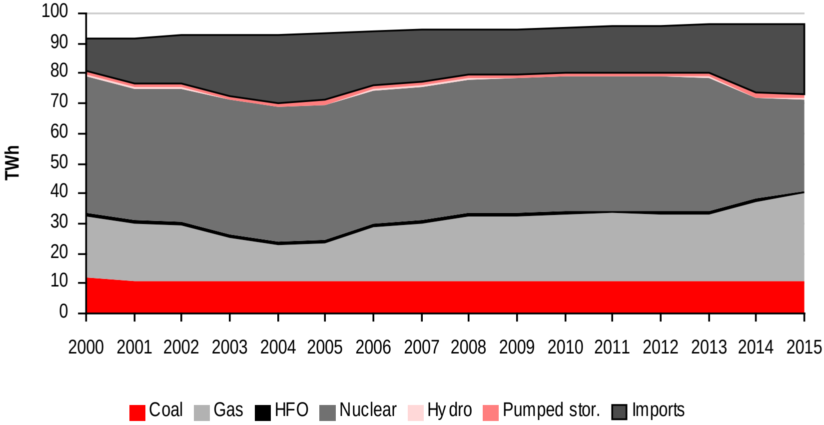
Generation mix 2010e (96TWh)



Source: Powerink/HSBC

Belgium

Projections for the Belgian power sector by fuel type



Source: Powerink/HSBC

Belgian import capacity 2002

Country	France	Netherlands
Capacity	1,800	1,700*
%	51	49

Source: Powerink/HSBC

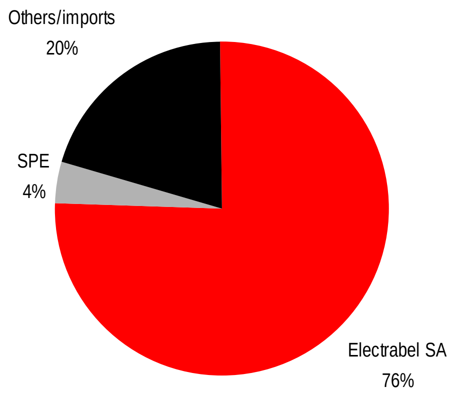
**this figure takes account of the limitations in the Dutch network. Without these limitations the Net Transfer Capacity would be 2200MW*

Belgium

Market players

In Belgium the main entity is Electrabel (44% owned by French diversified industrial SUEZ through energy arm, Tractebel), which generated 76% of the domestic electricity consumed in 2002. Other generators include SPE (10% owned by EdF), which generates 4% of national consumption, plus a number of smaller generators making up the remainder.

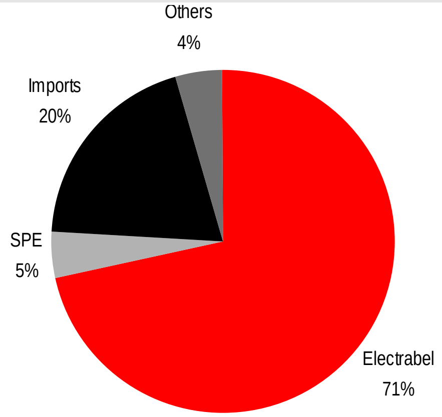
Generation by company: total 93TWh (2002)



Source: Powerink/HSBC

Belgium

Capacity in Belgium by company: total 17,696MW (2002)



Source: Powerink/HSBC

Installed capacity by company MW

Company	Capacity	%
Electrabel	12,617	71
SPE	815	5
Imports	3,500	20
Others	764	4

Source: Powerink/HSBC

Belgium

Belgian gas market value chain

Regulation	
	‣ The Belgian gas market was 59% liberalised at the end of 2002 with customers consuming >5m cubic metres pa able to choose supplier; this will be reduced to >1m cubic metres pa by 2006 and all by 2010.
	‣ CREG oversees the liberalised segments of the gas market and monitors compliance with the 2001 Gas Act, while acting in an advisory capacity to the government on matters regarding the operation and organisation of the market.
	‣ CCEG regulates the non-liberalised segments of the gas market.
	‣ The three regions (Flanders, Wallonia and Brussels) in Belgium are responsible for the implementation of the European Gas Directive.
	‣ Gas network fully unbundled. (Fluxys).
Key dates	
1999	‣ The European Gas Directive is incorporated into Belgian Federal Legislation in April 1999 with the Federal Gas Act 1999.
2001- July	‣ The Gas Act was amended, increasing the pace of gas market liberalisation and decreeing that the system of negotiated TPA was to be replaced by a system of regulated TPA.
2001 - December	‣ Belgian gas company, Distrigas, split its activities into two separate companies – Fluxys and Distrigas.
Market structure	
Production/ storage	‣ Belgian imports gas in the following mix: 42.5% Netherlands, 33.9% Norway, 14.7% Algeria, 2% UK, others 6.9%.
Tranmission / Distribution	‣ Fluxys has 3731km of pipelines, of which 77% operate at high pressure. It has 48bcm capacity pa.
	‣ Fluxys (43.4% owned by Tractebel/SUEZ) is the principal gas transporter in Belgium and the trend is toward regulated TPA for the transport network rather than negotiated.
	‣ Distrigas (43.4% owned by Tractebel/SUEZ) sells natural gas in Belgium and Europe and carries out abritrage trading in natural gas spot markets in Europe.
Supply	‣ Distrigas is the principal Belgian gas supplier and international gas trading company.
	‣ Belgium's total number of domestic and tertiary sector customers amounts to 2.5m of which nearly 2m use natural gas for heating.
	‣ Stakes in Distrigas and Fluxys may be sold by Tractebel/SUEZ to Electrabel in the near future.
Outlook	
	‣ Gas storage rights remain unresolved.

Source: HSBC

Belgium

Pricing

2002 Belgium marginal wholesale electricity prices: EUR/MWh

	Q1	Q2	Q3	Q4
Base	31.97	28.18	25.13	30.27
Near base	31.97	28.18	25.13	30.28
Mid base	38.60	34.10	30.47	36.65
Mid load	44.51	40.16	35.84	42.93
Mid peak	49.66	42.90	41.94	46.85
Near peak	55.83	51.96	48.89	51.96
Peak	86.17	73.22	67.29	73.22

Source: HSBC

Time Weighted Average (TWA) EUR/MWh (assumes 100% load factor)

	Q1	Q2	Q3	Q4	All year
2002	45.08	40.50	37.99	42.61	41.54

Source: Powerink/HSBC

Major issues

Topic	Comment
Nuclear Power	▸ The seven nuclear power stations in Belgium are to be decommissioned between 2015-25 (unless an exemption is made on grounds of security of energy supply) following a 40-year operating limit. With national consumption increasing at a rate of 2.7% (as in 2001) a new-build plan concentrating on alternative methods of energy production (CCGT, renewables) is under way.
Interconnector liberalisation	▸ Electrabel has won the right to keep long-term contacts with France's EdF that allow Electrabel to control most of the capacity on the Belgium/France switching facility. ▸ Electrabel is obliged to sell production capacity through a 1,200MW virtual capacity auction until 2008. This will replace the need for utilities to depend solely on importing their capacity, as most of the plants in Belgium are owned by Electrabel.

Source: HSBC

Belgium

Electrabel

Key data

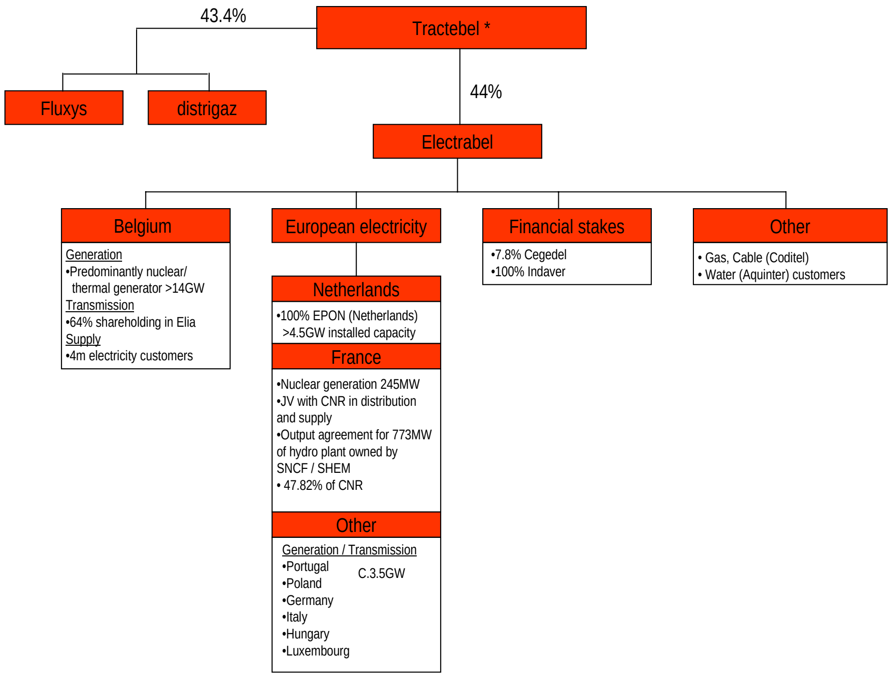
RIC code	Mkt cap
ELCBt.BR	EUR12.5bn

Analyst:
Alex Perricone

Business description

Generation, transmission, distribution and supply of electricity; natural gas and related energy services in Europe. Additional offerings include water supply and cable.

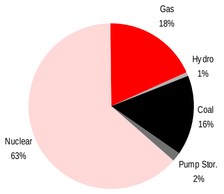
Ownership structure



Source: HSBC
** Tractebel is c98% owned by SUEZ*

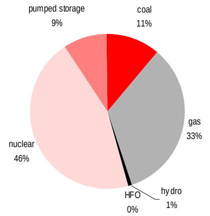
Belgium

2002 generation by fuel type: total 70TWh



Source:Powerink/HSBC

2002 capacity by fuel type: total 12,628MW



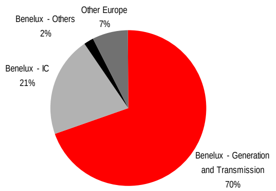
Source:Powerink/HSBC

Installed capacity breakdown MW

Fuel type	Coal	Gas	Nuclear	Hydro	Pumped storage
Capacity MW	1,219	4,220	5,713	87	1,164
%	10	34	46	1	9

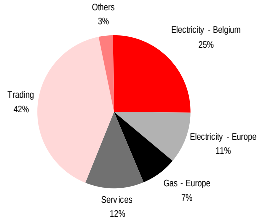
Source:Powerink/HSBC

2002 EBITDA: EUR2,118m



Source:Powerink/HSBC

2002 revenue by division: EUR14,853m



Source:Powerink/HSBC

Belgium

Electrabel

Key dates	
1970s	▶ Belgium's gas and electricity companies merge into three large utilities: Intercom, Unerg, and Ebes.
1990	▶ These three companies combine to form Electrabel, a subsidiary of holding company, Tractebel.
1996	▶ The Societe pour la Coordination de la Production et du Transport de l'Energie Electrique (CPTE) formed in Belgium through a JV between government-owned Societe Cooperative de Production d'Electricite (SPE 8.5%) and Eletcrabel (91.5%) to unite power prodcution and control the country's transmission grid (Elia).
1990s to present	▶ Electrabel dominates power distribution through long-term contracts (up to 30 years) signed with mixed intermunicipal companies.
1997	▶ In preparation for deregulation of Belgium's power market, the EC rules that these long-term contacts would be void after 2011.
1999	▶ Electrabel acquires 100% of Dutch power generator EPON in the Netherlands (now Electrabel Nederland).
2001	▶ Electrabel acquires the generating assets of Tractebel in Europe (Poland, Hungary, Italy and Portugal) and signs a number of JV's in the area of European supply.
2001 – March	▶ Agreement to sell 30% of grid operator Elia to municipalities, Publi-T.
2002 – May	▶ Electrabel and Acea sign a strategic JV.
2002 – November	▶ Electrabel joins Gamesa to develop 252MW of Portuguese wind farm generation between 2004-06.
	▶ Electrabel forms part of consortium with Acea to purchase Italian genco, Interpower.
2002 – December	▶ Electrabel sells the bulk of its financial participations in Iberdrola and ScottishPower, raising EUR450m.
2003 – February	▶ Electrabel and public sector electricity company, SPE, end joint industrial venture.
2003 – March	▶ AceaElectrabel and Italian utility Meta, form JV to supply customers in North Italy.
2003 – June/July	▶ Electrabel takes a 17.9 stake in CNR (Companie Nationale du Rhône). Electrabel subsequently reaches an agreement to buy a 22.2% stake in CNR from EdF, increasing its total stake to 47.8%.
2003 – July	▶ Electrabel shareholders vote to terminate partnership with SPE and approve the division of CPTE by taking over the majority of its assets.
2005	▶ Most of Electrabel's activities are conducted by the CPTE subsidiary. SPE has the option to increase its equity stake in CPTE from 8.5% to 15% before the end of 2005.
Generation	▶ Electrabel is the largest generator in Belgium with total installed capacity of 12.6GW and actual generation of 70TWh in 2002.
	▶ Predominantly a nuclear and thermal power generator in Belgium, but capacity of 4650MW acquired in 1999 in the Netherlands through EPON (now Electrabel Nederland) and JVs in France and Italy. New CCGT projects in Spain and capacity in Poland.

Belgium

Electrabel (contd)	
Generation (contd)	▸ c6GW installed nuclear capacity generates >60% of Electrabel's total production. ▸ Electrabel has almost c4GW of CCGT capacity, in addition to interests in co-generation, hydro plant and wind farms.
Supply/distribution	▸ Electrabel distributes electricity, natural gas (in conjunction with Distrigas) and water to municipalities and industrial clients in Belgium. ▸ 4m domestic electricity customers (80% of the market) plus a number of commercial customers and a JV with Metá in Italy, called Metá energy. ▸ Electrabel has a number of initiatives to distrubute electricity (and gas) in Europe with Spark Energy in the Netherlands, a JV in France with CNR, called Energie du Rhône and Energie SaarLoxLux in Germany.
Transmission	▸ Elia operates the 8,132km high-voltage network (20-380 kV). ▸ CPTE owned 99.9% of Elia until October 2001, when 30% was sold to a consortium of municipalities (Publi-T) for EUR220m. ▸ Electabel currently owns 64% of Elia through its 91.5% holding in CPTE.
Gas	▸ Electrabel works closely with Distrigas and Fluxys (all three have the same parent – Tractebel), which trade and transport natural gas throughout Europe. ▸ Distrigas and Fluxys transport and supply gas to more than 2m customers in Belgium and internationally. ▸ Electrabel has an 85% share of the Belgian natural gas supply market.
Water	▸ Electrabel has 0.5m domestic Belgian water customers through water utility, Aquinter SA, giving it a c10% market share.
Current strategy	▸ Consolidate and expand position in the European gas and electricity markets, including the doubling of electricity sales between 2000-04 from the 1999 base. In its 2002 full-year results presentation, the company said that it was on target for meeting this goal. ▸ European expansion is key to Electrabel's strategy. Electrabel has faced falling electricity tariffs ahead of market opening and continued 'pressure from competition and action from regulators'. The company particularly identified France as a key market for development, with a long-term objective of gaining 10% of the open market according to comments from the company's 2002 full-year presentation. ▸ To systematically develop a market strategy that offers customers the optimal range of services, mainly through close collaboration with other companies in the Tractebel group. ▸ To maximise the synergy between electricity and natural gas, by closer collaboration with Distrigas. ▸ Electrabel is set to acquire controlling stakes in gas transmission and supply businesses, Fluxys and Distrigas, energy services division, Elyo and Tractebel Engineering from SUEZ for EUR3.15bn.

Source: HSBC

Belgium

Other company generation and capacity data

Other market players

Company	Fuel type	Generation TWh	Capacity MW
SPE (Belgium)	Gas	3	654
	HFO	1	161

Source: Powerink/HSBC

France

Introduction

France is Europe's largest electricity market in terms of both installed capacity and electricity supplied. The majority of power is generated through nuclear plant, making the production price per kilowatt one of the most competitive in the industrialised world. This competitiveness and its geographic location result in France exporting a sizeable proportion of its production to other European countries.

Nationalisation of the electricity and gas sector in the 1940s created EdF and GdF, replacing over a thousand private companies. State monopoly Electricitié de France (EdF) is responsible for generating, transmitting and distributing electricity throughout the country. The need for secure energy supply after World War II led to an era of major network and power plant construction programmes, and by the 1950s there was enough generation to modernise the country. This output was heavily reliant on hydrocarbons and after the first oil crisis in the 1950s, France sought to reduce its reliance on oil by adopting a nuclear system. The first nuclear unit was commissioned in 1963 and a generation later, France possessed the second-largest nuclear generation mix in the world.

Electricity generation, transmission, distribution and supply have been partially unbundled though generation is still monopolised by state incumbent EdF with various smaller companies such as CNR (47.8% owned by Electrabel) and SNET (30% owned by Endesa) having only minimal market share. Independent transmission operator, RTE, operates the transmission network but is still owned by EdF. As Transmission Systems Operator (TSO), RTE must ensure the balancing of generation and consumption at all times, the operating safety of the power system and the maintenance and development of the public power transmission network. The distribution and supply network is again monopolised by EdF.

Gaz de France (GdF) dominates the gas market. In August 2001, the European Directive concerning common rules for the internal market in natural gas took effect. As a result, GdF's pipelines are now available to third parties with capacity and transportation charges deemed to be clear, transparent and fair. The French gas market is currently 28% open.

In November 2002, an agreement on European energy liberalisation was finally reached. EU power and gas markets are set to be fully liberalised from July 2007. The market will be open to all non-household users by July 2004 while retail customers will be free to switch suppliers from July 2007.

France

Schematic

French electricity market

Non-regulated | **Regulated** | **Regulatory review methodology**

Generation

- No electricity pool - prices set by EdF
- Virtual capacity auctions (6,000MW)
- Powernext - exchange for suppliers and traders (domestic and foreign)

↓

Transmission

- Independent TSO - RTE is sole operator of high voltage grid
- CRE participates in nomination of RTE director and approves accounting rules of separation and yearly CAPEX
- Regulated TPA with reasonable transparency on proposed tariffs

↓

Distribution

	Non-regulated	Regulated
Distribution	• EdF, HEW, RWE, ENDESA	•regulated TPA
Supply	• 34.5% liberalised (20/02/03) • Jan 2003 all industrial and commercial users free to choose supplier • CRE ensures prices are same for all non-eligible consumers in all French territories •CNR, SNET	• 65.5% regulated (monopolised by EdF)

↓

Supply

Regulatory review methodology

- Energy regulator CRE 'Commission de Regulation de l'Energie was created in 2000 under Presidential authority
- The CRE (under Art 35 Feb 2000 law) will guarantee autonomy in Electricity and Gas markets
- CRE has proposed a transparent tariff methodology for network access to the French Ministry
- CRE voices its opinion on new entrant projects, tender offerings, renewable energy purchase obligations at attractive tariffs and tariffs to non-eligible clients.
- In 2001 it initiated an interconnection study with CREG (Belgium) and ruled in Nov 2001 that RTE must improve the imbalance charges mechanism to failitate TPA
- CRE reconciles public service obligations with market opening

Source: HSBC

France

Deconstructing the value chain

French electricity value chain

Regulation	
	▸ EdF and GdF are regulated by independent regulator, the Commission de Regulation de l'Energie (CRE).
	▸ The CRE is hampered by political motivations emphasised by recent French political opposition to electricity liberalisation.
	▸ A capital flotation of EdF is expected in 2004 although there has not been any confirmation on this matter.
	▸ Public opposition to liberalising French energy markets is strong due to protective labour market regulations.
	▸ European-wide liberalisation plans will see France open up energy markets to all non-household users by July 2004.
Key dates	
1963	▸ First nuclear facility opened.
2004	▸ Flotation of EdF expected.
2004-07	▸ EU liberalisation laws are to open up all non-households by July 2004 and the entire EU energy market by July 2007. France tends to adhere to the minimum requirement.
Market structure	
Generation	▸ Generation market dominated by competitive nuclear power plant owned by state monopoly EdF.
	▸ As a state company, EdF effectively regulates itself.
	▸ Alternative French generators include Société Nationale d'Electricité et de Thermique (SNET), 30% owned by Endesa of Spain, and Companie National de Rhone (CNR).
	▸ The lack of market liberalisation coupled with state protectionism has seen EdF increase its installed generating capacity (both organically and through acquisitions) to over 100 GW in France alone.
	▸ Some 79% of electricity produced in 2002 was generated by nuclear plant with the remainder coming predominantly from conventional thermal and hydro.
Transmission	▸ Under EU electricity market regulations, EdF had to unbundle the transmission grid RTE from its value chain but RTE is still fully owned by EdF.
	▸ French electricity network formed in July 2000 and RTE is the sole operator of the high voltage public power transmission system.
	▸ As TSO, RTE must be independent of EdF's other activities, ensuring a balanced system, safety, maintenance and grid development.
Supply/distribution	▸ Two main players: EdF and CNR, though EdF is a monopoly in the regulated supply market.
	▸ As of 20 February 2003 those consuming >7GWh/year/site are free to choose supplier.
	▸ European-wide liberalisation plans will see France open up energy markets to all non-domestic users by July 2004 and domestic customers by July 2007.

France

French electricity value chain (cont.)

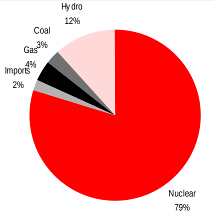
Outlook

- Prospects of EdF coming to the market. While nothing has been officially confirmed, it is expected that a capital flotation may occur in 2004/05.
- The French pension system is viewed as a critical element of social policy, with nearly 75% of French workers retiring by the age of 60. Pensions typically provide 70% of pre-retirement earnings. The vast majority of private pensions are unfunded. Most employees are covered by supplementary employer pension schemes that are administered by the employer federation and unions and are operated on a PAYG basis. However, companies active in the electricity and gas sector are the exception and operate under a specific pension regime dating back to 1946. Under this plan, the companies must finance the shortfall existing between active employee contributions and payments to retirees. This represents a significant cash expense for both EdF (EUR1.992bn in 2002) and GdF (EUR422m), and treatment of existing employees and their pension plans are a key issue to be addressed before EdF and GdF can move forward with privatisation. It is expected that the government will have to retain at least some responsibility for existing workers if EdF and GdF are to be successfully privatised.
- Continued market opening as France moves towards full liberalisation.

Source: HSBC

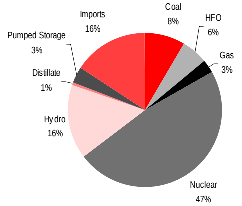
France

2002 generation by fuel type: total 523TWh



Source: Powerink, HSBC

2002 capacity by fuel type: total 132,815MW



Source: Powerink, HSBC

2002 installed capacity breakdown by fuel type

	Coal	HFO	Gas	Distillate	Nuclear	Hydro/ renew	Pumped storage	Imports
Installed Capacity (MW)	11263	7510	3914	728	62950	21200	4300	20950
%	8	6	3	1	47	16	3	16

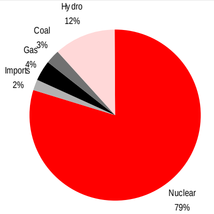
Source: Powerink, HSBC

French capacity margin*

Reserve margin	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peak demand (GW)	65	71	70	71	71	72	73	73	74
Capacity available (GW)	103	107	107	109	109	110	110	110	111
Capacity margin (%)	59	52	53	54	53	52	52	51	50

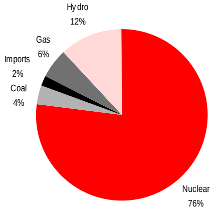
*Source: Powerink, HSBC (*takes average seasonal demand and maximum available capacity)*

French generation mix 2002



Source: Powerink, HSBC

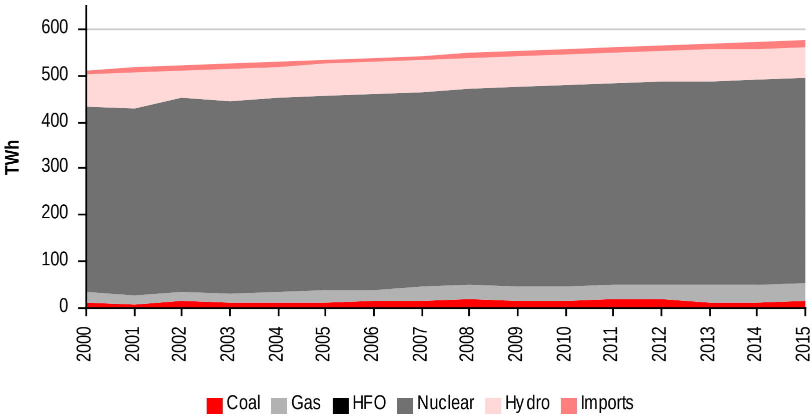
Generation mix 2012e



Source: Powerink, HSBC

France

Projections for the French power sector by fuel type



Source: Powerink, HSBC

French import capacity

Country	Belgium	Spain	Germany	Switzerland	Italy	UK
Capacity (MW)	2,500	1,450	4,000	7,000	4,000	2,000
%	12	7	19	33	19	10

Source: Powerink, HSBC, ELIA

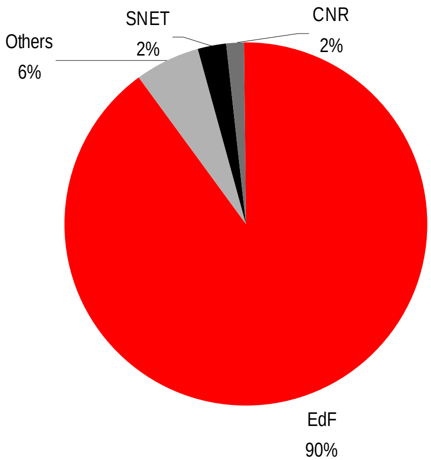
France

Market players

France

EdF (electricity) and GdF (gas) are the incumbent operators in the French market, dominant in all parts of the production, transmission and distribution chain for electricity and gas. EdF accounts for 90% of total French generation and has 103GW of total nameplate capacity. Only two other sizeable players operate within France: SNET (30% owned by Endesa of Spain) and CNR (47.82% owned by Electrabel of Belgium). Collectively they represent close to 5% of total generation and have a combined capacity of 5.5GW.

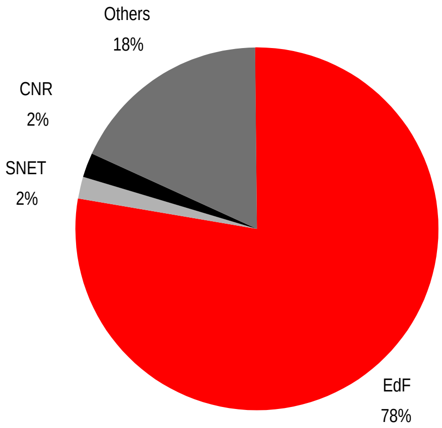
2002 generation by company: total 523TWh



Source: Powerink, HSBC

France

2002 installed capacity by company: total 132,815MW



Source: Powerink, HSBC

2002 installed capacity by company (MW)

Company	Capacity	%
EdF	103,067	78
SNET	2,593	2
CNR	2,905	2
Imports/others	24,250	18

Source: Powerink, HSBC

France

French gas value chain

Regulation	▶ EdF and GdF are regulated by independent regulator, the Commission de Regulation de l'Energie (CRE). ▶ The CRE is hampered by political motivations emphasised by recent French political opposition to electricity liberalisation. ▶ A capital flotation of GdF is expected in 2004 although there has not been any confirmation on this matter. ▶ Public opposition to liberalising French energy markets is strong due to restrictive labour market regulations. ▶ European-wide liberalisation plans will see France open up energy markets to all non-household users by July 2004.
Key dates 2004-07	▶ EU liberalisation laws are to open up all non-households by July 2004 and the entire EU energy market by July 2007. France tends to adhere to the minimum requirement.
Market structure	▶ Like the French electricity market, the French gas market is dominated by a state owned entity GdF (Gaz de France). ▶ GdF sells natural gas to more than 10m customers in France and 2m internationally. ▶ Despite the introduction of TPA to the gas network in August 2001, GdF has retained a monopoly status. ▶ Customers consuming more than 11m cubic metres pa are free to choose their supplier (c28% of the market). This threshold is set to fall to 5m cubic metres pa by 2008 (or 33% of the market).
Outlook	▶ Prospects of GdF coming to market. While nothing has been officially confirmed, it is expected that a capital flotation may occur in 2004/05. ▶ However, it is more commonly assumed that GdF's capital may be opened up through the entry of an industrial partner. ▶ Continued market opening as France moves towards full liberalisation.

Source: HSBC

France

Pricing

2001 marginal wholesale electricity prices (EUR/MWh)

	Base	Near base	Mid base	Mid load	Mid peak	Near peak	Peak
Winter	23.89	24.02	24.28	24.72	27.62	30.95	38.22
Spring	11.22	23.59	24.22	24.59	25.52	27.55	33.21
Autumn	11.22	23.29	23.89	24.22	24.91	26.84	32.38
Summer	10.66	22.27	22.65	23.32	24.90	26.84	32.38

Source: Powerink, HSBC

Time-weighted average (TWA) E/MWh (assumes 100% load factor)

	Winter	Spring	Autumn	Summer	All year
2001	27.82	22.39	24.15	21.3	23.92

Source: Powerink, HSBC

Major issues

Topic	Comment
Market liberalisation	▸ French public opposition to power market liberalisation is significant due to strong labour market dynamics and workers' unions. The timetable for EU-wide energy market liberalisation has been set: ▸ Full market opening on 1 July 2007 ▸ Legal unbundling of transmission on 1 July 2007 ▸ Legal unbundling of distribution on 1 July 2007
Interconnection capacity	▸ France committed to increasing interconnection capacity with Spain to 4000MW (from 1100MW) by 2010. This was a condition for the approval of the EdF/EnBW purchase of a stake in Hidrocantabrico of Spain. The first phase of the investment will involve laying 1,200MW of interconnector parallel to the future Perpignan-Figueres high-speed railway while the timetable for the remaining 1700MW remains unclear. ▸ The French grid operator RTE has come under EU scrutiny for its alleged lack of visibility with tariffs while EdF has come under scrutiny for the way its capacity auctions are handled.
State ownership and Privatisation	▸ The process of unbundling generation, transmission, distribution and supply assets is under way in France. France has now committed to opening its market albeit to a lesser extent compared to other countries. Widespread European liberalisation has put EdF and GdF under increased pressure to face competition in a proportion of their businesses. We expect to see further developments on this matter in 2004/05.

Source: HSBC

France

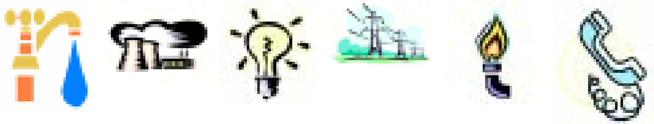
SUEZ

Key data

RIC code **LYOE.PA**

Mkt cap: EUR15bn

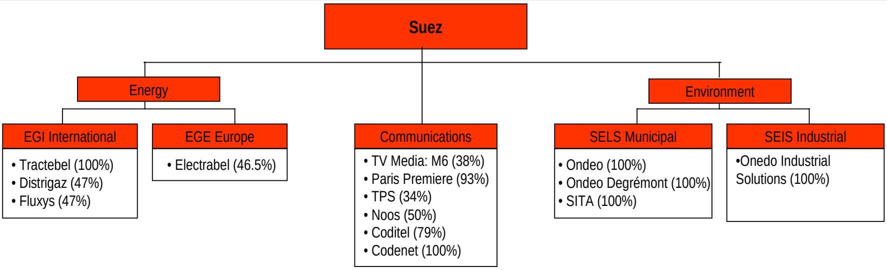
Analyst name **Alexandra Perricone**



Business description

Water, waste services, energy and communications

Organisational structure



Source: HSBC

France

SUEZ

Key dates	
1858	▸ Ferdinand de Lesseps founds the SUEZ Canal Company in order to build and operate the SUEZ Canal.
1880	▸ Lyonnaise des Eaux et de l'Eclairage founded.
1880-1914	▸ Lyonnaise des Eaux et de l'Eclairage acquires water distribution, gas production and distribution, and electricity generation and distribution.
1914-1946	▸ Lyonnaise des Eaux expands internationally with operations in North Africa, Central Africa and the Pacific.
1980-1990	▸ Lyonnaise des Eaux expands its core businesses of water and wastewater treatment further into the UK, Spain and the US.
1996	▸ Northumbrian Water acquired.
1997	▸ SUEZ merged into Lyonnaise des Eaux.
1998	▸ SUEZ Lyonnaise bids for minorities in SGB (Société Générale de Belgique).
1999	▸ Acquisition of Nalco and Clagon, making SUEZ the largest water chemical treatment business.
1999	▸ SUEZ holds 98.19% of Tractebel.
2001	▸ SUEZ Industrial Solutions set up.
2003 – January	▸ SUEZ issues its 2003-04 action plan – key points include a refocus, debt reduction programme and increased profitability.
2003 – January	▸ SUEZ and Atlanta reach a mutual dissolution agreement for the city's drinking water services contract.
2003 – February	▸ SUEZ sells stakes in AXA, Vinci and reduces holding in Total Fina Elf.
2003 – February	▸ SUEZ terminates water/sewage concession in Manila (Philippines).
2003 – April	▸ SUEZ sells its Fortis stake in the market and through a convertible bond..
2003 – May	▸ 75% of Northumbrian Water sold for EUR1.3bn cash + EUR1.8bn debt deconsolidation.
2003 – June	▸ SUEZ cancels Halifax (Canada) contract.
2003 – September	▸ SUEZ divests Ondeo Nalco for USD4.35bn.
Water	
	▸ 125m customers in water and wastewater treatment services
	▸ Active in more than 100 countries
	▸ 10,000 water treatment plants
Waste services	
	▸ Serving more than 74m people and 350,000 industrial and commercial customers
	▸ Presence in more than 30 countries
	▸ 32m tonnes of waste collected and more than 50m tonnes processed
	▸ 218 sorting centres, 112 composting plans, 58 incinerators and 251 landfills

France

SUEZ (contd)

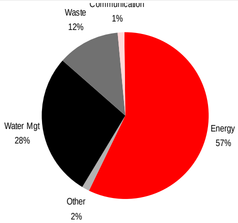
Energy	▶ Market presence in over 100 countries. ▶ Interest in over 50,000MW installed electricity capacity (installed or in development). ▶ Natural gas transmission network on three continents.
Other services	▶ Integrated energy service (heating, cooling, ventilation). ▶ France's largest cable network operator with 803,000 subscribers. ▶ Terrestrial TV broadcasting. ▶ Broadband internet. ▶ Interactive TV. ▶ Home shopping. ▶ Engineering. ▶ On-site customer solutions.

Current strategy	▶ Highlights of SUEZ's 2003-04 action plan:
	  ▶ Reduction of debt by one-third, backed by a substantial asset disposal programme.
	  ▶ Impact of intensified cost reduction programme as early as 2003: EUR500m.
	  ▶ Cash flow generated by each business line to finance all their investments before any proceeds of asset sales by 2004, implying a slowdown of investments from EUR8bn to an annual average of EUR4bn.
	  ▶ More streamlined, integrated organisation.
	  ▶ Refocused group meaning reduction of exposure to emerging countries by more than one-third as measured by capital employed, focused on the most profitable and recurrent activities within the global business.
	▶ In addition to the action plan, SUEZ will also implement the 'Optimax' programme aimed at reducing operating costs, streamlining the organisational structure, and improving efficiency of capital employed. This is expected to have a positive EUR575m positive impact on group operating profit.

Source: Company, HSBC

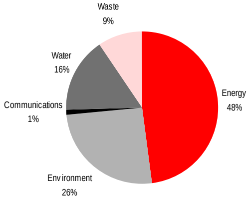
France

2002a EBITDA:EUR7,254m



Source: HSBC

2002a revenue: EUR46.09bn



Source: HSBC

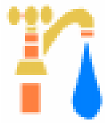
France

Veolia Environnement

Key data

RIC code
VIE.PA

Mkt cap:
EUR7.7bn

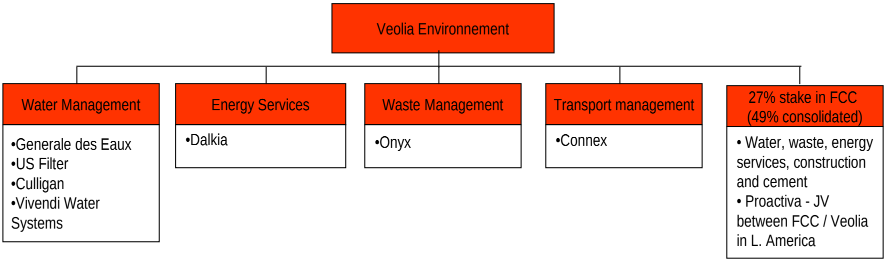


Analyst name
Verity Mitchell

Business description

Water, energy, waste and transport management.

Organisational structure



Source: HSBC

France

Veolia Environnement

Key dates

1853	▸ The Compagnie Générale des Eaux founded.
1960s	▸ Compagnie Générale des Eaux starts providing environmental services.
1967	▸ Becomes involved in the waste management sector and opens its first incineration and household waste composting plants.
1980s	▸ Broadens range further by taking over Compagnie Générale de Chauffe (renamed Dalki) specialising in energy management, and Compagnie Générale d'Entreprises Automobiles (CGEA), which will become Connex and Onyx.
1997	▸ Creation of Global Environnement, a single structure for multi-service industrial management.
1998	▸ Compagnie Générale des Eaux becomes Vivendi. Within this group, a new utilities division covers all environmental service activities: Vivendi Water (water), Onyx (waste management), Dalkia (energy) and Connex (transport).
1999	▸ Vivendi Environnement buys US Filter, the leading US water company.
2000 – July	▸ Vivendi Environnement floats on the Paris stock exchange.
2002 – June	▸ Vivendi Universal announces it will reduce its stake in Vivendi Environnement to 40%
2002 – November	▸ Further placement with financial institution with call option on remaining 20% by end-2004 with an exercise price of EUR 26.5.
2002 – Jan to Dec	▸ Company disposes of EUR1.3bn of US non-core assets ahead of its EUR1bn targets
2003 – February	▸ Southern Water Capital and VIE reach an agreement to acquire First Aqua JV. VIE holds 19.9% stake with an option for a further 5.1% stake.
2003 – April	▸ Vivendi Environnement becomes Veolia Environnement in a name change, which reflects the reduced ownership by Vivendi Universal.
2003 – July	▸ US Filter sells its surface preparation business for USD130m.

Key divisions

Water

- Veolia Water is involved in water treatment provision and water management services to municipalities and industrial clients. Veolia Water has 40,000 customers and is the largest water treatment provider in the world.

Other services

- Onyx has more than 250,000 waste customers and more than 60% of its business is with industrial customers.
- Dalkia Industries provides more than 2,500 industrial customers with tailor-made technical and economic solutions to optimise their energy facilities on a daily basis, solutions that take the deregulated context and environmental issues into consideration. It also provides district heating management in Central and Eastern Europe.
- Connex delivers integrated transport solutions – rail, light rail and buses in Europe, Asia and the US.

France

Veolia Environnement (contd)

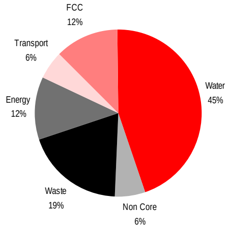
- FCC is a JV that delivers VIE's activities in Spain – water, waste and energy services, in conjunction with traditional construction and cement-making activities. VIE consolidates 48% of FCC and has a 27% economic interest in partnership with Esther Koplowitz.
- Generally, Veolia has a balance of 65% municipal and 35% industrial and commercial customers and has 95% of its business in developed markets, Europe, the US and Asia.

Current strategy

- To be the leader in the provision of environmental services in its core business to industrial and municipal customers.
- To stabilise current debt levels – gearing 117% and deliver modest growth of 6-8% pa between 2002-05 and improve margins and ROCE.

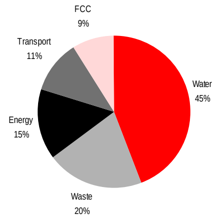
Source: Company, HSBC

2002 EBITA: EUR1,924m#



Source: HSBC #includes EUR47m for 'others'

2002 revenue: EUR30.08bn



Source: HSBC

Environmental issues

Challenges and responses

- Environmental issues are increasingly driving management practice in the sector
- We review the environmental issues and the government responses that companies will face
- SPW, SSE and IBE to benefit from renewables drive

Environmental measures facing the sector

While the utilities industries are facing a range of policy measures from governments to tackle environmental issues, we see the Emissions Trading Directive as the most influential piece of European legislation, given its potential impact on electricity prices. However, with emissions trading not due to be introduced until 2005, of more immediate concern to companies is the commitment to renewable energy required by the Kyoto agreement; this is already a key driver of investment strategy in the near term.

Company exposure, response and recommendations

Based on their current positioning and strategy for renewable energy development, ScottishPower, Scottish and Southern Energy and Iberdrola emerge as the best placed companies.

However, uncertainties about the impact of emissions trading will remain until the exact allocation of carbon emissions credits is finalised. We do not expect this until September 2004.

Executive summary

This section examines the commercial implications of global warming, acid rain, and nuclear waste production on the electricity industry. It describes the key environmental issues, and the policy responses that countries have proposed or adopted and reviews the performance of European companies in meeting these policy directives.

Countries have developed and agreed a number of measures to combat the increasing threat to the environment from greenhouse gas emissions, but these are difficult to implement, both for political and commercial reasons. At a global level, the failure of some countries to ratify the Kyoto Protocol has made it more difficult to adopt uniform standards on emission control. At the EU level, nations have had mixed success in reducing emissions from fossil fuel burning. In the past, the nuclear power generation sector offered the potential for low carbon emissions. However, political concerns on spent fuel reprocessing and the risk of pollution (especially since Chernobyl) have made most governments – with the exception of Finland – reluctant to further invest in nuclear generation.

A reduction in fossil fuel burning is the key to reducing CO_2 emissions, the major cause of global warming. The energy industries are responsible for some 27% of these emissions, and are, along with the transport industry, the major contributors to emissions of NOx and SOx, the gases that cause acid rain. The brunt of emission control measures imposed by governments has fallen on the power generation industry because of the political and technical difficulties of reducing emissions from the transport industry. As a result, environmental issues are increasingly driving management practice in the electricity sector.

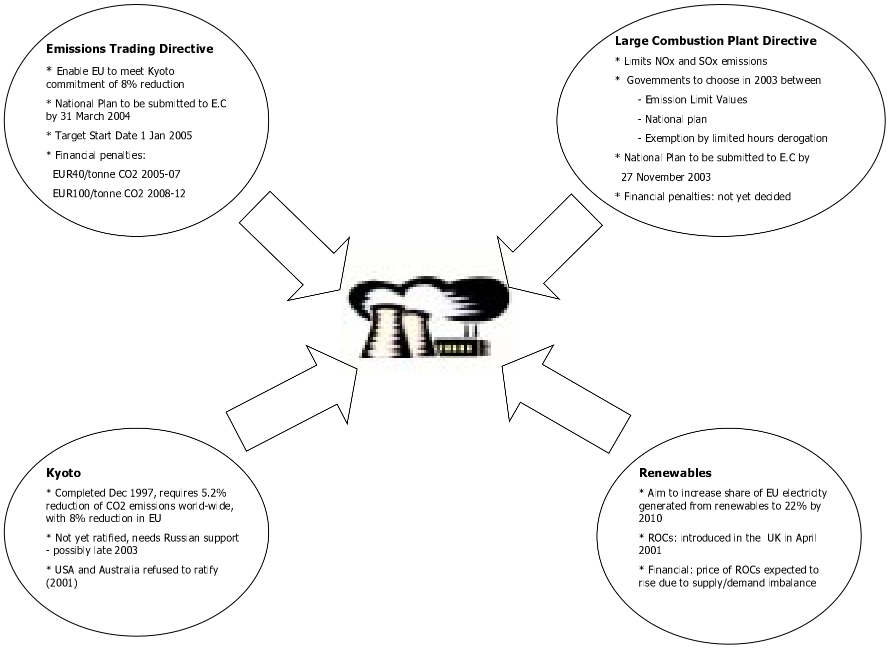
Government responses fall into three categories: global measures such as the Kyoto Protocol; European measures such as the Emissions Trading Directive, the Large Combustion Plant Directive (LCPD), and the Renewables Directive; and national responses such as the UK's Climate Change levy. Much of the impact on companies depends on the nature of their respective government's response, which is in turn shaped by existing commitments to power generation facilities and resources.

European countries and companies show notable variations in performance in meeting requirements for emissions reduction. At a national level, the UK's 'dash for gas' has made it straightforward to meet the LCPD requirements, and has led to a

Executive summary

reduction in CO_2 emissions in accordance with the Kyoto Protocol. Germany has made good progress in wind power generation and is also on track to meet its Kyoto requirements. France's commitment to nuclear power generation has also helped it to meet Kyoto targets – but leaves the question of nuclear waste disposal unanswered. A number of other European countries have much further to go in meeting their commitments; for example, Portugal, Spain and Italy have major coal and oil-fired generating capacity and will find it difficult to convert to renewables. The European Emissions Trading Directive aims to meet the Kyoto requirements in the most cost-effective way. This could offer countries such as Spain the ability to buy allowances that would ease the immediate problem for its generating industry.

Legislation influencing generation



Source: HSBC

The sector

The companies

In this report, we focus on the European companies listed below, which have exposure to the electricity industry. To provide context, the table highlights the respective exposure of each company to the different parts of the value chain.

Companies covered

Company name	HSBC rec	Electricity Generation	Electricity Transmission	Electricity Distribution	Electricity Supply
Centrica	Add	X			X
E.ON	Reduce	X	X	X	X
EDP	Reduce	X		X	X
Electrabel	N/R	X	X	X	X
Endesa	Add	X		X	X
Enel	Reduce	X	X	X	X
Gas Natural	Reduce	X			X
Iberdrola	Add	X	X	X	X
National Grid Transco	Add		X	X	
RWE	Add	X	X	X	X
Scottish & Southern	Reduce	X	X	X	X
ScottishPower	N/R#	X	X	X	X
Union Fenosa	Buy	X		X	X

 # HSBC does not provide a recommendation or target price on companies where the firm is broker. This complies with the procedures of HSBC on research independence
Source: HSBC

Key environmental issues

Climate change

Scientific evidence is growing that man-made greenhouse gas emissions are having a noticeable effect on the earth's climate. Global temperatures have increased by 0.6°C over the past century, with seven of the 10 warmest years on record occurring in the 1990s. Climate models predict that global temperatures will rise during the 21st century by between 1.4°C and 5.8°C, and that sea levels will rise by between 0.09 and 0.88 metres. This would be without precedent in the past 10,000 years, and could have significant social, environmental and economic costs.

Naturally occurring greenhouse gases maintain the earth's surface at a temperature 33°C higher than it would be in their absence, enabling the earth to be habitable. The most important natural greenhouse gases are water vapour and carbon dioxide, and there are also significant natural sources of methane, ozone and nitrous oxide. However, over the past century, increasing emissions of man-made greenhouse gases have begun to disturb this equilibrium and cause significant rises in the earth's temperature.

Climate change is thought to occur as a result of the emissions of six greenhouse gases: carbon dioxide (CO_2); methane (CH4); nitrous oxide (N_2O); hydroflourocarbons (HFCs); perflourocarbons (PFCs); and sulphur hexaflouride (SF6).

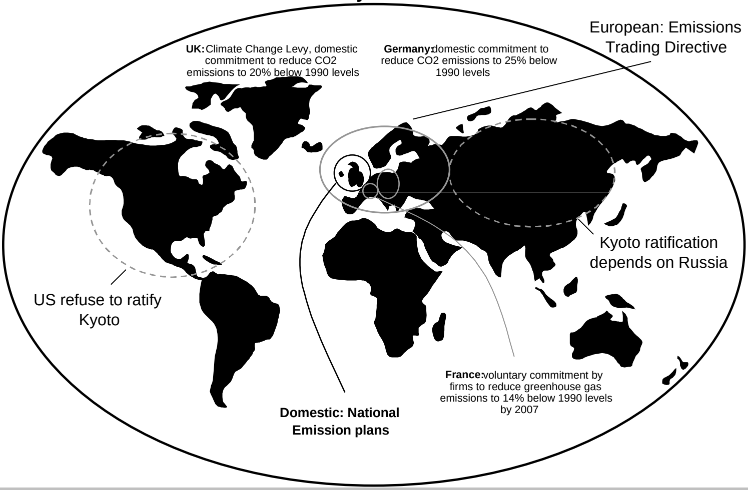
The main contributors to total EU greenhouse gas emissions in 2000 by sector were energy industries (electricity sector and refineries) 27%, industry (fossil fuel combustion and processes) 21%, and transport (mainly CO_2 from fossil fuel combustion, but also N_2O) 21%.

About 87% of global warming is attributed to CO_2 emissions from the burning of fossil fuels.

Key environmental issues

Measures

Global: Kyoto Protocol



Source: HSBC

Key environmental issues

Acid rain and local air quality

As a by-product of electricity generation, power stations can emit pollutants into the air, such as sulphur oxides (predominantly sulphur dioxide, known as SOx) and nitrogen oxides (nitric oxide and nitrogen dioxide, known collectively as NOx). These chemicals may either fall directly back to the earth as a result of gravity, or they may combine with water vapour in the air to form acids. Once acids have been formed, they can be transported long distances by the wind before being deposited in rain, snow or hail; this effect is called acid rain. Acid rain can have harmful effects on the environment: it affects trees by harming leaves and soils, and affects freshwater lakes and the wildlife that depend on them. Acid rain can also damage buildings made of limestone and marble.

The principal source of sulphur dioxide (SO_2) is power stations burning fossil fuels (coal, oil, and natural gas) that contain sulphur. As many power stations are now located away from urban areas, SO_2 emissions may affect air quality in both rural and urban areas. Nitrogen oxides are created by the oxidisation of nitrogen in high-temperature combustion processes. Motor vehicles are typically the main source of NOx, but power stations also contribute.

Measures

At a European level, the revised Large Combustion Plant Directive, completed October 2001, is designed to reduce acidification, ground level ozone and particles throughout Europe by controlling emissions of SO_2, NOx and dust from large combustion plants.

Key environmental issues

Nuclear waste

Nuclear power is a significant source of carbon-free energy, and is used in many European countries to generate electricity. However, there is no clear resolution to the problem of managing nuclear waste, which is radioactive and harmful to the environment. Currently, there are three options:

- Reprocessing: which allows unburnt fissile uranium and finite isotopes of plutonium to be extracted for potential re-use as nuclear fuel
- Wet storage: where the spent nuclear fuel is stored in water. The water acts as a shield against radiation and an absorber of the heat released from the spent fuel
- Dry storage: where spent fuel is stored in inert gas. This is the lowest-cost option for managing nuclear waste

Measures

To tackle the long-term problems associated with nuclear power, European countries are reassessing the use of nuclear power in electricity generation, with some committed to phasing-out nuclear power and decommissioning nuclear plants.

Many utilities and governments with nuclear programmes are moving to storing rather than reprocessing their spent fuels, including utilities in Germany, Spain and, recently, the UK. Almost all new developments in fuel storage are based on dry storage rather than wet storage.

Key environmental issues

Visual impact

Power stations, transmission lines and wind farms (turbines) are not considered aesthetic. Local communities tend to regard wind farms as an eyesore, and generally oppose their construction.

A possible alternative is offshore wind farms, which are less offensive to the public, as they are generally out of sight and removed from rural areas. A primary reason for moving wind farm development offshore is the lack of suitable wind turbine sites on land. This is particularly true in densely populated countries such as Denmark or the Netherlands with relatively flat landscapes. Equally important is the fact that wind speeds are often significantly higher offshore than onshore, sometimes by up to 20%. The wind over the sea is also less turbulent, as the temperature difference between the sea and the air above it is smaller than the corresponding difference on land, particularly during the daytime. In countries like the UK, however, the difference between good land sites and offshore sites may be smaller, as turbines on land are often situated on hilltops where the wind speed is higher than in flat terrain. The UK government is looking to further develop offshore sites and on 14 July 2003 plans were announced to license up to 6,000MW of offshore wind capacity in three development areas: the Thames estuary, Greater Wash and northern Irish Sea (see map below).

Offshore wind farms do have a number of disadvantages: they are difficult to construct; transportation of equipment and personnel by ship is expensive; environmental groups and fisherman are worried about the impact on sea life; and they can interfere with the shipping lanes. A major obstacle to the development of wind farms is the problem of convincing the public that development would be visually acceptable and would not hinder TV reception.

Blackouts in Europe in summer 2003, in part caused by extreme summer temperatures, have highlighted the need for further capacity. Wind can be an unreliable source of power generation, and needs to be backed up by conventional supply; in Germany, for example, for every 1MW of renewable energy, up to 0.8MW of conventional capacity can be required for backup. Development of offshore wind farms requires significant investment in transmission and grid connections, as well as the difficulty and expense of building offshore.

Key environmental issues

UK offshore wind farms

Source: HSBC, DTI, Platts

Policy responses/measures

Kyoto Protocol

- To tackle climate change, the Kyoto Protocol requires developed countries to reduce their emissions of greenhouse gases by an average of 5.2% below 1990 levels over the period 2008-12, with a reduction of 8% overall in the EU
- To come into force, the protocol must be ratified by at least 55 countries, representing a minimum of 55% of the 1990 carbon dioxide emissions of industrialised countries. Currently, 111 countries representing 44.4% of emissions have ratified the protocol
- Ratification will not have a direct impact on companies' European operations, in our view (European governments are already acting to bring emissions into line with their commitments). The Kyoto Protocol is binding on governments, but not on individual companies

The measure

The Kyoto Protocol, completed 11 December 1997, requires developed countries to reduce their emissions of greenhouse gases by an average of 5.2% below 1990 levels in the period 2008-12, with a reduction of 8% overall in the EU. The greenhouse gases covered are carbon dioxide, methane, nitrous oxide, hydroflourocarbons (HFCs), perflourocarbons (PFCs) and sulphur hexaflouride.

State of progress

To come into force, the protocol must be ratified by at least 55 countries representing a minimum of 55% of the 1990 carbon dioxide emissions of industrialised countries. Currently, 111 countries representing 44.4% of emissions have ratified it, but Russia, representing 17.4%, has not yet done so. The US, the world's largest emitter of CO_2 with c36% of emissions, signed up in 1998 subject to Senate approval but stated in 2001 that it would not ratify, so without Russian ratification the '55/55' threshold for implementation cannot be met. It is not clear whether Russia will ratify the protocol, although there are some positive signs that this could occur before the end of 2003. There is certainly diplomatic pressure from other European countries for Russian support, and the World Conference on Climate Change taking place in September 2003 in Moscow would be an opportunity for the Russian government to make its intentions clear.

Policy responses/measures

Relevance to companies

We do not think that ratification will have a direct impact on companies' European operations at present (European governments are already acting to bring emissions into line with their commitments). However, ratification will enable the political process (in supporting countries) to move towards planning the more significant cuts that are likely to be needed after 2012. Unlike the targets set out under the Kyoto agreement, further emission reductions could require significant social and economic disruption or technological progress.

Kyoto Protocol: status of ratification

Country	Signature	Ratification	% of emissions
US	12/11/98		36.1
Russia	11/03/99		17.4
Japan	28/04/98	04/06/02	8.5
Germany	29/04/98	31/05/02	7.4
UK	29/04/98	31/05/02	4.3
Canada	29/04/98	17/12/02	3.3
Italy	29/04/98	31/05/02	3.1
Poland	15/07/98	13/12/02	3.0
France	29/04/98	31/05/02	2.7
Australia	29/04/98		2.1

Source: HSBC, United Nations Framework on Climate Change

Policy responses/measures

Emissions Trading Directive

- To tackle climate change, the Emissions Trading Directive aims to cap the amount of CO_2 from major industrial sources and enable the EU to meet its commitment under the Kyoto Protocol – ie to cut emissions by 8% from 1990 levels (as an average over the period 2008-12)
- State of progress: the EU as a whole does not appear to be on track to meet its Kyoto commitments. Considerable uncertainty surrounds target achievement
- Relevance to companies: it will make carbon-emitting plants (especially coal-fired) more expensive to run. This is likely to lead to an increase in the cost of carbon and a probable shift to gas-fired plants or renewables

The measure

The Emissions Trading Directive has been introduced to enable the EU to meet its commitment under the Kyoto Protocol in the most cost-effective way. The target start date is 2005, which means it would include the 10 countries expected to join the EU in 2004, bringing its membership to 25 countries. The EU has a basket Kyoto obligation to reduce emissions by 8% from 1990 levels, by 2008-12.

The European Parliament on 22 July 2003 adopted the directive creating an EU emissions scheme. Although the target start date is 2005, governments have won the right to opt their country out of the scheme until 2008, the start of the Kyoto Protocol commitment period. To qualify for the opt-out, they must show that their national efforts achieve equivalent results. From 2008, the EU scheme would be mandatory for all.

The scheme covers carbon dioxide emissions in power generation (over 20MW), including turbines on industrial sites, but not waste burning. Companies are allocated emissions credits, and must only emit up to the quota set out by their allowances. If they do not have the allowances to cover their CO_2 emissions, they pay a penalty: EUR40 per tonne of CO_2 in the first phase and EUR100 thereafter. Until 1 January 2008, allowances will be allocated to companies free of charge. For the second period, at least 90% of the allowances will be allocated free of charge, and 10% will be auctioned to participants. If a company over-achieves, it can sell the spare emission allowances. Those that under-achieve (emit too much CO_2)

Policy responses/measures

must look to the market to buy allowances to cover the shortfall. At the end of the first phase, which runs from 2005-07, the installations must register their certificates and actual emissions. In the first phase, the scheme will cover only CO_2 emissions, but there is scope for the directive to be expanded in the future to include other greenhouse gases.

The situation for companies will remain uncertain until March 2004, when governments must communicate their national plan to the European Commission. There are two factors to consider: the overall level of allowances to be distributed by the government, and the proportion of allowances to be allocated to specific sectors and installations. Governments whose countries are on track to meet Kyoto commitments (such as Germany and the UK) may keep some allowances back to trade with other governments and thus under-allocate companies, to push for further reductions in emissions.

Once the overall level of allowances has been decided, governments have to decide how to allocate credit:

- Between designated sectors and non-designated sectors
- Then between the different designated sectors
- Then among companies within each sector.

Once they know what their individual allowance is, companies have three basic choices:

- To make real cuts in their emissions to meet their target
- To choose to emit at present levels and pay a penalty on their surplus
- To choose to buy emissions credits from companies that have not used up their allowance, through one of the emissions trading schemes

State of progress

As it appears that the EU will not meet its Kyoto obligations, the allocation of carbon credits in countries that are not on track could increase the cost of carbon for emitters in those countries. Conversely, the allocation of credits to countries that are on track could open up the potential to trade credits at a profit.

Policy responses/measures

- Countries that are on track to meet Kyoto commitments: Finland, France, Germany, Luxembourg, Sweden, UK
- Countries that are not on track: Austria, Belgium, Denmark, Greece, Ireland, Italy, Netherlands, Portugal and Spain

Emission reductions: EU objectives under Kyoto agreement

	1990-01 (%)	2010 target (%)
Germany	-18.3	-21.0
UK	-12.0	-12.5
Sweden	-3.3	4.0
Finland	0.0	4.7
France	0.4	0.0
Belgium	6.3	-7.5
Netherlands	4.1	-6.0
Italy	7.1	-6.5
Ireland	31.1	13.0
Spain	32.1	15.0
Portugal	36.4	27.0
EU	-2.3	-8.0

Source: European Environment Agency

The UK already has its own emissions trading scheme, established in March 2002. The scheme is voluntary, open to all sectors – but specifically excludes power generation – and covers all greenhouse gases. As such, it clashes with the EU scheme and cannot run in parallel. The UK is expected to make use of the opt-out clause from the EU version until 2007, when all direct participants in the UK scheme will transfer their CO_2 emissions to the EU scheme. The UK is regarded as being on track to meet its Kyoto obligations. The closure of coal-fired power plants and 'dash for gas' have led to falls in emissions since 1990: gas produces about 40% less carbon dioxide per unit of energy than coal, and significantly less sulphur dioxide. There is debate underway within the UK government about how to allocate emissions credits; this will be decided by March 2004.

Germany has a scheme of voluntary agreements with industry, and this has led to dramatic falls in its greenhouse gas emissions. As a result, it would be a net seller in the EU emissions trading scheme, as would the UK. The German government has stated it will support the EU scheme on the condition that it would not

Policy responses/measures

undermine its domestic initiative; it is therefore likely to opt out of the EU scheme, as is the UK, until 2007.

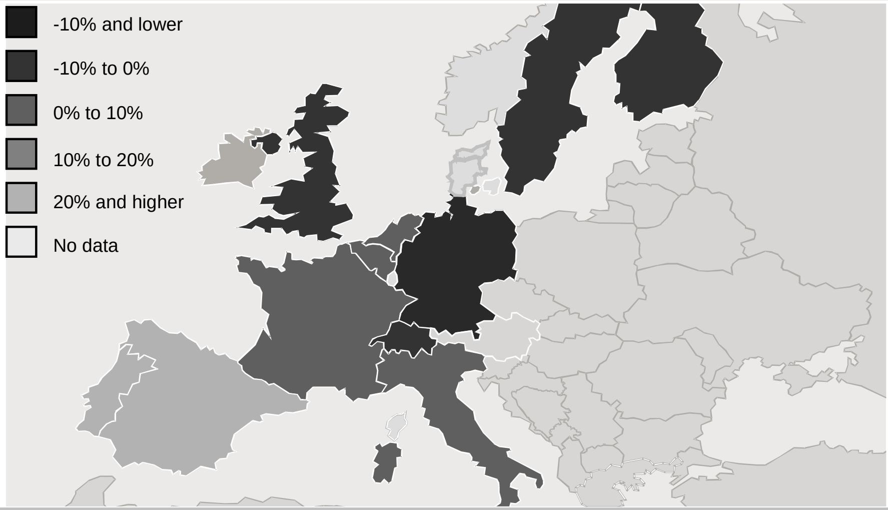
The absence of the UK and Germany could make the EU scheme more expensive for net buyers, such as Spain, Ireland and Greece.

France has announced an extensive 10-year plan to curb its carbon emissions to meet its commitments under the Kyoto Protocol. It has now stated that it is ready to consider tradeable carbon emissions permits in an international context, including stringent regulation. The government has set guidelines for creating a market in carbon, involving industries that are large energy consumers and which sign a voluntary agreement to limit emissions of greenhouse gases. On 10 July 2003, firms responsible for nearly one-fifth of French greenhouse gas emissions in 2001 signed up to a voluntary commitment to reduce these emissions by 14% compared with 1990 levels by 2007. This marks a potentially major shift in French policy, which had previously opposed the tradeable scheme, arguing that it was ineffective and unenforceable.

Although not an EU country, Norway has undertaken to set up an emissions trading scheme by 2005, in timing with the European Commission's planned project. The government set out the proposal in a white paper to lower emissions. The proposal is for a quota-based domestic emissions trading system for greenhouse gases that are not subject to the current CO_2 tax.

Policy responses/measures

1990-01 CO2 emission reductions



Source: HSBC, European Environment Agency

Relevance to companies

The EU directive affects coal, oil or gas-fired plants above 20MW that have CO_2 emissions. It will increase the cost of producing power for European utilities and reduce the competitiveness of coal-fired generation in favour of gas-fired production. The extra costs incurred in producing electricity are likely to be passed on to the consumer; this will lead to an increase in the price of electricity. Hydro, other renewable and nuclear plants would benefit whatever the choice of allocation; although they have no emissions and thus no need to buy rights, they would benefit from the expected higher market prices. The effect of emissions trading is likely to have the greatest impact on utilities with large amounts of coal-fired generating capacity, such as Enel and Endesa.

The directive is particularly relevant to countries that are not on track to meet their Kyoto commitments, namely Belgium, Italy, Portugal and Spain. Companies operating in these countries are likely to be under-allocated with emissions credits, and would therefore have to buy allowances to cover any surplus emissions.

Policy responses/measures

The impact of the directive on companies is extremely dependent on how the directive is translated into national law, in particular:

- Which year will serve as a base for calculating emissions rights allocation
- Treatment of already accomplished reductions
- Ability to pass on extra environmental costs to end-users

Significant uncertainties will remain for companies until national plans are decided in March 2004. For example, basing allocations on emissions from an early year or period would benefit companies that have already made reductions in emissions. It seems most likely that the base year taken for allocations will be an average of past years, possibly 1998-01. This appears a fair method for allocation, as companies would be credited for recent reductions, and fluctuations in yearly emissions would be smoothed over.

Timeline for implementation and compliance

- 31 March 2004: governments to submit national plan for emissions allocations to the European Commission
- January 2005: initial phase of the scheme starts, covering CO_2 from electricity generation, oil refineries and some other heavy industry sectors. Temporary exclusions are allowed for heavy industry during this first phase, with caps on generator emissions adjusted to take account of measures for renewables and energy efficiency
- January 2007: current phase of UK emissions trading scheme for 'direct participants' ends. All direct participants in the UK scheme that are covered by the EU scheme transfer their emissions to the EU scheme
- January 2008: second phase of the EU scheme starts. Scheme covers CO_2 from other sections of industry as required by the directive and relevant changes made as necessary to the arrangements for the climate change agreements

Policy responses/measures

Link between Kyoto and Emissions Trading

The European Commission on 23 July 2003 proposed a directive linking the Kyoto Protocol and the Emissions Trading Directive. The Kyoto Protocol outlined some “flexible mechanisms”, which could be used to promote new technologies in transition countries (through joint implementation – JI) or developing countries (through clean development mechanisms – CDM). The linking directive proposes that European companies would be able to carry out emission reduction projects around the world and convert their credits into up to 6% of their allowances to be used under the EU emissions trading scheme (in the 2008-12 trading period). This will benefit companies because emission reduction projects in transition and developing countries are cheaper than in the EU, generating more credits for lower investment. The Commission stated that “it is expected that the measure will reduce the annual compliance costs for participants in the EU emissions trading scheme by approximately 25%”. If trading reaches 6%, the EC will consider capping the amount of credits that could be converted during the remaining trading period. JI and CDM credits in excess of this could be used to meet Kyoto commitments but not for emissions trading.

Policy responses/measures

Large Combustion Plant Directive

- To tackle local air quality and acid rain, the Large Combustion Plant Directive aims to limit NOx and SOx emissions
- State of progress: revised directive completed October 2001, member states have until 27 November 2003 to communicate compliance plans to the European Commission
- Relevance to companies: retrofitting equipment to meet emissions standards is expected to be prohibitively expensive for some large power stations and could lead to their closure

The measure

Amendments to the 1988 Large Combustion Plant Directive (LCPD) were completed in October 2001. The revised LCPD applies to combustion plants with a thermal input of greater than 50MW. The directive is intended to reduce acidification, ground level ozone and particles throughout Europe by controlling emissions of sulphur dioxide (SO_2), nitrogen oxides (NOx) and dust from large combustion plants. Member states have until 27 November 2003 to communicate their compliance plans to the European Commission. Newer combustion plants – those licensed on or after 1 July 1987 – must meet the emission limit values given in the revised directive. Governments have to decide how 'existing' plants (those plants with a construction or operating licence before 1 July 1987) meet the emission targets. They have three options:

- Emission Limit Values (ELVs) where each plant has a set emission limit
- National emissions reduction plan, where the country as a whole has a limit – which can be met by reductions and trading. The national plan will reduce emissions of SO_2 and NOx from existing plants to the levels that would have been achieved by applying the ELVs
- Exemption from the above by committing to limit operation of the plant to less than 20,000 hours between 1 January 2008 and 31 December 2015 (this commitment has to be made by 30 June 2004)

Policy responses/measures

The new lower limits for existing plants will come into effect from January 2008. To meet these emissions targets, companies must opt for retrofitting or commit to limited operation. Companies can retrofit flue gas desulphurisation (FGD) and low NOx burners to coal stations. FGD is a technology that employs a sorbent, usually lime or limestone, to remove sulphur dioxide from the gases produced by burning fossil fuels, and can reduce SO_2 emissions by up to 90%.

State of progress

In the UK, consultation on the approach to take is due to complete on 27 November 2003. The government has indicated that "on balance, our preference is for the national plan approach. The national plan allows trading and the experience so far with other emissions trading schemes is that they offer a most cost-effective way of reducing emissions". The Department for Environment, Food and Rural Affairs (Defra) estimates that the emission limits approach would cost about GBP900m over the period 2008-24 for emission reduction measures. Over the same period, the national plan approach would cost some GBP650m – around GBP250m less than the emissions limit approach.

Privatisation of the UK electricity sector in 1989 led to the rapid growth of gas-fired generation in the UK. This, combined with the closure of many coal-fired plants, reduced the costs to the UK of compliance with the LCPD, as the need for expensive investment in FGD became unnecessary. In the UK, there has been massive over-compliance with the directive's targets: in 1993, SO_2 emissions amounted to 40% of the British LCP target.

France, Germany and Italy have all signed voluntary agreements with industry to limit emissions from large combustion plants.

France initiated its nuclear energy programme in the early 1970s, and since 1980 the share of nuclear-generated electricity has risen from 15% to 75%. Nuclear energy does not emit NOx or SOx into the atmosphere – so the growth of nuclear energy in France has led to sizeable reductions in NOx and SOx emissions, and clear compliance with the LCPD.

Portugal has adopted a National Programme for the Reduction of Emissions from Large Combustion Plants (PNRE).

Policy responses/measures

Relevance to companies

The cost of retrofitting the equipment needed to meet the directive emissions standards is expected to be prohibitively expensive for some large power stations. This could lead to mothballing or closure of coal-fired generation without FGD.

Policy responses/measures

Renewables Directive

- To tackle climate change, the Renewables Directive aims to increase the share of EU energy supply generated renewably to 12% by 2010
- State of progress: the directive entered into force on 27 October 2001 and EU member states must transpose the directive into national law by November 2003
- Relevance to companies: key beneficiaries will be companies with existing production; in particular, we would highlight IBE, SPW and SSE

The measure

The Renewables Directive was passed in July 2001, and entered into force on 27 October 2001. It was established to increase the share of EU energy generated from renewable sources. The directive set national targets that reflect the starting point and the potential of each member state. These targets are indicative, not binding, and there are no penalties associated with not achieving them. EU member states are required to transpose the directive into national law by November 2003.

Member states can support renewables in whichever way they wish for an initial period of four years. At this point, the Commission will review the situation and formulate a harmonisation proposal, followed by a seven-year transition period for implementation. There are three different approaches to stimulating renewables: guaranteed tariffs, which are a cost-based support system; competitive bidding; and green certificates, both of which are quota-based support systems.

Guaranteed tariffs

Generators are paid a specific tariff for the power produced, which can be a stand-alone tariff or a premium on top of the market price. The premium is defined by the regulatory authority and is effectively a subsidy. This support mechanism has proven to be most popular among member states.

Competitive bidding

The regulator or an independent authority chooses projects on the basis of their relative competitiveness. Power is supplied on a long-term contract basis at a tariff

Policy responses/measures

fixed through a tender. This mechanism enables the regulatory authority to control the development, technology, and location of renewable energy plants.

Green certificates

This support mechanism offers renewable energy generators two income streams. First, power produced is sold at the prevailing market price. In addition, generators of renewable energy receive green certificates for their production. These certificates can be used to satisfy renewable energy obligations in markets where customers or suppliers must demonstrate that a certain percentage of their power is derived from renewable sources. As a market for these certificates develops, renewable generators receive a second income from the sale of certificates.

In addition to support mechanisms, taxes on carbon emissions and electricity consumption are a strong incentive for the development of renewable energy.

State of progress

Targets for renewable (including hydro) share of electricity by 2010

	Now (%)	2010 target (%)
Belgium	3.0	6.0
France	15.0	21.0
Germany	8.0	12.5
Italy	18.0	25.0
Portugal	35.5	39.0
Spain	21.0	29.4
UK	4.3	10.0
EU	15.0	22.0

Source: HSBC, European Environment Agency

The UK hopes to increase the share of electricity generated by renewables from 3% in 2001 to 10% by 2010. The UK government is investing more than GBP250m over the period 2002-05 into renewable energy sources, including solar, biomass and wind. The UK now has 1,000 wind turbines operating throughout the country and offshore, providing 555MW of electricity. By the end of 2004, the UK hopes to add an additional 400MW generation capacity, and to have 15% of its electricity generated through (mostly offshore) wind turbines by 2020. The UK had previously used the competitive bidding support mechanism for renewables. It was successful

Policy responses/measures

in keeping projects costs low, but failed to promote development of significant installed capacity. The UK now operates a green certificates system.

Because of its lack of indigenous natural resources, France's energy self-sufficiency depends to a great extent on developing renewable energy sources. In its January 2000 plan to meet its Kyoto commitments, the French government included several long-term structural measures to encourage the use of renewable energy resources. The government's aim is to have 5,000MW capacity of energy from wind power online by 2010. However, it seems unlikely that renewable energy will see a real surge until the French government removes market barriers (such as subsidies for other energy sources) that inhibit the use of renewables for electricity and heat production. France initially used the competitive bidding system to support renewables, but is abandoning this in favour of guaranteed prices.

The German government is hoping to use renewable energy sources to compensate for the loss of atomic power through better conservation and new technology, particularly for renewable resources. The Environment Minister has stated that up to 60% of nuclear power could be replaced by wind energy by 2030, though only a few of the additional plants have so far been built. Germany's main renewable resource is wind power. In 1999 wind power already accounted for 2.8% of Germany's total electric power generation, a figure the government hopes to increase to 12.5% by 2010. As suitable sites for additional wind farms in Germany are increasingly scarce, the government is looking to build offshore wind power parks. Plans are in progress to build about 40 wind generators offshore in a small-scale pilot project before 2004. Germany uses guaranteed prices to support renewables, under the Renewable Energy Law. The German system has been one of the most successful in Europe – there has been a significant increase in installed wind capacity due to predictable and stable returns.

The Italian government has placed increasing emphasis on developing renewable energy alternatives in recent years and plans to double its production of energy from hydro and other renewable sources by 2012, adding over 7,000MW of renewable power generation capacity. Due to the high levels of sunshine that reach Italy's land surface, the Italian government has made solar energy technologies its top priority. Italy is also studying the potential of biomass and wind energy. Italy's major wind energy programmes focus on the feasibility of constructing wind farms in Apulia and Sicily, both in the south where wind resources are greatest. Italy is also one of the

Policy responses/measures

largest producers of geothermal energy in the world, with installed geothermal capacity in 1997 of 550MW. Italy uses green certificates to support renewables.

Portugal and Spain both use the guaranteed price support system, Portugal having moved from competitive bidding. The Portuguese government has set a target of 3,750MW of installed wind capacity by 2010. Spain has had problems with transmission connections, which were hindering development. These appear to have been resolved; with an announcement in early August from the regional government of Catalonia that wind power producers will be able to link up with the electricity grid by mid-August. Under Spain's National Energy Plan, the country intends to increase its total installed wind capacity from 4,200MW to 13,000MW by 2011, which would account for 16% of electricity generation.

Belgium is another country to use the guaranteed pricing system, but green certificates schemes have now been adopted in the regions of Flanders and Wallonia.

Denmark has achieved national energy targets for installations on land and has a less favourable political environment. However, there was a notable failure of the green certificate scheme in Denmark. Until 2000, Denmark had used guaranteed prices to support renewables, which led to a clear increase in renewables installed capacity, reaching 603MW in 2000. The government then announced a green certificate scheme to start in 2001. The scheme proved extremely unpopular with investors, with renewable installed capacity additions falling by 81% to 115MW. As a result of low investor interest, Denmark returned to the guaranteed pricing system in 2002, with capacity additions immediately rising back up to 350MW.

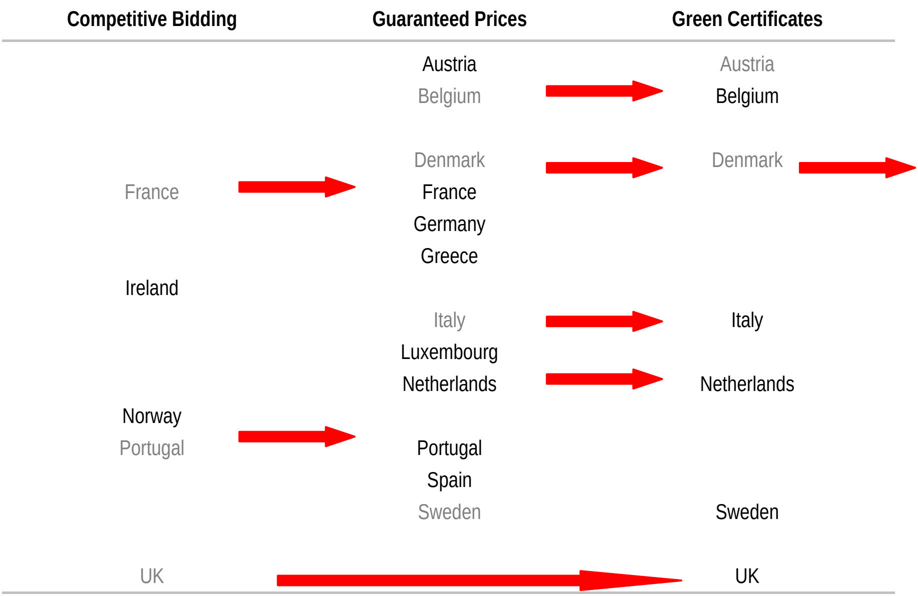
There is a clear trend in Europe to the guaranteed price support system. In the early stages of renewable energy development, member states implemented either a competitive bidding or a guaranteed price support system. Competitive bidding has effectively pushed down the cost of renewable technology, but has failed to develop much installed capacity, except notably in Ireland. The guaranteed prices system, on the other hand, has proved very efficient in promoting the development of renewable plants, but at a high cost for government. This system has been most successful in Germany, Denmark and Spain: these countries accounted for 84% of all installed wind capacity in the EU in 2001.

The green certificates support system is arousing interest from member states as it creates a fair incentive environment while not attributing unjustified rents to

Policy responses/measures

producers. However, while green certificates may be the most attractive support system on paper, it is the most complicated mechanism to set up, and implementation has been slower.

Different approaches to supporting renewables



Source:CERA

Renewables Obligation Certificates (ROCs)

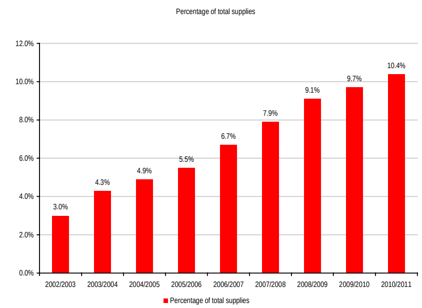
In April 2002, the UK introduced Renewable Obligation Certificates (ROCs), a government initiative designed to incentivise and promote renewable energy. The obligation requires all electricity suppliers to supply a percentage of their total sales from electricity generated from renewable sources. For 2003-04, the requirement is 4.3%, rising to 10.4% by 2010-11. Ofgem has the responsibility for implementing the government's Renewables Obligation.

The scheme certifies that energy is from green sources (wind, solar, small hydro, and biofuels). Suppliers with insufficient capacity to meet their own quota can buy certificates

Policy responses/measures

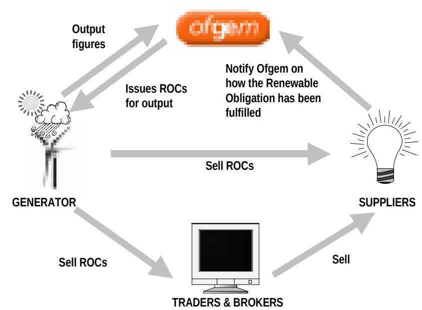
from operators with surplus certificates or can pay the buy-out price (currently GBP30.51). Because of a supply and demand imbalance, we expect the price of ROCs to remain substantially above the buyout price, with the ROC price projected to rise as high as GBP65/MWh in 2005. This system is unique in Europe in that the revenue from buy-outs is recycled to companies according to the number of ROCs surrendered.

Renewables as a proportion of total capacity



Source: HSBC, DTI

The ROC process



Source: HSBC, Ofgem

Relevance to companies

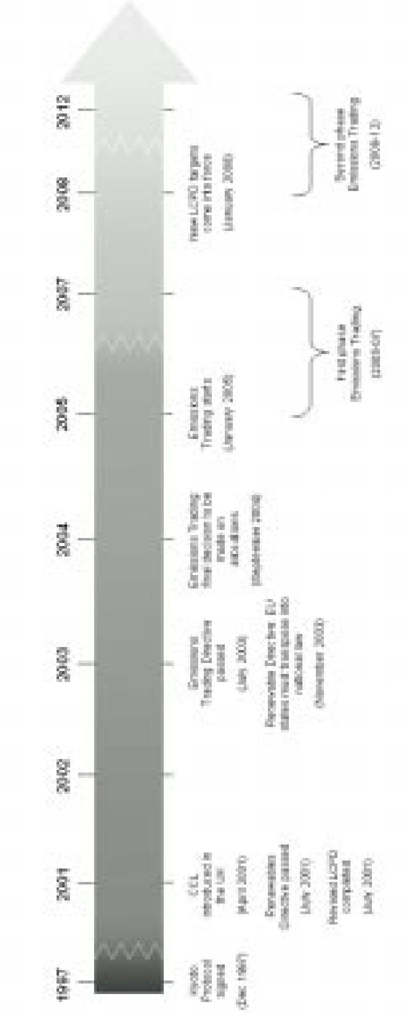
On a company-specific basis, we would identify those companies with existing renewable production as the key beneficiaries from the high forecast price of ROCs over the next decade. In particular, in the UK electricity sector, we would highlight SPW and SSE, both of which have made substantial commitments to increase their renewables portfolios. Centrica appears most at risk from the scheme – a recent announcement to invest GBP500m in renewable joint ventures could indicate a change of strategy, but the timing and method of delivery remain unclear at present.

The ultimate winners will be those with existing capacity or new build in process. The losers will be companies long of retail that lack the upstream ROC income to offset the higher unit cost of buying the certificates.

The Spanish utility, Iberdrola, has emerged as the European leader in renewables investment. Iberdrola has a strong competitive position within the renewable markets, and a joint venture holding of Gamesa (31.8%) gives the company a stake in wind power expansion.

Policy responses/measures

Outlook on renewables – timeline



Source: HSBC

Nuclear decommissioning

- To tackle the long-term problems associated with nuclear power, European countries are reassessing the use of nuclear power in electricity generation, with some committed to phasing out nuclear power and decommissioning nuclear plants.
- State of progress: nuclear power to be phased out in Germany and Belgium, with all nuclear plants to be closed by 2021 and 2025, respectively
- Relevance to companies: companies operating in these countries will face increased costs as they are forced to close nuclear plants and use alternative energy sources

The measure

To tackle the long-term problems associated with nuclear power, European countries are reassessing its use in electricity generation, with some committed to phasing out nuclear power and decommissioning nuclear plants. Nuclear power is a significant source of carbon-free energy, but the waste created can be damaging to the environment.

Nuclear power is unpopular with the public, partly because of its close connection with nuclear weapons, as original stations were built not to produce electricity but to make plutonium for nuclear weapons. In addition, a fear of radioactivity and the Chernobyl accident have increased public opposition. Increased awareness of the terrorist threat since September 11 and aggressive nuclear policy in North Korea have led to further concerns about the use of nuclear power.

Policy responses/measures

State of progress

Government policy for nuclear power (2002)

	% Electricity generated from nuclear power	Government position
Belgium	56	Nuclear phase-out approved
France	77	Very much in favour of nuclear power
Germany	20	Potential change to phasing out nuclear power in long term
Italy	0	None, but possibility of returning to nuclear in future
Portugal	0	No action at present
Spain	34	Government supports nuclear power at present, but has ruled out further construction of nuclear plants
UK	28	No clear policy

Source: Energy Information Administration

The Belgian government has passed new legislation to phase out nuclear power. Belgium's seven nuclear power plants, which produce 56% of current output, must be shut down no later than 40 years from the date on which they started production. According to this schedule, the first plant will be shut down in 2015 and the last in 2025. The legislation passed in January 2003 also bans the construction of new nuclear plants (fusion exempted) and offers no compensation for operators.

Currently, c77% of France's electricity comes from the country's 58 nuclear reactors. The right-wing election victory in June 2002 may be highly significant for the future of French nuclear power, particularly as the Greens lost their key position in the presidential and legislative elections. The new government would favour new nuclear construction if necessary, but, for the moment, France does not need new capacity.

In Germany, the phasing out of nuclear power has been one of Chancellor Gerhard Schroeder's main environmental policy objectives. In June 2001, the Chancellor and leading energy companies formally signed an agreement to shut down Germany's 19 nuclear power plants. This new pact limits the lifespan on nuclear plants, which provide close to one-third of Germany's electricity, to an average 32 years of operation. Should this pact be enforced, it is likely that the newest plant operating in Germany would be closed by 2021. Germany is the first large industrial country to abandon nuclear energy. The pact also requires the nuclear industry to construct interim waste-storage sites near the plants to reduce the unpopular transport of nuclear waste, and provides for the termination of spent nuclear fuel

Policy responses/measures

reprocessing by 2005. In Germany, concerns over nuclear power have led to over-provisioning by nuclear generators for their decommissioning and spent fuel liability.

Italy has four nuclear power plants. Since 1987, none of the stations has been in operation after a public vote decided to abandon the use of nuclear power. The plants are currently being dismantled. The Italian government is in the process of identifying a single site to store all radioactive waste located within the country to increase security. More recently, the Italian government has been reconsidering its policy towards nuclear energy. In December 2002, the Italian parliament considered a draft law that would permit Italian utilities to buy stakes in nuclear power plants outside of Italy. The document also included prospects of returning to nuclear energy generation in Italy. Enel is already seeking to gain stakes in four nuclear power plants in France.

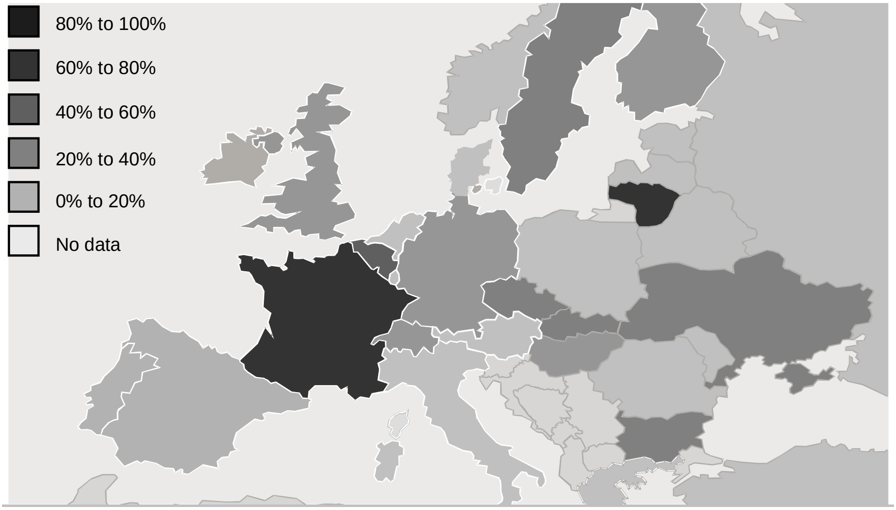
Portugal has no nuclear power plants. While there has been some interest and discussion regarding the construction of a nuclear plant, there has been no action toward this end.

Spain has nine nuclear reactors in operation, with one, Vandellos-1, having been shut down in 1989. According to Spain's National Energy Commission (CNE), the country derived approximately 34% of its gross production from nuclear power in 2002. In the early 1980s, security concerns led to the mothballing of five nuclear plants at various stages of construction. Subsequently, the Spanish utilities affected were compensated via a nuclear moratorium levy in the end-user electricity tariff. At present, the Spanish government has stated it has no intention of reducing the use of nuclear power, but has ruled out any construction of further nuclear plants.

The UK currently has no clear policy on nuclear power. No new nuclear plants have been built since 1995, but because of limited domestic coal and gas reserves in the long run, new construction has been under discussion, at least to maintain nuclear's market share as older plants are retired. New construction now appears unlikely following the difficulties encountered by British Energy. All but one of the UK's nuclear power stations is expected to close by 2025. Nuclear energy provided approximately 28% of the UK's electricity in 2002.

Policy responses/measures

Nuclear dependency



Source: HSBC, Energy Information Administration

Relevance to companies

In the near term, the companies most exposed to nuclear decommissioning are E.ON, RWE and Electrabel as a result of their nuclear operations in Germany and Belgium, where the governments are committed to phasing out nuclear power by 2021 and 2025, respectively. In addition, companies in Spain, France and the UK will face costs from decommissioning as older nuclear plants reach the end of their lifetime and must be retired.

Policy responses/measures

Nuclear: reprocessing versus storage

- To tackle the long-term problems associated with nuclear waste, governments have three options: reprocessing, wet storage and dry storage. Nuclear waste is harmful to the environment, remaining radioactive for many years
- State of progress: the UK, France and Russia are the only European countries carrying out reprocessing. A number of other nations, including Germany, Belgium and Spain, have stopped reprocessing and are moving to storage
- Relevance to companies: nuclear generators will have to set aside money to deal with nuclear waste

The measure

To tackle the long-term problems associated with nuclear waste, governments have three options: reprocessing, wet storage and dry storage. When 'spent fuel' is removed from a nuclear reactor, it is unloaded into a storage facility immediately adjacent to the reactor to allow the radiation levels and the quantity of heat being released to decrease. The fuel must then be stored or reprocessed.

Reprocessing is used to separate out potentially reusable plutonium from spent nuclear fuel, which can then be used for military purposes. It has two major disadvantages: expense (estimated costs are at least twice as high as storage) and environmental concerns – reprocessing discharges are a significant source of radioactive pollutants. Since the early 1990s, interest in reprocessing has declined, mainly due to increased environmental pressures and a reduced need for military plutonium. At present, c23% of global spent fuel is reprocessed. The UK, France and Russia are now the only European countries carrying out reprocessing.

An alternative, and much cheaper, option is to store the spent fuel in such a way that it does not deteriorate significantly. Since the 1960s, in most European countries, some spent fuel has been stored in large pools of water. Newer nuclear stations have been building progressively larger pools – spent fuel can now be held in some pools for up to 30 years. However, wet storage has caused problems because the fuel cladding was subject to corrosion, which in time could lead to the release of radioactivity from the fuel. Storage pools are also high maintenance,

Policy responses/measures

requiring continuous operation of cooling, filtration, cleaning and sampling systems. These operations result in appreciable quantities of radioactive wastes.

It has been suggested that the dry storage of spent fuel could remove the need for reprocessing. Dry storage is even less expensive than wet storage and requires much less maintenance. It also has greater reliability, with stores expected to be able to operate for over 100 years. The world's first dry store for spent fuel was constructed in 1970 as part of the Wylfa reactor, in north Wales.

Options for nuclear waste

Reprocessing • Very expensive (at least 2x storage costs) • Significant source of radioactive pollutants • Used to generate military plutonium • Declining industry - countries moving to dry storage	**Countries Committed to Reprocessing** • UK • France • Russia
Wet Storage • Cheaper than reprocessing • High maintenance - creating low-level nuclear wastes • Risk of corrosion • Accounts for approximately 70% of spent fuel	**Countries Using Only Storage (wet and dry)** • Finland • Sweden • Canada
Dry Storage • Cheapest option • More reliable than wet storage - stores expected to operate for over 100 years • Very little maintenance needed	**Countries Constructing Dry Stores** • Germany • Hungary • Spain

Source: HSBC, DTI

Spent fuel disposal

Ultimately, spent fuel must either be reprocessed or sent for permanent disposal. A number of countries are carrying out studies to determine the optimal approach to the disposal of spent fuel and waste from reprocessing. The most commonly favoured method for disposal is placement into deep geological formations. This would involve cooling the spent fuel, probably in dry stores above ground, for several years. Then it would be conditioned, packed and buried in a deep repository. At present, no nuclear waste repository exists. The earliest planned date for a repository is 2015 in Sweden.

Policy responses/measures

State of progress

The UK, France and Russia are currently the only European countries carrying out reprocessing. A number of other nations, including the US, have stopped reprocessing.

Many utilities and governments with nuclear programmes are moving to storing rather than reprocessing their spent fuels, including utilities in Germany, Spain and recently the UK. Almost all new developments in fuel storage are based on dry storage rather than wet storage.

Relevance to companies

The relevance to companies of nuclear waste management depends on governmental policy toward nuclear waste. Companies operating in France and the UK face higher costs because of the expense of reprocessing relative to storage. Nuclear waste management in Germany, Belgium and Spain is of less significance to companies as a result of the lower costs of storage.

Climate change levy

- To tackle climate change, the UK government in 2001 introduced a levy on energy supply, with opt-outs including electricity generated from renewable sources
- State of progress: the climate change levy took effect from 1 April 2001. The levy is charged at a flat rate of energy consumed, which for electricity is 0.43p/kWh
- Relevance to companies: exemption from the levy will help to support the market for renewable energy

The measure

To tackle climate change, the UK in 2001 introduced a levy on energy supply. The levy forms a key part of the government's Climate Change Programme. The levy package is expected to lead to reductions in carbon dioxide emissions of at least 2.5m tonnes of carbon pa by 2010. It aims to reduce energy consumption and emissions.

The levy is chargeable on a supply of electricity, if the supply is made by an electricity utility and is to a non-utility or source not excluded or exempt. It is imposed at the time of supply to the electricity supplier, which can then pass on the costs to industrial and

Policy responses/measures

commercial consumers. This means that electricity suppliers are required to pay to Customs the levy that is due. There are several exemptions from the levy, including:

- Electricity generated from new renewable energy (eg solar and wind power)
- Supplies for domestic use
- Supplies to be used in some forms of transport

State of progress

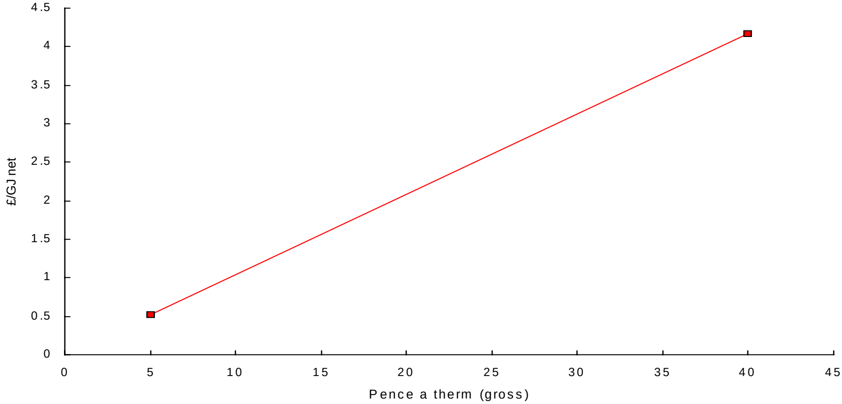
The climate change levy took effect from 1 April 2001. The levy is charged at a flat rate of energy consumed, which for electricity is 0.43p/kWh. GBP50m pa is being made available for research and promotion of energy efficient technology from the revenue raised by the climate change levy. Questions remain about the status of the levy once the EU Emissions Trading Scheme is introduced.

Relevance to companies

The exemption from the levy will help to support the market for renewable energy.

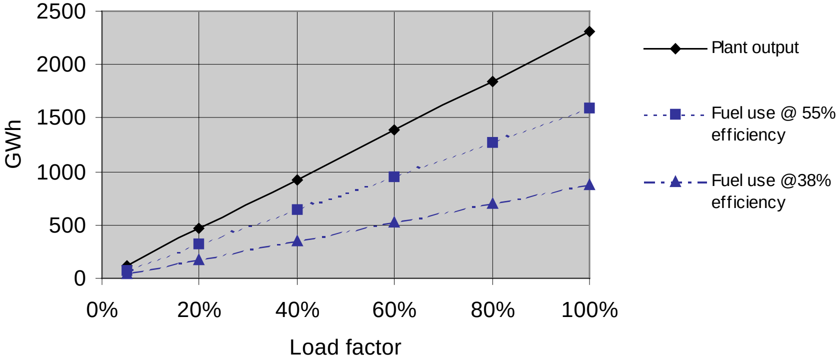
Converter – Electricity & Gas

Joules into Therms



Source: Powerink/HSBC

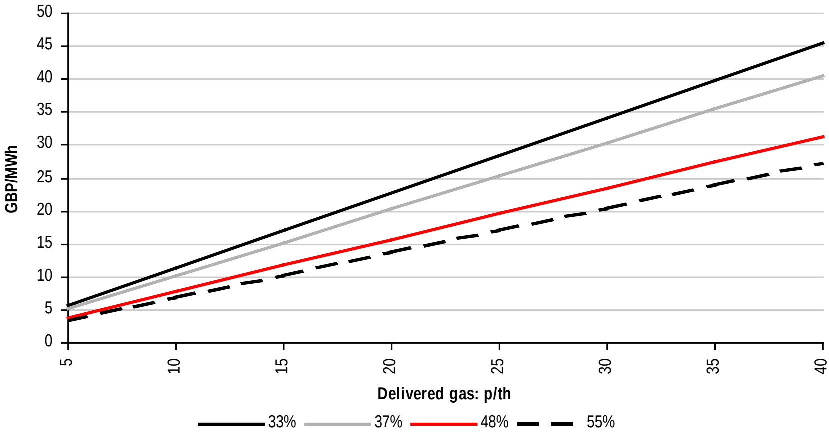
Output and station fuel use vs load factor



Source: Powerink/HSBC

Converter – Electricity & Gas

CCGT generation cost vs gas price and efficiency



Source: Powerink/HSBC

Energy conversions

	Gigajoule	Therm	Million British thermal unit	Kilocalorie	Kilowatt-hour	Tonne of coal equivalent	Tonne of oil equivalent
From:	**GJ**	**th**	**Btu**	**kcal**	**kWh**	**tce**	**toe**
1 Gigajoule	1	9.478	0.9478	238,800	278	0.03413	0.02389
1 therm	0.1055	1	0.1	25,200	29.31	0.0036	0.00252
1M.Btu	1.0551	10	1	252,000	293.1	0.036	0.0252
1 kilocalorie	4.188E-06	3.968E-05	3.968E-06	1	0.001164	1.429E-07	1.000553E-07
1 kilowatt-hour	0.0036	0.0341	0.00341	859	1	0.0001228	8.598E-05
1 tce	29.3	277.8	27.78	6,998,250	8,140	1	0.7
1 toe	41.86	396.83	39.68	9,997,500	11,628	1.4286	1

Source: Powerink/HSBC

Converter – Electricity & Gas

Energy conversion

To \ From	Joules	Kg-meters	Ft-lbs	KWh's	Metric Hp-hrs	Liter-atm	K-cal	Btu
Joules	–	9.80665	1.356	3600000	2648000	101.333	4187	1055
Kg-meters	1/0.10197	–	0.1383	367100	270000	10.333	426.9	107.6
Ft-lbs	1/0.7376	7.233	–	2655000	1952900	74.74	3088	778.2
KWh's	1m/0.2778	1m/2.724	1m/0.3766	–	0.7355	0.00002	0.00116	0.00029
Metric Hp-hrs	1m/0.3777	1m/3.7037	1m/0.51206	1.3596	–	0.00003	0.00158	0.00039
Liter-atm	1/0.00986	0.09678	0.01338	35528	26131	–	41.32	10.41
K-cal	1/0.00023	0.00234	0.00032	859.9	632.4	0.0242	–	0.252
Btu	1/0.00094	0.00929	0.00128	3412	2510	0.09604	3.968	–

Source: HSBC

Annual output and fuel use of 100MW station: GWh

Load factor	fuel use @ 38% efficiency	fuel use @ 55% efficiency	Plant output
100%	876	1,593	2,305
80%	701	1,274	1,844
60%	526	956	1,383
40%	350	637	922
20%	175	319	461
5%	44	80	115

Source: HSBC

Utility glossary

A

Actual peak load reductions	A reduction in annual peak load by consumers who participate in a DSM (demand side management) programme that reflect changes in demand.
Advanced gas-cooled reactor (AGR)	Advanced gas-cooled reactors are second-generation gas-cooled nuclear reactors built in the UK. Designed to replace the older Magnox stations, AGRs use a carbon dioxide coolant (the gas which absorbs the reactor's heat and, via a heat exchanger, produces steam to drive a turbine and produce electricity). They operate at 650°C and at higher pressures than Magnox stations, increasing thermal efficiency by 10% to around 42%.
Alternating current (AC)	Electricity flow that changes direction continuously between positive and negative charges. Almost all electricity generators generate using AC as it can easily be transformed to higher or lower voltages.
Ampere	Unit of measurement that measures electrical current in a circuit by 1 volt acting through a resistance of 1 ohm.
Anthracite (hard coal)	A hard, black coal with high energy content. Often referred to as hard coal.
APX	Amsterdam Power Exchange.
Authorised supply capacity (ASC)	This is the agreed level of kVA (kilovolt amperes) to be supplied by a supplier to meet the maximum electrical requirements of a customer. The REC (Regional Electricity Company) charges on a per kVA basis, for use of their wires, and this charge is passed on to the customer via the supplier at cost.
Availability factor	Used in reference to a nuclear power plant. It is the energy that could have been generated during a specified time period, expressed as a percentage of the energy that could have been produced by a continuous power rate during the same period. In lay terms, it is the time a reactor is 'offline' due to planned outages or unplanned stoppages.
Available but not needed capability	Available capacity of generating units that are not required to run to satisfy demand.
Avoided costs	Costs that a utility avoids by acquiring power from an IPP (independent power producer) rather than generating the electricity itself (eg, fuel and use of system).

B

Balancing A requirement imposed by electricity grids or gas pipelines that supply and demand be equal over a certain time period.

Barrel (bbl) Unit of volume measurement used for petroleum and its products. 7.5 barrels = 1 tonne. 6.29 barrels = 1 cubic metre. 1 barrel = 35 imperial gallons or 159 litres.

Base gas Volume of gas required in a storage pool to maintain sufficient pressure to keep the working gas recoverable.

Baseload The minimum amount of electricity generated or required over a given period of time at a continuous rate.

Baseload capacity Generating equipment/capacity that runs continuously, ie, 24 hours a day. Characteristic of nuclear generation.

Baseload generation The actual generation of a power station that runs at a constant high level of output for a sustained period of time.

Baseload plant A plant that operates near 100% load factor producing electricity at a constant rate. Nuclear plants are considered as baseload plants.

Baseload price TWA (time-weighted average) price which is indicative of the price paid by consumers that require constant load.

Baseload unit A generating unit (within a plant) that operates at a constant output to take all or part of the baseload of a system.

Base rate The percentage of the total electric or gas ‘rate’ that covers non fuel related costs of a plant.

Billion cubic feet (bcf) 1 bcf = 0.83 million tonnes of oil equivalent.

Billion cubic metres (bcm) 1 cubic metre = 35.31 cubic feet.

Bilateral contract A direct contract between the generating utility and user or broker outside of a centralised power pool.

B

Biomass conversion — The process by which organic materials, such as wood waste or garbage, are burned for direct energy or electrical generation, or by which these materials are converted to synthetic natural gas.

Bitumonous coal — Most commonly used coal with a moisture content <20%. Used for generating electricity, making coke, and heating.

Black Start — This is the term used when the National Grid System fails and all generating plant has to be brought back on line from a cold start in the correct sequence to balance the voltage on the system. Black Start allows the main power station to start itself without needing an external power supply. It is used as an emergency start if the national electricity network supply is interrupted.

BNFL — British Nuclear Fuels.

Boiling water reactor (BWR) – RBMK — A reactor type similar in design to a pressurised water reactor (PWR). The Soviet-designed 'RBMK' reactor is only found in the former Soviet Union. The core is an assembly of graphite blocks not unlike the core of a Magnox reactor. Through this core run the pressure tubes which contain the fuel. Water is pumped through the pressure tubes where it boils to steam, which is piped to the steam turbines. The fuel is uranium dioxide, enriched to c2%, contained in Zircaloy tubes. The reactors are physically very large with high electrical outputs of up to 1,500 MW. The physics of RBMK reactors are complex because, as well as the graphite, water and steam in the pressure tubes moderate the neutrons in the core.

Brayton cycle — A fossil fuel fired power plant that uses the conversion process where the fuel, oil or gas is combusted and drives a turbine generator.

Brent crude — Brent crude oil is notable for its high distillate yield and low sulphur content. It is used as the basis for trading on London's International Petroleum Exchange (IPE). It is also the international price marker for over two-thirds of the world's crude oils.

British thermal unit (Btu) — An imperial measurement, one British thermal unit represents the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit. One Btu is about the amount of heat produced by burning a match.

B

Broad equivalence	The proposal that the capital expenditure to maintain the serviceability of a group of assets should be broadly in line with the current cost depreciation charged on those assets over an appropriate period of time.
Brownout	A controlled power reduction in which the utility decreases the voltage on the power lines, so customers receive weaker electric current. Brownouts can be used if total power demand exceeds the maximum available supply. The typical household does not notice the difference.
Build, operate and own (BOO)	A type of project whereby an investor builds, operates and maintains a 'project' at his own cost for an indefinite period, in exchange for a pre-agreed cash flow stream.
Build, operate and transfer (BOT)	A type of project risk allocation whereby an investor builds, operates and maintains a 'project' at his own cost and after a pre-agreed period sells the facility to the contracting entity (usually state).
Bulk supplies	Supplies of treated or untreated water trade between individual water companies. These supplies are often traded under long-term contracts and on non-standard terms. The Director has the power to determine the terms of such supplies if so requested.
Bulk power market	Wholesale purchases and sales of electricity.
Bulk power supply	Often this term is used interchangeably with *wholesale* power supply. It refers to the aggregate of electric generating plants, transmission lines, and related equipment. The term may refer to those facilities within one electric utility, or within a group of utilities in which the transmission lines are interconnected.
Busbar	The point at which power is available for transmission. A conductor or group of conductors that serve as a common connection for two or more circuits, generally in the form of insulated cable, rigid rectangular or round bars, or stranded overhead cables held under tension.
Buy through	An agreement between a utility and customer to import power when the customer's service would otherwise be interrupted.

C

Calorie (cal)

The amount of heat required to raise the temperature of one gram of water to 1°C. 1 calorie = 4.184 joules.

Calorific value

The calorific value indicates the energy potential of a material, and is usually measured on energy per unit mass or unit volume basis (MJ/kg, MJ/cubic metre). It can be expressed as the gross or higher calorific value, which includes the latent heat of condensable water vapour produced from the hydrogen component of the fuel on combustion. Also as the net or lower calorific value, which does not include the latent heat of the water vapour.

Capacitor

A device designed to improve the efficiency of the flow of electricity through distribution lines by reducing energy losses. It is installed in substations and on poles.

Capacity

The maximum load a generating unit, station, or other electrical apparatus is rated to carry by the manufacturer or can actually carry under existing service conditions.

Capacity charge

The amount charged for capacity being purchased.

Capacity margin

The difference between the available generation and potential demand in a system at any point in time.

Capital maintenance

Planned work carried out by companies to replace and repair water and sewerage assets to provide continuing services to customers.

Capital programmes

Planned construction work being carried out by companies to build new assets such as sewage treatment works and water mains.

Captive customer

A customer who does not have realistic alternatives to buying power from the local utility, even if that customer had the legal right to buy from competitors.

Coke

A hard, dry substance containing carbon that is produced by heating bituminous coal to a very high temperature in the absence of air.

Combined cycle gas turbine (CCGT)

A type of generation plant in which exhaust gases, typically from the combustion of natural gas, are used to drive a turbine directly and then routed through a boiler to produce steam to drive a second turbine.

C

Combined heat and power (CHP)/cogeneration
A generation technique that produces hot water or steam as a by-product of power generation. In a conventional power plant, the fuel burnt turns water to steam and drives a turbine. This steam exits to a cooling tower at high temperatures, giving efficiencies of up to 35%. In a CHP plant, upon exit, the steam passes through heat exchangers to provide process heat, space heating, hot water and so on. CHP plant efficiencies are therefore much higher, often over 80%. The biggest industrial users of CHP are found in the paper, chemicals, oil refining, and iron and steel industries. CHP reduces emissions through its greater efficiency and also reduces energy costs by up to 40%.

Comparative efficiency studies
Comparisons of companies' operating costs, taking into account factors outside management control which influence costs. Such factors include the make-up of inherited asset stock (outside short-term control), economies of scale, population density, and the nature of the terrain. From these comparisons it is possible to rank or band companies by relative efficiency and to assess relative scope for reducing costs.

Comprehensive National Energy Policy Act
Federal legislation in 1992 that opened the US electric utility industry to increased competition at the wholesale level and left authority for retail competition to the states.

Compressed natural gas
Natural gas that is highly compressed (although not to the point of liquefaction), so that it can be utilised by an operation not attached to a fixed pipeline.

Compression station
Any combination of facilities that supplies the energy to move gas in transmission or distribution lines or into storage by increasing the pressure.

Conductor
A substance or body, usually in the form of a wire, cable or busbar, that allows a current of electricity to pass continuously along it.

Consortium power
Output from a power plant to which several parties have rights.

C

Contract energy management (CEM)

Combined heat and power (CHP) systems are capital intensive and while fuel cost savings may be possible via the switch to CHP, the initial outlay may be too much for some companies. Many CHP system developers offer a contract energy management (CEM) service whereby they will finance, design, build, operate and maintain a CHP plant at the host company's site, selling its heat and power output direct to the customer. The advantages of this are that the host company enjoys guaranteed reduced energy prices from the general market prices, while promoting a 'greener' image through the use of CHP. Contracts are often for 10 years or more.

Contracts for differences (CFDs)

Financial contracts designed to reduce exposure to volatility in pool prices.

Co-operative electric utility

An electric utility legally established to be owned by and operated for the benefit of those using its service. The utility company will generate, transmit and/or distribute supplies of electric energy to a specified area not being serviced by another utility.

Cubic feet per second (CFS)

A measurement of water flow representing one cubic foot of water moving past a given point in one second.

Cubic foot (cf)

Equals approximately 1,000 Btu. A standard unit used to measure quantity of gas (at atmospheric pressure). 1 cubic foot = 0.0283 cubic metres.

Current

A flow of electrons in an electrical conductor. The rate of movement of the electricity, measured in amperes.

D

Daily peak	The maximum amount of energy or service demanded in one day from a company or utility service.
Declining block rate	A fall in an electricity rate when an increase in consumption cuts the cost to a utility of providing service.
Decommissioning	The process whereby a nuclear power station is shut down at the end of its economic life and eventually dismantled, and the site made available for other purposes.
Degree day	A measure of seasonal variation and intensity of temperature. In residential customer load, the more degree days in a year than the 'average', the higher the electricity bill.
Demand management	Demand management strategies, such as selective marketing, appropriate tariff structures, leakage reduction and promoting efficiency measures by customers, play an important role in maintaining a company's supply/demand balance.
Demand-related tariffs	Tariffs that are structured so that they encourage the efficient use of water by those whose demands impose additional costs of supply, eg, sprinkler users and other peak users.
Depletable energy sources	This includes electricity purchased from a public utility and energy obtained from burning coal, oil, natural gas or liquefied petroleum gases.
Direct access	The ability of a retail customer to purchase commodity electricity directly from the wholesale market rather than through a local distribution utility.
Director General of Electricity Supply (DGES)	The Director General of Electricity Supply is responsible for overseeing the regulation of the electricity industry under the Electricity Act 1989. As of January 1999, the electricity and gas regulatory offices, OFFER and Ofgas, merged and a new regulatory body was created to oversee the UK's electricity and gas markets, known as the Office of Gas & Electricity Markets, OFGEM.
Discharge consent	Under the Water Resources Act 1991, discharges of sewage or trade effluent to controlled waters require consent. The discharge consent is a licence issued by the Environment Agency, which sets out the conditions under which the licence holder may make a discharge.

D

Displacement	The substitution of less expensive energy generation for more expensive generation. Usually this means reducing or shutting down production at a high cost plant and using cheaper generation when it is available.
Distribution	The system of lines, transformers and switches that connect between the transmission network and customer load. The transport of electricity to ultimate use points such as homes and businesses.
Distributed electricity generation	Small-scale, decentralised electricity generation, eg, small-scale power and heat generation in individual buildings.
Distribution Network Operators (DNOs)	These own and operate the electricity distribution system within its authorised area. There are 12 licensed DNOs in England and Wales and 2 in Scotland.
Distribution use of system charges (DUOS)	These are the charges paid for use of the regional distribution wires to the REC in whose area the customer's site lies. A REC's DUOS charges can consist of the following components: a standing charge (GBP/year), an availability charge (GBP/kW), a unit charge (p/kWh, peak and off-peak), a demand charge (GBP/kW at peak), a reactor power charge (p/kVArh), and a charge for distribution losses (as a percentage of the units charged). These charges are paid by suppliers and are published by RECs one year in advance.
District heating	Large-scale central heating system based on hot water or steam and including many different buildings in a particular area.
Drinking Water Inspectorate (DWI)	The Drinking Water Inspectorate was set up in 1990 as a part of the Department of the Environment with responsibility for monitoring the provisions relating to water quality.

E

East Central Area Reliability Coordination Agreement (ECAR)	One of the 10 regional reliability councils that make up the North American Electric Reliability Council (NERC).
Economic dispatch	The distribution of total generation requirements among alternative sources for optimum system economy with consideration to both incremental generating costs and incremental transmission losses.
Economic leakage level	The point at which further leakage control activity would cost more than alternative means to bridge the gap between supply and demand. In determining this, it is important to include consideration of environmental and social costs as well as other costs.
EEX	European Electricity Exchange in Frankfurt.
Electric Reliability Council of Texas (ERCOT)	One of the 10 regional reliability councils that make up the North American Electric Reliability Council (NERC).
Electricity Act 1989	This is the statutory instrument by which the electricity supply industry was privatised in the UK.
Electro magnetic fields (EMF)	Electromagnetic fields, generated by power lines, generators and other electrical equipment.
Enabling agreement	An agreement that provides the general terms and conditions for the purchase, sale or exchange of electricity, but does not list specific contract details or obligate either party to perform.
Energy Policy Act of 1992 (US)	This Act, which was the first comprehensive federal energy law promulgated in more than a decade, helped to create a more competitive US electric power marketplace by removing barriers to competition. The law gives the Federal Energy Regulatory Commission the authority to order electric utilities to provide access to their transmission facilities to other power suppliers.
Enhanced service levels	Permanent, identifiable and measurable improvements in service levels that are above the most recently established company-wide base levels of service and which are additional to improvements resulting from expenditure in other purpose categories.

E

Environment Agency (US)

The Environment Agency, which took over the main functions of HMIP, NRA and WDA in April 1996, is the result of the government's approach to integrated pollution control (IPC). The Environment Act 1995 sets out the functions and duties of the Agency, primarily: (a) achieving sustainable development taking into account the risks, costs and benefits, (b) assessing and reporting the effects of pollution on the environment, and (c) compiling this information for analysis.

Exempt wholesale generator (EWG) (US)

An EWG is a category of power producer defined by the Energy Policy Act of 1992. EWGs are independent power facilities that generate electricity for sale in wholesale power markets at market-based rates. The Federal Energy Regulatory Commission is responsible for determining EWG status.

Exit fee

A fee that is paid by a customer leaving a utility network intended to compensate the utility in whole or part for the loss of fixed cost contribution from the exiting customer.

F

Federal Energy Regulatory Commission (FERC) (US)	A federal agency created in 1977 to regulate, among other things, interstate wholesale sales and transportation of gas at 'just and reasonable' rates.
Federal Power Act (US)	The Federal Power Act includes the regulation of interstate transmission of electrical energy and rates and is administered by the Federal Energy Regulatory Commission.
Field	A geographical area under which an oil or gas reservoir lies.
Firm power	Electricity capacity intended to be available at all times during the period covered by a guaranteed commitment to deliver, even under adverse conditions, but subject to *force majeure* interruptions.
Flexibility/dispatchability	This is the ability of a generating unit to increase or decrease generation, or to be brought on line or shut down at the request or a utility's system operator.
Flue gas desulphurisation unit (SCRUBBER)	Equipment used to remove sulphur oxides from the combustion gases of a boiler plant before discharge to the atmosphere. Chemicals such as lime are used.
Forced outage rate	The rate of shutdown of a generating unit, transmission line, or other facility for emergency reasons or a condition in which the generating equipment is unavailable for load because of unanticipated breakdown.
Fossil Fuel Levy (FFL)	The Fossil Fuel Levy is effectively a government tax payable by all licensed suppliers on all sales of electricity to their customers. It is used to reimburse the additional costs incurred by the RECs in meeting the Non-Fossil Fuel Obligation as well as being put aside for the costs of decommissioning nuclear plant.
Fossil fuels	Naturally occurring fuels of an organic nature, such as coal, crude oil and natural gas.
Fuel cell	A device that generates direct current to electricity by means of an electrochemical process.
Fuel switching	Substituting one fuel for another based on price and availability. Large industries often have the capability of using either oil or natural gas to fuel their operation and of making the switch on short notice.

G

Generation	The process of producing electricity by transforming other forms of energy such as steam, heat or falling water. Also, the amount of electricity produced, expressed in kilowatt-hours (kWh) or megawatt-hours (MWh).
Generating station (generating plant or power plant)	The location of prime movers, electric generators, and auxiliary equipment used for converting mechanical, chemical and nuclear energy into electric energy.
Generation company (Genco)	A regulated or non-regulated entity (depending upon the industry structure) that operates and maintains existing generating plants. The Genco may own the generation plants or interact with the short-term market on behalf of plant owners.
Geothermal	An electric generating station in which steam tapped from the earth drives a turbine generator, generating electricity.
Gigawatt (GW)	Equates to 1,000 MW or 1 billion watts.
Gigawatt-hour (GWh)	Is enough to meet the energy needs of an average town with a population of 90,000 for eight hours and can be generated in one hour by an average-sized hydro plant or in 20 minutes by a 1,500 MW nuclear plant.
Global Environment Facility (GEF)	The GEF was launched as a pilot programme in 1991, built on the achievements of the Earth Summit. Over 150 nations signed the conventions. In Geneva 1994, a meeting of representatives from 73 countries decided to upgrade the GEF from an experimental programme into a permanent financial mechanism. This gave the GEF the power to provide grants and concessional funds for a number of projects, in different countries. The GEF continues to deal with global environmental problems such as climate change, the destruction of biological diversity, pollution of international waters, and ozone depletion.
Greenfield plant	This refers to a new electric power generating facility built from the ground up.
Grid	The layout of an electrical distribution system.
Grid Code	A nationally agreed document, it is the specification for the installation and operation of the National Grid System.

G

Grid supply point (GSP)	The point at which electricity crosses from the National Grid Transmission system onto the REC distribution system.
Grid Trade Master Agreement (GTMA)	Agreed for the UK electricity market in 2000. Replaced the pool-based EFA power market in the UK in March 2001.

H

Header Natural gas facility where several pipeline systems interconnect and volumes of gas can flow from one pipeline to another. Headers are important components of a production hub.

Heat rate A measure of generating station thermal efficiency and generally expressed as Btu per net kWh. The heat rate is computed by dividing the total Btu content of the fuel burned (or of heat released from a nuclear reactor) by the resulting net kWh generated.

Henry Hub The standard delivery point for the NYMEX natural gas futures contract.

Heavy fuel oil (HFO) HFOs are liquid hydrocarbon fuels from the higher boiling fraction of crude petroleum. UK HFOs originate from the North Sea and have been used substantially in UK industrial energy production. HFO is generally regarded as two products: high sulphur fuel oil (HSFO) with maximum sulphur content of 3.5%, and low sulphur fuel oil (LSFO) with a maximum sulphur content of 1%. HFOs are sometimes known as 'Bunker A'. A heavier grade is also used as fuel on large ships known as 'Bunker C'.

HFO price Spot prices of HFO base on the Rotterdam market, expressed in EUR/GJ.

Hot standby Power generating plant capacity held on standby so that power generation can match rapid fluctuations in demand.

Hub Location where pipelines intersect, enabling the trading, transportation, storage, exchange and lending of natural gas.

HVDC light A new technology for DC transmission with the benefits of a short construction time, minimal environmental impact and improved electricity quality. It is suitable for local electricity generation, eg, by offshore wind power plants.

Hydrocarbon A compound containing only the elements hydrogen and carbon. May exist as a solid, a liquid or a gas. The term is mainly used in a catch-all sense for oil, gas and condensate.

Hydroelectric An electric generating station in which a water wheel is driven by falling water, thus generating electricity.

I

Impedence	The opposition in an electrical circuit to the flow of alternating current.
Incentive-based price cap regulation	The current regulatory system operated by the Director who sets the overall limits to prices that companies are able to charge customers. These are set at such a level as to encourage or incentivise companies to make further savings which can be shared with customers and shareholders.
Independent power producers (IPPs)	These are entrepreneurs who develop, own or operate electric power plants. Such facilities do not form part of the electricity distributor's assets.
Independent system operator (ISO)	An ISO is the entity charged with reliable operation of the grid and provision of open transmission access to all market participants on a non-discriminatory basis.
Indirect utility cost	Any cost that is not identified with a specific DSM category such as administration, marketing, etc.
Infrastructure charges	Paid by developers and customers in properties for a first-time connection of premises for domestic purposes to a public water supply or a public sewer.
Infrastructure renewals charge	An annual accounting provision for expenditure on the renewal of infrastructure (ie, mainly underground) assets charged to the profit and loss account.
Injection well	A well used for pumping water or gas into a reservoir.
In lieu energy	Energy exchanged between a reservoir owner and the owner of a downstream project. The agreement allows reservoir owners to retain water above a reservoir's energy content curve. However, owners of downstream projects may request release of such water.
Installed capacity	The total generating unit capacities in a power plant or on a total utility system.
Interchange (electric utility) (US)	The agreement among interconnected utilities under which they buy, sell and exchange power among themselves. This can, for example, provide for economy energy and emergency power supplies.
Interim determination (IDoK)	The opportunity for a regulated price increase between water price review periods, subject to meeting certain cost escalation thresholds.

International Energy Agency (IEA)
The IEA was formed in 1974 to co-ordinate the energy policies of 23 industrialised countries within the framework of the OECD (Organisation for Economic Co-operation and Development). IEA is an autonomous body with a board comprising senior energy officials from participating nations.

International Petroleum Exchange of London (IPE)
The IPE was established in 1980 because of increased price instability in the energy markets around that time. It was the first futures and options exchange in Europe providing a forum where companies involved in the energy industry could minimise their price exposure in the physical market. The exchange lists futures contracts in Brent crude oil, gas oil and unleaded gasoline, as well as liquid option contracts in Brent crude oil and gas oil.

Intrastate companies
Companies not subject to FERC jurisdiction.

Investor-owned utility (IOU)
An IOU is a form of utility owned by a group of investors. Shares of IOUs are traded on public stock markets.

J

JNRC Joint Nuclear Research Council

Joules A measure of energy equal to 1 watt per second. It takes 4,200 joules to raise the temperature of one kilogram of water by one degree Celsius.

K

K factor (gas)	The Director General for Electricity uses an RPI + K formula when working out by how much Transco (regulated business) can raise revenues on an annual basis. The RPI + K formula (retail price index plus a company-specific factor) allows a specified return on asset base – any recovery over and above is then clawed back the following year.
Kilovolt ampere (kVA)	The practical unit of apparent power, which is 1,000 volt-amperes. The volt-amperes of an electric circuit are the mathematical products of the volts and amperes of the client.
Kilovolt ampere reactive (kVAr)	Reactive power is the power dissipated in circuits with inductive or capacitive loads.
Kilowatt (kW)	1,000 watts.
Kilowatt-hour (kWh)	One kilowatt-hour is a unit of energy and represents one hour of electricity consumption at a constant rate of 1 kW. It is enough to run a car's heater for an hour or a 60 watt bulb for almost 17 hours.
Kilowatt year (kW-y)	A unit of electrical capacity equivalent to one kilowatt of power used for 8,760 hours.
Kyoto Protocol	International agreement signed in 1997 concerning reduced emissions of climate gases, including carbon dioxide.

L

Large Combustion Plant Directive (LCPD)	EC Directive 88/609 deals with emissions from large combustion plants. Under the directive, each member state is given total national emission limits to stay within. This total value is known as the 'bubble' limit, and it gets reduced gradually, to reduce total emissions within the EC countries. Part I of the Environmental Protection Act 1990 implements this directive in Britain. The nature of the directive is such that it is allowable for one power station to exceed its own limit values as long as another is below its limit.
Layoff	Excess capacity of a generating unit, available for a limited time under the terms of a sales agreement.
Lightning arrestor	This protects lines, transformers and equipment from lightning surges by carrying the charge to the ground. Lightning arrestors serve the same purpose on a line as a safety valve on a steam boiler.
Lignite	A type of coal with lowest carbon content (25-35%) and a heat value of only 4,000-8,300 BTUs per pound. Often referred to as 'brown coal', it is used mainly for electric power generation.
Line packing	Utilising the full working pressure of a high-pressure pipeline to store gas mainly for daily fluctuations in gas demand.
Liquefied natural gas (LNG)	Natural gas (primarily methane) that has been liquefied by reducing its temperature to -260°F. When natural gas is cooled to -160°C it forms a liquid at approximately atmospheric pressure. As natural gas becomes liquid it reduces in volume by almost 600 times. Thus this process can be used to increase storage capacity and make transportation feasible. The cooling process does not alter the gas chemically and it can be introduced to the consumer at its original pressure.
Liquefied petroleum gas (LPG)	Light hydrocarbon material, gaseous at atmospheric temperature and pressure, held in the liquid state by pressure to facilitate storage, transport and handling. Commercial liquefied gas consists essentially of either propane or butane, or mixtures thereof.
Load	The amount of electricity delivered or required at any specific point or points on a system. The load of an electricity system is affected by many factors and changes on a daily, seasonal and annual basis, typically following a pattern. System load is usually measured in megawatts.

L

Load diversity The condition that exists when the peak demands of a variety of electric customers occur at different times. This is the objective of 'load molding' strategies, ultimately curbing the total capacity requirements of a utility.

Load factor The electricity produced by a power station expressed as a percentage of the electricity it could have produced if operating at maximum output in a fixed time period, usually one year. In terms of electricity supply, load factor describes the proportion of actual average electricity demand to the maximum electricity demand, over any timescale desired, ie, load factor = average demand/ maximum demand x 100%. In general plant terms, the load factor describes the actual demand to the maximum possible demand, ie, load factor = actual annual load/maximum possible load x 100%.

Load forecast Estimate of electrical demand or energy consumption at some future time.

Local network Electricity distribution network with a voltage of 0.4-20.0kV.

Loss of load probability (LOLP) A measure of the probability that system demand will exceed capacity during a given period. This period is often expressed as the expected number of days per year over a long period, frequently taken as 10 consecutive years. An example of LOLP is one day in 10 years.

LPX Leipzig Power Exchange.

M

Market area hub	An interchange where a gas shipper can gain access to multiple transportation paths, flexible supply/delivery points, and imbalance protection through storage and borrowing services.
Megawatt (MW)	1,000 kilowatts.
Megawatt-hour (MWh)	1,000 kilowatt-hours. One megawatt-hour represents one hour of electricity consumption at a constant rate of 1 MW.
Metric tonne	Equivalent to 1000 kilograms, 2204.61 pounds, or 7.5 barrels.
Mid-America Interconnected Network (MAIN)	One of the 10 regional reliability councils that make up the North American Electric Reliability Council (NERC).
Mid-Atlantic Area Council (MAAC)	One of the 10 regional reliability councils that make up the North American Electric Reliability Council (NERC).
Mid-Continent Area Power Pool (MAPP)	One of the 10 regional reliability councils that make up the North American Electric Reliability Council (NERC).
Mid merit price	The demand-weighted price, typically the price paid by domestic customers whose demand for electricity fluctuates during the 24-hour period. For example, daily electricity demand is usually highest between 17:00 and 18:00.
Mileage-based rates	Rates designed to reflect the difference in pipeline costs based on the distance between supply sources and delivery points.
Mbbl	One thousand barrels.
Mcf	One thousand cubic feet.
Ml/day	One million litres a day, or 1,000 cubic metres of water a day.
MMBtu	One million British thermal units. Approximately equal to a thousand cubic feet of natural gas.
MMcf	Million cubic feet.
Mmcfd	Millions of cubic feet per day (of gas).

M

MMcfe	Million cubic feet equivalent (1 barrel of oil = 6 Mcf of gas).
Mobile substation	A movable substation used when a substation is not working or when additional power is needed.
Moderator	A moderator slows down the speed of neutrons in a nuclear reactor, necessary to ensure the prevention of a chain reaction (nuclear fission). Water is used in most reactors as a moderator. Graphite is also sometimes used.
Mt	One million tonnes.
Municipal electric utility	A power utility system owned and operated by a local jurisdiction.

N

National Grid Company (NGC)	NGC owns and operates the high voltage transmission system in the UK, mainly at 275 kV and 400 kV, transmitting electricity between generating stations and suppliers.
National Grid Company Zone (NGC Zone)	Supplies points located within the National Grid Zone of which there are 12.
National Rivers Authority (NRA)	Part of the Environment Agency, the NRA is a UK independent body with statutory responsibilities for management of water in England and Wales.
Native gas	Gas in place at the time a reservoir was converted to use as an underground storage reservoir.
Natural gas liquids (NGLs)	Natural gas liquids (hydrocarbons) found in association with natural gas.
Net generation	Gross generation minus energy consumed at the generating station for its use.
New Electricity Trading Arrangements (England & Wales) (NETA)	Introduced in March 2001 to replace the Pool system.
New England Power Exchange (NEPEX)	Operating arm of the New England Power Pool (NEPOOL) in the US.
New England Power Pool (NEPOOL)	Regional consortium of 98 utilities co-ordinating, monitoring and directing operations of major generation and transmission facilities in New England, US.
New York Mercantile Exchange (NYMEX)	Regulated futures exchange trading commodities including natural gas and electricity futures and options.
NNS	Northern North Sea.
Non-coincidental peak load	The sum of two or more peak loads on individual systems, not occurring in the same time period.
Non-utility generator (US)	IPPs, exempt wholesale generators and other companies in the US power generation business exempt from traditional utility regulation.
Non-utility power producer	A legal entity that owns electric generating capacity but is not an electric utility.

N

Nordic Association for Electricity Traders (NAET)	Association for traders active on the Nordic electricity derivatives market from companies in the Nordic region, Germany, the US and the UK.
Nordpool	Nordic Power Exchange.
North American Electric Reliability Council (NERC)	Promotes reliability and adequacy of bulk power supply in utility systems of North America. Consists of 10 regional reliability councils: Alaskan System Coordination Council (ASCC), East Central Area Reliability Coordination Agreement (ECAR), Electric Reliability Council of Texas (ERCOT), Mid-America Interconnected Network (MAIN), Mid-Atlantic Area Council (MAAC), Mid-Continent Area Power Pool (MAPP), Northeast Power Coordinating Council (NPCC), Southeastern Electric Reliability Council (SERC), Southwest Power Pool (SPP), and Western Systems Coordinating Council (WSCC).
Northeast Power Coordinating Council (NPCC)	One of 10 regional reliability councils in NERC.
NII	Nuclear Installations Inspectorate
Nuclear Regulatory Commission (NRC)	US federal agency responsible for licensing and overseeing nuclear facilities. It also makes sure regulations and standards are followed.

O

Obligation to serve	A utility is under an obligation to provide electric service to any customer who seeks and is willing to pay set rates for it.
Office of Gas and Electricity Markets (OFGEM)	UK energy regulator.
Office of Water Regulation (OFWAT)	Independent body set up under the Water Act 1989 to regulate the UK water sector.
Off-peak	Periods of relatively low system demand.
Ohm	Unit of measure of electrical resistance.
On-load refuelling	Refuelling operations conducted while the reactor is operating and pressurised.
On-peak energy	Energy supplied during periods of relatively high system demand as specified by the supplier.
Open access	Access to electric transmission system by any legitimate market participant, including utilities, IPPs, co-generators, and power marketers.
Order 636 (US)	FERC's final rule on natural gas restructuring, issued in April 1992, ordering interstate pipelines to unbundle sales from transportation services at upstream points near production. It offered blanket certificates to allow pipelines to offer unbundled firm and interruptible sales at market-based rates.
Organization of Petroleum Exporting Countries (OPEC)	Multinational organisation established to co-ordinate petroleum policy between members to ensure stability and prosperity of the petroleum market. Eleven country members (Algeria, Libya, Indonesia, Iran, Iraq, Kuwait, Nigeria, Qatar, Saudi Arabia, UAE and Venezuela) currently supply more than 40% of the world's oil and possess c78% of the world's total proven crude oil reserves.
Outage (planned and unplanned)	A period during which a reactor is shut down.

P

Parallel path flow	Flow of electric power on transmission facilities resulting from scheduled power transfers between two other electric systems.
Partial load	Electrical demand that uses only part of the electrical power available.
Peak	Periods of relatively high system demand.
Peak clipping	A reduction in the utility's system peak thus diminishing the need to operate peaking units with relatively high fuel costs. It is typically pursued only on days system peak is likely to occur and the resources are not expected to meet the load requirement.
Peak load power plant or peaking capacity	Power plant normally operated during peak load times and designed to meet the portion of load above baseload.
Peat	Partially carbonised vegetable material usually found in bogs and used as fuel.
Photovoltaics	Technology that converts light into electricity using modules made up of thin layers of semiconductors (cells).
Plant	A facility containing electric generators and other equipment for producing electric energy.
Plant margin	Capacity in the peak month compared with peak demand reveals the plant margin on the system.
Point of delivery	Point for interconnection on the transmission system where capacity and/or energy are made available to the end user.
Point of receipt	Point of connection to the transmission system where capacity and/or energy will be made available to the transmission providers.
Pool	The market for bulk trading of electricity in England and Wales before NETA (March 2001). Contractual arrangements entered into by generators and suppliers that provided the wholesale market mechanism for trading electricity.
Pool purchase price (PPP)	Time-weighted average pool purchase price that forms the basis of payments by distributors for purchases of electricity from generators through the pool.

P

Pool selling price (PSP)	Paid by suppliers for electricity purchased through the pool. It is the same as PPP + the cost of a number of other services required to maintain the security and quality of electricity supply.
Power factor	Known as capacity or power factor, the ratio of the actual power/capacity over the apparent power/capacity.
Power purchase agreement (PPA)	Specifies terms and conditions under which electric power will be generated and purchased. Requires the IPP to supply power at a specified price for the life of the agreement.
Primary recovery	Recovery of oil or gas from reservoir purely by using the natural pressure in the reservoir to force the oil or gas out.
Provider of last resort	Legal obligation to provide electricity to a customer where competitors have decided they do not want that customer's business.
Public utility	Utility operated by non-profit governmental or quasi-governmental entity (eg, municipal utilities, co-operatives and power marketing authorities).
Public Utility Holding Company Act of 1935 (PUHCA)	Passed by US Congress to regulate large interstate holding companies that monopolise the electric utility industry. The Act ensures that multi-state utility companies reinvest ratepayers' money into providing affordable and reliable electricity. Under PUHCA, a corporation is considered a holding company if it owns 10% or more of an electric or gas utility.
Publicly owned utilities	Municipal utilities (utilities owned by branches of local government) and/or co-ops (utilities owned co-operatively by customers).
Pumped storage	Facility designed to generate electric power during peak load periods with a hydroelectric plant using water pumped into a storage reservoir during off-peak periods.
Pressurised water reactor (PWR)	Recent type of nuclear reactor constructed in the UK that uses pressurised water as both the coolant and the moderator.

R

Ramp rate	Rate at which load can be increased on a power plant.
Recoverable reserves	The proportion of oil and/or gas in a reservoir that can be removed using available techniques.
Recovered energy	Re-used heat or energy that would otherwise be lost, eg, a combined cycle power plant recaptures some of its own waste heat and re-uses it to make extra electric power.
Regional network	Electricity distribution network.
Regional reliability councils	Regional US organisations charged with maintaining system reliability even during abnormal bulk power conditions such as outages or unexpectedly high loads.
Reliable water yields	The supply that can be reliably maintained from the water resources system available to a company under drought conditions, as constrained by the company's given level of service and obligations to the Environment Agency.
Renewable energy	Energy that is capable of being renewed by the natural ecological cycle.
Repowered plant	An existing power facility substantially rebuilt to extend its useful life.
Reserve capacity	Capacity in excess of that required to carry peak load.
Reserve generating capacity	The amount of power that can be produced at a given point in time by generating units that are kept available in case of special need.
Reserve margin	The excess of the peak load of a utility for a specified period over its dependable capacity, net of system use and forced outage.
Retail company	Company authorised to sell electricity directly to industrial, commercial and residential end users.
Retail wheeling	A transaction whereby utilities supply power to the customers of another utility.

R

Revalorisation

Nuclear liabilities are stated in the balance sheet at current price levels, discounted at 3% pa from the eventual payment dates. The revalorisation charge is the adjustment resulting from restating these liabilities to take into account the effect of inflation in the year and to remove the effect of one year's discount as the eventual dates of payment become one year closer. A similar revalorisation credit arises from restatement of the decommissioning fund assets.

Rolling blackouts

Controlled and temporary interruption of electrical service necessary when a utility is unable to meet heavy peak demands because of an extreme deficiency in power supply.

Rolling incentive allowance

The mechanism that allows companies to retain for five years the benefit of any outperformance. This acts as an incentive to make efficiency savings throughout the period for which prices are set. It operates in a similar way for both operating and capital expenditure.

Running and quick-start capability

Refers to generating units that can be available for load within a 30-minute period.

S

Scheduled outage	A stop in generation that results when a component is deliberately taken out of service at a selected time, usually for the purposes of construction, maintenance or testing.
Scottish Environment Protection Agency (SEPA)	Body responsible for the protection of the environment in Scotland.
Seasonal load	Amounts of capacity, expressed in gigawatts, required to operate in the different load periods.
Seasonal load factors	Average load factor of capacity, expressed as a percentage, called on to generate on the different load blocks.
Self-generation	Generation facility dedicated to serving a particular retail customer, usually located on the customer's premises.
Settlements Agency	Arrangement made by NGC to co-ordinate payments between RECs and NGC for supply and use of the National Grid.
Shoulder months	Months when gas demand is lowest (normally spring and autumn).
Single phase line	Line that carries electrical loads capable of serving needs of residential customers, small commercial customers, and streetlights.
Small power producer	A producer that generates at least 75% of its energy from renewable sources.
SNS	Southern North Sea.
SO_2	Sulphur dioxide.
Solar thermal electric	Process that generates electricity by converting incoming solar radiation to thermal energy.
Southeastern Electric Reliability Council (SERC)	One of the 10 regional reliability councils that make up the NERC.
Southwest Power Pool (SPP)	One of the 10 regional reliability councils that make up the NERC.

S

Spinning reserve	Reserve generating capacity running at zero load.
Spot market	Market characterised by short term, typically interruptible contracts, for specified volumes. The bulk of the natural gas spot markets trade on a monthly basis.
Spot purchase	Single shipment of fuel purchased for delivery.
Standard cubic feet (SCF)	Unit under which gas volume is measured. SCF is measured at 60°C and 14.7 pounds per square inch.
Station efficiency	Critical value as the loading of a station is largely determined by its efficiency multiplied by the unit fuel cost.
Storage	Facilities such as salt domes or beds, depleted oil or gas reservoirs and acquifers used to store natural gas that has been transferred from its original location.
Stranded investments/costs	Investments in facilities built to serve utility customers under traditional regulation may become unrecoverable or 'stranded' if those assets are deregulated and the cost of generation exceeds the actual price of power in a competitive market.
Sub-bituminous	Coal with 35-45% carbon content and heat value of 8,300-13,000 BTUs per pound. It also has lower sulphur content than other types and is thus cleaner burning.
Substation	Facility used for switching and/or changing the voltage of electricity.
Sweet gas	Gas found in its natural state that does not need to be purified to remove sulphur-bearing compounds.
Swing factor	Ratio of minimum to maximum rates of gas delivery for offshore gas pipelines.
Switching station	Facility used to connect two or more electric circuits through switches.

S

Synthetic natural gas (SNG) A manufactured product, chemically similar to natural gas, that results from the conversion or reforming of petroleum hydrocarbons. It may be easily substituted for or interchanged with pipeline quality natural gas.

System marginal price (SMP) The bids of all despatched stations by load period.

System peak demand The highest demand value that has occurred during a specified period for the utility system.

T

Take and pay — Clause requiring a minimum quantity of natural gas to be physically taken and paid for, usually in association with oil, or wells that will be damaged by failure to produce.

Tariff basket — The basket of charges to which the annual regulatory price limits apply comprising charges for unmeasured water supply, charges for measured supply, charges for unmeasured sewerage services, charges for measured sewerage services, and charges for reception, treatment and disposal of trade effluent.

Tcf — Trillion cubic feet.

Terawatt (TW) — One terawatt (TW) equals 1,000 GW.

Terawatt-hour (TWh) — One TWh represents one hour of electricity consumption at a constant rate of 1 TW. It is enough to run two large newsprint machines for a year and can be generated by a 2,000 MW nuclear plant in 12 days. 1 TWh = 1,000,000,000 kWh.

Therm — One hundred thousand British thermal units.

Thermal power — Electricity generated by a gas turbine or steam process.

Time-of-use rates — Electricity prices that vary depending on the time periods in which the energy is consumed. Higher prices are charged during utility peak-load times.

Transco Nominated Interruptible (gas) — Transco is the UK pipeline company responsible for the transportation of gas. It takes into account how much interruptible gas is required and then nominates its own prediction for how much gas is required. This is known as Transco Nominated Interruptible.

Transformer — A device for changing the voltage of the alternating current.

Transmission — The act or process of transporting electric energy in bulk through wires.

Transmission and distribution (T&D) losses — Losses resulting from friction that energy must overcome as it moves through wires to travel from the generation facility to the customer.

T

Transmission and distribution (T&D) system	Interconnected electric transmission lines for the movement of electric energy in bulk between points of supply and points at which it is transformed for delivery to the customer.
Transmission charge	Part of the basic service charges on every customer's bill for transporting electricity from source of supply to electric distribution company.
Transmission use of system (TUOS) charges	Charges paid to NGC for use of 'the wires'. Charges are for connection at entry and exit as well as for use of the national system (capacity and output charges in GBP/kW and p/kWh, respectively).
Transmitting utility	A regulated entity that owns, and may construct, wires used to transmit wholesale power.

U

UKOOA	UK Offshore Operators Association Limited.
UKPX	United Kingdom Power Exchange.
Ultrahigh voltage transmission	Transporting electricity over bulk-power lines at voltage greater than 800 kV.
Unbundled service	The separation of services, such as transportation, storage and gathering, with rates charged that reflect cost of each service.
Underground storage	The injection of large quantities of natural gas into underground rock formations for storage during periods of low market demand and withdrawal during periods of high market demand.
Unit capability	The unit capability factor is the ratio of the available electricity generation over a given time period to the reference energy generation over the same time period, expressed as a percentage.
United Kingdom Atomic Energy Authority (UKAEA)	Created for R&D of all non-military aspects of nuclear energy.
United Kingdom Continental Shelf (UKCS)	Defined as the land between the shoreline and a depth of 100 fathoms (183m). Offshore oil recovery projects frequently operate on the continental shelf.
United Nations Environment Programme (UNEP)	Created to raise environmental awareness and action at all levels of society worldwide.
United States Department of Energy (DOE)	Manages programmes of research, development and commercialisation for various energy technologies, and associated environmental, regulatory and defence programmes in the US. DOE announces energy policies and acts as a principal advisor to the US President on energy matters.
Use of system agreement	Contract between supplier and local REC, which enables the supplier to use the local REC's network for distribution of electricity to customer premises.
Use of system charges	Charges for use of the REC's distribution system and NGC's transmission system.
Utility plant	Equipment used for the generation, transmission, and distribution of electricity

V

Valley filling — A form of load management that increases off-peak loads (desirable if a utility has surplus capacity in the off-peak hours).

Value of loss load (VLL) — An approximation to the rationing price that the last customer would be prepared to pay if there was insufficient generation to meet demand.

Volt (V) — Unit of electrical pressure that measures the force or push of electricity. A volt is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current one ampere. 1 kV = 1,000 volts.

W

Waste-to-energy	Technology that uses 'waste' to generate electricity. Untreated waste is burned to produce steam, which is used to drive a steam turbine generator.
Watt	Electric unit of power, equal to one unit of energy per second. One horsepower is equivalent to approximately 746 watts.
Watt-hour	An electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.
Western Systems Coordinating Council (WSCC)	One of the 10 regional reliability councils that make up the NERC.
Wheeling service	The movement of electricity from one system to another over transmission facilities of intervening systems.
Wholesale competition	A system whereby a distributor of power would have the option to buy its power from a variety of power producers, and the power producers would be able to compete to sell their power to a variety of distribution companies.
Wholesale power market	Purchase and sale of electricity from generators to resellers.
Wind energy conversion	Process that uses energy from the wind and converts it into mechanical energy and then electricity.
Winter peak	The greatest load on an electric system during any demand interval in the winter season or months.
World Association of Nuclear Operators (WANO)	Industry organisation that collects and shares operating data used to benchmark performance.

X

X factor Value used in the price calculation formula to determine how much system charges may be increased each year.

Y

Yellowcake Natural uranium concentrate that contains 70-90% uranium oxide by weight. It is used as feedstock for uranium fuel enrichment and fuel pellet fabrication.

Notes

European Utilities team

Electricity. Gas Distribution, Water

Analysts			
Jonathan Yee	Firstname.Initial.Lastname@hsbcib.com	UK	44 20 7991 6855
Alexandra Perricone		UK	44 20 7991 6841
Bruce Bromely		UK	44 20 7991 6729
Verity Mitchell		UK	44 20 7991 6840
Specialist sales			
James Gale		UK	44 20 7991 5839

HSBC is broker to ScottishPower, British Energy and Severn Trent.

HSBC makes a market in Deutsche Telekom's shares.

HSBC has provided investment services to ScottishPower, Endesa, Vivendi, France Telecom, Deutsche Telekom, Telefonica, National Grid Transco, Kelda Group and Pennon Group within the past 12 months.

The research analyst(s) who prepared this report certifies(y) that the views expressed herein accurately reflect the research analyst's(s') personal views about the subject security(ies) and issuer(s) and that no part of his/her/their compensation was, is or will be directly or indirectly related to the specific recommendation(s) or views contained in this research report.

HSBC Bank plc

8 Canada Square, London, E14 5HQ, United Kingdom

Telephone: +44 20 7991 8888, Fax: +44 20 7992 4880, Website: www.research.hsbc.com

Recommendation structure		**Sector (vs market)**	
Stock (vs sector)	Overweight	Neutral	Underweight
Buy (outperform >15%)	Key Buy	Buy	Add
Add (outperform <15%)	Buy	Add	Hold
Hold (Sector neutral)	Add	Hold	Reduce
Reduce (underperform <15%)	Hold	Reduce	Sell
Sell (underperform >15%)	Reduce	Sell	Key Sell

For companies covered on a sector basis, we apply a two-stage recommendation structure: a combination of the analysts' view on the stock relative to its sector and the sector call relative to the market, together giving a view on the stock relative to the market. The sector call is the responsibility of the strategy team set in co-operation with the analysts. For other companies, we show a recommendation relative to the market. The performance horizon is 6-12 months. The target price is the level the stock should currently trade at if the market accepted the analysts' view of the stock and, therefore, abstracts from the need to take a view on the market or sector.