The employment impact of the opening of electricity and gas markets
The impact of the opening of electricity and gas markets on employment in EU-27, and of key EU directives in the field of energy

Case study country report - DENMARK and DONG

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1.0 INTRODUCTION

This chapter presents the Danish energy market and the experiences of market opening in the electricity and gas sectors. The impact of deregulation on the energy market, the restructuring process and the changed ownership structures are discussed and based on national statistics and data from Eurostat the impact on the quantity and quality of employment is assessed.

The company of DONG plays a very important role in the developing of the Danish energy sector, mainly due to its size and very integrated structure. The company was established in 1972 as the National state owned Danish Oil and Gas Company. Through the 1990s, the company consolidated its status and at the threshold of the new millennium DONG was largely debt-free.

One of the first elements of the liberalisation was the abolition, in the mid-1990s, of DONG's sole concession to import natural gas. With the new prospect of foreign gas competition in the Danish market, DONG decided that it would be better equipped to take up future competition against foreign companies by gathering the Danish energy sector in a single company. In 1998 DONG's Supervisory Board adopted a strategy plan that featured the integration of the five danish regional gas companies into DONG, expansion within the electricity sector, and expansion of the exploration activities to include Denmark's neighbouring countries.

The liberalisation of the energy market meant a complete change of structure for DONG. In the last section of the present chapter the experiences gathered throughout this process are presented as the company case on how DONG - which in 2006 became DONG Energy - has managed the restructuring process.

The information presented in the present chapter is based on a review of relevant literature from Denmark, consultations with the Danish Energy Authority, survey responses from social partners and companies as well as interviews with branch organisations.

In respect of the case study of DONG Energy's responses to restructuring is primarily based on consultations with the human resource department at Dong Energy's head office in Hørsholm, Denmark, consultations with IDA - Danish trade union for engineers, DJØF - Danish Association of Lawyers and Economists, and 3F - the United Federation of Danish Workers.
2.0 KEY ENERGY MARKET FACTS

Energy production and use is influenced by many factors such as economic growth, weather conditions and changes in market regulations such as the liberalisation processes. To get an understanding of the environment within which changes in employment are taking place - a brief description of the recent Danish developments in energy production and use seems to be in place. The description is based on statistical information from 2004. References to company responsibilities related with the data from 2004 therefore reflect the structure as it was in 2004. During the period 2004 - 2006 large structural and organisational changes have taken place within the Danish Energy sector. Companies have changed names and responsibilities. The changes and the resulting structure have been described in the sections 3.4 and 3.5.

2.1.1 Energy production

Denmark has multi-tier energy supplies based on many different sources of energy and a quite developed energy infrastructure. In 2004, the degree of self-sufficiency for energy was 156%, meaning that that the production of energy exceeded consumption by 56%.

Denmark has a relative high production of oil, natural gas and renewable energy and in 2004 the total production was 1,302 PJ, which represented an increase for oil and gas on respectively 6.2% and 17.9% from 2003.

The import and export ratio have changed throughout the years. In 2003, Denmark had significant net exports of electricity, only surpassed by the net exports in 1996. Total electricity production in 2004 was 145.7 PJ. Large-scale power units produced 88.7 PJ of which 55.0 PJ originated from separate production. Electricity generation from small-scale CHP units and auto producers was 23.3 PJ and 10.0 PJ respectively. Wind turbines in 2004 generated 23.7 PJ of electricity.
2.1.2 Electricity and district heating

The electricity generation in Denmark is featured by extensive use of combined heat and power. 13 large central power stations out of a total of 15 also produce heat for district heating in combination with electricity. In addition to that nearly 600 medium and small sized CHP-plants as well as more than 150 industrial co-generation plants contribute to electricity and heat production. More than 75% of the Danish electricity generation is taking place in power plants owned and operated by the electricity supply industry. Two generating companies - Elsam A/S and ENERGI E2 A/S – assured the greater part of the generation.

Large-scale power units generate electricity, partly in separate production and partly in combined heat and power production. Separate electricity generation from large-scale power units varies greatly from year to year due to fluctuations in foreign trade in electricity.

Power exchange between the Nordic countries through NordPool makes use of the advantages to be gained from interconnecting hydropower and thermal power systems. In countries like Denmark with thermal power-based systems, the capacity of the power plants determines how much electricity can be generated. In the hydropower-based systems of Sweden and Norway, the limiting factor is the quantity of energy (water) available. The pattern of demand for electricity, and thus the amount that must be
generated, is generally the reverse of the fluctuations in inflow. Electricity prices are determined by the supply and the demand in the Nordic market.

Production costs are lowest for hydropower and when the price increases other technologies will be used in increasing "marginal cost order": nuclear power, combined heat and power generation, condensing power stations (coal, oil) and natural gas turbines. Hence, in a year when hydropower production is close to the average level, electricity prices will largely be determined by the costs of producing electricity from coal. In periods when the consumption is higher, power plants with higher marginal production costs, such as oil condensate plants or gas turbine plants, will determine the prices.

Geographically the Danish market is placed between bigger power markets i.e. to the south Germany and to the north Norway and Sweden. The Danish thermal production is primarily based on coal and gas. There is an excess of generation capacity in Denmark and a lack of production capacity in the countries to the north. Denmark is therefore expected to strengthen its position as a power exporter in the future

2.1.3 District heating

Combined production of electricity and district heating makes it possible to utilise the large amounts of heat that unavoidably result from traditional electricity generation.

In 2004, 54.7% of thermal electricity (i.e. the total generation excluding wind power and hydro-power) was generated in combination with heat and 81.6% of district heating was generated together with electricity. The supply of district heating is not subject to liberalisation.

Consumption of natural gas and renewable energy etc. has increased year by year in the district heating sector. In 1990, the share contributed by natural gas was 17.4% and the share contributed by renewable energy etc was 31.6% (biomass accounting for 10.3% and wastes for 20.0);
2.1.4 Energy consumption

The gross energy consumption divided between the main sectors is indicated below.

The consumption of residential customers has increased barely 2%. The very limited increase is a consequence of the appearance of more energy efficient household appliances and conversion of dwellings from electric space heating into heating based on other sources such as natural gas and district heating. The average electricity
consumption for the entire country amounted to more than 6,400 kWh per inhabitant in 2003. There is no significant change in electricity consumption per inhabitant since 1996.

The industrial consumption in the same period covers a great variation between different branches. Within the trade and service sector the consumption has increased 16 %, while the consumption in agriculture and gardening has decreased 3 %. In total, industrial consumption goes up barely 2 % in spite of a significant increase in the general production of products.

2.2 Status of electricity and gas market liberalisation

2.2.1 Electricity directive

The Danish electricity market was liberalised in accordance with a decision of the Danish Parliament, the Folketing, at the end of the 1990s\(^1\). This decision provided the foundation for the restructuring of the electricity sector and the opening of the electricity market and resulted in the adoption of the Act on electricity supply.

Production and trading in electricity is subject to competition and the electricity grid and its operation are subject to public price regulation. The demarcation between monopoly and areas of competition is clearly defined by law. Since 1 January 2003 all electricity customers may purchase electricity in the open market and choose the supplier they prefer. Customers who do not wish to exercise their free choice are assured electricity supplies. Special supply obligation companies (suppliers of last resort) offer electricity to all customers at publicly controlled prices.

The main legislative framework is described within the following orders regulating the electricity and heat market:
- Order on electricity Act on supply, no 286 of 20/04/2005
- Order on Act on heat supply, no. 347 of 17/05/2005

2.2.2 Gas directive

The Reform follow-up Agreement\(^{II}\) of 22 March established the framework for the Danish implementation of the Council Directive 98/30/EC on the liberalisation of the gas sector within the Danish Natural Gas Supply Act\(^{III}\). This Act regulates the natural gas industry, except the production of natural gas - with the objective of ensuring that the natural gas supply to the country is organised and implemented under consideration of security of supply, the national economy, environment and consumer protection.


\(^{II}\) “Reform-opfølgning” of 22 March 2000.

The Act applies to the transmission, distribution, supply and storage of natural gas, including liquid natural gas (LNG). The Act also applies to biogas, gas from biomass and other types of gas, to the extent that these gases may be technically and safely injected to and transported through the natural gas system.

Under the Natural Gas Supply Act, a corporate unbundling of transmission, distribution, and storage activities and the supply of non eligible customers from commercial trade should be affected from 1 January 2003. There is no requirement that activities regarding offshore pipelines must be carried out by a separate company.

The market has been fully opened by 1. January 2004

The main legislative framework is described within the following order regulating the gas market; Order on Act on Natural Gas supply no 287 of 20/04/2005

2.3 Level of market opening

2.3.1 Electricity

Electricity consumers are divided into two categories; time hour registered consumers (larger industries which have hourly registration of electricity consumption) and standard customers (households and small industries with a consumption on less than 100 000 kWh).

All around 3.1 million consumers have the possibility of selecting a supplier of their own choice. However, as many may have changed several times, it is hard to sum up how many consumers have actually made use of the free choice since the market opening. The figures shows that the ratio of supply change has been decreasing since the first year of full liberalisation 2003, where 76,693 consumers changed supplies corresponding to 26% of the total Danish energy consumption. During the year 2004 about 33,000 customers representing about 13% of the total consumption in Denmark switched to another supplier and in 2005, 39,000 consumer changed supplier corresponding to 519 GWh/year or 15% of the overall consumption. The majority of changes take place within the category of time hour registered consumers.

A number of initiatives to promote and support the "free choice" have been taken. Most importantly the electricity price web board, where consumers can compare prices of the different electricity companies (http://www.elpristavlen.dk). However, for the moment there are almost no incentives for the small consumers to change supplier, as prices are more or less the same due to the fact that more than 2/3 of the price is fixed, consisting of fees, taxes, VAT as well as transmission and distribution tariffs. Yet many of the distribution
companies are trying to develop other products and services, as e.g. fibre net, energy saving advising, green electricity, different pricing concepts, etc., in order to increase their competitive advantage.

For time hour registered consumers as prices is more directly influenced by the "pure" electricity market price, the benefits of finding the right supplier and selecting a specific mean of contracting are much more evident.

**Figure 2.4 Composition of the electricity price**

![Diagram of electricity price composition](http://www.ens.dk/sw15175.asp)

2.3.2 Gas

With a limited number of players and until recently few supplier changes in the gas market, Competition in the Danish gas market is not functioning as well as the electricity market.

However, the unbundling of the organisations has taken place and the market has been fully opened by 1. January 2004. All Danish consumers were given the free choice of supplier and around 8% of the Danish gas market (speaking in gas volumes) changed supplier. As for the electricity market the possibility of changing supplier has mainly been used by the large industrial consumers, whereas households and business consumers tend to keep their "old" supplier. In order to support the process and increase the information level among consumers and suppliers on rights and opportunities, a number of platforms have been established. This includes the two web platforms of "The Gas Price guide" (http://www.gasprisguiden.dk/) and "Gas Market 2004" (http://www.gasmarked2004.dk/), where information about prices and conditions related to supplier changes is presented.
There is still no exchange for natural gas and hence all gas is traded bilaterally. There is, however, a possibility for traders to swap gas amongst each other on the virtual Gas Transfer Facility (GTF). The development of real gas exchanges on the European market - similar to Nordpool in the electricity market - is expected to promote competition and greater use of natural gas at competitive prices.

2.4 Structure of the energy market

2.4.1 Electricity market

In the electricity sector, the grids form natural monopolies, which are not exposed to competition. Consequently, some of the activities in the electricity sector cannot be carried out in open competition because they are based on ownership of grids etc.

The market setup includes the following segments:

Monopoly activities

► Grid companies. They own, maintain, expand and operate the distribution grids, which is the physical connection between the transmission grids and consumers. Under the new administrative order the regulation structure has been transferred from regulation of costs to the regulation of earnings. Under the new regulations companies will be encouraged to enhance the efficiency of their operations, as this will enable them to improve their profitability, while consumers are safeguarded. Utility rates (calculated as fixed rates) are not allowed to exceed 1 January 2004 levels. From 2008 the Danish Energy Authority will announce individual efficiency enhancement requirements based on benchmarking of both the companies’ financial efficiency and the quality of their services.

► Transmission system operators (TSO’s). They own, maintain, expand and operate the transmission grids, being the physical connection between producers and the distribution grids. TSO’s monitor the physical stability of the overall electricity grids and ensure the functioning of the electricity market. They are in charge of security of supply and the balancing and distribution of environmentally friendly electricity generation. Until recently there were two Danish TSO’s, Eltra in Jutland/Funen and Elkraft System on Zealand. In 2004 it was decided to transfer the overall transmission system to the State to be administered independently of commercial interests. State ownership of the TSO (Transmission System Operator) and the overall electricity transmission grid will be undertaken by the new government company Energinet.dk, which will also assume responsibility for natural gas transmission and the natural gas system. As a result, also the gas transmissions
operator Gastra A/S, which is already a government-owned company, has now been transferred to the new company effective as of 1 January 2005.

► Supply obligation companies. Must offer electricity on reasonable terms and at reasonable prices to all consumers, who does not have market access or who do not want to exercise it.

Competitive activities
► Generation companies. Produce and offer electricity on commercial conditions.
► Sales and wholesale companies. Trade electricity on commercial conditions.
► Independent producers. A large number of decentralised and industrial CHP producers as well as owners of wind turbines, whose power generation is granted priority in the grid. Generation from independent producers accounts for about 40% of the total electricity consumption.

2.5 Developments in company structure

2.5.1 Grid and transmission companies

Discussions on free competition are often mixed up with discussions on ownership structures. As part of the liberalisation of the electricity sector, the previously vertically integrated companies covering all activities have been unbundled as described above. Natural monopolies are separated from companies with competition activities, and the two groups are regulated under different legal frameworks. Following some of the new companies became attractive for new owners and important assets for owners (e.g. municipalities). Legislation to protect consumers and citizens from economic speculators became relevant.

Liberalisation thus results in changed structures both with regard to ownership, responsibility and strategic alliances. The organisational restructuring at company level is actually characterised by mergers and thus by a path towards horizontal monopolies. During the latest phase of the Danish liberalisation the merging process has even integrated the electricity, gas and oil sector. The process is still ongoing and has recently become much more international in its scope. Other European companies are getting involved in the Danish market (mainly Swedish) and Danish companies (e.g. DONG) establish themselves at foreign markets. Also the companies involved in monopoly activities have gone through major changes with restructuring and merging of companies. The focus on efficiency e.g. promoted through benchmarking and increased performance measuring has increased.
To understand the development and to establish a basis for interpretation of the employment effects the main organisational changes within the Danish energy sector is summarised below.

Historically the Danish electricity sector is characterised by a high degree of consumer engagement both in relation to the ownership of the electricity companies and the participation in the development of renewable energy. The sector, however, has undergone significant changes over the last decade. In 2002, by far the majority of grid companies were owned by municipalities or by consumers through co-operative societies. The consumer owned grid companies also owned:

- the two large generation companies, Elsam (Jutland and Funen) and Energy E2 (Zealand, etc.)
- the 14 transmission companies,
- the two system operators, Eltra (West of the Great Belt) and Elkraft System (East of the Great Belt) both established in 1999,
- 50 supply-obligation companies.

Due to the new market situation many municipalities started to consider selling their shares in the companies, as the large profits were very tempting. However, at that stage there were no clear rules on how to divide the profit and protect consumers from speculations. In 2003, a clear framework for selling municipally owned electricity companies was created and this marked a new epoch for the sector. 40% of a municipality’s profit from selling electricity supply should be set against the block grant from the state. In 2005 there are around 112 grid companies, but with a quite differentiated structure. The ten largest companies account for 62% of the electricity sale, with the largest company NESA accounting for 26% of the sale. The majority of the companies have remained as either co-operative societies (81) or municipal companies (24), but around 20% of the electricity is nowadays sold from private limited companies.

The discontinuation of the separation between restricted and free equity in the electricity companies has led to increased incentives to reorganise companies and carry out structural adjustments in the rest of the electricity sector. In spring 2004, in east Denmark Elsam took over the majority holding in NESA A/S including participations in Energi E2, whilst SEAS, NVE and a number of municipalities, including the City of Copenhagen, entered agreements concerning their participations in the E2 with DONG A/S. The agreements with SEAS, NVE and the City of Copenhagen have opened up either cash payments or payment in shares.

There now are five gas distribution networks and around 10 commercial gas supply companies. Two of the gas distribution companies are operated by DONG Distribution.
and the remaining three are operated by Naturgas Fyn, Naturgas Midt-Nord and Hovedstadens Naturgas respectively. The gas distribution companies are also corporately associated with the supply obligation companies and the commercial sales companies/suppliers, however, each of these business units act as individual legal entities in accordance with the requirement of unbundling.

The sales activities of two of the companies, Naturgas Midt-Nord and Hovedstadens Naturgas, have been joined into one common company; HNG Midt Nord Sales.

2.5.2 Summary - structure of Danish energy sector

In 2004 the electricity market in Denmark comprised the following types of companies:

- 15 central power stations being operated on commercial terms. Elsam and E2 were the Danish electricity generation incumbent operators in West Denmark and East Denmark respectively. They were both active in production and trading of electricity on the wholesale market. Elsam also has activities in electricity distribution companies via its subsidiary NESA, KE (Copenhagen Energy) and FE (Frederiksberg energy) supplying customers with electricity in the Copenhagen area.
- Around 3200 MW wind-generators, 600 local CHP/DH installations, and 170 industrial co-generating plants feeding electricity into the grid at politically determined prices not linked to market prices.
- Around 112 distribution companies. These companies are primarily ensuring local security of supply. They are subject to public control. Incomes from distribution and transmission of electricity must be held within caps fixed by the Danish Energy Regulatory Authority.
- Around 25 electricity trading companies operating on commercial terms and selling electricity to customers wanting to buy on the market e.g. DONG, Fortum, KE, NESA, Helia, Elsam Kraft A/S, etc.
- Around 40 obligation-to-supply companies, i.e. electricity supply companies having an obligation to supply consumers, which do not wish to buy electricity on the market. From 2005, the legal position of these companies was changed into electricity trading companies with an obligation to supply. Obligation to supply electricity prices are regulated by the Danish Energy Regulatory Authority.

The main players in the Danish gas market are:

- Gas producers of Maersk Oil and Gas, DONG E&P AS and Amerada Hess.
  At the beginning of 2005 there were almost 50 platforms in the Danish part of the North Sea and the production was led from the reservoir layers via 130 wells to the productions facilities.
• The Storage Company of DONG Lager A/S, owns and operate the gas storage facilities.
• Gas distribution includes the companies of DONG, Naturgas Fyn, Naturgas Midt-Nord and Hovedstadens Naturgas covering a great part of Denmark with transmission and distribution grids, who are obligation-to-supply companies.
• Around 10 gas trading companies; including DONG, EON, Shell, E2, etc.

2.5.3 Structural developments 2005 – 2006

Mergers within the electricity and the gas sector.

System responsibility
29 March 2004, the Government made a number of energy policy agreements with a broad majority of the Parliamentary parties and with the trade organisation for the Danish power distribution companies Elfor. Under the agreements reached, the Government passed a milestone in their strategy for liberalising the electricity market. Among other things it was ensured that system responsibility and the overall transmission system was transferred to the State to be administered independently of commercial interests. The transfer was made to ensure open and equal access for all users of the national electricity grid. At the same time grid and distribution companies were ensured full control over their equity capital while consumers could rely on that this would not result in higher prices.

State ownership of the TSO (Transmission System Operator) and the overall electricity transmission grid is undertaken by the new government company Energinet.dk, which became effective as of 1 January 2005. Energinet DK also assumes responsibility for the natural gas transmission system. As a result, Gastra A/S, which was already a government-owned company, was transferred to Energinet DK. This body now acts as system operator on behalf of the State and manages system responsibility and the overall electricity- and gas-transmission network. Furthermore, it is responsible for general, long-term planning of the overall transmission networks and for ensuring that any necessary concrete infrastructure expansion is carried out.

Production, distribution and trade
The liberalisation of the energy market meant a complete change of structure for DONG. As mentioned above DONG unbundled its transmission activities into DONG Transmission A/S and sold all the shares to the State. Following the unbundling of the transmission activities in 2005, DONG's activities covered: Exploration & Production - Natural Gas, Trade & Supply - Natural Gas, Distribution & Storage - Electricity and Renewable Energy - Oil Pipeline.

In 2006 DONG became DONG Energy - gas and electricity activities were merged. At the Annual General Meeting of DONG Energy 19 April 2006 DONG Energy and SEAS-NVE
COWI (electricity distribution) completed their agreement to exchange SEAS-NVE’s 24% shareholding in Energi E2 (electricity production) for shares in DONG Energy. Moreover, DONG Energy acquired Energi E2 (electricity production) shares from the municipalities Elsinore, Hillerød, Roskilde and Slagelse. 1 May 2006 DONG Energy completed share purchase agreements with the City of Copenhagen on the acquisition of København Energi’s electricity (distribution) activities and 34% stake in Energi E2 (electricity production). Further DONG Energy May 2006 acquired Frederiksberg Forsyning’s electricity activities, including their shareholding in Energi E2.

The remaining 36% of the shares in Energi E2 (electricity production) are currently held indirectly by Elsam. DONG Energy holds 64.7% of the shares in Elsam. Final transfer of the remaining Elsam shares from Vattenfall and the subsequent divestment of Elsam’s and Energi E2’s electricity generation activities to Vattenfall took place during the summer 2006. DONG Energy now controls, directly or indirectly, all shares in Energi E2 A/S and 64.7% of the share capital of Elsam A/S. Furthermore, DONG Energy’s acquisition of the electricity activities of the City of Copenhagen and Frederiksberg Municipality has been completed.

To prevent a monopoly for the gas market DONG the larger of its two Danish gas storage facilities has been sold to Energinet DK for take over 2007 along with an undertaking to auction off to competitors every year, for a 7-year period, large quantities of gas equivalent to 10% of Danish annual gas demand. The storage remedy will reinforce the effect of the unbundling of gas infrastructure assets in Denmark, and create conditions for competition in the provision of gas storage services. The gas release remedy will improve the liquidity of the Danish gas market and ensure that gas users will not face less choice than before the merger. Today DONG is 73% owned by the Danish State through the Ministry of Finance.
3.0 IMPLEMENTATION AND IMPACT OF OTHER KEY ENERGY DIRECTIVES

3.1 Impact of market opening on energy intensive industries

In 2003 there were 147 large consumers with electricity consumption of more than 10 GWh/year in Denmark. Compared with other European countries this is a relatively low number. Since the liberalisation of the electricity market, there has not been any official survey of the electricity prices paid by the large consumers.

The energy intensive industries are organised in the Association of end users of energy (FSE), an organisation which has been very critical towards the development of energy prices and market structure during the first years of liberalisation. Their arguments are that energy prices are too high at the moment and that they have increased significantly since the liberalisation. Also they have expressed great concern about the monopolisation of the sector i.e. merger of many energy companies into DONG Energy leading to integration of the electricity and gas market and a take over of the largest gas consumers (the power plants) by the gas supplier DONG Energy.

3.2 Bill on CO2 quotas

In Denmark, the Parliament in 2004 passed a bill on CO2 quotas, which implements the EU directive on trading with CO2 quotas in the energy sector. The scheme entered into force on 1 January 2005. Pursuant to a supplementary directive of March 2005 the Transport and Energy Minister has put forward proposals for an amendment to the Act on CO2 quotas, which will allow the use of credits from the JI and CDM projects in the quota scheme.

Denmark has ratified the EU directive on greenhouse gas emission allowance trading and made it law. The government regards the emission allowance trading scheme as a vital element in the Danish climatic strategy from February 2003. Roughly 380 Danish production units are covered by the CO2 allowance trading scheme as from 1 January 2005. Most of these are generators of power and heat, the rest are industrial enterprises and a few production units within the offshore sector.

Denmark has allocated a total of 100.5 million CO2 emission allowances during the first three years of the scheme. Of these, 5.025 million will be sold and 3.0 million allocated to new production units and major expansions. The rest are allocated free of charge to those production units covered by the trading scheme from the start.
3.3 Interaction between the Directives

In addition to the market directives for gas and electricity, the Danish energy sector has been influenced also by other EU directives and regulations, including the directive on trading with CO2 quota, directive on the promotion of electricity produced from renewable energy sources in the internal electricity market, directive on the limitation of emissions of certain pollutants into the air from large combustion plants; directive establishing a scheme for greenhouse gas emission allowance trading within the Community, directive on the promotion of cogeneration based on a useful heat demand in the internal energy market and directive on energy end-use-efficiency and energy services.

This whole framework of directives has influenced the Danish energy sector, yet many of the directives follow a direction, which, to some extent was already established in Denmark prior to the adoption at EU level. Combining the objectives of liberalisation and commercialization with overall public environmental policy, emission reduction, objectives for renewable energy, and security of supply as well as consumer protection has remained a great challenge for the Danish government. Regulatory changes to follow up on the balanced goals have been seen in the past and will constantly be needed also in the future.
4.0 EFFECT ON QUANTITY OF EMPLOYMENT

The implementation of the electricity and gas directives is taking place in a period with other changes in employment situation in general in Denmark. This change is, for example, characterised by falling unemployment in the period 1993 to 2002, a rise between 2002 and 2005, and a fall since. It is much influenced by the globalisation process with many job functions - mostly unskilled jobs - lost or outsourced abroad every year, and the creation of many new jobs. Not least - as in the rest of the EU - the workforce is ageing, giving an increased focus on retirement.

The presentation of the employment trends is made on the basis of official - immediately accessible - data sources. Since the data set provided by Eurostat - building on the Danish labour force survey - only allows the analysis of the electricity, gas and water as sector as a whole, and where electricity and gas account for just above 50% of the employment, we have chosen to mainly rely on the Danish register-based labour market statistics in the analysis.

This register does, however, not give a picture of the share of employment by ethnic minorities in the electricity and gas sectors - but this is feasible via special extractions. Furthermore, Denmark like in any other country does not report on employment by disabled person - partly because of often weak and different definitions of disability and partly due to political incorrectness. However, estimates are made - although not by branch - for example on the basis of the number of supported jobs. Furthermore, the useful information about the occupations of the employees is better covered by Eurostat, which also via its Structural Business Survey provides an insight into the development in the number of enterprises.

4.1 Electricity

The employment trend within the electricity sector is illustrated below via three tables based on the official register and one based on a number of annual statistical survey carried out by the Association of Danish Energy Companies\(^1\).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-employed</td>
<td>278</td>
<td>541</td>
<td>582</td>
<td>698</td>
<td>486</td>
<td>208</td>
<td>75%</td>
</tr>
</tbody>
</table>

\(^1\) www.danskenergi.dk.
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assisting spouses</td>
<td>10</td>
<td>17</td>
<td>14</td>
<td>16</td>
<td>11</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Top managers</td>
<td>289</td>
<td>239</td>
<td>243</td>
<td>184</td>
<td>183</td>
<td>-106</td>
<td>-37%</td>
</tr>
<tr>
<td>Employees - upper level</td>
<td>1,200</td>
<td>1,062</td>
<td>992</td>
<td>1,086</td>
<td>1,089</td>
<td>-111</td>
<td>-9%</td>
</tr>
<tr>
<td>Employees - medium level</td>
<td>2,578</td>
<td>1,945</td>
<td>1,650</td>
<td>1,715</td>
<td>1,965</td>
<td>-613</td>
<td>-24%</td>
</tr>
<tr>
<td>Employees - basic level</td>
<td>4,767</td>
<td>3,981</td>
<td>3,477</td>
<td>3,132</td>
<td>2,550</td>
<td>-2,217</td>
<td>-47%</td>
</tr>
<tr>
<td>Other Employees</td>
<td>2,197</td>
<td>951</td>
<td>900</td>
<td>833</td>
<td>848</td>
<td>-1,349</td>
<td>-61%</td>
</tr>
<tr>
<td>Employees, not specified</td>
<td>324</td>
<td>522</td>
<td>436</td>
<td>472</td>
<td>1,008</td>
<td>684</td>
<td>211%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11,643</td>
<td>9,258</td>
<td>8,294</td>
<td>8,136</td>
<td>8,140</td>
<td>-3,503</td>
<td>-30%</td>
</tr>
</tbody>
</table>

Source: Danish Statistics, Register-based labour market statistics/RAS9 - www.statistikbanken.dk (in both Danish and English).

Note: Improvements in data registration methods may cause minor breaks from 2003.

The table which covers all employed in the sector - show that employment within production and distribution of electricity has fallen by 30% between 1997 and 2004. The largest fall has happened among those with basic level skills only and those categorised as other employees, while employees with upper level skills have best withstood the decline in employment. The average skills level of the workforce has thus increased.

This general trend is also supported by figures obtained through Association of Danish Energy Companies. This source covers companies owned by network companies where the companies regard their activities as related to electricity. However, private wind turbines and private CHP-stations are not included. This partial coverage of employment is reflected in slightly lower total employment figures. Furthermore, the figures show that some changes have taken place in the first years after the introduction of the new electricity legislation, with a change in employment levels between the different company types.

There has been a relatively large fall within the regional transmission and distribution network and obligation to supply companies, while the employment situation within the transmissions system operators and the group of other companies has remained almost unchanged, although with some fall in the generating companies;
Table 4.1  Employees in the electricity sector - by type of company

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>absolute change 2001-05</th>
<th>percentage change 2001-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution network and obligations to supply companies</td>
<td>993</td>
<td>1063</td>
<td>893</td>
<td>888</td>
<td>697</td>
<td>-296</td>
<td>-30%</td>
</tr>
<tr>
<td>Regional transmission network companies</td>
<td>245</td>
<td>237</td>
<td>191</td>
<td>169</td>
<td>167</td>
<td>-78</td>
<td>-32%</td>
</tr>
<tr>
<td>Transmission system operators</td>
<td>272</td>
<td>279</td>
<td>266</td>
<td>263</td>
<td>271</td>
<td>-1</td>
<td>0%</td>
</tr>
<tr>
<td>Public electricity supply utilities, total</td>
<td>1510</td>
<td>1579</td>
<td>1350</td>
<td>1320</td>
<td>1135</td>
<td>-375</td>
<td>-25%</td>
</tr>
<tr>
<td>Generating companies</td>
<td>2353</td>
<td>2223</td>
<td>2246</td>
<td>2098</td>
<td>2133</td>
<td>-220</td>
<td>-9%</td>
</tr>
<tr>
<td>Other companies²</td>
<td>3110</td>
<td>3077</td>
<td>3151</td>
<td>3097</td>
<td>3274</td>
<td>164</td>
<td>5%</td>
</tr>
<tr>
<td>Non-public electricity supply utilities, total</td>
<td>5463</td>
<td>5300</td>
<td>5397</td>
<td>5195</td>
<td>5407</td>
<td>-56</td>
<td>-1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6973</strong></td>
<td><strong>6879</strong></td>
<td><strong>6747</strong></td>
<td><strong>6515</strong></td>
<td><strong>6542</strong></td>
<td><strong>-431</strong></td>
<td><strong>-6%</strong></td>
</tr>
</tbody>
</table>

Source: Association of Danish Energy Companies, Danish Electricity Supply - Statistical Survey (various issues).

Note: 1 Ultimo December information. 2 Includes electricity trading companies, holding companies (if the activity for subsidiary companies are electricity supply), service companies etc.

It is quite difficult to draw any clear conclusions from the overall figures provided by the two statistical sources as presented above. First of all, the changes and development in employments between the company types and years is influenced by the dramatic changes within the sector as described in the previous chapters.

As a result of the new electricity legislation a comprehensive restructuring of the Danish electricity sector took place and a number of different company types have appeared. As an example the distribution and supply obligation companies have been selling off shares in production companies, invested in fibre nets and gone through numerous restructuring processes, while the generating companies and trading companies have become much more international in their operations, with activities abroad and foreign companies established at the Danish market.

However the general falling trend in employment is clear and looking back to the late 1990ies, where the Danish electricity supply industry employed more than 10,000 people, the decline is even sharper.

The main fall took place just prior to and after the new electricity legislation was introduced in the year 2000. About 6,500 people are now employed in the electricity supply industry. The numbers above are based on full-time employment. The total of wages in the year 2004 amounted to 2.6 billion DKK (compared to 2.7 billion DKK in 2002).

In relation to the distribution and regional transmission companies the increasing focus on cost-effectiveness e.g. yearly benchmarking against similar companies and registration of
impact of energy advising activities have had an impact in terms of reducing cost and work force.

There also seem to be a falling tendency, however not as marked, within the segment of power generation companies, which also could be analysed as an impact of the increasing competition on the power markets.

This development was predicted by the administration before the liberalisation was initiated. Hence, a report from the Competition Agency\(^1\) stated that liberalisation of the energy sector would contribute to increased productivity and efficiency of the energy companies in the field of 20% corresponding to yearly savings in the field of 1.4 billion DKR for electricity companies and 0.6 billions in the gas and heat companies.

In contrast the work force of the trading and service companies has been increasing, which is somehow not surprising given the fact that these companies have to pay much more attention to marketing and trading of financial and physical electricity products.

The following table show the development in employment divided on gender. The bulk of the employment decline has been among the male workforce - absolutely as well as relatively.

**Table 4.2 Production and distribution of electricity - employed by gender**

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>9,200</td>
<td>2,443</td>
<td>11,643</td>
</tr>
<tr>
<td>2001</td>
<td>7,136</td>
<td>2,122</td>
<td>9,258</td>
</tr>
<tr>
<td>2002</td>
<td>6,268</td>
<td>2,026</td>
<td>8,294</td>
</tr>
<tr>
<td>2003</td>
<td>6,135</td>
<td>2,001</td>
<td>8,136</td>
</tr>
<tr>
<td>2004</td>
<td>6,097</td>
<td>2,043</td>
<td>8,140</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1997-2004</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute</td>
<td>-3103</td>
<td>-400</td>
<td>-3503</td>
</tr>
<tr>
<td>Percentage</td>
<td>-34%</td>
<td>-16%</td>
<td>-30%</td>
</tr>
</tbody>
</table>

Source: Danish Statistics, Register-based labour market statistics/RAS9 - www.statistikbanken.dk

Note: Improvements in data registration methods may cause minor breaks from 2003.

The reason seems to be that it is traditionally male dominated fields of job profiles, which have been most significantly influenced by declination e.g. "Elementary Occupations" and "Process Plant & Machine Operatives" (see figure 2.4), while the traditionally more female dominated fields of activity such as "sales and customer services" and "administrative and secretarial occupations" have experienced a growth in work force.

When it comes to the change in the age profile, the sector has experienced a remarkably ageing work force. This, however, also means that any possible future workforce reductions could be effected through natural wastage.

---

\(^1\) Konkurrencestyrelsen (1998), 1998-05-28: Konkurrence i energisektoren
Table 4.3  Production and distribution of electricity - employed by age

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-15</td>
<td>16</td>
<td>12</td>
<td>8</td>
<td>13</td>
<td>6</td>
<td>-10</td>
<td>-63%</td>
</tr>
<tr>
<td>16-19</td>
<td>154</td>
<td>75</td>
<td>57</td>
<td>55</td>
<td>72</td>
<td>-82</td>
<td>-53%</td>
</tr>
<tr>
<td>20-24</td>
<td>431</td>
<td>231</td>
<td>238</td>
<td>213</td>
<td>236</td>
<td>-195</td>
<td>-45%</td>
</tr>
<tr>
<td>25-29</td>
<td>729</td>
<td>420</td>
<td>395</td>
<td>401</td>
<td>452</td>
<td>-277</td>
<td>-38%</td>
</tr>
<tr>
<td>30-34</td>
<td>1,280</td>
<td>869</td>
<td>707</td>
<td>663</td>
<td>698</td>
<td>-582</td>
<td>-45%</td>
</tr>
<tr>
<td>35-39</td>
<td>1,480</td>
<td>1,191</td>
<td>1,052</td>
<td>1,053</td>
<td>1,058</td>
<td>-422</td>
<td>-29%</td>
</tr>
<tr>
<td>40-44</td>
<td>1,641</td>
<td>1,279</td>
<td>1,147</td>
<td>1,095</td>
<td>1,125</td>
<td>-516</td>
<td>-31%</td>
</tr>
<tr>
<td>45-49</td>
<td>1,671</td>
<td>1,436</td>
<td>1,243</td>
<td>1,204</td>
<td>1,170</td>
<td>-501</td>
<td>-30%</td>
</tr>
<tr>
<td>50-54</td>
<td>1,851</td>
<td>1,458</td>
<td>1,267</td>
<td>1,198</td>
<td>1,190</td>
<td>-661</td>
<td>-36%</td>
</tr>
<tr>
<td>55-59</td>
<td>1,306</td>
<td>1,381</td>
<td>1,281</td>
<td>1,281</td>
<td>1,233</td>
<td>-73</td>
<td>-6%</td>
</tr>
<tr>
<td>60-66</td>
<td>658</td>
<td>582</td>
<td>556</td>
<td>664</td>
<td>613</td>
<td>-45</td>
<td>-7%</td>
</tr>
<tr>
<td>67+</td>
<td>426</td>
<td>324</td>
<td>343</td>
<td>296</td>
<td>287</td>
<td>-139</td>
<td>-33%</td>
</tr>
<tr>
<td>Total</td>
<td>11,643</td>
<td>9,258</td>
<td>8,294</td>
<td>8,136</td>
<td>8,140</td>
<td>-3503</td>
<td>-30%</td>
</tr>
</tbody>
</table>

Source: Danish Statistics, Register-based labour market statistics/RAS9
Note: Improvements in data registration methods may cause minor breaks from 2003.

4.2 Gas sector

Unfortunately there has not been any specific registration of developments of the work force within the gas markets, as it has been seen with the statistics prepared by the association of Danish Energy companies for the electricity market. Hence data and figures can only be obtained through Danish Statistics.

The employment trend within the gas sector on the official register shows the following tendency:

Table 4.4  Manufacture and distribution of gas - employed by socioeconomic status

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-employed</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>-100%</td>
</tr>
<tr>
<td>Assisting spouses</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>...</td>
</tr>
<tr>
<td>Top managers</td>
<td>32</td>
<td>11</td>
<td>17</td>
<td>14</td>
<td>25</td>
<td>-7</td>
<td>-22%</td>
</tr>
<tr>
<td>Employees - upper level</td>
<td>366</td>
<td>346</td>
<td>398</td>
<td>414</td>
<td>457</td>
<td>91</td>
<td>25%</td>
</tr>
<tr>
<td>Employees - medium level</td>
<td>372</td>
<td>271</td>
<td>432</td>
<td>357</td>
<td>407</td>
<td>35</td>
<td>9%</td>
</tr>
<tr>
<td>Employees - basic level</td>
<td>707</td>
<td>570</td>
<td>469</td>
<td>628</td>
<td>576</td>
<td>-131</td>
<td>-19%</td>
</tr>
</tbody>
</table>
As it can be seen the sector of manufacture and distribution of gas has only experienced small changes between 1997 and 2005, although it has risen in recent years following an initial decline post-1997.

Similar to the electricity sector there has been a shift towards a workforce with a higher average skill level, although the category of "top managers" has declined, which most likely reflect the merging of companies.

As for the electricity sector, the decline has mostly affected men.

**Table 4.5  Manufacture and distribution of gas - employed by gender**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1,151</td>
<td>898</td>
<td>962</td>
<td>1,046</td>
<td>1,107</td>
<td>-44</td>
<td>-4%</td>
</tr>
<tr>
<td>Female</td>
<td>556</td>
<td>443</td>
<td>480</td>
<td>500</td>
<td>560</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>1,707</td>
<td>1,341</td>
<td>1,442</td>
<td>1,546</td>
<td>1,667</td>
<td>-40</td>
<td>-2%</td>
</tr>
</tbody>
</table>

Source: Danish Statistics, Register-based labour market statistics/RAS9 - available free-of-charge via www.statistikbanken.dk (in both Danish and English).

Note: Improvements in data registration methods may cause minor breaks from 2003.

Also for the change in the age profile the developments are similar to those of the electricity sector and have been remarkably pronounced - with an ageing work force. Depending on the future need for labour - there will be a need to focus on either retention or on ways to reduce the workforce through natural wastage.

**Table 4.6  Manufacture and distribution of gas - employed by age**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-15</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>16-19</td>
<td>14</td>
<td>13</td>
<td>8</td>
<td>13</td>
<td>10</td>
<td>-4</td>
<td>-29%</td>
</tr>
<tr>
<td>20-24</td>
<td>54</td>
<td>29</td>
<td>26</td>
<td>31</td>
<td>33</td>
<td>-21</td>
<td>-39%</td>
</tr>
<tr>
<td>25-29</td>
<td>103</td>
<td>68</td>
<td>85</td>
<td>70</td>
<td>83</td>
<td>-20</td>
<td>-19%</td>
</tr>
<tr>
<td>30-34</td>
<td>222</td>
<td>99</td>
<td>112</td>
<td>149</td>
<td>174</td>
<td>-48</td>
<td>-22%</td>
</tr>
</tbody>
</table>
### Regional impact within electricity, gas and water sector

The accessibility of employment data - in particular when the focus is on regions or local areas in Denmark - is restricted by data protection, e.g. it must not be possible to be able to identify single-enterprise information. Such selected information can, however, be directly obtained from the energy companies or other stakeholders.

Figures 5.1, 5.2 and 5.3 therefore contain employment information for electricity, gas and water as a whole. The first figure shows some variation in the regional employment picture, but the picture is somewhat blurred by the mere size of the region;
The second figure - which adjusts for total employment in the county - shows that Vestsjælland County relatively is the county which is most dependent on the electricity, gas and water employment, followed by Frederiksborg and Bornholm counties.
The regional differences are much more striking when looking at the change in employment in electricity, gas and water between 1994 and 2004. Figure 5.3 shows that employment in particular has declined in the peripheral counties of Ribe, Sønderjylland, and Nordjylland, while a few counties actually have experienced small increases in employment. This change in the regional distribution of work is in addition to the general occupational decrease also a result of the restructuring and mergers, where companies have moved head quarters and administrative units in order to reorganise and streamline the companies.

Source: Danish Statistics, Register-based labour market statistics/RAS2 - available free-of-charge via www.statistikbanken.dk (in both Danish and English).
Finally, the development in the number of enterprises is interesting as a background for analysing enterprise formations, mergers etc. Figure below shows that the volatility in the employment development is overshadowed by the changes in the number of enterprises and thus the number of employees per enterprise. This indicates a restructuring process where some enterprises have closed down or been merged with others, and new enterprises have been formed. Furthermore, many of the employees have remained in employment but have had to adjust to new ownership structures.

Source: Danish Statistics, Register-based labour market statistics/RAS2 - available free-of-charge via www.statistikbanken.dk (in both Danish and English).
4.4 Effects on skills and occupations

With the present study’s focus on how skills requirements are changing during restructuring, it is worth reflecting upon the changes in the occupational mix - even though we only have data for the electricity, gas and water sector as a whole. Figure 5.5 reveals a quite volatile picture - both with respect to the total number of employees and the occupational mix, however without any specific trend. In recent years, however, it seems that there has been an increase in the share of managers, senior officials and professionals at the expense of fewer plant and machine operators, and the elementary occupations.
This tendency in change of skill requirements is also supported by findings obtained through telephone interviews and questionnaires, where the response was that the development of the energy sector has implied a request for new skills and also skill shortage in certain fields. In particular, this includes high level qualifications in the field of financing, marketing and legislative issues.

According to the trade union for lawyers and economists, the energy trading and sale companies have developed much in the direction of the finance sector requesting the same kind of persons with knowledge about trading, contracting, exchange markets and products, price hedging, insurance, etc. Currently, there is a shortage of these kinds of skills at the labour market with current unemployment rates at only 2% for lawyers and economists.

Table 4.7 Development in employment by occupation

<table>
<thead>
<tr>
<th>OCCUPATIONAL CLASSIFICATIONS</th>
<th>Tendency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior officials and managers</td>
<td>Growth</td>
</tr>
<tr>
<td>Professionals and associate professionals in commercial/legal field</td>
<td>Growth</td>
</tr>
<tr>
<td>Professional and associate professionals in technical field</td>
<td>Decline</td>
</tr>
<tr>
<td>Administrative clerks</td>
<td>Growth</td>
</tr>
<tr>
<td>Service and sales workers</td>
<td>Growth</td>
</tr>
</tbody>
</table>
### OCCUPATIONAL CLASSIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>Tendency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craft and related trades workers</td>
<td>Decline</td>
</tr>
<tr>
<td>Plant and machine operators and assemblers</td>
<td>Decline</td>
</tr>
<tr>
<td>Elementary occupations</td>
<td>Decline</td>
</tr>
</tbody>
</table>

*Source: Interviews, case study and questionnaires*

All companies have experienced a fall in the need for low-level and technical qualifications and most of them point out the liberalisation process as the main reason behind the development.

Many of the Danish companies including the ones addressed through the survey, have on their own initiative tried to handle skill shortage by implementing different means, such as internal training programmes, recruitment from other sectors and by using external training providers.

#### 4.5 Upstream and downstream sectors

Changes in the electricity and gas sectors will have some influence on the employment situation in both upstream and downstream sectors. This can be due to both changes in amounts - e.g. amount of raw materials and semi-manufactures bought from other branches, and it can be due to the price changes.

Table 5.9 provides an estimate of the overall spill-over effects from the energy sectors to other sectors. It shows firstly that the linkages are much more pronounced in the gas sector than in the electricity sector, and secondly that it has decreased over time.

**Table 4.8 Number of jobs created in other branches by one job in the energy sector**

<table>
<thead>
<tr>
<th></th>
<th>Electricity</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>0.49</td>
<td>1.24</td>
</tr>
<tr>
<td>2000</td>
<td>0.45</td>
<td>1.08</td>
</tr>
</tbody>
</table>

5.0 EFFECT ON QUALITY OF WORKING LIFE

There exist only few officially available data sets which gives a useful contribution to the
depiction of quality in work. One of these is the number of accidents at work which is a
central aspect of health and safety at work. Table below shows here that the number of
accidents - hereunder compared with the number of employees - has fallen in recent
years.

Table 5.1 Electricity, gas, and water - number of accidents at work

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>381</td>
<td>193</td>
<td>206</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Per 1000 employed</td>
<td>21.4</td>
<td>13.0</td>
<td>14.4</td>
<td>11.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Danish Statistics, Register-based labour market statistics/RAS9 - and Danish Working Environment Authority (www.at.dk).

Yet, results from interviews all indicate that the working environment has changed
significantly and that the restructuring and mergers of companies has influenced the work
negatively with increased levels of stress related absence and a worsened work-life
balance.
6.0 RESPONSES TO RESTRUCTURING - DONG ENERGY

The following case study of DONG Energy's responses to restructuring is primarily based on consultations with the human resource department at Dong Energy's head office in Hørsholm, Denmark - which until now primarily have dealt with employment issues before the recent merger with Elsam, E2, Nesa, København E, and Frederiksberg Forsyning. A central observation from these consultations is that DONG almost fully have managed the restructuring of the workforce in house - in close collaboration with employee representatives, but without much direct involvement of employee or employer organisations.

This observation has to a large extent been confirmed via consultations with IDA - Danish trade union for engineers, DJØF - Danish Association of Lawyers and Economists, and 3F - the United Federation of Danish Workers. It is acknowledged that the negotiations between employer and employee representatives mostly have avoided deadlocks - which could necessitate a direct involvement of the employee organisations. An important reason for this is that the organisations have prepared their representatives well for the negotiations. Regarding the central issue of labour mobility covered in the below DONG Energy case, the employee organisations actually have worked towards increasing its members mobility - both professionally via guidance to training, an issue where DONG Energy also needs to be proactive, and geographically via information services. However, at the same time the tenure nature of many employment contracts have restricted mobility somewhat.

6.1 Introduction

DONG Energy (as the company has been officially called since mid-2006) is the largest energy company in Denmark. Originally, it was a gas company, but recently it has merged with two larger Danish power companies, Elsam and Energi E2, so it now covers both gas and electricity. The large gas customers in Denmark are almost exclusively supplied by DONG Energy - one reason being that it owns and operates the Danish gas storage capacity. With respect to electricity production, it owns and operates a portfolio of approximately 7.300 MW - consisting of centralised thermal power and CHP plants, decentralised CHP plants and wind mills. The second largest production company in Denmark is Vattenfall - operating a portfolio of approximately 2.400 MW in Denmark.

DONG Energy as it stands now is the result of many years of restructuring in the Danish energy sector. Around 1990, the EU Commission first aired the idea of a future liberalisation of the entire EU energy market. This had a marked influence on DONG
Energy's development, as both Denmark - and DONG Energy - wanted to be at the forefront of the liberalisation in order to be in a stronger position in the coming competitive market. One of the first elements of the liberalisation was the abolition, in the mid-1990s, of DONG Energy's sole concession to import natural gas.

The purpose of this chapter is to review how the employment situation within DONG Energy has altered as a result of restructuring and how DONG Energy has managed these workforce changes. The review considers four central steps in this restructuring taken during the last eight or nine years - a period where the number of employees across Europe doubled during the first eight years, with employment soaring further in 2006 due to merger activities (see Figure 6.1).

Figure 6.1 Number of employees at DONG Energy, ultimo year

![Number of employees at DONG Energy, ultimo year](chart.png)

Source: DONG Energy, various Annual Reports.
Note: 2005 is average for the year; end-2006 is an estimate.

6.2 The growth dimension

DONG Energy's Supervisory Board adopted a strategic plan in 1998 which featured the integration of the five regional gas companies into DONG Energy, expansion within the electricity sector, and expansion of the exploration activities to include Denmark's neighbouring countries. With the new prospect of foreign gas competition in the Danish market, the Supervisory Board decided that DONG Energy would be better equipped to
take up future competition against foreign companies by gathering the Danish energy sector in a single company - initially in the gas sector. Two of the five regional companies - the gas companies in South and Southern Jutland and West and South Zealand - were taken over by DONG Energy in 1999 and 2000, respectively. DONG Energy now covered all aspects - from production, through transmission, to distribution and end-customer sales. DONG Energy's customer number rocketed from about 100 to almost 100,000 - overnight.

The text box below shows that growing in size had a number of implications for DONG Energy's workforce. The experience is that it takes time to integrate employees from a company which has been taken over into DONG Energy's culture - even though DONG Energy is generally considered to be a good employer, for example, indicated by its easiness to attract new employees when needed.


The expansion of DONG Energy meant that the number of employees increased from 426 to 709 between 1998 and 2002. This net-increase in employment did not differ much from the gross-increase as staff turnover was limited during such an expansion period characterised by takeover of other companies.

However, the company takeovers implied some rationalisation - partly to eliminate the duplication of functions. At that time the Danish government obliged DONG Energy - as a state-owned company - to provide employees in the gas companies which had been taken over with a job/income-security guarantee covering 18 months. Hence, if one was laid off within this period of time, the salary income continued the remaining months. Hereafter, if still unemployed the standard unemployment benefit system took over.

The takeovers involved only a few movements of employees - mainly at management level from the regional companies to head quarter. As for the other steps in DONG Energy restructuring this form of integration of staff has shown to be difficult - i.e. a low physical as well as mental mobility among employees.

The wider integration of the companies - i.e. getting all employees in the companies which had been taken over to become members of the DONG Energy group of companies - was pursued in various ways. The target was to use the better of both worlds. One of the successful tools for integration was the collaboration in generating a common IT system - using SAP. Another tool was the use of comprehensive communication efforts to ensure - as far as possible - transparency in the restructuring process, and so to avoid untrue stories.

As for the other restructuring responses presented below - DONG Energy did by and large manage the responses by itself in consultation with company employee representatives. In other words, there was hardly any involvement of employee or employers organisations, nor public institutions.

### 6.3 The international dimension

The liberalisation of energy markets in the EU also presented the opportunity for DONG Energy to sell gas directly to customers in Germany and Sweden, and in Denmark DONG Energy was now able to offer its customers both gas, electricity and energy advice. DONG Energy therefore no longer partipates in all licences as a State participant, but carries out exploration and participates on an equal footing with other licence partners.
In parallel with its exploration activities in the Danish sector, DONG Energy had been granted licences to explore in the neighbouring areas and at the Faroe Islands and in Greenland, and in 2001 DONG acquired the Norwegian oil company Pelican, which, under the name DONG Nørge, now accounts for roughly half of DONG Energy's oil and natural gas production. Furthermore, DONG Energy acquired Statoil's exploration and production activities in Denmark in 2002, becoming the operator of the Siri field, and is drawing on this expertise in connection with the development of offshore wind farms - for example in the Irish Sea.

More recently, DONG Energy has expanded into Germany. In January 2005, DONG Energy and the German company Energie und Wasser Lübeck (EWL) entered into a long-term strategic cooperation in Germany through DONG Energy's acquisition of 25.1% of the shares of EWL. Furthermore, a Dutch company has been acquired.

The text box below shows that the international expansion has been challenging because of low employee mobility and different labour laws in different countries requiring different treatment of employees - which to some extent is a barrier to the full integration on international employees into the DONG Energy group of companies.

### Employment impact and measures - The international dimension (2001-)

The number of DONG Energy employees increased by 145 between 2001 and 2002 - from 755 to 900. The main reason for the increase was the purchase of the Norwegian oil company Pelican - leading to the establishment of the company under the new name DONG Nørge, and the takeover of the operation of the Siri field. In addition, more staff were needed to fulfil the requirements of a split of DONG Energy’s natural gas activities.

The main workforce challenge in Norway was that the acquisition involved a movement of activities from Oslo to Stavanger, which proved very unpopular with employees. Although significant compensation packages were offered - only two employees made the move, while the remaining 20 or so found other employment, or became redundant. As a result this provided a challenge of recruiting sufficiently skilled employees in Stavanger.

Integration of international employees into the DONG Energy group of companies has shown not only to be a matter of addressing cultural differences; it is also made challenging by differences in labour laws. It is, for example, much more difficult to lay off workers in Germany; similarly the Norwegian rules do differ from the Danish. A consequence of these differences is that the employee committees or meeting rarely have representatives from more than one country. However, efforts to pursue this are under way.

### 6.4 The unbundling dimension

The liberalisation of the energy market meant a complete change of structure for DONG Energy. The acts regulating DONG Energy's activities were repealed. DONG Energy would now be functioning as any other commercial company. However, the Danish
Folketing decided that the transmission arm was to remain under regulated ownership, and DONG Energy therefore unbundled its transmission activities into DONG Transmission A/S, selling all the shares to the State (which, for the time being, also owns all the shares in DONG Energy). The transmission company changed its name to Gastra A/S and now forms part of Energinet.dk, together with other power transmission companies.

Following the unbundling of the transmission activities, DONG Energy's activities were as follows: exploration & production; natural gas, trade & supply; natural gas, distribution & storage; oil pipeline; electricity & renewable energy.

The below text box shows that unbundling has resulted in the need to manage a number of changes in job functions. The main response has been that of the Gastra A/S - i.e. employees leaving the DONG Energy group of companies.

### Employment impact and measures - The unbundling dimension (2000-)

The sale of activities to Gastra A/S was the main reason for a decline in the number of employees between 2003 and 2005 - from 1156 to 980. At the same time DONG Energy reduced its administrative personnel in order to prepare the company to the increasing competitiveness of the market. The rationalization implied an excess of workers - in the first place targeted by internal job shifts, retraining, and reductions through normal attrition. Unbundling has, for example, led to an increase in the number of economist in trade functions, while effectiveness gains have reduced the need for certain technicians. Hence, there has been a change in the mix of job functions.

Somewhat independent of the DONG Energy response - but interesting for the unbundling process - is the response of Gastra A/S leaving the DONG Energy group of companies - a group with a strong culture. Gastra tried, for example, to find its own identify - both at top level and at floor level - by "not allowing" the use of "old" DONG Energy material - such as clothes with DONG Energy -logos etc. However, at the same time it continued the good working condition elements from DONG Energy - such as "reusing" the collective agreements as a starting point for their own negotiations with employee representatives.

### 6.5 From gas company to energy company

Denmark is one of the countries that has made the most headway in the process of implementing the EU Gas and Electricity Directive. It was perceived by company management that an integrated company will be more competitive in a liberalised market where national borders will be of decreasing relevance. A strongly integrated energy company was considered more likely to retain jobs in Denmark and anchor technological development in Denmark.

In this context, the EU Commission approved in mid-March 2006 a merger of six energy companies into one. DONG Energy succeeded in merging Elsam, E2, Nesa, Copenhagen Energy (electricity) and Frederiksberg Forsyning to form a single company, DONG Energy A/S (see the below figure). The Swedish energy group Vattenfall, which had a stake in
Elsam has swapped its shareholding for assets in the Danish energy sector to the effect that DONG Energy will in future be responsible for approx. 43% of power production in Denmark and Vattenfall for approx. 19%. The remaining 38% of Danish power comes from private and municipal wind turbines and CHP plants. The new company will have more than 4000 employees.

The text box below shows that the move from being a gas company to become a large energy company had several implications for the workforce of DONG Energy. Two main measures have been implemented to manage the restructuring process - a severance package and a mobility package.

Employment impact and measures - From gas company to energy company (2006-)

DONG Energy will have around 4000 employees. In addition to an HRD department at the group level, DONG Energy will have three further HRD departments - one for the "original" DONG including the wind power division from E2, one for Elsam and E2, and one for Nesa, København E and Frederiksberg Forsyning. There will be some movements of employees between these three. Here we concentrate on the responses of the original DONG HRD department.

From the outset, restructuring measures were discussed in a coordination committee with employee representatives - i.e. without a need to directly involve either trade unions or employer organisations. Two main measures were agreed upon: a severance package and a mobility package.

The severance package is targeted at employees whose skills are no longer required and at employees who cannot fulfil the requirements for geographical mobility. The package includes salary compensation for three months (four if one has been employed at DONG Energy for more than 20 years), retraining support (on average DKK 8000 per person), and replacement assistance (using the services of a private employment agency).

Restructuring involves the geographical movement of many employees - to workplaces for some within and for some outside commuting distance. The mobility package therefore both includes relocation assistance and temporary compensation to the new commuters. Building on the experience from the last eight years - it is envisaged that mobility of employees will be one of the main challenges during the merger.
7.0 CONCLUSION

Denmark has multi-tier energy supplies based on many different sources of energy and a quite developed energy infrastructure. Liberalisation results in changed structures both with regard to ownership, responsibility and strategic alliances. The organisational restructuring at company level is actually characterised by mergers and thus by a path towards horizontal monopolies. During the latest phase of the Danish liberalisation the merging process has even integrated the electricity, gas and oil sector. The process is still ongoing and has recently become more international in its scope. Other European companies are getting involved in the Danish market (mainly Swedish) and Danish companies (e.g. DONG) establish themselves at foreign markets. Also the companies involved in monopoly activities have gone through major changes with restructuring and merging of companies.

Implementation of the electricity and gas directives is taking place in a period with other changes in the employment situation in general in Denmark. The changes are much influenced by the globalisation process with many job functions - mostly unskilled jobs - lost or outsourced abroad every year, the creation of many new jobs and the work force ageing, giving an increased focus on retirement.

Employment within production and distribution of electricity has fallen by 30% between 1997 and 2004. The largest fall has happened among those with basic level skills while employees with upper level skills have best withstood the decline in employment. The average skills level of the workforce has thus increased. As a result of the new electricity legislation a comprehensive restructuring of the Danish electricity sector has taken place and a number of different company types have appeared. The bulk of the employment decline has been among the male workforce. Traditionally male dominated fields of job profiles as e.g. "Elementary Occupations" and "Process Plant & Machine Operatives", have most significantly declined, while the traditionally more female dominated fields of activity such as "sales and customer services" and "administrative and secretarial occupations" have experienced a growth in work force.

Within the gas sector there has been a similar shift towards a workforce with a higher average skill level, although the category of "top managers" has declined, which most likely reflect the merging of companies.

A remarkable change in the regional distribution of work is also a result of the restructuring and mergers. Companies have moved head quarters and administrative units in order to reorganise and streamline the companies. The volatility in the employment development is
over shadowed by the changes in the number of enterprises and thus the number of employees per enterprise.

Many of the Danish companies including the ones addressed through the survey, have on their own initiative tried to handle skill shortage by implementing different means, such as internal training programmes, recruitment from other sectors and by using external training providers.

DONG Energy is by far the largest player on the Danish market. Vattenfall is the second largest production company whereas Energinet DK the state owned system operator for both gas and electricity is the third main significant company.

The employment responses of DONG Energy during the restructuring process are generally covering the responses of Denmark as a whole. The situation in DONG Energy is during the last ten years characterised by a shift in job functions - e.g. relatively more economists and fewer technicians, by more workers in international locations, and by significant geographical movements within the Danish borders. The mobility issue has in particular caused difficulties.

DONG Energy almost fully have managed the restructuring of the workforce in house - in close collaboration with employee representatives, but without much direct involvement of employee or employer organisations or public institutions.

DONG Energy has a strong culture and a very good reputation for taking care of its employees - and it must be concluded that DONG Energy has pursued a smooth restructuring.

DONG Energy's responses are characterised by:

- DONG Energy has provided fairly attractive packages targeting severance, mobility, retraining, and help to redundant employees in finding another job.
- DONG Energy has focused on integrating new employees into the DONG Energy group of companies - and thereby treating all employees equally. DONG Energy has in this context accepted that cultural adaptations take time.