Oxera

Celebrating 25 years

# Energy market competition in the EU and G7

## Final 2005 rankings

**Prepared for**
**Department for Business, Enterprise and Regulatory Reform**

**October 2007**

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# 1 Introduction

The Department for Business, Enterprise and Regulatory Reform (BERR) has a Public Service Agreement (PSA) target that requires it to ensure that the UK is among the three most competitive energy markets in the EU and G7 in each year.[1]

Commissioned by the BERR, Oxera has studied the competitiveness of the energy markets of the UK within the PSA context from 2001 onwards. To this end, a multi-staged methodology has been developed to compare the energy market competitiveness of the EU and G7 countries. As a first step, an initial filter of the minimum conditions considered necessary for a competitive energy market is applied to all the countries.[2] Detailed competitiveness scores of the electricity and gas markets are then calculated for each of the countries meeting the conditions of the initial filter. Following this, the electricity and gas market scores are aggregated into a single energy market score.[3]

The methodology applied to the competitiveness analysis from 2001 to 2005 ('the original methodology') has been recently reviewed. The 'new methodology' applies alternative standardising rules and weightings to some of the indicators used in the calculation of competitiveness scores. It also introduces an alternative approach for aggregating electricity and gas market scores into a single energy market score.[4]

In October 2006, Oxera used the original methodology to analyse the competitiveness of the UK energy markets in comparison to those of the rest of the EU and G7 in 2005, concluding that the UK met the PSA target, and had the highest-ranking energy market.[5] As the study was constrained by data limitations, its results were considered preliminary findings.

This report presents final 2005 results according to the original methodology, going on to compare them to the results obtained through the new methodology in the concluding section.

Table 1.1 now presents the competitiveness scores of the energy markets of the eleven countries that passed the initial filter in 2005 and were subject to a detailed, though preliminary, analysis of competitiveness according to the original methodology. Among the countries analysed, the UK was found to have the most competitive electricity and gas markets separately, and the most competitive energy market in aggregate.

[1] The energy markets comprise the electricity and gas markets.

[2] These initial filter conditions are the existence of regulated third-party access (rTPA) to transmission networks, unbundling at the transmission level and 100% opening of either electricity or gas supply.

[3] See Oxera (2003), 'Energy market competition in the EU and G7: the relative extent of energy market competition in the EU and G7', September, pp. 20–33 for a description of the initial filter and detailed methodology for measuring competitiveness.

[4] For details, see Appendix 3 Methodological review.

[5] Oxera (2006), 'Energy market competition in the EU and G7: preliminary 2005 findings', October.

**Table 1.1 Preliminary 2005 energy market scores and rankings, original methodology**

| | Electricity market score | Electricity rank | Gas market score | Gas rank | Aggregate energy market score | Energy market rank |
|---|---|---|---|---|---|---|
| UK | 9.2 | 1 | 8.3 | 1 | 8.5 | 1 |
| Sweden | 8.2 | 4 | 2.7 | 9 | 7.8 | 2 |
| Finland | 8.6 | 2 | 3.8 | 7 | 7.0 | 3 |
| Spain | 6.5 | 9 | 5.8 | 2 | 6.1 | 4 |
| Germany | 7.4 | 6 | 4.9 | 3 | 5.9 | 5 |
| Denmark | 8.4 | 3 | 3.7 | 8 | 5.7 | 6 |
| Austria | 7.1 | 7 | 4.5 | 4 | 5.5 | 7 |
| Netherlands | 7.8 | 5 | 4.4 | 5 | 5.1 | 8 |
| Italy | 6.8 | 8 | 4.3 | 6 | 4.9 | 9 |
| Ireland | 3.2 | 11 | 2.3 | 10 | 2.7 | 10 |
| Portugal | 3.9 | 10 | 0.0 | 11 | 2.0 | 11 |

Source: Oxera (2006), op. cit.

In each of the countries analysed, the electricity markets were found to be more competitive than the gas markets, possibly because electricity market liberalisation began before gas market liberalisation, or because of innate differences between the structures of the electricity and gas markets. Most of the countries have highly competitive network areas,[6] as transmission and distribution networks have been unbundled from generation and supply, and access to networks is regulated. Some of the countries have gone a step ahead and started to implement ownership unbundling. The main scope for improvement therefore lies in relation to the competitive conditions of the upstream, wholesale and downstream markets, particularly those of the gas industry.

This report updates the preliminary analysis with a more complete dataset for 2005. The key results of this final 2005 analysis are as follows.

– The UK retains the position of the highest-ranking energy market, and also has the highest-ranking electricity and gas markets separately. This result holds both with the original and with the new methodology.

– The Netherlands has displaced Austria at the seventh rank (according to the original methodology).

– Rank at the top three positions does not change when the new rather than the original methodology is applied to the final 2005 results. However, with the new methodology, Spain and Germany swap rankings, as do Italy and Austria.

[6] The gas markets in Finland and Portugal are exceptions, as both countries have been granted a derogation from the implementation of the EU Gas Directive.

# 2 Final 2005 rankings

The preliminary 2005 rankings presented in Table 1.1 were based on the latest data available at the time of the analysis and were obtained through the original methodology. This section finalises the 2005 rankings by updating the preliminary dataset. The data updates do not affect the initial filter, so the detailed competitiveness of the same eleven countries as in the preliminary 2005 report is measured. After the data updates, the UK retains its ranking as the most competitive energy market.

The remainder of this section is structured as follows:

– section 2.1 details the additional sources of information that have become available since the publication of the preliminary 2005 report;
– section 2.2 uses this updated dataset to determine the final electricity market rankings in 2005, presenting the changes that have taken place since the preliminary 2005 analysis;
– section 2.3 undertakes the same analysis for the gas market;
– section 2.4 aggregates the electricity and gas market score into a single energy market score.

## 2.1 Revisions to the preliminary 2005 dataset

Relative gas market consumption has been updated to its 2005 level since the preliminary 2005 report, resulting in a change in the relative size of gas and electricity markets used for aggregating gas and electricity scores into a single energy market score.

Additional data sources have been made available over the course of the year.

– The national regulators have issued their 2006 reports to the European Commission on the state of regulation and performance of their gas and electricity markets.

– Some electricity/gas companies have published 2005 Annual Reports containing information useful for the calculation of market shares in the upstream and/or downstream supply markets.

– The Commission has published an Internal Market Fact Sheets on the status of competition in EU energy markets, containing useful data on customer switching.[7]

Appendix 1 sets out the latest year of data availability for each of the indicators of the electricity and gas markets examined. Appendix 2 further presents the detailed data representing all the competitiveness indicators.

## 2.2 Electricity rankings

### 2.2.1 Final 2005 rankings

Oxera's analysis shows that with a score of 9.2 (see Table 2.1 and Figure 2.1), the UK has the most competitive electricity market across the EU and G7. A higher spread in scores occurs in the market areas, with scores in the network areas being concentrated between a

[7] See http://ec.europa.eu/energy.

minimum of 8.0 for Austria, Germany and Ireland, and a maximum of 10 for the other countries.

In the upstream segment of the market, the UK is more competitive than the other countries analysed. In particular, the UK has the lowest generation market concentration (27%), with the other comparator countries' concentration measures calculated according to Oxera's methodology ranging from 43% (Netherlands) to 83% (Ireland). As a result, the UK has the highest upstream market score of 8.7, with the others' scores ranging from 2.0 to 7.2. With a score of 7.2, the Netherlands and Finland show a marked improvement in their upstream concentration level from their 2004 level (scores of 5.6 and 5.4 respectively).

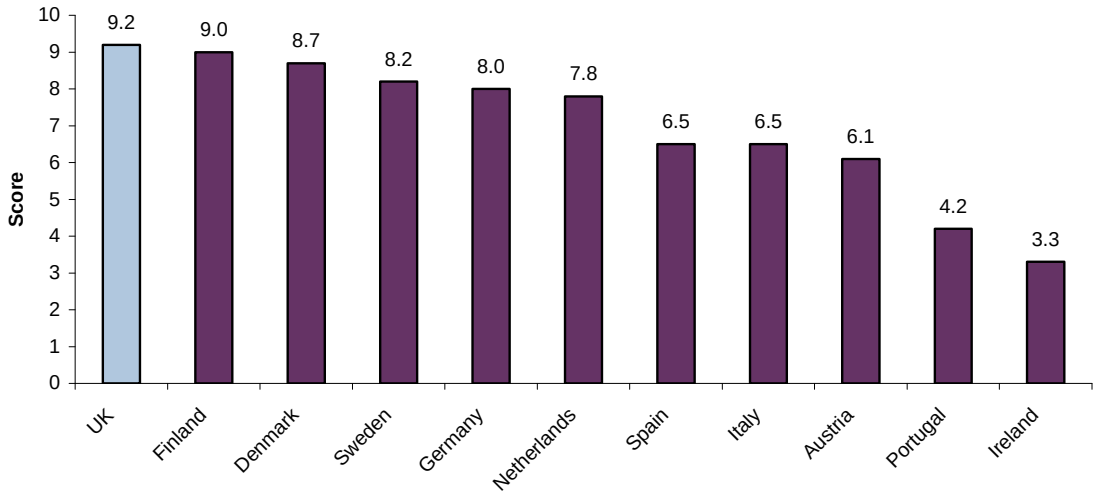
At the wholesale level, the UK is one of the countries that achieve the highest possible score. Although the UK is competitive at the downstream supply level with a score of 7.9, the downstream supply areas of Denmark, Finland and Sweden are more competitive than those of the UK. With a score of 7.4, Germany also has a relatively unconcentrated supply market.

**Table 2.1 Disaggregated scores for selected EU electricity markets (final 2005)**

| | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream market | 3.9 | 5.8 | 7.2 | 5.0 | 7.2 | 3.5 | 3.3 | 4.4 | 8.7 | 6.8 | 2.0 |
| Wholesale market | 8.7 | 10.0 | 10.0 | 6.0 | 7.8 | 0.0 | 10.0 | 10.0 | 10.0 | 10.0 | 0.0 |
| Downstream supply | 3.3 | 8.8 | 8.8 | 4.0 | 5.8 | 1.8 | 1.8 | 8.0 | 7.9 | 7.4 | 2.2 |
| **Score—all market areas** | 5.3 | 8.1 | 8.6 | 4.9 | 6.9 | 1.7 | 5.0 | 7.4 | 8.8 | 8.0 | 1.4 |
| Network-related activities | 8.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 8.0 | 8.0 |
| **Score—network areas** | 8.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 8.0 | 8.0 |
| **Overall electricity score** | 6.1 | 8.7 | 9.0 | 6.5 | 7.8 | 4.2 | 6.5 | 8.2 | 9.2 | 8.0 | 3.3 |

Source (of this and all subsequent tables and figures in section 2): Oxera analysis.

**Figure 2.1 Overall competitiveness scores for selected EU electricity markets (final 2005)**



**Changes to preliminary 2005 results**

Table 2.2 compares the electricity market scores of countries, as estimated using the preliminary 2005 dataset, with those estimated using the final 2005 dataset.

**Table 2.2 Comparison of preliminary 2005 and final 2005 scores for electricity**

| Country | Preliminary 2005 score | Final 2005 score | Adjustment in score |
|---|---|---|---|
| UK | 9.2 | 9.2 | 0.0 |
| Finland | 8.6 | 9.0 | +0.4 |
| Denmark | 8.4 | 8.7 | +0.3 |
| Sweden | 8.2 | 8.2 | 0.0 |
| Germany | 7.4 | 8.0 | +0.6 |
| Netherlands | 7.8 | 7.8 | 0.0 |
| Spain | 6.5 | 6.5 | 0.0 |
| Italy | 6.8 | 6.5 | –0.3 |
| Austria | 7.1 | 6.1 | –1.0 |
| Portugal | 3.9 | 4.2 | +0.3 |
| Ireland | 3.2 | 3.3 | +0.1 |

Note: Due to rounding, the difference between the preliminary 2005 and final 2005 scores shown in this and subsequent tables may not equal the adjustments in the scores.

In updating the preliminary 2005 dataset to the final 2005 version, the following changes have taken place.

– **Finland**—the score has increased by 0.4 due to a decrease in market concentration in the upstream market from 54% to 49%, as data has been updated from the 2004 figure used in the preliminary analysis. Also, domestic annual gross switching since start of liberalisation has increased from 2% to 3%.

– **Denmark**—the score has increased by 0.3 due to a decrease in market concentration in the upstream market from 63% to 57%, as data has been updated from the 2004 figure used in the preliminary analysis.

– **Germany**—the score has increased by 0.6 due to a decrease in concentration in the I&C downstream supply market, as highlighted by new data.

– **Italy**—despite a decrease in the market concentration in the upstream market from 63% to 57%, there was a decline of 0.3 in the electricity score. This is due to a downward revision of the degree of technical openness of the upstream market from 13% to 9% and of the annual gross switching figure for I&C customers from 45% to 15%. This has however been counterbalanced by an upward revision of the figures relating to concentration in the domestic downstream supply market from 23% to 90% on the basis of information provided by Italy's 2006 annual report to ERGEG looking explicitly at the domestic market, in contrast to the preliminary 2005 figures which reflected a combination of the domestic and I&C markets.

– **Austria**—the score declined by 1.0 due to several revisions allowed by greater data availability. The degree of technical openness of the upstream market has been revised downwards from 24% to 14%, and the market concentration in downstream supply market increased from 53% to 60% due to new data made available by E-control in its market report. The European Commission 2005 corrigendum reported that unbundling on distribution network level was in fact not implemented in Austria.

– **Portugal**—the score has increased by 0.3 due to the introduction of auctions as the allocation mechanism to import capacity in the upstream market.

– **Ireland**—the score increases by 0.1 due to an update in data indicating that auctions are used to allocate interconnector capacity in Ireland.

## 2.3 Gas rankings

### 2.3.1 Final 2005 rankings

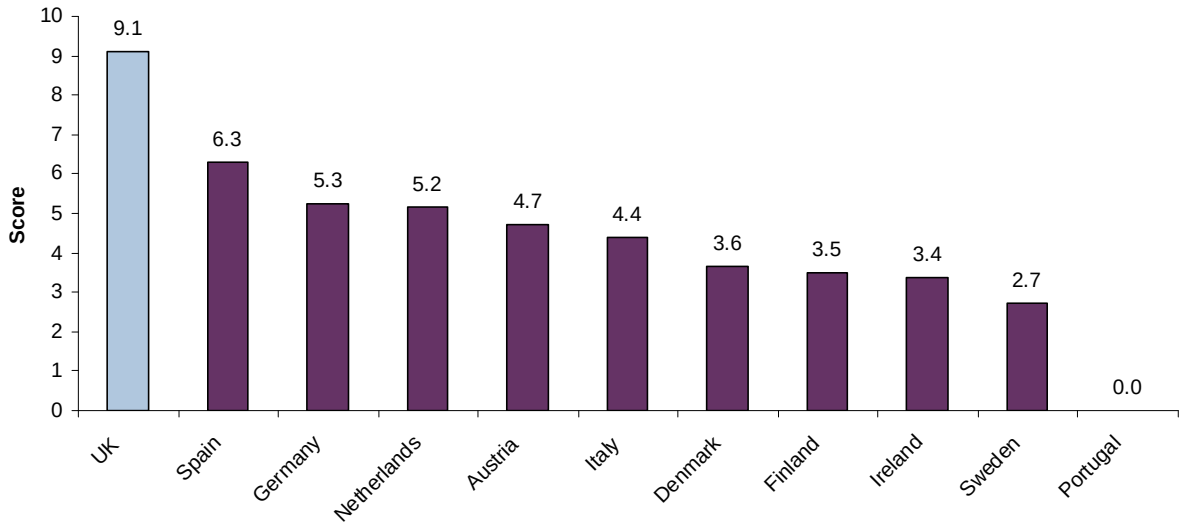
As in the electricity market, the UK was found to have the most competitive gas market in 2005, as shown in Table 2.3 and Figure 2.2. As in the electricity sector, the market areas show a high variation in scores across countries. Apart from the UK, the other countries analysed have highly concentrated shipper markets. Concentration in the downstream supply market is generally quite high, with only the UK, Italy and the Netherlands attaining a score above 5. It can also be noted that, in general, the development of the wholesale market in the gas sector lags behind that in the electricity sector. As regards the network aspect of the market, the majority of countries analysed are competitive. Exceptions are Portugal, which has been granted derogations from the implementation of the European Commission's Gas Directive, and Finland, which is exempted from the gas directives as long as it maintains its isolation from gas networks of other member states and has only one main natural gas supplier.[8]

[8] European Commission (2006), Finland Internal Market Fact Sheet

**Table 2.3 Disaggregated scores for selected EU gas markets (final 2005)**

| | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream market | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 10.0 | 2.0 | 2.0 |
| Wholesale market | 2.5 | 2.5 | 9.2 | 0.0 | 8.8 | 0.0 | 7.9 | 0.0 | 10.0 | 8.7 | 0.0 |
| Downstream supply | 5.0 | 1.6 | 0.0 | 6.0 | 5.8 | 0.0 | 4.4 | 0.7 | 6.5 | 3.0 | 2.9 |
| **Score—all market areas** | 2.5 | 1.3 | 3.0 | 2.0 | 4.8 | 0.0 | 4.7 | 0.2 | 8.7 | 4.5 | 1.6 |
| Network-related activities | 10.0 | 9.0 | 4.5 | 10.0 | 6.0 | 0.0 | 10.0 | 8.5 | 10.0 | 7.0 | 7.5 |
| **Score—network areas** | 10.0 | 9.0 | 4.5 | 10.0 | 6.0 | 0.0 | 10.0 | 8.5 | 10.0 | 7.0 | 7.5 |
| **Overall gas score** | 4.7 | 3.6 | 3.5 | 4.4 | 5.2 | 0.0 | 6.3 | 2.7 | 9.1 | 5.3 | 3.4 |

**Figure 2.2 Overall competitiveness scores for selected EU gas markets (final 2005)**




### 2.3.2 Changes to preliminary 2005 results

Table 2.4 compares the gas market scores of countries, as estimated using the preliminary 2005 dataset, with those estimated using the final 2005 dataset. Table 2.4 shows that the gas scores of the majority of the countries have been adjusted upwards. Only Denmark and Finland have been adjusted downwards, while Sweden and Portugal's scores have not changed.

**Table 2.4 Comparison of preliminary 2005 and final 2005 scores for gas**

| Country | Preliminary 2005 score | Final 2005 score | Adjustment in score |
|---|---|---|---|
| UK | 8.3 | 9.1 | +0.8 |
| Spain | 5.8 | 6.3 | +0.5 |
| Germany | 4.9 | 5.3 | +0.4 |
| Netherlands | 4.4 | 5.2 | +0.8 |
| Austria | 4.5 | 4.7 | +0.2 |
| Italy | 4.3 | 4.4 | +0.1 |
| Denmark | 3.7 | 3.6 | -0.1 |
| Finland | 3.8 | 3.5 | -0.3 |
| Ireland | 2.3 | 3.4 | +0.9 |
| Sweden | 2.7 | 2.7 | 0.0 |
| Portugal | 0.0 | 0.0 | 0.0 |

The key effects of updating the dataset are detailed below for all countries affected:

– **UK**—On updating the data, shipper market concentration was found to have reduced.

– **Netherlands**—an increase in liquidity in the wholesale market from 20% to 53% has lead to an upward shift in the Netherlands competitiveness score in the gas market.

– **Italy**—there has been a decrease in market concentration in the downstream supply[9] to the I&C sector but an increase in market concentration in the downstream supply to the domestic sector from 25% to 37%.

– **Denmark**—The score has declined by 0.1. Market concentration in the upstream market has risen slightly, from 90% to 91%. Market concentration in the downstream supply market to I&C has been revised upward from 69% to 71%. An offsetting change has occurred in the domestic downstream supply market concentration, decreasing from 79% to 77%. However, this offsetting change is not picked up in the score due to the insensitivity of the scoring system to changes in that range.[10]

– **Germany**—changes have been made to the information on gas distribution networks.[11]

– **Austria**—updated scores for switching in the downstream markets have been produced, based on the European Commission Internal Market Factsheet.[12]

– **Finland**—The score has declined by 0.3 as a lack of gas production or storage facilities in Finland has lead to a revision in the competitiveness access to gas storage indicator from 'yes' to 'no', pointing to lack of gas storage facilities in Finland.

– **Ireland**—A new legislation, SI 760 of 2005, was introduced in late 2005, which gave further legal effect to the Electricity Directive by providing for the legal unbundling of the

[9] Market concentration in the downstream supply is defined as one third of the sum of the market share of the largest, the market share of the two largest and the market share of the three largest suppliers.

[10] According to the original methodology, a score of 0 is assigned to market concentration levels greater or equal than 0.7.

[11] European Commission (2005), 'Report on progress in creating the internal gas and electricity market', November.

[12] European Commission (2007), 'AUSTRIA—Internal Market Factsheet', January. See http://www.ec.europa.eu/energy/energy_policy/doc/factsheets/market/market_at_en.pdf

transmission and distribution systems operations of BGE, the incumbent gas company. This has lead to an increase in the score for network areas from 4.5 to 7.5.

## 2.4 Aggregate rankings

Electricity and gas market scores are averaged into a single energy market score using the relative sizes of the electricity and gas markets as weights.

Changes in energy market score can therefore result from the following reasons:

– changes in electricity market competitiveness;
– changes in gas market competitiveness; or
– changes in the relative sizes of the electricity and gas markets.

The changes in electricity and gas market competitiveness have been discussed in section 2.2 and 2.3. In addition, there have been updates to the data on the sizes of the electricity and gas markets. While the preliminary 2005 report used data reflecting gas consumption in 2004, the updated analysis has obtained 2005 data on the same from Eurogas.[13]

When the updated data was used, the relative size of the electricity market remained constant or increased for all countries with the exception of Finland and Ireland, whose electricity market size was adjusted, respectively, from 66% to 64%, and from 38% to 36%. Given that all countries, except for Ireland, have higher electricity market scores than gas market scores, the increased weighting on the electricity market has had a tendency to push up their energy market scores.

The following sub-sections set out the final 2005 rankings calculated using the aggregation methodology described. The final 2005 scores and rankings are then compared with the preliminary 2005 ones.

### 2.4.1 Final 2005 rankings

Table 2.5 shows that on aggregating the electricity and gas markets, the UK is found to have the most competitive energy market in the EU and G7 in 2005—a position it has held since Oxera first analysed competitiveness of energy markets in 2001.

[13] Eurogas (2006), 'Natural Gas Consumption in EU25 in 2005', press release, February 17th.

**Table 2.5 Ranking of selected EU energy markets, final 2005, original methodology**

| Country | Competitiveness score | Ranking |
|---|---|---|
| UK | 9.1 | 1 |
| Sweden | 7.8 | 2 |
| Finland | 7.0 | 3 |
| Spain | 6.4 | 4 |
| Germany | 6.3 | 5 |
| Denmark | 5.8 | 6 |
| Netherlands | 5.7 | 7 |
| Austria | 5.3 | 8 |
| Italy | 5.0 | 9 |
| Ireland | 3.4 | 10 |
| Portugal | 2.3 | 11 |

### 2.4.2 Changes since preliminary 2005 analysis

The aggregate energy market competitiveness scores and rankings estimated using the preliminary 2005 dataset are now compared with those estimated using the final 2005 dataset.

As Table 2.6 shows, the updates in this report have led to an increase in the Netherlands' rank from eight to seventh, with Austria falling behind the Netherlands. This has largely resulted from a marked decrease in Austria's electricity score and a moderate decrease in Austria's gas market score. Other than this swap of ranks, a significant increase in Ireland's score of 0.6 is seen due to its new provisions in the gas network area.

**Table 2.6 Comparison of preliminary 2005 and final 2005 energy rankings and scores**

| Country | Preliminary 2005 score | Final 2005 score | Adjustment in score | Preliminary 2005 ranking | Final 2005 ranking | Adjustment in ranking |
|---|---|---|---|---|---|---|
| UK | 8.5 | 9.1 | +0.6 | 1 | 1 | No change |
| Sweden | 7.8 | 7.8 | 0.0 | 2 | 2 | No change |
| Finland | 7.0 | 7.0 | 0.0 | 3 | 3 | No change |
| Spain | 6.1 | 6.4 | 0.0 | 4 | 4 | No change |
| Germany | 5.9 | 6.3 | 0.0 | 5 | 5 | No change |
| Denmark | 5.7 | 5.8 | 0.0 | 6 | 6 | No change |
| Netherlands | 5.1 | 5.7 | +0.6 | 8 | 7 | +1 |
| Austria | 5.5 | 5.3 | –0.2 | 7 | 8 | –1 |
| Italy | 4.9 | 5.0 | +0.1 | 9 | 9 | No change |
| Ireland | 2.7 | 3.4 | +0.6 | 10 | 10 | No change |
| Portugal | 2.0 | 2.3 | +0.3 | 11 | 11 | No change |

# 3 Conclusions

Oxera's analysis shows that even with an updated dataset, the UK continues to meet the PSA target in 2005. It is ranked first in the electricity and gas markets separately, and in the energy markets as a whole.

Table 3.1 sets out the development of energy market competitiveness of the eleven countries that passed the initial filter in 2005. In transposing the requirements of the Electricity and Gas Directives, more and more EU Member States have met the conditions of the initial filter. As can be seen, only six countries passed the filter in 2001 and 2002. In 2003 Denmark, and in 2004 the Netherlands and Portugal, were added to the list. In 2005, Ireland and Germany were also found to have passed the filter.

In general, energy market scores of the countries analysed have increased over time, but there have not been significant changes in the ranking, apart from the Netherlands' overtaking of both Italy and Austria in 2005, due to a marked increase in its score. The UK energy market has remained the most competitive among the EU and G7, followed by Sweden in a stable second place.

**Table 3.1 Development in energy market competitiveness of selected countries, 2001–05**

| Country | 2001 | | 2002 | | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Score | Rank | Score | Rank | Score | Rank | Score | Rank | Score | Rank |
| UK | 7.8 | 1 | 7.7 | 1 | 8.0 | 1 | 8.5 | 1 | 9.1 | 1 |
| Sweden | 7.5 | 2 | 7.4 | 2 | 7.9 | 2 | 8.0 | 2 | 7.8 | 2 |
| Finland | 6.4 | 3 | 6.4 | 3 | 6.1 | 3 | 6.1 | 4 | 7.0 | 3 |
| Spain | 4.7 | 5 | 6.1 | 4 | 5.7 | 4 | 6.3 | 3 | 6.4 | 4 |
| Germany | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 6.3 | 5 |
| Denmark | n/a | n/a | n/a | n/a | 5.1 | 6 | 5.1 | 5 | 5.8 | 6 |
| Netherlands | n/a | n/a | n/a | n/a | n/a | n/a | 3.7 | 8 | 5.7 | 7 |
| Austria | 4.9 | 4 | 6.0 | 5 | 5.6 | 5 | 5.1 | 6 | 5.3 | 8 |
| Italy | 2.9 | 6 | 3.6 | 6 | 3.8 | 7 | 4.8 | 7 | 5.0 | 9 |
| Ireland | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 3.4 | 10 |
| Portugal | n/a | n/a | n/a | n/a | n/a | n/a | 2.3 | 9 | 2.3 | 11 |

Source: Oxera analysis.

Oxera has recently developed a new methodology, in line with developments in the energy markets and greater data availability coming about as markets liberalise. The new methodology introduces different standardisation and aggregation rules than those adopted in the original methodology.[14]

– A downward-sloping quadratic function replaces the step function in the calculation of the market concentration score, and a logarithmic standardisation rule replaces the linear standardisation rule of the liquidity indicator. In network areas, unbundling is given

[14] For a complete discussion of the methodological review, see Appendix 3.

a score of 10 only when it is ownership unbundling, while legal unbundling is given a score of 7.

– As an increasing number of Member States employ competitive interconnector capacity access mechanisms, the openness of allocation mechanism to import capacity indicator becomes less discriminatory across countries. Hence, in aggregating the indicators of upstream areas competitiveness, a lower weighting (10%, instead of 15%) is given to openness of allocation mechanism to import capacity, while the weighting for degree of technical openness of the market is increased from 15% to 20%. As the existence of price reporting and standardised contracts become universal in the wholesale areas, the weightings on these two indicators are lowered from 50% and 25% to 15% and 10% respectively, while the liquidity multiple's weight is accordingly increased from 25% to 75%.

– Finally, a rebased cardinal approach replaces the current aggregation mechanism of electricity and gas market scores into a single energy market score. Before applying the original relative market size weighting rule, the electricity and gas market scores are rebased, so that the score of the most competitive country is converted to 10, and those of the other countries are changed proportionally.

The analysis carried out on final 2005 data using the new methodology shows that the UK again achieves the highest electricity and gas market scores and, consequently, it achieves the highest energy market score. [15] Table 3.2 compares the final 2005 electricity and gas market scores using the original and the new methodology. Due to the application of the new methodology, which applies more stringent criteria, especially in the network areas indicators, all the scores have been revised downwards. Table 3.3 compares the final 2005 energy market scores and rankings using the original and the new methodologies. While the energy market scores using the original and the new methodologies are not directly comparable in absolute terms, they are comparable in relative terms. Rankings at the top three positions are unchanged. Germany, as opposed to Spain, ranks fourth and Italy, as opposed to Austria, ranks eight, according to the new methodology.

**Table 3.2 Comparison of electricity and gas market scores using original and new methodology**

| | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Electricity market score original methodology | 6.1 | 8.7 | 9.0 | 6.5 | 7.8 | 4.2 | 6.5 | 8.2 | 9.2 | 8.0 | 3.3 |
| Electricity market score new methodology | 5.3 | 7.9 | 7.9 | 5.8 | 7.3 | 4.0 | 5.5 | 7.0 | 8.3 | 7.4 | 3.0 |
| Gas market score original methodology | 4.7 | 3.6 | 3.5 | 4.4 | 5.2 | 0.0 | 6.3 | 2.7 | 9.1 | 5.3 | 3.4 |
| Gas market score new methodology | 4.0 | 3.2 | 2.7 | 4.3 | 4.3 | 0.0 | 5.3 | 2.6 | 8.2 | 4.5 | 2.8 |

Source: Oxera analysis.

[15] The rebased cardinal approach rules out situations in which a country ranking first in both the electricity and gas market does not rank first in the energy market due a larger relative size in the sector where it has the lower score.

**Table 3.3 Comparison of energy market scores and rankings using original and new methodology, rebased cardinal approach applied for energy market aggregation**

| | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy market score original methodology | 5.3 | 5.8 | 7.0 | 5.0 | 5.7 | 2.3 | 6.4 | 7.8 | 9.1 | 6.3 | 3.4 |
| Energy market score new methodology | 5.5 | 6.3 | 7.3 | 5.7 | 6.0 | 2.6 | 6.5 | 8.1 | 10.0 | 6.8 | 3.5 |
| Final ranking according to original methodology | 8 | 6 | 3 | 9 | 7 | 11 | 4 | 2 | 1 | 5 | 10 |
| Final ranking according to new methodology | 9 | 6 | 3 | 8 | 7 | 11 | 5 | 2 | 1 | 4 | 10 |

Source: Oxera analysis

# Appendix 1 Data updates in the final 2005 dataset

Tables A1.1 and A1.2 set out the latest year of data availability for each of the competitiveness indicators measured. The 'updated with 2005 data' category includes the cases where 2005 preliminary data has been updated with 2005 data from the new regulators' reports or other sources.

### Table A1.1 2005 electricity update

**Key:**

Updated with 2005 data

Final 2005 data, unchanged

2004 is latest data available

Assumptions[1]

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upstream market** | | | | | | | | | | | |
| Market share of the largest generator | | | | | | | | | | | |
| Market share of the two largest generators | | | | | | | | | | | |
| Market share of the three largest generators | | | | | | | | | | | |
| Degree of technical openness of market | | | | | | | | | | | |
| Openness of allocation mechanism to import capacity | | | | | | | | | | | |
| **Wholesale market** | | | | | | | | | | | |
| Existence of price reporting | | | | | | | | | | | |
| Share of total (daily) volume traded covered by price reporting | | | | | | | | | | | |
| Existence of standardised contracts | | | | | | | | | | | |

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Downstream supply** | | | | | | | | | | | |
| **I&C** | | | | | | | | | | | |
| Degree of supply market opening | | | | | | | | | | | |
| Market share of largest supplier | | | | | | | | | | | |
| Market share of two largest suppliers | | | | | | | | | | | |
| Market share of three largest suppliers | | | | | | | | | | | |
| Annual gross switching | | | | | | | | | | | |
| **Domestic** | | | | | | | | | | | |
| Degree of supply market opening | | | | | | | | | | | |
| Market share of largest supplier | | | | | | | | | | | |
| Market share of two largest suppliers | | | | | | | | | | | |
| Market share of three largest suppliers | | | | | | | | | | | |
| Annual gross switching | | | | | | | | | | | |
| **Network-related activities** | | | | | | | | | | | |
| Unbundling at transmission level | | | | | | | | | | | |
| rTPA at transmission level | | | | | | | | | | | |
| Unbundling on distribution network level | | | | | | | | | | | |
| rTPA at distribution level | | | | | | | | | | | |

Note: [1] Appendix 2 details the basis for making assumptions where data is not available.
Source: Oxera.

## Table A1.2 2004 gas update

**Key:**

Updated with 2005 data

Final 2005 data, unchanged

2004 is latest data available

Assumptions[1]

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upstream market** | | | | | | | | | | | |
| Market share of the largest shipper | | | | | | | | | | | |
| Market share of the two largest shippers | | | | | | | | | | | |
| Market share of the three largest shippers | | | | | | | | | | | |
| **Wholesale market** | | | | | | | | | | | |
| Existence of price reporting | | | | | | | | | | | |
| Share of total (daily) volume traded covered by price reporting | | | | | | | | | | | |
| Existence of standardised contracts | | | | | | | | | | | |
| **Downstream supply** | | | | | | | | | | | |
| **I&C** | | | | | | | | | | | |
| Degree of supply market opening | | | | | | | | | | | |
| Market share of largest supplier | | | | | | | | | | | |
| Market share of two largest suppliers | | | | | | | | | | | |
| Market share of three largest suppliers | | | | | | | | | | | |
| Annual gross switching | | | | | | | | | | | |

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic** | | | | | | | | | | | |
| Degree of supply market opening | | | | | | | | | | | |
| Market share of largest supplier | | | | | | | | | | | |
| Market share of two largest suppliers | | | | | | | | | | | |
| Market share of three largest suppliers | | | | | | | | | | | |
| Annual gross switching | | | | | | | | | | | |
| **Network-related activities** | | | | | | | | | | | |
| Unbundling at transmission level | | | | | | | | | | | |
| rTPA at transmission level | | | | | | | | | | | |
| Unbundling on distribution level | | | | | | | | | | | |
| rTPA at distribution level | | | | | | | | | | | |
| Competitive access to gas storage | | | | | | | | | | | |

Note: [1] Appendix 2 details the basis for making assumptions where data is not available.
Source: Oxera.

# Appendix 2 Data used for indicator evaluation, final 2005 dataset

## A2.1 Data availability, final 2005 dataset

Tables A2.1 and A2.2 set out whether data is available for the different segments of the electricity and gas markets in the eleven comparator countries, providing details where data is missing (not available, n/a).

### Table A2.1 Electricity

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upstream market** | | | | | | | | | | | |
| Market share of generators | Yes | n/a for third largest generator | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | n/a for second largest generator |
| Degree of technical openness of market | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Openness of allocation mechanism to import capacity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Wholesale market** | | | | | | | | | | | |
| Price reporting | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Share of total (daily) volume traded covered by price reporting | n/a | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Standardised contracts in wholesale markets | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Downstream market** | | | | | | | | | | | |
| Degree of supply market opening | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Market share of largest suppliers | Yes | Yes | n/a for second largest domestic supplier | Yes | Yes | Yes | Yes | Yes | Yes | Yes | n/a for second largest supplier |
| Switching rates | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Network-related activities** | | | | | | | | | | | |
| Unbundling at transmission level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| rTPA at transmission level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Unbundling at distribution level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| rTPA at distribution level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## Table A2.2 Gas

| Indicator | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upstream market** | | | | | | | | | | | |
| Market share of shippers | n/a for second largest shipper | n/a for second largest shipper | Yes | Yes | n/a for second largest shipper | Yes | Yes | n/a for second largest shipper | Yes | n/a for second largest shipper | n/a for second largest shipper |
| **Wholesale market** | | | | | | | | | | | |
| Price reporting | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Share of total (daily) volume traded covered by price reporting | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | n/a | Yes |
| Standardised contracts in wholesale markets | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Downstream market** | | | | | | | | | | | |
| Degree of supply market opening | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Market share of largest suppliers | n/a for third larges I&C supplier | Yes | n/a for the largest and the second largest supplier | n/a for the second largest supplier | Yes | Yes | Yes | Yes | Yes | Yes | n/a for the second largest supplier |
| Switching rates | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Network-related activities** | | | | | | | | | | | |
| Unbundling at transmission level | Yes | Yes | n/a | Yes | Yes | n/a | Yes | Yes | Yes | Yes | Yes |
| rTPA at transmission level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Unbundling at distribution level | Yes | Yes | n/a | Yes | Yes | n/a | Yes | Yes | Yes | Yes | Yes |
| rTPA at distribution level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Competitive access to gas storage | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## A2.2 Detailed data, final 2005 dataset

## Austrian electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.44 | Verbund annual report 2005, p.58 and Eurostat | |
| two largest generators | As above | 0.67 | Wien Energie Geschäftsbericht 2006 Part 2. | |
| three largest generators | As above | 0.76 | EVN Annual report 04/05, p.62. | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.14 | EC2005 Annex p106 and Austrian 2005 report to ERGEG, p.15 | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | Austrian 2005 report to ERGEG, p.15 | Joint explicit auction |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | Energy Exchange Austria | |
| Share of total (daily) volume traded covered by price reporting | | 0.500 | Assumption | |
| Standardised contracts | | Y | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.49 | E-Control Market Report 2006 (MARKTBERICHT 2006). p.56. Table 11. | Combined figure for I&C and domestic |
| two largest suppliers | As above | 0.63 | As above | As above |
| three largest suppliers | As above | 0.69 | As above | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.0725 | EC2005 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/ consumption | 0.49 | E-Control Market Report 2006 (MARKTBERICHT 2006). p.56. Table 11. | Combined figure for I&C and domestic |
| two largest suppliers | As above | 0.63 | As above | As above |
| three largest suppliers | As above | 0.69 | As above | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.0129 | E-Control 2006 annual report p.100 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005, p.79 (Corrigendum ) | Legal |
| rTPA at transmission level | Tariffs imposed/approved by independent regulator | Y | EC2003, p.13 Table 1 | Does not specify whether regulated network access applies to TSOs or DSOs |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005, p.80 (Corrigendum ) | |
| rTPA at distribution level | | Y | EC2003, p.13, Table 1 | Does not specify whether regulated network access applies to TSOs or DSOs |

Note: here and in subsequent tables L stands for legal unbundling, O stands for ownership unbundling.
Sources (for this and subsequent tables): EC2003 = European Commission (2004), 'Third Benchmarking Report on the Implementation of the Internal Electricity and Gas market', March; EC2004 = European Commission (2005), 'Fourth Benchmarking Report on the Implementation of the Internal Energy and Gas Market', January; and EC2005 = European Commission (2005), 'Report on progress in creating the internal gas and electricity market', November. EC2006 Energy Internal Market Fact Sheet = European Commission (2006) Energy Internal Market Fact Sheet.

## Austrian gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.71 | Austria annual report to ERGEG 2005 p60 | EconGas is the largest shipper |
| two largest shippers | As above | 0.76 | Assumed | |
| three largest shippers | As above | 0.80 | EC2005 annex table5.1 p55 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | Austria annual report to ERGEG 2005 p60 | No price reporting in either Baumgarten hub or gas release programme |
| Share of total (daily) volume traded covered by price reporting | | 0 | As above | As above |
| Standardised contracts | | Y | Herbet Smith: European Energy Review 2007 Austria p.9. | Because of the Baumgarten hub. Gas is traded physically and on the basis of bilateral contracts |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004 p.2 | The gas market was fully opened on 1 October 2002. No differentiation between I&C/domestic market. |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.78 | Econgas annual report, 2004/5 and press release | Econgas, in East control area. The definition of the geographic markets is restricted to the Eastern control area. |
| two largest suppliers | As above | 0.92 | Steirische Gas Wärme, Geschäftsbericht 2005 - Umschlag und Überblick, www.energie-steiermark.at | |
| three largest suppliers | As above | 0.95 | Assumed | Assumption based on Total Sales to final customers adjusted for cross-holdings from E-Control Market Report 2004, p.65 |
| Switching | Proportion of eligible customers' gross switching | 0.0445 | EC 2006 Energy Internal Market Fact Sheet Austria | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.10 | Freshfields Gas Regulation 2005, page 13. Austrian Competition Inquiry 2005, Page 78. | At household level, the gas market is split between the 9 roughly equal historical regions of Austria and the gas company for each area has a 90% + market share in its zone. |
| two largest suppliers | As above | 0.20 | As above | As above |
| three largest suppliers | As above | 0.30 | As above | As above |
| Switching | Proportion of eligible customers' gross switching | 0.004 | EC 2006 Energy Internal Market Fact Sheet Austria | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005 p.81 (Corrigendum) | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p.13 | Data does not specify whether regulated network access applies to TSO or DSOs |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005 p.82 (Corrigendum) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p.13 | Data does not specify whether regulated network access applies to TSO or DSOs |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | EU Energy, Issue 97–98, December 17th 2004, p. 26 | |

# Danish electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.47 | DONG Energ Investor Presentation Sept 06, Page 13, Denmark report to ERGEG 2006. | |
| two largest generators | As above | 0.61 | Denmark report to ERGEG 2006 page 22 | |
| three largest generators | As above | 0.63 | Assumed | Only 2 generators in Denmark with >5% share. Assumption of 2% for the third generator |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.50 | EC2005 Annex p117 | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | Denmark report to ERGEG 2005, P.6 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | Nord Pool | |
| Share of total (daily) volume traded covered by price reporting | | 5.66 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | Y | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.18 | DERA Press Release 'Elforsyningspligtselskaber–efterregulering', 31/10/05 | NESA is the largest supplier |
| two largest suppliers | As above | 0.30 | As above | Forsyning A/S is the second largest supplier |
| three largest suppliers | As above | 0.40 | As above | SEAS is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.21 | IEA Denmark 2006 Review table 24 p141. Danish Electricity Supply 2005, p.74 (danskenergi.dk) | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.18 | DERA Press Release 'Elforsyningspligtselskaber–efterregulering', 31/10/05 | NESA is the largest supplier |
| two largest suppliers | As above | 0.30 | As above | Forsyning A/S is the second largest supplier |
| three largest suppliers | As above | 0.40 | As above | SEAS is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.01 | IEA Denmark 2006 Review table 24 p. 141. Danish Electricity Supply 2005, p.74 (danskenergi.dk) | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 (Corrigendum ) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | Data does not specify whether regulated network access applies to TSO or DSOs |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | Data does not specify whether regulated network access applies to TSO or DSOs |

## Danish gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.83 | Danish Competition Authority | DONG is the largest shipper |
| two largest shippers | As above | 0.92 | Assumed | There are three gas distribution/supply companies in |
| three largest shippers | As above | 0.97 | EC2005, Table 5.1 | EC2005 Annex Table5.1 p55 |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | Herbet Smith: European Energy Review 2007, Denmark, p.8. | |
| Share of total (daily) volume traded covered by price reporting | | 0 | As above | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.51 | Denmark report to ERGEG 2006 p. 45 | DONG is the largest I&C supplier |
| two largest suppliers | As above | 0.73 | As above | Statoil Gazelle is the second largest I&C supplier |
| three largest suppliers | As above | 0.9 | As above | HNG/MN is the third largest I&C supplier |
| Switching | Proportion of eligible customers' gross switching | 0.3 | Danish Energy Regulatory Authority Annual Report 2005 p10 | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/ consumption | 0.52 | Denmark report to ERGEG 2006 p. 45 | HNG/MN is the largest domestic supplier |
| two largest suppliers | As above | 0.8 | As above | DONG is the second largest domestic supplier |
| three largest suppliers | As above | | As above | Statoil Gazelle is the third largest domestic supplier |
| Switching | Proportion of eligible customers' gross switching | )024 | Danish Energy Regulatory Authority Annual Report 2005 p10 | 2004 data refers to consumers who consume <300,000m$^3$ |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | Danish Energy Regulatory Authority Annual Report 2005 p10 | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2004, Annex 1, p. 2 | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1 p. 13 | |
| Competitive access to gas storage | Competitive auctions; rTPA | N | Energy Policies of IEC countries Denmark 2006 Review p151 | |

## Finnish electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.34 | Vattenfall presentation, EEI Utility Conference, 2007. Page 9 | Forum is the largest generator |
| two largest generators | As above | 0.53 | As above | PVO is the second largest generator |
| three largest generators | As above | 0.61 | As above | Helsingin Energia is the third largest generator |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.23 | Finland annual report to ERGEG 2005, p.26 | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | Finland annual report to ERGEG 2005, p.11 | Implicit auction |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | Nord Pool | |
| Share of total (daily) volume traded covered by price reporting | | 5.66 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.16 | Stora Enso Citigroup Global Paper & Forest Products Conference – 07/12/06, p.16 | |
| two largest suppliers | As above | 0.28 | UPM-Kymmene Group 2005 Annual Report, p. 43 | |
| three largest suppliers | As above | 0.33 | Metsäliitto 2005 Annual Report, Environmental Responsibility section | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.03 | EC2005 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.18 | Littlechild, S. (2005), 'Competition and Contracts in the Nordic Electricity Markets', November, p. 5, Table 1b | |
| two largest suppliers | As above | 0.26 | Assumption | Assumption. According to ERGEG, there are 5 companies with >5% retail market. Top 1 is 18%, so the second has been set to 8% and the third 7% to make up 33% share |
| three largest suppliers | As above | 0.33 | Finland annual report to ERGEG 2006 Table 7, p.33 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.03 | Finland annual report to ERGEG 2006 Table8 p34 | Difference between total switching in the market by 2005 and total switching by 2004 |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005, p.79 (Corrigendum ) | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |

# Finnish gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 1 | ERGEG Finland 2006, p. 44 | Gasum Ltd is the sole wholesale supplier in Finland. It imports natural gas from Russia. |
| two largest shippers | As above | 1 | As above | As above |
| three largest shippers | As above | 1 | As above | As above |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | www.energiamarkkinavirasto.fi/select.asp?gid=118&languageid | |
| Share of total (daily) volume traded covered by price reporting | | 0.70 | Finland annual report to ERGEG 2005, p41 | |
| Standardised contracts | | Y | Finland annual report to ERGEG 2005, p41, Finland annual report to ERGEG 2006 p.44 | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0 | EC2004 p.2 | Because of the derogation and 0% market opening, the competitiveness indicators of market opening and customer switching = 0 |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.25 | Assumption | |
| two largest suppliers | As above | 0.40 | Assumption | |
| three largest suppliers | As above | 0.50 | Finland annual report to ERGEG 2006, p.45 | |
| Switching | Proportion of eligible customers' gross switching | 0 | EC2003, p.9, Table 4 | Derogation |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0 | EC2004, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.25 | Assumption | |
| two largest suppliers | As above | 0.40 | Assumption | |
| three largest suppliers | As above | 0.50 | Finland annual report to ERGEG 2006 p45 | |
| Switching | Proportion of eligible customers' gross switching | 0 | EC2003, p.9, Table 4 | Derogation |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | N | Assumed | |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | Finland annual report to ERGEG 2005 p9 | |
| Unbundling at distribution level | Legal or ownership separation | N | Assumed | |
| rTPA at distribution level | | Y | Finland annual report to ERGEG 2005 p9 | |
| Competitive access to gas storage | Competitive auctions; rTPA | N | EU Energy, Issue 97-98, 17th December 2004, p.26 | There are no production or storage facilities in Finland |

# Italian electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.50 | Enel Annual Report 2005. Eurostat | |
| two largest generators | As above | 0.57 | Edison Annual Report 2005, p.2 | |
| three largest generators | As above | 0.65 | Endesa annual report 2005, p.83 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.09 | EC2005 Annex p141. Autorita' per l'energia elettrica e il gas, Press Release: Rules drawn up for electricity imports and exports and exports for 2006, 13 December 2005, Eurostat. | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | Italy annual report to ERGEG 2006, p.14, 15 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | GME | |
| Share of total (daily) volume traded covered by price reporting | | 0.44 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | N | GME | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0.79 | European electricity market indicators of the liberalization process, Table1, p.1 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.13 | Italy report to ERGEG 2006, p. 31 | Enel is the largest I&C supplier |
| two largest suppliers | As above | 0.24 | As above | Edison Group is the second largest I&C supplier |
| three largest suppliers | As above | 0.33 | EC2005, p.45 | Egl Italia is the third largest I&C supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.15 | EC2005 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0.79 | European electricity market indicators of the liberalization process, Table1, p.1 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.85 | Italy annual report to ERGEG 2006, p. 30 | Enel in the largest domestic supplier |
| two largest suppliers | As above | 0.90 | As above | Acea is the second largest domestic supplier |
| three largest suppliers | As above | 0.94 | EC 2005, p.45 | Acm is the third largest domestic supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0 | EC2005 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 (Corrigendum ) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, p.13 Table 1 | |

# Italian gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.65 | ENI Factbook 2005, p58 | |
| two largest shippers | As above | 0.76 | As above | |
| three largest shippers | As above | 0.85 | As above | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | Italian regulator, 'Fact-finding investigation into the state of liberalisation in the natural gas sector' | |
| Share of total (daily) volume traded covered by price reporting | | 0 | | |
| Standardised contracts | | N | Italy annual report to ERGEG 2006, p.37 | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.45 | ENI Factbook 2005, p.52. Italy annual report to ERGEG 2006, table4.10, p.5 | |
| two largest suppliers | As above | 0.58 | Assumed | |
| three largest suppliers | As above | 0.71 | Italy annual report to ERGEG 2006, table4.10, p.51 | |
| Switching | Proportion of eligible customers' gross switching | 0.08 | Italy annual report to ERGEG 2006, p.52 | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.26 | ENI factbook 2005, p.54 | |
| two largest suppliers | As above | 0.37 | Assumed | Enel sold 6.7 bcm gas in 2005. Assumed 3.3 residential. |
| three largest suppliers | As above | 0.47 | Italy annual report to ERGEG 2006, table4.10, p.51 | |
| Switching | Proportion of eligible customers' gross switching | 0.01 | Italy annual report to ERGEG 2006 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005 p.81 (Corrigendum) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005 p.82(Corrigendum) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1 | |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | EC2005 Annex Table6.6, p73. | |

# Dutch electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.23 | Essent 2005 Annual Report, p.45 | |
| two largest generators | As above | 0.44 | Electrabel Activities Report 2005, Electricity Generation, p. 32 | |
| three largest generators | As above | 0.62 | Nuon. Moody's Analysis June 2005, report no. 93060 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.28 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | EC2002, Appendix 5, p. 34 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | APX | |
| Share of total (daily) volume traded covered by price reporting | | 0.15 | As above | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2005, p156 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.29 | Peace Software and VaasaEmg—Utility Customer Switching in the Netherlands and Belgium, Nov 05, p.6 | Nuon is the largest supplier |
| two largest suppliers | As above | 0.56 | See above | Essent is the second largest supplier |
| three largest suppliers | As above | 0.79 | See above | ENECO is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.06 | EnergieNed, 'Energy in the Netherlands 2006' Page 56 | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2005, p.156 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.29 | Peace Software and VaasaEmg—Utility Customer Switching in the Netherlands and Belgium, Nov 05, p.6 | Nuon is the largest supplier |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| two largest suppliers | As above | 0.56 | See above | Essent is the second largest supplier |
| three largest suppliers | As above | 0.79 | See above | ENECO is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.08 | Peace Software and VaasaEmg Utility Customer Switching research project, June 2005, p.7 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |

# Dutch gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.80 | IFP 2006, 'The Strategy of Players on the European Gas Market', p. 4; Nma Annual Report 2005, p.126 | |
| two largest shippers | As above | 0.83 | Assumption | |
| three largest shippers | As above | 0.85 | EC2005, p. 55, table 5.1 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | APX | |
| Share of total (daily) volume traded covered by price reporting | | 0.53 | As above | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.3 | Continuon Netbeheer/Nuon. Page 2, S&P Ratings Direct 20-Sep-2005 | Nuon is the largest supplier |
| two largest suppliers | As above | 0.57 | EnergieNed 'Energie in Nederland 2006', p.22 | Essent is the second largest supplier |
| three largest suppliers | As above | 0.83 | As above | ENECO is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0.06 | EnergieNed, 'Energy in the Netherlands 2006', p.56 | Same value taken for I&C and domestic |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.3 | Continuon Netbeheer/Nuon. Page 2, S&P Ratings Direct 20-Sep-2005 | Nuon is the largest supplier |
| two largest suppliers | As above | 0.57 | EnergieNed 'Energie in Nederland 2006', p.22 | Essent is the second largest supplier |
| three largest suppliers | As above | 0.83 | As above | ENECO is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0.06 | EnergieNed, 'Energy in the Netherlands 2006', p.56. Nma Annual Report 2005, p.128 | Same value taken for I&C and domestic |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005 p.81 (Corrigendum) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | N | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005 p.82(Corrigendum) | Legal |
| rTPA at distribution level | | Y | IEA - Energy Policies of the Netherlands 2004, p. 82 | |
| Competitive access to gas storage | Competitive auctions; rTPA | N | EU Energy, Issue 97–98, December 17th 2004, p. 27 | |

## Portuguese electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.52 | EDP financial results 2005 (07/03/06). EDP Institucional Report 2005, p.51 | |
| two largest generators | As above | 0.65 | INFORMAÇÃO MENSAL, www.ren.pt, page 5 dec 2005 | |
| three largest generators | As above | 0.75 | Tejo Energia 2005 Annual Report, p. 4 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.08 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | ERSE Annual Report to the European Commission 2006, p. 32 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | | Cne ready to run spot market and OMIP to manage contract trading from January 2005. |
| Share of total (daily) volume traded covered by price reporting | | 0 | | |
| Standardised contracts | | N | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2005, Annex p163 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.66 | EDP Institucional Report 2005, page 66 http://www.edp.pt/download/PDF/2005_institutional_report.pdf | |
| two largest suppliers | As above | 0.90 | Endesa 2005 Annual report, page 78 | |
| three largest suppliers | As above | 0.99 | Iberdrola 2005 Annual Report, page 91 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.07 | Difference between EC2004, Annex 1, p.5 & EC2005 p.38 | Figure has stayed consistent in 2005 |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2005, Annex p.163 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.70 | EDP Institucional Report 2005, p.66 | |
| two largest suppliers | As above | 0.94 | Endesa 2005 Annual report, p. 78 | |
| three largest suppliers | As above | 0.99 | EC2005 | Iberdrola is the third largest domestic supplier. EC2005 reports only 2 companies with 5%+ market share |
| Switching | Proportion of eligible customers' gross switching per annum | 0.01 | EC2005, p.163 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 (Corrigendum ) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p.13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p.13 | |

## Portuguese gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | **Information not available due to derogation from the European Commission's Second Gas Directive** |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 1 | | |
| two largest shippers | As above | 1 | | |
| three largest shippers | As above | 1 | | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | | |
| Share of total (daily) volume traded covered by price reporting | | 0 | | |
| Standardised contracts | | N | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0 | | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 1 | | |
| two largest suppliers | As above | 1 | | |
| three largest suppliers | As above | 1 | | |
| Switching | Proportion of eligible customers' gross switching | 0 | | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0 | | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 1 | | |
| two largest suppliers | As above | 1 | | |
| three largest suppliers | As above | 1 | | |
| Switching | Proportion of eligible customers' gross switching | 0 | | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | N | Assumed | |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | N | | |
| Unbundling at distribution level | Legal or ownership separation | N | Assumed | |
| rTPA at distribution level | | N | | |
| Competitive access to gas storage | Competitive auctions; rTPA | N | EU Energy, Issue 97–98, December 17th 2004, p. 27 | |

# Spanish electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.38 | Endesa Presentation, 'Endesa: stronger business, greater value', October 3rd 2005 | |
| two largest generators | As above | 0.64 | As above | Iberdrola is the second largest generator |
| three largest generators | As above | 0.78 | Union Fenosa. 'An Overview of the Spanish Electricity Industry' Universidad Carlos III de Madrid and CEPR, May 05, p.18 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.05 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | OMEL | |
| Share of total (daily) volume traded covered by price reporting | | 1 | As above | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.42 | Endesa Presentation, 'Endesa: stronger business, greater value', October 3rd 2005 | |
| two largest suppliers | As above | 0.80 | As above | Iberdrola is the second largest supplier |
| three largest suppliers | As above | 0.90 | Union Fenosa. 'An Overview of the Spanish Electricity Industry' Universidad Carlos III de Madrid and CEPR, May 05, p.19 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.07 | Difference between EC2004, Annex 1, p.5 & EC2005 p.45 | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.42 | Endesa Presentation, 'Endesa: stronger business, greater value', October 3rd 2005 | |
| two largest suppliers | As above | 0.80 | As above | Iberdrola is the second largest supplier |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| three largest suppliers | As above | 0.90 | Union Fenosa. 'An Overview of the Spanish Electricity Industry' Universidad Carlos III de Madrid and CEPR, May 05, p.19 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.01 | Difference between values in EC2004, Annex 1, p. 5 and EC2005 p. 45 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 (Corrigendum ) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |

# Spanish gas market data

| Indicator | Definition | | Assessment | Source | Comments |
|---|---|---|---|---|---|
| **Upstream market** | | | | | |
| Market share of | | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.45 | | Gas natural comercializadora. Información básica de los sectores de la energía 2005, CNE, Gas chapter page 21. Informe sobre el consume de gas natural en 2004, CNE (27/05/05) | |
| two largest shippers | As above | 0.62 | | Información básica de los sectores de la energía 2005, CNE, Gas chapter page 21. | Energas is the second largest shipper |
| three largest shippers | As above | 0.73 | | As above | Iberdrola is the third largest shipper |
| **Wholesale market** | | | | | |
| Price reporting | Price information publicly available | Y | | Gas release programme | |
| Share of total (daily) volume traded covered by price reporting | | 0.20 | | | |
| Standardised contracts | | Y | | | |
| **Downstream market** | | | | | |
| **I&C** | | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | | EC2004, Annex 1, p. 2. | |
| Market share of | | | | | |
| largest supplier | Proportion of total supply/consumption | 0.54 | | Gas Natural 5 year data summary | Figure is TPA distribution only |
| two largest suppliers | As above | 0.67 | | Iberdrola 2005 financial results, p.3 | |
| three largest suppliers | As above | 0.78 | | Cedigaz, The Players on the European Gas Market: Positioning and Strategies', page 11 | BP is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0.1 | | Difference between EC2005, Table 3.2 page 39 & EC2004, Annex 1, p. 6, | |
| **Domestic** | | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | | EC2004, Annex 1, p. 2 | |
| Market share of | | | | | |
| largest supplier | Proportion of total supply/consumption | 0.54 | | Gas Natural 5 year data summary | |
| two largest suppliers | As above | 0.67 | | Iberdrola 2005 financial results, p.3 | |
| three largest suppliers | As above | 0.78 | | Cedigaz, The Players on the European Gas Market: Positioning and Strategies', page 11 | |
| Switching | Proportion of eligible customers' gross switching | 0.14 | | Comision Nacional De Energia Memoria 2005, p.16 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005 p.81 (Corrigendum) | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005 p.82(Corrigendum) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | EU Energy, Issue 97–98, December 17th 2004, p. 26 | |

## Swedish electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.47 | Swedish Energy Markets Inspectorate's Annual Report to the EC in accordance with the proposed reporting structure, May 2005. P. 5. | |
| two largest generators | As above | 0.70 | Swedish Energy Agency, 'The Swedish Energy Market' 2005, Table 10, p. 23 | Sydkraft is the second largest generator |
| three largest generators | As above | 0.86 | Swedish Energy Markets Inspectorate's Annual Report to the EC in accordance with the proposed reporting structure, May 2005. P. 5. | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.24 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | rTPA | | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | Nord Pool | |
| Share of total (daily) volume traded covered by price reporting | | 5.66 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | Y | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.23 | Competition and Contracts in the Nordic Electricity Markets', Littlechild, Nov 05, p.5. | |
| two largest suppliers | As above | 0.37 | http://www.fortum.com/gallery/Investors2005/CMD_2005_Lundberg.pdf | Fortum is the second largest supplier |
| three largest suppliers | As above | 0.50 | Supplier Switching in the Nordic Countries, Sept 05, page 73 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.03 | Supplier Switching in the Nordic Countries, Sept 05, page 76 | |

| | | | | |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.23 | Competition and Contracts in the Nordic Electricity Markets', Littlechild, Nov 05, p.5. | |
| two largest suppliers | As above | 0.37 | http://www.fortum.com/gallery/Investors2005/CMD_2005_Lundberg.pdf | Fortum is the second largest supplier |
| three largest suppliers | As above | 0.50 | Supplier Switching in the Nordic Countries, Sept 05, page 73 | |
| Switching | Proportion of eligible customers' gross switching per annum | 0.10 | Swedish Energy Agency, The Swedish Energy Market 2005, p.27 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |

# Swedish gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.75 | E.On Strategy & Key Figures 2005, p.110 | Sydkraft Gas is the largest shipper |
| two largest shippers | As above | 0.80 | Assumed | DONG Sverige is the second largest shipper |
| three largest shippers | As above | 0.85 | EC2005, Table 5.1, p.55 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | | |
| Share of total (daily) volume traded covered by price reporting | | 0 | | |
| Standardised contracts | | N | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | Sweden annual report to ERGEG2005, p.5 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.54 | 2005 Energimarknadsinspektionen, p. 59. 'Swedish Energy Market 2005' p.29. | Sydkraft Gas is the largest supplier |
| two largest suppliers | As above | 0.69 | As above | Göteborg Energi is the second largest supplier |
| three largest suppliers | As above | 0.81 | As above | Nova Naturgas—owned by Dong—is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0 | EC2005 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 0 | EC2005 p175, country summary | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.54 | 2005 Energimarknadsinspektionen, p. 59. 'Swedish Energy Market 2005' p.29. | Sydkraft Gas is the largest supplier |
| two largest suppliers | As above | 0.69 | As above | Göteborg Energi is the second largest supplier |
| three largest suppliers | As above | 0.81 | As above | Nova Naturgas—owned by Dong—is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0 | EC2005 | EC2005, p.175 states that very few customers have changed supplier or renegotiated their contracts. It adds that no specific studies have been undertaken on the subject. |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005 p.81 (Corrigendum) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005 p.82(Corrigendum) | |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | EU Energy, Issue 97–98, December 17th 2004, p. 26 | |

# UK electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.15 | DUKES, Table 5.11 | |
| two largest generators | As above | 0.27 | As above | |
| three largest generators | As above | 0.38 | As above | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.03 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | | |
| Share of total (daily) volume traded covered by price reporting | | 1.57 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | Y | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | Market concentration = 0.34 | BERR | Market share not available due to confidentiality |
| two largest suppliers | As above | As above | BERR | As above |
| three largest suppliers | As above | As above | BERR | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.20 | Peace Software & VaasaEmg Utility Customer Switching Research Project, Dec. 2004 figure | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.22 | Domestic Retail Market Report - June 2005, Ofgem | BGT is the largest domestic supplier |
| two largest suppliers | As above | 0.43 | As above | Powergen is the second largest domestic supplier |
| three largest suppliers | As above | 0.59 | As above | SSE is the third largest domestic supplier |
| Switching | Proportion of eligible customers' gross switching per annum | 0.19 | Peace Software and VaasaEmg Utility Customer Switching research project, June 2005 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005, p.79 | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | L | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |

# UK gas market data

| Indicator | Definition | | Assessment | Source | Comments |
|---|---|---|---|---|---|
| **Upstream market** | | | | | |
| Market share of | | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.20 | | DG Competition report on energy sector inquiry (SEC(2006)1724, 10 January 2007), Part 1, Table 1 p. 40. | |
| two largest shippers | As above | 0.27 | | E.ON UK. 'Gas Contingency Arrangements and Customer Demand Side Response' 1 December 2005, slide 3. BG Group Response to Energy Sector Inquiry Preliminary Report, 02/05/06 | |
| three largest shippers | As above | 0.33 | | UK annual report to ERGEG 2006, Table 4.11, p. 68 | |
| **Wholesale market** | | | | | |
| Price reporting | Price information publicly available | Y | | | |
| Share of total (daily) volume traded covered by price reporting | | 1 | | | |
| Standardised contracts | | Y | | | |
| **Downstream market** | | | | | |
| **I&C** | | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | | EC2004, Annex 1, p. 2. | |
| Market share of | | | | | |
| largest supplier | Proportion of total supply/consumption | 0.2 | | UK annual report to ERGEG 2006, Table 4.17, p. 74 | GdF is the largest I&C supplier |
| two largest suppliers | As above | 0.37 | | As above | Statoil UK is the second largest I&C supplier |
| three largest suppliers | As above | 0.51 | | As above | Shell Gas Direct is the third largest I&C supplier |
| Switching | Proportion of eligible customers' gross switching | 0.19 | | EC2004, Annex 1, p. 6 | |
| **Domestic** | | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | | EC2004, Annex 1, p. 2. | |
| Market share of | | | | | |
| largest supplier | Proportion of total supply/consumption | 0.53 | | Ofgem, Domestic Retail Market Report - June 2005 | BGT is the largest domestic supplier |
| two largest suppliers | As above | 0.67 | | As above | Powergen is the second largest domestic supplier |
| three largest suppliers | As above | 0.76 | | As above | SSE is the third largest domestic supplier |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| Switching | Proportion of eligible customers' gross switching | 0.17 | Ofgem, 'Domestic Retail Market Report' - Sept 2005, p. 9 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | O | EC2005 p.81 (Corrigendum) | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2003, Table 1, p. 13 | |
| Unbundling at distribution level | Legal or ownership separation | O | EC2005 p.82 (Corrigendum) | Ownership |
| rTPA at distribution level | | Y | EC2003, Table 1, p. 13 | |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | *EU Energy*, Issue 97–98, December 17th 2004, p. 26 | |

## German electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.29 | RWE Annual Report 2005, p. 38 | |
| two largest generators | As above | 0.51 | E.ON. Strategy and Key Figures 2005, p. 31 | |
| three largest generators | As above | 0.64 | Vattenfall Annual Report 2005 p. 37 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.15 | UCTE System Adequacy Forecast, Nordel Annual Statistics, NGC 7 Yr Statement and Eirgrid Transmission Forecast Statement | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | EEX | |
| Share of total (daily) volume traded covered by price reporting | | 6.58 | EC Sector Inquiry, Tables 16 and 17 | |
| Standardised contracts | | Y | | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.17 | RWE facts and figures 2006, p. 204, p. 195 (Source: VDEW 2005) | Does not distinguish between I&C and domestic |
| two largest suppliers | As above | 0.35 | As above | As above |
| three largest suppliers | As above | 0.46 | As above | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.08 | Verband der Elektrizitätswirtschaft e.V. (German Electricity Association), April 2005, quoted p.7 RWE. Utilities—Electricity—Electricity Supply—Market Data | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p.2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.17 | RWE facts and figures 2006, p. 204, p. 195 (Source: VDEW 2005) | Does not distinguish between I&C and domestic |
| two largest suppliers | As above | 0.35 | As above | As above |
| three largest suppliers | As above | 0.46 | As above | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.01 | Peace Software and VaasaEmg Utility Customer Switching research project, June 2005 | |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005, p.79 | Ownership |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | | Due to the implementation of the Energy Act July 2006 |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005, p.80 (Corrigendum ) | Legal |
| rTPA at distribution level | | Y | | Due to the implementation of the Energy Act July 2006 |

## German gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.40 | Ruhrgas Annual Report 2005, p. 12 | |
| two largest shippers | As above | 0.60 | Assumed | |
| three largest shippers | As above | 0.80 | EC2005, p.55 table 5.1 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | Y | Eurohub | |
| Share of total (daily) volume traded covered by price reporting | | 0.5 | Assumed | |
| Standardised contracts | | Y | Eurohub | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.56 | Cedigaz, 'The Players on the European Gas Market: Positioning and Strategies', p. 12 | Ruhrgas is the largest supplier |
| two largest suppliers | As above | 0.72 | As above | RWE Gas is the second largest supplier |
| three largest suppliers | As above | 0.87 | As above | VNG is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0.05 | Eurostat: European gas market indicators of the liberalisation process 2004-2005, p. 6 | Same value taken for I&C and domestic |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | EC2004, Annex 1, p. 2 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.56 | Cedigaz, 'The Players on the European Gas Market: Positioning and Strategies', p. 12 | Ruhrgas is the largest supplier |
| two largest suppliers | As above | 0.72 | As above | RWE Gas is the second largest supplier |
| three largest suppliers | As above | 0.87 | As above | VNG is the third largest supplier |
| Switching | Proportion of eligible customers' gross switching | 0.05 | Eurostat: European gas market indicators of the liberalisation process 2004-2005, p. 6 | Same value taken for I&C and domestic |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2004, Annex 1, p. 2 | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EU Energy, Issue 122–123, December 16th 2005, p.34 | Reg TPA provided by the new Energy Act, which entered force on 13/07/05 |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005 p.82 (Corrigendum) | Legal |
| rTPA at distribution level | | N | As above | |
| Competitive access to gas storage | Competitive auctions; rTPA | Y | EU Energy, Issue 122-123, December 16th 2005, p.34 | Reg TPA provided by the new Energy Act, which entered force on 13/07/05 |

# Irish electricity market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest generator | Proportion of total available capacity | 0.65 | ESB Press release July 13th 2005: http://www.esb.ie/main/news_events/press_release277.jsp | ESB is the largest generator |
| two largest generators | As above | 0.90 | Assumed | Viridian is the second largest generator. 2 generators with >5% share, assume 3% share for the 3rd largest generator |
| three largest generators | As above | 0.93 | Ireland annual report to ERGEG 2005 Table3.2.1 p.24 | |
| Degree of technical openness of market | Total interconnector capacity as proportion of peak demand | 0.06 | EC2005 Annex Table 9.1, p.89 | |
| Openness of allocation mechanism to import capacity | rTPA, auction mechanism, long-term contracts | Auction | Ireland annual report to ERGEG 2005, p.26 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | EC2005 Annex, p.139 | |
| Share of total (daily) volume traded covered by price reporting | | 0 | | |
| Standardised contracts | | N | Ireland annual report to ERGEG 2005, p.24 | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | 'European electricity market indicators of the liberalization process', Table 1, p.1 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.70 | Ireland annual report to ERGEG 2005, Table 3.2.5 p.27 | No distinction between I&C and domestic |
| two largest suppliers | As above | 0.89 | Assumed | As above. 3 firms with >5% share |
| three largest suppliers | As above | 0.99 | Ireland annual report to ERGEG 2005, Table 3.2.7, p.28 | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.06 | As above | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | 'European electricity market indicators of the liberalization process', Table 1, p.1 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.70 | Ireland annual report to ERGEG 2005, Table 3.2.5 p.27 | No distinction between I&C and domestic |
| two largest suppliers | As above | 0.89 | Assumed | As above. 3 firms with >5% share |
| three largest suppliers | As above | 0.99 | Ireland annual report to ERGEG 2005, Table 3.2.7, p.28 | As above |
| Switching | Proportion of eligible customers' gross switching per annum | 0.02 | As above | |
| Network-related activities | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | EC2005, p.79 (Corrigendum ) | Legal |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2005 p.138 | |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005, p.80 (Corrigendum ) | |
| rTPA at distribution level | | Y | EC2005 p.138 | |

# Irish gas market data

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| **Upstream market** | | | | |
| Market share of | | | | |
| largest shipper | Proportion of total gas sources by shipper | 0.42 | Bord Gais annual report 2005, p.10 | |
| two largest shippers | As above | 0.71 | Assumed | 5 shippers with >5% share |
| three largest shippers | As above | 0.84 | EC2005 Annex Table 5.1, p.55 | |
| **Wholesale market** | | | | |
| Price reporting | Price information publicly available | N | Ireland annual report to ERGEG 2006, p.39 | Since the market is a bilateral 'over-the-counter' contracts market there is no swaps market in place. Similarly, since the market is bilateral there is no direct market surveillance. |
| Share of total (daily) volume traded covered by price reporting | | 0 | As above | |
| Standardised contracts | | N | As above | |
| **Downstream market** | | | | |
| **I&C** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | Ireland annual report to ERGEG 2005, p.37 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.37 | Energy Policies of IEA Countries: Ireland 2007 Review, p. 108 | BGS is the largest supplier |
| two largest suppliers | As above | 0.7 | Assumed | 4 firms with >5% share |
| three largest suppliers | As above | 0.97 | EC2005 Annex, Table 5.2, p.58 | |
| Switching | Proportion of eligible customers' gross switching | 0.23 | Ireland annual report to ERGEG 2005, Table 4.2.5, p.49 | |
| **Domestic** | | | | |
| Degree of supply market opening | Proportion of total customer base in volume terms | 1 | Ireland annual report to ERGEG 2005, p37 | |
| Market share of | | | | |
| largest supplier | Proportion of total supply/consumption | 0.37 | Energy Policies of IEA Countries: Ireland 2007 Review, p. 108 | |
| two largest suppliers | As above | 0.7 | Assumed | |
| three largest suppliers | As above | 0.97 | EC2005 Annex, Table 5.2, p.58 | |

| Indicator | Definition | Assessment | Source | Comments |
|---|---|---|---|---|
| Switching | Proportion of eligible customers' gross switching | 0 | Ireland annual report to ERGEG 2005, Table4.2.5, p.49. EC 2006 Ireland Internal Market Fact Sheet 2006. | Only opened up to competition in 2007 |
| **Network-related activities** | | | | |
| Unbundling at transmission level | Legal or ownership separation | L | ERGEG Ireland 2006, p. 37 | New legislation, SI 760 of 2005, was introduced in late 2005 which gave further legal effect to Directive 2003/55/EC by providing for the legal unbundling of the transmission and distribution systems operations of BGE |
| rTPA at transmission level | Tariffs imposed or approved by independent regulator | Y | EC2005 Annex p138 | |
| Unbundling at distribution level | Legal or ownership separation | N | EC2005 p.82 (Corrigendum) | |
| rTPA at distribution level | | Y | EC2005 Annex, p.138 | |
| Competitive access to gas storage | Competitive auctions; rTPA | N | 'An Assessment of the Technical and Economic Requirement for Third Party Access to a Proposed Storage Facility at the Kinsale Head Gas Facility in Ireland', Oct 05 | Marathon proposes to make the full capability of the Kinsale storage facility available to third parties from 1 May 2006 |

# Appendix 3 Methodological review

## A3.1 Introduction

The multi-staged methodology developed in 2003[16] by Oxera to measure and compare the competitiveness of the UK energy market with that of the remainder of the EU and G7 has been recently reviewed in light of developments in the energy markets and greater data availability as markets liberalise. Oxera's methodology produces an energy market competitiveness score of between 0 and 10 for each of the countries. Oxera measures and scores its selection of competitiveness indicators so that highest scores are given to market structures and outcomes that are expected to deliver competitive outcomes in terms of efficient pricing and profitability. This appendix assesses the need for changes to the 2003 methodology. The key stages in this analysis are as follows.

– **Choice of indicators**—a range of indicators at the upstream, wholesale, downstream and network stages of the electricity and gas supply chains have been chosen to measure competitiveness. These indicators were selected on the basis of their economic relevance and the feasibility of obtaining data on them across countries and over time. Where data availability posed problems, appropriate proxies for the relevant indicators were used. (See Table A3.1 for a complete list of indicators.)

– **Standardisation of indicators**—due to the variety of indicators used, they cannot be combined into a single energy market score without first being standardised into comparable scores. For instance, downstream market competitiveness is a combination of market concentration and switching rates. These indicators are therefore standardised into scores from 0 to 10, with 10 awarded when the values of the indicators are considered to be highly competitive, and 0 given when they are judged uncompetitive. Table A3.1 explains the standardisation rules for the indicators used in Oxera's methodology.

– **Aggregation of indicators at different segments of the supply chain**—the chosen indicators are then averaged separately into scores for upstream, wholesale, downstream and network areas for the electricity and gas sectors using the pre-determined weights set out in Table A3.1.

– **Aggregation of segmental indicators into electricity and gas market scores**—the upstream, wholesale, downstream and network competitiveness scores are then averaged into electricity and gas sector competitiveness scores. Each of the market areas (upstream, wholesale and downstream) is given an equal weighting of 0.33 to determine an aggregate score for the market areas as a whole. The weights given to the market and network areas are then determined on the basis of the share of generation and supply costs versus network costs in the final consumer price.

– **Aggregation of electricity and gas scores into a single energy market score**—the electricity and gas market scores are averaged into a single energy market score with the size of the markets as weights. The rebased cardinal approach, which has been adopted as part of the new methodology, together with alternative methodologies, are discussed in this appendix.

[16] The methodology is discussed in Oxera (2003), 'Energy Market Competition in the EU and G7: The Relative Extent of Energy Market Competition in the EU and G7'.

**Table A3.1 Original methodology for the standardisation of competitiveness indicators**

| Indicator | Standardisation rule | Weights (electricity) | Weights (gas) |
|---|---|---|---|
| **Upstream market** | | | |
| Market concentration | 20–30%=10; 30–40%=8; 40–50%=6; 50–60%=4; 60–70%=2; >70%=0 | 70 | 100 |
| Degree of technical openness | 20% =10; 0%=0; linear in between | 15 | 0 |
| Openness of allocation mechanism to import capacity | rTPA or non-discriminatory auction process = 10; other=0 | 15 | 0 |
| **Wholesale market** | | | |
| Price reporting | Y=10; N=0 | 50 | 50 |
| Share of daily volume traded covered by price reporting | 100%=10; <5%=0 | 25 | 25 |
| Standardised contracts | Y=10; N=0 | 25 | 25 |
| **Downstream market** | | | |
| Market concentration | 20–30%=10; 30–40%=8; 40–50%=6; 50–60%=4; 60–70%=2; >70%=0 | 70 | |
| Annual gross switching | >5%=10; 0%=0; linear in between | 30 | |
| **Network areas** | | | |
| TSO unbundling | Y=10; N=0 | 30 | 30 |
| rTPA to transmission | Y=10; N=0 | 30 | 30 |
| DSO unbundling | Y=10; N=0 | 20 | 15 |
| rTPA to distribution | Y=10; N=0 | 20 | 15 |
| rTPA to gas storage | Y=10; N=0 | 0 | 10 |

Source: Oxera.

This appendix is structured as follows:

– section A3.2 reviews the indicators chosen by Oxera as a measure of competitiveness, studying the requirement and scope for additions or changes to those currently used;
– section A3.3 inspects the methodology for aggregating the standardised indicator scores into scores for different segments of the supply chain, with particular focus on the impact of the interactions between various indicators;
– section A3.4 examines the rules used for standardising the indicator data;
– section A3.5 inspects the methodology for aggregating electricity and gas market scores into a single energy market score.

## A3.2 Review of Oxera's choice of indicators

In reviewing the choice of indicators, the requirement for additional indicators or changes to existing indicators has been considered to ensure that the methodology captures as closely as possible the existing degree of barriers to competition in energy markets. The recently published European Commission's Energy Sector Inquiry ('the Sector Inquiry') provides an indication of the issues relevant to an assessment of competition concerns.[17] The following barriers to competition in the gas market are identified in the Sector Inquiry.

[17] European Commission (2007), 'DG Competition Report on Energy Sector Inquiry', January 10th.

– **Market concentration**—high wholesale market concentration and the existence of long-term contracts is reducing trade on gas hubs.

– **Vertical foreclosure**—limited wholesale market liquidity (due to long-term contracts) and lack of access to infrastructure preventing new entry. The latter constraint on new entry results from the ownership of network and storage infrastructure by the incumbent gas importers, and insufficient separation of infrastructure and supply areas.

– **Market integration**—cross-border sales apply limited competitive pressure as incumbents rarely enter other national markets (other than by acquisition) and there is limited availability of transit capacity. The latter is controlled by incumbents on legacy contracts that are derogated from normal rTPA rules. Congestion management rules are ineffective and network capacity remains unavailable to new entrants even when networks are expanded.

– **Transparency**—there is limited access to information on access to networks, transit capacity and storage.

– **Price formation**—the linking of gas contracts to oil price indices is leading to inefficiencies.

– **Issues in balancing markets**—new entry is hampered due to the existence of small balancing zones that increase the costs and complexity of shipping gas. Lack of transparency in balancing charges further favours incumbents.

– **Foreclosure of retail markets**[18]—this is taking place due to the exclusive and long-term nature of contracts, a limited number of supply offers being made and limitations in the number of consumers that have exercised their eligibility in some Member States. In addition, use restrictions on gas and restrictions by suppliers on delivery points limit competition.

The European Commission has identified barriers along the same lines for electricity markets.

– **Market concentration**—generation market concentration remains high, providing generators with the power to raise prices in wholesale markets.

– **Vertical foreclosure**—vertical integration between generation and retail activities reduces wholesale market liquidity, creating a barrier to new entry. Integration between network and supply companies reduces the incentives for the former to grant access to third parties.

– **Market integration**—cross-border sales are unable to exert competitive pressure on dominant generators due to limited integration. This results from insufficient interconnection capacity and pre-liberalisation long-term capacity reservation contracts. Inefficient congestion management and lack of incentives for market participants to invest in additional capacity add to the problems.

– **Transparency**—more information is required on the technical availability of interconnectors and transmission networks, on generation, on balancing and reserve power, and on load.

– **Price formation**—the co-existence of regulated and market prices in some markets has been considered to hamper the development of competition if, in the presence of rising wholesale prices, regulators are tempted to set supply tariffs below the wholesale level, squeezing out new entrants that do not own generation capacity.

[18] As supply to industrial users was opened up to competition before that of the remaining market, the Sector Inquiry deals with industrial users alone.

– **Issues in balancing markets**—high concentration in balancing markets allows generators to exercise their market power, creating barriers to entry. Increasing the size of the balancing control area, harmonisation of balancing market regimes and unbundling between the TSOs and generators have been identified as potential remedies.

– **Foreclosure of retail markets**—the issues concerning electricity retail markets remain similar to those in gas markets.

The remainder of this section identifies whether the existing indicators capture these barriers to competition and suggests additions or modifications to the indicators adopted, where needed. Each of these barriers is evaluated within Oxera's framework of separately analysing the upstream, wholesale, downstream and network areas. Where the need for additional indicators has been identified, they are proposed as possible additions only where consistent and comparable data is expected to be available for them across countries and over time to make their inclusion feasible. On this basis, changes have been proposed to the network area indicators alone.

### A3.2.1 Upstream market indicators

The original methodology for measuring energy market competitiveness uses the following indicators:

– market concentration of generators and shippers as a measure of the potential for single or joint market dominance in the electricity and gas markets, respectively.

The following indicators are additionally used for the electricity market:

– interconnector capacity as an additional source of competition;
– the allocation mechanism to interconnector capacity, to evaluate whether the existence of interconnector capacity provides a potential source of competition, or whether the incumbents alone would be able to procure electricity through the interconnectors.

The difference between the electricity and gas indicators arises due to the differing roles of domestic producers in the two markets. Whereas electricity demand is met by electricity produced by domestic generators, most countries are dependent on imports for a significant proportion of their gas supply. Therefore, while concentration of electricity generators provides the competitive element in the electricity market, that of gas shippers provides it in the gas market. As shippers rather than producers are the market participants of interest in the upstream gas market, the role of interconnectors is not separately considered.

#### Market concentration indicators

One of the problems with the original methodology with regard to the electricity markets is that it does not incorporate the merit order of generators when measuring concentration. The key variable of interest in electricity generation markets is the ability and incentives for generators to influence marginal prices at different points in time. The Office of Fair Trading (OFT) has recognised the temporal nature of the electricity markets and the ability of generators to possess short-term market power.[19] Other competition authorities that have considered the temporal nature of the electricity market include the NMa, the Netherlands Competition Authority, which considered each time unit as a separate relevant product market in its decision on the Nuon–Reliant merger.[20]

Therefore, instead of measuring overall generation market concentration, it may be more appropriate to measure concentration at different points along the merit order curve to

[19] OFT and Ofgem (2005), 'Application in the energy sector. Understanding Competition Law', January.

[20] NMA (2006), 'Consultation Document on Mergers on the Energy Markets in the Netherlands and a Possible North-West European Market', June.

determine the impact that withdrawal of capacity by generators may have on wholesale prices. However, data availability concerns do not allow for this to be measured.

### Openness of allocation mechanism to import capacity

The original methodology gives a maximum score of 10 to this indicator in markets where interconnector capacity is auctioned or where an rTPA is applied, with a score of 0 being given where other allocation regimes are applied. However, even in countries where competitive regimes such as auctioning and rTPA are applied, they may not be applied to the entire interconnector capacity, with some capacity being tied up in pre-liberalisation long-term contracts.

Furthermore, with a few exceptions, the majority of the Member States apply a competitive market-based method of congestion management.[21]

In light of these facts, the indicator of the congestion management regime would ideally be replaced with one measuring the percentage of interconnector capacity open to allocation (that is, capacity not already tied up in long-term contracts) as a more relevant indicator of competitiveness. This would allow for differentiation between countries that apply the same rules for congestion management, but have different levels of open capacity available.

While the Sector Inquiry has presented some data on the level of interconnector capacity tied up in long-term contracts in a few Member States, collation of such data would prove to be beyond the scope of an annual evaluation of the PSA target. Therefore, an appropriate step may be to give a lower weighting to the openness of allocation mechanism to import capacity indicator currently used, and a higher weighting to the degree of technical openness of the market. This is discussed further in section A3.3 below.

### Wholesale price–cost margins

As cost data for individual generators will not be available, an alternative to the wholesale price–generation cost margin could be provided by a comparison between wholesale electricity prices across countries that have a similar generation mix. Interpretational difficulties, however, imply that this would not be an objective measure of competitiveness.

### Existence of regional monopolies

A concern across the upstream and downstream markets is that the existence of regional monopolies is not captured within the original methodology. For instance, a market with a large number of small regional monopolies may end up looking more competitive than one with fewer nationally active players when considering the market share of the three largest companies. This issue has arisen in the preliminary 2005 analysis, where the Italian downstream gas market appears more competitive than the UK market.

Ideally, the methodology for measuring competitiveness would incorporate these differences in the geographic markets. However, the lack of compatibility in the level of regional monopolisation across countries makes this approach infeasible. In the UK, for instance, the market shares of the ex-PES suppliers within their former PES areas ranges from 49% to 81% across different regions.[22] Cross-shareholdings between companies adds to the problems in countries such as Germany where, although the local distribution companies supply to customers within their defined territories, cross-shareholdings across companies make the estimation of market shares difficult.

[21] The exceptions are detailed in ETSO (2006), 'An Overview of Current Cross-order Congestion Management Methods in Europe', May (http://www.etso-net.org/upload/documents/Current_CM_methods_update%202006%20.pdf) as follows: While Slovenia uses explicit auctions for short-term congestion management, it pro-ratas long-term interconnector capacity, thus affecting capacity allocation on its interconnections with Austria, Italy and Croatia. A combination of explicit auctions and pro-rata rules are also used in the Spain–Portugal interconnector.

[22] Ofgem.

### A3.3.2 Wholesale market indicators

## Existing indicators

### The original methodology

The original methodology evaluates wholesale markets on the basis of three measures:— the existence of price reporting; volumes of trade reflected in price reporting; and the existence of standardised contracts. These are basic measures of transparency and the ability of market participants to trade on non-discriminatory terms. These indicators are largely a measure of the very existence of wholesale markets, and were therefore appropriate for use in nascent markets. At present, most countries have standardised contracts for trade and some degree of price reporting. Therefore, indicators of the performance and outcomes of wholesale markets have become more relevant, particularly given that the current indicators fail to discriminate between countries, especially in the electricity market.

### How can the performance and outcomes of wholesale markets be evaluated?

A well-functioning wholesale market is one where market participants are able to find a counterparty for trade when required, one that has transparent price-formation mechanisms and is free from manipulation by market participants.[23] Such a market may be defined as a liquid market. An assessment of the functioning of wholesale markets could therefore be provided by a measure of liquidity in the market.

Liquidity in markets can be expected to develop when a sufficient number of market participants are willing to trade in them, when costs of trading are minimised either through the existence of organised marketplaces or through standardised contracts, and when market participants have confidence in the inability of other market participants to manipulate prices. Therefore, in measuring the existence and degree of price reporting and the existence of standardised contracts, the original methodology includes aspects of the minimisation of costs of trading and building confidence in the price-formation mechanism.

In addition, a number of variables provide an indication of the level of liquidity.

– First is the volume of trade, both on its own and as a proportion of consumption (reflected in the daily volume traded as a proportion of consumption indicator currently used). As contracts can be traded several times in liquid markets, volume traded can be expected to be a greater multiple of consumption, the greater the liquidity of the markets. This is the most widely used indicator of liquidity as it encompasses the effects of the other indicators discussed below and is most amenable to data collation and interpretation. It can be expected to be in part dependent on the number of participants, and to influence the volatility in prices and the bid-offer spread.

– Secondly, price volatility tends to be higher in less liquid markets as individual transactions tend to have a greater impact on prices in such markets. However, this measure would be fraught with interpretational difficulties, given that a certain amount of volatility is also expected in a well-functioning market.

– The number of participants, particularly the number of pure traders, also provides an indication of liquidity, as the latter only enter markets that are more liquid and offer sufficient opportunities for arbitrage. However, this is not a valid indicator of competitiveness. A large number of players may either imply a competitive market consisting of a number of participants with comparable market shares, or may consist of a few major suppliers, with the majority participating in limited trading activity. For

[23] This section draws on Office for Energy Regulation (DTe) (2004), 'Development of Liquidity of the Dutch Electricity Market 2003–2004', March.

this reason, this indicator is not taken further in Oxera's energy market competitiveness analysis.

– Lastly, the bid-offer spread also reflects liquidity as it tends to fall with increasing liquidity due to competition between buyers and sellers. In a well-functioning and competitive market, the bid-offer spread is likely to reflect the transactions costs of trading alone. Among the liquidity indicators considered, this is therefore likely to provide greatest information on the level of competitiveness in the market. However, due to data availability issues, the bid-offer spread is not taken further.

While a comparison of wholesale prices with generation costs would provide the ideal indication of the efficiency of wholesale market outcomes, in the absence of such information, the existing liquidity and transparency indicators are used to judge whether wholesale markets are expected to operate efficiently.

### Issues in using liquidity as a measure of competitiveness of wholesale markets

When measuring the volume of trade as a proportion of consumption, one can differentiate between physical trades and financial trades. Liquidity in markets may be driven by a large number of financial trades as opposed to physical trades, implying that the same limited amount of physical volumes are being traded over and over. In such a scenario, even though wholesale markets may appear to be liquid due to a high level of financial trades, scope for entry by independent producers or suppliers may remain low due to the limited amount of physical trades. That said, a large amount of financial trades are likely to come about only when a minimum level of physical trades develops, and pure traders have confidence in the market.

In addition, in developing a compatible measure of liquidity across countries, further difficulties arise, as they have differing trading platforms—while some countries have taken up pool-based trading arrangements where there is an explicit requirement or strong incentive to trade on power exchanges, others have focused on the development of voluntary bilateral trades between parties. While the former are likely to be dominated by spot trades, the latter see a large amount of forward trading.

The current measure of liquidity reflects the total level of wholesale trades in a market, irrespective of whether they are spot trades or forward trades of varying durations. As the only relevant alternative to this measure of liquidity would be bid-offer spread, which in addition to facing difficulties on data collation across all the Member States, would face problems when being compared across countries and across contracts of different durations. On the grounds of economic relevance and feasibility, the existing indicator is considered appropriate for evaluating wholesale market competitiveness.

However, changes to the standardisation rule of the liquidity indicator are proposed to make it more reflective of the state of the markets. These changes are discussed in section A3.4.

### Competitiveness of balancing markets

In the European Commission's inquiry into the state of competition in energy markets, some characteristics of the existing balancing regimes have been found to be detrimental to competition.[24] In particular, the Commission concluded that some gas balancing regimes create barriers to entry due to the following reasons.

– As some TSOs are affiliated with incumbent gas producers or suppliers, there is scope for cross-subsidisation of the incumbents. The Commission suggests that TSO unbundling should be reinforced (or enforced) to prevent cross-subsidisation and to remove incentives on TSOs to prevent the development of a competitive market.

[24] European Commission (2007), 'DG Competition Report on Energy Sector Inquiry', January 10th, pp. 245–260 and pp. 295–310.

– The existence of a large number of geographic zones for balancing has increased the level of complexity and costs of balancing. A possible remedy would be to reduce the number of balancing zones across the EU, which would be facilitated by greater harmonisation across balancing zones and markets. To this end, the Commission has spoken in favour of the harmonisation of gas quality specifications. Where this is not possible, sufficient facilities to adapt gas qualities should be provided at minimal cost.

– Hourly balancing periods in some markets are found to place particularly onerous informational and forecasting requirements on small players, and should consequently be replaced in favour of daily balancing periods.

– Total imbalance penalties in comparison to total network charges have been found to be proportionally smaller for incumbents than for new entrants.

The Sector Inquiry also identifies detriments to competitive electricity markets placed by the electricity balancing regimes in the EU.

– Electricity balancing markets are highly concentrated in many Member States. Although, in contrast to the gas markets, the electricity balancing zones tend to be national in scope, in most Member States, concentration in balancing markets would be reduced if the geographical size of the balancing areas were further increased by harmonising balancing regimes across the EU.

– Some TSOs are vertically integrated with the generation businesses, which incentivises them to buy capacity reserves from their affiliated generators. This may create the risk of cross-subsidisation, particularly in countries where capacity payments are fed into network tariffs.

– As a result of the above two factors, small players may be exposed to excessive imbalance charges, which may deter entry in the generation and supply markets.

Considering the above, the following indicators are considered for inclusion within the competitiveness analysis.

– Creating a distinction between ownership unbundling and legal unbundling—in addition to promoting market entry by creating a level playing field in the balancing markets, ownership unbundling would directly prevent barriers to entry in upstream and downstream markets, as is discussed in greater detail in section A3.2.4 below.

– The size of gas balancing zones—however, this may not in itself allow for the determination of whether the balancing zone is ‘too small’, as there may be additional factors at play determining the ‘appropriate’ geographic size of the gas balancing area, such as the size of the Member States under consideration.

– The duration of gas balancing periods, with lower scores being given to markets with shorter balancing periods—Oxera does not propose to add this indicator to the existing set of wholesale market indicators, as small players would not appear to be disadvantaged when faced with hourly balancing periods, provided that sufficient information is available. Information and transparency issues are discussed in the following sub-section.

### Transparency issues

Information on available demand, supply and network/interconnector capacity is essential for the development of efficient wholesale markets and the provision of access to network capacity. The benefits of such information would be as follows.

– Reducing commercial risks for new entrants, thus mitigating barriers to entry.

– Creating a level playing field by preventing incumbents from sharing information with their affiliates, but not with other market participants.

While participants in the Sector Inquiry have identified a large set of informational requirements, the following are key in the case of the gas markets:

– forecasts of available, contracted and unused capacity on pipelines and storage facilities;
– to facilitate secondary trading of capacity, information on aggregate unused capacity and rules of secondary trading should be made available.

The most important of the information requirements in the electricity market deal with the following:

– generation output and capacity forecasts;
– availability of the transmission network and interconnectors;
– demand for balancing power and the use of reserve power.

The presence of all these indicators is likely to be reflected in the level of liquidity in the wholesale markets and in the level of market concentration upstream and downstream. Where TPA to networks is regulated, the lack of information may be expected to become less burdensome. Consequently, Oxera does not suggest that these indicators need to be added to the analysis.

## A3.3 Downstream market indicators

### A3.3.1 Vertical integration between generators/traders and suppliers

At the downstream level, the original methodology combines market concentration and switching rates for I&C and domestic customers to measure competitiveness. Another potential factor that may be added to the indicators is the degree of vertical integration of generators/traders with suppliers. A balance between generation market shares and supply market shares of a particular vertically integrated company, for instance, would imply that the company in question would not need to trade in the wholesale markets, leading to lower wholesale market liquidity, and consequently deterring new entry by suppliers who may not own generation capacity. Obtaining data on this indicator would require an evaluation of the major generation and supply companies across each of the countries whose competitiveness is being assessed. Given that information on market shares of the second-largest player is already difficult to obtain, the use of this indicator will not be practicable. The level of liquidity in wholesale markets is an effective proxy for this indicator.

However, inasmuch as vertically integrated companies report within-group trades as wholesale market trades, liquidity underestimates the degree of vertical integration.

### A3.3.2 Switching rates

#### Switching rates and competition

Switching rates may be considered an indicator of competitiveness as they are reflective of the barriers to market participation by consumers. Consumers may have incentives to switch suppliers because they can obtain lower prices or receive a higher quality of service. Of these, lower prices have consistently been found to be the primary reason for switching in UK energy markets in research published by Ofgem over the years since the market has been liberalised.

High switching rates can be expected in markets with large price differentials across suppliers and low barriers to switching. Low switching rates, however, may be expected to result from low price differentials between suppliers or high switching costs. This in turn may suggest a highly competitive market, where competition has brought down prices of all

suppliers, or may be reflective of a highly uncompetitive market where all suppliers charge prices much higher than costs as they are sheltered by the high costs of switching. Therefore, although high switching rates do tend to imply that consumers are placing a competitive pressure on suppliers, low switching rates could exist in both competitive and relatively less competitive markets (see Table A3.2)

Also, scenarios may arise of high switching rates in markets with low price differentials and low switching rates in markets with high price differentials. While the former does not prove to be problematic, low switching rates in markets with high price differentials would indicate that markets are not transparent and that the competitive process is not functioning effectively.

**Table A3.2 Switching rates versus competitiveness**

| | Large price differentials | Low price differentials |
|---|---|---|
| **High switching** | Competitive market | Competitive market |
| **Low switching** | Uncompetitive market | Competitive or uncompetitive market |

Source: Oxera.

This implies that switching rates in themselves are not the ideal indicator of competitiveness unless they are considered in conjunction with price differentials in the market. Even when considered alongside price differentials, the actual price–cost margin matters when studying low switching rates in a market with low price differentials to determine whether the market is competitive. Although it would be ideal, the lack of data on price differentials between suppliers implies that it is not possible to employ a hybrid indicator incorporating both switching rates and price differentials.

In addition to the question of whether switching rates on their own are an appropriate indicator of competition, or whether a hybrid indicator also incorporating price differentials and price–cost margins would be preferred, the decision on the appropriate indicator of switching also needs to be taken. Oxera's original methodology uses annual gross switching rates. However, other indicators of switching are also available: namely, net switching, multiple switching and churn rates.[25]

– **Gross switching**—the proportion of customers who have switched at least once. However, gross switching as used in previous Ofgem reviews measured the total number of switches, including multiple switches.

– **Net switching**—the proportion of customers no longer with their incumbent supplier. This indicator understates the progress of competition, as it does not account for customers regained by the incumbent. The inverse of net switching is the incumbent's market share.

– **Multiple switching**—this refers to customers who have changed supplier more than once. This indicator is a means of assessing the extent to which customers are willing to continue to seek savings through switching.

– **Churn**—the difference between gross switching and net switching, comprising customers who have switched more than once, including those who have returned to their incumbent supplier.

In choosing an alternative switching measure, data availability constraints need to be taken into account. The consistently available measure is provided by the European Commission and measures the gross switching rates since the start of liberalisation.

[25] The definitions are provided in Ofgem (2004), 'Domestic Competitive Market Review 2004', April, Glossary.

### Alternatives to Oxera's existing switching measure

The gross switching indicator used in Oxera's methodology is one of annual gross switching. Data from publicly available sources such as the European Commission's benchmarking reports measures gross switching rates from the start of liberalisation. However, a better indicator of competitiveness in any particular year would be the switching rates for that year. In measuring competitiveness in each year, Oxera therefore uses a measure of switching that is the differential between gross switching rates since liberalisation up to the end of one particular year, *less* the gross switching rates since liberalisation up to the end of the previous year. This annual figure of gross switching rates only includes those customers that have switched for the first time in that particular year, and excludes those that may have switched for a second or third time, for example, in that year.

Furthermore, switching rates alone do not indicate the level of competitive pressure placed on suppliers by consumers. Contract renegotiation must also be taken into account, particularly in the case of I&C customers. However, given the general lack of transparency in renegotiation rates, it is not possible to incorporate these into the analysis.

## A3.3.3 Network area indicators

### Degree of network unbundling

The Second Electricity and Gas Directives[26] place the following key unbundling requirements on Member States:

– legal and functional unbundling of transmission networks by July 1st 2004;
– functional unbundling of distribution by July 1st 2004 and legal unbundling by July 1st 2007. Distribution system operators with fewer than 100,000 customers are exempt from unbundling.

Although only legal and functional unbundling are required by legislation, some Member States have gone further by implementing ownership unbundling. The original methodology gives a score of 10 to the legal or ownership unbundling of TSOs or DSOs and a score of 0 otherwise.[27] In reviewing the scoring rules, the effects of ownership unbundling need to be compared with those of legal and functional unbundling. The European Commission has stated a clear preference for separation of the ownership of transmission and distribution functions from supply functions. This is to ensure that network operators do not offer preferential treatment to their upstream or downstream affiliates to a greater extent than if legal and functional unbundling were to be implemented. The effects of vertically integrated TSOs on balancing markets have already been highlighted in section A3.2.2 above. It is therefore suggested that a score of 10 be given to the implementation of ownership unbundling, with a score of 7 being given to legal unbundling, with a score of 0 otherwise.

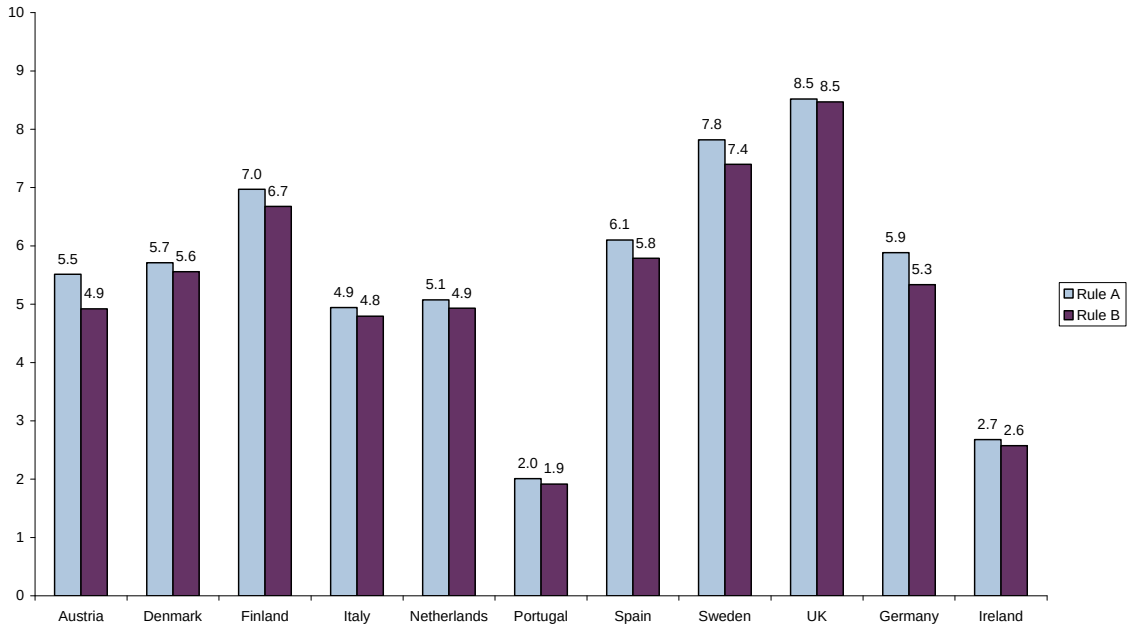
Figure A3.1 shows the impact of using the alternative network unbundling scoring rules, where the scores of all countries decline with the imposition of the alternative rules.[28]

[26] Directives 2003/54/EC and 2003/55/EC, respectively.

[27] No distinction is made between adoption into national law and actual implementation.

[28] The UK's score declines with use of the rules B and C, as some of the electricity DSOs in Great Britain have implemented legal unbundling, whereas the others have implemented ownership unbundling. The nature of unbundling of electricity DSOs in Great Britain has been considered to be legal for the purposes of this analysis.

**Figure A3.1 Impact of alternative network unbundling scoring rules, preliminary 2005 energy scores**




Note: Rule A refers to Oxera's original scoring rule, where ownership and legal unbundling are given scores of 10, and other unbundling regimes are given a score of 0. Rule B gives a score of 10 to ownership unbundling, 7 to legal unbundling and 0 to other forms of unbundling.
Source: Oxera.

# Appendix 4 Review of indicator aggregation

This section evaluates the weights given to each of the energy sector competitiveness indicators. Also studied is the impact of the interdependencies between indicators on the final weight given to them.

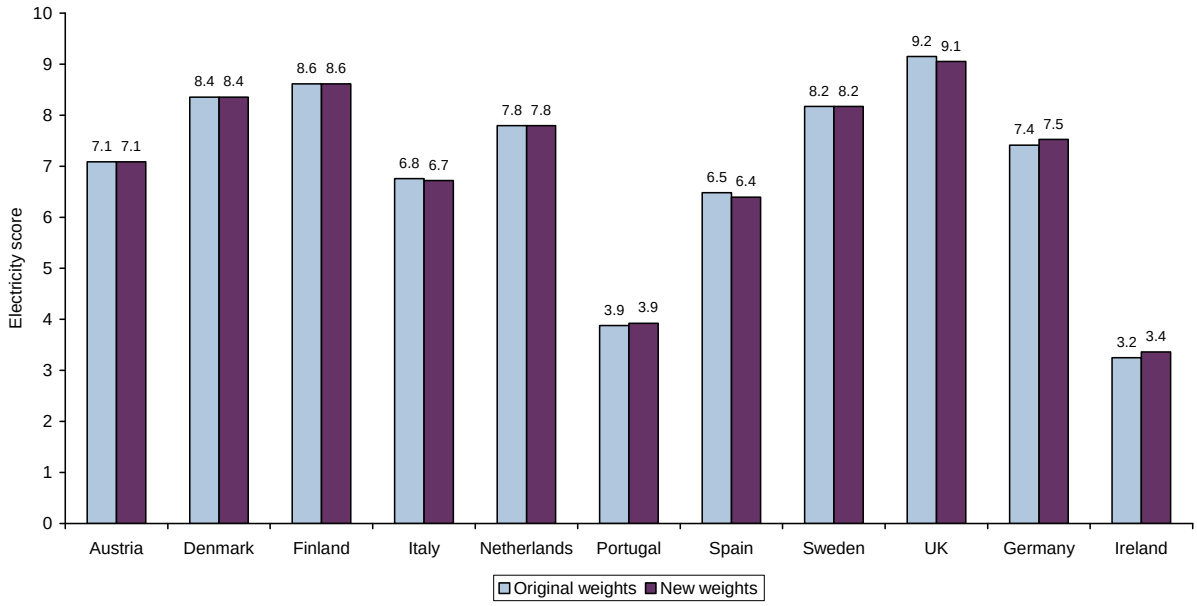
## A4.1 Upstream areas

In the upstream electricity market, market concentration is given a weight of 70%, degree of technical openness of the market a weight of 15% and the openness of allocation mechanism to import capacity a weight of 15%.

As discussed in section A3.2, the weighting given to the openness of allocation mechanism to import capacity score should be decreased on grounds of the efficiency of indicators and discrimination between countries. A more appropriate set of weightings would be as follows. While market concentration continues to be given a weighting of 70%, the weighting given to the degree of technical openness of the market should be increased to 20% and that to the openness of allocation mechanism to import capacity should be decreased to 10%.

Figure A4.1 illustrates the impact of changing the weightings on the electricity market scores.

**Figure A4.1 Impact of using new weightings, preliminary 2005 electricity scores**




Source: Oxera.

There may be further scope for changing the upstream market weightings to undo the bias that the original methodology displays in favour of highly interconnected markets, such as those in the Nordic countries. In evaluating their competitiveness, using the market shares of the largest three companies within particular countries is likely to overestimate the degree of concentration, as the relevant market for these generation companies would be the Nord Pool, rather than any of the national markets.

While this is an area of negative bias against interconnected markets, higher levels of liquidity may be expected in such markets, thus mitigating the bias through higher

wholesale market scores for them. Therefore, a change in weightings on account of this bias is not advocated.

### A4.1.2 Wholesale areas

Under the original methodology, the weightings given to the indicators are as follows:

– existence of price reporting: 50%;
– share of daily volume traded covered by price reporting: 25%;
– existence of standardised contracts: 25%.

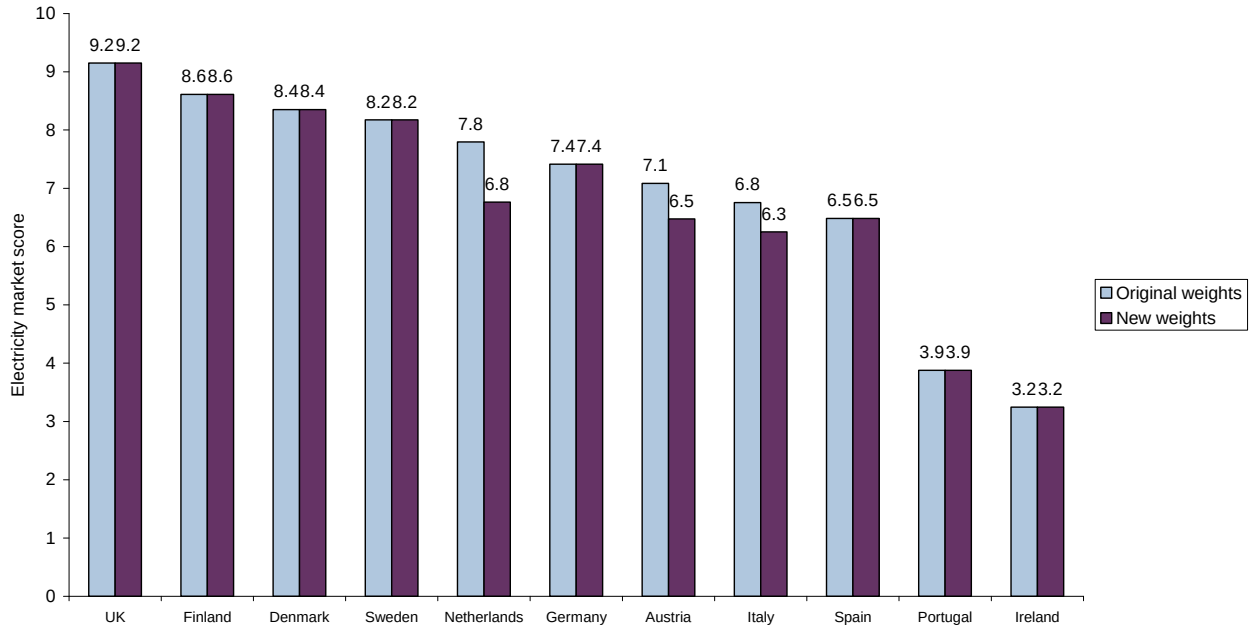
Standardised contracts decrease transaction costs and the existence of price reporting increases participants' confidence in the market, both leading to greater liquidity in the market. Their impact may therefore be expected to be reflected in the level of liquidity in the market. Furthermore, the existence of price reporting and standardised contracts is becoming increasingly prevalent. This implies that higher weighting should be given to the liquidity multiple than is currently done.

The following weights are suggested:

– existence of price reporting: 15%;
– share of daily volume traded covered by price reporting: 75%;
– existence of standardised contracts: 10%.

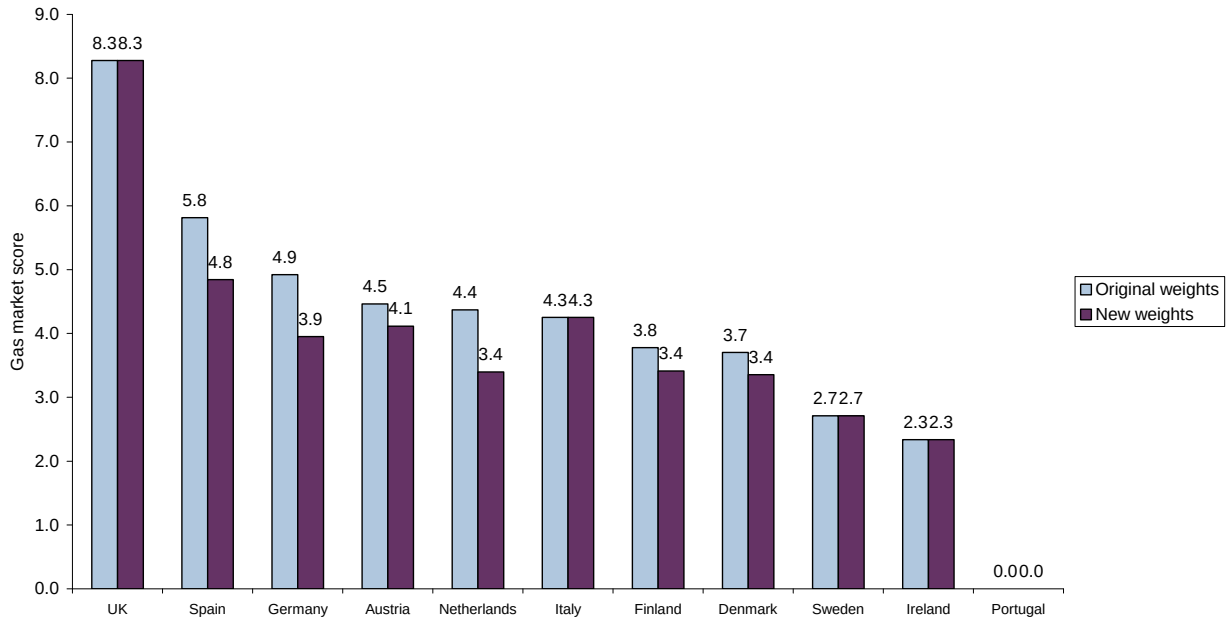
The alternative weightings lead to greater discrimination between wholesale market scores across countries. While no change occurs in electricity or gas market scores of countries that currently score either 10 or 0 on the share of daily volume traded covered by price reporting indicator, the remainder of the countries see a decline in their wholesale market score, and consequently in their electricity and gas market scores. Also, as development of liquidity is more limited in gas markets than in electricity markets, a larger number of countries see a fall in gas market scores than in electricity market scores from the application of the new weightings (see Figures A4.2 to A4.4 below).

**Figure A4.2 Impact of using new weightings, preliminary 2005 electricity scores**



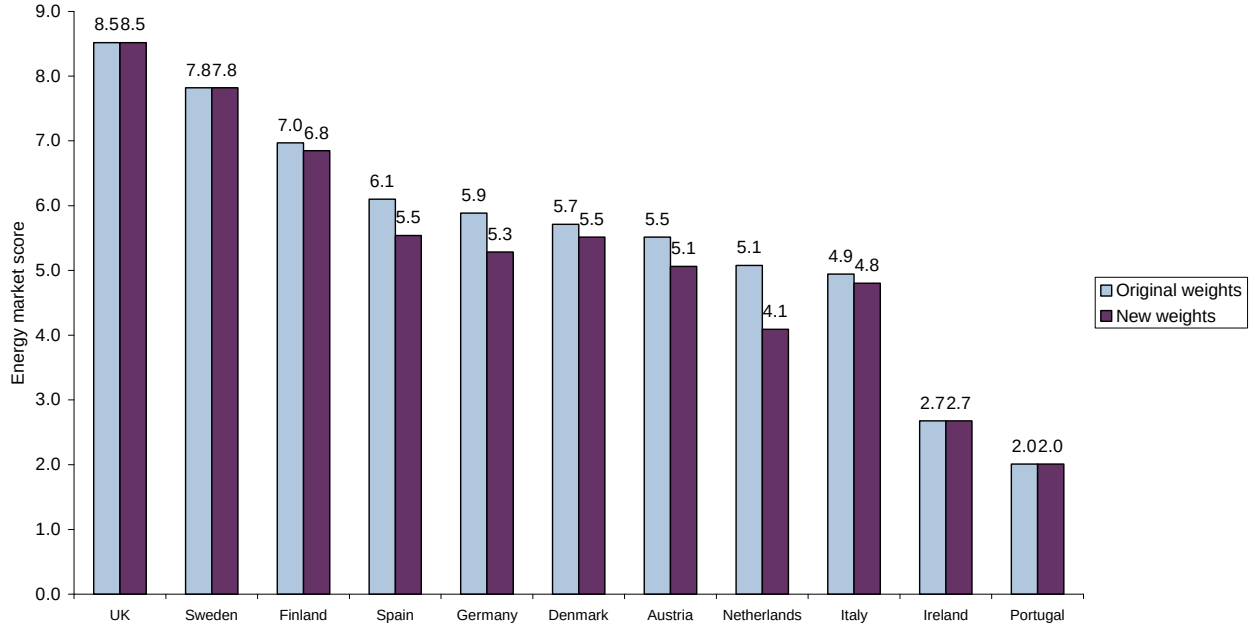

Source: Oxera.

**Figure A4.3 Impact of using new weightings, preliminary 2005 gas scores**




Source: Oxera.

**Figure A4.4 Impact of using new weightings, preliminary 2005 energy scores**

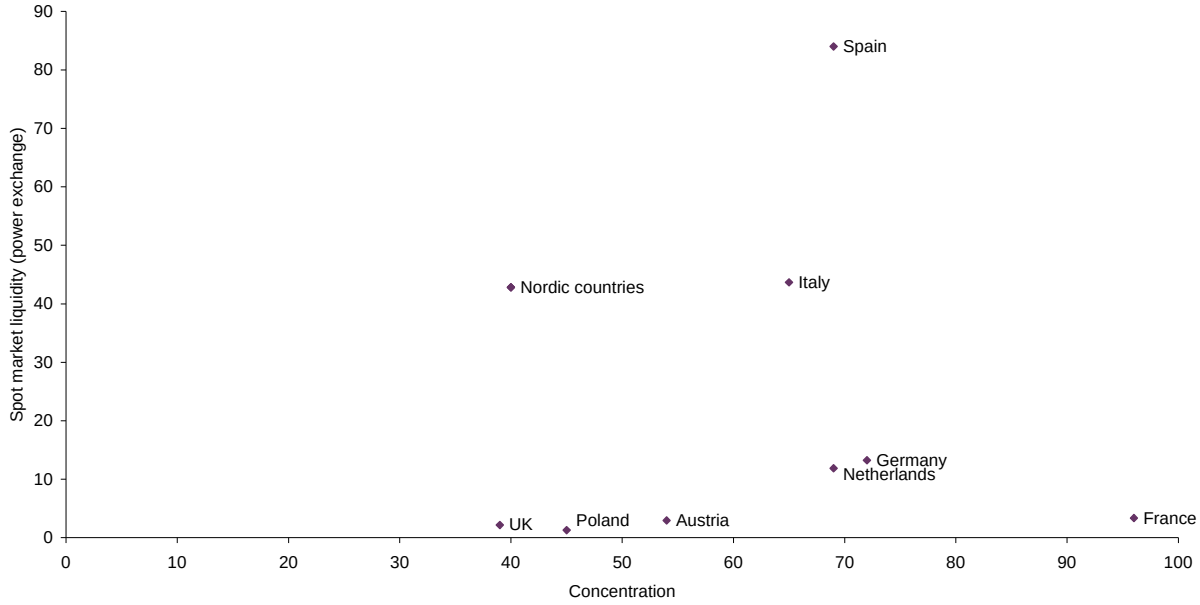



Source: Oxera.

### Interaction of liquidity with other competitiveness indicators

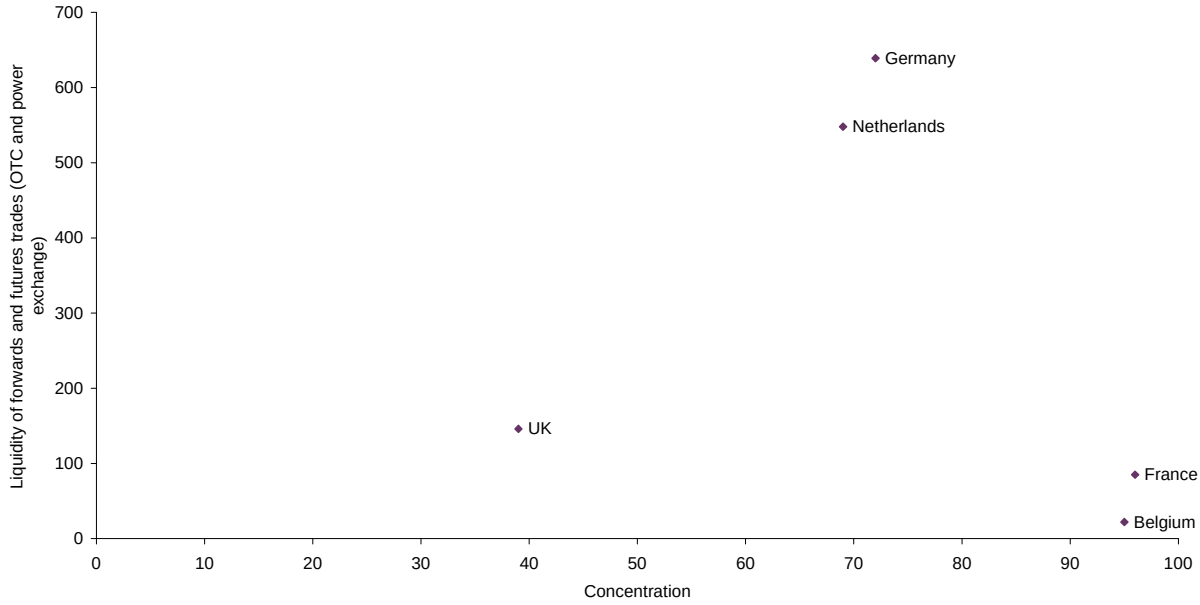
Upstream market concentration and supply market concentration are two indicators that may be expected to have an impact on liquidity in the wholesale markets. This may affect the relative weightings given to wholesale markets and to upstream market concentration. However, the C3 measure that is currently used at the upstream level of the energy markets appears not to be directly correlated with liquidity in these markets, as set out in Figures A4.5 and A4.6 below. It must be noted that given the limited number of data points used in this analysis, particularly in the case of forward and futures market liquidity, firm conclusions cannot be reached.

**Figure A4.5 Generation concentration versus spot market liquidity on power exchange**




Note: The measure of concentration used in this figure and in Figure 3.6 is the sum of the market shares of the three largest market participants.
Source: European Commission (2005), 'Energy Sector Inquiry', Draft Preliminary Report, and European Commission (2005), 'Report on Progress in Creating the Internal Gas and Electricity Market', November.

**Figure A4.6 Generation concentration versus forward and futures market liquidity on OTC and power exchange trades**




Source: European Commission (2005), 'Energy Sector Inquiry', Draft Preliminary Report, and European Commission (2005), 'Report on Progress in Creating the Internal Gas and Electricity Market', November.

### A4.1.3 Retail areas

The ideal indicator of competitiveness at the retail level would be the wholesale–retail price differential, in terms of both actual level and trends. This differential may be expected to be efficient when individual suppliers face competitive pressure from other suppliers and from consumers. Given the absence of data to estimate wholesale–retail price differentials,

supplier market concentration measures have been used to estimate competitive pressure from other suppliers and switching rates to measure competitive pressure from consumers.

In determining the weighting between market concentration and switching rates, the mechanisms through which switching, concentration and competition are interrelated need to be taken into account. High switching activity could lead to retail concentration remaining fairly constant if consumers are continually switching to and from suppliers. It could also, however, lead to a decline in retail concentration if more consumers switch away from the incumbent suppliers than return to them. High and low concentration may be associated with both high or low switching rates, as explained in Table A3.3.

Thus, high switching rates are necessarily reflective of competition. Low switching rates may reflect either a competitive market or an uncompetitive one. Therefore, the question of using switching as a valid indicator of competitiveness arises, and, where it is included, what weighting it should be given.

**Table A4.1 Switching and concentration**

| | High concentration | Low concentration |
|---|---|---|
| **High switching** | Consumers switching to and from the incumbents, so competition working. | Competition working to bring down concentration. |
| **Low switching** | Low price differentials at high levels implying competition not working. | Low price differentials at low prices brought about by competition, *or* low price differentials at high prices implying that competition not working. |

Source: Oxera.

In choosing the relative weights to be given to switching rates and market concentration, there is a trade-off between over- and underestimating the level of competition. If in a market with regional monopolies, concentration is low, giving a relatively high weighting to the concentration measure will lead to an overestimation of the level of competition. If, however, a relatively higher weighting is given to switching rates, the level of competition will be underestimated where low switching rates exist in a highly competitive market with low price differentials.

## A4.2 Review of standardisation of indicators

A range of binary and cardinal variables is used in the competitiveness analysis. Aggregating them into a single electricity or gas market score requires the imposition of certain standardisation rules, as described below.

– Binary variables—these are measured in ‘yes’ or ‘no’ terms. Where the binary variable is a ‘yes’ (for instance, if legal/ownership unbundling of networks has been implemented, standardised contracts exist in wholesale markets etc), a score of 10 is given for that indicator. If the binary variable is a ‘no’, a score of 0 is given.

– Cardinal variables—these include indicators such as market concentration measures and switching rates that are estimated in percentages. They are converted to values from 0 to 10 using step or linear functions.

Table A4.2 describes the standardisation rules currently applied to the indicators used in the competitiveness analysis.

**Table A4.2 Original methodology for the standardisation of competitiveness indicators**

| Indicator | Standardisation rule |
|---|---|
| **Binary variables** | |
| Access regime to import capacity | rTPA or non-discriminatory auction process=10; other=0 |
| Existence of price reporting | Y=10; N=0 |
| Existence of standardised contracts | Y=10; N=0 |
| Legal/ownership unbundling of the TSO | Y=10; N=0 |
| rTPA to transmission | Y=10; N=0 |
| Legal/ownership unbundling of the DSO | Y=10; N=0 |
| rTPA to distribution | Y=10; N=0 |
| rTPA to gas storage | Y=10; N=0 |
| **Cardinal variables** | |
| Market concentration | 20–30%=10; 30–40%=8; 40–50%=6; 50–60%=4; 60–70%=2; >70%=0 |
| Degree of technical openness of the upstream electricity market | 20% =10; 0%=0; linear in between |
| Share of volume traded covered by price reporting | 100%=10; <5%=0, linear in between |
| Switching rates | >5%=10; 0%=0; linear in between |

Source: Oxera.

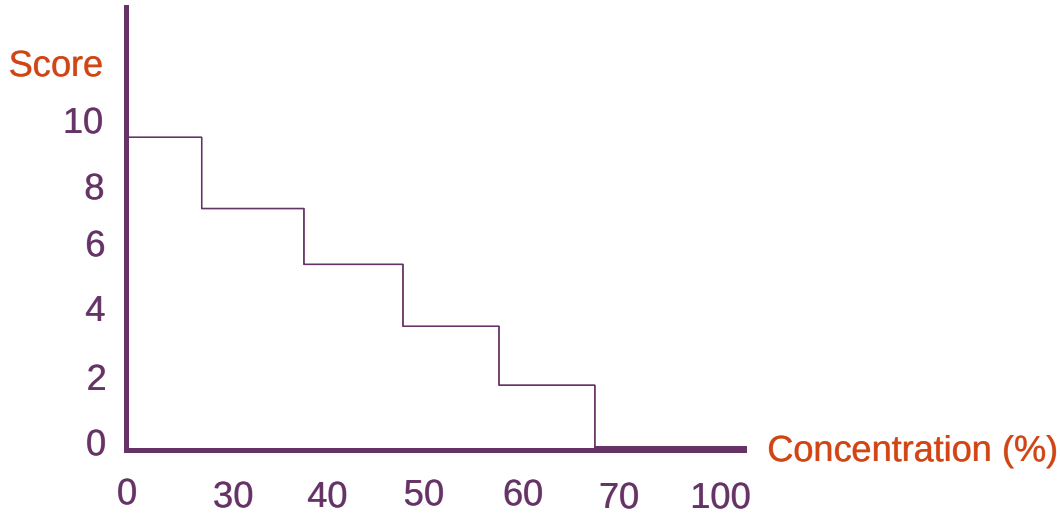
This section evaluates whether the existing standardisation rules are appropriate, or whether alternatives need to be put in place.

The binary approach is not considered suitable for the unbundling of TSO/DSOs as already discussed. It is recommended that the remainder of the binary variables retain their binary nature, and continue to be measured in 'yes' or 'no' terms.

Among the cardinal variables, the key methodological problems arise with the step function used for standardising the market concentration variables (see Figure A4.7). Changes are also proposed to the standardisation rule of the wholesale liquidity indicator to make it more economically relevant.

### A4.2.2 Standardisation of market concentration

**Figure A4.7 Current standardisation rule for market concentration**




Source: Oxera.

An obvious disadvantage of this method is insensitivity on some ranges and over-sensitivity at other points. For example, market consolidation from 41% to 49% will not affect the score, but a change from 49% to 50% will lead to a sudden jump. More importantly, these scores, being designed simply to give a decreasing function, do not carry any economic significance in themselves. To avoid these shortcomings, a function could be adopted that is not only continuous but also reflects the impact of concentration on market competitiveness. Theoretical findings suggest that a downward-sloping quadratic function may be more appropriate to serve the purpose than the step function currently being used.[29]

## Quadratic function

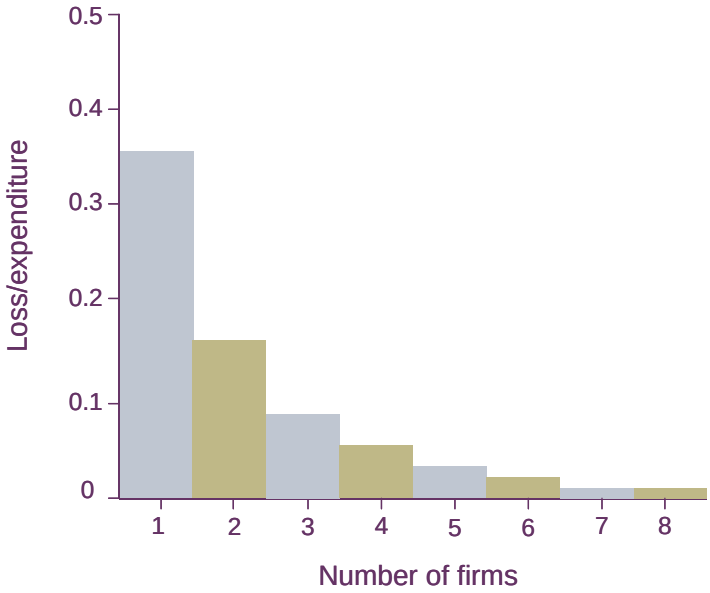
Newbery (1990) defined distortion cost as the deadweight loss due to imperfect competition over total expenditure on the commodity (L/PQ). He also demonstrated that, in Nash–Cournot oligopoly, the cost increases as the square of distortion, as follows:

$$L/PQ=1/(2n^2\varepsilon)$$

where n is the number of firms and $\varepsilon$ denotes price elasticity of demand. The distortion cost rises rapidly as the number of firms falls, as shown in Figure A4.8 below.

[29] This section draws on Green, R.J. and Newbery, DM. (1992), 'Competition in the British Electricity Spot Market', *Journal of Political Economy*, 100:5, 929–53 and Newbery, D.M. (1990) 'Growth Externalities and Taxation', *Scottish Journal of Political Economy* 37:4 305–26.

**Figure A4.8 Distortion cost versus number of firms**




Source: Newbery (1990), p. 314.

Assuming n firm symmetric oligopoly (ie, each firm supplies 1/n of the market), the concentration ratio is C=2/n. Distortion cost then increases as square of concentration:

$$L/PQ=(1/8\varepsilon)C^2$$

Undoubtedly, the competitiveness score (C) should be negatively linked to the magnitude of distortion cost. Hence, the scoring function is of the form:

$$S=a – b(L/PQ)$$

or equivalently:

$$S=a – kC^2$$

where a and k are coefficients to be determined.

For consistency with the step function, the new scoring function is calibrated such that S=10 when C=30%, and S=0 when C=70%. At these points, a=12.25, k=25. The scoring function is given by:

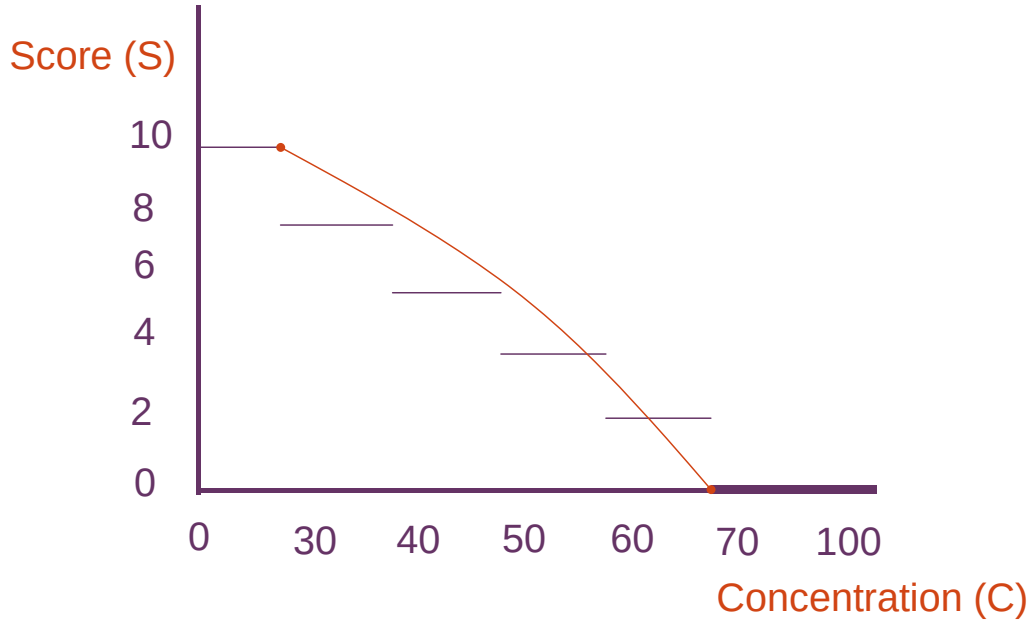
$$S=10 \text{ for } C<30\%$$

$$=12.25 – 25C^2 \text{ for } 30\%<C<70\%$$

$$=0 \text{ for } C>70\%$$

The new scoring function is illustrated by a downward-sloping parabola in Figure A3.10.

**Figure A4.9 Comparison of step and quadratic functions**




Source: Oxera.

## Calibrating the quadratic function

While the above methodology has proposed a calibration rule where markets with concentration of less than 30% score 10 and those with concentration greater than 70% score 0, a fully quadratic function may also be used where markets with concentration equal to 100% score 0 and those with concentration of 0% score 10, the function being concave between 0 and 10.

In choosing the appropriate thresholds for scores to be 0 or 10, theoretical or policy considerations will have to be taken into account as the choice of the threshold level can have a significant effect on the standardised scores. The existing 70% and 30% thresholds, for instance, have been chosen on the basis of European Commission and Competition Commission guidelines on joint and single market dominance.

## Impact of using the quadratic function

The quadratic function increases the concentration scores when concentration lies between 30 and 50%. In the 50–60% and 60–70% ranges, the concentration scores may increase or decrease compared with the step function, depending on where in the 50–60% or 60–70% range they lie. For market concentration to the right of the concave curve, the score will fall, and for that on the left, it will rise.

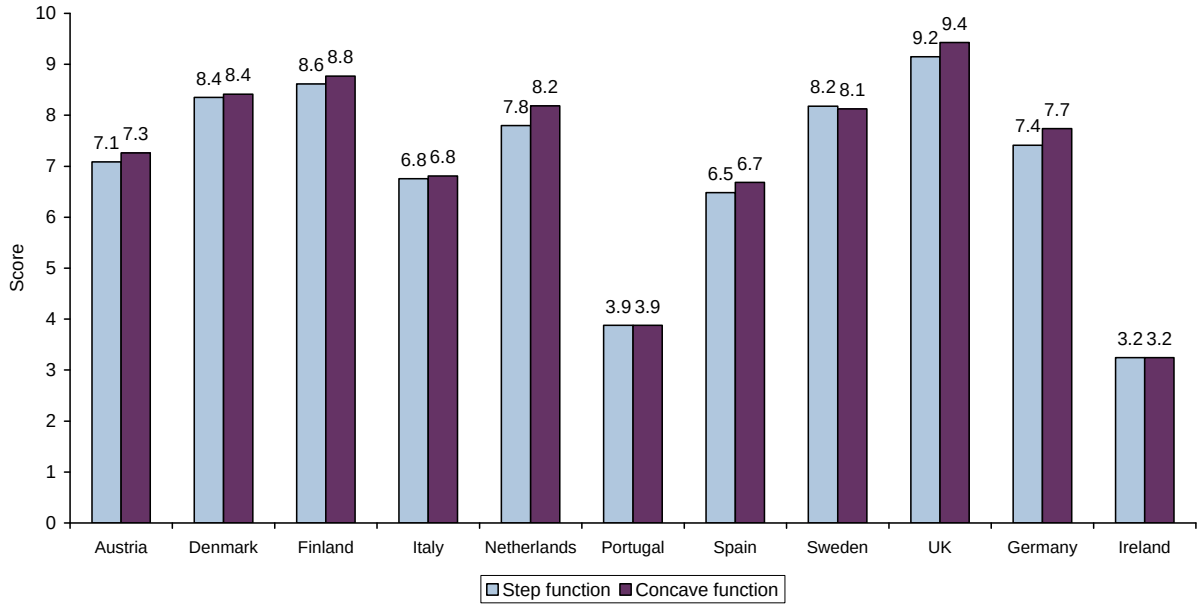
## Table A4.3 Impact on electricity scores, preliminary 2005

| | Generation | | | Upstream score | | Domestic supplier | | | Downstream score | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Concentration | Step function | Quadratic function | Step function | Quadratic function | Concentration | Step function | Quadratic function | Step function | Quadratic function |
| UK | 27.0 | 10.0 | 10.0 | 8.7 | 8.7 | 41 | 6 | 8.0 | 7.9 | 9.1 |
| Finland | 54.0 | 4.0 | 5.0 | 5.8 | 6.5 | 29 | 10 | 10.0 | 8.5 | 8.5 |
| Denmark | 63.0 | 2.0 | 2.4 | 4.4 | 4.7 | 29 | 10 | 10.0 | 8.8 | 8.8 |
| Sweden | 68.0 | 2.0 | 0.8 | 4.4 | 3.6 | 37 | 8 | 8.9 | 8.0 | 8.6 |
| Netherlands | 43.0 | 6.0 | 7.6 | 7.2 | 8.3 | 55 | 4 | 4.8 | 5.8 | 6.3 |
| Germany | 48.0 | 6.0 | 6.5 | 5.7 | 6.0 | 32 | 8 | 9.6 | 6.0 | 7.1 |
| Austria | 64.0 | 2.0 | 2.0 | 4.4 | 4.4 | 53 | 4 | 5.1 | 4.6 | 5.4 |
| Italy | 63.0 | 2.0 | 2.3 | 3.9 | 4.1 | 23 | 10 | 10.0 | 6.7 | 6.7 |
| Spain | 60.0 | 2.0 | 3.4 | 3.4 | 4.2 | 71 | 0 | 0.0 | 1.8 | 1.8 |
| Portugal | 64.0 | 2.0 | 2.0 | 2.0 | 2.0 | 88 | 0 | 0.0 | 1.8 | 1.8 |
| Ireland | 83.0 | 0.0 | 0.0 | 1.5 | 1.5 | 86 | 0 | 0.0 | 2.2 | 2.2 |

Source: Oxera.

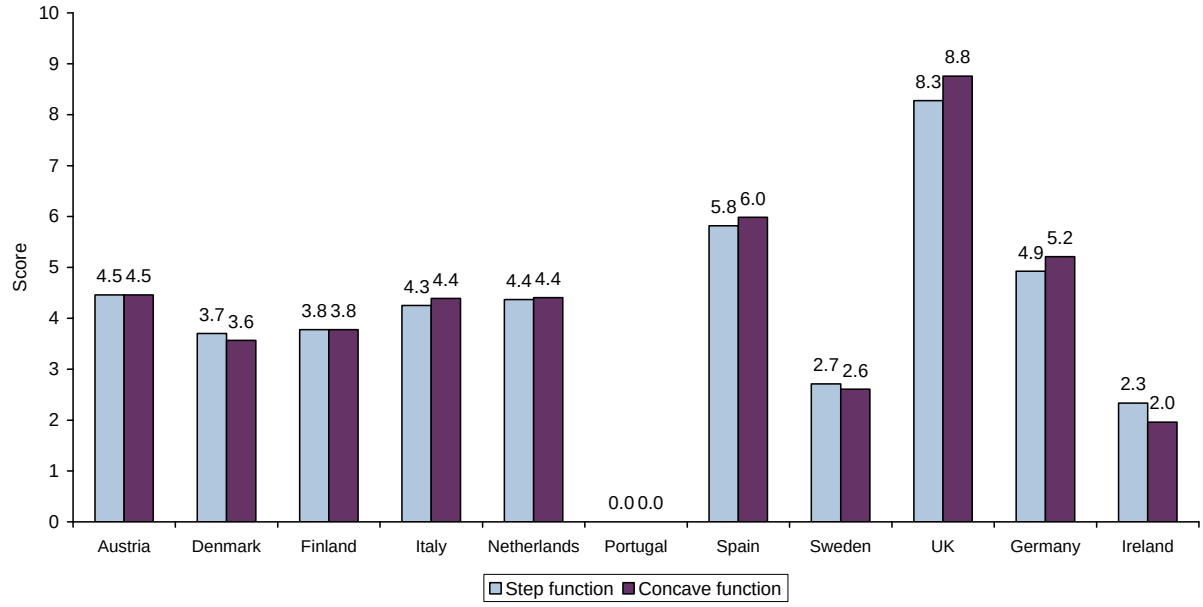
The only change in rankings has been the swap between the Netherlands and Sweden due to a fall in Sweden's score from 8.2 to 8.1 and a rise in the Netherlands' score from 7.8 to 8.2.

## Figure A4.10 Impact of using the quadratic function on preliminary 2005 results—electricity score



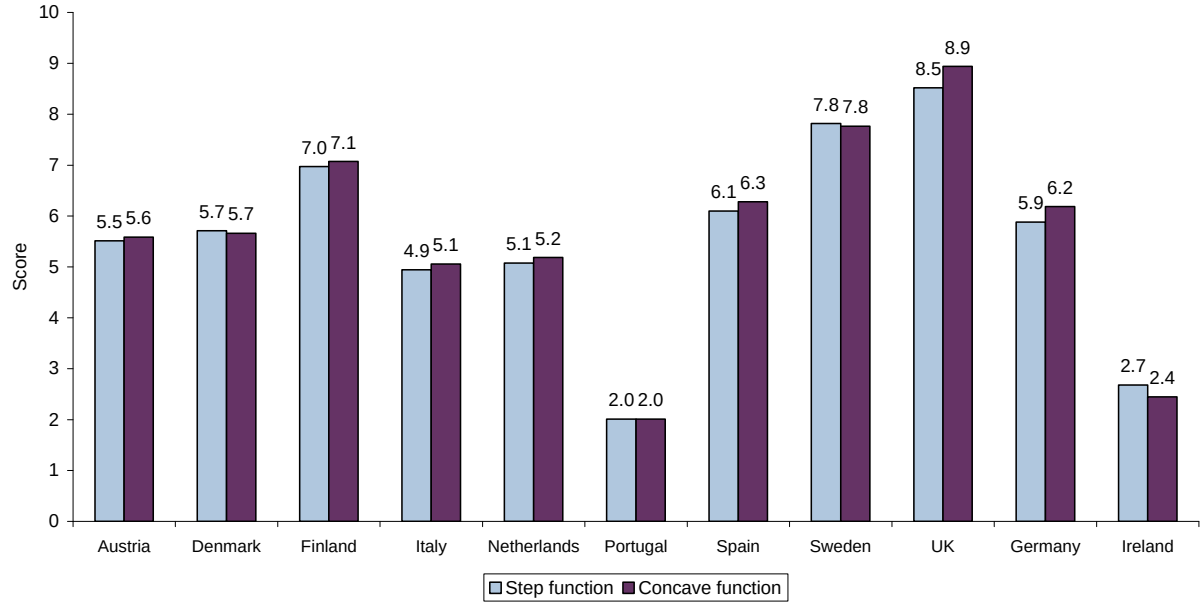

Source: Oxera.

**Figure A4.11 Impact of using the quadratic function on preliminary 2005 results—gas score**




Source: Oxera.

**Figure A4.12 Impact of using the quadratic function on preliminary 2005 results—energy score**




Source: Oxera.

## Summary

It is recommended that a quadratic function be introduced to remove the disadvantages of the step function. No jumps would be observed along the trajectory, minimising the effects of small changes in market share, and its concave shape provides a better measure of the impact of market concentration. Furthermore, it exhibits the non-linearity noticed by economists. For example, a change of concentration from 60% to 70% leads to a larger drop in competition score than an increase from, say, 30% to 40%. However, the new function is not problem-free. Notably, the energy market is not characterised by symmetric

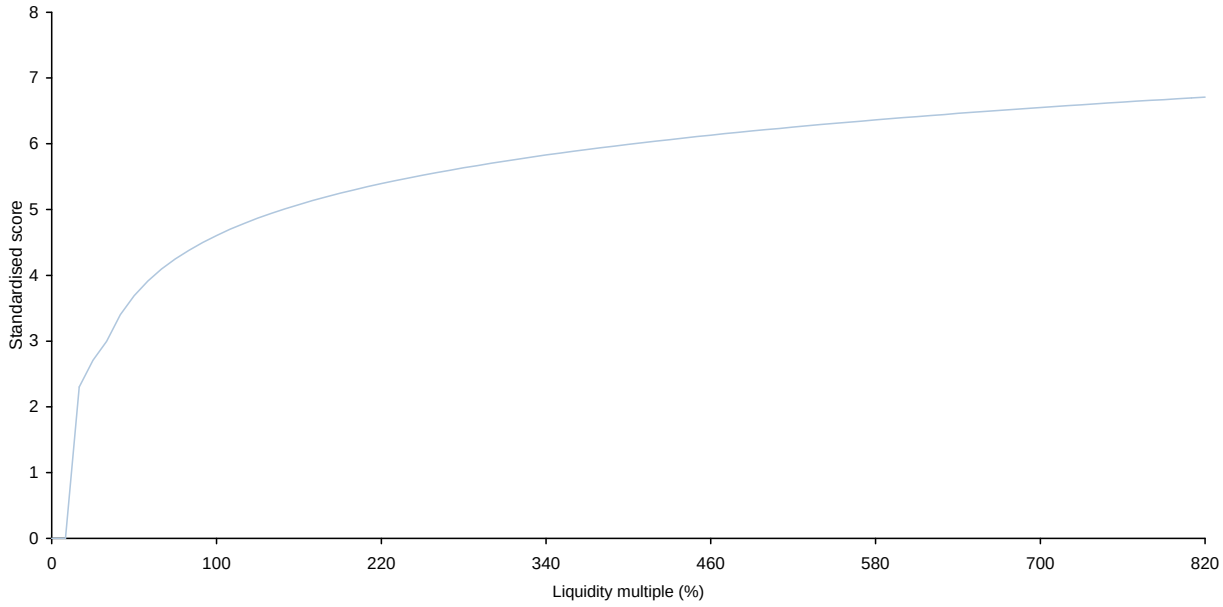
oligopoly, and energy firms do not often engage in Cournot competition. Hence, the algebra may not apply exactly to the real situation. As shown in the graph, countries initially with high scores initially will have even higher scores using the new method, and the opposite happens to countries with low scores. The new function will therefore further highlight cross-country differences in market concentration.

### A4.2.3 Standardisation of liquidity

While the share of total daily volume traded covered by price reporting continues to be the liquidity indicator used within Oxera's methodology, there may be a case for changing the standardisation rule for this indicator. Currently, the liquidity indicator is given a score of 10 when it is 100% or greater, with a score of 0 being given to countries with liquidity less than 5%, and a linear score given in between. In markets such as Nord Pool and Germany, traded volumes are over 500% of consumption. It therefore does not seem valid to give these markets an equivalent score to those where liquidity equals 100%.

A log function may be a more appropriate indicator. In addition, as energy wholesale markets are maturing, the 5% upper band for a standardised score of 0 appears to be too low. This should be raised to 10%, with wholesale markets with liquidity lower than 10% being given a score of 0, and a natural log function being applied to liquidity levels above 10%, as shown in Figure A4.13. The log rule leads to greater increases in liquidity scores with increments in liquidity when countries are at low levels of liquidity than with increments in liquidity when it is already at a high level. A potential disadvantage of using this rule is that the possibility of a market receiving a score of 10 becomes only a theoretical possibility, as countries would require liquidity levels over 22000% to get that score.

**Figure A4.13 Logarithmic function for standardising liquidity**




Source: Oxera.

While countries with liquidity levels of 100% or higher that score 10 under the existing scoring rule see a fall in their standardised liquidity scores with the implementation of the log rule, Italy and the Netherlands find that their liquidity levels increase (see Table A4.4 below).

**Table A4.4 Comparison of standardised liquidity scores with the original and proposed rules, preliminary 2005 electricity market**

| | Austria | Denmark | Finland | Italy | Netherlands | Portugal | Spain | Sweden | UK | Germany | Ireland |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Liquidity (%) | 50.0 | 565.8 | 565.8 | 30.0 | 15.0 | 0.0 | 100.0 | 565.8 | 156.8 | 657.6 | 0.0 |
| Standardised liquidity score (original) | 4.7 | 10.0 | 10.0 | 2.6 | 1.1 | 0.0 | 10.0 | 10.0 | 10.0 | 10.0 | 0.0 |
| Standardised liquidity score (proposed methodology) | 3.9 | 6.3 | 6.3 | 3.4 | 2.7 | 0.0 | 4.6 | 6.3 | 5.1 | 6.5 | 0.0 |

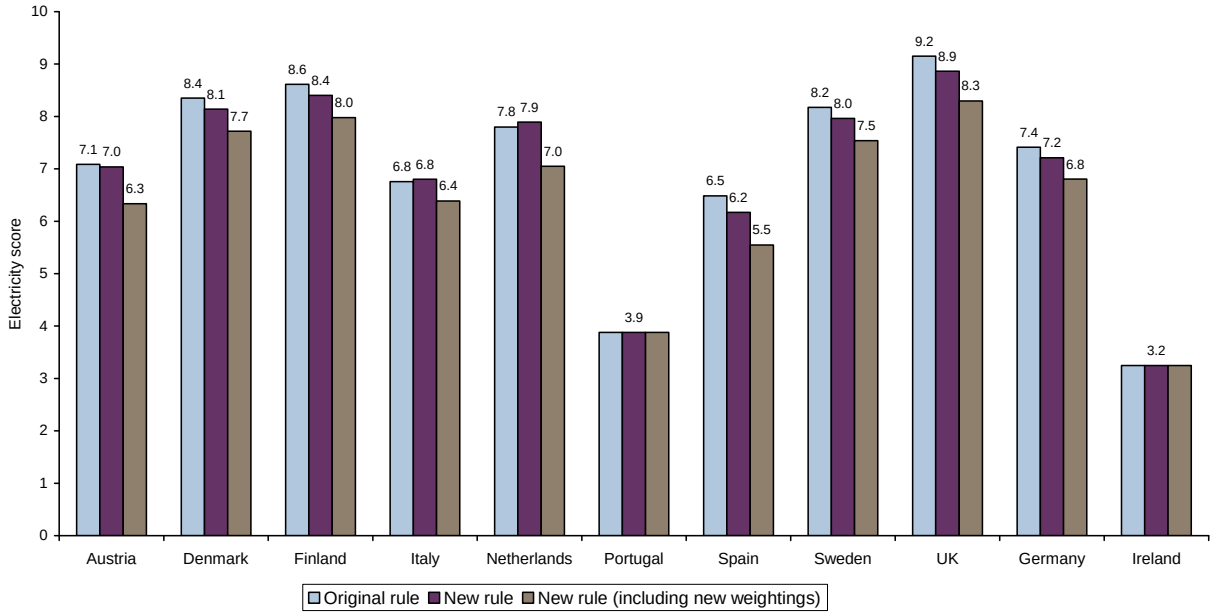
Note: The liquidity data on Denmark, Finland and Sweden is a combined Nordic market level.
Source: Liquidity of countries with levels greater than 100% obtained from European Commission (2007), 'DG Competition Report on Energy Sector Inquiry', January 10th, Tables 16 and 17.

Figure A4.14 compares the impact of using this alternative scoring rule with that of the original scoring rule on the electricity market score in aggregate.

The figure first considers the impact of the application of the proposed new standardisation rule with the relative weightings given to the three indicators of wholesale market competitiveness (the existence of price reporting, share of total daily volume traded covered by price reporting, and the existence of standardised contracts) remaining the same as in the existing methodology. It then evaluates the impact, assuming that the new standardisation rule is used alongside the new weightings.[30] With the exception of the Netherlands and Italy, whose standardised liquidity scores and consequently electricity scores increase with the application of the log rule, the remaining countries find that their score declines. This decline becomes more significant when the proposed 75% weighting is applied to the liquidity multiple instead of the existing 25% weighting. In fact, Italy and the Netherlands also see a decline in their scores in this scenario.

[30] See section 3.2 for a discussion on the proposed changes in weightings.

**Figure A4.14 Impact of using an alternative liquidity standardisation rule, preliminary 2005 electricity scores**




Source: Oxera.

## A4.3 Review of current aggregation methodology of electricity and gas market scores

### A4.3.1 Description

The original methodology used to evaluate the competitiveness of the UK energy market compared with that of the rest of the EU and G7 involves determining separately the competitiveness scores of the electricity and gas markets in each country. Scores are allocated to different market characteristics—eg, market concentration, degree of market opening, network unbundling and liquidity of wholesale markets—and are then combined to produce separate scores for the electricity and gas markets.

The energy market competitiveness score is then estimated by averaging the electricity and gas market scores, with the relative sizes of the electricity and gas markets in each country as the weights. This provides a cardinal score of between 0 and 10, with 10 being the maximum possible score attainable.[31]

### A4.3.2 Possible perverse implications

Applying this methodology has shown that separately, the UK has had the most competitive electricity and gas markets from 2001 to 2005—the years for which the PSA target analysis has been undertaken. Aggregating the electricity and gas market scores, it has also had the most competitive energy market as a whole.

However, it is possible that a country with lower electricity and gas market scores than the UK could obtain a higher overall energy market score. The relative sizes of other countries' electricity and gas markets compared with those of the UK will determine whether such an outcome is reached.

[31] In the analysis undertaken from 2001 to 2004, no country has achieved a score of 10 in either the electricity or the gas market.

Table A4.5 sets out a hypothetical example where country E has higher scores than country F in both the electricity and gas markets. However, aggregating the electricity and gas market scores into a single energy market score, by weighting them according to the relative sizes of the electricity and gas markets respectively, results in a higher overall energy market score for country F than for country E, due to the lower weight given to its gas market than to that of country E.

**Table A4.5 Hypothetical scenario of a perverse outcome under the current aggregation methodology**

| | Electricity market score | Gas market score | Relative size of electricity market | Total score |
|---|---|---|---|---|
| **Country E** | 9.0 | 6.0 | 0.3 | 6.9 |
| **Country F** | 8.0 | 5.0 | 0.9 | 7.7 |

Source: Oxera.

With some changes in its electricity market concentration, such a result could, for example, be achieved by Sweden. In the preliminary 2004 analysis, Sweden was ranked third in the electricity market and sixth in the gas market, and was second in the energy market as a whole. The Swedish energy market is highly biased towards electricity, with 90% of its energy market being electricity and 10% gas. In contrast, the electricity market is only 25% of the UK energy market, while 75% is gas. The electricity market scores of both countries are higher than their gas market scores, as shown in Table A4.6. Therefore, the higher the weight on their electricity markets, the higher their energy market scores will become. Thus, if Sweden's electricity market score were to increase from 8.0 to 8.5 (its rank remaining third), its overall energy market score would rise above that of the UK. Thus, a situation would arise where with electricity and gas market ranked third and sixth, respectively, Sweden would have an overall first rank, while, ranked first in the electricity and gas markets, the UK would be ranked only second in the energy market as a whole.

Such a situation could arise if, for example, the market shares of the three largest suppliers in the domestic Swedish electricity market were to decline by 10% each, and if those of the second and third largest suppliers in the I&C market for electricity were to decrease by 10% each.

**Table A4.6 Changes in competitiveness required for Sweden to surpass the UK**

| | Preliminary 2004 score (rank) | Changed scores (rank) |
|---|---|---|
| **Sweden** | | |
| **Electricity market score** | 8.0 (3) | 8.5 (3) |
| **Gas market score** | 3.2 (6) | 3.2 (6) |
| **Relative electricity market size** | 0.92 | 0.92 |
| **Relative gas market size** | 0.08 | 3.2 |
| **Energy market score** | 7.6 (2) | 8.1 (1) |
| **UK** | | |
| **Electricity market score** | 9.2 (1) | 9.2 (1) |
| **Gas market score** | 7.6 (1) | 7.6 (1) |
| **Relative electricity market size** | 0.25 | 0.25 |
| **Relative gas market size** | 0.75 | 0.75 |
| **Energy market score** | 8.0 (1) | 8.0 (2) |

Source: Oxera calculations.

An aggregation methodology that allows for such conclusions is not robust, as a country that has the most competitive gas and electricity markets when taken separately should also have the most competitive energy market as a whole.

Given the scope for perverse conclusions, it is necessary to consider alternatives to the current aggregation methodology, to identify a more robust measure.

### A4.3.3 Proposed methodologies and their impact on rankings

This section examines whether there are alternative aggregation methodologies that would not allow perverse conclusions to be drawn in aggregate. The alternatives are outlined below.

- **Approach A (UK-weighting cardinal approach)**—here, an aggregate energy market score for the comparator countries is calculated as a weighted average of their electricity and gas market scores. The weights used for each comparator country are the relative sizes of the electricity and gas markets in the UK, instead of the relative sizes of the markets in the countries themselves as are used under the original methodology.

- **Approach B (Rebased cardinal approach)**—the electricity and gas market scores are rebased, such that the score of the most competitive country is converted to the maximum possible score of 10, and those of the other countries are changed in proportion to their scores relative to those of the most competitive country. These rebased scores are then weighted by the relative sizes of the electricity and gas markets in each country to determine an overall energy market score.

- **Approach C (Simple average ordinal approach)**—the electricity and gas markets are ranked according to their competitiveness scores. An unweighted average of these ranks (rather than their scores) is then calculated to determine an energy market score. Subsequently, countries are ranked according to this average ranking.

- **Approach D (Weighted average ordinal approach)—**the electricity and gas markets are ranked according to their competitiveness scores. These ranks are then weighted according to the relative size of the two markets to determine an energy market score. The countries are then ranked on the basis of this average.

For the countries that passed the initial filter and whose energy market competitiveness was analysed from 2001 to 2004, Tables A4.7–A4.10 below set out the separate electricity and gas market ranks, the energy market rank according the current aggregation methodology and their positions using the possible alternative methodologies.

The greatest variation from the rankings calculated under the original methodology occurs under Approach A (UK-weighting cardinal approach), with the least difference found under Approach B (rebased cardinal approach).

All the countries analysed have higher scores in their electricity markets than in their gas markets. Countries that currently have higher electricity market weightings than the UK will therefore find a decline in their energy market score when Approach A (UK-weighting cardinal approach) is used instead of the current aggregation methodology. In 2004, Sweden and Finland had larger electricity markets than gas markets, whereas the UK was 25% electricity and 75% gas. Therefore, the application of Approach A to the preliminary 2004 figures leads to a decline in Sweden and Finland's energy market ranks as compared with those calculated under the current aggregation methodology. The Netherlands sees an improvement in its ranking, due the greater weight being given to its electricity market under Approach A than under the original methodology.

The tables also show that over time only Finland, Spain and Austria's rankings are affected by shifting from the original methodology to one where the cardinal scores have been

rebased. In 2004, for example, while other countries' ranks remain the same as under the original methodology, Finland and Austria swap ranks.

Compared with the limited change in rankings that takes place when a shift is made from the original methodology to one of rebasing the cardinal scores, taking an average (simple or weighted) of ordinal scores has a greater impact on rankings.

### Table A4.7 Impact of change in methodology: preliminary 2004 scores

| Rank by current approach | | Individual market rank | | Relative market size | | Energy market rank by alternative approaches to aggregation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Country | Electricity | Gas | Electricity | Gas | A | B | C | D |
| 1 | UK[1] | 1 | 1 | 0.3 | 0.8 | 1 | 1 | 1 | 1 |
| 2 | Sweden | 3 | 6 | 0.9 | 0.1 | 6 | 2 | 3 | 2 |
| 3 | Spain | 7 | 2 | 0.4 | 0.6 | 2 | 3 | 3 | 4 |
| 4 | Finland | 2 | 8 | 0.6 | 0.4 | 8 | 5 | 5 | 5 |
| 5 | Austria | 5 | 3 | 0.4 | 0.6 | 3 | 4 | 2 | 3 |
| 6 | Denmark | 6 | 5 | 0.4 | 0.6 | 5 | 6 | 6 | 7 |
| 7 | Italy | 8 | 4 | 0.3 | 0.7 | 4 | 7 | 8 | 6 |
| 8 | Netherlands | 4 | 7 | 0.2 | 0.8 | 7 | 8 | 6 | 8 |
| 9 | Portugal | 9 | 9 | 0.6 | 0.4 | 9 | 9 | 9 | 9 |

Note: [1] The relative market sizes in the UK do not sum to 1 due to rounding.
Source: Oxera calculations.

### Table A4.8 Impact of change in methodology: final 2003 scores

| Rank by current approach | | Individual market rank | | Relative market size | | Energy market rank by alternative approaches to aggregation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Country | Electricity | Gas | Electricity | Gas | A | B | C | D |
| 1 | UK | 1 | 1 | 0.3 | 0.7 | 1 | 1 | 1 | 1 |
| 2 | Sweden | 4 | 5 | 0.9 | 0.1 | 4 | 2 | 4 | 5 |
| 3 | Finland | 2 | 7 | 0.6 | 0.4 | 7 | 5 | 4 | 3 |
| 4 | Spain | 6 | 2 | 0.5 | 0.5 | 2 | 3 | 2 | 4 |
| 5 | Austria | 5 | 3 | 0.4 | 0.6 | 3 | 4 | 2 | 2 |
| 6 | Denmark | 3 | 6 | 0.4 | 0.6 | 5 | 6 | 4 | 6 |
| 7 | Italy | 7 | 4 | 0.3 | 0.7 | 6 | 7 | 7 | 7 |

Source: Oxera calculations.

**Table A4.9 Impact of change in methodology: final 2002 scores**

| Rank by current approach | Country | Individual market rank | | Relative market size | | Energy market rank by alternative approaches to aggregation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Electricity | Gas | Electricity | Gas | A | B | C | D |
| 1 | UK | 1 | 1 | 0.3 | 0.7 | 1 | 1 | 1 | 1 |
| 2 | Sweden | 4 | 5 | 0.9 | 0.1 | 4 | 2 | 5 | 5 |
| 3 | Finland | 2 | 6 | 0.6 | 0.4 | 5 | 5 | 4 | 4 |
| 4 | Spain | 5 | 2 | 0.5 | 0.5 | 2 | 3 | 3 | 3 |
| 5 | Austria | 3 | 3 | 0.4 | 0.6 | 3 | 4 | 2 | 2 |
| 6 | Italy | 6 | 4 | 0.3 | 0.7 | 6 | 6 | 6 | 6 |

Source: Oxera calculations.

**Table A4.10 Impact of change in methodology: final 2001 scores**

| Rank by current approach | Country | Individual market rank | | Relative market size | | Energy market rank by alternative approaches to aggregation | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Electricity | Gas | Electricity | Gas | A | B | C | D |
| 1 | UK | 1 | 1 | 0.3 | 0.7 | 1 | 1 | 1 | 1 |
| 2 | Sweden | 3 | 4 | 0.9 | 0.1 | 2 | 2 | 2 | 2 |
| 3 | Finland | 2 | 6 | 0.6 | 0.4 | 5 | 3 | 5 | 5 |
| 4 | Austria | 4 | 3 | 0.4 | 0.6 | 4 | 4 | 2 | 3 |
| 5 | Spain | 5 | 2 | 0.5 | 0.5 | 3 | 5 | 2 | 4 |
| 6 | Italy | 6 | 5 | 0.3 | 0.7 | 6 | 6 | 6 | 6 |

Source: Oxera calculations.

### A4.3.4 Comparison of proposed methodologies

While the concerns about the original approach have been noted above, this section compares the advantages and disadvantages of the proposed methodologies.

## Approach A (UK-weighting approach)

Under this approach, the energy market scores in the UK are compared with scores that would result in other countries if the relative sizes of their electricity and gas markets were identical to those in the UK. As the weights applied to all the countries are the same under the UK-weighting methodology, its application will ensure that a country that has the most competitive electricity and gas markets is also determined to have the most competitive energy market in aggregate. Thus, it eliminates the chance of the perverse outcome that may arise under the original methodology due to differences in the relative weights of markets as discussed above.

This approach, however, leads to the loss of information about the actual structure of the energy industry in the comparator countries. For example, Sweden has a large (90% of the energy market) and highly competitive electricity market. Although its gas market is uncompetitive, at 10%, it constitutes a small proportion of the entire energy market. By assuming the same market split in Sweden as in the UK, the UK-weighting cardinal approach assumes that 75% of Swedish energy consumption comes from an uncompetitive market (gas) and only 25% comes from a competitive market (electricity). This approach to aggregation is therefore creating a downward bias on the energy market competitiveness of countries that currently have small gas markets relative to their energy market as a whole.

## Approach B (rebasing of cardinal scores)

Competition in the electricity and gas markets is at different stages of development. In the analysis of energy market competitiveness undertaken from 2001 to 2004, the gas market scores of each country analysed has been lower than their electricity market scores. Rebasing the electricity and gas market scores to the country with the highest score pulls up the scores of all countries, bringing up the score of the most competitive country in each market to a benchmark level of 10. This makes the electricity and gas market scores more comparable. Also, by giving a maximum possible score of 10 to countries with the most competitive electricity and gas markets, it also removes the possibility that a country that has the most competitive electricity and gas markets will not be seen to have the most competitive energy market score in aggregate.

## Approaches C and D (ordinal approaches)

As both the ordinal approaches are averages of ranks, they will ensure that a country that has the highest rank in the electricity and gas markets will also have the same rank in the energy market as a whole. Thus, these approaches will alleviate the problem of the possible perverse outcome resulting from aggregation using the original methodology.

However, the choice between an ordinal approach based on simple average of ranks and one based on weighted average of ranks still remains.

Taking a simple average of electricity and gas market ranks to determine an overall energy market score results in equal ranks for several countries, as can be noted from Tables A4.7–A4.10. In the 2003 analysis, for example, Spain and Austria are both ranked second, whereas Sweden, Finland and Denmark are jointly ranked fourth. This makes it difficult to compare the energy market competitiveness of the countries being analysed.

Table A4.11 below sets out a scenario where country G is ranked third in the electricity market and fourth in the gas market, with the reverse holding for country H. In relative terms, both countries have equally sized electricity markets. The weighted average energy rank is calculated to be higher for country G than for country H. This is because the higher weight on the electricity market than on the gas market combined with a higher electricity market rank creates an upward push on the weighted average rank for country G. Taking a simple average of ranks however eliminates such a push, leading to an equal energy market rank for both countries. This may be thought of as a more rational result than that obtained by using a weighted average approach. However, an argument against the simple average ordinal approach is that by giving equal weights to electricity and gas markets, the simple average approach can penalise countries with small and uncompetitive gas markets.

**Table A4.11 Energy market ranks under ordinal approaches (Approaches C and D)**

| Country | Electricity market rank | Gas market rank | Relative size of electricity market | Approach C (simple average rank) | Approach D (weighted average rank) |
|---|---|---|---|---|---|
| G | 3 | 4 | 0.7 | 3.5 | 3.3 |
| H | 4 | 3 | 0.7 | 3.5 | 3.7 |

Source: Oxera.

A problem with both the ordinal approaches is that countries' ranks in the electricity and gas markets are quite sensitive to small changes in their scores in these markets. Any changes in electricity and gas market ranks would be further passed on to the energy market ranks to a greater extent than in case of the cardinal approach. This is illustrated in Tables A4.12 and A4.13 below.

Table A4.12 sets out the electricity and gas market scores and the relative size of the electricity market of countries K, L and M. Their ranks by the current and the four proposed aggregation methodologies have also been calculated. The electricity market score of country L is increased from 8.0 (in Table A4.12) to 8.2 (in Table A4.13), raising its electricity market rank from second to first. At the same time, the gas market score of country K is increased from 5.9 to 6.1, raising its rank from second to first.

In terms of aggregate energy market ranks, this small change in electricity and gas market scores does not affect the countries' ranks as determined by Approaches A and B. When using the Approaches C and D, or the current approach[32], however, the energy market ranks are affected by the changes in electricity and gas market scores as can be noted from Tables A4.12 and A4.13.

**Table A4.12 Electricity and gas market ranks by alternative methodologies**

| | Individual market score | | Individual market rank | | Relative market size | Energy market rank by current and proposed approaches | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | Electricity | Gas | Electricity | Gas | Electricity | Current approach | A | B | C | D |
| K | 7.6 | 5.9 | 3 | 2 | 0.5 | 3 | 3 | 3 | 2 | 3 |
| L | 8.0 | 5.8 | 2 | 3 | 0.7 | 1 | 2 | 2 | 2 | 2 |
| M | 8.1 | 6.0 | 1 | 1 | 0.4 | 2 | 1 | 1 | 1 | 1 |

Source: Oxera.

**Table A4.13 Electricity and gas market ranks by alternative methodologies**

| | Individual market score | | Individual market rank | | Relative market size | Energy market rank by current and proposed approaches | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | Electricity | Gas | Electricity | Gas | Electricity | Current approach | A | B | C | D |
| K | 7.6 | 6.1 | 3 | 1 | 0.5 | 2 | 3 | 3 | 1 | 2 |
| L | 8.2 | 5.8 | 1 | 3 | 0.7 | 1 | 2 | 2 | 1 | 1 |
| M | 8.1 | 6.0 | 2 | 2 | 0.4 | 3 | 1 | 1 | 1 | 2 |

Source: Oxera.

The issue of sensitivity to small changes in scores will increases in importance as countries meet the July 2007 deadline for adopting the European Commission's Electricity and Gas Directives, and pass Oxera's initial filter[33] for analysis as part of the PSA target.

In addition, when countries' scores in the electricity and gas markets are separately ranked before being averaged, there is a loss of information regarding the actual differences in competitiveness between countries in both markets—only information regarding relative positioning remains. This may magnify (diminish) actual differences between countries' competitiveness in the electricity and gas markets if the level of difference between their scores is low (high).

[32] However, controlling for market size, that is, using a scenario where countries K, L and M all have equal relative sizes of the electricity market, the current approach does not show sensitivity to small changes in scores.

[33] Oxera (2002), 'Energy Market Competition in the EU and G7', September indicates the criteria required by countries to pass the initial filter.

## Aggregation: issues under the PSA target

As the PSA target is set for the energy market as a whole, the separate electricity and gas markets in each country need to be aggregated into a single energy market. This can either be undertaken on the basis of the relative sizes of the two markets, as under the original methodology and in three of the four alternative aggregation methodologies proposed, or it could be a summation of the electricity and gas markets, as under the proposed Approach C (simple average ordinal approach). Table A4.14– A4.17 set out the outcomes associated with the aggregation of the markets by the various possible methodologies.

In using Approaches A (UK-weighting cardinal approach) and C (simple average ordinal approach), differences in relative electricity and gas market sizes do not result in differences in aggregate energy market scores (or ranks) when countries have the same electricity and gas scores. The electricity and gas market weights, however, have an impact on the ranks resulting from applying the current approach and Approaches B (rebased cardinal approach) and D (weighted average ordinal approach).

### Table A4.14 Aggregation under the current approach

| Country | Electricity market score | Gas market score | Relative size of electricity market | Energy market score |
|---|---|---|---|---|
| P | 9.0 | 8.0 | 0.6 | 8.6 |
| Q | 9.0 | 8.0 | 0.7 | 8.7 |

Source: Oxera.

### Table A4.15 Aggregation under Approach A (UK-weighting cardinal approach)

| | Individual market score | | Relative market size | Energy market rank by Approach A | | |
|---|---|---|---|---|---|---|
| Country | Electricity | Gas | Electricity | Country R-specific weighting | Country S-specific weighting | Country T-specific weighting |
| R | 9.5 | 8.6 | 0.4 | 9.0 | 9.1 | 9.2 |
| S | 9.0 | 8.0 | 0.6 | 8.4 | 8.6 | 8.7 |
| T | 9.0 | 8.0 | 0.7 | 8.4 | 8.6 | 8.7 |

Source: Oxera.

### Table A4.16 Aggregation under Approach B (rebased cardinal approach)

| | Individual market score | | Relative market size | Individual market rebased scores | | Energy market rank by proposed approach |
|---|---|---|---|---|---|---|
| Country | Electricity | Gas | Electricity | Electricity | Gas | B |
| U | 9.5 | 8.6 | 0.4 | 10.0 | 10.0 | 1 |
| V | 9.0 | 8.0 | 0.6 | 9.5 | 9.3 | 3 |
| W | 9.0 | 8.0 | 0.7 | 9.5 | 9.3 | 2 |

Source: Oxera.

**Table A4.17 Aggregation under Approaches C and D (simple and weighted average ordinal approaches)**

| | Individual market rank | | Relative market size | Energy market rank by proposed ordinal approaches | |
|---|---|---|---|---|---|
| Country | Electricity | Gas | Electricity | C | D |
| X | 3 | 4 | 0.6 | 3.5 | 3.4 |
| Y | 3 | 4 | 0.7 | 3.5 | 3.3 |

Source: Oxera.

The pros and cons of each of the four alternative methodologies that have been proposed need to be compared to select the most suitable methodology.

While the simple average ordinal approach (C) solves problems of biases in scores that arise under a weighted average approach due to differences in the relative sizes of the electricity and gas markets across countries, it may create biases in countries that have small, uncompetitive gas markets. This approach also has the drawback of creating difficulties in comparing energy market ranks of different countries as its application leads to the same rank being allocated to several countries.

The simple and weighted average ordinal approaches (C and D respectively) both have the disadvantage of being sensitive to small changes in scores—a factor not present under either the UK-weighting cardinal approach (A) or the rebased cardinal approach (B).

While the two ordinal approaches lead to a loss of information on the actual differences between countries' competitiveness, the UK-weighting cardinal approach leads to the loss of information on their actual market structure.

On the basis of this evidence, the most appropriate methodology for the aggregation of the electricity and gas markets would be the rebased cardinal approach.

# Appendix 5 Conclusions

This review of the methodology for measuring energy market competitiveness indicates that the core methodology is still appropriate. However, some changes to the choice of indicators, indicator aggregation methodology, and rules for the standardisation of some indicators would improve the relevance of the approach.

## A5.1 Choice of indicators

On the basis of economic relevance and data availability, the following change is proposed to the indicators used in the methodology employed to measure energy market competitiveness.

– **Network areas**—a maximum possible score of 10 should be given to ownership unbundling, with a score of 7 being given to legal unbundling. In addition, given consistent data availability across countries, when legal/management/accounts unbundling has been implemented, a score may be given according to the number of characteristics of unbundling implemented.

## A5.2 Indicator aggregation

– **Upstream areas**—as an increasing number of Member States employ competitive interconnector capacity access mechanisms, the openness of allocation mechanism to import capacity indicator becomes less discriminatory across countries. It is therefore proposed that a lower weighting be given to this indicator, and a higher weighting to the degree of technical openness of the market (see Table A5.1).

**Table A5.1 Proposed change to upstream market aggregation weightings**

| | Existing weightings (%) | Proposed weightings (%) |
|---|---|---|
| **Market concentration** | 70 | 70 |
| **Degree of technical openness of the market** | 15 | 20 |
| **Openness of allocation mechanism to import capacity** | 15 | 10 |

Source: Oxera.

– **Wholesale areas**—as the existence of price reporting and standardised contracts becomes universal, higher weighting should be given to the liquidity multiple than is currently done, as is set out in Table A5.2.

**Table A5.2 Proposed change to wholesale market aggregation weightings**

| | Existing weightings (%) | Proposed weightings (%) |
|---|---|---|
| **Existence of price reporting** | 50 | 15 |
| **Share of total daily volume traded covered by price reporting** | 25 | 75 |
| **Existence of standardised contracts** | 25 | 10 |

Source: Oxera.

## A5.3 Standardisation of indicators

– **Market concentration**—given the sensitivity of the step function to small changes in market concentration, a downward-sloping quadratic function is recommended as an economically justified alternative.

– **Liquidity**—in the interest of economic efficiency, the liquidity standardisation rule is changed from a linear form to a logarithmic form.

## A5.4 Aggregation of electricity and gas market scores

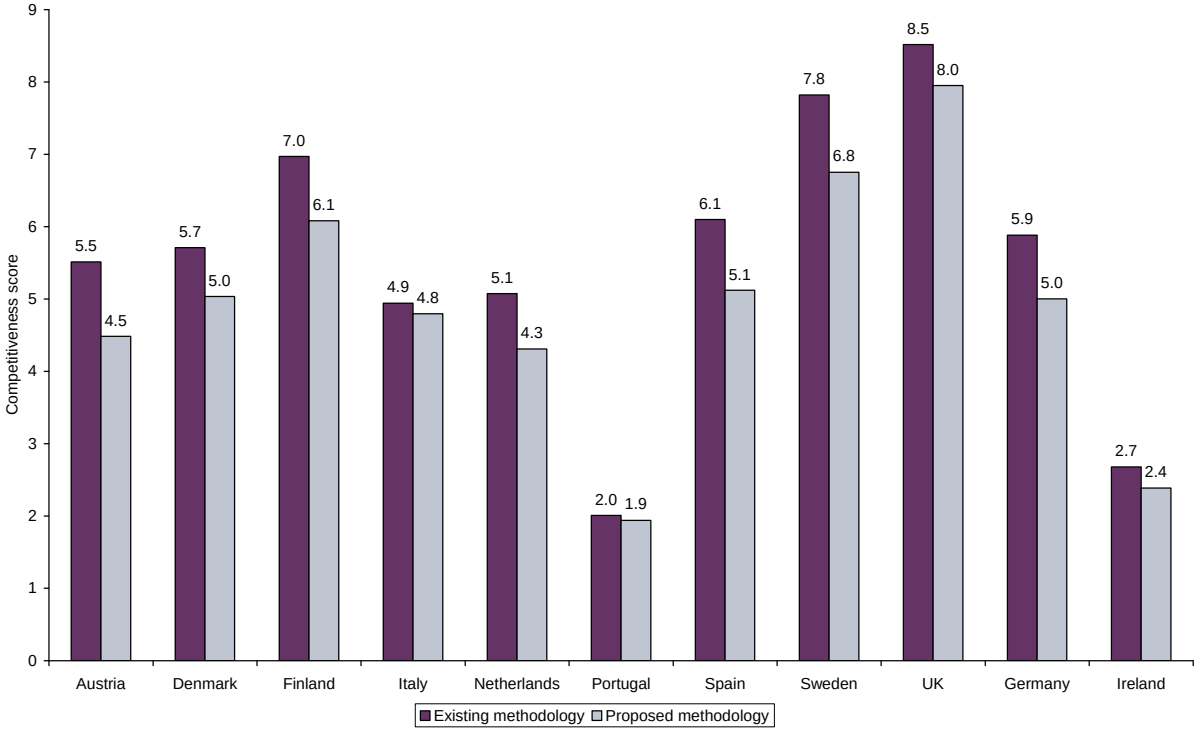
The rebased cardinal approach, involving a two-step procedure where the electricity and gas scores of the most competitive countries is changed to a maximum of 10 and others' scores are changed proportionally, then scores are weighted according to relative market size, is proposed as an alternative to the current aggregation methodology.

This would prevent a country with the highest electricity and gas scores to be overtaken by a country with lower scores in both but a larger size in the higher score market, while retaining the ability to make country-to-country comparisons of rankings.

## A5.5 Impact of change in methodology

With the application of these methodological changes except for the new aggregation methodology of electricity and gas market scores, the energy market scores of all the Member States decline (see Figure A5.1). The top three (UK, Sweden and Finland) remain unchanged, including when the cardinal rebased aggregative approach is introduced for combining the electricity and gas market scores (see Figure A5.2).

**Figure A5.1 Impact of all proposed methodological changes except for aggregation of gas and market scores, preliminary 2005 energy scores**



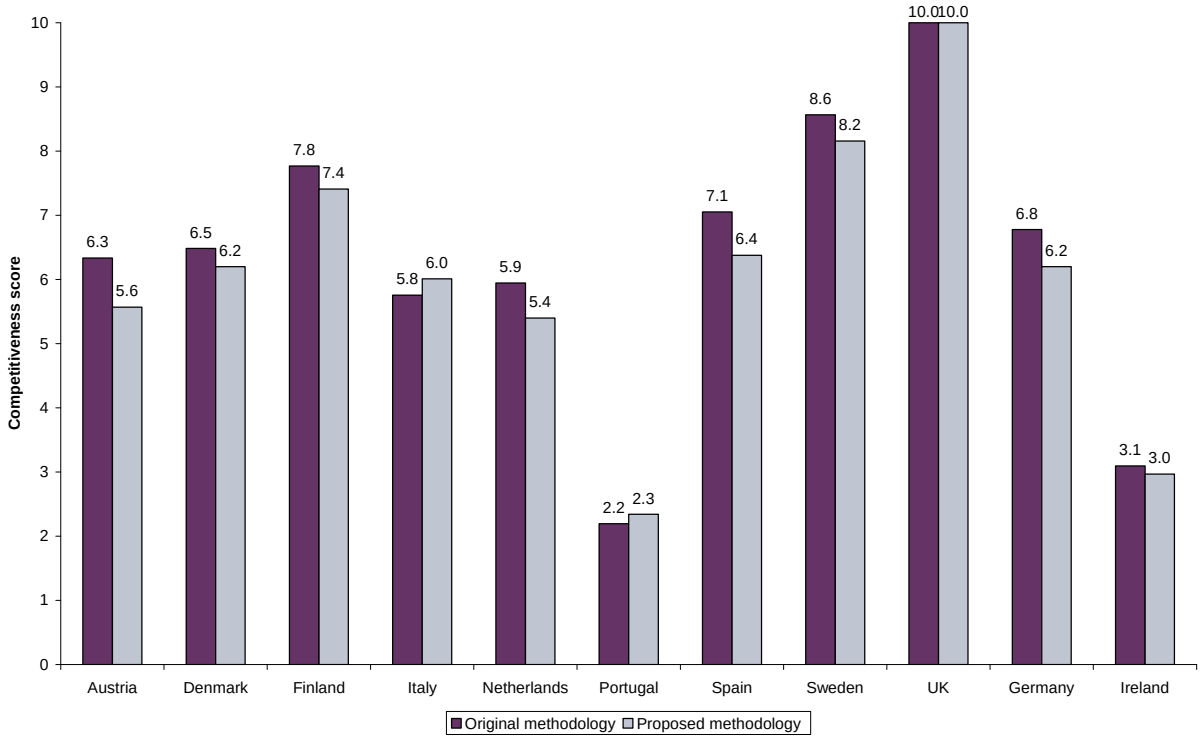

Source: Oxera.

**Table A5.3 Impact of all proposed methodological changes on energy market ranks, including cardinal rebased aggregation of electricity and gas market scores, preliminary 2005 results**

| | Original methodology | New methodology with network rule B (change in ranking) |
|---|---|---|
| UK | 1 | 1 |
| Sweden | 2 | 2 |
| Finland | 3 | 3 |
| Spain | 4 | 4 |
| Germany | 5 | 6 (–1) |
| Denmark | 6 | 5 (+1) |
| Austria | 7 | 8 (–1) |
| Netherlands | 8 | 9 (–1) |
| Italy | 9 | 7 (+2) |
| Ireland | 10 | 10 |
| Portugal | 11 | 11 |

Source: Oxera.

**Figure A5.2 Impact of all proposed methodological changes, including aggregation of electricity and gas market scores through cardinal rebased approach, preliminary 2005 energy scores.**




Note: To make figures comparable in absolute terms, the cardinal rebased approach has been applied also to the 'original methodology' figure in the graph.
Source: Oxera.

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