Incentive Proposals for Quality of Service Measures in Finnish Electricity Distribution

A Final Report prepared for

Energy Market Authority of Finland (EMV)

By

London Economics in association with Professor Jarmo Partanen, LUT Finland

November 2006

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Executive Summary

Regulation of quality of service is generally necessary in Finland. This is because the firms face true and potentially binding incentives to reduce costs and improve efficiency, and can keep profits from achieving measured efficiencies. There is the possibility of profiting from lowering quality of service levels. Competitive forces are evolving for some parts of the country and service. Some elements will remain natural monopoly (pure DNO) and some will become or are potentially competitive (supply). Regardless of the true state of competition, competition and the profit motive cannot be relied upon to provide socially optimal levels of service quality. This is for a number of reasons, but depends mostly on how demand changes when quality of service changes. This has been recognised internationally, and the international evidence points to a wide range of quality of service regulatory measures. Further, consumers and DNOs surveyed in Finland, indicate a high importance for a variety of service measures. These conclusions are robust for whatever type of quality of service is being considered.

Quality of service in electricity DNO and supply operations can be divided logically into three broad categories: quality of supply, technical quality, and customer quality. The focus of this report is on the third, but in general, some form of quality monitoring or regulation is needed for all three.

Quality of customer service regulation needs to be straightforward, easy to measure, track, and verify. There are numerous measures important to customers, but a sub-set of these that covers the major aspects of customer quality of service should suffice. Broadly speaking, they fall into some main categories:

- Customer contacts
    - Telephone
        - Agent
        - Machine
    - Letter/written
    - In person
    - Internet
- Record keeping accuracy

  - Billing
  - Metering
  - Address, personal, other
- Information
  - Information during unplanned outage
  - Information in advance of planned work
  - Information about changes in commercial operations
- Physical service on the premises
  - Keeping appointments
  - Calling to fix problems within certain period
  - Switching within certain period
  - Connections within the regulated time period
- Dispute resolution

In the very general sense, we recommend that customer quality of service be regulated and that the regulation include some form of incentives that result in rewards or penalties if measured targets are not met. Only in this way will quality of service have any rational meaning in terms of companies taking the regulation seriously. We note however, that the regulator should be careful not to implicitly attempt to maximise service quality in and of itself, as this is not likely to be optimal. The optimal regulation is the one that incentivises the companies to provide the level of service quality that equates the marginal costs with the marginal benefits.

A number of options are available to Finland in terms of regulation of customer quality of service. Difficulties however arise in Finland in terms of recommending very specific methods for regulation such as monetary values for each service category.

We propose that specific regulations be enacted for each of the broad service categories listed above. More detailed regulations and actions for the sub-categories can be enacted with more flexibility. These recommendations are as follows.

First, each company should be required to track data on the broad categories. The data should be measured in common units and be verifiable. It is suggested that the data not be audited annually, but perhaps spot-checked by the regulator. In general, the data should be kept to allow the regulator to determine the distribution of the data, e.g., the percentage of call-responses taking more than a certain amount of time (we propose more specific standards for each item later).

Each company should propose a company customer charter. The charter should be made public before being finalised to allow consumer groups to comment or have inputs into the process. The regulator should check that the companies' proposals are of a minimum standard.

We propose a range of possible standards and penalties for the elements that will be monitored by both the regulator and consumers below. We propose that the period for monitoring should be annual. This will preclude the possibility of once-off events influencing the results significantly. While we propose these ranges, we wish to note that these ranges are indicative judgements from our experience and from the international research. Consultation with the industry and consumer representatives would likely be necessary before formal binding standards and penalties would be required. We also note that in general, the principles of the economics of penalties and incentives suggest that the penalty should be proportional to the costs and benefits of the transgression/improvement in service quality. This may need to be weighed or rebalanced by the cost of compliance and the probability of being caught, among other things.

It is proposed and suggested that the timing and implementation of the above would take between 1 and 2 years. A first step is to allow stakeholders to comment on the proposals. A second step is to collect and estimate the relevant data and indicators. It is further suggested that a one-year "trial" period be run where the estimated impacts on revenues be calculated by the companies. This will give the companies a chance to secure systems, ascertain methods of improvements, and perhaps appeal if penalties appear too harsh. We believe, however, that as the proposed penalties are limited, there is limited risk in the proposed regime in general for companies.

The report makes proposals for an indicative way forward for quality of service regulation of customer commercial quality elements in Finland. The section proposes elements that companies should collect data on and that the regulator should track. Total revenues allowed are proposed to be adjusted by between 0.25% and 0.5% for hitting a set of service quality standards. If two or more of five customer contact standards are not met, a 0.25% penalty is proposed. If one or more of three customer record keeping accuracy standards are not met, a 0.5% penalty is proposed. If two or more of the customer switching and connection standards are not met, then a 0.25% revenue adjustment is proposed. Companies complying with all the standards for customer contacts should get a 0.2% reward and those complying with all the standards for accuracy should get a 0.3% reward, while a reward of 0.2% for appointments and switching compliance is suggested.

Individual customers who receive poor service for written contacts, inaccurate bills, or failure to meet appointments, switches or connections, can receive direct payments of between €5 and €25. It is noteworthy that the system effectively employs a dead-band where no adjustment is made if the company fails to hit one of either customer contact standards or customer record keeping accuracy standards. It is also noteworthy that the penalties are effectively capped at 1% of revenues (notwithstanding direct payments to customers) and rewards are capped at 0.7% of revenues.

The system of standards and rewards and penalties is summarised by the table overleaf.

Table E.1: Summary of Proposed Service Quality Measures

Broad Indicator	Specific Items	Standard proposed	Proposed penalty (reward) Allowed Revenues	Payment to individual customer
Customer contacts				
	Telephone (average time and % receiving the standard)			
	Agent (average time and % receiving the standard)	90% of calls answered within 1 minute	0.25% (0.2%) of allowed revenues if any two or more not met	none
	Machine (average time and % receiving the standard)	90% of calls answered within 30 seconds		none
	Letter/written (average time and % receiving the standard)	90% response within 3 working days		€ 5
	In person (average time and % receiving the standard)	90% within 20 minutes		none
	Internet (average time and % receiving the standard)	90% within 2 working days		€ 5
Record keeping accuracy				
	Billing (number of corrections/number bills)	99.5% of bills accurate	0.5% (0.3%) of allowed revenues if any one of three not met	€ 10
	Metering (number of corrections/number of meters; total % true up from estimates)	total true-up from estimates to actual should not exceed 10% annually		€ 10
	Address, personal, other (number of questions and number of corrections)	none	none	none
Information				
	Information during unplanned outage	Information available within 30 mins of outage	none	none
	Information in advance of planned work	Information available within 7 days	none	none
	Information about changes in commercial operations (timeliness of availability and sources)	none	none	none

Service performance on premises, other services				€25
	Keeping appointments	within 15 mins of scheduled time	none	€ 25
	Calling to fix problems within certain period	90% calls made within 3 days	0.25% (0.2%) of allowed revenues if any two or more not met	€ 25
	Switching within certain period	95% of switching made within billing cycle or legal limit		€ 25
	Connections within the regulated time period (track numbers or % achieved within target)	95% within regulated time period or legal limit		€ 25
Dispute resolution		standardised procedure		Forfeit in dispute

It is our opinion that these proposals are modest but sufficient to properly incentivise DNOs in Finland to achieve high levels of customer commercial quality standards.

1 Introduction and Background

The Energy Market Authority of Finland (EMV) faces the task of confirming in advance the methods for determining the electricity network operators' return from their distribution business, and the fees changed for electricity distribution services during the regulatory period, according to the relevant Finnish legislation, the Electricity Market Act. Included in a recent (2004) amendment of the Act is a general efficiency improvement target.

The objective of this report is to develop further the measurement and regulatory programme for the EMV in terms of quality of service measurement and regulation, consistent with the provisions of the Act. This includes the possibility of overall and customer specific quality of service measurement and targets. .

1.1 Quality of service in regulated network industry

The terms of reference state that one of the primary tasks of this study is to define quality as it relates to electricity distribution network operators (DNO) service. In general, quality of service can be defined across three factors: security of supply, technical quality, and customer commercial quality. This report focuses on the later, but we discuss the economics of quality of service and the general regulatory principles before tackling specific issues and recommendations with respect to customer commercial quality.

Under a regulated natural monopoly market structure, there is a need for quality of service regulation in some sectors. When price or revenue caps are employed in order to extract greater efficiencies, service quality may unintentionally suffer. Service quality incentive (SQI) mechanisms are used in order to ensure that customers receive appropriate levels of efficiency and service quality. There are numerous candidate measures and factors for measuring service quality. Quality could be defined in terms of customer minutes lost or number of outages, for example, which are standard measures. Alternatively, quality could adjust customer minutes lost by voltage, or demand (load), or some other factor correlated with size. Quality measures could also be adjusted to have nonlinearities with respect to time. After a certain amount of time, the 'cost' to customers of an outage might increase. Finally, there would be other non-technical matters for quality definition, such as the responsiveness to customer calls and complaints, the accuracy of bills (and the speed by which inaccuracies are corrected), the speed and difficulty of switching suppliers, etc. The quality measures chosen and their definitions may want to include such factors. Section 2 reviews a variety of quality of service measures.

When a consumer makes a purchasing decision in the open market for goods that are competitively supplied, economists and policy makers have long recognised that the consumer is in fact purchasing a "bundle of attributes", rather than a single product. This led to, among other things, the development of the so-called "hedonic pricing" estimation techniques (famous for its use in calculating the 'real constant-quality-adjusted price' of computer equipment in national accounts). Hedonic pricing is now a well-known and important technique when it comes to properly measuring productivity growth1.

[1] Griliches, Z. (1988). "Hedonic Price Indexes and the Measurement of Capital and Productivity: Some Historical Reflections." Cambridge, MA : National Bureau of Economic Research, 1988.

When a market is regulated (and presumably a natural monopoly, so a single firm operating in the service area minimises total cost), rather than competitive, consumers can no longer choose the variety of quality bundles and give producers the incentives to produce products with the quality attributes that are most desirable and profitable. In addition, with prices regulated and often an obligation to serve demand, the quality of service likely becomes the endogenous variable in the production process. In other words, inputs and outputs are determined exogenously (outside the system) and so quality is wholly determined once input decisions are made.

The electricity distribution market in a geographic or economic entity tends to be a natural monopoly. This means there is generally demand for only one firm in the industry, as more than one firm would entail costly duplication of resources such as distribution infrastructure, meters and overheads like customer service call centres. However, a monopoly market structure creates difficulties. This is because socially sub optimal production and pricing outcomes may result. This is primarily due to the fact that the objectives of the profit maximising firm do not correspond with the socially optimal level of production. Generally, the level of output tends to be lower than is socially ideal and unit prices tend to be higher. Regulation of monopolies is designed to guide the firm towards the socially optimal level of production and price.

When price caps or other such incentive regulation is also introduced, then the focus on quality for the regulator becomes more acute. The firm now potentially has an incentive to degrade quality, if the price cap is of a form that allows residual profit to be kept by the shareholders, and if quality measures are not properly accounted for in the details of the price cap formula, or via some other part of the regulator regime.

This report concludes that quality of service in Finland should be regulated using an incentive regulation regime. The current regime's effects on quality of service are ambiguous. Our conclusions draw on international experience and the fact that both consumers and distributors of electricity regard quality of service as important. In particular, consumers tend to attach much importance to how billing accuracy and complaints are handled by distributors.

This report recommends that quality of service should be regulated by the use of financial incentives such adjustments to distributors' revenues and payments that must be made to individual customers. Companies will be rewarded when quality exceeds the standard and penalised when quality of service falls below standards.

1.2 Scope of the project and terms of reference

This report is in relation to project 'C' of the EMV's efficiency measurement programme, the quality of customer service. The central objective of this report to examine how the quality of customer service could be taken into account in the regulatory pricing regime set down for the Finnish Distribution Network Operators (DNOs).

The report explores definitions of what quality of service means and how it should be measured. The report also examines what customers' expectations are regarding quality of service, and what customers are willing to pay for quality. This was conducted using a survey of DNO customers.

Finally, an assessment of how quality should be accounted for in the regulatory regime for the DNO business in Finland is conducted, and preliminary recommendations are made.

The report is structured as follows: Section 2 provides a background to the research and the objectives of the report. Section 3 discusses previous research in this area. Section 4 presents a summary of the international experience regarding electricity distribution regulation.

2 Background

In Finland, the electricity market is regulated by the Energy Market Authority (EMV). The principle task of the EMV is to supervise the pricing of transmission, distribution and other electricity network services. The EMV ensures that the pricing of network services produced by distribution and regional network operators is reasonable and non-discriminatory. Investigations can be commenced through complaints or on the initiative of the EMV.

The EMV also seeks to promote competition in the electricity market by intervening in the terms and prices of the network services that are considered to restrict competition. The EMV produces and publishes timely information on the pricing of both electric energy and its distribution. Electricity network operation is subject to licence requirements. The EMV grants network licences to organisations and utilities engaged in network operations, and building permits for constructing power lines of 110 kV and higher voltages.

The deregulation of the electricity sector in many European and other countries has divided the previously vertically integrated sector into different businesses. In Finland, the Electricity Market Act liberalised electricity markets in 1995. In most cases, transmission and distribution are considered as separate natural monopolies and the price level is regulated. Similarly, in Finland, sales, production, transmission and distribution are currently separate functions (but not necessarily in separate companies). Transmission and distribution are defined to be natural monopolies and one distribution company operates on each geographic area. Based on the Electricity Market Act, the companies are obliged to connect all customers in the area to the network and to distribute electricity at reasonable prices. Reasonable prices include efficient operations, and so the EMV must measure efficiency. Quite frequently, Data Envelopment Analysis (DEA) and other efficiency measurement techniques are used as a part of the regulation scheme, and this is the current state of practice in Finland. Also, the companies have to maintain, use and develop the network so that the needs of the customers are met, and adequate service quality is ensured.

The Electricity Market Act further obliges the authorities to supervise the distribution business and the appropriateness of distribution pricing. The task of supervision has been assigned to the Energy Market Authority (EMV). One of the tasks of the EMV is to define the cost level that a company can achieve by efficient operation. A reasonable price level is authorised in order to cover these costs and allow reasonable return on investment. The companies are obliged to report the data needed by the EMV in the evaluation. When the EMV finds that a company violates the Electricity Market Act, it can oblige the company to change its behaviour, e.g. to lower its distribution price level. If the company is not satisfied with the decision, it can appeal from it to the Supreme Administrative Court.

At the beginning of 2000, there were 106 local distribution companies in Finland. The abundance of the companies enables a relative efficiency comparison. However, the companies do not work in exactly similar circumstances, which makes comparison more difficult. The conditions depend on the geographic areas where the companies operate, and they are very different e.g. for urban and rural companies. To make the comparison possible, we need to take into account those differentiating conditions.

Fundamentally, Finland has adopted an incentive-based form of regulated pricing. If firms outperform the efficiency targets, then they receive an adjustment to their allowed revenues that implies a higher rate of return on capital. The efficiency targets are set on an industry wide basis, but in the future regulatory period will be set using company-specific targets as well. Tightening of the efficiency targets has seemingly already led to some catch-up by the firms with measured efficiency significantly below the frontier.

As further development of the measured efficiency becomes part of the standard regulatory regime, more attention needs to be paid to quality of service. Most often, high levels of service quality, especially customer commercial quality, are costly. Therefore, firms may have an incentive, or an enhanced incentive in the future, to allow customer service quality to slip. Alternatively, customer service quality may be below standard already in some network areas in Finland. Further, market opening and competition, in many cases, cannot be relied upon to incentivise the optimal levels of service quality. This suggests further investigation of the need to regulate customer service quality.

3 Previous Research

In this section, we examine relevant research on the topic of regulatory frameworks that aim to enhance quality of service. We examine the various factors contributing to quality of service in electricity distribution and theory on the optimal level of quality. The lessons are often applicable across all types of service quality, and so we take a broad view of what previous research is relevant. We then focus on the various ways which regulators can ensure adequate quality of service among electricity distributors.

3.1 Definition of service quality

While the overall quality of service experienced by the final consumer is affected by all aspects of the electricity supply chain (generation, transmission, distribution and supply), a large proportion of the reliability aspects of service quality is associated with electricity distribution. Sanghvi (1990) reports that over 85% of supply interruptions in the US occur due to distribution system outages. Distribution firms will also have to deal with consumer queries and complaints when they are also the supplier of electricity, so the quality of their customer services will also affect their overall performance.

The quality of service in the electricity distribution sector consists of a number of factors:

- **Supply quality:** This refers to technical aspects of electricity supply to final customers in terms of the voltage and frequency, which are in turn affected by a number of characteristics;
- **Reliability**: This refers to the ability of the system to deliver electricity to all points of consumption, measured by the number and duration of outages for example;
- **Customer services**: The quality of service of an electricity system will also depend on firms' capacity to deal with customer queries and complaints. Customer satisfaction surveys or the average time taken to answer calls are two ways in which this may be measured.

Some consumers may also consider other attributes as enhancing the quality of service, such as achieving environmental objectives and ensuring public safety.

3.2 Measuring quality of service

Kaufmann and Lowry (1999) examine the issue of what factors should be used to measure the quality of service. They state that measures should concentrate on outputs that affect quality, as opposed to inputs, which may improve it such as staff training or infrastructural development. They also underline the point that the variation in quality across customers, as well as the average, should be taken into account to ensure that there are no significant outliers, which would indicate that some groups receive poor quality service. It is in general possible to outline four criteria for choosing a relevant quality of service measure, it should:

- be related to aspects of the service that customers value;
- focus on monopoly services;
- be measurable by the utility; and
- not ignore pockets of service quality problems.

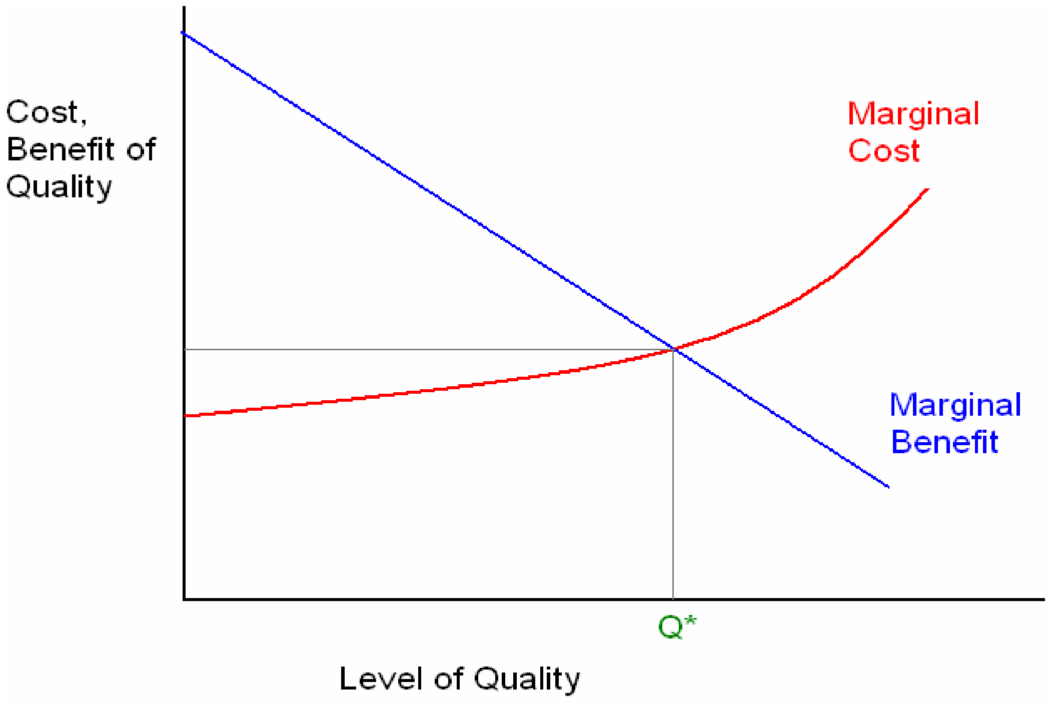
There will be other factors that influence what service quality measures should be tracked and quantified. For example, the degree to which any particular service quality problem affects an individual customer, versus the whole or a large group of customers.

3.3 Designing regulation to achieve optimal quality

Achieving optimal regulation is a difficult task. The marginal benefits and marginal costs of service improvements must be accounted for. In addition, the administrative costs of the regulatory system must be considered.

Ajodhia (2003) discusses the role of the regulator in promoting quality improvements in the electricity distribution business. The regulator must estimate the optimal level of level and establish the price at which it is made available to consumers. According to economic theory, the socially optimal level of quality is the level at which the marginal benefit of quality is the same as its marginal cost. In Figure 3.1 below, the socially optimal level of quality is found at Q*. At any other level, welfare to society will be lower than at Q*. Telson (1975) also addresses this point and points out that optimal service quality in the electricity sector, in terms of reliability of supply, will not be 100% reliability as the economic cost of achieving this will exceed the benefit arising from it.

Figure 3.1: Optimal level of service quality



Source: London Economics analysis

From the perspective of a monopoly firm, the optimal level of quality is that which maximises its profits. In contrast, the socially optimal level of quality is the level at which the marginal cost to society is the same as the marginal benefit to society. These two optima are not necessarily the same and the role of the regulator is to guide firms towards providing socially optimal levels of quality. This may not be achieved through rate-of-return regulation, which is likely to incentivise cost inefficiency, or by basing regulated profit on the level of investment, which can lead to an over-supply of capital (the so-called Averch-Johnson Effect[2]). The use of price and revenue caps may also be ineffective in guaranteeing quality as it incentivises cost efficiency, which may cause firms to under supply in terms of quality. Fraser (1994) finds that that regulated companies under a price-cap scheme reduce costs by lowering quality while Kidokoro (2002) concludes that a shift from rate-of-return legislation to a price-cap scheme actually leads to a reduction in investment aimed at improving quality.

Ajodhia (2003) points out that there are two major problems associated with the formulation of regulation that provides incentives for quality improvement among electricity distributors:

- It is difficult to measure the point at which the marginal benefit to consumers of increased quality matches their willingness to pay. The regulator will probably not have much information on this or the costs associated with delivering improved quality.
- There are also technical difficulties associated with finding this balance, such as variations in reliability across the network and the fact that investments may only deliver benefits after a long time-lag.

It has therefore been recognised in recent years that new regulatory frameworks need to be introduced in order to provide adequate measures in order to encourage electricity distributors to bring the level of quality towards the socially optimal level.

[2] Averch & Johnson (1962) developed a model showing that firms have an incentive to over-capitalise under rate-of-return regulation, with implications on the rates paid by the consumer and the efficiency of resource allocation.

In one of the earliest papers on the issue of regulation and quality, Spence (1975) noted that when monopolies set quality levels as well as price, market failure results because prices do not succeed in fully conveying information about consumers' preferred quality levels. It is therefore up to the regulators to develop a framework that allows this information to be conveyed. Spence suggests that rate-of-return regulation be used to overcome this problem, and this type of framework was adopted in a number of countries in the 1980s and 1990s. However, this type of regulatory framework may actually provide incentives for firms to over-capitalise and over-invest in quality because the level of capital acts as the denominator in the calculation of the rate of return. It has therefore been observed that this framework may not give rise to a socially optimal level of quality.

There is substantial evidence to suggest that regulation that aims to increase cost efficiency may actually lead to a reduction in quality of service. Giannakis, Jamasb and Pollitt (2003) examine cost efficiency and quality of service in regulated electricity distributors in the UK. They found that distributors with high levels of cost efficiency do not necessarily have high levels of service quality, indicating a possible trade-off between costs and quality and service. They conclude that price regulation based purely on the costs of distributors is inefficient in ensuring quality improvements and suggest that quality measures be integrated into the price-cap formula. They state that:

> "in the absence of (incentive) regulation, natural monopolies such as electricity distribution utilities may operate at sub-optimal quality and social cost levels. Therefore, in order to prevent inefficient allocation of resources, service quality standards and incentives need to be incorporated in the regulation of the utilities."

Tilley and Weyman-Jones (1999) look at productivity and efficiency growth in electricity distribution in the UK since privatisation. The initial regulatory period, between 1990 and 1995, was characterised by a generous price control formula that allowed higher revenues to be collected from customers. This was used by the newly privatised distribution companies to undertake an investment programme, which led to a large improvement in quality of supply measures. This initial period was followed by a tighter price cap with a specific capital expenditure allowance for quality of supply measures. However, this tighter price cap led to a general reduction in capital stock over the period 1995-1997, though the authors do not report the effect that this had on quality.

3.4 Regulatory approaches to service quality

In this section, we describe the different options open to regulators to ensure quality of service in the electricity distribution market. We also look at initiatives to incorporate quality measures into the regulatory framework in other jurisdictions.

3.4.1 Litigation

The most basic form of ensuring quality of service is by allowing consumers to seek compensation for low quality service via legal routes including the court system. Consumers have recourse to litigation if they suffer a loss resulting from a low quality of service and distributors would be liable for breach of contract provisions in this case. This is in general an inefficient form of ensuring quality; however, as the onus is on consumers to pursue distributors and this may be impeded by legal fees, for example. It also offers no incentives to distributors to offer anything but a basic level of service. Finally, some quality of service elements may be shared by consumers, and so an individual consumer's incentives to pursue the service provider are not matched to the social incentive (externalities exist).

3.4.2 Minimum standards

Minimum standards play a role in electricity distribution regulation in most jurisdictions. This ensures a basic quality of service for consumers and gives distributors clear instructions on the required level of service. While this is a simple way of ensuring quality, these requirements will generally be ineffective in improving the quality of service as they only stipulate a quality 'floor' below which the distributor may not operate. Therefore, minimum standards are typically used in conjunction with other regulatory approaches in order to ensure that firms continually improve quality.

It is also important to ensure that minimum standards are set at a correct level. If they are set too low, then underperforming firms will have no incentive to improve their quality. If they are set too high, the cost of attaining them may exceed the penalties associated with not attaining them, obviating the incentive for firms to comply with them.

The general idea of minimum standards also is not clear on the consequences of not achieving the minimum. If the minimum is not achieved, some penalty regime must be in place or the company will face no incentive to obey the minimum standard.

A system of minimum standards therefore will usually be linked to penalty payments. These penalties involve the payment of compensation, to individual consumers or to the regulator on behalf of all consumers, by a distributor in the event of a breach in quality standards. The use of these payments increases the incentive for firms to meet minimum standards.

3.4.3 Benchmarking / Yardstick regulation

The use of benchmarking (or yardstick regulation) requires the regulator to issue comparative indices of service quality for each of the electricity distributors. This allows consumers to compare the service quality of different distributors, helping to mitigate the informational asymmetry arising from the fact that consumers have no choice over their provider due to the regional monopoly nature of the business. Distributors who have below-average levels of quality will be put under pressure to improve, due mainly to increased consumer awareness, as has been observed in a number of jurisdictions.

One of the main criticisms of benchmarking is that it may not provide adequate incentives for distributors to improve their quality of service above the industry average or provide incentives for over-performing firms to further improve their quality of service. Waddams, Price et al (2002) examine the effects of benchmarking on a range of UK regulated utilities, including electricity distribution. They find that while the use of benchmarking does increase the average quality of service, this comes about primarily due to the improvements in quality by those at the bottom of the scale. The 'best practice' frontier does not move out, but instead, the low performing companies move towards the existing frontier. While this may be due to the existence of a technical limit to quality improvement, it may also reflect a lack of incentives for high-performing companies to improve the quality of their service due to their existing position.

Another criticism of benchmarking to achieve quality standards is that it may create unrealistic expectations among consumers which do not take account of the cost of improving quality, as different distributors may face different costs. For example, it is more expensive to improve the service quality for low density rural consumers than for high density urban consumers.

It is common for regulators to use benchmarking in conjunction with other measures. Giannakis, Jamasb and Pollitt (2003) suggest that benchmarking could be used as part of a regulatory regime which provides incentives quality improvements. They find that integrated cost-quality benchmarking "is a useful tool for overall analysis and progress of the incentive regulation regime". Weisman (2005) finds that increased information dissemination regarding regulated firms' compliance with benchmarks provides those firms with "unambiguous incentives for increased investment in quality".

Littlechild (2003) states that the UK experience highlights how much can be achieved in improving overall industry quality simply by publishing information on actual performance in relation to minimum standards and overall industry performance. In comparison to performance-based regulation, as described below, these measures also have the advantage of low costs in terms of awarding price or revenue increases on account of quality improvements.

3.4.4 Performance-based regulation (PBR)

Performance based regulation includes incentive regulation with price caps and revenue caps. These forms of regulation are becoming increasingly popular in the area of electricity distribution. PBR involves including mechanisms in the regulatory framework which actively promote quality of service improvements, providing distributors with incentives to improve their level of service.

Sappington et. al. (2001) discuss the use of performance-based regulation (PBR) in electric utilities. This type of regulation can be defined as follows:

> "the implementation of rules, including explicit financial incentives, that encourage a regulated firm to achieve certain performance goals, while affording the firm significant discretion in how the goals are achieved. This discretion enables the firm to employ its superior knowledge of its operating environment to achieve the desired goals."

PBR is thus differentiated from cost-of-service regulation in that it aims to provide incentives for a range of measures, as opposed to just minimising costs. It allows firms to earn more than the target return by achieving a higher performance, while at the same time employing penalties for underperformance.

There are several different instruments available to the regulator which fall under the rubric of PBR:

- Price cap regulation: this usually sets a period during which the firms cannot raise its prices above the rate of inflation, adjusted for a productivity offset, as well as a possible quality of service offset;
- Rate freeze: firms cannot change their rates during the commitment period;
- Rate case moratorium: systematic increase or decreases in rates are not allowed, though individual rate elements can be modified; and
- Earnings sharing plans: earnings are shared between the firm and its customers, with customers receiving a payment or lower rates. These plans are often operated in conjunction with the above measures.

The main benefit of these types of plans is that authorised revenues are not linked to operating costs, so firms are provided with incentives to control costs and increase the quality of their service. However, for a plan to deliver the desired quality improvements it must be well-designed. The authors list the following attributes of a well-thought out plan:

- It is transparent and easy to understand;
- It provides the correct incentives insomuch as it avoids encouraging firms to focus solely on costs;
- It provides a careful balance of risks and awards, allowing it to achieve a sustainable outcome;
- It receives the confidence of the industry; and
- In terms of providing incentives to improve quality, the incentives must be analysed carefully to make sure that they elicit the desired response and that they are compatible.

The use of price or revenue caps is one of the most popular forms of performance-based regulation and is used widely in regulated industries. In order to adjust the price- or revenue-cap formula to integrate quality measures, as extra variable is added to account for the departure of the distributor from the benchmark quality level. The magnitude of this factor will determine the level of the price or revenue cap, with a negative performance leading to a more onerous cap. Ideally, this factor will accurately reflect the balance between consumers' willingness to pay for increased quality and the cost of its provision. The quality factor can be composed of several different quality measures aggregated into a single index or operating separately. The level of awards and penalties can be symmetric or asymmetric.

Sometimes a 'deadband' is placed around performance targets, in which neither a penalty nor reward applies. See Table 3.1 below.

Table 3.1: Size of Deadbands in Selected Countries

Country	Deadband
Hungary	5% for penalties, 10% for incentives
Italy	5% around target for both incentives and penalties
Portugal	12% around the target for both rewards and penalties

Source: Council of European Regulators (2005)

The use of performance based incentives is seen as one of the most effective ways of incentivising distributors to improve quality as they encourage distributors to improve quality while taking account of the cost effectiveness of these improvements. However, the system must be well designed in order to achieve these aims and quality measures must be well chosen. Meyrick and Associates (2002) suggest that it is best to introduce these schemes gradually, adding new quality measures and modifying rewards/penalties over time.

3.4.5 Market solutions

Although electricity distribution is a natural monopoly, there is a range of market-based measures that can be employed to provide incentives for the improvement of quality in the industry. For example, market forces could be harnessed by allowing different contracts for different types of users, so-called 'price/service offerings'. In this way, customers can be offered lower reliability at a lower price, and higher reliability at a higher price. Distributors will therefore be able to measure consumers' willingness to pay for quality. A variant of this is reliability guarantees, where distributors guarantee to compensate customers who demand higher reliability. The major inconvenience of these methods, however, is that it may be prohibitively expensive for distributors to install the technology allowing individual customers to choose different levels of reliability.

A variant of this 'price/service offering' is for the regulators to provide different types of offerings to different distributors, allowing variations in the X factors and the service quality elements. This provides the distributor with incentives to reveal its true cost base through the decision that it makes.

3.4.6 Long-term quality regulation

Certain types of regulation may provide incentives for firms to enhance quality in the short term at the expense of long-term service quality. Ajodhina, Francken and van der Lippe (2003) discuss this in more detail. Firms may still take a short term view and maximise short term reliability, increasing their rewards in the short term. The authors discuss several ways of dealing with this problem and introducing regulatory regimes which provide incentives for long term service quality:

- **Network Input Regulation**: Regulators can take an active role in monitoring the capital spend by distributors, for example, examining differences between past and forecast spend. This type of approach has been used by Ofgem in the UK. The disadvantage of this is that it may lead firms to window dress their costs and capital spends in order to appear in the best light during regulatory reviews.
- **Process Input Regulation**: Under this system, regulators monitor certain aspects of the distributors' internal processes to ensure that they are in line with optimal outcomes for consumers. This technique is criticised on the basis that it is out of line with other regulatory practices of simply providing firms with sufficient incentive, as opposed to intervening directly in the management of the firm. It is not widely used.
- **Projection Outputs Regulation**: This involves regulators simply monitoring estimated outputs and providing incentives to ensure that they are met. This system fits most comfortably with common price- or revenue cap formulae as the regulator does not directly intervene in the distributors' management.

4 International experience in electricity distribution

In the previous section, we outlined the main types of regulatory frameworks that can be adopted to maintain service quality. We also indicated jurisdictions where the different types of measures are used. In this section, we also provide detailed descriptions of regulatory frameworks currently in use in a selection of jurisdictions.

Price and revenue cap regulation has become a common form of regulation for electricity distribution internationally for most utilities. There has traditionally been a concern that incentive regulation would lead to reduced quality of service. This issue was investigated by Littlechild (2003). This was not the case in the UK, however, were explicit steps were taken to ensure that quality of service in the newly-privatised companies would not fall. This was initially achieved through the use of benchmarks and minimum standards, though it is not more common to include quality measure directly in the price- or revenue-cap formula.

4.1 International overview

Table 4.1 overleaf provides an overview of how various international regulators provide incentives for quality of service standards or improvements.

Table 4.1: Summary of Quality of Service Regulation in Selected European Countries

Country	Regulator	Description of Regulatory Framework	Quality Measures	Size of Caps
Norway	Norwegian Water Resources and Energy Directorate (NVE)	Revenue cap model adjusted annually on the basis of distributors' payments to consumers for costs linked to shortages in supply.	Cost of Energy not Supplied (CENS): The level of energy not supplied is based on the length of the shortage and the expected load. The NOK per kWh rate is set by the regulator each year on the basis of the operator's historical ENS rate and technical constraints.	Not applicable
Sweden	Swedish Energy Agency	Ex-post price-cap framework under the Performance Assessment Model for Electricity Networks. Distribution companies set own tariffs; these are reviewed at the end of the period by the regulator.	Frequency of interruptions and voltage stability. Assessment is done on a bench-marking basis with individual company performance based on it's relation to overall industry performance.	Company's revenue levels must be 'reasonable' – no explicit cap
Denmark	Danish Energy Regulatory Authority (DERA)	Ex-ante revenue cap regulation		
Netherlands	Dutch Energy Regulator (DTe)	Price-cap adjusted for efficiency and quality factors.	Reliability is the only direct measure in the price-cap formula. Voltage quality and commercial quality are regulated through minimum standards.	Rewards and penalties applied to companies in a year must sum to zero
Ireland	Commission for Energy Regulation (CER)	Revenue-cap model adjusted for quality of services measures	Supply Interruptions: Based on the number of customer minutes lost and number of interruptions. Customer Care: Based on response time to customer enquiries Customer charter: Set of minimum standards with corresponding penalty payments	Penalties and rewards capped at 4% of revenues

UK	Ofgem	Revenue-cap model adjusted for quality of services measures	Quality of supply: measured by the number and duration of interruptions Quality of telephone services, measured through a customer survey	Rewards are capped at 2% of revenues, made up of 0.5% for 'number of interruptions', 1.25% for duration of interruptions, 0.25% for telephone service quality

Source: London Economics Analysis

4.2 Norway

Incentive-based regulation of electricity distribution was introduced in Norway in 1997 with the aim of improving both cost efficiency and quality of service, as defined by the number and duration of outages3. The regulatory framework sets revenue caps but adjusts company's caps each year in function of consumers' interruption costs, based on a measure of 'cost of energy not supplied' (CENS). The CENS rate is NOK per kWh of energy not supplied, set to reflect the end users' average cost of energy not supplied. This can be contractually set by the licensee or imposed by the regulator. The amount is paid directly to the end user by the network company in the event of an interruption. The cost rates are adjusted on the basis of urban/rural distribution and the type of customers. The expected CENS (duration and rates for different consumers) is set by the regulator each year on the basis of operators' historical ENS rates and operating constraints.

While this framework is subject to review, it was originally hoped that it would provide adequate incentives to distributors to maintain acceptable reliability measures.

This regulation is enforced by the Norwegian Water Resources and Energy Directorate (NVE). The calculation base for the income cap is reviewed every 5 years at the earliest. According to Grasto (1997), the factors determining the level of the new revenue cap are:

- Development of the network company's efficiency;
- Development of the network company's cost level;
- Development of the network company's return on network capital;
- Development in quality of supply;
- The network company's efforts on supervision and safety;
- Developments in the actual increase in energy supplied;
- Changes in the reference interest rate;
- Changes in investment; and
- Other relevant factors.

[3] Heggset et al (2001)

4.3 Sweden

Regulation of electricity distribution in Sweden is governed principally by the Electricity Act (1997), which states that electricity distributors' fees must be "reasonable"[4]. This concept was modified in 2002 in order to reflect the overall performance of the companies, and not just their costs. As the interpretation of the term "reasonable" is somewhat arbitrary, there is currently debate in Sweden over the establishment of a more explicit tariff regime.

The Swedish Energy Agency performs an ex post evaluation of companies' performance based on their Performance Assessment Model for Electricity Networks. From this, it establishes a "reasonable net tariff" for each of the companies. The Agency examines the tariffs only after they have been set and may require the companies to undertake corrective measures, such as repayments to consumers. The ex post nature of the evaluation stems from the legislature's belief that companies are best able to estimate their own performance and to set their tariffs accordingly.

Quality is measured by the frequency of interruptions and voltage stability. The concession holders' performance is rated against equivalent performance by other operators and added as a parameter to the Performance Assessment Model. Operators with insufficient levels of service quality may be ordered to compensate customers through a refund of payments, though this must be enforced by the courts and can take a number of years.

4.4 Denmark

In Denmark, a revenue cap model was introduced. The first year of the cap allowed for maximum revenues to be equal to the previous year's costs. Thereafter, the value of the cap was reduced in line with efficiency targets. Furthermore, a benchmarking element was included which further reduced the allowed revenues of underperforming companies.

[4] See Swedish Energy Agency (2004)

This system was designed to give companies an incentive to rationalise their operations and to reduce costs. Firms that reduced costs to a sufficient extent would be rewarded with trading surpluses. It was also designed to encourage less efficient companies to merge with more efficient ones and also to force them to approach best practices.

According to Sørenson (2005), the actual outcomes were not as anticipated. It is believed that allowed revenues were probably set too high, resulting in firms not raising their prices as high as caps permitted. Companies were able to save up allowed revenues for later years, mitigating much of the pressure for cost reduction and the achievement of increased efficiency.

Part of the problems lay with the fact that there was no resolution to how companies' assets should be valued and how depreciation should be incorporated into the caps. There were also problems with the benchmarking model, which was formulated in co-operation with the industry. Strong pressure by firms may have led to the perception that the model was complex, intransparent and not credible. Problems also resulted from the division of work between two different regulatory bodies and their apparent under resourcing. All of these factors probably contributed to revenue caps which were too large.

Companies were not pressurised by such loose revenue caps, mitigating the incentive for efficiency and rationalisation. In fact, there were incentives to maintain costs at a certain level, so as not to negatively affect the following period's revenue cap.

One of the achievements of this revenue cap was to focus attention on costs and trigger cost saving mechanisms. These did result in a reduction in the number of employees in the sector.

4.5 United Kingdom

Ofgem sets the electricity distribution framework in the UK for 5-year periods. During the last period, between 1999 and 2004, the Information and Incentives Project (IIP) was launched in 1999 in order to strengthen the incentives provided to distributors to improve their quality of service. It was also hoped to reduce regulatory uncertainty by increasing the transparency of reviews and clearly defining expected levels of service. This plan was incorporated into the regulatory regime in 2002 and currently forms part of the 2005-2010 plan.

The IIP links distributors' revenues to measures of performance, rewarding good performance and penalising underperformance. This framework was further developed for the 2005 to 2010 period allowing for annual reviews of quality targets with symmetric rewards and penalties around the target. It involves four main concepts[5]:

- A mechanism for penalising underperformance in relation to quality of supply targets, as measured by the number and duration of interruptions;
- A mechanism for rewarding companies who exceed these targets;
- A commitment to rewarding 'frontier performance', i.e.,. the best performing companies; and
- A mechanism for rewarding/penalising companies for the quality of their telephone services.

The four output measures under the Information and Incentives Project are:

- Average number of supply interruptions per 100 customers;
- Average duration of supply interruptions in minutes per connected customers;
- Quality of telephone response, as measured by customers' expressed satisfaction on a survey; and
- Speed of telephone response.

These output measures were chosen to satisfy three criteria:

- They should reflect what customers actually value;
- Be attributable to DNOs; and
- Be capable of objective measurement over time and across companies.

[5] 'Information and incentives project, incentive schemes: Final Proposals', Ofgem 2001

There are no deadbands around any of the benchmarks. Penalties or rewards depend on how companies perform relative to the established benchmarks. The maximum penalty/reward is specified as a percentage of revenues, and this percentage varies over the three year term of the IIP. In the first year, maximum penalties were capped at 0.85% of revenue. This was the sum of three separate caps: 0.5% related to duration of interruptions, 0.25% for number of interruptions, and 0.1% related to the quality of telephone response. In the last two years of the IIP, the overall cap is 2% of revenue. This is the sum of a 1.25% cap for duration of interruptions, a 0.5% cap for number of interruptions, a 0.125% cap for the quality of telephone response, and a 0.125% cap related to the speed of telephone response. Caps were lower in the first year because of doubts relating to new data methodology.

A DNO earns maximum rewards on the "Number of Interruptions" indicator by exceeding the benchmark by 15%. A DNO earns maximum reward on the "Duration of Interruptions" indicator by surpassing the benchmark standard by 20%.

4.6 The Netherlands

The Netherlands employs a system of performance-based regulation. It is based on the concept of yardstick competition, in which firms are rewarded for above average performance relative to competitors and below average performance is penalised. This integrates a classic price cap regulatory framework, based on a uniform X-factor, and quality regulation which seeks to maintain and enhance the reliability of the network. This latter aspect is based on a system of penalties and rewards in the form of a revenue increase or decrease depending on the firm's reliability, as measured by the number of interruptions and their duration. The quality framework is based on the following formula:

Equation 4.1: Dutch Regulatory Framework

$$\pi_{i,t+1} = \varphi * (\gamma_t * s_{i,0} - s_{i,t})$$

Source: Ajodhia, Franken &van der Lippe (2003)

This equation is to be interpreted as follows: π refers to the revenue adjustment in period t+1 for firm i and this is a function of the marginal penalty/reward (φ), the reliability index in the previous period (γ) and the difference between the reliability target (s0) and the actual reliability (si) in the previous period.

This framework only measures quality in terms of reliability. However, it is recognised that voltage quality and commercial quality are also factors in overall quality, but these are currently regulated through a system of minimum standards.

The authors state that there may be some negative consequences associated with this type of regulation, including:

- Distributors only have an incentive to improve their average performance, which may mean that they accept under-average quality to some customers where quality is harder to improve, such as for rural residential customers. One possible way of avoiding this is to set minimum standards.
- A second problem with this kind of system is that is may not provide adequate incentives to ensure long term quality of service, due to an emphasis on optimising short-term performance. For example, firms may choose to not undertake certain maintenance work as this will increase outages in the short term, though decrease them in the long term. This is discussed in greater detail below.

According to DTe – Netherlands Office for Energy Regulation (2002), the Dutch regulator (DTe) adopted an integrated model for regulating price and quality for the 2004-2006 regulatory period with the aim that network companies "should find a balance between the level of quality and cost"6. While the regulator recognises that there are three elements to quality (reliability, power quality and commercial quality), it states that reliability is seen as being the most important element and the price-cap formula only takes this into account. There are therefore three measures of quality in the regulatory regime:

- The frequency of interruptions;
- The duration of interruptions; and
- The average duration of interruptions.

The regulator allows for interruptions due to force majeure, e.g., interruptions caused by weather conditions.

[6] Office of Energy Regulator, Netherlands, (2002)

The initial standards for the regulatory period were, based on historic performance by company. The reason given for this is that specific factors may exist for different companies in different regions which have an effect on reliability. These standards are set for an indefinite period, in order to provide regulatory certainty for firms.

4.7 Australia

The regulatory regime in Australia varies from state to state. In the State of Victoria between 2001 and 2005, a price cap incentive scheme was employed in which customers who experienced service levels below a minimum standard were compensated. (See Meyrick (2003)). For example, a payment of AU$80 was made to all urban customers who experienced more than 9 supply interruptions in a year and rural customers who experienced more than 15 interruptions. All customers whose power was off for more than 12 hours at any one time received AU$80.

The actual quality of service measures incorporated into price caps were:

- Unplanned interruption frequency;
- Unplanned interruption duration; and
- Planned minutes off supply.

Unplanned interruptions were given a weight of 100%, average unplanned interruption duration a weight of 75% and total planned minutes off supply a weight of 25%. Incentives were symmetric, with performance above the target being rewarded at the same rate as penalties were for performance below target. Incentive rates were based on estimates of the distributor's marginal costs of improving reliability rather than estimates of customer valuation. Exceptional events were excluded from performance evaluation and included:

- Supply interruptions made at the request of the customer affected;
- Load shedding due to a shortfall in generation;
- Supply interruptions caused by a failure of the shared transmission network; and
- Supply interruptions caused by a failure of transmission connection assets, to the extent that the interruptions were not due to in adequate planning of the transmission connections.

Natural disaster events that are widespread in their effect, which the DNO could not have been reasonably expected to have mitigated and which are rare events, were also excluded.

In the State of South Australia, a service quality incentive scheme operates for ETSA Utilities, South Australia's electricity distributor. Maximum allowed revenue is adjusted according to actual performance vis-à-vis targets in relation to:

- Planned minutes off supply;
- Unplanned interruption frequency;
- Unplanned interruption duration;
- Time to restore supply to not less than 80% of affected customers; and
- Operating cost per customer.

A points score is used to measure performance for the first four indicators, with revenue adjustments made at the rate of AU$300,000 per point. Calculation of points is symmetric, with deviations from target being rewarded or penalised at the same rate. The timing of payments is not symmetric, with revenue reductions being passed on to customers immediately, but price increases being delayed until the following year and capped at a maximum of 1.5% per annum.

The terms of the scheme were revised in 2003 with a view to improving the service quality of those customers receiving the poorest level of service. New targets focused on the percentage of customers who experience:

- More than a given number of interruptions in a year;
- More than a given number of minutes off supply in a year; and
- An interruption longer than a given number of minutes in a year.

Call centre performance was also incorporated into the new scheme as market research suggested that consumers highly valued this aspect of service.

4.8 United States

Meyrick (2003) examined quality of service regulation in a selection of US states. Service quality incentives are designed to ensure that utilities maintain existing quality levels even as they operate under arrangements that create stronger incentives to contain cost. Service quality indicators generally fall under the following headings:

- Reliability (e.g. frequency and duration of power supply interruptions);
- Non-emergency on-site services;
- Safety indicators;
- Telephone services (e.g. call centre quality, average time taken to answer customer calls);
- Metering and billing (e.g. timely and accurate meter reading and bill preparation);
- Customer satisfaction (generally based on surveys); and
- Other factors (e.g. employee safety, customer education programmes, etc.).

Meyrick (2003) found that service quality incentive plans for electric utilities investigated almost always feature reliability indicators. Nearly all of these plans have separate indicators for the frequency and duration of interruptions. Telephone indicators and customer satisfaction indicators are also popular; although a range of other indicators have been included in approved plans.

The total number of indicators in most approved plans is between five and seven. Many plan updates have simplified and reduced the number of indicators used in the second plan. In a few cases, the updated plan increased the number of indicators.

There are both penalty-only and penalty/reward service quality incentive plans for US energy utilities. Penalty-only plans are more common and this may be because a number of service quality indicators (SQIs) were implemented as part of merger agreements, as countervailing measures against cost cutting which could imperil quality.

In the US, it is common for utilities to be able to trade good performance on some quality indicators against poor performance on other indicators. Furthermore, most penalty/reward rates are not based on estimates of customer value but through negotiation or judgment. One reason for this is that establishing estimates of customer value would entail costly research of the company's customers.

On average for the sampled companies, total penalties or rewards as a percentage of revenues are just under 2 per cent. In some cases (e.g. Massachusetts) this limit was set by state statute rather than by the regulator. On average, about 45% of total potential penalties/rewards is tied to reliability performance, about 12 per cent to telephone centre performance, and about 43% to miscellaneous other indicators such as billing, employee safety, customer satisfaction, etc.

Table 4.2: Utilisation of Quality of Service Measures

Quality Measure	Number of US Companies	Countries
Customer Satisfaction	16	Ireland, UK
Reliability	15	Norway, Sweden, Netherlands, Ireland, UK
Telephone Services	13	Ireland, UK
Onsite Services	10	
Metering / Billing	7	

Source: London Economics Analysis

4.9 Ireland

Electricity distribution in Ireland is regulated by the Commission for Energy Regulation (CER). The regulatory period lasts for 5 years and the current regulatory period covers the period 2006-2010. See Commission for Energy Regulation (2005) for more details.

One noteworthy feature of electricity distribution in Ireland is that the network remains under the ownership and operational control of the fully state-owned monopoly Electricity Supply Board (ESB). This makes benchmarking more difficult to undertake. To overcome this problem, the CER undertakes international benchmarking on various quality issues to determine whether the level of service offered by ESB meets international norms. These international benchmarking exercises are typically with distribution firms in the US and UK.

The regulatory framework for electricity distribution in Ireland follows a price-cap model incorporating several quality measures. There is also a series of minimum standards in place, with an associated penalty scheme, set out in a customer charter. The main quality of service elements in the framework are as follows:

- **Supply interruptions**: This measure is based on a combination of the number of customer minutes lost, the rate of customer interruption, distribution losses and customer satisfaction ratings for call centre services. Targets are set annually for both elements by the Commission and these take into account the distributor's planned capital expenditure plans. The rewards/penalties associated with this element of the price-cap formula are capped at 1.5% of total revenues.
- **Customer contact care:** This element is based on the target response time of the ESB to customer enquiries. Rewards and penalties of up to 1.5% of allowed revenues can be applied on the basis of this element.
- **Customer charter:** This charter sets out a range of minimum standards for customer service, such the maximum amount of time allowed to return calls and time taken to deal with customer connection problems. If the distributor fails to pay compensation directly to consumers then the shortfall can be addressed directly through the revenue cap mechanism, from which the amount will be deducted plus an additional 10%.

In total, the amount of the distributors' revenues which are affected by the reward/penalty is capped at 4% annually, though it is capped at 2.5% in 2006, the opening year of the plan.

4.10 Cross-country comparisons

A variety of standards of commercial quality is applied to DNOs in different European countries. These can be classified into two categories:

- **Guaranteed standards (GS):** These fix minimum levels of service, which have to be adhered to each individual case. In the event of the standard not being reached, a fixed amount of compensation is payable to the customer in question.
- **Overall standards (OS):** These are applied to areas of service where providing guarantees may not be practicable. They normally involve a level of service defined in percentage terms to be achieved within a certain time frame. They do not necessitate penalty payments, but are important in gauging the quality of service and driving improvements.

Table 4.4 below summarises the penalty and incentive schemes in operation in several European countries. It is clear from this that supply quality is a crucial determinant of rewards and penalties, with the number of interruptions and / or the duration of interruptions the most popular gauges of supply quality. Most countries offer exceptions to the system in the case of force majeure situations. In several cases, the penalty or reward is defined as a percentage of revenues, such as in Great Britain and in Ireland.

Table 4.3: Characteristics of Incentive / Penalty Schemes

Country	Indicators	Exclusions	Incentive / Penalty	Incentive Rate
Great Britain	Number of customers interrupted per 100 customers; average number of customer minutes lost per customer	Exceptional events	3% of price control revenue is exposed	Average value of energy not supplied implicitly used in the scheme: €4.18 per kWh not served
Hungary	Network Security (NS): Outage rate, Number of MV faults per grid length, average repair time of MV network, average number of LV grouped faults. Continuity of Supply (CS) indicators: SAIDI, SAIFI, percentage of interruptions restored within 3 hours and 24 hours	NS: No CS: Yes	Tariff related incentives and penalties apply to 3 indices out of NS and CS: outage rate, SAIDI and SAIFI. Fines apply to all NS and CS indicators	Not applicable
Ireland	SAIDI, SAIFI and Losses	Days when daily SAIDI deviates by more than twice the standard deviation from the mean	4% of price control revenue is exposed to incentives	Average value of energy not supplied used in the scheme €7.20 per kWh not supplied (in 2000)
Italy	SAIDI	Force majeure and external causes	The price cap formula contains a Q factor that funds the net difference between incentives and penalties	Differentiated according to type of customers (domestic and business); respectively €10.80 and €21.60 per kWh not

				supplied
Norway	Energy not supplied (ENS)	Exceptional events can be evaluated upon request by the company	The difference between expected interruption costs and actual interruption costs is calculated annually for each company and added to the company's revenue cap if positive and subtracted if negative. From 2007 companies will have to adjust tariffs yearly on the basis of the incentive / penalty effect.	
Portugal	Energy Not Supplied	*Force majeure*, public interest, service reasons, safety reasons, agreements with the customer, facts attributable to the customer	Rewards (penalties) are proportional to the difference between the actual performance level and the target (excluding the dead band)	
Sweden	SAIDI and SAIFI	Force majeure	The difference between "expected interruption costs" and actual interruption costs (using reported SAIDI and SAIFI) is calculated annually for	

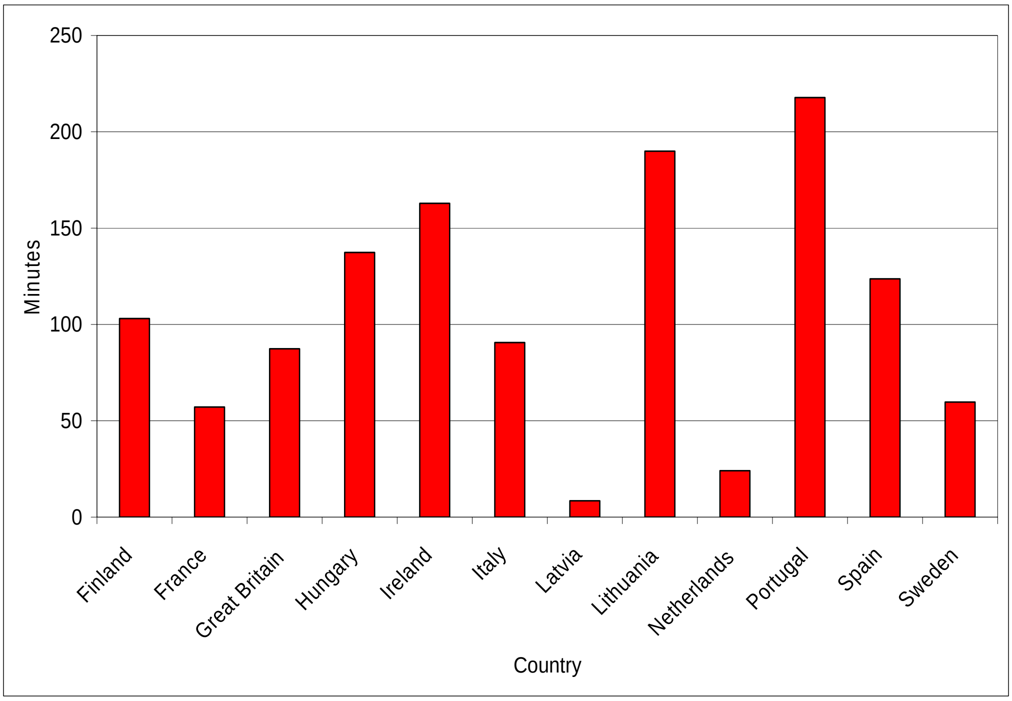
		each company. The tariff for the company is adjusted accordingly. An upper boundary (totally underground network) and a lower boundary (quality of pure radial network) are used.

Source: Council of European Regulators (2005)

Note: SAIFI = Number of interruptions per customer per year and SAIDI = Total duration of interruptions per customer per year

Figure 4.1 below shows the number of minutes lost per customer due to unplanned interruptions in 2004 and gives some indication of the range in supply quality. The average number of minutes lost was 105 amongst the countries analysed with a standard deviation of 62 minutes, indicative of large variation amongst countries. Portugal lost the most minutes per customer (217.8), with customers in Latvia showing the shortest losses, at 8.5 minutes per year.

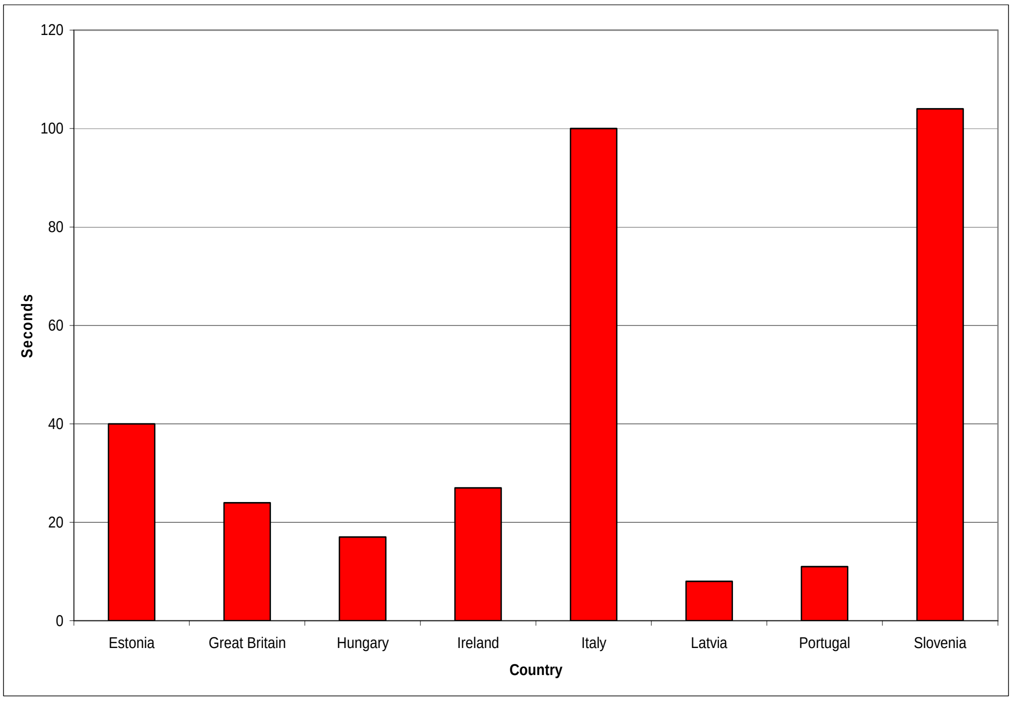
Figure 4.1: Minutes lost per customer due to unplanned interruptions, 2004



Source: Council of European Energy Regulators (2005)

Telephone service quality is another factor in the composition of service quality. Figure 4.2 below shows the average waiting time encountered by customers contacting electricity companies' call centres. The average waiting time is 41.4 seconds, with the standard deviation of 36.2 seconds suggesting large variation across countries. This ranges from a 104-second average wait for customers in Slovenia to an 8-second wait in Latvia.

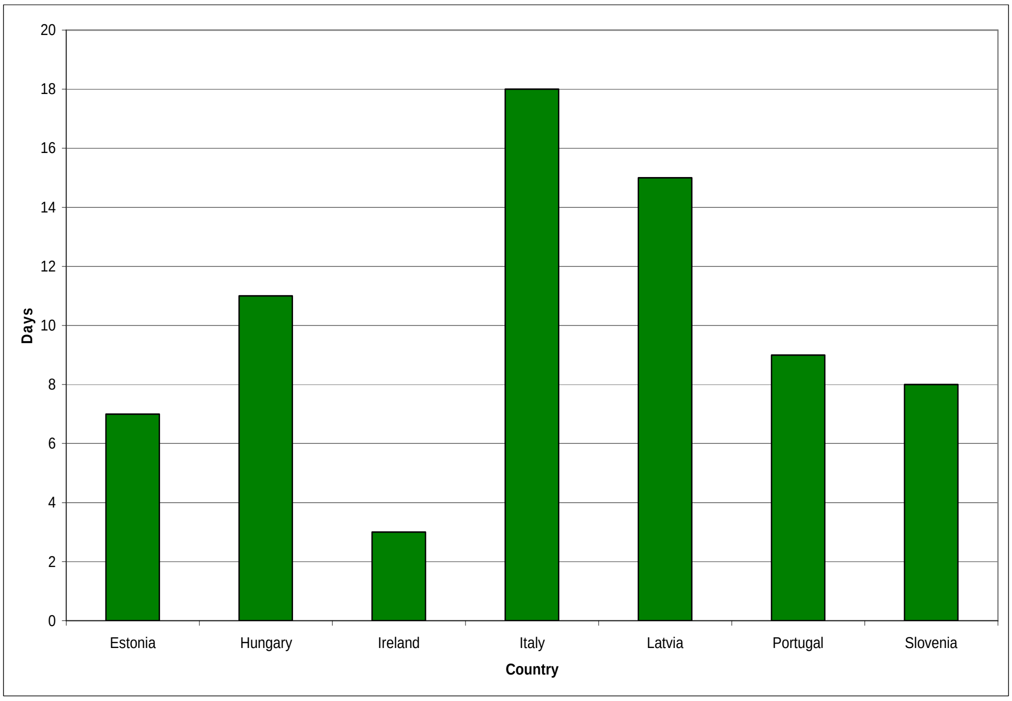
Figure 4.2: Average waiting time in call centres



Source: Council of European Energy Regulators (2005)

The averaged response to written customer queries in 7 European countries is illustrated in Figure 4.3 below. The average number of days taken to respond is 10.1, with a standard deviation of 4.7 days. The longest response times are found in Italy (18 days), while the response time in Ireland is 3 days.

Figure 4.3: Average Response time to customers' written queries



Source: Council of European Energy Regulators (2005)

A survey of 12 European energy regulators conducted by the Council of European Energy Regulators (2005) investigated standards of service applying in different European countries. These include:

- **Standards applied for the reconnection of the customer to the network after the payment of debt:** Almost every regulator indicated a reconnection time of 1 day. The compensation rate varies between €15 and €120 depending on a variety of factors. In Slovenia and Lithuania, no compensation is payable, while compensation in paid only on request in Hungary and the Czech Republic.
- **Actual levels for the average response time to demands for Low Voltage supply:** These were between 0 and 30 days.

- **Actual levels for the time of connection of a new customer to the network:** This varied between 1 day and 4 months amongst respondents.
- **Actual levels for the time of starting supply service:** This activity is generally performed within a time range of 1 to 7 days.
- **Standards applied for the case of meter problems:** The initial check up should take place within 5 to 7 working days of the DNO being contacted about the problem. The average time limit for fully resolving the issue is 15 days and the amount of compensation paid to the customer in the event of a fault ranges from €15 to €75.
- **Standards applied for notice of scheduled supply interruptions:** In the majority of cases where a minimum period of notice is stipulated, there is an obligation to inform customers 24 to 48 hours before interruption. However, in the Czech Republic, a stringent 15-day limit applies.
- **Standards applied for answering customers' letters:** The standard response time is 15 days in almost every instance. In Estonia, however, the required response time is 30 days, while it is only 8 days in France. Compensation for non-compliance by the company varies from €15 to €25.
- **Actual levels for the average response time of answering written queries:** These varied from 3 to 18 days.
- **Standards applied for the service level indicators of call centres:** In France, the number of abandoned calls should not exceed 5% of incoming calls. In Hungary, 80% of calls have to be answered within 30 seconds, while in Portugal the same proportion must be answered within 60 seconds. In Ireland, 75% of calls should be answered within 20 seconds.
- Actual levels for the average waiting time measured in Call Centres: This ranges between 15 and 70 seconds amongst responding countries.

Table 4.4: Most Frequently Used Commercial Quality Standards in European Countries

Area	Standard	Number of Countries where applied
Customer Connection	Estimating charge (simple work)	7
	Execution of simple works	6
	Execution of complex works	5
	Connection (supply and meter)	12
Restoration in case of fault related to single customer	Responding to failure of distributor's fuse	9
Solving problems related with voltage or meter	Voltage complaints	11
	Meter problems	11
Customer contact in person, in writing or by phone	Notice of interruption of supply	14
	Queries on charges and payments	5
	Response to customers' letters	2
	Response to customers' claims	3
	Appointments scheduling	7
Meter reading and billing	Number of meter readings within a year	10
	Reconnection following repayment of debts	10

Source: Council of European Energy Regulators (2005)

Table 4.5 below illustrates the powers vested in the electricity regulatory bodies as regards quality standards. Based on this information, the most powerful regulatory authorities are those in the Czech Republic, Italy, Great Britain, Portugal and Norway. They each have the power to set quality standards, compensation to customers, and incentive/penalty regimes. Regulatory authorities in Austria, Greece, Lithuania, Poland and Spain do not have any of these powers.

Table 4.5: Powers of Regulatory Authorities on the Subject of Quality Regulation

Country	Can set quality standards	Can set compensation to customers	Can set incentive / penalty regimes
Austria	No	No	No
Czech Republic	Yes	Yes	Yes
Estonia	No	Yes	No
France	No	Yes, the regulator can sometimes set compensation	Not yet
Great Britain	Yes	Yes	Yes
Greece	No	No	No
Hungary	Yes	Yes	
Italy	Yes	Yes	Yes
Latvia	Yes	No	No
Lithuania	No	No	No
Norway	Yes	Yes	Yes
Poland	No	Not yet	Not yet
Portugal	Yes, In collaboration with GD for Geology and Energy	Yes	Yes
Spain	No	No	No
Sweden	No	Yes	Yes

Source: Council of European Energy Regulators (2005)

Table 4.6 below illustrates the regimes regarding standards for unplanned interruptions for several European countries. Schemes vary according to the maximum permitted duration per customer, whether compensation is payable and if so how much. In some countries, compensation is paid automatically, while in others it is only paid on request.

Table 4.6: Maximum Duration of Each Unplanned Interruption

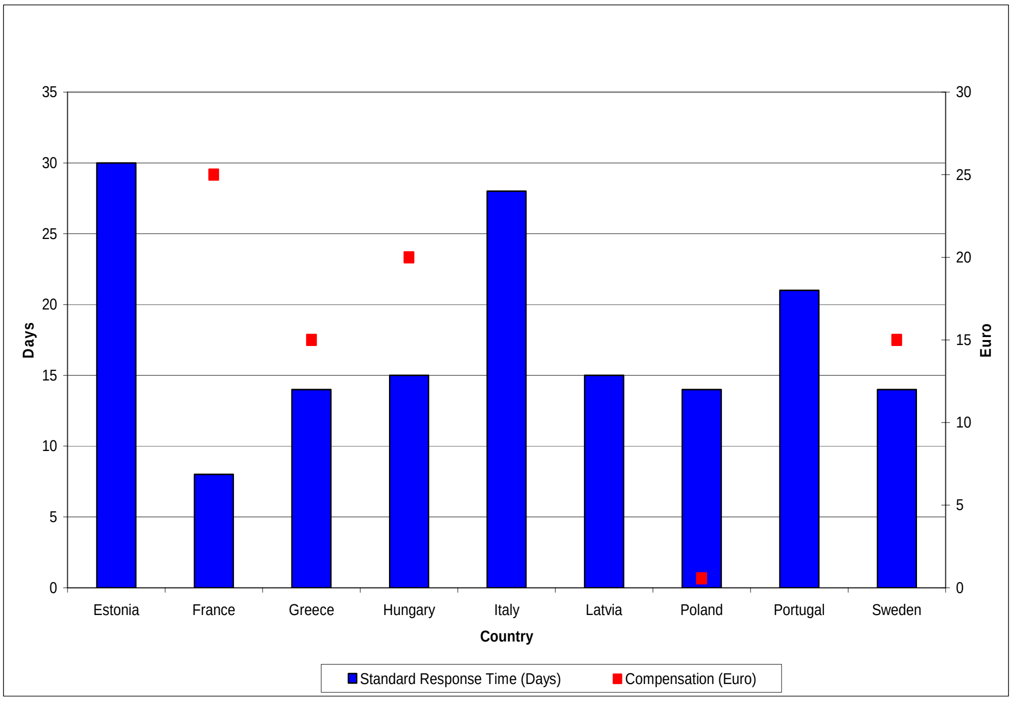
Country	Standard	Conditions	Compensation	Amount
Belgium (Wallonia)	4 hours	Exceptional events (*force majeure*) excluded	Economic compensation on request. After 4 hours provisional production has to be installed.	Damages only if interruptions are distributor's fault.
Czech Republic	LV: 18 hours HV: 12 hours	Exceptional events (*force majeure*) excluded	On request. Must be claimed by the customer within 5 working days.	10% from yearly payments for distribution, maximum €150 for LV and €300 for HV
Estonia	20 hours (in summertime) 24 hours (in wintertime)	Exceptional events (*force majeure*) excluded	Automatic for the 3 biggest distribution companies. On request for others.	LV: From €8 (excess up to 48 hours) to 24 (excess more than 96 hours) MV: From €0.77 per kW to €2.30 per kW according to the excess time.
France	6 hours	Exceptional events (*force majeure*) excluded	Automatic	For each range of 6 hours interruption, 2% of the fixed tariff component depending on the subscribed power
Great Britain	18 hours (normal	Severe weather events	On customer's request	£50 for domestic

	weather conditions), 24 to 141 hours in exceptional situations	excluded Some exceptional events excluded		customers, £100 non-domestic, plus £25 for each further 12 hours £25 plus £25 for each further 12 hours up to maximum of £200
Hungary	12 hours (in case of single disturbance); 18 hours (in case of several disturbances)	Exceptional events excluded	Automatic in the case of 1 company in 6, on customer's request for the other 5.	Household customers: automatic payment around €8, on request €20. Non domestic consumers: from €12 (LV, automatic) up to €120 (MV, on request)
Lithuania	24 hours	Exceptional events excluded	On customer's request.	Not defined

Source: Council of European Regulators (2005)

Standards are also applied to response times for customer letters to electricity companies. These standards and the amount of compensation payable in the event of their breach are illustrated in Figure 4.4 below. The average standard response time is 17.7 days, with a standard deviation of 6.8 days. The average compensation payable amongst countries that do provide compensation is €15.10, with a standard deviation of €8.20. Estonia has the longest standard response time (30 days) and France the shortest (8 days). In terms of compensation, France provides the highest level of compensation, with customers eligible for €25 in the event of standards being breached. It is notable that they also have the lowest number of days. Polish electricity companies must award compensation of €0.57 if response time standards are breached.

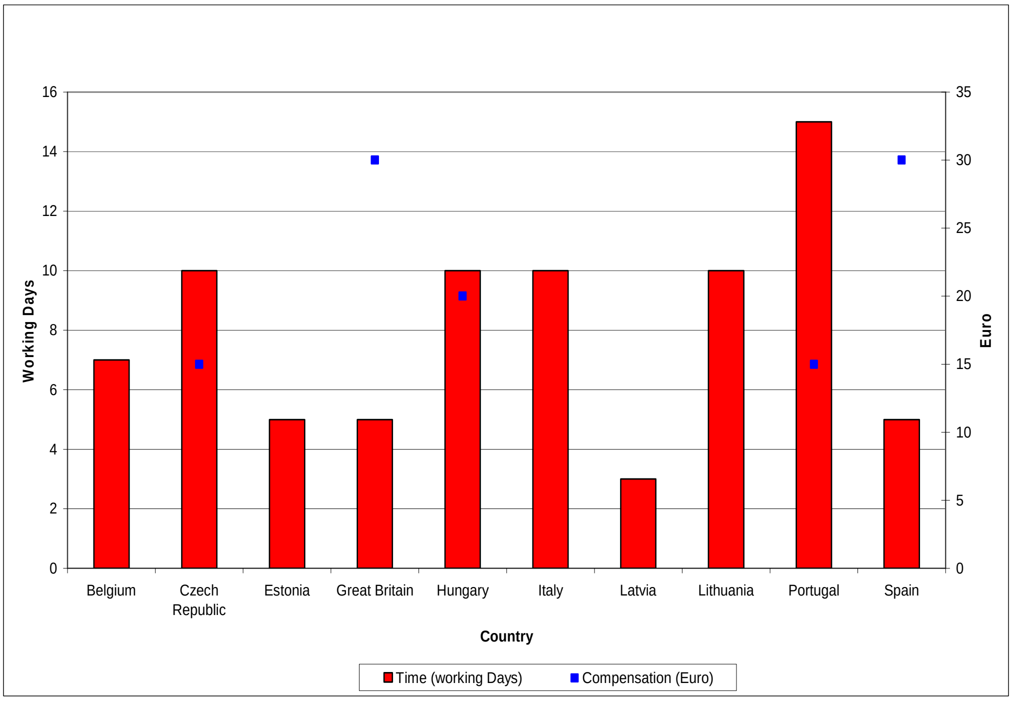
Figure 4.4: Standards of Response to Customer Letters



Source: Council of European Energy Regulators (2005)

Several countries employ standards for the amount of time taken to resolve metering problems. These are illustrated in Figure 4.5 below. In the event of the problem not being resolved within the specified period, compensation is payable to the customer. The average standard is 8 days, with a standard deviation of 3.4 days. Compensation payments average €22.00 with standard deviation of €6.80. Compensation ranges from €30 in Great Britain and Spain to €15 in the Czech Republic. Portugal has the longest standard resolution time (15 days) while Latvia has the shortest (3 days).

Figure 4.5: Standard Time to Resolve Meter Problems and Compensation



Source: Council of European Energy Regulators (2005)

4.11 Conclusions to the international experience

This section has reviewed the international experience in quality of service regulation for electricity distribution. The broad conclusion is that most jurisdictions around the globe measure both security of supply and customer or commercial quality, and incorporate these into various forms of price or revenue regulation. While security of supply measures are probably more prevalent, minimum standards and customer charters often cover some forms of commercial quality. While some jurisdictions include overall measures of quality, we note that indicators that are hard to measure or difficult to quantify the costs and benefits are not preferable, as it is difficult to obtain estimates of consumers' willingness to pay or the marginal cost of improvement.

5 Experience in other network industries

It is also instructive to examine the experience of other regulated industries to see how regulators have dealt with the issue of quality of service and the degree of success that they have had. In this section, we look at international experience in a number of different jurisdictions.

5.1 Telecommunications

Sappington (2003) reviews several papers[7] dealing with the effects of regulation on quality of service in the U.S. retail telephone industry. Quality of service in this industry can be characterised by the following factors:

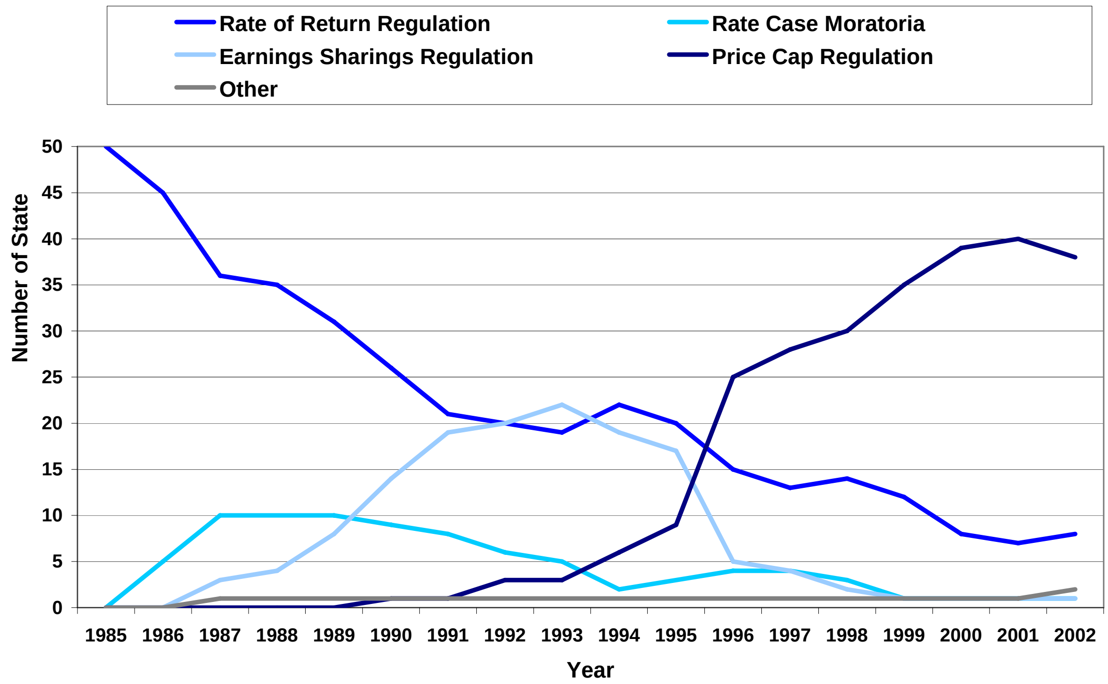
- The speed and reliability at which new service is installed;
- The number of service problems reported by customers;
- The speed with which reported problems are solved; and
- Overall customer satisfaction.

Trends in these four factors were variable over the 1990s. While the time needed to install new lines fell dramatically, the number of customer complaints (per number of installed lines) remained fairly steady as did the length of time needed to resolve problems. Additionally, the rate of complaints by residential customers increased dramatically in the late nineties, though it remained fairly steady for business customers.

During the same period, there was a general trend by U.S. regulators to replace rate-of-return regulation with price-cap regimes, as shown in Figure 5.1. The main aim of this price-cap regulation has been to provide incentives for providers to improve cost efficiency.

[7] He principally draws on work in four papers: Ai & Sappington (1998), Roycroft and Garcia-Murrilo (2000), Banerjee (2003) and Clements (2004).

Figure 5.1: Number of U.S. States Employing Regulatory Regimes by Type



Source: Sappington (2003)

Sappington finds that there is no conclusive evidence on the effects of incentive regulation on service quality in the retail telephone sector. There are conflicting results from the four papers under review, with different findings on the effects of incentive regulation on specific factors affecting overall service quality. There is also variability in results across states. Roycroft and Garcia-Murrilo (2000) report an initial fall in trouble reports with the introduction of price-cap regulation, but with some states reporting an actual rise in repeat reports, though this may be due to the quality of the infrastructure in different states. Clements (2004) also reports that repeat trouble reports also increase under incentive regulation. Ai & Sappington (1998) find that the time taken to resolve problems in longer under price-cap regulation, as compared to a rate-of-return regime.

Sappington concludes that the empirical research to date does not provide "unequivocal findings" on the link between regulatory framework and quality of service. However, it is interesting to note that while the majority of U.S. regulators now use a price-cap regulatory framework, there has not been a significant improvement in most of the quality of service measures for the sector.

Fixed telephony in the U.K. is not subject to financial regulatory incentive to improve quality but instead relies on a system of benchmarking, minimum standards and penalties.

There are two main benchmarking exercises undertaken by Oftel, the national regulator:

- **Comparable performance indications (CPIs**): This scheme involves a variety of performance indicators and was introduced in 1993 on a voluntary basis, though has since been made compulsory. There are no financial incentives linked to this benchmarking exercise.
- **Key performance indicators (KPIs):** This second benchmarking exercise only applies to operators with significant market power, as defined by the regulator. It provides detailed quality of service information for the relevant suppliers.

Consumers are also entitled to compensation for various reasons, such as delays in installing phone lines and unplanned interruptions in service.

It is interesting to note the reasons for which Oftel decided not to introduce regulatory incentives to maintain and improve quality. These can be summarised as follows:

- It was felt that it would be complicated to introduce a framework like this and that it would be difficult to set rewards and penalties at an appropriate level;
- Oftel believed that if the penalties were not set correctly then the costs of achieving the target may be larger than the penalty, which would provide an incentive to firms to undertake no investment in quality improvements; and
- Finally, the regulator believed that the current system of compensating customers directly was fairer as it was they who suffered the cost of poor service and should therefore receive direct payment.

5.2 Gas distribution

In Britain, Ofgem proposed that a revenue cap system should apply to the gas distribution company Transco aimed at linking revenue to the number and duration of non-contractual supply interruptions, along the same lines of Ofgem's IIP for electricity distribution (see Section 4.5 above). Under the plan, the maximum revenue exposed would be 2% of Transco's revenue.

Guaranteed standards of performance establish service levels that must be met in each individual case. If the gas transporter fails to meet the specified standard, it is obliged to pay a fixed level of compensation to the affected customers ranging from GB£20 to GB£100 depending on the type of customer and the standard. See Royal Mail (2005) for more.

Overall standards of performance are applicable to customers connected to Transco's distribution networks and those connected to independent gas transport's networks. They include areas where the regulator considers customers in general to have the right to expect minimum levels of service, but in areas where it would not be necessarily appropriate to put in place guarantees for individual customers, such as performance related to telephone calls to the national emergency number, customer complaints handling, and informing customers when they are due to be reconnected following unplanned supply interruptions. Overall standards do not entail obligations for gas transporters to make compensation payments if they fail to meet the target. See Royal Mail (2005) for more.

5.3 Water and sewerage services

The regulatory framework for water services in the UK is controlled by Ofwat. The principal feature of this framework is an Overall Performance Assessment (OPA) which comprises a comparative assessment of the different providers. The performance of individual companies is linked to the price limits placed on them by the regulator in the next period. It also provides a benchmarking exercise allowing consumers to compare the quality of service of their local provider with others in the country.

There are also other aspects of the regulatory framework relating to quality of service. Companies are obliged to provide information on a range of quality measures to Ofwat and these are assessed an regulatory action may be taken in response to poor performance, where the company will have to provide an explanation for the performance and present plans to deal with it. There is also a system of minimum standards and penalties, to be paid to customers, in relation to a number of measures, such as interruptions to service. See Royal Mail (2005) for more.

5.4 Postal services

In the UK, a penalties or rewards amounting to 5% of revenue can be applied by the postal services commission Postcomm based on eight quality of service targets. These include 93% next-day delivery for first class mail, 98.5% of second class items delivered by the third working day after posting, 90% of standard parcels delivered by the third working day, 85% of European international delivery items delivered by the third working day, 99.9% of collection points served everyday, 99.9% of delivery walks completed everyday and 99.5% of items delivered correctly. Further, a payment is to be made directly to customers for whom mail is lost when customers apply in writing to Royal Mail.

5.5 Railways network

A quality incentive regulation scheme is included as part of Network Rail's regulation of track access charges to train operating companies (TOCs). It is designed to compensate TOCs for the revenue effects of changes in infrastructure performance, measured by average lateness at certain monitoring points on the network. Compensation is paid by Network Rail to the TOC affected by average lateness above a benchmark level (based on recent performance) that is attributable to infrastructure related issues in any one four-week period. Below the benchmark level of average lateness attributable to Network Rail in a four –week period, the TOC pays Network Rail.

In both cases, the difference between actual lateness minutes and the benchmark is multiplied by a marginal revenue effect (MRE) parameter, which represents the revenue effect of one minute of additional lateness for the service group in question, and the 'busyness' factor, which represents the number of trains stopping at each monitoring point in any one period.

Since the penalties or bonuses depend on the level of fare revenue gained or lost as a result of poor performance, Network Rail's financial exposure for quality underperformance is, in principle, uncapped. However, even if the theoretical maximum level of penalties is uncapped, the exposure of the network operator in a 'worst case scenario' such as the Hatfield derailment[8] is significantly below the 100% of its profits. See Royal Mail (2005) for more.

5.6 Conclusions to the international experience

This section has reviewed the international experience in quality of service regulation for other network service industry. In general, other network service industry, especially telecoms and post have included customer service quality indicators in a similar fashion to other electricity distribution service industry.

[8] In October 2000, a train was derailed in Hatfield, Hertfordshire, UK, resulting in the deaths of four people and injuries to about seventy more.

6 Results of consumer surveys

6.1 Introduction

In this survey of DNOs' household customers, 1,049 responses were obtained from consumers all over Finland. The majority of respondents were female (57.2%) with males making up the 42.8% balance. See Table 6.1 below.

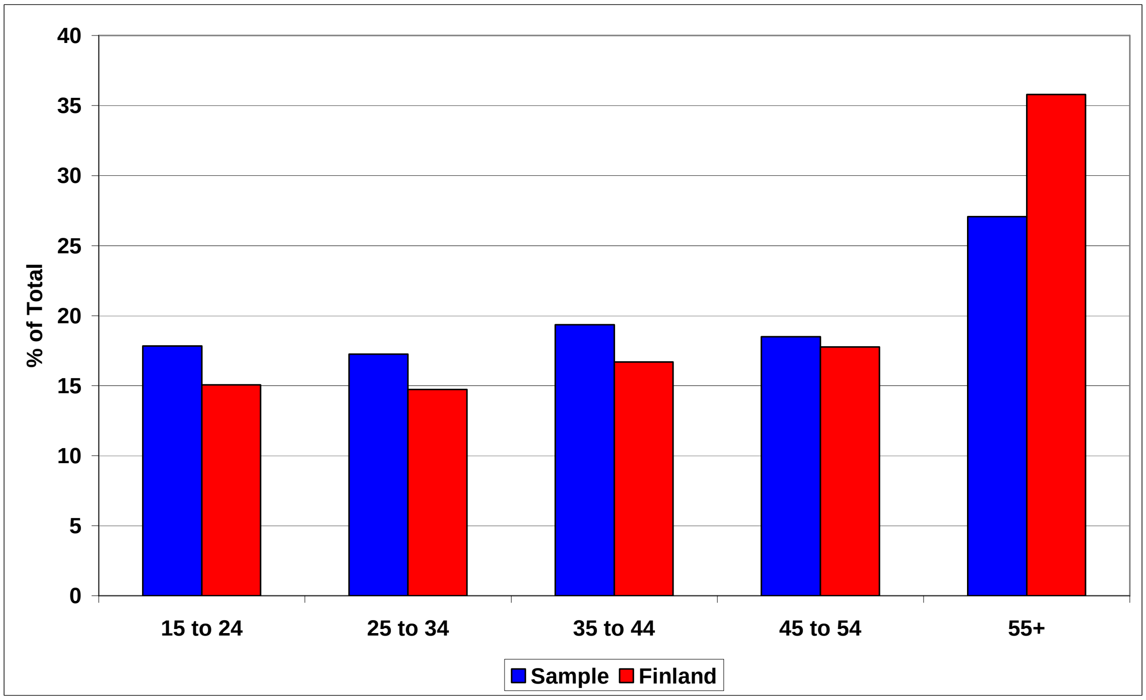
Table 6.1: Breakdown of Respondents by Gender

Gender	Number of Respondents	% of Respondents
Male	449	42.8
Female	600	57.2
Total	1,049	100.0

Source: London Economics

When classified by age, respondents aged 55 years or more formed the largest single group, making up 27.1% of the total number of respondents. Over half of all respondents were under the age of 45 years. A breakdown of the composition of respondents by age group is shown in Figure 6.1 below. This is compared against the general Finnish population profile, and suggests that those of 55 years and under may be overrepresented in the survey, with persons aged 55 years and over underrepresented relative to their share of the national population.

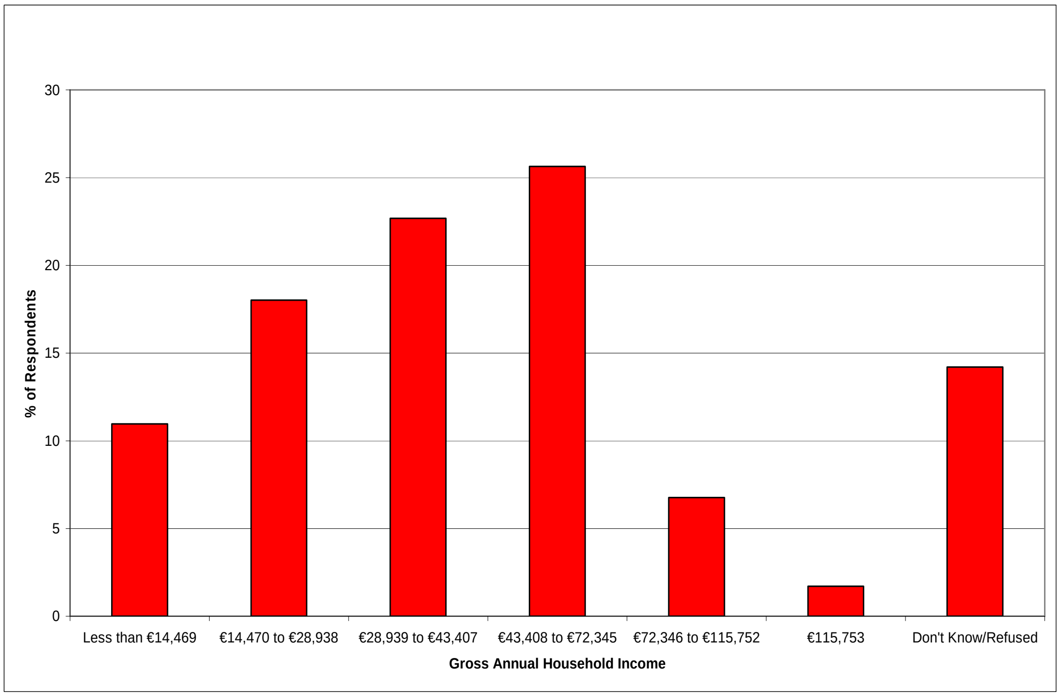
Figure 6.1: Breakdown of Respondents by Age Group



Source: London Economics analysis and Statistics Finland

Figure 6.2 below shows the breakdown of respondents by gross annual household income. The largest single group received between €43,408 and €72,345 annually and made up 25.6% of respondents. However, over one half of respondents had income of less than €43,408 per year. A sizeable 14.2% of respondents did not provide data on their level of income.

Figure 6.2: Gross Annual Household Income of Respondents



Source: London Economics analysis

Over one quarter (26.3%) of all respondents resided in the Greater Helsinki region, with a further 12.8% of respondents living in Tavastia. South eastern Finland was the area in which fewest respondents resided, making up 3.5% of the total number. A full regional breakdown is provided in Table 6.2 below.

Table 6.2: Breakdown of Respondents by Region

Region	Number of Respondents	% of Respondents
Greater Helsinki	276	26.3
Eastern Tavastia & Hanko	74	7.1
South western Finland	131	12.5
Western Tavastia	134	12.8
Central Finland & Kymenlaakso	106	10.1
South eastern Finland	37	3.5
Ostrobothnia	91	8.7
Northern Savonia	47	4.5
Eastern Finland & Ylivieska	67	6.4
Northern Finland	86	8.2
Total	1,049	100.0

Source: London Economics

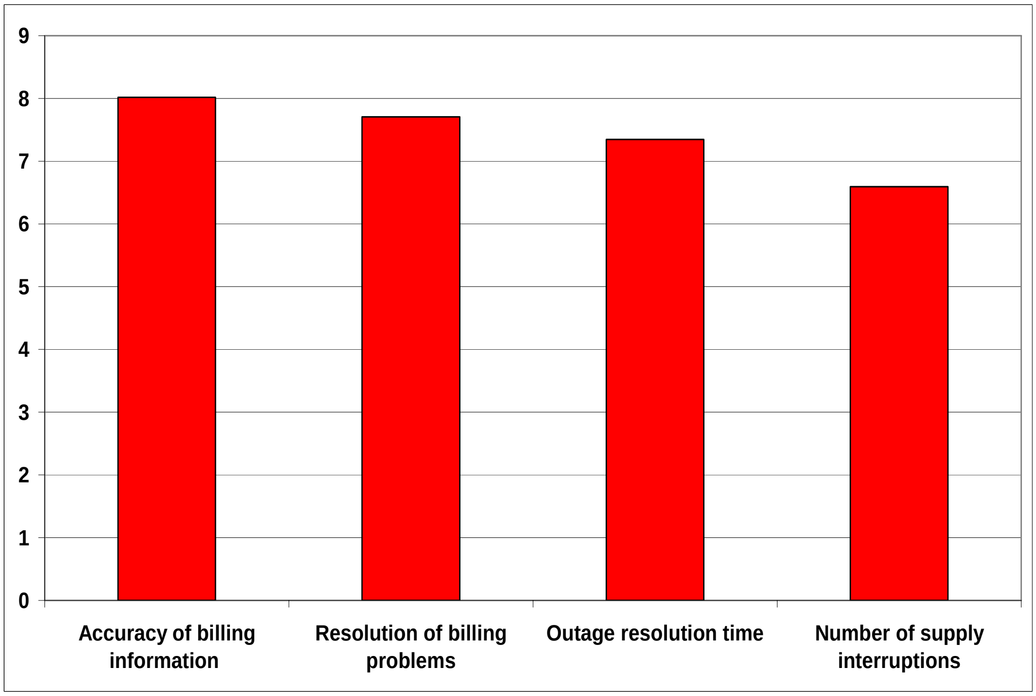
6.2 Overall results

Figure 6.3 below summarises the results regarding the importance that consumers attach to different aspects of electricity service quality. Based on these results, the quality of service measures can be ranked in order of importance as follows:

- Accuracy of billing information (average rating of 8.0);
- Resolution of billing problems (average rating of 7.7);
- Outage resolution time (average rating of 7.3); and
- Number of supply interruptions (average rating 6.6).

These results suggest that customer relations aspects of service quality are more important to consumers than technical aspects such as supply reliability. Billing seems to be the most important element to consumers. This is likely due to the difficulty consumers would encounter if they needed to continually check the bill for accuracy. Caution should be exercised when interpreting ordinal data of this kind, however. This is because rankings may not necessarily be directly comparable when different variables are being used. There may also be a strong degree of subjectivity in how respondents interpret terms used in the survey such as 'Most Important' and 'Least Important'.

Figure 6.3: Average Importance Ranking of Different Quality Attributes

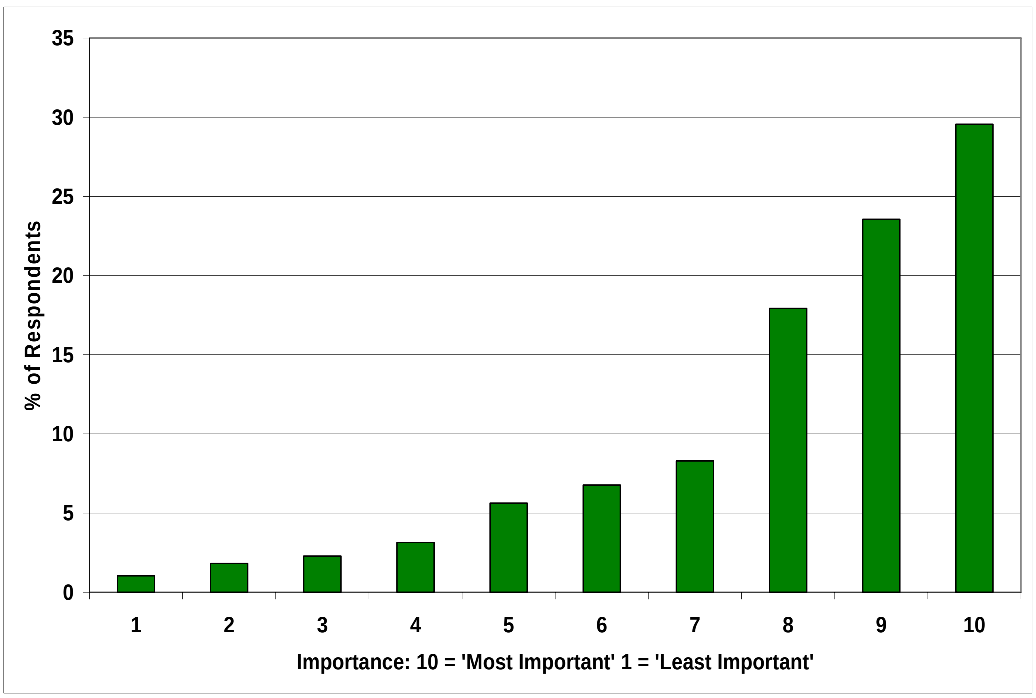


Source: London Economics analysis

6.2.1 Accuracy of billing information

Figure 6.4 below summarises the responses of consumers regarding the importance of accurate billing information from their electricity distribution company. In general, ratings are very high with an average rating of 8.0 and over half of respondents (53.1%) providing a score of either 9 or 10. A 10 rating was the single most common score received, with 29.6% of respondents indicating that this variable was of maximum importance to them. At the other end of the scale, 1.0% of consumers provided a rating of 1, the least common rating.

Figure 6.4: Accuracy of billing information: importance ratings amongst consumers



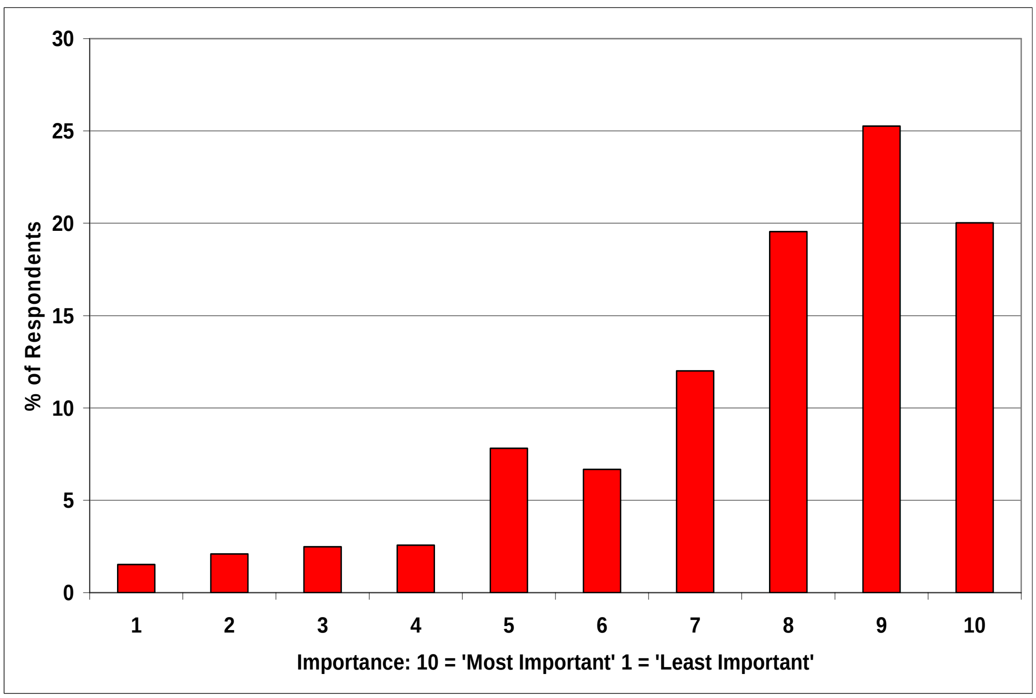
Source: London Economics analysis

These results strongly suggest that billing information accuracy is an extremely important attribute of service quality to consumers.

6.2.2 Resolution of billing problems

Figure 6.5 below illustrates the responses of survey participants in relation to the importance they attach to the speed and ease with which billing problems and similar problems are resolved. The average rating was 7.7 with a large majority (64.8%) providing a rating of 8 or higher. The single most common rating given was 9, with 25.3% of consumers providing this. In contrast, only 1.5% of consumers gave a rating of 1.

Figure 6.5: Resolution of billing problems: importance ratings amongst consumers



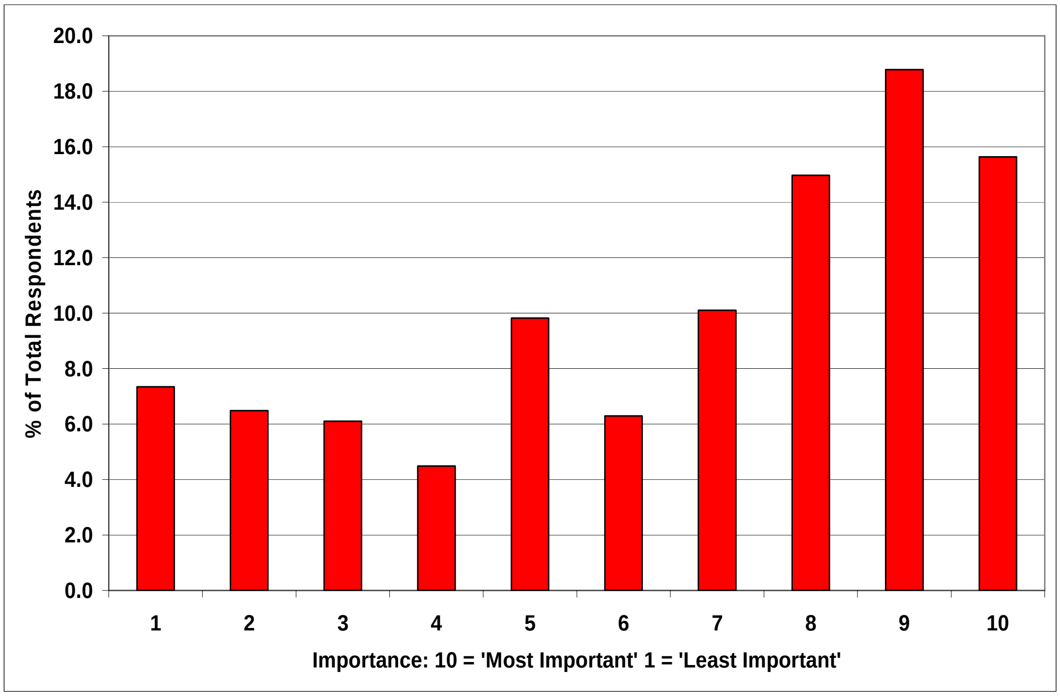
Source: London Economics analysis

These figures suggest that easy and quick resolution of billing issues is very important to consumers.

6.2.3 Number of supply interruptions

Figure 6.6 below shows the importance ratings given by consumers to the number of interruptions to their electricity supply per year. The average rating was 6.6, with about half (49.4%) of respondents providing a rating of 8 or over. 18.8% of consumers gave a rating of 7, which was the single most common rating. This was in contrast to the 4.5% of respondents who gave a rating of 4, the least common rating.

Figure 6.6: Importance rating of number of supply interruptions



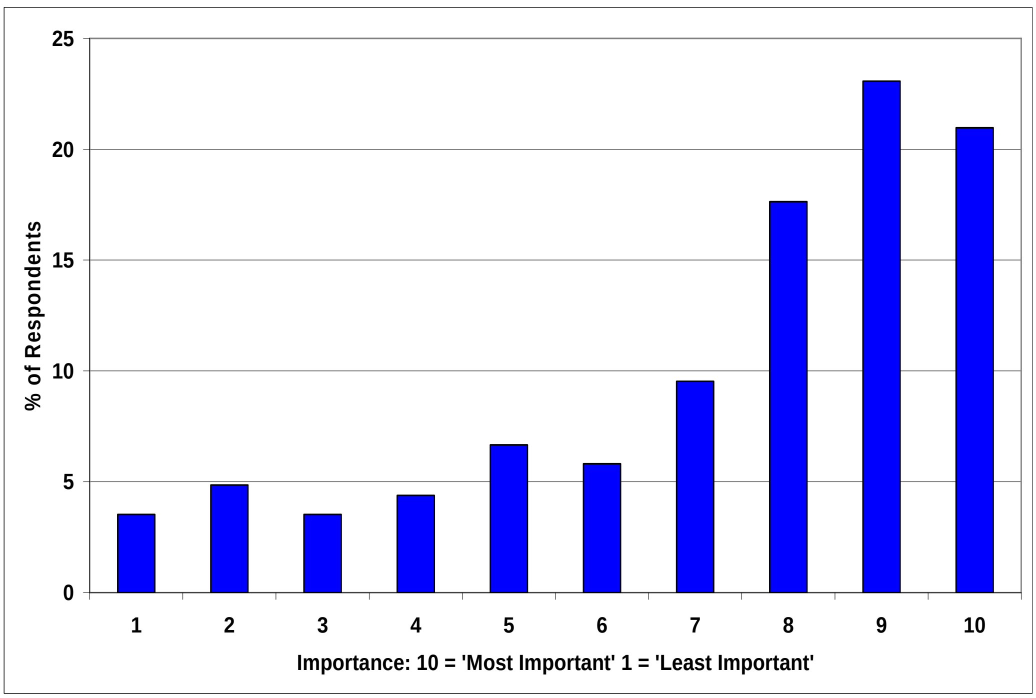
Source: London Economics analysis

These results suggest that supply reliability is an important issue for consumers in Finland.

6.2.4 Outage resolution time

Figure 6.7 below illustrates the responses of consumers in the survey regarding the importance of the time taken to resolve an electricity supply outage. The average rating was 7.3 and well over one half of consumers (61.7%) provided a rating of 8 or higher to this aspect of service quality. A rating of 9 was provided by 23.1% of respondents, making it the single most common rating. A 3.5% minority of consumers each gave rating of 1 and 3, the least common ratings awarded.

Figure 6.7: Outage resolution time: importance ratings amongst consumers



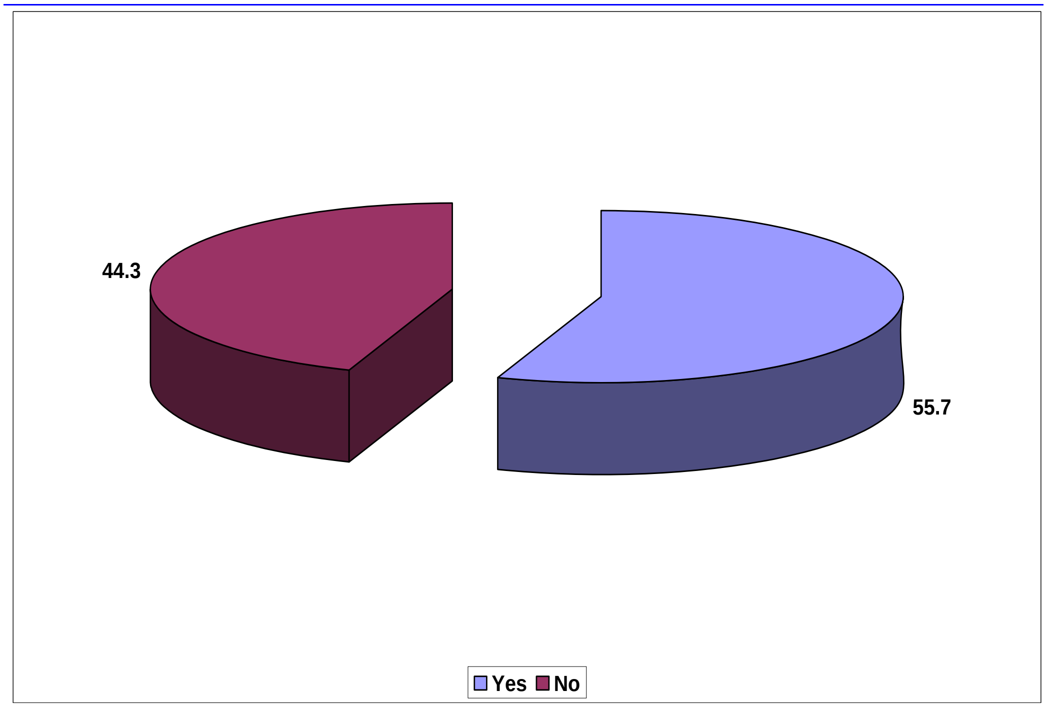
Source: London Economics analysis

These results suggest that prompt resolution of electricity supply interruptions is an aspect of service quality which is very important to consumers in Finland.

6.2.5 Contact with customer services

Customer service centres are the main vehicle through which contact between customers and electricity distribution companies occurs. Contact is generally made by telephone, by email, by regular mail, or by customers visiting the company's offices. Figure 6.8 below illustrates the share of customers who have made contact with their company in the previous two to three year period. A slight majority (55.7%) of customers have done so.

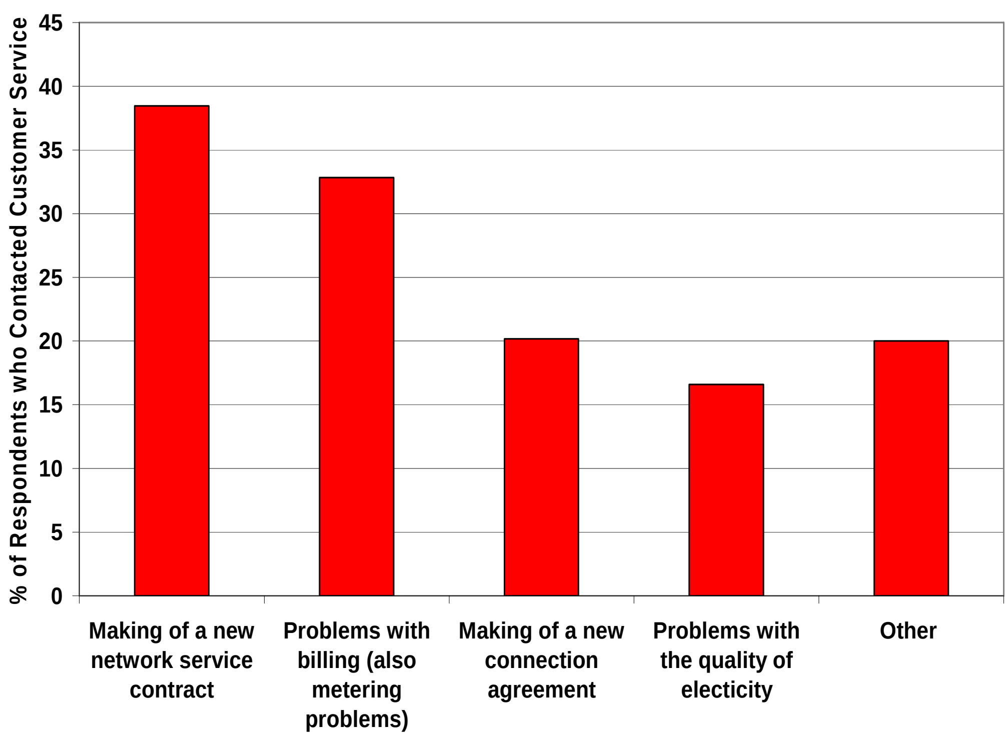
Figure 6.8: Have you been in contact (by telephone, by visiting, by email) with the customer service of your electricity distribution company during the past 2 to 3 years?



Source: London Economics analysis

Participants in the survey were asked their reasons for initiating contact with customer service. A summary of responses is shown in Figure 6.9 below. The single most common reason was for the making of a new service connection, with 35.5% of those who contacted customer service doing so for this purpose. 32.8% contacted customer service due to problems with billing or metering, 20.2% made contact in order to make a new connection agreement and problems with electricity quality was the reason for 16.6% of the contact with customer service. 20% of contact with customer service was for other reasons, including switches to different companies and request for meter reading reports.

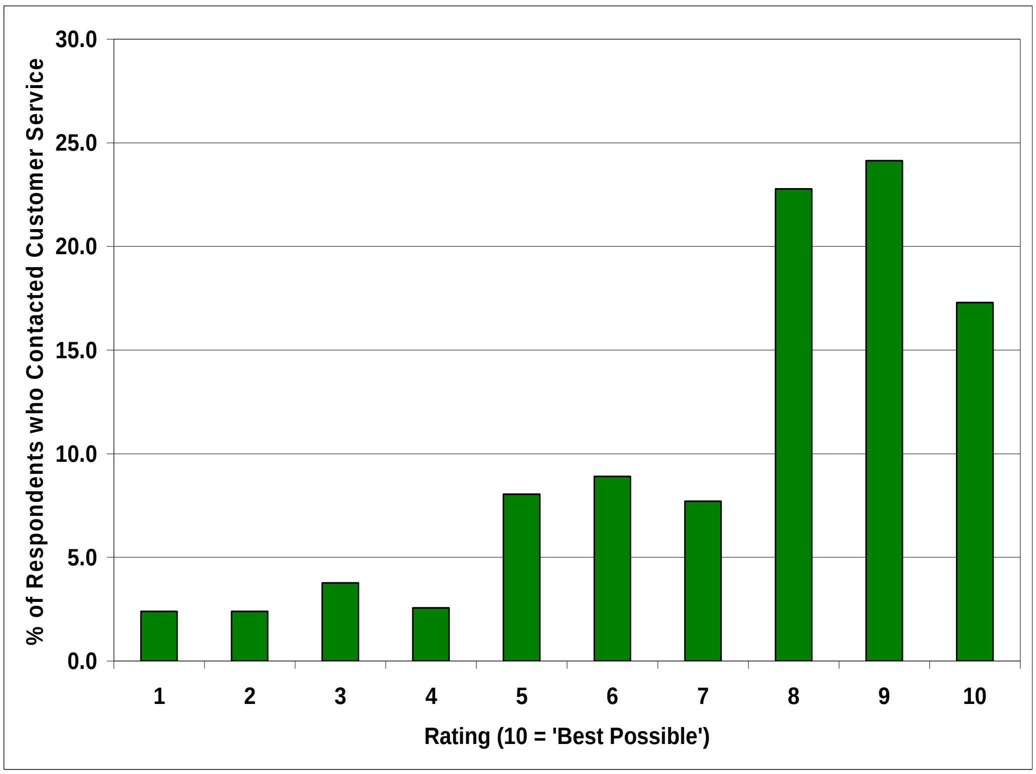
Figure 6.9: Reasons for contact with customer service



Source: London Economics analysis

Respondents who made contact with Customer Service, appeared to be generally quite satisfied with the speed and ease with which their problems were resolved. See Figure 6.10 below. The average rating was 7.5, and a large majority (66.4%) of respondents provided a rating of 8 or higher. A rating of 9 was the single most common rating, provided by 25.0% of respondents. A 2.5% section each gave ratings of 1 and 2, which were the least common ratings received.

Figure 6.10: Customer ratings of speed and ease with which problems were resolved by customer service



Source: London Economics analysis

These results suggest a reasonably high degree of satisfaction amongst customers with the problem resolution capabilities of their electricity distribution company's customer services department.

6.3 Correlation between variables

This section aims to identify how similarly consumers value different aspects of quality of service. In other words, we try and establish whether customers who value one aspect of service highly are more or less likely to consider a different aspect of service as important. Table 6.3 below shows the coefficient of correlation between the importance ratings of four quality-of-service variables and the degree of contact with Customer Service. A coefficient of 1 is the maximum, and means that the two variables are perfectly positively correlated. A coefficient of -1 is the minimum, and is indicative of perfectly negative correlation. A value of 0 implies that there is no linear correlation.

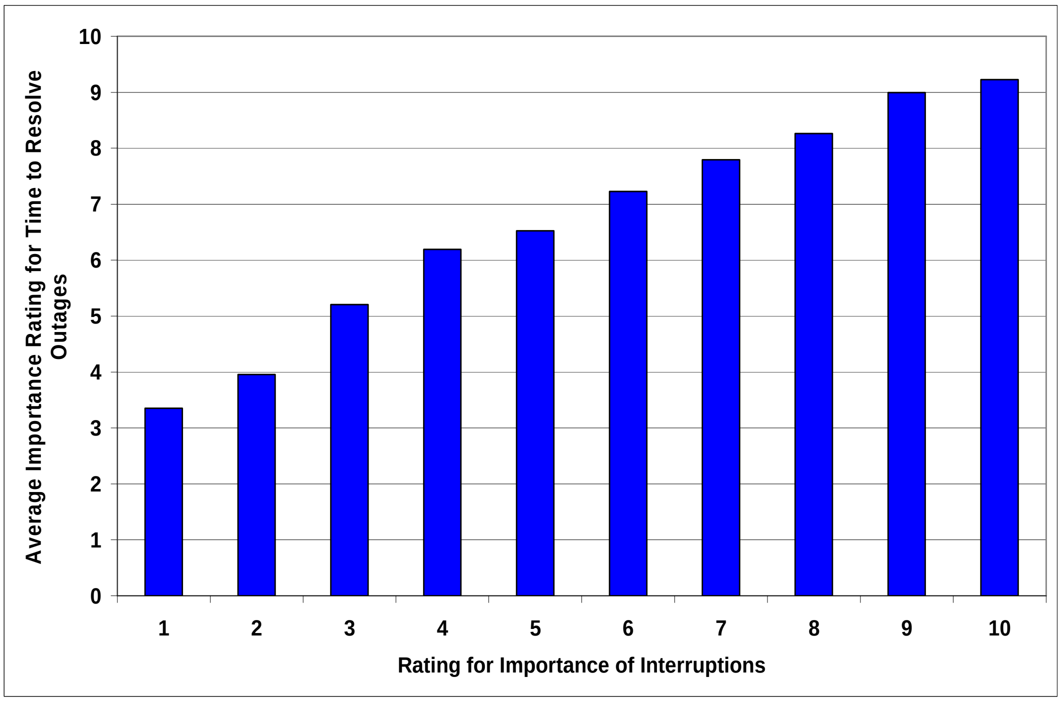
Table 6.3: Correlation between customers' survey responses

	Number of supply interruptions: importance rating	Outage resolution time: importance rating	Accuracy of billing information: importance rating	Resolution of billing problems: importance rating	Contact with customer service
Number of supply interruptions: importance rating	1.00	0.72	0.30	0.28	0.02
Outage resolution time: importance rating	0.72	1.00	0.37	0.39	0.00
Accuracy of billing information: importance rating	0.30	0.37	1.00	0.70	0.09
Resolution of billing problems: importance rating	0.28	0.39	0.70	1.00	0.08
Contact with customer service	0.02	0.00	0.09	0.08	1.00

Source: London Economics analysis

The strongest correlation is between the importance ratings of the number of supply interruptions and the time taken to resolve outages. These are both measures of supply reliability. The correlation coefficient of 0.72 is indicative of a strongly positive relationship, meaning that customers who rate one of the variables importantly is very likely to rate the other variable importantly too. The relationship between importance ratings for the two variables is shown is Figure 6.11 below.

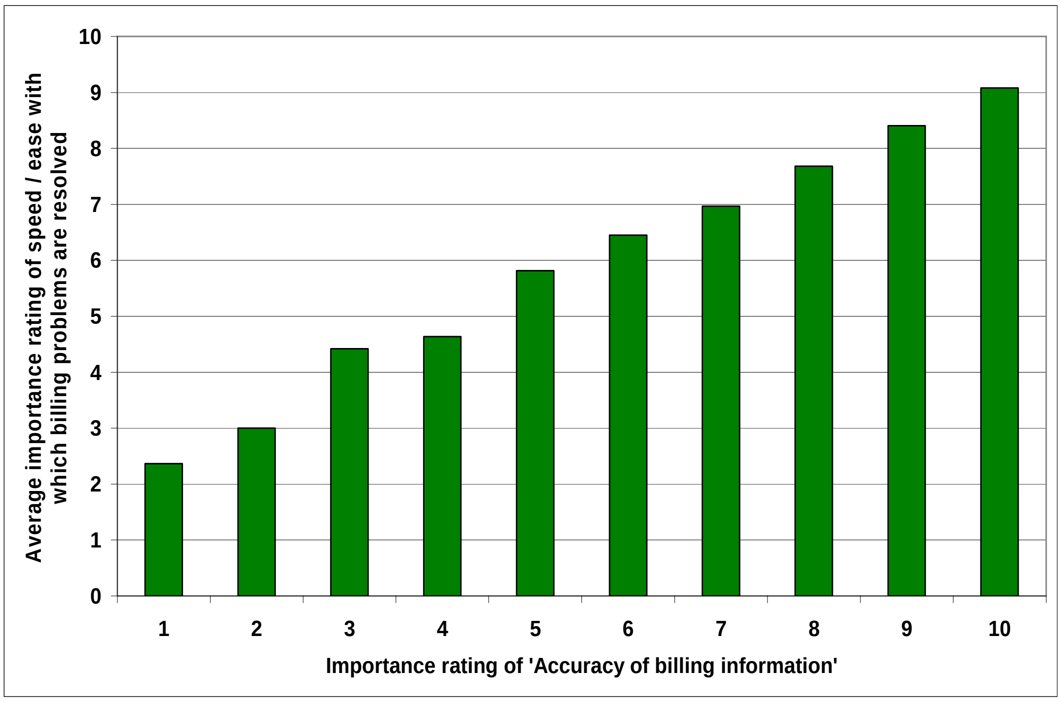
Figure 6.11: Relationship between importance ratings for number of supply interruptions and outage resolution time



Source: London Economics analysis

The correlation coefficient between the importance ratings for accuracy of billing information and resolution of billing problems is 0.70, also indicative of a strong relationship between the variables. They are both measures of the quality of customer service. Figure 6.12 below provides more detail on the strength of the relationship between the two variables. Consumers tend to value these quality attributes in a similar way.

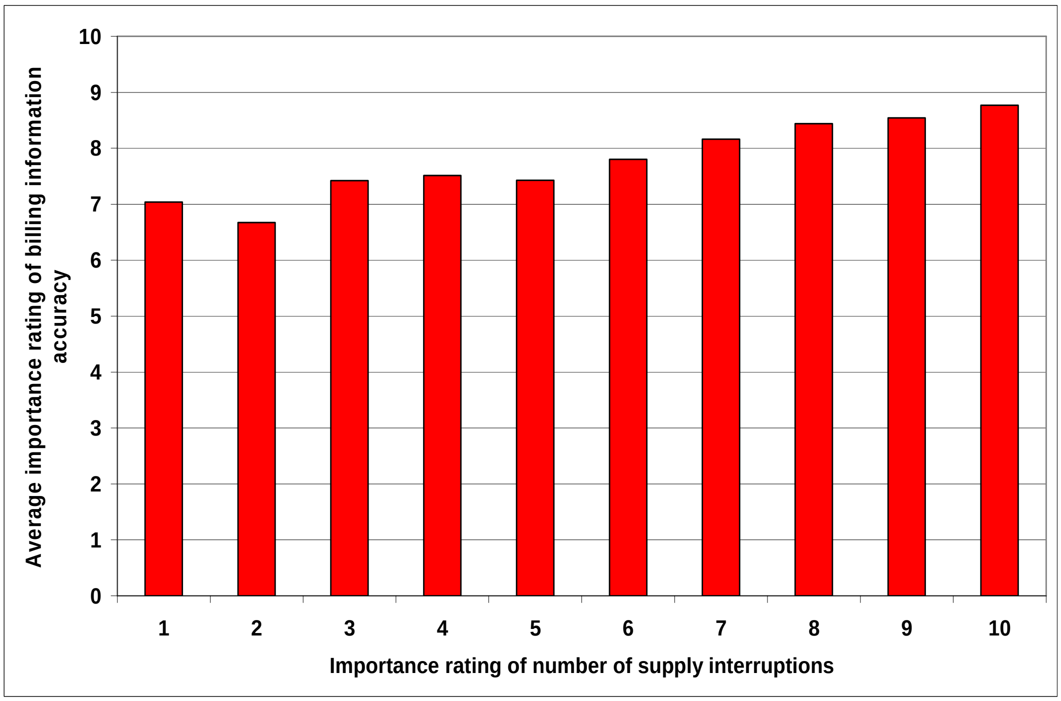
Figure 6.12: Relationship between importance ratings for accuracy of billing information and resolution of billing problems



Source: London Economics analysis

Figure 6.13 below illustrates the relationship between importance ratings for the number of supply interruptions (a measure of supply reliability) and the accuracy of billing information (a measure of customer service). A positive relationship between the two is visible, though it is not as strong as that between the variables in Figure 6.11 and Figure 6.12 above. There is a correlation of 0.39 between the two variables.

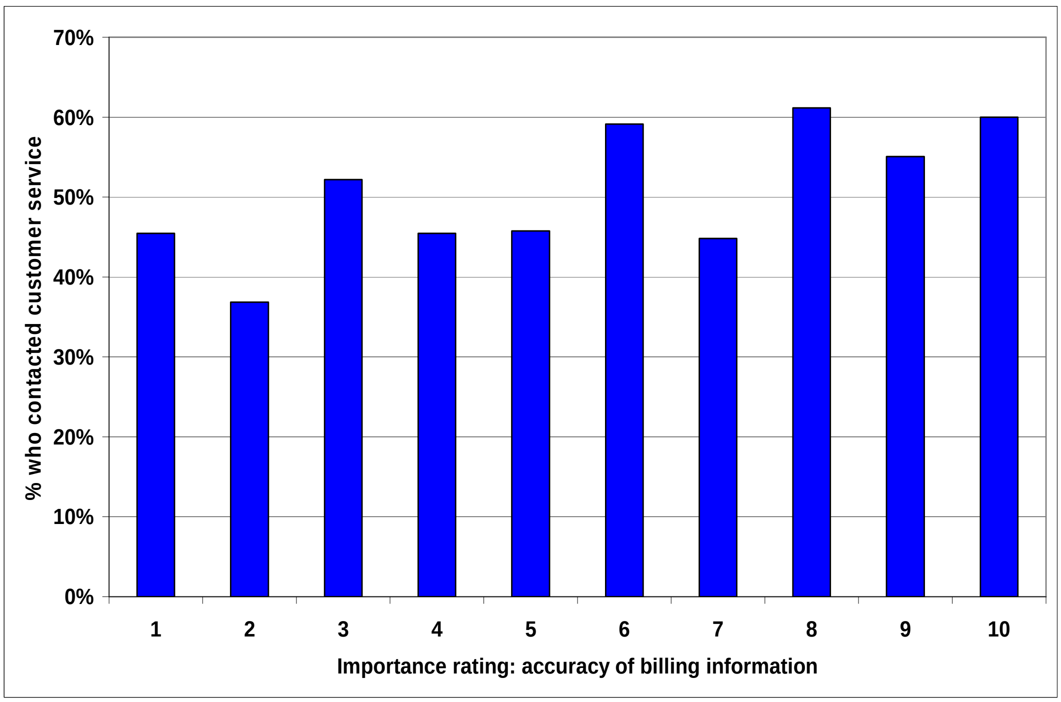
Figure 6.13: Relationship between importance ratings for number of supply interruptions and billing information accuracy



Source: London Economics analysis

Figure 6.14 below illustrates the relationship between the importance rating for accuracy of billing information and the percentage of customers who have contacted customer service. A positive relationship is visible in this instance, though it is quite weak. Consumers who have contacted customer service in the last number of years have a slight tendency to rate the importance of accurate billing information more highly.

Figure 6.14: Relationship between importance rating for accuracy of billing information and rate of contact with customer service



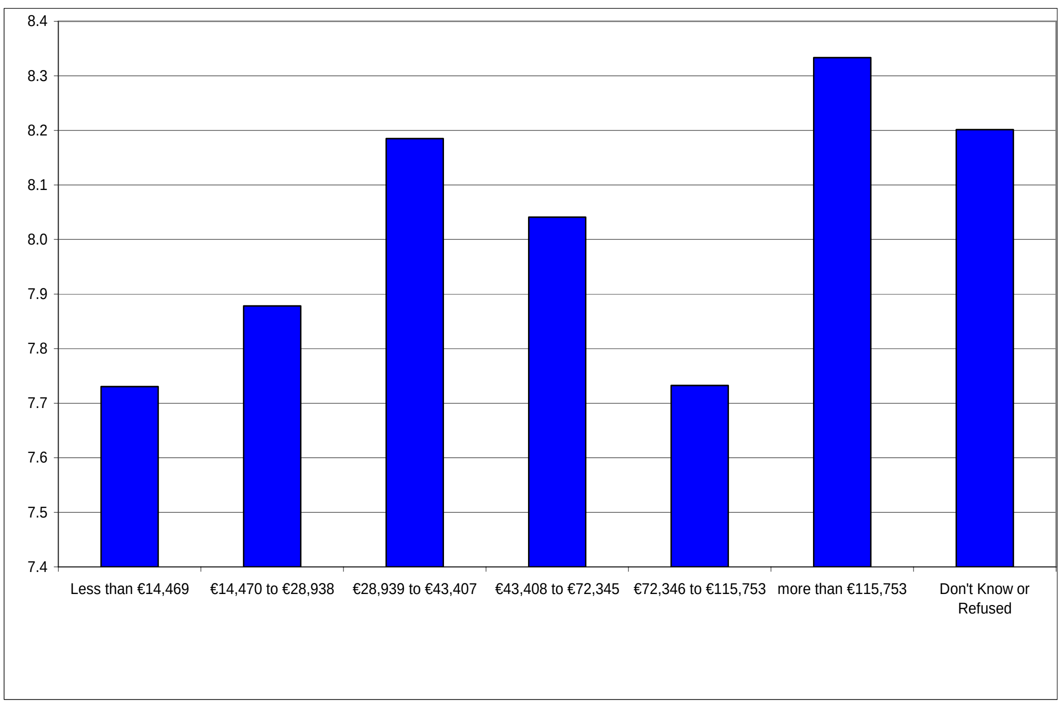
Source: London Economics analysis

6.4 Analysis by Income Group

6.4.1 Accuracy of Billing Information

There is no clear pattern to the relationship between the importance of accurate billing information and consumers' income. The highest income group awards the strongest rating to this component of quality (8.3) and the lowest income group gives an average rating of 7.7, the joint lowest. Despite this, however, Figure 6.15 below suggests that a significant direct and linear relationship between income and this variable does not exist.

Figure 6.15: Accuracy of billing information: average importance rating by customers' income group

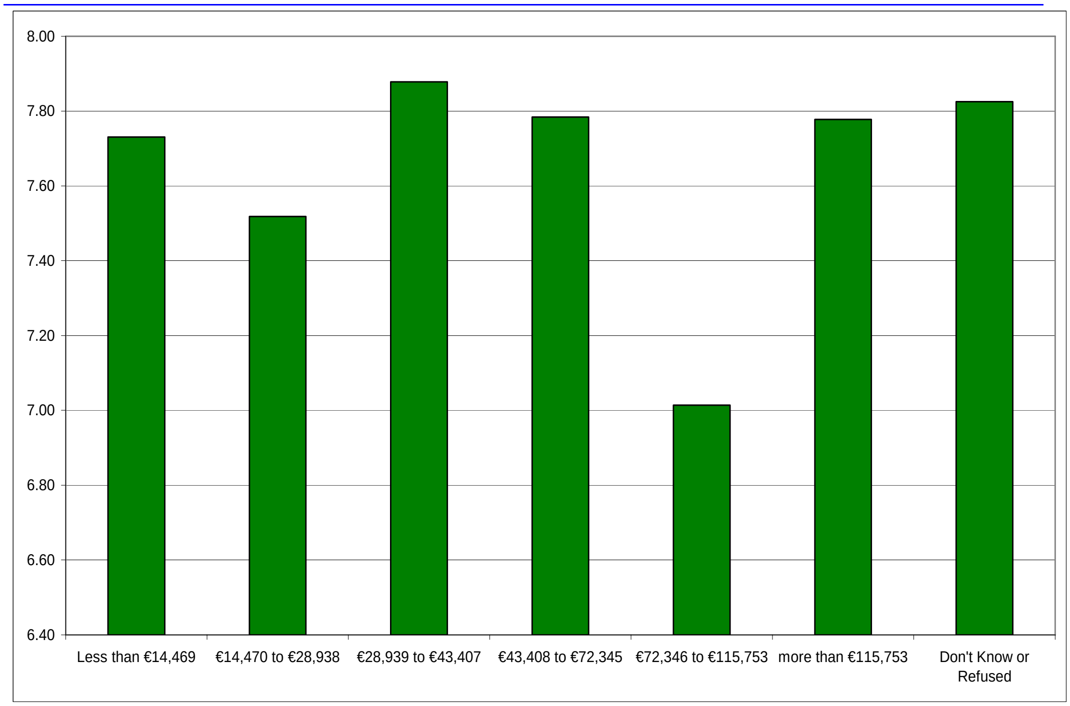


Source: London Economics analysis

6.4.2 Speed and Ease with which Billing Problems are resolved by Customer Service

The average importance rating given to this aspect of service quality is 7.7. Consumers whose annual income lies between €72,346 and €115,753 give the lowest rating (7.0) while consumers with income between €28,939 and €43,407 rate it the most highly (7.9). Inspection of Figure 6.16 below reveals no clear relationship between the two variables.

Figure 6.16: Resolution of billing problems: average importance rating by customers' income group

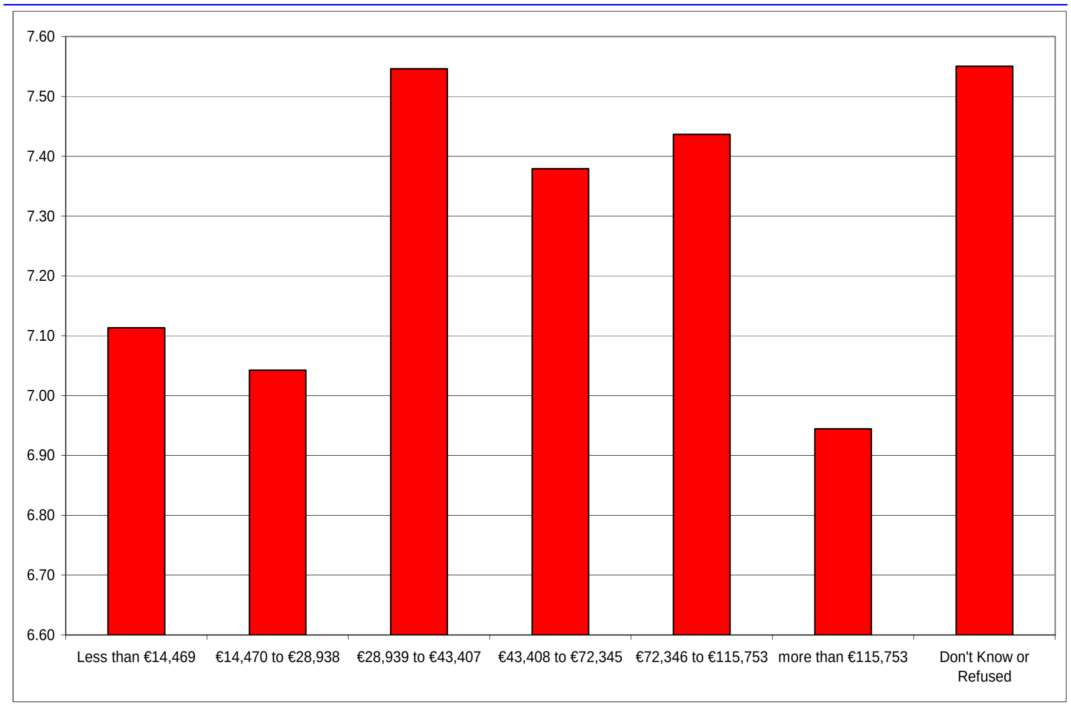


Source: London Economics analysis

6.4.3 Duration of supply interruptions

The relationship between consumers' income and the importance that they attach to the time it takes to resolve outages are not very clear. There is a slight tendency for higher income groups to rate this aspect of quality more highly. However, the highest income group awards the lowest average rating to this (6.9). Those in the €28,939 to €43,407 income bracket appear to value it the most highly of all groups, with an average rating of 7.6. The average rating across all categories is 7.3. See Figure 6.17 below.

Figure 6.17: Outage resolution time: average importance rating by customers' income group

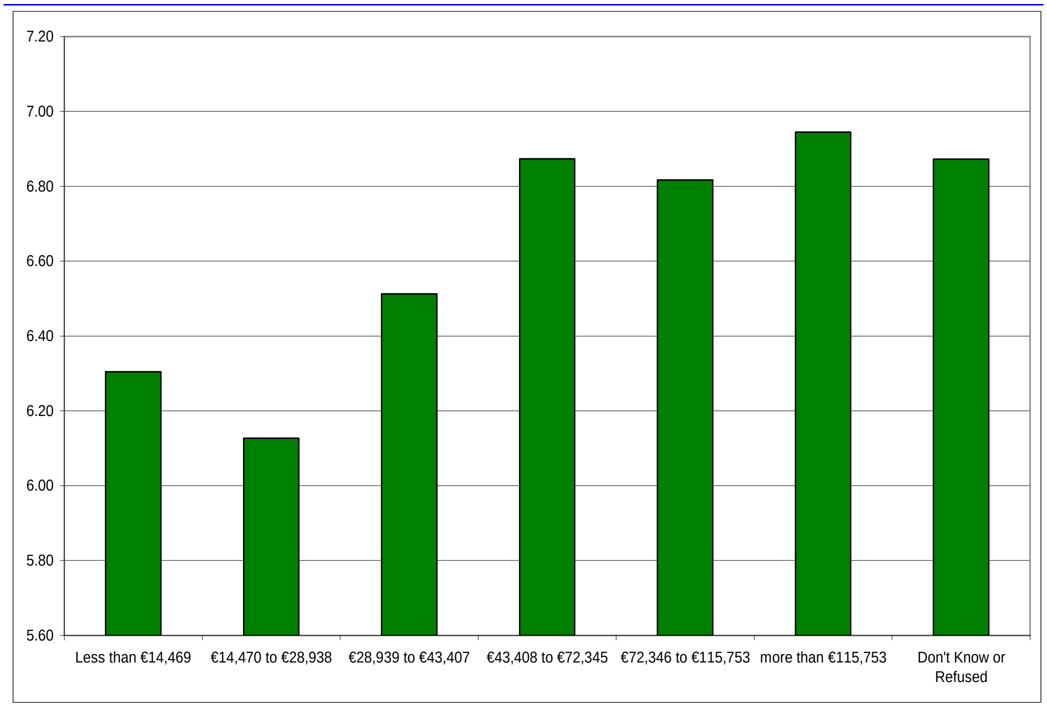


Source: London Economics analysis

6.4.4 Number of supply interruptions

Figure 6.18 below shows the average importance rating of supply interruptions to consumers of different levels of income. Notwithstanding the possible difficulties with interpreting ordinal data discussed above, these results suggest that consumers with higher incomes tend to regard supply interruptions as a more important aspect of supply quality. Consumers whose annual income was €14,469 or less gave an average rating of 6.6, while customers whose income exceeded €115,753 annually gave an average of 6.9, the highest average rating. Consumers whose incomes lie between €14,470 and €28,938 gave an average rating of 6.1, the lowest of any income group.

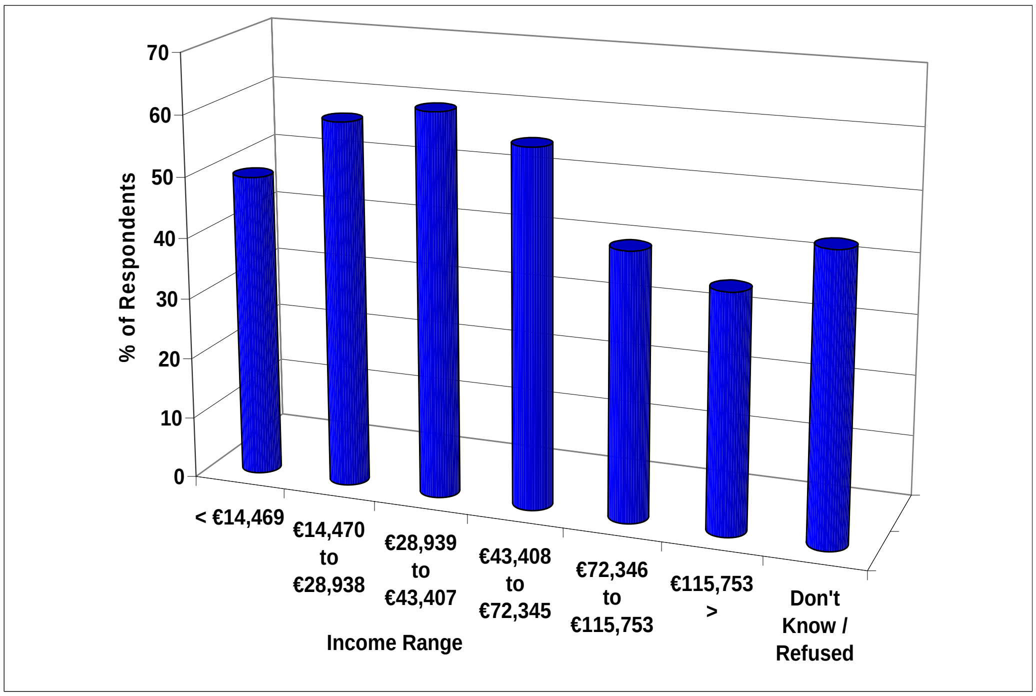
Figure 6.18: Number of supply interruptions: average importance rating by customers' income group



Source: London Economics analysis

There is a negative relationship between customers' income and the rate of contact with customer service. The rate of contact is highest amongst those with annual income of between €28,939 and €43,407, with 62.6% of respondents in this income bracket having been in previous contact with customer service. Contact was lowest amongst those with income exceeding €115,752 per year, with 38.9% of respondents in this category having previous contact with Customer Service. This may be due to the fact that those on higher incomes have less of an incentive to correct issues like bill overcharging. A full breakdown is provided in Figure 6.19 below.

Figure 6.19: Previous contact with customer service according to customers' income category



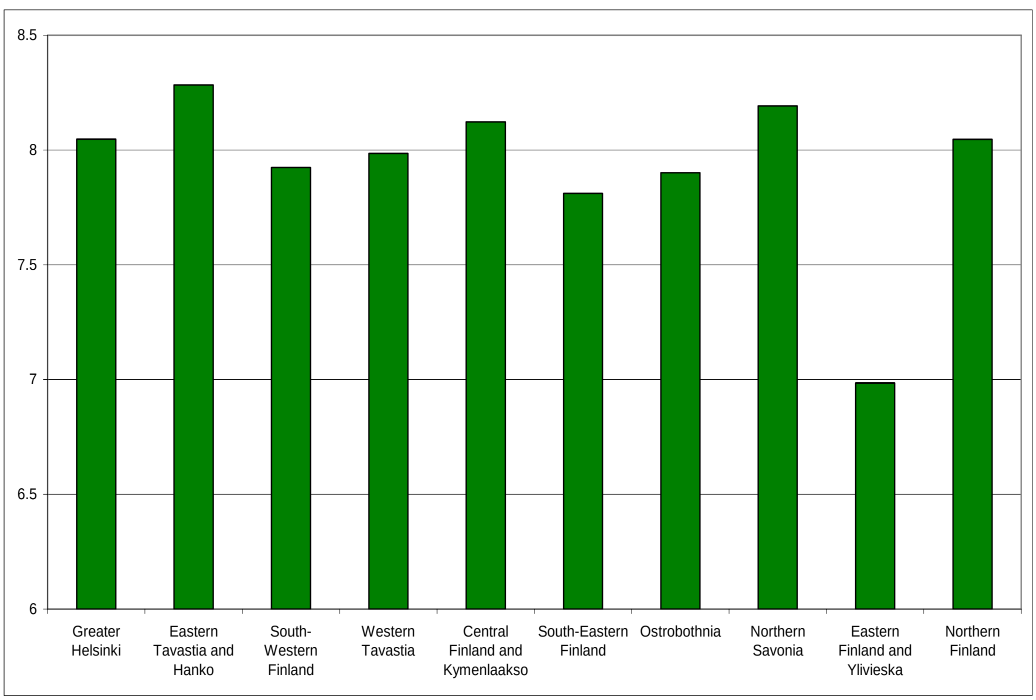
Source: London Economics analysis

6.5 Regional analysis

6.5.1 Accuracy of billing information

Figure 6.20 below suggests that consumers in southern regions of Finland have a slight tendency to regard the accuracy of billing information more importantly than consumers in the north. Those in Eastern Tavastia and Hanko give an average rating of 8.3, which is the highest. This compares with the 7.0 rating awarded by consumers in Eastern Finland and Ylivieska, the lowest average rating of a Finnish region. Consumers in Greater Helsinki and Northern Finland both gave an importance rating of 8.0, which is the same as the national average.

Figure 6.20: Accuracy of billing information: average importance rating by customers' region

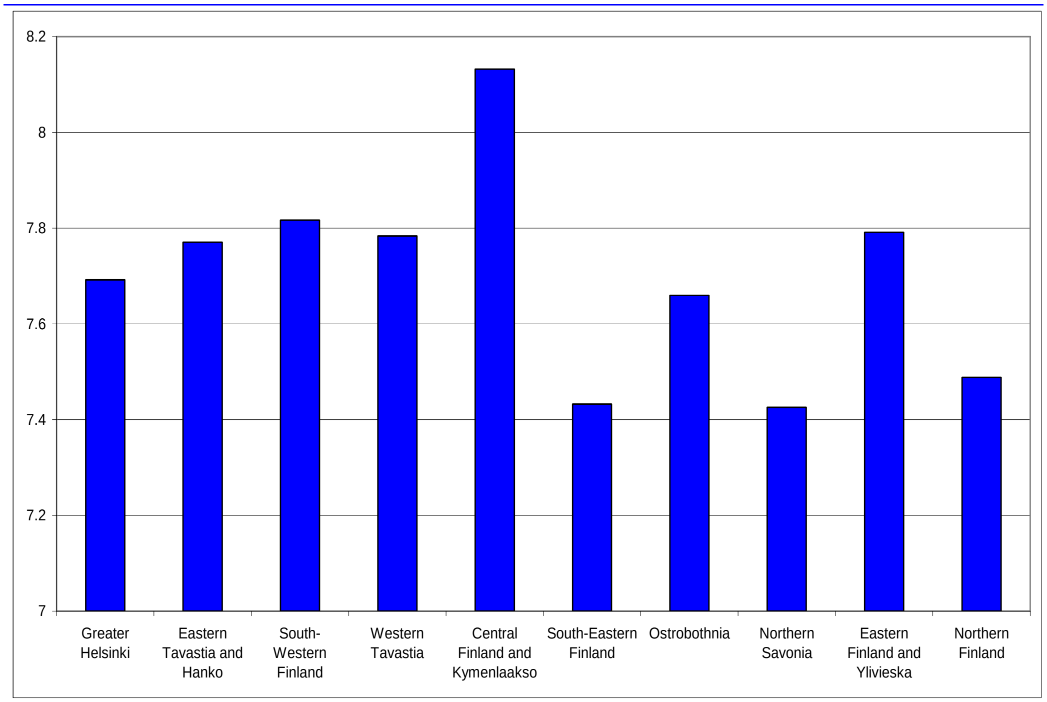


Source: London Economics analysis

6.5.2 Speed and ease with which billing problems are resolved

Consumers in Finland gave an average rating of 7.7 to the importance of the speed and ease with which billing problems are resolved. Average ratings ranged from 8.1 in Central Finland and Kymenlaakso to 7.4 in Northern Savonia. Figure 6.21 below suggests that the average rating is higher in southern region then northern regions.

Figure 6.21: Resolution of billing problems: average importance rating by customers' region

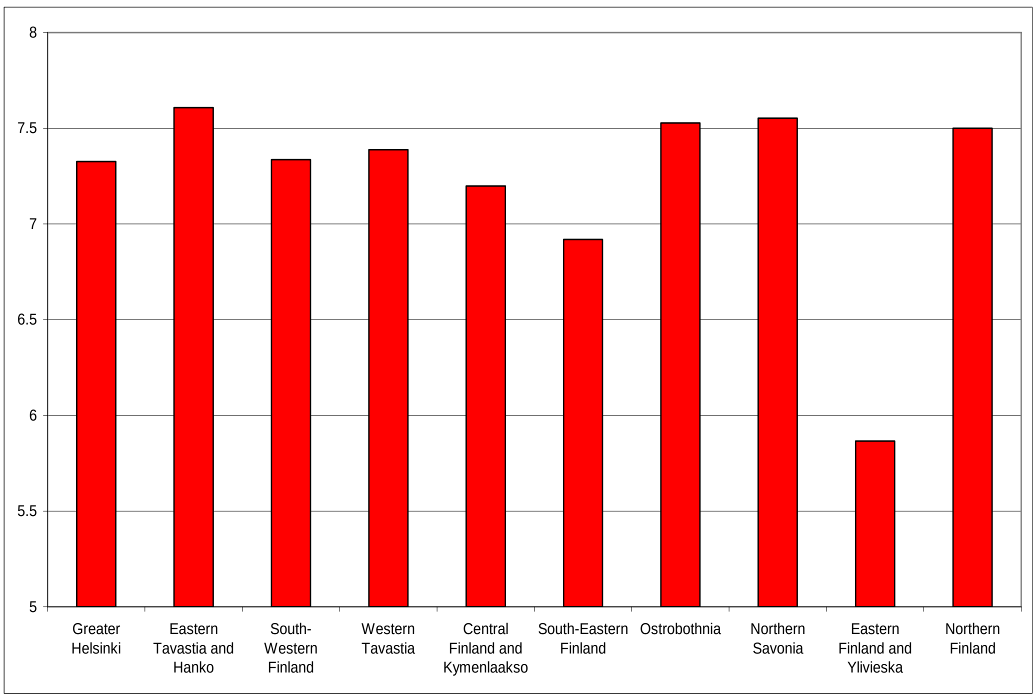


Source: London Economics analysis

6.5.3 Time taken to resolve outages

Customers in Easter Tavastia and Hanko appear to rate the importance of the amount of time it takes to resolve an outage higher than in any other region. Consumers here award an average of 7.6, compared to the national average of 7.3. Consumers in Eastern Finland and Ylivieska give the lowest average rating of 5.9 to this aspect of service quality. Consumers in Greater Helsinki award an average rating of 7.3, while those in Northern Finland award an average rating of 7.5. These data are summarised in Figure 6.22 below.

Figure 6.22: Outage resolution time: average importance rating by customers' region

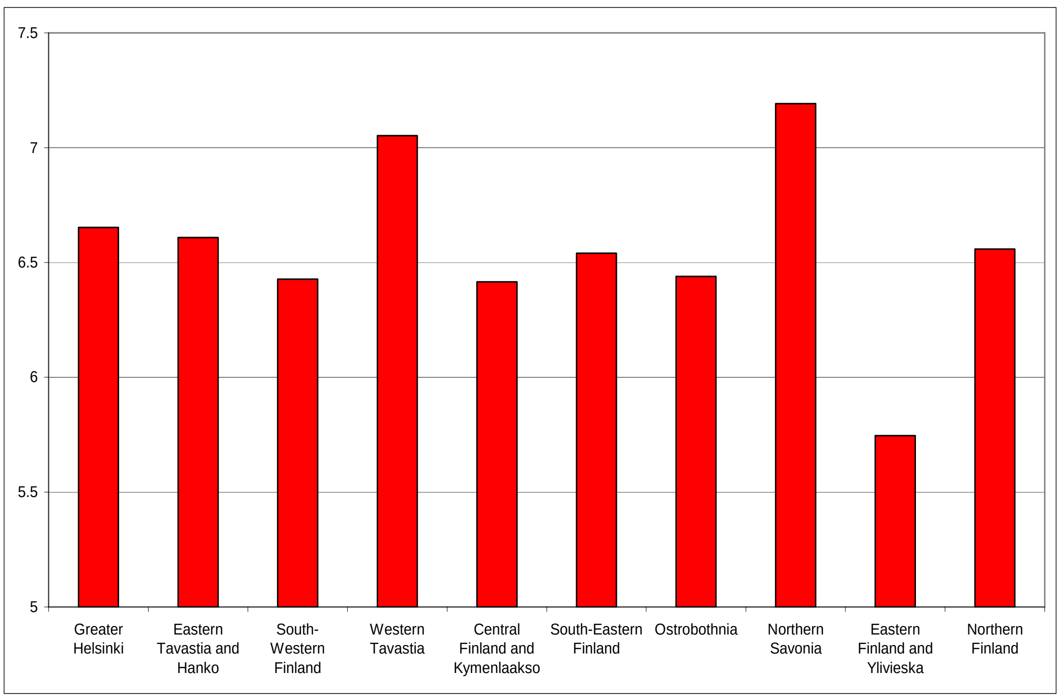


Source: London Economics analysis

6.5.4 Number of interruptions to supply

Figure 6.23 below illustrates the regional pattern to how consumers rate the importance of the number of supply interruptions. Consumers in Greater Helsinki award an average rating of 6.7, while those in Northern Finland give an average rating of 6.6. The highest rating is given by consumers in Northern Savonia (7.2). The lowest rating is given by respondents in Eastern Finland and Ylivieska (5.7). The average rating is 6.6.

Figure 6.23: Number of supply interruptions: average importance rating by customers' region

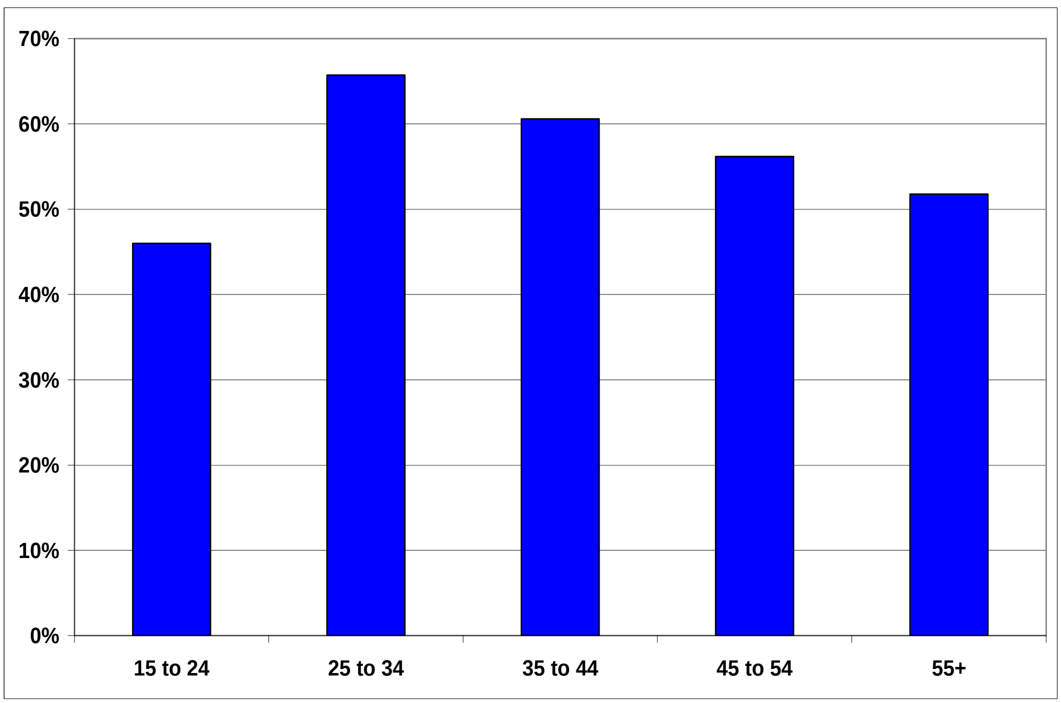


Source: London Economics analysis

6.6 Analysis by age group

Figure 6.24 below shows the relationship between the age group of customers and their contact with Customer Service. Of the entire survey cohort, 55.7% of customers had contacted Customer Service. The rate of contact was highest in the 25 to 34 year age group (66%), and lowest amongst those aged from 15 to 24 years (46%). Amongst those aged 25 years and older, there appears to be a significant negative relationship between age and contact with Customer Service.

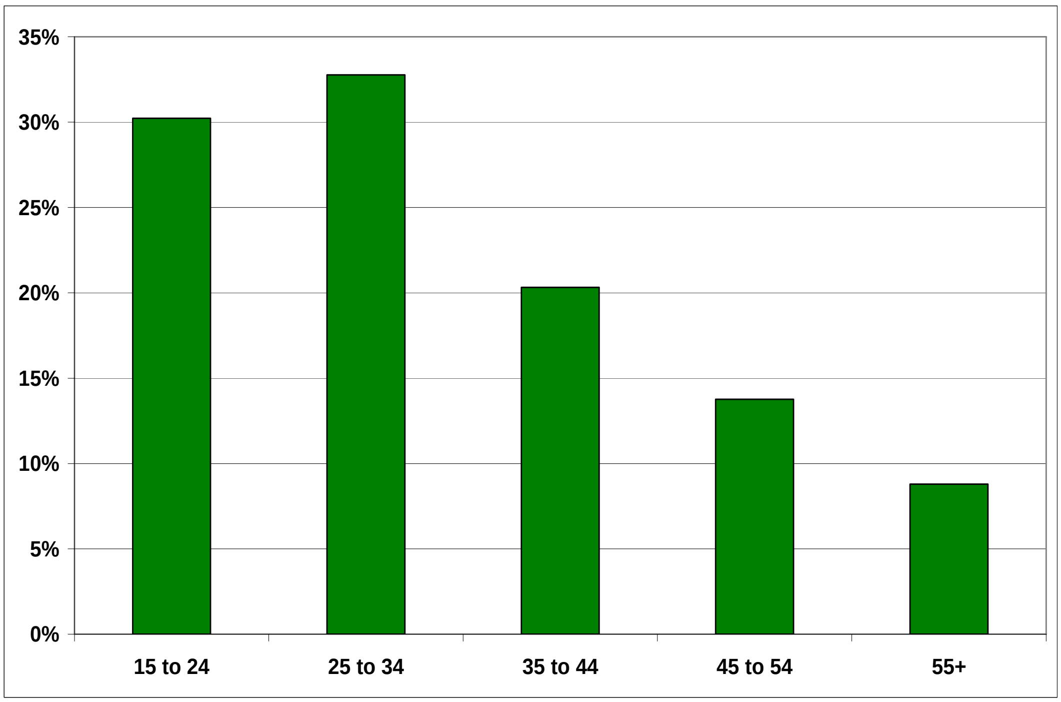
Figure 6.24: Contact with Customer Service (in preceding 2 to 3 years) by customers' age group



Source: London Economics analysis

There appears to be quite a strong negative relationship between customer age and the amount of contact with Customer Service regarding new connection agreements. This is evident in Figure 6.25below. Contact for this purpose was highest amongst the 25 to 34 year age group, averaging 33%. Contact was lowest within the 55 years and older age bracket, averaging 9%. The high rate of new connection agreements amongst younger customers may be because this group makes a significant contribution to household formation and to the occupation of newly built houses.

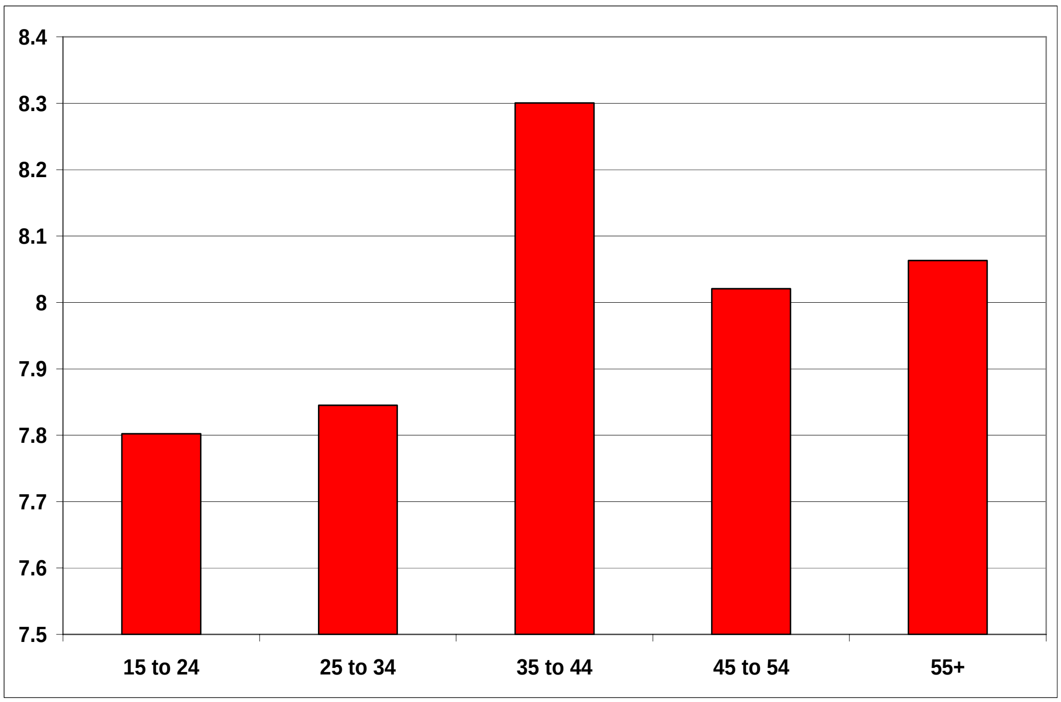
Figure 6.25: Percentage of customers contacting Customer Service in order to make new connection agreement by customer age group



Source: London Economics analysis

The importance that consumers attach to the accuracy of billing information tends to rise with age. The lowest importance rating was given by those in the 15 to 24 age group, averaging 7.8. Respondents aged between 35 and 44 years gave an average rating of 8.3. The response profile amongst all age groups is illustrated in Figure 6.26 below.

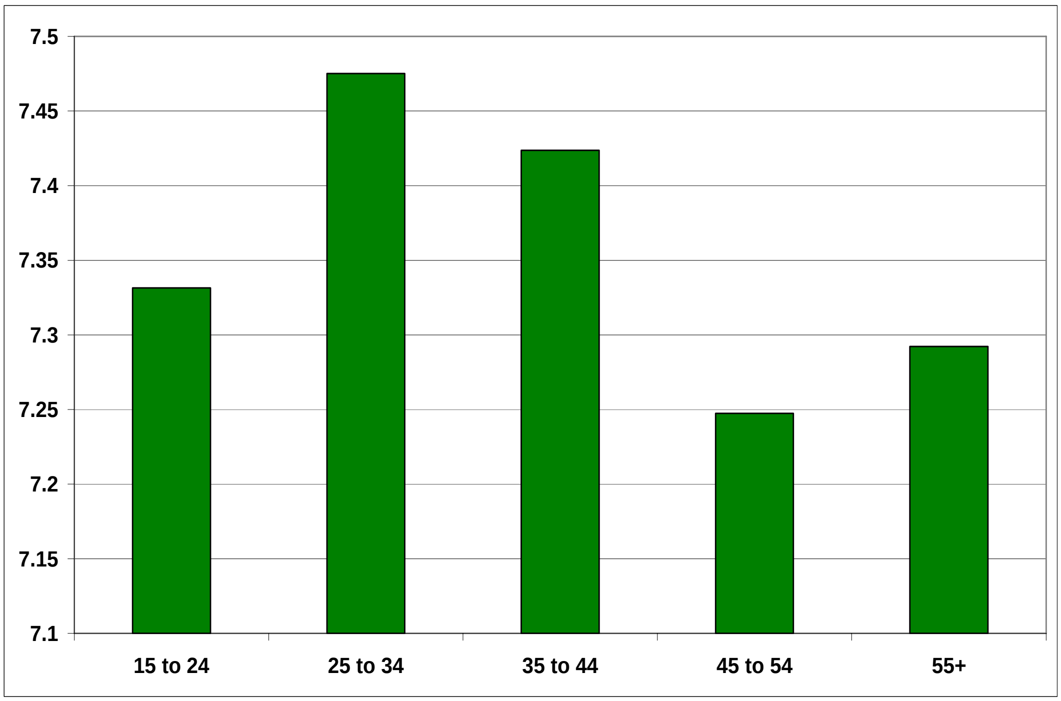
Figure 6.26: Accuracy of billing information: average importance rating by age group of customer



Source: London Economics analysis

Figure 6.27 below illustrates the relationship between the customers' age groups and the importance rating for outage resolution time. Ratings were highest amongst the 25 to 34 year old age group (averaging 7.5), with the lowest ratings in the 45 to 54 year age cohort (averaging 7.2). The average importance rating appears to decline slightly with age.

Figure 6.27: Outage resolution time: average importance rating by age group of customer



Source: London Economics analysis

6.7 Conclusions to this section

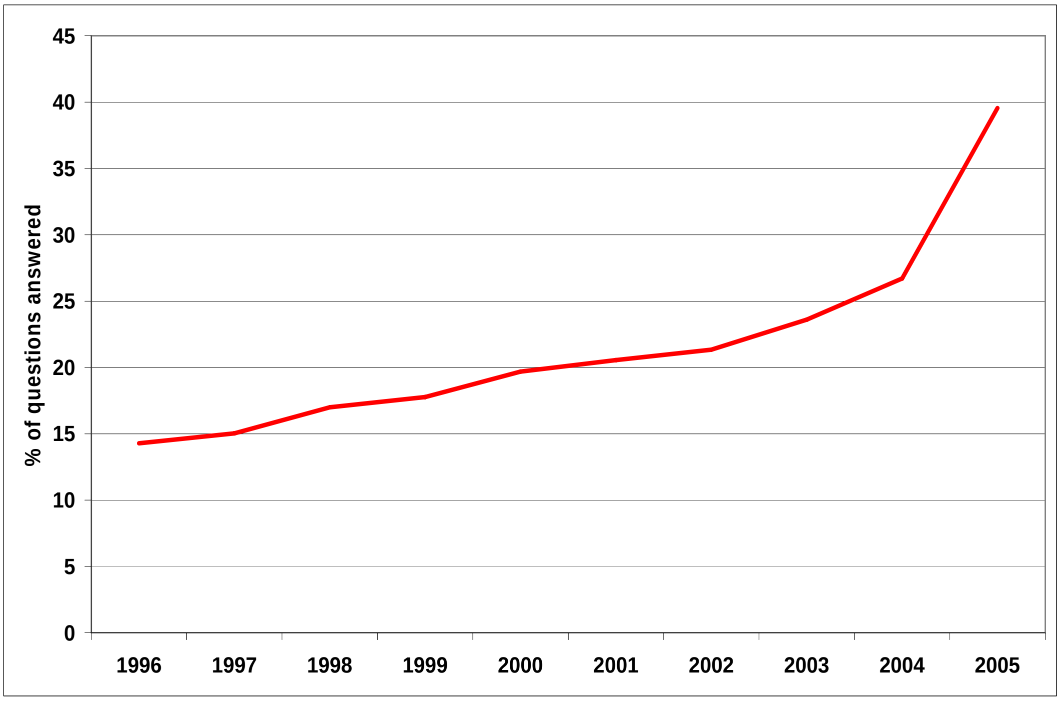
This section has reviewed the results of our consumer surveys. The results suggest that consumers view billing accuracy as the most important customer quality of service element. This is also the most common reason for customer contact. Supply interruptions and similar problems are also important and highly ranked. Finally, some variation by customer groups and regions seems indicated, but there is not evidence that some customer groups value customer quality largely differently than others.

7 Results of DNO questionnaires

7.1 Introduction

In the survey of Distribution Network Operators (DNOs), responses were received from 40 companies across Finland. Data on a variety of variables were sought for years from 1996 to 2006. On average, 22.4% of the requested data was provided. Data were provided for 39.6% of variables in 2005, while only 14.3% of 1996 data were provided. See Figure 7.1 below. For this reason, caution must be applied when interpreting data from the DNO survey. Data from different years may not be comparable as it may cover a different combination of companies from one year to the next. Many companies who supplied data on one variable did not do so for other variables. It must therefore be borne in mind that each variable, even for the same year, may cover a different range of DNOs.

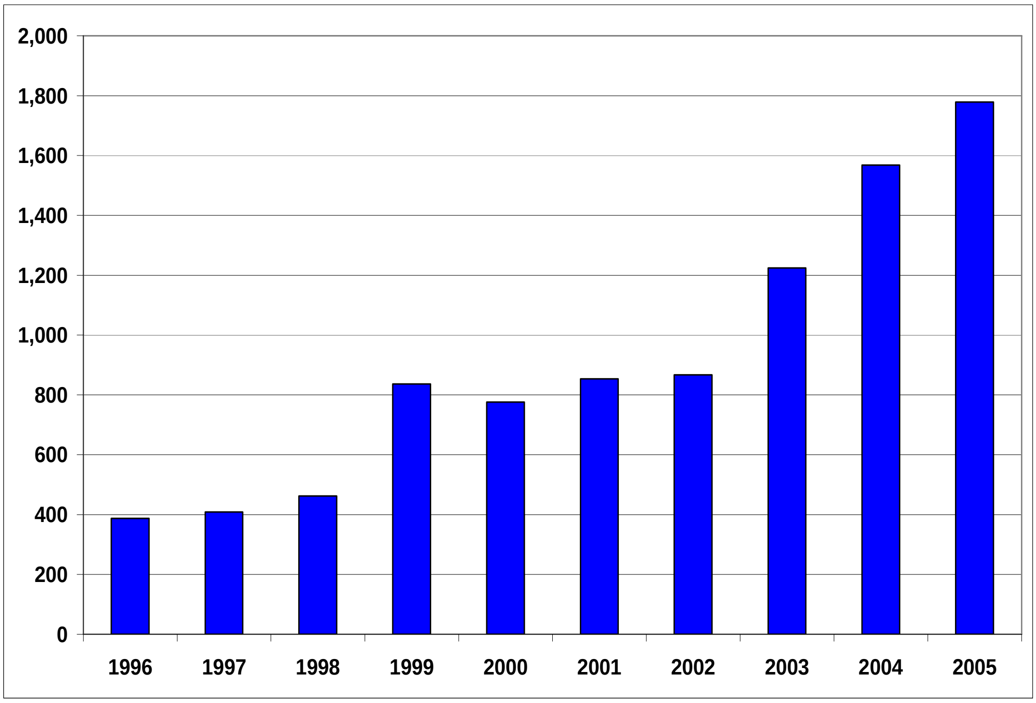
Figure 7.1: Response rate for DNO survey by year



Source: London Economics analysis

Figure 7.2 below shows the number of residential customers served by the DNOs which participated in the survey. It is clear that the number of customers served has increased over time and this trend is statistically significant. However, these increased numbers may be due in part to the higher response rate. Table 7.1 below shows that 15 DNOs provided data for 2005 in contrast to only 5 responses in 1996 and 1997. According to these responses, residential customers numbered 387,180 in 1996 and rose to 1,779,203 in 2005.

Figure 7.2: Total residential customers of DNO respondents



Source: London Economics DNO questionnaire data

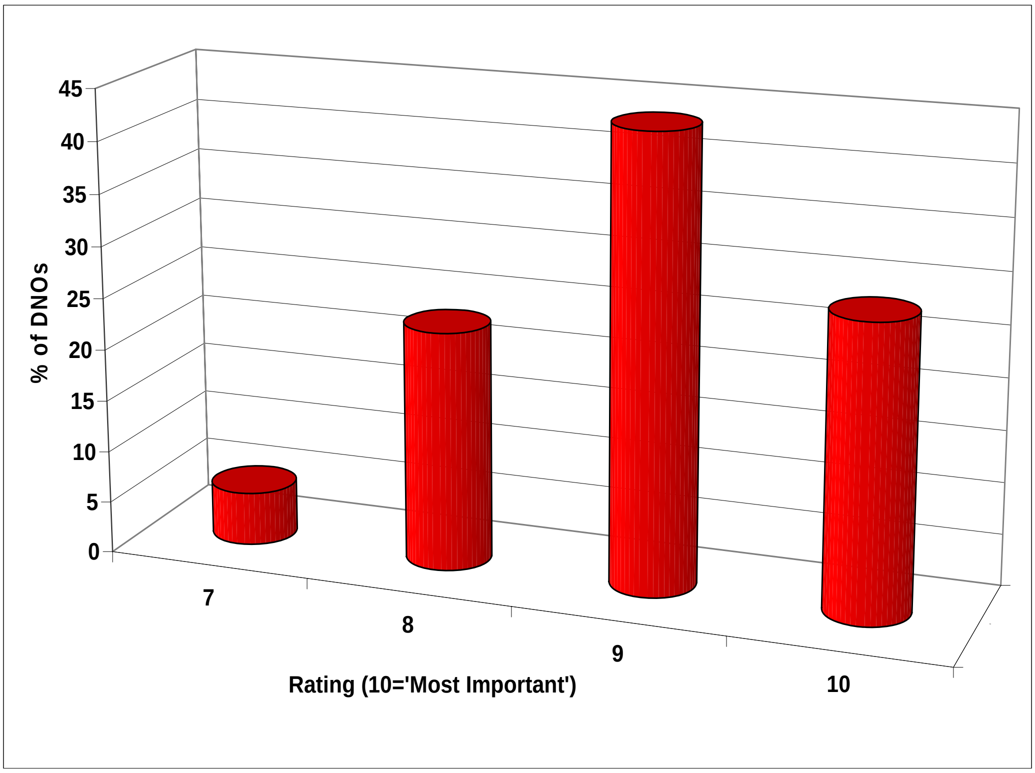
Table 7.1: Number of DNOs providing responses regarding total residential customers by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	5	5	7	6	6	6	6	7	8	15
% of Total	12.5	12.5	17.5	15.0	15.0	15.0	15.0	17.5	20.0	37.5

Source: London Economics analysis

DNOs were asked how importantly they rate quality of their service on a scale of 1 to 10. A summary of their responses is presented in Figure 7.3 below. Every respondent gave a rating of 7 or above. The average rating was 8.9, and well over one-half of respondent DNOs (71.8%) gave a rating of 9 or 10. These results suggest that DNOs consider quality of service to be very important.

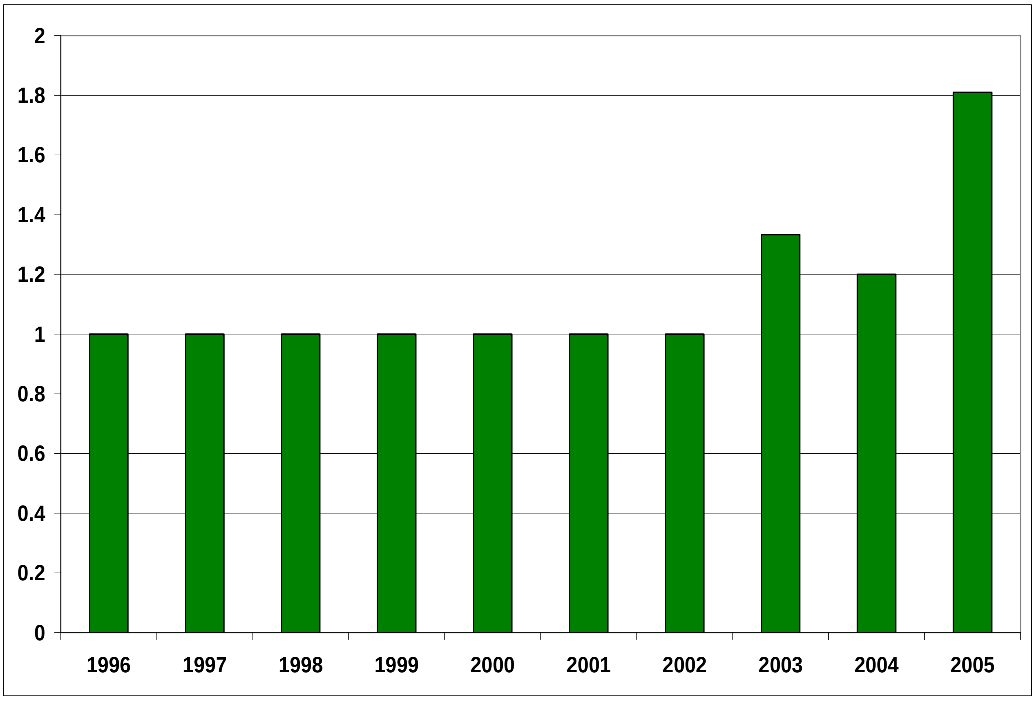
Figure 7.3: DNOs' importance rating for quality of service



Source: London Economics analysis

Figure 7.4 below illustrates the average length of time taken for DNOs to resolve billing complaints based on their survey responses. The results of customer surveys described in Section 6 above indicated that customers regard these billing issues as especially important. Between 1996 and 2002, the average resolution time was exactly 1 day, but this increased in 2003 and the average resolution time was 1.8 days in 2005. This may signify a slight deterioration in billing resolution but it could also be due to the impacts of the additional firms to data for more recent years. Figures are only available for 4 DNOs for years from 1996 to 2003, however 9 companies provided data for 2005. See Table 7.2 below.

Figure 7.4: Average number of days to resolve billing complaints



Source: London Economics analysis

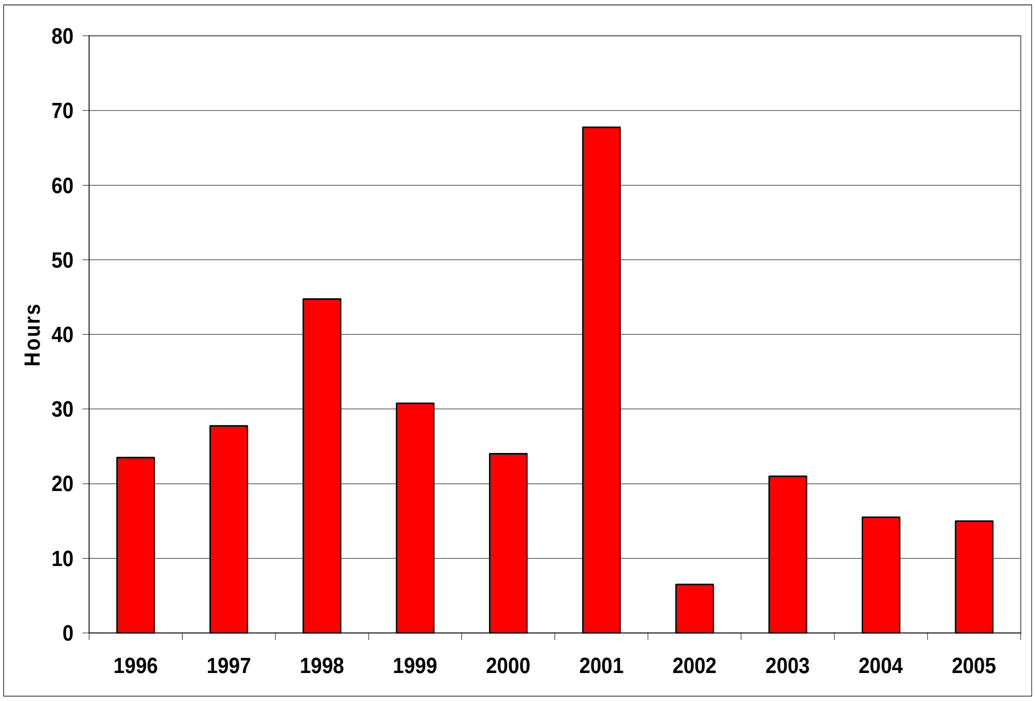
Table 7.2: Number of DNOs providing responses regarding number of days to resolve billing complaints by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	4	4	4	4	4	4	4	4	5	9
% of Total	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12.5	22.5

Source: London Economics analysis

Figure 7.5 below illustrates the development in the time taken to restore unplanned interruptions between 1996 and 2005. Consumer survey results indicate that this is an important issue to consumers. It has shown no significant trend over the last decade. Average resolution time peaked in 2001 at 68 hours. It reached its shortest in 2002, averaging 7 hours. In 2005, the average resolution time was 15 hours. These results may be obscured by the fact that data were only available from 3 DNOs for the period between 1996 and 2002, while 2005 data cover 12 operators. See Table 7.3 below. Notwithstanding comparability issues, these results suggest that this aspect of supply quality is improving.

Figure 7.5: Average time taken to restore full service after unplanned interruption (hours)



Source: London Economics analysis

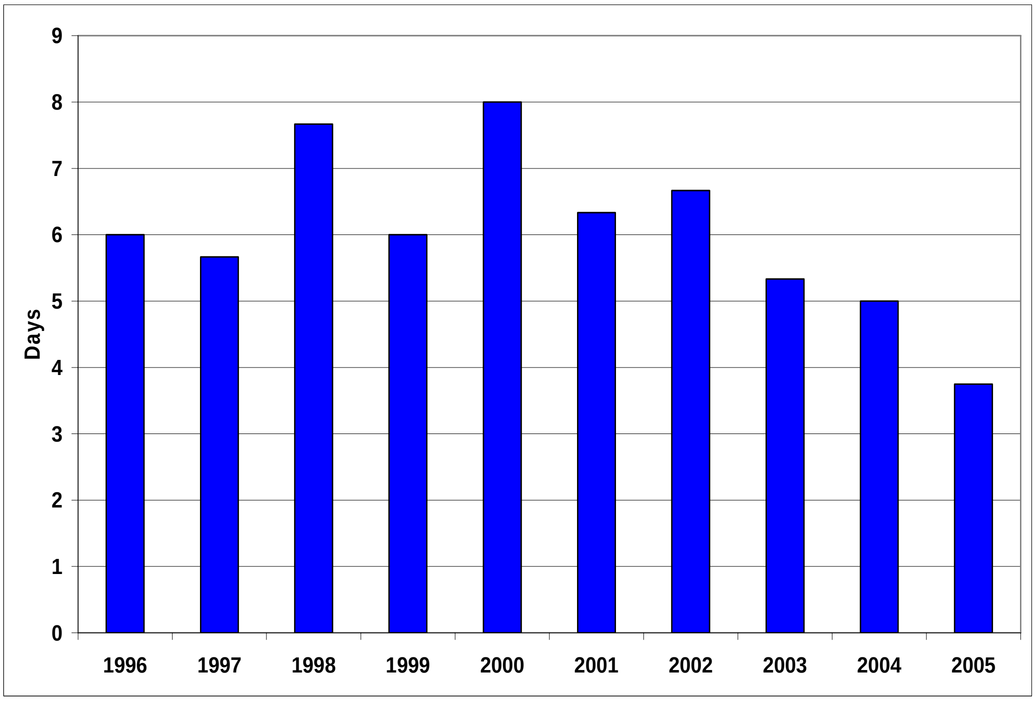
Table 7.3: Number of DNOs providing responses regarding time taken to restore full service after unplanned interruption by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	3	3	3	3	3	3	3	4	5	12
% of Total	7.5	7.5	7.5	7.5	7.5	7.5	7.5	10.0	12.5	30.0

Source: London Economics analysis

Figure 7.6 below suggests that the average number of days taken by DNOs to resolve safety issues has fallen over the last decade. In 1996, it took an average of 6.0 days to resolve safety issues, with the figure falling to 3.8 days in 2005. Safety issues took the longest to resolve in 2000, with an average of 8.0 days taken, and the average resolution time was shortest in 2005. These results may be influenced by response rates. According to Table 7.4 below, data were available for only 4 DNOs between 1996 and 2002, in comparison to the 10 operators providing data for 2005.

Figure 7.6: Average number of days taken to resolve safety issues



Source: London Economics analysis

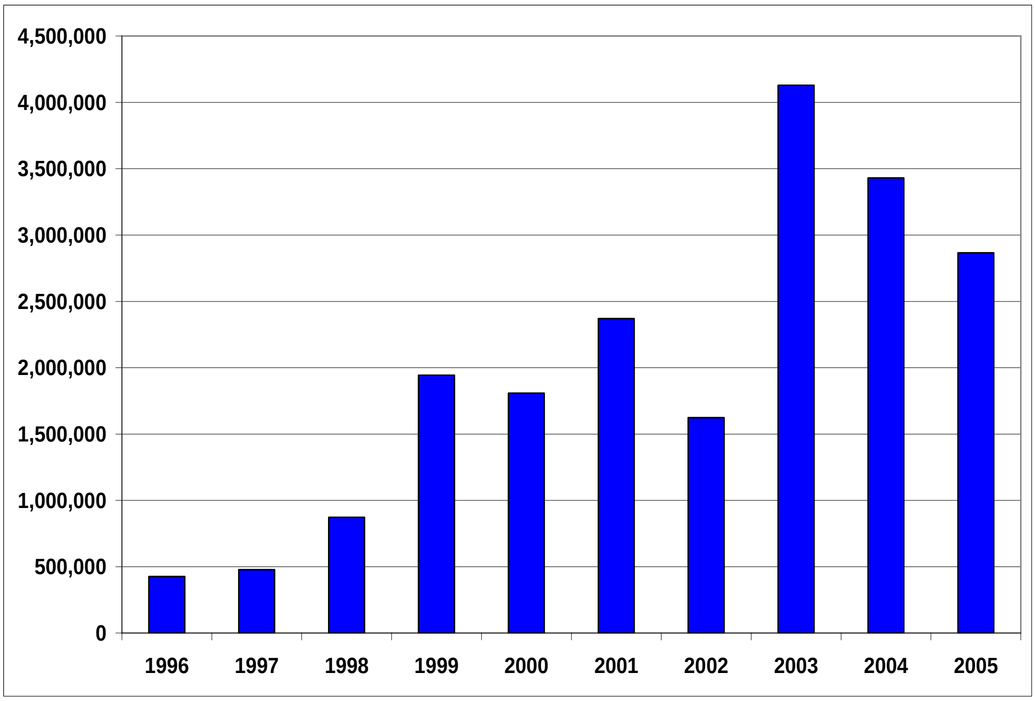
Table 7.4: Number of DNOs providing responses regarding days taken to resolve safety issues by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	4	4	4	4	4	4	4	5	6	10
% of Total	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12.5	15.0	25.0

Source: London Economics analysis

According to Figure 7.7 below, the number of DNO customers experiencing interruptions has risen over the last number of years. Results in Section 6 above indicate that supply reliability is an important issue for consumers. It must be remembered that this measured increase may be heavily influenced by the greater response rates for more recent years. In 1996, 426,637 customers experienced supply interruptions, rising to 2,866,056 in 2005. The numbers affected peaked in 2003 at 4,129,094 and were at their lowest in 1996.

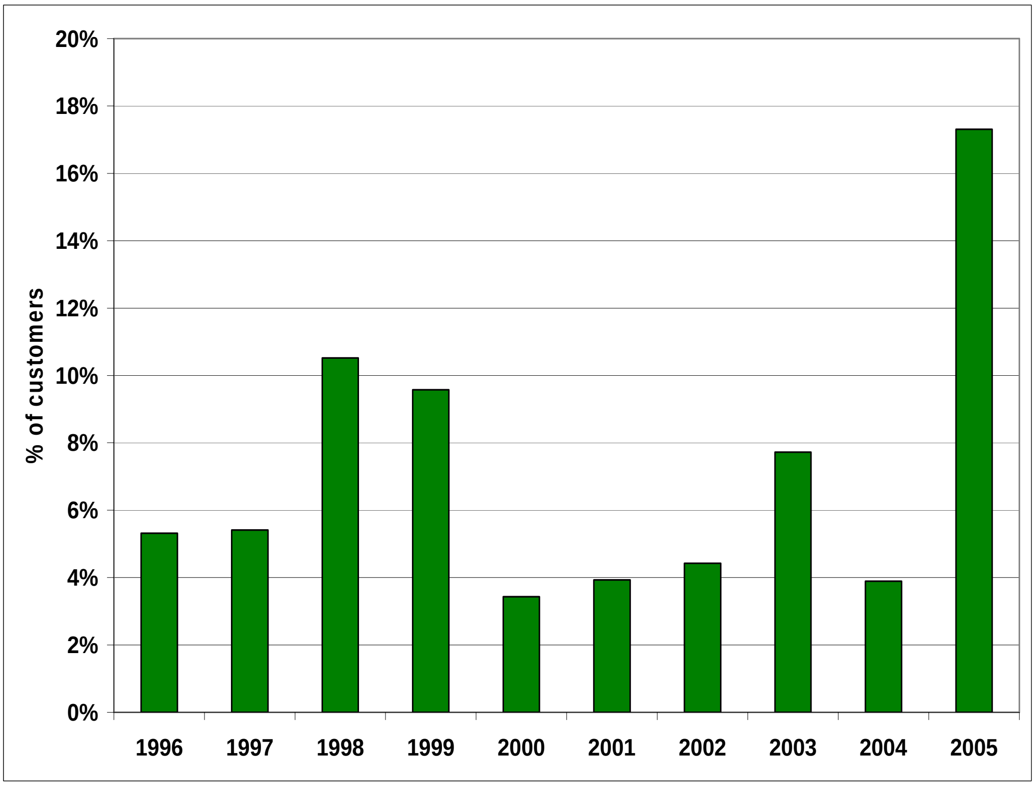
Figure 7.7: Number of DNO customers interrupted per year



Source: London Economics analysis

Figure 7.8 below shows how the number of interruptions per customer has evolved over time. There is significant and clear trend over time. The least satisfactory performance appears to have been in 2005, when 17.3% of customers were interrupted more than once. This is in contrast to 2000, when only 3.4% of customers experienced more than one interruption to their supply.

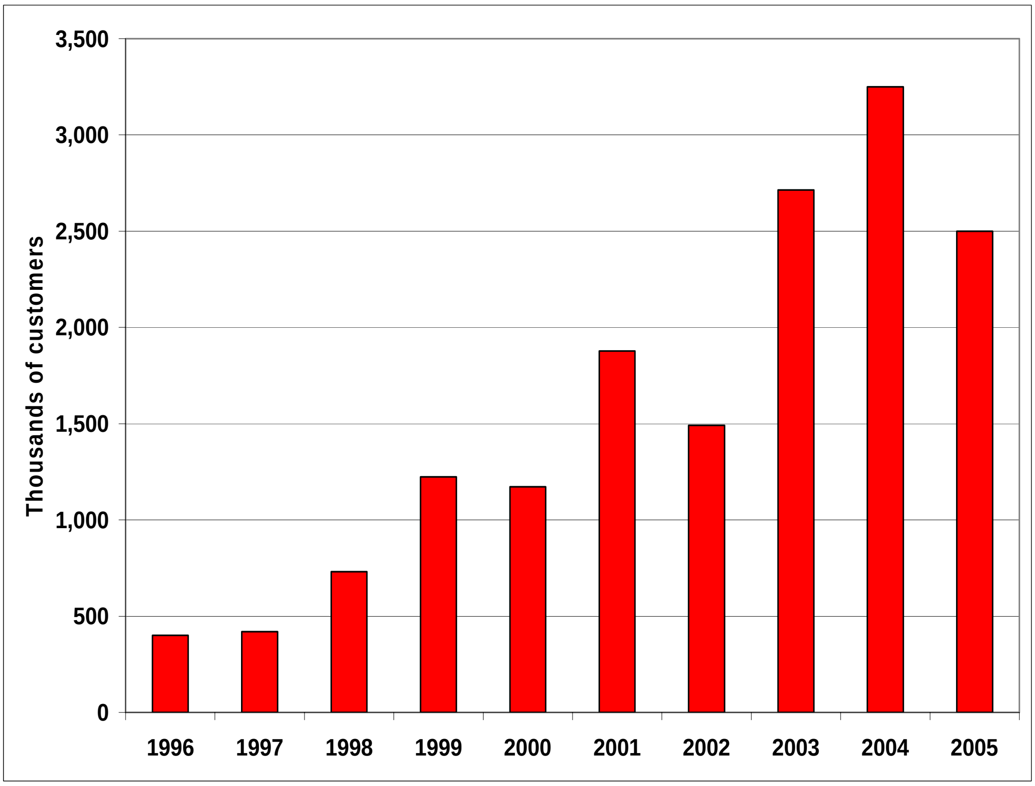
Figure 7.8: Percentage of customers affected by supply interruptions more than once per year



Source: London Economics analysis

Figure 7.9 below shows the numbers of customers who have been affected by unplanned interruptions over the last decade. It is on a significantly upward trend, but it must be remembered that these data are sensitive to the survey response rate. This is because data for 21 DNOs are included in the 2005 figure, while the 1996 figure is composed of only 8 operators. See Table 7.5 below. The numbers affected peaked in 2004 at 3,249,175. The lowest number of customers interrupted was recorded in 1996, with 400,481 affected.

Figure 7.9: Number of customers affected by unplanned interruptions



Source: London Economics analysis

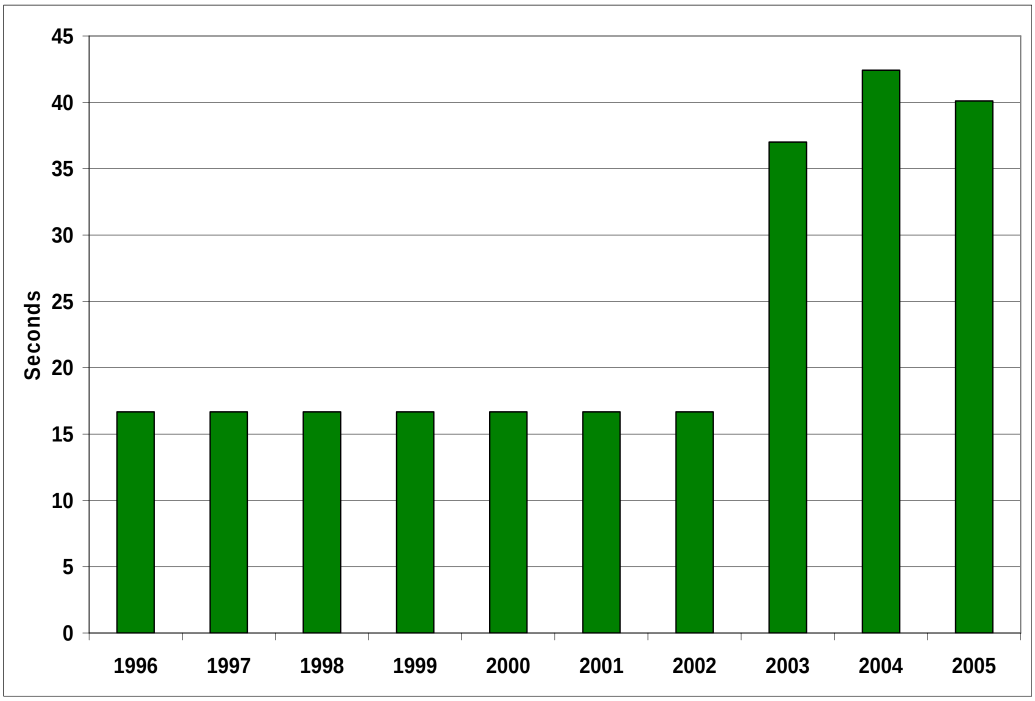
Table 7.5: Number of DNOs providing responses regarding customers affected by unplanned interruptions by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	8	9	9	9	12	12	12	13	14	21
% of Total	20.0	22.5	22.5	22.5	30.0	30.0	30.0	32.5	35.0	52.5

Source: London Economics analysis

Figure 7.10 below shows that the time taken to answer customers' telephone calls has lengthened in recent years. Survey results show that customer service is a factor of concern to consumers. However, this increase may be influenced by the fact that a larger number of DNOs are included in the figure for more recent years. Between 1996 and 2001, data was only available from 3 operators while 2005 results included 15 operators. See Table 7.6 below. In 2004, it took an average of 42.4 seconds to answer calls. This is in contrast to the 16.7 seconds taken on average to answer calls between 1996 and 2002.

Figure 7.10: Average time taken for telephone calls to be answered



Source: London Economics analysis

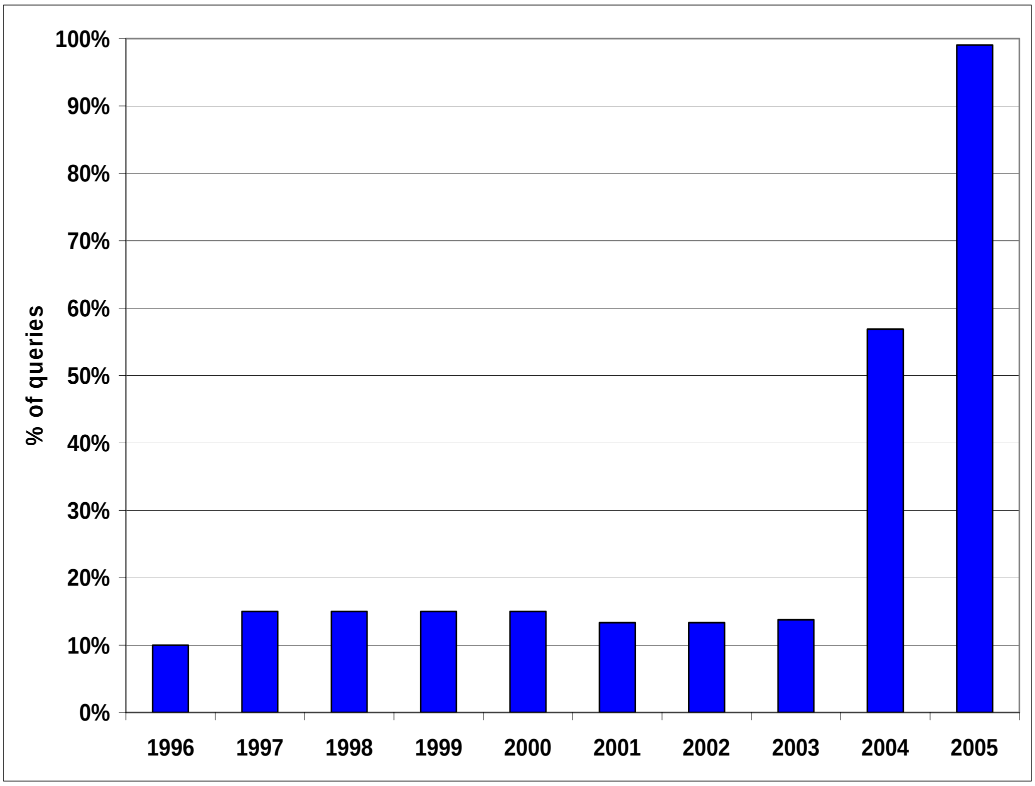
Table 7.6: Number of DNOs providing responses regarding time taken for telephone calls to be answered by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	3	3	3	3	3	3	4	4	8	15
% of Total	7.5	7.5	7.5	7.5	7.5	7.5	10.0	10.0	20.0	37.5

Source: London Economics analysis

Many DNOs allow for queries to be submitted by email or through their website. Figure 7.11 below indicates that the percentage of these queries responded to within 30 days has risen sharply in recent years. In 1996, only 10% of queries were responded to within this timeframe. However, 99.1% of queries submitted in 2005 were dealt with within a 30-day period.

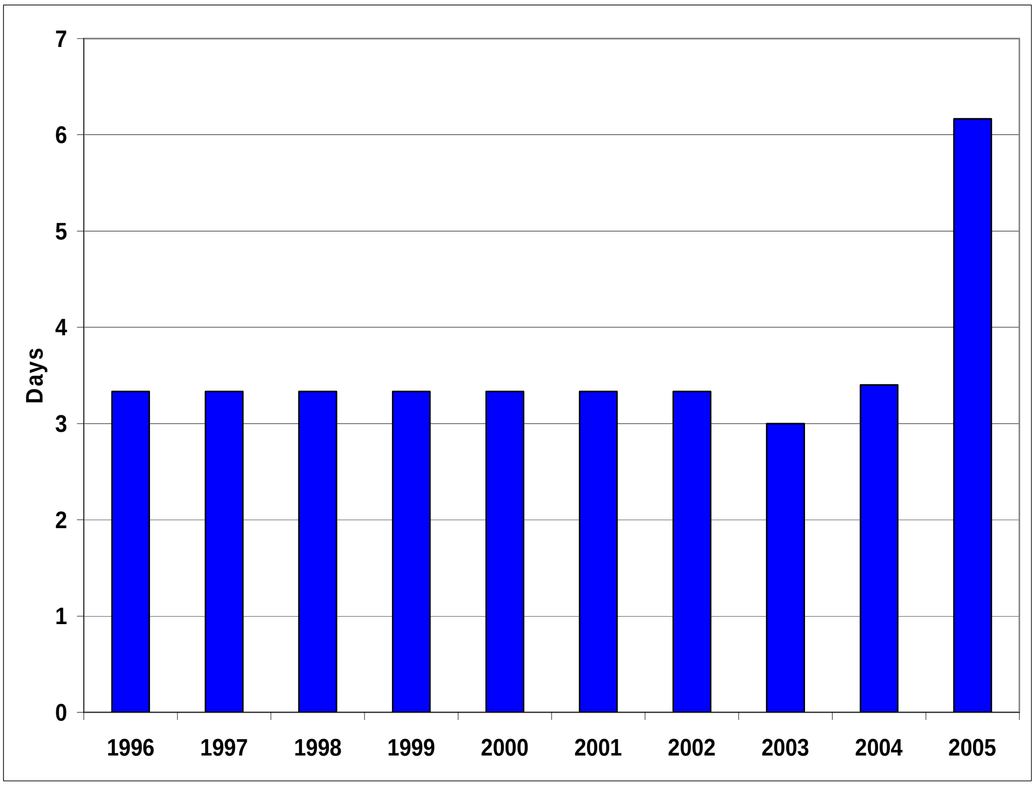
Figure 7.11: Percentage of queries submitted by web / email responded to within 30 days



Source: London Economics analysis

Figure 7.12 below shows the average number of days taken to acknowledge customers' written complaints. Between 1996 and 2003, it was stable at around 3 days. This has increased in the last two years, reaching 6.2 days in 2005. This appears to represent a sizeable deterioration in relation to its performance over much of the past decade. However, this may also be due to the inclusion of data from more DNOs in recent years. For years from 1996 to 2003, data were available for 7 operators, in contrast to the 14 DNOs included in the figure for 2005. See Table 7.7 below.

Figure 7.12: Average number of days to acknowledge receipt of written complaint



Source: London Economics analysis

Table 7.7: Number of DNOs providing responses regarding number of days to acknowledge receipt of written complaint by year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of DNOs	7	7	7	7	7	7	7	7	9	14
% of Total	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	22.5	35.0

Source: London Economics analysis

7.2 Conclusions to this section

This section has reviewed the results of our DNO surveys. The results suggest that DNOs view service quality as important but they vary significantly in their performance, at least among respondents. While all companies ranked service quality as important, the number of companies tracking the relevant data is small. Nonetheless the numbers tracking elementary data such as telephone response times has increased and elements seemingly may be improving (some indication of non improvement is more likely to be due to firms beginning to track certain indicators). It is difficult to ascertain whether the responding DNOs were a representative sample, and therefore how much can be extrapolated from the results received to non-responding DNOs.

8 Conclusions and Recommendations

This section gives conclusions and recommendations based on LE's experience, the research and available evidence. Fundamentally, LE recommends that more formal regulation of customer quality of service regulation be adopted in Finland.

8.1 Rationale for regulation of quality

Regulation of quality of service is generally needed in Finland. This is because firms face true and potentially binding incentives to reduce costs and improve efficiency, and can keep profits from achieving measured efficiencies. There is the possibility of profiting from lowering quality of service levels. Competitive forces are evolving for some parts of the country and service. Some elements will remain natural monopoly (pure DNO) and some will become or are potentially competitive (supply). Regardless of the true state of competition, competition and the profit motive cannot be relied upon to provide socially optimal levels of service quality. This is for a number of reasons, but depends mostly on how demand changes when quality of service changes. This has been recognised internationally, and the international evidence points to a wide range of quality of service regulatory measures. Further, consumers and DNOs surveyed in Finland indicate a high importance for a variety of service measures. These conclusions are robust for whatever type of quality of service is being considered.

8.2 What to regulate

Quality of service in electricity DNO and supply operations can be divided logically into three broad categories: quality of supply, technical quality, and customer quality. The focus of this report is on the third, but in general, some form of quality monitoring or regulation is needed for all three.

Quality of customer service regulation needs to be straightforward, easy to measure, track, and verify. There are numerous measures important to customers, but a sub-set of these that covers the major aspects of customer quality of service should suffice. Broadly speaking, they fall into some main categories:

- Customer contacts
    - Telephone
        - Agent

        - Machine
    - Letter/written
    - In person
    - Internet
- Record keeping accuracy
    - Billing
    - Metering
    - Address, personal, other
- Information
    - Information during unplanned outage
    - Information in advance of planned work
    - Information about changes in commercial operations
- Physical service on the premises
    - Keeping appointments
    - Calling to fix problems within certain period
    - Switching within certain period
    - Connections within the regulated time period
- Dispute resolution

8.3 How to regulate

In the very general sense, we recommend that customer quality of service be regulated and that the regulation include some form of incentives that result in rewards or penalties if measured targets are not met. Only in this way will quality of service have any rational meaning in terms of companies taking the regulation seriously. We note however, that the regulator should be careful not to implicitly attempt to maximise service quality in and of itself, as this is not likely to be optimal. The optimal regulation is the one that incentivises the companies to provide the level of service quality that equates the marginal costs with the marginal benefits.

A number of options are available to Finland in terms of regulation of customer quality of service. Difficulties, however, arise in Finland in terms of recommending very specific methods for regulation such as monetary values for each service category. This is due to a number of reasons, including:

- The size and organisational diversity of Finland's DNOs
  - There may be scale and scope economies in quality of service provision, meaning small DNOs may find it more costly to comply than large DNOs.
- The quality of information kept by the range of DNOs
  - Only a proportion (less than half) responded to our survey, and many indicated they did not keep accurate information on key service quality indicators.
- The difficulty in measuring customers' willingness to pay for service quality improvements.
- The difficulty in measuring companies' marginal costs of customers' service quality improvements.

We propose that specific regulations be enacted for each of the broad service categories listed above. More detailed regulations and actions for the sub-categories can be enacted with more flexibility. These recommendations are as follows.

8.3.1 Data

First, each company should be required to track data on the broad categories. The data should be measured in common units and be verifiable. It is suggested that the data not be audited annually, but perhaps spot-checked by the regulator. In general, the data should be kept to allow the regulator to determine the distribution of the data; e.g., the % of call-responses taking more than a certain amount of time (we propose more specific standards for each item later). Auditing all the data annually could be quite expensive to small operators, but the regulator could reserve the rights to require an independent audit and impose sanctions or penalties if data are inaccurate. In general, data should be collected on an annual basis on:

- Customer contacts
  - Telephone
    - Agent (number of contacts and time to respond)
    - Machine (number of contacts and time to respond)
  - Letter/written (number of contacts and time to respond)
  - In person (number of contacts and time to respond)
  - Internet (number of contacts and time to respond)
- Record keeping accuracy

    - Billing (number of questions and number of corrections)
    - Metering (number of questions and number of corrections; Total true-up from estimated readings)
    - Address, personal, other (number of questions and number of corrections)
- Information
    - Information during unplanned outage (timeliness of availability and sources; e.g., within one 30 minutes information on website and with telephone agents)
    - Information in advance of planned work (timeliness of availability and sources; e.g., 7 days in advance ads in local newspaper, information printed with previous bills, information available on website)
    - Information about changes in commercial operations (timeliness of availability and sources)
- Service performance on premises, other services
    - Keeping appointments (track numbers or % achieved within target)
    - Calling to fix problems within certain period (track numbers or % achieved within target)
    - Switching within certain period (track numbers or % achieved within target)
    - Connections within the regulated time period (track numbers or % achieved within target)
- Dispute resolution (nature and number of days to resolve)

8.3.2 Regulator's elements to monitor

We further propose that some of the above elements be regulated by the regulator checking company data provided on an annual basis while other elements should be checked by customers as they receive the services and covered under a company customer charter. Some services may be covered under both.

The rationale for this dichotomy is to minimise the cost of regulation; customers perform some of the checking. The guiding principle is to use customers' own self-interest and observation to check the achievement of targets. The customers cannot be relied upon to achieve optimal monitoring when externalities occur (the impacts are not specific to the individual customer) or when actions may or may not be received by the customer. Finally, some services, such as telephony and internet, should be easily monitored by the companies, but the cost to a customer of filing a complaint may exceed to waiting time extra cost of poor service quality. Alternatively, the penalty needed to incentivise customers and companies to monitor some elements may need to be too large relative to the cost of lower service quality. Therefore, these types of services should also be monitored by the regulator.

The elements that should be monitored by the regulator are proposed to be:

- Customer contacts
  - Telephone (average time and % receiving the standard)
  - Letter/written (average time and % receiving the standard)
  - Internet (average time to respond and % receiving the standard)
- Record keeping accuracy
  - Billing (number of corrections/number bills)
  - Metering (number of corrections/number of meters; total % true up from estimates)
- Information
  - Information during unplanned outage (timeliness of availability and sources; e.g., within 30 minutes information on website and with telephone agents)
  - Information in advance of planned work (timeliness of availability and sources; e.g., 7 days in advance ads in local newspaper, information printed with previous bills, information available on website)
- Service performance on premises, other services
  - Time to call out to fix a problem (non safety related)
  - Switching within certain period (track numbers or % achieved within target)
  - Connections within the regulated time period

8.3.3 Consumers and company customers' charter

Each company should propose a company customer charter. The charter should be made public before being finalised to allow consumer groups to comment or have inputs into the process. The regulator should check that the companies' proposals are of a minimum standard.

- Customer contacts
  - Contacts in person
  - Written requests
- Record keeping accuracy
  - Billing
- Service performance on premises, other services
  - Keeping appointments
  - Time to call out to fix a problem (non safety related)
  - Connections within the regulated time period
- Dispute resolution

8.4 Ranges of standards and penalties

We propose a range of possible standards and penalties for the elements that will be monitored by both the regulator and consumers below. We propose that the period for monitoring should be annual. This will preclude the possibility of once-off events influencing the results significantly. While we propose these ranges, we wish to note that these ranges are indicative judgments from our experience and from the international research. Consultation with the industry and consumers representatives would likely be necessary before formal binding standards and penalties would be required. We also note that in general, the principles of the economics of penalties and incentives suggest that the penalty should be proportional to the costs and benefits of the transgression/improvement in service quality. This may need to be weighed or rebalanced by the cost of compliance and the probability of being caught, among other things.

8.4.1 Standards

The following standards are proposed as indicative. A range of + or – 5% could be considered as reasonably similar:

- Customer contacts
    - Telephone
        - Agent (90% of calls within 1 minute)
        - Machine (90% of calls within 30 seconds)
    - Letter/written (number of contacts and time to respond) (90% within 3 working days)
    - In person (90% within 20 minutes)
    - Internet (90% within 2 working days)
- Record keeping accuracy
    - Billing (99.5% of bills accurate annually)
    - Metering (total true-up of actual meter data should not exceed 10% annually)
- Information
    - Information during unplanned outage (within 30 minutes of an event information on website and with telephone agents)
    - Information in advance of planned work (at least 7 days in advance information made available via print and internet sources)
- Service performance on premises, other services
    - Keeping appointments (90% of appointments kept within 15mins of scheduled time)
    - Calling to the residence to fix non-safety related problem (90 % within 3 days)
    - Switching within certain period (95 % achieved within target/legal obligation)
    - Connections within the regulated time period (95 % achieved within target/legal obligation)

- Dispute resolution (each company should have a standard dispute resolution procedure as part of the company charter. The procedure should set out timelines and rights and responsibilities of each party, and who or where the next level of dispute resolution is appealed to if a resolution is not reached until an ultimate arbitration can be found.)

8.4.2 Indicative proposed penalties and rewards

The following penalties are proposed as indicative. We dichotomise into penalties that are paid by reducing the allowed revenues versus penalties that are paid directly to

- Customer contacts;
  - Overall regulated penalty: if any two of the above standards are not met then the company will have allowed revenues reduced by 0.25%.
  - Customer charter: if written responses not returned within the required period a bill credit to the customer of €5 should be paid.
  - If the company achieves all of the standards then the company should have an increase in allowed revenues by 0.2%
- Record keeping accuracy
  - Overall regulated penalty: if any two of the above standards are not met then the company will have allowed revenues reduced by 0.5%.
  - Customer charter: if bill is not correct, customers demonstrating this in writing should receive a bill credit to the customer of €10 should be paid.
  - If the company achieves all of the standards then the company should have an increase in allowed revenues by 0.3%
- Information

- It is proposed that no penalties or rewards be used for the provision of information as in general it is in companies' interest to provide this. However, we propose that data should be collected and monitored in case a standard with penalty needs to be introduced.

- Service performance on premises, other services
  - Overall regulated penalty: if any two of the above standards are not met then the company will have allowed revenues reduced by 0.25%.
  - Customers charter: appointments or other services requiring calling out to the premises, switching services etc. If the company does not achieve the standard then the customer should be able to receive a payment of €25 upon notification of the company in writing.
  - If the company achieves all of the service performance standards for appointments, switching, and other services then revenues would be increased by 0.2%.
- Dispute resolution
  - a company failing to follow its customer charter with regards to the dispute resolution procedure should be deemed to forfeit their chance to have the dispute resolved in their favour.

8.5 Timing and implementation

It is proposed and suggested that the timing and implementation of the above would take between 1 and 2 years. A first step is to allow stakeholders to comment on the proposals. A second step is to collect and estimate the relevant data and indicators. It is further suggested that a one-year "trial" period be run where the estimated impacts on revenues be calculated by the companies. This will give the companies a chance to secure systems, ascertain methods of improvements, and perhaps appeal if penalties appear too harsh. We believe, however, that as the proposed penalties are limited, there is limited risk in the proposed regime in general for companies.

Finally, the system of standards and rewards and penalties should be reviewed over time. If performance against standards is apparently slipping then penalties and rewards may need to be increased. If companies hit targets easily then the standards may possibly be tightened, or the standard might be removed from the penalty reward system and merely monitored.

8.6 Conclusions to this section

This section has made proposals for an indicative way forward for quality of service regulation of customer commercial quality elements in Finland. The section proposes elements that companies should collect data on and that the regulator should track. Total revenues allowed are proposed to be adjusted by between 0.25% and 0.5% for hitting a set of service quality standards. If two or more of five customer contact standards are not met a 0.25% penalty is proposed. If one or more of three customer record keeping accuracy standards are not met a 0.5% penalty is proposed. If two or more of the customer switching and connection standards are not met then a 0.25% revenue adjustment is proposed. Companies complying with all the standards for customer contacts should get a 0.2% reward and those complying with all the standards for accuracy should get a 0.3% reward, while a reward of 0.2% for appointments and switching compliance is suggested.

Individual customers who receive poor service for written contacts, inaccurate bills, or failure to meet appointments, switches or connections, can receive direct payments of between €5 and €25. It is noteworthy that the system effectively employs a dead-band where no adjustment is made if the company fails to hit one of either customer contact standards or customer record keeping accuracy standards. It is also noteworthy that the penalties are effectively capped at 1% of revenues (notwithstanding direct payments to customers) and rewards are capped at 0.7% of revenues.

It is our opinion that these proposals are modest but sufficient to properly incentivise DNOs in Finland to achieve high levels of customer commercial quality standards.

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10 Data Appendix

Table A1: Breakdown of Respondents by Age Group

Age Group	Number of Respondents	% of Respondents
15 to 24 years	187	17.8
25 to 34 years	181	17.3
35 to 44 years	203	19.4
45 to 54 years	194	18.5
More than 55 years	284	27.1
Total	1,049	100.0

Source: London Economics

Table A2: Breakdown of Respondents by Gross Annual Household Income

Income Bracket	Number of Respondents	% of Respondents
Less than €14,469	115	11.0
€14,470 to €28,938	189	18.0
€28,939 to €43,407	238	22.7
€43,408 to €72,345	269	25.6
€72,346 to €115,752	71	6.8
More than €115,753	18	1.7
Don't Know / Refused	149	14.2
Total	1,049	100.0

Source: London Economics

Table A3: Importance Ratings of 'The number of times per year the electricity supply to your residence is interrupted'

(10 = ‘Most Important’, 1 = ‘Least Important’)

Importance Rating	Number of Customers	% of Respondents
1	77	7.3
2	68	6.5
3	64	6.1
4	47	4.5
5	103	9.8
6	66	6.3
7	106	10.1
8	157	15.0
9	197	18.8
10	164	15.6
Total	1,049	

Source: London Economics

Table A4: Importance of 'The length of time the electricity is out once it is interrupted (i.e. the amount of time it takes to resolve an outage)'

Importance Rating	Number of Customers	% of Respondents
1	37	3.5
2	51	4.9
3	37	3.5
4	46	4.4
5	70	6.7
6	61	5.8
7	100	9.5
8	185	17.6
9	242	23.1
10	220	21.0
Total	1,049	

Source: London Economics

Table A5: Importance of 'The accuracy of billing information and charges from the electricity distribution company'

Importance Rating	Number of Customers	% of Respondents
1	11	1.0
2	19	1.8
3	24	2.3
4	33	3.1
5	59	5.6
6	71	6.8
7	87	8.3
8	188	17.9
9	247	23.5
10	310	29.6
Total	1,049	

Source: London Economics

Table A6: Importance of 'the speed and ease with which billing problems or similar problems are resolved'

Importance Rating	Number of Customers	% of Respondents
1	16	1.5
2	22	2.1
3	26	2.5
4	27	2.6
5	82	7.8
6	70	6.7
7	126	12.0
8	205	19.5
9	265	25.3
10	210	20.0
Total	1049	

Source: London Economics

Table A7: Reasons for Contacting Customer Services

Reason	Number of Customers	% of Customers who Contacted Customer Services
Making of a new Network Connection	225	38.5
Making of a New Connection Agreement	118	20.2
Problems with billing (also metering problems)	192	32.8
Problems with the quality of electricity (interruptions, voltage quality, etc.)	97	16.6
Other	117	20.0
Total Number of Customers who Contacted Customer Services	585 (55.7% of total respondents)	

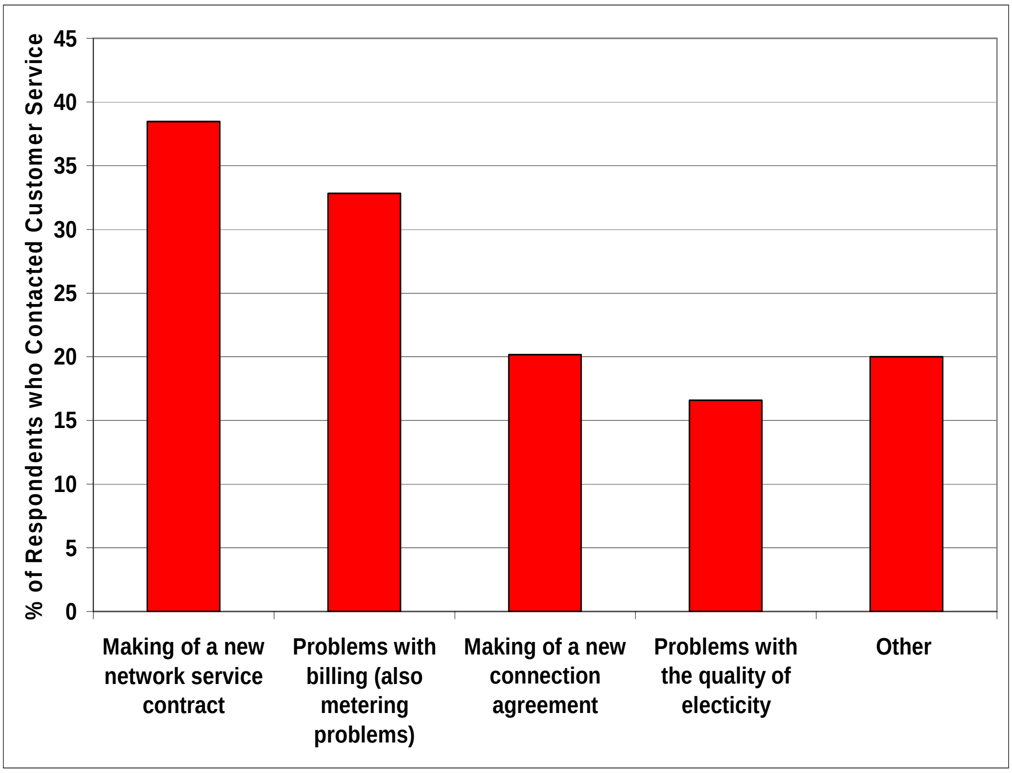
Source: London Economics

Table A8: Rating of speed and ease with which problems were solved by customer services

Rating	Number of Customers	% of Customers
1	14	2.4
2	14	2.4
3	22	3.8
4	15	2.6
5	47	8.0
6	52	8.9
7	45	7.7
8	133	22.8
9	141	24.1
10	101	17.3
Total	584	

Source: London Economics

Figure A1: Reasons for contacting customer service



Source: London Economics analysis