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THE CONSEQUENCES FOR CONSUMER WELFARE OF THE 2001-2003 ELECTRICITY DISTRIBUTION PRICE REVIEW IN THE NETHERLANDS*

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Abstract

The Dutch regulatory process for setting the first X-Factors in the electricity distribution sector has gone badly wrong. During two-and-a-half years four different X-Factors were published by the regulator. These X-Factors fluctuated wildly. We demonstrate that Dutch electricity consumers will pay at least €300mln. more over three years for the distribution of electricity than might otherwise have been the case. We estimate that benefits for the companies in terms of extra revenue from lowered X-Factors amounts to 3~5 percent of total asset value. We provide a history of the regulatory process and analyse the impact of the different X-Factors on the final bills of consumers. The negative political reaction to the perceived problems of regulation has hampered the course of deregulation and the privatisation of the municipally-owned electricity companies. The Minister of Economic Affairs and the majority of Parliament want the complete ownership unbundling of the sector by 1 January 2007.

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[1] The views expressed here are those of the author and do not necessarily reflect the views of PricewaterhouseCoopers.

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I. Introduction

The price control review has become a key element of independent economic regulation of network utilities around the world in recent years. Once every 3 to 5 years the regulatory agency responsible for setting prices for monopoly network companies in telecoms, electricity, gas, water, railways or airports deliberates on what the maximum prices for these services should be, and sets them for the upcoming control period. The process pioneered in recent years by the Office of Telecommunications Services (Oftel) in the UK can be expected to take up to 18 months from the publication of the first consultation document to the publication of the final prices.

Many countries around the world now have such an approach to electricity regulation in the wake of privatisation and deregulation of electricity generation and the gradual opening up to competition of final markets for electricity supply (or retail). Jamasb and Pollitt (2001) in a survey of 23 OECD and leading developing countries found that 13 countries had price control periods of 3 to 5 years. The approach contrasts sharply with the previous regime under public ownership where there was an annual determination of prices by the relevant government ministry following a more or less formal process of internal consultation between the ministry and the companies it regulated. In the US Sappington *et al.* (2001) found that at least 16 out of 50 US states had introduced some form of multiyear price control (often amounting to a nominal rate freeze for domestic customers) as opposed to the traditional third party initiated rate review. Multi-year price caps in the US differ crucially from those in other countries in that they are voluntary agreements between firms and regulators and lack statutory backing. The new approach has the advantages of transparency and increased investor and consumer certainty about the future path of prices.[3]

The Netherlands adopted this approach to economic regulation of its electricity distribution and transmission network companies in 1998. Originally the first price control period was to be from 1 January 2001 to 31 December 2003. The first consultation document for this price control review period was published in July 1999 (DTe, 1999). However the process has gone badly wrong. The Dutch energy regulator (DTe) published four different X-Factors during a period of two-and-a-half years, these X-Factors fluctuated substantially. Two major court cases before the industrial tribunal (CBb) were lost by the DTe regarding

[3] See Nillesen & Pollitt (2001) for a firm-specific response to the threat of regulation in Florida.

the interpretation of the Electricity Act. The Final X-Factors were significantly lower than the initial proposed X-Factors.

Final prices for the first regulatory period were only agreed in May 2003.[4] This was almost two-and-half years after they were due to be implemented. Furthermore, the May 2003 agreement sets prices to 31 December 2006, signalling that there would be no proper review of prices for the second price control period, which was originally envisaged to begin on 1 January 2004. The agreement which includes an adjustment for the period from 1 January 2001, however does consist of two separate regulatory periods, with the second regulatory period subject to a different regulatory regime known as yardstick competition, and the possibility of *ex post* re-calculation of the average X-Factors in the second period.

The cost – to consumers and ultimately shareholders - of this failure to implement price controls as originally envisaged has been high. In this paper we present an analysis that attempts to quantify the costs of this regulatory failure. We demonstrate that Dutch electricity consumers will pay at least €300mln. more over three years for the distribution of electricity than might otherwise have been the case. Meanwhile the largest company, Essent, has ended up having its revenue reduced by almost €128mln. less than it might have done. In addition, the Dutch legislature has spent a considerable amount of time debating appropriate responses to this regulatory failure and the setbacks experienced during the liberalisation of the market. Meanwhile other problems have beset the sector. The opening of the market for business customers per 1 January 2002 was accompanied by substantial administrative problems, related to billing and the accuracy of meter reading. Furthermore, the bankruptcy of EnergyXS (a new entrant) during the summer of 2003 demonstrated the fragility of the regulatory framework and showed some potential caveats in legislation. Therefore, although the regulatory failure we discuss has contributed to calls for tighter legislation, the proposed amendments were not solely instigated by the X-Factor changes. In the evaluation of the Electricity Act in 2002 (Ministry of Economic Affairs, 2002) three areas of concern were discussed: (i) regulation, (ii) security of supply, and (iii) prices or tariffs. The Minister concluded that non-discriminatory access to the networks was functioning properly. The Minister further intended to clarify the role and responsibility of DTe and announced that DTe would grow from 15 fulltime equivalent employees (FTE) to 55 FTE. Thus a strengthening of the regulatory framework would be desirable.

[4] DTe (2003c), De Overeenkomst Regulering Nettarieven Elektriciteit (2001-2006), 26 May 2003, The Hague.

Recently (29 June 2004) a Bill ("Interventiewet") passed through parliament that will tighten the regulatory framework substantially including the possibility of fines and further unbundling steps to ensure the independence of the distribution network operator.[5] In the short run the negative political reaction to the perceived problems of regulation has hampered the course of deregulation and the privatisation of the electricity network companies, that remain (with the exception of two small gas-only companies) municipally-owned. In addition to this it is the Minister's intention to fully unbundle the existing energy companies at ownership level into a regulated network company and a commercial company.[6]

In what follows we seek to document the course of the price review for the period 2001-2003. We provide an analysis of the effects of different stages of the review on customer bills and the consequences for consumer welfare. We also conclude by discussing what can be learned from this episode by regulators and legislators around the world. We suggest that although the network companies may have got the better of the regulator during the current price control period the longer-term consequences of such a "win" could be seriously negative. As such, "beating" the regulator may provoke a reaction from the regulator or legislator that is more severe than the "win" (such as the proposed forced ownership unbundling). This is because regulated firms may exploit any given rules of the regulation game to their advantage but the government always has the power to change the rules of the game to ensure a politically acceptable outcome. The danger in this for regulated companies is that the negative reaction they provoke may lead to a worse outcome than if they had not exploited the original rules. Society is almost always the loser in situations such as these, as real resources are consumed in the regulatory battles over prices, uncertainty is increased and subsequent regulation is likely to be overly draconian. We begin our story with a discussion of the principles of economic regulation.

II. Regulation

Asymmetric information between the regulator and the regulated firm is a key issue in the regulation of natural monopolies. Baron and Myerson (1982) and Laffont and Tirole (1986) address regulation of monopoly firms in the presence of asymmetric information in

[5] Ministry of Economic Affairs (2004), Wetsvoorstel "Wijziging Elektriciteitswet 1998 en Gaswet in verband met implementatie en aanscherping toezicht netbeheer" (29 372), The Hague.
[6] Ministry of Economic Affairs (2004), Vision on the Future Structure of the Energy Market, 31 March 2004, The Hague.

the form of unknown costs and unobservable effort to reduce costs.[7] A rather common criticism of the rate-of-return (ROR) regulation model is that it lacks incentives for efficiency improvements and encourages firms to engage in strategic behaviour. Averch and Johnson (1962) showed that ROR regulation encourages utilities to inflate their regulatory asset base through over-investment and socially-inefficient resource allocation. The argument finds some parallels in the US power sector in the 1970s and 1980s where stranded costs of over-investment in generation capacity contributed to electricity price increases and, consequently, the calls for restructuring of the sector in the high-price states (Joskow, 1997).

Regulatory reform of network industries around the world has challenged the traditional ROR regulation, as regulators have adopted a variety of incentive-based models. These models aim to provide monopolies with the incentive to utilise their exclusive information on effort and costs, to improve operating efficiency and investment decisions, and to ensure that consumers benefit from the efficiency gains.[8] In the US, incentive-based regulation is generally termed Performance-Based Regulation or Rate-Making (PBR). This interest in incentive regulation is not due to new contributions from economic theory, rather, it reflects the need and desire for new practical approaches to regulation, even though these may not always be fully in line with theory. It was also partly prompted by the success of incentive regulation in Britain. (Crew and Kleindorfer, 1996, p. 215).

Outside the US, incentive based regulation is synonymous with RPI-X (or CPI-X) regulation, as first suggested by Littlechild (1983). Such price cap regulation usually allows average prices (or revenue) to rise by the rate of inflation minus an efficiency factor (X), which reflects the potential for relative productivity improvement in the regulated firm. Under both PBR and RPI-X companies retain extra profits made under the control formula.[9] Price-cap regulation decouples profits from costs by setting maximum prices for the duration of a specific period (or regulatory lag).

An important feature of incentive regulation is the use of benchmarking, which can be broadly defined as the *comparison of a firm's actual performance against some pre-defined reference or benchmark performance.* A perceived advantage of benchmarking has been that it reduces

[7] See also Armstrong, Cowan, and Vickers (1994) for a review of these models.
[8] See Joskow and Schmalensee (1986) for a discussion of the main approaches to incentive regulation of electric utilities.
[9] For the purposes of this study, unless specified, we do not differentiate between a price and a revenue cap regulation based on the CPI-X formula.

the information asymmetry problem that occurs in ROR regulation by reducing the regulator's reliance on the firm's own costs, but references the price to an external non-influencable benchmark.

The most contentious issue in price-cap regulation is the basis for determining efficiency improvements and the translation of these into tariff changes (X-Factors). Regulators have adopted a variety of benchmarking methods to arrive at X-Factors. The main approaches can be divided into two types: (i) frontier-based and (ii) non-frontier techniques.[10] This division also reflects the divide in benchmarking approaches used by, on the one hand, the European and Australian electricity regulators, and the Public Utility Commissions (PUC) in the United States on the other. The European regulators have generally adopted frontier-based benchmarking methods as the basis on which to calculate the X-Factors. The PUCs that have adopted PBR have tended to use industry wide productivity measures such as Total Factor Productivity (TFP) to calculate the efficiency requirements (see Jamasb and Pollitt, 2001).

Frontier-based methods

In frontier-based benchmarking, the relative performance of a firm is measured in the form of efficiency scores on a scale of 0 (lowest) to 1 (highest) against the best practice or efficient frontier of a sample of firms. Regulators then work out procedures for translating the efficiency scores into X-Factors and setting initial prices for the rate period in question. The procedures that translate scores into tariffs and X-Factors reflect the different objectives of regulators, such as speed of decisions, level of efficiency drive, or detail of output steering.[11] The most widely used frontier-based benchmarking methods are Data Envelopment Analysis (DEA), Corrected Ordinary Least Square (COLS), and Stochastic Frontier Analysis (SFA). DEA is non-parametric and identifies the efficient frontier using a linear programming technique. In DEA, the relative efficiency of a firm is computed (rather than estimated) on a scale of 0 to 1 relative to best practice or to a sample of efficient firms.

COLS and SFA are statistical techniques that estimate the efficiency score of a firm relative to an efficient frontier. Both techniques require the specification of a production or

[10] The review of the methods in this section is based on Jamasb and Pollitt (2001) and Pollitt (1995). See also Coelli, Rap, and Battese (1998) and DTe (1999).
[11] See Jamasb and Pollitt (2001) for some examples.

cost function. Similar to DEA, the COLS technique assigns all deviation from the frontier to inefficiency. The efficiency scores calculated using COLS are therefore sensitive to the position of the frontier firms. SFA recognises the possibility of stochastic errors in the measurement of the inefficiencies. If there are no inefficiency measurement errors in the sample, the error assumption would result in some inefficiency being regarded as noise. Essentially, a part of the relative inefficiency is attributed to stochastic elements in the data rather than to the inefficient operation of the firm. Consequently, due to the measurement error factor, the SFA scores are likely to be higher than those measured by COLS.

Non-Frontier Methods

Andrei Shleifer (1985) suggested that if a group of regulated utilities in the same industry had access to the same technology that they should be subject to "yardstick" competition. This involves setting an identical price, or over time an identical X-Factor for each firm. The feature of yardstick competition that ensures optimal incentives is that the yardstick price should bear no relation to the actual costs of the given regulated firm. Thus, using the change in a general productivity index, as the basis for the X-Factor would approximately satisfy this condition. A number of yardstick approaches have been suggested. The most widely used benchmarking technique in non-frontier approaches is Total Factor Productivity (TFP). The method can, for example, use the Tornqvist index as a measure of historical productivity growth of the individual firm (internal benchmarking), the electricity sector (domestic or international), or the whole economy when setting the X-Factor in incentive regulation (see e.g. Coelli, Rap, and Battese, 1998). In either case, a simple Tornqvist TFP index can be expressed in terms of:

TFP = (output index) / (input index) (1)

The Tornqvist input quantity requires information on quantity and cost share of inputs for the two periods for which the productivity change is calculated. Equation (2) shows the Tornqvist input quantity index from the base period *S* to period *t*. The output index is calculated in a similar way.

$$Q_{st}^{T} = \prod_{i=1}^{N} \left[\frac{x_{it}}{x_{is}} \right]^{\frac{w_{is}+w_{it}}{2}} \qquad (2)$$

where:

$?_{is}$ cost share of *i*-th input in period *s*

x_{it} quantity of *i*-th input in period *t*

The implementation of TFP-related X-Factors for regulatory purposes is relatively easy, but the information requirement of the approach is non-trivial. Also, a potential weakness of the approach is that less efficient firms may find it easier than efficient firms to outperform the TFP measure and earn large profits.

In yardstick regulation, the mean of the costs of a peer group of firms can also serve as the benchmark for individual firms. In this approach, all the firms in the group are subject to the same price cap.[12] Such an approach has been implemented in Japan among regional electricity supply companies (see Hattori *et al.*, 2002). Another yardstick method has been used by the National Energy Commission (CNE) in Chile to calculate the value-added for the distribution services. The value-added for a group of comparable firms is derived from a designed efficient model or reference firm (see e.g. Rudnick and Donoso, 2000; Rudnick and Rainari, 1997). In Spain, the regulator has used model firms for specific geographical areas to allocate a portion of the total system revenues among distribution utilities.

Also, the sliding scale method (as used by the California PUC) can be viewed as a form of average benchmarking where the target ROR in the dead-band is intended to represent a fair rate of return based on the return earned by comparable industries or firms in similar operating environments. The regulated utility is, therefore, competing with the average performance in the industry or economy.

[12] The Dutch energy regulator DTe, intends to implement a generic X-Factor method in the current regulatory period that started in 2004. The generic X-Factor will be based on the productivity growth of the frontier firms. See DTe (2002b) for a detailed description of the proposed methodology for this current (second) period.

Other firm specific benchmarking methods

The Norwegian Water and Energy Administration (NVE) has used the Value Chain Model (VCM) for one-to-one benchmarking of the state-owned central transmission utility Statnett against the Swedish national grid company Svenska Kraftnät. The model allows for the adjustment of data to account for operational and environmental factors.[13] There are also partial benchmarking approaches, such as the method applied in the study of electricity distribution utilities in the state of Victoria, Australia (see UMS, 1999). The method assumes separability of different cost categories and involves the comparison of firms of different scales. This drawback is potentially mitigated when the firms have similar technologies and scale. Finally, targeted incentive schemes can use average or frontier performance benchmarks to address specific aspects of operations of firms. These benchmarks may be based on the past or expected performance of the firm or industry. These have been particularly applied to quality benchmarks where firm specific quality standards for outages and accidents are widely used (e.g. for Southern California Edison see Jamasb and Pollitt, 2001).

Which technique is best?

From a regulatory policy point of view, a major difference between the frontier and average benchmarking is that the former has a stronger focus on performance variations between firms. Frontier methods appear suitable at initial stages of regulatory reform when a primary objective is to reduce the performance gap among the utilities through firm-specific efficiency requirements. Average benchmarking methods may be used to mimic competition among firms with relatively similar costs, or where there is a lack of sufficient data and comparators for the application of frontier methods.

It should be noted that there is an important methodological difference between frontier and TFP-based approaches to efficiency measurement. In the frontier-based approach, a relative efficiency score is measured for each firm relative to the efficient frontier. This results in a direct inter-dependence between a firm's efficiency measure (score) and the potential strategic behaviour of frontier firms in the sample. In the index number

[13] See Magnus and Midttun (2000) for a brief description of the method.

approach to TFP at sector level, each firm's benchmark is the same and can only be marginally affected by its own or other firms' strategic behaviour.

Setting the X-Factor – interaction with the regulated firm

In principle, the aim of benchmarking within incentive regulation is to exploit the efficiency improvement potential of the regulated firm. Regulators should recognise that their benchmarking exercise inevitably shapes the efforts, and directs considerable resources, of the firms towards the make up and variables of these models. However, while benchmarking can measure "true" performance improvements, gaming can sometimes produce illusive or "virtual" efficiency improvements. Therefore, benchmarking models need to strike a balance between reflecting the main performance drivers of the business in question and reducing incentives for engaging in unproductive method or model-induced strategic behaviour.

This type of behaviour is rational from a firm's perspective. Optimising the regulatory process and exploiting the information advantage will maximise profits for shareholders. In cases where customers are, directly or indirectly, shareholders (e.g. co-operatives or mutuals in the strict sense, or municipal-owned), the firm's excess profits might still benefit the local consumer.[14] However, where customers have no relation with the capital of the firm, such regulatory strategies are likely to lead to welfare losses for consumers.

Regulated firms may attempt to influence the use of regulation benchmarking at the adoption stage. Although these efforts may not be considered as gaming, utilities may attempt to influence: (i) the use of benchmarking in incentive regulation, (ii) the choice of method, model, and variables (and their weighting), (iii) the definition of variables adopted during the consultation process, and (iv) the translation of efficiency scores into X-Factors. At a later stage, firms may use gaming strategies to benefit from the regulator's adopted benchmarking model.

Some regulation games are associated with the periodic aspect of ROR and incentive based regulatory reviews through timing of specific types of actions. Dynamic aspects of

[14] In the case of co-operatives, the alignment of the interests of customers and owners reduces the need for regulatory intervention (Ofwat 2000). Electricity co-operatives are common in the USA. Regulators in Florida, Indiana, Maine, and

strategic behaviour of the firm associated with regulatory lag are known to regulators, and have been addressed by some authors (see e.g. Baumol and Klevoric, 1970; Sappington, 1980). Di Tella and Dyck (2002), in a study of the Chilean electricity distribution utilities under price cap regulation, report evidence of cyclical cost reductions that coincide with the initial years of rate periods, and the reverse prior to the next rate review.

Gaming behaviour is not only limited to private firms. Publicly-owned firms can also be motivated to pursue monetary or other performance measures. Several countries noted for the use of benchmarking, including The Netherlands, Norway, and Australia, have significant municipal or state ownership. Courty and Marschke (2002), in a study of job training agencies, show that public organisations can engage in gaming by timing their performance reports in order to benefit from awards. They show that performance incentives can come at a cost by having a negative effect on efficiency.

Broadly, it is possible to differentiate between two types of strategic behaviour. The first is behaviour that may not have a material effect on the efficient operation of the firm and is intended to present the performance of the firm in a more favourable light. For example, a firm may shift costs from operating to capital costs, or influence the choice of output variables in order to affect measured relative performance. The main undesirable outcome of such virtual efficiencies is that they result in welfare transfer from customers, or even other firms, to the gaming firm through lower efficiency targets than the true underlying efficiency would suggest.

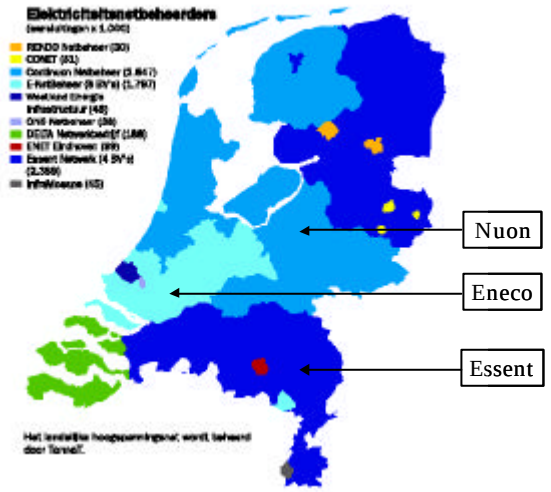
The second type of gaming is in the form of behaviour that distorts the efficient operation and investment decisions of the firm. For example, the firm might increase its cost base or delay efficiency improvements in periods leading to a new rate case. This type of gaming results in socially inefficient resource allocation and dead-weight loss. An important concern with both of these gaming categories in frontier-based approaches is that, due to the inter-dependency between the efficiency scores, a firm's gaming can also affect the measured performance of other firms.

Mississippi do not regulate the rates co-operatives charge. For a discussion of the performance of these co-operatives see Hansmann (1988).

Gaming behaviour is therefore not only isolated to ROR systems but can be found to exist in incentive-based regulatory frameworks.[15] In the next section we discuss the Dutch approach to regulating the electricity sector.

III. Electricity and regulation in The Netherlands

The Dutch electricity and gas distribution sector is predominantly in public ownership (the exception being two small gas companies owned by Germany's RWE). Following a wave of consolidation during the 1990s, there are now three large vertically-integrated energy distribution companies, with a combined market share of 94 percent (total number of customers approximately 7.3 million). Nuon and Essent are roughly equal with market shares of 33 percent (both also have generation assets[16]), and Eneco has around 25 percent market share following its purchase on the fourth-largest energy company REMU in December 2002. For the purposes of this paper we focus on these three companies when discussing the events of the first regulatory period.[17] Figure.1 shows the different coloured areas where Nuon, Essent, and Eneco operate.



Source: EnergieNed

The existing shareholders, as well as the management of the companies, are keen to privatise. For the municipal shareholders this would be a welcome release of capital. It

[15] For a detailed discussion of gaming see for example, Jamasb, Nillesen & Pollitt (2003a,b).
[16] Nuon recently completed the purchase of Reliant's UNA assets in December 2003.
[17] There are actually 20 separate legal entities that act as network operators but are owned by the same holding company. We have therefore merged these firms into three main network operators: Eneco, Essent, and Nuon. The X-Factors are therefore the effective X-Factor deduced from the required cost savings of each separate entity.

would also make for more efficient local government, freeing the municipalities from oversight of commercial market activities, such as generation and retail. For the management, privatisation will allow the companies to grow internationally via merger with one of the remaining European players.

Although privatisation was initially allowed, an amendment to the Electricity Act, placed a moratorium on privatisation until at least six months after full market liberalisation – on 1 July 2004.[18] The privatisation discussion is still a hot topic for debate. The history of the DTe and X-Factors we sketch below are the background to these discussions. The current focus in Parliament is on the Interventiewet, this Act will substantially strengthen the powers of the regulator. The content of this Act is partly the result of the regulatory failings we describe below. However, the Act's contents do not go far enough for certain parties, which are arguing for the complete separation of networks from retail and a ban on privatising this vital infrastructure. The Minister for Economic Affairs recently presented his vision for the energy sector.[19] Next to the tougher regulatory regime, the Minister intends to fully separate the networks from the commercial activities. This is to be effective by 1 January 2007. The Minister states that the separation will benefit customers, by creating a level playing field with new entrants that do not own networks, avoid potential abuse of the natural monopolistic position that these networks enjoy, and will allow the networks to remain in public hands should the companies be privatised. Importantly, the Minister also states that this will facilitate regulation by DTe. We return to the impact of this in our conclusion. However, we begin by setting out the history of the first regulatory period.

The setting of the X-Factor

The liberalisation of the Dutch energy sector follows the long and drawn-out process of agreeing the EU Electricity Directive and EU Gas Directive in the middle of 1996 and middle of 1998 respectively.[20] The Directive for electricity was implemented in The

[18] Spain's Endesa actually acquired REMU and NRE in December 2000, but could not get Ministerial approval for the transaction – the Parliamentary compromise was to allow a sale of the "economic" ownership, but not the "legal" ownership. This was not attractive for Endesa and they subsequently withdrew. However, RWE did manage to find a construction that satisfied the Minister of Economic Affairs and acquired Obragas and Haarlemmermeer.
[19] Ministry of Economic Affairs (2004), Vision on the Future Structure of the Energy Market, 31 March 2004, The Hague.
[20] Directives nr. 96/92/EC and 98/30/EC. In the summer of 2003 two new Directives nr. 2003/54/EC and 2003/55/EC were agreed that altered the original Guidelines and were meant to be implemented before July 2004. Under these Directives all business customers shouldl be free to choose their supplier from 1 July 2004 and all residential customers from 1 July 2007. It also requires legal unbundling for transmission by 1 July 2004 and by 1 July 2007 for distribution. It foresees regulated Third Party Access and requires each country to establish a regulator (Germany has been the exception in the EU).

Netherlands with the enactment of the Electricity Act 1998 (or E-Act).[21] The discussion below draws heavily on the detailed summary of events from a more legal perspective by Janssen & Pigmans (2004).

The E-Act set-up a regulator and required the integrated energy companies to split their tariffs into a retail and network component. This split was to take effect in 2000 and was to be based on the integrated tariffs of the companies in 1996 (1996=2000 principle). The network tariffs were differentiated between the various voltage levels using the "cascade" principle, where consumers pay for all the voltage levels they use. Thus, a residential customer pays for the low voltage grid and part of mid and higher voltage grids, whereas a high voltage customer only pays for the high voltage grid.

The E-Act also requires the regulator to set X-Factors for the companies. The X-Factors are set for a regulatory period, which can vary between three to five years (initially 3 years). The formula for adjusting the tariffs is CPI-X (similar to RPI-X). The companies are allowed to adjust their tariffs by the Consumer Price Index (CPI), whilst simultaneously adjusting their tariffs with the X-Factor.

On 1 August 1998 the Dienst uitvoering en Toezicht energie (DTe) was set up (and later to become a separate chamber of the Dutch competition authority NMa). In July 1999 the DTe published its first consultation document *Price Cap Regulation in the Electricity Sector*[22]. The procedure followed by the DTe allowed companies to provide input into the consultation document, after which the DTe published its methodology and subsequently the X-Factor decisions. Relevant parties could then appeal against these decisions at the DTe. The final appeal procedure was to proceed to a special tribunal for business (College van Beroep voor het bedrijfsleven, CBb).

As well as specifying that the first regulatory period would be for three calender years (2001-2003) the 1999 consultation document further stated that:

> *"It is the DTe's remit to formulate sensible rules and incentives aimed at enabling the latter category of actors [network operators] to perform fairly, safely and with*

[21] Ministry of Economic Affairs (2003a), Wet van 2 juli 1998, houdende regels met betrekking tot de productie, het transport en de levering van elektriciteit (Elektriciteitswet 1998) (Stb. 2003, 235), The Hague.
[22] DTe (1999), Price Cap Regulation in the Electricity Sector, Information and Consultation Document, July 1999, The Hague.

maximum efficiency as well as monitor the proper implementation of regulations and ascertain whether the incentives are having the appropriate effect." (DTe, 1999, p.4)

In the document the DTe sets out its basic principles: (i) 1996=2000 where the tariffs set for 2000 should be based on the tariffs in 1996 (adjusted for volume growth), (ii) output steering (light-handed regulation) and the use of comparative benchmarking, and (iii) regulation to be developed within the context of an internationalisation of the energy sector and the (possible) privatisation of municipal-owned companies.

The DTe's approach to the comparative benchmarking exercise was to be based on *"the principle of using different methodologies to cross-check each other…"*.[23] However, when the *Guidelines for Price Cap Regulation of the Dutch Electricity Sector*[24] were published in February 2000, it became clear that the DTe had opted to only use DEA.[25] The fear within the sector was that the DTe would direcly translate the efficiency results into X-Factors. To counter these fears the DTe stated that:

"…, it is important to stress that DTe is not proposing to adopt a mechanistic approach to the determination of X-Factors for the companies, based solely on efficiency scores from a benchmarking exercise." (DTe 2000c, p.4)

Nevertheless, when the DTe published its first X-Factors in September 2000 for the sector it incorporated a substantial narrowing of the approach to translating efficiency scores into X-Factors.[26] Firstly, although the DTe capped the X-Factors at 8 percent, it did apply the efficiency scores directly to the standardised cost of the companies. The efficiency scores were not cross-checked with other methods, neither were the companies grouped into different categories, such as for example top perfomers, average, and poor performers, thus making no allowance for stochastic factors below the 8 percent cap, measurement error or misspecification of inputs and outputs. Secondly, the DTe applied the efficiency scores to total cost (including capital costs but (initially) excluding non-controllable costs, such as TSO

[23] DTe (1999), op. cit., page 24.
[24] DTe (2000b), Guidelines for Price Cap Regulation of the Dutch Electricity Sector, February 2000, The Hague.
[25] The DTe used a Constant Returns to Scale (CRS) DEA model, arguing that companies were in control of the optimal scale by being able to merge or de-merge. The model has *total standardised cost* as input factor and *number of customers (small/large)*, *kWh transmitted*, *number of transformers*, *maximum simultaneous demand (distribution/transmission)*, and *network length* as output factors. For a discussion of the benchmarking methods see Jamasb and Pollitt (2001).
[26] DTe (2000a), Besluit, houdende vaststelling van de factor Xt, bedoeld in Artikel 41 van de Elektriciteitswet 1998, (one for each individual network operator), The Hague, 22 september 2000.

charges), as opposed to just operational expenditure as it had been discussing with the sector.

In order to compare the outcomes of the various X-Factors we calculate the cumulative change in allowed revenues – discounted using the regulated return (6.6 percent) - for the three-year period. Because Nuon, Essent, and Eneco consist of many smaller network operators we re-calculate the effective X-Factor by comparing total starting revenue with final allowed revenue. As the definition of "revenue" changes over the regulatory period (e.g., including or not including non-controllable items), it is better to use the difference in revenue as measure for customer savings, rather than focusing solely on the X-Factor. As shown later, it is possible for the X-Factor to be higher than initially, but for the total required savings to be smaller.

Example of calculation for Essent

Table 1 shows the allowed revenue in Euros for the three-year period and the actual X-Factors as set by DTe in 2000 for the Essent companies.

Table 1: Allowed revenue (DTe 2000 X-Factors) for Essent companies (x 1000 €)

€x1,000	***2000***	***2001***	***2002***	***2003***	***X-Factor***
Essent Brabant	289,907	293,748	297,640	301,584	-1.3%
Essent Friesland	11,401	10,348	9,393	8,526	9.2%
Essent Limburg	172,306	171,916	171,528	171,139	0.2%
Essent Maastricht	12,950	12,439	11,948	11,476	3.9%
Essent Noord	256,482	249,668	243,035	236,578	2.6%
Total	**743,046**	**738,120**	**733,543**	**729,303**	-

Comparing the total revenue for the Essent Group in 2003 with 2000 allows the calculation of the effective X-Factor for the three-year period. In this case:

Effective X-Factor = $1-(Rev_{20003} / Rev_{2000})^{(1/3)} = 0.6\%$. Thus the X-Factor is 0.6 procent for the Essent Group. The total cumulative revenue reduction (discounted using the regulated return of 6.6 percent) for the Essent Group in Euros (x1,000) is:

2001 / 2000	€4,926
2002 / 2000	€8,915
2003 / 2000	€12,094
Total	*€25,935*

The Essent Group has a total of 2.4 million customers, which implies a total discounted cumulative saving over the three-year period of €11 per customer.[27]

The results

In order to calculate the X-Factors and required cost reductions we assume that there is no volume growth or growth in the customer base over the regulatory period, as there are no individual figures available for the companies. Furthermore, the allowed revenues have 2000 as starting year and the revenues for the following years are based on 2000 prices. Table 2 summarises the 2000 X-Factors and total discounted cumulative savings for consumers.

Table 2: 2000 X-Factors

Company	***Number of customers (x 1,000)***	***Starting revenue (€ mln.) (2000)***	***Effective X-Factor***	***Total cum. rev. Reduction (€ mln.)***	***Total cum. savings per cust. (€)***
Eneco	1,792	484	8.1%	205	114
Essent	2,374	743	0.6%	26	11
Nuon	2,656	671	7.7%	270	101
Sector	7,280	2,025	5.1%	511	70

Note: X-Factor for sector is customer-weighted, according to customer numbers per individual network operator.

From Table 2 it can be seen that the effective customer-weighted average X-Factor for the sector was 5.1 percent. This resulted in a total discounted cumulative revenue reduction relative to inflation for the sector of €511mln. over a three-year period from 2001-2003.[28] Per customer this amounts to €70. An average household consuming 3,500 kWh annually pays

[27] See the appendices for the complete underlying data.
[28] In the DTe's press release announcing the X-Factors (26 September 2000) it refers to an average X-Factor of 5.9 percent for the sector, which results in a total saving of €590mln. However, it subsequently had to make some adjustments as it erroneously forgot some data from the smaller companies. In addition, the DTe did not discount the cumulative savings, therefore the final savings are €511mln.

approximately €149 for distribution. That would suggest a total reduction equivalent to 50 percent of the annual bill over three years.. However, although the customer mix consists predominantly of small households, it also consists of large customers. Average revenue per customer – based on the 2003 figures from the May 2003 agreement – is €278. That would suggest the savings amount to 25 percent. Total revenue for the sector in 2000 was approximately €2bn. Remarkable here is the stark difference between the X-Factors for Essent and Nuon, two comparable companies. As we will demonstrate later, this causes the greatest loss of cost savings for customers. At the time there was also a discussion whether these revenue reductions were the elimination of inefficiencies, or whether the reductions were attempting to reduce excess profits. This is dependent on the valuation method used for the Regulated Asset Base (RAB) and the allowed return on invested capital. In the initial results, a substantial component of the revenue reductions was driven by excess profits, however as the RAB calculation methodology changed (and the RAB increased) and the X-Factor deal was concluded in May 2003, the reductions were less driven by excess returns, and more by operational inefficiencies.

There was substantial criticism of the DTe's results and most companies (except notably Essent) subsequently appealed to the DTe.[29] Exactly a year later (September 2001) the NMa announced its decision on appeal (2001 X-Factors). Although the DTe officially dealt with appeal procedures, the actual handling of the case was given to the legal department of the NMa. In these revised X-Factors there were some substantial changes. Firstly, the DTe adopted a different approach to calculating the value of regulated assets. Initially, the DTe had adopted a clever, but impractical, method to calculate the RAB by discounting the regulated profits.[30] This method was now replaced by using the companies' actual historical investments and depreciating these using standardised depreciation schedules. Secondly, DTe updated the benchmarking data set by removing certain mistakes. However, it did not cross-check results and still applied the efficiency scores mechanically to obtain X-Factors. Finally, DTe applied the legal principle of no "reformatio in peius", stating that:

> *"By virtue of section 7:11, clause 1, of the General Order in Council, the director of the DTe is also of the opinion that the party lodging a notice of objection must not, as a result, be put in a worse position than if he had not made an objection (principle that*

[29] See for example, KPMG BEA (2000), Nillesen & Telling (2001), and NYFER (2001).

'reformatio in peius' is forbidden). Therefore for a grid operator no more unfavourable x must be set than had been set in relation to the primary decision, even if this stems from application of the amended regulatory methodology." DTe (2001) p.36/37

"Furthermore, in the opinion of the director of the DTe the relevant principle (no 'reformatio in peius') applies only with respect to the x-factor as the end result of applying the regulatory method, not with respect to any interim result on the basis of a step in the method (in that case more favourable interim results for a grid operator may be passed on, but not more unfavourable ones). In the final analysis, when the decision is made on the objection a grid operator must not be put in a worse position than if the grid operator had not made an objection." DTe (2001) p.36/37 [31]

As is shown later on, the application of the no reformatio principle allowed Essent to benefit from the lenient X-Factor it received in 2000 even though it was later shown that it should have been substantially higher.

Table 3 summarises the 2001 X-Factors and total cumulative savings for consumers.

Table 3: 2001 X-Factors

Company	***Number of customers (x 1,000)***	***Starting revenue (€ mln.) (2000)***	***X-Factor***	***Total cumulative revenue reduction (€ mln.)***	***Total cumulative savings per customer (€)***
Eneco	1,792	394	7.0%	146	82
Essent	2,374	743	0.6%	26	11
Nuon	2,656	572	7.2%	217	82
Sector	7,280	1,795	4.4%	376	52

[30] As tariffs were fixed at the 1996=2000 level, all that was required to calculate the RAB was to subtract operational expenditures and depreciation charges. The remainder were the regulated profits, which when discounted by the DTe's weighted average cost of capital would give the RAB value.

[31] In its 2001 X-Factor decision DTe states that "Gelet op artikel 7:11, eerste lid, Awb is de directeur DTe verder van oordeel dat degene die een bezwaarschrift indient, niet daardoor in een slechtere positie mag worden gebracht dan wanneer hij geen bezwaar had gemaakt (beginsel dat reformatio in peius is verboden). Voor een netbeheerder mag dus geen ongunstigere x worden vastgestelddan bij het primaire besluit was vastgesteld, ook indien dat uit toepassing van de aangepaste reguleringsmethode zou voortvloeien." And "Overigens geldt naar de mening van de directeur DTe bedoeld beginsel (geen reformatio in peius) slechts ten aanzien van de x-factor als eindresultaat van de toepassing van de reguleringsmethode, dus niet ten aanzien van ieder tussenresultaat op basis van een stap in de methode (dan zouden voor een netbeheerder gunstigere tussenresultaten mogen worden doorgerekend maar ongunstigere niet). Per saldo mag een netbeheerder bij de beslissing op bezwaar dus niet in een slechtere positie worden gebracht dan wanneer de netbeheerder geen bezwaar had gemaakt." DTe (2001), p.36/37.

From Table 3 it can be seen that the effective 2001 customer-weighted average X-Factor for the sector is 4.4 percent instead of 5.1 percent in the 2000 decision. The resulting total cumulative revenue reduction for the sector – and thus for each customer - dropped 26 percent to €376mln. The starting revenue in 2001 also differs from the starting revenues in 2001. This is because in 2001 non-controllable costs, such as e.g. TSO charges, were treated separately; and more accurate data became available.

The companies that had appealed the 2000 X-Factor decisions however were still unhappy with the results. The benchmarking exercise and its mechanistic application of the results were a focal point of their criticisms. The final resort for the companies was to take their case to court. Nearly all the companies subsequently lodged their appeals with the CBb. During this whole process the 2000 X-Factors still applied.

At the same time that the discussions surrounding the X-Factors for network operators was taking place, there were discussions about the X-Factors for retail tariffs. The articles describing the methodology for setting the retail tariff X-Factor are exactly the same as for network tariffs. As the retail X-Factor was less labour-intensive the appeal procedure had run ahead of the X-Factors for networks. One of the retail companies (Rendo) had already lodged an appeal against its retail tariffs to the CBb. On 6 February 2002 the CBb ruled that DTe had not acted according to the E-Act's intentions.[32] According to the CBb the E-Act did not allow DTe to set X-Factors that could vary between individual companies. Instead the X-Factor had to be uniform for the sector. In Article 58:1:b the E-Act states that:

> "x_t = *the discount factor to stimulate the efficient operation by retail license holders,…."*[33]

This was a substantial blow for the DTe and the ruling was unexpected by the sector.[34] This was clearly not the intention of the original E-Act and reflected poor drafting.

The DTe announced that same month (February 2002) that it was starting a project called "Correctie Besluiten" (corrected decisions). It intended to issue a new request for information from the network companies, allowing them to revise and update data (some

[32] College van Beroep voor het bedrijfsleven (2002a), No AWB 01/623.
[33] The original Dutch Article states: "x_t = de korting ter bevordering van de doelmatige bedrijfsvoering door vergunninghouders voor zover het betreft de inkoop van elektriciteit en de diensten met betrekking tot de levering van elektriciteit."

data had been estimated as actual figures had not be available at the time of the 2000 X-Factors). This data set would be then be verified by the companies, before it would be used to re-calculate the X-Factors for the period for a third time. Both DTe and companies took part in this exercise, attempting to agree on a final dataset.

During the intermittent period of regulatory uncertainty following the CBb´s decision, the DTe published *An Overview of the First Regulatory Review of the Regional Electricity Networks Business* in July 2002.[35] The report contains a detailed discussion of the role of the regulator and the objectives of DTe. In the introduction the DTe states:

> *"In particular DTe is keen to demonstrate that each of the decisions it has taken during the first regulatory review has been guided by a common set of underlying princples." (DTe, 2002, p.1)*

In addition the DTe states that it: *"…it would prefer to provide incentives for the companies to focus their attention on delivering the best services to customers, rather than debating their costs with the regulator."*[36] Importantly, the DTe explains why it has chosen the DEA benchmarking technique over the other possible methodologies:

> *"Regression analysis seeks to explain differences in cost on the basis of a range of factors. In contrast, DEA evaluates whether observed costs can be regarded as reasonable on the basis of the basket of outputs delivered, where the regulator selects which outputs are considered valuable. For this reason alone DTe regards DEA as better suited for use in a regulatory context." (DTe, 2002, p.27)*

In August 2002 DTe published new X-Factors. These X-Factors were based on the project Correctie Besluiten. The results – although never formally implemented – are interesting because of their results. Table 4 summarises the 2002 X-Factors and total cumulative savings for consumers, it does not include the no "reformatio in peius" for Essent.

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[34] See for example: Knops (2002), De Pree (2002), De Telegraaf (2002), and Het Financiële Dagblad (2002).
[35] DTe (2002c), An Overview of the First Regulatory Review of the Regional Electricity Networks Business, July 2002, The Hague.

Table 4: 2002 X-Factors

Company	***Number of customers (x 1,000)***	***Starting revenue (€ mln.) (2000)***	***X-Factor***	***Total cumulative revenue reduction (€ mln.)***	***Total cumulative savings per customer (€)***
Eneco	1,792	311	4.4%	74	41
Essent	2,374	584	4.7%	147	62
Nuon	2,656	465	6.8%	168	63
Sector	7,280	1,463	5.1%	384	53

From Table 4 it can be seen that the effective 2002 customer-weighted average X-Factor for the sector is 5.1 percent as in the 2000 decision. The resulting total cumulative revenue reduction for the sector – and thus for each customer – however only changes slightly compared to the reduction from 2001 (an additional €8mln. required saving) and is still substantially less than the figure for 2000. This is due to the change in level of allowed revenue. The allowed revenue for the sector was €2bn. in the 2000 X-factor but €1.5bn. in the 2002 X-Factor. The previous two X-Factor decisions were based on estimates, rather than actual figures. During the "Correctie Besluiten" actual audited data was available. Therefore, although the effective X-Factor is unchanged, the total savings for customers decreases. Interestingly the net effect of the 2002 re-calculations is negligible (assuming the no reformatio principle is not applied) - but there is a re-distribution between the three large companies. Eneco benefits most with a 50 percent reduction in required cost savings when compared to 2001. Nuon benefits from a 23 percent reduction, however Essent's revenue reduction has increased more than €121mln. (equivalent to an increase of 466 percent).

The uncertainty over individual versus uniform X-Factors (and the legal basis for DTe's approach) was finally removed when on 13 November 2002 when the CBb ruled that the relevant article of the E-Act for setting X-Factors for network operators was to be read in the same way as the article for retail tariffs.[37]

"x_t = <u>the</u> discount factor to stimulate the efficient operation by grid operators"[38]

[36] DTe (2002c), op. cit. Page 3.
[37] CBb (2002b), No AWB 01/841, 01/847-53, 01/955, 01/956. This did not come as a surprise to either the sector or DTe. In actual fact DTe had been preparing for this eventuality during 2002. This is confirmed by the consultation note discussing possible solutions published 16 January 2003 by DTe (DTe 2003b).

This meant that according to the E-Act DTe only had the legal basis to set a uniform X-Factor for the sector and not individually varying X-Factors.[39]

On 2 December 2002 the DTe announced that the then head of DTe would be replaced.[40] On 13 December 2002 DTe announced that Gert Zijl would become head of the DTe per 1 January 2003. Mr Zijl had until then been CEO of TenneT – the national transmission system operator.[41]

The new Director's approach to the deadlock was two fold. First, in January 2003 DTe published a consultation note setting out DTe's vision of repairing the X-Factors.[42] Second, at the same time behind the scenes negotiations took place between DTe and Eneco, Essent, and Nuon. After months of negotiating and discussing alternative models, a deal was finally presented to all the network operators. After some minor changes the deal was signed on 26 May 2003.[43] The deal covers two regulatory periods, the first from 2001 until 2003 and the second period from 2004 until 2006. For the first regulatory period there is a uniform X-Factor of 3.2 percent, as is legally required. For the second regulatory period however there are individual X-Factors. The change in methodology for calculating the X-Factors is a substantial move away from the previous three X-Factors. These individual X-Factors are set so that all companies converge to the same end point by 31 December 2006, thus achieving a major target of DTe: convergence. Therefore, during the second period the tariffs converge to the average and supplemental inefficiencies not yet eliminated in the first period, are removed.

In the new methodology, the performance of each company is compared to the total weighted output factor that incorporates all different tariff levels and types of customer. For example, it weights low voltage customers differently than high voltage customers. This allows each company to have a "uniform" bill for the services it provides. This is then benchmarked and the company that provides most value-for-money is set as the reference company. In essence the method is a weighted tariff benchmark against the sector average

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[38] The original Dutch Article states: "x_t = de korting ter bevordering van de doelmatige bedrijfsvoering door netbeheerders."
[39] One of the unfortunate side-effects of the CBb rulings was that the actual X-Factor methodology and underlying benchmarking was never tested in a court. Thus, in a sense the legal basis for DTe´s approach to setting the X-Factors, has never been verified.
[40] DTe (2002d), Directeur De Jong stapt over naar Europees platform energietoezichthouders, press release, 2 December 2002, The Hague.
[41] DTe (2002e), Gert Zijl nieuwe directeur DTe, press release, 13 December 2002, The Hague.
[42] DTe (2003b), Consultatienotitie: Reparatie X-Factor Netbeheerders Elektriciteit, Visie DTe, The Hague, 16 January 2003.
[43] A similar deal was signed in November 2003 with the gas network operators after several months of intense discussions.

tariffs. This methodology is in some aspects superior to the original approach. Therefore, although the benefits to customers may be smaller than initially communicated in the 2000 X-Factors, it is likely that this outcome more accurately reflects the underlying efficiency potential.

It is important to note that during these negotiations the Minister for Economic Affairs prepared emergency legislation to repair the loophole in the current E-Act. A first draft of this legislation was first published on 10 April 2003 (Overgangswet Elektriciteitsproductiesector[44]). This reparation would allow the DTe to set individual X-Factors and importantly also do this retrospectively (and backdate the X-Factors), allowing DTe to effectively re-take its decisions and ignore the CBb ruling. In the final version, the amended E-Act states in Article 41a:1:a:

> *"With regard to the proposal, as mentioned in Article 41:b, the director of DTe sets for each individual grid operator, for a period of three to five years, the following:*
>
> *a. the discount factor to stimulate efficient operation…"* [45]

The final bill was enacted on 19 August 2003, only after – among other things – the Minister promised the Upper Chamber not to make use of the retrospectivity of the Act.

Table 5 summarises the final 2003 X-Factors and total cumulative savings for consumers.

Table 5: The Final 2003 X-Factors

Company	***Number of customers (x 1,000)***	***Starting revenue (€ mln.) (2000)***	***X-Factor***	***Total cumulative revenue reduction (€ mln.)***	***Total cumulative savings per customer (€)***
Eneco	1,792	482	3.2%	83	46
Essent	2,374	742	3.2%	128	54
Nuon	2,656	657	3.2%	114	43
Sector	7,280	2,021	3.2%	349	48

[44] The abbreviation for this Act, which repairs a substantial amount of previous legislation, is ironically "Oeps"!
[45] The original dutch Article states: "Ten behoeve van het voorstel, bedoeld in artikel 41b, stelt de directeur van de dienst voor iedere netbeheerder afzonderlijk voor een periode van ten minste drie en ten hoogste vijf jaar vast:
a. de korting ter bevordering van de doelmatige bedrijfsvoering."

From Table 5 it can be seen that the final effective 2003 customer-weighted average X-Factor for the sector is 3.2 percent instead of 5.1 percent in the initial 2000 decision. The resulting final total cumulative revenue reduction for the sector dropped 32 percent to €349mln. when compared to the initial decision in 2000. Whereas initially in 2000 the customer was promised a reduction of €70 over the three-year period, after three years of appeals and court cases, the final saving was €48. The sector revenue in the 2003 X-Factor includes non-controllable expenditures, as in the 2000 X-Factor.

However, DTe was forced to apply the no "reformatio in peius" principle as it had itself proposed in 2001. In practice this meant that if companies were still owed money they were allowed to recover this through their tariffs, whereas those that earned too much were not required to reimburse customers.[46] Therefore, in Table 6 we adjust Table 5 to demonstrate the actual effect for customers applying the no reformatio principle to the 2001 X-Factors. In order to calculate the impact of the no reformatio we compare the total cumulative savings under the 2003 X-Factor with the total savings under X-Factor in 2001. If the total savings are greater in 2003 than in 2001, we use the 2001 revenue stream. Although these numbers are not directly comparable, they generate the correct total required savings.

Table 6: Final 2003 X-Factors including no Reformatio in peius based on X-Factor 2001

Company	***Number of customers (x 1,000)***	***Starting revenue (€ mln.) (2000)***	***Effective X-Factor***	***Total cumulative revenue reduction (€ mln.)***	***Total cumulative savings per customer (€)***
Eneco	1,792	482	3.2%	83	46
Essent	2,374	743	0.6%	26	11
Nuon	2,656	657	3.2%	114	43
Sector	7,280	1,970	2.0%	209	29

From Table 6 it can be clearly seen that the actual final effective 2003 customer-weighted average X-Factor for the sector is 2.0 percent instead of 3.2 percent, as a result of the application of no reformatio in peius using the 2001 X-Factors. Thus, the actual savings for customers from the first regulatory period is not €70 (or €48), but only €29 – a reduction of 60 percent compared to the initial X-Factor decision in 2000. This is the result of allowing

companies to keep excess revenues from X-Factors that were too mild, and allowing companies to recoup lost revenue as a result of previously harsher X-Factors.

Table 7 summarises the four final effective X-Factors set during the first regulatory period. Note that the X-Factors are not directly comparable as they are based on different revenue streams and definition of costs. It is therefore more useful to focus on total revenue reductions. This table is therefore purely illustrative.

Table 7: X-Factors for the first regulatory period

Company	***X 2000***	***X 2001***	***X 2002***	***X 2003***
Eneco	8.1%	7.0%	4.4%	3.2%
Essent	0.6%	0.6%	4.7%	0.6%
Nuon	7.7%	7.2%	6.8%	3.2%
Sector	5.1%	4.4%	5.1%	2.0%

Table 8 summarises the required revenue reductions under the four different X-Factor decisions during the first regulatory period.

Table 8: Revenue reductions from starting year 2000, as a result of different X-Factors during first regulatory period

Company	***X 2000*** ***€ mln.***	***X 2001*** ***€ mln.***	***X 2002*** ***€ mln.***	***X 2003*** ***€ mln.***	***% change 2000-2003***
Eneco	205	146	74	83	-59%
Essent	26	26	147	26	0%
Nuon	270	217	168	114	-58%
Sector	511	376	384	209	-59%

Table 8 summarises the result of the protracted X-Factor setting process in the Dutch electricity distribution sector. Whereas DTe initially publicised a total saving of €511mln. for the sector in September 2000 (around 25 percent of the total revenue for the sector in 2000), the final result in May 2003 was nearly 60 percent less. Essent benefited most from the revision of the X-Factors, having been particularly fortunate with a low X-Factor in September 2000 and falling under the no reformatio principle. This allowed them to pass

[46] However, from 1 January 2004 all companies will start from the adjusted starting point taking the full 3.2 percent X-Factor

through €26mln. in tariff reductions, whereas that figure should have been closer to €128mln. based on the 2003 X-Factors without the no reformatio. Eneco and Nuon also benefited from the revision of the X-Factors. Both companies saw a reduction of nearly 60 percent in required savings.

IV. The experience in context: conclusions and lessons

It is important to stress that the Dutch price review process has been unusually bad and compares unfavourably to other price reviews that regularly take place in for example the UK, Norway, Australia, and Chile.

The regulatory failure was caused by a number of factors. The first and ultimately the most important was the badly drafted legislation. The wording of the original E-Act did not clearly state whether a single X-Factor had to be set for the sector, or whether the X-Factors could vary per individual company. However the poor drafting might not have been legally tested if the DTe had been more successful in its calculations of X-Factors. Second, the DTe was much too ambitious in its original timetable. It had less than 18 months from its first consultation document to the beginning of the new X-Factors. It should have either given itself longer or it should have set undemanding uniform X-Factors for the first three years and concentrated on getting things right from 1 January 2004. This would have been possible within the E-Act. Third, once committed to the timetable the DTe failed to discuss the process sufficiently with the companies and to follow up its initial approach in the July 1999 document. The result was an increasingly adversarial relationship and a loss of confidence in the process early on. This was clearly unnecessary given the usually consensual nature of the Dutch system. This made the companies reluctant to cooperate with data collection efforts and given the size of the tariff reductions, made companies take a more litigious approach to protect their revenue streams through the courts. At one point there were over 300 appeal/court cases running with DTe. The companies themselves were also badly prepared and only engaged specialists and consultants at a late stage to help them understand the dynamics of the regulatory process and the seriousness of its implications for company asset values. Fourth, the mistakes that were made in the first round of X-Factors in 2000 haunted the DTe right through to the final deal with the sector in 2003. These were compounded by the application of the no reformatio principle, which essentially allowed companies to retain

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into consideration.

favourable, though potentially erroneous X-Factors. Yet DTe was required to compensate those network operators that should have received more favourable X-Factors. Finally, customers lost out on €300mln. in cost savings. In addition there is little reason for confidence in the distribution of price reductions between the companies as indicated by the difference between the actual and calculated X-Factors for Essent.

Relative to the value of the electricity network assets, the consequences for consumer welfare are only marginal. Bosma, Mahieu & Nillesen (2003) estimate the sector value at approximately €6.5bln. based on DTe´s 2001 Regulated Asset Base data. According to the deal in 2003 the total asset value for the sector was €9.1bln. Therefore, a loss of savings of €300mln. amounts to 3~5 percent of the total value of the sector. Furthermore, Domah and Pollitt (2001) suggest that the timing of cost reductions in UK electricity distribution is strongly correlated with the timing and strength of X-Factors. This would suggest that implementation of delayed and lower than expected final X-Factors in The Netherlands may well have blunted incentives to cut costs and resulted in losses to society.

As a direct result of these regulatory failures, the debate around liberalisation and regulation has become more politicised. During the review of the E-Act and Gas Act, it was concluded that the DTe needed further powers to regulate the sector. In the Interventiewet the DTe will be granted further powers, such as the ability to levy fines of up to 10 percent of group revenue. As a result of the Interventiewet the network operator will also have balance sheet control over the network assets.[47] This will allow the network operator to finance its activities itself, rather than rely on a holding company for financing (which also finances commercial non-regulated businesses). Although these measures go beyond the requirements of the new EU Energy Directive, the sector and other third parties welcomed them. However, in addition to this Act, the Minister for Economic Affairs announced his vision of the future of the energy sector. It is the Minister's intention to fully separate the companies into a commercial company that can be sold to private parties, and a regulated network company that should remain (initially) in public hands. The split would need to be effective by 1 January 2007. In the document the Minister states that this will guarantee the independence of the network operator and avoid any abuse by a holding company to favour – either financially or physically – the commercial activities.[48]

[47] This particular Article in the Act will not be implemented pending the discussion surrounding the Minister's plans to force ownership unbundling.
[48] See for example, Pollitt (2004).

It seems that although the companies were successful in fighting the DTe and lowering their required cost reductions, this "win" and regulatory failure by DTe has resulted to some effect in the draconian measures sought by the legislative body to combat the perceived weaknesses of DTe. The forced ownership unbundling at the distribution level has not been implemented elsewhere and it is not clear that the benefits of this proposed structural remedy will weigh up against the possible costs associated with it. The evidence of ownership unbundling elsewhere around the world at distribution level is that it has been left to the market, rather than imposed through legislation. The sector estimates the total cost of unbundling at €1.5bn. This includes one-off costs from e.g. the renegotiation of cross-border leases and duplication of IT systems, and includes the structural loss of synergies, such as jointly using call centres and corporate staff.[49] Even a fraction of this cost would still imply substantial welfare losses from a forced unbundling of the networks from the commercial non-regulated activities.

The ultimate result of the companies successfully acquiring €300mln. of extra revenue may be therefore have been greater regulatory uncertainty and substantially reduced asset sale prices (from foreign investors) when the network companies are eventually privatised.

The Dutch experience illustrates that in price control reviews that make use of benchmarking exercises in setting X-Factors a certain amount of give and take is very important for the achievement of both parties´ objectives. In this case hard nosed bargaining led to consumers losing and shareholders gaining extra revenue in the short run. The image of the deregulated industry in the Netherlands has been tarnished, which is bad for both parties. Other countries, with much less of a history of consensual regulation, have managed similar price control reviews with more success.

[49] Calculations by the sector in a position paper (see Nuon 2004) estimate the total value loss from a forced split-up at €1.5bn. This incorporates operational costs and cross-border lease renegotiation costs:

i) €175mln. IT investments;
ii) €25mln. p.a. operational costs valued at 6.6%;
iii) €20mln. p.a. extra corporate staffing valued at 6.6%;
iv) €40mln. refinancing costs;
v) €110mln. for three-year additional call centre capacity; and
vi) €500mln. cross-border lease renegotiation costs.

There have also been a number of reviews of regulatory structures that have performed well. In general eight characteristic features can be detected[50]:

i) **Clarity**: regulatory objectives, roles and requirements should be clear and understandable;
ii) **Proportionality**: actions or decisions taken by the regulator are proportional to the specific regulatory objective or risk;
iii) **Consistency**: regulatory actions are predictable, rational, and uniform;
iv) **Transparency**: regulatory process is open and accessible;
v) **Independence**: regulatory process should be independent of all stakeholders in regulatory process;
vi) **Accountability**: regulator should be independent, but accountable for his actions, through e.g. an appeals court;
vii) **Effectiveness and efficiency**: regulatory process should have a positive trade-off between benefits and costs; and
viii) **Flexibility**: regulatory process should be consistent and predictable, but should be able to evolve with changing market circumstances.

Current reviews of the regulatory process in the Netherlands should attempt to learn from past mistakes. The DTe's powers need to be strengthened and a more consesual approach should be applied by all parties involved in the regulatory process.

[50] For a discussion see Eurelectric (2004).

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Appendix 1: Allowed Revenue 2000 (2000 prices)

Company	*Allowed Rev. (x1,000 €) 2000*	*Allowed Rev. (x1,000 €) 2001*	*Allowed Rev. (x1,000 €) 2002*	*Allowed Rev. (x1,000 €) 2003*	*(Effective) X-Factor*	*Customers (x1,000)*
Delta	57,933	58,897	59,878	60,875	-1.6%	196
Remu (Eneco)	137,207	125,727	115,208	105,569	8.3%	494
Eneco	277,704	255,427	234,937	216,091	8.0%	1,062
Eneco Delfland	37,450	34,022	30,908	28,079	9.1%	118
Eneco EZK	2,814	2,559	2,327	2,116	9.0%	12
Eneco Gouda	24,053	22,404	20,869	19,439	6.8%	86
Eneco Weert	4,784	4,733	4,691	4,649	0.5%	19
Eneco	**484,012**	**444,873**	**408,940**	**375,942**	**8.0%**	**1,792**
NRE	23,662	22,517	21,426	20,388	4.8%	99
Essent Brabant	289,907	293,748	297,640	301,584	-1.3%	938
Essent Friesland	11,401	10,348	9,393	8,526	9.2%	45
Essent Limburg	172,306	171,916	171,528	171,139	0.2%	456
Essent Maastricht	12,950	12,439	11,948	11,476	3.9%	45
Essent Noord	256,482	249,668	243,035	236,578	2.6%	888
Essent	**743,046**	**738,120**	**733,543**	**729,303**	**0.6%**	**2,374**
Cogas	10,560	10,127	9,711	9,312	4.1%	50
Nuon	**670,858**	**619,495**	**572,065**	**528,266**	**7.6%**	**2,656**
ONS	8,721	7,897	7,151	6,475	9.4%	38
Rendo	7,352	6,819	6,326	5,868	7.2%	29
Westland	18,580	18,408	18,237	18,068	0.9%	47
Total	**2,024,726**	**1,927,154**	**1,837,277**	**1,754,496**	**5.1%**	**7,280**
Discount Factor	-	1.0	0.938	0.880		
Total Savings (x1,000 €)		97,572	187,449	270,229		**511,218**
Savings per customer (€)						**€70**
Eneco: savings		39,139	70,424	95,103		204,666
Eneco: cust						€114
Essent: savings		4,926	8,915	12,094		25,935
Essent: cust						€11
Nuon: savings		51,363	92,677	125,482		269,522
Nuon: cust						€101

Appendix 2: Allowed Revenue 2001 (2000 prices)

Company	*Allowed Rev. (x1,000 €) 2000*	*Allowed Rev. (x1,000 €) 2001*	*Allowed Rev. (x1,000 €) 2002*	*Allowed Rev. (x1,000 €) 2003*	*(Effective) X-Factor*	*Customers (x1,000)*
Delta	45,106	47,045	49,068	51,178	-4.3%	196
Remu (Eneco)	122,589	114,621	107,171	100,205	6.5%	494
Eneco	221,391	204,122	188,201	173,521	7.8%	1,062
Eneco Delfland	27,427	25,589	23,875	22,275	6.7%	118
Eneco EZK	1,858	1,711	1,576	1,451	7.9%	12
Eneco Gouda	18,280	17,676	17,093	16,529	3.3%	86
Eneco Weert	2,789	2,806	2,823	2,839	-0.6%	19
Eneco	**394,333**	**366,526**	**340,738**	**316,821**	**7.0%**	**1,792**
NRE	14,052	13,434	12,843	12,278	4.4%	99
Essent Brabant	289,907	293,748	297,640	301,584	-1.3%	938
Essent Friesland	11,401	10,348	9,393	8,526	9.2%	45
Essent Limburg	172,306	171,916	171,528	171,139	0.2%	456
Essent Maastricht	12,950	12,439	11,948	11,476	3.9%	45
Essent Noord	256,482	249,668	243,035	236,578	2.6%	888
Essent	**743,046**	**738,120**	**733,543**	**729,303**	**0.6%**	**2,374**
Cogas	6,486	6,557	6,629	6,702	-1.1%	50
Nuon	**571,945**	**530,765**	**492,550**	**457,086**	**7.2%**	**2,656**
ONS	6,891	6,402	5,947	5,525	7.1%	38
Rendo	3,845	4,111	4,394	4,698	-6.9%	29
Westland	9,698	10,717	11,842	13,085	-10.5%	47
Total	**1,795,403**	**1,723,676**	**1,657,554**	**1,596,676**	**4.4%**	**7,280**
Discount Factor	-	1.0	0.938	0.880		
Total Savings (x1,000 €)		71,727	137,849	198,727		**375,922**
Savings per customer (€)						**€52**
Eneco: savings		27,808	50,277	68,212		146,297
Eneco: cust						€82
Essent: savings		4,926	8,915	12,094		25,935
Essent: cust						€11
Nuon: savings		41,180	74,479	101,076		216,736
Nuon: cust						€82

Appendix 3: Allowed Revenue 2002 (2000 prices)

Company	*Allowed Rev. (x1,000 €) 2000*	*Allowed Rev. (x1,000 €) 2001*	*Allowed Rev. (x1,000 €) 2002*	*Allowed Rev. (x1,000 €) 2003*	*(Effective) X-Factor*	*Customers (x1,000)*
Delta	59,555	61,402	63,305	65,268	-3.1%	196
Remu (Eneco)	122,406	121,917	121,429	120,943	0.4%	494
Eneco	148,520	136,935	126,254	116,407	7.8%	1,062
Eneco Delfland	19,504	18,120	16,833	15,638	7.1%	118
Eneco EZK	1,661	1,545	1,436	1,336	7.0%	12
Eneco Gouda	16,521	16,141	15,770	15,407	2.3%	86
Eneco Weert	2,685	2,644	2,605	2,566	1.5%	19
Eneco	**311,297**	**297,301**	**284,327**	**272,296**	**4.4%**	**1,792**
NRE	13,942	12,924	11,981	11,106	7.3%	99
Essent Brabant	224,474	217,291	210,337	203,606	3.2%	938
Essent Friesland	8,249	7,630	7,058	6,529	7.5%	45
Essent Limburg	136,344	126,936	118,178	110,024	6.9%	456
Essent Maastricht	7,459	6,885	6,355	5,865	7.7%	45
Essent Noord	207,508	197,755	188,460	179,603	4.7%	888
Essent	**584,034**	**556,497**	**530,388**	**505,627**	**4.7%**	**2,374**
Cogas	6,539	7,219	7,969	8,798	-10.4%	50
Continuon	212,022	199,089	186,945	175,541	6.1%	-
EWR	42,344	39,464	36,781	34,280	6.8%	-
NWN	210,299	194,316	179,548	165,902	7.6%	-
Nuon	**464,665**	**432,869**	**403,273**	**375,723**	**6.8%**	**2,656**
ONS	5,277	4,897	4,544	4,217	7.2%	38
Rendo	4,525	4,661	4,801	4,945	-3.0%	29
Westland	13,058	12,300	11,587	10,915	5.8%	47
Total	**1,462,890**	**1,390,070**	**1,322,175**	**1,258,894**	**5.1%**	**7,280**
Discount Factor	-	1.0	0.938	0.880		
Total Savings (x1,000 €)		72,821	140,715	203,996		**384,342**
Savings per customer (€)						**€53**
Eneco: savings		13,996	25,300	34,321		73,616
Eneco: cust						€41
Essent: savings		27,537	50,324	68,999		146,860
Essent: cust						€62
Nuo n: savings		31,795	57,590	78,269		167,655
Nuon: cust						€63

Appendix 4: Allowed Revenue 2003 including Reformatio in Peius (2000 prices)

Company	*Allowed Rev. (x1,000 €) 2000*	*Allowed Rev. (x1,000 €) 2001*	*Allowed Rev. (x1,000 €) 2002*	*Allowed Rev. (x1,000 €) 2003*	*(Effective) X-Factor*	*Customers (x1,000)*
Delta	65,563	63,465	61,434	59,468	3.2%	196
Eneco	**481,827**	**466,408**	**451,483**	**437,036**	3.2%	**1,792**
NRE	24,928	24,130	23,358	22,611	3.2%	99
Essent	**741,851**	**718,112**	**695,133**	**672,888**	3.2%	**2,374**
Cogas	10,228	9,900	9,539	9,277	3.2%	50
Nuon	**657,233**	**636,201**	**615,843**	**596,136**	3.2%	**2,656**
ONS	8,348	8,081	7,822	7,572	3.2%	38
Rendo	7,063	6,837	6,618	6,406	3.2%	29
Westland	24,304	23,527	22,774	22,045	3.2%	47
Including No Reformatio*						
Delta	45,106	47,045	49,068	51,178	-4.3%	196
Eneco	**481,827**	**466,408**	**451,483**	**437,036**	**3.2%**	**1,792**
NRE	14,052	13,434	12,843	12,278	4.4%	99
Essent	**743,046**	**738,120**	**733,543**	**729,303**	**0.6%**	**2,374**
Cogas	6,486	6,557	6,629	6,702	-1.1%	50
Nuon	**657,233**	**636,201**	**615,843**	**596,136**	**3.2%**	**2,656**
ONS	8,348	8,081	7,822	7,572	3.2%	38
Rendo	3,845	4,111	4,394	4,698	-6.9%	29
Westland	9,698	10,717	11,842	13,085	-10.5%	47
Total	**1,969,641**	**1,930,674**	**1,893,468**	**1,857,987**	**2.0%**	7,260
Discount Factor	-	1.0	0.938	0.880		
Total Savings (x1,000 €)		38.967	76.173	111.654		**208,680**
Savings per customer (€)						**€29**
Eneco: savings		15,418	28,465	39,416		83,300
Eneco: cust						€46
Essent: savings		4,926	8,915	12,094		25,935
Essent: cust						€11
Nuon: savings		21,031	38,827	53,766		113,624
Nuon: cust						€43

**Note: If the total cumulative savings under X-2003 are greater than under X-2001 we apply the no reformatio principle. The allowed revenues 2001 are then entered into the table. Although these numbers are not directly comparable, they generate the correct total required savings.*