

Vertical separation of the energy distribution industry: a cost-benefit analysis

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ABSTRACT

This paper provides a systematic overview of costs and benefits of the policy decision recently taken by the Dutch government to introduce ownership separation between energy distribution on the one hand, and production and retail on the other. Ownership unbundling increases independence of network management as well as efficiency of regulatory activity. Moreover, ownership unbundling facilitates retail competition by tackling the potential tight oligopoly in this market, but total welfare would be hardly affected by this. The impact of ownership unbundling on welfare is higher if it facilitates competition in the wholesale market which mainly depends on the future development of small-scale generation and separation of the transmission grid. Furthermore, ownership unbundling enables privatisation of commercial activities. The realisation of these results is, of course, not a free lunch. Ownership unbundling reduces economies of scope and, furthermore, creates one-off transaction costs. Unbundling may also affect investments in generation by the currently vertically integrated Dutch utility holdings. We conclude that mainly because of the uncertainty about the future role of small-scale generation and the uncertainty about the magnitude of the transaction costs related to the cross-border leases, the net effect on welfare of ownership unbundling is ambiguous.

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1. INTRODUCTION

1.1. Background

Recently, the Dutch government decided to replace the currently implemented structure of legal unbundling in the energy distribution industry by ownership unbundling of networks from commercial activities. According to the government, legal unbundling is unable to fully guarantee free access to the network by new entrants and adequate investment in the grid.² Despite regulatory measures, legal unbundling would not completely prevent influence of the vertically integrated holdings on activities of network firms. Due to remaining links between network and other activities and the presence of asymmetric information, regulation faces difficulties in removing all ways of mutual influence. As a result of this influence, incumbent distribution firms could still hinder competition by deterring potential entrants or favouring own commercial activities.

In the view of the government, ownership unbundling is necessary to facilitate competition as well as to enhance efficiency of network management. In addition, ownership unbundling might enable the current ultimate shareholders – regional public authorities – to sell their shares in production and supply, raising both liquidity of regional public authorities and incentives for efficiency in these parts of the holding.

The proposal to introduce ownership unbundling has induced a fierce debate on the pros and cons of ownership unbundling. The aim of this paper is to deliver a systematic analysis of conceivable effects of several options to unbundle the energy distribution industry. We will not only deal with the option of ownership unbundling, but also analyse options to improve legal unbundling by additional behavioural measures.

² The Minister of Economic Affairs, letters to the House of Parliament , Kamerstukken II, 2003 – 2004, 28982, nr.18 (March 2004) and nr. 29 (October 2004).

Before giving more detail about the scope of our research, we describe the issue in the remainder of this section. We present an overview of institutional choices made elsewhere in the European Union (section 1.2) and describe the current structure of the energy distribution industry in the Netherlands (section 1.3). Section 1.4 presents the scope of our research and the structure of the report.

1.2 European context

The introduction of competition in the energy industry in European countries, as in other industries, has strongly been encouraged by initiatives of the European Union. The European Union has published several directives prescribing steps towards competition to be taken by member countries. These steps include restructuring of the industry, design and opening of markets as well as introduction of regulation. The issue of ownership, in particular privatisation, has not been dealt with by the EU Electricity Directives until now.

The restructuring issue refers to both vertical and horizontal organisation. Although the potentially adverse effects of concentrated markets are widely acknowledged, the EU Electricity Directives have not required horizontal separation. In addition, due to the absence of proactive regulation and control, the electricity market has shown an ongoing process of concentration, which may seriously limit effectiveness of competition (Jamashb, et al., 2005).³

Regarding the vertical structure of the energy industry, several countries initially introduced weak forms of unbundling in the electricity industry, notably accounting unbundling and management (organisational) unbundling, following the first EU Electricity Directive (1996). Some countries already implemented legal unbundling, although this more strict form of unbundling was formally

³ In many European countries, the share of the largest three generation firms in generation is above 60%, while comparable figures exist for the retail market (Jamashb et al., 2005).

introduced in the second EU Electricity Directive adopted in June 2003. Ownership unbundling of the energy distribution networks has only been implemented in one country of the European Union, i.e. the United Kingdom. The ownership unbundling in the British gas industry, is not the result of legislation, but has been implemented voluntarily. The former monopoly supplier, British Gas, has been split into production, supply and transportation business. The National Grid Transco is currently about to sell four of their distribution business. This sale has been conditionally approved by Ofgem. For transmission system operators, many countries have chosen for legal or ownership unbundling, since TSOs perform the most crucial market-facilitating functions and need a high degree of independence. Still there are some countries, e.g. Germany (having accounting unbundling of TSO in the gas industry) lagging behind this development. The sluggishness in the restructuring processes in national energy industries may be a concern for the formation of the European energy market.

1.3 Current structure of Dutch energy distribution

The Dutch transmission system operator TenneT is fully separated from commercial electricity generators and traders. This TSO is entirely owned by the state government. TenneT currently manages 100% of the high-voltage network of 220 and 380 kV lines, of which it owns 58% and 90% respectively (see table 1.1). In addition, TenneT owns and manages 12% of the 150 kV network. The rest of the 150kV grid and all the lower voltages are owned and managed by regional distribution companies⁴.

⁴ According to the proposal of the Minister, in the near future, the complete network of 110 and more kV will be managed by TenneT.

Table 1.1 Ownership and management of Dutch electricity lines from 50kV, by voltage, 2003

	50kV	110kV	150kV	220kV	380kV
% Owned by TSO (TenneT)	0.0	0.0	12.4	58.2	90.1
% Managed by TSO (TenneT)	0.0	0.0	12.4	100.0	100.0

Ownership of lines per company, in km

TenneT	0	0	542	379	1803
Delta	213	0	281	0	94
Eneco	638	0	278	0	0
Essent	67	1496	1432	140	105
Nuon	2020	475	1849	146	0
Total in the Netherlands	2938	1971	4328	638	2002

Source: DTe division of regions across companies of August 18, 2003 and the annual report of TenneT of 2003.

Regional distribution companies, whose ultimate owners are local authorities, are vertically integrated firms which are active in generation, network and supply. There are three large electricity distribution companies: Essent, Nuon and Eneco. Together, these firms deliver to end users more than 80% of the electricity. About 10% is delivered to end users by TenneT, while a number of small distribution companies, with Delta Energy as the largest one, distribute the remaining part. The three largest electricity distributors generate approximately 40% of the electricity. In addition, they have a large share in the supply⁵, especially in the market for small customers, where their share is about 90%.

At present, network management and commercial activities of the regional companies are legally unbundled. However, the network firms are 'lean', i.e., they do not have economic ownership of their assets. Also the tasks of the network firm and the other firms within the holdings are not fully separated. As the regulator faces difficulties in guaranteeing full independence of network management from other parts of the holding, the Dutch government has decided to introduce

⁵ The term 'distribution' refers to the transport of energy to end users, while the term 'supply' refers to retail sales of energy to end users.

ownership unbundling, which structurally eliminates any influence of holdings on distribution companies.

In addition to ownership unbundling between network and commercial activities, the government has proposed to reallocate the management of all networks at and above 110 kV (hereafter 'regional transmission networks') to TenneT. This part of the proposal represents another dimension of unbundling (between two network activities) and can be implemented independently from the four policy options that we discussed above. However, costs and benefits of vertically unbundling depend also on the implementation of this part of the proposal.

1.4 Scope of research and structure of the paper

In this paper, we analyse the effects of several options for vertical separation of the distribution network from commercial activities. Besides ownership unbundling and legal unbundling, we analyse two additional, intermediate options. As each option has specific strong and weak points, it is hardly possible to define the optimal structure. Therefore, we focus on describing the trade-offs between benefits and costs of each option for restructuring, instead of looking for the optimal option.

The focus of the analysis is on national welfare effects, meaning that we have looked for the net effect of unbundling on costs and benefits in the Dutch economy. Distributional effects, however, will also be mentioned as far as it is possible. Given the focus on welfare effects, this analysis does not include other aspects relevant for the decision on unbundling, such as legal aspects and political aspects. Moreover, although the debate holds for both electricity and natural gas networks, here we focus on the electricity industry.

Our analysis is of a highly qualitative nature as empirical data on effects of separation are very scarce. Instead of a quantitative analysis, our research is mainly based on desk research of economic literature on unbundling in network industries in general and studies directed at the Dutch case in particular. In addition, we have used discussions with several participants in the Dutch debate to collect information and check tentative findings.

Section 2 describes the four options for unbundling in more detail. Section 3 presents the framework for analysing the costs and benefits of unbundling. The analysis of the several benefits is the subject of section 4, while section 5 deals with the costs. Section 6 offers the overall assessment of costs and benefits, summarising the main conclusions and gives some concluding remarks.

2. FOUR OPTIONS FOR UNBUNDLING

2.1 Introduction

The current form of legal unbundling and the ownership unbundling option do not exhaust all options for unbundling the energy distribution industry. In addition to these options, intermediate options can be distinguished in which a more clear division of tasks and responsibilities is specified for the network manager. We define two intermediate options between the current situation and ownership unbundling. Consequently, we have four alternative options for unbundling:

- a) Legal-Lean: legal unbundling with lean network managers, which is the current structure of most energy-distribution firms;
- b) Legal-Fat: legal unbundling with fat network managers, i.e. network firms with a proper allocation of tasks and the economic ownership of their assets, without independent financing capabilities;

- c) Legal-Fat Plus: legal unbundling with fat network managers and a financial ring fence between the network and commercial activities;
- d) Ownership: Full ownership unbundling of the network and commercial activities..⁶

The options b) and c) feature ‘legal unbundling with a fat network manager’, i.e. network firms with economic ownership of their assets. We assume that these intermediate options implement a proper division of tasks between the network and other businesses, allocating strategic tasks to the network manager. The difference between the Legal-Fat option and the Legal-Lean option is that in the Legal-Fat option the network firm executes all strategic activities while it also has the network assets on its balance sheet. The Legal-Fat Plus option differs from the Legal-Fat option as in the former financial ring-fence of the network firm is added. The measure secures sufficient financing for network activities. In the Ownership option, there is full independence. The holdings lose ownership rights with respect to the network. For example, this option also prevents the holdings from having informal powers that may affect the choice of the board of directors of network companies. Below, we describe each option for unbundling in more detail.

2.2 Legal-Lean

Currently, the network firms belong to groups (‘holdings’), which share their operational, managerial, and financial responsibilities. For example, some strategic and operational tasks of network companies are now done in collaboration with other parts of the holdings, or outsourced to them (e.g. shared service centres). Most network firms are lean, i.e. do not have economic ownership of their assets. They are organised as a BV⁷ with no assets and only a few employees, while the network assets are typically owned and financed by the holdings. In the recent revision

⁶ In our definition of ownership unbundling, the network firm is able to integrate with other non-energy, commercial activities, giving rise to other sources of cross subsidies. A stronger form of ownership unbundling could, therefore, include limitation on integration with activities outside the energy industry.

⁷ BV=‘Besloten vennootschap’.

of the Electricity law 1998 (also referred to as the I&I-law) there is an article regarding shifting economic ownership to network companies, but this article has not come into force yet. Although the network firms do not possess the infrastructure assets, the regulator (DTe) assumes that these assets belong to the network firms, i.e. it assumes a so-called regulatory asset base.

2.3 Legal-Fat

In this option for structuring the industry, the network firms are still part of the groups. They are legally and operationally unbundled from commercial activities and have the economic ownership of the assets. Operational unbundling means that all the strategic network activities⁸ are assigned to the network firm. To prevent cross-subsidisation in the case of contracting certain tasks among the companies within the same holding, the arms' length principle is applied. This means that companies should charge each other on the same basis as they would charge external companies. Given informational asymmetry existing between the firms and the regulator, it may however be challenging to control for the application of the arms' length principle in this situation. In addition, in this option no difference exists between the formal and actual treatment of the assets of network firms by the regulator, as is the case in the Legal-Lean structure.

2.4 Legal-Fat Plus

The Legal-Fat Plus option is different from the previous options in that it strengthens the existing financial rules by giving the network more financial capabilities. In the previous options, financing issues are to a large extent dealt with at the level of the holding. There is no formal restriction preventing that cash flow of networks can be used by the holdings. Cash may flow out

⁸ I.e. investment decisions regarding the extension and maintenance of the network; operational management (e.g., dispatch, negotiations on contracts over the access to the network, responsibility about information systems); contracting of the parties that perform outsourced activities; financial policy (setting up the annual reports, billing, contact with clients); supervision of the design of new and maintained networks and management of information systems.

in the form of dividends or through transactions, especially with respect to the old financial contracts of the holdings where the network assets provide guaranties, such as cross-border leases which are still in place⁹. Since commercial activities are generally more risky than network activities, this imposes the risks on the network companies that there may be insufficient cash flow to maintain the network or insufficient funds to finance network investment. In order to protect the networks from such problems, a further step is taken: the introduction of extra rules that would provide the networks with more financial independence. Such rules are called financial ring fencing.

The term ring fencing can be defined as “a process undertaken to determine the total asset and resource base and liabilities and obligations of a particular functional unit and the revenue and operational costs associated with the unit as if it were to operate independently.” (See, e.g., PWC, 2004.) Any form of unbundling can also be seen as some form of a ring fence. A financial ring fence secures that the networks do not run into financial difficulties due to financial losses in other parts of holdings. This can be done by setting a threshold on the credit rating of the group, after which the regulator have to approve all financial transactions of the network company with other companies in the group to which it belongs. This secures the ability of the network company to get enough financing for its operation and investment and prevents creditors of the holding (or other subsidiaries) from having recourse on the assets of the network owner in case the company defaults on its debts.

By implementing a financial ring fence, not all links between the network firm and commercial firms are cut through. The holdings still have certain shareholder powers, e.g., through personal links with the network firm. Although, the holdings’ formal shareholder powers are restricted

⁹ There is an article in the Electricity Act that prevents using network assets as a collateral for new contracts.

(especially for larger network companies that are subject to the 'structuurregime'), informal powers may still play a role, affecting the choice of the management board members.

2.5 Ownership unbundling

This policy option results in the strongest form of unbundling. It completely removes all financial and operational links between network firms and commercial firms, such as carrying the same name, combining commercial and network information in one mail to a customer, etc. In this option, networks are fully split from the original holdings, so that the holdings have no shareholders' rights. For example, a holding (a current owner of a network company) cannot even informally affect the choice of the board members for the network company, financial decisions or decisions on network investment. Ownership separation means that there will be no common financing of the network and commercial activities. The old contracts of the holdings regarding financing, such as cross-border leases, may need to be broken or altered, in order to implement the full separation.

3. FRAMEWORK OF THE COST-BENEFIT ANALYSIS

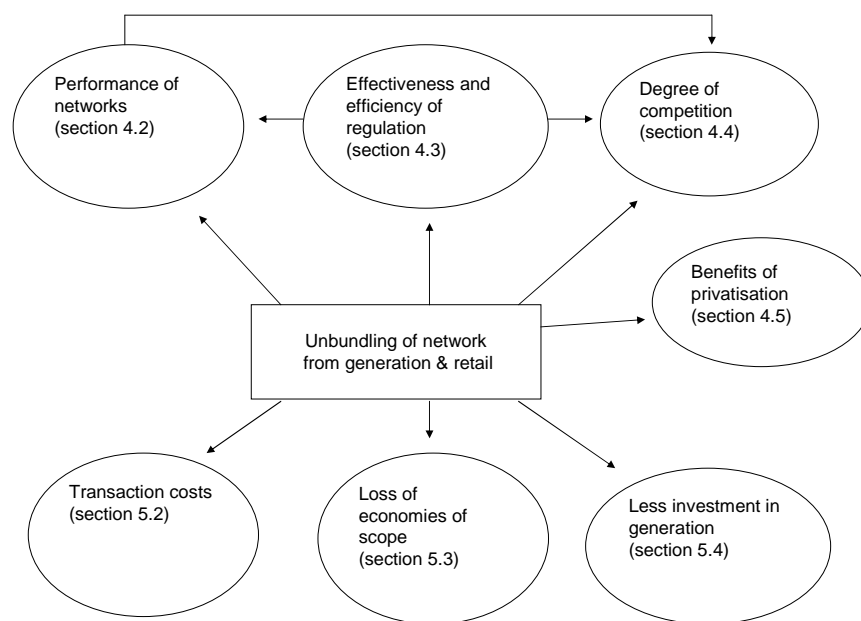
3.1 Introduction

In order to compare several options for structural separation, we use the welfare-economic approach. In this approach, the key question is whether a policy measure, i.e. an option for unbundling, affects allocative efficiency, technical efficiency or distribution of effects on efficiency. Allocative efficiency refers to welfare effects of the allocation of goods and technical efficiency to the costs of supplying goods. If a good is not priced according marginal costs of supplying it, an allocative inefficiency exists. So, allocative efficiency is related to the way goods are priced and allocated. Technical efficiency is related to the incentives firms have to improve productivity. Both efficiency concepts have a static as well as a dynamic dimension. These efficiency concepts determine our cost-benefit analysis. In other words, we analyse whether

unbundling affects the functioning of markets and the allocation of goods, the incentives for firms to improve productivity and raise quality of their products, and finally, the distribution of the results of production and allocation (i.e. welfare) among consumers and firms.

As unbundling potentially impacts many components of the industry, we have distinguished several categories of costs and benefits (see figure 3.1).¹⁰

FIGURE 3.1. Categories of costs and benefits of unbundling



3.2 Benefit categories

Unbundling immediately affects independence of network management. Depending on the degree of unbundling, it raises transparency of costs and returns of the network firm and reduces

¹⁰ These categories are more or less comparable to those used in OECD (2003). In that report, the benefit categories include facilitation of competition, transparency about costs of the non-competitive activity, and innovation in the infrastructure. The cost categories in that study include loss of economies of scope, investments in relation-specific assets and one-off transaction costs.

incentives for cross subsidies and distorting actions, provided a proper allocation of tasks between network firm and commercial firms, and, furthermore, it increases financial security for the network firm. Moreover, unbundling of network firms may open options to realise economies of scale in network management. As a result, the performance of the network firm rises. Section 4.2 analyses this benefit.

Unbundling also directly impacts effectiveness and efficiency of regulation. The increased transparency enables the regulator to set appropriately access tariffs and other incentives for the network firm. This also increases performance of networks. In addition, the increased transparency improves regulator's ability to monitor the market. Due to the reduction in incentives for strategic behaviour, regulation becomes less complicated and, hence, more efficient. Section 4.3 is directed to the benefits on regulation.

Both improved network performance and more effective regulation affect competition. The improved network performance leads to less allocative distortion caused by high network tariffs¹¹ as well as to better options for new entrants for dispatching to the grid or for supplying. Regulation directly affects competition by improved market surveillance. Competition is also directly affected by unbundling through the impact on cross subsidies and distorting actions by vertically integrated firms. Section 4.4 deals with all these effects on competition.

A final, side-benefit of unbundling is related to its impact on privatisation of commercial activities. If public shareholders are enabled to sell their shares in these activities, several benefits follow. Firstly, privatisation enables public authorities to withdraw public capital from

¹¹ If network costs are not priced according to the marginal costs, allocative inefficiency exists. Pure marginal cost-pricing is a convenient theoretical idea, however, infeasible in practice due to fixed costs. However, other pricing structures based on this idea may be still feasible (e.g. two-part tariffs, with variable charges reflecting marginal cost).

commercial activities and to use the proceeds for financing other socially preferable investments. Secondly, unbundling and privatisation could raise the value of the commercial firms by reducing corporate inefficiencies, optimising the financial structure and increasing the pressure of private shareholders to increase efficiency. Section 4.5 is directed at these benefits.

3.3 Cost categories

As there is no free lunch, unbundling also introduces costs. We distinguish transitional cost (section 5.2), loss of economies of scope (section 5.3) and a risk of reduced investment in generation (section 5.4).

Transaction costs are costs which are directly related to the implementation of the measure to unbundle. This cost item mainly consists of costs of restructuring the industry, such as breaking existing links between network and commercial parts of the holding and changing (financial) contracts. Other transaction costs include costs of changing legislation by the public authorities.

Loss of economies of scope is a potentially significant cost of unbundling as network and other parts of the chain (i.e. generation and retail) are closely related to each other.

A final cost item which deserves specific attention is the risk of less investment in generation. Unbundling likely results in higher capital costs for the (currently) vertically integrated generation firms, as a result of which investments in new power plants by these firms could reduce.

3.4 Overall assessment

Combining the four options for unbundling and the above categories of benefits and costs, we are able to construct a table with the list of benefits and costs as captions of the rows, and the four

policy options as captions of the columns (see table 6.1). In section 4 and 5, we look horizontally, focusing on each individual category of benefits and costs, and compare the relative performance for this category across the four policy options. Section 6 looks vertically, analysing the trade-offs between benefits and costs for each option.

4. BENEFITS OF UNBUNDLING

4.1 Introduction

In this section, we analyse the benefits of four options for unbundling using the categories described in section 3. Section 4.2 analyses the impact of unbundling on the performance of the network, section 4.3 focuses on effectiveness and efficiency of regulation, section 4.4 deals with the overall impact on competition, and section 4.5 goes into the benefits of privatisation after unbundling has been realised.

4.2 Performance of networks

A direct consequence of unbundling is a more independent management and financing of the network. Unbundling increases focus of network management on the network without the need for compromising with other needs of an integrated holding (OECD, 2003) In particular, when the network is fully unbundled from generation and supply it focuses on its own profit and not on the profit of the group. As a result, it better responds to regulatory incentives and it is more likely to do investments that are good for facilitating competition (e.g. in technology that reduces switching costs).

Also with respect to financing, especially full ownership unbundling secures that the cash flow generated by the network is not diverted to other activities, but spent in the best interests of the network company. Also financial ring fencing helps to prevent the risk that network may have insufficient financial means. In this respect, options Legal-Fat Plus and Ownership Unbundling

are better than Legal-Fat. The option of ownership unbundling is the best with respect to this benefit as it fully secures operational and financial independence.

Notice, that cash flow is perfectly secured only if networks are kept separately and not allowed to merge with *any* other businesses, which may be also an undesirable obstacle to the movement of capital. In case of merging with low-risk businesses, such as other network firms, the cash flow of the network is less at risk than in the case of merging with high-risk businesses.

Adverse effects of increased network independence

While highlighting the positive side of a more independent position of network companies for their performance, we also have to discuss two main arguments that may be used against this claim and explain why possible negative consequences of the increased independence of the networks are minor in the current context.

First, there is a theoretical argument regarding the possibility of ‘hold up’ of network investment if the network is not vertically integrated with commercial activities: as a separated network firm has to share gains from their investments with other parties in the chain, it invests less than an integrated firm would. Therefore, separation may theoretically reduce network investment. For instance, an integrated network firm has a better incentive to invest in network extension than a separated network firm as this improves its opportunities for commercial activities. This incentive is still present in the case of legal unbundling, but may be less in the case of ownership unbundling. In other words, the latter may induce some network firms to hold up investment. In practice, however, tariff regulation serves to mitigate this problem. Under stronger unbundling forms, network companies better respond to regulatory incentives, in particular towards more efficiency and a more optimal reliability, which leads to a more optimal price-to-quality ratio and enhances welfare.

A second argument relates to substitution between investment in the network and investment in generation. In some situations reinforcing the network may be more efficient than building new production capacity, but a non-integrated network firm may be less keen to take that decision. This issue is in particular important for the transmission level, but may also play a role at the distribution level. The management of regional transmission lines is currently done by distribution companies, but will, in accordance with the proposal of the Dutch government, be transferred to TenneT. As a result, unbundling does not affect this issue. Only if the proposal on transmission is not implemented then vertically integrated companies may have better incentives to take into account the substitution between transmission and generation in investment decisions. However, there is a trade off between this and the effect of such integration on competition. The gains of more vertical integration between large-scale generation and transmission are likely to be offset by competition gains. As the role of distributed generation increases, the same argument holds also for the distribution level. See section 4.4 for more detail on competition issues.

Economics of scale

Another theoretical advantage of ownership unbundling of regional distribution networks is the option to achieve positive scale effects in the network management by consolidation of these networks. However, this goes at the expense of losing the possibility to apply benchmarking in regulation of regional distribution networks. Therefore it is important to evaluate how large the scale economies actually are.

It appears from the economic literature that scale economies are large in transmission, but negligible in distribution. In particular, KEMA (2004)¹² presents numerous arguments in favour

¹² This report by KEMA has been commissioned by TenneT. In KEMA(2004), transmission is defined from 50kV. However, in our analysis, we refer to the lines of 110kV+ as transmission, since this was

of merging regional and national transmission together. According to their report, cost savings due to more economic design of the network, better communication, and cheaper operation could reach up to tens of millions euros annually (the total revenue of TenneT being around 350 mln¹³). Furthermore, an integrated network would be more reliable. Transfer of the management of transmission network of 110/150 kV to TenneT would improve the synergy between regional transmission networks and the national TSO. The proposal allows for the possibility of (voluntary) sale of the respective transmission networks to TenneT.

For the distribution level, there is some evidence supporting the assumption of constant returns to scale. See, e.g., Pollitt (1995) and Kittelsen (2003). For Norway, Kittelsen finds that “even for the very smallest sizes the VRS [variable returns to scale] frontier is very near CRS [constant returns to scale]”, implying negligible positive scale economies in distribution.

Therefore, if the proposal with respect to regional transmission is implemented then economies of scale in transmission are realised. Horizontally integrating distribution networks after this is unlikely to be beneficial. Firstly, economies of scale in this network hardly exist. Secondly, the regulator would lose the option of benchmarking if networks were integrated in one firm. Hence, the four options will be equivalent for this benefit.

In contrast, if the proposal regarding transferring the management of transmission networks to TenneT is not implemented, then ownership unbundling may create larger benefits than any other option, because it increases the prospect of consolidation of transmission networks in the future. If regional networks are not fully unbundled from commercial activities, then the chance that the

conventional terminology historically. In any case, the lines of 110kV+ represent the bulk of transmission in the Netherlands.

¹³ According to the annual report of TenneT (2003, p.3), in 2002 the revenue of TenneT was 358.1 mln euros.

transmission can be merged in the future is smaller, because vertically integrated companies are less likely to sell their shares in transmission, or voluntary to transfer the management of transmission lines to TenneT.

Conclusion

Concluding, unbundling creates a more independent position of the network, which provides benefits for the network performance through a better focus on the objectives of the network and a better response to regulatory incentives. Furthermore, unbundling may have a positive effect if it leads to achieving scale economies in network management. In the Legal-Lean situation, which is our benchmark, networks are the least independent, as they even do not have economic ownership of their assets. In tariff regulation, DTe already treats the networks as if they were economic owners, assuming a regulatory asset base. Making networks 'fat' would be a logical step that creates more transparency with respect to the network firms' assets. This and a proper allocation of the strategic tasks will decrease the interference with the holdings and secure a better performance of the network. From this perspective, the option Legal-Fat is better than Legal-Lean; and the option Legal-Fat Plus is even better as it decreases the risk of insufficient financing. The option of ownership unbundling improves on Legal-Fat Plus by removing the last distortions and focuses the performance of network companies on their objectives the best.

4.3 Effectiveness and efficiency of regulation

Economic literature acknowledges three main regulatory constraints: informational, transactional, and administrative and political, which in practice prevent regulators from implementing their preferable policy. (See e.g., Laffont and Tirole, 1993.) The literature mostly focuses on informational and transactional constraints. An important consequence of these two constraints is that contracts are inherently incomplete, and contingencies left out of incomplete contracts have to be filled in. In such a case, the pattern of ownership matters.

Structural separation creates more transparency and leave less incentives for network companies for cross subsidies and other distortions, which looses both informational and transactional constraints, and hence contributes to more efficient and effective regulation. More transparency improves the informational position of the regulator, enabling setting tariffs and incentives more appropriately. Since the network company has less incentives to favour the former sister companies after unbundling, the surveillance task of the regulator becomes easier and more effective.

In the Netherlands, distribution networks are already legally unbundled and subject to regulated third-party access. Network tariffs are set by the regulator (DTe) based on benchmarking of the companies' standardised costs, which includes the regulatory return on capital. The regulator also creates incentives for quality by introducing financial compensations for changes in quality indicators. Although the tariff setting procedure is the same under all four options, unbundling still may have effect on its outcome through increasing the adequacy of the regulator's information.

As DTe argues in their advice to the Minister of Economic Affairs (DTe, 2004b), regulation is more difficult and less effective if there is no proper division of tasks between the network and the respective commercial companies. The internal transactions between the companies within the same group are difficult to control, therefore, some freedom remains with respect to the (operational) cost allocation, which may affect the network tariffs.

Under stronger unbundling forms, the network operator loses the possibility to strategically reallocate its internal costs. A vertically integrated firm would have the incentive to shift costs of commercial activities to the network firm and to shift resources of the latter to the commercial

part of the group. By unbundling, the regulator obtains a better insight in the costs of network management. As a consequence, the regulator is able to implement more appropriate rules, such as efficiency targets, on network firms.

Comparing across the four options, the situation already improves under Legal-Fat as compared to Legal-Lean, because the implementation of a proper task allocation reduces opportunity for shifting costs between the companies within the same group. Adding financial ring-fencing – as described in the option Legal-Fat Plus, i.e. adding rules restricting cash outflow – seems not to add much to what can be already achieved in Legal-Fat. The reason is that under the current legislation there is already a provision that the network assets cannot be used as a collateral in new contracts of the holdings. Therefore, the financial cross subsidy with respect to future contracts has already been eliminated, while such a cross-subsidy is still present with respect to the old contracts. Ownership unbundling removes last cross-subsidies and distorting actions that could be present under vertical integration. In addition to the improvement of information position of regulator, ownership unbundling also improves focus of network companies on regulatory incentives, increasing the effectiveness of regulation. However, it is hardly possible to assess the magnitude of this effect.

Unbundling makes the market-monitoring task of the regulator simpler and more effective because it reduces the incentives of the network operator to favour its subsidiary in the competitive segment. The information stream within the group is also difficult to control. Therefore, the closer the relationship between the companies in the group, the higher the risk of preferential treatment of the affiliated company by the network. Since interference between the network company and commercial divisions of the holding reduces after implementing a proper

allocation of activities between the two, Legal-Fat (and also stronger options) make an improvement on Legal-Lean.

Still, legal unbundling cannot fully remove the incentive of the network firm to give a better treatment to their subsidiaries. Even with extra measures with respect to customer systems, billing information, etc., there will always be a risk of preferential treatment and it would be extremely difficult to prove when sensitive information would 'leak' from the network to other holding members. Here we refer to the textbox from section 4.4. called "Some examples regarding risks of too little unbundling" illustrating this point. Only ownership unbundling eliminates this risk and creates the most effective "Chinese walls" between the network and commercial activities, as it fully removes such incentives.

Conclusion

Concluding, stronger unbundling contributes to incentive regulation as well as the market surveillance task of the regulator. The Legal-Fat as well as the Legal-Fat Plus options have higher benefits than the Legal-Lean option, because they introduce a proper task allocation, and hence eliminate a great deal of possible cross-subsidies and interference between the network and commercial divisions of the holding. Still, the largest improvement will be achieved only in the Ownership option, since it removes last cross-subsidies and personal links. The surveillance task of the regulator becomes much easier, as networks have no incentives to favour or disadvantage any competing company.

4.4 Degree of competition

One of the main arguments in favour of more unbundling of distribution networks relates to improved competition in commercial segments, which will increase welfare. An integrated network company has both incentive and possibility to affect competition in the competitive

segment. This can be done either via cross subsidies to competitive activities from the network or through distorting actions of the network firm. As has been said in section 3, unbundling affects competition via several routes. The improved network performance leads to less allocative distortion caused by high network tariffs as well as better options for new entrants for dispatching to the grid or for supplying. Regulation directly affects competition by insuring non-discriminative third-party access. Competition is also directly affected by unbundling through the impact of the latter on cross subsidies and distorting actions by vertically integrated firms. Unbundling can, however, also have a negative impact on competition: stand-alone commercial companies may become more prone to the risk of takeovers, which may reduce the number of market players.

It is useful to distinguish between the retail segment and the production segment when discussing competition in the electricity market. Competition in retail directly relates to links between retailers and low-voltage network owners. For competition in production, the relation is slightly more complicated and the magnitude of benefits depends on the realisation of the proposal of the Minister of Economic Affairs with respect to allocation of the management of high voltage networks to TenneT.

Retail competition

With an improved allocation of tasks and respective formal procedures put in place, the network activities become better separated from retail activities, reducing incentives and opportunities for cross-subsidies and soft-discrimination. Compared to Legal-Lean, the situation improves under both Legal-Fat and Legal-Fat Plus options, approximately to the same degree, and under ownership unbundling to a higher degree, as only ownership unbundling is able to fully remove these incentives and possibilities.

Unbundling is likely to improve the possibilities of entry in retail. However, whether and to what extent entry actually will take place, depends on several factors. Entry is more likely in a growing market than in a market in decline. The Dutch electricity market will continue to grow in the coming decades, stimulating entry. Given the low or absent economies of scale in retail, no significant barriers to entry are expected. However, there may be imperfections on both the consumer side and the firms' side that may reduce or deter entry.

On the consumer side, switching costs may play a role. Such costs may be especially important in the market for small residential customers.¹⁴ In addition to financial switching costs (e.g. switching fees), also other switching costs exist, for instance costs associated with uncertainty about the market or psychological hurdles. High (perceived) switching costs make it harder on entrants to gain market share after entry. On the other hand, high switching costs leave room for higher profit margins, thus rendering entry more profitable. The net effect of switching costs on entry is ambiguous.

Although it is not clear how much entry will actually occur after unbundling, we can get an impression of the welfare effects of entry in retail. Let us first note that retailers compete in two-part tariffs and that it is clear from economic theory that it is optimal to realise price-cost margins in the standing charge rather than in the per unit price. This implies that an increase in competition (e.g. through entry) will reduce the standing charge rather than the per unit price, which has no effects on consumption volumes. Therefore, static effects coming from entry are distributive. Still, in the case if retailers are foreign companies, the allocation of surplus between

¹⁴ Such markets are in general characterised by the low activity of customers. According to the EC (2004, p.9), "based on experience of those member states which have already had a competitive market for some time one might expect a well functioning market share to have around 15-20% of business changing suppliers every year with most, if not all, seeking to renegotiate tariffs with their current supplier every year. For households, an annual level of switching of perhaps 10% would be seen a reasonable benchmark."

retailers and their customers affects national welfare. Turning to dynamic effects, obviously, efficiency gains from increased competitive pressure may increase welfare in the longer run, although the relationship between the degree of competition and dynamic efficiency is not straightforward. An increase in retail competition may also positively affect competition in generation, as retailers are pressed to minimise costs.

Splitting up the network from other activities and liberalisation of the market could lead to an increase in the number of players active in the commercial activities, which may result in higher costs of coordination. These costs could consist of for instance slackening the pace of decision making. In addition, an increase in the number of players could make it difficult to identify which company is responsible for a failure (e.g. why the customer switch has not been performed on time, why bills are delayed). Moreover, it could make it difficult and/or costly to write enforceable contracts on this, because collection of information and conflict resolution are costly. This may affect both costs and quality of service in energy supply. However, such an effect is more attributed to the introduction of competition (i.e. to access of several market players to the network and the need for the duplication of information stream in the liberalised market), than to unbundling.

Both the distributive effects and the efficiency gains in retail are unlikely to be very large. From a recent study by Lijesen (2002), it can be deduced that increasing the number of retailers from 3 to 4 leads to a decrease of the standing charge of approximately 14%, boiling down to 1% of total electricity expenditure for an average household. Likewise, dynamic efficiency gains will be limited, simply because retail costs form only a small part of total electricity costs.¹⁵ On top of the dynamic effects, the disappearance of cost-increasing non-price discrimination will enhance

¹⁵ Even in the extreme case where retail profits are absent, total expenditures on electricity decrease by less than 5 percent.

welfare, but again, the order of magnitude is probably fairly small for the same reasons mentioned above.

Regarding the small-customers segment, a countervailing effect of retail competition is brought forward by Joskow and Tirole (2004). They address the consequences of ‘load profiling’, finding that a better outcome¹⁶ can be achieved by a (regulated) monopoly retailer that uses two-part tariffs than by retail competition. This is because under retail competition with no real-time metering, retailers cannot face the real-time wholesale price for the aggregate consumption of their customers, but an average price. In contrast, a monopoly retailer in an area would be able to observe the total load in real-time and to face the real-time wholesale price, thus increasing the efficiency of its electricity purchases by time of day. This argument may lose significance in the near future because of technical developments, such as real-time metering or the development of a real-time spot market. Newbery (2002a) mentions another argument against retail competition for small customers. In his view, a monopoly for small customers (up to 50-100 kW) is likely more able to act as a viable counterparty for medium and long term contracts compared to independent retailers. However, the net benefits of such a development are not straightforward, as they depend on the respective regulatory costs and effectiveness.

The concentration in the Dutch retail market is relatively high, as most customers are still supplied by the three large incumbent energy companies. Given such a high concentration and no full integration in the electricity market, it is unlikely that further mergers of the ‘Top3’ commercial companies can be allowed by the competition authority, irrespectively of

¹⁶ In economic terms, in a world with homogeneous consumers and on traditional meters, a monopoly retailer can achieve a second best outcome provided that it charges two-part tariffs, while retail competition achieves a third best outcome.

unbundling, although competition policy regarding the electricity industry is highly complex (Newbery, 2002b).¹⁷

Several characteristics of the retail electricity market make this market to be prone to the risk of formation of a tight oligopoly, i.e. a structure that can enable the incumbents to realise supranormal profits for a substantial period of time (Canoy et al., 2003). These characteristics include the limited number of suppliers, the relatively high switching costs, the low elasticity of demand, the rather stable level of demand (on annual basis) and hurdles for entry. Because of these characteristics, the incumbents are able to (implicitly) coordinate their activities. A conceivable example of such coordinated activities is the way the incumbents deal with administrative restructuring and the problems following from it. Unbundling the incumbents likely reduces the risk of formation of a tight oligopoly to some extent as it improves conditions for entrants.

Concluding on the effect of unbundling on retail competition, unbundling is likely to promote entry in retail, but the net welfare effects are limited. However, unbundling may tackle a potential tight oligopoly to some extent. Because of the pricing structure in retail, price decreases are likely to be distributive rather than total welfare effects. Moreover, retail costs and margins form a relatively small part of total electricity costs and finally, there may be welfare losses in the market segment that requires load profiling. The impact of unbundling on consolidation in the Dutch retail market is probably negligible because of the current high level of concentration. This threat of increased consolidation is likely to be dealt with by the competition authority. Although direct welfare effects of increased competition in retail are likely to be small, indirectly welfare may increase due to the impact of retail competition on the wholesale market.

¹⁷ One of the problems to be dealt with is cross-border ownership which requires competitive measures on international (European) level.

Wholesale competition

Improved performance of networks, more effective regulation and fewer opportunities for cross subsidisation and other distortions also affect wholesale competition. The magnitude of the effect of unbundling on wholesale competition depends on three factors: ownership of the transmission grid by the distribution companies, future development of small-scale generation, and development of the North-Western European power market.

When both regional transmission and the main generation in the respective area belong to the same direct owner, the scope for gaming in generation exists. Such a network has both incentives and opportunities to strategically affect competition in production. Competition between producers may be harmed in three ways.

Vertically integrated generation incumbents may hinder entry or harm entrants' operations by 'non-price discrimination'. Unbundling transmission and generation is therefore likely to facilitate entry in electricity production, which leads to an increase in welfare as well as induce improvements in productive efficiency and raise the level of supply security. We can obtain an impression of the order of magnitude of the welfare effects by looking at the price effects from entry. Simulations with CPB's model for the electricity market (Ten Cate and Lijesen, 2004) show that an extra entrant in generation would bring average per unit prices down by 9 %. Other than in the case of retail, per unit prices are affected, so that not only distributional effects arise, but welfare effects as well.

A second effect follows from the fact that a vertically integrated firm has a strong incentive to adjust its capacity choice in order to have its generator gain local market power (Joskow, 2004).

A third threat if transmission lines are vertically integrated with electricity producers is a very specific one, in which the only generator in a region is vertically integrated with the transmission network in a neighbouring region. It can then influence the ability of its neighbouring transmission lines operator to resolve congestion, thus creating a very favourable position for its own generator.

At least two options exist to deal with these threats for wholesale competition: reallocation of transmission lines to the TSO (TenneT) and unbundling of the distribution firms. Given the importance of regional transmission lines for wholesale competition, their unbundling from production is especially important. Therefore, if the proposal of the Minister regarding transferring the management of the regional transmission lines to TenneT does not take place and distribution companies continue to manage these lines, unbundling of distribution companies from production will bring very large benefits.

Another factor which has to be taken into account is the role of small-scale generation. The Netherlands has quite some small-scale generation capacity, amounting to approximately 17 percent of total generation capacity (Timpe and Scheepers, 2003). Future predictions range from a stable share to an increase to 27 percent (*op. cit.*, p. 16). Most small producers generate electricity primarily to cater for their own needs and sell the surplus to the market. It is not their main activity to sell electricity, but merely a side effect. However, technical developments may change this. As distributed regulation becomes more and more important, regulators begin to pay more attention to creating right incentives for regulated network companies to facilitate such generation. See, e.g. the recent decision documents of Ofgem (2005) and DTe (2004c) covering

this issue. Especially if virtual utilities are created by coordinating small producers, they may form a substantial competitive fringe.¹⁸

One important aspect in virtual utilities competing with large scale generators is the level at which they deliver their production to the network. Small-scale generators feed into the distribution network, whereas regular power plants feed into the transmission network. This difference may be important because, as Ackermann et al. (2001) point out, distribution networks are often designed for a different purpose than transmission networks. This causes differences in costs that are unfavourable for small-scale generators.

If incumbent producers are vertically integrated with owners of distribution networks, they have an incentive to exaggerate the cost difference between transmission and distribution networks, as this enhances the competitive position of their power plants vis-à-vis virtual utilities. Wals *et al.* (2003) and Connor and Mitchell (2002) report complaints from small scale producers over high connection costs charged by distribution network operators. High fees for delivering to the local network as well as non-price discrimination are likely to dampen the success of small producers in the market place. Even if the regulator will be able to perfectly regulate feed-in tariffs, the network owner may hinder downstream competitors through non-price discrimination. This may for instance take the form of delaying decisions to connect, delaying needed repairs, giving incomplete, untimely or incorrect information on balancing needs and so on.

Both Legal-Fat options increase the possibilities for regulators to act against practices as described above. The incentive for the integrated firm is not affected, however. Hindering virtual utilities, either through access fees or through non-price discrimination, is in the interest of the

¹⁸ Virtual utilities, also referred to as distributed generation, consists of coordinated small plants, often combined heat and power plants or renewable sources. See Künneke (2003) and Awerbuch and Preston (1996) for a more extensive discussion.

group or holding to which they belong. Ownership unbundling would eliminate these incentives. Therefore, ownership unbundling is a more effective cure than the Legal-Fat options.

Ownership unbundling prohibits distribution network owners to invest in local generation capacity, possibly disabling them to gain economies of scope from this combination. These economies of scope may arise because of the use of the network owner's own production capacity to resolve congestion. Note, however, that restoring balance can be contracted perfectly (as is the case with transmission in many countries), and does not require shared ownership. Investment decisions may be altered, since an integrated producer is likely to consider network solutions and capacity solutions jointly. Possible efficiency gains from this integrated decision will be lost in the case of ownership unbundling.

Conclusion

Concluding on the effect of unbundling on competition in electricity production, we find that a higher degree of unbundling of generation and *transmission* networks enhances the position of new entrants and may lead to substantial welfare gains. Unbundling of generation and *distribution* networks increases the opportunities for small-scale producers to compete in the electricity market, which is especially relevant if the concept of virtual utilities is further developed in practice. Such a development is more likely if there is much entry in distributed generation, which is also facilitated by stronger unbundling of distribution networks. Finally, ownership unbundling may result in sales of generation owned by Dutch utility holdings to foreign firms, however, this is unlikely to have a large effect on competition on the North-Western European power market.

4.5 Benefits of privatisation

Unbundling network activities from commercial activities enables public shareholders to sell one of these activities separately. More specifically, it enables public authorities to privatise the commercial part of the currently publicly-owned integrated firms. Complete unbundling would give public shareholders who do not want to run risky businesses a way out, while at the same time, keeping the essential facility, notably the network, in public hands.

Dutch incumbent energy companies are historically in public hands. They belong to local authorities and the current law prevents sales of the networks to private shareholders, as 50% of the network assets should remain with the current owners. At the same time, since the energy market in the Netherlands has been liberalised, the energy holdings already perform a number of commercial activities and get involved in financially risky businesses, such as acquiring companies abroad. Theoretically, as there is no prohibition to sell commercial activities, these can be sold by holdings already. There is an example of such an intention in the Dutch energy market – a combined sale of the retail businesses of NRE and Intergas.¹⁹

Several of the public shareholders of distribution companies prefer to sell the commercial parts of these companies as these shareholders do not want to be active in risky, entrepreneurial activities. In the case of legal unbundling, the management of the holding is able to sell parts, such as generation plants or retail firms, but this does not imply that the shareholders would always benefit from such transactions. In the current structure, the holding can decide to use the revenues from the transaction for other activities, for instance abroad, instead of transferring it to the shareholders. In the prevailing Dutch governance system (called ‘structuurregime’), the ultimate shareholders, such as regional and local authorities in the energy sector, are not able to effectively

¹⁹ Also, before the condition of 50% public ownership was introduced with respect networks, two integrated incumbent gas companies, Obragas and Haarlemmermeer, were sold to RWE.

influence companies' decisions with respect to both divestiture and destination of the proceeds of the divestiture.

Changing the governance structure so as to increase the power of public shareholders in this respect would be one option to deal with this issue. Another option is ownership separation. Given the uncertainty regarding the Parliamentary decision on privatisation of the network companies, ownership unbundling would provide public shareholders, who may not want to hold risky commercial businesses, with a way out. Under the current corporate governance, this is realised only under the option of ownership unbundling, and not under the other options.

Unbundling a firm in separated companies may raise the total value because of increased transparency about future cash flows and the feasibility of a financial structure which make commercial parts operate more efficiently. Many utility holdings are conglomerates with multiple goals. Literature provides several reasons why a conglomerate structure may be inferior to having separate owners.

Unbundling of conglomerates could induce better investment opportunities. For instance, a pension fund may not be interested to buy a conglomerate with risky businesses, while it may be interested to invest in a low risk network business. By bundling these activities together, these investors will be excluded from the list of potential buyers.

A split structure is more transparent and hence better manageable. In a separated structure, managers of each firm can strongly focus on their own business, while in an integrated setting interests of a particular division, say the network division, can be compromised by the needs of other divisions (OECD, 2003). This argument, of course, only holds if economies of scope do not

compensate for the costs of managing a conglomerate. Moreover, corporate separation possibly increases transparency on inefficiencies of the corporate.

A large stream of related literature exists on the issue of the optimal financing structure, predominantly based on principal-agent theory and agency costs theory. Recent examples include Denis *et al.*, 1997 and Burkart *et al.*, 1997. Unbundling may improve options to choose the optimal financial structure. According to corporate finance literature (e.g. Jensen and Meckling, 1976), a large share of equity financing implies that managers have limited incentives to earn a profit, whereas a large share of debt financing urges managers to invest in high-risk projects. The trade-off between these costs implies the existence of an optimal capital structure, which is probably different for a network firm and a generation firm or a retail firm. If this difference is large, the effect of bundling these activities is that they can not reach their optimal debt-equity ratio.

Agency costs are thought to be higher in diversified firms because individual shareholders do not have the ability to monitor and discipline managers adequately. This implies that shareholders are likely to prefer equity in focused firms, thus raising the value of those firms. Recent empirical work, though, overviewed in Matsusaka (2001) is not conclusive on the effect of diversification of firm activities on the firm value.

Some economists argue that private shareholders do a better job in monitoring managers than do public shareholders (e.g. Karpoff, 2001). As the commercial parts of energy companies are more likely to have private shareholders after unbundling, this would imply that unbundling increases the efficiency of these firms.

The vertically integrated distribution companies in the Netherlands have realised relatively low returns on investments. In 2003, their dividend yield was approximately 1.5% for the largest companies, while the regulator guarantees a much higher return to the network assets (see figure 4.1). However, this information has to be interpreted with caution, because the rate of dividends does not fully reflect return on capital: companies may use the returns in other ways, e.g. to do efficient investment.

According to Sequoia (2004), complete unbundling would improve performance of the commercial firms and, hence, their value. Others believe, however, that in the Dutch situation buyers will exercise their market power and, hence, offer a lower price, since splitting does not only allow for sales of competitive businesses, but also forces such sales while the number of potential buyers is limited (Van Damme et al., 2004).

Interestingly, two Dutch companies have voluntarily announced their decision to unbundle fully their competitive activities from the network.²⁰ From this we can conclude that these companies do not expect a decrease of their value after unbundling. Note, however, that these companies are much smaller than the three large incumbents. International experiences with voluntary unbundling (see Chapter 2) also support the view that ownership unbundling may be good for a company value.²¹

Under the current corporate governance, public authorities have very limited options to impose privatisation of commercial parts. Ownership unbundling strongly improves possibilities of

²⁰ See transaction-cost literature for more detail regarding the choice of the organisation form by a firm, e.g. Joskow (2003b).

²¹ The energy industry has shown several voluntary separation initiatives, such as by British Gas. In the telecom industry several vertically integrated firms have considered voluntary separation, such as Rochester Telephone and British Telecom, but they eventually concluded that the costs incurred would be higher than the benefits (OECD, 2003).

public shareholders to privatise commercial firms. The other forms of unbundling do not affect these possibilities. Another option to the withdrawal of public capital from commercial activities is a further improvement of the corporate governance.

Conclusion

Regarding the impact of unbundling on value of the separate firms, we conclude that the theoretical and empirical literature is inconclusive. By itself, an increase of efficiency and a positive effect on the value of a company may provide a reason for voluntary unbundling but do not necessarily justify enforced unbundling. Conversely, if these arguments for unbundling hold, they are reason for voluntary unbundling. Note however that the private decision not to unbundle does not imply that the benefits discussed here are smaller than the costs of unbundling, as that decision may be biased by private benefits, such as market power, that are not in the public interest.

5. COSTS OF UNBUNDLING

5.1 Introduction

Unbundling a vertically integrated firm involves several types of costs. In section 3, we have distinguished the following categories: transitional costs, loss of economies of scope, and increased risk of hold-up of investment in generation. Here we address each of these costs in more detail.

5.2 Transitional costs

Unbundling results in costs of restructuring companies' offices and rearranging contracts of integrated companies with other parties. Here we speak about one-off transaction costs associated with these processes. In the context of restructuring Dutch energy distribution companies, a special issue arises with respect to one type of financial contracts: cross-border leases (CBL).

Therefore, we present this issue separately in section 5.2.2, and analyse the effect of other transitional costs²² separately in section 5.2.3, ending the analysis with conclusions in section 5.2.4.

The existing cross-border leases of the network and power generation assets possibly generate large one-off transaction costs. Such costs may arise in the last two options. The textbox below elaborates on the issue of cross-border leases. Due to confidential information on these contracts, it is not possible to adequately predict the magnitude of these transaction costs. We only mention that, according to some experts, the current cross-border lease contracts may not need to be broken in the case of the ownership unbundling of the networks from the holdings. In some cases – when no substantial assets are to be unbundled – the respective transaction costs seems minor. However there is uncertainty for the cases in which substantial assets need to be unbundled. According to these experts, the issue might be solved by providing cross-guarantees between the current holdings (which are the parties that concluded the current cross-border lease contracts) and the companies/new holdings who will become the owners of the assets after the split. Notice that such a compromise implies no full financial ring fence.

Also the transfer of the management of regional transmission networks, proposed by the Minister, does not necessarily require breaking of the cross-border lease contracts. However, here too, there is uncertainty regarding transaction costs in the case of voluntary sales of transmission assets to TenneT.

In addition to the possible need for rearranging financial contracts, which in particular may be caused by the necessity to break the existing CBL contracts that we discussed above, there are

²² In economic literature, the concept of transaction cost has a much broader meaning than the one-off cost of reorganisation addressed in this section. This concept refers to the trade off between contractual relationships and internal organisation. (See e.g. Joskow, 2003b.)

also other transitional costs. These costs include the cost of the introduction of new ICT processes and program management, costs related to changes in personnel and housing, legal costs associated with implementing of a higher degree of unbundling, as well as costs associated with rearranging the other contracts of the companies with third parties.

Especially introduction of new ICT systems and restructuring the working process in the company may be costly. This is however one of the unavoidable costs associated with introduction of competition, since changes in technology are needed to accommodate more players in the energy market and to secure informational streams (we will discuss this also in the next section, when we address economies of scope). This means that substantial transitional cost arises already under the Legal-Fat option.

Little evidence is available regarding the magnitude of these one-off costs. For example, according to OECD (2003) one-off transaction costs of breaking-up the integrated firm are significant in the telecommunications industry. However, there may be substantial differences in such costs across industries. As there is little international experience with ownership unbundling in electricity, it is difficult to evaluate these costs, although we observe a couple of voluntary unbundlings (in the United Kingdom). The latter suggests that the one-off costs associated with breaking the last link is may not be large. However, this does not include the effect of CBLs. Also, since ownership unbundling is a new development, which companies have not experienced before, it may be that it will increase uncertainty in the market during the transition period.

Conclusion

Except from the current situation, which is the status quo, each of the other three policy options imposes some transition cost. Especially introduction of new ICT systems and restructuring the working process in the company may be costly. Therefore, changing the allocation of tasks when

shifting to the option Legal-Fat introduces a large reorganisation cost. Shifting to Legal-Fat Plus may give rise to only little extra transaction costs compared to Legal-Fat, while the cost of shifting to ownership unbundling is larger. Both, legal and financial costs may arise in this option. In particular, there is uncertainty about the cost associated with cross-border leases.

4.2 Economies of scope

In the electricity industry synergies between different activities could occur because of economies of scope. The latter exists if integration of different types of activities reduces average costs. We distinguish operational and financial synergy. Unbundling of network management from commercial activities and allocation of all strategic activities of the network to the network will reduce the options for combined activities and lead to losses of economies of scope.

Operational synergies

Let us first address the loss of economies of scope between the network and generation. Such scope economies exist where a company's generation is located at the own network area, however, their positive effect is countervailed by possible negative effects of vertical integration on competition. In the Netherlands, main production units feed into the transmission level (i.e., at and above 110 kV). If the management of all the high-voltage grids will be transferred to the TSO, ownership unbundling will not yield further loss of economies of scope between network and such generation units. Small generation units feed into the distribution level. Many of such units are not co-owned by utility holdings. Therefore, in many cases, economies of scope that may arise from common ownership of such units and distribution networks have not been explored anyway.

Economies of scope arise also between the network and supply activities. Common facilities such as call centres and billing machines are often mentioned as an example where synergies may

arise. However, these are exactly the activities where exchange of commercially sensitive information may take place. Hence, also in the case of legal unbundling, ‘Chinese walls’ have to be established to separate the information stream of the network from that of commercial companies. Notice that maintaining ‘Chinese walls’ in not fully unbundled network and supply companies active in the same region whose profit-maximising incentives work in the same direction (as both want to maximise the overall profit) may be costly and ineffective, because of large information asymmetry between the company and the regulator.

Even in the US-case, without these Chinese walls, Gilsdorf (1995) finds only insignificant economies of scope. After implementing legal unbundling and a proper division of tasks between the network and competitive activities, the additional losses of scope economies between the network and supply activities by introducing ownership unbundling are unlikely to be large in practice. Ownership unbundling leads to some additional loss of economies of scope. These additional costs follow from the removal of all remaining shared facilities, such as a common name, and shared activities, such as shared purchase of non-strategic products and shared contracts with, for instance, lawyers. After all, in the ownership option, all relationships between network firm and holding are removed.

We conclude that the loss of operational synergies occurs mainly between the central generation and transmission and between the network and retail. However, the choice for liberalisation of the electricity market exactly implies removing these economies of scope to a large degree, also under legal unbundling. Therefore, when comparing the four policy options, the main cost of losing economies of scope arises with introducing a proper task allocation when moving from Legal-Lean to Legal-Fat. The cost stays almost the same if we go further to Legal-Fat Plus. Additionally, ownership unbundling adds only small extra cost.

Financial synergies

Financial synergies (which is just another term for financial cross-subsidies) may be also sometimes seen as a form of economies of scope. An integrated firm has an advantage as it benefits from lower interest rates compared to the competitors. One may, however, wonder how these benefits of lower interest rates of an integrated firm come about. Using network assets as a base for non-network debts implies that shareholders of the network pay for the higher credit rating of the holding, by bearing higher risks on their future dividends from the network.

Lower interest rates on debts are unlikely to be passed on to customers for two reasons. First, as shareholders of the company pay for these lower rates through increased risk on their dividends, they are likely to demand a higher return on capital, thus offsetting the initial advantage. Secondly, the cost advantage is not available to all players in the market, as it is linked to owning a network. Firms without a network do not have access to the advantage, and can not gain access to this advantage either. It is a general feature of oligopoly markets that firms with exclusive cost advantages will not pass these advantages on to consumers, but transfer them into rents. From these considerations, we conclude that economies of scope that are associated with financial synergies are unlikely to be welfare improving.

We conclude that there are some economies of scope between the network and commercial businesses exploring which may be welfare improving. This positive effect on welfare is mainly due to the production technology in the electricity sector, which exhibits economies of scope, and the need for coordination of the actions of market participants, rather than due to financial synergies. When comparing the four policy options with respect to operational economies of scope, the main loss of such economies of scope arises after introducing a proper task allocation when moving from Legal-Lean to Legal-Fat. The cost stays almost the same if we go further to Legal-Fat Plus. Additionally, ownership unbundling adds only small extra cost.

As we have noticed above, the effect of financial synergy is mainly allocative and not on total welfare. There is however one related issue: eliminating financial synergies may increase the risk of insufficient investment in generation, which we discuss in the next section.

5.2. Increased risk of insufficient investments in generation

Theoretically, unbundling could affect risks for commercial parts of holdings in two ways. The first one is higher costs of capital. Unbundling could weaken the financial base of Dutch utilities, which may adversely impact their investment in generation. The second one is the reduced role of long-term contracts, also negatively affecting investment in generation. Both arguments relate to financing capabilities, namely to the possibility to use the network as a collateral. The current law already prohibits this for new financial contracts of the holdings. In this respect all three options that feature legal unbundling are equivalent. The Ownership option separates financing fully. Therefore, the risks are higher in this option. How serious are these risks? To which extent does the argument hold that unbundling financially weakens Dutch energy companies and, hence, reduces investments in generation capacity?

In a vertically integrated firm, the combined risk of all activities could be lower than the risk of some specific activities, notably commercial activities, due to the relatively low risks associated with network management. Firms active in generation and/or supply who do not have a network face a larger probability of bankruptcy. Hence, such companies have, *ceteris paribus*, a higher cost of capital than integrated firms. In other words, unbundling would reduce the financing capabilities of commercial firms and, hence, reduce investments.

On the other side, if this significantly affects profitability, electricity-producing companies or supply companies may (and will) solve it by merging with other companies, in particular those

active in less risky sectors or having network assets in other countries. For example, they may acquire a distribution company in another country or industry. If the market is sufficiently competitive, the companies will converge to the optimal structure in the long run.

The upstream level has already shown a process of consolidation of generating firms on the European level for several years. This process could be enhanced if firms were split from network firms. As a result, the number of players on the upstream level could reduce after splitting. Whether this would negatively affect competition is an issue subject to competition policy. Over and above, the question is whether the existence of vertically integrated firms would effectively countervail the on-going consolidation in the European power industry which may form a threat for achieving allocative efficiency in the electricity market. Such risks are always present. Competition policy measures, such as European merger control, seem to be far more appropriate to deal with these risks.

In electricity, there is a concern that when supply activities compete with each other, risks on the upstream side, i.e. on the side of generation, may increase. The source of this additional risk is the reduced role of long-term contracts in the retail market. With less long-term contracting, generators facing higher risks would invest less, possibly resulting in underinvestment in production capacity.

Green (2003) argues that retail competition might lead to less long-term contracting and to higher prices. If electricity retailers face competition, then companies signing long-term contracts are exposed to the risk that a fall in short-term prices would allow their rivals to buy on the spot market and undercut them. This will result in less contracting. This argument holds for both separate and integrated companies, and relates to the introduction of retail competition rather than

unbundling. In practice, both integrated and non-integrated companies have only relatively short-term contracts.

As said, the ability of Dutch utilities to invest in generation may reduce after ownership unbundling. However, the reduction in investment of these particular companies may be temporary, as they can improve their investment position by merging with other companies who may have investment capabilities. Furthermore, it is not obvious why such investment should necessarily be financed from the Dutch networks, as Dutch regional utilities are not the only investors in this market.

The amount of generation investment is determined by the future price for energy and the average costs of producing electricity. If access to the grid is guaranteed, new firms may enter the generation market if investment becomes economically attractive. This implies that the network does not and should not play an important role in financing generation investments. Higher levels of investments due to network-based lower capital costs may even be labelled overinvestment, as it is partly financed from other sources than the investment itself.

Related to this, we would like to touch upon the argument that is often mentioned, which is often put forward by the Dutch companies regarding the possible loss of work opportunities in the Netherlands after unbundling because of the closed head offices, no need for electricity production in the Netherlands, and smaller supply offices. See, e.g., the recent article by several leaders of the Dutch unions in 'Het Financieele Dagblad', where they argue that ownership unbundling will result in the loss of 14,000 -21,000 jobs in the industry.²³ This argument seems to boil down to 'no need to produce electricity in the Netherlands'. Although there indeed exists a

²³ FD, 08-04-2005: "Voorzichtig met energiebedrijven!" by L. de Waal, D. Terpstra, A. Verhoeven and J. de Jong.

'home-bias' phenomenon for investment (it is often easier to invest in your home-country than abroad), the main motivation for investment in generation is not the location of the head-office, but the expected return on such an investment. Hence, investment in generation in the Netherlands will occur when the return on such investment is sufficient.

Conclusion

We conclude, except for ownership unbundling the other three options are equivalent with respect to the effect on generation investment. The Ownership option may indeed reduce investment in generation by the currently integrated Dutch utility holdings. However, other parties will still be willing to invest as long as the expected returns are sufficiently high. In such a case, the risk of insufficient generation investment does not increase much.

6. CONCLUSION

6.1 Trade-offs per option

In this section, we compare the four policy options with each other, beginning with the current structure of the energy distribution industry. Table 6.1 depicts the trade-offs of Legal-Fat, Legal-Fat Plus and Ownership, using the current structure (Legal-Lean) as benchmark.

Legal-Fat

One difference between the Legal-Lean structure and the Legal-Fat structure, is that the step towards the latter increases independency of network managers and raises transparency of all the different activities of the integrated firm, thus increasing both the effectiveness and efficiency of network regulation. These are clear benefits of this option for structuring the energy distribution industry. Note that in price regulation, DTe already treats network companies as economic owners of their assets, and takes the corresponding capital cost into account when setting prices for network services. Moving the economic ownership of the assets to the network companies –

i.e., a shift from 'lean' to 'fat' – seems to be a logic step, formalising this and giving the regulator a better view on the network companies' costs.

Table 6.1 Costs and benefits of unbundling: improvement/decrease in total welfare under the alternative policy options as compared to Legal-Lean

	Legal-Fat (Legal unbundling with 'Fat' networks+ task allocation)	Legal-Fat Plus (Legal unbundling with 'Fat' networks+ task allocation+ extra rules on financing)	Ownership (Full ownership unbundling as proposed by the Ministry of Economic Affairs)
Benefits			
a. Performance of networks:			
- Better focus and more secure financing	Improvement	Larger Improvement	Even larger improvement
- Economies of scale	No change	No change	Depends on scenario
b. Effectiveness and efficiency of regulation	Improvement	Improvement	Larger improvement
c. Degree of competition:			
- retail	Small improvement with modest welfare effects	Small improvement with modest welfare effects	Small improvement with modest welfare effects
- generation	Improvement	Improvement	Larger Improvement
d. Benefits of privatisation	No change	No change	Improvement
Costs			
a. Transaction costs			
- Cross-border leases	Uncertainty, likely no effect	Uncertainty, but risk of large costs	Uncertainty, but risk of large costs
- Other costs	Welfare decrease	Welfare decrease	Larger welfare decrease
b. Loss of economies of scope:			
- Operational	Welfare decrease	Welfare decrease	Larger welfare decrease
- Financial	No change	No change	No change
c. Less investments in generation	No change	No change	Unlikely to change

Compared to the Legal-Lean structure, the Legal-Fat structure levels the playing field for all suppliers and may stimulate entry both in retail and in generation. In the case of retail, entry leads to increased competition, lowering end-user prices. As the decrease in end-user prices takes the form of lower standing charges (Lijesen, 2002), this will merely redistribute wealth from retailers

to consumers, rather than increase the level of wealth. In the longer run, increased competition between retailers may increase their efficiency, but given the cost share of retail in the end-user price of energy, welfare gains are likely to be modest. For generation, per unit prices are affected, leaving much more room for welfare increases. Furthermore, gaming in generation may lead to considerable welfare losses, so that a decrease in the scope for gaming may increase welfare substantially. These benefits are (partly) achieved by applying the Legal-Fat structure, which is a stronger unbundling form than Legal-Lean.

Going from the Legal-Lean structure to the Legal-Fat structure also gives rise to costs. Making the network owner fat gives rise to one-off transition costs. Furthermore, due to the extended operational separation between network and supply, loss of economies of scope occurs.

Legal-Fat Plus

Compared to the Legal-Fat structure, the Legal-Fat Plus structure would mainly affect the independence of network financing. Note from the table that these options are very similar in terms of costs and benefits. In the Legal-Fat Plus option, the management of networks will have increased means, as the credit rating based on network assets is now fully available for the network itself. On the negative side, giving the network more financial independence imposes some risk on old financial contracts of the holdings, such as CBL contracts. However, there is uncertainty regarding the latter effect.

Ownership

The Ownership structure alters several categories of benefits and costs compared to the Legal-Fat structure. The entirely independent status following from full ownership unbundling will further improve the management of networks, as network firms will now no longer be compromising between the interests of the network and other activities. Furthermore, depending on the scenario

with respect to regional transmission, full unbundling may facilitate horizontal mergers at the transmission level, which may give rise to economies of scale.

A further benefit of unbundling is that it eases network regulation greatly, especially since the network firm no longer has an incentive to influence downstream competition. This implies that network regulation will become both more effective and more efficient.

Competition in retail or generation is further facilitated, as cross-subsidies are now fully impossible and the incentive for all forms of anti-competitive behaviour is taken away. Note that, as said before, welfare effects from competition in generation are likely to be larger than welfare effects from competition in retail. The net effect of entry and consolidation in the case of ownership unbundling depends on the current market structure. As discussed before, the Dutch supply market is already highly concentrated. It must be questioned whether ownership unbundling would result in further concentration due to consolidation. Other measures, notably directed at tackling mergers and concentration, would be needed to prevent this outcome.

A benefit which (under the current governance structure) can be achieved by ownership unbundling is the possibility to privatise commercial activities while keeping network firms in public hands. If this option is highly valued, ownership unbundling seems to be the appropriate choice.²⁴ The increased transparency following from the unbundling attracts more focused shareholders for both parts of the firm, thus increasing the value of the firm to shareholders. Moreover, privatisation of the commercial activities increases shareholder pressure to raise efficiency.

²⁴ However, if shareholders would have more influence on decisions on the current distribution firms, as result of another governance structure, some firms would split voluntary.

The costs of the Ownership option, compared to the Legal-Fat Plus are an increase in the loss of economies of scope and higher transitional costs. Furthermore, investment in generation may be affected. The loss of economies of scope is fairly small, due to the regulations already in place in all of the options in the table. The order of magnitude of transitional costs mainly depends on the risk of dissolving the current CBL contracts of some companies. Regarding the generation investment, the effect is likely to be small and temporary.

How does this option compare to the Legal-Fat Plus option? From the above, it is clear that at least one of the cost elements (loss of economies of scope) is probably fairly small, whereas the benefits are larger than in the Legal-Fat Plus case. The final judgement of the step of full ownership unbundling is ambiguous however, as it depends on how one weighs the costs against the benefits.

6.2 Conclusions on ownership unbundling

Ownership unbundling strongly increases independence of network management, fostering the focus of network companies on their direct activities. This encourages investment and innovations in the grid and hence reduces the risk of insufficient investment in networks.

This effect is related to the improved effectiveness of regulation, enabling the regulator to acquire adequate information needed to determine appropriate access charges. Related to this, ownership unbundling increases efficiency of regulatory activity as the regulated parties have less incentives to strategically relocate costs and benefits and affect competition in the market. Ownership unbundling facilitates competition in retail by tackling the potential tight oligopoly in this market, but total welfare would be hardly affected by this. The impact of ownership unbundling on welfare is higher if it facilitates competition in the wholesale market which mainly depends on the future development of small-scale generation and separation of the transmission grid.

Furthermore, ownership unbundling enables privatisation of commercial activities, making them more sensitive to shareholder pressure to increase efficiency and giving current public shareholders the option to withdraw their capital from commercial activities.

This generates a more clear distinction between the role of the government and activities of market parties in the liberalised part of the industry.

The realisation of these results is, of course, not a free lunch. Ownership unbundling reduces economies of scope and, furthermore, creates one-off transaction costs. There is uncertainty about the size of the one-off transaction costs caused by the impact of unbundling on the current cross-border leases. Unbundling may also affect investments in generation by the currently vertically integrated Dutch utility holdings, but this is unlikely to affect overall investments in power plants.

Mainly because of the uncertainty about the future role of small-scale generation and the uncertainty about the magnitude of the transaction costs related to the cross-border leases, the net effect on welfare of ownership unbundling is ambiguous. Ownership unbundling is not the only option to realise some of the benefits mentioned above. By fierce regulatory surveillance and competition policy, competition in the retail market can be improved. Moreover, changing the corporate governance structure can give (public) shareholders the option to withdraw from risky, commercial activities. As in that case shareholders have information on the magnitude of the transaction costs they incur by unbundling a specific utility, voluntary unbundling will take place where it is efficient.

6.2 Final considerations

Besides the benefits and costs considered above, other factors should be taken into account.

One factor is the impact of the decision on unbundling on future freedom to change policies.

Contrary to the legal-unbundling options, ownership unbundling is a radical measure. The

uncertainty regarding the welfare effect suggests the alternative of postponing the decision on unbundling in order to wait for more information, in particular on the development of small-scale generation and the degree to which it is encouraged or hindered by the currently legally unbundled distribution networks.

A comparable 'wait and see attitude' is now adopted by several states in the United States regarding introducing competition in the electricity industry, waiting for more evidence on effects of restructuring the electricity industry in states running at the forefront in this process. According to Joskow (2003a), experts do not agree on the most appropriate way for proceeding with structural and institution reforms. An additional argument for this attitude follows from the European perspective. None of the other EU-members has already introduced ownership unbundling or is now considering doing so. These are arguments in favour of maintaining or improving legal unbundling possibly in combination with other policy measures improving independence of network management, such as increasing the power of shareholders and improving regulation and competition policy.

On the other hand, waiting to decide creates uncertainty about the future institutional design. This could cause a hold-up problem: private firms delaying investment decisions because of the risk that the government will alter conditions affecting profitability of these investments in the future. This is an argument in favour of ownership unbundling, as that decision would strongly reduce uncertainty. However, uncertainty would also be reduced by legislation determining the legal structure for a long period of time.

Another factor which should be taken into account is the relationship between unbundling and privatisation. If the government were to choose for legal unbundling and subsequently privatise the vertically integrated companies, it loses the chance to split privatised companies in the future

if such a measure appears necessary. In addition, given the reservations of the politicians regarding privatisation of the infrastructure, improving legal unbundling instead of imposing ownership unbundling hinders the possibilities to privatise commercial activities. This is also an argument in favour of ownership unbundling. However, improving the corporate governance structure can give the current public shareholders the power to sell commercial businesses of the utility holdings.

From these considerations, another route regarding the utility industry might be an option. This route consists of improving the current legal unbundling structure and improving the corporate governance structure. When these measures appear not to be sufficient for the development of small-scale generation and the privatisation of commercial activities, ownership unbundling is the logical next step.

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