

**Consultation Document  
on the Cost of Capital for Regional Network  
Managers**

*The Hague, December 2005*

**PROJECT NAME**                      **Consultation Document on the Cost of Capital of Regional Network Managers**  
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**NETHERLANDS COMPETITION AUTHORITY**  
**OFFICE OF ENERGY REGULATION**  
**THE HAGUE, DECEMBER 2005**

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## 1 Summary

On 1 January 2007, the third regulatory period will start for the regional electricity grid managers. On 1 January 2008, the third regulatory period will start for the regional gas network managers. This means that in mid-2006 (electricity) and mid-2007 (gas), new method and x-factor decisions will have to be taken for these network managers.

The Board of Directors of the Netherlands Competition Authority (hereinafter "the Board") aims to inform the market of and consult the market about possible changes to the general framework of market regulation. The purpose of this document is to inform the market of and consult the market about the Board's views on the level of the regulatory cost of capital of network managers. This cost of capital enables efficient companies to recover the necessary investments in the network. The cost of capital plays a role in determining the method used in setting the x-factor and may have consequences for the level of the x-factor.

The regulatory cost of capital is currently 6.6% for electricity grid managers, and 6.8% for gas network managers (the real cost of capital, including an allowance for tax). These costs of capital have remained constant throughout the first two regulatory periods (a total of six years). In recent years, however, several changes have occurred which raised the question as to whether the level of the cost of capital which had been determined was still appropriate.

In this document, the Board sets out the consequences which these developments may have for the level of the regulatory cost of capital. The Board also requests market parties to respond to the proposed methods used in determining the cost of capital.

In a number of cases, the Board uses bandwidths for the proposed parameters. The bandwidths indicate the range which the Board considers reasonable at this moment. The table below provides the parameters proposed by the Board. The Board is of the opinion that these parameters are applicable both to the regional electricity grid managers and to the regional gas network managers. The mean of the bandwidth for the actual pre-tax cost of capital is 5.7%.

	Low	High
Nominal risk-free rate	3.8%	4.3%
Debt premium	0.8%	0.8%
<b>Cost of debt</b>	<b>4.6%</b>	<b>5.1%</b>
Equity risk premium	4.0%	6.0%
Asset beta	0.23	0.36
Equity beta	0.47	0.74
<b>Cost of equity</b>	<b>5.7%</b>	<b>8.7%</b>
Gearing	60%	60%
Tax rate	30%	30%
<b>Nominal pre-tax cost of capital</b>	<b>6.0%</b>	<b>8.1%</b>
Inflation	1.25%	1.25%
<b>Real pre-tax cost of capital</b>	<b>4.7%</b>	<b>6.7%</b>

## 2 Background

1. On 1 January 2007, the third regulatory period for regional electricity grid managers will commence. On 1 January 2008, the third regulatory period for regional gas network managers will commence. This means that in mid-2006 (electricity) and mid-2007 (gas), new method and x-factor decisions will have to be determined for these network managers. The Board of Directors of the Netherlands Competition Authority (hereinafter "the Board") aims to inform the market of and consult the market about possible changes to the general framework of market regulation. The purpose of this document is to inform the market of and consult the market about the Board's views with regard to the level of the regulatory cost of capital for network managers. This cost of capital enables efficient companies to recover the investments which they have to make in the network.
2. At present the cost of capital is 6.6% for electricity grid managers and 6.8% for gas network managers.<sup>1</sup> These costs of capital have remained constant throughout the first two regulatory periods (a total of six years). In recent years, however, several changes have occurred which raised the question as to whether the level of the cost of capital which had been determined was still appropriate. These changes relate, for instance, to the macroeconomic environment, such as expected inflation, changes to the financial markets, for instance in relation to expected interest rates, and changes in expected tax rates. In this document, the Board indicates what consequences these developments may have for the level of the regulatory cost of capital. The Board also requests market parties to respond to the Board's views.

## 3 Structure of the document

3. The structure of this document is as follows. Chapter 4 deals with the legal context of the information and consultation process, as well as the status of this consultation document. Chapter 5 deals with the further procedure. Chapter 6 discusses the estimated cost of capital against the background of the regulatory system currently applied. After this, chapter 7 discusses the methods which can be used to set the parameters for determining the cost of capital. These involve the following parameters: the cost of debt, the level of gearing, the tax rate, the cost of equity and the development of the consumer price index. Chapter 8 of the document discusses the possible effects of several structural changes on the level of the cost of capital. This relates, in

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<sup>1</sup> This is the so-called real cost of capital, including an allowance for corporation tax. Chapter 7 of this document gives a further explanation of the definitions and terminology used.

particular, to the possible consequences of the bill aimed at splitting energy companies [*Splitsingswetsvoorstel*], which is currently before Parliament.<sup>2</sup>

4. In this document, the Board asks a number of questions about the methods used to determine the cost of capital. At the same time, this document also provides an indication of the bandwidths within which a suitable cost of capital should be determined. An overview of the consultation questions is contained in Annex 1.
5. The main points on which the document rests will be set out in this consultation document. For a more detailed substantiation, you are referred to the report by Frontier Economics (hereinafter "Frontier") on the cost of capital for regional network managers entitled "The Cost of Capital for Regional Distribution Networks".<sup>3</sup> Frontier's report forms an integral part of the consultation.

## 4 Statutory context and the status of the consultation document

6. Pursuant to section 41 of the Electricity Act of 1998 (hereinafter "the Electricity Act") and section 81 of the Gas Act, the Board is required to adopt a method for determining the price cap to promote operational efficiency. The price cap to promote operational efficiency has the aim, amongst others, of ensuring that network managers in any event cannot obtain a return which is higher than that which is usual within the economy and of ensuring that equivalent efficiency is promoted amongst network managers (section 41(3) of the Electricity Act and section 81(2) of the Gas Act).
7. The price cap, which is also referred to as the x-factor, must be determined separately for each network manager for a period of three to five years (section 41a of the Electricity Act and section 81a of the Gas Act). Pursuant to sections 41b and 41c of the Electricity Act and section 81b and 81c of the Gas Act, the Board is required to set the maximum tariffs (hereinafter "the tariffs") for electricity grid managers and gas network managers, taking into account, for instance, the x-factor.
8. The cost of capital which this consultation document raises for discussion plays a role in determining the method used to set the x-factor and may affect the level of the x-factor. The role which the cost of capital plays in the regulatory system will be explained in more detail in chapter 6 of this document. By law, the cost of capital should not be higher than that which is usual within the economy.

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<sup>2</sup> Amendment of the Electricity Act of 1998 and the Gas Act in relation to further rules with regard to independent network management. Lower House of the Dutch Parliament, 2005-2006, 30 212, Nos 1-4 [*Wijziging van de Elektriciteitswet 1998 en van de Gaswet in verband met nadere regels omtrent een onafhankelijk netbeheer*].

<sup>3</sup> Frontier Economics. *The Cost of Capital Allowance for Regional Distribution Networks*. December 2005, [www.dte.nl](http://www.dte.nl)

9. The standpoints of the Board expressed in this document are preliminary by nature and may be amended on the basis of the responses of respondents. The document therefore has no legal status which binds the Board to its contents.

## 5 Further procedure

10. A number of questions are posed in this document. The Board requests you to respond to these questions. Respondents are asked to substantiate and explain their answers to the questions as far as possible.
11. The Board would appreciate receiving your response before 20 January 2006, preferably by e-mail addressed to [DTe-Financieringnetbedrijven@nmanet.nl](mailto:DTe-Financieringnetbedrijven@nmanet.nl), stating the project number 101729. Responses may also be sent by mail to the following address, stating the project number:

**Netherlands Competition Authority**  
**Office of Energy Regulation**  
**Project Number 101729**  
**P.O. Box 16326**  
**2500 BH The Hague**  
**The Netherlands**

12. In principle, the Board will publish the responses received from respondents on its website. If certain parts of your response are of a confidential nature, you are requested to mark the respective passages as confidential.
13. The Board will take the responses into account in determining the definitive method for setting the cost of capital. Within the framework of the procedure for adopting the method decision for the regulation of electricity grid managers, the Board will indicate how it has dealt with the responses to these consultations. In addition, (if necessary) the Board will draw up a position paper in the second half of 2006 to discuss (any) opinions which relate specifically to the cost of capital of regional gas networks.
14. The following indicative schedule will be adhered to for these steps:
  - beginning of December 2005: the consultation document will be sent to network managers and representative organisations and will be published on DTe's website;
  - 20 January 2006: deadline for the submission of responses to the consultation document;
  - 1 March 2006: publication of the draft method decision for regional electricity grid managers;

- 1 June 2006: adoption of the method decision for regional electricity grid managers;
- the second half of 2006: publication of the position paper on the cost of capital of regional gas network managers.

## 6 Background

15. The Board intends to base the x-factor for the third period on the system of yardstick competition introduced in the second regulatory period (2004 to 2006). In this system, the x-factor is based on the average change in productivity of companies in the sector. In this regard, productivity is measured on the basis of the development of standardised economic costs per unit of composite output.<sup>4</sup>
16. An important part of the standardised economic costs of the regulated companies is the cost of capital. In a capital-intensive sector, such as network management, these constitute a substantial part of the total costs. The cost of capital is a percentage based on the invested capital (the standardised asset value of the network manager). The cost of capital includes both an allowance for invested debt capital and invested equity.
17. It is of considerable importance that the cost of capital is set at the right level. A cost of capital which is too high would result in a situation where buyers receive too little for their money. A cost of capital which is too low will result in a situation where providers of capital are not sufficiently willing to make capital available for investments in the network. As a result, necessary investments may come under pressure. A cost of capital which is too low also results in buyers' having to pay too little relative to the costs of the service provided.
18. In assessing the desired level of the cost of capital, an investor will mainly consider the risk associated with an investment in a network manager. A relatively high risk will be accompanied by a relatively high required return and a lower return will be sufficient if the risk is relatively low.

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<sup>4</sup> The regulatory system is set out in method decisions published on DTe's website ([www.dte.nl](http://www.dte.nl)). The full title of this decision for regional electricity grid managers is: Decision adopting the method for determining the price cap to promote efficient operations, pursuant to section 41 (4) of the Electricity Act of 1998 (September 2003) [*Besluit tot vaststelling van de methode van de korting ter bevordering van de doelmatige bedrijfsvoering ingevolge artikel 41, vierde lid, van de Elektriciteitswet 1998*]. In the case of the regional gas network managers, the title is: Decision of the Board of Directors of the Netherlands Competition Authority amending the decision of 31 August 2004 (reference 101732-31), adopting the method for determining the price cap to promote efficient operations, as referred to in section 81 (1) of the Gas Act (September 2005) [*Besluit van de Raad van Bestuur van de Nederlandse Mededingingsautoriteit tot wijziging van het besluit van 31 augustus 2004 (kenmerk 101732-31), tot vaststelling van de methode van de korting ter bevordering van de doelmatige bedrijfsvoering als bedoeld in artikel 81, lid 1, van de Gaswet*].



19. The cost of capital is not based on the actual cost of capital incurred by the separate network managers. After all, it is not possible to determine such an allowance accurately because several components of the cost of capital cannot be determined accurately at the company level. For this reason, the Board has determined a cost of capital which is the same for all network managers. This cost of capital is based on the cost of capital of a network manager which finances itself efficiently. This gives the network managers an incentive to finance their operations efficiently.
20. The estimate of the cost of capital is (partially) based on undertakings which are comparable to electricity grid managers or gas network managers in the Netherlands on which data are available. The approach followed in this regard is explained below and in the aforementioned report by Frontier.

## **7 Determination of the cost of capital**

21. In this chapter, the Board will discuss the various parameters which jointly determine the level of the regulatory cost of capital. Before discussing the various parameters, a few general comments are made in section 7.1, which are relevant to both the cost of debt and the cost of equity.

### **7.1 Introduction**

22. Companies can finance their operations by means of both debt capital (such as bonds and loans) and equity (such as the issuing of share capital). The various types of capital have different costs of capital, which in turn are partly affected by the fiscal treatment of these types of capital. The cost of capital used is therefore a weighted average of the cost of debt capital and equity, whereby the proportion of these types of capital in the total capital of the network manager is used as the weighting factor. This cost of capital allowance is referred to as the 'Weighted Average Cost of Capital' (WACC).
23. As is explained in the text box, the Board applies a real cost of capital before taxation. This means that the cost of capital does not include an allowance for inflation. This is not necessary because the network managers' tariffs increase annually in line with inflation. The cost of capital used, however, does include an allowance for corporation tax.

**Box: Determination of the cost of capital as a formula**

The approach proposed by the Board is to use a real cost of capital (WACC) before taxation (a real pre-tax WACC). This means that a WACC is used which does not include the effect of currency depreciation (inflation) and that the WACC also includes an allowance for corporation tax. This WACC is derived as follows:

$$\mathbf{WACC}_{after\ tax} = \mathbf{g \times r_d (1-T) + (1-g) \times r_e} \quad \mathbf{(1)}$$

Where:

$r_d$  is the cost of debt (D);

$r_e$  is the cost of equity (E);

T is the corporation tax rate; and

g is the gearing (D/[D+E]).

The above formula means that the WACC after tax is a weighted average of the cost of debt and equity. Since the interest costs are deductible from taxable earnings, in determining the WACC (after tax), only the net interest costs are taken into account.

Since network managers are also required to pay corporation tax, the above formula, however, cannot simply be used to determine the cost of capital. The (after-tax) WACC still has to be increased to take into account the tax payable. The formula for the pre-tax cost of capital proposed by the Board is as follows:

$$\mathbf{WACC}_{pre-tax} = \mathbf{g \times r_d + [(1-g) \times r_d]/(1-T)} \quad \mathbf{(2)}$$

The required cost of capital, however, cannot be measured directly in practice. For this reason, the respective parameters of the proposed method are first measured in nominal terms in accordance with formula (1). The pre-tax cost of capital is then calculated by dividing the term (1-T) by the result obtained. The result of this exercise is set out in formula (2). Finally, the nominal data are corrected for expected inflation to obtain the real pre-tax cost of capital.

24. The Board proposes determining the cost of equity capital on the basis of the Capital Asset Pricing Model (CAPM). This model is considered by the financial world and regulators to be the most suitable model for determining the cost of capital. The CAPM makes it possible to calculate the cost of capital for all systemic risks (market risks) which a company incurs. Risks which are not related to market risk, so-called non-systemic risks, can be eliminated by an investor by maintaining an investment portfolio of sufficient size and spread, so that the investor only requires compensation for systemic risks.
25. The non-systemic risk is important in determining the compensation given to providers of debt capital. The non-systemic risk, together with the systemic risk, comprises the total risk. The total risk determines the probability of default and therefore the debt premium. The size of the non-

systemic risks depends partly on the expected degree to which business-specific cost shocks occur.

26. In this document, the Board proposes not distinguishing between a separate cost of capital for regional electricity grid and gas network managers. The Board is of the opinion that, given the comparable risks associated with electricity grid and gas network management and the correspondences in their regulatory systems, there is no substantive reason to distinguish between the cost of capital for regional electricity grid and gas network managers. The fact that the cost of capital for certain types of network managers is determined at different moments may possibly result in differences in the cost of capital determined.

*Question 1: The Board proposes not using a separate cost of capital for electricity grid and gas network managers. Do you agree with this approach?*

27. In determining the cost of capital, it is important that a cost of capital is determined which is considered representative for the next regulatory period. This means that the cost of capital to be determined should ideally be "forward-looking" and should anticipate expected developments. In practice, however, it is difficult to predict expected developments on the financial markets. An attempt is made to take this into account by paying attention to the recent past and giving consideration to a slightly longer period in determining the parameters for the cost of capital. If possible, forecasts with regard to the parameters are also taken into account in determining the cost of capital. Furthermore the parameters set must be sufficiently robust in the light of possible developments on the financial markets during the regulatory period. This is achieved by making conservative estimates of variables. Finally, the Board takes into account the possible uncertainty with regard to the various parameters by using bandwidths, where relevant. These bandwidths are an indication of the range which the Board considers reasonable. Market parties are asked to what extent they consider the proposed ranges reasonable. In addition, they are asked how the cost of capital should ultimately be derived from this range.
28. In accordance with the Electricity Act of 1998, a regulatory period lasts for three to five years. The bill to split energy companies recently presented to Parliament<sup>5</sup> will possibly limit the duration of the third regulatory period for electricity grid managers to one year. Since the bill has not yet been passed by Parliament, the Board has decided to prepare for the third regulatory period as if its duration will not be limited. In the discussion below, the Board will therefore assume a regulatory period of three to five years.

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<sup>5</sup> Amendment of the Electricity Act of 1998 and the Gas Act in relation to further rules with regard to independent network management, *op. cit.*

## 7.2 *Cost of debt*

29. The cost of debt is calculated by determining the risk-free rate and the debt premium. In the following subsections, the determination of these parameters is discussed.

### 7.2.1 *Risk-free rate*

30. The risk-free rate is the required return on investment without any form of risk. In practice, however, a completely risk-free investment does not exist. The risk-free rate can be estimated by assuming the required return on a government bond. In determining which bond best represents the risk-free rate, a number of factors play a role. These factors are discussed below.

#### *Life to maturity of the bond*

31. Normally there is a positive correlation between the life to maturity of a (government) bond and the required return. This positive correlation can be explained, for instance, by a greater inflation risk and an increased probability of bankruptcy in the case of bonds with a longer life to maturity. This means that a short-term bond provides the best estimate of the risk-free rate. Short-term bonds, however, are more sensitive to changes in economic conditions and (expected inflation) than long-term bonds. As a result, the required return on these bonds is more volatile compared to long-term securities.
32. For this reason, the Board proposes using a government bond with a life to maturity of 10 years to determine the level of the risk-free rate. A life to maturity of 10 years generally corresponds better to the average life to maturity of the debt capital of companies than short lives to maturity. In addition, the market for bonds with a life to maturity of 10 years is relatively liquid.

*Question 2: Do you consider a life to maturity of 10 years to be a good life to maturity for determining the risk-free rate?*

#### *Reference period*

33. The Board proposes determining the risk-free rate on the basis of the average return required by investors on the 10-year Dutch government bond for a period considered representative prior to the start of the regulatory period.
34. The Board considers it important that the reference period used is representative of the (expected) risk-free rate in the coming regulatory period. The Board is of the opinion that a recent period provides a better estimate of the risk-free rate for the coming regulatory period than data for a longer period, since a recent period provides a better reflection of present conditions on the capital market. The use of a very short period, however, may lead to a situation, for instance due to economic shocks, where the risk-free rate is based on a period which will not be representative for

the coming regulatory period. In addition, the risk-free rate may be relatively volatile in the shorter term, so that too short a period is not desirable from the point of view of obtaining robust estimates. A reference period of two years is regarded as a reasonable period on which to base the risk-free rate.

35. In the light of developments on the capital market—the historically low level of (risk-free) interest rates—it may be worthwhile, however, to take a longer period into account when determining the risk-free rate. By also taking into account a period of five years, a situation can be avoided where too much emphasis is placed on the most recent historic data. As a result, a stable and cautious estimate can be made of the risk-free rate.
  
36. The Board proposes determining the risk-free rate as a bandwidth. The lower limit of the band is determined by the average risk-free rate during the past two years; the upper limit of the band is determined as the average risk-free rate for the past five years.

*Question 3: Do you agree with the chosen reference period of two to five years for the risk-free rate?*

*Nominal or index-linked bonds*

37. In addition to the use of nominal bonds, it is possible to make use of index-linked bonds (hereinafter "indexed bonds"). Such bonds offer a return which is indexed for inflation. In contrast to nominal bonds, indexed bonds therefore offer a real return, that is a return which is not affected by the development of inflation. The use of indexed bonds may be useful because the Board uses a real cost of capital.
  
38. The market for indexed bonds, however, is a relatively young market. Under the present circumstances, it is possible that the yield on index-linked (government) bonds does not fully reflect the risk-free rate. The reason for this is that the market for indexed bonds is generally much less liquid than the market for nominal bonds. The State of the Netherlands, in contrast to, for instance, the French or British governments, has not as yet issued indexed government bonds. If the French indexed bonds are used, however, this may result in an overestimate of the risk-free rate due to the relatively low liquidity of these bonds. In addition, as a result of legal obligations in the United Kingdom, certain institutional investors are obliged to invest in indexed bonds, which may result in an underestimate of the risk-free rate.
  
39. On the basis of the above, the Board proposes not making use of indexed government bonds.

*Question 4: What, in your view, the advantages and disadvantages of using indexed bonds?*

*National or international bonds*

40. The risk-free rate can be determined by using Dutch or international bonds. If bonds of countries within the Eurozone are used, exchange-rate risks and other structural differences in capital market conditions between the countries must be taken into account. If bonds within the Eurozone are considered, the required yield on government bonds will be well aligned to the required yield on Dutch government bonds. It appears, for instance, from data obtained from Eurostat<sup>6</sup> that the average 10-year interest rate on Dutch government bonds was 3.43% (from November 2004 up to and including October 2005), while the 10-year interest rate in the Eurozone was 3.47%.
41. The Board proposes using Dutch government bonds.

*Question 5: Do you agree with the proposal to use Dutch government bonds?*

## 7.2.2 Debt premium

42. The debt premium is the premium which investors require a due to the additional risk that they incur, compared to a risk-free investment. In general, it can be argued that the debt premium is higher the greater the probability of default. The probability of default depends, for instance, on the activities of the undertaking, the associated volatility of its cash flows and the method of financing. The regulatory system may also affect the probability of default.
43. The Board proposes determining the debt premium by taking into consideration the historical debt premium, as well as making use of a reference group. The reference group is comprised of undertakings whose activities correspond as far as possible to the activities of network managers, which have issued long-term debt securities and have a rating which is in the vicinity of a single A rating.<sup>7</sup> The Board also proposes using the single A rating as the basis for determining the level of gearing (debt capital as a proportion of total capital, see section 7.3). As a result, the probability of default of the reference group is comparable to the probability of default of the network managers.
44. In order to make the best possible estimate of the debt premium, the characteristics of the bonds, on the basis of which the debt premium is determined, must correspond as closely as possible to the characteristics of the bonds on the basis of which the risk-free rate is determined. On the basis of this assumption, the debt premium is determined by including undertakings in the reference group which have issued nominal bonds with a remaining life to maturity of approximately 10 years. The reference group proposed by the Board for the debt premium is listed in section 4.3.2 of Frontier's report.

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<sup>6</sup> <http://europa.eu.int/comm/eurostat>.

<sup>7</sup> In this regard, the Board assumes the scale used by the credit rating agency Standard & Poors.

45. The average debt premium on European corporate bonds with a single A rating amounted to 71 basis points over the past five years. The debt premium required during the past two years on corporate bonds issued by companies in the reference group varied from approximately 50 basis points to 90 basis points. The average required yield on corporate bonds in the reference group amounted to 60 basis points.
46. The Board proposes setting the debt premium at 80 basis points. As a result, the debt premium will be set slightly higher than the aforementioned two-year and five-year averages. In determining the debt premium, the Board took into account the volatility of the debt premium. This also makes it possible for regional network managers to recover any transaction costs.

*Question 6: Do you agree with the proposed method for determining the debt premium and the proposed level of this premium?*

### **7.3 Gearing**

47. Gearing relates to the degree to which an undertaking is financed by debt capital, expressed as a fraction of total capital. The point of departure in determining the level of gearing for the purpose of determining the regulatory cost of capital is to make it possible for network managers to achieve a healthy solvency position. The extent to which a solvency position can be considered healthy depends partly on the activities of an undertaking and may therefore differ from one sector to another. For this reason, in determining the level of gearing, the Board has taken into account the relatively low risk profile associated with carrying out network management activities. A second point of departure in determining the level of gearing is to provide network managers with an incentive to achieve an efficient capital structure.
48. In the first two regulatory periods, the Board applied a level of gearing of 60% debt capital (as a percentage of total capital). In the light of the aforementioned starting points (a healthy solvency position and an efficient capital structure) and developments on the market, the question which arises is whether there are reasons to adjust the level of gearing.
49. In general, depending on the level of interest rates and the nature of a regulated network company, it can be argued that it may be attractive for a network company to finance itself by means of a relatively high proportion of debt capital (compared to other types of undertakings). Regulated network companies are, after all, undertakings with stable cash flows and relatively valuable assets with a long economic life. Partly due to stable demand for the transmission of energy and annual indexation of their tariffs on the basis of actual inflation, the network companies can generate relatively stable and predictable operating cash flows. As a result of these characteristics, providers of capital are expected to be willing to offer a relatively large amount of debt capital on relatively favourable terms. The present low level of interest rates combined with

the favourable conditions under which network managers can obtain finance may make it attractive to network companies to achieve a higher level of gearing. As long as the level of indebtedness of network managers does not become too high, this may result in lower financing costs.

50. It is therefore possible that undertakings will aim to achieve higher levels of gearing. The Board is of the opinion that it is not desirable to anticipate higher levels of gearing in the regulation of these companies, since this could result in a relatively lower return for companies which opt for conservative financing (with lower levels of gearing). In addition, it is possible that a higher level of gearing will result in a reduction in the financial stability of network managers. In the light of the above, the Board considers it reasonable to maintain the level of gearing at the present level of 60% in determining the regulatory cost of capital.

*Question 7: What is your opinion of determining the cost of capital on the basis of the present level of gearing of 60%?*

#### **7.4 Tax rate**

51. The tax rate is the average corporation tax rate applicable to undertakings in the Netherlands during the regulatory period. This tax rate is not yet known prior to the regulatory period. Adjustments to corporation tax rates in the method for determining the cost of capital proposed by the Board, in which the cost of capital also includes compensation for corporation tax, may unintentionally result in a higher or lower cost of capital for network managers. The present cost of capital, for instance, is based on a corporation tax rate of 35%, while the actual rate is lower. This has had an unintended positive effect on the returns of network managers. To avoid unintended effects of this sort, the Board proposes including deviations from the expected and realised tax rates in the rates for the fourth regulatory period (referred to hereinafter as "retrospective settlement").
52. The marginal corporation tax rate will amount to 31.5% in 2006, but will fall further to 29.6% and 29.1% respectively in 2006 and 2007. According to the most recent Tax Plan, the rates will fall further in later years to 26.9%.<sup>8</sup> Before determining the (draft) decisions, the Board proposes using the best possible estimates of expected corporation tax rates on the basis of the information available at the time. If the rates develop contrary to expectations during the regulatory period, the Board proposes settling the difference retrospectively. This will ensure that the adjustment to corporation tax rates does not have financial consequences for network managers.

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<sup>8</sup> See <http://vpb2007.minfin.nl> for the most recent update of the tax plans.



53. In this document, for the time being the Board will base its calculations on a corporation tax rate of 30%. This rate is higher than the present level and is also higher than the level which the Board expects for the coming years.

*Question 8: Do you agree with the way in which the tax rate is determined above?*

## 7.5 Cost of equity

54. The cost of equity is calculated by multiplying the equity beta by the market risk premium and by adding the risk-free rate to this product.

### 7.5.1 Equity risk premium

55. The equity risk premium is the expected return which investors require for the additional risk associated with an investment in the market portfolio, compared to a risk-free investment. The way in which the Board intends to determine the risk-free rate has been set out above.
56. To determine the level of the equity risk premium, use is made of both the historically realised (*ex post*) equity risk premium and expectations with regard to the future (*ex ante*) equity risk premiums.

#### *Ex post equity risk premium*

57. It appears from recent literature<sup>9</sup> that academics are divided about whether the *ex post* equity risk premium should be determined on the basis of the geometric or arithmetic average. The Board is of the opinion that it is reasonable to determine the equity risk premium on the basis of results generated by both methods.
58. On the basis of extensive research into the level of the equity risk premium in 16 different countries during the period from 1900 to 2002, it appears that the equity risk premium of this "world" index, calculated on the basis of the geometric and arithmetic averages, amounts to 3.8% and 4.9% respectively.<sup>10</sup> If only data on the Netherlands is taken into account, this results in an equity risk premium of 3.8% or 5.9% on the basis of the geometric and arithmetic averages respectively. Since government bonds were taken as the point of departure in determining the risk-free rate, the Board—if possible—will use the equity risk premium determined on the basis of the national share index.

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<sup>9</sup> Wright, Stephen, Robin Mason and David Miles. *A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.* Study on behalf of Smithers & Co Ltd, 2003.

<sup>10</sup> Dimson, Marsh and Staunton. *Global Investment Returns Yearbook 2002* (ABN AMRO/London Business School, 2003).

*Ex ante and equity risk premium*

59. The *ex ante* expectations with regard to the level of the equity risk premium are based, on the one hand, on models which adjust the historically realised equity risk premiums by making use of macroeconomic data, such as the growth in gross domestic product. On the other hand, the *ex ante* expectations are based on surveys amongst investors and undertakings into their expectations with regard to the development of the equity risk premium.
60. As was explained in Frontier's report, the *ex ante* expectations vary from approximately 4% to 6%.

*Question 9: Do you agree with the use of both the realised and expected equity risk premiums in determining the equity risk premium?*

61. It appears from the above-mentioned points with regard to the equity risk premium that the results of the research differ and depend on the method on which the estimate is based. Given this uncertainty with regard to the level of the equity risk premium, the Board intends to use a bandwidth.
62. A bandwidth of 4% to 6% is in line with the historically realised equity risk premium, as well as with expectations regarding the future equity risk premium. The proposed bandwidth for the equity risk premium corresponds to the equity risk premium measured for the Dutch equity market.<sup>11</sup>

*Question 10: Do you agree with the selected bandwidth of 4% to 6% for the equity risk premium?*

## 7.5.2 Calculation of beta

63. The beta is the measure of risk incurred in carrying out the activities of an undertaking, compared to the risk of the activities of the market as a whole.
64. To calculate the equity beta of a network manager, the following steps must be taken:
1. a group of listed undertakings which are comparable to a certain degree with regional network managers (hereinafter "the reference group") must be determined;
  2. the equity beta of undertakings which are part of the reference group must be determined;
  3. the asset beta of the reference group must be calculated; and
  4. the equity beta of the regional network managers must be calculated.

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<sup>11</sup> *Ibid.*

*Step 1) Determining the reference group*

65. Since the regional network managers are listed, it is not possible to determine the beta on the basis of market data relating to these network managers. The beta of the regional network managers is calculated using a reference group for which this market data is available.
66. The most important criterion in compiling the reference group is the risk profile of the undertakings. The reference group is comprised of undertakings whose activities correspond as far as possible to the regulated activities of the regional network managers. This ensures that the risk profile of the reference group is comparable with the risk profile of the regional network managers. If undertakings which are part of the reference group also carry out other activities, the risk profile of these activities should not deviate significantly from the risk profile of the regulated activities of the regional network managers.
67. An assessment is then made to ascertain whether the shares of the undertakings selected for the reference group are tradeable to a reasonable degree (liquid). If the shares are not sufficiently liquid, this may have a negative effect on the reliability of the estimates. To ensure liquidity, undertakings with an annual turnover of at least USD 100 million, whose shares are actively traded on a sufficient number of days of trading (at least 90% of days of trading), are included in the reference group. An assessment is then made to establish whether the regulatory system applicable to the selected undertakings bears any similarity to the regulation applicable to the regional network managers.
68. If a potential comparator does not meet the above-mentioned criteria entirely, a decision may be taken not to include the undertaking in question in the reference group. A further option is to take into account deviations, for instance in the risk profile in the definitive determination of the beta.
69. As was stated in paragraph 26, the Board is of the opinion that in the light of the comparable risks associated with electricity grid and gas network management and the similarity in the regulatory system applicable to both groups of network managers, there are no substantive reasons to distinguish between a separate cost of capital for regional electricity grid and gas network managers.
70. The Board is considering including the following companies in the joint reference group of electricity grid (EG) managers and gas network (GN) managers.

Country	Undertaking	EG and/or GN
Australia	Australia Gas Light	GN, EG
Australia	Investra	GN
Canada	Canadian Utilities	EG
Canada	Emera	EG
Canada	Terasen	GN
Spain	Red Electrica	EG
UK	Transco	GN, EG
UK	Scottish Power	EG
UK	United Utilities	EG
UK	Viridian	EG
USA	Atlanta Gas Light	GN
USA	Atmos Energy	GN
USA	Duquesne Light Holdings	EG
USA	Exelon	GN

Table 1 Composition of the reference group

*Question 11: What you think of the criteria used to determine the reference group? What do you think of the composition of the reference group?*

*Step 2) Determining the equity beta of the reference group*

71. The equity beta of the undertakings in the reference group is determined on the basis of the correlation between the return on equity of undertakings in the reference group and the return on the market index of the market on which the stock is listed.

*Data frequency and reference period*

72. Returns can be used to calculate this correlation. For theoretical and empirical reasons, daily and weekly data are more useful than monthly data. The use of data with a relatively high frequency (such as daily and weekly data) makes it possible to achieve a considerably higher level of reliability than is the case if, for instance, monthly data are used. Frontier, for instance, argues that ‘using data of lower frequency (for example, monthly) will still produce an unbiased estimate of beta, but the standard error of this estimate will be much larger, making it less precise’.<sup>12</sup>
73. To guarantee the reliability of the estimates, the Board proposes using two methods of calculation. The use of the two methods of calculation ensures that the average of both estimated betas is less sensitive to the choice of data frequency and the time period. The Board intends to use the following methods:
- a. weekly returns for the past five years; and
  - b. daily returns for the past two years.

<sup>12</sup> Frontier Economics. *The Cost of Capital Allowance for Regional Distribution Networks*. December 2005, www.dte.nl.

74. By basing the (daily) beta on a period of two years, the risk profile of the undertaking's present activities are taken into account. Since weekly data provide less precise estimates than daily data, a period of five years is necessary for weekly data. Using these two methods, the sample size for both daily and weekly data is considerable (500 and 250 observations per company respectively).

*Question 12: What is your opinion of the use of both daily and weekly data in determining the equity beta?*

*National versus international indices of equity markets*

75. The beta can be determined both by determining the correlation of undertakings in the reference group relative to national equity market indices and on the basis of an international share index. Since the various national equity markets are possibly not integrated fully, for instance because of a 'home bias' of national investors, the Board proposes using national share indices as the basis for calculating the betas of the undertakings in the reference group.

*Question 13: Do you share the Board's preference for the use of national share indices for calculating the betas?*

*Blume versus Vasicek correction*

76. To increase further the reliability of the estimates, it is usual to correct betas by applying the Blume or Vasicek correction to the rough estimates of the equity betas. This correction ensures that a statistically reliable measurement is made.
77. The Vasicek correction is based on the statistical reliability of the estimated beta. The more robust the estimates, the smaller the correction of the beta. The Blume correction is a standard correction, which does not take into account the statistical reliability of the underlying estimates. The Board is of the opinion that it is desirable to take into account the degree of reliability of the estimates, because reliable estimates do not require any further correction in the direction of a beta of 1. The Board proposes applying the Vasicek correction.

*Question 14: Do you agree with the application of the Vasicek correction to the beta?*

*Step 3) Calculation of the asset beta of the reference group*

78. The level of the equity beta depends partly on the extent to which the undertaking is financed by debt capital. To make it possible to compare the betas of undertakings in the reference group, the asset beta is calculated. In calculating the asset beta, a correction is made for differences in the capital structure and dependency on the capital structure of the chosen method. This is also done for the corporation tax rates of undertakings in the reference group. To calculate the asset betas, it is assumed that undertakings only make use of equity capital.

79. To convert the equity betas to asset betas, the Modigliani-Miller or the Miller method can be applied. Use of the Modigliani-Miller method means that the equity beta is corrected for the effect of the capital structure and for the corporation tax rate. The Miller method does not apply a correction for the effect of corporation tax in the conversion to asset betas.
80. Both methods produce similar results in the final estimate of the equity beta, due to the fact that the average gearing of the reference group corresponds to the gearing of the regional network managers. The Board proposes applying the Modigliani-Miller method because this method takes into account the corporation tax rate explicitly.

*Question 15: Do you agree with the use of the Modigliani-Miller formula in converting equity betas into asset betas?*

81. The asset beta of the reference group is determined in the form of a bandwidth. The lower limit of the band is determined by the lowest (unweighted) average asset beta (either on the basis of weekly data, or on the basis of daily data), while the upper limit of the band is determined by the highest average asset beta (on the basis of weekly or daily data).
82. This results in the following asset betas:

Country	Undertaking	Activity	Asset beta based on weekly data <sup>13</sup>	Asset beta based on daily data <sup>13</sup>
Australia	Australia Gas Light	GD, ED	0.16	0,39
Australia	Envestra	GD	0.10	0,21
Canada	Canadian Utilities	ED	0.32	0,26
Canada	Emera	ED	0.11	0,10
Canada	Terasen	GD	0.14	0,16
Spain	Red Electrica	ED	0.21	0,30
UK	Transco	GD, ED	0.28	0,35
UK	Scottish Power	ED	0.38	0,40
UK	United Utilities	ED	0.20	0,26
UK	Viridian	ED	0.11	0,31
USA	Atlanta Gas Light	GD	0.32	0,49
USA	Atmos Energy	GD	0.33	0,69
USA	Duquesne Light Holdings	ED	0.32	0,60
USA	Exelon	GD	0.27	0,54
<b>Unweighted average</b>		<b>ED, GD</b>	<b>0.23</b>	<b>0.36</b>

Table 2: Level of the asset betas

83. The Board proposes a bandwidth of 0.3 to 0.35 for the asset betas of regional electricity grid and gas network managers.

<sup>13</sup> With the Vasicek correction.

*Step 4) Calculate the equity betas of the network managers*

84. The equity beta of the network managers is calculated by converting the asset beta of the reference group into an equity beta for the network managers using the Modigliani-Miller method. In accordance with the method used to determine the asset beta of the reference group, a bandwidth is also determined for the equity beta of the network manager. Since the corporation tax rate is settled retrospectively, this is an estimated equity beta. The bandwidth of the estimated equity beta is 0.47 to 0.74.

**7.6 Expected consumer price index (CPI) in the third regulatory period**

85. The Board bases the expected CPI on the CPI forecasts of the Netherlands Bureau for Economic Policy Analysis as well as the historic CPI data. The Netherlands Bureau for Economic Policy Analysis's projections with regard to the third regulatory period are not available at present. The most recent projections are for the year 2006 and amount to 1%.<sup>14</sup> The table below shows that the Dutch economy was also characterised by relatively low inflation in 2004 and 2005, but that historically the level of inflation was higher.

86. In determining the real cost of capital, whether the financial markets expect an increase in inflation is important. The expectations of the financial markets depend on a range of factors, such as expectations with regard to salary developments in the Netherlands, the competitive position of the Netherlands, world trade and the development of energy prices. The Board is of the opinion that it is not likely that the Dutch economy can maintain a level of inflation in the longer term which is permanently below the inflation targets of the European Central Bank.<sup>15</sup> The Board therefore is of the opinion that the Dutch economy in the medium-term will realise inflation of 1.5% to 2%. For the coming years, for the sake of caution, in determining the real cost of capital the Board proposes using inflation figures which are in line with the realised rates of inflation of recent years. The Board proposes using an estimated CPI of 1.25% per annum.

Year	2001	2002	2003	2004	2005	2006
CPI %	4.5	3.4	2.1	1¼	1½	1

Table 3: Consumer Price Index (CPI) for the Netherlands. Source: Netherlands Bureau for Economic Policy Analysis (*MEV 2005* and *CPB Informatief*)

*Question 16: Do you agree with the above mentioned method for determining the CPI?*

<sup>14</sup> <http://www.cpb.nl/nl/prognoses/nlinfo.html>.

<sup>15</sup> The ECB has set an inflation target of 0%-2% and, in doing so, targets the other end of the bandwidth (1.5%-2%).

## 7.7 Overview of the values of the parameters

87. The various parameters for the cost of capital are set out in sections 7.2 up to and including 7.6. The table below provides the parameters proposed by the Board. The Board is of the opinion that these parameters apply both to regional electricity grid managers and regional gas network managers. The mean of the bandwidth for the pre-tax cost of capital amounts to 5.7%.

	Low	High
Nominal risk-free rate	3.8%	4.3%
Debt premium	0.8%	0.8%
<b>Cost of debt</b>	<b>4.6%</b>	<b>5.1%</b>
Equity risk premium	4.0%	6.0%
Asset beta	0.23	0.36
Equity beta	0.47	0.74
<b>Cost of equity</b>	<b>5.7%</b>	<b>8.7%</b>
Gearing	60%	60%
Tax rate	30%	30%
<b>Nominal pre-tax cost of capital</b>	<b>6.0%</b>	<b>8.1%</b>
Inflation	1.25%	1.25%
<b>Real pre-tax cost of capital</b>	<b>4.7%</b>	<b>6.7%</b>

Table 4: Values of the parameters used to determine the cost of capital

*Question 17: What is your opinion of the proposed bandwidth for the real pre-tax cost of capital? How should the Board ultimately derive the cost of capital from this bandwidth?*

## 8 Consequences of possible structural changes

88. The bill to split energy companies [*Splitsingswetsvoorstel*] referred to above will result in several structural changes to the energy sector in the Netherlands. The most important changes are: a structural division between the networks and production and distribution activities and the transfer of the management of the high-voltage grids to the national network manager, TenneT. Although this bill has not yet been passed by Parliament, the Board is of the opinion that at this stage it is worthwhile exploring what the possible consequences of this bill could be for the way in which the cost of capital is determined. The Board does not expect these structural changes to affect the cost of capital applied in the third regulatory period to electricity grid managers. However, if this bill comes into force, the consequences could be relevant to a later regulatory period.
89. In principle, the Board does not expect the unbundling of networks and production and distribution to have consequences for the regulatory cost of capital. The reason for this is that the



cost of capital is still determined from the perspective of an independent network manager that focuses entirely on network management activities.

90. The proposed transfer of the management of the high-voltage grids from the regional network managers to TenneT is also not expected to have significant consequences for the cost of capital. The risks associated with the management of these grids, after all, are unrelated to the identity of the network manager. The transfer of these grids may change the risk profile of the national and regional grid managers. In the case of the national grid manager, TenneT, the risks will possibly decrease, because the development in TenneT's revenues will be more stable from year to year. The size and the number of parties that purchase electricity directly from the grids managed by TenneT will increase sharply as a result of the proposed transfer. There is therefore a greater probability that the utilisation of the grids managed by TenneT will develop in a more balanced way from year to year. TenneT is already protected from volume risks through the regulatory system because TenneT is subject to turnover regulation.
91. The transfer of the management of the high-voltage grids is expected to result in a slight decrease in the risks of regional grid managers due to the fact that the turnover of the high-voltage grids will be more volatile compared to the low-voltage grids. The reason for this is that the parties connected to the high-voltage grids are more sensitive to a change in economic circumstances compared to the parties connected to the low-voltage grids.

*Question 18: What is your opinion of the possible consequences of the bill to split energy companies [Splitsingswetsvoorstel] for the cost of capital to be applied?*

## Annex: Summary of the consultation questions

*Question 1: The Board proposes not using a separate cost of capital for electricity grid and gas network managers. Do you agree with this approach?*

*Question 2: Do you consider a life to maturity of 10 years to be a good life to maturity for determining the risk-free rate?*

*Question 3: Do you agree with the chosen reference period of two to five years for the risk-free rate?*

*Question 4: What, in your view, are the advantages and disadvantages of using indexed bonds?*

*Question 5: Do you agree with the proposal to use Dutch government bonds?*

*Question 6: Do you agree with the proposed method for determining the debt premium and the proposed level of this premium?*

*Question 7: What is your opinion of determining the cost of capital on the basis of the present level of gearing of 60%?*

*Question 8: Do you agree with the way in which the tax rate is determined above?*

*Question 9: Do you agree with the use of both the realised and expected equity risk premiums in determining the equity risk premium?*

*Question 10: Do you agree with the selected bandwidth of 4% to 6% for the equity risk premium?*

*Question 11: What do you think of the criteria used to determine the reference group? What do you think of the composition of the reference group?*

*Question 12: What is your opinion of the use of both daily and weekly data in determining the equity beta?*

*Question 13: Do you share the Board's preference for the use of national share indices for calculating the betas?*

*Question 14: Do you agree with the application of the Vasicek correction to the beta?*

*Question 15: Do you agree with the use of the Modigliani-Miller formula in converting equity betas into asset betas?*

*Question 16: Do you agree with the above mentioned method for determining the CPI?*

*Question 17: What is your opinion of the proposed bandwidth for the real pre-tax cost of capital? How should the Board ultimately derive the cost of capital from this bandwidth?*