The WACC for the Dutch Electricity TSO and Electricity and Gas DSOs

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Over the next decades, the use of electricity in the Netherlands is expected to increase substantially, while the use of natural gas will decrease progressively, with a phasing out to be completed by 2050. The ACM has asked us to assess whether this 'energy transition' could affect the cost of capital of the Dutch Energy Networks in ways that the current methodology does not reflect.

In the Gas TSO Report[1] we analysed the impact of the energy transition on the cost of capital of GTS, the Dutch Gas TSO. In that report, we explained that there are broadly two ways that the energy transition could affect the beta of energy networks in the Netherlands and Europe. The two ways generally relate to expected volumes and investments:

- **Volumes**: expected changes in volumes (and particularly expected declines in natural gas volumes) may directly affect the systematic risk faced by energy networks, and hence affect the energy networks' beta.

- **Investments**: significant differences in future investment requirements may create a difference in the asset betas of gas and electricity transmission and distribution networks.

With regards to **volumes**, in the Gas TSO Report we explained that expected changes in demand or volumes are unlikely to affect the beta of either the Dutch Gas TSO or the peers we used to estimate the beta, for a number of reasons. First, both the Dutch Gas TSO and the peers face limited or no volume risk.[2] If gas volumes fall, then tariffs will adjust to compensate. Second, the risk for network assets being stranded is limited, because network assets generally remain in the asset base until they are fully depreciated.[3] Third, the gas network will continue to be used because natural gas will

[1] See Gas TSO Report, Section VI (Energy Transition).

[2] All of the European peers are subject to revenue cap regulation and, therefore, face very limited volume risk. The US comparator TC Pipelines operates instead under long-term contracts at FERC-approved rates. However, volume risk is limited, because pipelines can file with FERC for a rate revision if revenues no longer provide a reasonable opportunity to recover costs.

[3] The only exception for the Gas GTO relates to assets that are 'divested', i.e. taken out of the network. The ACM has informed us that in the method decision for the next regulatory period it will change the way it treats divested assets. More specifically, if assets are divested, they will be charged into the tariffs at their efficient cost, whereas the inefficient portion of the historical cost will be stranded. However, if the divested assets are then sold, then 90% of the sale price will be charged to reduce tariffs, compensating users for the efficient cost of the divestment that was charged to tariffs. The other 10% will go to the network operator to provide it with the appropriate incentives to sell at a higher price. In sum, even in the case of asset divestiture, the risk for assets being stranded is limited.

be partly substituted by hydro and green gas. Fourth, even if there was a risk of assets being stranded, the risk of asset stranding is not likely to be systematic. Rather, the risk of volume decline and asset stranding is related to policy decisions that are independent of the market index. In other words, the risk of volume decline and asset stranding has a 'zero beta'.

Similar considerations also apply to the Dutch Energy Networks. Because electricity volumes are expected to increase, the issue of volume risk and asset stranding is only relevant for the Dutch Gas DSOs.

Gas DSOs do not face short-term volume risk, in the sense that they will receive lower revenues if the volume of gas consumed decreases. Rather, Gas DSOs derive most of their revenue from capacity or connection charges. Hence, Gas DSOs potentially face 'capacity' risk if either large number of individual customers or even entire neighborhoods decided to disconnect from the gas network.

While the volume of Gas consumed on the distribution networks may be expected to decline over the next regulatory period,[4] it is unlikely that large numbers of individual customers will decide to disconnect entirely from the distribution networks over the next five years. However, though unlikely, there remains the possibility of large-scale disconnection events, so that part of a gas distribution network may no longer be needed.[5]

Under the current regulation, assets remain in the asset base until they are fully depreciated. The ACM, however, plans to change the regulation in order to take account of the decreasing utilization of the gas networks that will happen in the long run. In particular, the ACM has informed us that it is planning to:

1. Front load depreciation, so that DSOs will recover the cost of investments more quickly, thereby reducing the value of assets that will no longer be in use and will be taken out of the asset base.

2. Increase tariffs of the Gas DSOs to recover the remaining value of assets taken out of the asset base.

3. Reimburse the Gas DSOs for the costs of removal of the assets that are no longer in use and no longer part of the asset base.

Taken together, these measures imply that even in the case of asset divestiture, Gas DSOs are likely to be fully compensated. Hence, based on the current expectations for the Gas DSO regulatory

[4] For example, because homes and boilers continue to become more energy efficient.

[5] Large number of disconnections could emerge, for example, if a number of neighborhoods decided to disconnect entirely. However, the ACM has informed us that this is highly unlikely. A number of municipalities have started experimenting with disconnecting households from the gas distribution network, but they are all experiencing problems for two main reasons. First, because private users cannot be forced to leave the gas network. Second, because disconnecting from the gas network requires making a big investment. Individual households may also leave the gas network on their own initiative. Even in this case, however, it takes a rather big investment (in insulation, equipment and upfront costs) to leave the network. Hence, the ACM does not expect that the number of individual households leaving the grid will be large.

regime, we do not see any need to adjust the Gas DSO betas to account for volume risk resulting from the energy transition.

With regards to **investments**, in the Gas TSO Report we explained that the commitment to make large investments may have an effect on the cost of capital – and specifically the firm's beta – similar to that of debt or leverage. When a firm commits to investments that are large relative to the existing assets, profits, and hence the firms value, are more sensitive to changes in market conditions. To understand why, suppose that two regulated firms, A and B, both have a market value of 100 today, based on their current assets or RAB. Further, assume that the two firms face the same risk on the assets, which may result in a gain or loss of 10% of market value. Hence, the value will vary between 90 and 110.

Suppose that firm B plans to increase its assets by 100. Because the new investments will be remunerated at the firm's cost of capital, the expected value of firm B is also equal to 100. This is because the firm will create additional assets with a value of 100, but needs to spend 100 to create these assets. That is, the new investments are NPV neutral. However, the expected value of the new assets will still vary by plus or minus 10%. Hence, the value of Firm B now varies between 80 and 120, while the value of firm A varies from 90 to 110. In other words, the higher investment commitment of firm B increases the volatility of the firm's value.

Financial analysts refer to this issue with the notion of operating leverage. Firms with higher investment requirements – higher operating leverage – will have higher betas. Hence, increased investment requirements for electricity networks could increase their asset beta, relative to historic asset betas. Similarly, estimating the asset beta for Dutch electricity networks based on firms with lower investment commitments could result in an underestimate of beta. Conversely, if gas networks will be making relatively few investments, then their asset beta for the next regulatory period may be lower than the betas for past regulatory periods.

In the Gas TSO report, we analysed the relative size of historical and planned investments for GTS and for the peer group of companies used to estimate the beta. We determined that no strong shift in investment behaviour was expected as a result of the energy transition, either for GTS or for the peers, and concluded that at least for the next regulatory period, there was no need to adjust the beta of GTS because of the energy transition.

Over the next few years, however, the Dutch electricity networks are expected to make significant investments to meet the increasing capacity requirements. Electricity DSOs have announced publicly that they need more capital to fund these investments. Enexis, for example, recently issued about € 500 million in green bonds to finance investments in automation, smart meters and grid extensions, and successfully attracted an additional € 500 million financing in the form of subordinated loans from shareholders.[6] Similarly, Liander has recently issued about € 500 million in green bonds,[7] while

[6] See Energeia.nl, "Enexis sluit groene lening af voor uitbreiding en verslimming stroomnet", 11 June 2020, and "Enexis stelt in eerste ronde grootste deel van de lening veilig", 29 July 2020.

[7] See Energeia.nl, "Alliander haalt €500 mln op met groene obligaties", 5 June 2020.

Stedin is undergoing discussions with shareholders about a large equity capital injection.[8] TenneT has already issued about € 1.35 billion in green bonds,[9] and will require new capital injections exceeding € 5 billion, 50% of which relate to the Dutch TSO.[10]

As we explained in our simplified example above, the key factor to determining the effect on beta is not the absolute level of future investments, but their size relative to the current RAB. Accordingly, to determine whether and to what extent an adjustment to the beta of the Dutch Energy Networks is warranted, we have analysed the size of the investment plans relative to the existing RAB in 2019.

The ACM has provided us with data on the RABs, annual depreciation, annual additions to the RABs from investments and planned capex expenditures for TenneT and for the gas and electricity DSOs. We estimate the future RAB over 2020-2022 (2020-2024 for TenneT) by updating the 2019 RAB to account for (i) planned investments, (ii) depreciation and (iii) indexation to inflation. We calculate depreciation each year over 2020-2024 as equal to the RAB in the previous year times a company specific depreciation factor. We define the company specific depreciation factor as the ratio of 2019 depreciation divided by the 2018 RAB.[11] We update the depreciated RAB from the previous year by applying the expected rate of inflation of [1.69% (see section **Error! Reference source not found.**, below]. We acknowledge that by adding planned capital expenditures to the RAB, we are potentially overestimating the expected increase in the RAB. This is because investments are generally added to the RAB when they are put into use, whereas planned capital expenditures reflect the time when the investments are made. On the other hand, however, we are potentially *underestimating* the expected increase in the RAB, because assets that are currently under construction are excluded from this calculation. The issue, however, is only about timing, because the planned capex will eventually be included in the RAB.

In Table V-1, below, we report the expected evolution of the RAB for the Dutch Energy Networks. For TenneT and each of the electricity and gas DSOs, Table V-1 reports the value of the RAB in 2019, and an estimate of the RAB over the 2020-2022 period (2020-2024 for TenneT onshore and offshore). The table further reports the expected change in RAB and the compound annual growth rate (CAGR) in the RAB over the 2019-2022 period (2019-2024 for TenneT). Table V-1 shows that:

- The RAB of TenneT's **onshore** transmission will increase by 76.64% over the 2019-2024 period, representing a compound annual growth rate of 12.05%.
- The RAB of TenneT's **offshore** transmission will increase by 792.81% over the 2019-2024 period, representing a compound annual growth rate of 54.94%.

[8] See Energeia.nl, "Stedin: komende jaren tot €1 mrd aan extra kapitaal nodig", 13 May 2020, and "Aandeelhouders Stedin willen 'onder voorwaarden' financieel bijspringen", 29 September 2020.

[9] See Energeia.nl, "Tennet haalt €1,35 mrd op met nieuwe groene obligaties", 18 November 2020.

[10] Letter of the Minister of Finance and of the Minister of Economics and Climate to the Parliament of 19 May 2020, 28165, no. 325, p.2.

[11] Because TenneT offshore had a RAB of zero in 2018, we calculate its depreciation by applying the depreciation factor of TenneT onshore.

- The RAB of the Dutch Electricity DSOs will increase by 20.69% on average over the 2019-2024 period, representing a compound annual growth rate of 6.47%.

- The RAB of the Dutch Gas DSOs will increase by 8.55% on average over the 2019-2024 period, representing a compound annual growth rate of 2.77%.

TABLE V-1: EXPECTED EVOLUTION OF THE RAB FOR THE DUTCH ENERGY NETWORKS

		End of year RAB						Expected change	CAGR
		2019	2020	2021	2022	2023	2024		
		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
		€ '000	€ '000	€ '000	€ '000	€ '000	€ '000	%	%
TenneT									
TenneT Onshore	[1]	4,376,573	4,878,981	5,664,235	6,499,820	7,164,272	7,730,808	76.64%	12.05%
TenneT Offshore	[2]	439,070	893,397	1,388,767	1,850,042	2,829,948	3,920,049	792.81%	54.94%
Electricity DSOs									
Liander	[3]	4,250,028	4,563,013	4,963,141	5,395,773			26.96%	8.28%
Enexis	[4]	3,646,924	3,767,475	3,966,944	4,126,642			13.15%	4.21%
Stedin	[5]	3,171,673	3,431,512	3,702,869	3,943,233			24.33%	7.53%
Coteq	[6]	53,385	55,803	59,098	62,214			16.54%	5.23%
Rendo	[7]	28,612	32,452	34,544	36,551			27.75%	8.50%
Westland	[8]	244,596	250,081	257,265	265,559			8.57%	2.78%
Enduris	[9]	331,134	357,396	387,944	422,337			27.54%	8.45%
Average E DSOs	[10]	**1,675,193**	**1,779,676**	**1,910,258**	**2,036,044**			**20.69%**	**6.47%**
Gas DSOs									
Liander	[11]	2,014,399	2,074,841	2,120,345	2,159,925			7.22%	2.35%
Enexis	[12]	1,636,295	1,765,118	1,877,352	1,988,021			21.50%	6.71%
Stedin	[13]	1,676,546	1,740,445	1,809,283	1,880,899			12.19%	3.91%
Coteq	[14]	87,139	94,053	97,860	100,490			15.32%	4.87%
Rendo	[15]	133,675	131,753	129,860	128,345			-3.99%	-1.35%
Westland	[16]	114,565	113,934	112,205	110,535			-3.52%	-1.19%
Enduris	[17]	137,188	142,995	147,755	152,488			11.15%	3.59%
Average G DSOs	[18]	**828,544**	**866,163**	**899,237**	**931,529**			**8.55%**	**2.77%**

Notes:
[1][A] to [9][F] and [11][A] to [17][F]: Data provided by ACM.
[10]: Average [3] to [9].
[18]: Average [11] to [17].
[G][1], [G][2]: [F]/[A] -1.
[G][3] to [G][18]: [D]/[A] -1.
[H][1], [H][2]: (1+[G])^1/5 -1.
[H][3] to [H][18]: (1+[G])^1/3 -1.

As the table above suggests, and unlike our conclusion for the Dutch Gas TSO, the investment requirements for TenneT offshore, and to a lesser extent for TenneT onshore and for some of the electricity DSOs are significant.

We have researched other cases where regulators have made allowances for large capital investment programs in the cost of capital. A prominent example comes from the airport sector, with the construction of Heathrow Terminal 5. In 2003, the UK Civil Aviation Authority (CAA) selected a beta at the top of the range selected to remunerate the BAA's investments in Heathrow Terminal 5 (see box 1). In that circumstance, the CAA found that BAA's investments in Heathrow Terminal 5 would increase BAA's RAB by over 70% over the following regulatory period, and that the

construction of the new terminal would increase BAA's risks, not only with respect to regulatory and construction risk, but with respect to uncertain demand.

We adopt a similar approach in this case. Specifically, we look for cases where planned investments are expected to increase the RAB significantly over the next few years. We note that unlike the construction of Heathrow Terminal 5, the Dutch Energy Networks face limited volume risk. In the case of the Dutch Energy Networks it is mainly the increase in operating leverage that may potentially affect the beta. Accordingly, a beta uplift is only warranted in case of an extraordinary increase in in the RAB, significantly higher than in the case of Heathrow.

TenneT's offshore transmission business definitely meets this criterion. While there is no exact method to determine the correct size of the required uplift, we find the application of a one standard deviation uplift over the median beta to be appropriate. Such an approach is consistent with regulatory precedent in similar circumstances. We note that the increase in beta in offshore transmission should only be temporary. Once the large capital investment programs are completed, and spending levels are similar to other peer groups TSOs, then ACM can revert to using the unadjusted median beta.

In contrast, the expected increase in investment levels for TenneT onshore and for the DSOs is not sufficiently high to justify an adjustment to the respective betas. Annual RAB increases between 5% and 10% a year are not out of the ordinary. Furthermore, there is no additional demand risk associated to these investments. Accordingly, we recommend making no adjustment to the beta of TenneT onshore and of the DSOs.

Box 1: The construction of Heathrow terminal 5

In 2003, the CAA approved a capex plan for 2003-2008 equivalent to over 100% of the opening RAB in 2003. The RAB was expected to grow by over 70%. In that circumstance, the CAA selected a WACC at the "top of the range" because of the size of the investment program. In its cost of capital decision, the CAA argued that:[12]

> *Large investment projects tend to be risky in a number of ways. The scale of Terminal 5 will increase BAA's risks, not only with respect to construction risk but also risks of uncertain demand and risks associated with the Terminal 5 triggers as pointed out by the Competition Commission […].*
>
> *This results in a cost of equity figure above the mid-point of the range as determined by the Competition Commission […].*
>
> *In the view of the CAA a point estimate of 7.75% pre-tax real for Heathrow's cost of capital is appropriate and reasonable. This figure reflects the uncertainty surrounding the cost of equity, and especially the cost of new equity, and the importance of*

[12] Economic Regulation of BAA London Airports (Heathrow, Gatwick and Stansted) 2003 – 2008, CAA Decision (February 2003): paragraphs 4.65–4.71.

> *enabling BAA to finance Terminal 5 on a commercial basis given the risks involved.*

The Competition Commission had estimated a mid-point WACC for the British Airport Authority (BAA, the owner of Heathrow and Gatwick at the time) of 7.21% (pre-tax real). The Competition Commission had said:[13]

> *In our view there are four special factors linked to T5 which could affect BAA's cost of capital of which account needs to be taken:*
>
> *(a) Our proposals for the price control include a trigger mechanism under which the level of permitted airport charges will increase only when the specified construction landmarks have been met. Were delays in construction to occur, some of which might be outwith the control of BAA, the company would suffer a significant financial penalty. This represents a definite increase in the risks faced by BAA.*
>
> *(b) In a competitive market companies will tend to delay capital projects and only embark on them at the latest possible moment, as the option to discontinue a project has a value to the company. It is arguable that, in keeping with its responsibilities as a regulated company, BAA is undertaking construction of T5 earlier than might otherwise have been the case and in doing so is giving up its option on timing; something for which it should be compensated.*
>
> *(c) The increase in borrowing to fund the construction of T5 is expected to increase BAA's gearing from [ ] per cent to more than [ ] per cent by the end of Q4. The increase in gearing will have an effect both through an increase in the debt premium through the perceived greater risk of default, and an increase in the equity beta reflecting the greater risks to equity shareholders. In particular, any major adverse change in the financial circumstances of BAA could lead to the requirement for a rights issue by the company. At present the possibility of a rights issue is implicitly being regarded as a contingency against either another major event such as 11 September or the need to raise funds should the SERAS study lead to construction of one or more new runways at BAA's London airports. A rights issue would represent a definite cost to the BAA, including the possible cost of an adverse change in market sentiment, and the fact that T5 increases BAA's exposure to one in Q4 needs to be recognized.*
>
> *(d) In the course of the construction of T5 the scope for BAA to outperform the price control set for Q4 is limited, but there is real scope for the expectations incorporated in the price control not to be met and for BAA thereby to be financially disadvantaged.*
>
> *[…] In our view the[se] factors […] can best be recognized by way of a further T5-related uplift to the WACC […]*
>
> *We consider that a WACC of 7.75 per cent should be sufficient to enable BAA to raise the finance needed for T5, to compensate the company for the loss of its real option on the T5 project and to recognize the increased risk to the company as a whole.*

[13] BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd), Competition Commission (November 2002), Chapter 4, paragraphs 4.70–4.72.