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Incentive regulation of the gas and electricity networks in the Netherlands

General information about the method of regulation of the system operators of natural gas and electricity in the Netherlands by the Netherlands Authority for Consumers and Markets.

May 2017

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Introduction

Who are we?

The Netherlands Authority for Consumers and Markets (ACM) is responsible for the regulation of the transmission system operators ("TSOs") and distribution system operators ("DSOs") of the electricity and natural-gas networks in the Netherlands.

Why did we write this document?

We recently issued new method decisions. We publish our regulatory decisions in Dutch. Because the energy market is an integrated European market, we find it important to explain our regulation in English as well.[1] That is why we wrote these explanatory notes, which consist of three parts.

The first part contains general information about what parties are regulated, and what regulatory decisions we take. The second part gives a bird's eye view of our regulation. If you are interested in detailed information about our methodology and regulatory parameters, these can be found in the third and final part of this document.

Please note that parties may appeal our decisions. The result of such appeals may lead to changes in our regulation and regulatory parameters.

[1] This is a non-binding document, which has been prepared for informational and illustrative purposes only. No rights can be derived from the information published in this document. In case of any inconsistencies between this document and our official decisions (in Dutch), the latter shall prevail.

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Part 1: General information

Who are the network operators in the Netherlands?

Table 1: network operators

TSO Gas	TSO Electricity – onshore	TSO Electricity – offshore	DSOs Gas	DSOs Electricity
Gasunie Transport Services (GTS)	TenneT	TenneT	Cogas Infra & Beheer	Cogas Infra & Beheer
			Enduris	Enduris
			Enexis	Enexis
			Liander	Liander
			RENDO	RENDO
			Stedin	Stedin
			Westland	Westland
			Zebra	

What are the tasks of the TSOs and DSOs?

The TSOs and DSOs are neutral market facilitators. The Dutch Electricity Act and Gas Act specify what responsibilities the TSOs and DSOs have. These responsibilities are linked to two domains. First, TSOs and DSOs are tasked with the transport and distribution of electricity and natural gas in an efficient, safe, and secure manner. Second, they are responsible for creating and maintaining connection points with other networks and consumers. TSOs are also responsible for system operations. Furthermore, TSOs and DSOs have a responsibility to share all relevant information in order for consumers and producers to make efficient decisions. And finally, they have the task to ensure the safety of the networks.

How do our regulatory decisions relate to each other?

The process of determining the tariffs is as follows. First, we publish method decisions for a period of between 3 to 5 years before the commencement of that regulatory period. In these decisions, we determine *how* we are going to calculate the allowed revenue or target revenue. After this, we publish the so-called x-factor decisions. In these decisions, we calculate the base level of revenue for the regulatory period and the annual tariff cut (this is the x-factor). Finally, during the regulatory period, we publish annual tariff decisions.[2] In these decisions, we set the tariffs for each individual system operator, using the calculations from the x-factor decisions and following the tariff codes, which explain how the revenues translate to the various tariffs.

[2] For the offshore grid, we publish annual revenue decisions.

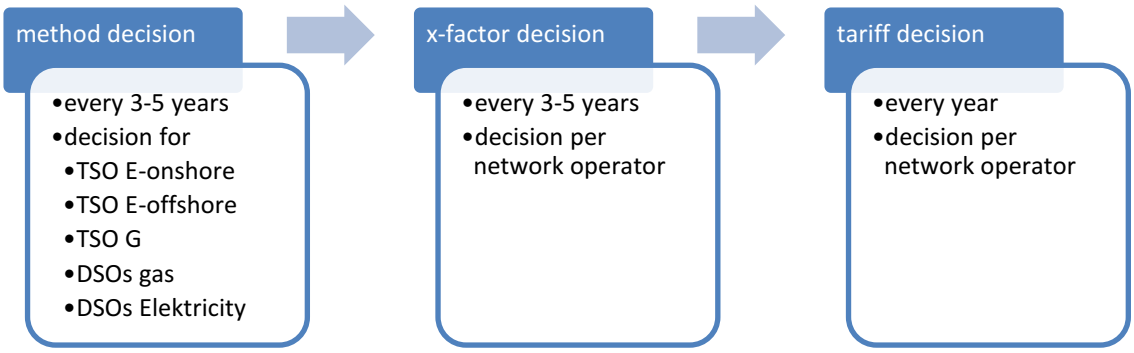

Figure 1: the relationship between our regulatory decisions

Where can I find these decisions?

These decisions are published on the website of ACM. For the regulatory period of 2017-2021, an overview of the decisions (in Dutch) can be found through the following link: https://www.acm.nl/nl/onderwerpen/energie/netbeheerders/tariefregulering-besluitenoverzicht/

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Part 2: Bird's eye view of the Dutch regulation

Why do we need regulation?

Electricity grids and natural-gas networks are categorised as 'natural monopolies', in which competition is limited or does not even exist at all. To protect energy consumers from the disadvantages of monopolistic behaviour, electricity and gas network operators are regulated.

We created an incentive-based regulatory scheme around four distinctive goals (figure 2), which follow directly from national and European legislation. In the below figure, we explain these goals and how we aim to achieve them.

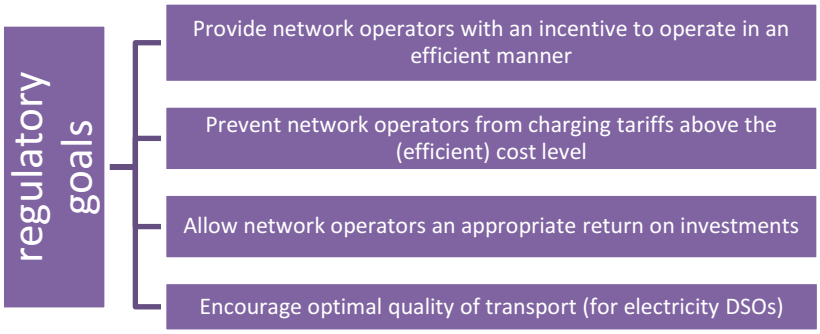

Figure 2: regulatory goals

Provide system operators with an incentive to operate in an efficient manner

Main principle: revenue cap/price cap based on exogenous efficient cost level

We incentivise TSOs and DSOs to operate efficiently by setting the revenue of the operators before the start of the regulatory period (ex ante revenue cap or ex ante price cap). The allowed revenue or target revenue is set equal to the expected efficient costs. If a system operator operates *more efficiently* than the cap (so that its costs are lower than the target), it may keep the resulting profits. On the other hand, if a network operator operates *less efficiently* and has higher costs than the target, it has to take a loss. This ensures that the system operator has an incentive to operate cost-efficiently. Because the efficient cost level is not (or not only) based on the network operator's own costs, the regulation also gives incentives for dynamic efficiency. That is: because the efficient cost level is based on mostly exogenous data, the network operator knows that, in future periods, it is able to profit from efficient choices today. This gives the system operator an incentive to be efficient in both the short term *and* the long term.

For each regulatory period, we renew the revenue cap or the price cap to the efficient cost level based on then current insights. If cost reductions lead to a lower efficient cost level, consumers will benefit from these cost reductions in the period following these cost reductions. In this way, network operators earn a bonus for efficient operation, and consumers profit from lower cost levels in the long run.

Prevent system operators from charging tariffs above the (efficient) cost level

Incentive regulation is meant to ensure affordability of energy network services. Consumers should not have to pay more than the efficient costs for the network services, and system operators should not make a higher than reasonable (or appropriate) return. Our incentive scheme ensures this by setting the revenue cap or the price cap at the level of efficient costs, and by setting the allowed return based on the returns investors can reasonably expect from comparable companies in the financial markets (sees WACC in section 3).

Allow network operators an appropriate return on investments

In order to ensure the safety and security of the network, TSOs and DSOs have to invest in their networks. They need capital to do so. System operators receive an appropriate return on their investment, so they are able to compensate their providers of capital. This appropriate return should match the return a company would get in a competitive market. However, whether or not a system operator actually receives this return will depend on the choices the operator makes. If the operator makes inefficient choices, the actual return on investment could be lower.

Our regulation is technology-neutral – it facilitates efficient investments, regardless of their nature. System network operators are currently expected to make the investments that are necessary to contribute to a more sustainable and renewable energy chain, for example, infrastructure for solar panels or wind farms. The method of regulation enables system operators to make an appropriate return on these investments.

Encourage optimal quality of transport

By way of the q-factor, we give an incentive to the electricity DSOs to maintain an optimal quality standard. If a DSO has fewer or shorter outages than the norm, it will gain extra revenue through a positive q-factor. If it has more or longer outages than the norm, it will lose a share of his revenues through a negative q-factor. For the gas DSOs, we have, as of yet, not been able to find an informative indicator for quality. By law, we are unable to impose such a q-factor on the TSOs. Quality maintenance for the TSOs and the gas DSOs is therefore safeguarded by the minimum requirements embedded in the Electricity Act, the Gas Act, and the technical conditions, which are also set by us through separate procedures.

Part 3: Details of the methodology, parameters and adjustments

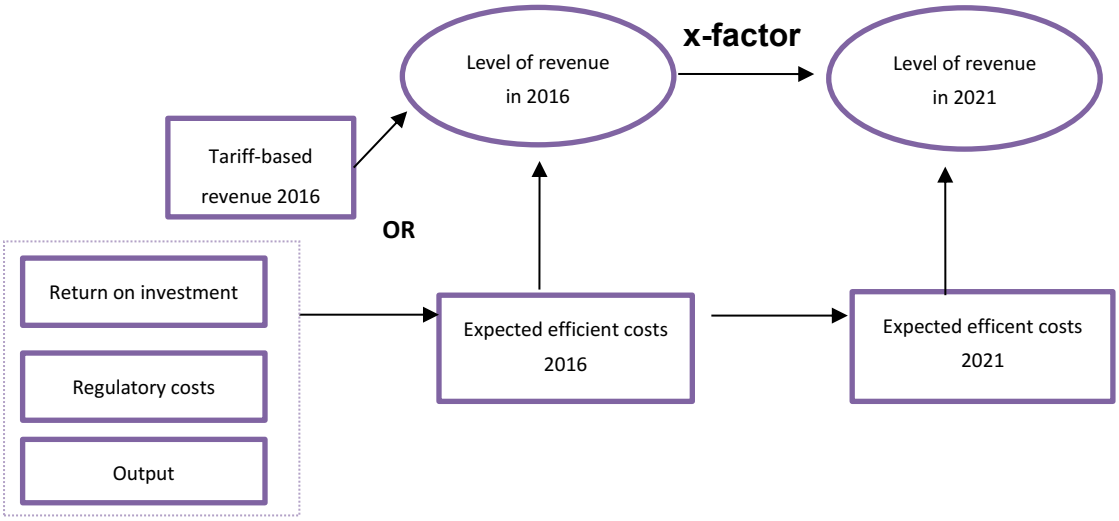

Figure 2: overview of the regulation

The regulatory period

The Electricity Act and the Gas Act allow for a regulatory period of at least three years and no more than five years. In our method decisions, we set a 5-year regulatory period for all system operators. The new regulatory period thus commences on the 1st of January 2017 and ends on the 31st of December 2021. In the past, we often implemented our decisions for a period of three years. An advantage of a shorter period is the flexibility to adapt the method decisions to unforeseen circumstances such as changes in the European or national laws. Another advantage is that the likelihood of deviations between the estimates and the realisations is lower. However, the main advantage of having a longer regulatory period is that it leads to regulatory stability. If the allowed revenues of the system operators are set for a longer period, it means that the market has more certainty about future network tariffs. In addition, a longer regulatory period creates stronger efficiency incentives, because the system operators will have a longer period in which they are able to profit from efficient system operation. We concluded that it is not likely that an adjustment of the method will be required within three years. If the estimates deviate disproportionally from the realisations, we can update these estimates when setting the tariffs. We therefore concluded that the advantages of a longer period were greater than the advantages of a shorter period.

X-factor Mechanism

The mechanism of the x-factor works as follows: we determine the base revenue on the basis of the realised costs and the static efficiency measures. Then, using parameters that estimate future cost trends, we determine the level of revenue in 2021. The annual revenue gradually evolves from the base level to the level in 2021. The x-factor is equal to this annual change in revenue. This means that, in our system, the x-factor is a price differential, rather than an efficiency target.

We then determine the annual income using the following formula:

$$TI_t = \left(1 + \frac{cpi - x + q}{100}\right) TI_{t-1}$$

Where:
TI_t represents the total income in year *t*
TI_{t-1} represents the total income in year *t-1*
cpi represents the consumer price index as determined by Statistics Netherlands
x represents the x-factor; the price differential
q represents the quality parameters (see explanation in the next chapter)

Figure 3 shows the successive steps in our x-factor mechanism. Below, we explain these steps in more detail.

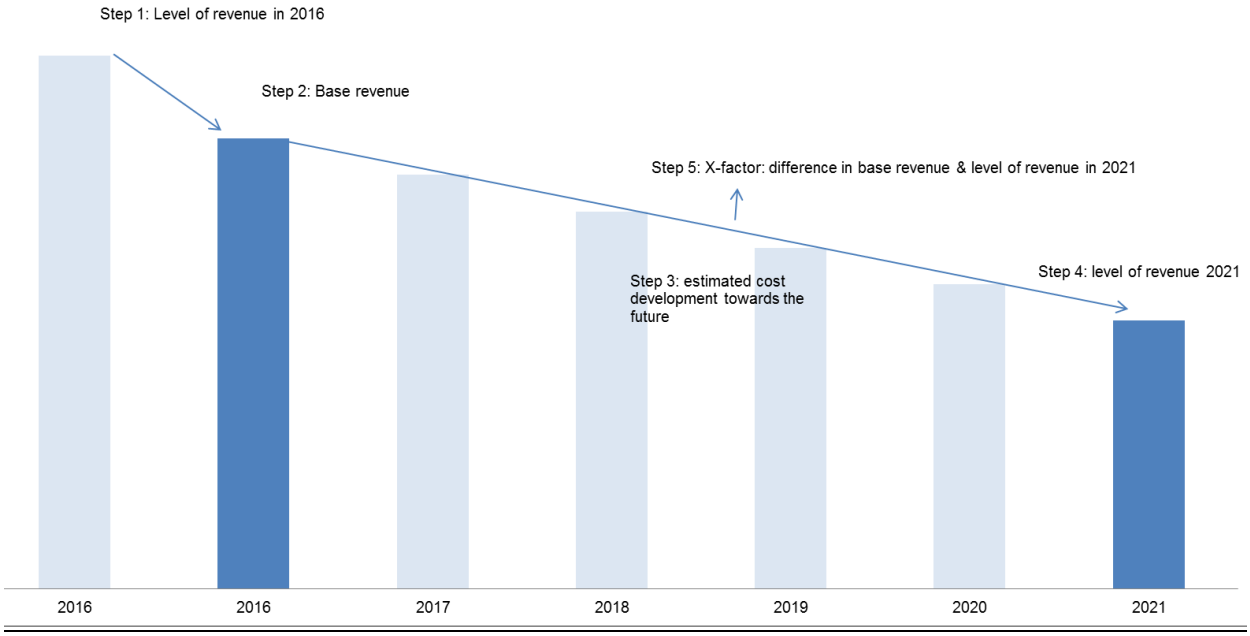

Figure 3: x-factor mechanism

Base revenue

For the period of 2017-2021, we chose to set the revenue at the start of the regulatory period equal to expected efficient costs for TenneT and the DSOs. Setting the revenue equal to expected efficient costs ensures that consumers benefit from the efficiency gains in the previous period.

For GTS, we chose to set the base revenue equal to the estimated cost level of 2016, instead of the efficient cost level. In the regulatory period of 2017-2021, we used the results of two benchmark studies for the first time. We decided to let the tariffs of GTS gradually evolve towards an efficient cost level in 2021. Therefore, the revenues of 2016 are set equal to the estimated cost level of 2016, without taking the results of the benchmark studies into account.

Step 1a: The cost level of 2016

In order to determine the efficient cost level of 2016, we first have to estimate the cost level of 2016[3]. The cost level for the year 2016 for the DSOs is based on the average of the total costs of the previous three years (2013-2015). For TSOs, the cost level in 2016 is based on the average of the operational costs of the previous three years and the capital costs of the previous year (2015). We chose to use the average costs, because it is more robust, and incidental costs in the previous year do not fully determine the income levels in the coming regulatory period. TSOs have very long depreciation periods, which means the capital costs are very stable. The previous year is therefore the most representative for the capital costs.

The cost of a system operator includes operational costs and capital costs. The operational costs are determined on the basis of the requested data from the system operators. The capital costs include the return on investment and depreciation. These are calculated by ACM based on investment data from system operators.

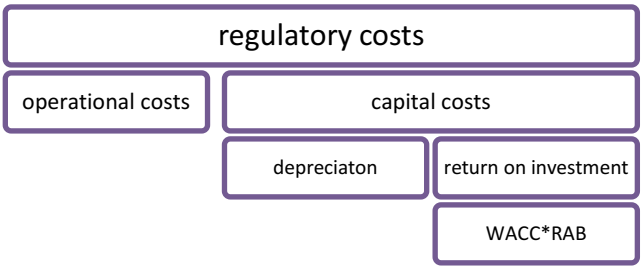

Figure 4: break-down of the regulatory costs

Depreciation periods

We set regulated depreciation periods for all investments. Periods vary between classes of assets, ranging from 5-55 years. The depreciation periods for TSOs can be found in paragraph 8.2.2 of the method decision of TenneT and GTS. For DSOs, the deprecation periods can be found in appendix 2 and 4 of the annually published regulatory accounting rules for DSOs.

Return on investment

The tariffs include an appropriate return, which is based on a WACC-method ("weighted average cost of capital"). This WACC gives an allowance for both the cost of debt and the cost of equity. When setting the WACC, we look at the market return instead of the actual costs the system

[3] Please note that the most recent data (of an entire year) that we had at the time we set our method decisions were the data for 2015.

operators face. By looking at the market return, we ensure that the return is no higher than what would be appropriate in a competitive environment. If we looked at the actual costs of a system operator, they would have an incentive to drive up the costs for debt and equity.

The WACC (real, pre-tax), for all system operators, is set at 4.3% in 2016 and 3.0% in 2021. The method takes into account embedded debt. This is not necessary for expansion investments ("EI" in the table below), so, for these investments, the WACC is set at 3.6% in 2016 and 3.0% in 2021. We apply the same WACC for the TSOs and the DSOs, because the reference group we use for the WACC is representative for both TSOs and DSOs.

Table 2: WACC parameters

	2016	2021	EI 2016	EI 2021
Nominal risk free rate for cost of debt	2.50%	1.33%	1.28%	1.28%
Debt premium	0.93%	0.81%	0.76%	0.76%
Transaction costs	0.15%	0.15%	0.15%	0.15%
Cost of debt	**3.58%**	**2.29%**	**2.19%**	**2.19%**
Nominal risk free rate for cost of equity	1.28%	1.28%	1.28%	1.28%
Equity risk premium	5.05%	5.05%	5.05%	5.05%
Asset beta	0.42	0.42	0.42	0.42
Equity beta	0.74	0.74	0.74	0.74
Cost of equity	**5.02%**	**5.02%**	**5.02%**	**5.02%**
Gearing	50%	50%	50%	50%
Tax rate	25.0%	25.0%	25.0%	25.0%
Nominal WACC pre tax	**5.13%**	**4.49%**	**4.44%**	**4.44%**
Inflation	0.77%	1.42%	0.77%	1.42%
Real WACC pre tax	**4.3%**	**3.0%**	**3.6%**	**3.0%**

Since we use a real WACC, we index our regulatory asset base. This means that in order to determine the capital costs for the year 2015; we index each investment from before 2015 to the year 2015. Subsequently, we deduct the deprecation indexed to 2015. This is how we come to a regulatory asset base in 2015.[4]

Expansion investments

For the TSOs, we determine the expected costs of regular expansion investments during the regulatory period as additional capital costs. We set the expected costs equal to the average costs for regular expansion investments of the three most recent years (2013, 2014, and 2015). We estimate the operational costs for expansion investments at 1% of the investment expense.

[4] The full report about the calculation of WACC can be found in English on our website

Step 1b: the efficient cost level of 2016

After determining the cost level in 2016, we determine the efficient cost level in 2016 for TSOs by using the static efficiency parameter for TSOs. For GTS, we set the level of revenue in 2016 equal to the estimated cost level in 2016. This means that this step does not apply to GTS. This is explained further below. For DSOs, we use the average costs per unit output of all DSOs as a 'yardstick'. This is also explained further below.

Static efficiency

The European Electricity Regulation and the Gas Regulation stipulate that tariffs should reflect the actual costs incurred, insofar they correspond to those of an efficient and structurally comparable system operator. There are different ways to determine the efficient costs. We decided to use a cost benchmark. Since there is only one gas TSO and one electricity TSO in the Netherlands, we determine the efficient costs for the TSOs by comparing them with other European TSOs (a so-called international cost benchmark).

For TenneT, we use the same cost benchmark as for the regulatory period of 2014-2016 ("E3GRID" by Sumicsid). This resulted in an efficiency score of 85% (i.e. an inefficiency of 15%). We apply a 10 percentage-point margin to this score, resulting in an efficiency parameter of 95%. In the method decision for the period of 2011-2013, we decided to allow the revenue of TenneT to grow to this efficient level in 15 years. For the period of 2017-2021, nine years remained. We assume that TenneT has been able to become more efficient during this period.

For GTS, we determined the static efficiency for the first time. Two benchmark studies were carried out. One study was performed by Frontier Economics, in which GTS was compared with German TSOs. This study resulted in three efficiency scores with an average of 78.9% efficiency. Another study was performed by Sumicsid, in which GTS was compared with 21 other European TSOs. The study led to an efficiency score of 81.6%. Because some of the data from GTS is relatively old (from 2010), we apply a 5 percentage-point margin to the efficiency scores. Since it was the first time that we determined the static efficiency, we decided not to include the static efficiency parameter in the estimated revenue of 2016. We *did* include the static efficiency parameter in the estimated revenue of 2021. This means that the tariffs will gradually evolve towards an efficient cost level during the regulation period of 2017-2021.

We use the instrument of 'yardstick competition' to determine the static efficiency of DSOs. This means that we set the DSOs' revenues based on the same efficiency yardstick. We set the efficiency yardstick equal to the efficient costs per unit of output, which we calculate using the average costs of the DSOs. If a system operator has higher costs than the average costs, it will have to reduce costs or take a loss. We choose not to use the costs of the most efficient system operator as the efficient cost level, because it would give fewer incentives to this system operator to reduce its costs. It is possible to use 'yardstick competition', because there are seven electricity DSOs and eight gas DSOs in the Netherlands, we can use this group as a peer group. We can only use them as a peer group on the condition that their operations (and thus, their cost structures) are comparable. If certain

costs are not comparable, we are able to correct for this by not including these costs when determining the efficient costs. These costs are then later added to the efficient cost level.

The level of revenue in 2021

We set the level of revenue in 2021 for a system operator at our estimate of the efficient costs of this system operator in 2021. We determine the efficient costs in 2021 adjusting the efficient cost level in 2016 for expected cost trends during this period. For the TSOs, the revenues also gradually evolve towards the static efficiency level (see the explanation of the static efficiency parameter in step 1b).

Dynamic efficiency

When setting the efficient cost level of 2021 for TSOs, we take into account a frontier shift. This is the scope for improving productivity resulting from technological progress and lower purchasing prices. Lower costs because of such dynamic efficiency are passed on to consumers during the regulatory period in the form of lower tariffs.

When setting the frontier shift for TenneT and GTS, we use data from selected sectors of the Dutch economy as well as from available research on TSOs dynamic efficiency. We use a weighted average of these results. Since there were no recent studies on the dynamic efficiency of international TSOs, we concluded that the econometric analysis of the selected sectors of the Dutch economy was more representative for the frontier shift. Therefore, we allocated more weight to the latter (75%). The frontier shift for TenneT is equal to 0.8% and the frontier shift for GTS is equal to 0.6%.

For DSOs, the dynamic efficiency is equal to the geometric mean of the annual difference in the costs/output ratio. For electricity, this is based on the years 2004-2015, and, for gas, the years 2005-2015 are used. The dynamic efficiency parameter for electricity DSOs is equal to 0.69%. For gas DSOs, it is equal to 0.03%

Mechanism: Q-factor

For electricity DSOs, we use the duration and the number of outages to determine the quality of the network. The average value that consumers and small and medium-sized enterprises attach to quality is used as a norm for the quality performance of the system operators. If a system operator scores above the norm, it receives extra revenue through a positive q-factor. And conversely, if a system operator scores below the norm, it loses revenue through a negative q-factor.

Breakdown of the base revenue and of the x-factor

The following graphs show what parameters determine the level of the base revenue and of the x-factor. For TenneT offshore, the x-factor is equal to 0. Therefore, there is no such graph for TenneT offshore. In the last section (numbers and figures), you can find all the parameters and income levels. In the figures below, the effects of inflation are not taken into account. Therefore, the numbers in the graphs and the numbers in the last section may differ slightly.

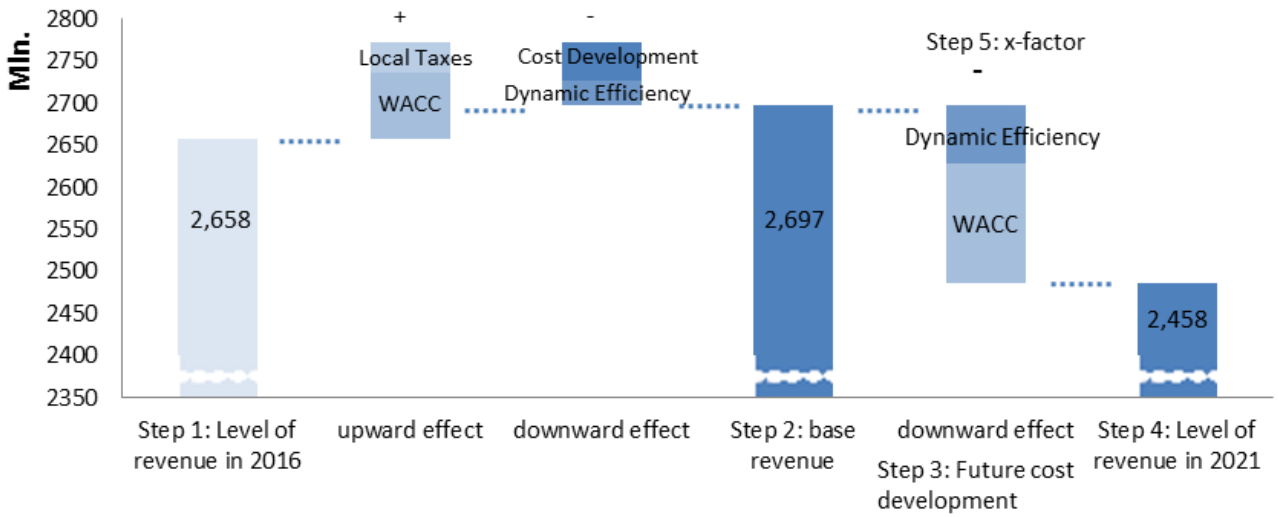

Figure 5: break-down of the level of revenue in 2016 and x-factor for DSOs electricity

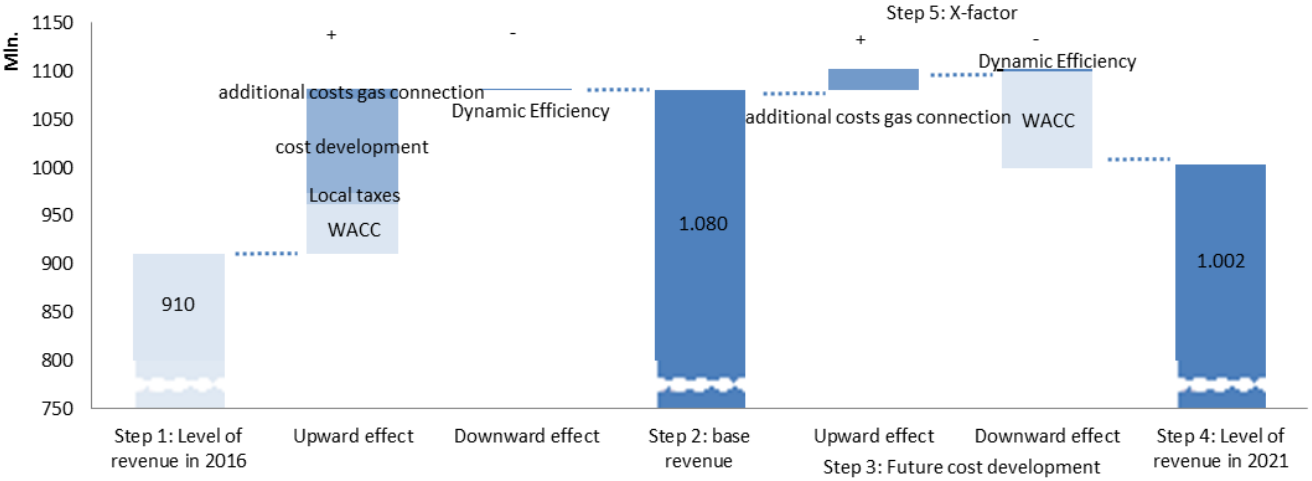

Figure 6: break-down of the level of revenue in 2016 and x-factor for DSOs natural gas

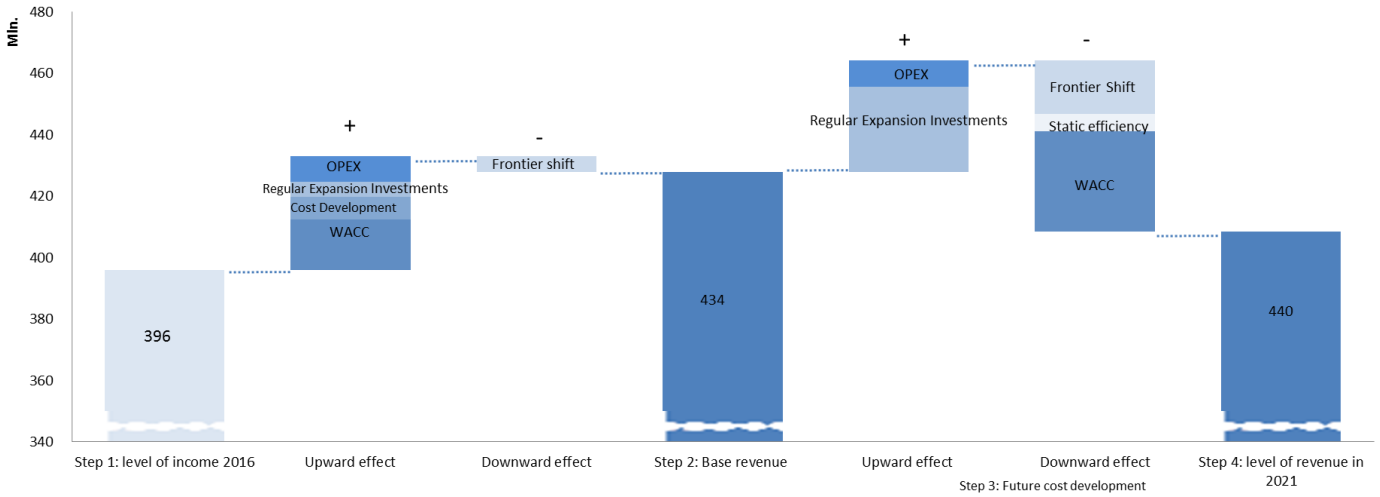

Figure 7: break-down of the level of revenue in 2016 and x-factor for TenneT

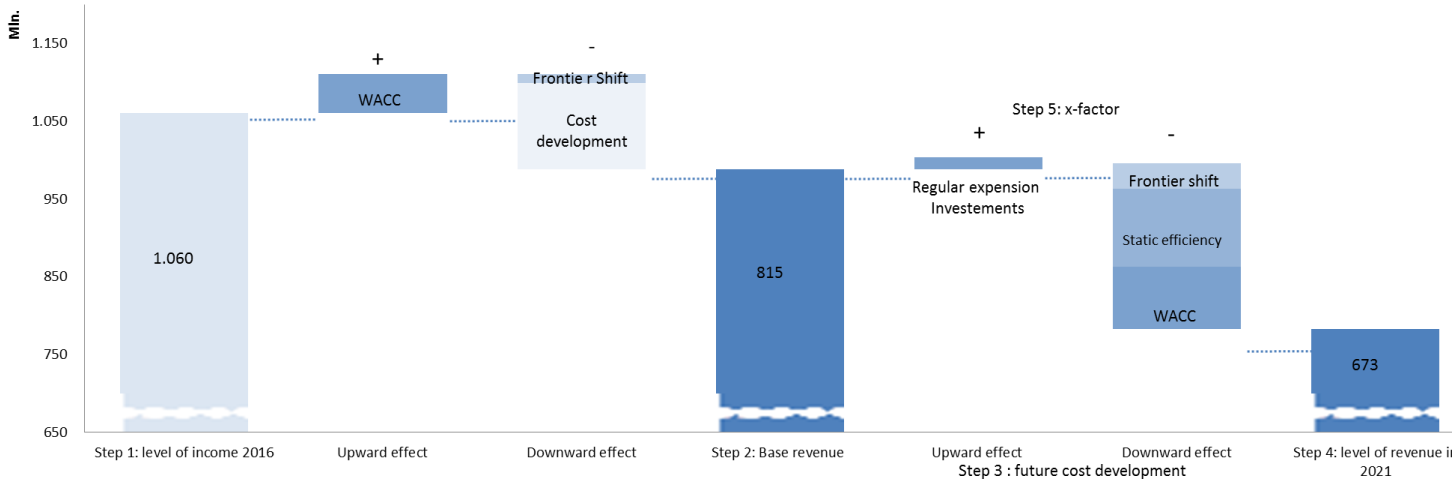

Figure 8: break-down of the level of revenue in 2016 and x-factor for GTS

What are the tariff adjustments that we foresee?

Each year, we correct the allowed revenue of the system operators by updating the estimates for some of the costs. There are two reasons why we update the cost estimates. Some of the cost estimates are updated every year, because that is statutorily mandated. In other cases, *we* find it reasonable to update those cost estimates. The law allows us to do so in the following cases:

- If a ruling by the court affects the estimate on which the tariffs are based;
- If we have used incomplete or incorrect data to determine the tariffs;
- If there are large deviations from the estimate on which the tariffs are based;
- If the revenue is based on services that a system operator no longer provides;
- Or if the revenue estimate does not include a service a system operator is required to provide.

More specifically, if we correct the estimates on the basis of the third point, we will have to determine whether or not it is appropriate to do so. We find it appropriate to update cost estimates if the cost estimates meet all three criteria listed below:

1. We are unable to make a good estimate of the costs;
2. There is a significant probability of a substantial impact on the finances of the system operator, if the costs are estimated incorrectly;
3. The system operator is in not compensated for this risk in any other way.

In some situations, we know in advance that we intend to apply a correction in the tariff decision, while in other situations, we are required by law to apply a correction. Such corrections are announced in the method decisions. We can also decide to correct the estimate during the regulatory period. This will be included in the tariff decision of that particular year. The corrections we are currently already foreseeing for the regulatory period of 2017-2021 are listed in table 3.

Table 3 overview of the cost estimates we correct yearly in the coming regulatory period

Correction	*Operator*	*Explanation*
Revenue reconciliation	TenneT and GTS	We apply a revenue-cap regulation, where we determine an allowed revenue. The tariffs are determined by dividing this allowed revenue by the expected volumes. The TSOs will always receive the allowed revenue, irrespective of the volumes they sell. The underrecovery (if less volume is sold than expected) or overrecovery (if more volume is sold than expected) is corrected in the tariffs of the year t+2. For the DSOs, we determine the allowed revenue given a specific volume. This means that, unlike TSOs, DSOs have a volume risk.
Non-regular investments	TenneT and GTS	For 'non-regular' expansion investments, we are required by law to take into account the realised (efficient) costs for certain expansion investments when we set the tariffs. This is in addition to the budget (extra allowance) for 'regular' expansion investments that is part of the ex ante revenue cap.
Auction	TenneT	The TSOs receive auction premiums. This revenue can be used and

premium	and GTS	currently *is* used to lower the tariffs.
Overbook and Buy Back	GTS	GTS has implemented the 'overbook and buy-back mechanism' in line with the congestion management procedures ("CMP") guidelines. GTS gets to keep 50% of every euro it earns when overselling, and also has to take 50% of the costs it makes when having to buy back capacity. The other 50% is corrected for in the tariffs.
Quality conversion energy costs	GTS	GTS is responsible for quality conversion. Due to various circumstances, there is uncertainty about the level of energy costs for quality conversion in the regulatory period of 2017-2021. We will therefore correct the tariffs so that GTS is compensated its actual costs.
Transport costs	TenneT & Electricity DSOs	TenneT has to pay for the transport of electricity through international connections. The electricity DSOs have to pay TenneT for the transport over the network of TenneT. We are statutorily required to correct the tariffs so that TenneT is compensated its actual costs.
Local taxes	DSOs	Municipalities in the Netherlands are allowed to tax the DSOs for the use of land. Because of political discussions about whether or not keeping these taxes in place, we cannot estimate the level of the local taxes with enough certainty. We therefore correct the estimate of the revenue with the realised (paid) local taxes.

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Numbers and figures

Table 4: general parameters

General parameters	
Real pre-tax WACC 2016	4.3%
Real pre-tax WACC 2016, new investments	3.6%
Real pre-tax WACC 2021	3.0%
real pre-tax WACC 2021, new investments	3.0%
Inflation 2016	0.8%
Inflation 2017-2021	1.2%

Table 5: TenneT information

TenneT	onshore	offshore
Parameters		
Static efficiency % in 2021 based on E3GRID	97.9%	n/a
Dynamic efficiency	0.8%	0%
x-factor	0.92	0
Income levels		
Base revenue	€434,278,484	€15,269,962
Expected efficient costs 2021	€440,392,526	€16,208,414

Table 6: GTS information

GTS – General parameters	
static efficiency % 2021 based on BNetzA benchmark	83.9%
static efficiency % 2021 based on CEER benchmark	86.6%
dynamic efficiency	0.6%

GTS – per task	Transport	Balancing	Connections	Connection points	Quality conversion
Base revenue 2016	€815,831,900	€31,206,685	€44,419,441	€523,335	€96,550,568
Level of revenue in 2021	€673,663,945	€26,843,531	€35,844,355	€659,159	€94,157,125
x-factor	4.95	4.16	5.39	-3.53	1.70

Table 7 DSO information

DSO– General parameters	E	G
dynamic efficiency	0.69%	0.03%

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DSOs Electricity	Cogas	Enduris	Enexis	Liander	Rendo	Stedin	Westland
x-factor	2.21	1.94	2.13	1.90	2.12	1.99	2.25
q-factor	0.97	0.38	0.05	-	0.27	-0.13	0.19
Base revenue	16,133,862	72,166,871	876,988,224	1,027,511,98	10,766,135	651,241,009	43,036,241
Level of revenue in 2021	11,829,976	59,645,720	665,185,037	829,866,950	7,952,953	517,086,261	30,820,291

DSOs Gas	Cogas	Enduris	Enexis	Liander	Rendo	Stedin	Westland	Zebra
x-factor	1.54	1.51	1.54	1.42	1.44	1.46	1.79	2.19
Base revenue	20,195,501	28,219,963	330,110,915	380,662,873	17,074,085	282,544,856	16,130,067	5,521,688
Level of revenue in 2021	19,852,492	27,783,865	324,505,391	376,479,602	16,865,440	278,831,204	15,656,753	5,252,897