Report on Monitoring of Security of Supply 2006-2014

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TenneT

Contents

1. Introduction

TenneT monitors the long-term security of supply each year at the request of the Minister of Economic Affairs. This year the monitoring and the associated data gathering took place for the third time on a statutory basis under Section 16, subsection 2 (f) of the Electricity Act, which assigns the monitoring of security of delivery and supply to TenneT (under Section 4a, subsection 1 of the Electricity Act of 1998). Monitoring took place twice before in previous years using data obtained through a voluntary exchange of information with members of the Production section of the trade organisation EnergieNed.

The purpose of this monitoring exercise is to provide an insight into the expected development of the domestic supply of and demand for electricity. We also examine the extent to which national capacity can cover national demand. Security of supply is not confined to the national borders. Therefore, as in previous years, we examined the extent to which foreign supply and the required international transmission capacity are available for electricity supplies to the Netherlands. This latter point is particularly important because the available export capacity from Germany to the Netherlands is under increasing pressure, especially due to large transit flows resulting from high production surpluses in northern Germany. From this monitoring report it appears that at the end of the surveyed period, the export potential of the Dutch electricity system will be considerable. This is why an analysis is being performed of whether the international transmission capacity is sufficient in order to export this potential capacity.

During the past year, TenneT has been confronted with an increase in connection requests for large-scale production capacity which was so great that not all requests could be granted without restrictions. Various solutions are available for expanding the transmission capacity. TenneT presumes that in the end all requests can be granted. This will, however, require several investments in the Dutch transmission grids. The situation that has arisen has also resulted in the initiation of further investigations into the functioning of the connection policy currently applied by TenneT in a market environment which is no longer characterised by coordinated planning of transmission grids and production capacity. At the behest of DTe, TenneT is conducting a study into the current connection policy and the effectiveness of improvement options. This study is still in progress.

Although there is an enormous increase in the planned construction of new large-scale production capacity, at the same time we cannot be certain that all these plans will actually be realised. It follows that the long term picture is uncertain. Therefore, a separate ‘sensitivity calculation’ has been performed as part of this analysis to determine the consequences for the security of supply if some plans are cancelled. For this calculation, a pessimistic scenario has been assumed in which only around 25% of the registered projects will actually be realised.

For this monitoring exercise, we have adopted the so-called LOLE methodology as the standard for assessing the adequacy of the production system. During the previous two years, this methodology was already used in addition to other methodology. An important reason for the transition to LOLE-based assessment is that this methodology is more in line with the models and analyses used abroad, so that results can be more easily compared.

At the moment, TenneT is collaborating with the Transmission System Operators (TSOs) of Germany, France, Belgium and Luxembourg under the terms of the Pentalateral Energy Forum. The purpose of this collaboration is to jointly develop a better assessment framework, among other things by exchanging information, using common models and performing joint analyses. The common model, too, will in all probability be based on LOLE methodology.

2. Conclusions and recommendations

2.1 Conclusions

The results of this monitoring exercise indicate that in principle there will be sufficient supply of electricity to meet national demand up to and including 2014.

During the first part of the surveyed period, up to and including the 2008 reference year, the Netherlands will continue to depend on supplies from other countries for its security of supply. During this period the security of supply will remain virtually level, but afterwards there appears to be a turnabout: in 2011 and possible even earlier, we will have an export potential rather than being dependent on imports. This potential will rise even further during the last year of the surveyed period. This trend is caused by an enormous increase in new large-scale production capacity.

The dependence on imports up to and including the 2008 reference year can be seen as a continuation of the present situation: there is a slight increase in production capacity, particularly small-scale production capacity. This increase is keeping in step with the growth in demand. This does not need to present a problem, however, as sufficient reserve capacity still exists in our neighbouring countries and the reliably available import capacity is sufficient. Moreover, the start-up of the NorNed cable in the second half of 2007 will create greater import possibilities.

It appears from the analysis that at the end of the surveyed period there will be a considerable increase in new large-scale production capacity. For instance, around 13 GW of new large-scale thermal production capacity has been reported for the period up to and including 2014. Around half of this capacity (7 GW) will be realised by the end of 2011. Partly due to excellent supply routes for fuels such as coal, a high-quality gas and electricity grid, relatively large quantities of cooling water, substantial gas reserves and a considerable amount of interconnection capacity, the Netherlands offers a relatively favourable climate for the establishment of enterprises. It therefore appears that in the evolving northwest European market, energy companies, too, are opting for a Dutch location. This is a positive development for the security of supply within the Dutch electricity system.

We cannot be certain that all projects will in fact be realised. Therefore, a separate ‘sensitivity calculation’ has been performed as part of this analysis to determine the consequences for the security of supply if some plans are cancelled. This analysis shows that even if just over 25% of plans for the construction of new capacity are realised, in 2014 the security of supply of the Dutch production capacity will still not fall below the level of the past few years.

As mentioned earlier, the results of this monitoring exercise indicate that no structural problems need to be expected. Nevertheless, extreme situations may occur which our assessment method does not cover, such as situations arising from cooling water restrictions in the summer (Phase 2) and gas supply problems during extremely cold winters. This monitoring report indicates that the electricity supply system will probably be less vulnerable to such situations in the future, because the larger part of the reported large-scale new production capacity will be built at coastal locations and near open water, where there are few cooling water restrictions. In addition, some of the reported new capacity will no longer be gas-fired. This diversification of fuels has a favourable effect on the security of supply.

It will be possible to improve the monitoring of the security of supply even further if more insight can be obtained into the value of the available reserves in the surrounding electricity systems and in the available international transmission capacities. This requires proper analyses of the entire interconnected western European electricity system, which is why TenneT has decided to perform cross-border analyses during the next few years in collaboration with the TSOs of Germany, France, Belgium and Luxembourg.

2.2 Recommendations

The results of this monitoring exercise do not give us cause to advise the government to take new measures in order to guarantee the future security of supply in the Netherlands.

3. Results

This chapter presents the results of the analyses of the security of supply performed using the LOLE methodology. The results of the assessment method indicate the extent to which national supply can meet national demand.
The LOLE methodology is used widely in other countries to determine the adequacy of electricity systems. The result of the method is an expected value for the number of hours per year during which the available production capacity will not be able to meet the demand (the so-called 'Loss of Load Expectation', abbreviated to LOLE). A maximum LOLE value is used as a criterion for the adequacy of a system and refers to the acceptable risk of not being able to meet the demand. This value can be easily translated into the minimum production capacity that is required.

In the Netherlands, too, the criteria used for the reliability of limited-capacity electricity production systems are usually based on macro-economic discussions concerning the (financial) damage to society in the event of a power disruption. By comparing these costs with the costs of investments in additional production capacity, the desired level of reliability can be determined. In calculations relating to the Dutch system, a standard of four hours is used.

In this chapter, the model results of several calculation variants are presented per year in several ways. For each variant the calculated LOLE value is presented first. From this value it can already be deduced whether there is a shortage (if the LOLE value exceeds the standard used) or a surplus (if the LOLE value falls below the standard used). In addition, capacity values are presented for each variant, which indicate the extent of the shortage or surplus. If there is a shortage, these values will tell us exactly how much capacity must be added to the system (or purchased from surrounding systems) to meet the reliability criterion. In case of a surplus, the values will tell us how much capacity can be removed from the system (or sold to surrounding systems) before the criterion is no longer met.

As in the previous monitoring exercise, we again examined two variants as regards the assumed unavailability of means of production (basic variant and sensitivity variant A). The basic variant will be presented in Chapter 3.1. The unavailability figures assumed in said chapter are those indicated by the producers for this monitoring exercise. Chapter 3.2 indicates the sensitivity of the outcomes to alternative assumptions about the unavailability of means of production. It appears from this monitoring report that there is an enormous increase in the planned construction of new large-scale production: approximately 13 GW in total. We cannot be certain, however, that all these plans will actually be realised. Therefore, a separate 'sensitivity calculation' has been performed to determine the consequences for the security of supply if some plans are cancelled (sensitivity variant B). The results of this analysis are presented in Chapter 3.3. In Chapter 3.4, the results of the investigated variants are compared with the available transmission capacity for imports and exports. Chapter 3.5 concludes with an overview of the reserve factors that can be derived from the data we used.

3.1 Main results of the 2006-2014 monitoring exercise (basic variant)

Figure 1 summarises the results of the basic variant of the 2006-2014 monitoring exercise. The line shown in this figure represents the calculated LOLE values. The blue part of the line represents the calculated actual values for the period 2003-2006.

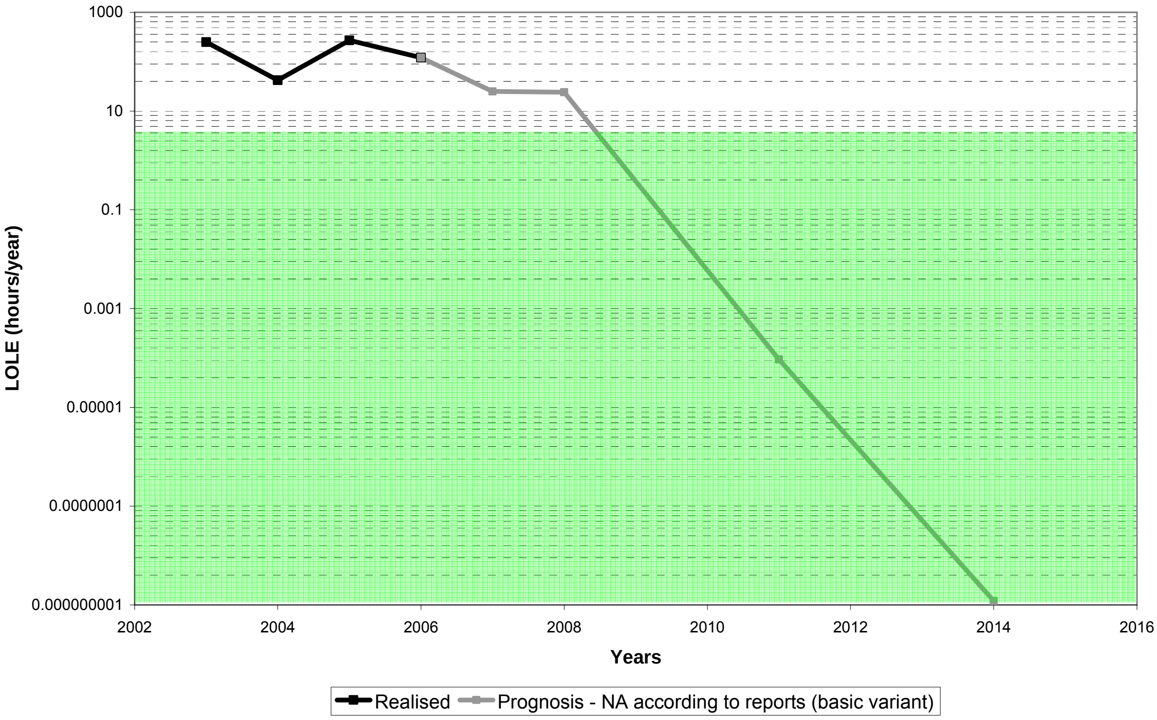

Figure 1: Main results of the 2006-2014 monitoring exercise (basic variant)

From this figure it can be deduced whether a shortage or a surplus exists. The four-hour standard applied in the Netherlands has been indicated by the colour green. Up to and including 2008 there will be a shortage; the system will depend on the production capacity of other countries (i.e. dependence on imports). A notable element is that at the beginning of the surveyed period, in the 2007 and 2008 reference years, there is a slight increase in the security of supply compared to the actual levels realised in 2003-2006 (lower LOLE). After 2008, the line moves into the green area and there will be a surplus (i.e. export potential).

Table 1: Main results of the 2006-2014 monitoring exercise, actual figures for 2003-2006 and prognosis for 2007-2014, incorporating the unavailability of means of production according to information provided by producers (basic variant)

	demand	non operational capacity	operational capacity				LOLE	shortage of capacity	
								firm	equivalent production capacity
	total		total	renewables	thermal	other (incl. waste)	NA acc.to reports		
year	TWh	GW	GW	GW	GW	GW	h	GW	GW
2003	109.6	0.5	20.2	1.0	18.7	0.5	**249**	**1.6**	**2.0**
2004	112.9	0.4	21.0	1.1	19.4	0.5	**42**	**0.9**	**1.1**
2005	114.8	0.4	21.1	1.3	19.3	0.5	**270**	**1.8**	**2.2**
2006	116.2	0.0	21.8	1.6	19.7	0.5	**121**	**1.3**	**1.6**
2007	119.4	0.0	22.5	1.9	20.0	0.6	**25**	**0.6**	**0.7**
2008	122.7	0.0	23.1	2.2	20.2	0.7	**24**	**0.6**	**0.7**
2011	130.2	0.1	29.9	3.2	26.0	0.7	**0**	**-3.2**	**-3.7**
2014	138.2	0.6	36.8	4.7	31.4	0.7	**0**	**-7.0**	**-8.1**

Note: NA = Unavailability of means of production

By way of amplification of the calculation results presented in the graph, Table 1 provides further information on the development of national demand and supply. The national supply has been subdivided into operational and non-operational capacity. Non-operational capacity refers to conserved or ‘mothballed’ capacity. Finally, the operational capacity has been subdivided into thermal capacity, generation sources (almost solely wind) and other capacity.

In addition to the results in terms of LOLE, the table presents two different capacity values which indicate the extent of the shortage or surplus: a so-called ‘firm’ capacity value and an equivalent production capacity value. The firm value represents a surplus or shortage in terms of capacity with a 100% availability. Because capacity with a 100% availability does not exist, more capacity will always be required in reality. Among other things, this ‘equivalent production capacity’ depends on the likelihood of a disruption or failure, the overhaul duration and the unit size of the means of production concerned. In the results, the equivalent production capacity has been determined on the basis of a representative mix of large-scale production capacity.

The table shows that at the beginning of the surveyed period, in 2007 and 2008, there is a shortage of capacity (in terms of equivalent production capacity) of around 0.7 GW. However, this shortage can be easily compensated by imports, which means that the security of supply will not be jeopardised (see also Chapter 3.4). We can also clearly see that particularly in the 2011 and 2014 reference years there will be a considerable increase in production capacity, so that as of the 2011 reference year (and possibly even sooner) a situation will arise in which the Netherlands has a significant export potential. In 2011, the export potential will amount to 3.7 GW, and after that it will rise further to 8.1 GW in 2014.

3.2 Sensitivity to the unavailability of production units (sensitivity variant A)

The assumptions made in respect of the likely unavailability of means of production are important input for the calculations. These assumptions greatly influence the findings. As was the case last year, we again noticed a major difference between the unavailability levels that actually occurred in the past and those forecast by producers: the producers' forecasts were significantly lower than the unavailability levels actually realised. This can be seen in Figure 2, which depicts the actual unavailability levels from 2003 up to and including 2006 and the forecasts given by producers. The black line shows the historical average unavailability levels of the past few decades (14.6%). As in the previous monitoring exercise it is striking that the further we look ahead, the larger the difference between the actual historical values and the values reported by producers: the values forecast are 2.4 to 6.4 percentage points below the historical average, while the actual values remain around the line of the historical average. For this reason, we again performed several analyses for this monitoring report – in addition to the basic variant, with unavailability figures according to the information provided by the producers – in which we based the unavailability figures for all surveyed years on the historical average.

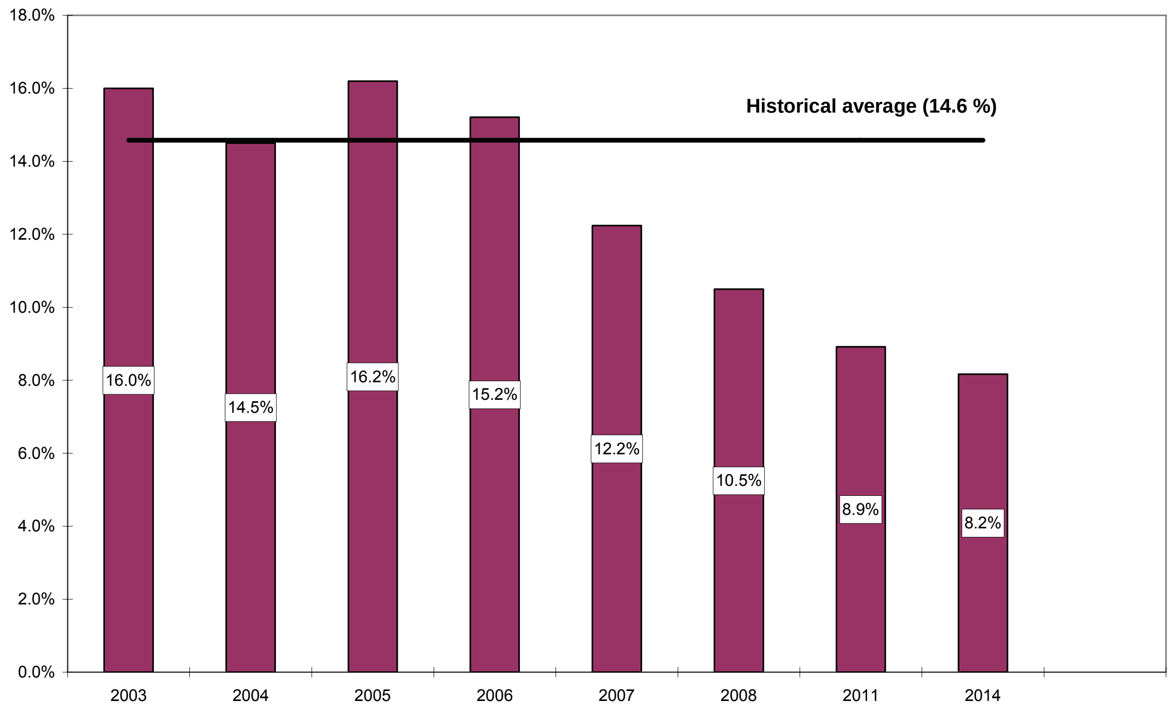

Figure 2: Unavailability of production units as a percentage, actual and estimated values

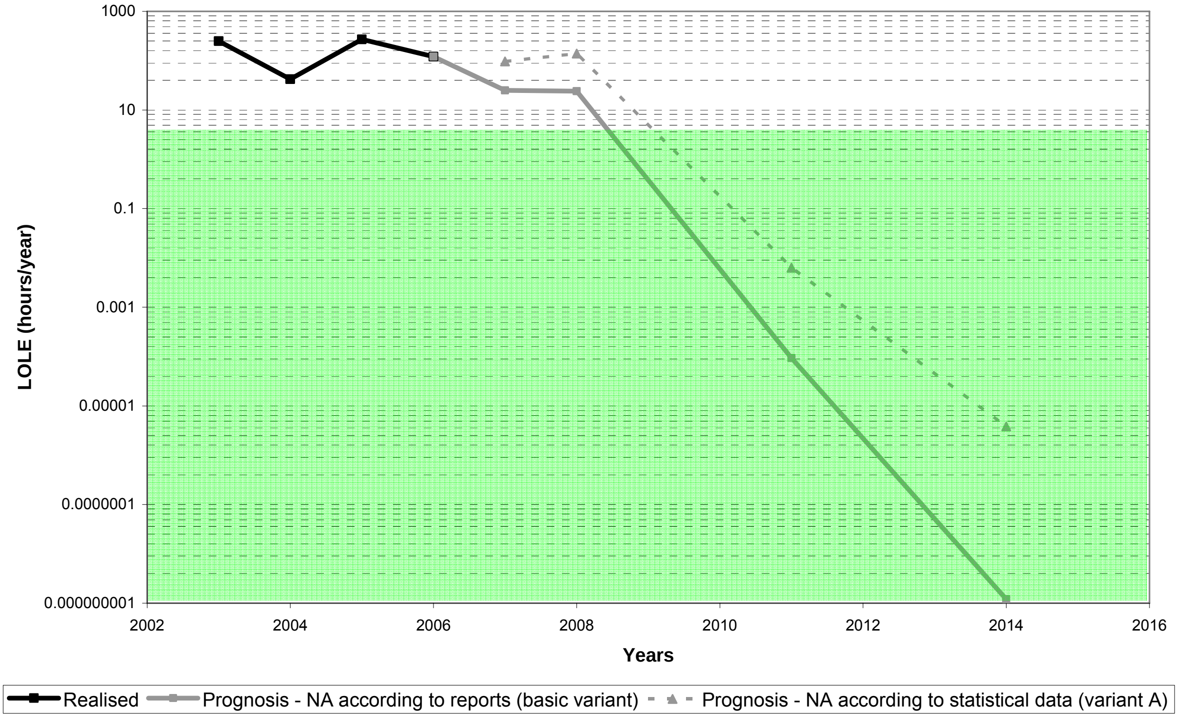

Figure 3: Monitoring results for 2006-2014 (basic variant and sensitivity variant A)

To supplement the main results presented earlier, the dotted line in Figure 3 shows the results of the variant with the availability data based on actual historical values. Table 2 shows the results of the sensitivity variant.

Table 2: Monitoring results for 2006-2014, prognosis for 2007-2014 with standardised unavailability of means of production based on historical statistical data (sensitivity variant A)

year	demand total	non operational capacity	operational capacity total	operational capacity renewables	operational capacity thermal	operational capacity other (incl. waste)	LOLE NA acc.to historical statistics	shortage of capacity firm	shortage of capacity equivalent production capacity
	TWh	GW	GW	GW	GW	GW	h	GW	GW
2003	109.6	0.5	20.2	1.0	18.7	0.5	**249**	**1.6**	**2.0**
2004	112.9	0.4	21.0	1.1	19.4	0.5	**42**	**0.9**	**1.1**
2005	114.8	0.4	21.1	1.3	19.3	0.5	**270**	**1.8**	**2.2**
2006	116.2	0.0	21.8	1.6	19.7	0.5	**121**	**1.3**	**1.6**
2007	119.4	0.0	22.5	1.9	20.0	0.6	**97**	**1.2**	**1.5**
2008	122.7	0.0	23.1	2.2	20.2	0.7	**139**	**1.4**	**1.8**
2011	130.2	0.1	29.9	3.2	26.0	0.7	**0**	**-2.3**	**-3.0**
2014	138.2	0.6	36.8	4.7	31.4	0.7	**0**	**-5.4**	**-7.1**

As was to be expected, greater shortages occur in the sensitivity variant than in the basic variant due to the higher assumed unavailability of means of production. In 2007, the shortage amounts to 1.5 GW of equivalent production capacity (0.7 GW in the basic variant). This will increase to 1.8 GW in 2008 (also 0.7 GW in the basic variant). The export potential in 2011 (3.0 GW) and 2014 (7.1 GW) will be 0.7 GW and 1.0 GW below the basic variant, respectively. As in the basic variant, the shortages in 2007 and 2008 can be easily compensated by imports (see Chapter 3.4).

3.3 Sensitivity to reduced realisation of new large-scale production capacity (sensitivity variant B)

For this monitoring exercise we have taken into account a total of around 13 GW of planned new production capacity. Because we cannot be certain that all these plans will actually be realised, a sensitivity calculation has been performed to determine the consequences for the security of supply if some plans are not realised. In the basic variant, the plans for new large-scale thermal production capacity for the period between 2009 and 2014 inclusive amount to 12.6 GW. In this sensitivity variant we assume that only 3.4 GW (5 projects chosen at random) will be realised instead of 12.6 GW. This capacity represents approximately 27% of all reported projects in the period between 2009 and 2014. The calculations have been based on the standardised unavailability of means of production according to historical statistics.

Figure 4 shows the results of this sensitivity calculation in addition to the results presented previously. Table 3 shows the results in figures.

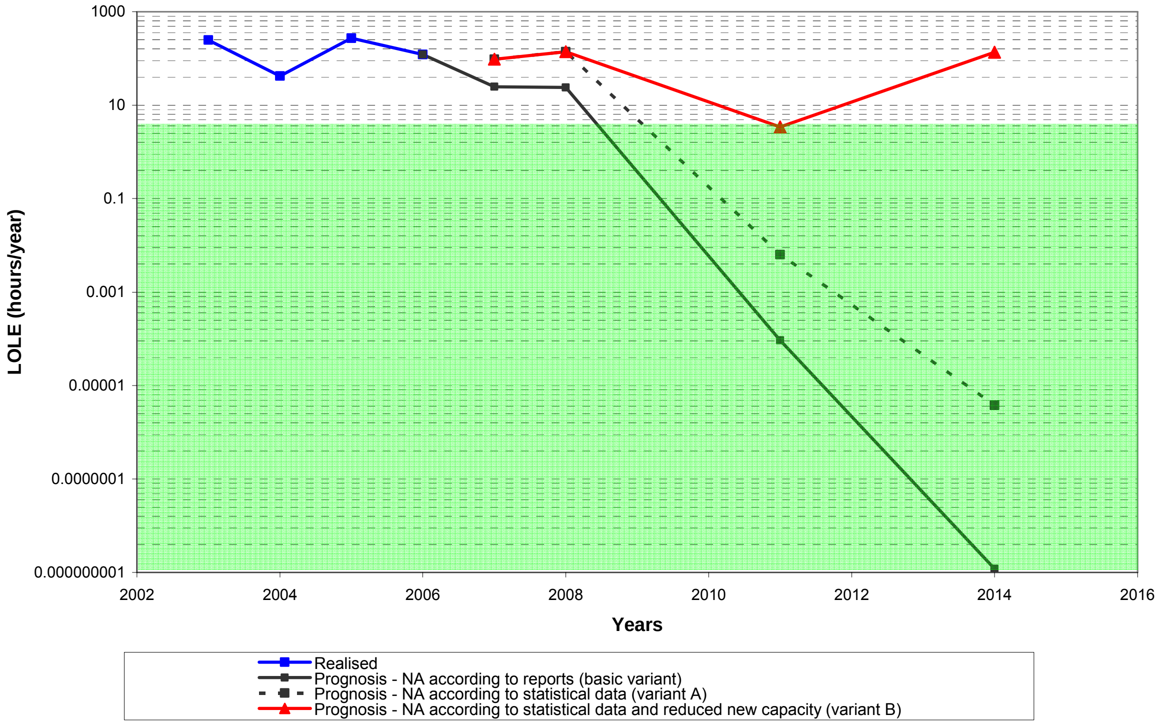

Figure 4: Monitoring results for 2006-2014 (basic variant and sensitivity variants A and B)

Table 3: Monitoring results for 2006-2014, prognosis for 2007-2014 with standardised unavailability of means of production based on historical statistical data and reduced realisation of new production capacity (sensitivity variant B)

	demand	non operational capacity	operational capacity				LOLE NA acc.to historical statistics	shortage of capacity	
	total		total	renewables	thermal	other (incl. waste)		firm	equivalent production capacity
year	TWh	GW	GW	GW	GW	GW	h	GW	GW
2003	109.6	0.5	20.2	1.0	18.7	0.5	**249**	**1.6**	**2.0**
2004	112.9	0.4	21.0	1.1	19.4	0.5	**42**	**0.9**	**1.1**
2005	114.8	0.4	21.1	1.3	19.3	0.5	**270**	**1.8**	**2.2**
2006	116.2	0.0	21.8	1.6	19.7	0.5	**121**	**1.3**	**1.6**
2007	119.4	0.0	22.5	1.9	20.0	0.6	**97**	**1.2**	**1.5**
2008	122.7	0.0	23.1	2.2	20.2	0.7	**139**	**1.4**	**1.8**
2011	130.2	0.1	27.1	3.2	23.2	0.7	**3**	**-0.1**	**-0.2**
2014	138.2	0.6	27.7	4.7	22.3	0.7	**136**	**1.5**	**2.0**

These results show that even if only just over 25% of plans for new production capacity are realised, the security of supply of the Dutch producers will still not fall below the level of the past few years at the end of the surveyed period.

3.4 Comparison of shortages and surpluses with the available import and export capacity

The results presented above show that up to and including the 2008 reference year, the Netherlands will depend on supplies from other countries for its security of supply. In this chapter, the shortages and surpluses will be compared with the available transmission capacity for imports and exports. With regard to the available transmission capacity for imports and exports, two scenarios have been investigated. According to the cautious transmission scenario, the import/export capacity at the German/Belgian borders amounts to 3.85 GW during the period up to and including 2007. From 2008 to the end of the surveyed period, an extra 0.3 GW is expected due to the realisation of phase shifters in the Belgian grid. According to the optimistic transmission scenario, the Doetinchem-Wesel connection, with a capacity of 1.5 GW, will be operational in 2014, which will result in a total import/export capacity at the German/Belgian borders of 5.65 GW in 2014.

Taking the NorNed cable (0.7 GW as of the 2008 reference year) and the BritNed cable (1.0 GW as of the 2011 reference year) into account, in 2014 the total cross-border transmission capacity for imports and exports will be 5.85 GW according to the cautious scenario and 7.35 GW according to the optimistic scenario.

The table below gives an overview of the assumptions used with regard to the available capacity in the two transmission scenarios. In addition to the sum of the nominally available transmission capacity for imports and exports, the table also provides an estimate of the average available capacity when taking account of reductions resulting from faults, overhauls and loop flows due to production surpluses from wind capacity.

In addition to physical expansion of the cross-border transmission capacity as incorporated in the table below, measures are also being introduced to make better use of the existing capacity. For example, in June 2007 a Memorandum of Understanding (MoU) was signed by the parties participating in the Pentalateral Energy Forum. In this Memorandum the parties have agreed, among other things, to introduce a market coupling system in 2009 between Germany and the already coupled TLC area (the Netherlands, Belgium and France). A market coupling system, as compared to an explicit auction system, will utilize import/export capacity more efficient.

Table 4: Available import/export capacity and maximum utilisation in the three calculation variants

	Belgium/Germany		NorNed	BritNed	tot. nominal [1]		tot. after reductions [2]		maximum utilisation of import/export capacity (%)					
	cautious	optimistic			cautious	optimistic	cautious	optimistic	cautious transm. scenario			optimistic transm. scenario		
									basic var.	var. A	var. B	basic var.	var. A	var. B
year	GW	GW	GW	GW	GW	GW	GW	GW						
2006	3.9	3.9	0.0	0.0	3.9	3.9	3.6	3.6	37%	37%	37%	37%	37%	37%
2007	3.9	3.9	0.0	0.0	3.9	3.9	3.6	3.6	17%	34%	34%	17%	34%	34%
2008	4.2	4.2	0.7	0.0	4.9	4.9	4.5	4.5	13%	31%	31%	13%	31%	31%
2011	4.2	4.2	0.7	1.0	5.9	5.9	5.5	5.5	-59%	-42%	-2%	-59%	-42%	-2%
2014	4.2	5.7	0.7	1.0	5.9	7.4	5.5	6.8	-128%	-98%	28%	-102%	-78%	22%

[1] Excluding reductions

[2] Including reductions resulting from faults, overhauls and loop flows due to production surpluses from wind capacity

In both Table 4 and Figure 5, the available import and export capacity after reductions in the two transmission scenarios are compared with the firm production shortages and firm production surpluses occurring in the three calculated variants (basic variant, variant A and variant B).

In the table, this comparison is expressed in terms of the utilisation of import and export capacity, in percentages, whereby a positive value indicates utilisation of import capacity and a negative value indicates utilisation of export capacity. The figure shows the maximum capacity for imports and exports for the cautious transmission scenario (orange line) and for the optimistic transmission scenario (red line). In addition, it shows the surpluses and shortages occurring in the three calculation variants in terms of firm production capacity.

It appears from both the figure and the table that in all cases there will be sufficient import capacity to compensate the shortages. Moreover, it appears that it will not be possible to transmit the full export potential in 2014, assuming the cautious export scenario for the production variant with optimistic availability levels of means of production (basic variant: availability of means of production based on data reported by producers). For the (more realistic) variant with standard availability levels (variant A) there are no bottlenecks in any transmission scenario. The same applies to variant B.

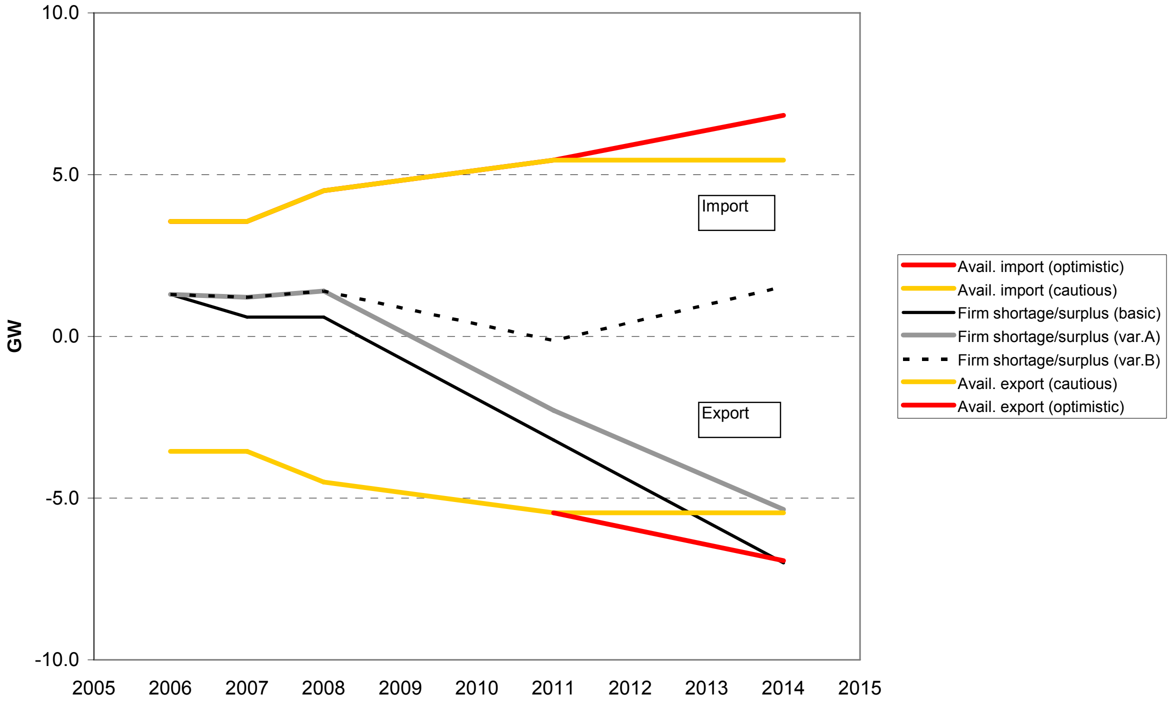

Figure 5: Comparison of surpluses and shortages with the available import and export capacity for the basic variant and the two sensitivity variants A and B

3.5 Reserve factors

As in our previous reports, we have once again estimated the reserve factors. The reserve factor is the ratio of the installed production capacity and the maximum demand. Table 5 provides an overview of the reserve factors that can be derived from the data used.

The reserve factors show the same trend as the results based on the LOLE calculations, i.e. an almost identical level in the years 2006 to 2008 inclusive, followed by a substantial increase in the reserves in the years 2011 and 2014.

Table 5: Reserve factors 2006-2014

year	non-operational capacity GW	total operational capacity GW	capacity from renewables GW	available import cap. (cautious) GW	peak demand GW	reserve factor 1)	reserve factor 2)	reserve factor 3)
2006	0.0	21.8	1.6	3.6	18.4	1.19	1.12	1.31
2007	0.0	22.5	1.9	3.6	18.9	1.20	1.11	1.30
2008	0.0	23.1	2.2	4.5	19.4	1.19	1.10	1.33
2011	0.1	29.9	3.2	5.5	20.6	1.46	1.33	1.59
2014	0.6	36.8	4.7	5.5	21.8	1.68	1.51	1.76

1) excluding import, renewables included for 100%, non operational for 0%

2) excluding import, renewables included for 100%, non operational for 0%

3) import capacity included for 100%, renewables for 20% and non operational for 0%

4. Notes on the data used

This monitoring exercise and the resulting report have been based on the following data:

- data obtained from members of the Production section of the trade organisation EnergieNed concerning national means of production under their management (generally speaking these data concern provisional plans);
- data obtained from producers known to EnerQ and CertiQ. As was the case last year, we requested data for this monitoring exercise from all producers with units of 5 MW and larger, insofar as known to TenneT. Our aim in doing this was to increase the degree of coverage and make less use of our own estimates so as to enhance the quality and reliability of the analysis. Among other means, we used the address databases of EnerQ and CertiQ to approach this new group of producers;
- data obtained from the draft reference scenario of the forthcoming Capacity Plan 2008-2014 concerning other national means of production, growth of the national market, the period after 2007, and transmission capacity on cross-border interconnections;
- data provided by CBS (Netherlands Statistics) with regard to the actual national demand up to 2006 inclusive;
- data provided by CPB (Netherlands Bureau for Economic Policy Analysis) with regard to the economic growth after 2006.

Table 6 presents an overview of the development of the installed capacity. With regard to the new large-scale thermal production capacity to be built, it should be noted that we have tried to remain as consistent as possible with the forthcoming Quality and Capacity Plan 2008-2014. Full consistency is, however, not possible because the collection of information for the Quality and Capacity Plan has not yet been completed.

The information provided reveals that the larger part of the reported construction of large-scale new capacity will be realised on the coast. This is favourable for the security of supply because coastal locations are usually not subject to cooling water restrictions. We also noticed that some of the reported new capacity will not be gas-fired. This diversification of fuels is again favourable for the security of supply, because it reduces dependence on gas and, by consequence, the vulnerability of the system to gas supply restrictions in extremely cold periods.

Table 6: Development of the installed capacity

	non oper. capacity	operational capacity			evolution					
					large scale thermal			sm. scale therm.	renewable	total
	total	total	renewables	tot. excl. renewables	new	out of operation	balance	balance	balance	balance
year	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
2005	0.4	21.1	1.3	19.8						
2006	0.0	21.8	1.6	20.2	0.1	0.0	0.1	0.3	0.3	0.7
2007	0.0	22.5	1.9	20.6	0.3	0.0	0.3	0.1	0.3	0.8
2008	0.0	23.1	2.2	20.9	0.1	0.0	0.1	0.2	0.3	0.6
2011	0.1	29.9	3.2	26.7	6.3	0.7	5.5	0.3	1.0	6.8
2014	0.6	36.8	4.7	32.1	6.3	0.9	5.4	0.0	1.4	6.8

The data provided (see Table 6) yield the following points for attention:

- For the years 2011 and 2014 we can see an enormous increase in the planned construction of new large-scale production capacity. For the entire period surveyed during this monitoring exercise, for example, approximately 13 GW of new large-scale thermal production capacity to be constructed has been reported. Over half of this capacity (7 GW) is to be realised during the period to 2011 inclusive. However, we cannot say for certain that all projects will in fact be realised. The figures do show that the Netherlands, partly due to excellent supply routes for fuels such as coal, a high-quality gas and electricity grid, relatively large quantities of cooling water, substantial gas reserves and a considerable amount of interconnection capacity, the Netherlands offers a relatively favourable climate for the establishment of enterprises. It therefore appears that in the evolving northwest European market, energy companies, too, are opting for a Dutch location. This is a positive development for the security of supply of the Dutch electricity system.
- During the years 2011 and 2013, approximately 1.6 GW of production capacity will be taken out of operation. Around 0.7 GW of this capacity will be conserved.

Table 7 summarises the main points of departure with regard to the size of the national market.

Table 7: Assumptions concerning market size

	monitoring 2003-2011		monitoring 2004-2012		monitoring 2005-2013		monitoring 2006-2014	
	growth of cons.	demand	growth of cons.	demand	growth of cons.	demand	growth of cons.	demand
year	%	TWh	%	TWh	%	TWh	%	TWh
2003	1.09%	109.6	1.32%	109.8	1.32%	109.8	1.32%	109.8
2004	1.25%	110.9	0.92%	110.8	2.83%	112.9	2.83%	112.9
2005	1.50%	112.6	1.00%	111.9	1.53%	114.7	1.64%	114.8
2006	2.00%	114.9	2.25%	114.5	2.75%	117.8	1.27%	116.2
2007	2.00%	117.1	2.00%	116.7	3.00%	121.3	2.75%	119.4
2008	2.00%	119.5	2.00%	119.1	2.00%	123.8	2.75%	122.7
2009	2.00%	121.9	2.00%	121.5	2.00%	126.2	2.00%	125.2
2010	2.00%	124.3	2.00%	123.9	2.00%	128.8	2.00%	127.7
2011	2.00%	126.8	2.00%	126.4	2.00%	131.3	2.00%	130.2
2012	*2.00%*	*129.3*	2.00%	128.9	2.00%	134.0	2.00%	132.8
2013	*2.00%*	*131.9*	*2.00%*	*131.5*	2.00%	136.7	2.00%	135.5
2014	*2.00%*	*134.6*	*2.00%*	*134.1*	*2.00%*	*139.4*	2.00%	138.2

legend
- realised (final figures from CBS)
- realised (initial estimation of CBS)
- prognosis (based on most recent CPB prognosis)

Among other things, Table 7 shows the following:

- The definitive figure for national electricity demand in 2005 is in accordance with the preliminary estimate used for the previous monitoring exercise.
- The actual growth in 2006 (based on the initial estimation by CBS) is approximately 1.5% lower than assumed in last year's monitoring exercise.
- The size of the national market in 2007 and 2008 has been based on CPB's most recent expectations of GDP growth in 2007 (2.75%) and 2008 (2.75%) (issued in April 2007). The growth in the years thereafter has been based on the reference scenario of the forthcoming Quality and Capacity Plan 2008-2014 and amounts to 2%.
- Together, the above factors result in a national market size of 138.2 TWh in 2014 (including grid losses). This is approximately 1.2 TWh lower than assumed in our previous monitoring exercise.

5. Vulnerability of the security of supply due to dependence on imports

The analyses show that in the 2007 and 2008 reference years the Netherlands is dependent on supplies from other countries for its security of supply. Dependence on imports is acceptable in principle, provided that we can rely on sufficient reserve capacity being available under all circumstances in the neighbouring markets to meet the national demand, together with the Dutch production capacity. Additionally, the various transmission grids and their interconnections must provide sufficient capacity for the required transmission volume.

In order to estimate the extent to which the security of supply in the Netherlands is vulnerable due to dependence on imports, it is particularly important to know how much import capacity and reserve production capacity is reliably available in our neighbouring countries.

Production surpluses in the northern German grid mean that less and less of the nominally available capacity on the interconnectors with Germany and Belgium can be regarded as reliable import capacity. We took this into account when calculating the import capacity. For all the surveyed years, there is sufficient reliable import capacity to make up for the national shortage by means of imports. Consequently, the available reserves in our neighbouring countries form the decisive factor when it comes to determining the degree of vulnerability of the Netherlands due to dependence on imports. The UCTE System Adequacy Forecast is the best source of information that is currently available on the reserves present in the European system.

The most recent UCTE System Adequacy Forecast (2007-2020) concludes, for the cautious scenario A, that sufficient reserves will be present in the system up to and including 2010. In the period that follows, supplementary investments appear to be necessary as of 2014-2015. The main conclusions of the UCTE report include the following:

(1) In scenario A, confirmed investment decisions seem sufficient, at UCTE level, to achieve a reasonable level of adequacy from now to 2010.

(2) Nevertheless, adequacy will be at risk by 2014-2015 if further investments are not decided in due time.

The above conclusions apply to the entire UCTE system. The Pentalateral Energy Forum recently performed analyses using the UCTE method for a group of countries consisting of the Netherlands, Germany, Belgium, Luxembourg and France. The analysis shows that the security of supply will not be at risk up to and including 2008. From 2009 onwards, however, situations may occur where the reserve margin will be insufficient, making this group of countries jointly dependent on external imports. Precisely in those years, the Netherlands will see an increase in the installed volume of production capacity.

This conclusion confirms TenneT's analyses in previous monitoring reports. Those reports also concluded that in the medium term the Netherlands, Belgium, France and Germany will become jointly dependent on external imports if and when an above-average unavailability of means of production occurs due to faults, overhauls or lack of wind or hydropower. At that time, the internal bottlenecks in the German and Belgian grids may pose a real danger to the imports that the Netherlands will need from countries outside the aforementioned group.

5.1 Cross-border analyses

The UCTE method provides a rough indication of the security of supply. There is room for improvement in the UCTE method in the following and other respects:

- One-year modelling period. The UCTE method examines two moments per year. It would be better to examine more, preferably all hours.
- Modelling of uncertainties. Taking account of uncertainties in the correct manner is important in order to form an impression of the security of supply in an electricity system. Important uncertainties include the load, the amount of wind, the unforeseen unavailability of power stations (failures), and the hydropower conditions.
- Modelling of the market. Better allowance could be made for the reactions of the demand and supply side to market prices.
- Limitations in the transmission grid. The integration of these limitations into the model could be improved.

To improve the model it is important to have a reliable and consistent data set. The Pentalateral Energy Forum is taking steps to enable an exchange of information in the near future between a group of countries consisting of the Netherlands, Belgium, Germany, Luxembourg and France. Using their own methods, these countries will be able to perform analyses that cover their own electricity systems and those of neighbouring countries.

Due to the inexact nature of the UCTE method, TenneT has decided to perform cross-border analyses in collaboration with the TSOs of Germany, France, Belgium and Luxembourg. This will allow alignment to our own results and to those of neighbouring countries that use the same method. These analyses will enable examination of the extent to which synergy effects are attainable for the security of supply, i.e. by regarding the various western European systems as a single market. These synergy effects are likely to occur both on the demand and on the supply side. A certain synergy may be expected on the supply side because, for example, failures of means of production can be compensated by reserves present in the systems of other countries. On the demand side, there is likely to be a certain lack of synchronicity in the various systems as regards the occurrence of high demand.