2010 - 2016

Quality and Capacity Plan

Executive Summary

TenneT

The Dutch transmission grid

As at 1 September 2009

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Foreword

TenneT closely follows all developments in the electricity market in order to maintain a high quality, reliable high voltage grid, both now and in the future. As far as the Dutch grid is concerned, we submit a Quality and Capacity Plan to the Board of the Netherlands Competition Authority once every two years to provide an official account of these developments. This plan adheres to the seven year time horizon prescribed by law. On its own initiative TenneT also conducts studies with longer planning periods, including our 'Vision 2030' document and a study into the impact that a fully sustainable energy supply would have on the grid infrastructure. The latter document will be published in autumn 2010.

TenneT has both a national and European obligation to draw up capacity plans. In collaboration with other TSOs within ENTSO-E, TenneT is therefore involved in drawing up a ten year grid investment plan for the North Sea region and a ten year development plan for the entire European Community. The development of grids in the North Sea will be one of the key feature in the plan for the North Sea region.

This is the first time that TenneT has had to draw up a national plan for the 110 kV and 150 kV grids for which. We acquired ownership of most over the past few years. Although we are not yet responsible for the 150 kV grid in the Randmeren region – which is covered by a Cross Border Lease (CBL) arrangement – we have decided in consultation with Alliander that TenneT will also draw up a Quality and Capacity Plan for this network. The grid operator Stedin has drawn up its own plan for the 150 kV grids covered by CBL arrangements in the provinces of Utrecht and Zuid-Holland.

Market operation, grid development and regulatory framework

In comparison to the previous Quality and Capacity Plan, the number of construction plans for new power stations in the Netherlands has further increased. If all of these plans are implemented, installed capacity would double by 2016. In several neighbouring countries, too, there is a relative increase in plans to construct new production capacity to the load. In essence, this can only lead to increasing competition in the European electricity market. Much will depend here on the eventual realisation of the aforementioned construction plans and the phasing out of obsolete production units. Until now, producers have been highly unresponsive with regard to providing information on this issue. Though this is understandable from a competitive point of view, it makes adequate grid planning a more complex process than it otherwise could be. For this reason, I wholeheartedly support the recommendation made in the Netherlands Energy Council's report entitled 'The Backbone of the Energy Supply System' ['De ruggengraat van de energievoorziening'] to give the Dutch Ministry of Economic Affairs a stronger supervisory role in the development of the gas and electricity infrastructure. This is also important in light of the government's aim of making the electricity supply more sustainable.

In accordance with the Netherland Energy Council's recommendation, it is also important that the current regulatory framework (with its one sided focus on reducing tariffs) is replaced by one that embraces a more economic approach. This will provide the financial stability required by grid operators to make investments, thereby ensuring that all grid expansion projects can be properly implemented and grids in the North Sea can be installed in the future.

Developing a European 'power hub'

Implementing the planned expansions outlined in this Quality and Capacity Plan will create a transmission grid in the Netherlands that offers scope for both the import and export of electricity. It will also be able to support the internal electricity market in Europe, in accordance with the aims of the European Commission. As the scenarios in the Plan predominantly focus on the consequences for the grid as a result of the power stations currently under construction, there should be no doubt as to the value and necessity of the planned measures. Together with the expansions and upgrades already underway, these plans will establish the Netherlands as Europe's 'power hub'. This will benefit the business climate in the Netherlands and enhance our security of supply.

Ir. J. M. Kroon mba
President and Chief Executive Officer

Executive Summary

General

This Quality and Capacity Plan has been drawn up during a period of great change in the economy and the electricity sector. The credit crisis and resulting economic recession led to a decline in electricity consumption levels in the first half of 2009, a unique occurrence in the history of the electricity supply system. Over the preceding forty years, the only decrease in consumption levels (amounting to less than one percent) occurred during the second energy crisis in 1981 and 1982, amid a contracting economy. During the first energy crisis in the 1970s, electricity consumption actually continued to rise in spite of economic contraction.

The present Quality and Capacity Plan contains even more plans for the construction of new production capacity than the previous one. Realisation of all these construction plans would double the installed capacity by 2017. There are also more plans in neighbouring countries to construct new power stations than are necessary, based on demand trends and the number of power stations announced for decommissioning.

With regard to the quality of our service provision, the transfer of management of the Dutch 150 kV- and 110 kV-grids was a very important issue.

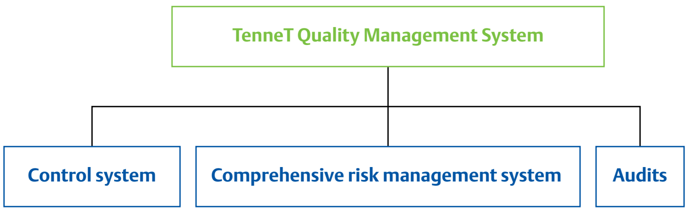
Quality

Quality management

In order to enable us to fulfil our responsibilities properly, TenneT has implemented a comprehensive quality assurance system known as the ‘TenneT Quality Management System’.

figure 1

TenneT Quality Management System



As a result of TenneT’s assumption of responsibility for the management of most of the 150 kV- and 110 kV-grids in 2008, much attention has been devoted over the past two years to developing a single, centralised company assets registration system, for the benefit of the Quality Management System.

Quality levels achieved in 2005 - 2008 period

The targets set by TenneT for the 150 kV- and 110 kV-grids were achieved in both 2007 and 2008. In 2008, one disruption occurred in the 380 kV- and 220 kV-grids managed by TenneT. As a result, the target set by TenneT was not achieved in that year. The disruption was caused by a failure in a terminal box. TenneT and the manufacturer conducted a joint investigation into the problem, resulting in improvements to the design of the terminal box.

Asset quality monitoring

TenneT is developing a so-called 'asset health index' in order to further improve asset quality monitoring, with the aim of objectively determining the condition or 'health' of the individual assets.

The risk analyses carried out for all grid components do not suggest a need to replace equipment on a large scale. The planned replacement investments for the coming years mainly concern the replacement of a number of obsolete transformers. We have also drawn up a plan to start replacing all secondary systems in substations over the coming ten years.

Capacity

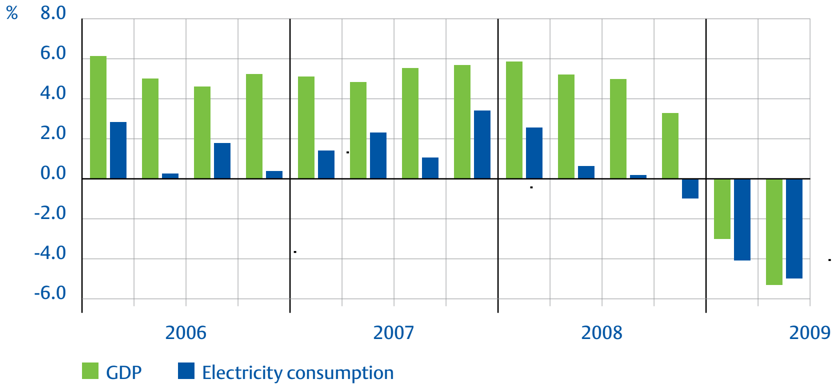
Developments in grid load

As has already been mentioned above, electricity consumption levels declined considerably in the first half of 2009 (see graph 1).

graph 1

Actual growth in GDP and electricity consumption levels

Relative increase/decrease compared to the same quarter of the previous year



On the basis of the short term estimate drawn up by the Netherlands Bureau for Economic Policy Analysis (June 2009) regarding the development of the country's Gross Domestic Product, electricity consumption levels were estimated to have declined by 4.75% in 2009 and will decrease by 0.5% in 2010, in line with the overall economic outlook. For the period after 2010, an average growth of 2% in electricity consumption has been assumed. Due to extensive developments in the field of electricity production (which usually have a much greater impact on the transmission grid than the geographically distributed developments in grid load), it has been decided that a single set of growth figures is to be used for the substantiation of consumption levels in all scenarios and variants. This has resulted in the following figures for developments in peak load:

table 1

Maximum national system demand (MW)

	2010	2011	2012	2013	2014	2015	2016
National system demand	19,283	19,977	20,589	21,122	21,460	21,810	22,099

Developments in production capacity

The three new power stations commissioned in 2009 by Delta, Electrabel and Maasstroom comprise the first in a series of major production units planned for construction in the coming years. In mid 2009, TenneT concluded connection and transmission agreements with producers to connect 7,703 MW in new production capacity to the grid. The construction of all these production units has begun and most of the capacity will be in operation by 2013.

table 2

Construction projects with connection and transmission agreement concluded

Location	Operator	Capacity MW	Operational	Fuel
Eemshaven	Nuon	1.350	2011	gas
	RWE	1.560	2011	coal
Schoonebeek	NAM	130	2010	gas
Westwoud	ECW	480	2010 - 2016	gas
Maasvlakte	E.On	1.050	2012	coal
	Enecogen	850	2011	gas
	Electrabel	800	2012	coal
Simonshaven	Intergen	428	2010	gas
Moerdijk	Essent	425	2011	gas
Maasbracht	Essent	630	2011	gas
Total		**7,703**		

Aside from significant investments in major power stations, the greenhouse horticulture sector has also invested substantially in the development of combined heat and power (CHP) capacity over the past few years. Despite the limited scale of this generation method, the installed electrical capacity in the entire greenhouse horticulture sector grew in a few short years from a couple of hundred megawatts to approx. 3,300 MW by the end of 2009. This amounts to almost 13 percent of the total installed capacity in the Netherlands. Electricity production in the greenhouse horticulture sector amounted to around 7 TWh in 2008, some 6% of the total domestic demand.

In addition to construction projects already underway, there are still many more plans for the construction of new power stations. In the present planning period, the total size of the project portfolio amounts to 20,623 MW, consisting of 6,535 MW of coal fired capacity, 13,918 MW of gas fired capacity, and 170 MW of waste/biomass capacity. This amount includes the approx. 8 MW currently under construction.

table 3

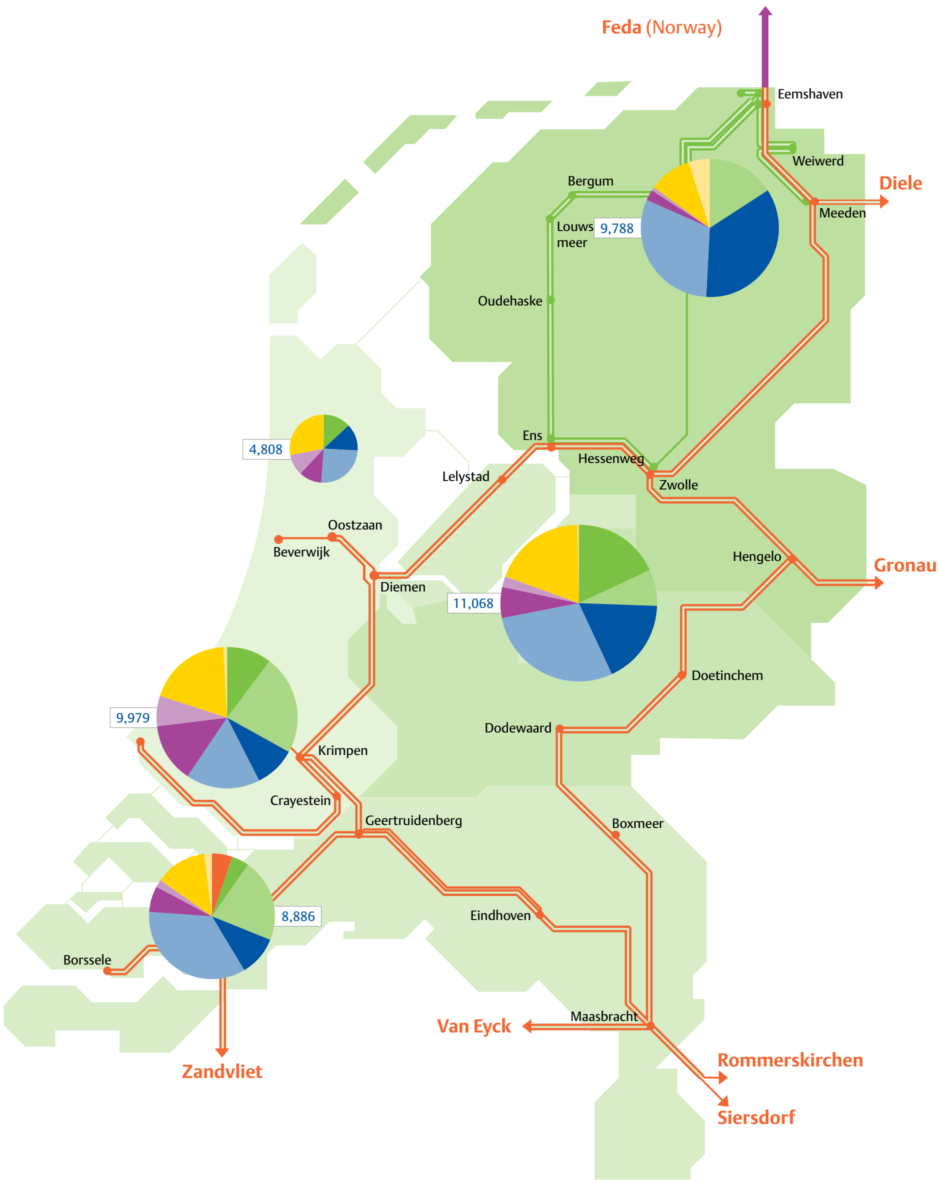
Projects for the construction of new large scale thermal production facilities until 2016

Location	Operator	Capacity MW	Operational	Fuel	CHP
Eemshaven	Nuon	1,350	2011	gas	
	RWE	1,560	2011	coal	
	Advanced Power	1,200	2013	gas	
Herbayum	Liander	80	2010	gas	80
Bergum	Electrabel	450	2013	gas	
Schoonebeek	NAM	130	2010	gas	
Wijster	GAVI	45	2010	waste	
Hengelo	Twence	25	2010	waste	
Hemweg	Nuon	450	2012	gas	
Diemen	Nuon	450	2012	gas	
Velsen	Corus	600	2012	gas	
	Nuon	170	2014	gas	
Westwoud	ECW	480	2010 - 2016	gas	480
Zoetermeer	Stedin	500	2011	gas	500
Zuidplaspolder	Stedin	175	2010 - 2016	gas	175
Luttelgeest	Enexis	40	2010 - 2016	gas	40
	Difra	140	2010	gas	140
Koekoekspolder	Enexis	60	2010 - 2016	gas	60
Maasvlakte	E.On	1,050	2012	coal	
	Enecogen	850	2011	gas	
	Electrabel	800	2012	coal	
Europoort	C.Gen	400	2013	coal	
Simonshaven	Intergen	428	2010	gas	
Rotterdam	E.On	400	2013	gas	
	AVR	45	2013	waste	
Dordrecht	HVC	25	2013	waste	
Geertruidenberg	Essent	825	2012	coal	
	Intergen	1,350	2012	gas	
Roosendaal	Sita	30	2010	waste	
Dinteloord	TOM	160	2010	gas	160
Moerdijk	Essent	425	2011	gas	
	Intergen	1,350	2014 - 2017	gas	
	SNR	120	2015	gas	
	Essent	1,100	2016 - 2018	coal	
Sloehaven	C.Gen	800	2013	coal	
Terneuzen	Intergen	450	2013	gas	
	AES	400	2013	gas	
Maasbracht	Essent	630	2011	gas	
	Essent	630	2014	gas	
Geleen	Essent	150	2013	gas	150
Miscellaneous	Enexis	300	2010 - 2016	gas	300
Total		**20,623**			**2,085**

As can be seen from the official information supplied to TenneT, the total amount of existing and new thermal capacity exceeds by approx 24,000 MW the grid load which was forecast (around 20,000 MW) at the end of the planning period covered by this Quality and Capacity Plan.

map 1

Existing production capacity and all planned expansions until 2016 (MW)



nuclear
coal
coal new
gas
gas new
glasshouse horticulture
glasshouse horticulture new
other
other new

Plans have already been reported for the construction of new coal fired capacity (1,100 MW) and nuclear capacity (5,700 MW in Borssele) in the period after 2016. In addition, a further 1,210 MW of new wind powered production capacity is planned for connection to the high voltage grid.

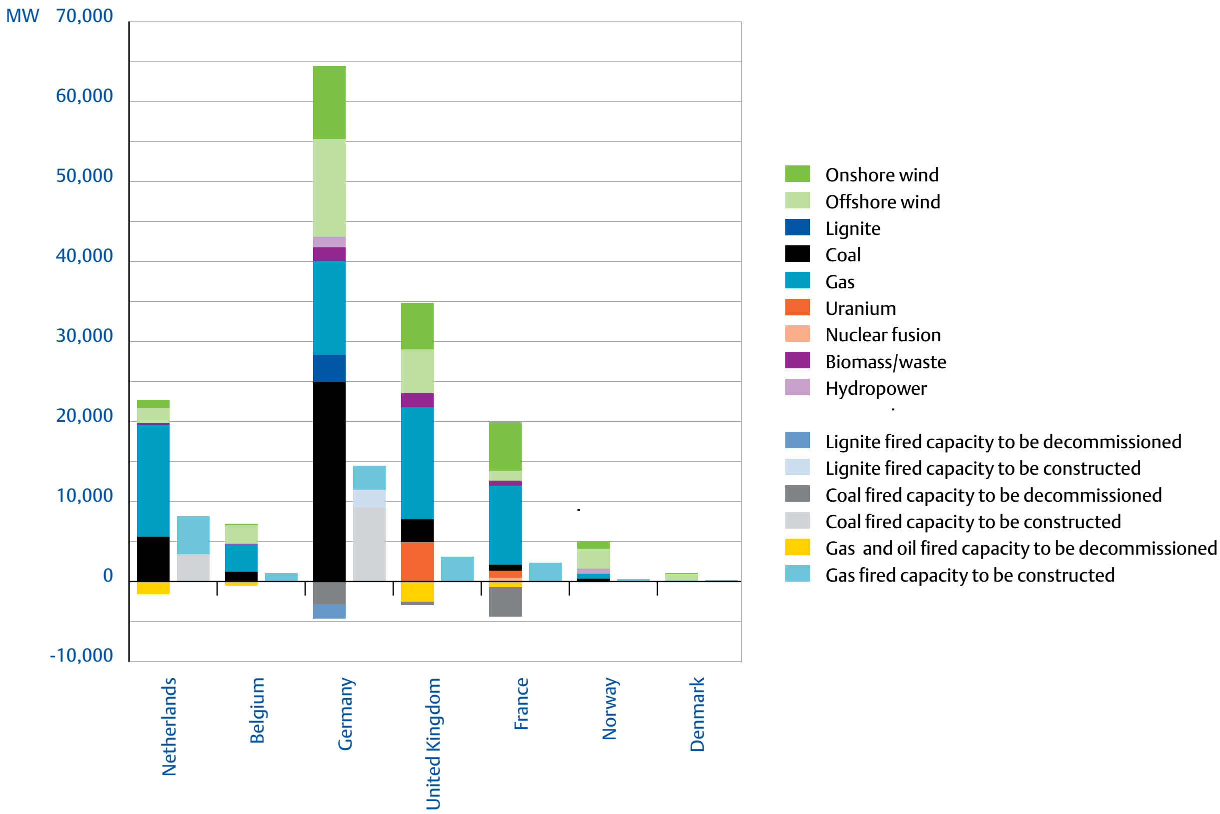
Compared with the previous Quality and Capacity Plan, the size of the project portfolio for new production capacity has increased by a factor of 1.7. This figure includes a correction for the projects that were implemented over the past two years.

If only those projects with a connection and transmission agreement are taken into consideration with regard to expansion, supply exceeds demand by approx. 11,000 MW. However, this surplus does not take maintenance work or power failures into account. If we use 15% of the total thermal production capacity (approx. 31,000 MW) as a rule of thumb in order to account for any maintenance work/power failures, this still leaves a surplus of around 6,000 MW. According to producers, few production capacity units will be decommissioned, meaning that either the Netherlands will become an exporter of electricity over time or that many production units will not be in operation.

The Netherlands is not unique in Europe when it comes to the increase in construction plans. Graph 2 outlines the developments in production capacity for the countries with which TenneT maintains a connection and/or market coupling. Graph 2 shows that, in addition to the Netherlands, a relatively large number of coal fired facilities are being constructed in Germany. Furthermore, all countries examined (except those in Scandinavia) have drawn up a relatively large number of plans to construct new gas fired power stations. With regard to sustainable production capacity, the various countries examined have principally developed plans involving wind powered production capacity.

graph 2

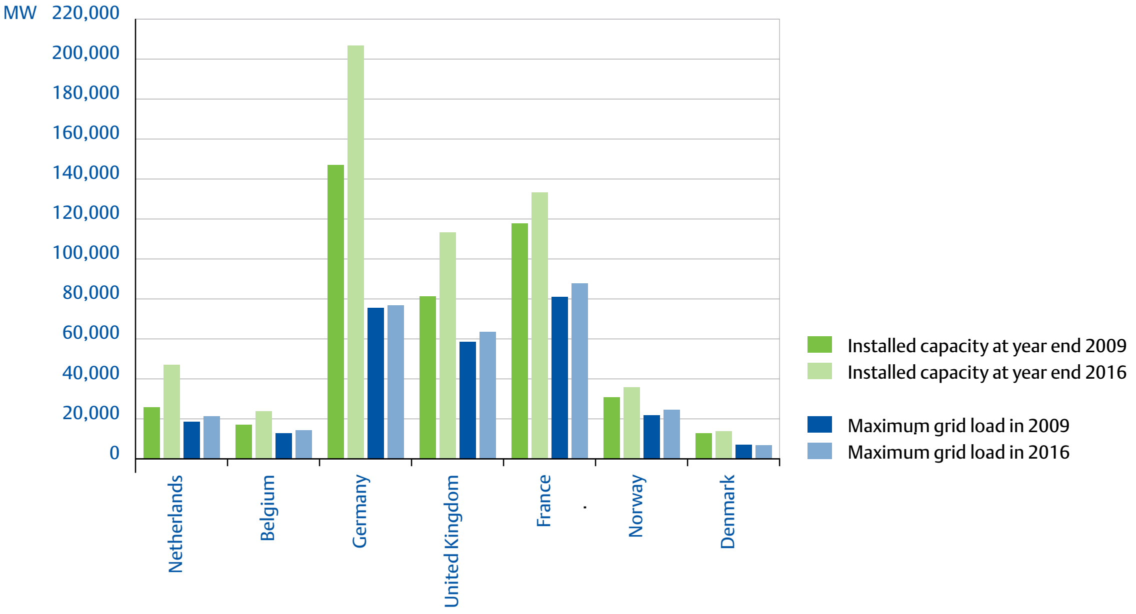
Construction plans and production capacity announced for decommissioning until 2016



As Graph 3 shows, the realisation of construction plans means that the reserve margin will increase in all countries. Based on the construction projects currently underway and the postponed phasing out of nuclear power stations, a surplus of production capacity seems to be developing particularly in Germany.

graph 3

Installed capacity and maximum grid load in 2009 compared to 2016



Scenarios

In light of international developments in production capacity, scenarios encompassing both exports to and imports from Germany have been developed for this Quality and Capacity Plan. The export scenario is based on maximum exports to Germany (and Belgium) in order to be able to determine the consequences that construction plans for new power stations in the Netherlands will have on the transmission grid. The import scenario is based on the figures for imports from Germany (and Belgium) as incorporated into the regional model [Regionenmodell] for 2013 drawn up by the German TSOs. At first sight this scenario seems to be less probable considering the planned increase in production capacity in the Netherlands. However, from a European perspective this scenario may indeed occur, mainly due to expansion plans in Germany.

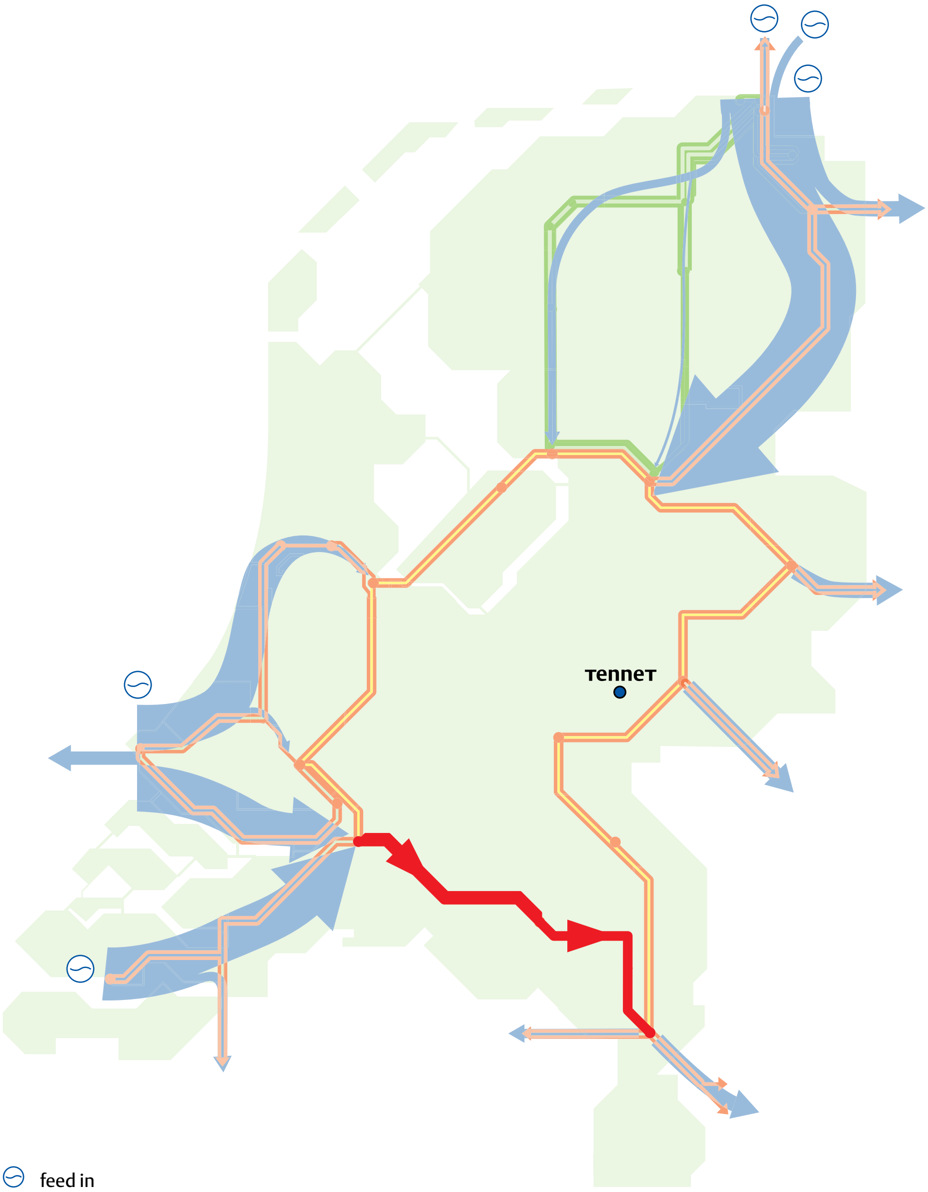
A number of scenario variants have been developed based on the export scenario. These have been used to determine the consequences for the transmission grid of the following planned developments:

- onshore and offshore wind powered production capacity;
- projects for the construction of new production capacity at the Eemshaven, Maasvlakte, and Moerdijk/Borssele sites.

Anticipated developments in the national 220 kV and 380 kV transmission grids

Grid calculations based on import and export scenarios and all variants once again confirm the necessity of the major grid upgrades in the Randstad conurbation, the southwest of the Netherlands (Borssele - 380 kV ring) and the northeast (Eemshaven - 380 kV ring).
In addition, the export scenario and its variants reveal new capacity problems on the Geertruidenberg - Eindhoven - Maasbracht connection due to the transmission of production capacity from the southwest and west of the Netherlands to Germany. Constructing new connections between Geertruidenberg - Dodewaard, Moerdijk - Dodewaard or Geertruidenberg - Maasbracht, and/or upgrading the current Eindhoven - Maasbracht connection have been proposed as possible solutions to this capacity problem. A follow up study will examine the best solution for these capacity problems.

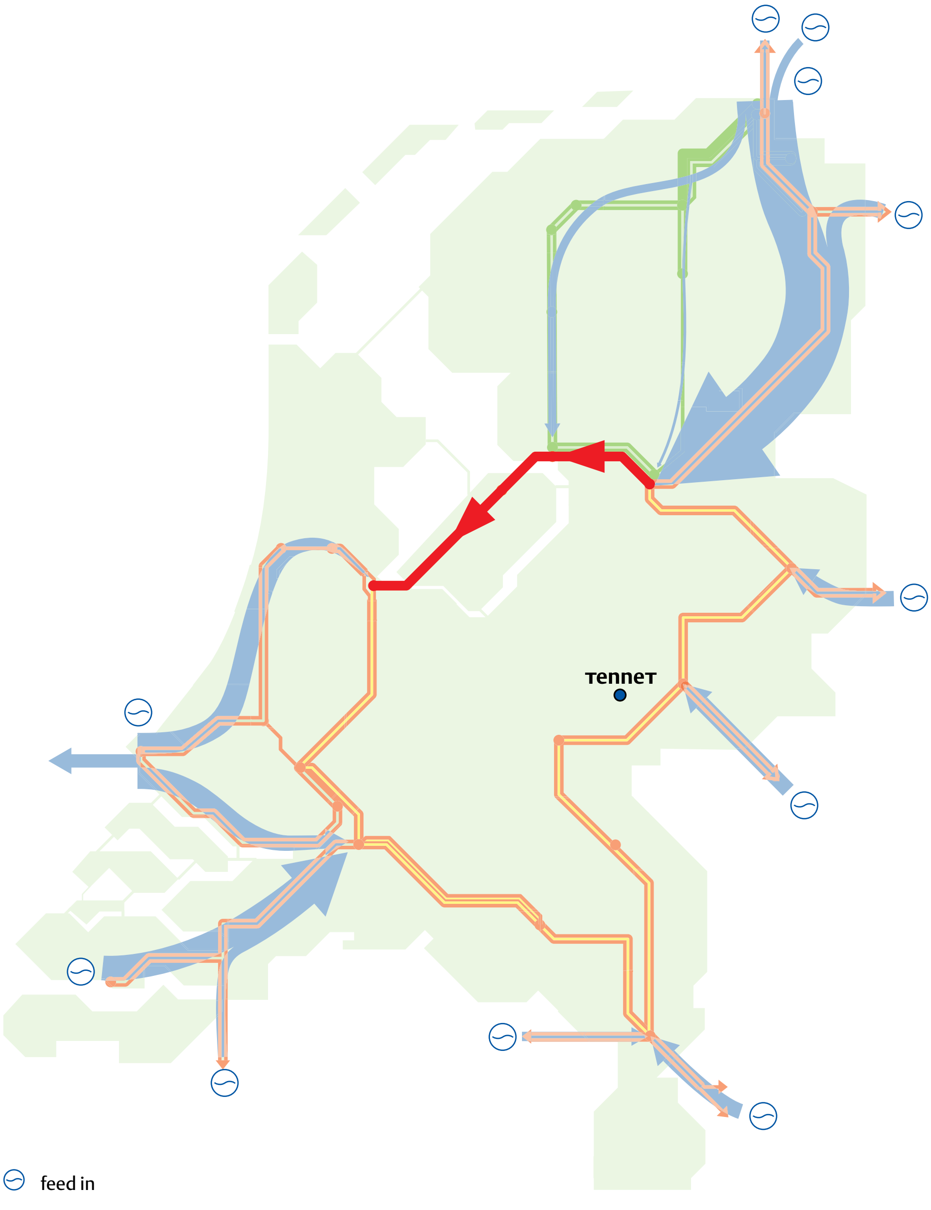
map 2 **Dominant load flows in the export scenario**



The import scenario does not lead to capacity problems in the southern part of the Geertruidenberg - Eindhoven - Maasbracht 380 kV ring. This scenario does reveal a need to upgrade the northern section of the 380 kV ring (Ens - Diemen) in view of the transmission of capacity from the northeast and east of the country to the major centres of consumption in the Randstad conurbation.

map 3

Dominant load flows in the import scenario



As can already be derived, a key factor that affects the choice of scenario is the competitiveness of the Dutch electricity market in comparison to the German market. Variation in prices for fuels and CO_2 emission rights (possibly in combination with situations involving a high or low supply of wind powered production capacity) will result in a more dynamic utilisation of the production base in both countries in the future. Based on the numerous plans to construct new production capacity in both the Netherlands and Germany (including wind powered capacity), it is reasonable to assume that major import and export of electricity could occur between the two countries in the future.

New connections must be added to both the northern and southern section of the 380 kV ring in order to be able accommodate this potential increase in imports and/or exports. For several other section of the 380 kV ring, TenneT is also planning to gradually replace existing conductors with conductors with a greater transmission capacity.

Developing a robust 380 kV transmission ring with strong connections to the German and Belgian hinterland and to coastal locations at which large scale production is concentrated will create a transmission grid that strongly supports the national and European aim to establish an integrated European electricity market.

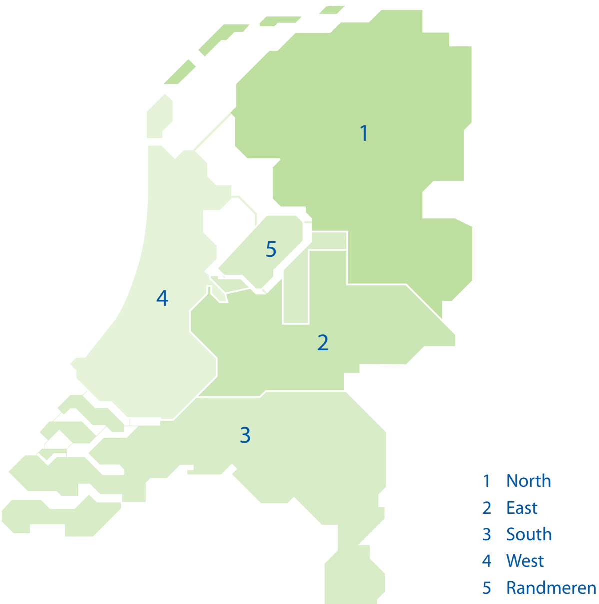
Anticipated developments in the regional 110 kV and 150 kV transmission grids

Introduction

Regional segmentation (as shown in the figure below) has been used to determine the capacity requirements of the 110 kV and 150 kV grids.

map 4

Regional segmentation used for grid calculations



In carrying out the grid calculations, the grid load data and production forecasts for the underlying grids (insofar as applicable and relevant) have been taken directly from the information provided to TenneT by the relevant grid operators.

In assessing the spur networks of the high voltage grids against the Grid Code criteria, TenneT has strictly applied the 100 MW grid load criterion by analysing the demand for electricity rather than the balance of production and demand in the connected areas. We took this approach because one or more production facilities will be unable to continue supplying electricity to the connected area in the event of a spur network failure, especially if there is a capacity shortage in the area.

Northern Netherlands region

The Northern Netherlands region encompasses the 110 kV grids in the provinces of Friesland, Groningen, Drenthe and Overijssel.

The grid load forecasts for the underlying grids demonstrate that planned developments are highly localised in nature. Minimal or no development in grid load is expected for the majority of high voltage substations.

With regard to production, three specific developments can be identified in the Northern Netherlands region:

- The increase in the number of decentralised CHP units operated by horticultural businesses, with specific attention to be paid to the developments occurring near Luttelgeest in the Noordoostpolder area. Decelerating growth due to the current economic climate has been taken into account here.
- The increase in the amount of decentralised wind powered production capacity, with specific attention to be paid to the developments occurring in the Noordoostpolder and Eemsmond areas.
- The realisation of a new base load unit at Veenoord.

As part of the grid calculations, four combinations for the deployment of centralised and decentralised capacity have been analysed for the whole region. The results of the grid analyses show that when decentralised capacity is operational, the consequences are twofold. Firstly, such capacity has a positive effect on the reduction of transit transmissions from the 220 kV and 380 kV grids. Secondly, it means that the 110 kV grid has to be expanded and/or upgraded. As such, a new 110 kV substation will need to be constructed near Luttelgeest in order to facilitate the further growth of this horticultural area. In addition to this, a 15 km long single circuit 175 MVA cable link must be installed between the new Luttelgeest substation and Emmeloord. At the same time, the single circuit connection between Vollenhoven and Zwartsluis must be expanded to a dual circuit connection.

Several scenarios also reveal a number of capacity problems. These can be divided into two categories. The first category relates to transit transmissions from the 220 kV and 380 kV grids. This predominantly concerns the 110 kV grids in Friesland and Overijssel. These capacity problems can be resolved by creating so called ‘pockets’ or target areas. The other category concerns conductors being suspended too low, thereby limiting the transmission capacity of connections. This predominantly concerns the 110 kV connections in Groningen and Overijssel. These capacity problems may be resolved by extending pylons and/or by tightening or replacing conductors.

Eastern Netherlands region

The Eastern Netherlands region encompasses the 150 kV grids in the provinces of Flevoland (excluding the Noordoostpolder area), Gelderland and Utrecht.

The regional grid operator Stedin has drawn up a capacity plan for the 150 kV grid in the province of Utrecht, as this grid is covered by a Cross Border Lease (CBL) arrangement. TenneT has drawn up a Quality and Capacity plan for the Randmeren grid section (for which Liander is responsible and which is also covered by a CBL arrangement), on the basis of the management agreement concluded between Liander and TenneT. The Randmeren grid section encompasses the 150 kV grid in the province of Flevoland (excluding the Noordoostpolder area) and part of the province of Gelderland.

According to grid operators connected to this grid, the grid load in Flevoland and Gelderland increases by 1.5 to 2.5% annually. An annual increase of 1 to 2% is assumed for the grid in the province of Utrecht.

For a situation involving maximum electricity demand, grid calculations have been performed for two combinations involving the deployment of centralised and decentralised capacity. A low load situation has also been calculated. For this, it has been assumed that all the region's production capacity (except medium load capacity) is operational.

Broadly speaking, the grid calculations reveal few capacity problems. If any problems are identified, they can be resolved by taking operational measures.

Southern Netherlands region

The Southern Netherlands region comprises the 150 kV grids in the provinces of Limburg, Noord-Brabant and Zeeland.

In the planning period of this Quality and Capacity Plan, the operator of the underlying grids has indicated that load demand will undergo a limited average annual increase of 1% in Noord-Brabant and 0.5% in Limburg. The increase in Noord-Brabant can be attributed largely to a single new consumer in Boxtel.

The capacity exchanges in Zeeland with the regional DNWB grid will rise from 373 MW to 393 MW in this planning period. On average, this amounts to less than 1% growth per year.

Since the beginning of the economic crisis in the Netherlands, the load caused by heavy industrial users in Zeeland taking electricity directly from the 150 kV grid has more than halved when compared to previous years. This load represents a significant amount of the total load in this grid section. However, the grid load caused by these industrial users should return to pre crisis levels as of 2012.

With regard to production capacity, the development of decentralised capacity for the 150 kV grid in Limburg is particularly important. In the north of the province, horticultural businesses have installed around 300 MW of decentralised CHP capacity over the past few years. In addition, a further 200 MW is planned for installation by 2017.

For the 150 kV grid in Noord-Brabant, decentralised capacity connected to the underlying grids is expected almost to double from 857 MW to 1,623 MW in the period up to 2017. Furthermore, the new WKC II 425 MW power station will 'feed in' electricity to the 150 kV grid via the Moerdijk substation in 2010.

With regard to the development of production capacity in Zeeland, there are advanced plans to upgrade and expand the wind farm in the vicinity of the Kreekrak locks. Considering the scale of this expansion and the local grid structure, connecting the wind farm to the Rilland 150 kV substation appears to be the most suitable solution. Furthermore, wind energy development will mainly occur in the vicinity of the Oosterschelde storm surge barrier.

In the grid calculations, four combinations for the utilisation of centralised and decentralised capacity have been analysed for the 150 kV grids in Noord-Brabant and Limburg. Two specific scenarios have been developed for the 150 kV grid in Zeeland. This is due to the special position of the energy intensive industrial sector in that province, in combination with the transmission of feed in capacity from the 150 kV grid to the 380 kV transmission grid.

The grid calculations for the 150 kV grid in Limburg province show that relatively few capacity problems will arise in this grid due to the increase in decentralised capacity in combination with relatively low load development. Only in the north of the province will we need to construct transformer fields at several 150 kV substations to enable transmission of the capacity generated by future greenhouses. A new 150 kV substation will even be constructed to facilitate the development of the Californië glasshouse horticultural area (part of the rural district of Boekend).

Due to the development of production capacity in the western part of Noord-Brabant province (Moerdijk) and Borssele, overloading will already occur under N 1 conditions on the 150 kV connections to the large consumption centres in the east of the province (Tilburg, Den Bosch and Eindhoven). These capacity problems can be resolved by installing heavier conductors and serial compensators, applying grid segmentation ('splitting the grid up'), and transferring large scale production to the 380 kV grid.

The Tilburg Zuid and Bergen op Zoom substations have a grid load in excess of 100 MW and are situated on spurs which are supplied by obsolete cables. TenneT will investigate how the security of supply can continue to be guaranteed for these substations.

In both scenarios, the grid calculations for Zeeland show overloading on the 150 kV connection between Noord-Brabant province and Zeeland due to the transmission of capacity from Zeeland. When the new 380 kV connection between Borssele and Tilburg is put into operation in 2014, the 150 kV connection between Noord-Brabant and Zeeland will be opened, thereby resolving the bottleneck. TenneT will consider installing serial compensators as a short term solution.

Western Netherlands region

The Western Netherlands region encompasses the 150 kV grids in the provinces of Noord-Holland and Zuid-Holland.

Based on information from grid operators connected to the grid, we have assumed organic load growth in this region in the industrial, services and domestic sectors. As far as the grid in Noord-Holland province is concerned, we have factored in specific grid load developments in the natural gas and greenhouse horticulture sectors.

In Noord-Holland, production had long been strongly centralised at Hemweg, Velsen and Diemen. In this province, a relatively large amount of decentralised production capacity (both wind powered and CHP) has since been installed and the amount of wind powered production capacity is expected to continue to increase. Limited further growth in the use of CHP systems is also expected in the glasshouse horticulture sector.

In Zuid-Holland province an increase is expected in industrial CHP capacity, which will be connected to the 150 kV substations in Botlek and Europoort. A slight increase in the use of CHP systems is forecast for the province's greenhouse horticulture sector.

As part of the grid calculations, four combinations for the deployment of centralised and decentralised capacity have been analysed for the whole region. These analyses show that high deployment of decentralised production capacity will reduce the load of the 150 kV grid in Noord-Holland province, and thus the number of bottlenecks. This is due to the fact that production occurs closer to the load.

Several scenarios arising from the grid analysis results for Noord-Holland reveal a number of bottlenecks on the 150 kV connections starting at Velsen. Though possible solutions have been put forward for all of the bottlenecks identified, construction of the North Ring of the Randstad 380 kV project always emerges as the best alternative.

Various bottlenecks have been identified in the 150 kV grid in Zuid-Holland province. These bottlenecks may arise due to failure of a circuit in the 380 kV connection between Crayestein and Maasvlakte when maintenance work is carried out on the other circuit. These bottlenecks in the regional grid will be resolved when the South Ring of the Randstad 380 kV project is completed.

Calculations relating to spurs in the region demonstrated the necessity of taking measures for the following connections: Oterleek - Anna Paulowna, Oterleek - Westwoud, Venserweg - Zorgvlied, and Dordrecht Merwedehaven - Alblasserdam.

TenneT TSO B.V.
Utrechtseweg 310
6812 AR Arnhem
P.O. Box 718
6800 AS Arnhem
The Netherlands

Telephone	+31 26 373 11 11
Fax	+31 26 373 11 12
E-mail	servicecentrum@tennet.org
Internet	www.tennet.org

06-2010