Transmission on Balance 2008

TenneT

Full of energy

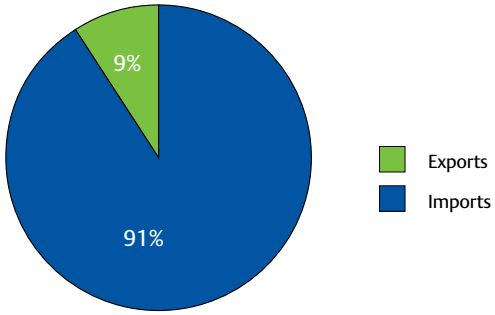
Every year, TenneT TSO presents its main technical operating results in a report entitled 'Transmission on Balance'. Besides providing information on TenneT's infrastructural assets, the report also indicates how we have used these assets to ensure the smooth operation of both the Dutch and the European electricity market.

Full of energy – 24 hours a day

In its capacity as Transmission System Operator (TSO) and independent administrator of the Dutch electricity transmission grid, TenneT offers and develops a wide range of transmission and system services, while also supplying services in support of free-market operation and a sustainable energy supply system. TenneT wishes to develop and strengthen its position on the Dutch and north-western European electricity market. This ambition fits into the 'Strengthen and Build' strategy that TenneT has adopted against the backdrop of international market conditions. As a TSO, TenneT wants to play an active role in strengthening the European electricity market, based on an international vision in which the company shows initiative and takes specific steps together with other TSOs, regulating bodies and government authorities. Integrating the electricity markets of the various countries is the best way to create a strong European market characterised by transparency, sufficient liquidity and good pricing.

An excellent example of such integration is the NorNed cable, an undersea power cable linking Norway and the Netherlands that entered service in 2008 and has got off to a very successful start. Since 1 January 2008, TenneT has also been the official administrator of the 110-kV and 150-kV high-voltage grid in the Netherlands, totalling approx. 6000 kilometres in length. As the administration of these grids will be incorporated into TenneT's operational processes in the course of 2008 and 2009, the associated results have not been included in this edition of 'Transmission on Balance'.

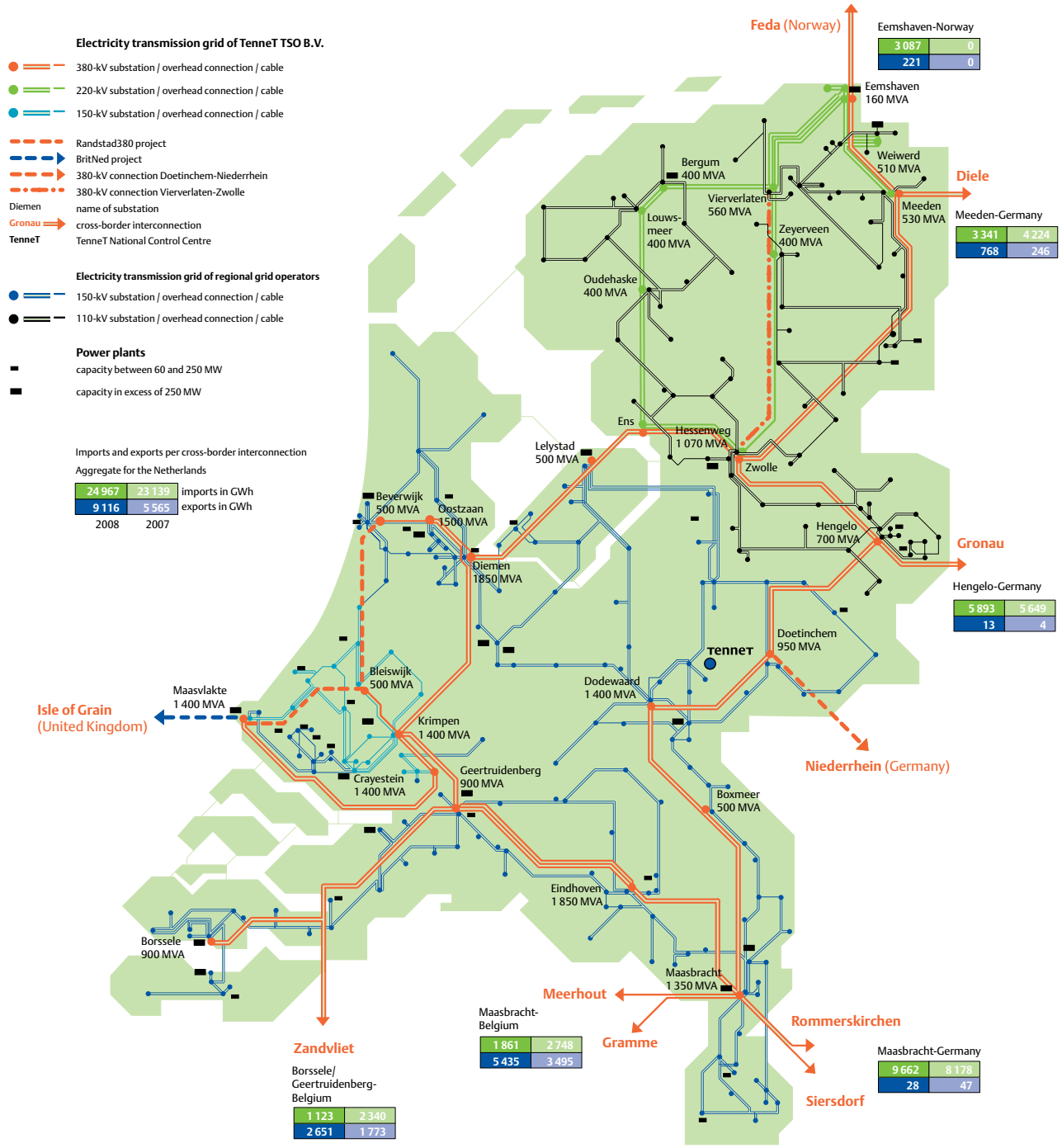
Electricity transmitted across NorNed cable from May 2008 onwards



Overview of the Dutch transmission grid

As at 31 December 2008

This map of the Dutch transmission grid shows the key figures for the high-voltage connections. Since 1 January 2008, TenneT has been responsible for managing all high-voltage connections with a voltage level of 110 kV and higher, some 9000 kilometres of overhead and underground connections in total. TenneT is also responsible for a large number of switching and transformer substations and six cross-border connections, including the new cable link to Norway.

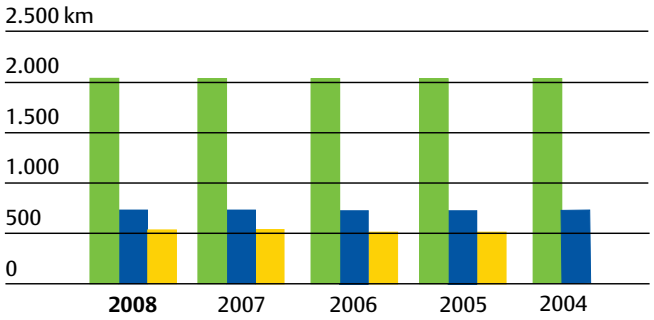


TenneT transmission grid

TenneT currently manages transmission grids with a total length of more than 9000 kilometres, following its assumption of responsibility for the regional transmission grids of the four regional grid operators. As far as 2008 is concerned, we will limit ourselves to the 380-kV, 220-kV and 150-kV grids in the graphs and diagrams. (The 150-kV grid serves the province of Zuid-Holland.) The graphs below give an idea of the circuit lengths, the connected capacity of transformer circuits, and the connected capacity of the high-voltage grids.

Circuit length

The aggregate 380-kV circuit length amounts to 2,030 kilometres.
The aggregate 220-kV circuit length amounts to 653 kilometres.
The aggregate 150-kV circuit length amounts to 532 kilometres.



Connected capacity of transformers

(including industrial consumers)
In 2008 the connected capacity of the 380-kV grid increased by 350 MVA due to the commissioning of a transformer at Hengelo substation.

	2008	2007	2006	2005	2004	
380 kV	**18 550**	18 200	17 600	15 600	15 100	MVA
220 kV	**5 430**	5 430	5 410	5 410	4 860	MVA
150 kV	**5 289***	5 289*	5 200*	5 189*	-	MVA

*) transformers owned by TenneT Zuid-Holland

Connected capacity of production units

The connected capacity of production units increased by 850 megawatts (MW) in 2008 due to the connection to the grid of the Sloecentrale power plant in Zeeland province. The plant is expected to go into service in 2009.

	2008	2007	2006	2005	2004	
380 kV	**4 458**	3 608	3 608	3 608	3 608	MVA
220 kV	**3 160**	3 160	3 160	3 160	3 160	MVA
150 kV	**1 615***	1 615*	1 615*	1 615*	-	MVA

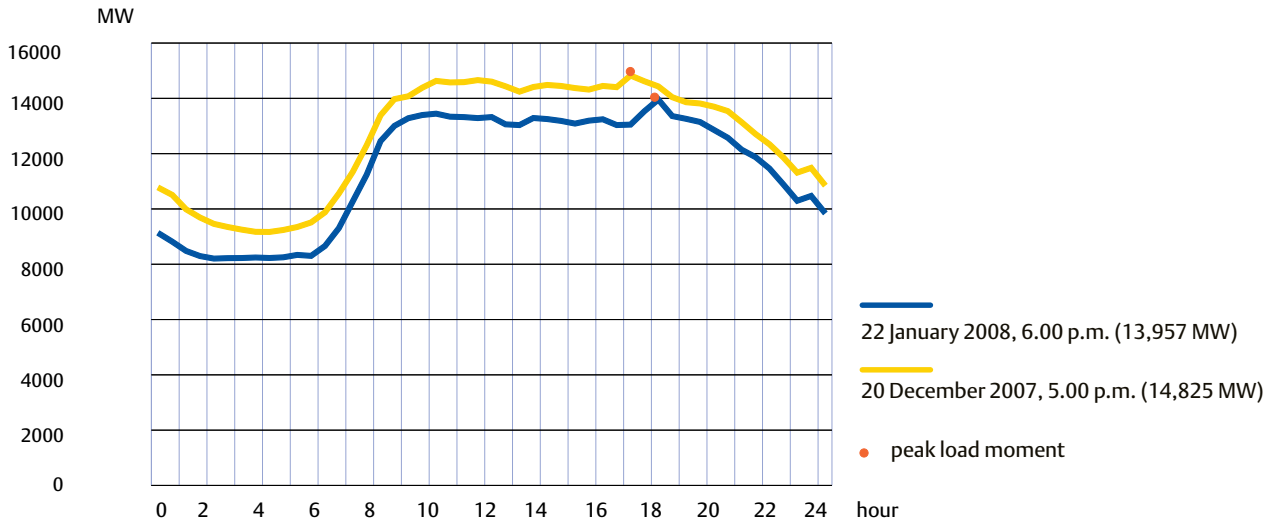
*) production capacity connected to the grid of TenneT Zuid-Holland

Peak load

The peak load moment (i.e. the moment of maximum national energy consumption) usually occurs during one of the winter months at around 6.00 p.m., when intensive use is made of heating and lighting throughout the country. In 2008, the peak load occurred on 22 January. The total electricity demand on TenneT's grid at peak load moments is around 13,500 megawatts (MW).

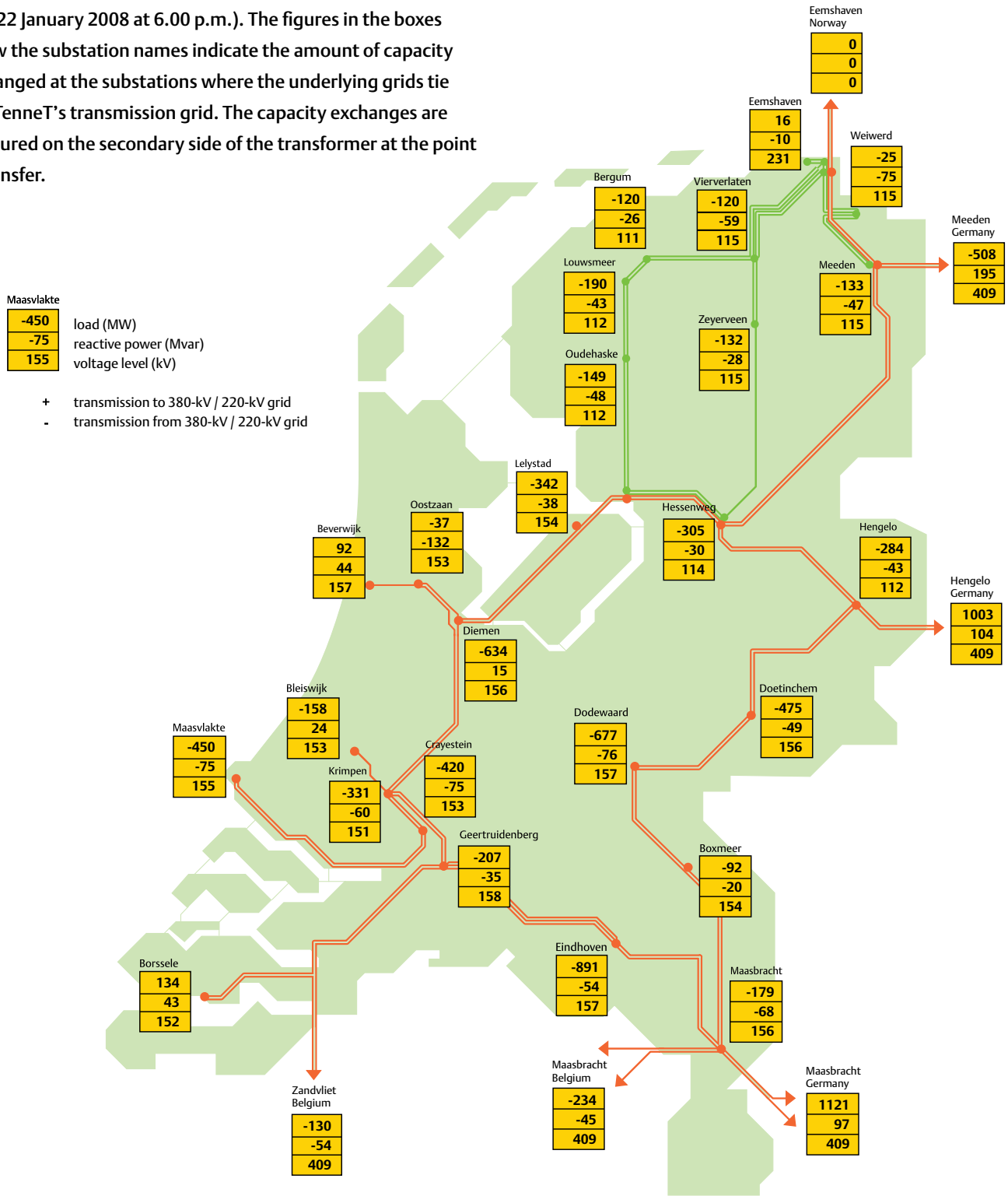
Peak load moment

In 2008, the peak load on the Dutch high-voltage grid (i.e. production capacity including imports) was measured by TenneT on 22 January at 6.00 p.m. and amounted to 13,957 MW. This peak load represents a decrease of approx. 868 MW (-5.9%) compared with the peak load in 2007, and a decrease of 889 MW (-6%) compared with 2006.



A closer look at the peak load day

The map shows the substation statistics on the peak load day (22 January 2008 at 6.00 p.m.). The figures in the boxes below the substation names indicate the amount of capacity exchanged at the substations where the underlying grids tie into TenneT's transmission grid. The capacity exchanges are measured on the secondary side of the transformer at the point of transfer.

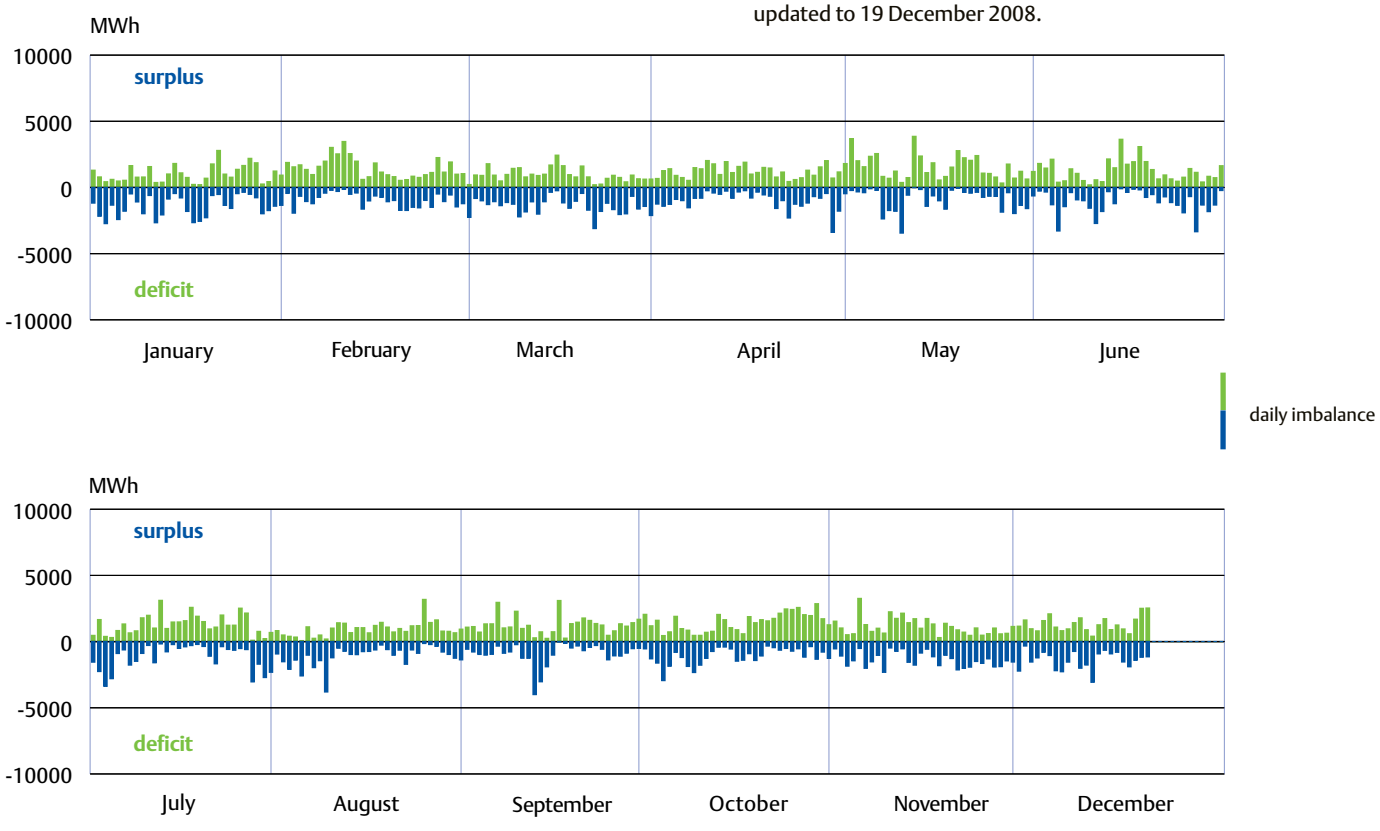


Imbalance adjustment

TenneT is responsible for providing a secure, reliable and efficient power supply system. This means that we must safeguard and maintain the balance between supply and demand. A slight imbalance – which it is up to TenneT to control – prevails on the electricity grid at any one time. This is caused by the large number of market players, which prevents a perfect balance being struck between the demand for and supply of electricity. Nevertheless, demand and supply are forecast with the greatest possible accuracy. A special 'Programme Responsibility' (PR) system has been developed for this purpose. TenneT receives daily Energy Programmes (EPs) from the Programme Responsible Parties (PRPs, parties that operate one or more connections to the grid), in which they indicate the amount of electricity they expect to transmit or receive the next day. TenneT continually monitors the national level of imbalance and makes adjustments where necessary.

Daily imbalance of PRPs

The graph below shows the aggregate daily imbalance of all PRPs in 2008. The bars represent the daily positive imbalance (surplus) and negative imbalance (deficit). The information has been updated to 19 December 2008.

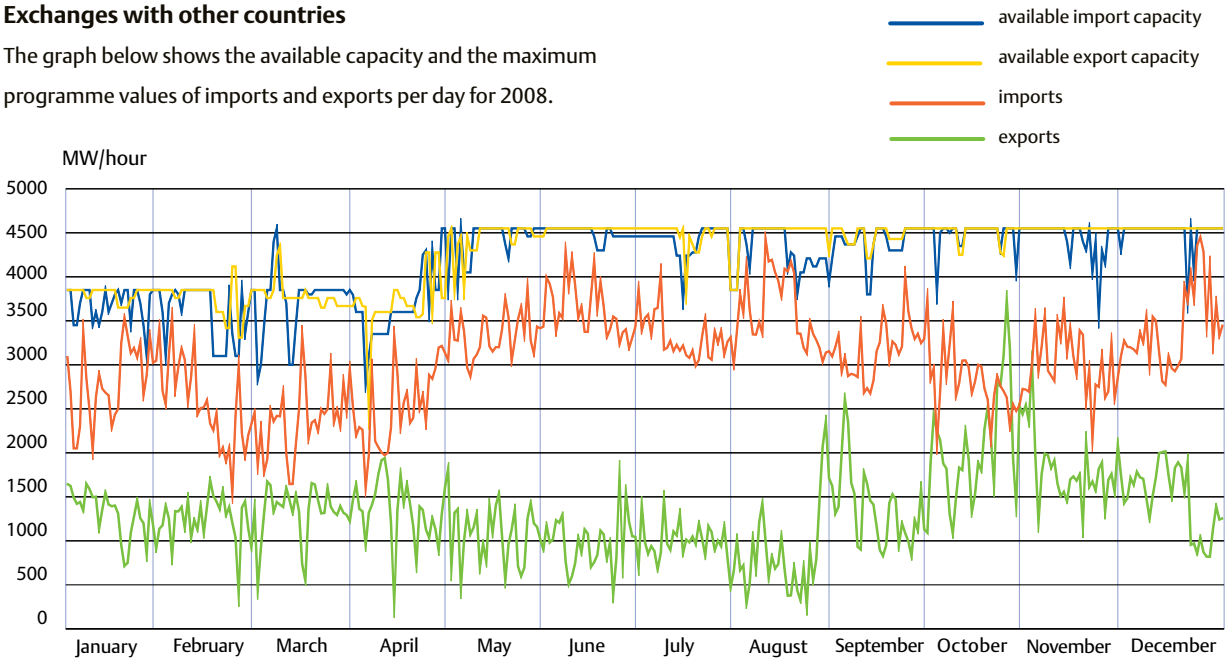


Cross-border interconnections

Six interconnections are in place at the highest voltage level (380 kV) between the Netherlands and the extensive European grid. Three interconnections with Germany, two with Belgium and one with Norway ensure efficient access to the European market. These links are used to facilitate international electricity transactions between market parties. In view of the substantial mutual influence exerted by interconnected international grids, the available capacity is carefully reconciled with the grid administrators in neighbouring countries on a daily basis. In recent years our country's electricity imports have exceeded its exports. However, forecasts indicate that the Netherlands is set to become a net exporter of electricity in the next few years, as planned new production units enter into service.

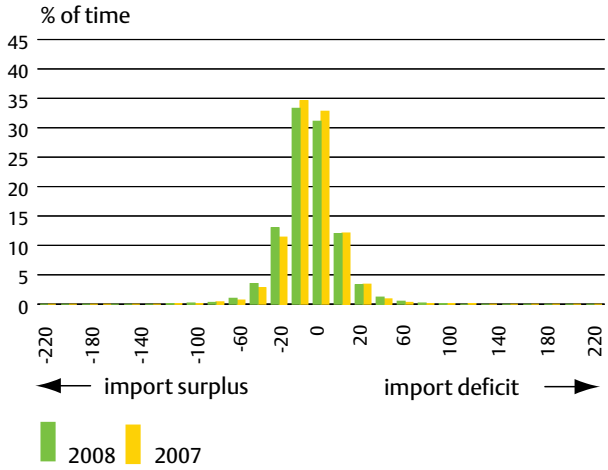
Exchanges with other countries

The graph below shows the available capacity and the maximum programme values of imports and exports per day for 2008.



Inadvertent exchanges between the Netherlands and other countries

The diagram on the right shows (in terms of hourly values) the differences in physical energy flows relative to the exchange programme with other countries. The difference relative to the exchange programme with other countries was less than 20 MWh for 65% of the time. The national standard for inadvertent exchanges was maintained for 99.3% of the time.



Security of supply

The Dutch transmission grid and distribution grid are among the most reliable in Europe. The average annual outage duration in our country is exceptionally low: only 30 minutes per connection. Through its grid administration operations, TenneT ensures that power transmission across our grids is possible virtually regardless of circumstances.

Transmissions on cross-border interconnections in 2008

in GWh	**Programmes**		**Measured values**	
	programmes	compensation as part of UCTE-programmes	total of programmes	Cross-border interconnec-tions
imports 2008	**22 502**	**31**	**22 533**	**24 967**
imports 2007	21 764	44	21 808	23 139
exporst 2008	**6 663**	**18**	**6 681**	**9 116**
exports 2007	4 196	23	4 219	5 565

Failure indicators

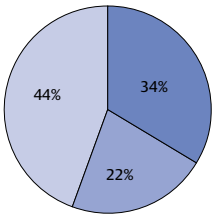
In 2008, one interruption of the supply of energy occurred in the 380-kV grid. On Thursday 6 November 2008, a fuse blew in a terminal box in the 380-kV high-voltage substation at Maasvlakte. The incident resulted in a brief interruption in the flow of electricity on the connection to a producer at the Maasvlakte site. As a result, the producer was unable to supply energy for a short period of time.

	2008	2007	2006	2005	2004
380kV/220kV					
• failures	**13**	11	17	39	14
• interruption	**1**	0	2	0	0
• amount of energy not supplied (MWh)	**357**	0	194	0	0
150 kV					
• failures	**1**	6	24	20	17
• interruption	**0**	1	2	1	1
• amount of energy not supplied (MWh)	**0**	1	792	151	141

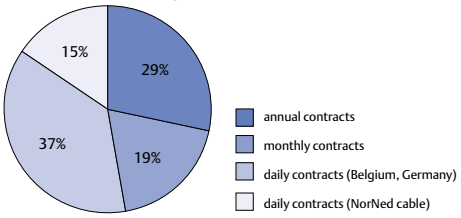
Distribution of net import capacity in 2008

In the first few months of 2008, the aggregate net import capacity released on the cross-border interconnections amounted to 3850 MW. As of 6 May 2008, the aggregate net import capacity on the cross-border interconnections increased to 4550 MW as the NorNed cable was taken into operation. The import capacity was lower on several days due to the planned unavailability of cross-border interconnections. In the period from January to March and from October to December, the import capacity was lower on several days in connection with expected high levels of wind power production in Germany.

Distribution up to 5 May 2008 inclusive



Distribution from 6 May 2008 onwards



Details of interruption

Location:	Maasvlakte
Start:	Thursday 6 November 2008, 2.29 p.m.
No. of suppliers affected:	1
Duration:	42 minutes

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