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Transmission on balance

tennet





Full of energy

In this brochure TenneT TSO B.V. has drawn up the balance in respect of its main technical operating results for 2005. In addition to providing information on tenner's infrastructural assets, the brochure also elaborates on the deployment of these assets for the purpose of power market facilitation.

Full of energy – 24 hours a day

In its capacity of Transmission System Operator and independent operator of the transmission grid, tenner is in charge of the 'expressways' of the Dutch electricity grid that connects all regional grids as well as the European grid. The organisation seeks to ensure optimal service in support of a smoothly operating electricity market in the Netherlands and in Northwestern Europe, and as such devotes continuous attention to the strengthening of the Dutch electricity market within a European perspective.

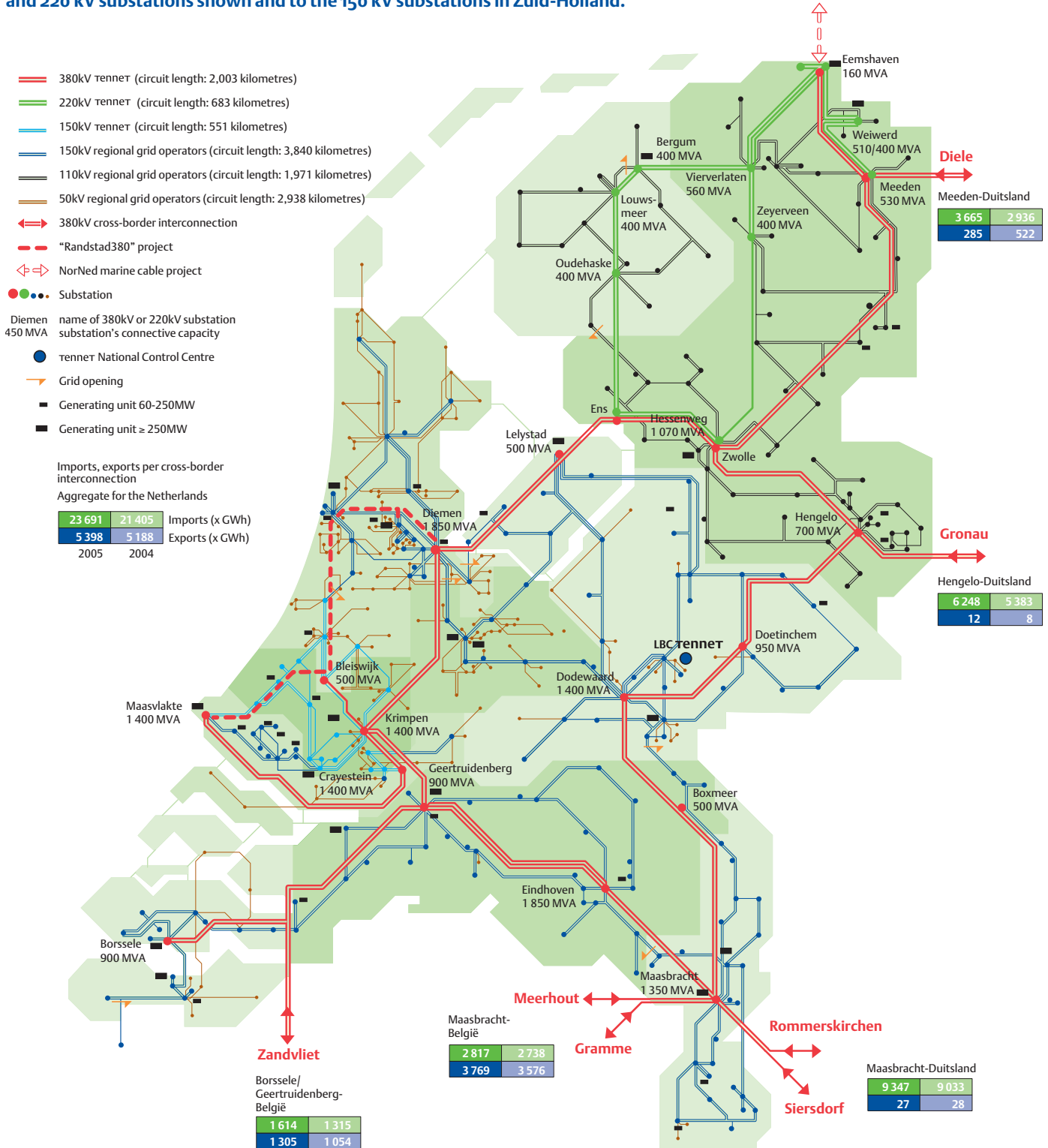
tenner makes every effort to ensure an optimum operating performance across the board, supplying its customers with services and products in an efficient and professional manner, the guiding principle of its modus operandi being the safeguarding of a reliable top-quality electricity supply.

tenner advocates the pooling of the various national transmission grids, which in the present situation are being managed in a 'fragmented' way and which are largely owned by a number of different energy companies. According to tenner it is desirable from a perspective of supply reliability and efficiency that a single national transmission grid should be formed.

The Dutch transmission grid

31 December 2005

This overview of the Dutch transmission grid shows the high-voltage interconnections, of which the 380 kV and 220 kV sections including the cross-border connections (the national transmission grid) come under tenneT management, as does a considerable portion of the 150 kV grid in the province of Zuid-Holland. The same applies to the 380 kV and 220 kV substations shown and to the 150 kV substations in Zuid-Holland.



Tennet's transmission grid

In 2005, TZH's 150 kV grid in the province of Zuid-Holland was included in tennet's measurements. The graphs below give an idea of the circuit lengths, the connective capacity of transformer circuits and the connective capacity of the generating units in tennet's 380 kV, 220 kV and 150 kV high-voltage grid.

Connective capacity of transformer circuits

(including industrial users)

A defective transformer at Zeyerveen was replaced by a spare unit in 2004, increasing the connective capacity by 50 MVA. In 2005 this spare unit was replaced by a new transformer, however, returning the capacity to its original level.

| | 2001 | 2002 | 2003 | 2004 | 2005 | |
|--------|--------|--------|--------|--------|---------------|-----|
| 380 kV | 14 600 | 14 600 | 15 100 | 15 100 | 15 600 | MVA |
| 220 kV | 4 810 | 4 810 | 4 810 | 4 860 | 4 810 | MVA |
| 150 kV | - | - | - | - | 5 189* | MVA |

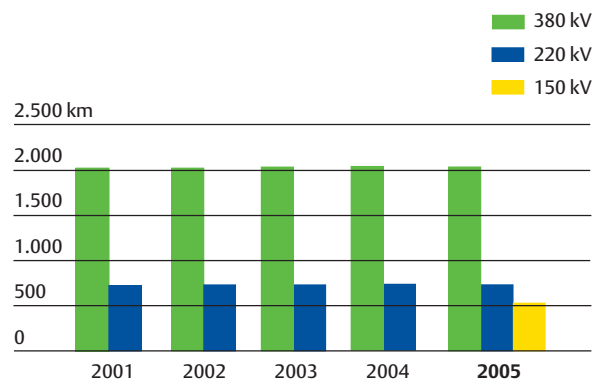
*) transformers owned by tennet Zuid-Holland as of 2005

Circuit length

The aggregate 380 kV circuit length amounts to 2,003 kilometres.

The aggregate 220 kV circuit length amounts to 683 kilometres.

The aggregate 150 kV circuit length amounts to 551 kilometres.



Connected capacity of generating units

The values from previous editions of "Transmission on balance" were revised in 2005 due to an amended definition

| | 2001 | 2002 | 2003 | 2004 | 2005 | |
|--------|-------|-------|-------|-------|---------------|-----|
| 380 kV | 3 608 | 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* | MVA |

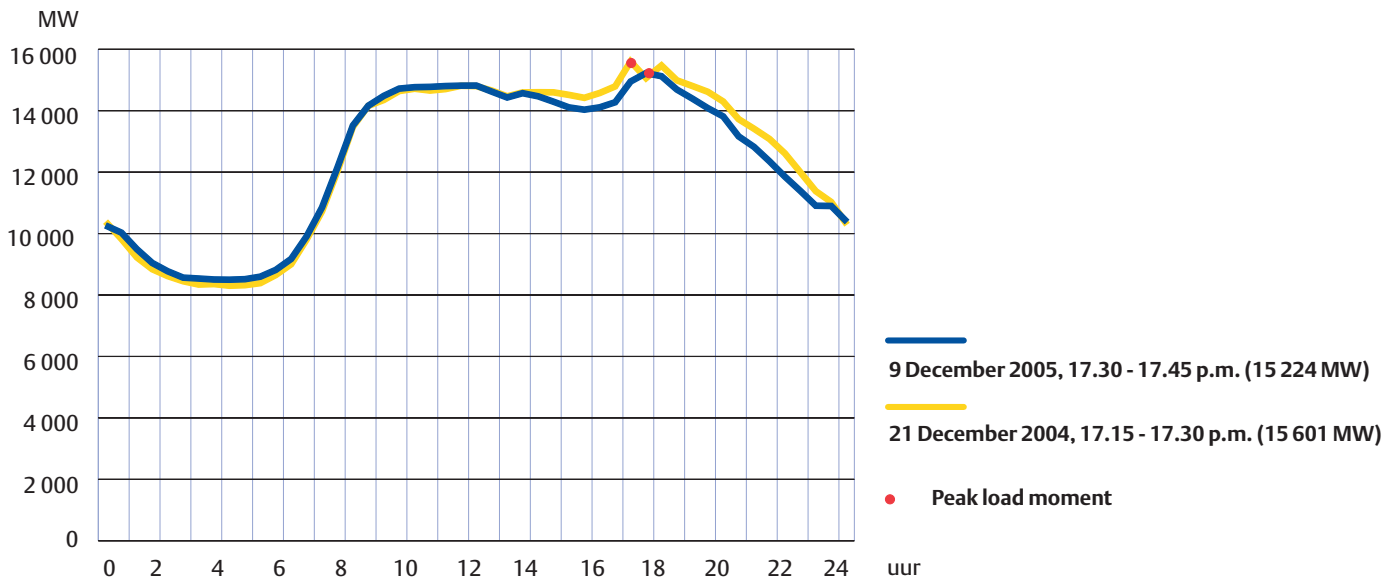
* production capacity connected to the grid of tennet Zuid-Holland

Peak load

The year's peak load to date usually occurs during the month of December around 5.30 p.m., when intensive use is made of heating and (Christmas) lighting all over the country. However, the increasing use of air conditioners during hot spells could at some point in the future result in the annual peak load shifting to the summer months. It will probably shift to late June or late August, as the load tends to be lower during the holiday period in July and August, when large numbers of people are abroad on holiday. Dutch society as a whole runs up a total of some 15,000 MW in electric power demand at peak load moments.

Peak load

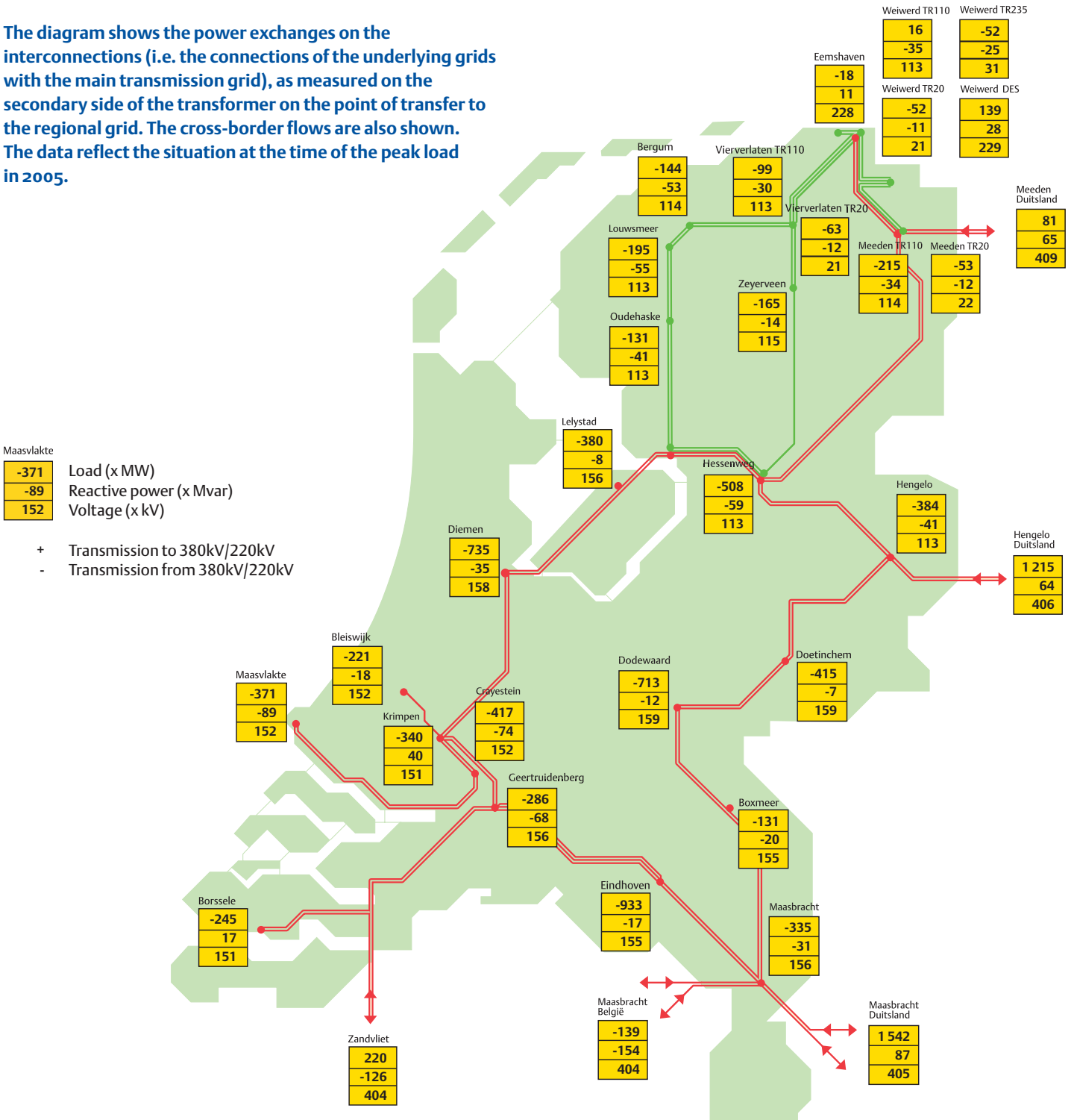
The peak load of the generating power as observed by TenneT plus imports, recorded for 2005, amounts 15,224 MW, and occurred between 5.30 and 5.45 p.m. on 9 December, representing a 377 MW (-2.4%) decrease compared with the previous year's high and a 755 MW (+5.2%) increase compared with 2003.



Peak load

Substation statistics on peak load day
9 December 2005, 5:30 – 5:45 p.m.

The diagram shows the power exchanges on the interconnections (i.e. the connections of the underlying grids with the main transmission grid), as measured on the secondary side of the transformer on the point of transfer to the regional grid. The cross-border flows are also shown. The data reflect the situation at the time of the peak load in 2005.





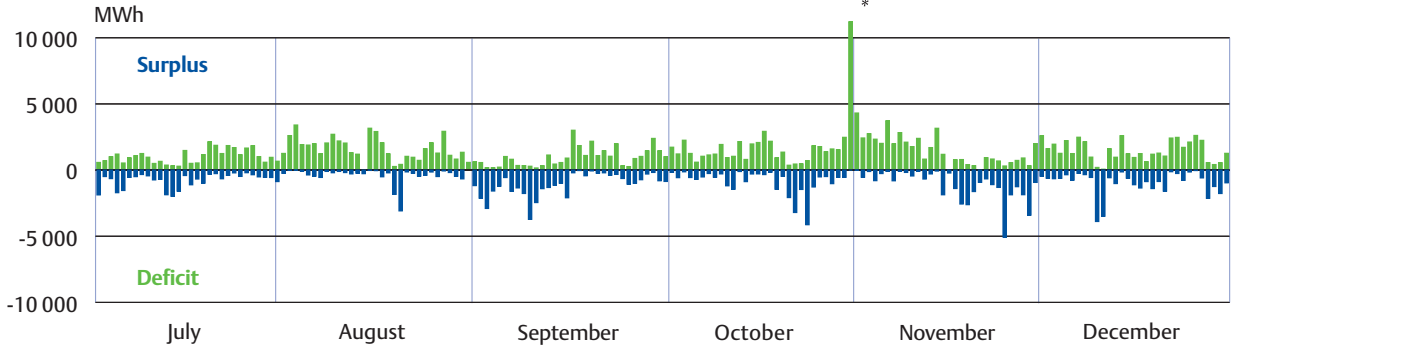
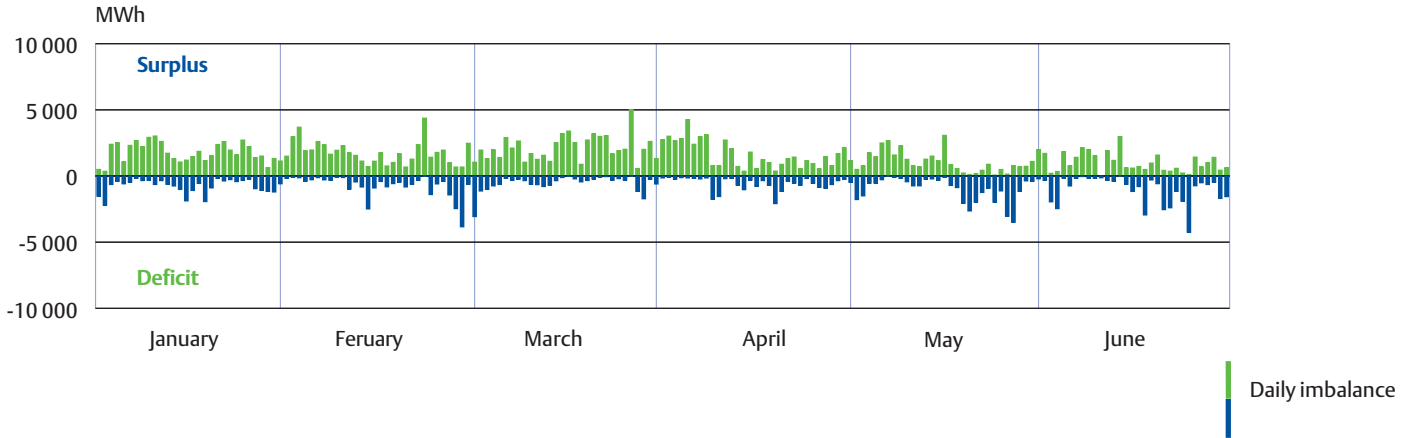
Imbalance control

It is up to tennet to provide a secure, reliable and efficient power supply system, which – put succinctly – boils down to tennet having to safeguard and maintain the demand-supply balance. Although a slight imbalance – which it is up to tennet to control – prevails on the electricity grid at any one time owing to the large number of market players preventing a perfect balance being struck between supply and demand for power, albeit the power demand and supply values are forecast with the greatest possible accuracy. A system of Programme Responsibility (PR) has been developed for this purpose in the context of which tennet receives daily Energy Programmes (EPs) from the Programme Responsible Partners (PRPs, these being parties that operate one or more connections to the grid) in which they advise us on the amount of electricity they expect to transmit or take in the next day. tennet continually monitors the level of imbalance and, where necessary, takes controlling action.

Imbalance of PRPs on a daily basis

The graph below shows the aggregate daily imbalance of all PRPs for the period from 1 January to 31 December 2005, with the bars representing the daily positive imbalance (surplus) and negative imbalance (deficit) volumes.

*) The unusually high value of 31 October 2005 concerns an administrative difference due to an allocation error made by a grid administrator.

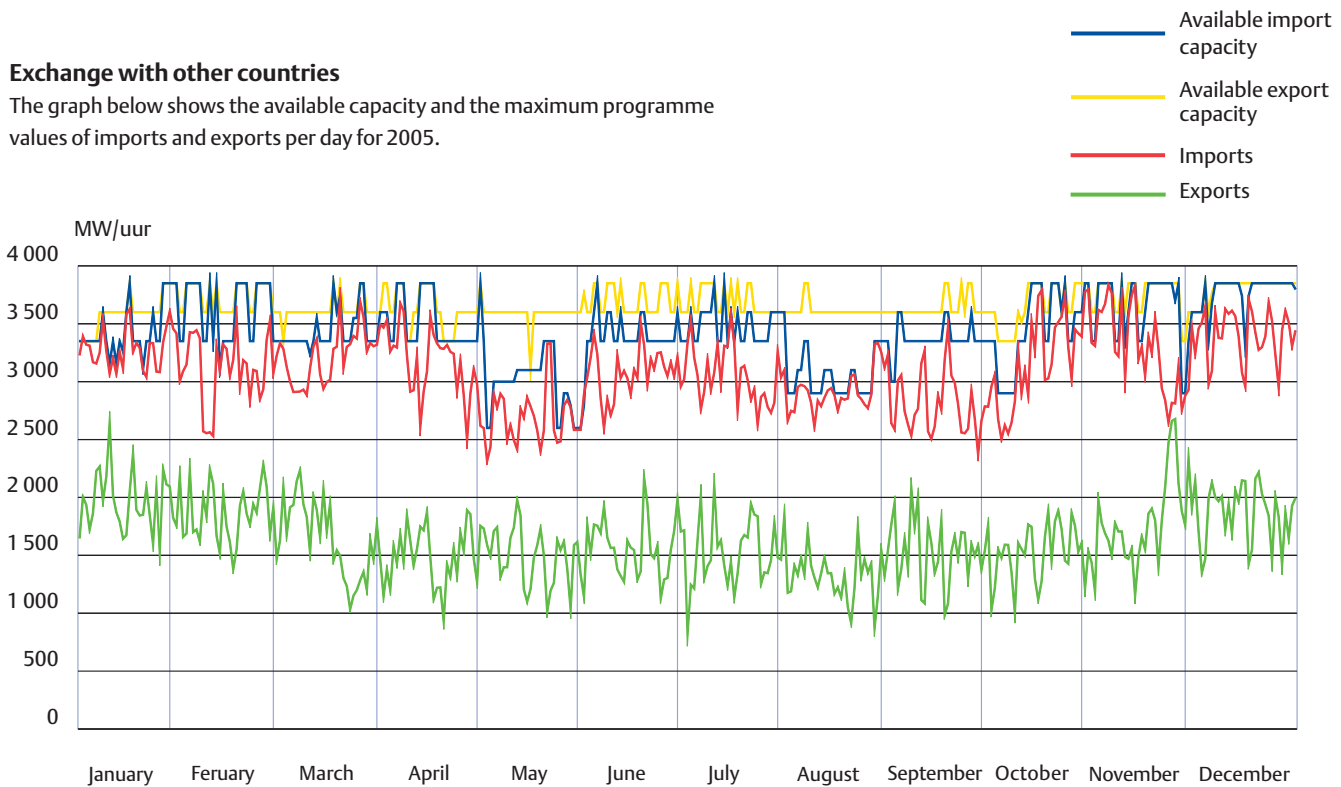


Cross-border interconnections

Interconnections are in place at the highest voltage level (380 kV) between the Netherlands and the vast European grid. Three German-Dutch and two Belgian-Dutch interconnections ensure that the Netherlands can access the European market and facilitate international power transactions between market players. In view of the great mutual influence of international grids that are connected to one another, the available capacity is closely reconciled with the TSOs in neighbouring countries on a daily basis. In recent years our country's power imports have exceeded its exports.

Exchange with other countries

The graph below shows the available capacity and the maximum programme values of imports and exports per day for 2005.



Inadvertent interchange 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 interchange programme with other countries. The difference relative to the interchange programme turned out at less than 20 MWh for 71.5% of the time whereas the national standard of 100 MWh was not achieved for 0.2% of the time.



Reliability of supply

The high-voltage grid of the Netherlands is one of the most reliable in Europe. The average annual outage duration in our country is exceptionally low: only 30 minutes per connection at low-voltage level. The influence of the high-voltage grids on this is very limited. Through our supervisory operations we ensure that power transmission across our grids is possible virtually regardless of circumstances.

Distribution of net import capacity for 2005

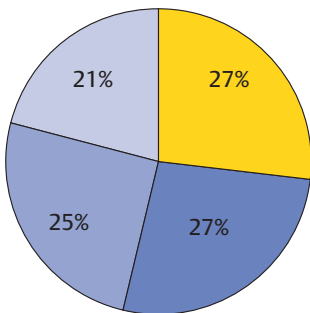
As of 31 December 2005

In 2005 the aggregate net release of available import capacity on the cross-border interconnections amounted to 3,350 MW in most months. In May, August and October the import capacity remained below 3350 MW on several days.

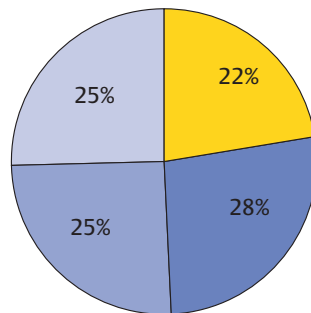
Whenever operational conditions permitted, the import capacity was raised to a maximum of 3850 MW. In April 2005, the long-term import contracts were lowered from 900 MW to 750 MW. They expired in September. In each case the capacity that became available was added to the daily capacity.

In 2005, the 3350 MW import capacity was distributed as follows:

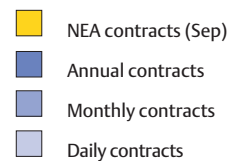
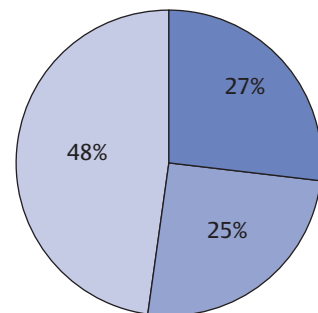
Verdeling januari t/m maart 2005



Verdeling april t/m augustus 2005



Verdeling september t/m december 2005



Cross-border interconnection transmission in 2005

| in GWh | Programmes | | Measurements | Cross-border interconnections |
|---------------------|---------------|-----------------------|-------------------|-------------------------------|
| | Programmes | UCTE programme setoff | Totaal programmes | |
| 2005 imports | 23 046 | 55 | 23 101 | 23 691 |
| 2004 imports | 22 075 | 39 | 22 114 | 21 405 |
| 2005 imports | 4 795 | 13 | 4 808 | 5 398 |
| 2004 imports | 5 882 | 15 | 5 897 | 5 188 |



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