

# Position Paper

**Direct and alternating current**



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## Direct and alternating current

TenneT manages a solid, reliable transmission grid. We are responsible for maintaining the present quality standard, also after expansion of the grid. This determines the technical principles governing our decision to use either direct or alternating current.

TenneT bases its new connections within the existing grid on the principle of alternating current (AC). To strengthen the meshed AC-system TenneT builds AC connections, mainly as overhead lines.



## *The European system is based on alternating current*

### **The use of AC connections**

The entire European electricity supply system – from power plant to socket – is solely based on the principle of alternating current. We therefore refer to it as an alternating current or alternating voltage grid.

### **Direct current in subsea connections**

In Europe direct current is only used in two cases: connections between two grids of different frequency, or subsea cable links longer than 100 kilometres. Examples of subsea cables based on direct current are the one between the Netherlands and Norway and the one between the Netherlands and the United Kingdom. Furthermore we build most of our offshore-connections in DC-technology. The reason why these connections have been realised using direct current is because the effectiveness of an AC cable drops across long distances. This is the case if a connection is constructed below the seabed.



### **Alternating current, alternating voltage**

Alternating current (also referred to as AC) is an electrical current that changes direction periodically. This type of electricity is supplied to households and industry by the electricity grid. Its direction changes at a frequency of 50 times per second, or 50 Hz.

### **Direct current, direct voltage**

Direct current (also referred to as DC) is an electrical charge that continuously flows in the same direction. Direct current is mainly used in subsea cable connections over long distances.

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TenneT is Europe's first cross-border grid operator for electricity. With approximately 20,000 kilometres of (extra) high voltage lines and 36 million end users in the Netherlands and Germany we rank among the top five grid operators in Europe. Our focus is to develop a Northwest European energy market and to integrate renewable energy.

## **Taking power further**

### **TenneT TSO B.V.**

Utrechtseweg 310, Arnhem  
P.O. Box 718, 6800 AS Arnhem  
The Netherlands

**Telephone** +31 (0)26 373 17 17

**Fax** +31 (0)26 373 13 59

**E-mail** [servicecentrum@tennet.eu](mailto:servicecentrum@tennet.eu)

**Twitter** @tennettso

**[www.tennet.eu](http://www.tennet.eu)**

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