

YOUR CONTACT  
TELEPHONE  
E-MAIL

Mathias Fischer, media spokesperson  
+49 921 50740-4044  
mathias.fischer@tennet.eu

DATE  
PAGE

11 December 2019  
1 of 2

## “MIGRATE” research project takes stock after four years

- **The focus: Integrating renewables into a stable, future-proof transmission system grid**
- **Different approaches for the power grid of the future**

“MIGRATE” – 25 consortium partners from 13 countries, transmission system operators, universities and research institutes worked together under this acronym for four years on the future of the European power grid. In January 2016, the European research project “Massive Integration of Power Electronic Devices”, MIGRATE for short, was launched. The project, which was coordinated throughout Europe by TenneT, was funded by the EU to the tune of around 17 million euros. The final conference has now been held in Brussels.

Some of the problems addressed by “MIGRATE” were: What does the increasingly decentralised infeed mean for grid stability and how can the European power grid be operated with 100 percent renewable energies? Five technical work packages investigated the effects of these changes and developing recommendations for future grid connection rules.

Increasing electricity production using renewable energies and the shutdown of conventional large power stations have a major impact on the operation of electrical grids. Wind turbines and photovoltaic systems typically feed the electricity into the grid through power electronic converters, while classic power stations use large rotating generators. The main difference between these two technologies is how they are controlled, e.g. their voltage, power and frequency on the electric grid.

For this reason, the power grid of the future not only has to be flexible to securely transport the decentrally generated power to the electrical load. Planning and operation also have to consider the changing properties of the generators themselves. Against this backdrop, it is necessary to develop new technologies to be able to reliably operate a future grid with 100 percent renewable energies – and thus 100 percent power electronics.

One essential point is adapting control strategies to generation operation. This adjustment alone can enable reliable operation of the electric grid with power electronics up to 65 percent. To cover the remaining 35 percent in stable grid operations, new, innovative solutions were developed as part of the MIGRATE research project.

Grid monitoring plays a major role. To keep this requirement possible in real-time, MIGRATE successfully tested a new WAMPAC system (wide area monitoring protection and control). This process allows the grid operator plant management staff to quickly and reliably detect whether and when the limits of reliable grid operations are reached.

The data from connected wind farms or photovoltaic systems are not required – instead, the measurements of the electric grid alone are used. This makes the process much more robust against information transmission malfunctions.

Ideally, the grid voltage should vibrate at 50 Hertz. A phenomenon more often being seen in electricity grids are vibrations with frequencies above 50 Hertz. These vibrations must be avoided. They not only cause additional losses in the system, but can also interfere with the function of, or even destroy connected devices.

MIGRATE has advanced the methods for assessing these phenomena and reducing these harmonics.

Another important function for reliable grid operations: protection systems that disconnect the affected equipment from the grid in case of a fault, such as a short circuit. In households, this function is assumed by fuses. MIGRATE also investigated possible safety system failure due to changed future grid properties, defining countermeasures.

Some of the working results are already being utilised by transmission system operators. It was also important for the MIGRATE project to gain new insights into how the European transmission system grid of the future will change in conjunction with future generation plants. MIGRATE therefore also represented a good start in the cooperation between European transmission system operators with system manufacturers in this field.

On the project website [www.h2020-migrate.eu](http://www.h2020-migrate.eu), a short film presents both the objective and the key MIGRATE project results.

### **About TenneT**

TenneT is a leading European electricity transmission system operator (TSO) with its main activities in the Netherlands and Germany. With over 23,000 kilometres of high-voltage connections we ensure a secure supply of electricity to 41 million end-users. TenneT is one of Europe's major investors in national and cross-border grid connections on land and at sea, bringing together the Northwest European energy markets and accelerating the energy transition. We make every effort to meet the needs of society by being responsible, engaged and connected.

### **Taking power further**