Technical

TYNDP 2018

Viability of the Energy Mix

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Section 3

Long-range transport of energy

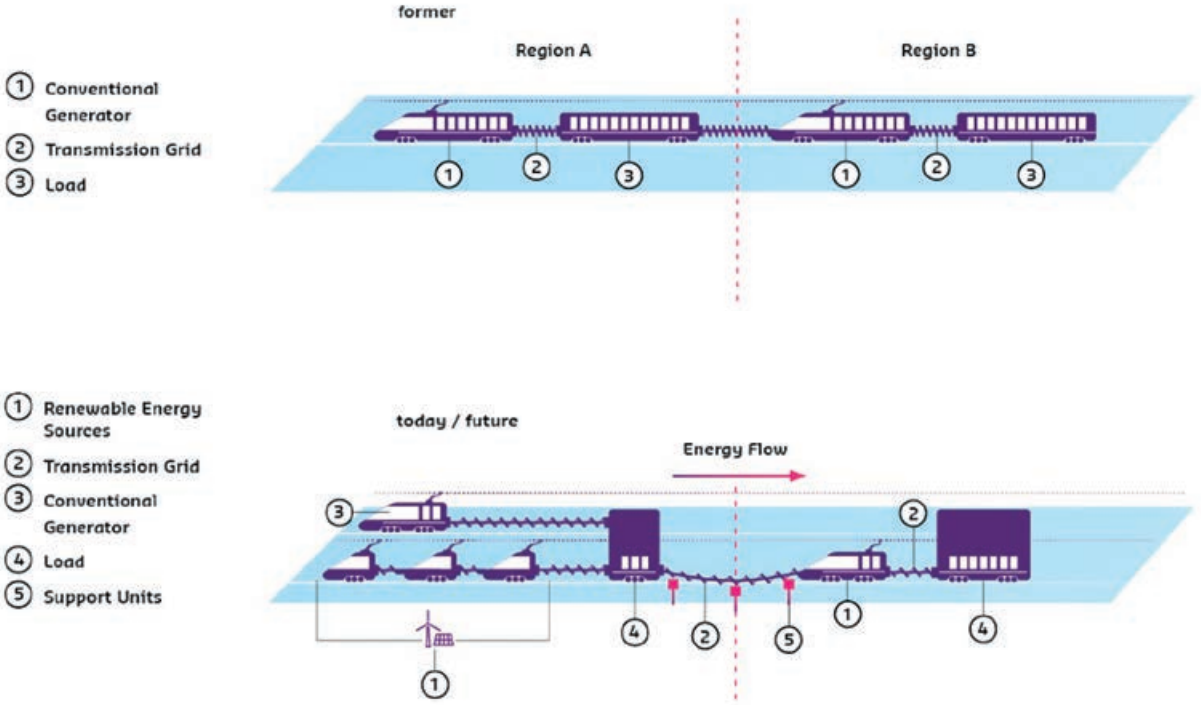
The energy generation from renewable sources and its exchange throughout Europe are leading to a more extensive energy transport. In order to adapt the transmission grid accordingly, it needs to be strengthened and expanded.

Beyond the grid reinforcement need, other technical challenges also arise.

The more energy has to be transported over long distances, the more voltage regulating means are needed. Together with generators capabilities, elements such as inductors, phase shifters or reactive power compensation systems are needed to regulate and support the voltage.

Due to the large distance between regions with high production and regions with high load, disturbances can also affect several regions or countries. In the event of a grid disturbance leading to a so-called system split, i.e. the separation of the transmission grid into several regions, a power surplus would arise in exporting regions and a power deficit would arise in importing ones. To mitigate these extreme situations from the most serious disruptions, the system defence plans[3] (and when necessary system restoration plans[4]) must define appropriate measures.

Figure 3.1 (U 6WWP VWUDGWRDODGWRGDIWUGDPFV IRUDSF



Conventional power plants used to generate energy where it was needed – comparable to a locomotive coupled almost directly to the railway carriage. The locations of the smaller renewable energy plants, on the other hand, depend on renewable source conditions. They are built in regions with strong winds or sunshine, where the energy demand is often relatively low. For this reason, extensive networks – shown here as elongated springs – are necessary to transport the excess electricity to the consumption centres. For energy to be transmitted, the springs must not sag too much. To avoid the sagging in an elongated spring, voltage-supporting units must be used. If a crack occurs in the spring, a so-called system split can be created, which abruptly decouples several regions from one another.

[3] According to the Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation: system defence plan means the technical and organisational measures to be undertaken to prevent the propagation or deterioration of a disturbance in the transmission system, in order to avoid a wide area state disturbance and blackout state.
[3] According to the Commission Regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration: restoration plan means all technical and organisational measures necessary for the restoration of the system back to normal state.

Section 4

Viability of the energy mix

Since the proportion of electricity from renewable energy sources must continue to achieve decarbonisation goals the, TSOs are committed to lead a successful energy transition, contributing with their comprehensive understanding of the various interrelationships, experience in system development and operation coordination between TSOs, DSOs, manufacturers, stakeholders and research centres.

Network investment solutions and the Connection Network Codes requirements are, from a technical perspective, key and complementary aspects to ensure the necessary technical capabilities from to grid users. Given the goal of a system with increasing shares of RES, Research & Development will be also an essential factor to ensure solutions able to bridge the gap between conventional and RES generation capabilities (e.g. the inertia capability).

ENTSO-E AISBL
Avenue de
Cortenbergh 100,
1000 Brussels,
Belgium

Tel (+32) 2 741 09 50

info@entsoe.eu
www.entsoe.eu

entsoe

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