Germany’s electricity networks outlook – Today and tommorow

Germany’s electricity networks outlook - Today and tommorow (photo by eon.com)

Network reliability in front of all

Germany’s electricity supply is currently based on a reliable and powerful network infrastructure. But to manage the ***energy transition***, it is essential to keep **distribution networks** efficiently in balance by means of sensor, management and control systems depending on the relevant requirements.

Germany’s electricity networks have been the most reliable in Europe for decades.

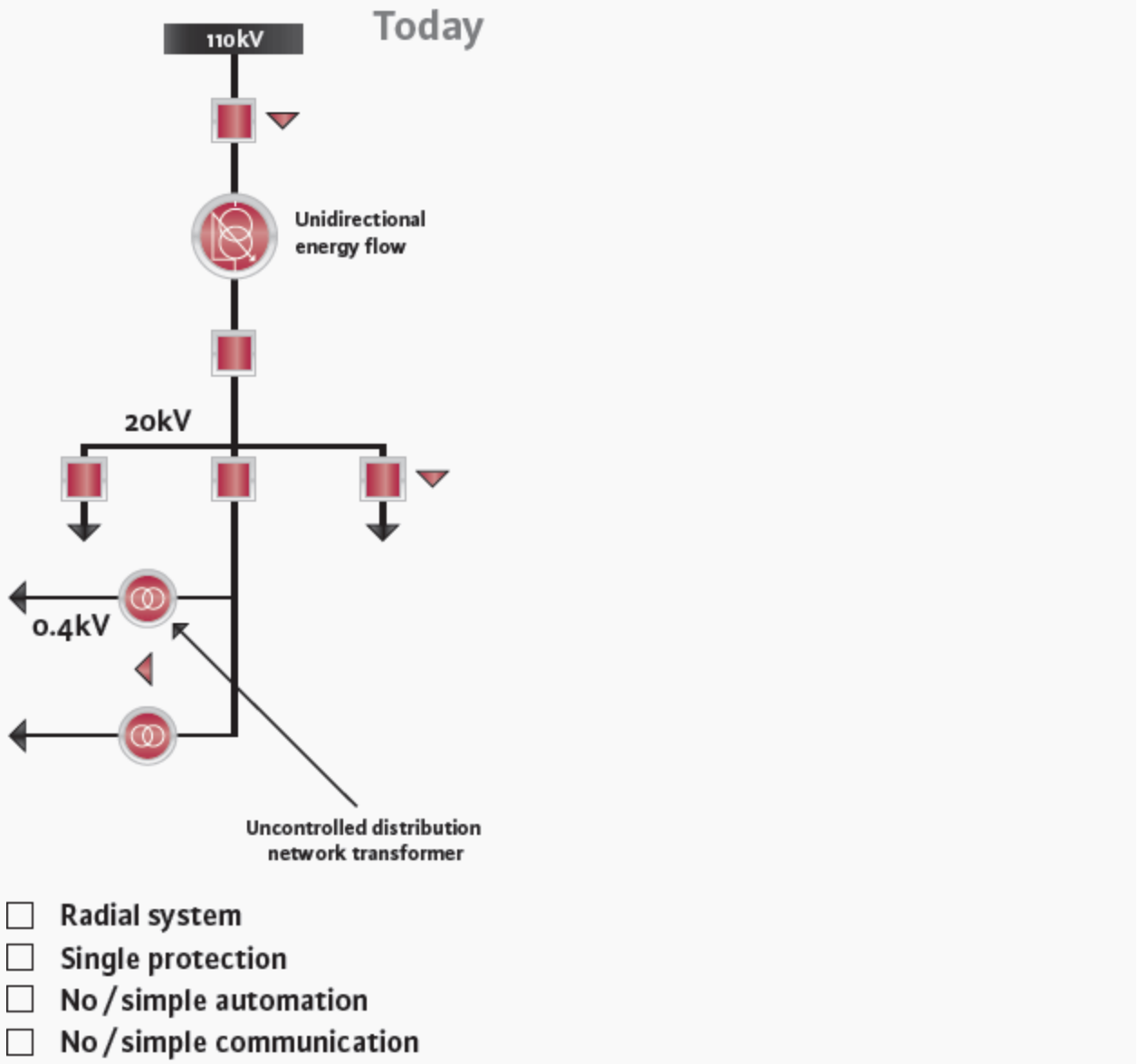
Electricity customers only have to expect power interruptions of ***16 minutes*** on average during the year. This corresponds to a reliability of 99.99 percent.

More than ***800*** electricity network operators maintain and operate Germany’s networks covering a distance of 1.78 million kilometres.

For the most part, these are low-voltage networks, connected by regional distribution networks (medium and high voltage) to the extra- high voltage grids. The existing infrastructure of distribution networks has developed over decades. A large part of the network elements have

been used since the sixties and seventies and were not designed for the intermittent feed-in of renewables-based electricity.

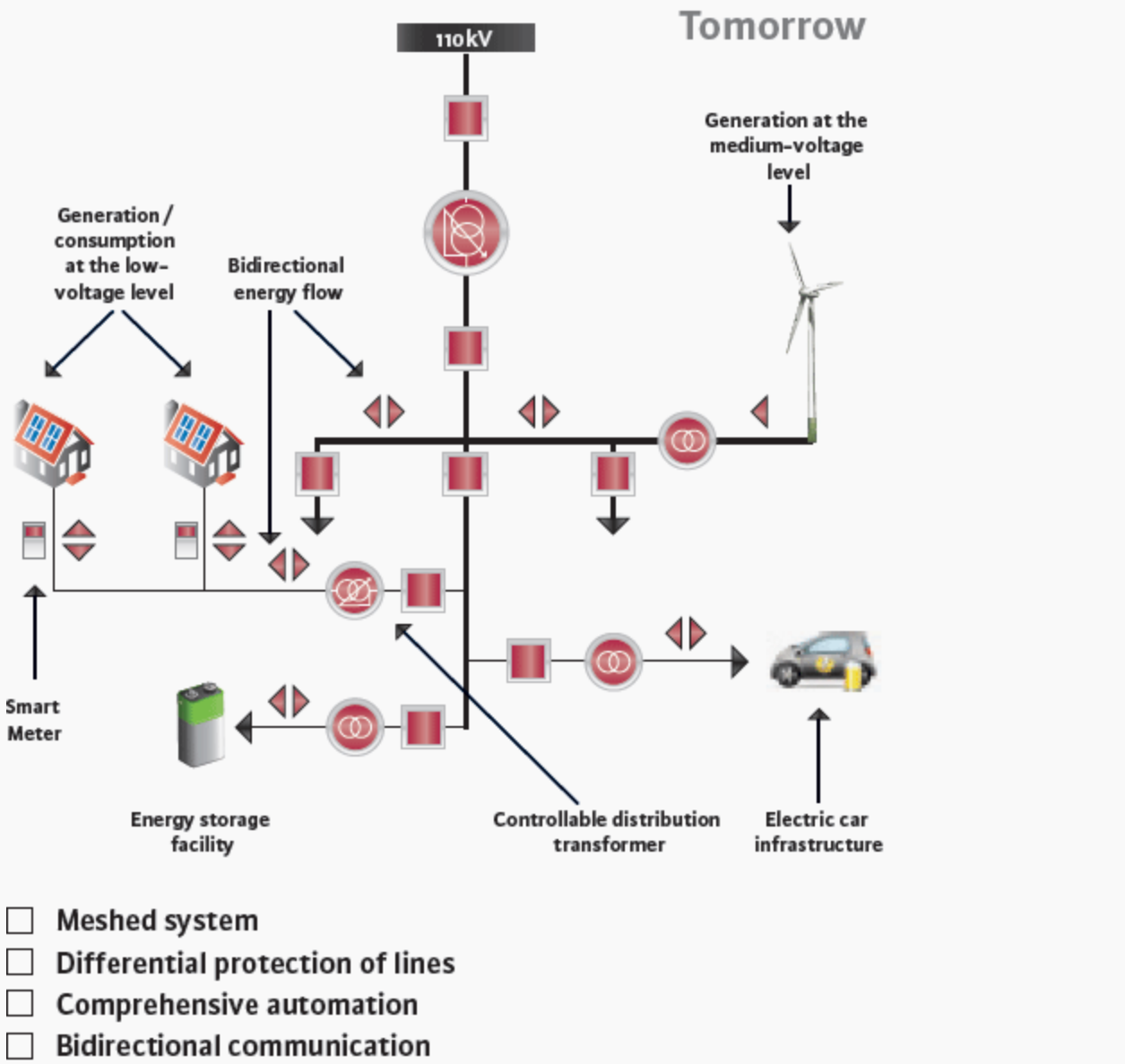
Moreover, hitherto passive customers are turning into active market participants, the so called "***prosumers***".
The medium and **low-voltage distribution networks** are changing into a multidirectional dynamic network. Monitoring and control of this system are a prerequisite for keeping the network efficiently balanced, working in cooperation with network users. It is important to take account of the fact that every distribution network must be individually assessed in terms of its***network structure*** (*e.g. consumers and generators connected to it*) and ***public infrastructures*** (*e.g. load and population density*).
In the past, distribution networks were operated in a single direction to distribute electricity from the higher voltage level, with the network structure designed for this specific task.



Germany's electricity networks outlook – Today

Through to today, only very few distribution networks proceed with detailed visualisation and analysis of the network situation together with real automation. Furthermore, only limited use is made of the efficiency of control and regulation possibilities.

This must be changed if the energy transition is to be managed. **Transmission and distribution** networks must respond even faster and more frequently to changes in generation and load-flow directions, particularly through the feed-in of increasing amounts of energy from wind power and photovoltaic.

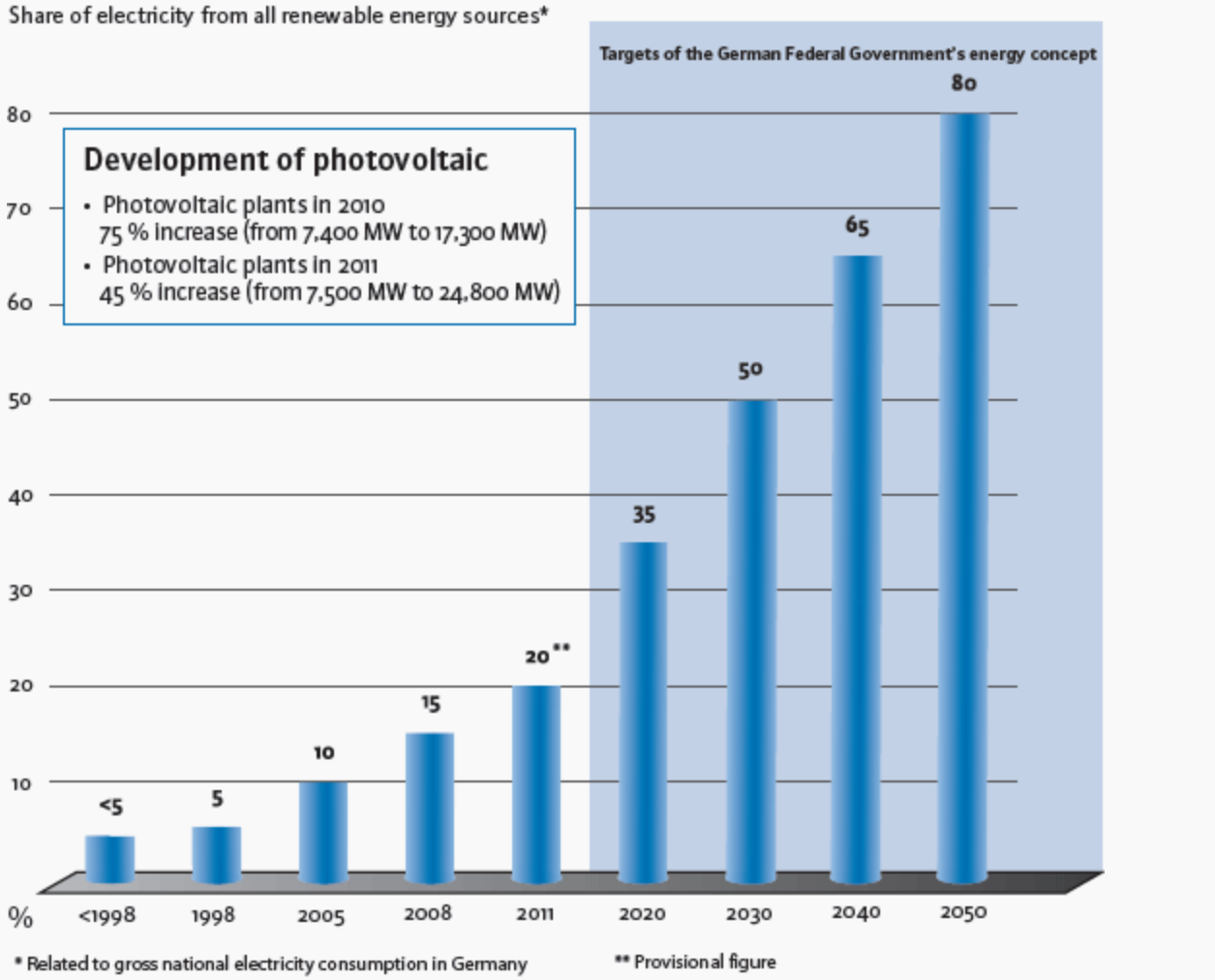


Germany's electricity networks outlook - Tommorow

More information and control possibilities will have to be available in order to keep the network efficiently balanced, working in cooperation with electricity producers and consumers.

The need for these functions will continue to grow: greater use of decentralised volatile feed-in and the expansion of electric mobility in the field of individual passenger traffic together with additional controllable load will make further demands on the networks and their operators.

Further improvements in energy efficiency will also be a driver for making the medium and low-voltage distribution networks fit for the future.



Transformation of energy supply

Improvements has already begun…

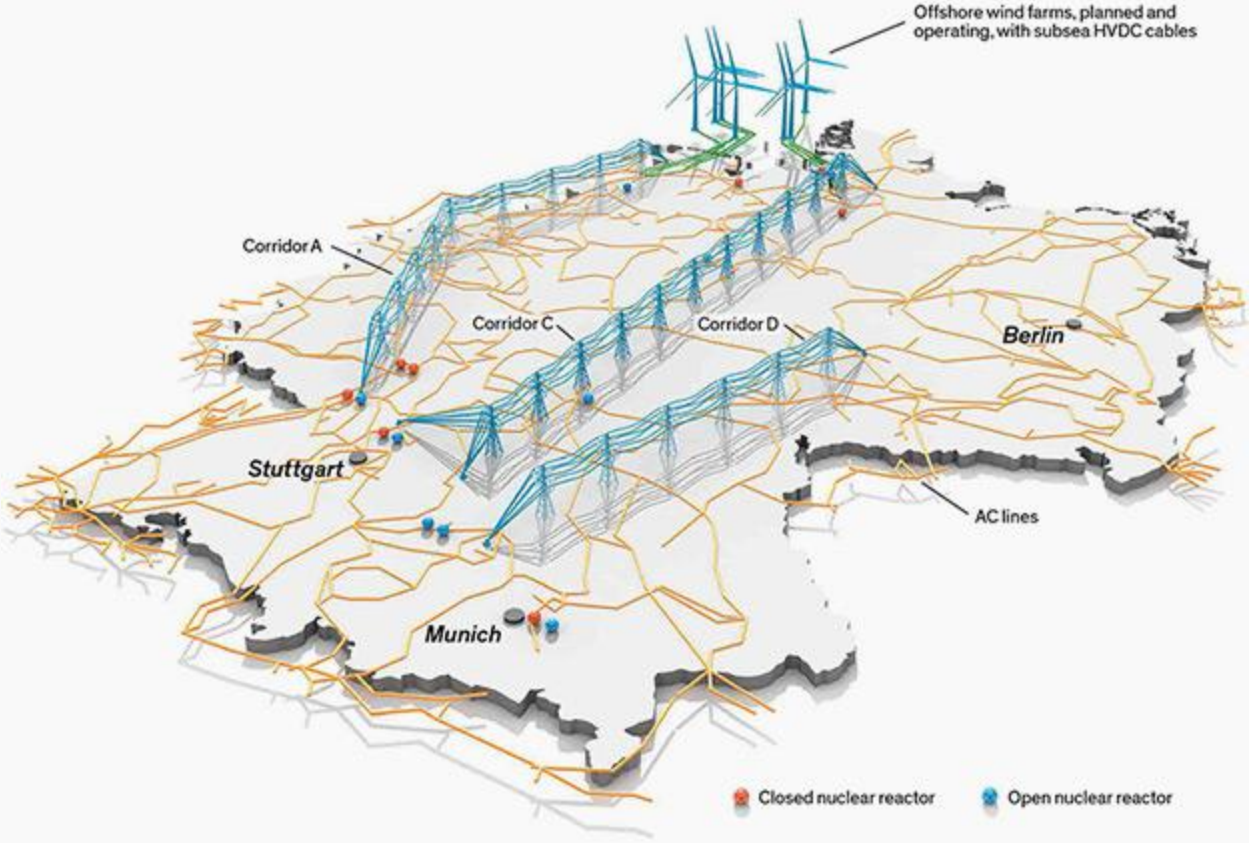
Northern Germany:

The development in ***Northern Germany*** shows that the future has already begun in certain networks. Here, network operators already issue warnings about overloading of energy networks due to the rapid development of renewable energies in rural and windy regions. In and around***Lower Saxony*** today, the installed renewables-based feed-in capacity exceeds the annual maximum load by ***almost 70 percent***.
Already 50 percent of the total electricity volume transported by certain network operators originates from renewable energy sources.

Southern Germany:

Bavaria has seen a considerable increase in the number of photovoltaic plants over the last two years.

More than 350,000 photovoltaic plants with a capacity of ***more than 7,000 MW*** are currently connected to the network. This figure not only exceeds the ***Bavarian demand*** during low-load hours but it also corresponds to about 35 percent of the PV capacity installed throughout the country, and far exceeds the installed total PV capacity in the USA of 3,000 MW.



Germany takes the first step toward a supergrid (picture via instituteforenergyresearch.org by IEEE Spectrum)

Reference: *Smart Grids in Germany Fields of action for distribution system operators on the way to Smart Grids published by:*

- ***BDEW*** *– Bundesverband der Energie- und Wasserwirtschaft e.V.*
- ***ZVEI*** *– Zentralverband Elektrotechnik- und Elektronikindustrie e.V.*

Source:

http://electrical-engineering-portal.com/germanys-electricity-networks-outlook-today-and-tommorow