

New Evidence on Strained German Grids

ENTSO-E Concerned about Grid Security

In a letter to the European Commissioner for Energy, Günther Oettinger, the president of ENTSO-E¹, Daniel Dobbeni, confirms his concern about security of power system operation in Europe².

An attached briefing paper gives an overview of the current situation³. The rapid increase of wind power and other renewable energy sources (RES) without a corresponding reinforcement of the electric grids has caused the problems.

The paper explains: "Heavy 'unplanned' transit flows added to scheduled flows cause severe loading on southern interconnectors (PL/CZ, PL/SK, DE/CZ, and also SK/HU and SK/UA) and lead to noncompliance with fundamental network security criteria. The high level of flows on the interconnectors leads to overloading of the network in Germany and neighboring countries Poland, Czech Republic, Slovakia and Hungary."

Among the countermeasures of the transmission system operators (TSOs) is the use of the HVDC links across the Baltic Sea for a redistribution of power flows. A common procedure has been developed by German and Polish TSOs and two Nordic TSOs (Energinet.dk and Svenska Kraftnät). However, the remedial actions cannot be guaranteed as they depend on prevailing system conditions.

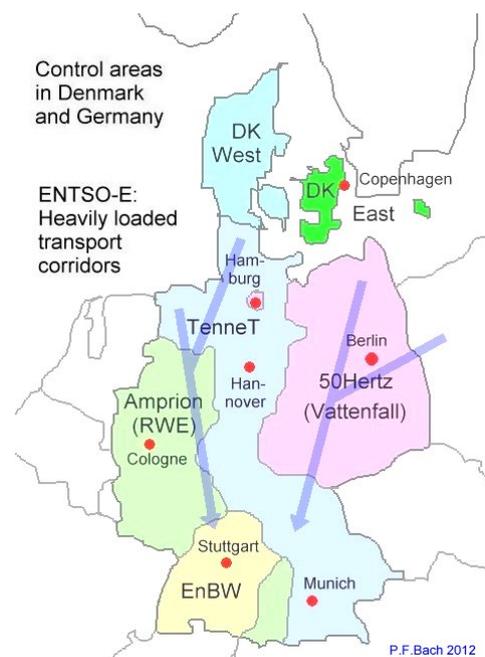
The countermeasures have cost implications and cannot be implemented without cost sharing agreements.

ENTSO-E makes reference to its Ten-Year Network Development Plans (TYNDP). The timely implementation of the projects will require the active support of European policy makers.

The paper estimates the necessary investment for reinforcement of the western and the eastern transport corridors in Germany to 30 billion Euros for the next decade. The German reinforcements must be coordinated with investments in neighbouring countries.

ENTSO-E:

"As long as RES generation in certain regions expands faster – partly as a function of national support schemes – than the transmission network can accommodate, the risk of insecure system operation coupled with costly generation curtailments will rise significantly."



¹ The European Network of Transmission System Operators for Electricity

² http://pfbach.dk/firma_pfb/entsoe_120416_letter_to_commissioner_oettinger.pdf

³ http://pfbach.dk/firma_pfb/entsoe_120416_briefing_paper_interconnected_system_operation.pdf

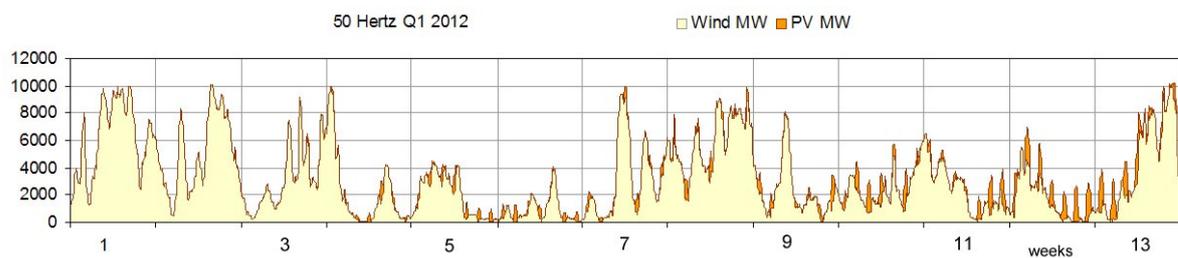
Efficient market arrangements are important for efficient congestion management, secure grid operation and overall market efficiency. Therefore the organisation of more consistent markets and redefinition of bidding areas deserve consideration.

The ENTSO-E paper concludes: "If this infrastructure does not materialize in due time then the rate of RES increase should be examined under a more pragmatic prism".

Profile of Interventions in the 50Hertz TSO Area

The ENTSO-E paper explains some important principles but there is no real indication of the seriousness of the grid conditions.

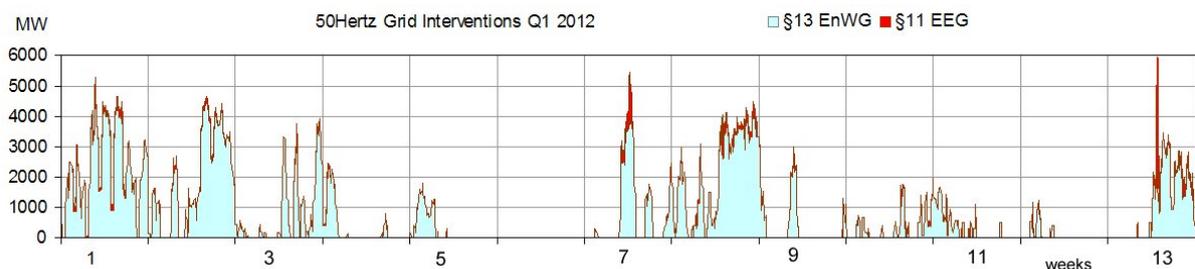
My previous paper on the events on 28-29 March 2012 tried to give an impression based on selected data⁴. Now the picture can be extended with data from the 50Hertz TSO area.



The wind power profile is practically the same as for the adjacent TenneT area. Photovoltaic (PV) still plays a modest role in the 50Hertz area.

Q1 2012	Wind	PV
Max	10,201 MW	2,972 MW
Energy	7,524 GWh	636 GWh

50Hertz reports on interventions according to §11 of the RES Act (EEG) and to § 13 of the German Energy Industry Act (EnWG) in MW per 15 minutes. §11 defines the rules for feed-in management of RES and CHP. §13 allows the grid operator to employ network or market-related measures such as re-dispatch and counter-trading and, in extreme cases, load shedding.



The main volume of the interventions refers to §13 and is not necessarily related to RES. However, it is obvious from the two charts above that the interventions are correlated with wind power and thus caused by the wind. The peaks of the interventions are about half the corresponding wind power peaks.

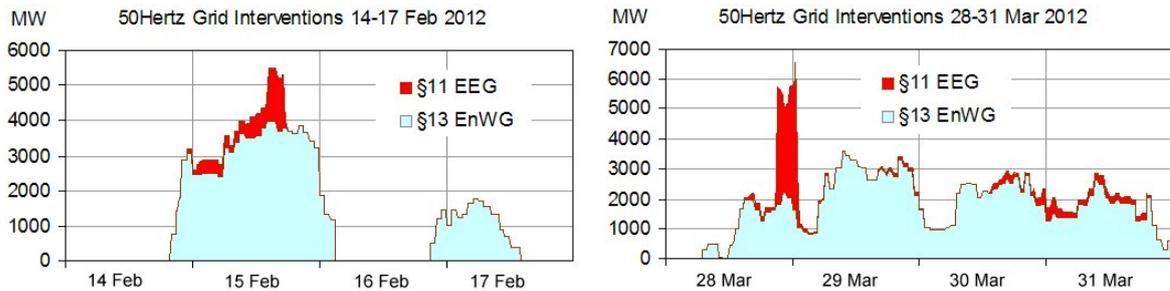
⁴ http://pfbach.dk/firma_pfb/german_wind_power_curtailments_2012_04_14.pdf

The total volume of the §11 interventions in Q1 2012 is 78 GWh distributed on 14.9% of the time.

Interventions	§11 EEG	§13 EnWG
Relative time	14.9%	46.2%
Energy	78 GWh	1,729 GWh

§13 interventions have been effective 46.2% of the time in Q1 2012. The distribution between curtailed RES and other measures has not been specifically mentioned.

Interesting peaks occur on 15 February and 29 March. On the following charts these days are extracted for further examination.



The red areas could be interpreted as curtailed wind power. §13 interventions have a cost but a cost estimate could not be made from the observed data.

A wind peak does not necessarily cause a §11 intervention. The §11 interventions are probably results of a combination of wind peaks and other events such as the tripping of a vital link on 28 March.

The high frequency of §13 interventions seems to indicate a heavily loaded grid. Maybe the frequency of §11 interventions can be seen as an indicator of the vulnerability of the system. Observations for a longer period may show a trend.

In the adjacent TenneT TSO area interventions are initiated either by the operator of the primary grid (TenneT) or by the operator of the regional grid (E.ON Netz). For the eastern Germany 50Hertz is the operator of 380 kV and 220 kV facilities. There seem to be a number of operators of the regional grids in this area, and the search for data on regional interventions has been unsuccessful so far.