

# Currents of Change

THE POWER SYSTEMS IN DENMARK, PORTUGAL, Spain, Ireland, and Germany have some of the highest wind penetrations in the world, as shown in Table 1.

The management of the different power systems to date, with increasing amounts of wind energy, has been successful. There have been no reported incidents in which wind has directly or indirectly been a major factor causing operational problems on the system. In some areas with high wind penetration, however, the transmission system operator (TSO) had to increase remedial actions significantly in order to decrease the loading of system assets during times of high wind power infeed. In some areas, the risk of faults may have increased. Higher targets for wind power will mean even higher penetration levels locally and high penetration levels in larger power systems. There are a number of issues that will require active management in the near future; in some cases, such management is needed today. In this article, the situations of five countries with high wind penetration are

European  
Experience and  
Perspectives  
with High Wind  
Penetration Levels

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