Security assessment for intentional island operation in modern power system

There has been a high penetration level of Distributed Generations (DGs) in distribution systems in Denmark. Even more DGs are expected to be installed in the coming years. With that, to utilize them in maintaining the security of power supply is of great concern for Danish utilities. During the emergency in the power system, some distribution networks may be intentionally separated from the main grid to avoid complete system collapse. If DGs in those networks could continuously run instead of immediately being shut down, the blackout could be avoided and the reliability of supply could be increased. However, when to island or how to ensure the islanded systems can survive the islanding transition is uncertain. This article proposes an Islanding Security Region (ISR) concept to provide security assessment of island operation. By comparing the system operating state with the ISR, the system operator can clearly know if it is suitable to conduct island operation at one specific moment. Besides, in order to improve the computation efficiency, the Artificial Neural Network (ANN) is applied for fast ISR formation. Thus, online application of ISR based islanding security assessment could be realized.