Appendix H

Transmission losses

Appendix H – Transmission losses

Appendix H gives expected transmission losses of the NETS at time of GB peak demand. The transmission losses come from both fixed losses and load related losses.

Fixed losses are mostly independent from the loading of the circuits and typically come from such things as transformer iron losses and high voltage corona losses. Fixed losses vary slightly because of variations in system voltages and weather conditions. Load-related losses typically come from the resistance of circuits and depend on the square of the current carried by the circuit (I^2R). Therefore load related losses change significantly with the loading of the transmission system.

Reporting transmission losses

When examining transmission losses on the NETS, the total losses for the following transmission elements are considered:

- 400kV and 275kV circuits
- 132kV circuits in Scotland
- 400/275kV transformers
- 400kV or 275kV to 132kV transformers in Scotland
- HVDC transmission circuits and converters
- offshore transmission cables of 132kV or above
- offshore/onshore transmission interface transformer.

At winter peak the NETS losses are indicatively calculated to be as follows, assuming an intact system.

Table H.1
Transmission losses

Year	MW losses at GB peak
2015/16	980
2017/18	990
2019/20	1100
2021/22	1480
2024/25	2020

The calculated losses for the first couple of years are similar, indicating little change in system operation. After that, however, the calculated losses rapidly increase, even though the network has been reinforced to follow the changes in generation. These larger losses indicate that power flow within the NETS is travelling over longer distances and circuits are more heavily loaded. Load losses increase exponentially with circuit loading so the growth in losses is not linearly proportional with the network loading. A particularly heavily loaded circuit in one year contributing significantly to the total losses may be less loaded the next year and have a much smaller proportion of the total losses. Local reactive support for voltage management avoids the transmission of reactive power over distances that would otherwise increase system losses.

The total annual NETS losses accounts for approximately 2% of the energy supplied, and may rise. If generation tends to move away from demand as some of the FES suggest then the transmission network will be used more and increased losses can be expected.