Smarter, more Efficient Electrification

What is the situation?

Electrical power demand on the railway continues to increase as a result of expanding electrification and longer, more frequent and more power intensive trains.

Approximately 40% of the British railway network is electrified, comprising 25 kV a.c. (two-thirds) and 750 V d.c. (one-third) systems supplying traction power to trains. The benefits of expanding the electrified network will be realised as part of a rolling electrification programme. However, the business justification for electrifying less frequently used lines hangs in the balance, leaving nearly half of the railway network reliant on self-powered trains.

In 2015-16, the UK railway traction electricity demand was 3.4 TWh, making us one of the largest single consumers of electricity in the UK. We are progressing Smart Grid technologies (such as IEC 61850) as well as energy harvesting, storage and recycling (regen. braking) to reduce costs and demand.

R&D activities are required to further unlock the following ambitions:

- To reduce the cost of electric traction infrastructure.
- To grow the capability to increase the proportion of electric traction use.
- To improve the management of electrical energy demand.
- To improve the efficiency of electrical energy.

Our challenge is to improve the electrification infrastructure operation, economically and efficiently, keeping sufficient capacity headroom maintained. An enabler to achieving this objective, and satisfying our licence condition, is further development and 'hotel' loads. An enabler to achieving this objective, and satisfying our licence condition, is further development and implementation of smarter, more efficient electrification systems. This includes new electrification, as well as, modifications to legacy infrastructure where appropriate.

**Expected impact & benefits**

- Reduced cost of electrical traction infrastructure.
- Greater capability to increase the proportion of electric traction.
- Improved management of electrical energy demand.
- Improved efficiency of electrical energy distribution.