ADAPTATION

Adaptation of Railway Infrastructure to Climate Change

Preparing the rail infrastructure for when 'today's extreme weather becomes tomorrow's normal weather'

While we have a decent understanding of the likely causes of climate change, the consequences advance quickly and are hard to predict. Observable effects vary from region to region, and include track buckling, heavy rain, storms, flooding, eruption, landslides and avalanches, and catastrophic scenarios such as hurricanes and tsunamis. These threats represent huge potential damage to transport infrastructure, and demand new attitudes toward its planning, construction and maintenance. It is important to differentiate between natural hazards and the effects of climate change. While the appearance of the two is often similar, the causes and consequences are significantly different.

The railways have an extremely long life time and are constructed to withstand natural hazards, such as i.e. the 100 year flood. Traditionally, the threat of natural hazards has been an integrated element in the planning and construction of rail infrastructure. For example, Swedish construction of roads and tracks incorporates specific dimensioning in order to cope with the '50 years deluge'. However, much international rail infrastructure was constructed more than 100 years ago, and in many places rail tracks have suffered from lack of proper maintenance, due primarily to company cutbacks. As the number and the intensity of incidents caused by extreme weather events will arise in the future, the pressure on the capacity of the rail system will rise together with the costs for the sector. If the right measures are taken at the right time, the risk will be bearable

The increased occurrence of extreme weather events demands a re-evaluation of how transport systems are being designed and maintained. Policymakers, planners and constructers will have to work harder and with greater innovation to ensure transport safety, availability and quality. The consequences of extreme weather differ according to factors such as geography, topography, geology and population density. For example, the effects of heavy rain on a landscape will differ depending on the porosity of the soil. Trends in society, such as the urbanization process, are also influential. For example, asphalt and clear-felled areas increase the intensity of flooding.

In 2007 UIC established its task force on climate changes' consequences on rail infrastructure. During 2008 a feasibility study was carried out to understand if and how the impacts from climate changes were an issue for the rail sector, and if so, how did they deal with it. The results clearly stated that the increasing frequency of extreme weather events was a subject of high importance for the nearly 40 railways that responded to the questionnaire.

The UIC project Adaptation of Railway Infrastructure to Climate Change (ARISCC) thus started in 2009. Several railway members with experiences from extreme weather events and conditions are joining forces to gather existing knowledge about the weather of the past and today in order to develop a new level of knowledge and management of the impact of climate on rail infrastructure. The project is focusing on the following three "R"s:

Readiness (preparedness)
Resilience (robustness)
Recovery (plan B and returning to business as usual)

This includes new thinking and non-traditional cooperation across sectors and professional areas, for example with meteorologists and climatologists to predict, and mitigate the effects of extreme weather. This technology transfer will lead to new expertise and generate greater 'preparedness'.

The ARISCC project will provide:
A guidance document on adaptation for existing and new rail infrastructure
A webpage gathering knowledge base and exchange platform for good practise
Solutions for natural hazard management and early warning, incl. impact and risk assessments, vulnerability mapping,

This cooperative process in the rail sector to the uniform and international threat impacts from climate change represents to rail infrastructure, can then be applied to the global stage. This strategy will be able to support the development of smart, sound and sustainable transport systems in all parts of the world. The advantages of rail recommend it as the ideal backbone for such a system. It promises greater safety, improved access and reduced emissions; in short, a higher quality of mobility, and a higher quality of life.