

Countries with less than 1000 km total railway track length are not labelled

CARTOGRAMS

TRAIN SPOTTING

BY BENJAMIN HENNIG

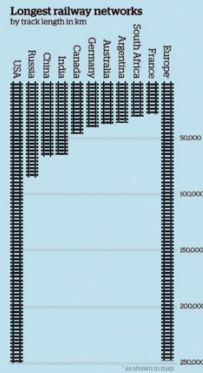
Passenger transport in Europe is largely dominated by cars. In the past decade, cars kept a consistent share of around 83 per cent of the modal split within the European Union, followed by buses and coaches (around nine per cent in most recent statistics) and trains (between seven and eight per cent). The modal split describes these modes of transport as 'transport kilometres travelled by all inland passengers'. In the debate about sustainable development, this is an important measure to monitor the environmental and social impacts of the specific modes of transport.

Cars are generating the most emissions and pollution per passenger kilometre and also have significantly higher accident rates. Mass transit and public transport, including buses and coaches as well as trains, are therefore regarded as the more sustainable alternatives and have regained importance in urban and regional planning.

Buses rely on the same transport infrastructure as cars, while trains require railway tracks in order to maintain or improve the existing transport capabilities. Recent trends showing a slow but steady revival of passenger transport by train in Europe therefore have to be seen in the context of its existing transport infrastructure. New railway infrastructure is costly and requires time-consuming planning procedures.

A look at the railway infrastructure in Europe (beyond the EU) shows that across the continent there are approximately 250,000km of tracks, just slightly lower than the length of tracks in the USA, where train travel plays a subordinate role in passenger transport but serves mostly freight transport.

This month's cartogram shows the share of railway infrastructure in Europe in the form of a so-called 'rectangular cartogram'. Early forms of this perhaps most classic form of cartogram can be found in the 19th century and have been regular features in school atlases for decades.



Their construction is a lot less complex than other cartogram types, although complexities remain with the geographical arrangement of the rectangles, and how each entity is connected to the others. With only four sides, geographic accuracy is hard to preserve. In this map, each country is represented by a rectangle whose area represents the total amount of railway tracks it has. In addition, all countries that have more than 1,000km of track length are labelled, and the countries are shaded by the relative importance of railway travel in the passenger modal split of that country.

The cartogram shows the important role of train transport in parts of Central and Eastern Europe. Here the network is considerably stronger than the motorway network, a legacy of a strong focus on non-individual means of transport until the 1990s, although they are partly in need of major re-investments. The smaller train networks in Switzerland, Austria, and Denmark stand out. The modal split of train travel in these (equally relatively small) countries is significantly above the European average. The relative importance of the train is much lower in the Baltic states as well as across the Balkan countries. Southern European countries also show a relatively poor network compared to their area.

The future of train transport in Europe remains challenging. While there is an overall revival of railway travel, the differences in the quality and structure of the networks vary. This matters even more in inter-continental travel routes between countries in pan-continental transport corridors. A fully functioning trans-European rail network will be key to a more sustainable transport system across the continent.

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TSUNAMIS

MAKING WAVES

An innovative new theory hopes to save millions of lives from the threat of tsunamis

An impending tsunami, an enormous surge powering its way across the ocean, is a fearsome prospect. Altogether, almost half a million people have been killed by tsunamis in the past two decades, including ones created by the 2011 'Great Tōhoku Earthquake' off the coast of Japan in which more than 15,000 people lost their lives, and the 2004 Boxing Day Indian Ocean earthquake, which killed 230,000 people.

Embracing the science of 'acoustic-gravity waves' (AGWs) - very long sound waves, which are naturally created by trigger events such as earthquakes - Usama Kadri, from the Cardiff University School of Mathematics, has studied how using underwater hydrophones to detect and read these AGWs could help give vital warnings of, and potentially even prevent, approaching tsunamis. 'You can use acoustic-gravity waves to say that there is an upcoming tsunami,' explains Kadri. 'With the help of acoustic-gravity wave theory, you can now say where it started, the affected radius from the source, and the speed.'

Kadri's research suggests that, since AGWs can travel up to ten times faster than a tsunami itself, warnings urging people to head to higher ground could, in future, be generated much sooner. Additionally, with the right transmission technology, it might even one day be possible to fire AGWs back at the approaching tsunami in a way that would reduce its destructive potential. 'This study has provided proof-of-concept that devastating tsunamis could be mitigated by using acoustic-gravity waves to redistribute the huge amounts of energy stored within them,' says Kadri, 'potentially saving lives, as well as preventing billions of pounds worth of damage.'

However, he stresses that, unlike using hydrophones for detection, the technology to transmit AGWs remains a major obstacle, not least because of the vast complexities created by applying this theory to the real world, but also because of the immense energy which would be required (the 2004 earthquake and subsequent tsunami generated more than 1,500 times the energy released by the Hiroshima atomic bomb).