

All trains are green? It's not that simple

The fast roll-out of electric vehicles in the United Kingdom means the £100B (\$139B) highspeed railway network HS2 won't have any environmental benefits, a report by think thank Institute for Government has found.

Due to the planned phase-out of petrol and diesel cars by 2030, the carbon emissions from building and operating the network will be higher than the emissions savings from shifting road and air transport to rail, according to the analysis. (*The Independent*)

Why does this matter?

When Japan introduced the world's first high-speed trains in 1964, they were a symbol of prosperity, modernisation and technological progress. Now, high-speed trains are also hailed as a solution to decarbonising long-distance travel, yet the benefits for the environment are less clear than they seem.

Many countries have expanded their high-speed rail (HSR) networks in recent years, with *China leading the way*. In 2000, the country did not have a single high-speed line, now there is a network of 38,000 km connecting all major cities. In comparison, HSR only covers 9,100 km in the EU, and the US has one single line from Boston to Washington, DC.

High Speed 2

Meanwhile, the UK is building a £106B network called High Speed 2 (HS2) to connect London, Birmingham, Manchester, and Leeds. Supporters say HS2 will provide *£92B in economic benefits*, create thousands of jobs and reduce carbon emissions. On the other hand, environmental groups warn the project will negatively affect more than 130 protected wildlife sites, including more than 50 ancient woodlands, and won't lead to significant climate benefits.

Are high-speed trains bad for the environment?

Constructing a high-speed network comes with a lot of embedded emissions. For example, it requires large amounts of steel and concrete, not least because these lines often necessitate new bridges, viaducts and tunnels.

In a study from 2012, *Swedish researchers calculated* a 500 km long high-speed rail line with 50 km of tunnels needs 10 million one-way trips annually to offset construction emissions, and a large share of that would have to substitute plane trips. Moreover, fast trains require a lot of energy, which has to come from renewable sources to be climate-friendly.

Nevertheless, HSR can still be a good thing for the environment if it manages to save emissions elsewhere. The Eurostar, for instance, has been very successful in doing so, achieving a 55% reduction in air kilometres travelled between Brussels and London. Other projects are less effective, merely creating additional rail demand while keeping air passenger numbers constant, as the example of a new fast connection between Berlin and Munich shows.

Supporting the modal shift

So, how can we make sure more people travel by train? In France, the government has recently attempted to solve this problem by *banning domestic short-distance flights* which can be travelled in 2.5 hours or less by train. Other strategies include making rail travel cheaper compared to flying by cutting subsidies for airlines or introducing a plane ticket levy. At the same time, it's important to remember that decarbonising the transport sector requires more than just optimising travel between big cities. To effectively reduce emissions we also need *more rail freight* and better local train connections.

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