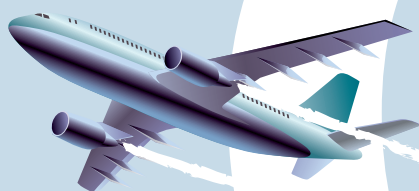


HIGH-SPEED RAIL *The carbon impacts of High Speed 2*

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SYSTRA



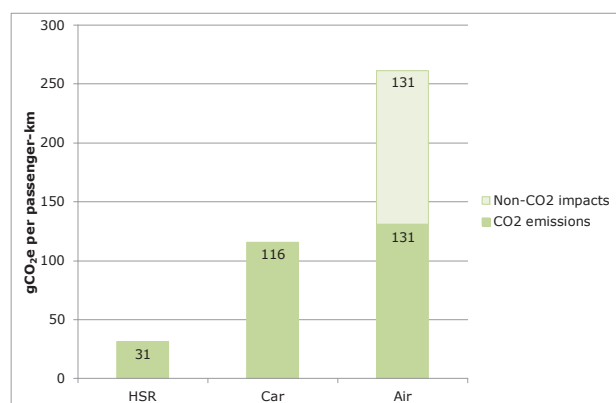
2012

The carbon impacts of High Speed 2

Government's plans for high-speed rail can help meet carbon emissions targets. Research by Greengauge 21 shows that building the first phase of HS2 on its own delivers a carbon saving of 0.6 million tonnes of CO₂ over sixty years. These savings could be quadrupled if Government puts in place a wider package of policies to capture the full carbon benefit of HS2. And the second phase of HS2 will quadruple the carbon savings again.

High-speed rail compared to other modes of transport

If HS2 was available for use today, the carbon emissions arising from making a trip by high-speed rail (HSR) would be **73% lower than making the equivalent journey by car and 76% lower than flying**.



Over time, the carbon efficiency of all modes of transport will change, but HSR will benefit from much reduced carbon emissions as electrical power generation is decarbonised.

The effects of speed

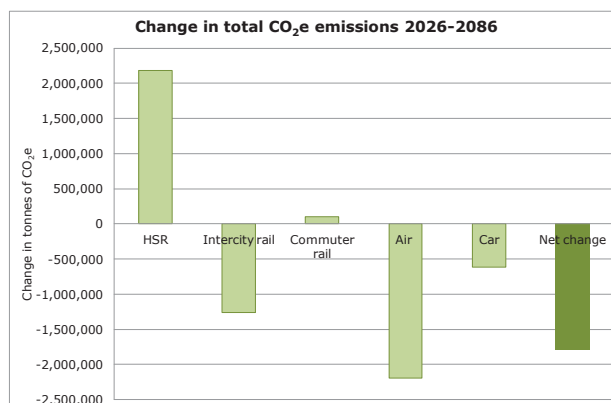
The carbon effects of operating trains at high speed are much less than commonly thought. Simulations carried out by Imperial College show that a London-Birmingham journey on HS2 would consume **only 23% more energy** with a maximum speed of 360km/h compared with a 300km/h maximum.

High-speed rail has **similar carbon emissions per passenger-km to conventional intercity rail**. This is because the effects of operation at higher speed are outweighed by the benefits of carrying greater numbers of passengers at a steadier speed. High-speed trains have over 1,000 seats per train and are typically 70%-80% full. Such long trains or high loadings are not possible on today's railway network.

The impact of HS2 on carbon emissions

Operation of the first phase of HS2, the new line between London and Birmingham, is estimated to reduce emissions by **1.8 million tonnes CO₂e** over 60 years because of the expected reductions in car and air travel. This comfortably offsets the 1.2 million tonnes of

embedded carbon that will result from construction of the line.



There is huge scope to influence the carbon outcome of HS2. Under an environmentally-responsible set of policies, the operational carbon savings could increase to **3.5 million tonnes CO₂e**.

How to maximise HS2's carbon savings

HS2 can be designed to minimise carbon emissions, by:

- Constructing **city centre stations** rather than parkway stations;
- **Reducing the top speed** of HS2 where necessary, such as in early years if the electricity supply is being decarbonised more slowly than planned;
- Making full use of capacity freed up on the existing network, in particular for **more freight trains**.

In addition, wider policies can also enhance the carbon reductions from HS2, such as:

- Ensuring the **electricity supply** is substantially decarbonised;
- Regulating and managing the **air and road networks** to get the best value from the mode shift to high-speed rail;
- Sustainable **transport and spatial planning** policies.

The saving in carbon emissions from HS2 operation will increase to more than **7 million tonnes CO₂e** when the second phase of HS2 opens.