

High speed trains â€“ anything but carbon neutral

In terms of direct energy consumption electric trains are an efficient mode of transportation. However, trains are dependent on heavy infrastructure, which is extremely energy consuming to build and requires major alterations to the landscape.

According to a report produced by Econ at the request of The Norwegian Ministry of Transport, high speed railway lines must have gentle curves and a maximum climb rate of 3 percent, which, given the Norwegian topography, would require substantial interventions in terms of deep cuttings, filling, tunnels and other forms of excavation in valleys.

Across mountain plains such as Hardangervidda, a high speed rail line must either be suspended or built into the terrain to protect against drifting snow. Adding to which, the entire line must be fenced in order to protect the trains from wildlife and vice versa. Given that a high speed rail line between Oslo and Bergen will cross vast areas that are designated nature reserves, development of high speed rail is at best a worrying alternative from a conservation point of view.

From a socio-economic point of view, the estimated construction cost of MNOK 79,000 – MNOK 142,000 would cover the acquisition of 176- 316 brand new Boeing 737-800s - at list price. A mere 4-5 aircraft of this type is sufficient to cover the entire passenger volume on the route using existing infrastructure.

From an emissions point of view, the “business case” becomes even more vulnerable. The construction of a high speed rail link between Oslo and Bergen is conservatively estimated to produce approximately 1.6 million tons of carbon equivalents according to the above-mentioned report. By comparison, Norwegian, which has a 50 percent market share on the route, produced 0.038 million tons of carbon dioxide on the 3,400 round trips between Oslo and Bergen in 2010.

Assuming total aviation emissions are twice that figure, it would take a staggering 42 years just to offset the initial construction if as many as 50 percent of today’s airline passengers switched to the train. And that is provided train operations produce zero direct emissions, zero lifecycle emissions and zero emissions from maintenance of infrastructure and trains.

With a substantially shorter rail line of 370 kilometers, higher load factors than today’s trains and considerable more energy efficient trains (equivalent to German ICE), the marginal direct carbon emission per train passenger would be about 16 kilos between Oslo and Bergen. It would then take 63 years before the net carbon effect would start to be positive – given zero efficiency increases in aviation during the coming 63 years. In 1948, 63 years ago, the first passenger flight with a jet aircraft had yet occurred. Compared to the first jet aircraft which flew a few years after, the most efficient jets today are 80 percent more energy efficient.