The Future of Rail

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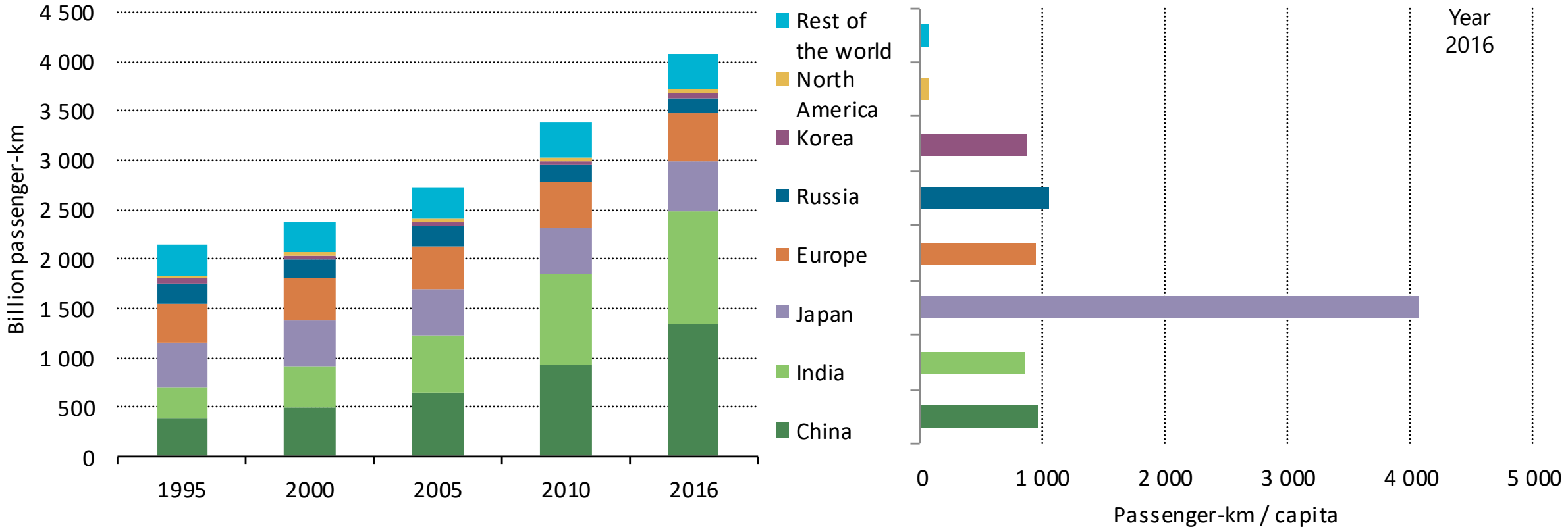
19 March 2019, Paris

The Future of Rail – Opportunities for energy and the environment

The Future of Rail examines how the role of rail in global transport might be elevated as a means to reduce the energy use and environmental impacts associated with transport

Rail is one of the pillars of passenger mobility



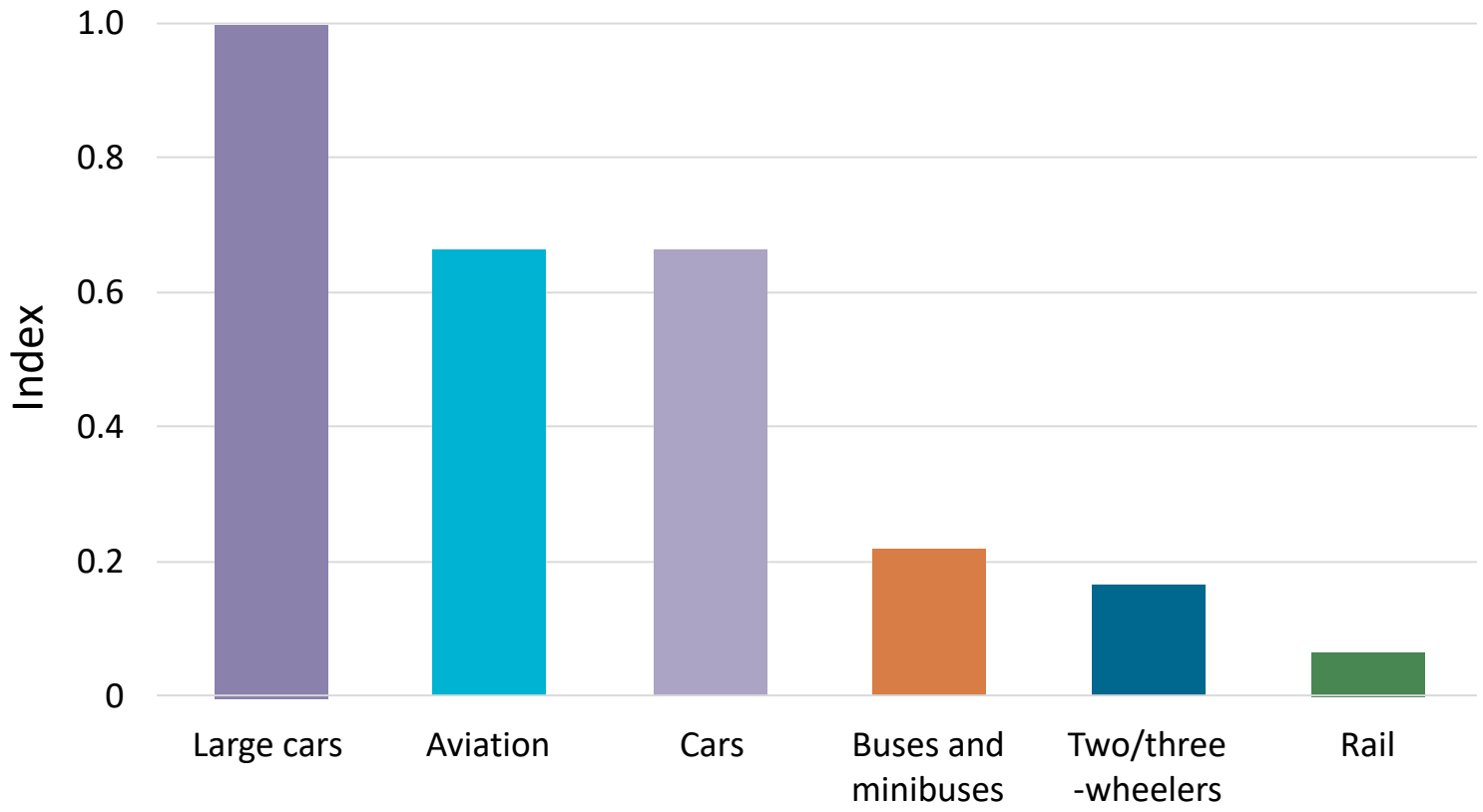
Globally, rail constituted 8% of passenger transport

Japan, by far, has the highest rail activity per capita

Other major rail regions globally include China, India, Europe, Russia and Korea

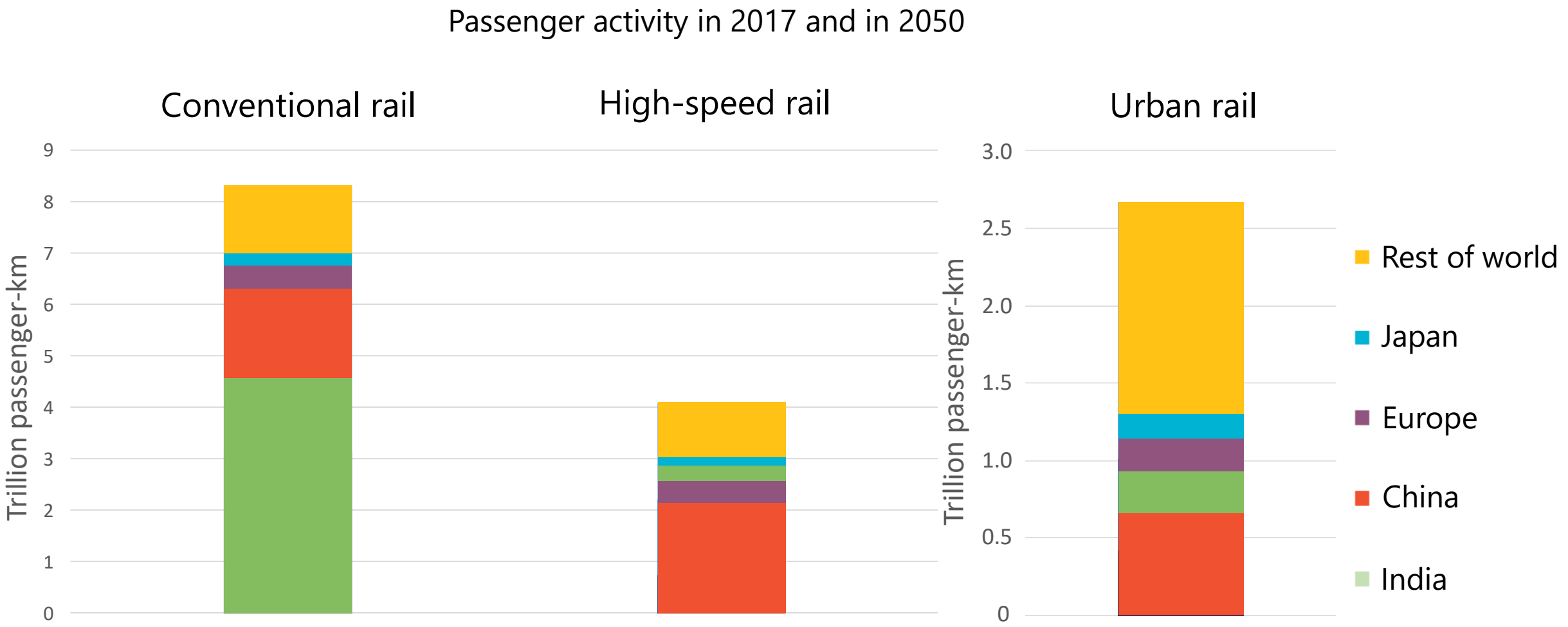
Rail is the most efficient mode of passenger transport

Relative global average energy intensity of motorised passenger transport modes, 2017



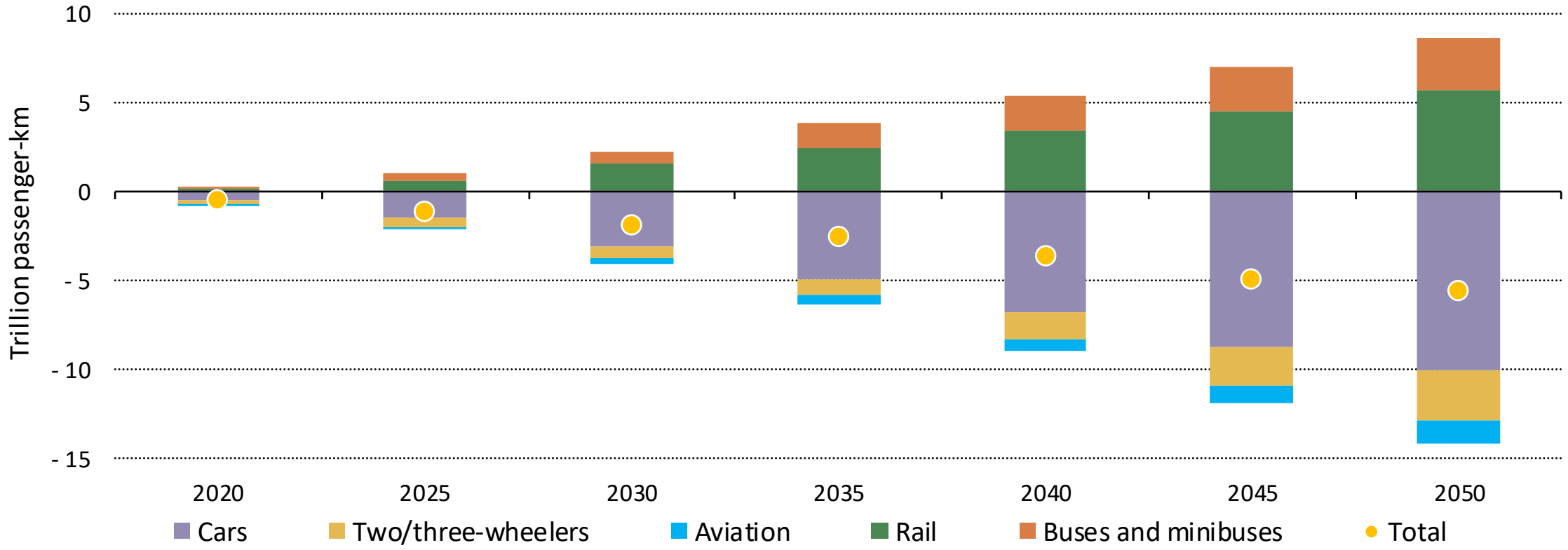
Rail is the most electrified transport mode: 60% of passenger and nearly half of freight movements use electricity. Freight rail is more efficient than any other transport mode except for ships.

Rail is growing inside and outside of cities



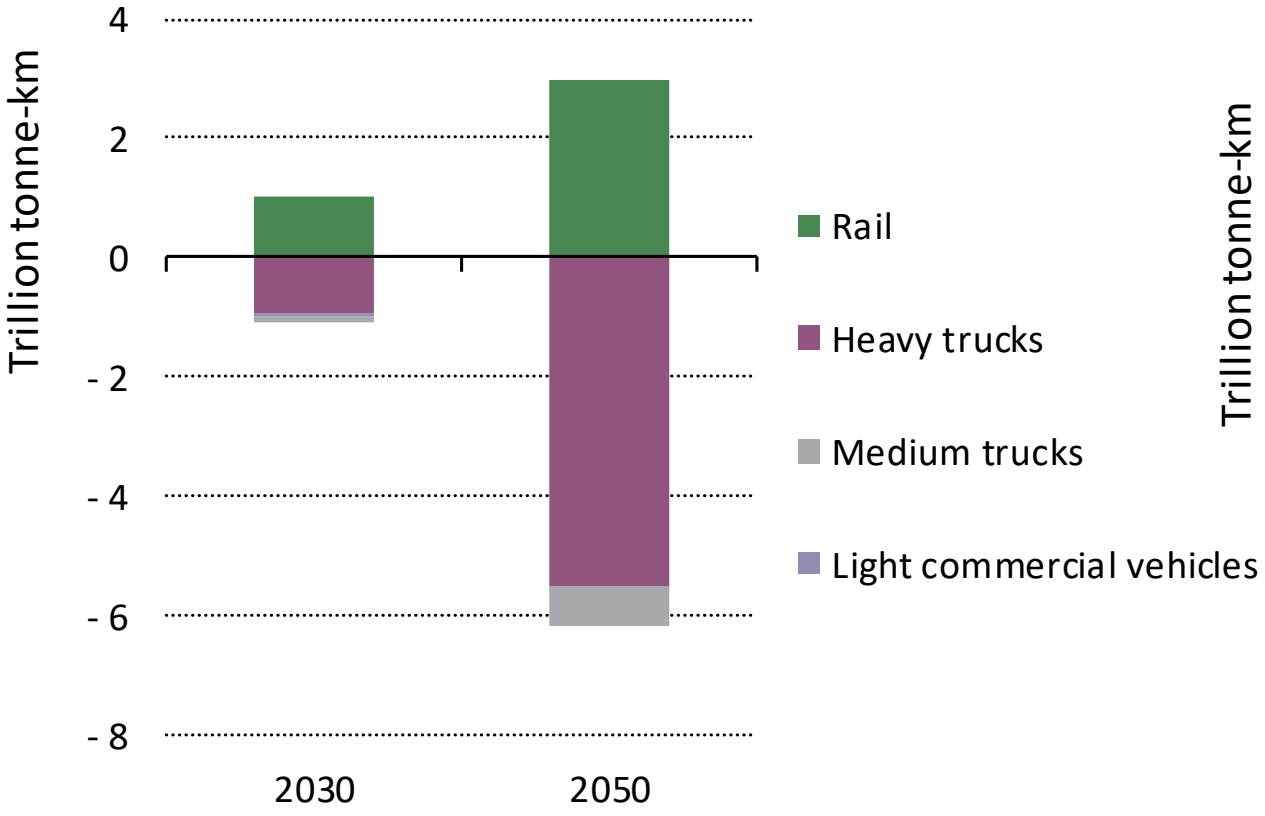
Rail has great growth potential, but requires continued investment.
Freight rail activity doubles in the Base Scenario, and grows even more in the High Rail Scenario.

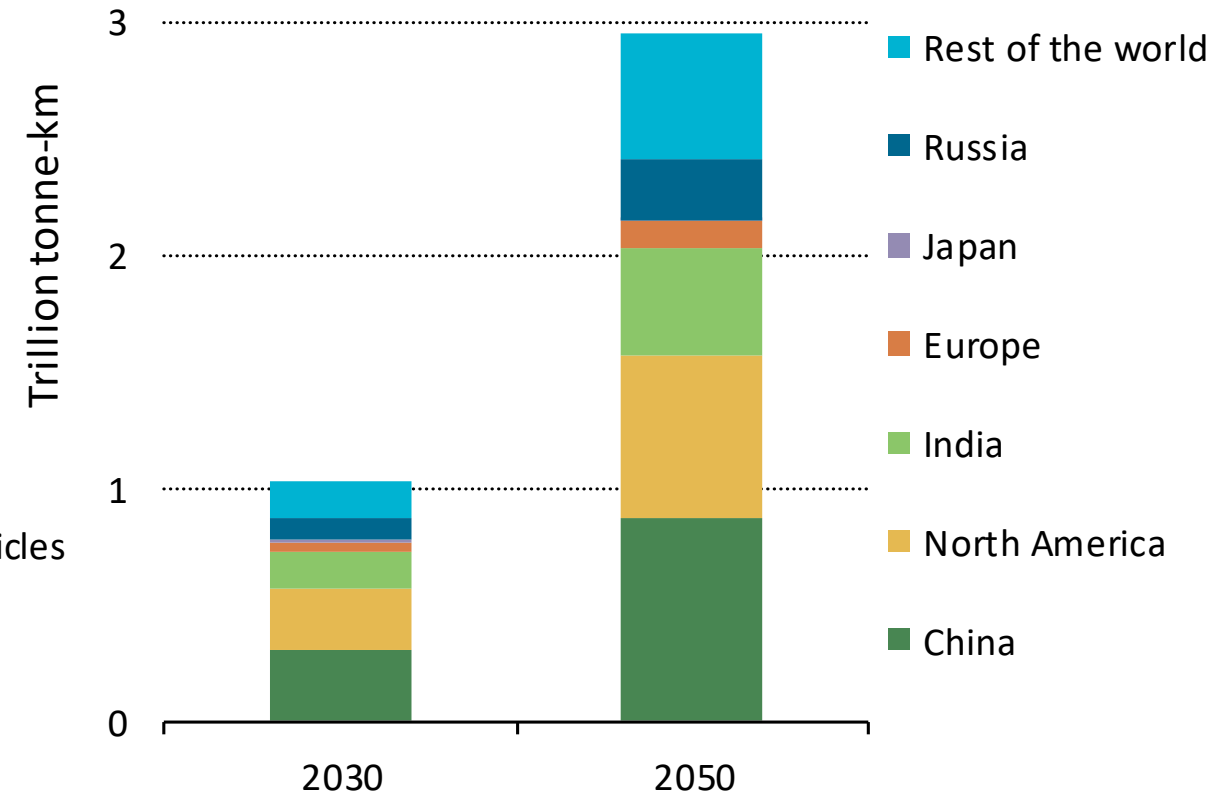
From Base Scenario to High Rail scenario: Change in passenger activity



The High Rail Scenario results in a shift from transport in cars, two/three-wheelers and planes to public transport relative to the Base Scenario, combined with a reduction in total passenger activity

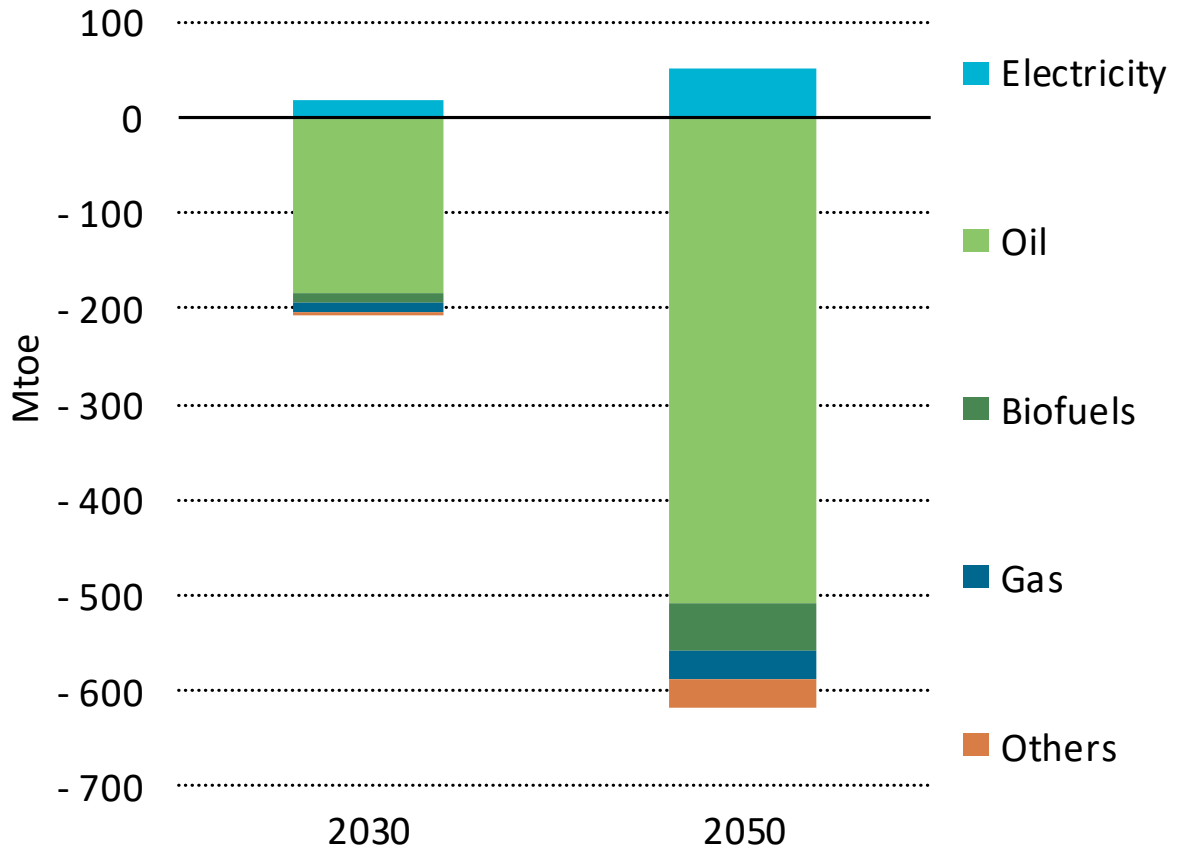
From Base Scenario to High Rail scenario: : Changes in inland freight transport





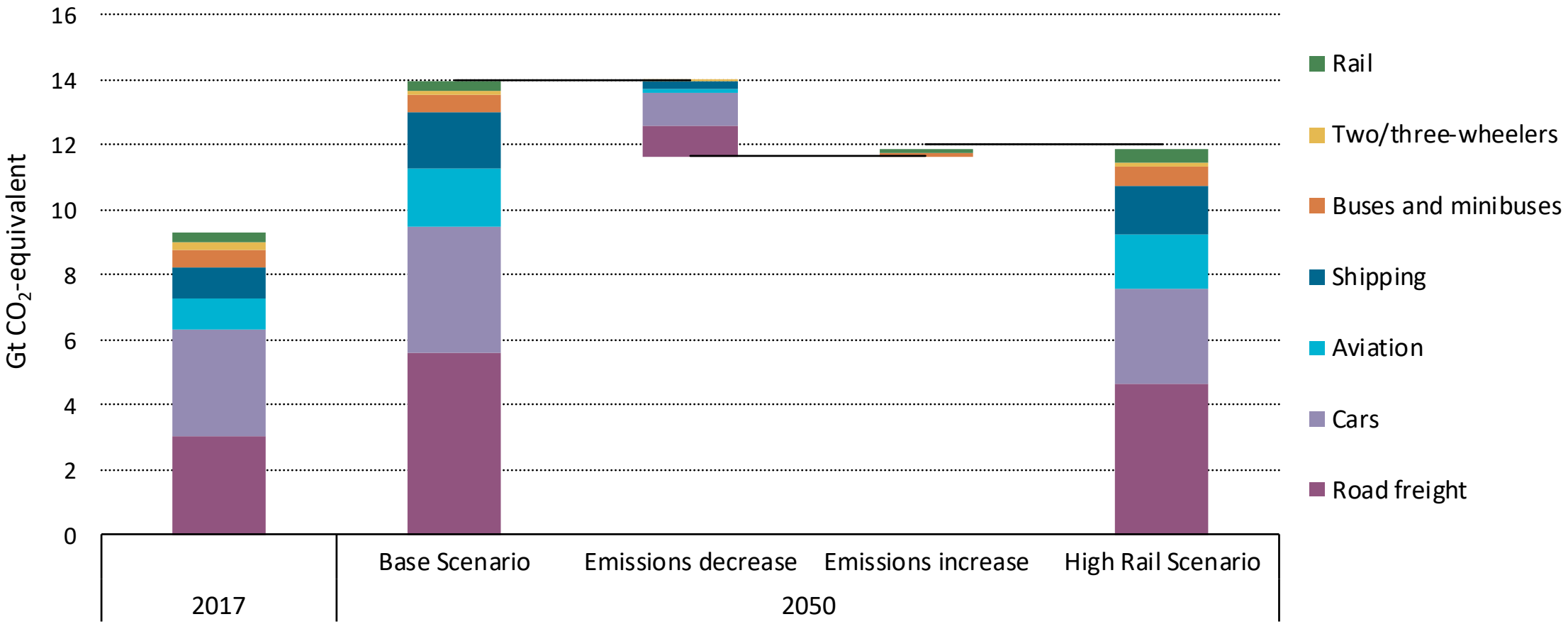
In the High Rail Scenario, increases in freight rail activity occur mainly at the expense of heavy trucks
The largest freight activity gains are in China, North America, Russia and India

From Base Scenario to High Rail scenario: Change in energy demand



The High Rail Scenario sees a reduction in oil demand for transport of 10 mb/d in 2050, compared with the Base Scenario

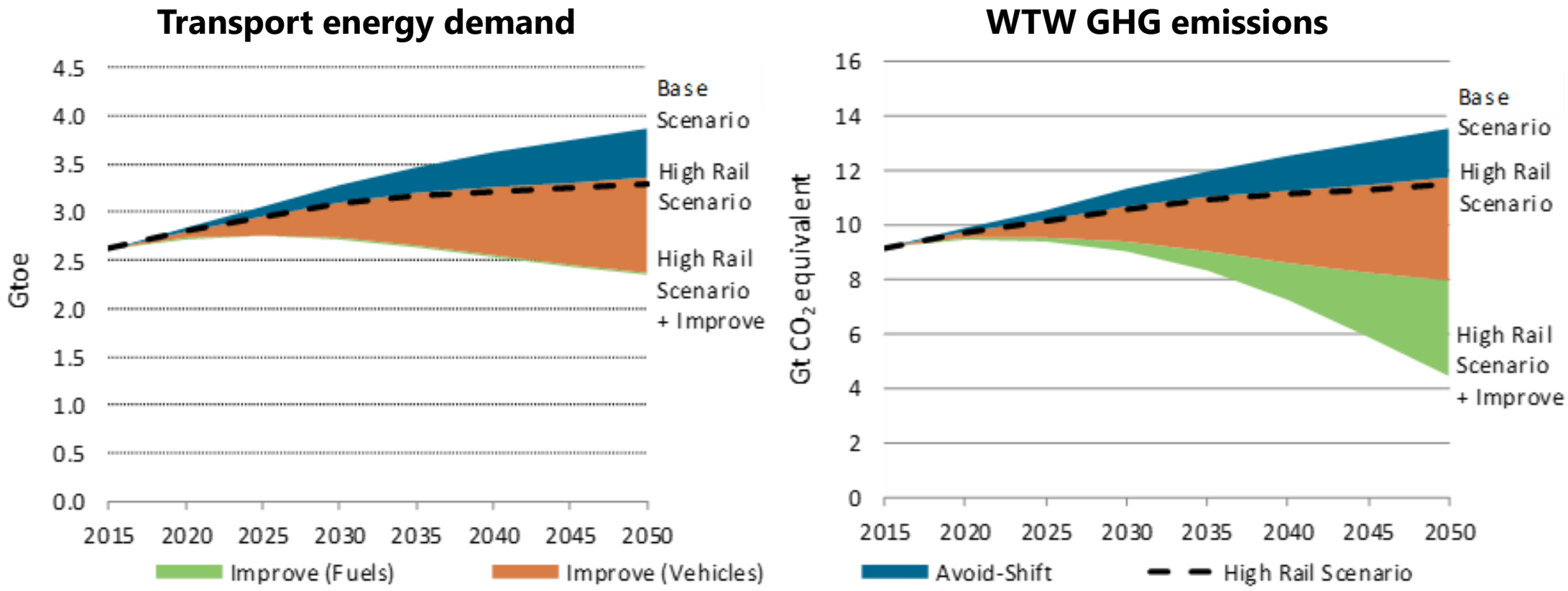
From Base Scenario to High Rail scenario: Well-to-wheel GHG emissions



In the High Rail Scenario, modal shift cuts by half the emission increase (2017-50) of the Base Scenario

Emission increases due to shifting passenger and freight activity to rail are more than an order of magnitude lower than those displaced from other modes

Contribution of the High Rail Scenario to the Paris Agreement



Reducing oil demand and GHG emissions from the transport sector in line with the Paris Agreement targets requires a combination of the modal shift of the High Rail Scenario with additional measures on vehicle efficiency/electrification, low-carbon fuels, and power sector decarbonisation

Conclusions

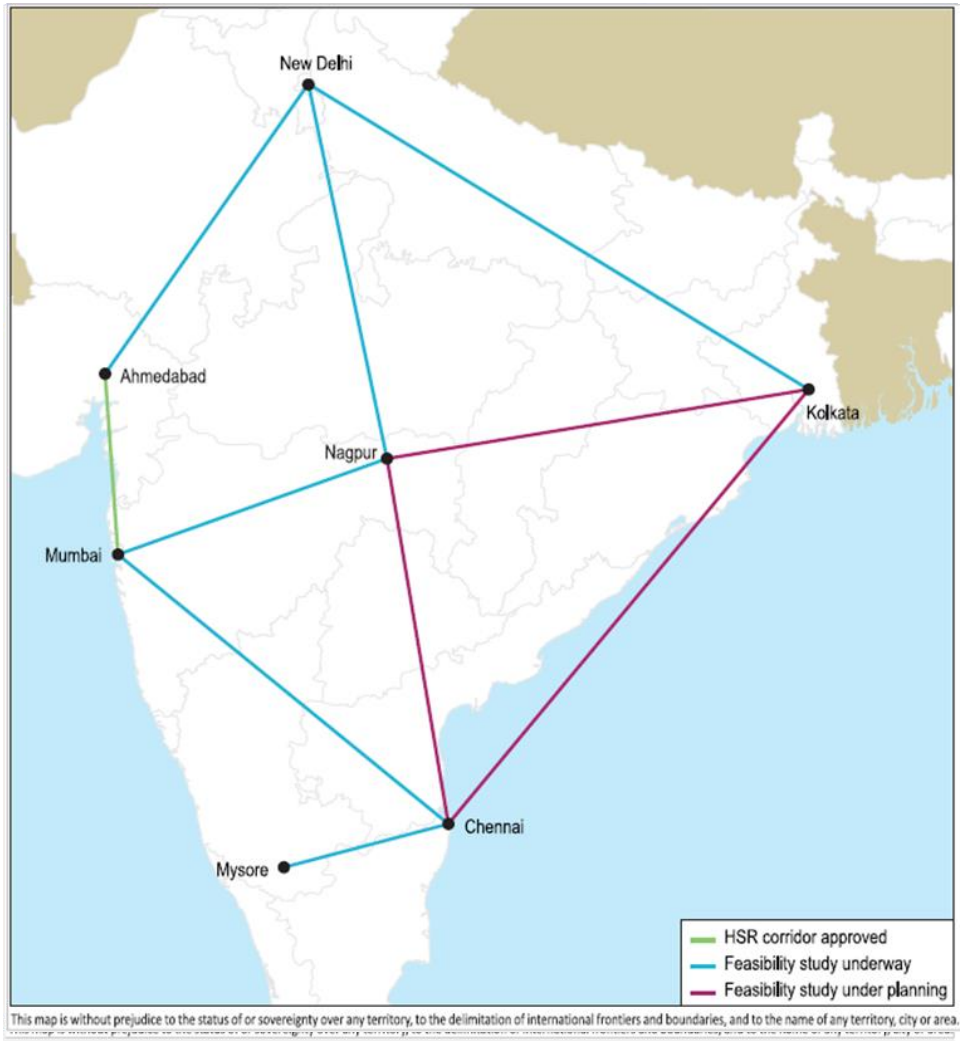
- The future of rail will be determined by how it responds to both rising transport demand and rising pressure from competing transport modes
- Strategic investment in rail can lead global CO_2 emissions in transport to peak in the late 2030s, reduce air pollutant emissions and save oil
- Two categories – urban and high-speed rail – hold the major promise to unlock substantial benefits both in India and throughout the world
- Rail remains most energy efficient transport mode, integrated policies for all modes needed to reach climate objectives

Supplementary slides

Context

- Mixed signals about the pace & direction of change in global energy:
  - For the first time, the global population without access to electricity fell below 1 billion
  - Our assessment points to energy-related CO2 emissions reaching a historic high in 2018
- The transport sector is a key source of global oil demand and emissions
- Rail is a long-standing pillar of passenger and freight transport, but its role for energy and the environment is underappreciated
- Can rail respond to both rising transport demand and pressure from competing transport modes, so as to further enhance its energy and environmental benefits?

India's railway sector: status today and future plans



Conventional rail network

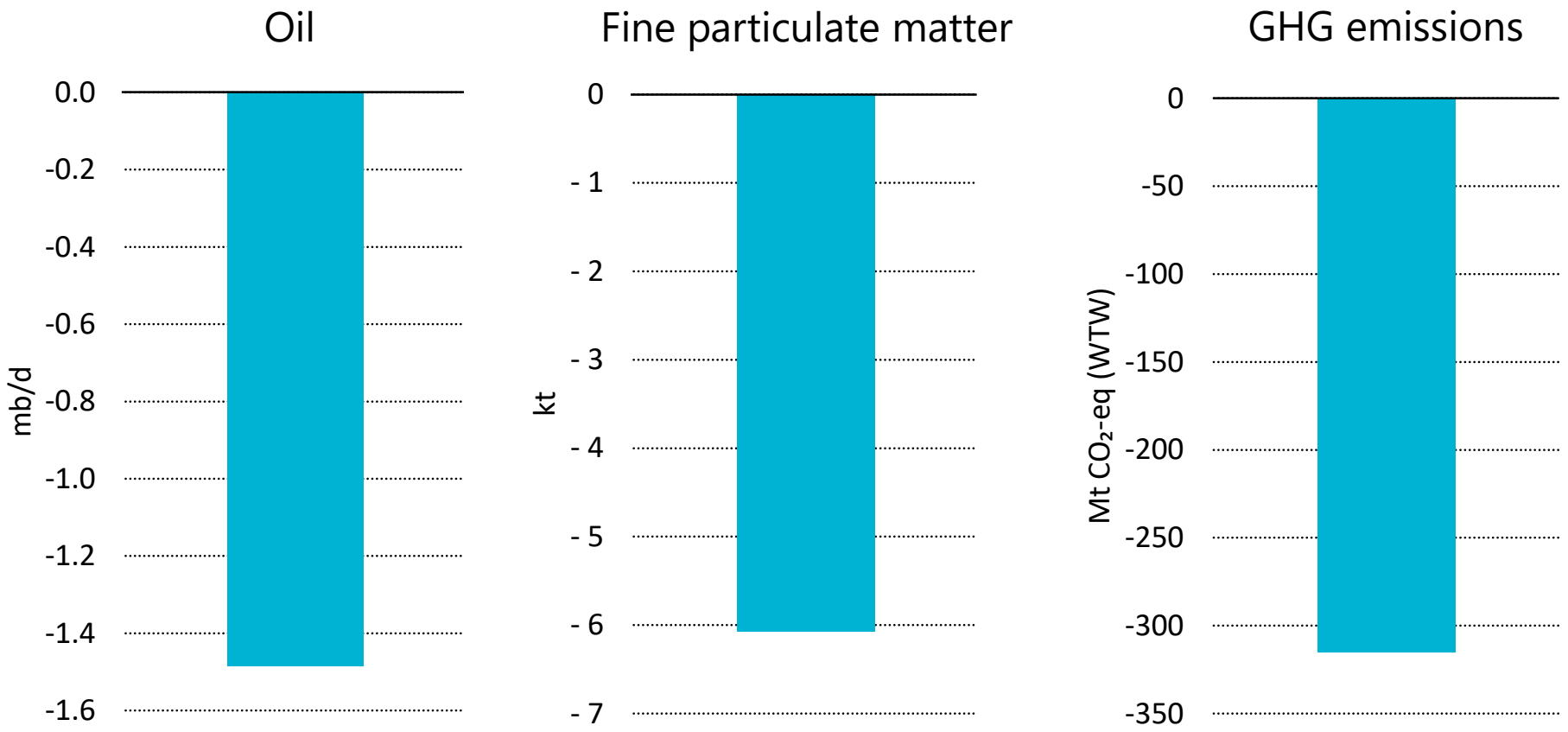
Metro systems: existing and under construction

High-speed rail corridors being built and under consideration

The railway network in India is widespread and connects the entire country; metro systems are expanding rapidly, and one high-speed rail corridor and two dedicated freight corridors are under construction.

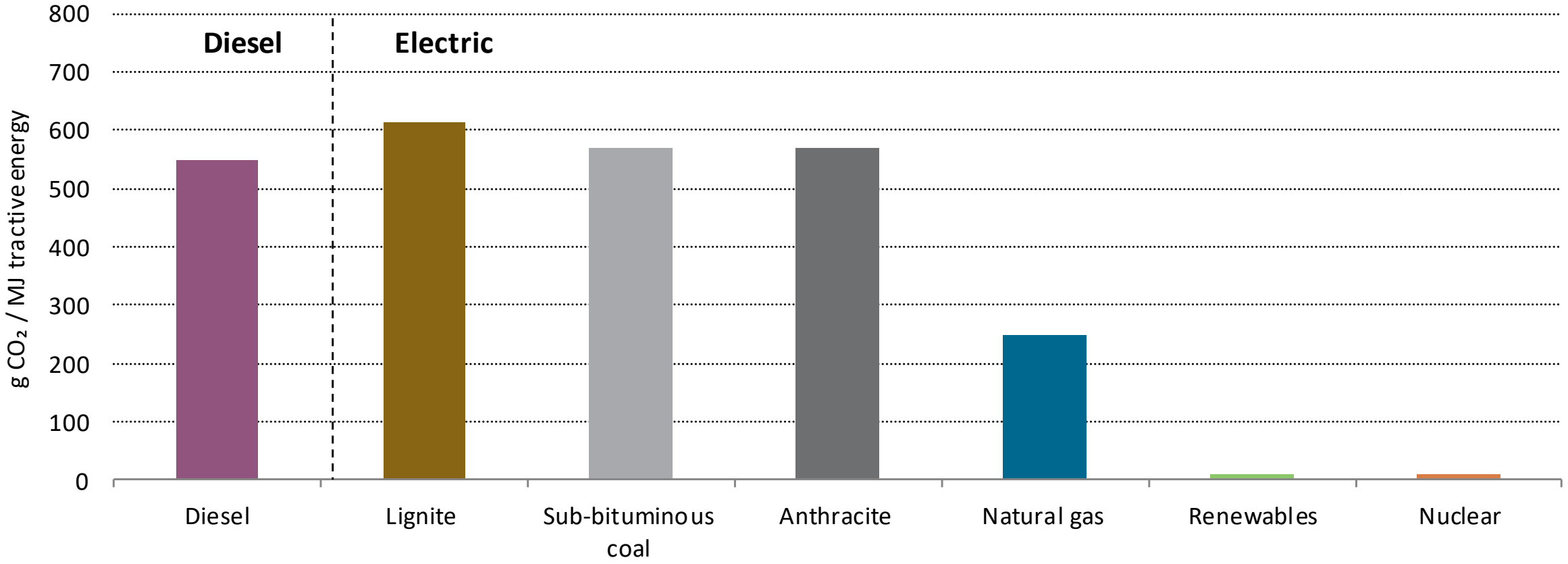
Energy and emissions benefits of rail in India in the High Rail Scenario

Savings in the High Rail Scenario, relative to the Base Scenario, 2050



The energy and environmental benefits of rail in India in the High Rail Scenario are greater than in most other countries.

Well-to-wheel carbon intensities for trains



Electric trains are significantly less carbon intensive than diesel trains, provided that they draw power from primary energy sources with low-carbon content

Projections

The future of rail will be determined by how it responds to both rising transport demand and rising pressure from competing transport modes

The report considers **two scenarios**

- The **Base Scenario** assumes no significant new emphasis on rail in policy making In this context:
  - Rail does no more than maintain its current share in global passenger activity relative to cars and air travel by 2050
  - The global freight activity share falls from 7% in 2017 to 5% in 2050, growing less than shipping and road freight transport
- The **High Rail Scenario** accounts for a greater reliance on rail for urban passenger movements and non-urban mobility, leading to CO_2 emissions in global transport to peak in the late 2030s and, by 2050, to an oil use that is more than 10 mb/d lower than in the Base Scenario

The High Rail Scenario

The High Rail Scenario explores the extent to which rail can replace less efficient transport modes including cars, two/three-wheelers, aviation and trucks, and delivers significant benefits:

- By 2050, transport-related well-to-wheel GHG emissions are 2.1 Gt CO2-eq (or 16%) lower than in the Base Scenario, and rail makes it possible to avoid an additional 220 kt (35%) of PM2.5 emissions
- Direct energy-related CO_2 emissions from transport peak before 2040 in this outlook and then decline to 2015 levels by 2050

The High Rail Scenario alone does not achieve the targets of the Paris Agreement, but it shows that rail is an essential component of a more comprehensive energy and transport strategy.

The feasibility of this scenario rests on three pillars:

- Minimising costs per passenger-kilometre or tonne-kilometre moved by ensuring maximum rail network usage
- Maximising revenues from rail systems, such as through “land value capture”, i.e. capitalising on the “aggregation” capacity of railway stations
- Implementing policies that ensure that all forms of transport pay adequately for the impacts they generate. Traditionally this has been accomplished through fuel taxes, but road pricing, and especially congestion charging, may be effective going forward