



# Global Transport 2050: Shifting patterns

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Over the next four decades, the global transportation sector will face several unprecedented challenges. World population is expected to increase by about 2.3 billion reaching 9.2 billion, with more than 70 per cent living in cities compared to 50 per cent today. In addition, the number of megacities is expected to increase from the present level of 22 to between 60 and 100. Many of these megacities, emerging mostly in Asia, Africa, and Latin America will face high levels of traffic congestion, local pollution, and noise. Furthermore, such an effect will be amplified by the 2 to 3 billion cars and trucks that could be in circulation.

Over the same period, travel and road freight will at least double due to the fact that demand for mobility goes hand in hand with economic development and improvements in standard of living. Driven by increases in all travel modes, some experts expect the energy consumption of the transport sector to increase between 80 per cent and 130 per cent above today's levels. The demand will come mostly from regions that are undergoing strong economic and population growth (China, India, Latin America, Africa, and the Middle East).

Challenges relating to demographics, urbanisation, and growth in fuel demand, will all be compounded by uncertainties emerging from the unpredicted degree of government intervention and regulations, regional and global cooperation, unstable global economic situations, and potential technology breakthroughs.

Capitalising on previous studies conducted in 1995 and 1998, the World Energy Council (WEC) has decided to re-examine the future of the relationship between energy and transport by building transport scenarios to 2050. This effort is undertaken in parallel with, and under the umbrella of, the Energy Scenarios exercise, but focuses solely on the mobility and transport sector. The aim of this project is to construct and describe global transport scenarios that will reflect potential developments in transport fuels, technologies, systems, and environmental policies over the course of the next forty years.

To achieve this goal, WEC assembled a team of 54 industry experts from 29 countries. The first objective of the team was to identify and evaluate existing and potential fuel and transport technologies, qualitatively and quantitatively. The qualitative assessment sought to address current and potential developments in global transport systems, as well as current and potential energy

policies that could be adopted at national and regional levels. The network used information from completed and on-going WEC studies and also from proprietary and publicly available sources. The team also used case studies, and quantified examples of available and emerging technologies and enabling policies to form the foundation for the study.

The information gathered by the team was compiled into a background document, which formed the input on technologies, fuels, and systems. In parallel, regional inputs on mobility and transport policies, and local issues and drivers were gathered during a series of regional workshops held in Johannesburg, Bangkok, London, Thessaloniki, Washington DC, and Rio de Janeiro. A series of mobility questions were prepared for each workshop and discussed at length with local experts and WEC Member Committees. The insights from these workshops were instrumental in forming the assumptions for the development of mobility scenarios from a bottom-up perspective.

The information from the background documents on technologies and fuel systems, along with all regional assumptions were then combined into a working draft for two mobility scenarios, which were constructed by the members of the network during a scenario building workshop in London. The "Full Throttle" scenario envisages a world with solutions where pure market forces prevail to create a climate for open global competition. Higher levels of privatisation, deregulation, and liberalisation have stimulated the role of the private sector, and entrepreneurs and global companies emerge as central players. The second scenario, "The Cruise", can be best described as a regulated world where governments, politicians, investors, and consumers decide to put common interests at the forefront and intervene in markets. In such an environment, the global economy which is more fragmented and differentiated suffers more trade restrictions. However, the world as a whole has witnessed increasing international cooperation on climate change issues in the short to medium term.

The fully described scenario stories along with the complete regional inputs were then translated into numeric assumptions which were fed into the mobility model provided by the Paul Scherrer Institute (PSI) in Switzerland. Evidently, the two scenarios describe two extreme global transport worlds in 2050. We envision

that the actual world will be somewhere in between.

Preliminary modelling results reveal that between 2010 and 2050, the total fuel demand in all transport modes will increase between 30 per cent to 82 per cent over 2010 levels. This growth is mainly driven by mass/cargo transport and aviation, i.e. trucks, buses, trains, ships and airplanes. Demand in this sector is expected to grow by about 64 per cent to 200 per cent. The fuel demand for light duty vehicles (LDVs), which currently constitutes about 52 per cent of the transport market, will range between an increase of 51 per cent in the Full Throttle scenario and a drop of 13 per cent in the Cruise scenario.

The transport sector as a whole will still heavily depend on gasoline, diesel, and jet fuel, as they will all still constitute the bulk of transport market fuels (80-90 per cent). In fact, the demand for these three fuels will increase by 10 per cent to 68 per cent over the scenario period. The main growth will be in diesel and jet fuel, where diesel will grow by 46 per cent to 200 per cent, while jet fuel will grow by 200 per cent to 300 per cent. In contrast, the demand for gasoline is expected to drop by 16 per cent to 63 per cent. Biofuels demand will increase 4 fold while alternative fuels (electricity, hydrogen, CNG, and methanol) will increase by 6 to 7 fold.

Fuel demand for personal cars (LDVs) will still heavily depend on gasoline and diesel which will satisfy 52 per cent to 80 per cent of the demand. In fact, growth will entirely be from diesel, as gasoline demand drops by 16 per cent to 63 per cent, while the demand for diesel increases by 200 per cent to 900 per cent. Biofuels in cars will grow 5 fold while the other fuels which will grow by 12 to 26 fold. Similarly, the mass/cargo transport and aviation market will still be heavily dependent on diesel and jet fuels which will satisfy 93 per cent of the transport fuel demand. In fact, the demand for diesel will increase by 42 per cent to 65 per cent, while the demand for jet fuel will increase by 225 per cent to 380 per cent. The remaining demand will be satisfied by biofuels which are expected to increase by up to 540 per cent and alternative fuels which will increase by 330 per cent to 480 per cent.

Over the scenario period, the bulk of the new transport fuel demand will come from non-OECD countries, which will increase their consumption by 200 per cent to 300 per cent. In contrast, the transport fuel demand for OECD countries will drop by up to 20 per cent. Hence, non-OECD countries will be 60 per cent to 70 per cent of

the transport demand in the future, while OECD countries will account for 30-40 per cent. In fact, the demand of the non-OECD countries surpasses that of the OECD countries by the year in 2025, if not earlier.

The total number of cars globally, will increase by 2.2 to 2.6 times, reaching between 1.7 billion to 2 billion cars. Most of this increase will come from non-OECD countries in which numbers will increase by 430 per cent to 557 per cent, while OECD countries will increase by 36 per cent to 41 per cent only. By the end of the scenario period, non-OECD countries are expected to have about 55 per cent to 61 per cent of the global fleet. The global car fleet will still depend on conventional gasoline and diesel ICEVs. Growth will be centred around mainly diesel ICEVs which are expected to grow by 61 per cent to 1000 per cent, while gasoline ICEVs drop by 54 per cent in the Cruise scenarios or increase by 23 per cent in the Full Throttle scenario. Other drivetrain technologies will capture the remaining market share.

With these higher levels of transport demands, the total emission from the transport sector is expected to increase by 16 per cent to 79 per cent, with emission from cars accounting for 20 per cent to 32 per cent of the total.

With this complete picture of the transport sector in 2050, and in light of the recognised major drivers, we are confident that the global transport sector can and will overcome the many challenges which lie ahead. The biggest of these challenges will be to provide a sustainable transport world for more than 6 billion people at the lowest social cost, where congestion, pollution, and noise generated by additional traffic and freight volumes are minimal.

Indeed, the dynamics and magnitude of these developments offers the opportunity to adjust the manner in which consumers, entrepreneurs, governments, and private businesses view their future plans and expectations. We have no doubt that the birth of the producer-consumer dialogue, breakthroughs in conventional and unconventional energy resource extraction, expansion in the use of renewable energies, technological improvements in efficiency, mileage, zero-emission fossil fuels, and policies specifically tailored to suit regional needs, will together ensure a sustainable future for transport, and will raise optimism about a better quality of life for current and future generations. 