



15 March 2024

Future Transport

Piecing the puzzle together

- ◆ Transport is the second-largest contributor to global emissions and, therefore, a key focus for decarbonisation
- ◆ Disruptive change is occurring within road transport, shipping and aviation that requires action in the short term
- ◆ Software, autonomous and mobility solutions are key topics dictating the longer-term developments in the space

Making transport clean(er) is a central tenet of the industry. The transport sector is the second-largest contributor to global CO₂ emissions, which, understandably, makes decarbonisation a key focus of future development. With 80-90m passenger cars sold annually and c1.5bn in circulation globally, passenger cars are collectively the worst offenders in terms of carbon emissions. As such, reducing passenger car emissions is central to reducing the environmental impact of transport. In this vein, electrification of the passenger car fleet is central to the future transport theme.

Despite this, global EV adoption appears to be slowing. Affordability, infrastructure and wavering government support/policy appear to be deterring consumers from making the switch to EV. This raises questions around what needs to change to make mainstream adoption a reality. Affordability is our main conclusion. Despite slower adoption, EV competition is intensifying, which raises investor concerns over pricing and margins. This makes lowering costs the common ambition within the industry. Encouragingly, battery makers and supply chains are seeing progress in this regard.

Aside from EVs, 'Autonomous' and 'AI' are progressing, but software developments bring both potential opportunities and risks to the mobility space. The opportunities come from subscription services all the way to robotaxis (although these still seem some way off). All require significant upfront costs, with long-dated and/or uncertain returns on investment. This perhaps explains why only a few OEMs/specialist companies continue to pursue L4+ autonomous driving, with most OEMs focused on Level 2+/3, although the latter is largely limited to premium vehicles.

Away from the auto world, aviation and logistics are looking to alternative fuels and electrification of fleets to reduce their environmental impact. Decarbonisation efforts shifting towards net zero can be a source of competitive advantage in the shipping space. Improving transport so that it is sustainable, safe and legal is the ideal for most stakeholders. Future Transport faces great change, which requires substantial investment to drive the agenda forwards.

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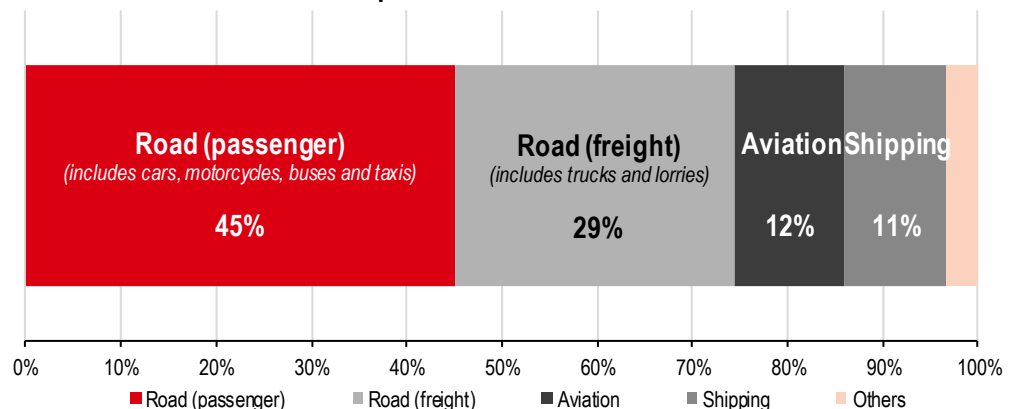
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Future Transport

- ◆ Transport is a substantial contributor to global emissions and, therefore, a key focus for decarbonisation
- ◆ In the short term, pricing development of electric vehicles is in focus; long term, software, autonomous, mobility solutions are key topics
- ◆ Outside the auto world, alternative fuels are a key area of interest in shipping and aviation, along with new technologies, such as eVTOLs

An overview of the theme

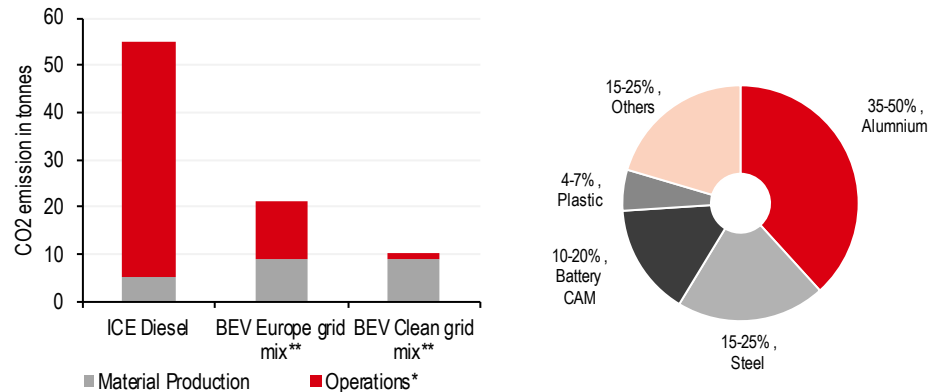
Global CO2 emissions from transport



Source: International Energy Agency, HSBC

The focus is on decarbonisation, and passenger cars are the primary offenders. The transport sector accounts for c20% of global CO2 emissions, of which c75% is attributable to road (see above). With 80-90m cars sold annually and c1.5bn cars in circulation globally, reducing passenger car emissions is central to reducing the environmental impact of transport. In this vein, electrification is a central tenet of the future transport theme. However, decarbonisation of passenger vehicle transport is not only about tailpipe emissions; we believe there also needs to be a holistic approach that encompasses the source of electricity generation (overleaf left) for battery electric vehicles (or green hydrogen in the case of fuel-cell electric vehicles, FCEVs) and the carbon footprint of materials used in the manufacture of these vehicles (overleaf right).

Decarbonisation of passenger transport goes beyond tailpipe emissions; material production also plays an important role



Source: McKinsey Centre for Future Mobility, ICCT, HSBC research

Notes: *Use phase emission including fuel/electricity production, fuel consumption (real-world values) and maintenance; based on Lifecycle mileage of 243,000km with 18 years' vehicle lifetime for a lower-medium segment passenger car. **Lifecycle GHG emissions of the vehicles' lifetime average electricity mix for a 2021 car based on IEA's stated Policy scenario and Sustainable Development Scenario as well as renewable electricity mix of solar and wind energy.

While electrification is the generally accepted solution for decarbonising passenger cars, hydrogen and synthetic fuels may find a greater use case in heavy-duty applications, such as trucks, trains, shipping, aviation, etc. Other key focus areas in Future Transport are EV charging infrastructure, software-enabled revenue pools and mobility-as-a-service (eg: ride-hailing). Beyond the automotive world, alternative fuels are a key area of development in shipping and aviation, along with new technologies, such as eVTOLs.

What's the outlook for 2024?

- ◆ **BEVs transition progressing, but at a slower rate than previously expected;** product, pricing and profitability are all in focus. We expect battery electric vehicle (BEV) penetration to continue to rise, but we have consistently downgraded our forecasts over the past 18 months. Arguably, we and others expected too much too soon. We have seen carmakers trim their ambitions (MBG most recently), and see further cuts should the ambitions of regulators also decline, as appears to be a risk in the US.
- ◆ **With new launches, competition is increasing:** BEV adoption hasn't kept pace with expectations in Europe, but in China BEVs are increasingly becoming mainstream. In 2023, penetration increased to 15% in the EU and 23% in mainland China. Over the next four years, model launch momentum will pick up. This is good for penetration, but as customer choice increases, so too does competitive intensity. In order to secure growth/market share we expect increasing price pressure in the BEV segment. The dynamic of pricing development versus battery material cost normalisation will be a key driver of BEV profitability in the medium term.
- ◆ **Model freshness, software functionality to influence purchase decisions:** Desirability of models is another key focus area. As new entrants grow, old brand norms appear to be changing. Model freshness, digital-infotainment content (software) relative to pricing could play a key role in the success of a model/brand. For example, a US brand with aging models looks to be suffering vs Chinese competition with newer products. This, to our minds, is one of the prompts for the repeated price reductions of this brand's cars in China.

- ◆ **BEVs still margin dilutive, but the gap with ICE is closing:** BEVs are currently margin dilutive for most traditional carmakers, but most have ambitions to achieve margin parity in the second half of the current decade. As such, costs need to come down substantially via scale, vertical integration, battery technology development, new platforms or lower raw material prices as planned new supply comes online. Encouragingly, all of these levers appear to be in the carmakers' plans, with battery costs expected to decline in the next few years.
- ◆ **Another round of BEV stimulus?** Another area of keen interest in the short term is purchase incentives – the US has a detailed plan (Inflation Reduction Act, effective from January 2023), but in Europe the recent trend has been to roll back or limit state subsidies (for example, in Germany, the UmweltBonus scheme was abruptly terminated in December 2023). If such incentive schemes are reintroduced/extended, they could help to soften the impact (on carmakers) of reduced margins. There are calls in the UK from the motor industry to reintroduce incentives (after they were phased out last year) to stimulate sales¹.
- ◆ **China leading the way with domestic players, but industry consolidation likely:** China appears to be a clear leader in e-mobility vs. the EU and the US, helped by policy support, domestic battery supply chain and emergence of a young customer demographic positively disposed to EV-tech, especially from domestic carmakers. However, the fragmented nature of the China industry, including traditional carmakers and numerous EV-tech players/EV start-ups, points to an elevated level of competition and widespread losses that could result in consolidation in the mid-term.
- ◆ **Securing supply chains:** The semiconductor chip shortages that affected the auto industry in 2021-22 emphasised the importance of secure supply chains for the carmakers. The requirement for semiconductor content in EVs is roughly 2x ICE (internal combustion engine) cars. In addition to semi supply, OEMs have to secure battery/cell suppliers, and some also battery raw materials. In the mid-term, we see a trend towards partnerships and JVs between carmakers and battery suppliers/miners/chip-makers. This could see a shift from typical supplier-customer relationships to more co-development, at times potentially bypassing typical tier-1 auto suppliers.
- ◆ **Are traditional tier-1 suppliers at risk?** As carmakers pursue vertical integration (e-motors, inverters, etc), the traditional businesses of tier-1 auto suppliers could be at risk in the long term. Historically, these suppliers have been aggregators of content and allowed carmakers to leverage the scale of competitors. Rapidly changing technology has seen carmakers take more development in-house and, at the same time, choose a different group of suppliers. This means the tier-1 suppliers face new competition in disciplines they are arguably less qualified in vs tech-native companies and semiconductor companies.
- ◆ **New opportunities – software:** Software-enabled revenues may emerge as a growth opportunity, potentially accounting for 5-10% of the total automotive revenue pool by the end of the decade. Carmakers have an opportunity to win a part of this pool through services and subscriptions, on-demand-features, increased residual values and service retention/cross-selling, etc. Increasing competition for this prize from EV-tech start-ups and technology behemoths appears to be waning as the costs, complications and losses rise.
- ◆ **Mobility solutions – disruptor or opportunity:** In the long term, should autonomous vehicles become feasible, robotaxis could be a clear disruptor for the industry as they would adversely affect the existing ownership model, and could also limit in-car content/features. But there would be opportunities from car rental and subscriptions to car sharing and ride hailing, therefore it is important for carmakers to progress Level 4+ autonomous driving (the full report contains full definitions of autonomous driving levels) . However, the challenge here is balancing the significant upfront costs versus the period before any returns are generated, with many choosing to focus up to only Level 3 and allowing a few OEMs/specialist companies to progress to Level 4+.

¹ For example, see SMMT 'Car industry urges 'fair tax for a fair transition' to put EVs back in the fast lane, 1 March 2024

- ◆ **Green methanol is the shipping sector's alternative fuel of choice...for now:** A breakthrough in safe handling of other fuels, particularly ammonia, could emerge in the second half of this decade. While technological breakthroughs for more alternative fuels and investment for fleet renewal are imminent, shipyard and aircraft manufacturing capacity and green fuel bunkering infrastructure would remain key hurdles, in our view.
- ◆ **Decarbonisation efforts a source of competitive advantage:** In the shipping space, it has been the bigger players with the might of their balance sheets and scale that have been pioneering the shift to net zero. For end consumers, costs are set to rise; this is where we think regulation needs to improve and keep pace with developments to help provide a level playing field.

In the full report, we also discuss the following items:

Electric Vehicles

We monitor global EV volumes, penetration and purchase prices, EV model launches, charging infrastructure, regulation and incentives. We discuss how the focus is also on EV batteries, materials and the supply chain, where the majority of the cost savings will come from. Lastly, we highlight that EV penetration continues to build, but at slower pace than expected; nevertheless, the future is still electric

ESG

We assess the entire EV value chain through an ESG lens. Stricter regulation and supply-chain laws create barriers to entry into the transport markets. Other key issues also include raw material sourcing, battery manufacturing, EV assembly, EV infrastructure, circular economy

Alternative Fuels

The shift to electrification in heavy duty vehicles is likely to vary by segment, with hydrogen also developing rapidly. Shipping companies are committed to decarbonisation, with three main possible solutions to achieve their targets. Airlines target net-zero emissions by 2050, but there is slow progress on sustainable aviation fuels so far

Disruptive Technology

Vehicles are now sold on their software, not their hardware, meaning revenue disruption for the manufacturers. The pace of development of AI chips and autonomous driving is accelerating, which is set to fuel demand for all types of sensors in vehicles: cameras, radars and laser-based LiDAR

Disclosure appendix

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