



Urban Mobility

Zero tailpipe
emissions led

Typically Low / Medium Power



New mobility vehicles for bus-rapid-transit



Community based transport



Buses with fixed city and urban routes

Long Range Mobility
Net-zero* emissions led

Typically Medium Power











Buses with flexible semi-urban and rural routes

Propulsion Technologies Roadmap



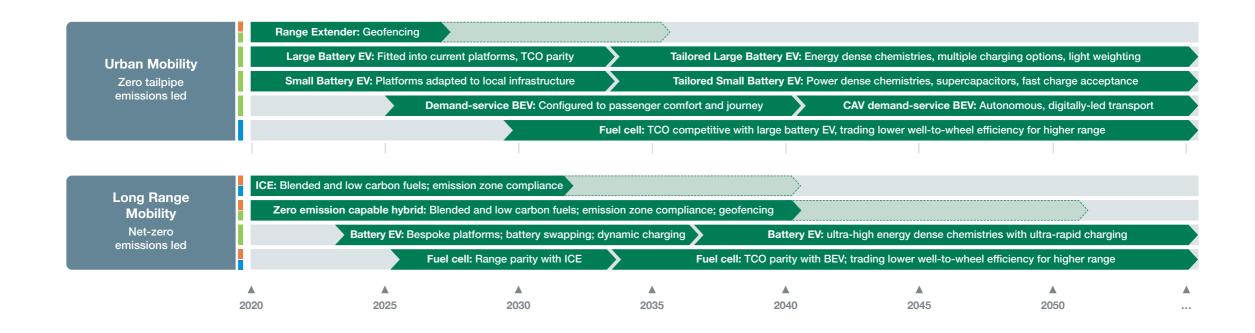


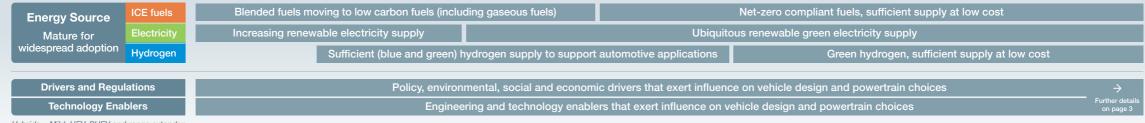
This roadmap represents a snapshot-in-time view of the global automotive industry propulsion technology forecast for mass market adoption.

Specific application-tailored technologies will vary from region to region.



Dotted line bar: Technology exists in international markets, but less prevalent in Europe





Drivers and Regulations / Technology Enablers

2030





Policy, environmental, social and economic drivers that exert influence on vehicle designs and powertrains Defined driver Predicted driver Towards net-zero CO2e and LCA compliance **VECTO Uptake** CO₂: -15% CO2: -30% CO2e Emission ZLEV mandates in specific areas Broader adoption of ZEV mandates to achieve net-zero CO2e and local air quality ambitions **ZEV Policies** Pollution and Euro VI / EPA 2015 Euro VII / EPA 2015 Holistic environmental impact legislation (VOC, resource use, land use) and LCA compliance **Drivers** and Resource Regulations Zone Localised zero tailpipe emission zones and geo-fencing Increasing pedestrianisation and vehicle entry restrictions, next gen city designs Ultra-low emission zones Regulation Urban Mobility Discrete transport services (pay per mile / usage) On-demand, integrated transport services that deliver accessible end-to-end mobility Total Cost of Ownership New Fleet Logistics and Operator Models New vehicle configurations adapted to demand-response, MaaS and CAV \blacksquare - 🛦 \mathbf{A} 2020 2025 2030 2035 2040 2045 2050 Technology adoption for Engineering and technology enablers that exert influence on vehicle designs and powertrains mass-market applications Configurable xEV powertrains for 2nd urban life Flexible xEV platforms that can be customised for developing worlds **Platforms** CAV¹ CAV - 1/2/3 Connected and autonomous - level 4 Connected and autonomous – level 5 Technology Timetable balancing for increasing EV fleet (charge and range) Scheduled services moving to demand-response services Scheduling Enablers Fleet Information-enabled control systems, V2X communication, telemetry and location management, geofencing System Efficiency Optimised heating and cooling to reduce energy demand Optimise energy usage for enhanced features such as CAV and infotainment

2035

2040

2045

2050

2025

2020

^{1.} Adoption is dependent on supporting roadside infrastructure (incl. V2X, digital networks, data protocols, interconnects). See further details on https://zenzic.io/roadmap/