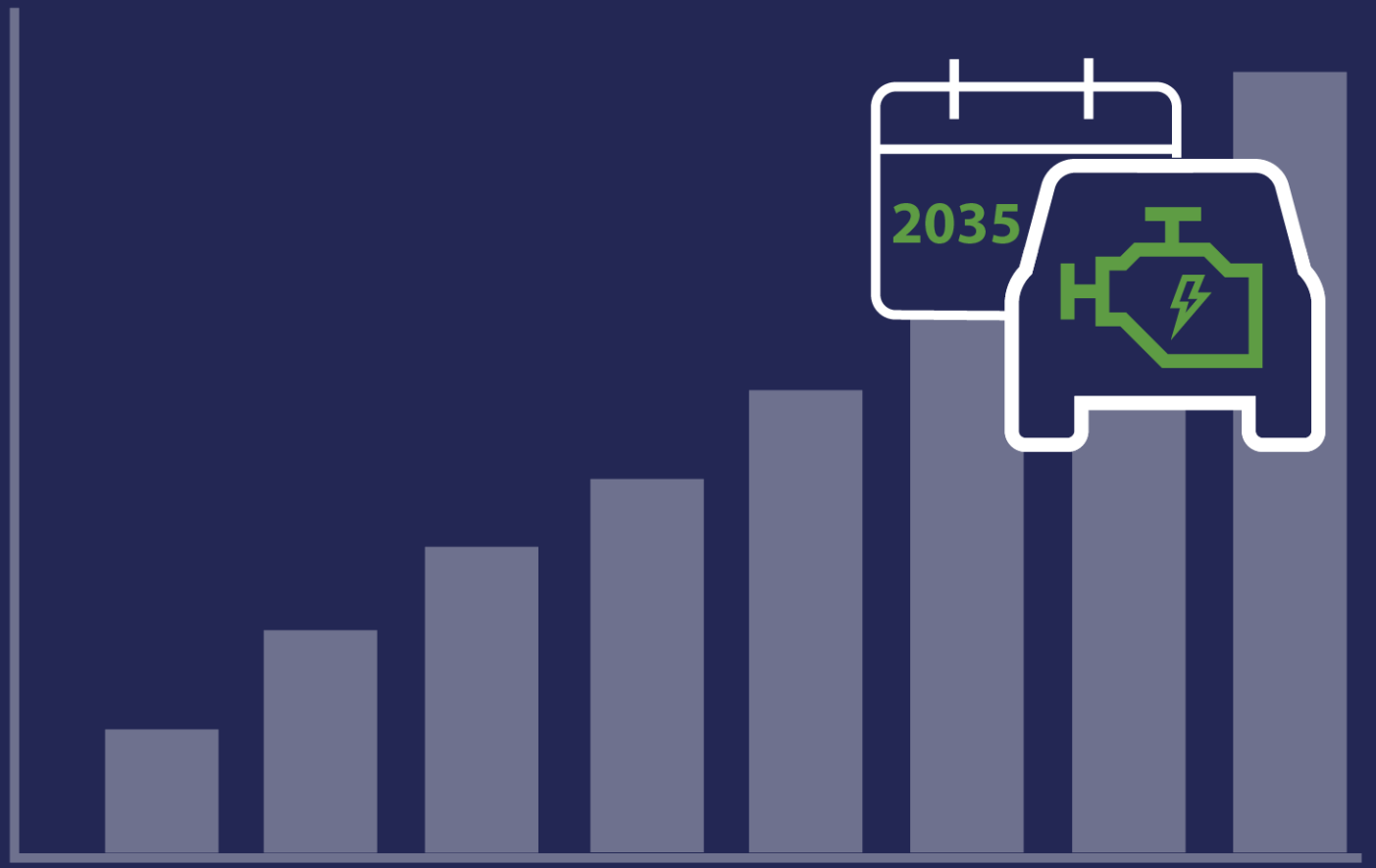

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European Vehicle Powertrain Forecast 2021-2035

Zero Emissions Targets Electrify the Pace of Transformation

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Executive Summary

A choppy recovery leads to an accelerated push to electrification

Executive Summary

A supply chain facing disruption and transformation

Recovery has Accelerated but Vehicle Sales Will Remain Low for the Next Decade

- After 2020's dramatic 23.7% decline year-on-year in new vehicle sales to 13.69m units in EU, UK and EFTA, overall volumes in 2021 will bounce back with 9.6% growth reaching 15.01m units. Recovery will continue with a further 6% growth reaching 15.92m units in 2022

- However, with a sharp decrease in ICE vehicles – particularly continuing decline in diesel – along with low GDP expansion, minimal population growth, and saturated European markets, overall vehicle sales volumes will struggle to recover to pre-Covid levels until at least 2028

- Production volumes will recover somewhat more quickly to pre-pandemic levels by around 2025, primarily thanks to stronger growth in export regions such as Asia and North America, where there will still be demand for ICE vehicles

Electrification Acceleration

- Country-level ICE bans, OEM plans to transition to 100% electric vehicles in Europe, and a new EU 'Fit for 55' policy will effectively end the sale of ICE petrol and diesel powertrains by 2035

- In the meantime, interim EU emissions targets will rapidly accelerate the pace of electrification over the next decade and more. The plethora of hybrid (HEV), plug-in hybrid (PHEV) and battery (EV) powertrains will amplify complexity in all parts of vehicle production, supply chains and logistics

- Nonetheless, significant challenges remain in growing the battery supply chain, charging infrastructure and persuading consumers to go electric

Vehicle Value Increasing

- Despite lower sales volumes, the individual price of vehicles is continuing to rise, mainly because of increasing safety regulations, such as mandatory Autonomous Emergency Braking (AEB) since 2021, tighter emissions regulations, rising use of electronics and 'premiumisation'. Inflationary pressure in the supply chain is also driving up prices

Executive Summary

Electrification will likely accelerate changes to ownership and distribution models, which will have implications for logistics

Changing Car Ownership Models

- As vehicle prices increase, vehicle ownership is becoming less common, with leasing increasingly popular. The pandemic has led to leasing periods being extended from 2-3 years up to as many as 5 years, reducing new vehicle volumes
- In the longer term, shared mobility could ultimately reduce sales volumes with fewer cars required per capita. 'Subscription' services – such as 'Care by Volvo' – remain niche but will eventually drive the shift away from ownership even further
- EVs may eventually decrease sales further thanks to lower maintenance costs, with consumers keeping them longer

Evolving Distribution Models

- The pandemic kickstarted an acceleration towards more online vehicle sales, and this is likely to remain a permanent structural change
- OEMs are introducing the direct sales/agency model, which can circumvent traditional car dealerships. More dealers may serve more as showrooms and service centres. Some OEMs, such as Volvo Cars, are already planning to sell EVs online only
- This evolution would further change the role of vehicle logistics providers in terms of distribution centre operations, PDI and potentially fewer deliveries to dealerships and instead direct to customers
- In many cases, however, dealers are likely to arrange last-mile deliveries to customers. Either way, more deliveries may occur using smaller trucks or as individual delivery. Customer service, customisation and visibility will be key differentiators for vehicle logistics services

02

Electrification Indicators

Economic and Policy Indicators Influencing Europe’s Vehicle Powertrain Outlook

European Commission's 'Fit for 55' Climate Target

Implications

- In July 2021, the **European Commission** proposes '**Fit for 55'** referring to a 55% reduction in CO_2 emissions (from 1990 levels) in all sectors by 2030
- This is the first plan across a large trading bloc detailing how to reach the Paris Climate Agreement's **carbon net zero objective by 2050**
- The '**polluter pays principle**' extends carbon pricing to around two-thirds of EU emissions
- Ships arriving in EU ports would need to use at least 80% low-carbon fuels by 2050, and there's a carbon tax on aviation

What Does This Mean For Automotive?

Automotive target years	2025	2030	2035
Vehicle CO_2 emissions reduction (from 2021 levels)	25%	55%	100%

- The 55% reduction by **2030 is a significant tightening of the previous 37.5% reduction**
- The 100% reduction for **2035 effectively bans ICE petrol and diesel cars by 2035**, following a similar timeline to the UK – and which will lead to a **rapid acceleration of electrification across Europe**
- The ICE ban needs to be 2035 if the vehicle 'parc' is to be carbon neutral by 2050, as the **average European vehicle is 11 years old**
- EU proposals are ambiguous between 2030-2035 and seem to also allow plug-in hybrid electric vehicles (PHEVs). Industry lobbying is likely to mean **'full hybrids' (HEVs) will be sold until 2035**, or at least those below a 80-100g CO_2/km threshold, which would be similar to UK policy
- In the years just **before 2035, we expect a 'pull forward' in demand** as consumers rush out for the last chance to buy ICE vehicles
- The EU acknowledges **charging infrastructure is a major constraint** and will provide funding mechanisms for **charging points every 60km of highway**, and **hydrogen refueling points every 150km of highway**
- However, '**Fit for 55'** needs to be ratified by the **27 EU members** and **European Parliament** in **November 2021**, and may be subject to compromises

EU & National Government Powertrain Stimulus

	Germany	France	Italy	Spain	Rest of EU	UK
CO_2 targets	OEM fleet average of 95g CO_2/km in 2021 cut by 25% by 2025, 55% by 2030 and 100% by 2035, effectively banning ICE. However, these are yet to be ratified by EU27 states and European Parliament					Expected to be in line with EU targets
Euro 7 Particulates	Draft standards require 60-90% cut in emissions by 2025/27 – potentially making ICE powertrains unviable, especially for smaller cars - and some claim even effectively banning ICE					
European ICE Bans	Proposed 2035 (pending ratification) would likely override national ICE bans					Aligns with UK ban
National ICE Bans	No ban - see above	2040	2030	2040	Mostly 2030	2030 (HEV to 2035)
EV purchase & tax Incentives	EVs up to €9,000 Hybrids €6,750. Local grants up to €1,500. 10-yr tax free for EV. Reduced tax for PHEV	EVs up to €6,000 PHEVs €1,000. €5,000 scrappage scheme	EVs €4,000 + €2,000 scrappage PHEV €1,000 + €1,000 scrappage	EVs up to €4,000 + €2,600 scrappage PHEVs €2,600 + €2,600 scrappage	Most EV incentives €2,000-€7,000. PHEV €1,000-€2,500. EV road tax exemption or CO_2-based road tax	£2,500 EV on vehicles <£35,000. £0 road tax Exempt LEZ / Congestion zones
Cars/charger(2020)	1,014	718	2,273	3,118	887 (average)	1,039
Charging point incentives	Grants from local gov and utilities up to €2,500 for private chargers	Municipalities €2,160 for each charger. 50% off home chargers	Tax deduction up to 50% and €3,000 maximum	30-40% subsidy (up to €100,000) public or private EV chargers	Most offer some form of charging point grants/subsidy	Discount of 75% (up to £350) on home chargers
Consumer attitude	Scepticism of EVs	Moderate acceptance of EVs	Scepticism of EVs	Scepticism of EVs	Apart from Scandinavia, low EV rates in rest of EU	Moderate acceptance of EVs

National ICE Bans Vs. EU Targets

Country	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Details
Austria						Ban											
Denmark						Ban											
France																Ban	
Germany																	No ban
Iceland						Ban											
Ireland						Ban											
Italy						Ban											
Netherlands						Ban											
Norway	Ban																
Spain																Ban	
Slovenia						Ban											
Sweden						Ban											
UK						Ban*											*HEV to 2035

EU 25% reduction in CO_2 emissions from 2021

EU 55% reduction in CO_2 emissions from 2021

EU 100% reduction in CO2 emissions

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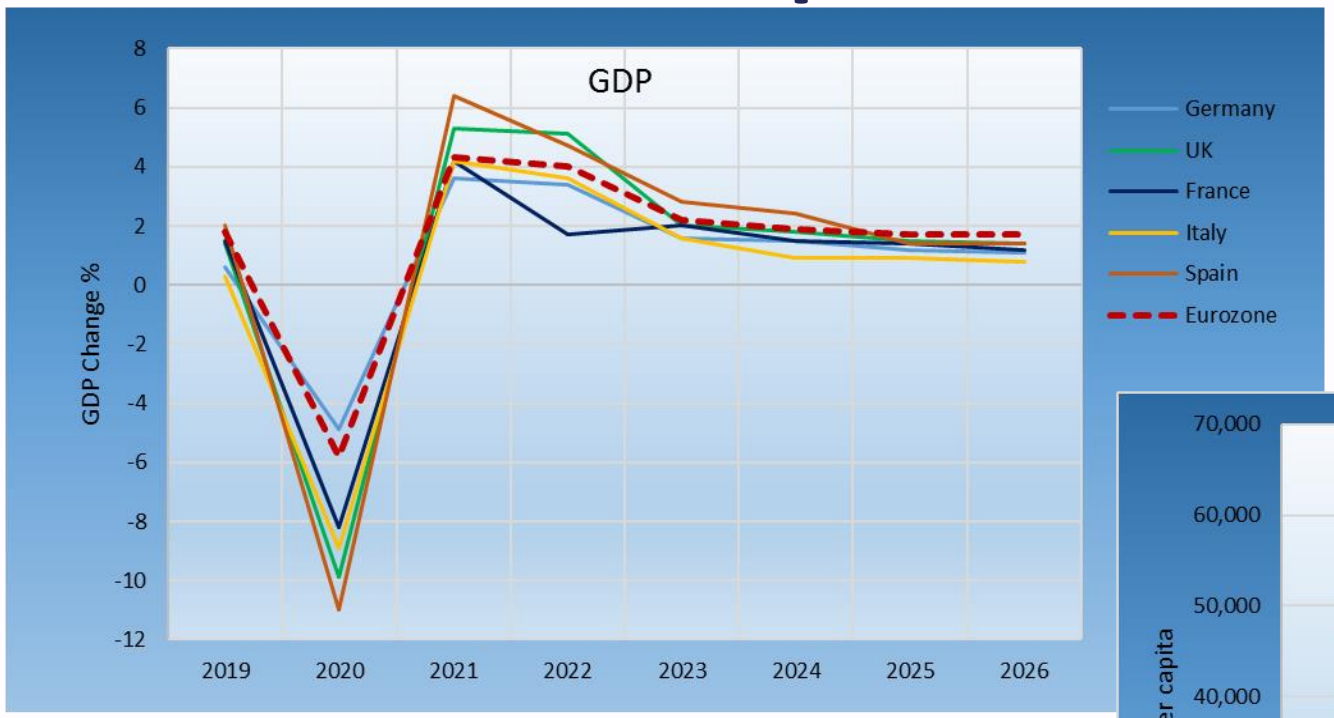
OEM EV Powertrain Targets (share of global sales)

OEM	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Details
Audi									100%			All new models to be EV from 2026
BMW						50%						No end date for ICE announced
Daimler	<=50%					<=100%						All new platforms EV from 2025
Ford (Europe)						100%						100% EV/PHEV by 2026
GM											100%	
Hyundai						82%						
Jaguar	100%											
Kia						40%						
Land Rover						100%						
Nissan											100%	100% EV/PHEV/HEV by 2030
Renault (Europe)												65% EV/PHEV/HEV by 2025, 90% by 2030
Skoda						50%-70%						50-70% in Europe
Stellantis (Europe)						70%						35% by 2030 in America
Toyota												Cars & production carbon neutral by 2050
VW (Europe)						70%					100%	VW global 50% by 2030
Volvo Cars	50%					100%						

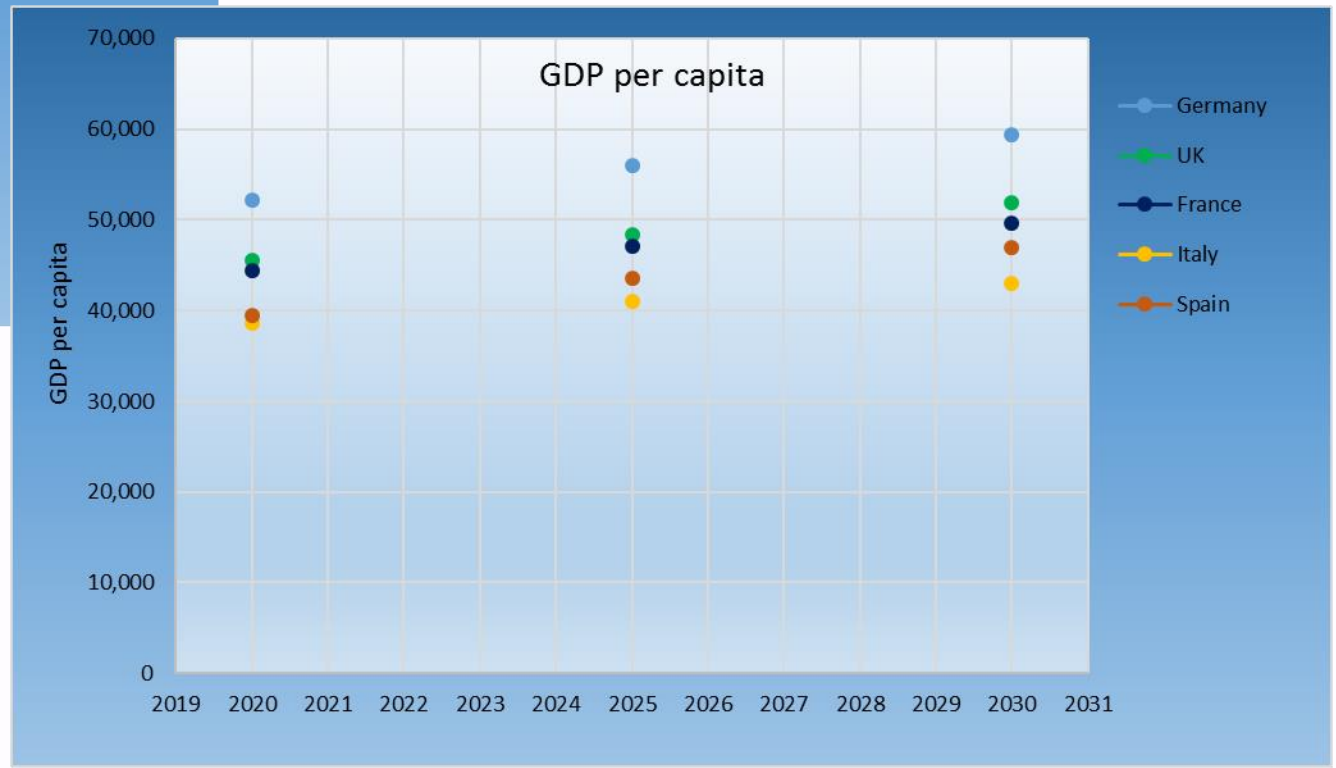
European Economic Indicators



Source: IMF

European GDP growth to slow post Covid recovery

- GDPs were savagely impacted by the Covid crisis
- For 2021, countries are bouncing back from a low starting point, although it will take until 2023 to recover lost ground and for growth to stabilise at relative norms
- At that point GDP growth will dip back to the low trend levels typical in Europe of 1-2% growth per year

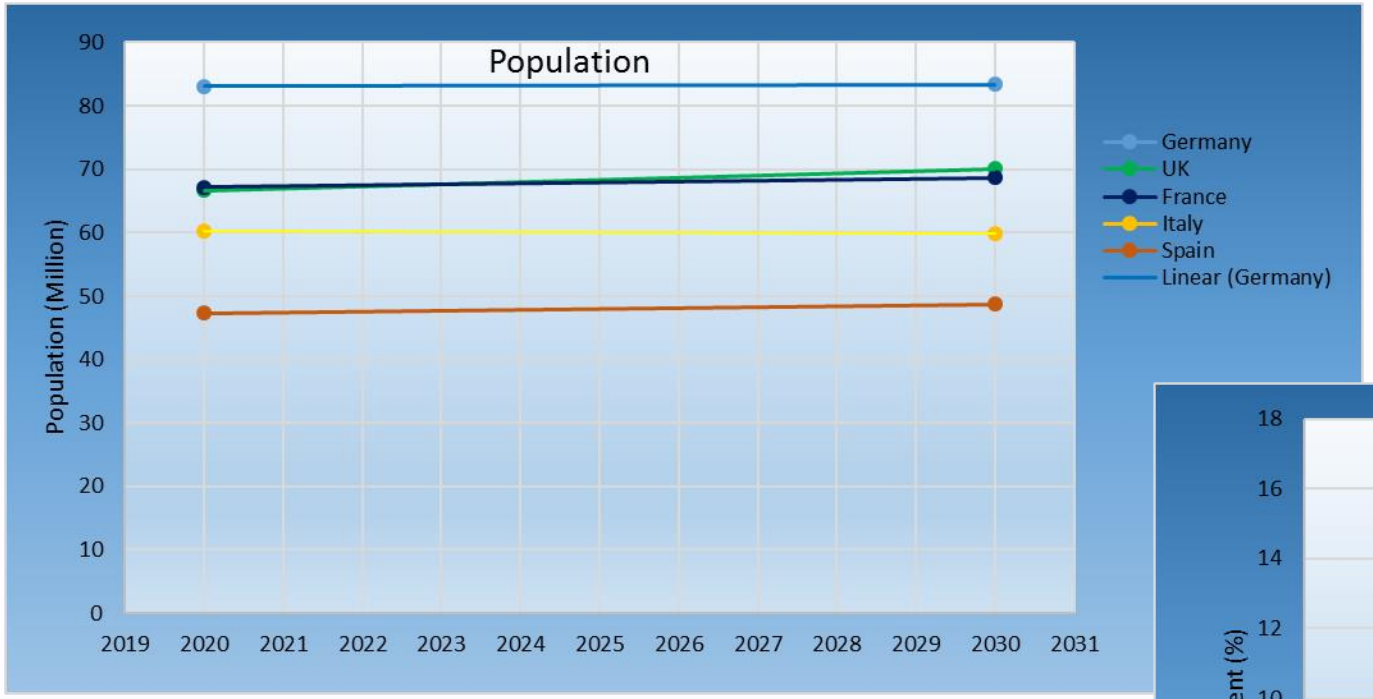


Source: PWC

Higher GDP per capita should support EV expansion

- Despite low GDP growth, GDP per capita is expected to rise notably across Germany, France, UK, Italy and Spain
- GDP per capita is a good indicator of vehicle demand and especially EV demand due to the currently higher price of EVs

European Demographic Indicators



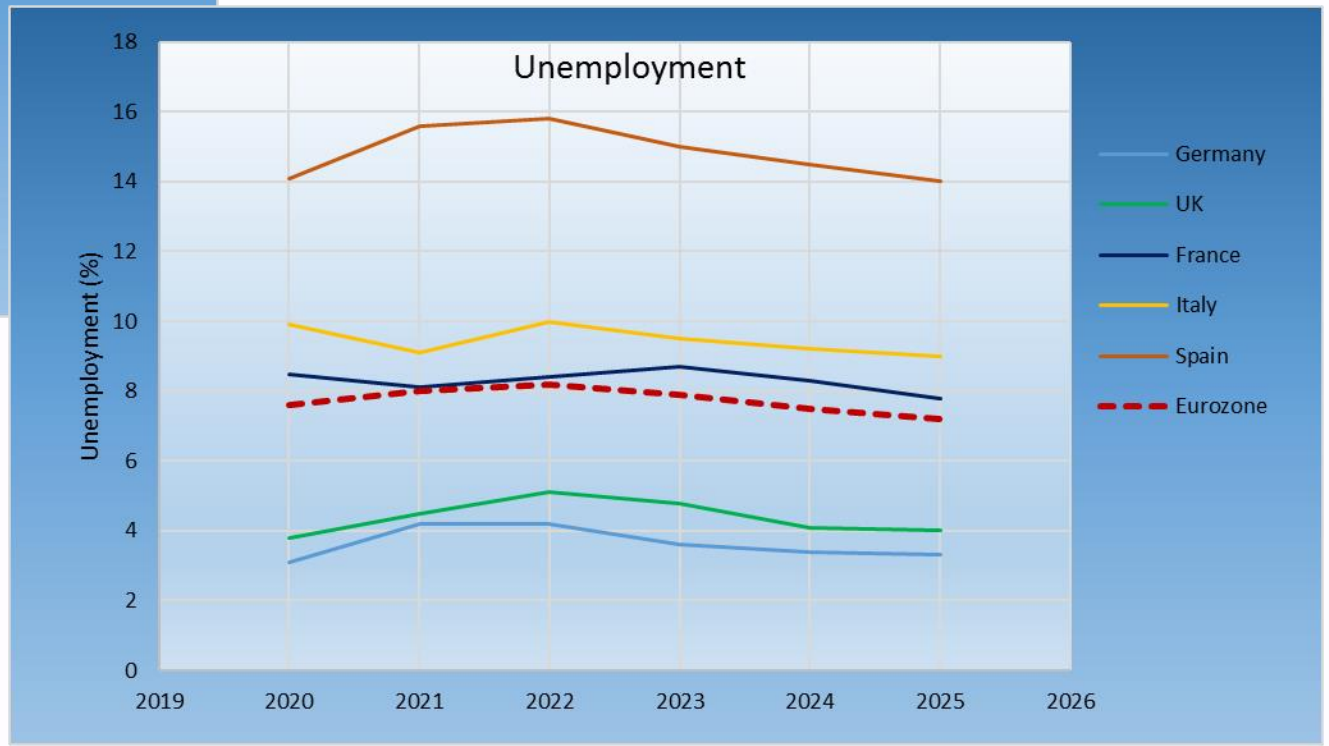
Source: Eurostat

Low population growth to restrain vehicle demand

- Slow population growth is expected in most countries
- Italy expected to decline by 0.3m by 2030
- Only the UK is expected to have significant population growth of 3.4m (5%) over the decade
- This would suggest a very stagnant consumer base and low new vehicle growth overall

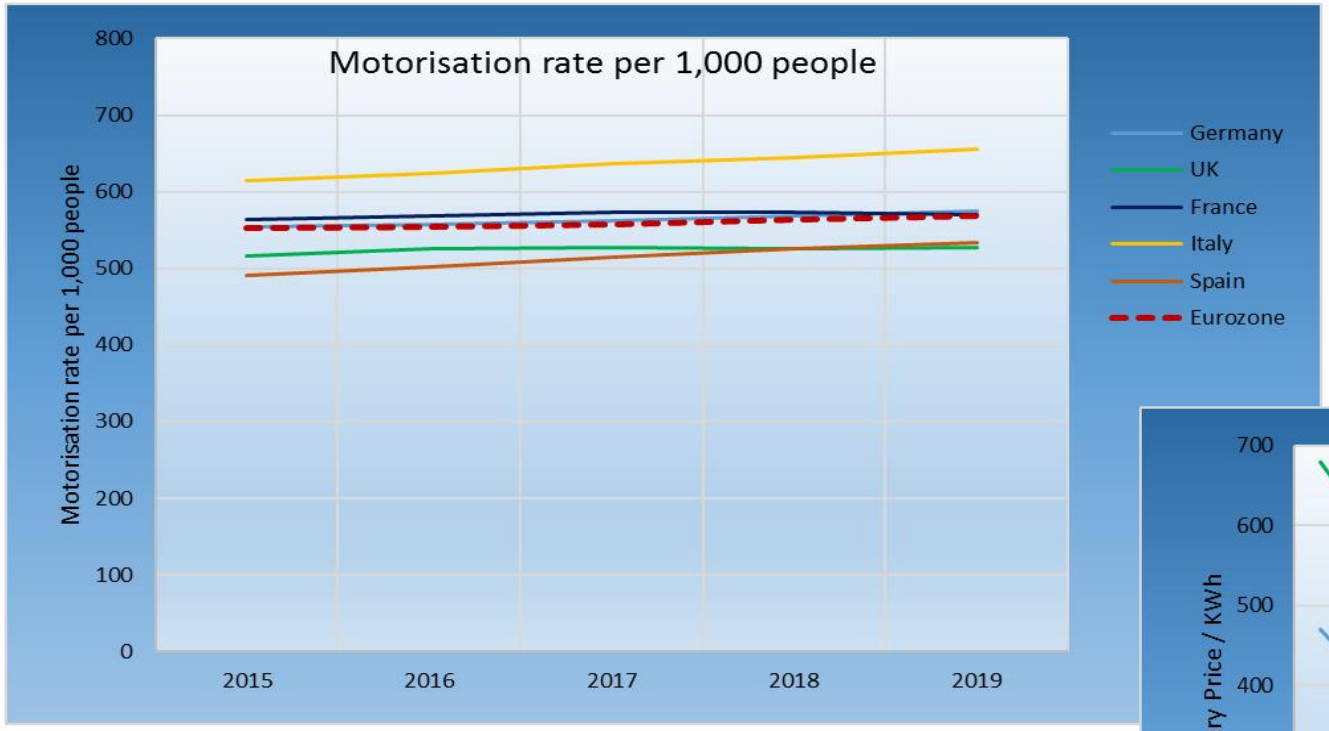
High unemployment will hinder recovery and long-term demand

- Unemployment has increased during the crisis, but government furlough schemes and spending have mitigated its rise
- Unemployment is a good indicator of consumer confidence especially relating to big ticket items such as vehicles
- Unemployment is notably high in Spain, around the EU average in Italy and France and below average in Germany and UK



Source: S&P Global

European Automotive Indicators



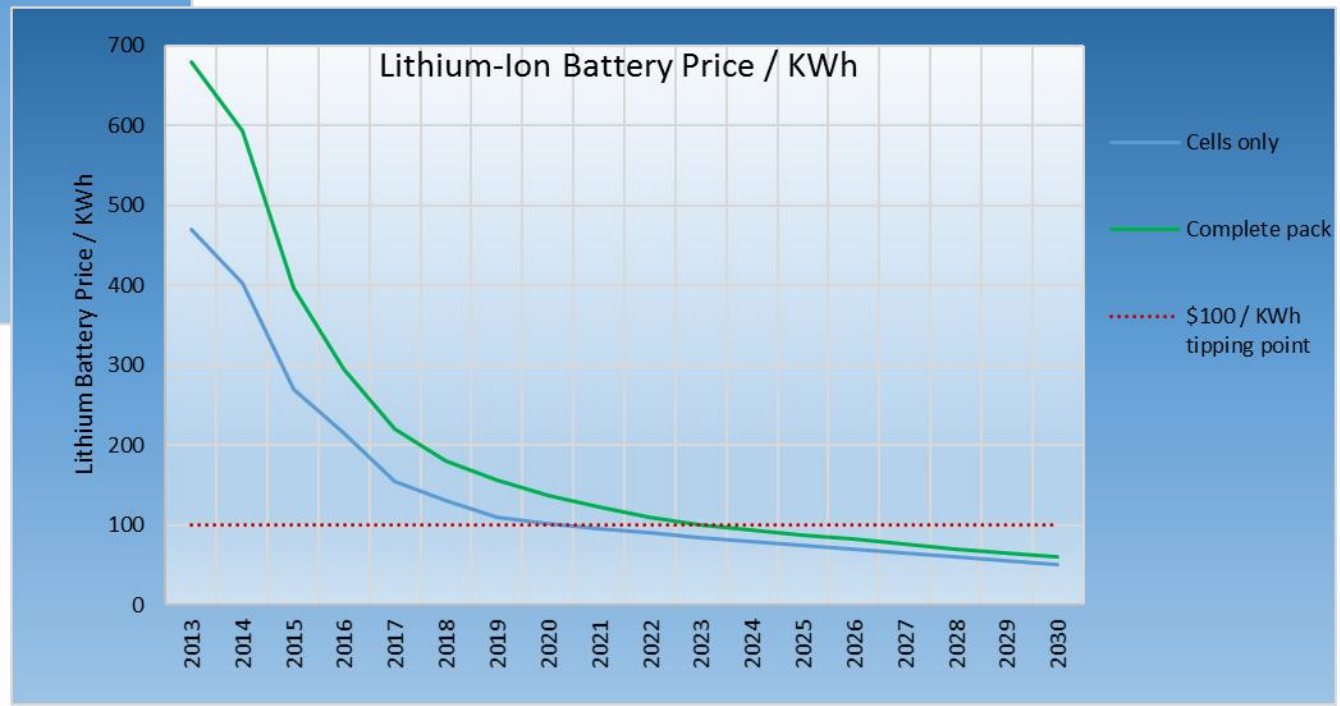
Source: ACEA

Saturated motorisation rate will limit growth

- Motorisation rates average 569 cars per 1,000 people in Europe
- Motorisation rates are a good indicator of market saturation
- Italy's motorisaton rate is one of the highest in the EU and has risen strongly over the past 4 years
- The UK and Spain have motorisaton rates below the EU average

Falling lithium-ion battery prices approach 'tipping point'

- The success of electrifying the European vehicle fleet depends fundamentally on the price and performance of batteries
- Economies of scale have led to significant price decreases
- 2023 is around when the 'tipping point' of $100/KWh will be achieved and purchase price parity with ICE vehicles is reached



Source: Automotive from Ultima Media

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03

European Powertrain Outlook 2021-2035

Demand & Production Forecasts

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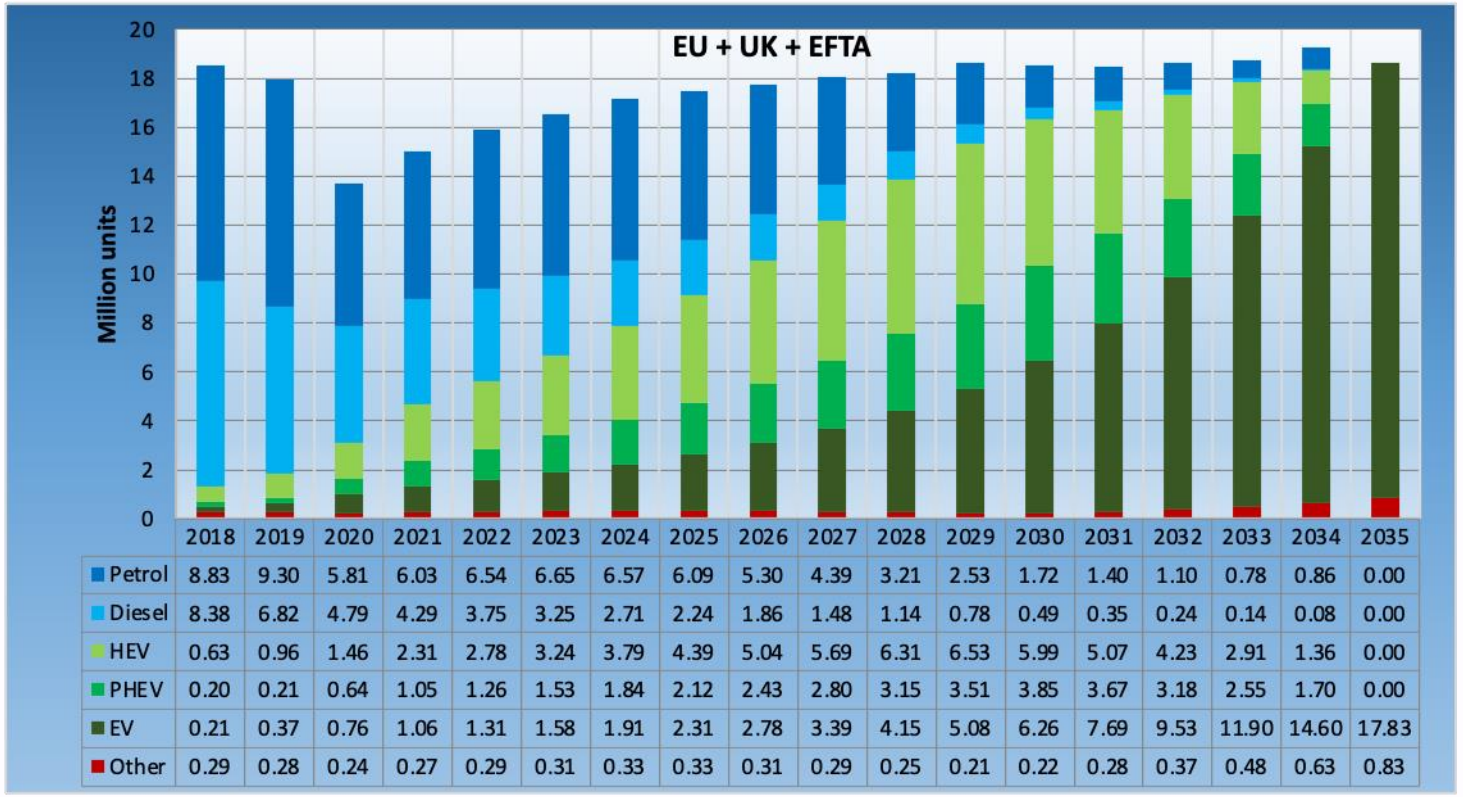
Europe Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	8.83	9.30	5.81	6.03	6.54	6.65	6.57	6.09	5.30	4.39	3.21	2.53	1.72	1.40	1.10	0.78	0.86	0.00
Diesel	8.38	6.82	4.79	4.29	3.75	3.25	2.71	2.24	1.86	1.48	1.14	0.78	0.49	0.35	0.24	0.14	0.08	0.00
HEV	0.63	0.96	1.46	2.31	2.78	3.24	3.79	4.39	5.04	5.69	6.31	6.53	5.99	5.07	4.23	2.91	1.36	0.00
PHEV	0.20	0.21	0.64	1.05	1.26	1.53	1.84	2.12	2.43	2.80	3.15	3.51	3.85	3.67	3.18	2.55	1.70	0.00
EV	0.21	0.37	0.76	1.06	1.31	1.58	1.91	2.31	2.78	3.39	4.15	5.08	6.26	7.69	9.53	11.90	14.60	17.83
Other	0.29	0.28	0.24	0.27	0.29	0.31	0.33	0.33	0.31	0.29	0.25	0.21	0.22	0.28	0.37	0.48	0.63	0.83

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

An electrifying decade ahead

Rapidly tightening emissions targets, the 2035 ICE phaseout under 'Fit for 55' legislation, national ICE bans and OEM electrification targets mean the next decade will see a huge increase in electrification and all types of hybridisation. During this transition phase, the plethora of powertrains will amplify the complexity in production, supply chains and logistics

Economic Indicators

GDP growth	Expected 2% GDP growth across the EU27
GDP per capita	$33,928 (€28,500)
Unemployment	7.3% (May 2021)
Population	447.7m population will rise modestly to 449.1m by 2030 (0.5%)
Motorisation Rate	569 vehicles per 1,000 average for Europe
Covid rates	Mostly low to moderate, apart from UK and Spain. Potential third wave underway, but not having a major impact on dealers

Powertrain Indicators

ICE bans	EU-wide ICE ban likely for 2035
EU CO2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	Most offer EV incentives of €2,000 - €7,000 Most offer EV road tax exemption
Consumer acceptance	Moderate. Scandinavian countries are more receptive than Germany or Italy
Charging Infrastructure	887 cars per charger as average across region

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

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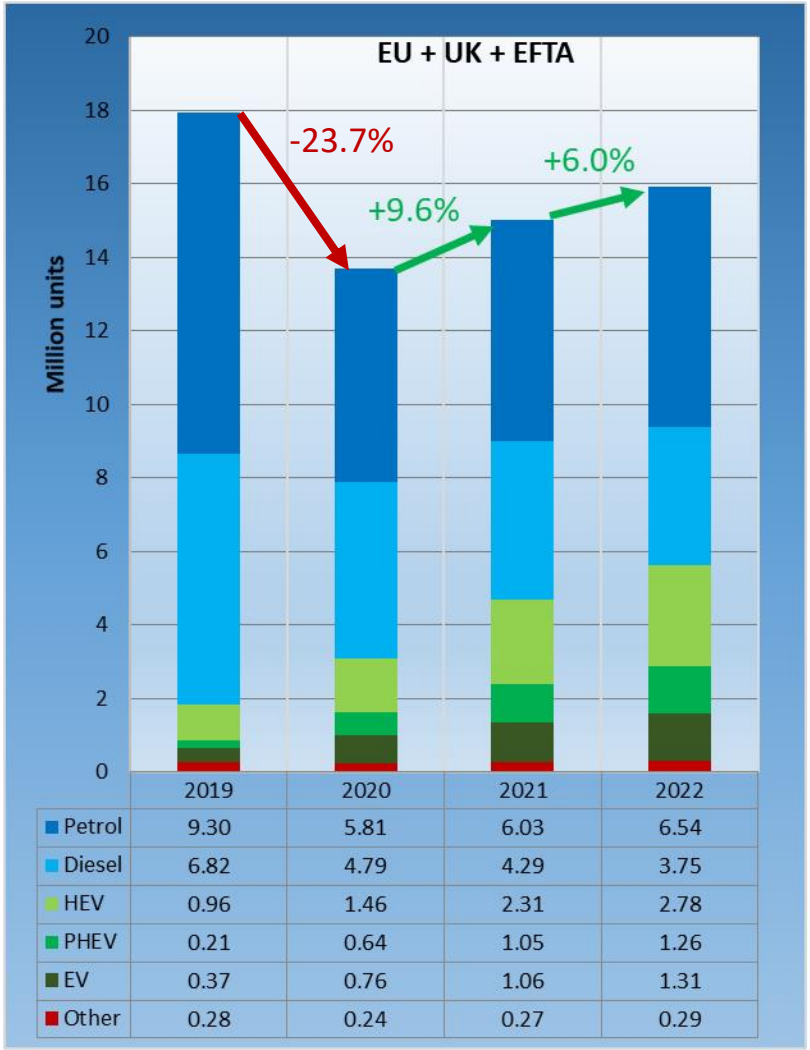
Europe Demand Recovery



	2019	2020	2021	2022
Petrol	9.30	5.81	6.03	6.54
Diesel	6.82	4.79	4.29	3.75
HEV	0.96	1.46	2.31	2.78
PHEV	0.21	0.64	1.05	1.26
EV	0.37	0.76	1.06	1.31
Other	0.28	0.24	0.27	0.29

Covid Impact and bounce back will take nearly a decade

- The Covid crisis resulted in a dramatic 23.7% year-on-year drop in overall vehicle volumes to 13.69m units in 2020
- Overall volumes in 2021 will bounce back with 9.6% growth reaching 15.01m units
- Recovery will continue with a further 6% growth reaching 15.92m units in 2022
- However, this growth is starting from a low base point in the pandemic and will not make up for the massive lost ground in 2020.
- It will likely take until 2027-2028 before volumes reach pre-pandemic levels of 18m units across the wider region, with the largest markets taking a similar time period to recover
- This recovery will be in the context of a continual drop in ICE powertrains, most notably diesel with ICE share of volumes falling from 77.4% in 2020 to 68.1% in 2021, to 63.3% in 2022
- Volume growth is only being achieved due to the surge in EV and PHEV sales with such ‘plug-in’ vehicles accounting for 10.2% of sales in 2020 rising to 14.0% in 2021 and 16.1% in 2022. However, over the medium term, the transition to electrification is set to take place in the context of volumes at below pre-pandemic levels rising to similar levels towards the end of the decade

Light Vehicle Registrations. Source: Automotive from Ultima Media,

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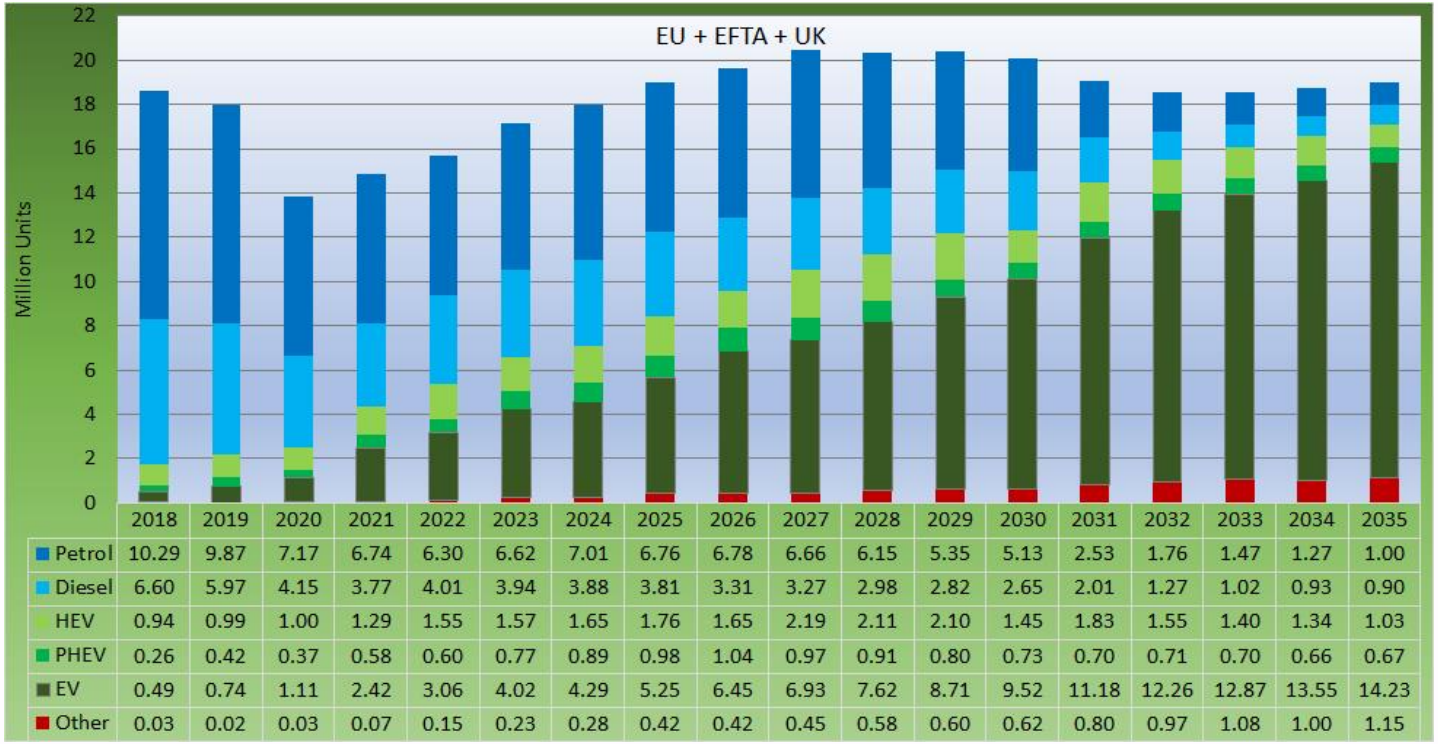
Europe Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	10.29	9.87	7.17	6.74	6.30	6.62	7.01	6.76	6.78	6.66	6.15	5.35	5.13	2.53	1.76	1.47	1.27	1.00
Diesel	6.60	5.97	4.15	3.77	4.01	3.94	3.88	3.81	3.31	3.27	2.98	2.82	2.65	2.01	1.27	1.02	0.93	0.90
HEV	0.94	0.99	1.00	1.29	1.55	1.57	1.65	1.76	1.65	2.19	2.11	2.10	1.45	1.83	1.55	1.40	1.34	1.03
PHEV	0.26	0.42	0.37	0.58	0.60	0.77	0.89	0.98	1.04	0.97	0.91	0.80	0.73	0.70	0.71	0.70	0.66	0.67
EV	0.49	0.74	1.11	2.42	3.06	4.02	4.29	5.25	6.45	6.93	7.62	8.71	9.52	11.18	12.26	12.87	13.55	14.23
Other	0.03	0.02	0.03	0.07	0.15	0.23	0.28	0.42	0.42	0.45	0.58	0.60	0.62	0.80	0.97	1.08	1.00	1.15

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other supply chain shortages	Moderate	Mild
EV Plant Capacity	Growing	Good
Export markets	Good	Good

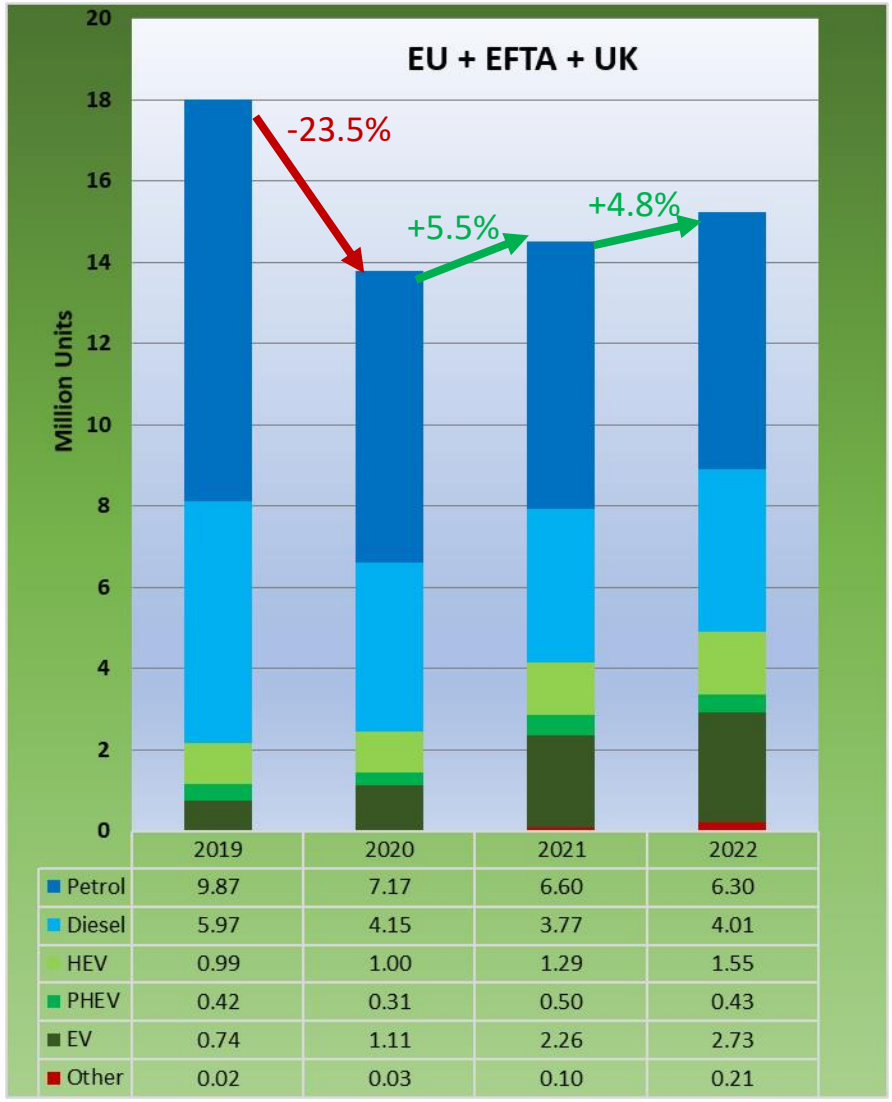
EU+UK Production Export Facts (2019)	
Share of LV Production Exported outside EU	23%
- Share of exports to USA	30%, 1.32m units
- Share of exports to China	17%, 0.76m units

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

A global green vehicle production hub

Production will rise by just 5.46% by the end 2021 given the ongoing chip and other materials shortages affecting the production supply chain. Recovery thereafter will remain gradual. Over the next 15 years, vehicle production in Europe will transition to EVs because of policies to achieve carbon neutrality by 2050 in the EU and UK, the EU ban on ICE vehicle sales from 2035 and the *Fit for 55* mandates. Meanwhile the latest EU 2030 Climate Target Plan further emphasises the reduction in CO_2 emissions by 50% per km compared to 2021 levels, and some European countries such as the UK are curtailing ICE demand from 2030, thus a 'pull forward' effect will take place resulting in a 5.2% decline in production in 2031 in the region. Note that OEMs will cut ICE production to avoid stockpiles of unsold vehicles. But there will continue to be some production of both petrol and diesel vehicles for exports. However, as China aims to be carbon neutral by 2060, and the US re-joins the Paris Agreement, the overriding export demand will also move to greener vehicles.

Europe Production Recovery



	2019	2020	2021	2022
Petrol	9.87	7.17	6.60	6.30
Diesel	5.97	4.15	3.77	4.01
HEV	0.99	1.00	1.29	1.55
PHEV	0.42	0.31	0.50	0.43
EV	0.74	1.11	2.26	2.73
Other	0.02	0.03	0.10	0.21

Light Vehicle Registrations. Source: Automotive from Ultima Media

Production recovers quicker than demand

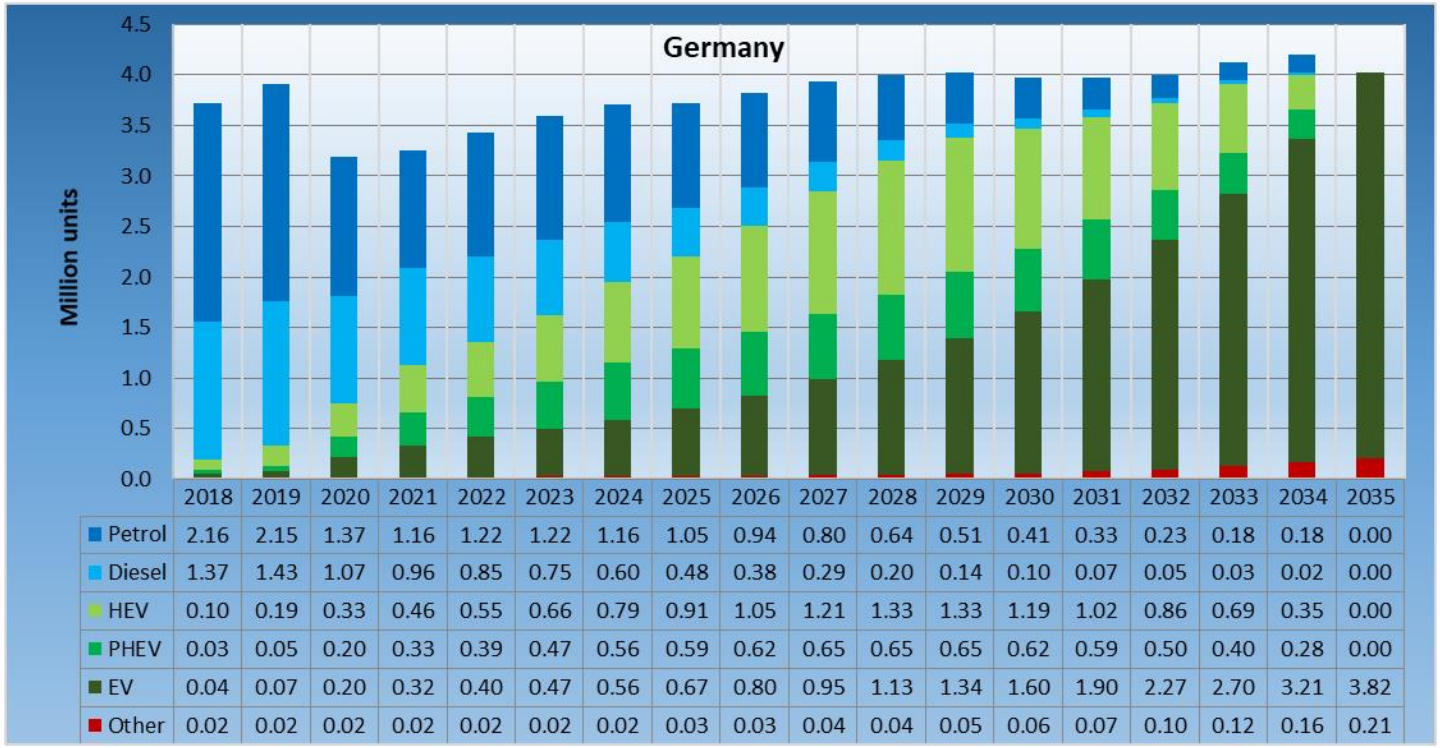
- European vehicle production reached 18m units in 2019 but declined 23.5% to 13.77m units in 2020 in the wake of the Covid crisis
- Production will rise by just 5.5% in 2021 and 4.8% in 2022 restrained in part by lower demand, but also by the ongoing semiconductor chip shortages and ongoing impacts from the pandemic, including labour shortages. Shortages of other materials, such as steel, foam, leather, rubber, are also affecting the production supply chain. Only by 2025 will production volumes recover to pre-pandemic volumes of 18m units
- Part of the explanation for the slow recovery in volumes is that OEMs are emphasising value over volume, prioritising higher margin vehicles, such as SUV and premium models, rather than pursuing high sales volumes with lower margin, especially at a time of supply chain shortages
- With export markets – notably US and China – of considerable importance, there will continue to be some production beyond 2035 in Europe of both petrol and diesel vehicles in the light vehicle segment
- However, as China aims to be carbon neutral by 2060, and the US re-joins the Paris Agreement, the overriding export demand will also move to greener vehicles, although this is not likely to be at the same pace as in Europe

04

National Powertrain Outlooks 2021-2035

Demand & Production Forecasts for 5 Largest European Markets

Germany Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	2.16	2.15	1.37	1.16	1.22	1.22	1.16	1.05	0.94	0.80	0.64	0.51	0.41	0.33	0.23	0.18	0.18	0.00
Diesel	1.37	1.43	1.07	0.96	0.85	0.75	0.60	0.48	0.38	0.29	0.20	0.14	0.10	0.07	0.05	0.03	0.02	0.00
HEV	0.10	0.19	0.33	0.46	0.55	0.66	0.79	0.91	1.05	1.21	1.33	1.33	1.19	1.02	0.86	0.69	0.35	0.00
PHEV	0.03	0.05	0.20	0.33	0.39	0.47	0.56	0.59	0.62	0.65	0.65	0.65	0.62	0.59	0.50	0.40	0.28	0.00
EV	0.04	0.07	0.20	0.32	0.40	0.47	0.56	0.67	0.80	0.95	1.13	1.34	1.60	1.90	2.27	2.70	3.21	3.82
Other	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.10	0.12	0.16	0.21

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Germany's slow but definite change

Following a 18.4% fall in sales in 2020, overall volumes will only recover 2% in 2021, 5.6% in 2022 and take until 2025 to recover to previous 2019 volumes. EV and hybrid demand has experienced a surge in 2020 and early 2021, with pure ICE sales set to fall to 65% in 2021. Germany has so far not set a date to ban ICEs, but an EU ban would overrule this

Economic Indicators

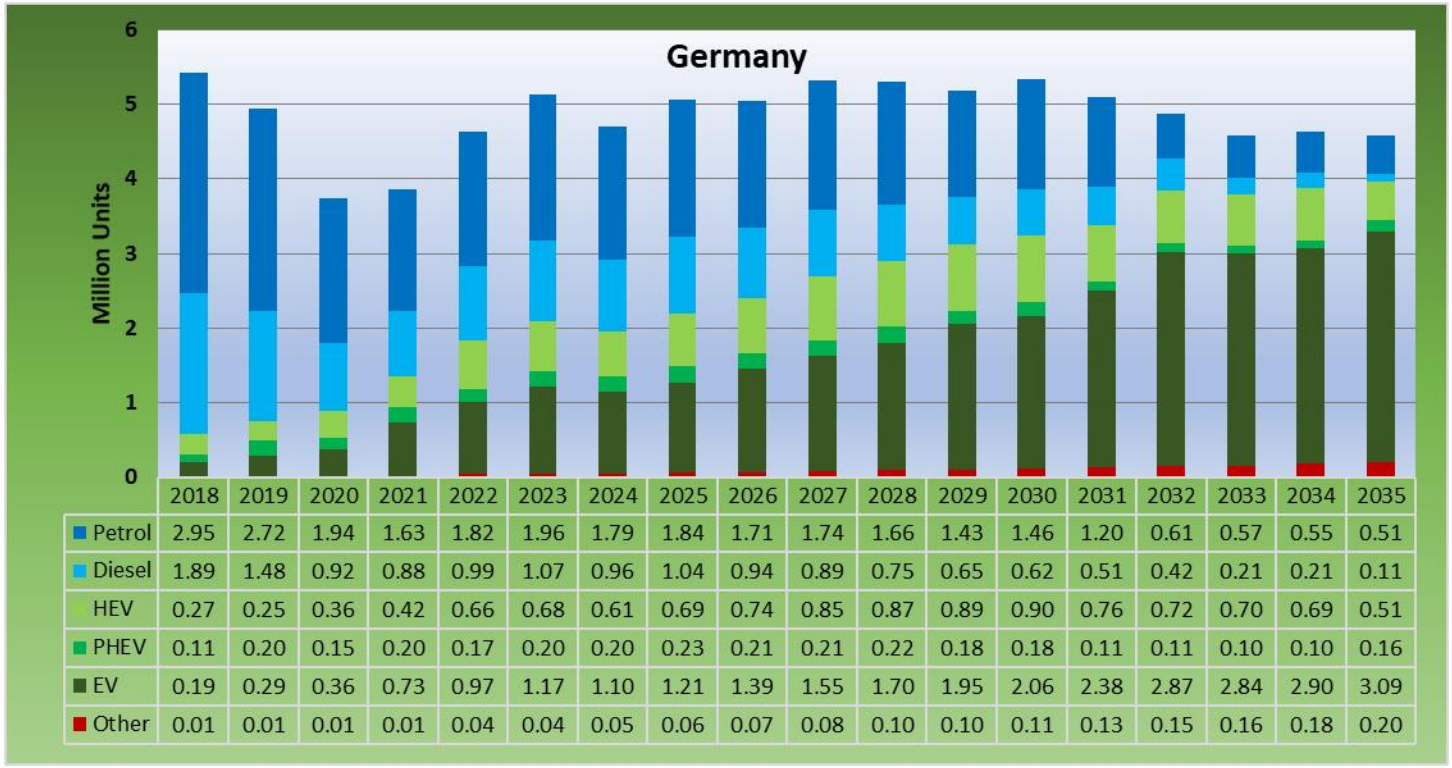
GDP growth	Expected 1% to 1.5% GDP growth
GDP per capita	High $52,200 (€43,850) GDP per capita, which is likely to boost EV uptake
Unemployment	Low 4.2% rate but could move higher as government support reduces
Population	83.1m population expected to increase by only 0.3m by 2030 to 83.4m
Motorisation rate	575 per 1,000 people is around average for Europe
Covid rates	Low cases, moderate-to-high vaccination

Powertrain Indicators

ICE bans	Powerful auto lobby opposes ICE ban. But EU-wide ICE ban likely for 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	EVs up to €9,000, Hybrids €6,750, zero tax
Consumer acceptance	Some consumer scepticism against EVs, countered by a surge in sales in 2020 & 2021
Charging Infrastructure	1,014 cars per charger is below average

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

Germany Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	2.95	2.72	1.94	1.63	1.82	1.96	1.79	1.84	1.71	1.74	1.66	1.43	1.46	1.20	0.61	0.57	0.55	0.51
Diesel	1.89	1.48	0.92	0.88	0.99	1.07	0.96	1.04	0.94	0.89	0.75	0.65	0.62	0.51	0.42	0.21	0.21	0.11
HEV	0.27	0.25	0.36	0.42	0.66	0.68	0.61	0.69	0.74	0.85	0.87	0.89	0.90	0.76	0.72	0.70	0.69	0.51
PHEV	0.11	0.20	0.15	0.20	0.17	0.20	0.20	0.23	0.21	0.21	0.22	0.18	0.18	0.11	0.11	0.10	0.10	0.16
EV	0.19	0.29	0.36	0.73	0.97	1.17	1.10	1.21	1.39	1.55	1.70	1.95	2.06	2.38	2.87	2.84	2.90	3.09
Other	0.01	0.01	0.01	0.01	0.04	0.04	0.05	0.06	0.07	0.08	0.10	0.10	0.11	0.13	0.15	0.16	0.18	0.20

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other supply chain shortages	Moderate	Mild
Export markets	Strong	Strong
EV plant capacity	Moderate	Good

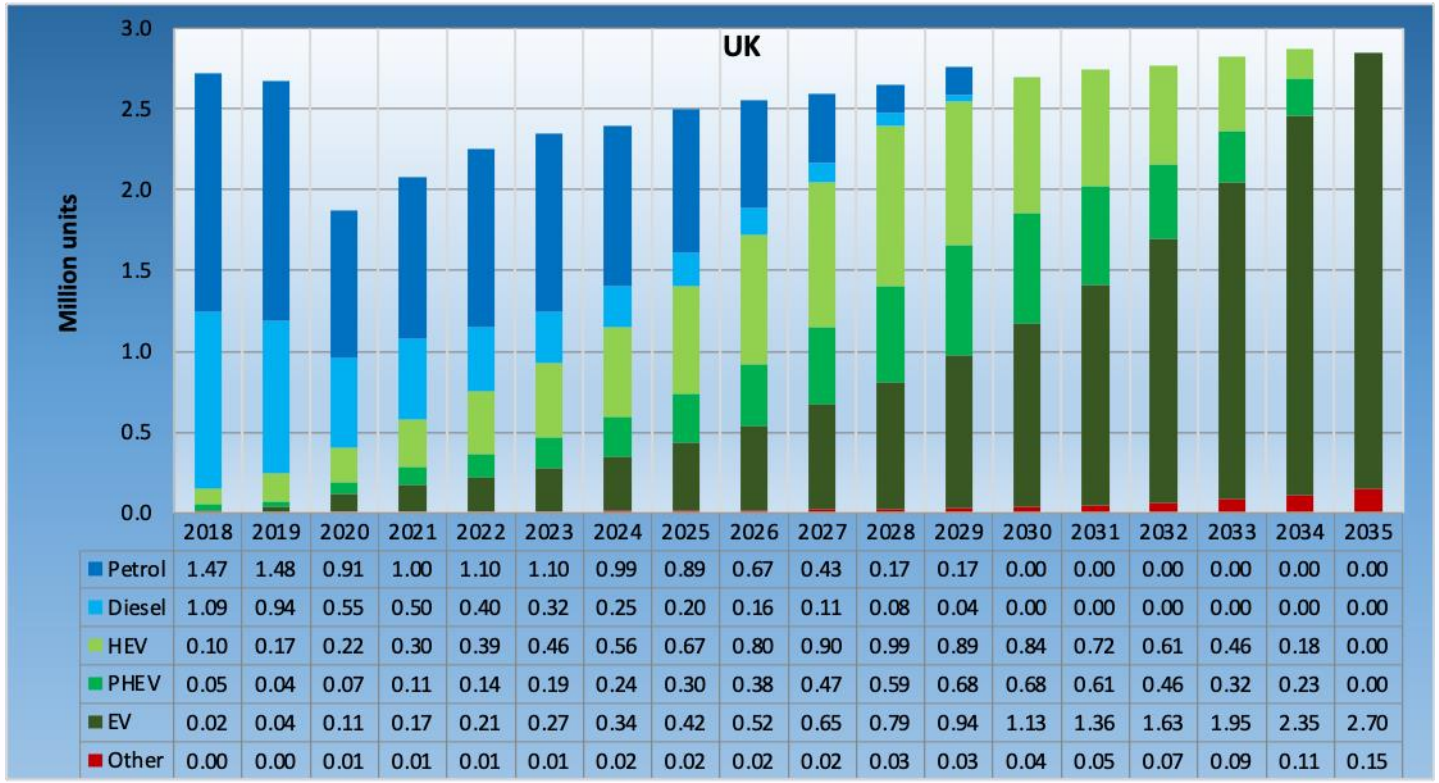
Germany Production Export Facts (2019)	
LV Production Exported	75%
- Share of exports within Europe	44%
- Share of exports to China	14.9%
- Share of exports to USA	12%
- Share of exports to UK	10.6%
- Share of exports to France	6.6%

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

Electrification could hit German exports

LV Production in Germany declined 24.35% in 2020 and is expected to rise only 3.36% in 2021 as a result of chip and materials shortages. Production will rise by 20% in 2022 to make up for the lost production volumes. German production is meanwhile in the midst of transformation, as output of pure ICE vehicles will reduce from around 60% to less than 10% by 2035, mainly for exports. As the US re-joins the Paris Agreement and China adheres to a 2060 carbon neutral target, share of ICE vehicles will fall further. German production will likely witness shocks from the finality of the EU's 2035 ban of ICE vehicles sales. We expect EV production to be over 70% of LV production in Germany by 2035. Other factors, such as shared ownership, will see production in Germany reduce further, but with more focus on premium vehicles. Exports are set to remain strong for EVs, but production will decline as ICE vehicles are withdrawn

UK Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	1.47	1.48	0.91	1.00	1.10	1.10	0.99	0.89	0.67	0.43	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Diesel	1.09	0.94	0.55	0.50	0.40	0.32	0.25	0.20	0.16	0.11	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00
HEV	0.10	0.17	0.22	0.30	0.39	0.46	0.56	0.67	0.80	0.90	0.99	0.89	0.84	0.72	0.61	0.46	0.18	0.00
PHEV	0.05	0.04	0.07	0.11	0.14	0.19	0.24	0.30	0.38	0.47	0.59	0.68	0.68	0.61	0.46	0.32	0.23	0.00
EV	0.02	0.04	0.11	0.17	0.21	0.27	0.34	0.42	0.52	0.65	0.79	0.94	1.13	1.36	1.63	1.95	2.35	2.70
Other	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.07	0.09	0.11	0.15

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

A long, winding road to recovery in the UK

After a 30% fall in volumes in 2020, overall volumes will recover 11.3% in 2021, and 8.4% in 2022, taking until 2029 to recover to 2019 volumes. Post-Brexit trade barriers with the EU are a concern for the economy. The UK has shown a strong acceptance of EVs, which will support the transition. Population growth and low unemployment should support recovery.

Economic Indicators

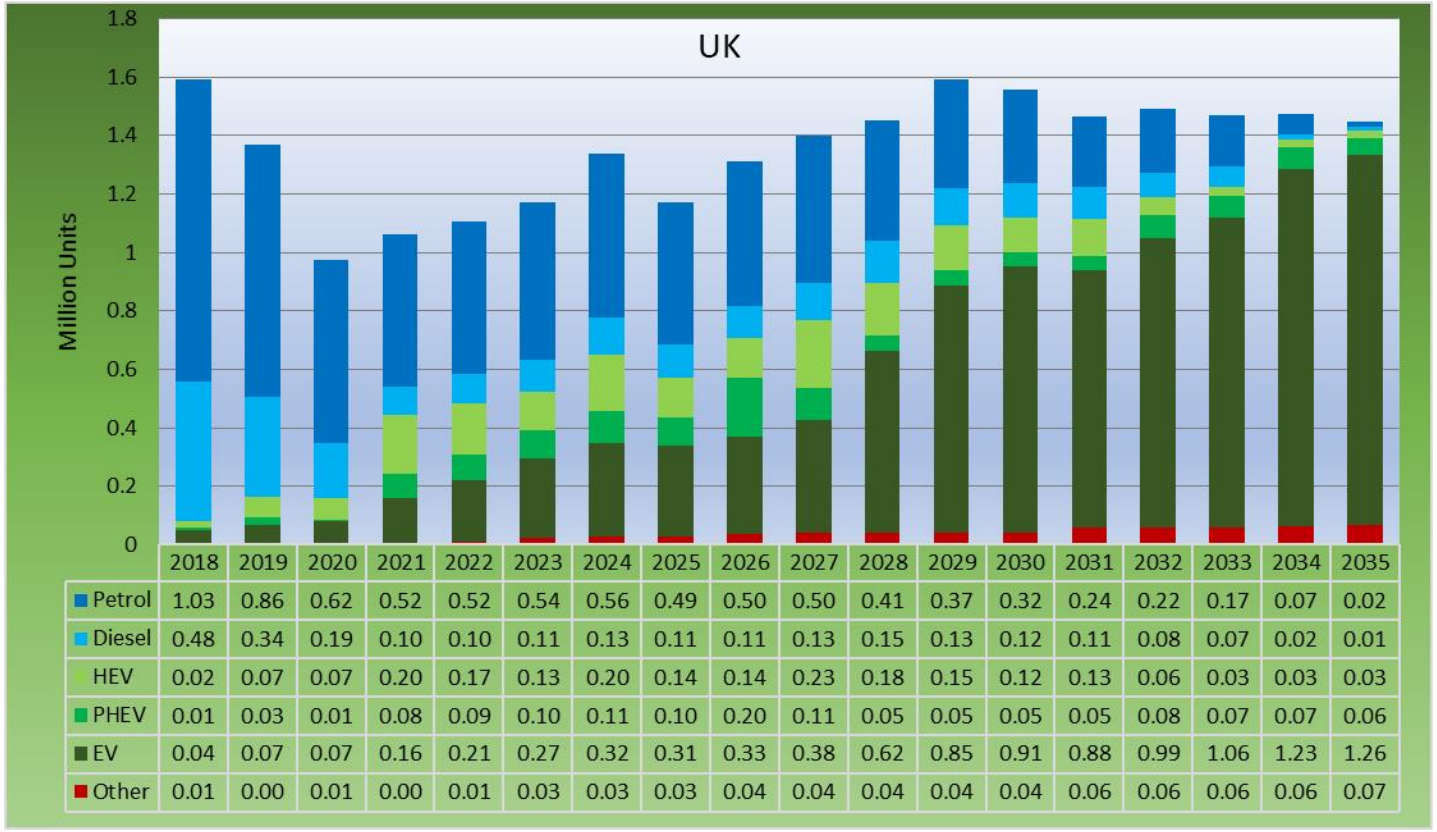
GDP growth	Expected 1.5% to 2% GDP growth
GDP per capita	$45,500 (€38,200) above average for the EU and this is known to be linked to EV uptake
Unemployment	5.1% in 2021 but could move higher as government support reduces
Population	66.7m population will rise strongly by 3.4m in 2030 stimulating vehicle demand
Motorisation rate	528 per 1,000 people is below the EU average of 569
Covid rates	High cases, high vaccination

Powertrain Indicators

ICE bans	2030 for pure ICE, 2035 for all hybrids aligning with the EU ICE ban likely for 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	£2,500 EV on cars <£35,000. Zero road tax
Consumer acceptance	Moderate acceptance of EVs
Charging Infrastructure	1,039 cars per charger is below average

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

UK Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	1.03	0.86	0.62	0.52	0.52	0.54	0.56	0.49	0.50	0.50	0.41	0.37	0.32	0.24	0.22	0.17	0.07	0.02
Diesel	0.48	0.34	0.19	0.10	0.10	0.11	0.13	0.11	0.11	0.13	0.15	0.13	0.12	0.11	0.08	0.07	0.02	0.01
HEV	0.02	0.07	0.07	0.20	0.17	0.13	0.20	0.14	0.14	0.23	0.18	0.15	0.12	0.13	0.06	0.03	0.03	0.03
PHEV	0.01	0.03	0.01	0.08	0.09	0.10	0.11	0.10	0.20	0.11	0.05	0.05	0.05	0.05	0.08	0.07	0.07	0.06
EV	0.04	0.07	0.07	0.16	0.21	0.27	0.32	0.31	0.33	0.38	0.62	0.85	0.91	0.88	0.99	1.06	1.23	1.26
Other	0.01	0.00	0.01	0.00	0.01	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.07

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other shortages	Moderate	Nil
Export markets	Strong	Strong
EV plant capacity	Developing	Good

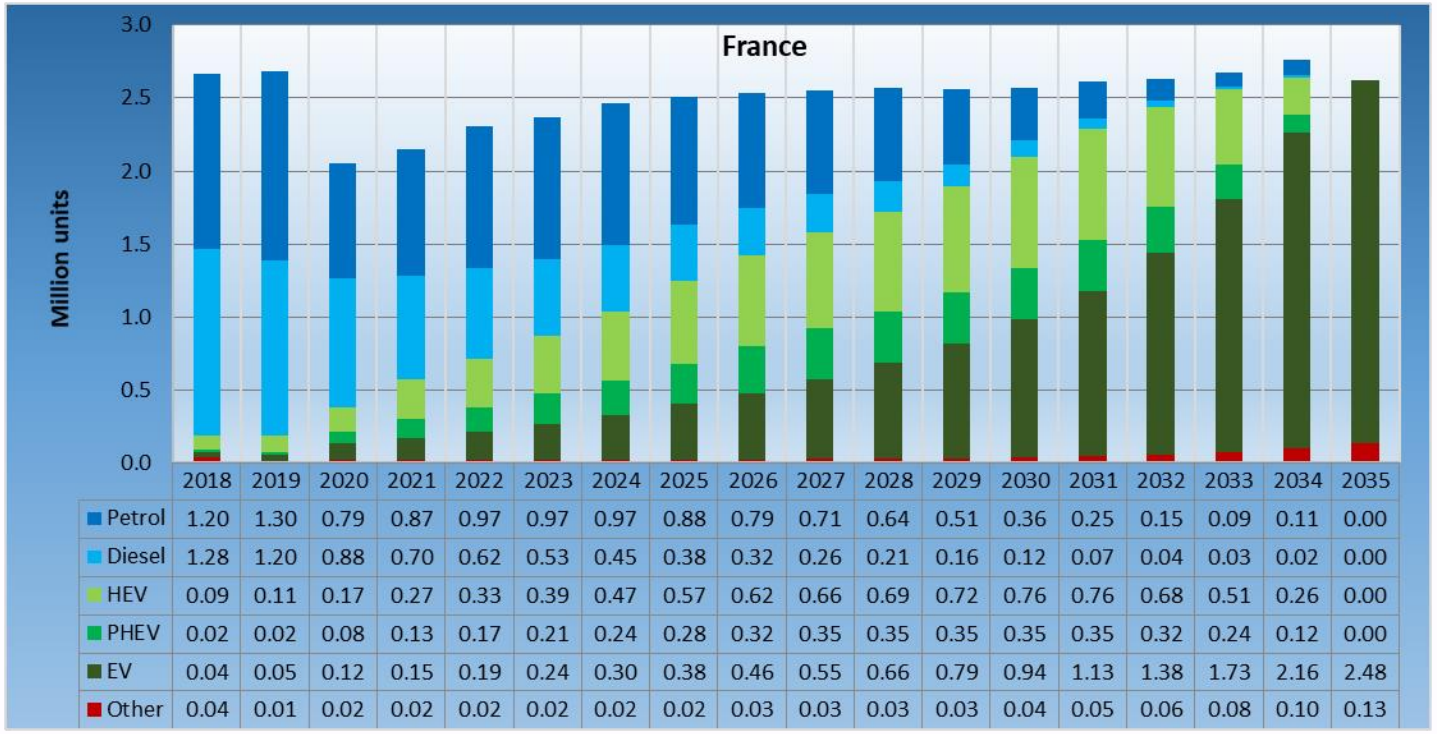
UK Production Export Facts (YTD 2021)	
LV Production Exported	83.3%
- Share of exports within Europe	54%
- Share of exports to USA	18.3%
- Share of exports to China	7.85%

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

Building back in Britain with electrified vehicles

Following a 28.86% decline in production in 2020, UK output is set to rise 9.18% in 2021. The shock of Covid-19 plus Brexit have resulted in a steep decline in local production, but OEMs have announced new production mandates for the UK helping to strengthen the outlook, especially for EV production under Nissan, Jaguar Land Rover and Stellantis. The UK government is also set to push hydrogen fuel cell vehicles with further production announcements expected at the COP26 summit later in 2021

France Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	1.20	1.30	0.79	0.87	0.97	0.97	0.97	0.88	0.79	0.71	0.64	0.51	0.36	0.25	0.15	0.09	0.11	0.00
Diesel	1.28	1.20	0.88	0.70	0.62	0.53	0.45	0.38	0.32	0.26	0.21	0.16	0.12	0.07	0.04	0.03	0.02	0.00
HEV	0.09	0.11	0.17	0.27	0.33	0.39	0.47	0.57	0.62	0.66	0.69	0.72	0.76	0.76	0.68	0.51	0.26	0.00
PHEV	0.02	0.02	0.08	0.13	0.17	0.21	0.24	0.28	0.32	0.35	0.35	0.35	0.35	0.35	0.32	0.24	0.12	0.00
EV	0.04	0.05	0.12	0.15	0.19	0.24	0.30	0.38	0.46	0.55	0.66	0.79	0.94	1.13	1.38	1.73	2.16	2.48
Other	0.04	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.08	0.10	0.13

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Fast on the uptake for EVs, but tempered by high unemployment in France

After a 23.3% fall in volumes in 2020, volumes will recover 4.7% in 2021 and 7.3% in 2022, but take until after 2030 to recover to previous 2019 volumes. Strong EV purchase incentives will drive a faster uptake of EVs, supported by charging point coverage and grants. Strong population and GDP growth are likely to be tempered by high unemployment, limiting the demand trajectory

Economic Indicators

GDP growth	Expected 1.2 to 2% GDP growth
GDP per capita	High $44.400 (€37,300) GDP per capita is known to boost EV uptake
Unemployment	High 8.4% unemployment and could rise further if government support withdrawn
Population	67.2m population expected to increase by 1.7m by 2030 to 68.9m
Motorisation rate	570 per 1,000 people is around average for Europe
Covid rates	Moderate cases, moderate vaccination

Powertrain Indicators

ICE bans	ICE ban for 2040. But EU ICE ban will override this in 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	EVs up to €6,000. PHEVs €1,000
Consumer acceptance	Generally good acceptance of EVs
Charging Infrastructure	718 cars per charger is better than European average

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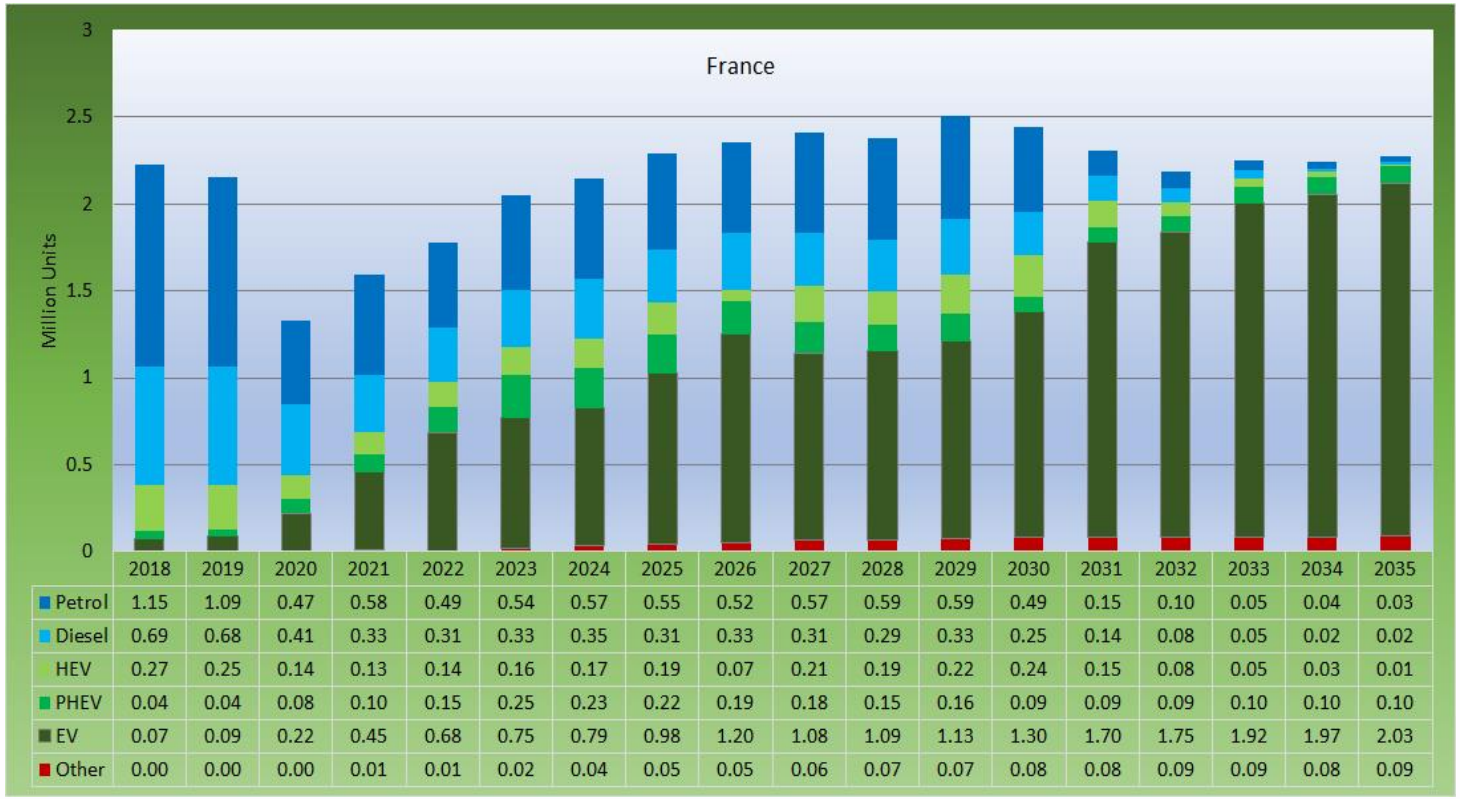
France Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	1.15	1.09	0.47	0.58	0.49	0.54	0.57	0.55	0.52	0.57	0.59	0.59	0.49	0.15	0.10	0.05	0.04	0.03
Diesel	0.69	0.68	0.41	0.33	0.31	0.33	0.35	0.31	0.33	0.31	0.29	0.33	0.25	0.14	0.08	0.05	0.02	0.02
HEV	0.27	0.25	0.14	0.13	0.14	0.16	0.17	0.19	0.07	0.21	0.19	0.22	0.24	0.15	0.08	0.05	0.03	0.01
PHEV	0.04	0.04	0.08	0.10	0.15	0.25	0.23	0.22	0.19	0.18	0.15	0.16	0.09	0.09	0.09	0.10	0.10	0.10
EV	0.07	0.09	0.22	0.45	0.68	0.75	0.79	0.98	1.20	1.08	1.09	1.13	1.30	1.70	1.75	1.92	1.97	2.03
Other	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.08	0.09

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other shortages	Moderate	Mild
Export markets	Moderate	Moderate
EV plant capacity	Developing	Good

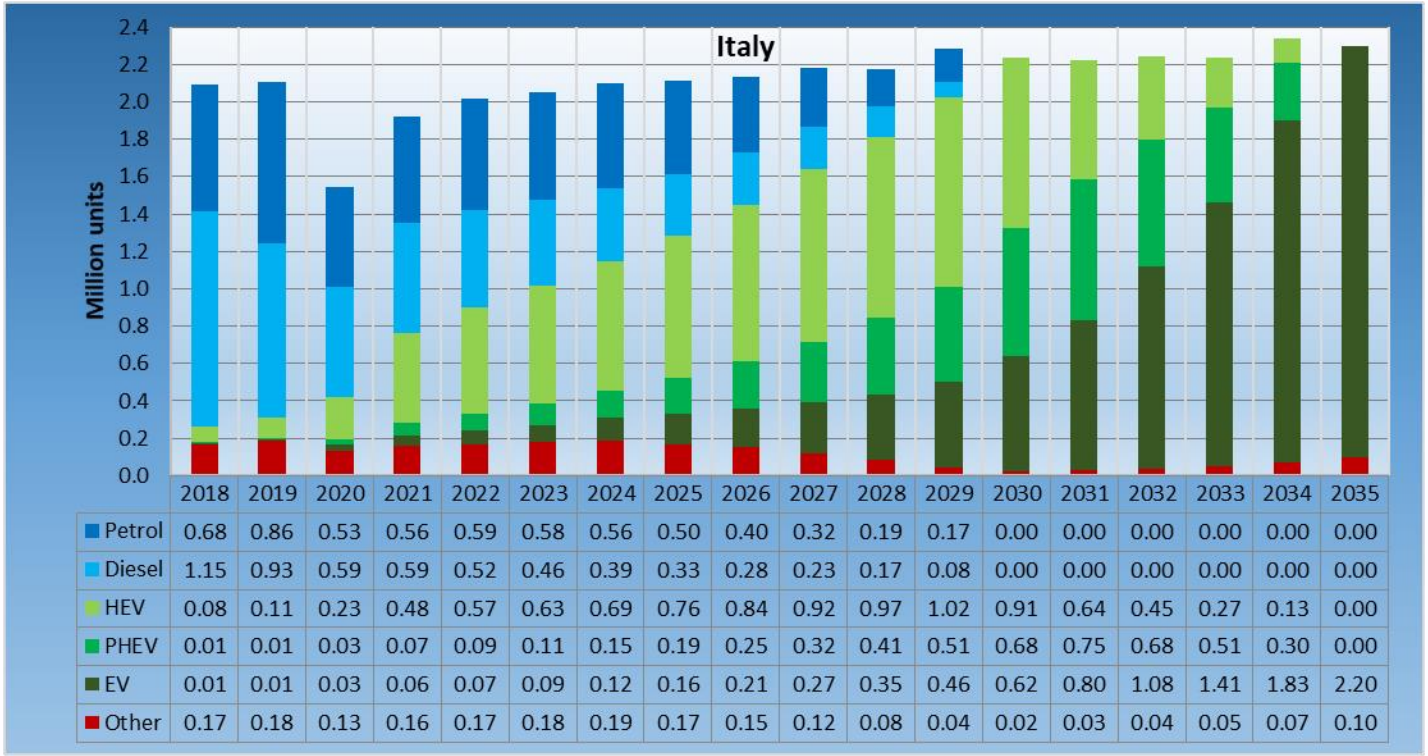
France Production Export Facts (YTD 2021)	
LV Production Exported	23%
-Share of exports within Europe	98%
- Share of exports to USA	0%
- Share of exports to China	0%

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

EVs bring production and export opportunity for French OEMs

French LV production declined by 38.48% in 2020 and in 2021 is expected to see a 20% recovery this year to 1.59m units. French production is mainly for the domestic market, but with both Renault and Stellantis announcing major EV production plans the mix is expected to steer strongly to battery electric vehicles and could support supply to Europe and beyond. Stellantis' Peugeot has stated that it will be 100% electric in 2025, while Renault is combining three plants in northern France into 'ElectriCity' where it aims to build 400,000 EVs per year by 2025. Both Renault and Stellantis aim to push exports and to gain from stronger EV demand in Europe

Italy Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	0.68	0.86	0.53	0.56	0.59	0.58	0.56	0.50	0.40	0.32	0.19	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Diesel	1.15	0.93	0.59	0.59	0.52	0.46	0.39	0.33	0.28	0.23	0.17	0.08	0.00	0.00	0.00	0.00	0.00	0.00
HEV	0.08	0.11	0.23	0.48	0.57	0.63	0.69	0.76	0.84	0.92	0.97	1.02	0.91	0.64	0.45	0.27	0.13	0.00
PHEV	0.01	0.01	0.03	0.07	0.09	0.11	0.15	0.19	0.25	0.32	0.41	0.51	0.68	0.75	0.68	0.51	0.30	0.00
EV	0.01	0.01	0.03	0.06	0.07	0.09	0.12	0.16	0.21	0.27	0.35	0.46	0.62	0.80	1.08	1.41	1.83	2.20
Other	0.17	0.18	0.13	0.16	0.17	0.18	0.19	0.17	0.15	0.12	0.08	0.04	0.02	0.03	0.04	0.05	0.07	0.10

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Italy's early recovery is likely to slow as market transitions to electric vehicles

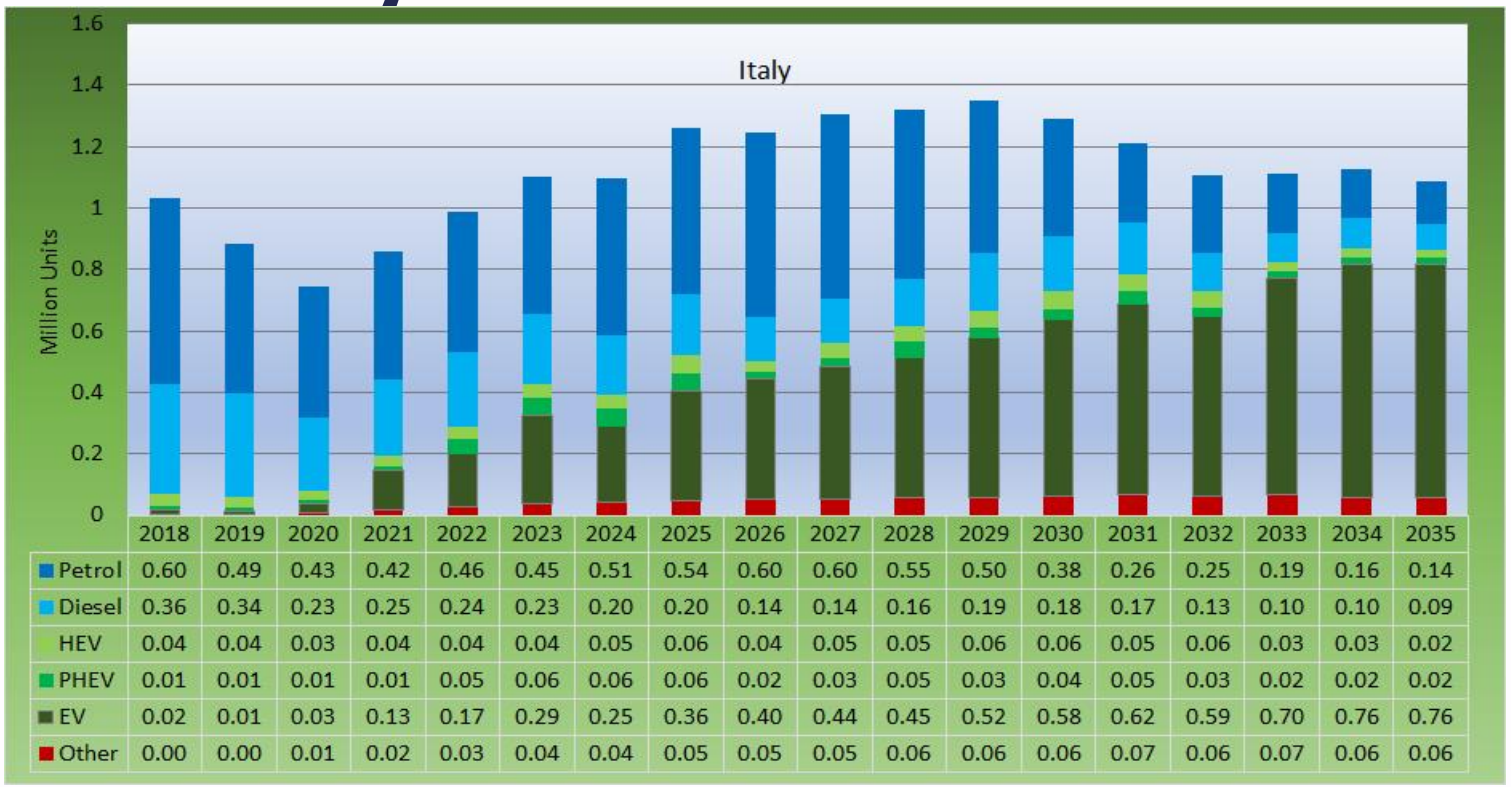
The severity of the Covid crisis and other economic headwinds mean Italian vehicle sales experienced a 26.7% fall in volumes in 2020. However early 2021 data suggests volumes will recover 24.2% in 2021, but the bounce back will slow to 5.1% growth in 2022, taking until 2025 to recover to previous 2019 volumes. However, Italy's low EV sales rate means it will need time to transition. Italy also has an above average use of Natural Gas Vehicles for CV.

Economic Indicators	
GDP growth	Low GDP trend growth of <1% will restrain vehicle demand growth
GDP per capita	Moderate $38,600 (€32,420) GDP per capita is around average for Europe
Unemployment	High 10% unemployment undermines consumer confidence for big ticket items
Population	60.3m population declines by 0.4m by 2030
Motorisation rate	655 per 1,000 people is one of the highest in Europe
Covid rates	Low cases, moderate-to-high vaccination

Powertrain Indicators	
ICE bans	2030, though likely to be pure ICE only, allowing HEV till 2035 and aligning with the EU ICE ban for 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	EVs €4,000 - €8,000. PHEV €1,500 - €4,500
Consumer acceptance	Italy has one of the lowest levels of EV sales in western Europe
Charging Infrastructure	2,273 cars per charger is well below average

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

Italy Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	0.60	0.49	0.43	0.42	0.46	0.45	0.51	0.54	0.60	0.60	0.55	0.50	0.38	0.26	0.25	0.19	0.16	0.14
Diesel	0.36	0.34	0.23	0.25	0.24	0.23	0.20	0.20	0.14	0.14	0.16	0.19	0.18	0.17	0.13	0.10	0.10	0.09
HEV	0.04	0.04	0.03	0.04	0.04	0.04	0.05	0.06	0.04	0.05	0.05	0.06	0.06	0.05	0.06	0.03	0.03	0.02
PHEV	0.01	0.01	0.01	0.01	0.05	0.06	0.06	0.06	0.02	0.03	0.05	0.03	0.04	0.05	0.03	0.02	0.02	0.02
EV	0.02	0.01	0.03	0.13	0.17	0.29	0.25	0.36	0.40	0.44	0.45	0.52	0.58	0.62	0.59	0.70	0.76	0.76
Other	0.00	0.00	0.01	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.06	0.07	0.06	0.06

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other shortages	Moderate	Mild
Export markets	Strong	Strong
EV plant capacity	Developing	Moderate

Italy Production Export Facts (YTD 2021)	
LV Production Exported	68%
-Share of exports within Europe	42%
-Share of exports to USA	8%
-Share of exports to China	1.9%

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

Stellantis investment could help revive Italian production and exports

In 2020 Italy witnessed a 15% decline in LV production and in 2021 is expected to almost recover this year, although supply shortages may hamper the expected bounce back. The Covid-19 crisis has, however, accelerated long-term declining vehicle production in Italy. Stellantis investment could stem the bleeding. The carmaker is planning to grow exports of Jeep and Fiat to new markets and is also planning to develop its Melfi plant into an EV hub. While we expect Italy to see recovery in production and exports beyond pre-Covid levels, it looks less likely to maintain this momentum through the transition to electric vehicles. The phasing out of ICE vehicles after 2030 is likely to result in a decline in production in Italy especially as export demand for ICEs fall off

Spain Demand Outlook

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	0.76	0.78	0.43	0.47	0.59	0.62	0.62	0.62	0.56	0.47	0.33	0.23	0.16	0.11	0.08	0.06	0.08	0.00
Diesel	0.67	0.54	0.38	0.38	0.34	0.30	0.26	0.21	0.16	0.13	0.11	0.08	0.07	0.05	0.04	0.03	0.02	0.00
HEV	0.08	0.11	0.14	0.21	0.25	0.30	0.36	0.44	0.52	0.63	0.75	0.83	0.79	0.75	0.67	0.50	0.30	0.00
PHEV	0.01	0.01	0.02	0.04	0.05	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.21	0.19	0.17	0.13	0.11	0.00
EV	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.10	0.14	0.19	0.26	0.35	0.47	0.64	0.84	1.14	1.54
Other	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.03	0.04	0.06

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Spain's painful recovery and transition

Spain has been hit hard by multiple waves of the crisis. After a 31.5% fall in volumes in 2020, overall volumes will only recover 12.6% in 2021, and 12.5% in 2022, taking until 2025 to recover to 2019 volumes. Spain's low EV levels will require a longer transition, including high growth in HEVs and PHEVs, before accelerating later in the 2020s. Economic and population growth should encourage growth, but unemployment may remain a long-term brake

Economic Indicators

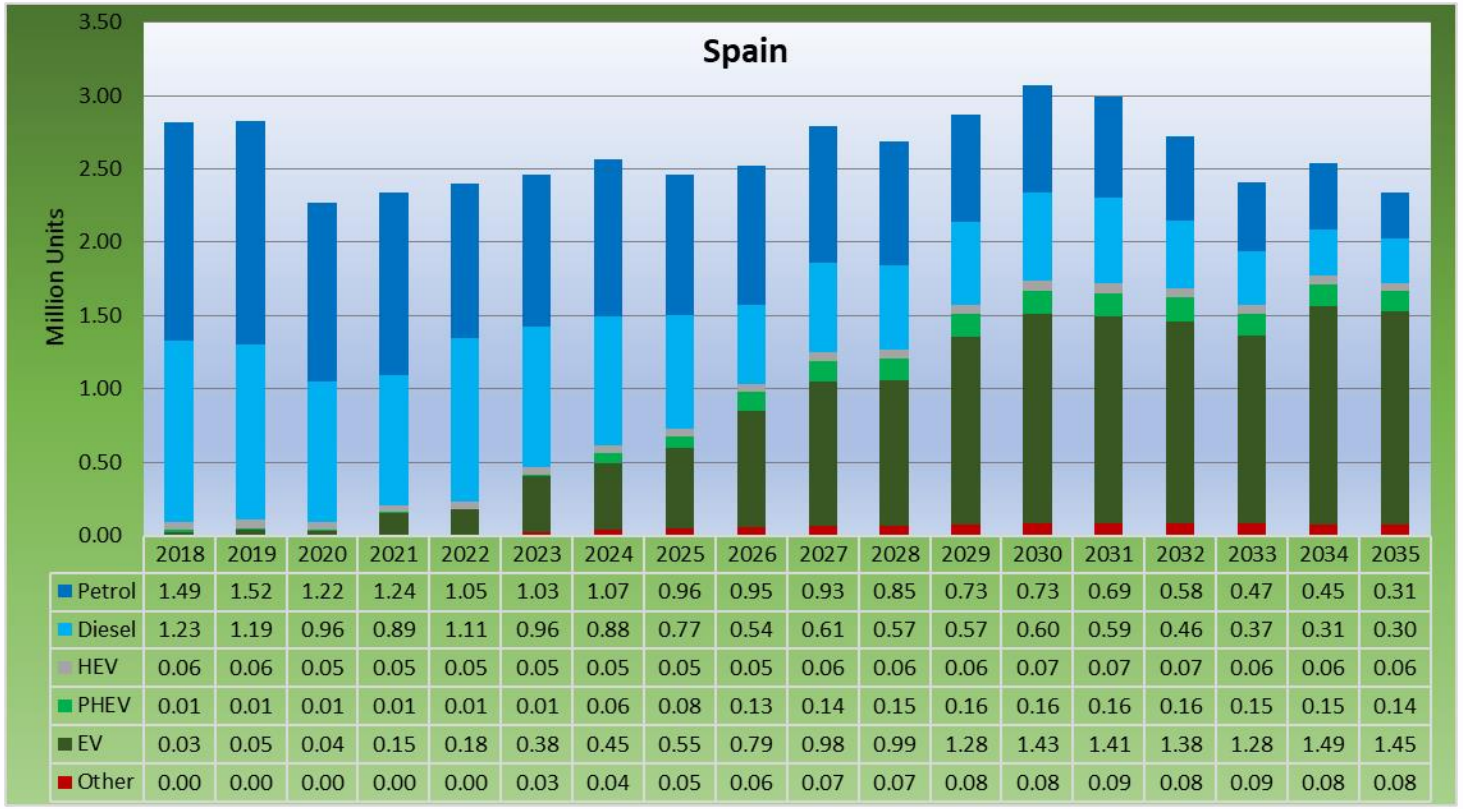
GDP growth	Trend GDP growth of 1.2% expected
GDP per capita	$39,500 (€33,180) GDP per capita is average for Europe and expected to grow strongly to $47,000 (€39,480) in 2030
Unemployment	High 15.8% unemployment is a restraint undermining consumer confidence
Population	47.3m and increasing to 46.3m by 2030
Motorisation rate	533 per 1,000 people is slightly below the EU average
Covid rates	High cases, high vaccination

Powertrain Indicators

ICE bans	2040 but EU-wide ICE ban likely for 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	For private EVs up to €5,500
Consumer acceptance	EVs up to €4,000 + €2,600 scrappage PHEVs €2,600 + €2,600 scrappage
Charging Infrastructure	3,118 cars per charger is well below average

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

Spain Production Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	1.49	1.52	1.22	1.24	1.05	1.03	1.07	0.96	0.95	0.93	0.85	0.73	0.73	0.69	0.58	0.47	0.45	0.31
Diesel	1.23	1.19	0.96	0.89	1.11	0.96	0.88	0.77	0.54	0.61	0.57	0.57	0.60	0.59	0.46	0.37	0.31	0.30
HEV	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.06
PHEV	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.08	0.13	0.14	0.15	0.16	0.16	0.16	0.16	0.15	0.15	0.14
EV	0.03	0.05	0.04	0.15	0.18	0.38	0.45	0.55	0.79	0.98	0.99	1.28	1.43	1.41	1.38	1.28	1.49	1.45
Other	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.08	0.09	0.08	0.09	0.08	0.08

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Production Factors	Short Term	Long Term
Chip shortages	Severe	Mild
Other shortages	Moderate	Mild
Export markets	Strong	Strong
EV plant capacity	Weak	Moderate

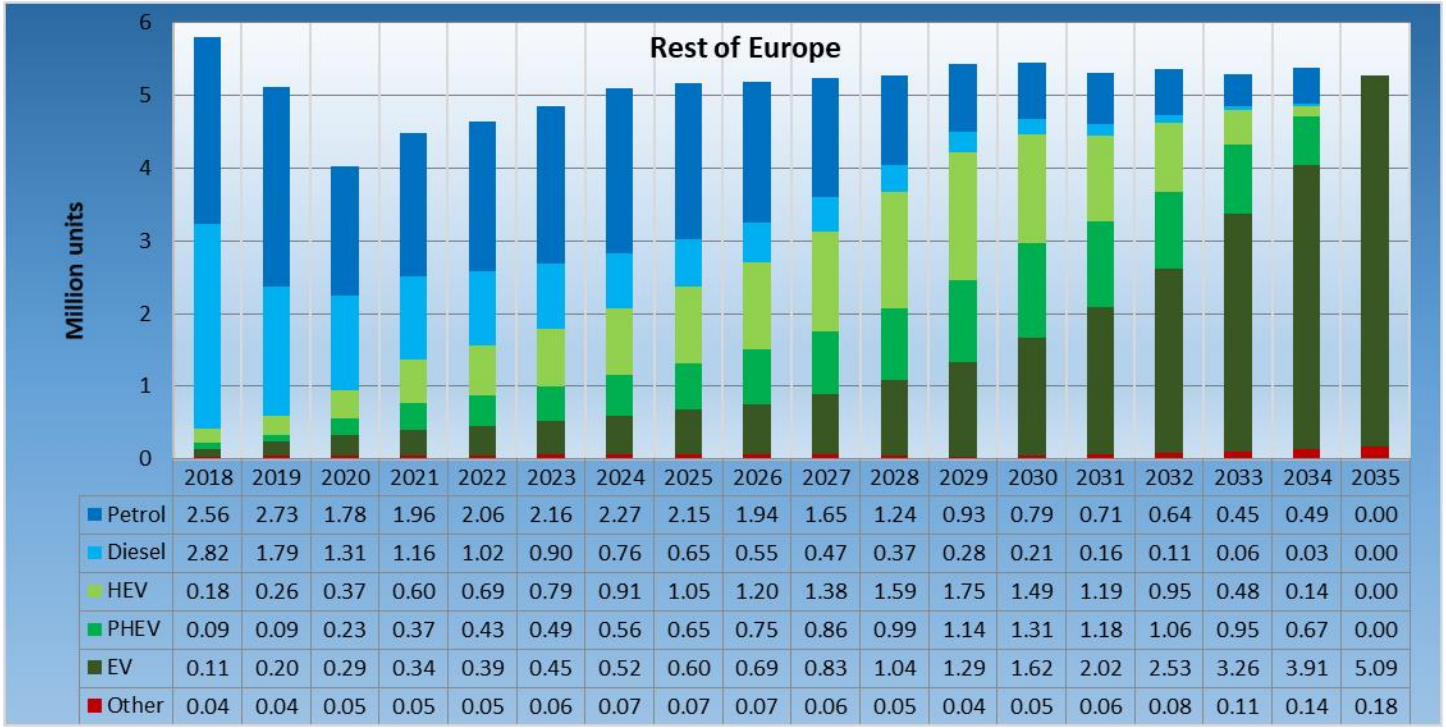
Spanish Production Export Facts (YTD 2021)	
LV Production Exported	58%
-Share of exports within Europe	72%
- Share of exports to USA	1.5%
- Share of exports to China	0.9%

Sources: OICA, ACEA, VDA, SMMT, ITC, Automotive from Ultima Media

Spanish production will depend on EV development

Spanish LV production declined 19.6% in 2020 and is currently forecast to witness a 4% annual increase this year. Spain is predominantly an ICE production base and the development of EV output elsewhere in Europe will hit volume here. However, OEMs are investing in EV production in Spain. VW will form an e-mobility hub in Spain for its subsidiary SEAT, while Ford is also likely to ramp up EV output in Spain to meet EV targets in Europe. Stellantis will use its plant in Vigo to manufacture LCVs, including the K9 for Toyota. Overall, Spanish output is unlikely to see volumes recover until its EV production takes off, however it could see declines in overall production volume as ICE vehicle volume is withdrawn after 2030.

Rest of EU Demand Outlook



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Petrol	2.56	2.73	1.78	1.96	2.06	2.16	2.27	2.15	1.94	1.65	1.24	0.93	0.79	0.71	0.64	0.45	0.49	0.00
Diesel	2.82	1.79	1.31	1.16	1.02	0.90	0.76	0.65	0.55	0.47	0.37	0.28	0.21	0.16	0.11	0.06	0.03	0.00
HEV	0.18	0.26	0.37	0.60	0.69	0.79	0.91	1.05	1.20	1.38	1.59	1.75	1.49	1.19	0.95	0.48	0.14	0.00
PHEV	0.09	0.09	0.23	0.37	0.43	0.49	0.56	0.65	0.75	0.86	0.99	1.14	1.31	1.18	1.06	0.95	0.67	0.00
EV	0.11	0.20	0.29	0.34	0.39	0.45	0.52	0.60	0.69	0.83	1.04	1.29	1.62	2.02	2.53	3.26	3.91	5.09
Other	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.06	0.05	0.04	0.05	0.06	0.08	0.11	0.14	0.18

Source: Automotive from Ultima Media, Light Vehicle Registrations (passenger + LCV)

Low EV penetration in eastern Europe, but more opportunities for growth

After a 21.2% fall in volumes in 2020, overall volumes will recover 11.1% in 2021, and 3.6% in 2022, taking until 2025 to recover to 2019 volumes. Norway, Sweden and the Netherlands have above average EV penetration rates, while most other EU countries, notably in eastern Europe, have EV sales below the EU average. The undeveloped charging infrastructure is likely to be a major restraint to EV adoption over the next decade, and therefore HEVs and PHEVs will need to fill the gap before ICE bans come into effect

Economic Indicators	
GDP growth	0.2-0.5% higher than EU 4+ UK average
GDP per capita	Much lower than the EU 4+ UK average, but growing faster
Unemployment	Unemployment rates are generally higher than the EU average
Population	189.8m (42% of EU population)
Motorisation rate	499 per 1,000 people which is below the EU average
Covid rates	Generally low rates, but potential 3rd wave starting

Powertrain Indicators	
ICE bans	EU wide ICE ban likely for 2035
CO_2 targets	95g CO_2/km in 2021, 43g in 2030, 0g in 2035
EV incentives	Most offer EV incentives of €2,000 - €7,000. PHEV €1,000 - €2,000
Consumer acceptance	Scandinavia has high EV uptake, but poorer EU countries generally cannot afford EVs
Charging Infrastructure	Apart from Norway and Sweden, charging infrastructure is relatively undeveloped

Sources: IMF, PWC, Eurostat, S&P Global, ACEA

05

Conclusions

Vehicle Logistics Faces New Products, Demand and Distribution Patterns

Electrification Will Face Many Challenges

European policy has made electrification a near requirement, but there are still many supply chain, production and consumer uncertainties

- Demand for lithium batteries could outstrip supply despite the huge investment and expansion of **battery gigafactories** across Europe, with challenges across the extended electric vehicle and battery supply chain
- **Charging infrastructure** may struggle to keep pace with EV growth, especially for rapid chargers. Although there is substantial investment and government support, current charger availability for vehicle in Europe is still very low
- **Consumer acceptance** may be a major barrier. The early adopters are easy to convince, the bulk of mainstream drivers may be more difficult
- Governments will at some point be forced to phase out **EV purchase and usage incentives** – which could slow the growth of EV sales
- Once EVs become mainstream, current **petrol/diesel fuel tax revenues will have to be replaced** with something, including further taxes on electric vehicles. For example, the UK and some EU governments have stated their intention that they will need to introduce road charging and / or start taxing the electricity used by EVs
- **Technological progress** such as lithium-sulphur batteries, or solid-state batteries are likely to supercede lithium-ion batteries, and may add further complexity to the overall powertrain mix
- And in the medium to longer term, **hydrogen fuel cell vehicles (FCV)** are likely to be the only viable option for larger commercial and heavy goods vehicles – but the refueling infrastructure does not exist yet, although the EU has committed to creating a hydrogen infrastructure with refuelling points every 150km of highway – which will themselves need to be refuelled. It must be noted though that any hydrogen refuelling infrastructure Is an utterly different prospect to EV charging infrastructure where the extensive national grid is already in place and it's relatively simple to tap into this and install a row of rapid chargers, install a home charger, or even just convert a roadside lamp post.

Vehicle Logistics Implications

Logistics providers face major transformation in the next decade, including new vehicle types and medium term reductions in sales and production

1. Changing products

- The **'Fit for 55'** proposal **rapidly accelerates electrification** of new vehicles sales across the EU, which will force faster adaption in the supply chain
- EVs are **~200kg heavier** than comparable ICE vehicles **and getting heavier**, which reduce truckload factors (and also affecting some ships), especially without increasing allowable weights and dimensions. This weight issue goes alongside a general trend towards **larger vehicles**
- The profusion of new powertrain types (MHEV, HEV, PHEV, EV, FCV, as well as potential future battery variations) creates **more complexity** for logistics operators including different **requirements**, **regulations** and **training**
- **Charging and refueling infrastructure** needs to be considered at ports, distribution hubs and storage facilities

2. Lower volumes, higher value

- **New vehicle sales volumes are unlikely to recover to previous 2019 volumes** until the end of the decade. Europe's **demand is relatively flat** and saturated. At the same time, vehicles are getting **increasingly expensive**, partly as a result of new features, safety and emissions requirements
- While European vehicle production will see some recovery thanks to export growth opportunities, in the longer term the shift to electrification is likely to contribute to a l**evelling off in production volumes**
- To maintain profitability, **OEMs are prioritising value over volume**, with more production and distribution prioritised based on higher margin and value opportunities. These shifts in output will have an impact on supply chain and logistics planning

Vehicle Logistics Implications

Further shifts towards mobility as a service are likely to be part of changing distribution and sales models that will impact vehicle logistics

3. Changing ownership models

- **Leasing periods are being extended** up to 5 years from 2-3 years – potentially reducing new vehicle volumes
- **Shared mobility** could ultimately reduce sales volumes in the longer term with fewer cars required per capita
- **Subscriptions** although currently very limited, are likely to change the dynamics further
- As emissions tightening and ICE bans approach, a temporary **ICE 'pull forward'** from consumers not wanting to go electric could lead to consumers hanging onto ICE vehicles longer and lead to lower overall sales in the longer term
- The expected low maintenance costs of EVs could impact residual values and lead consumers to keep them longer than ICE vehicles

4. Changing distribution models

- **Finished vehicle logistics** is already seeing changes as OEMs introduce more online sales, as well as direct sales in an 'agency model'
- Potential end of **Motor Vehicle Block Exemption Regulation (MVBER**) in 2023 could majorly impact car dealerships
- **Car dealerships** will increasingly become maintenance and service centres alongside physical showrooms, with the sales process occurring online. Some OEMs, such as Volvo Cars, are already planning to sell **EVs online only**
- **FVL providers will deliver fewer vehicles directly to dealerships,** with more deliveries to consumers or businesses. There are likely to be new opportunities in PDI and inspection, as well as opportunities to work more directly with online aggregators, distributors and auction firms

Glossary

Automotive terms used throughout this report	
AEB	Autonomous Emergency Braking
AGR	Annual Growth Rate
CAGR	Compound Annual Growth Rate
CO2	Carbon Dioxide
CV	Commercial Vehicles
EFTA	European Free Trade Area
EU	European Union
FCV	Fuel Cell Vehicle
FVL	Finished Vehicle Logistics
GDP	Gross Domestic Product
HEV	Hybrid Electric Vehicle
HGV	Heavy Goods Vehicles
ICE	Internal Combustion Engine
KWh	Kilowatt Hours
LCV	Light Commercial Vehicles
LV	Light Vehicles (PC+LCV)
MHEV	Mild Hybrid Electric Vehicle
MVBER	Motor Vehicle Block Exemption Regulation
OEM	Original Equipment Manufacturer
PC	Passenger Cars
PDI	Pre-Delivery Inspection
PHEV	Plug-In Hybrid Electric Vehicle

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