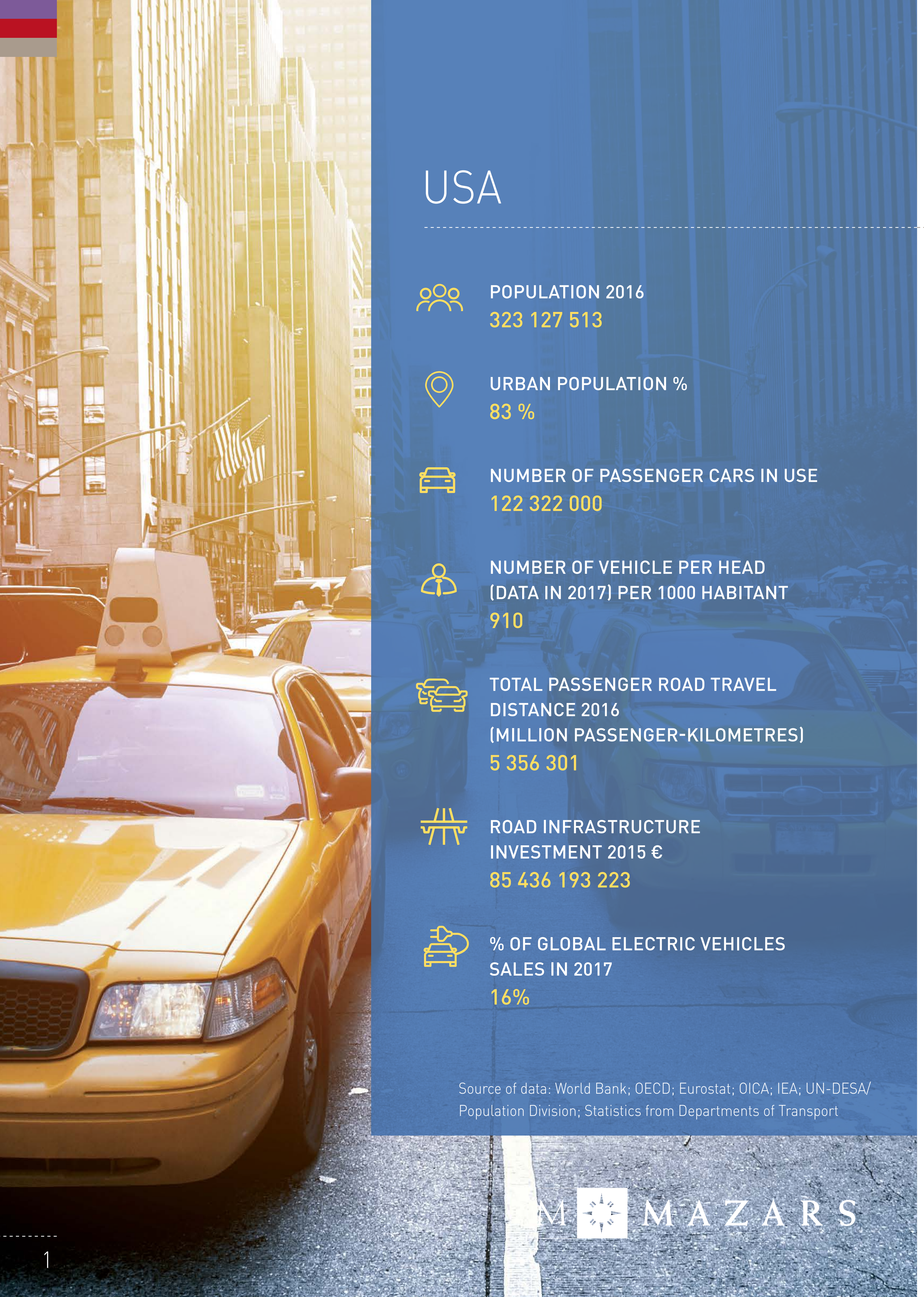

USA

POPULATION 2016
323 127 513

URBAN POPULATION %
83 %

NUMBER OF PASSENGER CARS IN USE
122 322 000

NUMBER OF VEHICLE PER HEAD (DATA IN 2017) PER 1000 HABITANT
910

TOTAL PASSENGER ROAD TRAVEL DISTANCE 2016 (MILLION PASSENGER-KILOMETRES)
5 356 301

ROAD INFRASTRUCTURE INVESTMENT 2015 €
85 436 193 223

% OF GLOBAL ELECTRIC VEHICLES SALES IN 2017
16%

Source of data: World Bank; OECD; Eurostat; OICA; IEA; UN-DESA/ Population Division; Statistics from Departments of Transport

MAZARS

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Senior Manager, Mazars USA

How the US can hedge its bets on sustainable mobility?

Jeremy Rice, Senior Manager, Mazars USA, looks at how the US automotive industry can use geography and demographics to develop focused sustainable mobility solutions that cater more specifically to consumer needs and preference.

While the US is the location of choice for testing on autonomous driving and is home to tech giants such as Tesla, Google and Uber who are taking the lead on shaping the sustainable mobility landscape, the picture for the traditional US automotive industry is less than clear.

With large combustion engine SUVs still the best selling vehicles in the US, OEMs are struggling to find an approach that takes advantage of cutting edge thinking on sustainable mobility development, while at the same time keeping Wall Street happy. Conscious that the sustainable winds of change are blowing stronger, Ford has recently announced an $11bn investment program in electric vehicles by 2022, which more than doubles its previous commitment. General Motors has already seen growing, albeit small, interest in its electric vehicle (EV) offering, the Chevy Bolt, and has announced similar intentions to increase its electric and hybrid fleet. But while sustainable mobility momentum is picking up at company level, taking into account the geographical make up and demographics of the US is key to catering for consumer needs and preference.

ARE WE THERE YET?

Despite a decrease in engine cylinder size over the past 10 years, the market for larger vehicles such as SUV/Crossovers has never been stronger. This is not surprising based on the sheer size of the US, where 97% of land is rural. Interstate driving needs require vehicles that have the power and capacity not only to cope with very long distances but often rugged driving conditions, which is why SUVs are a popular choice. For EVs to match their combustion engine counterparts, significant investment in infrastructure and continued development in longer life battery technology is required. OEMs that can achieve this will be in a better position to convince the American public that EVs are both a viable and reliable alternative.

AN URBAN VERSUS RURAL STRATEGY

While Ford's F150 pick-up truck is America's best-selling vehicle, smaller cars are gaining popularity in more densely populated cities, particularly on the coasts. This gives a potential market for EVs from younger city-based consumers who use cars to commute to work and prefer to fly for longer trans-America journeys. With only 80% of America's 327 million population living in urban areas it makes sense for OEMs to have a specific urban-focused sustainable mobility strategy. This also opens the door for building partnerships that give access to shared mobility options such as ride-hailing and car sharing which has more traction in more densely populated areas. Whereas in rural areas hybrid vehicles offer an interim solution to current consumer reluctance for EVs.

THE CHALLENGE OF SECOND GUESSING INNOVATION

While advances in technology, particularly in the area of automated driving, are disrupting OEMs, it's equally as hard to envisage what the end game is for those in the US supply chain. As a result, some players are hedging their bets and investing heavily in technology to cope with life without combustion engines or traditional car materials. While it's a gamble to invest in expertise and capabilities 5-10 years before the landscape becomes readable, companies that delay plans to acquire the right skills and expertise could potentially fall too far behind the curve.

Of course, the ultimate winners and losers in the US automotive industry will not only be decided by national considerations, but also what happens on the global stage. As players in the industry jockey for position, an increase in investment and research into sustainable mobility solutions, collaboration and acquisitions will become the strategic norm.

CASE STUDY: New York City

~8.5 Mn
POPULATION (2015)

~3.1 Mn
HOUSEHOLDS

~2.0 Mn
CAR OWNERS

~2.4 Mn
BUS DAILY RIDERSHIP

~302.6
NYC AREA (SQ. MILES)

USD 55,752
AVERAGE ANNUAL PER CAPITA INCOME (2015)

~5.6 Mn
SUBWAY DAILY RIDERSHIP

~ 2.0 Mn.
CAR OWNERSHIP

~ 5700
BUSES

~ 13,600
YELLOW CABS

~ 14,100
UBER CABS

CASE ASSUMPTIONS

PERSONAL OWNERSHIP MODEL

Currently 63% of 3,128,246 households own a car in NYC. It is assumed that this ratio will stay the same, with the population of NYC (and therefore number of households) growing at a CAGR of 5% between 2016-30. According to this, 63% of 3,354,484 households will own a car, bringing the number of cars in 2030 to 2,113,325.

The average distance covered by each car is assumed to = the average vehicle miles travelled by cars in 2014-15 (~11,300 miles), converted to ~18,095 km.

The ICE-EV ratio is taken to = the amount of electric car stock outstanding in the US in 2015-16 (as by International Energy Agency) to the total number of cars (as by OICA).

RIDE SHARING

It is assumed that each ride sharing car will carry a total of **4 passengers** across.

In each case, it is assumed that **100%** ride shared cars and **50%** of personal cars will be electric

Each ride-sharing vehicle is assumed to cover an average distance of 36,191 km/year.

VEHICLE ECONOMICS

- ✔ Cost for a Private 4-wheeler Petrol ICE car is assumed to be the average of the 5 top selling sedan, SUV and van models in 2017, as selected by the American Automobile Association. Cost of EV is based on the operating costs listed by the American Automobile Association.
- ✔ Cost of public transit is taken to be USD 0.34/km, given that the Operating Cost per mile for electric buses are presumed to be 0.55 USD, as per HART Government District.

ELECTRIFICATION SCENARIO:
80% EV PENETRATION REDUCES RUNNING COSTS BY 33.6%

20 % EVS

20% ELECTRIC VEHICLE + 80% INTERNAL COMBUSTION ENGINE

Data Points	Size
Avg Distance Covered - Year	18,095 km
Cars in 2016	1,970,795
Cars in 2030	2,113,325
Estimated EVs 2030	422,665
Estimated ICEs (Petrol) 2030	1,690,660
Avg Distance Covered by EVs	7,648,300,630 km
Avg Distance Covered by ICEs	30,593,202,521 km
Private 4w EV (USD/km)	0.06
Private 4w Petrol (RMB/km)	0.11

TOTAL RUNNING COST: USD 3.85 BN

50 % EVS

50 % ELECTRIC VEHICLE + 50% INTERNAL COMBUSTION ENGINE

Data Points	Size
Avg Distance Covered - Year	18,095 km
Cars in 2016	1,970,795
Cars in 2030	2,113,325
Estimated EVs 2030	1,056,663
Estimated ICEs (Petrol) 2030	1,056,663
Avg Distance Covered by EVs	19,120,751,576 km
Avg Distance Covered by ICEs	19,120,751,576 km
Private 4w EV (GBP/km)	0.06
Private 4w Petrol (GBP/km)	0.11

TOTAL RUNNING COST: USD 3.32 BN

80 % EVS

80% ELECTRIC VEHICLE + 20% INTERNAL COMBUSTION ENGINE

Data Points	Size
Avg Distance Covered - Year	18,095 km
Cars in 2016	1,970,795
Cars in 2030	2,113,325
Estimated EVs 2030	1,690,660
Estimated ICEs (Petrol) 2030	422,665
Avg Distance Covered by EVs	30,593,202,521 km
Avg Distance Covered by ICEs	7,648,300,630 km
Private 4w EV (USD/km)	0.06
Private 4w EV (USD/km)	0.11

TOTAL RUNNING COST: USD 2.79 BN

Source: Mazars Global Knowledge Center Analysis; American Automobile Association Federal Highway Administration; United States Census Bureau; Press Articles

RIDE SHARING SCENARIO:
Greater Ride Sharing Cuts Down on Number of Vehicles and Cost

20% RIDE SHARING

20 % RIDE SHARING + 80% PERSONAL CARS (WITH 50% EV)

Data Points	Size
Avg Distance – YR (Ride Sharing)	36,191 km
Avg Distance – YR (Personal Car)	18,095 km
Ride Sharing (2030)	105,666
Personal Ownership (2030)	1,690,660
Estimated EVs 2030	950,996
Estimated ICEs (Petrol) 2030	845,330
Avg Distance Covered by EVs	19,120,751,576 km
Avg Distance Covered by ICEs	19,120,751,576 km
Shared 4w EV (USD/km)	0.05
Private 4w EV (USD/km)	0.06
Private 4w Petrol (USD/km)	0.11

TOTAL RUNNING COST: USD 2.84 BN

50% RIDE SHARING

50 % RIDE SHARING + 80% PERSONAL CARS (WITH 50% EV)

Data Points	Size
Avg Distance – YR (Ride Sharing)	36,191 km
Avg Distance – YR (Personal Car)	18,095 km
Ride Sharing (2030)	264,166
Personal Ownership (2030)	1,056,663
Estimated EVs 2030	792,497
Estimated ICEs (Petrol) 2030	528,331
Avg Distance Covered by EVs	19,120,751,576
Avg Distance Covered by ICEs	9,560,375,788
Shared 4w EV (USD/km)	0.05
Shared 4w EV (USD/km)	0.06
Private 4w Petrol (USD/km)	0.11

TOTAL RUNNING COST: USD 2.14 BN

80% RIDE SHARING

80 % RIDE SHARING + 80% PERSONAL CARS (WITH 50% EV)

Data Points	Size
Avg Distance – YR (Ride Sharing)	36,191 km
Avg Distance – YR (Personal Car)	36,191 km
Ride Sharing (2030)	422,665
Personal Ownership (2030)	422,665
Estimated EVs 2030	633,998
Estimated ICEs (Petrol) 2030	211,333
Avg Distance Covered by EVs	19,120,751,576
Avg Distance Covered by ICEs	3,824,150,315
Shared 4w EV (USD/km)	0.05
Private 4w EV (USD/km)	0.01
Private 4w Petrol (USD/km)	0.01

TOTAL RUNNING COST: USD 1.43 BN

Source: Mazars Global Knowledge Center Analysis; American Automobile Association Federal Highway Administration; United States Census Bureau; Press Articles