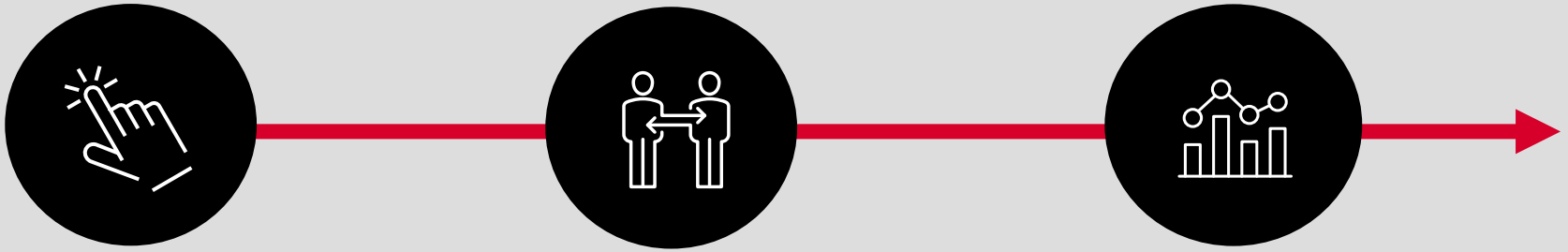
S&P Global
Mobility

Automotive Aftermarket Solutions

Complementary capabilities to power the mobility market of the future

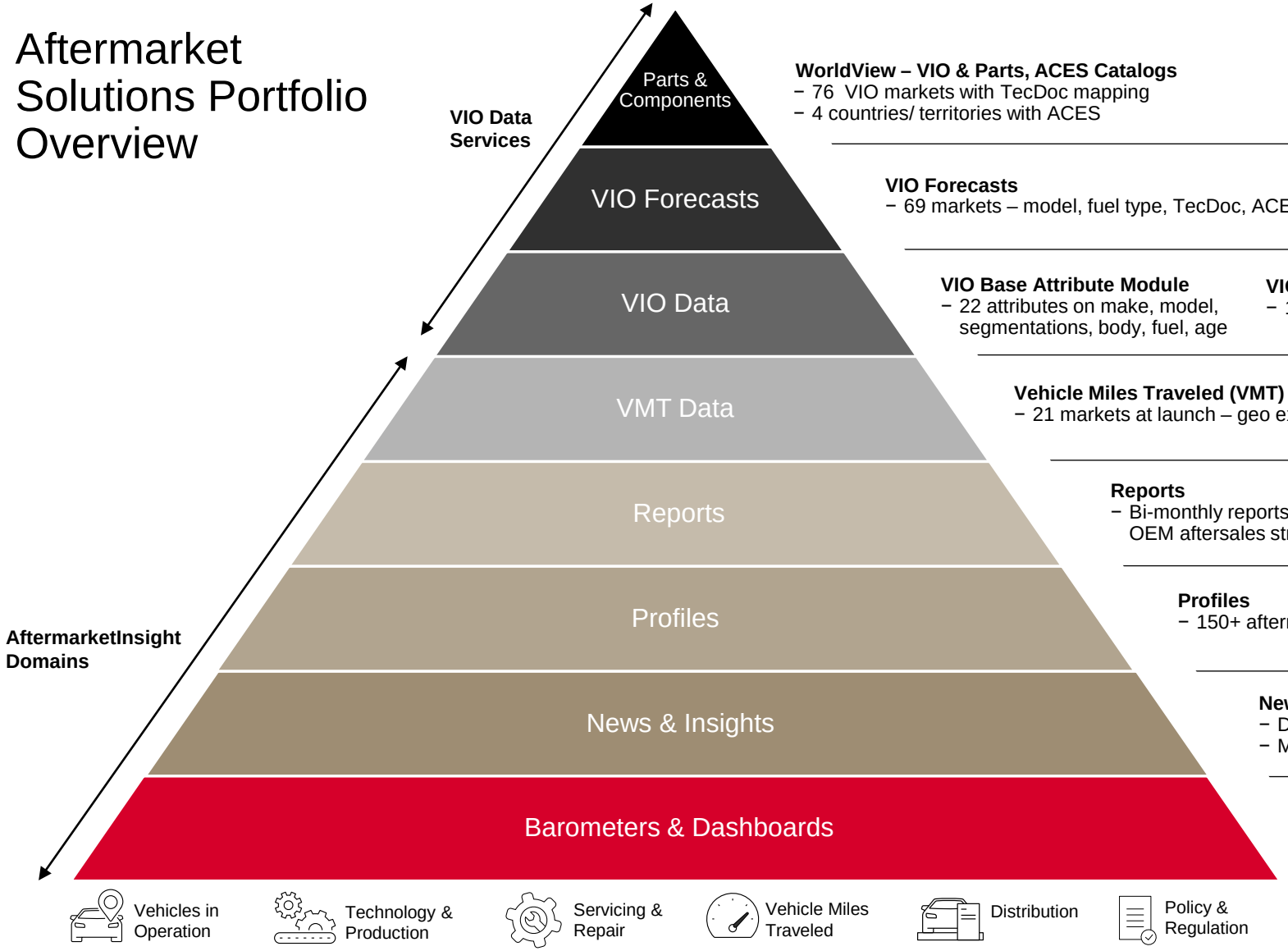
Together, S&P Global Mobility bring unique perspectives and original insights that power the markets of the future.



- Combining data, technology and expertise to accelerate progress
- S&P Global Mobility provides invaluable insights derived from unmatched automotive data
- This data enables our customers to anticipate change and make decisions with conviction.
- Our expertise helps customers to optimize their businesses, reach the right consumers, and shape the future of mobility

S&P Global
Mobility

Aftermarket Solutions Portfolio Overview



WorldView – VIO & Parts, ACES Catalogs
- 76 VIO markets with TecDoc mapping
- 4 countries/ territories with ACES

VIO Forecasts
- 69 markets – model, fuel type, TecDoc, ACES

VIO Base Attribute Module
- 22 attributes on make, model, segmentations, body, fuel, age

VIO Full Attribute Module
- 14 additional attributes on PWT

Vehicle Miles Traveled (VMT)
- 21 markets at launch – geo extension to 60+ markets and forecast planned by end of 2022

Reports
- Bi-monthly reports on VIO trends, market sizing, business opportunities, OEM aftersales strategies, etc.

Profiles
- 150+ aftermarket player profiles with plant, strategy, and financial information

News & Insights
- Daily news to capture the latest market activities and events
- Monthly insight articles reflect focused area of aftermarket industry

Barometers & Dashboards
- Barometers on key indicators released quarterly
- Interactive dashboards on VIO trends updated quarterly

Aftermarket Trends: How they might impact your business

First wave of replacement demand in emerging markets

New revenue stream from used car in China and other emerging market

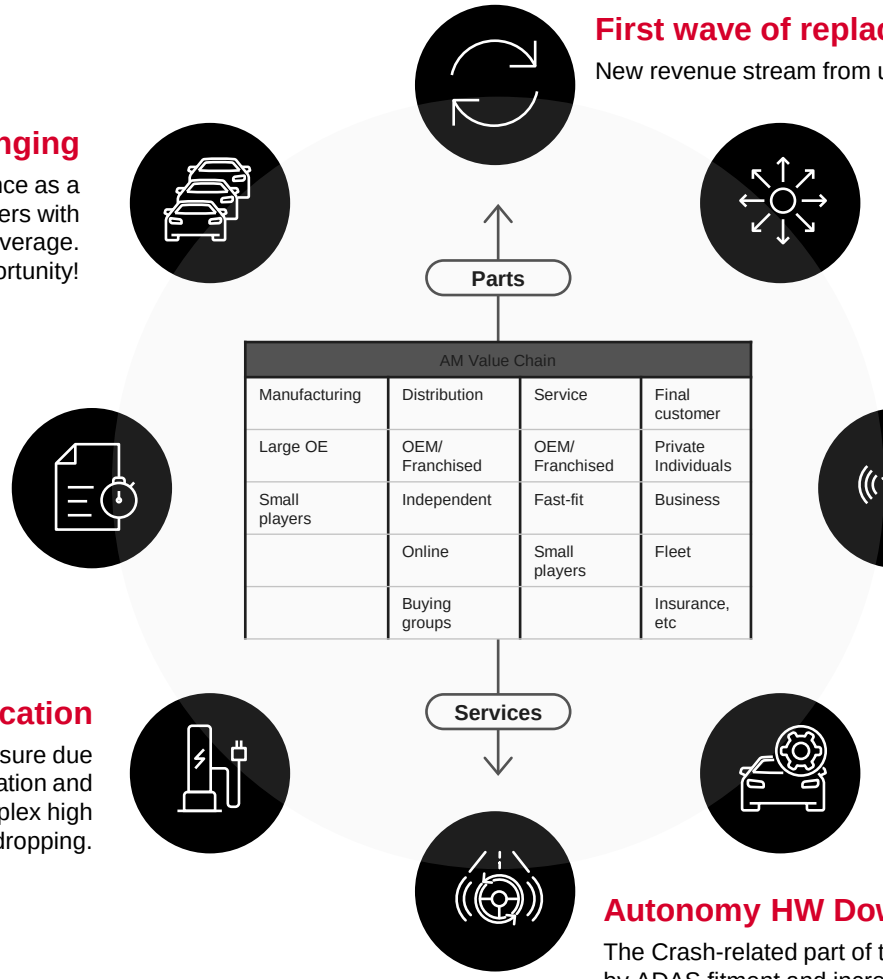
Fleet channel mix changing

Fleet market has a much higher importance as a buyer. Very likely consolidation of AM orders with fewer players who have more negotiation leverage. Risk but also opportunity!

Distribution is changing

The Distribution channel has changed and is bound to change with more online parts but also much more focus on franchised channel. The intermediate distribution is also impacted by greater consolidation

Profit pool shift in the Value Chain



Increasing vehicle age

Higher quality levels of OE parts impacts maintenance and the wear and tear parts business

Prognostics / Connected Car SW

Many OEMs are fitting sensors to parts to feed their connected car platforms and ensure maintenance is not performed at a certain mileage but upon event (thus driving more revenue extraction from captive customers)

Electrification

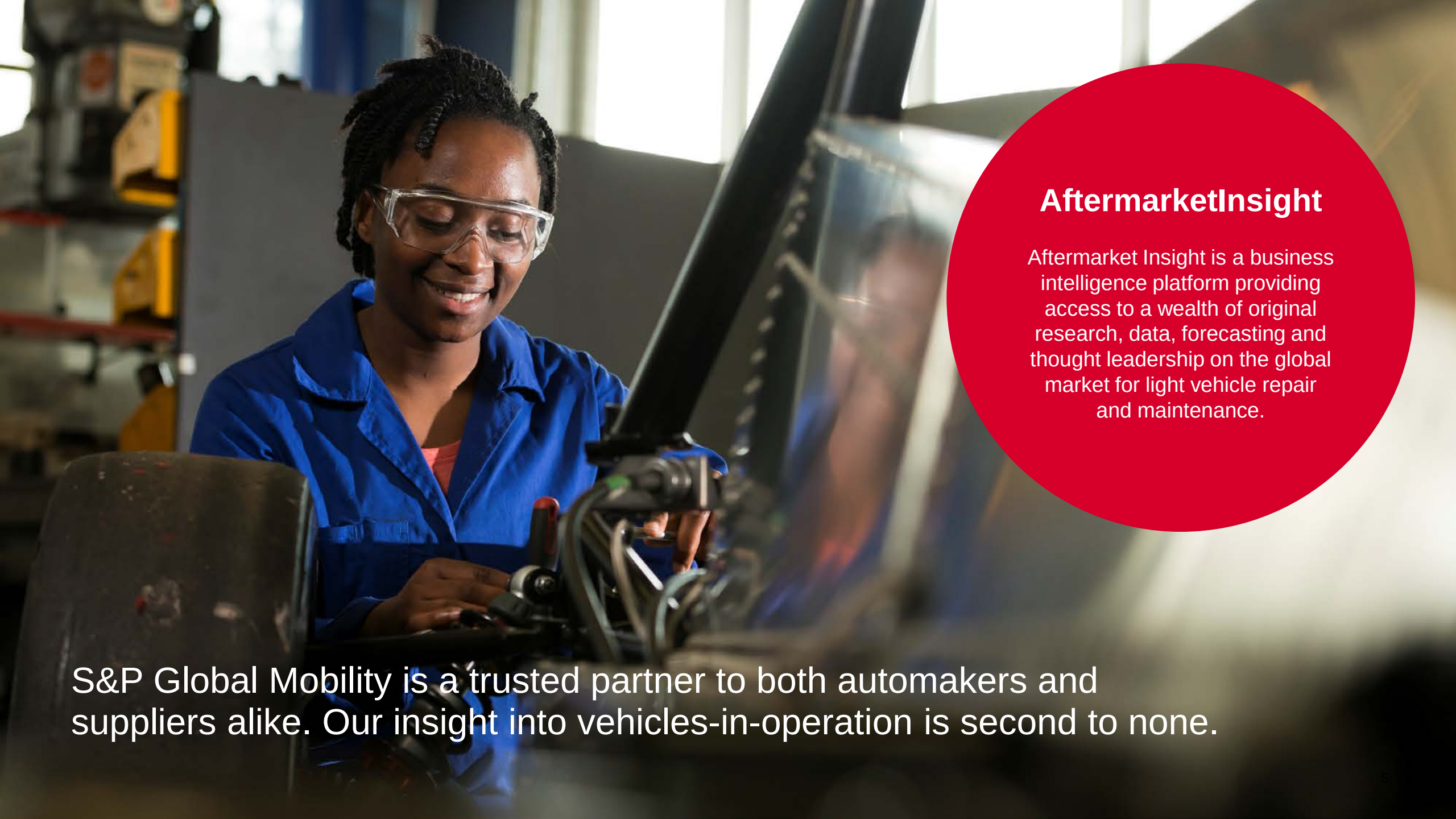
Wear and tear business is under pressure due to fewer moving parts with electrification and Diesel penetration (which is a complex high maintenance motorization) is dropping.

Connected Car HW Opportunity

Aftermarket telematics fitment remains a solid opportunity thanks to UBI (Usage-based Insurance) use cases. Revenue associated with this is expected to rise.

Autonomy HW Downside

The Crash-related part of the aftermarket business will be severely impacted by ADAS fitment and increasing levels of autonomy. Understanding its impact is imperative (alongside electrification)



AftermarketInsight

Aftermarket Insight is a business intelligence platform providing access to a wealth of original research, data, forecasting and thought leadership on the global market for light vehicle repair and maintenance.

S&P Global Mobility is a trusted partner to both automakers and suppliers alike. Our insight into vehicles-in-operation is second to none.

AftermarketInsight: Asset Overview

Aftermarket Barometers

6 barometers show Top VIO and Average vehicle mileage trends for Europe, North America, Greater China, APAC, MEA, South America and Oceania

VIO Dashboards

Highlight significant VIO Forecasts from 6 angles:

- VIO: Summary
- Global VIO
- Regional VIO
- VIO: Vehicle age
- VIO: Fuel type
- VIO: Brand.

VMT Dashboards

Estimated Current Annual Mileage

Weighted Lifetime Mileage

News & Insights

10+ daily news articles covering market activities and events including

- Mergers and acquisitions
- New alliances
- Product launches

A monthly Insight article highlighting a key industry topic from servicing and repair, distribution or technology and production.

Reports

Every 2 months, S&P Global Mobility analysts provide thought leadership by commenting in depth on a fundamental aspect of the industry.

Profiles

Profile cover over 100 top aftermarket players.

Profiles include:

- Annual revenues
- Key markets
- HQ locations
- Brands
- Product categories

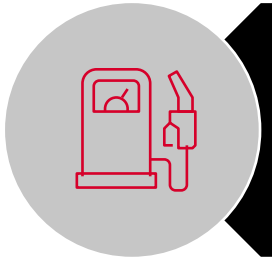
Profiles help users to target new clients and monitor competition.

Events

Quarterly webinars allow users direct interaction with S&P Global Mobility experts.

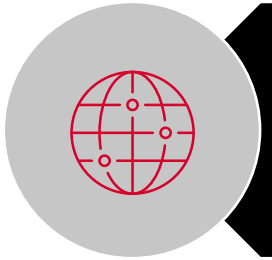
Available both live and on demand with complete presentations available for download

AftermarketInsight: Questions answered



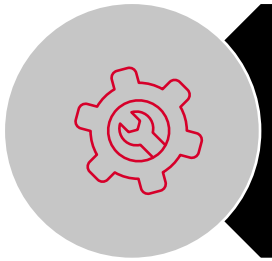
OE Parts Manufacturers

- How do you analyze vehicle age and fuel type trends in VIO?
- How do you keep track of competitors' actions and their business strategy?



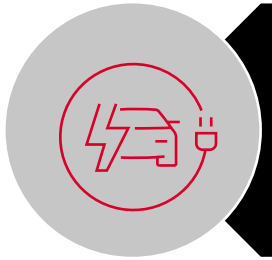
Aftermarket Suppliers & Distributors

- How do you anticipate future vehicle scrappage related to clean air & climate policies?
- How do you analyze changes in the distribution chain?



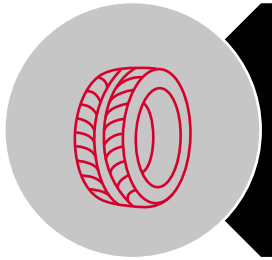
Repair & Service Providers

- How do you cope with the increased pace of vehicle electrification?
- How do track the relevant age classes of the VIO?



Energy Companies

- Do you need quick and ready-to-use data on vehicle electrification?
- Which sources do you use to validate future sales potential?



Tire & Lubricant Providers

- How do you cope with the increased pace of vehicle electrification?
- How do track the relevant age classes of the VIO?

Financial Institutions / Insurance

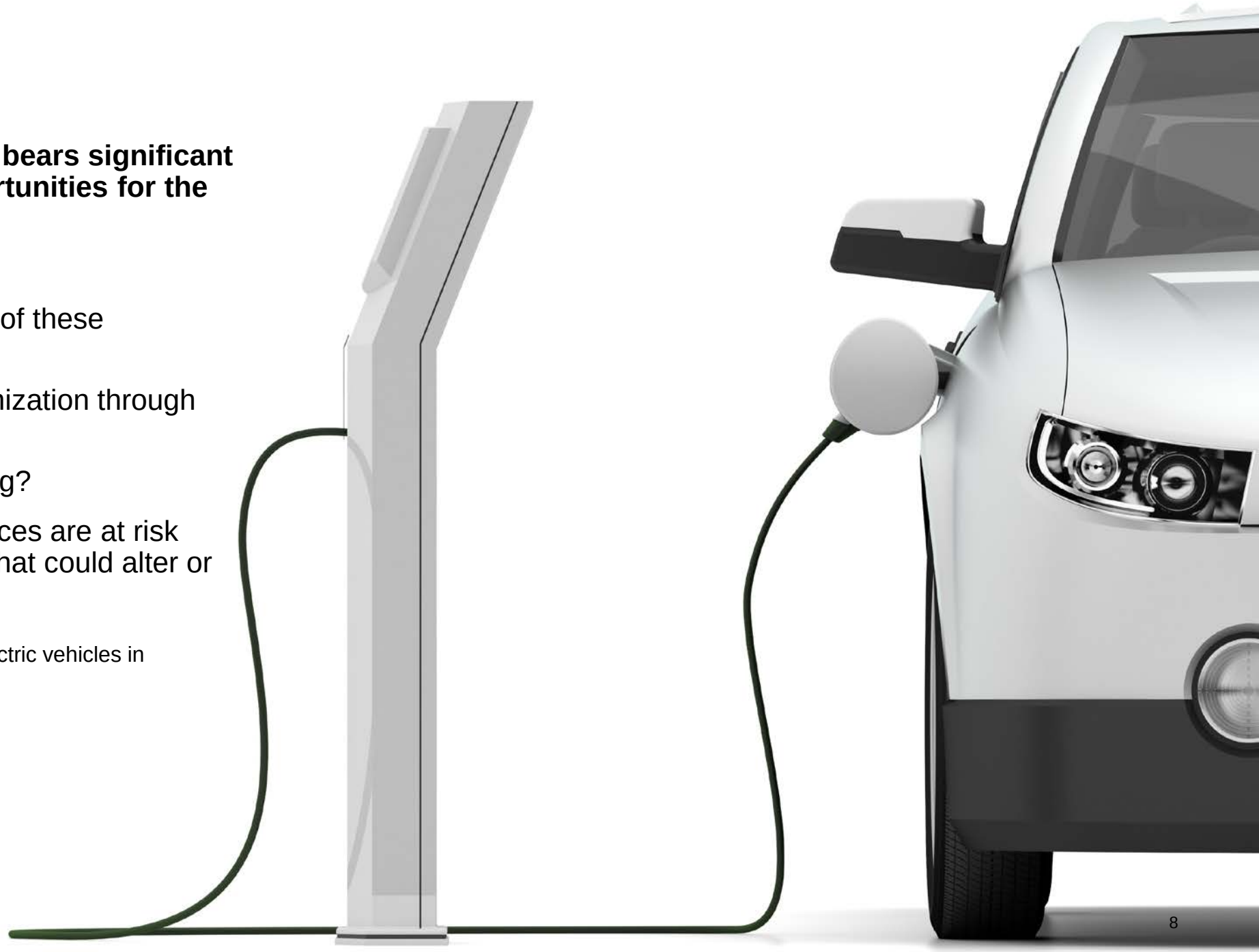
- What information do you use validate the market potential of aftermarket companies?
- How to estimate the future size of the collision repair market?

6.1M → 64M BEV*

Expected VIO transformation bears significant challenges but also big opportunities for the Automotive Aftermarket

- How can you take advantage of these opportunities?
- How can you steer your organization through the change?
- What is your competition doing?
- And which products and services are at risk from disruptive technologies that could alter or eliminate demand?

*2021 → 2030 Global count of Battery Electric vehicles in operation (Light vehicles)



AftermarketInsight Services

Focuses on six key topic domains

Planners and strategists use the service to:

- Assess and forecast market demand
- Analyze the competition
- Understand servicing & repair market
- Follow the rapid changes in the distribution chain
- Evaluate markets adoption paths to new technologies and regulations

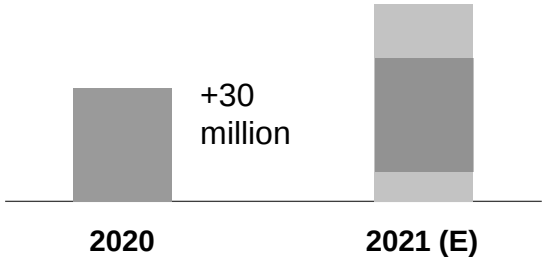
Vehicles in Operation | Vehicle Miles Traveled | Servicing & Repair | Technology & Production | Distribution | Policy & Regulation

S&P Global Mobility

AftermarketInsight Barometers

Aftermarket barometers show key facts at-a-glance

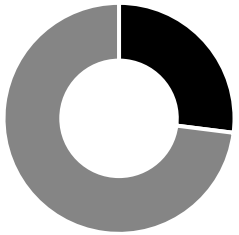
S&P Global Mobility estimate global VIO volume **1.5 billion**



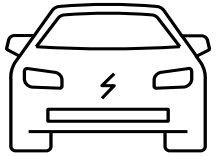
S&P Global Mobility estimate

73%

of global vehicles are older than 5 years in 2021



S&P Global Mobility estimate average age of global EV in 2021

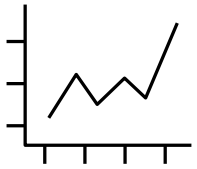


2.7 years

S&P Global Mobility estimate 2021 US estimated average mileage per vehicle

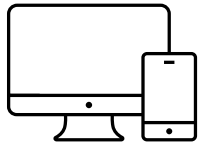
12,535 miles

S&P Global Mobility estimate global new vehicle sales in 2021



84 million

S&P Global Mobility estimate automotive aftermarket eCommerce market size* in 2020



$18.8 billion

Note: * Covers key automotive aftermarket eCommerce players in EU.US and Greater China

AftermarketInsight

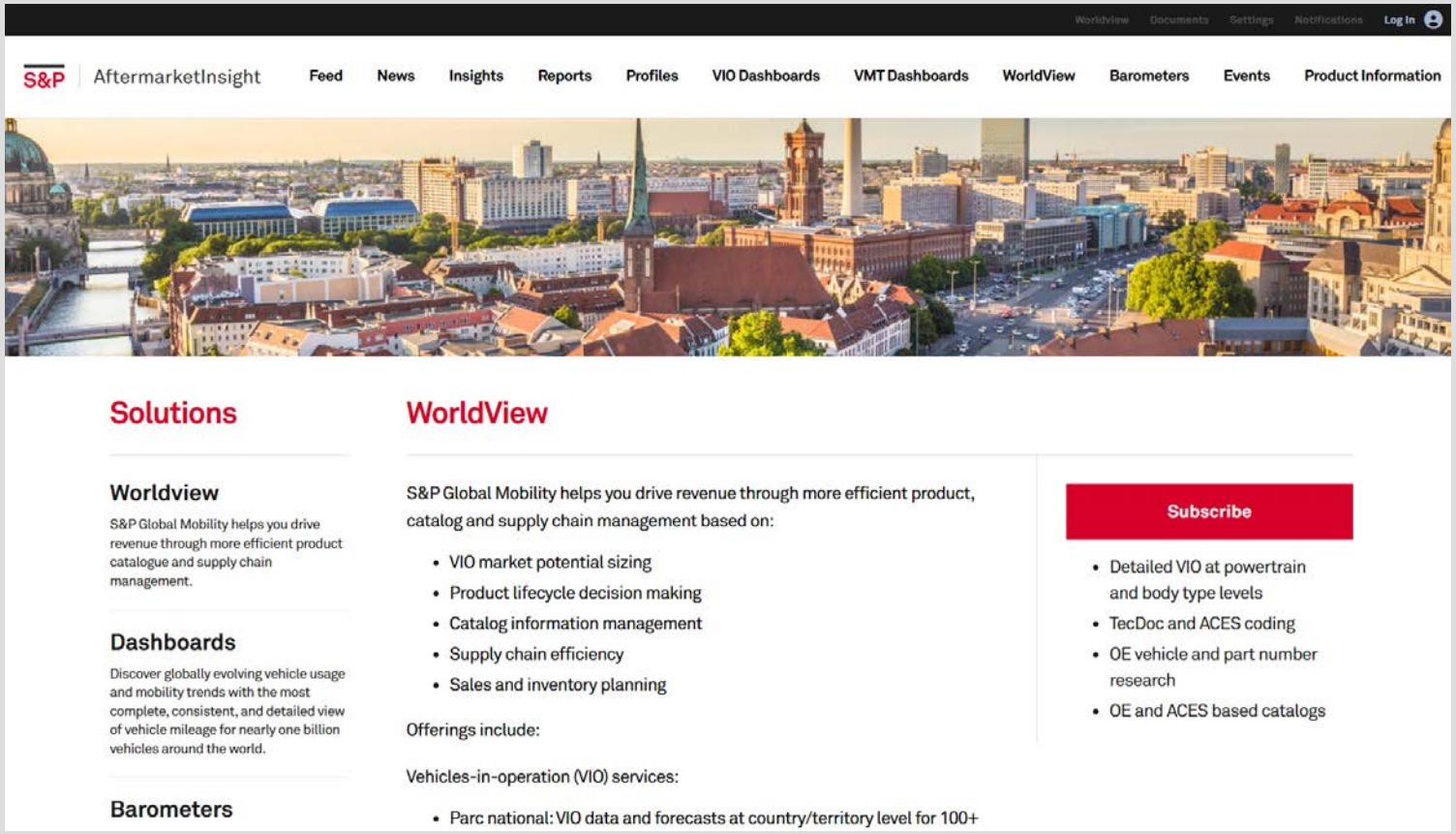
- VIO global counts
- Vehicle age groups
- Global vehicle average age
- Mileage per vehicle
- New vehicle sales
- eCommerce market size

S&P Global Mobility

Note: all barometers are for light vehicles only. For VIO, the weight split is up to 3/5 t except for North America, where it includes GVW classes 1-3, up to approx. 6.4 t.
Source: S&P Global Mobility

AftermarketInsight from S&P Global Mobility

With new branding comes new clarity

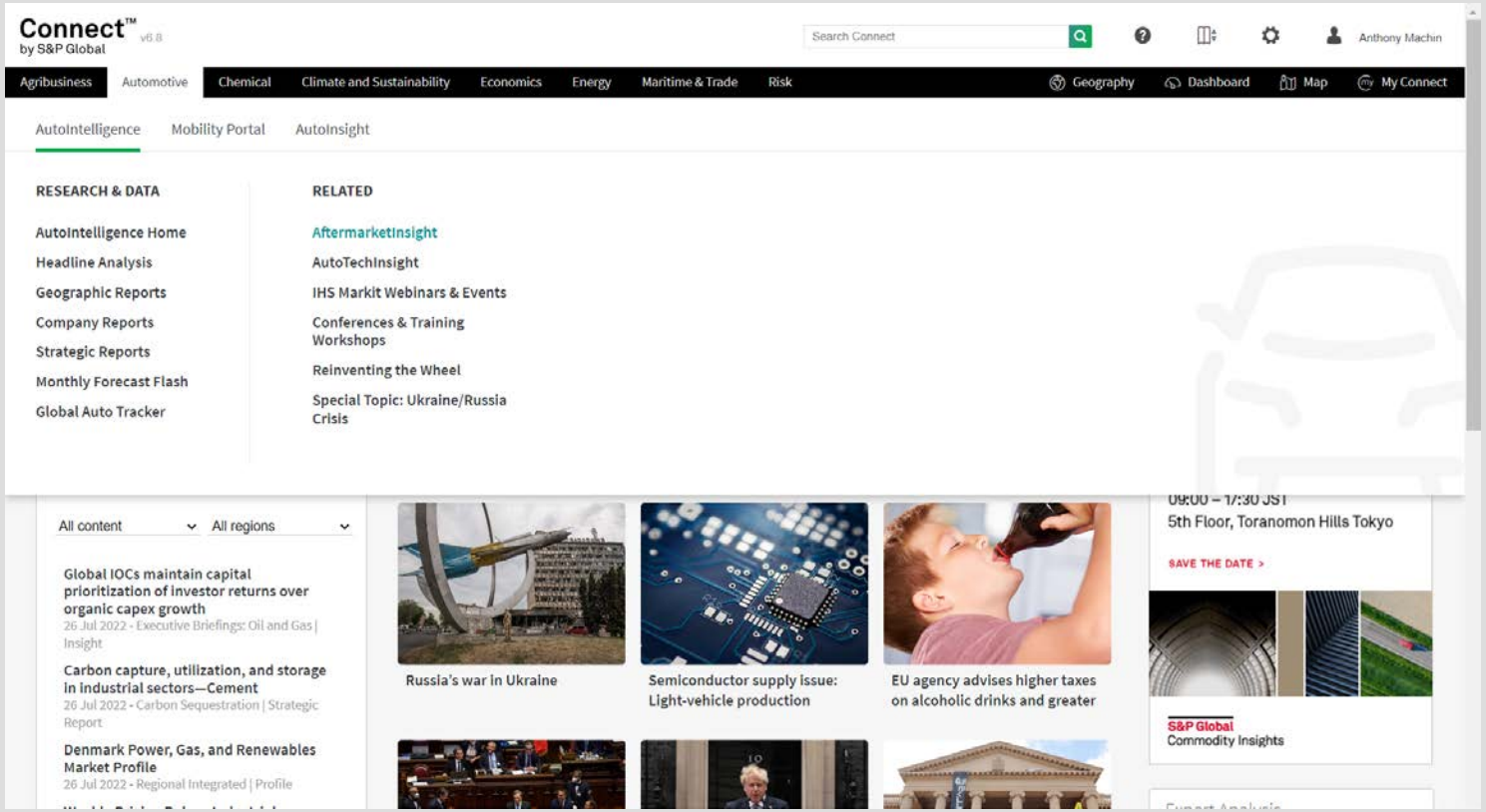


AftermarketInsight

- Logged out CFA Worldview page
- Available on the Worldview landing page
  - Worldview explanation
  - All available solutions
  - Subscribe call to action

Accessing AftermarketInsight

No change to the Login Process

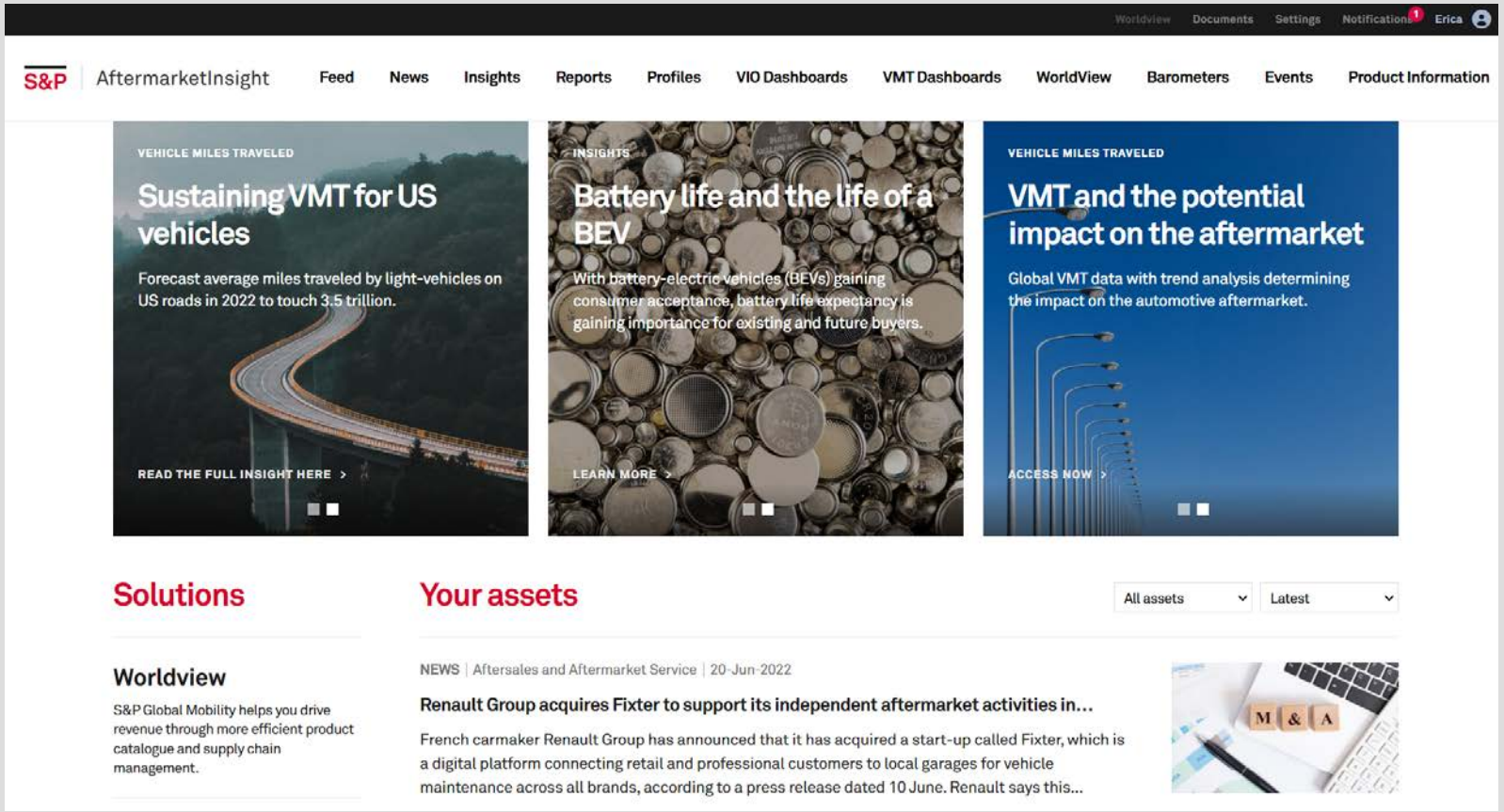


AftermarketInsight

- Login via S&P Global Mobility – Connect remains unchanged
- Alternatively, access AftermarketInsight at the following URL
- https://AftermarketInsight.ihsmarkit.com

S&P Global Mobility to S&P Global Mobility

Our insights help answer critical mobility questions related to the supply chain and evolving vehicle technologies enabling clients to make informed business decisions



AftermarketInsight

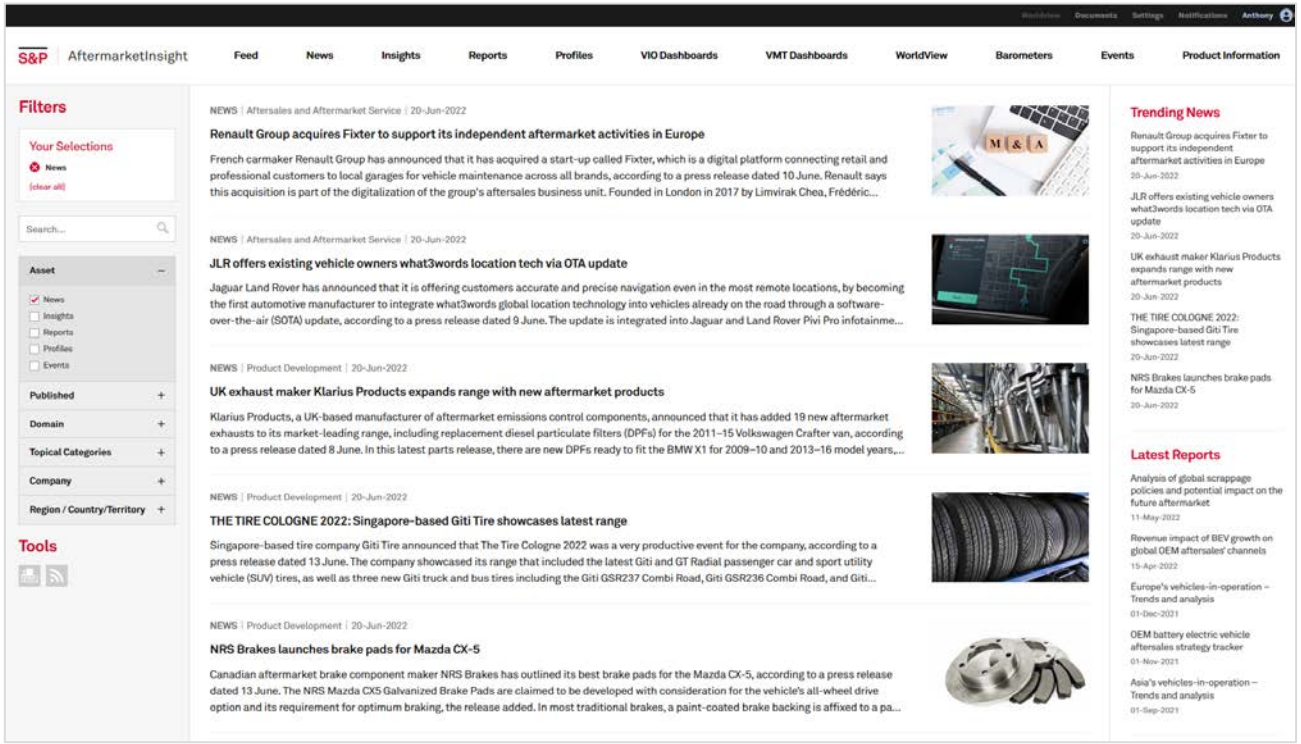
- **Identify opportunities and improve profitability** with insight into vehicle components and systems
- **New Look and Feel:** A new cleaner user interface across the entire site, with the Feed page now containing a more intuitive filter panel which displays your selections
- **Dashboard products** include:
  - VMT
  - VIO

Delivery Platform

AftermarketInsight: News & Insights

News & Insights

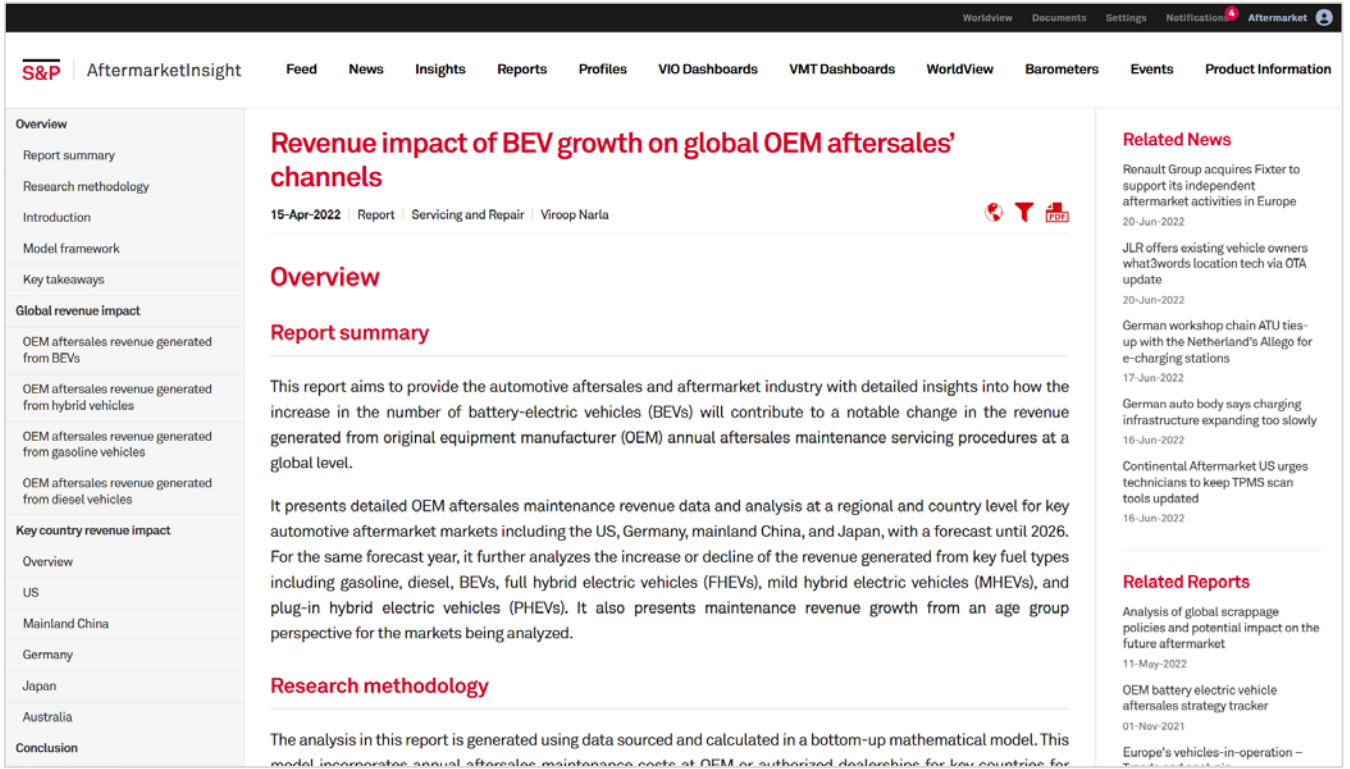
- Daily news cover global aftermarket parts manufacturers, distributors, servicing and repair providers, associations and OEMs
- Assets associated with the service domains
- Includes all service domains below
- Filtered RSS feed available
- Ability to create a combined PDF of articles of interest for later viewing
- Keyword search function
- Ability to review related assets



AftermarketInsight: Reports

Reports

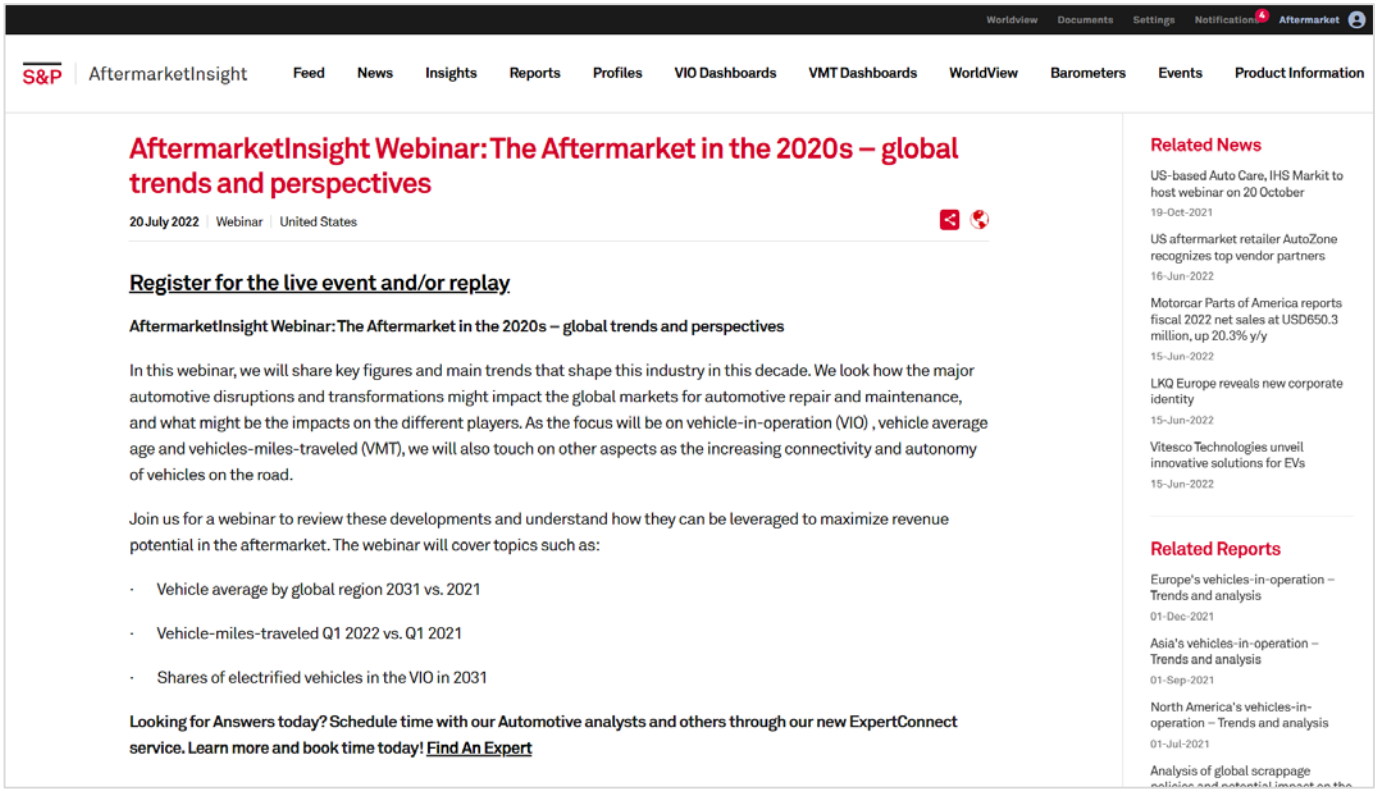
- Every 2 months S&P Global Mobility analysts provide thought leadership by commenting in depth on a fundamental aspect of the industries
- The global scrappage tracker follows regional and local scrappage schemes and exhaust emission regulations that have an ever-growing impact on VIO composition
- AMI reports also cover IAM and OES players profiling, market trends, SWOT analysis, and much more.



AftermarketInsight: Webinars

Webinars

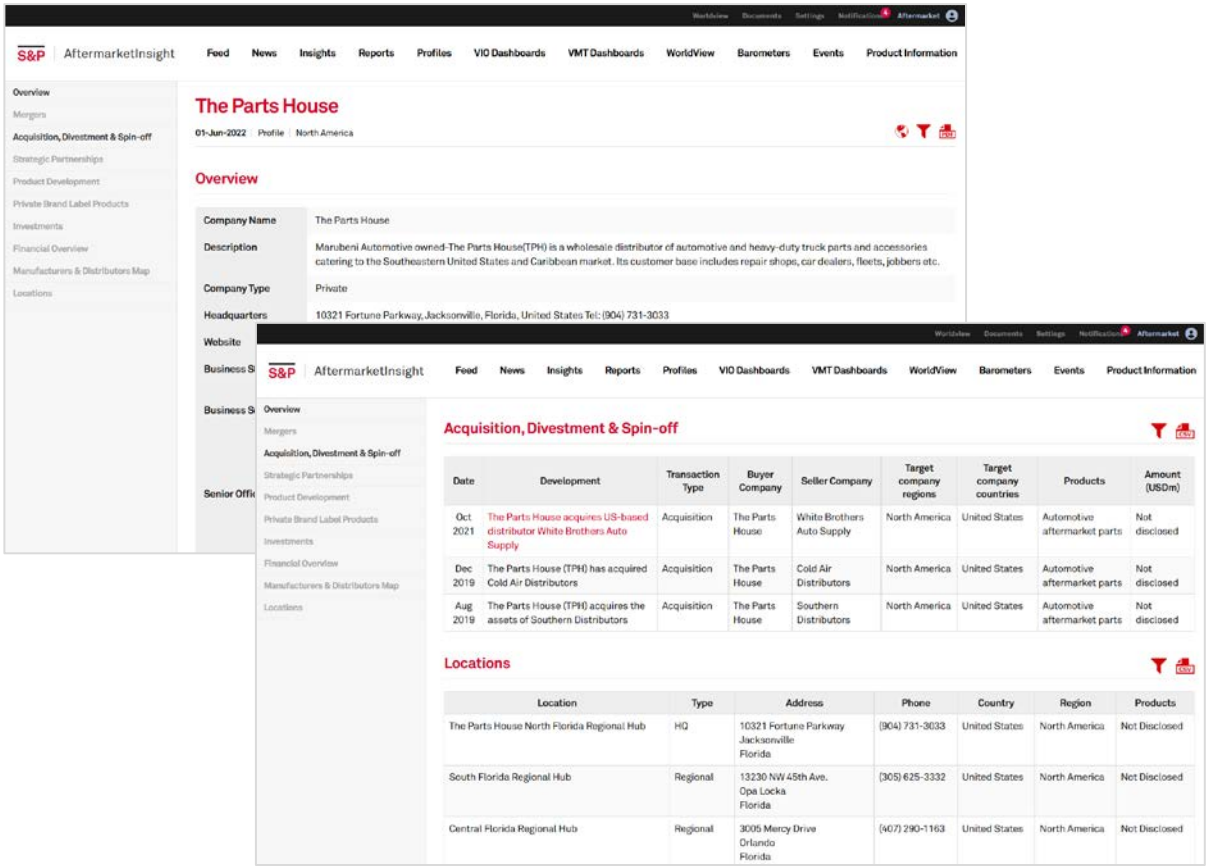
- Series of aftermarket webinars reviewing core trends and discussing market outlook
- Clients will also be able to have direct access to Subject Matter Experts for the respective services they subscribe to
- Access to S&P Global Mobility thought leadership across the 5 service domains



AftermarketInsight: Profiles

Company Profiles

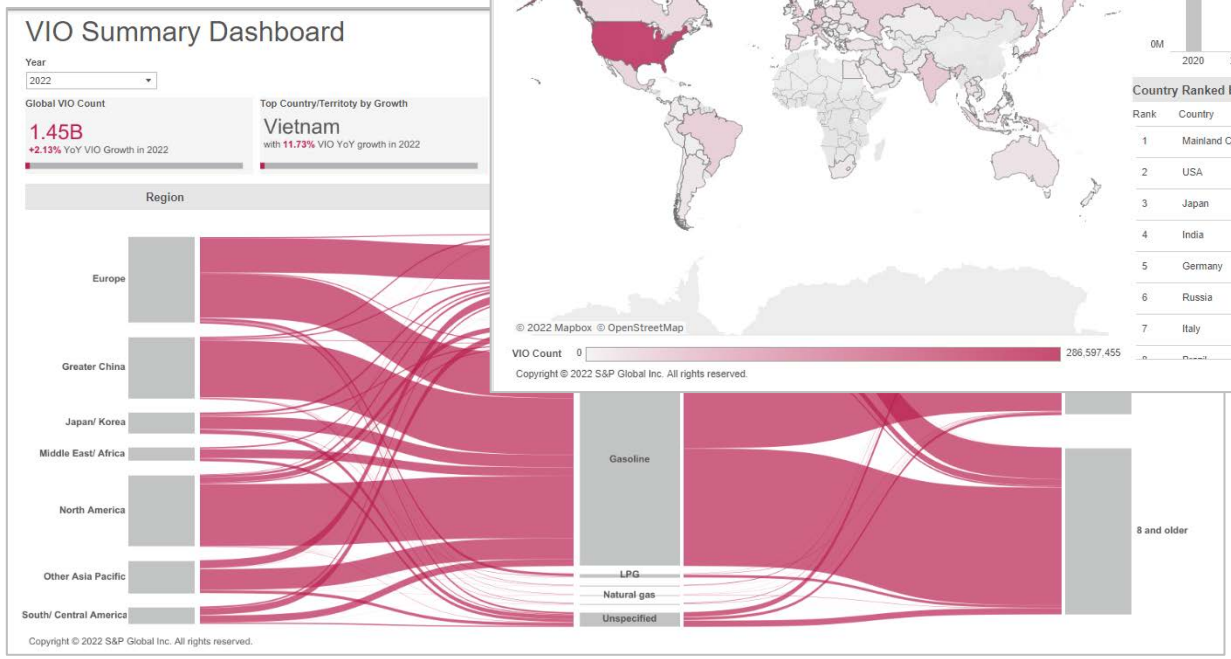
- Over 100 company profiles with data on product development, acquisitions, divestments, investments, strategic partnerships, plants and financials in a tabular format with data filters.
- Ability to filter, view and download data in CSV format by date, domain, transaction type, plant type, partnership type, country, region and component name. Full profile can be downloaded in PDF also.
- Ability to filter, view and download data of multiple suppliers through a new tool.
- Ability to view suppliers' manufacturing and R&D locations on map tool.
- The database is available with each AftermarketInsight service or as a standalone asset.

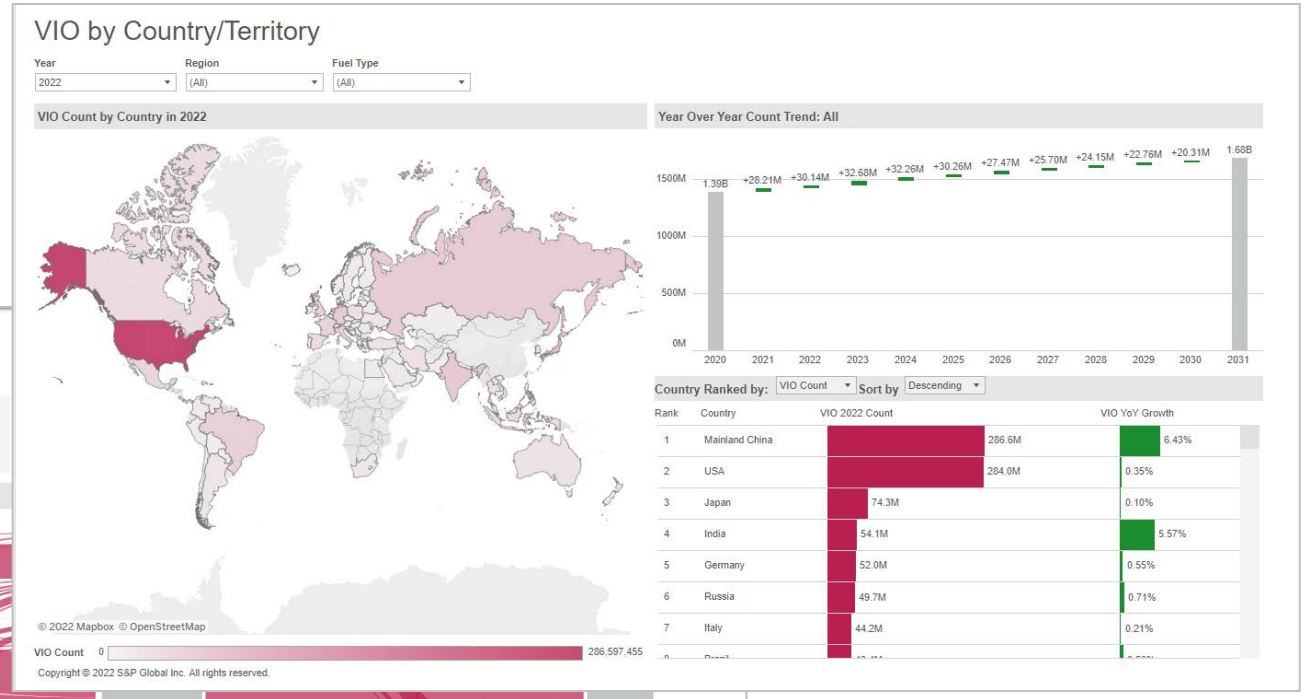


AftermarketInsight VIO Dashboards

VIO Dashboards

- Visual analytic tool
- Highlights significant VIO developments for the next 10 years from 6 angles:
- Global
- Regional
- Countries / territories
- Vehicle age
- Fuel type
- OEM Brand





S&P Global
Mobility

Vehicle Miles Traveled (VMT)

Discover globally evolving vehicle usage and mobility trends

Vehicle Miles Traveled

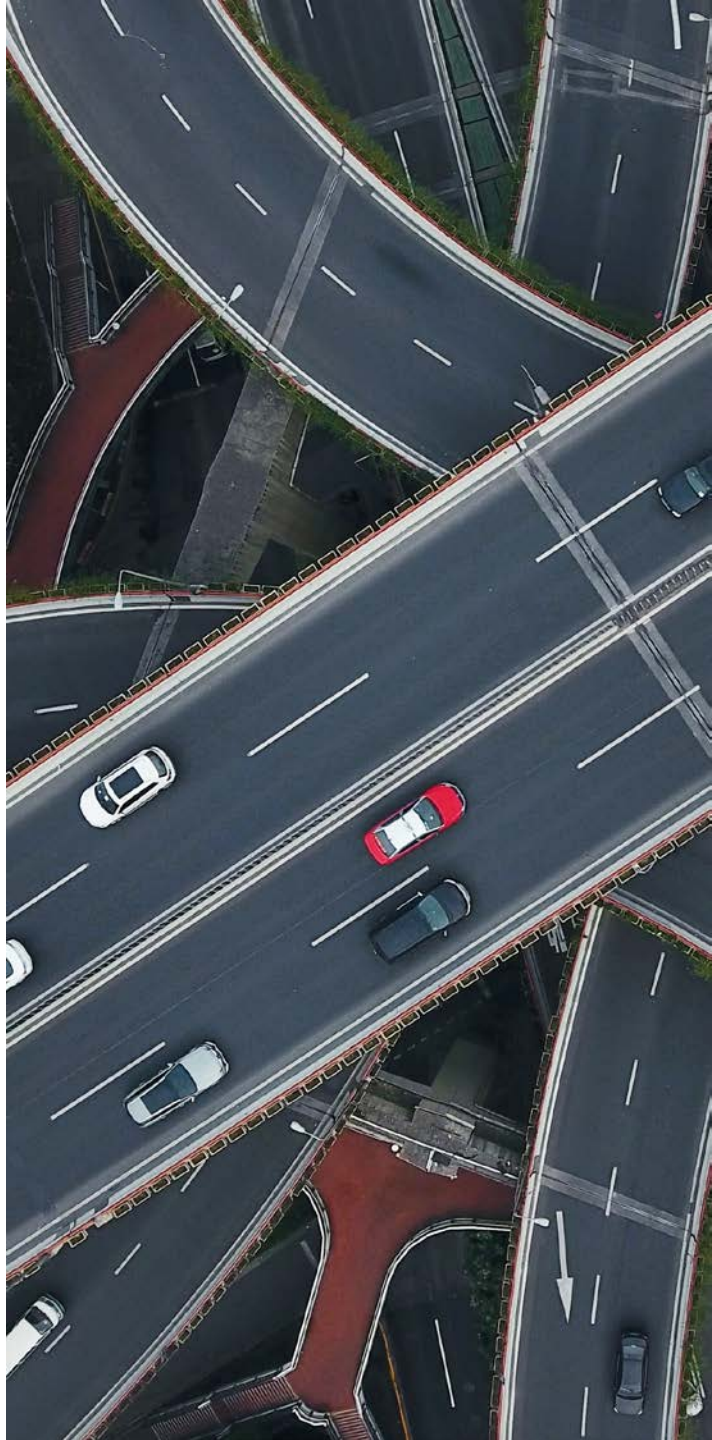
Annual Mileage

Annual Mileage drives:

- Annual cost of ownership
- Fuel consumption for ICE vehicles
- Lubricants, tires, maintenance expenditures
- Electricity demand for BEVs
- Insurance costs
- Road toll and congestion fees

Annual Mileage can help calculate:

- Total fuel / electricity volume and infrastructure demand
- Total lubricants, tires, maintenance demand
- Revenues from insurance and other services
- Annual revenues from road toll and congestion fees
- Annual exhaust particulate matter, CO2 and NOx emissions
- Road dust particulate matter from vehicles traveling on paved and unpaved roads
- Road congestion and repair requirements



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Vehicle Miles Traveled

Lifetime Mileage

The Lifetime Mileage measures the aggregated annual mileage of specific vehicle selections by weighting individual odometer readings with the Vehicle in Operation (VIO) counts for these vehicles.

Vehicle Miles Traveled can be used to:

- Estimate the changes in vehicle emissions over time
- Estimate the future volumes and fuel types of end-of-life vehicles
- Estimate new vehicle demand
- Predict the future utilization of service maintenance and repair outlets
- Predict the future utilization of charging infrastructure
- Measure the mobility level of the population
- Calculate the demand for parts, lubricants and tires
- Identify upcoming repair and maintenance opportunities
- Identify potential short falls in charging infrastructure

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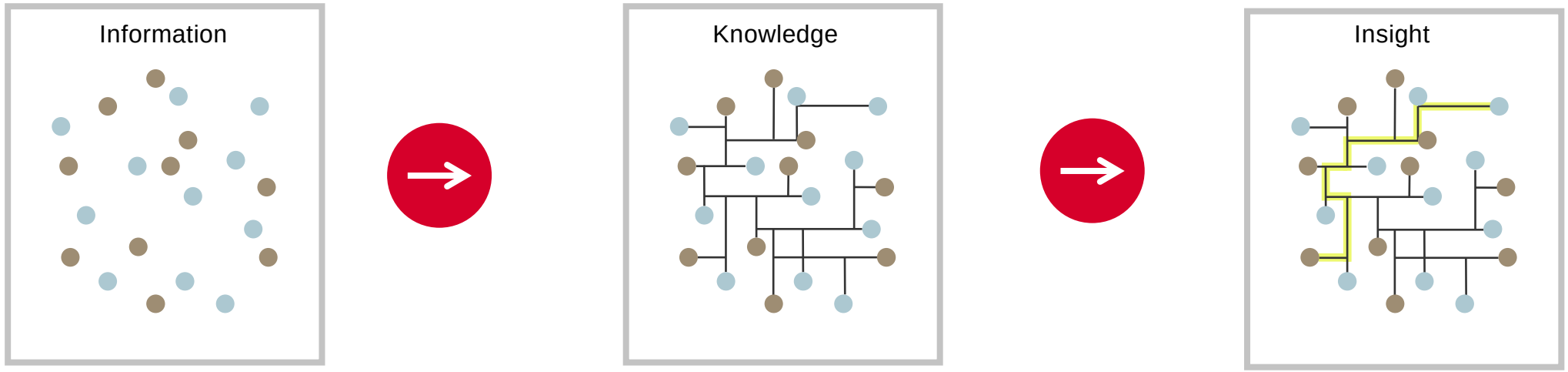
Mobility

VMT – Methodology

Innovative research methodologies adopted

A combination of regional analysis, market intelligence and data science techniques



Data inputs and Intelligence

- Multiple odometer readings at model level for 20 countries globally (between 2 and 15)
- Greater granularity (VIN level) for US
- Ownership data
- Vehicle attributes
- Market demographics

Data Science – Machine Learning

- Geographical Clustering (conurbation) to identify rural/urban/sub-urban trends
- Random forest algorithm to create usage patterns depending on vehicle attributes, location and usage type
- Self-adjusting loop to benchmark top down (country level) and bottom up (single vehicle level), also accounting for VIO weighting
- Harmonization of vehicle attributes

Deliverables (Data+Analytics)

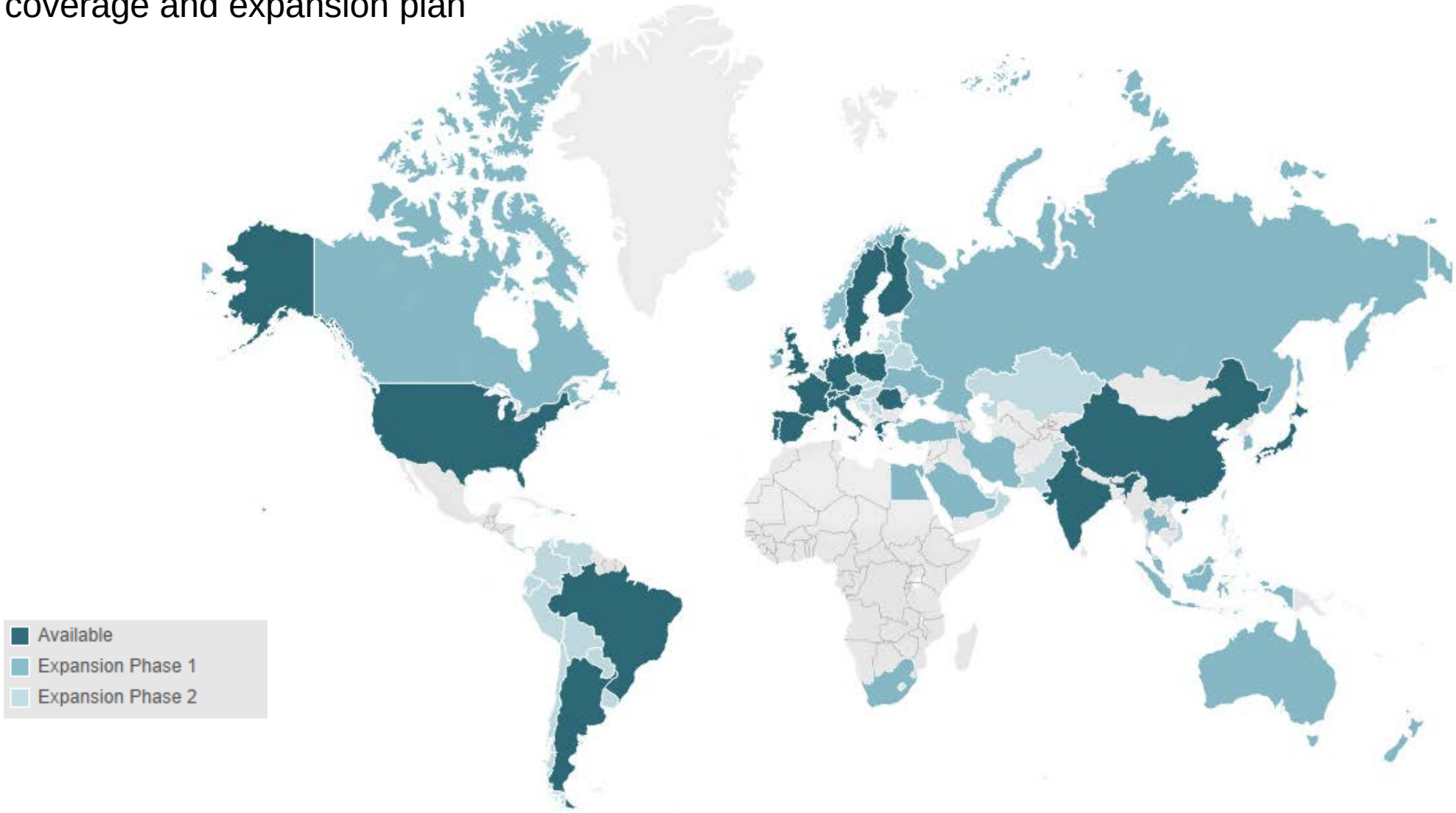
- AftermarketInsight - Dashboards
- AftermarketInsight - Query tool
- Flat files (US ZIP code areas)
- Data elements
  - > Weighted lifetime mileage
  - > Average annual mileage

S&P Global Mobility

VMT – Product details

Vehicle Miles Traveled

Current coverage and expansion plan



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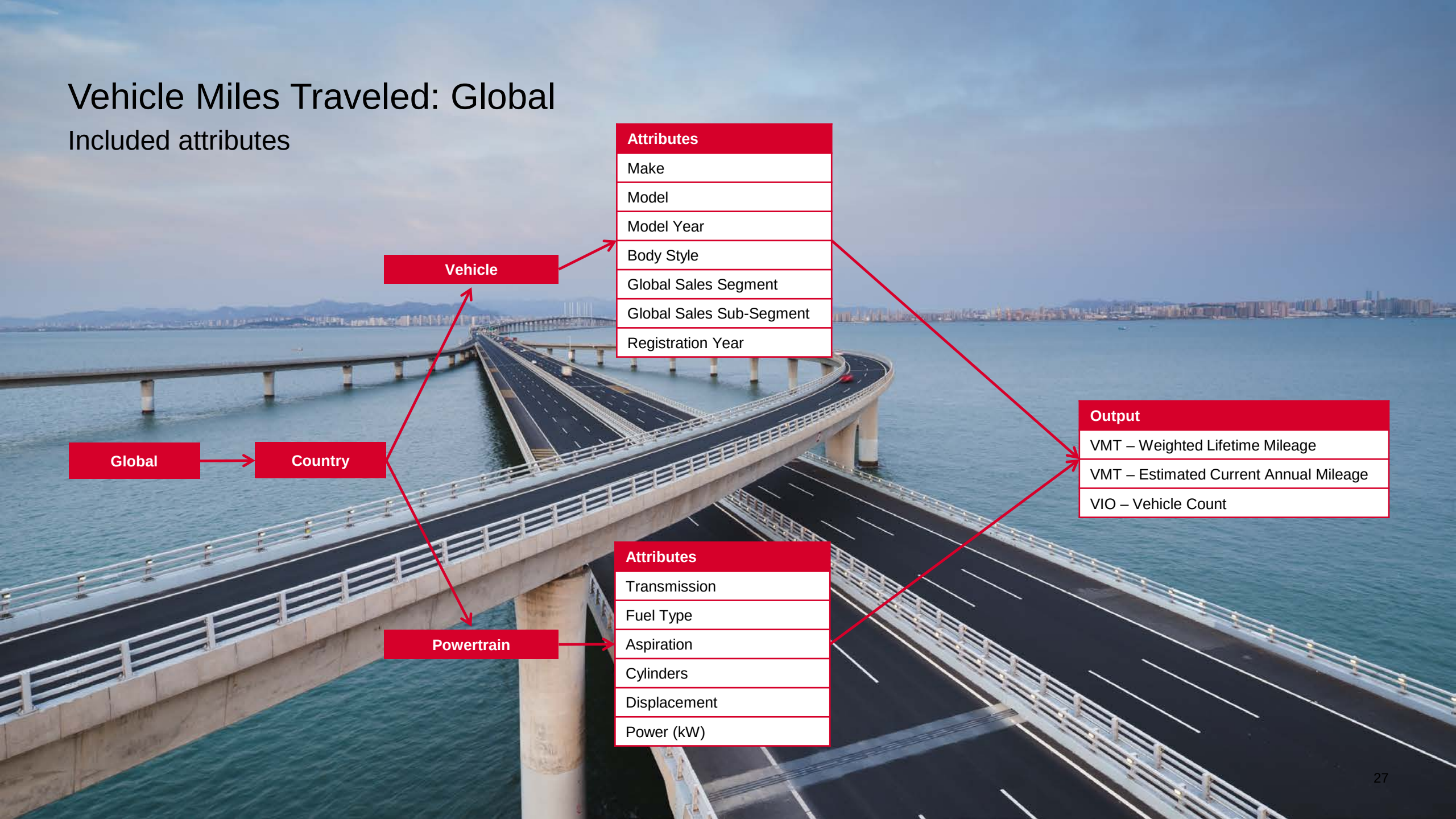
Vehicle Miles Traveled: Global

Included attributes



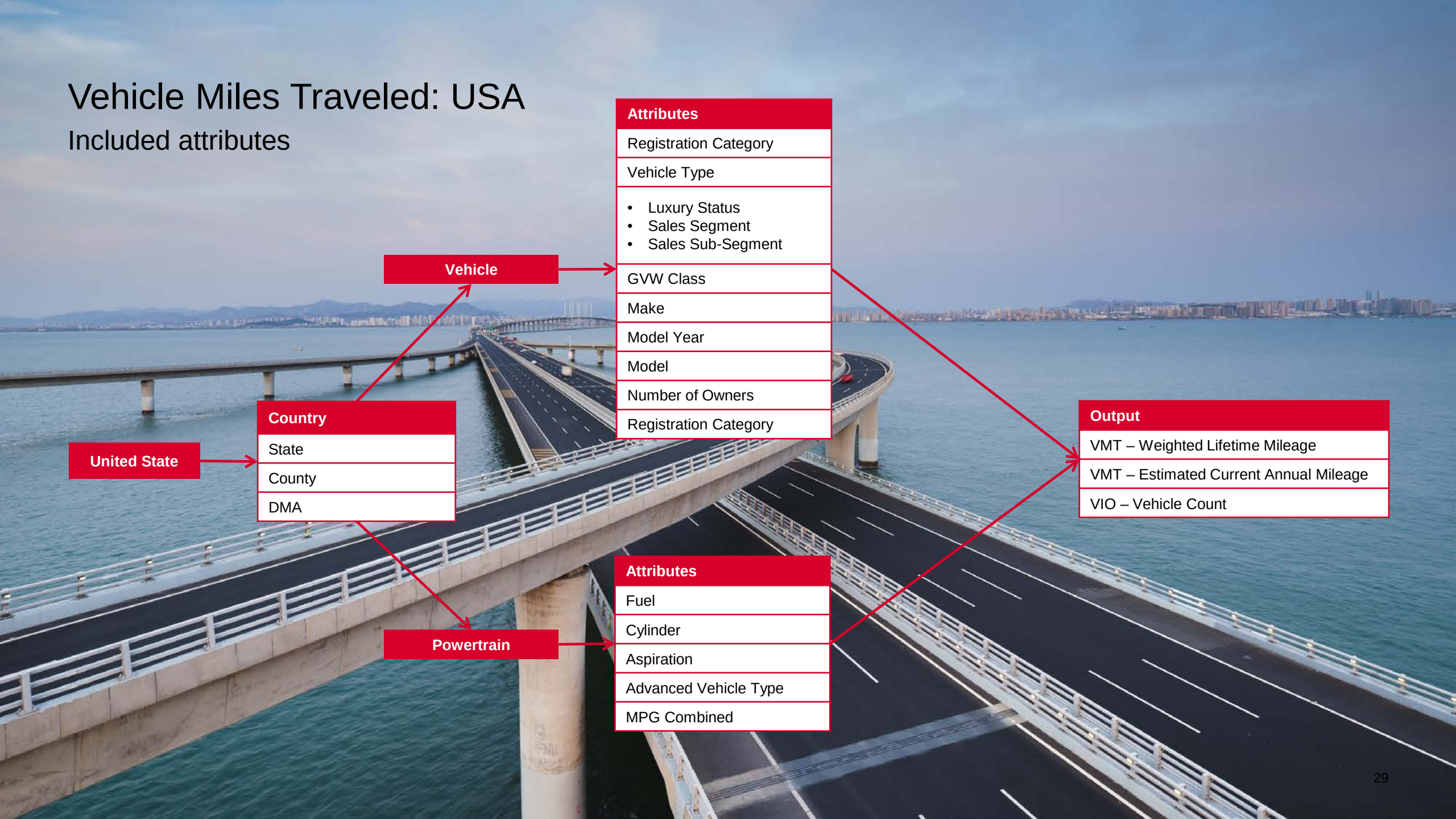
VMT Global

Data sample

Region	AMER	APAC	EMEA
Country	Brazil	China	Germany
Make	Toyota	Ford	BMW
Model	Hilux	Escape	328
Vehicle Type	CV	PV	PV
Body Style	Pickup Double Cab	SUV Closed	Wagon
Sales Segment	C	C	D
Sales Sub-Segment	PUP	SUV	Car
Transmission	Automatic	Automatic	Manual
Fuel Type	FFV	Gasoline	Gasoline
Aspiration	Non turbo	Non turbo	Turbo
Cylinders	4	6	4
Liters	2,7	3	2
Power Output(kW)	120	179	180
Vehicle Count	190	205	11
Registration Year	2016	2012	2015
Model Year	2016	2012	2013
Weighted Lifetime Mileage	75,662	85,842	117,000
Estimated Current Annual Mileage	12,453	8,392	12,741

Vehicle Miles Traveled: USA

Included attributes



VMT United States

Data sample

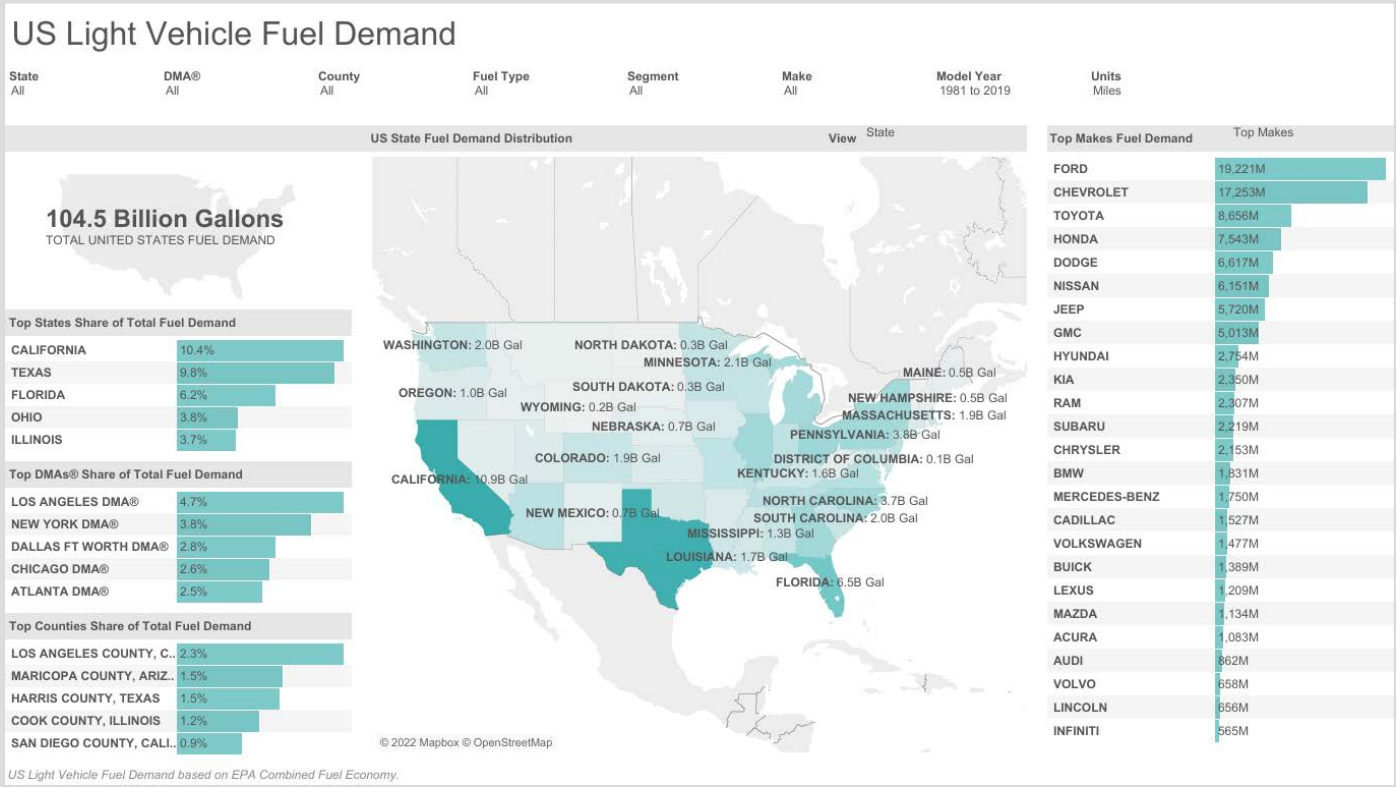
Country	United States
State	FLORIDA
County	CLAY
DMA	JACKSONVILLE
Registration Category	PERSONAL
Vehicle Type	LIGHT TRUCK
GVW Class	1
Make	JEEP
Model	COMPASS
Model Year	2020
Fuel Type	GAS
Cylinders	4
Aspiration	NATURALLY ASPIRATED
Luxury Status	Non-Luxury
Sales Segment	D
Sales Sub-segment	SUV
MPG Combined	21
Number of Owners	1
Weighted Lifetime Mileage	14,925
Estimated Current Annual Mileage	14,118
Vehicle Count	27

VMT – Customer Use Cases

Use Cases: Energy Companies, Retail Fuel Distributors, Fuel Station Networks

S&P Global Mobility VMT service allows:

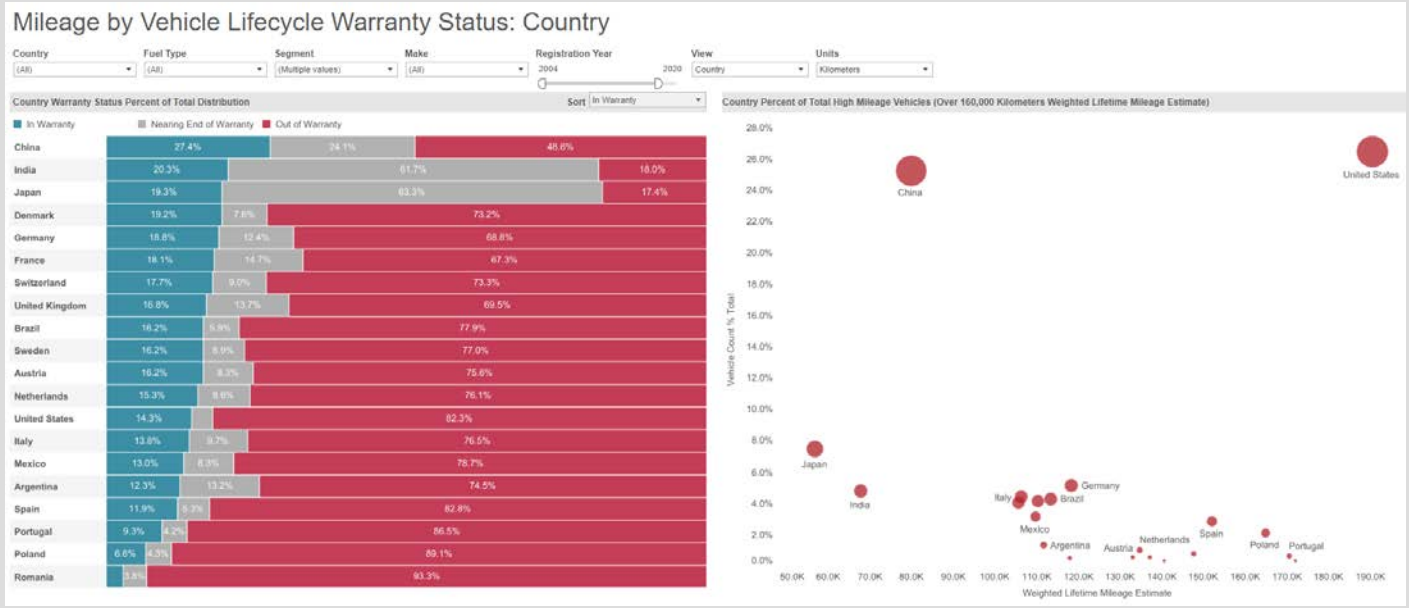
- Energy companies to calculate fossil fuel demand
- Improved logistics planning for retail fuel distributors
- Fuel station networks to optimize coverage



Use Cases: OEM HQ & NSC – Aftersales Divisions

S&P Global Mobility VMT data allows OEM HQ and NSC aftersales divisions to:

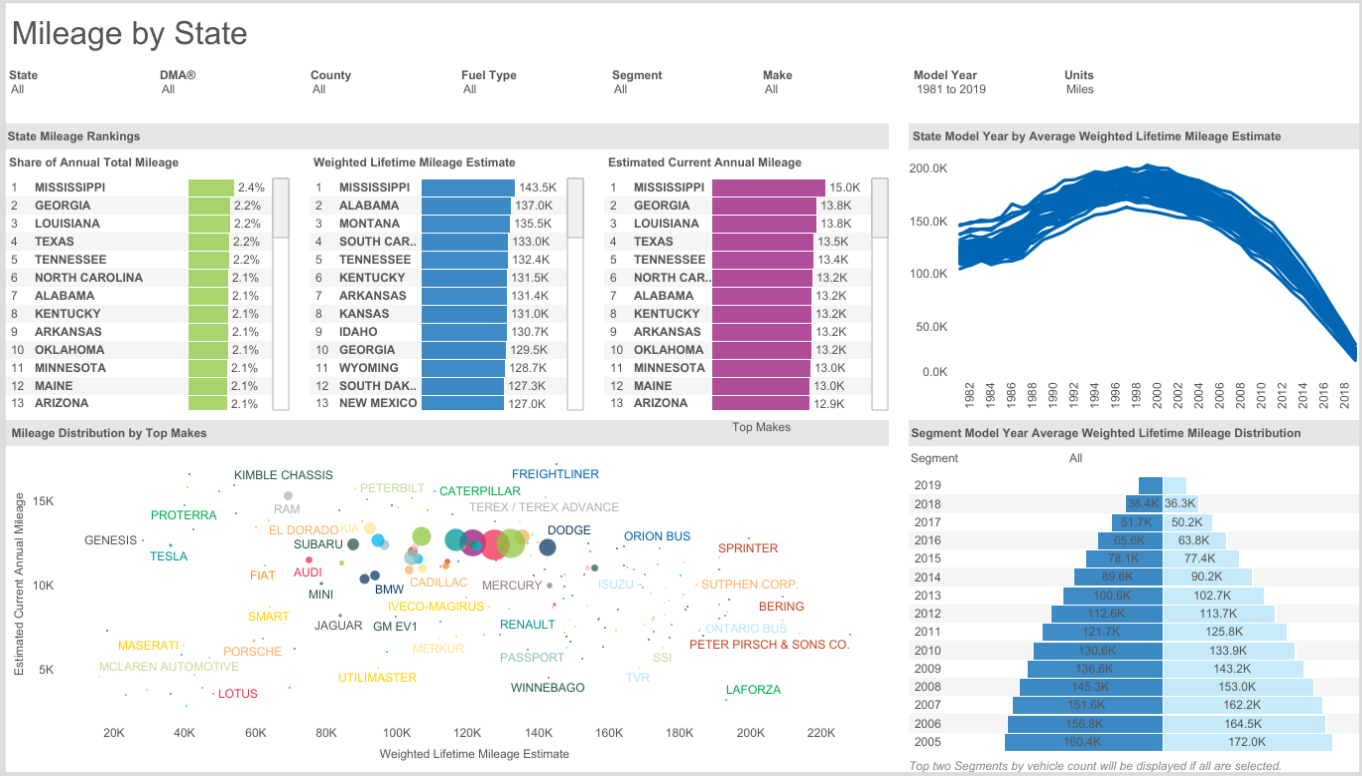
- Assess warranty and post-warranty repair demand for own and competitor brands based on VIO, average age and VMT
- Target marketing campaigns to win back older high-mileage vehicles back into the franchised network
- Offer the right products in their all-makes programs



Use Cases: Local, State & National Government

S&P Global Mobility VMT service allows legislators and governments to make good decisions on:

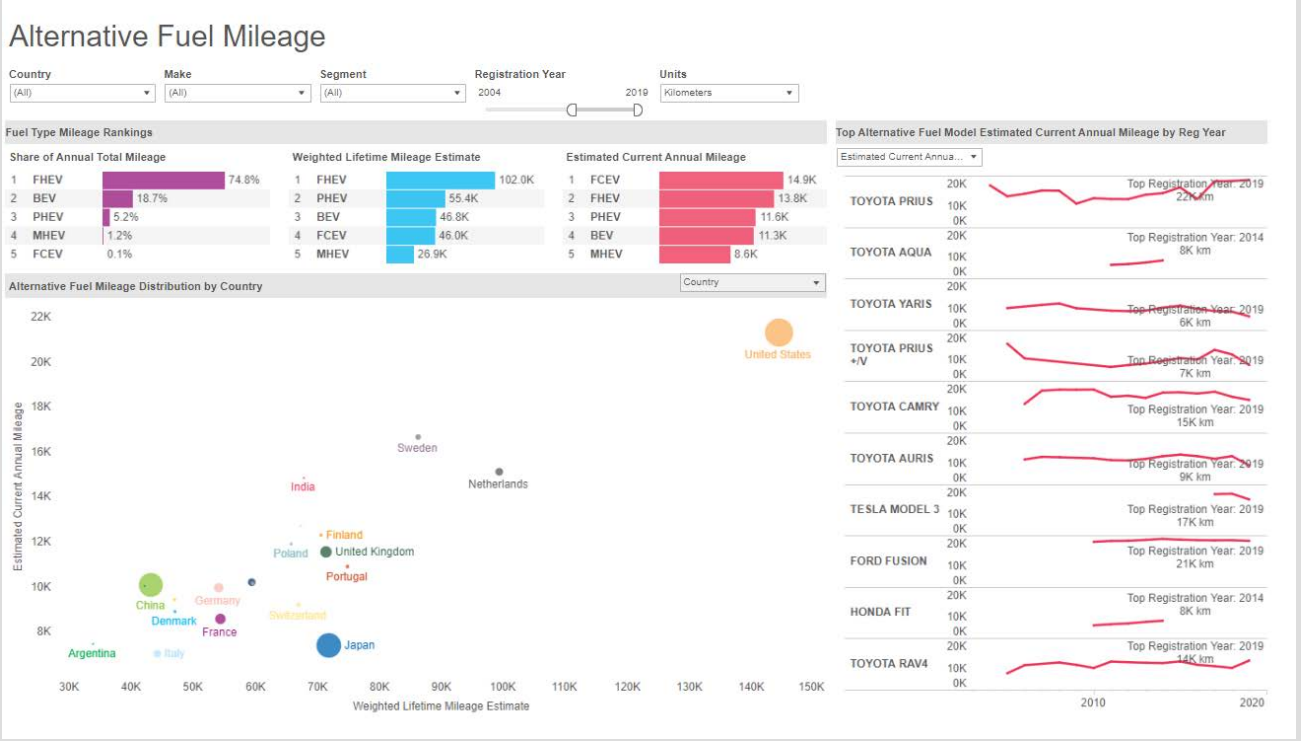
- Vehicle emission legislation
- Road construction planning
- EV charging infrastructure investments
- End-of-life vehicle scrappage policies
- Electric purchasing incentives for new vehicles



Use Cases: Electricity Providers, Utility and Charging Infrastructure Companies

S&P Global Mobility VMT service allows:

- Electricity providers and utility companies to calculate electricity demand and required grid capacities based on Annual VMT and VIO at national for 22 countries globally, and at subnational levels for the United States
- Charging infrastructure companies can prioritize their US network expansion based on xEV high VIO and high VTM at subnational levels – state, county, DMA and ZIP code areas



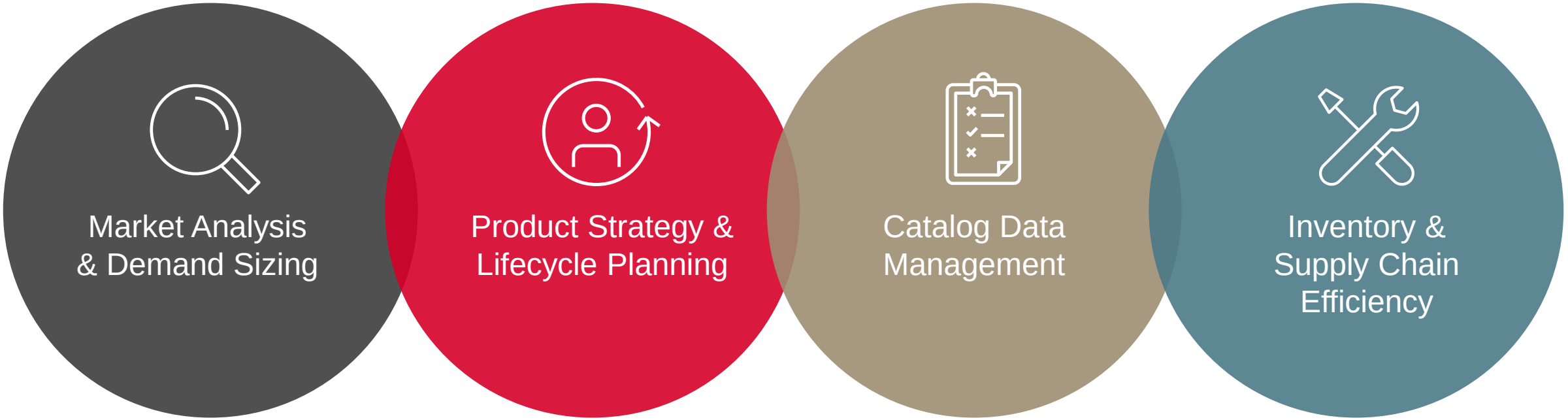
S&P Global
Mobility

Vehicles in Operation

August 2022

Aftermarket Customer Workflows

Supported by AMM Solutions

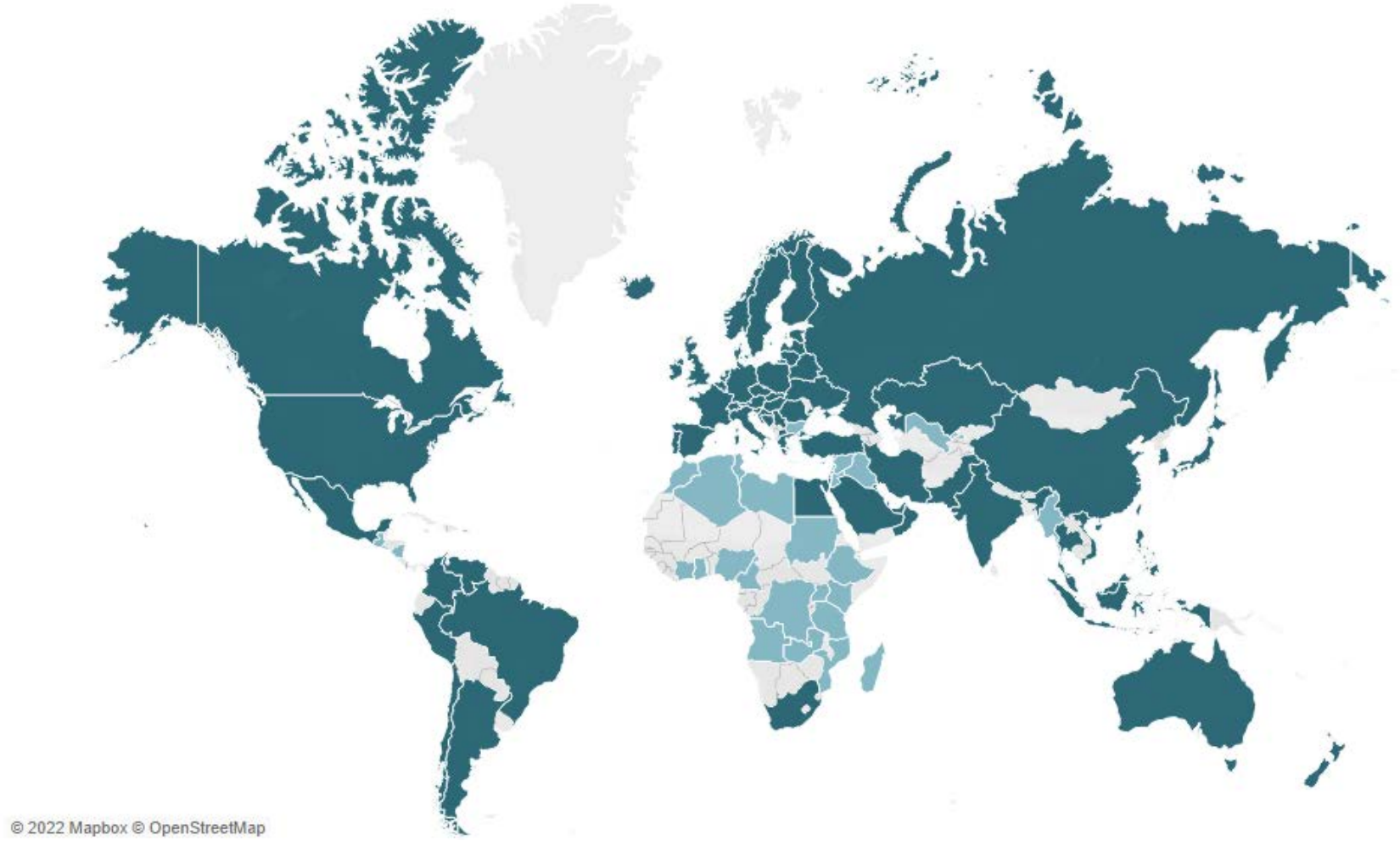


S&P Global
Mobility

Vehicles-in-Operation (VIO) - PARC

PARC National

Detailed data for 95% of the global VIO



76

Countries / Territories with detailed data

33

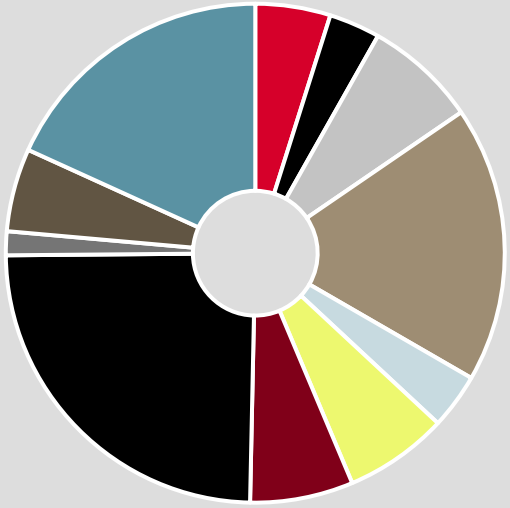
Countries / Territories covered at summary level

S&P Global
Mobility

PARC National

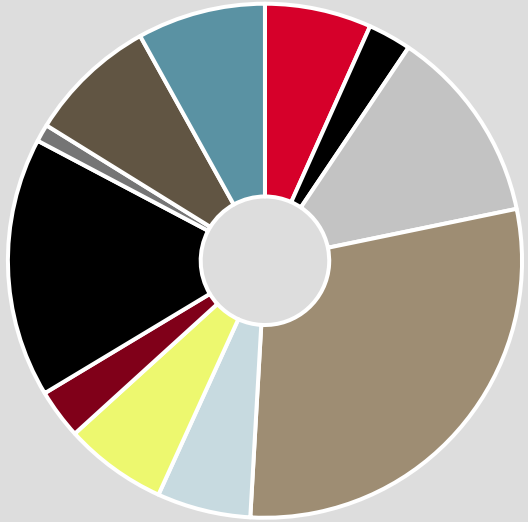
A global coverage of 1.5 billion on-highway vehicles

LV Count 2020: 1.45 B Vehicles



- ASEAN ASE
- CENTRAL EUROPE CE
- EASTERN EUROPE EE
- GREATER CHINA GC
- INDIAN SUBCONTINENT IN
- JAPAN KOREA JK
- MIDDLE EAST AFRICA MEA
- NORTH AMERICA NA
- OCEANIA OC
- SOUTH CENTRAL AMERICA SA
- WESTERN EUROPE WE

MHCV Count 2020: 69 M Vehicles



- ASEAN ASE
- CENTRAL EUROPE CE
- EASTERN EUROPE EE
- GREATER CHINA GC
- INDIAN SUBCONTINENT IN
- JAPAN KOREA JK
- MIDDLE EAST AFRICA MEA
- NORTH AMERICA NA
- OCEANIA OC
- SOUTH CENTRAL AMERICA SA
- WESTERN EUROPE WE

PARC National

Regional product bundles

North America

Western Europe

Central Europe

Eastern Europe

Japan/ Korea

Oceania

South/Central America

Middle East/Africa

Greater China

Indian Subcontinent

ASEAN

1

Global Package

11

Regional Bundles

Up to

60%

discount against single prices

S&P Global
Mobility

PARC Regional

Subnational geographies

Western Europe

Central Europe

Eastern Europe

European Geographies:
Lowest geo levels and NUTS 1-3 levels

Mainland China

Australia

Mainland China:
Province & City levels

Australia:
State/territory level

PARC National

Which countries/territories are available for Light Vehicle?

ASEAN	Central Europe	Eastern Europe	Greater China	Indian Subcontinent	Japan / Korea	Middle East / Africa	North America	Oceania	South / Central America	Western Europe
Indonesia	Croatia	Belarus	China, Mainland	India	Japan	Algeria*	Canada	Australia	Argentina	Austria
Malaysia	Czech Republic	Bosnia-Herzegovina	Hong Kong*	Pakistan	Korea	Angola*	Mexico	New Zealand	Bolivia	Belgium
Myanmar*	Estonia	Bulgaria*	Taiwan			Bahrain	Puerto Rico		Brazil	Denmark
Philippines	Hungary	Cyprus*				Cameroon*	United States		Chile	Finland
Singapore	Latvia	Kazakhstan				Congo*			Colombia	France
Thailand	Lithuania	North Macedonia				Côte d'Ivoire*			Costa Rica	Germany
Vietnam	Poland	Romania				Egypt			Dominican Republic	Greece
	Slovakia	Russia				Ethiopia*			Ecuador	Iceland
	Slovenia	Serbia				Ghana*			El Salvador*	Ireland
		Turkey				Iran			Guatemala*	Italy
		Ukraine				Iraq*			Jamaica*	Luxembourg
		Uzbekistan*				Israel			Nicaragua*	Netherlands
						Jordan*			Panama	Norway
						Kenya*			Paraguay	Portugal
						Kuwait			Peru	Spain
						Lebanon*			Trinidad and Tobago*	Sweden
						Libya*			Uruguay	Switzerland
						Madagascar*			Venezuela	United Kingdom
						Morocco*				
						Mozambique*				
						Nigeria*				
						Oman				
						Qatar				
						Réunion*				
						Saudi Arabia				
						South Africa				
						Sudan*				
						Syria*				
						Tanzania*				
						Tunisia*				
						Uganda*				
						United Arab Emirates				
						Zambia*				

*: summary level = total counts by registration type

PARC National

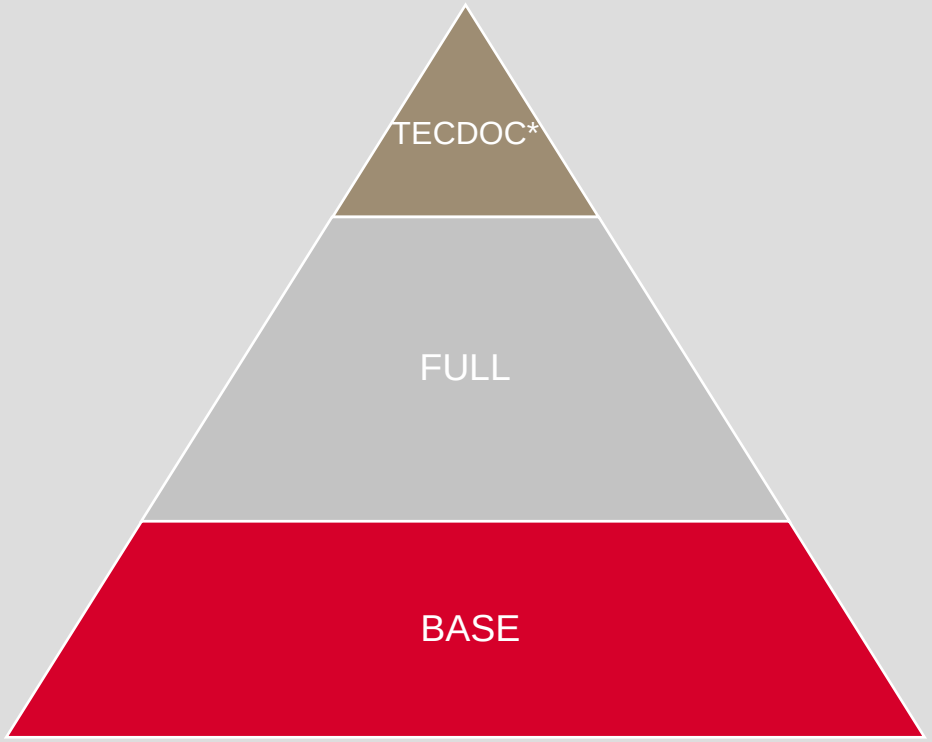
Which countries/territories are available for MHCV?

ASEAN	Central Europe	Eastern Europe	Greater China	Indian Subcontinent	Japan / Korea	Middle East / Africa	North America	Oceania	South / Central America	Western Europe
Indonesia	Croatia	Belarus	China, Mainland	India	Japan*	Algeria*	Canada	Australia	Argentina	Austria
Malaysia*	Czech Republic	Bosnia-Herzegovina	Hong Kong*	Pakistan	Korea	Angola*	Mexico	New Zealand	Bolivia*	Belgium
Myanmar*	Estonia	Bulgaria*	Taiwan			Cameroon*	United States		Brazil	Denmark
Philippines	Hungary	Cyprus*				Congo*			Chile	Finland
Singapore	Latvia	Kazakhstan				Côte d'Ivoire*			Colombia	France
Thailand	Lithuania	North Macedonia*				Egypt			El Salvador*	Germany
Vietnam	Poland	Romania				Ethiopia*			Guatemala*	Greece
	Slovakia	Russia				Ghana*			Jamaica*	Iceland
	Slovenia	Serbia*				Iran*			Nicaragua*	Ireland
		Turkey				Iraq*			Panama*	Italy
		Ukraine				Israel			Peru	Luxembourg
		Uzbekistan*				Jordan*			Trinidad and Tobago*	Netherlands
						Kenya*			Uruguay*	Norway
						Kuwait*			Venezuela	Portugal
						Lebanon*				Spain
						Libya*				Sweden
						Madagascar*				Switzerland
						Morocco*				United Kingdom
						Mozambique*				
						Nigeria*				
						Réunion*				
						Saudi Arabia*				
						South Africa				
						Sudan*				
						Syria*				
						Tanzania*				
						Tunisia*				
						Uganda*				
						Zambia*				

*: summary level = total counts by registration type

PARC

Three levels of Vehicle Attributes



TEC	K-Type Generation (TecDoc)	N-Type Fuel Type text (TecDoc)	Grade of Tecdoc Match Engine Code
FULL	Engine (KW)	Engine (PS)	No. of Cylinders
	Cylinder Conf.	Turbo	Type of Emission
	Transmission	Axle Configuration	Driven Wheels
	Gross Vehicle Weight	USA-CLASS	No. of Doors
	Engine (ltr)	Engine (CCM)	
BASE	Country/Territory	Global Sales Segment	Global Sales Sub-Segment
	Global Sales Price Class	MHCV Segmentation	ISO-Code
	Last Available Date	Registration Type	Make Group
	Age	Year of first registration	Count
	Make	Model Group	Model
	Model-short	Sub Model	Sub Model-short
	Fuel Type	Body Type	Parc Year

* Mapping to the K-Type and N-Type industry standards

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Mobility

Vehicles-in-Operation (VIO) – NVPP for North America

North American Vehicles in Operation

National Vehicle Population Profile (NVPP)

- Government sourced Registration Based Vehicles in Operation Information for the USA and Canada
- Best in class Mexico Vehicles in Operation assembled from the best information available
- Available at national and local geography levels
- VCDB industry standards at all levels of geography to enable linking to customer data
- For US and Canada, third party data is appended:
  - Battery Council Inform. (Battery type)
  - Black Book (Vehicle Values)
  - Tire (Tire sizes)
  - Wards (OE Installed Options), e.g. transmission type
- LV and MHCV for US, Canada and Mexico
- LV for Puerto Rico
- Motorcycles and Recreational vehicles for US
- Includes Historical Trending and Future Market Forecast for USA

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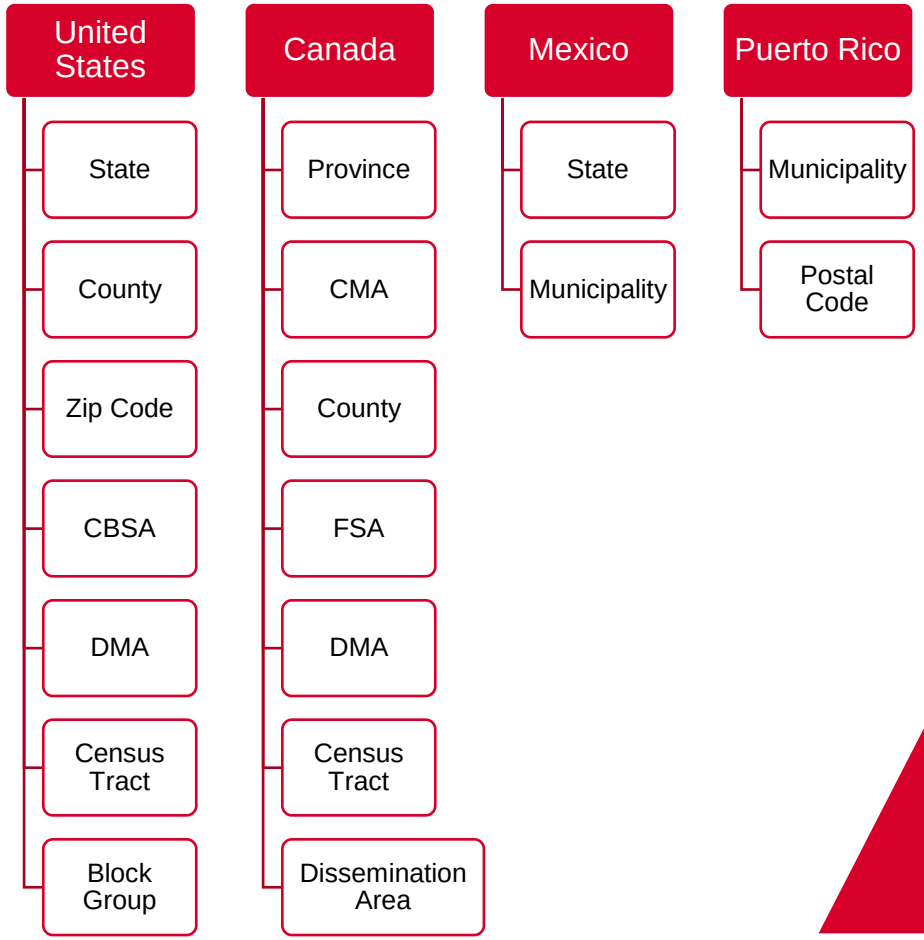
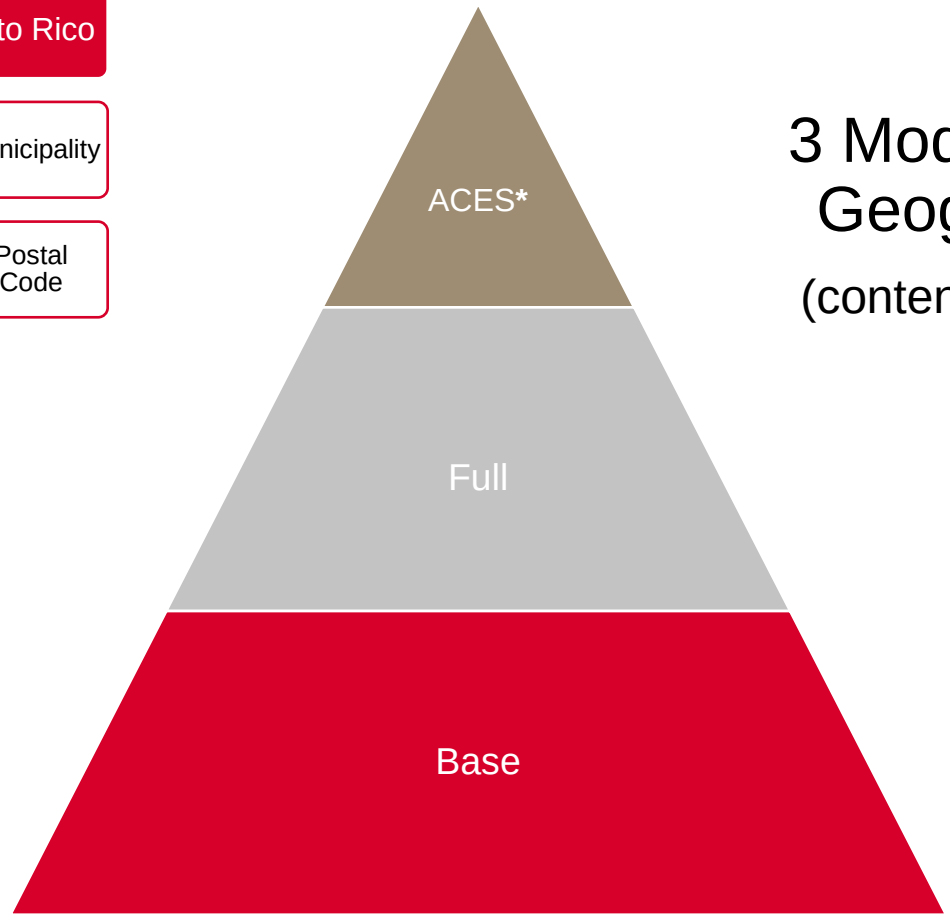
*: NVPP= National Vehicle Population Profile

NVPP

National summaries and subnational geographies





3 Modules for each Geography Level

(content see next slides)

NVPP BASE Module

Main attributes

LV for US, Canada, Mexico & Puerto Rico	MHCV for US, Canada and Mexico	Motorcycles for US	Recreational Vehicles for US
• Vehicle type • Year model • Make • Model • Body style • Fuel type	• Vin GVW • Vehicle type • Year model • Make • Model • Fuel type	• Make • Make abbreviated • Year model • Body style • Model • Category • Segment	• Manufacturer • Report year • Chassis year • Chassis manufacturing description • Model name • Chassis model name • Fuel desc

NVPP FULL Module

Main attributes

LV for US, Canada, Puerto Rico	LV for Mexico	MHCV for US, Canada	MHCV for Mexico	Motorcycles for US	Recreational Vehicles for US
• Vehicle type • Vehicle origin • Make • Manufacturer • Year model • Model • Trim level • GVW • Body style • Door count • Fuel type • Cylinders • Displacement cc • Displacement cid • Engine code • Fuel system • Turbo/supercharged • Drive wheels • Vehicle segment • Liters	• Vehicle type • Year model • Make • Model • Trim • Body style • Vehicle door count • Liters • Cylinders • Engine block type • Turbo/super • Engine head configuration • Fuel type • Drive wheels • GVW • Vehicle sale country code	• VIN GVW • Vehicle type • Year model • Make • Series • Model • Cab config • Cylinders • Engine manufacturer • Engine model • Fuel type • Eng dscplmnt cc • Eng dsplmnt ci • Liters • Aspiration • Engine valves • Engine block type • Engine head configuration • Vehicle doors • Brake type • Wheels driving	• Vehicle type • Year model • Make • Series • Model • VIN GVW • Wheels driving • Cab configuration • VEH door count • Engine block type description • Engine head configuration • Liters • Cylinders • Fuel type • Vehicle sale country code	• Make • Make abbr • Year model • Body style • Trim • Cylinders • Eng dscplmnt cc • Stroke • Model • Category • Segment	• Manufacturer • Report year • Chassis year • Chassis mfg desc • Model name • Chassis model name • Engine desc • RV type • Fuel desc • GVW desc • Brake desc • Cylinders • Displacement cc/cid • Liters • Axles • RV length • Wheelbase

NVPP ACES Module

Main attributes

LV for US, Canada, Puerto Rico	LV for Mexico	MHCV for US, Canada	MHCV for Mexico
• Vehicle ID • Base vehicle ID • Year ID • Make ID • Model ID • Sub model ID • Vehicle type ID • Fuel type ID • Fuel delivery ID • liter • CC • cid • cyl • block type • Aspiration ID • Drive type ID • Body type ID • Body num doors ID • Engine vin ID • Region ID • Power output ID • Fuel del config ID • Body style config ID • Valves ID • Cyl head type ID • Engine base ID • Engine config ID • Veh engconfig ID • Engine designation ID	• Region ID • Vehicle type ID • Year ID • Make ID • Model ID • Sub model ID • Vehicle ID • Engine config ID • Body type ID • Body num doors ID • Liter • Cyl. Block type • Aspiration ID • Cyl head type ID • Fuel type • Drive type ID • Transmission control type ID • Transmission num speeds ID • Base vehicle ID • Engine base ID • Body style config ID • VEH eng con fig ID • plus • Region name • Make name • Vehicle type name • Modelname • Sub model name • Body type name • Aspiration name • Fuel type name • Drive type name • Transmission control type name • Transmission num speeds	• VEHICLE_ID • BASE_VEHICLE_ID • YEAR_ID • MAKE_ID • MODEL_ID • SUB_MODEL_ID • VEH_TYPE_ID • FUEL_TYPE • FUEL_DELIVERY • ASPIRATION_ID • DRIVE_TYPE_ID • BODY_TYPE_ID • BODY_NUM_DOORS_ID • REGION_ID • FUEL_DEL_CONFIG_ID • BODY_STYLE_CONFIG_ID • ENGINE_BASE_ID • ENGINE_DESIGNATION_ID • ENGINE_VIN_ID • CYL_HEAD_TYPE_ID • BRAKE_SYSTEM_ID • ENGINE_MFR_ID	• Make ID/ Make • Model ID/ Model • Sub Model ID • Submodel • Vehicle ID • Base Vehicle ID • Year • Vehicle Type ID • Vehicle Type Name • Body Type ID • Body Type Name • Body Style Config ID • Body No. of Doors ID • Drive Type ID • Cylinder Head Type Name • Cylinders • Cylinder Head Type ID • Fuel Type ID/Fuel Type Name • Drive Type Name • Liter • Aspiration ID/Aspiration Name • Engine Base ID • Engine Config ID • Engine Block Type • Region ID/Region Name • Engine Designation Name

NVPP Advanced Powertrain Suite

Regulation and industry macro trends drive electrification and ICE powertrain efficiency

Powertrain Efficiency

- Greenhouse gas emissions (GHG) and fuel economy standards for light-duty vehicles (passenger cars and trucks) by EPA and National Highway Traffic Safety Administration (NHTSA)
- April 2020, NHTSA and EPA amended Corporate Average Fuel Economy (CAFE) and GHG standards for passenger cars and light trucks and established new less stringent standards, covering model years 2021-2026.

Source: www.epa.gov

Electrification

- Automakers increasingly aggressive over plans for electric and electrified powertrain solutions
- VIO share of xEV LV rose from 1.6 % (1/1/2017) to 2.4 % (4/1/2021)
- VIO share of xEV LV for model year 2020--22 vehicles: 5.6% (4/1/21)
- March 2021, United States passed 100,000 public chargers

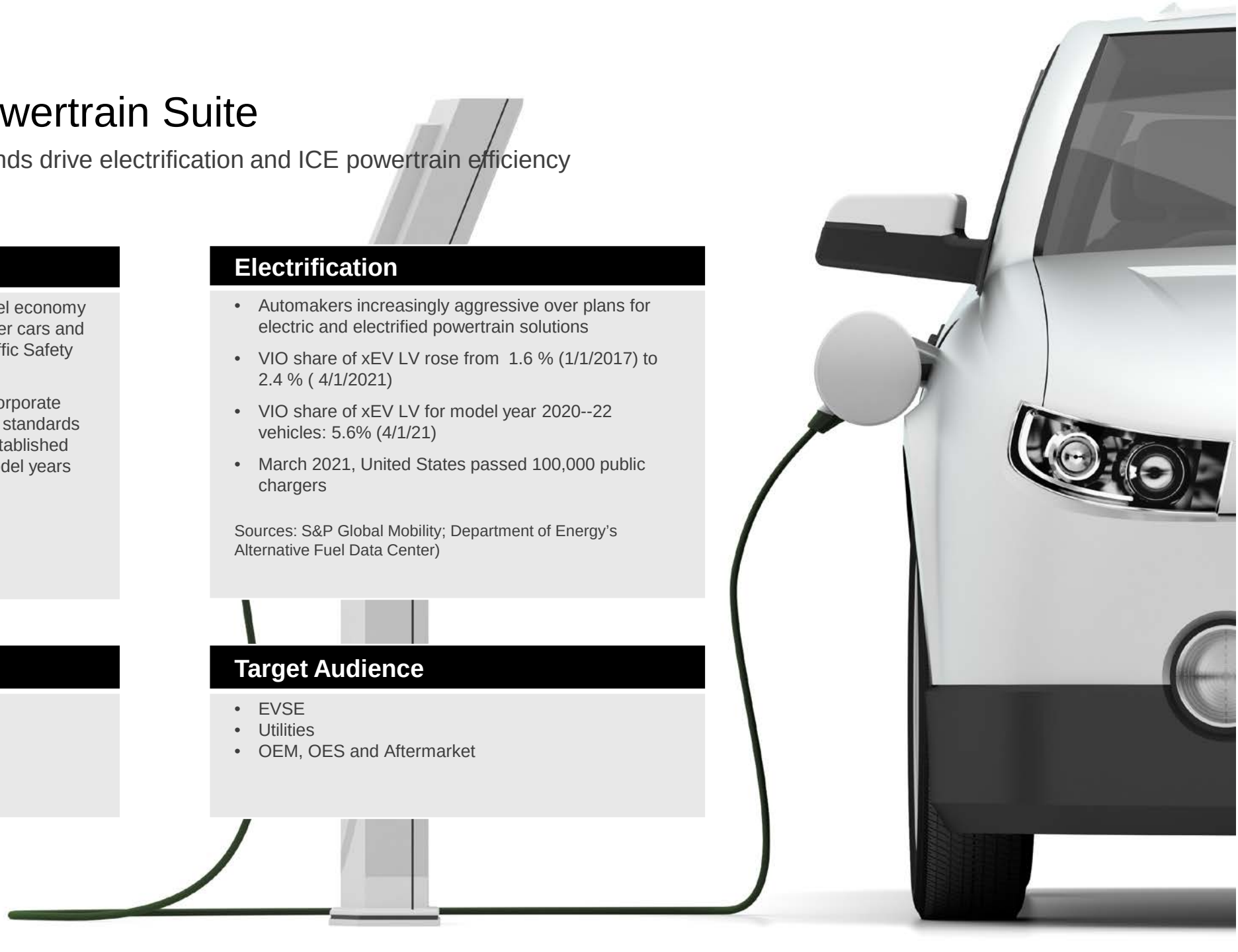
Sources: S&P Global Mobility; Department of Energy's Alternative Fuel Data Center)

Target Audience

- Lubricant companies
- Oil majors
- Municipalities

Target Audience

- EVSE
- Utilities
- OEM, OES and Aftermarket



S&P Global Mobility

NVPP Advanced Powertrain Suite

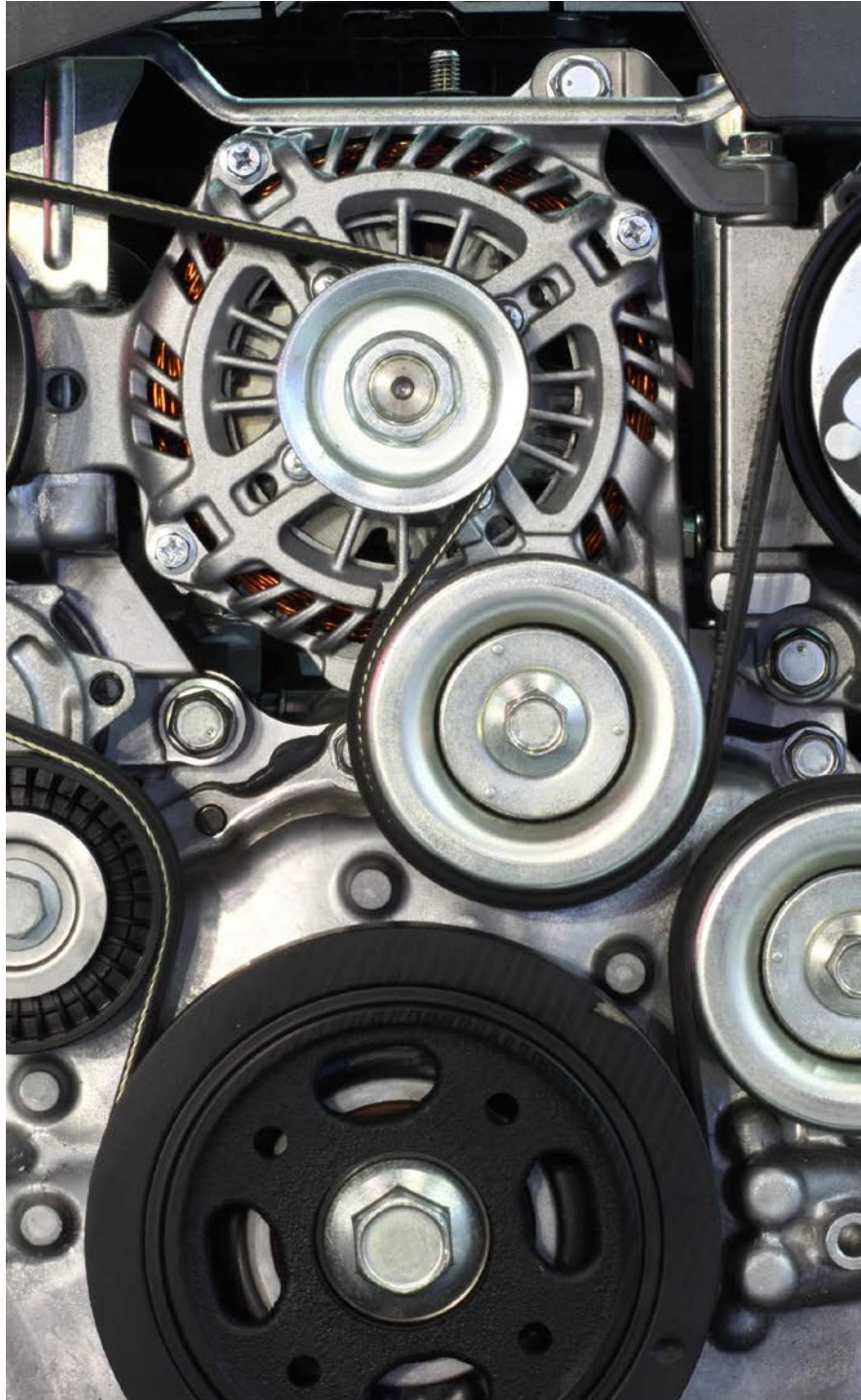
Questions answered

xEV Module

- How quickly are Battery Electric vehicles emerging among Vehicles In Operation (VIO)?
- Which architectures are poised to become serviceable in the near future?
- Which states and sub-national geographies are showing potential to reach some critical mass of electric vehicles?
- Where is there going to be more demand for infrastructure and power supply to support electric mobility?

Powertrain Efficiency Module

- Fuel consumption
- Energy efficiency of the vehicle…
- City restrictions
- State specific regulations
- Start-stop technology



S&P Global
Mobility

xEV NVPP Module

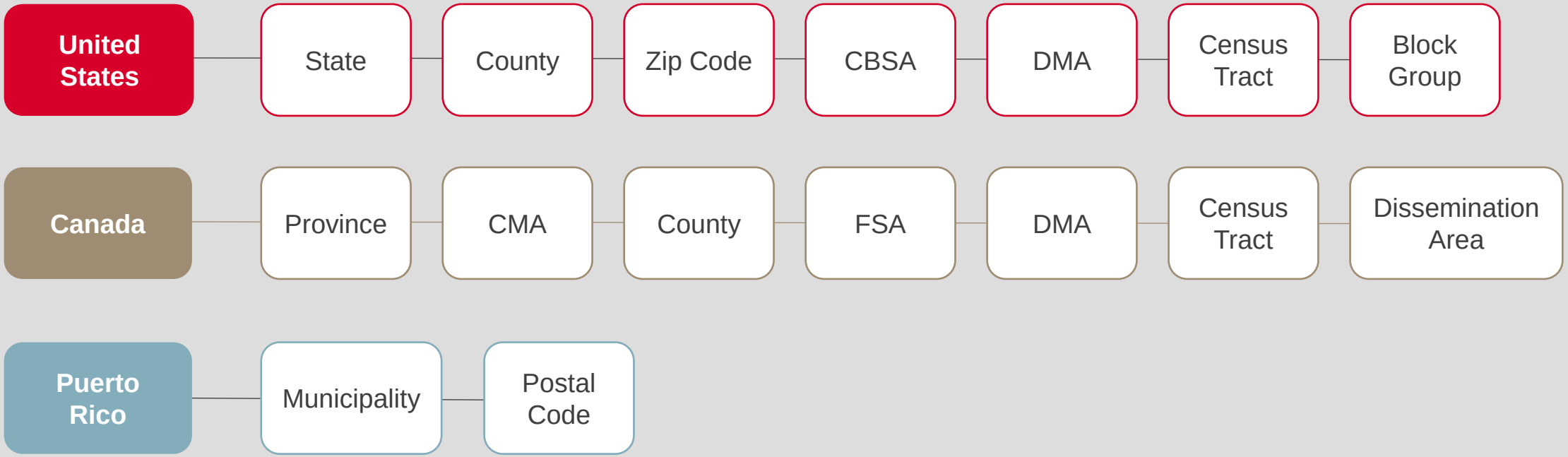
Attributes Included	Attribute Description	Attribute Value Examples
Battery Charging Time(Hrs)@120v	Number in hours that it takes to fully charge the advance technology vehicle battery at 240V. This applies to PHEV and EV vehicles.	0 | 5
Battery Charging Time(Hrs)@240v	Number in hours that it takes to fully charge the advance technology vehicle battery at 240V. This applies to PHEV and EV vehicles.	0 | 2
Battery kWh Rating	The measure of total battery capacity expressed in kilowatts hours.	100
Battery Total Available Capacity (kW)	Battery output in kilowatts for xEVs(Hybrid Electric Vehicle, Plug-in Hybrid Electric Vehicle, Fuel Cell Electric Vehicle or Battery Electric Vehicle)	398
Battery Type	Type of battery used in an advanced vehicle as a part of the hybrid or electric capabilities.	Lead Acid | Lithium ION Lithium-ION Polymer Nickel Metal Hydride
Battery Voltage Description	Battery tension in Volt (V)	48 | 240
EV Range (Miles)	Number of miles an Electric Vehicle or hybrid, operating only in electric mode, can travel on a full charge.	38 | 53
HEV Architecture	It describes how the system interacts with the ICE engine - parallel, in series, etc.	Parallel | Series | Series Parallel
Hybridization Level	It describes the type of hybrid	Mild Hybrid | Energy Hybrid Power Hybrid | Unknown
Motor Drive Assist	It indicates if the vehicle has an electric motor that assists with the drive of the vehicle	No | Unknown | Yes
Motor Power Output (kW)	Power output of an electric motor in kilowatts.	3.7 | 5 | 5.6

Powertrain Efficiency NVPP module

Attributes	Attribute Description	Attribute Value Examples
Cylinder Deactivation	Cylinder Deactivation is when cylinders are 'shut off' at cruising speed	No | Unknown | Yes
EPA Air Pollution Score	Score assigned by the EPA. The air pollution score is based on the government emission standards a given vehicle was verified to comply with. The score reflects the vehicle's tailpipe emissions that contribute to air pollution. This attribute applies to all vehicles the EPA provides scoring for. The scores range from 0 to 10, where 10 is the best.	0 - 10
EPA Certified Sales Region	Region where the vehicle is 'certified for sale'	California | Clean Fuel Vehicle Federal All Altitude
EPA Greenhouse Gas Score	Score assigned by the EPA., reflecting the emissions of greenhouse gases. The greenhouse gas score is based on the vehicle's fuel economy: Vehicles with higher fuel economy receive a higher greenhouse gas score. The scores range from 0 to 10, where 10 is the best.	0 -10
EPA Smart Way Rating	Each model year, EPA rates every new car, truck, and Sport Utility Vehicle (SUV) for greenhouse gas and smog-forming emissions on scales of 1-10. To earn the SmartWay designation, a vehicle must receive a combined score from both scales that is much better than the average vehicle. SmartWay Elite certification is given to only those vehicles that attain the highest scores on both scales. SmartWay Elite vehicles are the very best environmental performers.	Smart way elite vehicle not a smart way/Elite vehicle smart wat
Idle Stop-Go System	Idle Stop/Start	No | Unknown | Yes
MPG or MPGe Combined	Miles per gallon combined for city and highway driving for the given vehicle as reported by the OEM. MPGe is the Miles per gallon equivalent for an electric vehicle.	20
MPG or MPGe Hwy	Miles per gallon in highway driving for the given vehicle as reported by the OEM. MPGe is the Miles per gallon equivalent for an electric vehicle.	18
MPG or MPGe City	Miles per gallon in city driving for the given vehicle as reported by the OEM. MPGe is the Miles per gallon equivalent for an electric vehicle.	24
Regenerative Braking	Regenerative braking is when the energy created by the wheels during braking is captured and stored to be used to power the motor or other on board electrical devices.	No | Unknown | Yes

NVPP Advanced Powertrain Suite – Available geographies

The NVPP Advanced Powertrain Suite is available as 3 national summaries and 16 subnational geographies



S&P Global
Mobility

Vehicles-in-Operation (VIO) Forecasts

Vehicles in Operation (VIO) Forecast

Variations for specific requirements

Forecast Level	Make	Model	Age	Fuel Type	Vehicle Variant	Standard 5 years	Extended 11 years
PARC – Model	x	x	x	-	-	x	x
PARC – Fuel Type	x	x	x	x	-	x	x
PARC – TecDoc	x	x	x	-	x	x	x
NVPP – Base	x	x	x	-	-	x	-
NVPP – ACES	x	x	x	-	x	x	-

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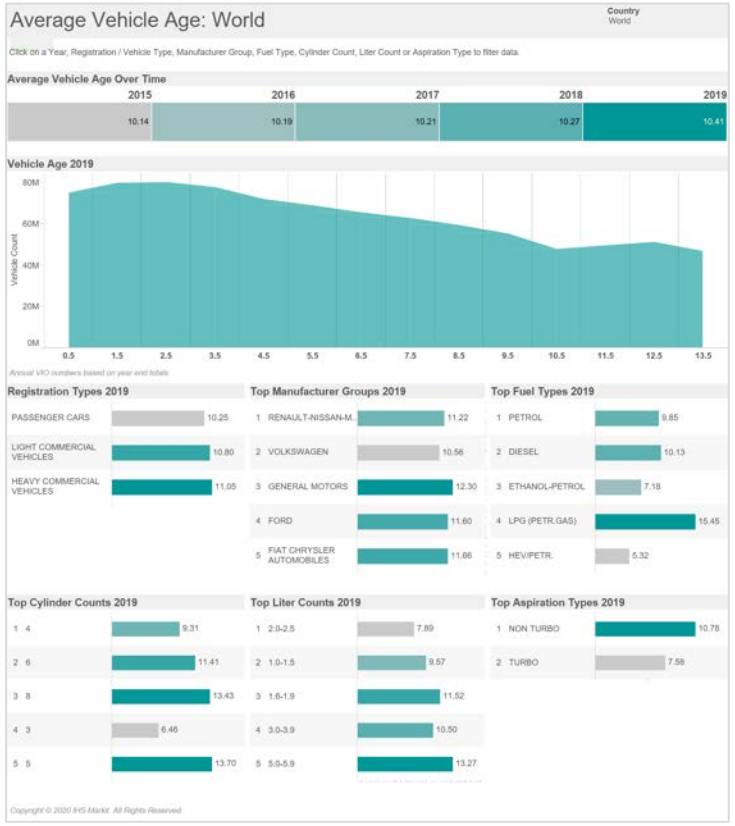
Mobility

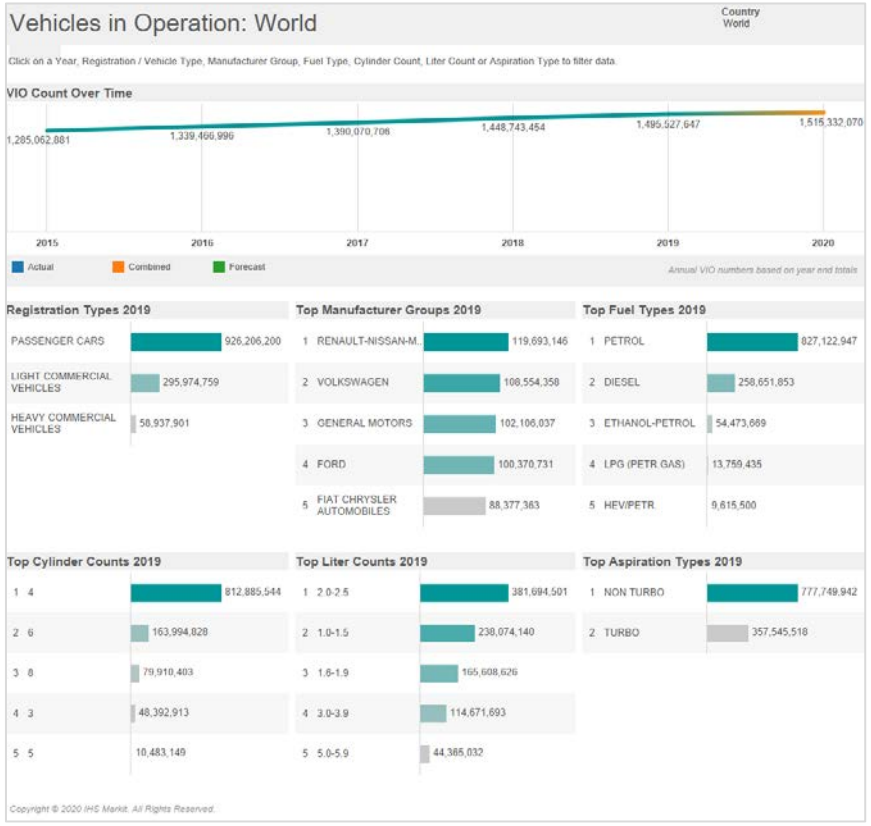
S&P Global
Mobility

WorldView Query Tool

WorldView

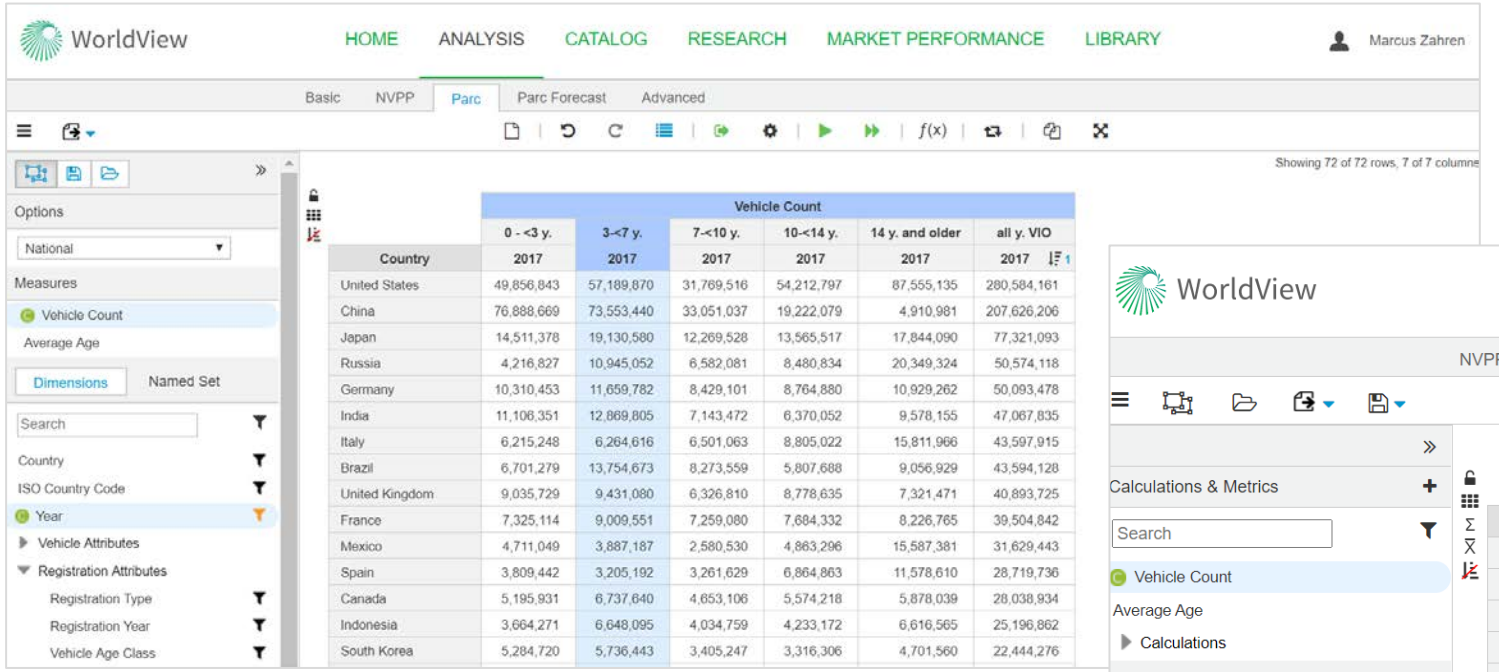
Access topline VIO charts and overview map

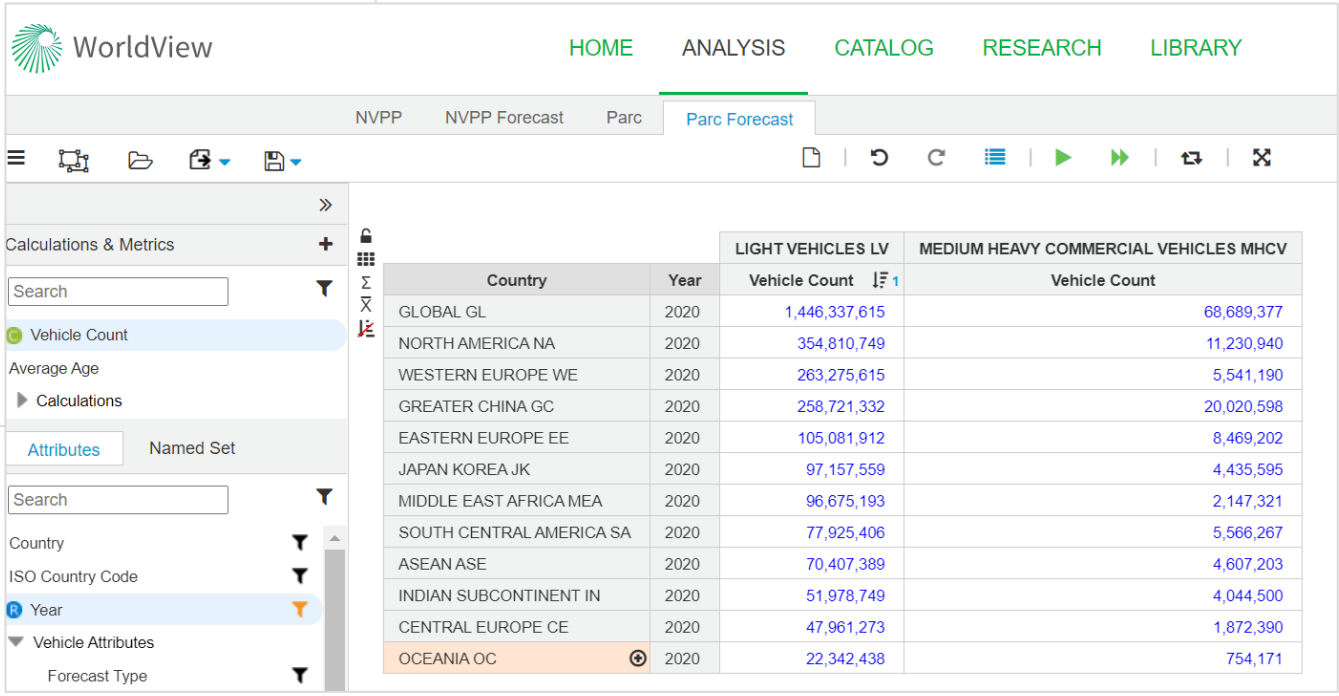




WorldView

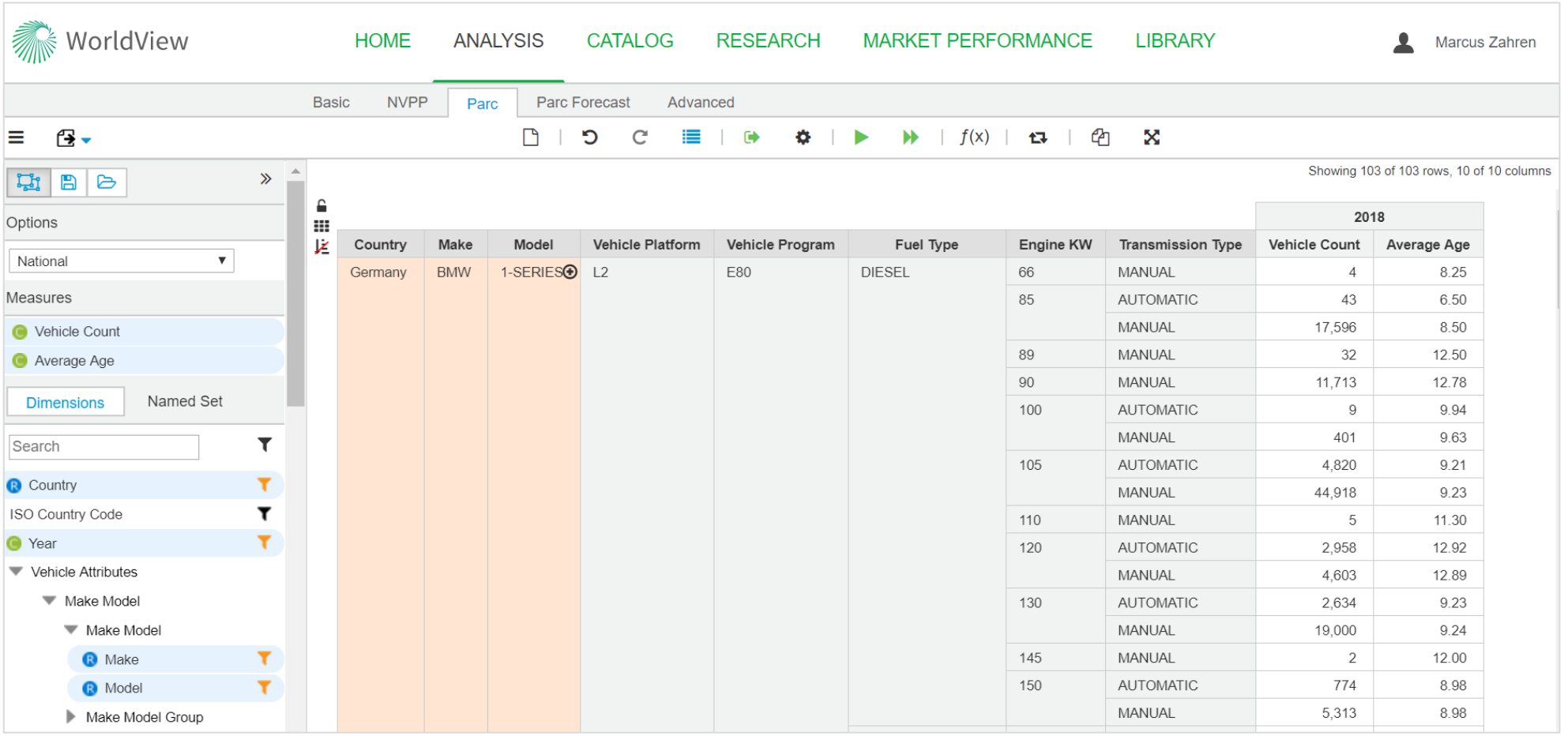
Analyze global VIO by country/ territory & age





WorldView

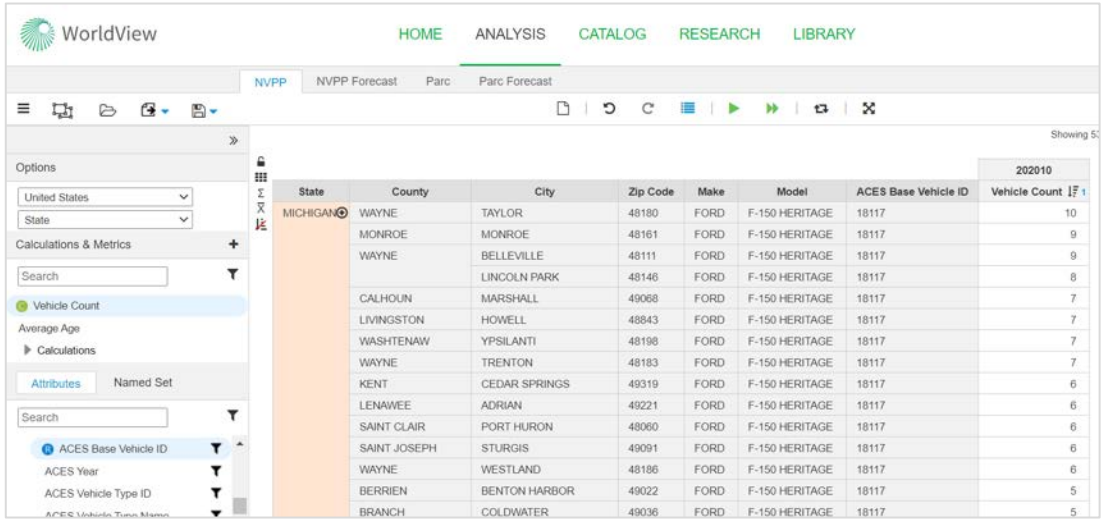
VIO by platform & program and transmission type



								2018	
Country	Make	Model	Vehicle Platform	Vehicle Program	Fuel Type	Engine KW	Transmission Type	Vehicle Count	Average Age
Germany	BMW	1-SERIES	L2	E80	DIESEL	66	MANUAL	4	8.25
						85	AUTOMATIC	43	6.50
							MANUAL	17,596	8.50
						89	MANUAL	32	12.50
						90	MANUAL	11,713	12.78
						100	AUTOMATIC	9	9.94
							MANUAL	401	9.63
						105	AUTOMATIC	4,820	9.21
							MANUAL	44,918	9.23
						110	MANUAL	5	11.30
						120	AUTOMATIC	2,958	12.92
							MANUAL	4,603	12.89
						130	AUTOMATIC	2,634	9.23
							MANUAL	19,000	9.24
						145	MANUAL	2	12.00
						150	AUTOMATIC	774	8.98
							MANUAL	5,313	8.98

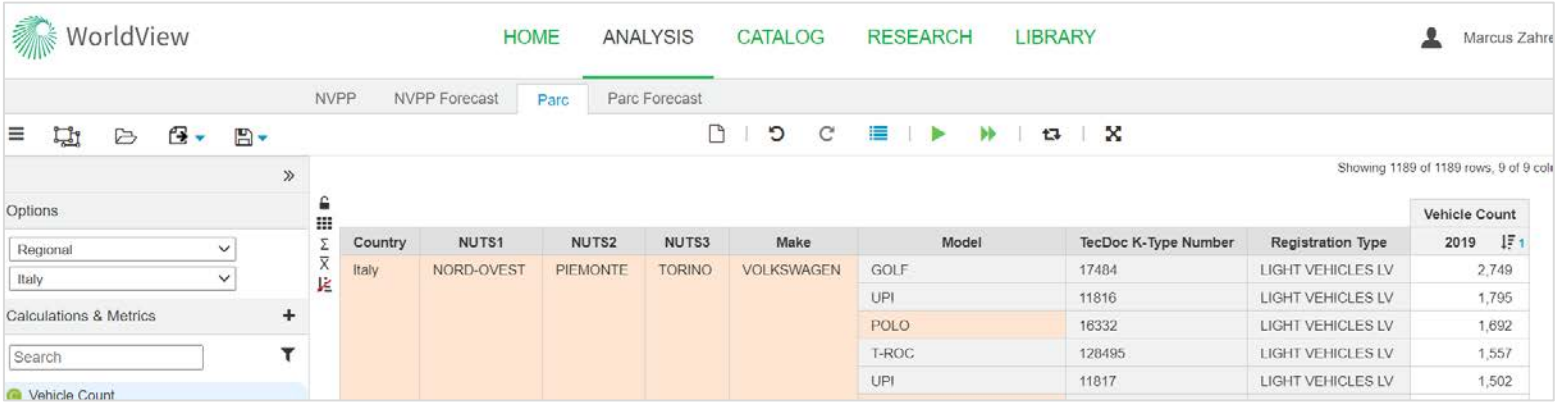
WorldView

Subnational VIO for US, Mainland China and Europe



State	County	City	Zip Code	Make	Model	ACES Base Vehicle ID	202010 Vehicle Count
MICHIGAN	WAYNE	TAYLOR	48180	FORD	F-150 HERITAGE	18117	10
	MONROE	MONROE	48161	FORD	F-150 HERITAGE	18117	9
	WAYNE	BELLEVILLE	48111	FORD	F-150 HERITAGE	18117	9
		LINCOLN PARK	48146	FORD	F-150 HERITAGE	18117	8
	CALHOUN	MARSHALL	49068	FORD	F-150 HERITAGE	18117	7
	LIVINGSTON	HOWELL	48843	FORD	F-150 HERITAGE	18117	7
	WASHTENAW	YPSILANTI	48198	FORD	F-150 HERITAGE	18117	7
	WAYNE	TRENTON	48183	FORD	F-150 HERITAGE	18117	7
	KENT	CEDAR SPRINGS	49319	FORD	F-150 HERITAGE	18117	6
	LENAWEE	ADRIAN	49221	FORD	F-150 HERITAGE	18117	6
	SAINT CLAIR	PORT HURON	48060	FORD	F-150 HERITAGE	18117	6
	SAINT JOSEPH	STURGIS	49091	FORD	F-150 HERITAGE	18117	6
	WAYNE	WESTLAND	48186	FORD	F-150 HERITAGE	18117	6
	BERRIEN	BENTON HARBOR	49022	FORD	F-150 HERITAGE	18117	5
	BRANCH	COLDWATER	49036	FORD	F-150 HERITAGE	18117	5

Country	Province	City	Make	Model	TecDoc K-Type Number	Registration Type	2019
China	HUBEI	WUHAN	VOLKSWAGEN-SHANGHAI	LAVIDA	22610	LIGHT VEHICLES LV	27,657
				TIGUAN	33642	LIGHT VEHICLES LV	16,229
				PASSAT NMS	12829	LIGHT VEHICLES LV	7,508
				LAVIDA	29857	LIGHT VEHICLES LV	6,588
				SANTANA	58639	LIGHT VEHICLES LV	6,392
				TIGUAN	9133	LIGHT VEHICLES LV	5,907
					130362	LIGHT VEHICLES LV	4,648
				PASSAT	24161	LIGHT VEHICLES LV	4,439
				SANTANA CLASSIC	31232	LIGHT VEHICLES LV	4,046
				LAVIDA	121921	LIGHT VEHICLES LV	3,996
				LAMANDO	109932	LIGHT VEHICLES LV	3,349
				PASSAT NMS	118841	LIGHT VEHICLES LV	3,100
				LAMANDO	109931	LIGHT VEHICLES LV	3,095
				TIGUAN	33643	LIGHT VEHICLES LV	3,065
				POLO	113743	LIGHT VEHICLES LV	2,845



Country	NUTS1	NUTS2	NUTS3	Make	Model	TecDoc K-Type Number	Registration Type	Vehicle Count 2019
Italy	NORD-OVEST	PIEMONTE	TORINO	VOLKSWAGEN	GOLF	17484	LIGHT VEHICLES LV	2,749
					UPI	11816	LIGHT VEHICLES LV	1,795
					POLO	16332	LIGHT VEHICLES LV	1,692
					T-ROC	128495	LIGHT VEHICLES LV	1,557
					UPI	11817	LIGHT VEHICLES LV	1,502

Sales & Technical Support

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Todd Campau is Associate Director for the Aftermarket solutions at S&P Global Mobility.

Todd has 18+ years in the global aftermarket industry. In his role at S&P Global Mobility he is responsible for the development of insights and new product concepts for the Aftermarket as well as being subject matter expert for the North American Aftermarket.

Prior to S&P Global Mobility, Todd spent three years as a catalog manager at Gates Corporation and over seven years in data management at MAHLE Clevite Inc.

Todd holds Master of Science degree in Sports Management and a Bachelor of Science degree in Computer Science, both from Eastern Michigan University.

EMEA

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Marcus Zahren is Associate Director for the Aftermarket solutions at S&P Global Mobility.

Marcus has over 20 years of industry experience, starting his career at an aftermarket service provider, followed by an OEM aftersales division.

Since 2002, he has held positions with S&P Global Mobility in both product and sales areas.

Whilst Marcus remains the dedicated subject matter expert for VIO and WorldView in EMEA, he is also responsible globally for Aftermarket go-to-market, pricing and product packing strategies.

Marcus has a Diploma of Economics degree from the University of Cologne, Germany.

APAC

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Joyce Wang is APAC Director for the Automotive Aftermarket and Supply Chain & Technology team at S&P Global Mobility.

With over 10 years of work experience in the automotive industry, Joyce specializes in OEM product planning, supply chain analysis, opportunity identification and assessment.

Joyce has led component and technology research in China, later moving on to lead a team of 11 analysts in Japan, China and South Korea. In her current capacity Joyce has conducted several OEM workshops to support clients identifying market trends and business opportunities.

Joyce has a Master of Economics degree from, Donghua University (Shanghai, China).

Get the insight you need! Contact us today.

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Contact us today and we'll be happy to show you how S&P Global Mobility can help you take advantage of future opportunities.

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