



**ESG** INTELLIGENCE



AFRICA & THE MIDDLE EAST

# Gearing Up for the Green Automotive Transition

## ENVIRONMENT: THE ROAD TO ZERO EMISSIONS

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*This report was created by the ESG Intelligence division of Oxford Business Group (OBG) in partnership with GM Africa & Middle East. Information about GM was provided directly by the company. All additional information contained within the report was collated and analysed by OBG's ESG Intelligence project team in accordance with their internal operating procedures and standards, and GM is not responsible for any content not directly related to the company.*

# The automotive industry has a key role to play in achieving sustainable development goals

The concepts of value creation and business success have evolved in recent times to go beyond profit maximisation. Today, companies, investors and consumers alike are increasingly aware of how products and corporate practices can impact the environment and broader society. Such factors are shaping decision-making processes everywhere from board rooms to points of sale. In response, there are ongoing efforts to develop globally recognised environmental, social and governance (ESG) standards and reporting frameworks to guide responsible corporate operations and growth strategies. Such efforts foster accountability by encouraging companies to report their actions in terms of preserving the environment, generating a positive social impact and advancing inclusive economic prosperity.

The UN Sustainable Development Goals (SDGs), launched in 2015, established 17 overarching goals and 169 targets that serve as both a guide and a tool kit for governments and businesses to engage in sustainable and responsible practices that promote positive economic, social and environmental development.

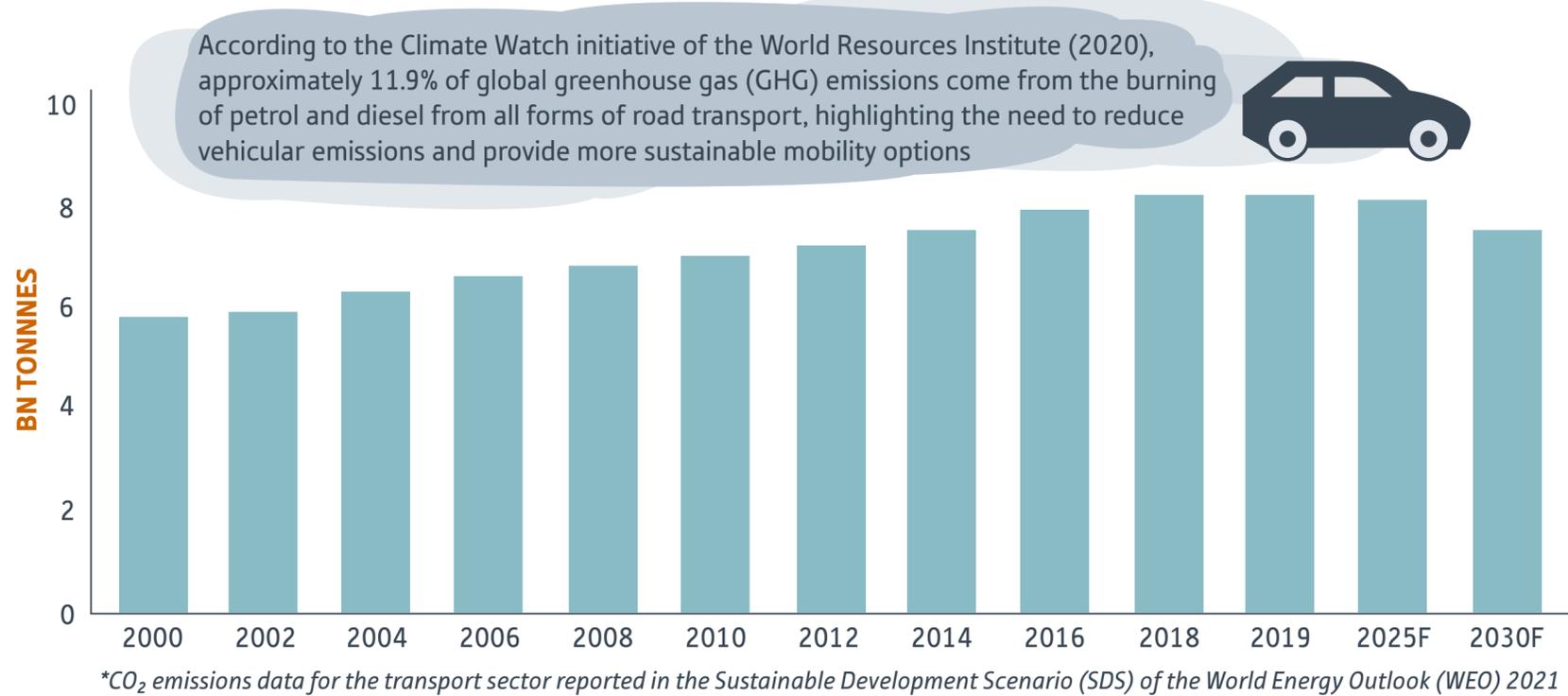


Stakeholders in the automotive sector – including original equipment manufacturers (OEMs) – are increasingly cognisant of the potential environmental and social impact of the industry. Consequently, corporate decision-makers are re-evaluating long-held practices across the value chain – from the extraction and processing of raw materials, to the manufacturing process, to global distribution, and lastly to the carbon emissions and traffic congestion resulting from product usage.

Although the automotive industry has a role to play in all 17 SDGs, its activities have major consequences for goals 3, 7, 8, 9, 11, 12, 13, 15 and 17, in particular. Responsible sourcing of materials and environmentally efficient production and distribution processes are important, alongside ambitious research and development (R&D) efforts to develop vehicles with low or zero carbon emissions, and smart features that can reduce or eliminate congestion and road accidents. The rapid global adoption of electric vehicles (EVs) and zero-emission technologies are critical steps on the path to a net-zero future, which puts the automotive industry in a pivotal position.

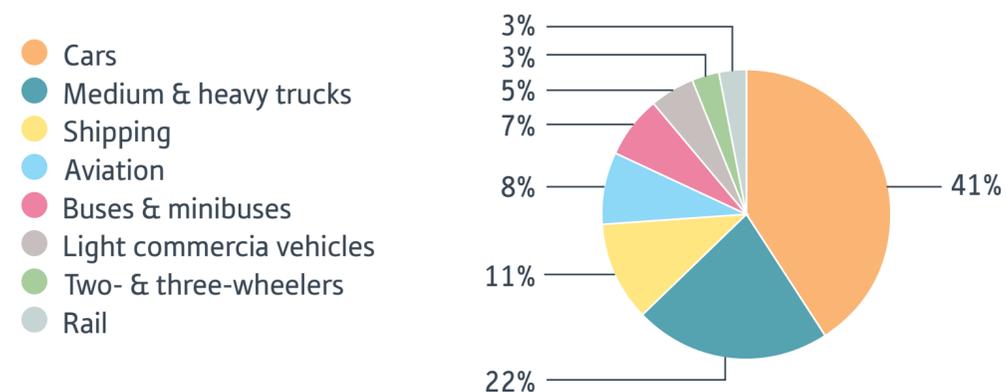
# Responsible production and consumption are essential to environmental sustainability in the automotive sector

## Transport sector's global direct CO<sub>2</sub> emissions



## Cars account for the highest emissions among all modes of transport

Distribution of global CO<sub>2</sub> emissions produced by modes of transport according to Statista data, 2020



By 2030 an estimated 127m cars will be produced globally and the total number of cars on the road could reach 2bn by 2035, according to Denmark-based advocacy group The World Counts. EVs could cut GHG emissions in half by 2030 compared to fossil fuel-powered cars, offsetting up to 540m tonnes of CO<sub>2</sub> equivalent.

## Key elements of sustainability in the automotive industry



### Product sustainability

Car production that takes into account eco-design and life-cycle impact to minimise the environmental footprint by moving to fuel-efficient or electric vehicles and biodegradable components



### Sustainable energy procurement

Utilising clean, renewable energy in buildings, facilities and production activities, while leasing or investing in renewable energy assets to reduce environmental impact



### Responsible marketing, sales and after sales

Applying marketing strategies that promote environmental awareness and protection and providing after-sales services such as retrofitting and refurbishing of old components or vehicles



### Responsible sourcing

Environmentally responsible sourcing of energy, materials and products from renewable and low-carbon sources and ensuring that production is done with minimum effect on the environment



### Emission control and product safety

Ensuring that the lifetime emissions produced by vehicles and their production process are monitored and managed to ensure sustainability and product safety



### Environmental due diligence

Due diligence of all material and product procurement to ensure all processes are compatible with environmental guidelines and are independently verified



### Sustainable manufacturing

Conducting production, quality and maintenance processes while conserving energy, water and natural resources, reducing waste, and improving the recyclability and reuse of materials



### Sustainable R&D

Innovating environmentally friendly products, features and use cases, such as vehicle-to-grid and green charging, and the development of autonomous vehicles (AVs) suitable for ride-sharing



### Circular economy

Fostering an industrial system that maximises the use and reuse of resources by being restorative and regenerative instead of the traditional manufacturing cycle of "take-make-use-dispose"

# General Motors' evolving footprint across Africa and the Middle East

Global automotive sales began to slow down in 2019 on the back of subdued demand in China, India and other emerging markets. The slowdown continued in 2020 amid the Covid-19 pandemic, inducing automakers to re-evaluate their growth and innovation plans in pursuit of new revenue streams and more sustainable opportunities.

## GM sales highlights in Africa & the Middle East, 2021

**58%**  
y-o-y growth in aggregate SUV sales

**37%**  
y-o-y increase in GMC and Chevrolet brands in the region

**41%**  
y-o-y growth in PU-E sales

**12%** y-o-y growth in SUV-E sales



**79%**  
y-o-y increase and the **highest sales** on record for Chevrolet Captiva



**Chevrolet Blazer**  
saw its highest sales on record



## GM's current and future footprint in Africa & the Middle East



**16** markets served



**15** dealer partners across nine markets



**1200** employees across the region



**194** customer-facing premises



**35** nationalities represented in the regional workforce



GM identifies significant growth potential among a population of **>1bn**

## Significant regional growth for GM in 2021



**11%** y-o-y growth for all Africa and Middle East operations

**13%** y-o-y growth for Africa markets

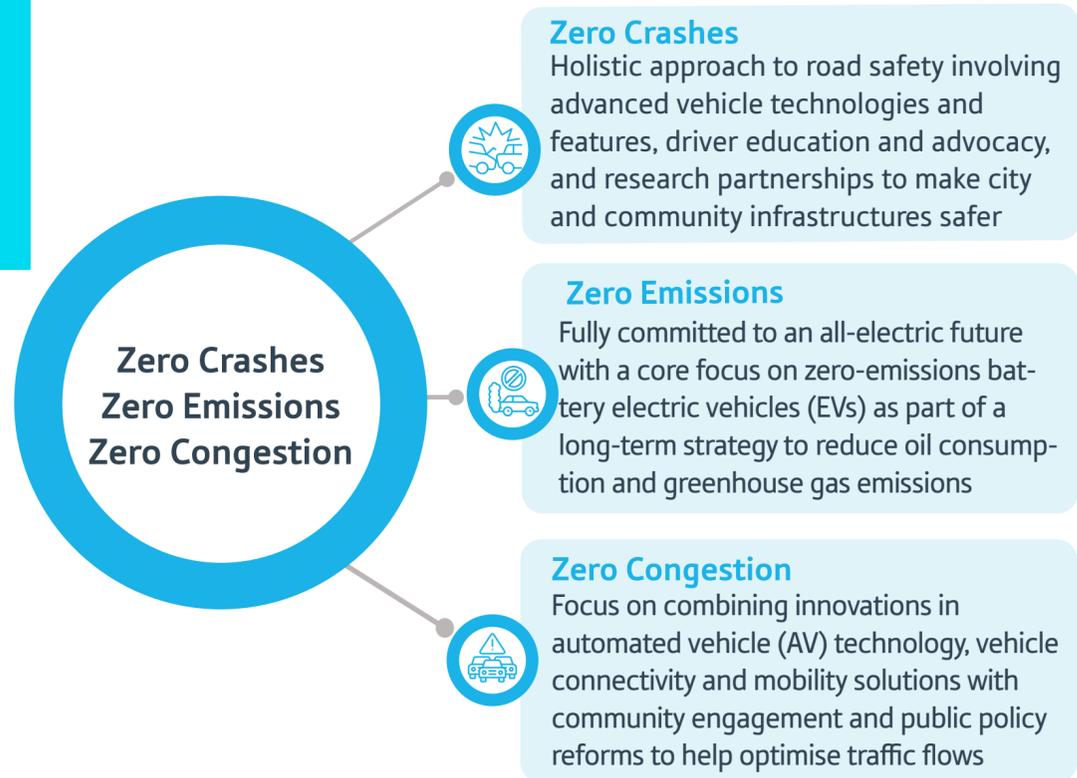
**9.4%** y-o-y growth for Middle East markets

**17.3%** market share in Egypt and market leader for Chevrolet for 14 consecutive years

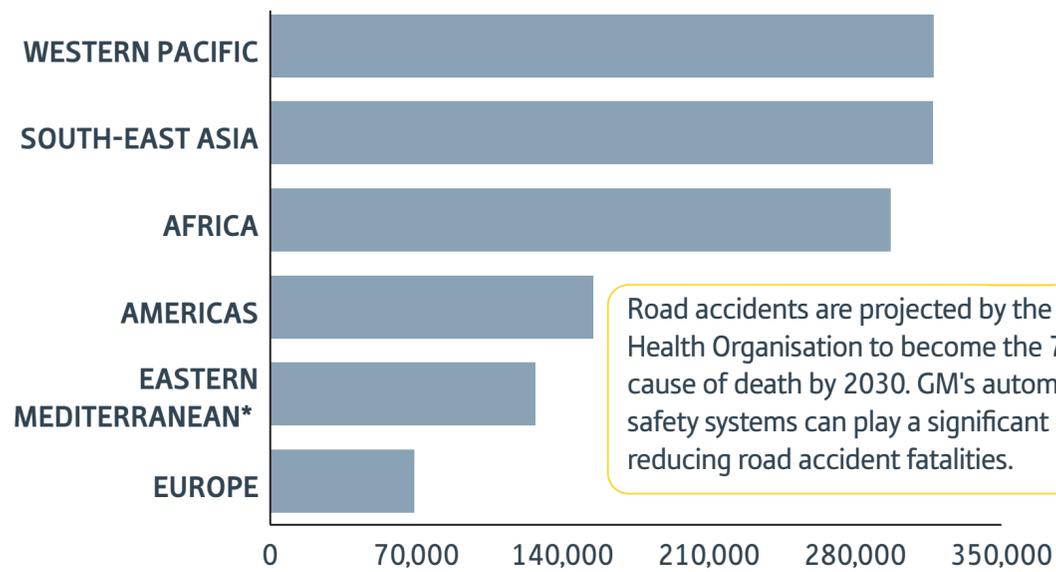
## Regional expansion

General Motors (GM) is a multinational automotive company headquartered in the US. Its automotive operations meet the demands of customers through its GM North America and GM International segments, with vehicles developed, manufactured and marketed under the Buick, Cadillac, Chevrolet and GMC brands. GM started operations in Africa and the Middle East with an office in Alexandria, Egypt in 1926. Regionally headquartered today in Dubai, with a manufacturing plant in Cairo, Egypt, GM Africa and Middle East aims to contribute significantly to sustainable mobility in the region, and plans to offer 13 electric vehicle models to regional consumers by 2025.

# GM's "triple zero" approach to responsible business and long-term value creation



No. of road traffic deaths estimated by the WHO, 2019

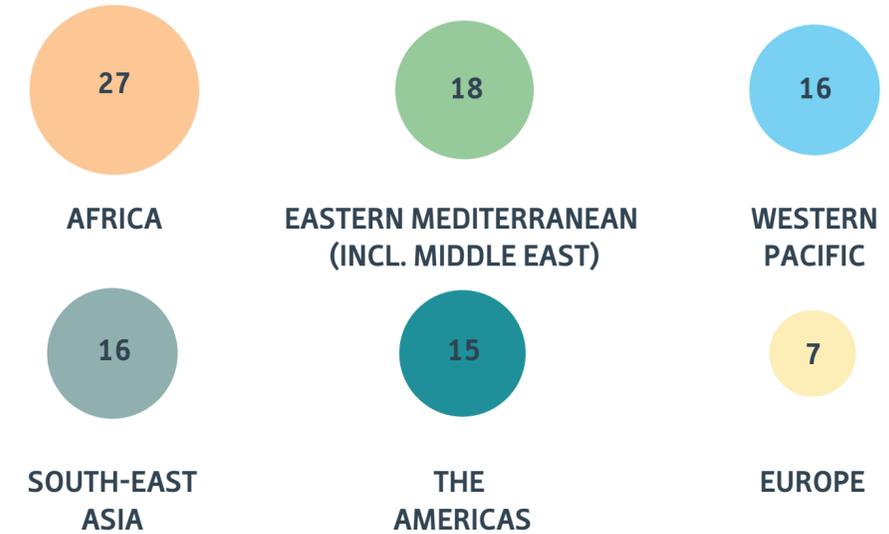


Road accidents are projected by the World Health Organisation to become the 7th-leading cause of death by 2030. GM's automated safety systems can play a significant role in reducing road accident fatalities.

\* WHO classification includes the Middle East, North Africa, Horn of Africa and Central Asia

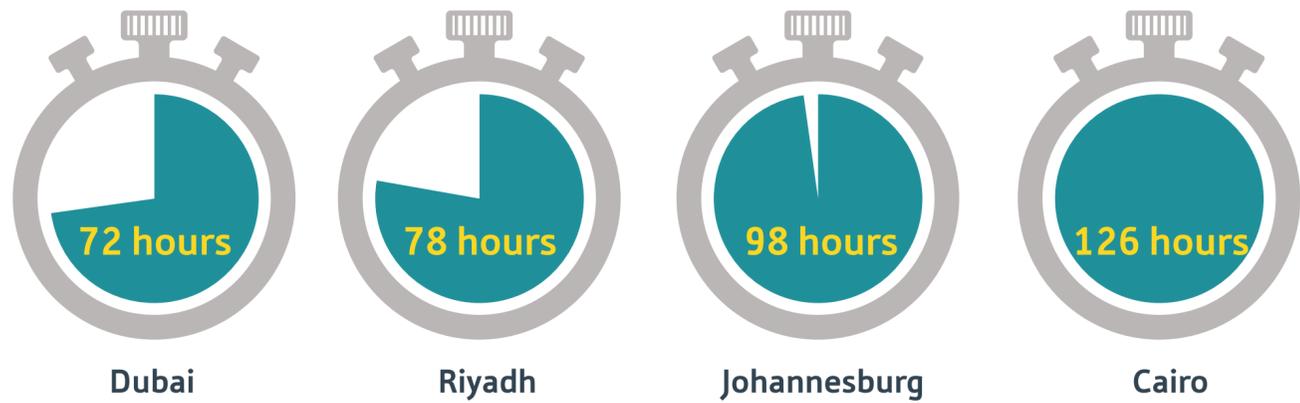
Africa and the Middle East have the highest road accident deaths rates

Road traffic death rate per 100,000 estimated by WHO, 2019



## Time lost in traffic annually in selected cities in Africa and the Middle East

GM is looking to innovations in connectivity – especially vehicle-to-vehicle communication, vehicle-to-infrastructure communication and AV technology – to optimise traffic flows and reduce accidents. Easing traffic congestion in urban centres can have a significant positive impact on economic productivity and quality of life.



\*2020 TomTom Traffic Index covering urban congestion worldwide

### Mobility transition

GM is planning to leverage its expertise in battery EV and AV production to help achieve its triple-zero vision (zero crashes, zero emissions, zero congestion) around the globe. Looking more closely at Africa and the Middle East, the immediate goal is to deliver a broad range of EVs across its Chevrolet, GMC and Cadillac brands. GM's planned EV offering in the region will cover the full spectrum of the market.

The company's in-vehicle safety and security system, OnStar, will be a key feature of its vehicle portfolio. Product development in the area of future mobility will be supported by innovative GM-backed start-ups such as Cruise and BrightDrop. The reduction in carbon emissions resulting from the transition to EVs and the adoption of greener production and distribution practices – combined with technological solutions to reduce road congestion and accidents, and robust cybersecurity features to protect customers' data – are the backbone of an integrated ESG strategy for sustainable long-term value creation.



# ENVIRONMENT:

## THE ROAD TO ZERO EMISSIONS

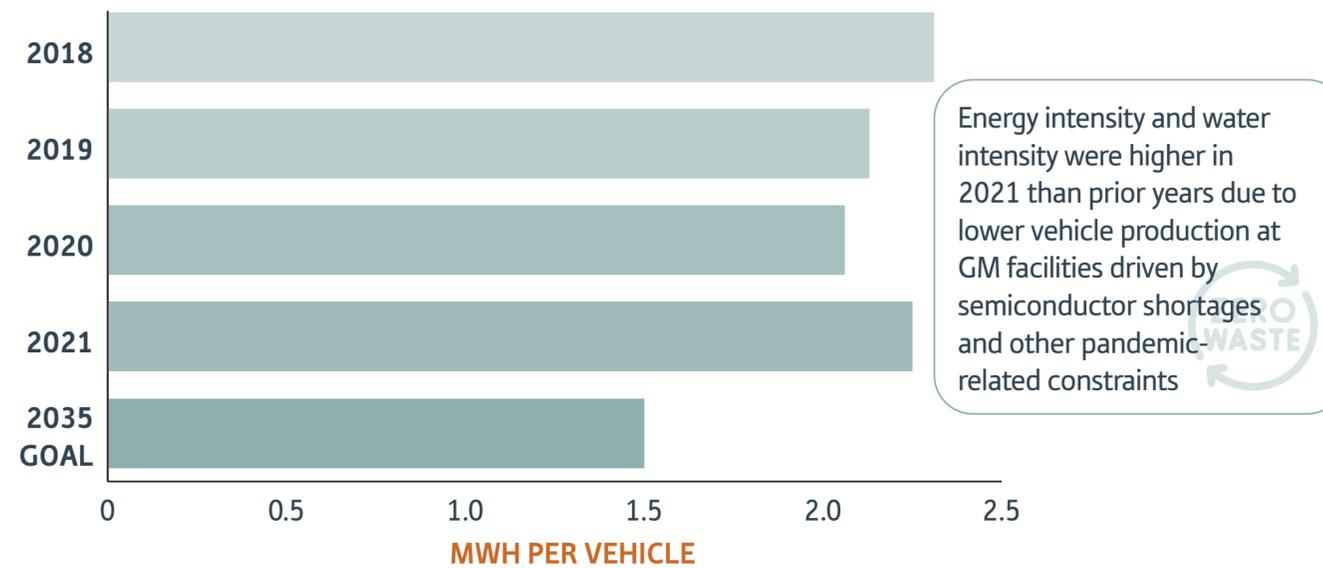


# Environmental stewardship is central to GM's global operations

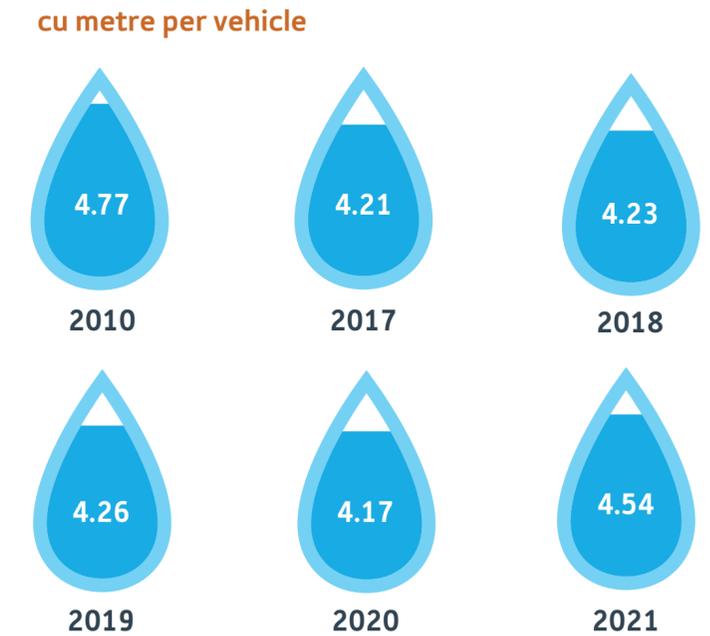
## Systematic approach

GM implements globally an environmental policy containing consistent standards to help minimise the impact of its operations, products and services on the environment. One of the main ways of doing this is by incorporating sustainability practices and the idea of circularity into design, engineering, manufacturing and distribution. GM monitors its performance using its own environmental practice criteria and implements an environmental management system in all its facilities, while conducting employee training on its environmental sustainability goals in areas such as GHG reduction and fuel economy, circular economy, water conservation, sustainable materials and energy efficiency.

## GM is making efforts to cut down global energy intensity in operations



## Global decline in GM's water usage during vehicle production



## GM's progress to date

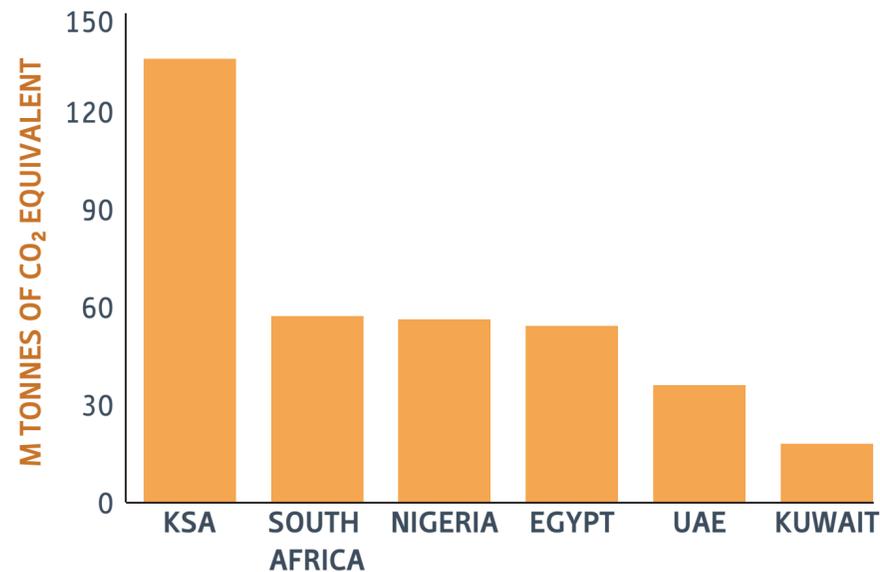


## GM's global commitments to environmental sustainability

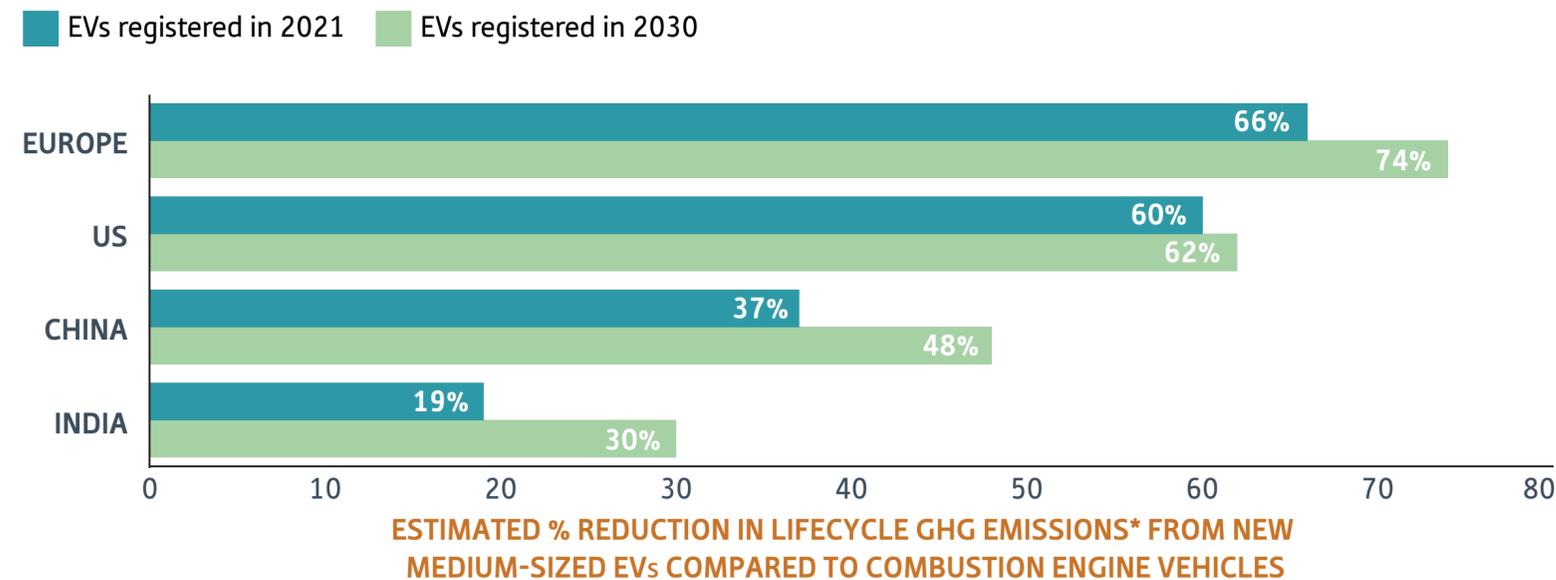


# Emissions-reduction policies to support green mobility adoption across Africa and the Middle East

IEA estimates of transport sector CO<sub>2</sub> emissions in selected Africa & Middle East markets, 2019



ICCT expects EVs to reduce emissions significantly



\*Includes emissions associated with vehicle and battery manufacture, fuel/electricity production and consumption, as well as maintenance

Against the backdrop of countries in Africa and the Middle East strengthening their policy efforts to adopt green mobility, a 2021 study by the International Council on Clean Transportation (ICCT) comparing lifecycle GHG emissions of combustion engine vehicles and EVs found that EVs cut emissions significantly, even in countries where the transition to renewable energy is still in the early stages. As the decarbonisation of energy generation progresses further, the emissions gap between EVs and cars with combustion engines is expected to widen substantially by 2030.

## Actions to reduce GHG emissions in selected Middle East and Africa markets

**UAE**

As part of the National Energy Strategy 2050, and related net-zero carbon efforts, the UAE aims for clean energy to account for 50% of its energy mix by that year and intends to invest over Dh600bn in renewables. With road transport one of the UAE's main sources of GHGs, Dubai adopted the Green Mobility Strategy 2030 to promote and provide environmentally friendly transport solutions, while the emirate's Roads and Transport Authority aims to make public transport emission-free by 2050. In Abu Dhabi, the Transportation Mobility Management Strategy 2030 was launched to encourage greater use of sustainable modes of transport.

**EGYPT**

The Sustainable Development Strategy: Egypt Vision 2030 sets targets for Egypt to tackle climate change, reduce GHG emissions and increase the share of renewable energy in the domestic mix to 37% by 2035. Aware of the devastating effects of emissions from vehicles, the Ministry of Military Production's Strategy 2040 was launched with targets to promote the use and local manufacturing of EVs, increasing EV market share by 50%, its industrial value by 65% and its GDP contribution to 5%. If successful, Egypt would be positioned at the forefront of clean mobility solutions in Africa.

**SAUDI ARABIA**

Aiming to reach net-zero carbon emissions by 2060, the world's biggest oil exporter has pledged to reduce its CO<sub>2</sub> emissions by 278m tonnes annually through to 2030. As part of Vision 2030, Saudi Arabia launched the National Renewable Energy Programme, which aims to increase the share of renewable energy to 50% by 2030. In 2021 the Saudi Green Initiative was launched with SR700bn in funds dedicated to more than 60 programmes and projects to expand clean energy usage, offset emissions and protect the environment. Numerous smart city and infrastructure projects are designed to include green mobility solutions.

**SOUTH AFRICA**

South Africa launched the Low Emission Development Strategy 2050, outlining its aim of becoming a net-zero economy by 2050. Africa's biggest emitter of GHGs has set a reduction target of 42% by 2025 and aims to keep emissions to a range of 350m-420m tonnes by 2030. Recognising the problem of vehicle emissions, the Green Transport Strategy 2018-50 was launched to reorient the transport sector away from fossil fuels and promote advanced technologies to achieve zero exhaust pipe emissions. In order to increase the uptake of EVs in South Africa, the government aims to catalyse investment of \$51.3bn in the segment by 2050.

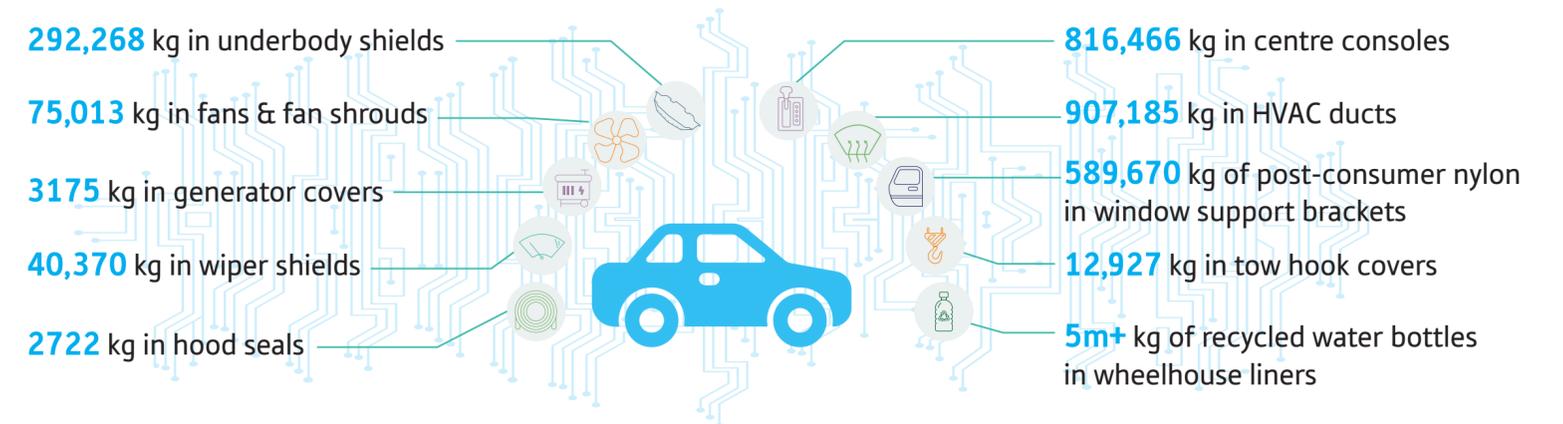
(see slide 13 for progress in EV adoption in these markets)

# Efforts to reduce emissions from vehicle manufacturing processes are essential to decarbonisation

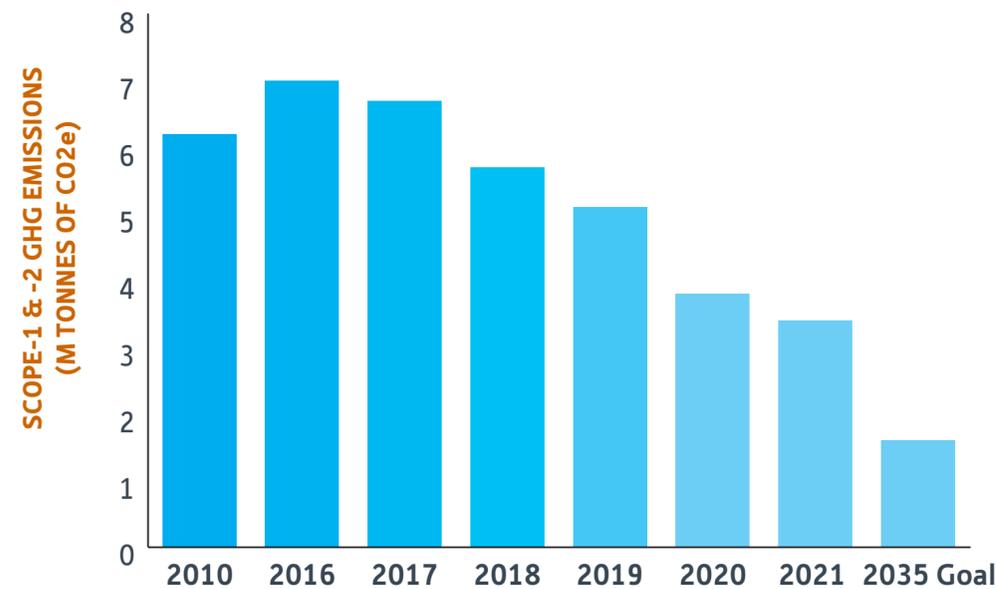
## Optimising operations

The scale of GM's manufacturing operations necessitates the efficient use of resources and energy. As such, GM is moving towards using only renewable energy sources for electricity, while also reducing waste and using recycled materials for vehicle components. In Egypt, where GM has its sole manufacturing facility in the region, the company achieved a 5.8% reduction in energy consumption and a 2.7% improvement in water consumption per unit produced in 2021 compared to 2020. GM's Egypt factory also received the Environmental Protection Agency Star Award in 2020 for its efforts to lower GHG emissions by reducing its energy intensity by 10.8% within three years.

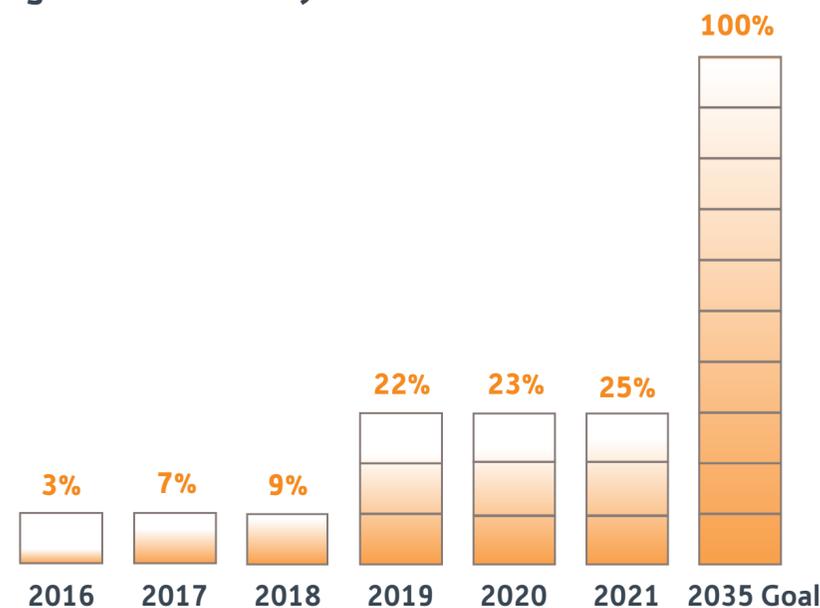
## More than 7.7m kg of recycled materials used in GM vehicles in 2021



## Absolute carbon reduction from GM's global manufacturing operations



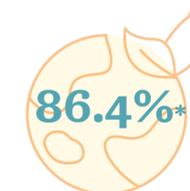
## Renewable energy as a percentage of GM's global electricity use



## Pursuing Zero Waste



Environmental sustainability awards received by GM in recognition of various achievements, including implementing good manufacturing practices



In 2021 Zero Waste performance

\*Figure represents the percentage of waste diverted from landfill, incinerators and energy recovery compared to a three-year average (2017-19) baseline of total operational waste generated.

GM's global aim is to divert 90% of operational waste from landfill and incineration, with or without energy recovery, by 2025. To this end, GM's Cairo factory has introduced waste recycling and re-usage policies as part of broader sustainability initiatives, which include the installation of energy-saving technologies and solar heating and lighting. Across the Middle East, GM collects core vehicle parts from dealers for reuse and recycling. All wooden pallets, cardboard and plastic received from the Middle East Distribution Centre are 100% reused and recycled for shipments.

# GM's company-wide approach to integrating sustainability into its supply chain and distribution

## Adding value through responsible sourcing

As demand for automotive and essential parts expands globally, sourcing and accessing critical materials is of significant importance, making supply chain sustainability a top priority for responsible automotive producers. GM's Global Procurement and Supply Chain Sustainability Team works with suppliers to reduce their overall carbon footprint and enhance long-term sustainability through knowledge transfer and capacity-building. Suppliers around the globe are expected to meet in-country environmental and safety standards, and comply with supply chain quality standards such as the IATF 6949. GM confirms the origin of critical minerals used in its products to ensure they are responsibly sourced, and the company also works to localise its value chain to build products that suit local requirements, reduce shipping-related emissions and create positive economic multiplier effects.

**73%** 

estimated local sourcing as a percentage of regional spend across global\* operations, helping to reduce shipping distances and scope-3 emissions

**89%** 

of GM's 4000 supplier locations are third-party certified to the IATF 16949 Quality Standard on responsible supply chain

**400** 

GM employees worldwide received AIAG's Supply Chain Sustainability training on responsible working conditions in 2020

\*Excludes US and China, which have even higher supplier localisation rates

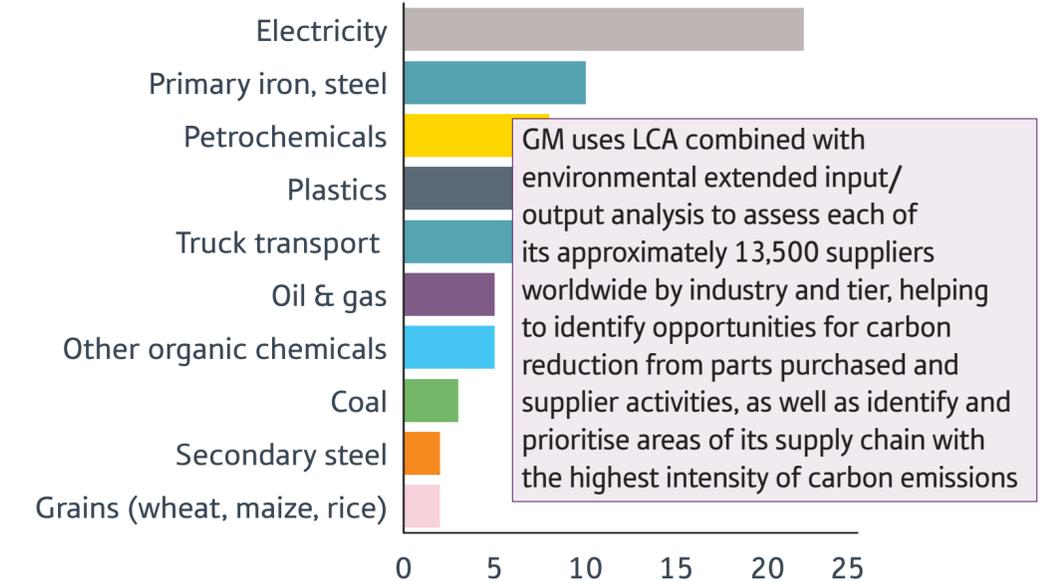
## Mitigating supply chain risks

Through the use of innovative tools and real-time data analysis, GM is able to monitor its supply chain and respond to disruptive events globally. Its in-house, customised supply chain visibility tool maps all its plants, suppliers and logistics network, and runs an analysis for both catastrophic events (such as earthquakes and hurricanes) and isolated disruptions (such as factory fires) with potential negative environmental and economic impacts, helping GM's command centre to identify and address them as required.

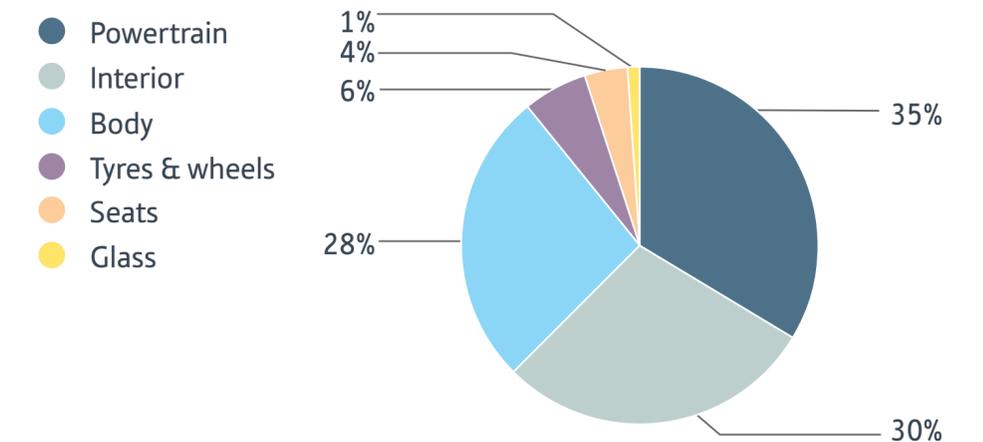
-  GM developed the Sustainability Goals Framework as a set of requirements for its supplier partners on sustainable materials and packaging, green logistics and supplier sustainability
-  Participated in developing and adopting policies of the Global Platform for Sustainable Natural Rubber on rubber extraction and protecting ecological health
-  Collaborates with supply chain focused organisations like the Automotive Industry Action Group and actively participates in its Responsible Materials Work Group
-  GM and its suppliers participate in the Carbon Disclosure Project (CDP) Supply Chain Initiative, which measures and manages their impact on climate change, deforestation and water-related risks
-  Integration of carbon calculation methodology into logistics networks and efforts to improve efficiency by redesigning supply routes, changing transport modes and adjusting shipping frequency
-  GM is an active member of organisations that set supply chain standards such as the International Automotive Task Force and the Responsible Minerals Initiative

## GM manages supply chain emissions through lifecycle analysis

### GHG impact from GM's supply chain by industry, 2021



### Environmental impact in supply chain by component



# Expansion of EV production and charging infrastructure is key to a zero-emissions future



Pledge by GM to be carbon neutral in global products and operations by 2040

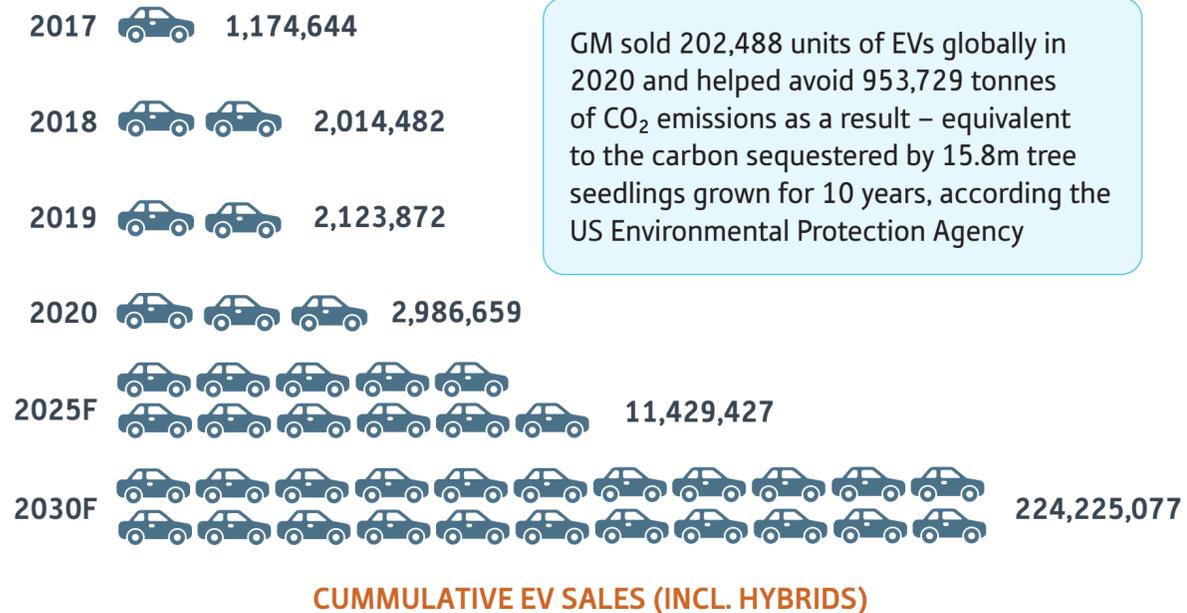


GM plans to eliminate tailpipe emissions from new light-duty vehicles by 2035

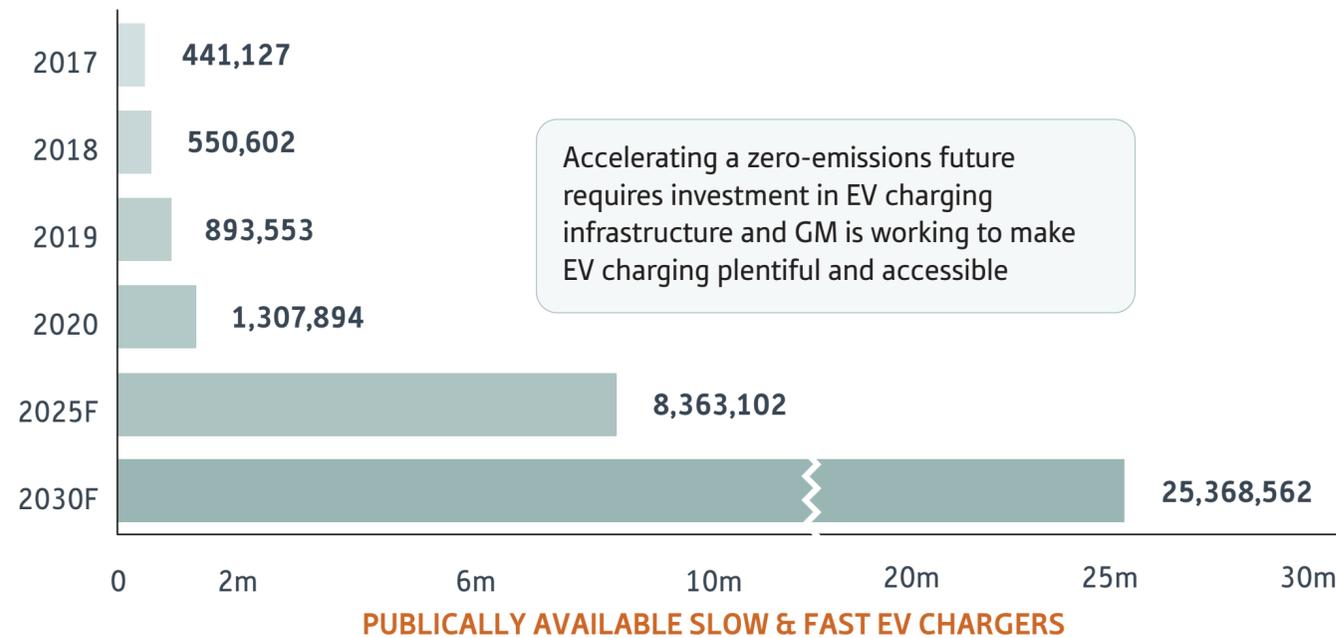
## Battery efficiency

At the heart of GM's EV strategy is its modular propulsion system and third-generation global EV platform powered by Ultium batteries. Ultium batteries will feature an almost completely wireless battery management system, an innovation that will reduce wires within the batteries by up to 90%. GM's Ultium-based EVs will have high nickel and low cobalt content, reduced by 70% as compared to the Bolt EV. GM asserts they will be capable of accelerating from 0 to 100 km per hour in approximately three seconds, with an estimated range of more than 480 km and battery energy storage ranging from 50 to 200 kWh.

## IEA estimates of global growth in EVs



## IEA estimates of global EV charging infrastructure growth



## Innovation for sustainability

**30+** new EV models to be introduced across GM's vehicle brands around the world by end-2025

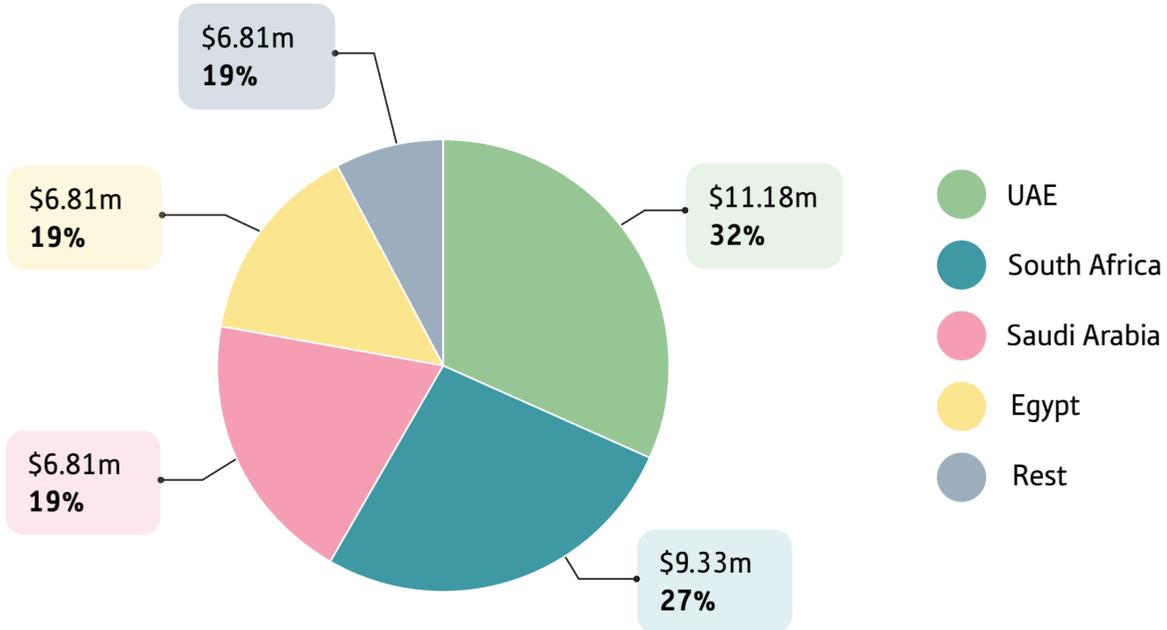
**22** vehicle models equipped with Super Cruise AV technology globally by end-2023

## Electric future

GM has made commitments to expand its EV portfolio to eliminate tailpipe emissions, and has also set goals consistent with the level of decarbonisation required by the Science-Based Targets initiative (SBTi), which include reducing absolute scope-1 and scope-2 GHG emissions 72% by 2035, and scope-3 GHG emissions from the use of sold products of light-duty vehicles by 51% per vehicle km by 2035. GM is adopting an EV strategy that commits to pursuing an all-electric and zero-emissions future through investment in battery and zero-emissions technology and vehicle architecture. GM plans to drive mass consumer adoption of EVs and AVs by delivering a wide range of products.

# EVs emerge as a viable sustainable mobility solution across key markets in Africa and the Middle East

Africa and Middle East EV market projected to grow from \$35m in 2020 to \$84m by 2026, according to Mordor Intelligence



### Drivers



The widespread adoption of EVs is seen both as a crucial step towards achieving global climate goals under the 2015 Paris Agreement, and as a promising opportunity for advancing socio-economic development. Across many emerging markets, particularly in sub-Saharan Africa, EVs are a potential solution to reduce the fiscal burden of fuel subsidies, advance the rollout of renewable energy infrastructure, and open up new local manufacturing and assembly industries, possibly benefiting from the local availability of lithium, copper, cobalt and other minerals in some countries.

### Challenges



Although electric mobility leads to large savings in the long term, the short-term costs of the EV transition can be relatively expensive for emerging markets, both in terms of the upfront vehicle acquisition costs, and the installation, expansion and integration of battery charging infrastructure. This can delay the widespread adoption of EVs in low- and mid-income markets, although constant progress is being made in developing affordable vehicle options and improving battery manufacturing and performance. Moreover, successful mobility electrification depends on the cost-effective decarbonisation of electricity production to ensure the widest possible environmental benefits, and electrical grids also need upgrading to integrate EVs and meet this new demand for electricity.

### Interventions



Fiscal incentives, primarily purchase subsidies or vehicle purchase and registration tax rebates, can support the initial uptake of personal and commercial EVs, as well as helping to scale up EV and battery manufacturing industries. In addition, the gradual erosion of fuel subsidies and introduction of taxes targeting CO<sub>2</sub> vehicle emissions in various forms can incentivise the transition to electric mobility. From the point of view of infrastructure development, targeted public spending and private-public partnerships are needed to decarbonise power generation and deploy EV chargers, as well as to roll out electrification across public transport, which is the main mobility segment in markets with low vehicle ownership.



### UAE

Under its 2050 net-zero target, the UAE government has so far succeeded in electrifying around 20% of its fleet and aims to have 42,000 EVs on its streets by 2030. Sales of EVs are mostly concentrated in Dubai, where the total number of EVs reached 8489 vehicles by the end of 2021. As of mid-2021 around 240 government-provided road-side charging stations were available, while private providers maintained more than 600 chargers at locations such as malls, hotels, parks and resorts. The consistent increase in EV numbers combined with the introduction of tariff policies has made the cost of electricity for EVs competitive with fuel for combustion engine vehicles.



### EGYPT

With around 1500 EVs currently on its roads and 40,000-50,000 forecast by 2025, Egypt is currently finalising its e-mobility strategy. The government aims to roll out incentives to support the nascent EV industry, such as Customs discounts for manufacturers using locally produced components. On the demand side, incentives could take the form of subsidies worth up to LE50,000 for buyers of locally made EVs. With regards to infrastructure, the government will invest LE450m to deploy up to 6000 EV chargers across 3000 stations nationwide. Together with the introduction of charging tariffs in February 2022, the stage is set for the country to enable widespread EV adoption.



### SAUDI ARABIA

Saudi Arabia is targeting an EV fleet penetration rate of 30% in the capital, Riyadh, by 2030. It is also embedding electric mobility concepts across flagship infrastructure projects, such as NEOM (see slide 15). The Public Investment Fund became the majority investor in US-based EV manufacturer Lucid Motors in 2019 with a \$1bn investment, and the company will establish a factory in the country by 2025. Moreover, the Australian EV Metals group plans to invest \$3bn in the country to build a lithium and nickel processing plant. In parallel, the Saudi Arabian Mining Company (Ma'aden) is scaling up its exploration efforts for lithium and nickel.



### SOUTH AFRICA

South Africa is the largest sub-Saharan EV market, with roughly 1100 EVs on the roads by 2019. The country can capitalise on the reduction in battery prices, its close proximity to mineral deposits, and export opportunities arising from growing interest in two-wheeled and three-wheeled EVs across Africa. With the automotive sector contributing 6.4% of GDP and 27.6% of manufacturing output, the South African Automotive Masterplan (SAAM) 2021-35 sets a production goal of 1.4m vehicles per annum by 2035, with average local content per vehicle rising from 40% to 60%. EVs will play an increasingly important role under SAAM from 2035 onwards.

# Africa and the Middle East are key destinations in the rollout of GM's green growth strategy

## New frontiers

To support its vision of a world with Zero Crashes, Zero Emissions and Zero Congestion, GM is leveraging three key pillars of future mobility: electrification, autonomy and connectivity. As regions central to GM's long-term growth strategy, Africa and the Middle East will be at the forefront of the company's global EV and AV rollout plans as it targets the mass adoption of zero-emission models. For example, GM plans to launch 13 EVs in the Middle East by 2025 as it strives to meet demand across various consumer segments and establish itself as the regional market leader in EVs. In doing so, the company will need to take into account long-standing consumer preferences, such as the penchant for high-end but durable utility vehicles capable of desert driving in the Middle East. GM's plans align with ambitious regional government commitments to achieve net-zero emissions by the middle of the century.

12% CAGR expected by Research and Markets in the Middle East and Africa AV market, 2020-30



15% CAGR projected by Mordor Intelligence for Middle East and Africa EV market, 2021-26

## Actions by GM to enhance EV/AV adoption in Africa and the Middle East

GM plans to deliver EVs and AVs across a wide spectrum of brands, segments and price points in Africa and the Middle East



13 new EVs will be launched in the Middle East by 2025, starting with the Chevrolet Bolt EUV, GMC HUMMER EV and Cadillac LYRIQ



Launch of OnStar in-vehicle safety and security system in the Middle East, starting with its rollout in Kuwait and the UAE in 2021



\$35bn is being invested globally through to 2025 by GM to boost EV and AV engineering and production across all regions of operation, with Africa and the Middle East among the key regions to benefit



Deployment of Cruise Origin AVs in the UAE from 2023 through a partnership with Dubai's Roads and Transport Authority (RTA), making this GM's first market outside North America to pioneer self-driving transport (see slide 16)



Up to 4000 Cruise Origin AVs to be deployed in the UAE by 2030, supported by GM's \$5bn multi-year credit facility to scale up the global Cruise Origin fleet



## PARTNER IN FOCUS: Selected models spearheading GM's regional rollout of EVs and AVs

### Chevrolet Bolt EUV

Currently available in Middle Eastern markets, Chevrolet's new all-electric crossover aims to meet regional customers' preference for utility vehicles. With a 200-horse-power (hp), 65-KWh battery pack and 360 Nm of torque that the US Environment Protection Agency estimates will provide 397 km of range, the vehicle features a set of standard driver assistance tools, including automated emergency braking and lane-keeping assist



### GMC HUMMER EV

Set for launch in the Middle East in late 2022, and powered by GM's Ultium battery system, the GMC all-electric truck offers a charging framework capable of up to 800 V at 350 KW, providing 160 km of range in 10 minutes. A full charge will deliver more than 500 km of range. The GMC HUMMER EV Edition 1 will debut with three electric motors producing 1000 hp and almost 15,600 Nm of torque. The electric truck model will also feature immersive technology such as Watts to Freedom mode and enabling acceleration from 0 to 100 km per hour in three seconds.



### Cadillac LYRIQ

Expected to be launched in the Middle East from mid-2023, LYRIQ will feature a 12-module, 100-KWh battery pack and a rear-wheel-drive Ultium Platform that will deliver 340 hp and 440 Nm of torque, together with approximately 480+ km of range with a full charge



### BrightDrop

GM has signed an memorandum of understanding with Emirates Post in the UAE to explore the possibility of a sustainable and electrified last-mile delivery system that could utilise products and vehicles developed by BrightDrop, a GM business focused on both first- and last-mile delivery solutions

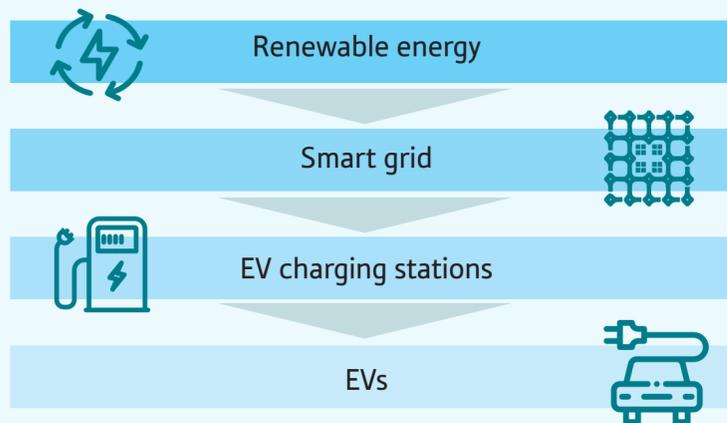


# Proliferation of smart cities in the Middle East provides a catalyst for EV adoption

## Smart future

As the Middle East accelerates its efforts to diversify away from oil and achieve net-zero carbon emissions, it is becoming an increasingly important centre for the development of smart cities that harness the power of digital and green technologies to enhance liveability and remove obstacles to quality of life, such as air pollution, traffic congestion and inadequate public services. The transformation of transport is one of the key pillars of smart city development, which is giving rise to a wave of innovation related to smart and green mobility options. With clean air and green spaces at the heart of many smart city visions, EVs and AVs will have an important role to play in meeting both the objectives of urban planners and the aspirations of citizens.

### Smart city EV ecosystem



## Planned or ongoing smart cities in the Middle East

**NEOM**  
Saudi Arabia is aiming to set a global benchmark in smart and sustainable urban development through NEOM, a 26,500-sq-metre giga-project taking shape in Tabuk, in the north-west of the Kingdom. Powered 100% by renewable energy, NEOM envisages a series of interconnected communities connected by high-speed, carbon-free public transport. According to the plans unveiled, NEOM will not feature any roads or internal combustion engine cars, although EV and AV technology is expected to play a role within the \$500bn smart city project.

**Amaala**  
Sustainability-driven giga-project under the Saudi Vision 2030 focusing on ultra-luxury wellness tourism and commerce. With a zero-carbon footprint as its goal, the destination will be powered by renewable energy and has more than 15 sustainability criteria, including clean and sustainable mobility.

**Qiddiya**  
Greenfield project and entertainment city developed as part of Saudi Vision 2030, structured on innovation and sustainability. The city will incorporate smart mobility technologies and intelligent transport systems in its overall transport strategy and as part of its motorsport offering.

**Red Sea Project**  
One of the largest and most sustainable planned tourism developments in the world, to be built on the Red Sea by 2030. A sustainable transport strategy for clean mobility is already in the works aimed at all modes of transport being either electric or emission-light, with ample charging stations provided for EVs.

**South Saad Al Abdullah**  
Kuwait's first green and smart urban development has smart mobility at the heart of its vision, with a focus using the country's advanced 5G infrastructure to deploy internet-of-things (IoT) solutions for traffic management.

**Lusail City**  
Qatar's largest smart and sustainable city features integrated ICT infrastructure and 100% renewable energy. Its environmentally friendly transport system includes electric buses and trams, with charging stations powered by solar energy.

**Masdar City, Abu Dhabi**  
Ongoing smart city and low-carbon development in Abu Dhabi made up of a rapidly growing clean-tech cluster. With a clean and smart mobility transport strategy in place, the city installed the first rapid charging station for EVs in the Middle East and is promoting a transport system where self-driven EVs can fully operate.

**Zayed Smart City, Abu Dhabi**  
Planned smart city project that is built mainly on a digital strategy that will harness the potential of IoT and create a urban transport system that utilises radar and sensor technology.

**Madinat Al Irfan**  
Oman's largest sustainable urban development is being developed in line with the Paris Climate Agreement and the UN SDGs, with an emphasis on walkability and low-carbon mobility options.

# CASE STUDY: How green automated taxis could revolutionise transport in Dubai

## Transforming mobility



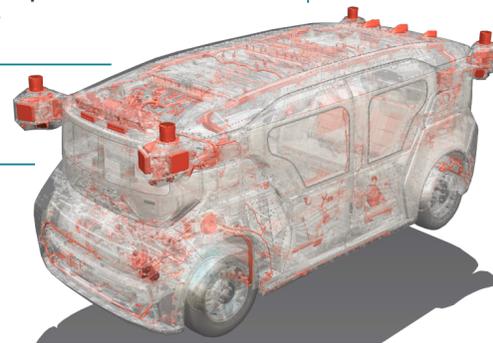
Self-driving vehicles are poised to disrupt the automotive industry significantly. Cruise, the GM-backed and majority-owned autonomous mobility technology company, is expected to play a key role in this transformation. Cruise's engineers have created machine learning-driven simulations that allow the AV software to "drive" in an infinite number of simulated environments, gaining experience more quickly than would be possible on the road. The company also used simulation to develop a sensor placement tool, which determines the optimal placement of sensors to create overlapping, 360-degree coverage around every vehicle. Such innovations are paving the way for the introduction of automated taxis around the world, with the UAE at the forefront of this trend in the Middle East.

## GM/Cruise technological innovations with potential use in robotaxis

**Vehicle Intelligence Platform** provides the necessary electrical bandwidth and data-processing power to ensure advanced smart solutions can all operate in conjunction with one another

**Product Cybersecurity** protects against unauthorised access to vehicles and customer data

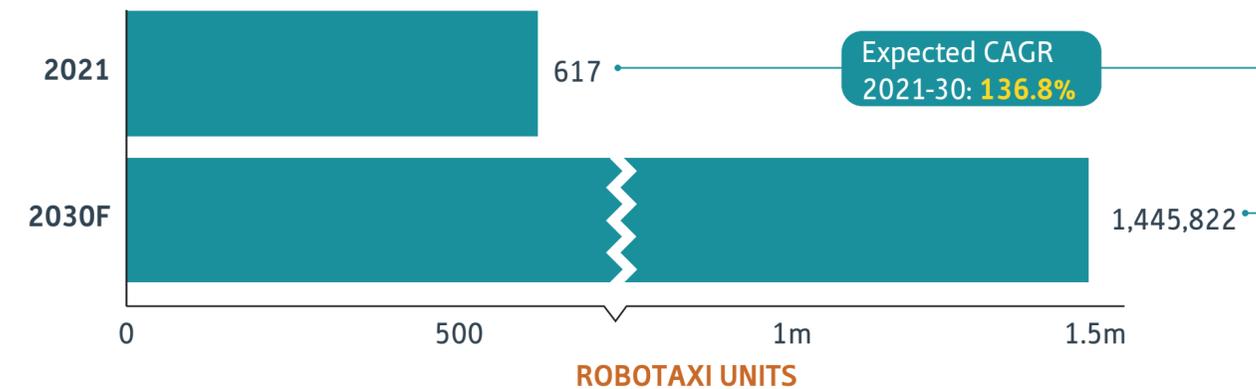
**Worldgen** parameterised scenario-generation tool that allows for the simulated construction of entire cities replete with real-world traffic scenarios in just a few hours



**LiDAR** map data, **GPS** and a network of **camera & radar** sensors help keep the vehicle in its lane

## The growth potential of robotaxis worldwide

Automated electric taxis are becoming commercial reality, and are expected to revolutionise the transport sector and contribute to vehicle emissions reductions



The global robotaxi market is expected to grow from 617 units in 2021 to 1,445,822 units by 2030, at a compound annual growth rate (CAGR) of 136.8%, according to a 2021 report by Markets and Markets

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## The path to autonomous mobility with Cruise in Dubai

- By 2023 Cruise will deploy a limited number of its purpose-built vehicles in the emirate, making **Dubai the first city outside the US** where these vehicles will commercially operate
- Cruise Origin is powered by GM's Ultium battery system and will be built in GM's Factory Zero production facility in the US
- By 2030 Cruise and the Dubai RTA plan to have a fleet of up to **4000 Cruise Origin AVs** in operation in Dubai
- By 2030 Dubai aims to convert **25% of trips** in the city to **self-driving transport**, contributing to efforts to reduce GHG emissions in the process
- These plans align with the RTA's **first- and last-mile strategy** to provide commuters with clean and convenient transport options to and from the nearest mass transit points
- The introduction of robotaxis is expected to support **Dubai's efforts to reduce transport-related environmental pollution by 12%**, as well as **generate Dh18bn by boosting economic productivity**

The planned robotaxi service in Dubai will use fully electric and environmentally friendly vehicles in support of Dubai's 2030 vision for using self-driving technology in smart cities. The use of such vehicles is expected to result in lower fuel consumption and tailpipe emissions, as well as reduced congestion thanks to the sophisticated vehicle-to-vehicle and vehicle-to-infrastructure technology deployed. The service should also make it more convenient to reach public transport stations, which can be difficult during the summer without an affordable and convenient shuttle option.



# GM's environmental strategy can support regional and global efforts to tackle climate change

## Company priority

## UN SDG alignment



### Enable mobility with zero emissions

**Aim:** Design, produce and distribute a broad range of EVs that will appeal to all price segments across Africa and the Middle East, as well as provide AVs that will boost green public transport options and reduce congestion



Industry, innovation & infrastructure



Sustainable cities & communities



Climate action



### Reduce carbon emissions from production & supply chains

**Aim:** Introduce renewable energy generation and energy efficiency technologies at production plants, while working to localise supply chains, engage with suppliers on environmental practices, and optimise supply routes for maximum efficiency



Affordable & clean energy



Responsible production & consumption



Climate action



### Design for the environment

**Aim:** Pursue circular design in products and zero waste in operations by diverting waste from landfill and incineration, expanding the utilisation of recycled materials in production and operations, reducing plastic and paper usage at all regional sites, and promoting responsible waste-management awareness in schools and communities



Good health & well-being



Life on land



Climate action

## Summary: GM's sustainability targets in Africa and the Middle East

### Four-pillar regional strategy

Energy efficiency	Sourcing renewables	Energy storage	Leveraging policy and scale
Invest in new technologies & make daily efforts to conserve electricity	On-site projects & power-purchase agreements	Innovations such as reuse of EV batteries after their first life in a vehicle	Engage a broad range of stakeholders to ensure mutual success

### Headline targets

### Estimated annual CO<sub>2</sub> footprint reduction from GM's Middle East operations



**95%** reduction in regional carbon footprint from operations by 2024

### Highlights of carbon saving plans:

- Partnership with Dubai Electricity and Water Authority to install solar panels at the Middle East Distribution Centre, GM's highest energy-consuming facility
- The project will be completed in 2023, with full benefits to be achieved in 2024
- Installation of LED light fixtures and motion sensors across facilities in the UAE
- Adoption of energy-efficient forklift battery chargers and energy-efficient warehouse chiller cooling plant

Regional reduction efforts will contribute to GM's global commitment to reduce absolute scope-1 and scope-2 GHG emissions by **72% by 2035** from a 2018 baseline

At the UN Climate Change Conference 2021 (COP26) in Glasgow, UK, 39 national governments and 11 automotive manufacturers – including GM – pledged to work towards universal zero-emissions sales of new cars and vans by 2040, and no later than 2035 in leading markets. Manufacturers that signed up said the goals would be supported by an effective business strategy designed to build customer demand. To achieve these aims, governments, automotive manufacturers, transport operators and investors will need to work together to overcome strategic, political and technical barriers, increase economies of scale and stimulate demand. Although African and Middle Eastern countries were under-represented in the declaration, those that pledged their commitment should find themselves gaining early-mover advantage in an era of green growth, spurred by innovation in EVs and AVs.

# Luay Al Shurafa, President and Managing Director, Africa and the Middle East, GM



Luay Al Shurafa

## What is your assessment of the consumer appetite for EVs in Africa and the Middle East, and what will support their uptake?

**AL SHURAF A:** The Middle East is a young, tech-savvy region home to early adopters primed for the EV revolution. With 13 new EVs launching in the region by 2025, GM is aiming to offer a broad EV portfolio for the benefit of our customers and to support a more sustainable future. Consumers are becoming increasingly conscious of the need for environmental stewardship and the role EVs can play to that end. In combination with the improvements in performance, technology and driving range of these vehicles, we anticipate an acceleration in the adoption of EVs in the region.

## How do you view the role of a multinational automotive company in terms of driving broader progress towards sustainability and lower carbon emissions in Africa and the Middle East?

**AL SHURAF A:** We are aligned with the governments of the region and their sustainability goals as they work to achieve net zero. Through strategic public-private partnerships, we can meet environmental targets together. Forward-looking and innovative companies that put corporate responsibility at the core of their operations are critical in helping champion and implement sustainability strategies. With this in mind, GM is striving to deliver a more sustainable and equitable future with the goals of improving safety on the road, lowering emissions and reducing congestion.

## What are GM's global sustainability plans in Africa and the Middle East?

**AL SHURAF A:** GM has set ambitious sustainability targets around the globe, including in Africa and the Middle East. Through a series of green

initiatives, annual CO<sub>2</sub> emissions from our Middle East operations will be reduced by approximately 2000 tonnes per year, driving us towards a 95% reduction in our annual operational carbon footprint by 2024.

With the Middle East Distribution Centre – the GM facility with highest level of energy consumption – transitioning to renewable energy and becoming 100% solar powered, we will be among the first automotive original equipment manufacturers in the region to have a facility powered by the sun. Installation will be completed in 2023, with the full benefits to be realised in 2024.

## Can you share some of the main priorities for reducing the company's carbon footprint across Africa and the Middle East?

**AL SHURAF A:** The company's commitment to sustainability in the Middle East is evidenced by our target of a 95% reduction in our annual operational carbon footprint in the UAE and our plan to launch 13 EVs in the region by 2025. Globally, our objective is to eliminate tailpipe emissions from our new light-duty vehicles by 2035, and make our products and operations carbon neutral by 2040. We also plan to source 100% renewable energy globally by 2035. Across our operations in Africa and the Middle East, initiatives such as transitioning to solar power, remaining landfill free and engaging in component recycling support our sustainability goals.

By 2035 we will have reduced our operational CO<sub>2</sub> emissions in the UAE by more than 24,000 tonnes. This regional target to reduce operational CO<sub>2</sub> emissions contributes to the company's broader global commitment to lower absolute scope-1 and scope-2 greenhouse gas emissions by 72% by 2035, when compared to the base year of 2018.

“ Forward-looking companies that put corporate responsibility at the core of their operations are critical in championing sustainability strategies ”

# 6 Key Takeaways

## 1 **Transition**

Automotive stakeholders are increasingly aware that the business-as-usual scenario that sustained the industry for over 100 years is no longer tenable. National and global regulatory changes, policy reforms and emissions-reduction targets are spurring a pivot towards low-carbon and zero-emissions vehicles, and underlining the importance of public-private partnerships when it comes to achieving shared vision.

## 2 **Innovation**

The transition towards low-carbon and zero-emissions vehicles and manufacturing processes will require a period of intense innovation in order to develop new technologies that make EVs and AVs appealing, as well as safe, reliable and affordable. Automakers such as GM have already made great strides in developing and commercialising a broad range of EVs and AVs that will underpin their long-term strategies for sustainable growth.

## 3 **Manufacturing**

Aside from the R&D investment required to develop new EV and AV models, automakers must take steps to ensure that their production processes become more sustainable – from the responsible sourcing of components and the shortening of supply chains, to the use of energy-efficient technologies and circular-economy solutions that reduce both carbon emissions and waste resulting from manufacturing.

## 4 **Demand**

Beyond R&D, automakers have a role to play in generating demand for low-carbon and zero-emissions vehicles. In addition to government incentives to reduce costs related to acquisition and maintenance, manufacturers need to ensure that they are developing vehicles that meet consumers' expectations as well as the needs of target demographics and regions.

## 5 **Mass transit**

In addition to the retail market, EV and AV technologies have the potential to provide public transport options in urban areas. The Middle East in particular is becoming a centre for sustainable smart cities, which promise low-carbon mobility. In such places, electric AVs have the potential to offer green taxi and shuttle services that integrate with countries' mass transit systems.

## 6 **Leadership**

The seismic transition to emissions-free vehicles will require bold leadership from stakeholders across the industry. GM and the 10 other automakers that have pledged to work towards achieving universal zero-emissions sales of new vehicles can gain an early-mover advantage in an era of green growth and intense innovation, as they strive to increase economies of scale and raise the appeal of EVs.

# ESG INTELLIGENCE