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THE AUTOMOTIVE BUSINESS COUNCIL

SOUTH AFRICA'S NEW ENERGY VEHICLE ROADMAP

THOUGHT LEADERSHIP DISCUSSION DOCUMENT

THE ROUTE TO THE WHITE PAPER

Monday, February 20, 2023

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

On November 12, 2021, the COP26 Joint Declaration [or Glasgow Climate Pact] established the goal of achieving carbon neutrality by 2050. This global commitment was reaffirmed again at COP27 held from 06 November to 20 November 2022 in Sharm El Sheikh, Egypt. The South African automotive industry and its social and business partners appreciate the importance of this goal and are working diligently to contribute to the decarbonisation of road transport in support of this broader objective. We also recognise that no single government policy or industry commitment alone will achieve this ambitious goal. We must work collaboratively - at all levels of government and across all economic sectors - to identify the range of approaches necessary to establish sustainable pathways to carbon neutrality across sectors and the unique circumstances of the South African economic landscape.

1.1. Why decarbonising road transport is mission critical

The auto industry understands the important role it plays in decarbonising road transport as a way to help achieve this broader goal. According to the International Energy Agency [IEA], transport as a whole contributed in 2020 to 37% of the global CO2 emissions from end-use sectors, while road transport [cars, trucks and buses] accounted for 76% of the total transport sector. As a result, 28% of the global CO2 emission is, according to the IEA, attributed to the road transport sector.

In our country, the South African National Greenhouse Gas Inventory confirms that Transport has been identified as the fastest growing source of greenhouse gas emissions, accounting for around 10,8% of National GHG emissions. Aviation emissions accounts for 5%; Maritime 2,2%; Rail 1,6%; and direct emissions from the road sector, accounts for 91,2%, mainly from the combustion of petrol and diesel. Our country's Green Transport Strategy under the stewardship of the Department of Transport confirms that South Africa's vision is to substantially reduce Green House Gas Emissions and other environmental impact from transportation by 5% in 2050.

To this end, the automotive industry is planning to invest $515 billion globally by 2030 to help facilitate the transition to a New Energy Vehicle [NEVs] future [including battery, plug-in hybrid and fuel cell electric vehicles], while simultaneously continuing to innovate on the broad array of powertrain technologies necessary to meet the broad and diverse needs of a global market. This includes, for example, internal combustion engines [ICE] with carbon neutral fuels.

While the long-term trajectory certainly embraces a shift toward electrification, the industry recognises, at present, no single technology is capable of achieving carbon neutrality across the global automotive industry. South Africa needs the flexibility to adopt multiple technologies and policies best suited to its unique socio-economic realities: including current pressures to the national fiscus; our geographical location; persistent socio-economic challenges; slow economic growth trajectory; and geopolitical considerations within the region and across the African continent. Technology neutral and multiple approaches provide more practical and sustainable pathways to carbon neutrality.

The auto industry therefore, advocates for and encourages a collective embrace of the following nationally established principles:

- that as we work towards carbon neutrality and rapid reduction of carbon emissions, electrification will play a leading role. This transition to electrification, however, will require a comprehensive plan that takes the present market realities into consideration, as well as the on-going investment and innovation in newer ICE technologies and low carbon fuels;

- South Africa working with all its social and business partners should proceed towards the achievement of carbon neutrality by implementing practical and sustainable technological and policy measures tailored to our specific circumstances as a country and not use a shot gun or cut and paste approach to our national solutions; and

- against the backdrop of our country's current and persistent energy challenges, it is essential also for our industry to pursue and achieve automotive carbon neutrality through comprehensive national industrial and energy policies that effectively promote the competitiveness of the auto sector.

1.2. The grand challenge of the twenty-first century

Climate change is the most pressing grand challenge of the twenty-first century. The science is clear that global warming must be kept below 1.5 °C to avoid the worst of climate impacts. To do so, greenhouse gas [GHG] emissions must be reduced dramatically over the next three decades to reach net zero emissions by 2050. Since transportation is a major contributor to CO^2 emissions globally, changes in technology are therefore at the core of the transition to the vehicle of the future, which is primarily linked to electric as far as passenger cars and light commercial vehicles are concerned. Governments across the world have been increasingly introducing policies or strengthening existing policies to ensure an uptake in new energy vehicle [NEV] purchases in efforts to reduce carbon emissions.

The South African automotive industry will have to adapt to the current rapid technological transition to NEVs to maintain and further grow its automotive manufacturing ambitions. As vehicle emissions regulations tighten globally, with associated costs, the shift is towards eco-friendly vehicles, which will be the future driving technology adopted by the global automotive industry. The demand for NEVs is driven largely by government incentives and the imperative to combat climate change in regions such as the European Union - the domestic automotive industry's top export region, which aims to become a zero-carbon economy by 2035.

Since 2020, developments in the domestic automotive industry's key export markets contributed to enhance the pace of the NEV landscape in South Africa through government's efforts to green the economy and to position South Africa as a centre for advanced green manufacturing. In 2021, South African passenger car and light commercial vehicle exports accounted for a significant 63,1% of total light vehicle production.

Europe dominated as a region, accounting for 77,1% of the total, or nearly four out of every five vehicles exported. As an export-oriented industry and in order not to lose exports to its key markets, the technological transition shift to NEVs is therefore inevitable. However, vehicle exports to the domestic automotive industry's top export destinations, the UK, and the EU, are subject to strict Rules of Origin requiring 60% local content in a vehicle to ensure duty-free access. Without battery manufacturing in South Africa or the UK and the EU, flexibility in the strict Rules of Origin requirements would be imperative for ongoing duty-free market access.

For the South African automotive industry, support would be required for the transition to NEVs in line with the objectives of the South African Automotive Masterplan [SAAM] 2021 - 2035. As part of the recommendations of the jointly funded naamsa - DTIC NEV Research Study, NEV sales targets of 20% of the total by 2025, 40% by 2030 and 60% by 2035 have been set linked to appropriate support to stimulate demand for NEVs as well as the manufacture NEVs and NEV components in the country. Globally, NEV sales have been particularly impressive over the last three years, even as COVID-19 shrank the market for conventional cars and as manufacturers started grappling with supply-chain bottlenecks.

The net growth in global car sales in 2021 came from NEVs. In 2021, NEV sales more than doubled to 6,6 million, representing 11,7% of the global passenger car market, and more than tripling their market share from two years earlier. China accounted for more than half of all electric cars sold, but there's also strong growth in Europe and the US. Globally, OEMs are accelerating their NEV launch plans, partly to comply with increasingly stringent regulations in Europe and China, along with a raft of new model launches and government-sponsored incentives. BEVs use lithium-ion batteries to power their operation and release no greenhouse gas emissions and are less harmful to the environment when they are charged using electricity generated from renewable sources.

1.3. The auto industry policy proposals

On 18 May 2021, the DTIC published a Green Paper on the advancement of new energy vehicles in South Africa. The aim of the Green Paper was to establish a clear policy foundation to coordinate a long-term strategy to position South Africa at the forefront of advanced vehicle and vehicle component manufacturing, complemented by a consumption leg. The Green Paper highlighted that the NEV challenge in South Africa was two dimensional, encompassing both demand and supply side considerations, and that it is an inevitable transition for the South African automotive industry in the global race to transition from the internal combustion engine [ICE] era, into electro-mobility solutions and technologies.

Driving a meaningful NEV transition in South Africa will require a careful balance between incentivising a sustained shift in domestic market demand to NEVs; establishing an appropriately aligned, renewable energy-based charging infrastructure; and supporting a shift in South African vehicle production, away from ICE vehicles to a mix of hybrid electric vehicles [HEVs], plug-in hybrid electric vehicles [PHEVs], and battery electric vehicles [BEVs].

Balancing these factors is key to successfully transitioning the South African vehicle industry to an ultra-low carbon future, while simultaneously ensuring it remains a major contributor to the industrial development of the domestic economy, as per the objectives of the SAAM, which runs until 2035. While existing policies around the world suggest healthy growth of NEVs, in South Africa, numerous challenges hamper the country from progressing in the NEV market. These include supportive regulatory frameworks, additional incentives to manufacture NEVs and NEV components as well as to address the costs of NEVs, and insufficient public charging stations across the country.

What is imperative for the domestic automotive industry's transition to NEVs is urgency and clarity with regards to a supportive regulatory framework in the form of incentives to address the price differential between NEVs and ICE vehicles, additional incentives to manufacture NEVs and NEV components, as well as the roll out of public charging stations across the country. How the South African government supports the industry and its complex value chain to make this transition is replete with challenges, the most notable of which is the major cost associated with transitioning to the consumption and production of more expensive vehicles - at least for a period, and until battery technologies advance to levels that secure their price parity with equivalent ICE products.

To support the transition of the South African automotive industry to an NEV dominated market, while continuing to develop the local industry in alignment with the objectives of the SAAM, the automotive industry recommends the following interventions for Government's consideration:

1. commitment to reduce CO2 emissions across the entire auto value chains as soon as it is practically possible. Although NEVs do not emit CO2 while in use, CO2 is emitted during the manufacture, distribution, recycling and disposal process. Carbon neutrality for motor vehicles cannot be achieved without CO2 emissions reductions throughout their life cycle, based on overall life-cycle assessment;
2. ensure that the manufacturing base in SA is protected, strengthened and retained, given that the country is at risk of losing more than 50% of its' production volume from July 2025 [instruction of Euro7 emission regulations in Europe] to 2035 [banning of ICE drivetrains in almost all the European countries];
3. introduction of NEV purchasing subsidies based on Government's ability to support the suite of policy options for the purchase of HEV, PHEV, and BEVs;
4. alignment on NEV import tariffs from the EU and the UK from 25% to 18% under the SADC EU EPA and SACUM EU EPA along with more flexible Rules of Origin for exports to the EU and the UK;
5. provision of a 50% CKD rebate on the import of specified NEV components for a limited period; and
6. an increase in the AIS for NEV investment from 30% for OEMs and 35% for component suppliers to 50% and expand the AIS offering for NEV investment to lower tier suppliers, including suppliers that conduct raw material beneficiation.

7. Increased levels of PI and VALA for a transitionary period to get NEV investment into SA and support export competitiveness while the economies of scale are low.

In addition to the above, the industry is prepared to match the purchasing subsidy from government for the different NEV categories in order to narrow the price differential between NEVs and ICE vehicles further to stimulate an accelerated off-take of NEVs in the country.

It is also imperative that the Rules of Origin for CBU exports to the UK/EU, which currently stand at 60%, be reduced via the SADC-EU EPA review to accommodate the lack of a real localisation opportunity for the battery in the foreseeable future in South Africa and the EU/UK. Failing to do so would defeat of the NEV transition in South Africa as without the NEV battery sourcing in South Africa or the EU/UK, the domestic automotive industry will not be able to export passenger cars and light commercial vehicles duty-free to the EU/UK. The long term NEV policy in the country should be linked to the timeframe of the SAAM 2035 and the target of 60% of the new vehicle market to comprise NEV sales by 2035 should be subject to appropriate government support levels.

The aim of the White Paper is to provide a comprehensive and long-term automotive industry transformation plan on NEVs for South Africa in line with the SAAM 2035 timeline. The focus of the White Paper is on passenger cars and light commercial vehicles eligible under the Automotive Production Development Programme Phase 2 [APDP2]. In view of the significant differences between the transitional requirements for light vehicles and heavy commercial vehicles, a NEV Road Map for trucks, buses will be developed separately.

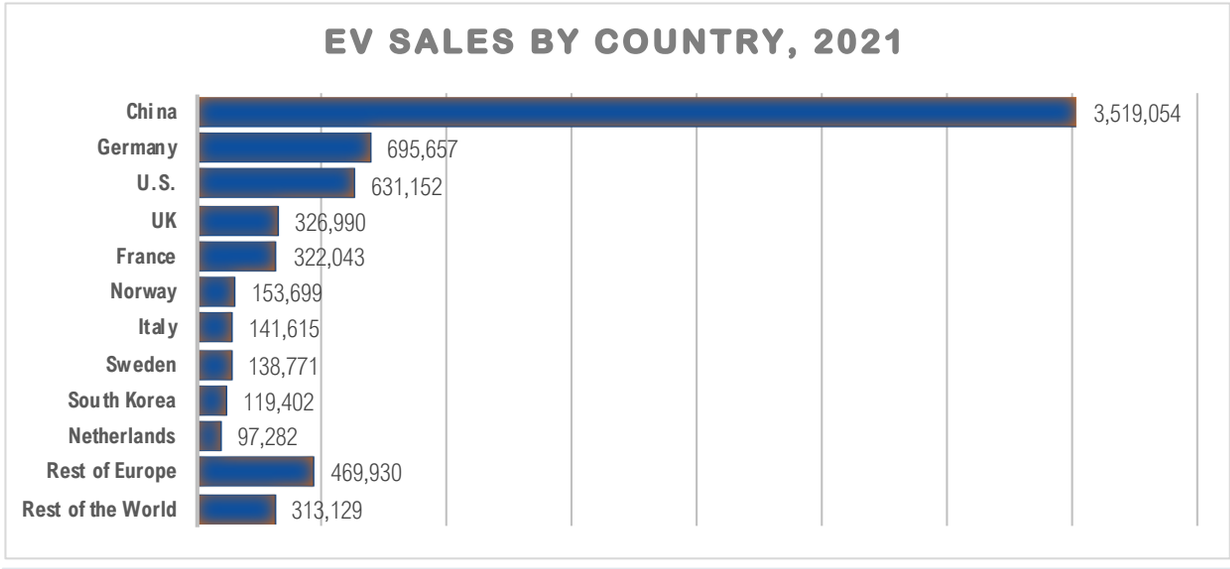
No single government policy or industry commitment will achieve the ambitious goal of carbon neutrality by 2050. We must work collaboratively, at all levels of government and across all industries, to identify the suite of approaches necessary to establish sustainable pathways to carbon neutrality across sectors that recognise and take into account the economic, geographic and cultural realities of South Africa.

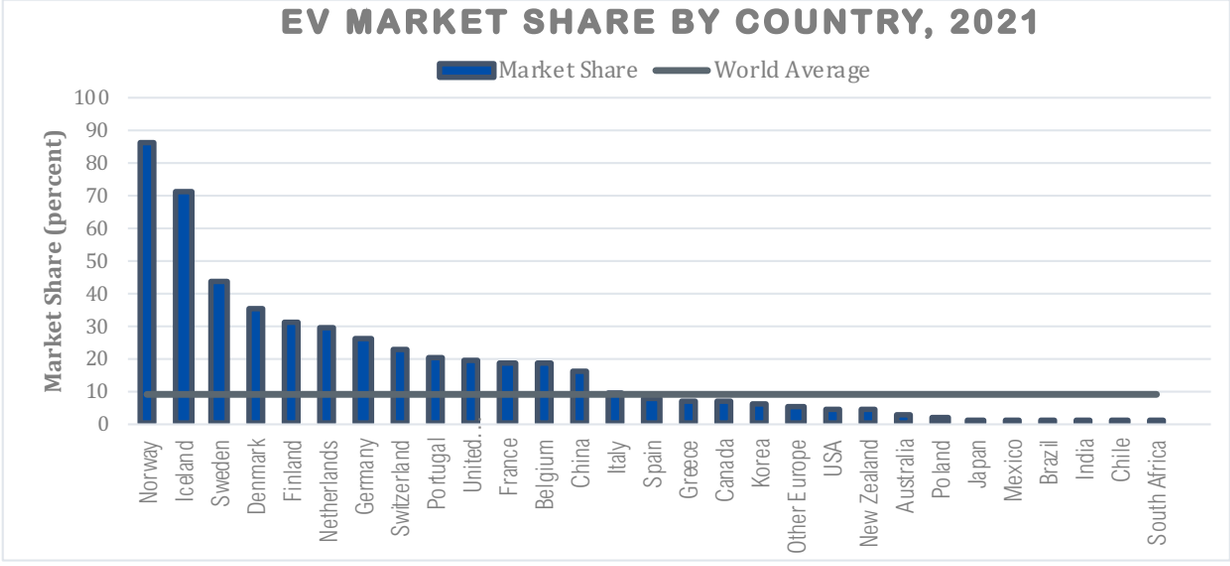
The automotive industry remains committed to supporting carbon neutrality as argued in this paper. We believe electrification will play a leading role in this transition but it is not the only and/or the most appropriate technology for our country for immediate implementation. Other technologies or fuels are also suitable and South Africa should proceed towards the achievement of carbon neutrality by implementing practical and sustainable technological and policy measures tailored to our specific circumstances. Finally, essential to achieving automotive carbon neutrality are comprehensive national industrial and energy policies that effectively promote the competitiveness of the automobile industry.

2. THE PATH TO NEW ENERGY VEHICLES [NEVs]

In many of the largest automotive markets, widespread consumer and commercial adoption of NEVs is important for achieving goals of long-term carbon neutrality from the transportation sector. To that end, motor vehicle manufacturers are working toward greenhouse gas reductions by increasing the number of NEVs and alternative fuel vehicles on the road, and with ongoing efficiency improvements for ICE vehicles. As a result, the world is on the cusp of achieving a remarkable milestone of 20 million NEVs on the road, up from just one million in 2016. To further illustrate the pace of this transition, sales of NEVs [including fully electric and plug-in hybrids] doubled in 2021 to a new record of 6.6 million.

Despite global supply chain challenges, sales kept rising into 2022, with 2 million NEVs sold worldwide in the first quarter, up by three-quarters from the same period a year earlier. The number of NEVs on the world's roads by the end of 2021 was about 16.5 million, triple the amount in 2018. Notwithstanding this tremendous progress and building momentum, NEVs still represent only a fraction of the more than 1.4 billion vehicles on the road worldwide. Likewise, the increasing pace of NEV sales are not the same in every country around the world.





Source: Govind BHUTADA, "Visualizing 10 Years of Global EV Sales by Country," 2022-08-08

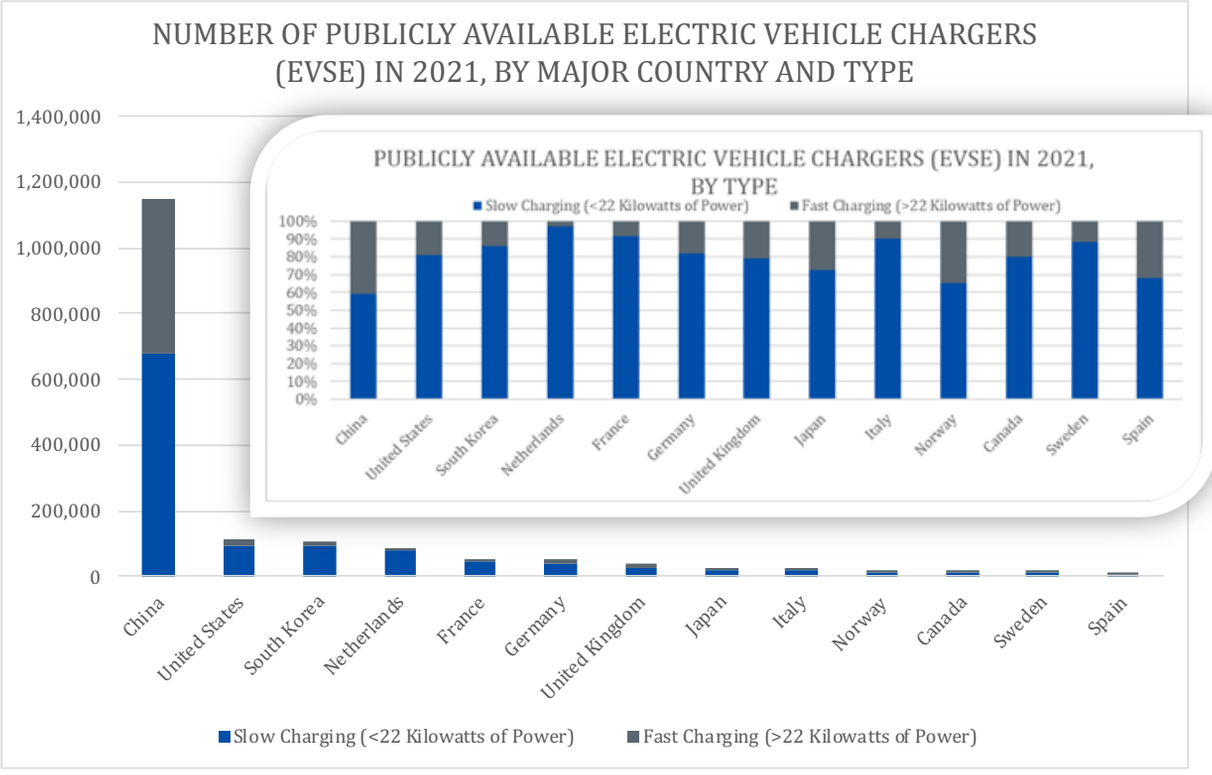
In order to maximise NEV acceptance and adoption, policymakers and industry investments must focus on improving vehicle affordability, increasing consumer awareness and confidence, developing

vital charging and refuelling infrastructure, and building reliable and resilient supply chains to support the manufacture of NEVs.

- Electrical charging and hydrogen fuelling infrastructure: All stakeholders must work together on public policy efforts, such as incentives, grants, rebates and other mechanisms, along with private investment, to spur significant electric charging and hydrogen refuelling infrastructure development to support three key areas: homes [especially multi-unit dwellings and areas with higher residential densities], workplaces and highway and other public locations, with an emphasis on those lacking public transport.

  Existing research shows charging needs will vary substantially by country and region, housing stock, average distance travelled, population density and NEV mix. For example, home charging is currently the most important charging option in most countries and will remain a critical option where demographics support home charging. Other countries and regions, however, may have lower potential for home charging, increasing the importance of public and workplace charging.

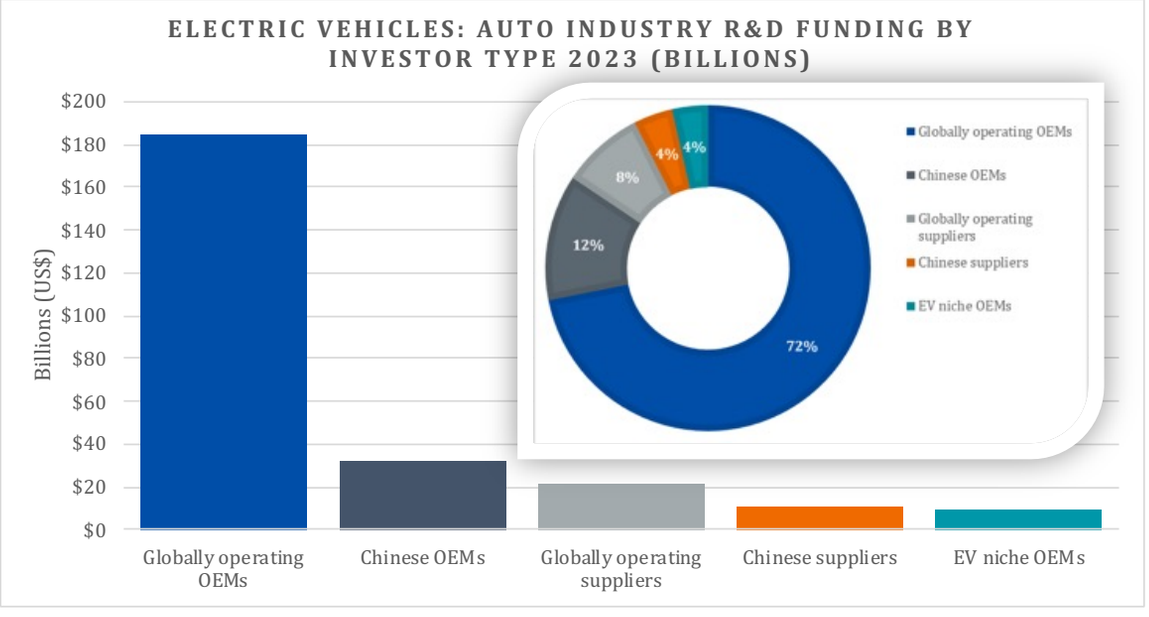
  South Africa will have different demands for DC fast charging mainly due to its energy challenges, socio-economic demographics and other local-specific factors. We know that there is no set playbook for optimising charging infrastructure and South Africa will make its choices based on the country's national interests and needs. Regardless, achieving the right charging infrastructure mix will require a massive and coordinated investment between the public and private sectors.



- Consumer Acceptance and Adoption: While South Africa may elect a gradual phased in approach after prioritising a manufacturing led strategy to NEV evolution, government incentives will undoubtedly be essential to stimulate demand and encourage consumers to replace their ICE vehicles with NEV models. Due to higher levels of inequality in our society, high unemployment rate and poverty, the complete replacement of the existing fleets of vehicles in South Africa will take decades, if not longer [a minimum of 15 to 20 years if not more]. In order to accelerate this process - especially as new, more expensive technologies scale and mature - incentives will be necessary in order to at least partly offset the additional cost to the consumer. Otherwise, if consumers are forced to keep their older vehicles longer than they should, the net effect of NEV introduction will be negative.

  While the auto sector has made significant progress driving down battery and fuel cell costs, further research and development [R&D] investments will be needed to realise cost, utility, and convenience parity between NEVs and their internal combustion counterparts. NEVs currently cost significantly more to produce than equivalent gasoline cars or trucks. This divide grows when considering convenience and utility parity, which requires larger batteries to support longer NEV ranges commensurate with consumer expectations and needs.

- R&D: To increase NEV market share, the focus should not be simply on strengthening fuel-efficiency and other regulations. These must be complemented by additional government policies that facilitate the transition to a NEV future, including support for critical R&D. Globally, automakers have already committed $255 billion to NEV R&D activities in 2023.

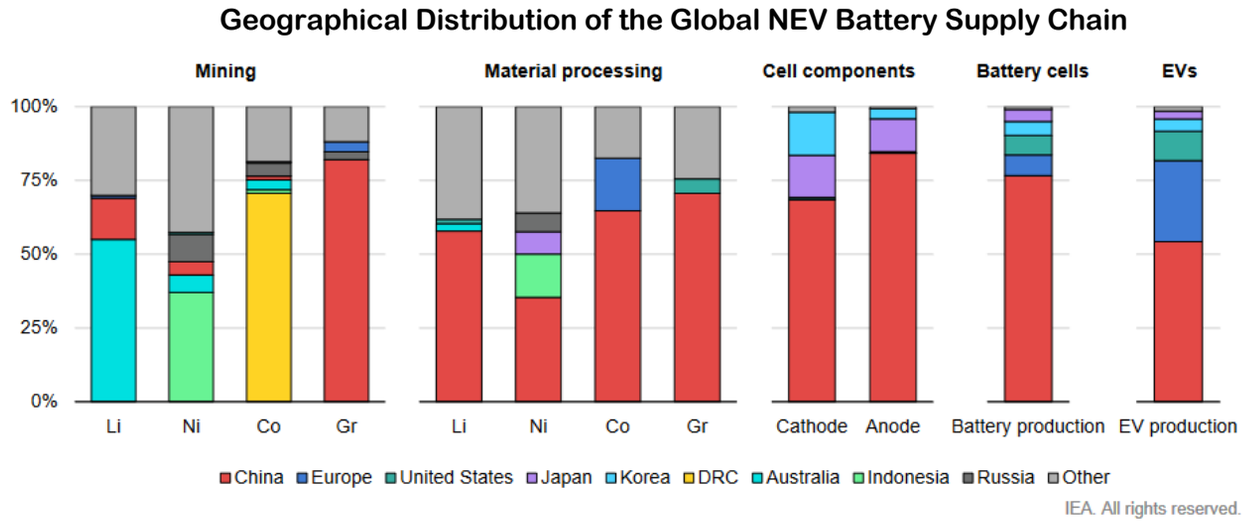


In order to increase NEV penetration and provide NEV owners the same cost benefits as those provided by ICE, governments must continue to work proactively with industry to identify and support critical R&D opportunities to enhance our localisation ambitions and secure stable access to critical components and supply chains for local component manufacturing.

- Mineral Extraction and Supply Chain: Sub-Saharan Africa and Southern Africa in particular is endowed with enormous and rich mineral resources we need in the production of Lithium Battery Technology. If we want to Make South Africa Attractive to global and local battery assemblers, we need to include a beneficiation strategy in our mix so that we do not just extract but we develop our own mega factories that would supply products to the world. Our region is ready and we have the following mineral resources around us:
    - Nickel | SA [the 9th largest global producer] and some in Zimbabwe;
    - Manganese | SA [70% of the world's manganese reserves], some in DRC and Gabon;
    - Cobalt | DRC [>60% of world supply, 85% is exported to China], and some from Zambia;
    - Lithium | Zimbabwe [5th largest producing country], some in SA, and in Namibia;
    - Graphite | Mozambique [20 - 40%: global reserves], some in Tanzania, Zimbabwe, Madagascar;
    - Copper | SA, the DRC, Namibia, Zambia, and Zimbabwe.

  Realising wide-scale adoption of electric vehicles will require a substantial increase in the identification and responsible extraction of resources critical to the battery supply chain, as well as battery end-of-life policies that minimise environmental harm and support robust and resilient supply chains for battery materials.

  Demand for NEV batteries will increase from what we have today to over 9,300GWh by 2030. This will apply tremendous pressure on existing supply chains for critical minerals, components and materials. For example, some estimates suggest that global demand for lithium from battery factories could hit 3 million tonnes by 2030, requiring a massive increase over the 82,000 tonnes produced in 2020. Benchmark Minerals Intelligence estimates that over 300 new mines for graphite, lithium, nickel and cobalt will need to be built over the next decade to meet NEV and energy storage battery demands. As a result of surging demand and tight supply chains, prices of raw materials such as cobalt, lithium and nickel will continue to surge. In May 2022, lithium prices were over seven times higher than at the start of 2021.



- Fuel Cell: In addition to battery and plug-in electric vehicles, hydrogen fuel cell electric vehicles represent an important technology on the path to decarbonising road transportation. This is particularly important for heavy duty vehicles, where battery technology may present challenges related to weight, cost, charging and range.

  For fuel cell electric vehicles [FCEVs] hydrogen should be priced at affordable levels, and hydrogen fuels made more conveniently available to users. Accordingly, government support measures are needed in the areas of fuel cell and hydrogen storage R&D, and hydrogen production and station infrastructure development. In South Korea for example, government has committed substantial resources to both hydrogen energy projects, as well as the establishment of a public-private hydrogen-powered FCEV market.[1] This type of public and private sector collaboration and investment reflects the type of national strategy and technology flexibility necessary to achieve broader decarbonisation goals.

- Grid Reliability/Decarbonising: South Africa has major energy supply and energy security challenges and realising the full potential of NEVs and their charging infrastructure will require careful consideration and evaluation of upgrades to the electricity grid infrastructure, as well as the transition to clean and renewable sources of energy. A critical factor in the wide-scale adoption of NEVs is ensuring the grid infrastructure is reliable, resilient, affordable and able to accommodate various charging needs [not limited only to light-duty vehicles].

  We must work collaboratively to understand how widespread adoption of NEVs will increase demand on existing infrastructure and plan for the necessary investments required to maintain grid upgrades and reliability. Further, realising the benefits of electric and fuel cell vehicles makes decarbonising the electric grid increasingly important. In order to truly achieve the bold ambition of carbon neutrality, especially decarbonisation of road transport, the power used to charge electric vehicles will need to come from clean and renewable sources - while also maintaining the reliability necessary to meet demand.

[1] https://www.macquarie.com/au/en/perspectives/a-clean-start-south-korea-embraces-its-hydrogen-future.htm

3. GLOBAL CLIMATE CHANGE COMMITMENTS

3.1. The Paris Agreement

Environmental protection and climate change are at the forefront of many discussions globally. All of the world's largest economies have committed to becoming carbon neutral by 2050, or in China's case by 2060. The Paris Agreement was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. This Agreement is a legally binding international treaty on climate change, which outlines ambitious goals of limiting global warming to below 2 °C above pre-industrial era levels, while pursuing efforts to limit the increase to 1.5 °C by reducing carbon dioxide emissions worldwide.

To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century. The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects. Implementation of the Paris Agreement requires economic and social transformation, based on the best available science.

The Paris Agreement works on a 5-year cycle of increasingly ambitious climate action carried out by countries. Although climate change action needs to be massively increased to achieve the goals of this Agreement, the years since its entry into force have already sparked low-carbon solutions and new markets. More and more countries, regions, cities and companies are establishing carbon neutrality targets. Zero-carbon solutions are becoming competitive across economic sectors representing 25% of emissions. This trend is most noticeable in the power and transport sectors and has created many new business opportunities for early movers.

In 2021, global emissions were at their highest level ever. The nationally determined contributions submitted in 2021 would result in an increase in global emissions of 14% by 2030. To be on a credible pathway to limit global average temperature rise to 1.5°C, global emissions need to decline by 45% below 2010 levels by 2030. The battle to keep the 1.5°C goal of the Paris Agreement alive and prevent the worst impacts of the climate crisis will be won or lost this decade. With each passing day of inaction, the pulse of the 1.5°C goal gets weaker and weaker.

The second half of 2021 in particular saw the start of the biggest energy crisis in modern history, exacerbated by Russia's invasion of Ukraine towards the end of February 2022, and the unprecedented global commodity shock. Like the oil crises of the 1970s, which saw huge gains in fuel efficiency and a boom in nuclear power, the world may see a jump in energy policies that speed the transition to cleaner energy. In the meantime, security of oil and gas supplies will continue to pose a challenge for Europe, and also for other regions. Although many more governments committed to net-zero greenhouse-gas emissions in 2021, the reality is that, in response to the energy crisis, most countries have gone back to seeking out new sources of fossil fuels and to burning even more coal, oil and natural gas.

3.2. A snail-paced momentum for a Global Commitment

Despite many new commitments to the net zero target, political momentum has not translated into action. In the lead-up to the United Nations [UN] COP 26 in November 2021, a record 135 countries pledged to achieve net zero greenhouse-gas emissions by 2050. However, only 84 of these countries had economy-wide targets for renewable energy, and only 36 had targets for 100% renewables. Nonetheless, for the first time in the history of UN climate summits, the COP26 declaration mentioned the need to reduce coal use, but it failed to call for targeted reductions in either coal or fossil fuels. However, meeting net-zero pledges will require significant efforts. Despite important green recovery measures in many countries, the strong economic rebound in 2021 contributed to 4% rise in final energy consumption, offsetting the growth of renewables.

Most of the increase in global energy use in 2021 was met by fossil fuels, resulting in the largest surge in carbon dioxide emissions in history, up more than two-billion tonnes worldwide. Further, 2021 marked the end of the era of cheap fossil fuels, with the largest spike in energy prices since the 1973 oil crisis. By the end of the year, gas prices reached around ten times the 2020 levels in Europe and Asia and tripled in the US, leading to a spike in wholesale electricity prices in major markets by the end of 2021. It should be reiterated that renewables are the most affordable and best solution to tackle energy price fluctuations.

3.3. Every contribution to reduce emissions counts

South Africa is a signatory to the United Nations Framework Convention on Climate Change, or UNFCCC, and to the Paris Agreement. As an energy and emissions intensive middle-income developing country, South Africa recognises the need for it to contribute its fair share to the global effort to move towards net-zero carbon emissions by 2050, considering the principle of common but differentiated responsibilities and the need for recognition of its capabilities and national circumstances. South Africa, the world's 13th-biggest emitter of greenhouse gases, has committed to reduce annual GHG emissions by 28% by 2030 and has set a target for net zero carbon emissions by 2050 as climate risks build.

Net zero targets are the most recent attempt to simplify the climate crisis in order to make it manageable. The Paris Agreement called on countries to balance greenhouse gas sources, such as cars and factories, with ways of removing emissions from the atmosphere, such as forests and carbon capture technology, in the second half of this century. In recent months, leaders from the US and the UK and the UN Secretary-General have suggested that a net zero emission target consistent with reaching global net zero carbon by 2050 is an important yardstick by which climate pledges by major economies are to be judged.

Yet how much each country has to do depends on how fast other countries reach net zero. The agreement at Paris provides some guidance. It recognises that emissions will take longer to peak in developing countries because addressing poverty is an overriding challenge. For the whole world to reach carbon neutrality in 2050, developed countries have to reach net zero carbon emissions earlier. The Paris Agreement also requires that developing countries receive support - in the form of money or green technology - to speed up their transition.

Net zero targets are a powerful way to signal common cause between nations. The Paris Agreement broke a long-standing political deadlock by allowing each country to develop its own

nationally determined contribution to cutting global emissions. This allows national governments to tailor climate policy in order to maximise its appeal to people at home. In South Africa, there is crippling inequality and unemployment stood at 35,3% in 2021. Emissions cuts can only proceed if jobs are created during a transition from a coal-based economy to a low emission one, particularly for young people.

3.4. Transport as a significant emitter

Today, the transport sector in most countries is dependent on fossil fuels. Transportation is a major contributor to CO^2 emissions globally, accounting for about 24% of total emissions come from this important sector. Of this figure, more than 75% is from road transportation in the form of cars, trucks and motorbikes. Passenger cars account for 60% of road transportation emissions globally. These polluting emissions arise from the state of vehicle technology, the quality of fuels used, and the maintenance levels of the vehicle parc.

The first step in reducing these emissions is to eliminate the lead in petrol and to reduce the fuel sulphur content. Reducing emissions from motor vehicles require the introduction of cleaner fuels coupled with the advanced vehicle technology which can use these fuels. However, for environmental sustainability as well as to enhance industrial policy, developing a NEV market is crucial to decarbonise transport and to transform the sector through the application of emerging technologies. Countries are therefore increasingly implementing policy measures and strategies to help reduce transport-related carbon emissions, improve air quality and increase the share of renewable energy sources.

Road transport plays an essential role in South Africa's national supply chain. The road transport network is the blood system of the domestic economy, but it does face challenges. Road networks carry some 80% of South Africa's goods, ingoing and outgoing, and thus anything that disrupts road logistics is bad not only for the individual logistics companies but the economy. The Department of Transport [DoT] has implemented a Green Transport Strategy [GTS-DoT] to lower GHG emissions and develop policy and regulations. Important focus areas for the department include promoting sustainable green mobility and more efficient technologies, transport systems integration and the development of infrastructure for e-mobility.

The GTS short-term strategy aims to convert 5% of the public and national sector fleet to green cleaner alternative fuel vehicles, including the use of compressed natural gas [CNG], biogas and biofuels, and renewable energy to provide electricity for transport in the next five to seven years. The government notes that the strategy and implementation plans will depend on financial support and resources, infrastructure investment, coherent policy framework and regulatory environment alignment. The DoT, DTIC and National Treasury are working on implementation plans, supporting relevant research work such as the automotive industry's NEV roadmap and assessing the policy implications of the proposed GTS plans.

NEVs are increasingly being deployed to solve challenges of air pollution, rising fuel prices and global warming, but also to assist electricity grids as distributed energy sources, making use of large battery packs for more than just mobility. Targets set for each industry, in particular transportation, will require major shifts in production and entire value chains having to convert from ICE to hybrid or battery electric vehicles [BEVs]. Europe is leading the way in terms of regulation. Electric mobility [e-mobility], paired with renewable energy generation, stands to play a major role in significantly lowering global CO^2 emissions in the transportation sector.

3.5. Working towards environmentally sustainable policies

Especially with the ratification of the Paris Agreement in 2015, there has been a concerted policy push for countries to promote e-mobility. Policymakers in various countries have since introduced new environmental standards and regulations that seek to compel industries to reduce their carbon emissions output and act sustainably. This has led to a technology paradigm shift, as industries shift to more sustainable energy solutions and clean technologies. Many countries have drafted goals, strategies, and guidelines to address environmental sustainability, particularly within the transport sector which is playing a critical role to reduce carbon emissions and the transition to e-mobility.

E-mobility can help countries achieve sustainable development objectives and decarbonisation goals. This will not only help South Africa to achieve its global targets but will have a positive impact on the environment and the quality of life due to reduced pollution and noise. The uptake of NEVs is, however, comparably slow to date. The high purchase price of NEVs and the availability of charging infrastructure remain major barriers to the spread of NEVs. To grow the market, however, generally a mix of strong and enabling policy measures and incentives addressing the cost, charging infrastructure, and information gap could help to increase the share of NEVs, as leading markets show.

In the interim, the introduction of Euro V equivalent fuels in South Africa is also important from an environmental health and air quality improvement perspective. Once the fuels become generally available, there will be a significant reduction in harmful vehicle emissions in South Africa in respect of the entire vehicle population. It will also enable vehicle manufacturers to market high technology, highly fuel efficient and low emission new vehicles in South Africa.

The automotive industry will continue to press government and oil companies for the earliest possible introduction of the cleaner fuels in South Africa. CO^2 based vehicle taxation was introduced in South Africa in 2010 to encourage vehicle manufacturers to introduce more fuel-efficient vehicles. While Industry objected at the time citing restrictions in access to the latest vehicle technology specifically from Europe, assurances were given that this matter was recognised and would be addressed.

In the 2013/2014 budget, the then Minister of Finance announced an allocation of R40 billion for the upgrading of SA oil refineries to produce Euro V fuels in South Africa by 2017. The Department of Energy subsequently decided to re-evaluate the Clean Fuels initiative and there has been little progress since then. Currently, South Africa is behind the rest of the world in terms of fuel standards and quality.

The introduction of Clean Fuels in South Africa is essential from an environmental/urban air quality and human health perspective. It is also essential to enable OEMs to supply the market with high technology, highly fuel efficient and low emission new motor vehicles with the following important benefits:

- Progressive reduction in CO^2 emissions by motor vehicles;
- Progressive reduction in emissions of hazardous gasses harmful to human health and the environment due to high levels of benzene and sulphur in current fuel;
- Enable greater efficiencies in vehicle manufacturing plants due to reduced complexities [uniform technologies built into domestic and export vehicles];
- Improved efficiencies for domestic vehicle manufacturers because re-engineering of vehicles to comply with lower quality fuel will no longer be required to accommodate outdated vehicle technology due to inferior fuel quality standards; and
- Gradual reduction in aggregate fuel / oil imports with associated benefits for the country's balance of payments.

Importantly, Clean Fuels would enable improved efficiencies and would avoid the need to adapt vehicles for the lower fuel quality [Euro II] available in South Africa. Inefficiencies arise due to adjustments needed to engine management systems, wiring harasses, drive trains, computerised management systems and exhaust systems. Moreover, having to produce export vehicles for high technology markets as well as vehicles for low technology markets is inefficient and negatively impacts on the industry's global competitiveness.

While steady progress has been made regarding the average new vehicle CO^2 emissions reduction, it is now noticeable that a plateau has been reached in terms of average vehicle fuel economy as measured in terms of CO^2 emissions. However, the automotive industry believes that any further progress is now unlikely without the widespread introduction of the latest engine technology which in turn requires new enabling fuels.

It is also illogical that vehicle manufacturers and importers should continue to be penalised for not introducing latest engine technology vehicles when many such vehicles will not be able to operate on South African fuel, and those models that are introduced may require expensive reverse engineering to use older less efficient engines. Product restrictions are being applied to domestic companies by their foreign principals particularly due to the lack of availability of clean fuels [low sulphur petrol].

CO^2 emissions tax on average adds about 2% to 3% to the price of the vehicle and is directly payable by the manufacturer to the South African Revenue Service. This tax is recovered through the selling price to dealers and consumers. Effective 1st September 2010, CO^2 emissions taxation was implemented in respect of new motor cars, including SUV's, based on an emissions threshold of 120g/km and a tax of R75 g/km above the threshold [as adjusted during the annual Budget on a regular basis]. In the case of higher fuel consumption vehicles, the tax and possibly therefore the price effect could be as high as 6%. Value Added Tax is payable on the emissions levy.

Effective 6 April 2022, the CO^2 emissions tax on passenger cars at present is R132 g/km on CO^2 emissions > 95g/km. On double cab light commercial vehicles, the CO^2 emissions tax at present is R176 g/km on CO^2 emissions > 175g/km. The following table reveals the weighted average CO^2 emissions on passenger cars, light commercial vehicles and double cabs from 2011 to 2021.

	Weighted average C02 emissions										
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Passenger Vehicles	**166**	**161**	**156**	**153**	**149**	**147**	**147**	**145**	**146**	**147**	**146**
A - Entry	146	142	141	140	137	135	133	129	128	128	126
AB - sub-Small	145	142	135	133	130	127	127	122	124	124	125
B - Small	157	153	146	144	142	140	142	144	145	143	145
C - Medium	170	154	145	139	135	130	130	134	140	143	142
D - Large	171	163	161	155	151	142	136	146	144	144	159
E - Luxury	226	210	196	186	194	181	186	180	201	205	204
F - MPV	200	194	188	183	177	171	166	167	167	160	165
G - SUV	225	218	210	203	195	188	187	185	182	187	185
SE - Sport and Exotics	214	195	204	205	186	216	218	225	226	229	236
X - Crossover	177	172	165	155	148	143	144	143	148	150	149
Light Commercial vehicles	217	212	213	214	213	207	207	205	205	205	205
LCV: Double Cabs	232	231	229	226	225	212	212	211	211	210	209

Source: **naamsa**/Lightstone Auto

A concern going forward is that, if the cleaner fuels are not being produced and sold in South Africa, it will restrict newer technology and lower-emission vehicles from coming into the country and being manufactured here. The problem is that to produce these fuels as determined by Clean Fuels 2 [CF2], domestic refineries need to make major investments. The question remains how they can recover these investment costs. The oil industry has been in negotiation with Government on how some type of cost recovery would work, but no finality has been reached.

The industry welcomed the recent announcement of the next step in government's clean fuels programme, for Petroleum Products Specification and Standards for Implementation gazette [Government Notice R784], published on August 31st, 2021, for the introduction of the next phase of Clean Fuels Program [CF2] in SA, effective by September 2023.

The Department of Mineral Resources and Energy [DMRE] in 2021 gazetted the introduction of the next phase of the Clean Fuels Programme - CF2 - in South Africa. The introduction of low-sulphur petrol and diesel [sub-10 ppm] and other revised fuel parameters nationally is progressive, and in line with the climate change considerations, and will enable vehicle manufacturers to market the latest technology fuel-efficient and low-emission new-motor vehicles in South Africa.

Once the fuel regulations are implemented, a significant reduction in vehicle emissions in respect of the entire vehicle population can be expected. The new measures to improve enforcement relating to mandatory record-keeping of fuel purchases by retailers are also essential for combating the increasing import and sale of grossly sub-specification fuels currently seen in the South African market. Furthermore, the progressive move to cleaner fuels supports the South African government commitment to the COP26 United Nations Framework Convention on Climate Change.

4. SOUTH AFRICA'S JUST TRANSITION

Global efforts to mitigate climate change are ramping up, with rising numbers of countries, companies and financiers taking actions to tackle climate change. At the same time, climate changes such as temperatures and weather changes are increasing, with dramatic impacts on populations. These are having material impacts on the economy and society. In the short term, dealing with this transition has materialised primarily in a focus on the decarbonisation of the energy systems. In the medium to long term, this will extend to virtually all sectors and segments of society. In this context, the just transition agenda has taken centre stage. It aims to lower the risks faced by the most affected and vulnerable stakeholders such as working people, small businesses, and low-income communities, while providing an opportunity to maximise the development of new opportunities and redress historical injustices.

The phrase, net zero has become synonymous with global sustainability objectives and the movement to curb climate change. As the world gears up to present a united front against impeding realities like environmental degradation and global warming, many have opinions on the role that the public and private sectors must play in driving positive change.

A just transition seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically - be they countries, regions, industries, communities, workers, or consumers. A rapid increase in the speed and scale of actions required to reduce the risks of climate change will create new economic opportunities. Whilst a just transition is based on environmental considerations, it is also shaped by other structural changes affecting labour markets, such as globalisation, labour-saving technologies, and the shift to services.

South Africa is highly vulnerable to the impacts of climate change and will need significant international support to build resilience, transition its economy and to decarbonise. Currently, coal contributes around 81% of South Africa's energy generation. South Africa's energy system is currently at a critical crossroads. The country's inability to ensure reliable electricity supply to the economy has been a key binding constraint to structural transformation. South Africa's electricity sector structure is from a bygone era characterised by the pursuit of ever larger economies of scale in coal-fired power generation.

As a developing country facing extreme poverty, inequality and unemployment, exacerbated by the COVID-19 pandemic, South Africa has an opportunity to align decarbonisation plans with economic recovery efforts to attract the foreign investment and finance the country needs to fund and manage a Just Transition. A Just Transition for South Africa must ensure that the transition to a low carbon economy is conducted in a way that serves to address present and historical inequality, creates jobs, relieves poverty, restores its natural systems to build resilience, and, critically, leaves no one behind.

What is needed is a well-planned energy transition to attain the long-term goal of an economy based on renewable and other forms of low-carbon energy. Despite the negative impact of coal on the environment, this energy mineral, however, remains a strategic national resource for the country and cannot simply be discarded. The pace and timing of the transition should therefore not be based on environmental concerns only but must also consider the socio-economic implications for the country.

Building green economy is the only viable path to a resource-efficient, low-carbon and pro-employment future for South Africa, and its commitment to the green economy as the anchor for its strategy is one of the keyways to contribute to the realisation of this goal and the economy's sustainability and effectiveness. Tackling climate change has far-reaching implications for socio-economic development, production, and consumption patterns. South Africa's greenhouse-gas emissions - the 13th highest in the world - contributes about 5% to global greenhouse-gas emissions. SA has an energy system heavily dependent on coal. The country also struggles to maintain a stable energy supply and experiences power cuts and frequent load-shedding. An accelerated electricity sector transition is the key to South Africa's sustained economic recovery. Specifically, several coal-fired power stations which are at the end of their lives can now be replaced by an energy mix including large-scale investment in renewable energy sources, the costs for which continue to fall.

South Africa's long-term just transition process includes to reduce the carbon intensity of South Africa's electricity system and reliability on coal, while developing new sectors such as green hydrogen and electric vehicles. South Africa has adopted a just transition framework and set a path for the low-carbon transition as outlined in the National Development Plan and the Integrated Resource Plan [IRP]. The IRP 2019 outlines South Africa's stepping stones to reduce coal's contribution to the energy mix to below 60%, in favour of renewables like wind, and photovoltaic [PV] technologies, which would account for 25% of our energy mix by 2030.

The areas where renewed emphasis on State capacity is required include the effective and timely implementation of the country's IRP - the country's key electricity investment planning instrument, which should be incrementally and regularly recalibrated and updated, given changing technology costs, and changing supply and demand patterns. Relatedly, the procurement process flowing from the IRP should continue to be executed with a high degree of autonomy by the Independent Power Producers Office. A modernised and updated electricity regulatory framework for the purpose of guiding the energy transition will need to be developed and run under the auspices of the National Energy Regulator of South Africa.

South Africa's just energy transition also hinges on integrated policy approach. By integrating the expansion in renewable energy generation capacity with active industrial policy measures, significant potential exists for accelerating growth, investment, and employment opportunities. It would be beneficial if government could achieve policy alignment and complementarity across four major policy streams: energy, fiscal, industrial, and environmental.

In the longer-run, the fact that South Africa has world-class solar and wind potential means that the shift towards increased solar photovoltaic and wind power has the potential to reduce the rate of electricity price increases and, over time, restore international competitiveness for South Africa's energy-intensive economy. This would confer a fundamental advantage to the South African economy in exporting low-carbon, electricity-intensive, hydrogen-rich products - including "green" products.

At present coal still dominates the South African energy mix, providing 81,4% of the total system load. However, due to the energy crisis in the country relating to breakdowns and lack of maintenance over many years resulting in electricity demand exceeding supply, persistent load shedding continues to harm the economy. Load shedding at present is causing lost economic output of about R700 million per stage per day while it is estimated to have contributed to more than one-million job opportunities lost. The most obvious solution to the problem would be to utilise more renewable energy sources which would assist South Africa's climate change commitments and just transition to a green economy. The contribution of renewable energy technologies increased in 2021 to a total of 5,7 GW installed capacity and provided 6,6% of the total energy mix. Electricity generated from renewables is not subject to the same pricing volatility as its fossil fuel-based counterparts. It is not linked to international commodity prices, nor the currency it is quoted in. Electricity generated from renewable sources offers pricing predictability and affordability.

In the order of 47% of South Africa's coal power capacity is scheduled to shut down by 2030. The decommissioning of coal plants reaching their end-of-life cycle will leave a 22GW gap. To ensure security of supply and system flexibility while exploring the decarbonisation of the power sector, the country is weighing up resources and technologies to make the energy transition a reality. South Africa is seeking to reduce dependence on its state-owned utility, Eskom, for power supply. The troubled utility, which is currently unable to meet the country's power demand due to financial and operational issues, recently began considering renewables for its plant portfolio.

A landmark regulatory change was announced by President Cyril Ramaphosa in August 2021, where Schedule 2 of the Electricity Regulation Act was amended to extend the limit over which a private power project must apply for a Generation License, from 1MW to 100MW. The additional energy supply would help reduce the burden on power utility Eskom. Further far-reaching interventions announced in July 2022 by the President included a doubling in the allocation for the next renewables procurement round, the scrapping of the 100MW license-exemption threshold for distributed generator and a proposal of a feed-in tariff for self-generating households and businesses - as part of a much-anticipated action plan for ending load-shedding.

The President also announced that special legislation would be placed before Parliament to address remaining legal and regulatory obstacles to the urgent introduction of new generation capacity. In the meantime, certain regulatory requirements, where possible to do so within existing legislation, would be waived or streamlined such as cutting red tape that has made it difficult for Eskom to buy maintenance spares and equipment within the required period to effect repairs. A single point of entry for all energy project applications, to ensure coordination of approval processes across government, would also be established. The measures announced together with the steps already taken would aim to hasten the end of load shedding and put the country on a clear path towards reliable, affordable, and sustainable energy supply. The move to remove limits to private sector electricity generation would help unlock investments, create jobs during the construction and help lower the cost of electricity in the long term.

Finance is essential to implement effective climate action. A just transition requires transition finance as a component of finance for climate action - to protect the adequacy of energy supply and to mitigate negative economic, employment and social impacts during transition - supporting both an accelerated phasing-out of coal and development that sustains livelihoods in affected regions. South Africa needs to spend about $250 billion over the next three decades closing down its coal-fired power plants and replacing them with green energy.

The key challenge is catalysing financing and investment. These are essential enablers for a socially inclusive transition to a low-carbon economy and a climate-resilient future on an economy-wide scale. The role of the private sector was emphasised at COP26, which stated that about 70% of the total funding requirement for a global climate change response would come from private enterprise.

At Glasgow, all countries agreed to revise and strengthen their nationally determined contributions. The G20 nations account for 80% of global emissions. On finance, the $100 billion commitment made over a decade ago remains unmet, and the trillions needed to ensure a low-carbon, climate-resilient future are yet to be mobilised. Developing countries continue to face extraordinary barriers to accessing the finance they need, particularly to protect themselves. In this regard concrete progress towards reforming rules around eligibility and burdensome access criteria that many developing countries face is required.

The establishment of a Presidential Climate Commission [PCC] emanates from the Presidential Jobs Summit held in October 2018 when social partners agreed that a statutory body be formed to coordinate and oversee the just transition towards a low-carbon, inclusive, climate change resilient economy and society. The PCC is an independent, statutory, multi-stakeholder body established by President Cyril Ramaphosa.

Its purpose is to oversee and facilitate a just and equitable transition towards a low-emissions and climate-resilient economy.
In fulfilling this role, our focus is to:

- Create a social partnership around a just transition;
- Define a vision for a just transition, and means of achieving that vision, covering the necessary sectoral shifts, technological innovation, employment opportunities, and climate finance;
- Conduct independent analysis into climate change impacts on jobs, the economy, and policy;
- Monitor progress towards mitigation and adaptation goals, as well as the achievement of a just transition linked to broader development objectives; and
- Engage with a wide range of stakeholders, including all spheres of government, business, labour, academia, communities, and civil society.

One of the first tasks of the PCC was to develop a framework for a just transition. The just transition framework presents an opportunity to start dealing with practical issues relating to jobs, local economies, skills, social support, and governance.

The just transition framework is a planning tool for achieving a just transition in South Africa, setting out the actions that the government and its social partners will take to achieve a just transition, and the outcomes to be realised in the short, medium, and long term.

Ahead of the 2021 COP26 climate talks in Glasgow, Scotland, South Africa made a material update to its nationally determined contribution [NDC] target range for 2030, which was improved to between 420- and 350-million tons of carbon dioxide equivalent [Mt CO^2-eq] from an initial NDC pledge to lower its carbon emissions to between 614 Mt CO^2-eq and 398 Mt CO^2-eq by 2030. This more ambitious NDC created the basis for the International Partners Group [IPG] of France, Germany, the UK, the US, and the European Union to sign a Political Declaration with South Africa that included an offer of $8,5 billion in climate finance to support the transition from coal to renewables while protecting workers and communities currently reliant on the coal value chain.

The Partnership aims to accelerate the decarbonisation of South Africa's economy, with a focus on the electricity system, to help it achieve the ambitious goals set out in its updated Nationally Determined Contribution [NDC] emissions goals. It will mobilise an initial commitment of $8,5 billion for the first phase of financing, through various mechanisms including grants, concessional loans and investments and risk sharing instruments, including to mobilise the private sector.

The Partnership is expected to prevent up to 1 to 1,5 gigatonnes of emissions over the next 20 years and support South Africa to move away from coal and to accelerate its transition to a low emission, climate resilient economy.

Essentially, the debt guarantee would allow companies such as Eskom to borrow the money they need to close down coal-based power plants and enable the generation of renewable energy. Ideally, this money would have come from Eskom's reserves or, failing that, a loan guaranteed by the government. But Eskom is already in debt to the tune of R416 billion and the South African government has already been pushed to the limit when it comes to guaranteeing Eskom's debt. In other words, Eskom needs money to transition to green technologies, but its current options for getting that money are extremely limited. The debt guarantee is an effective way of circumventing this. It's a well-established and effective development financing mechanism. It is important to point out that while $8,5 billion on its own is undoubtedly helpful, it doesn't come anywhere near meeting the amount South Africa needs to complete a meaningful energy transition.

It is becoming increasingly clear that the transition to renewables is essential. The polluted air predominantly produced by coal stations kill an estimated 45,000 South Africans every year. That alone should have been enough to convince us to take a renewable-led strategy years ago. In addition, a reminder of the dangers that come with pumping large amounts of greenhouse gasses into the atmosphere needs not to look further than the April 2022 floods which ravaged Kwazulu-Natal.

Exceeding the 1.5C rise in temperature will result in more heatwaves, droughts, and floods, which affect not only human health, but also of fauna and flora. To mitigate the impact of global warming a major transition in the energy sector is required which involve measures to significantly reduce fossil fuel use, widespread electrification, improved energy efficiency, and the use of alternative fuels such as hydrogen. South Africa is in a prime position to take advantage of its plentiful wind and solar resources, which provide an opportunity to decarbonise its electricity sector, as well as other sectors of the economy.

Superior sun, prime wind and land, favourable storage potential, know-how and metals put South Africa in pole position for green electricity and green mobility. If one looks at the energy storage options available today, one must be excited about green hydrogen, which South Africa has the potential to have in abundance. The storage options are batteries, hydrogen, and pumped water storage. As pumping and storing water is as green as it gets, the contest turns to hydrogen versus batteries. Not all hydrogen generation is done with the help of platinum group metals [PGMs]. Hydrogen generation through alkaline electrolysers does not require PGMs, and nor does hydrogen from ammonia and direct combustion. Hydrogen is only green when renewables apply and renewables are inconsistent, which means storage is essential, and energy is very storable as hydrogen. Hydrogen - a clean, versatile energy carrier - is key to achieving a low-carbon future.

South Africa is betting big on so-called green hydrogen to both grow and decarbonise hard-to-abate sectors of the economy. Hydrogen is the lightest and most abundant known element in the universe. It can serve as an alternative, emissions-free transport fuel when used to power fuel cells. Hydrogen is considered green when it is produced using renewable electricity to split water into hydrogen and oxygen using electrolysers. Fuel cells work by combining hydrogen and oxygen in an electrochemical process that generates electricity, with the only by-product being water. While this prototype offers a glimpse into a low-emissions future for mobility, having this technology widely adopted for passenger vehicle use in South Africa requires a level of investment in renewable energy generation, hydrogen production, hydrogen storage, hydrogen transportation and hydrogen refuelling sites that just does not exist at present.

Fuel cell electric vehicles [FCEV] are also only recently emerging from the shadows of their more well-known counterparts: electric vehicles [EVs] and variants thereof. While perhaps the most desirable option, especially as petrol prices skyrocket, South Africans have limited options in this regard. The lack of local supply is particularly striking in the entry- and mid-level market segments, with most available models competing in the high-end to niche segments. Moreover, the majority of South Africa's energy generation is powered by the carbon-intensive process of burning coal - thereby all but eliminating the environmental benefit of the vehicle's alternative drivetrain. Carbon emissions come from two major industries, of which energy production accounts for 34% of the emissions and manufacturing accounts for 24%.

Not only is transitioning away from coal vital to South Africa reaching its own climate targets, but it may also prove crucial to the country's ongoing ability to do business with its biggest trade partners. This relates to the economic imperative to South Africa's just transition. South Africa is the EUs largest trading partner on the African continent, but increasingly strict climate regulations in the economic bloc could make goods produced in South Africa with "dirty" electricity more expensive and less attractive.

Moving South Africa away from coal into renewable energy will reduce pollution and the negative externalities and impacts of carbon emissions on health and the environment. It is an excellent opportunity to recalibrate the Southern African economy to generate thousands and thousands of green jobs and power new green industries for a more competitive economy.

5. ENVIRONMENTAL, SOCIAL AND GOVERNANCE [ESG] METRICS

The global economic transition to an equitable, net zero and sustainable future is both one of the most pressing challenges as well as one of the greatest responsibilities for society today. A worldwide push towards more sustainable business practices has come alongside more and more legislation broadening the scope of mandatory sustainability reporting. Currently, all major economies have in place, in some form or another, legal regulatory mechanisms that make it mandatory for companies meeting specific broad criteria to report on sustainability.

One of the most important tools that companies, and investors utilise to assess sustainability performance is an Environmental, Social and Governance [ESG] score. An ESG score is typically a headline number that presents the provider's opinion of a company or entity's performance against pre-defined ESG criteria. An ESG metrics can be effectively used to measure and define the impact an organisation has, the trust it engenders and the value it takes beyond the shareholder and into the ecosystem.

While the term ESG is often used in the context of investing, stakeholders include not just the investment community but also customers, suppliers, and employees. All of them are increasingly interested in how sustainable an organisation's operations are. ESG factors can be described as follows:

- Environmental criteria can be described as the impact an organisation's operations have on the environment [such as greenhouse gas emissions, waste management, energy usage, etc] and risk management practices;
- Social refers to how an organisation manages its relationships with the people who work for and with it, as well as the local communities within which it operates; and
- Governance refers how a company is managed and led. Its compliance with regulations, internal controls, and checks to promote transparency and accountability by leadership, decision-making processes, and protection of stakeholder rights.

The ESG lens helps assess how an organisation manages the risks and opportunities created by changing conditions, such as shifts in environmental, economic, and social systems. ESG factors, though non-financial, have a material impact on the long-term risk and return of investments. ESG is incorporated into risk mitigation, compliance, and investment strategies. Companies that use ESG standards are more conscientious, less risky, and are more likely to succeed in the long run.

ESG is a yardstick against which a company's commitment to sustained outcomes is measured, and how investors respond to a company and its potential. Responsible investors evaluate companies using ESG criteria as a framework to screen investments or to assess risks in investment decision-making. ESG standards provide another level of due diligence, which is in the best interest of shareholders. The Capital Markets can be a powerful tool to create change. By restricting access to capital or making the terms under which it's available less favourable, bad actors may be incentivised to improve performance across E, S, or G measures. Conversely, rewarding companies and their management teams that are performing well against ESG factors has an equally positive impact on encouraging continuous improvement.

Many ESG investment vehicles have emerged, including green bonds, mutual funds, exchange-traded funds [ETFs], and index funds, among others. These publicly traded instruments make it easier for investors to align their investment decisions more closely with their own beliefs and values around E, S, or G criteria. Reporting on ESG, however, is complex, demanding and detail driven. It expects companies to provide comprehensive data and insights into every aspect of each criterion across ESG and to prove each point meticulously. When implemented correctly, ESG projects not only improve stakeholder relations, but also yield considerable financial benefits almost immediately. The right ESG projects could also attract cheaper forms of finance, making it easier to fund and allocate capital to such projects. Ultimately, these projects could enhance a company's ESG credentials, attracting investor interest and resulting in better valuations.

OEMs globally are currently increasing their upstream investments and supply contracts to secure enough battery metals, such as lithium, cobalt and battery-grade nickel, to drive forward their respective NEV policies and to meet the decarbonisation targets set by governments globally. These investments include partnerships with mines to secure short- and long-term metals contracts, as well as OEMs investing into mining companies or strategic mining projects.

Fitch Solutions believes nickel will remain incredibly important to NEV and battery manufacturers as nickel-based batteries remain the most popular chemistry among NEV manufacturers. Using data that Fitch Solutions had gathered on the battery chemistry used by NEV manufacturers and the batteries produced by giga-factories around the globe, it was estimated that lithium/nickel/manganese/cobalt [NMC] would make up between 70% to 78% of global NEV batteries by 2030, meaning that nickel-based batteries would remain the dominant battery chemistry in the long term. Fitch Solutions believes lithium iron phosphate [LFP] cells will also increase in use, with an estimated 6% of total NEV batteries this year being LFP, a figure the firm expects will rise to 12% by 2030.

While these investments will benefit OEMs by guaranteeing their supply of battery metals in a highly competitive market, the incorporation of mining into a company's portfolio also presents high ESG risks. This risk is particularly prevalent in lithium mining. In terms of lithium mining practices, extraction from salt flats is incredibly water-intensive, requiring two million litres of water for every tonne of lithium extracted. This practice presents a strong risk of water shortages, particularly in dry regions, in addition to health concerns relating to the potential for local water supplies to become polluted by toxic chemicals and metals. Another ESG risk is the production of nickel owing to the environmental costs of the conversion of nickel pig iron into nickel matte. Smelting and refining are energy-intensive processes that also produce carbon emissions, while the mining of nickel pig iron could see large-scale deforestation to access the metals underground.

The current period of high mining company revenues, combined with rapidly growing ESG considerations, is placing pressure on mining companies to pursue a green transition, and it remains to be seen how the industry will tackle the environmental costs presented by nickel pig iron conversion.

The ESG performance of businesses can have a direct impact on societal wellbeing and research shows that an increase in company-level ESG performance can result in a positive effect on a country's living standard in developed and emerging markets. In a South African context, 80% of the South African organisations surveyed by PwC have not yet made a net-zero commitment. Domestic organisations are lagging behind their global peers in adopting ESG goals and strategies. The risks associated with climate change have many social implications, including unemployment, food insecurity, increasing health risks and migration. All of the risks mentioned also increase the risk for social unrest and upheaval, emphasising the need to evaluate the social impacts of climate risk, rather than dealing with it in isolation.

Advancing ESG is supported by regulations, however, pressure from a variety of stakeholders, including institutional investors and asset managers, as well as public interest groups, have and would continue to play an important role going forward.Climate change is likely to be the key focus area from an ESG perspective for the foreseeable future, not only in South Africa, but across the African continent. Not only will governments, regulators, investors, funders, and public interest groups continue to escalate these imperatives, but shareholder activism in this space is likely to increase significantly.

6. THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY IN PERSPECTIVE

An analysis of the global automotive industry showed that all countries with automotive sectors have support programmes in recognition of the sector's significant contribution to the economy, in particular industrialisation, and South Africa is no exception to this. A well-developed manufacturing sector creates embedded jobs, deepens and broadens domestic value chains, advances technology, and supports skills development in a country.

One of the attractions of South Africa's automotive policy regimes over the past three decades has been its long-term vision and consistency. The stability in automotive support since 1995 has significantly enhanced investor confidence, and since the introduction of the Motor Industry Development Programme [MIDP], Automotive Production Development Programme [APDP] and APDP2, exports and capital investments in the industry have surged. The South African automotive industry remains a vital sector in the country's economy, and it is interrelated with various other major sectors that depend on the success of the domestic automotive industry.

6.1 Automotive policy evolution

The origins of South Africa's automotive industry developmental path can be traced back to the introduction of tariffs during the early part of the 20th century. High tariffs were placed on vehicles, which, when combined with a rapidly growing market, acted as a magnet to a large number of [initially] foreign OEMs that established assembly plants in the domestic market.

These operations were very small in international terms with correspondingly high unit costs. Production was aimed solely at the domestic market, and South African vehicle assembly plants were kept isolated from the global production networks of the parent companies, except as markets for completely knocked down [CKD] packs. Ford was the first motor vehicle manufacturer in 1924 to establish a subsidiary company in South Africa to assemble completely built-up vehicles from completely knocked-down kits. It was followed by General Motors in 1926. The coastal location of Port Elizabeth in the Eastern Cape allowed for the easy importation of components. In 1960, South Africa produced 120,000 vehicles, more than any other developing country in the world. In 1975, 13 motor vehicle manufacturers [OEMs] were operating in South Africa and produced 39 models which were serviced by 300 component manufacturers. The GDP contribution of the automotive sector was 3,3%.

Between 1961 and 1989, five distinct new phases of government support for the industry were identified. They featured continued domestic market protection and a variety of incentives and requirements for increased local content. The South African-based OEMs had to adapt and respond to the mass-based local content requirements to avoid paying excise penalties on their domestic operations. Unintended consequences of the programmes resulted in the domestic industry building the heaviest cars in the world. Phase VI, introduced in 1989, signalled a major policy shift through the promotion of automotive exports. The principal changes included a provision permitting exports to be counted towards local content, and a substantial reduction in local content requirements.

6.2 Motor Industry Development Programme [MIDP] and Automotive Production Development Programme [APDP]

Since the introduction of the MIDP [in 1995], significant structural changes have taken place in the domestic automotive industry. The sector has grown in stature to become the leading manufacturing sector in the country's economy. The production of vehicle models has been rationalised significantly to achieve economies of scale benefits in the domestic and export markets. Consequently, the complexity of the component sector has also been reduced. Exports have fuelled the growth of the South African automotive industry, and the supply of automotive components and vehicles to the world has grown from virtually no exports before 1995, to becoming a major South African industrial activity.

In this regard, linkages with multinational companies, mainly to obtain project funding or the relevant licences or technology agreements to manufacture and export, were imperative and the export growth was accommodated by major investments in best practice assets and state-of-the-art equipment, skills upgrading, productivity gains and upgrading of the whole automotive value chain. The following table reveals the key performance indicators and achievements of the domestic automotive industry since 1995 through to 2021.

Key performance indicators: 1995 to 2021

INDICATOR	PERFORMANCE		
	MIDP		APDP
	1995	2012	2021
Broader automotive industry contribution to GDP	6,5%	7,0%	4,3%
Average monthly employment by vehicle manufacturers	38,600	29,180	30,697
Automotive component sector employment	60,800	70,000	78,874
Capital expenditure – vehicle manufacturers	R841 million	R4,7 billion	R8,8 billion
Total South African new vehicle sales	399,967 units	630,542 units	464,493 units
Number of passenger car model derivatives	356	2,659	3,077
Total South African vehicle production	389,392 units	538,600 units	499,087 units
Total automotive export earnings	R4,2 billion	R86,8 billion	R207,5 billion
Number of export destinations	62	152	152
Total South African vehicle exports	15,764 units	277,893 units	298,020 units
Value of vehicle exports	R0,9 billion	R48,7 billion	R138,3 billion
Top vehicle export destination in volume terms	China	USA	UK
Value of automotive component exports	R3,3 billion	R39,9 billion	R69,2 billion
Top automotive export component category in rand value terms	Stitched leather seats	Catalytic converters	Catalytic converters
Number of model platforms	42	13	10
Models with production volumes > 40,000 units	0	5	5

Source: AIEC, Lightstone Auto

- Total number of vehicles exported under MIDP between 1995 and 2012 | **2,411,277 units**; and
- Total number of vehicles exported under APDP between 2013 and 2021 | **2,877,631 units**.

6.3 South African Automotive Masterplan [SAAM] 2021 - 2035

Aligned with its long-term policy certainty strategy, government, on November 23, 2018, approved the South African Automotive Masterplan [SAAM] 2021–- 2035 which was implemented on July 01, 2021. SAAM 2035 calls for a major reappraisal of the automotive industry, both in terms of its scale and the way it operates. Targets include a doubling of jobs in vehicle and component manufacturing by 2035, based on the 2019 level, from 120,000 to 240,000; and a more-than doubling of vehicle production from 2019 levels, from 600,000 units to 1,4 million units per annum by 2035.

In addition, the average value of local content in South African manufactured vehicles is targeted to rise from 40% to 60%. Together, it is hoped these initiatives will create the scale to enable mass entry into the predominantly white industry by black industrialists and entrepreneurs. The seven OEMs have established a R6 billion Automotive Industry Transformation Fund [AITF] to nurture black newcomers, mainly in components manufacture, logistics, services and motor dealerships. All these targets, however, were set before the inception of COVID-19.

The APDP Phase 2 will operate within the framework of the SAAM and provides the incentive framework for the industry for the period from 2021 to 2035. The APDP2 is a Trade-Related and Investment Measure [TRIM]. The TRIM allows safe and secure foreign direct investment [FDI] and allows duty rebates for the localisation of activities. The framework places local value-addition at the centre of any future support for the industry. The APDP2 shifts support away from production sales value towards local value-addition, specifically through the introduction of a volume assembly localisation allowance [VALA], replacing volume assembly allowance [VAA].

The new-look APDP also increases the production incentive benefit from 20% to 25% on components. Component manufacturing in South Africa has been less embedded than is the case in automotive industries in other jurisdictions. For this reason, government decided to adjust its incentives to ensure the development of automotive component suppliers, as well as to support those suppliers exporting into automotive supply chains elsewhere in the world. APDP2 also now supports the export of SKD kits to regional markets, provided that the kit comprises a complete vehicle.

The Production Rebate Credit Certificate [PRCC] was replaced by duty credits [PRC] that are tied to local value-addition at duty value. The Automotive Investment Scheme [AIS] cash grant for capital investments has been retained and the base has been set at 20% [previously 20% plus 10%] with investments in green mobility solutions at 30%. There will be no changes to the tariff regime in respect of vehicles.

A significant change is that LVA for government incentive support has to be generated from B-BBEE compliant companies, from OEM assembly operations back to the auto supply-chain. This is a phased-in requirement that comes into full fruition in January 2024.

The SAAM 2035 vision is the achievement of "a globally competitive and transformed industry that actively contributes to the sustainable development of South Africa's productive economy, creating prosperity for industry stakeholders and broader society". The vision of the SAAM can be described in four components. The first component is the improvement of the industry's global competitive position. The second component is related to the industry's contribution to the transformation of the South African economy, and which includes employment equity through the greater inclusion of Black-owned firms.

The transformation levels that have been set must be adhered to in order to participate in the benefits of both the APDP2 and AIS-2. The third component is related to the sustainable development of the South African economy, and includes aspects such as industry growth, employment levels, skills development, and environmentally friendly products and processes. The fourth component is related to the shared prosperity created by the industry and includes the financial health and wellbeing of firms within the value chain, the fair remuneration of employees, and the holistic contribution of the value chain to the South African fiscus.

A key summary of the SAAM 2021-2035 objectives is as follows:

- Grow South African vehicle production to 1% of global production by 2035;
- Increase local content in South African manufactured vehicles to 60%;
- Double automotive employment in the supply chain;
- Improve industry competitiveness levels to that of leading international competitors;
- Transformation of the South African automotive value chain; and
- Deepen value-addition within South African automotive value chains.

The automotive sector recognises that the SAAM vision can only be realised if the six development objectives are met. Achieving the SAAM objectives will require careful coordination and a close working relationship between government, the private sector and organised labour. Six industry development pillars have been identified as critical to the realisation of the SAAM. The six pillars relate to:

- local market optimisation;
- regional market development;
- localisation;
- infrastructure development;
- industry transformation; and
- the development of industry-required technologies and skills.

Seven workstreams, chaired by the CEOs of **naamsa** member companies, have been established. The industry-required technologies and skills pillar has been divided into two separate workstreams. The workstreams, feeding into the quarterly Executive Oversight Committee meetings, chaired by the Minister of Trade, Industry and Competition, support the execution of the SAAM 2021-2035 to grow the domestic automotive industry, and have gained momentum since 2020.

The APDP2 contains many elements similar to the previous APDP policy regime. The APDP2 consists of the following four pillars that drive the programme:

- Import Duty [domestic industry protection];
- Volume Assembly Localisation Allowance [VALA] [duty rebate mechanism];
- Production Incentive [PI] [duty rebate mechanism]; and
- Automotive Investment Scheme [AIS] [cash grant].

6.4 South African automotive industry key performance indicators

In 2021, the broader automotive industry's contribution to the gross domestic product [GDP] comprised 4,3% [2,4% manufacturing and 1,9% retail]. Classified as the anchor of the national industrial base and largest manufacturing sector in the country's economy, a substantial 17,3% of value addition within the domestic manufacturing output was derived from vehicle and automotive component manufacturing.

The automotive industry's GDP contribution was higher in previous years but following the finalisation of Statistics South Africa's comprehensive overhaul of the country's national accounts, the automotive industry's contribution to the economy was revised downwards for 2020 and 2021. The GDP rebasing and benchmarking exercise has resulted in an upward revision of the size of the South African economy, as well as changes to the composition of the supply and demand sides of economic activity. Overhauling the way in which the economy is measured provides a far more relevant and reliable measure of GDP. The revised GDP at current prices shows that the economy was 11,0% larger in 2020 than previously estimated.

The export value of vehicles and automotive components rebounded strongly by R31,8 billion, or 18,1%, from the R175,7 billion in 2020 to a record R207,5 billion in 2021, comprising 12,5% of total South African exports. Vehicle exports increased by 26 733 units to 298 020 units in 2021, from the 271 287 vehicles exported in 2020, while the export value increased by R17,1 billion from the R121,2 billion in 2020 to R138,3 billion in 2021. Automotive component exports reflected an increase of R14,7 billion to a record R69,2 billion in 2021, from the R54,5 billion in 2020. The domestic automotive industry's export destinations increased to 152 countries in 2021 from the 147 destinations in 2020, with the export value doubling from 2020 to 2021 in the case of 32 of these countries.

Foreign direct investment is critical to propel growth and create jobs in the domestic economy. The automotive sector continues to remain one of the most visible sectors receiving foreign investments, with the seven OEMs investing R8,8 billion in 2021, the second highest annual figure on record, while the component sector also invested a significant R5,7 billion in 2021.

The following table highlights the significant social and economic contribution made by the domestic automotive industry in the context of the South African economy for 2020 and 2021.

Key performance indicators under the APDP and APDP2 – 2020 to 2021

Indicator	Performance	
	2020	2021
Population	59,62 million	60,14 million
Consumer Price Index (CPI)	3,3%	4,5%
South Africa's GDP (current prices)	R5 521,1 billion	R6 206,3 billion
Broader automotive industry contribution to GDP	4,1%	4,3%
Vehicle and component production as % of South Africa's manufacturing output	17,0%	17,3%
Average monthly employment by vehicle manufacturers	29 926	30 697
Automotive component sector employment	76 800	78 874
Capital expenditure – vehicle manufacturers	R9,2 billion	R8,8 billion
Capital expenditure – component sector	R2,4 billion	R5,7 billion
Total South African new vehicle sales	380 207 units	464 493 units
Total South African vehicle production	446 215 units	499 087 units
South Africa's vehicle production as % of Africa's vehicle production	62,1%	53,6%
South Africa's global vehicle production ranking	22nd	21st
South Africa's global vehicle production market share	0,58%	0,62%
Vehicle ownership ratio per 1 000 persons	176	178
Vehicle parc (number of registered vehicles)	12,70 million	12,96 million
Total automotive export earnings	R175,7 billion	R207,5 billion
Automotive export value as % of total South African export value	13,9%	12,5%
Number of export destinations	147	152
Number of export destinations with export values more than doubling year-on-year	22	32
Top automotive country export destination in Rand value terms	Germany	Germany
Total South African vehicle exports	271 287 units	298 020 units
Value of vehicle exports	R121,2 billion	R138,3 billion
Top vehicle export destination in volume terms	UK	UK
Value of automotive component exports	R54,5 billion	R69,2 billion
Top automotive component export category in Rand value terms	Catalytic converters	Catalytic converters
Top automotive trading partner (imports and exports) in Rand value terms	Germany	Germany
Top automotive trading region (imports and exports) in Rand value terms	EU	EU
Top country of origin for total automotive imports in Rand value terms	Germany	Germany
Top country of origin for vehicle imports	India	India

Source: AIEC, Econometrix, **naamsa**/Lightstone Auto, NAACAM, OICA, SARS, StatsSA

In 2021, the local automotive manufacturing sector generated sales of approximately R309 billion, making it the fourth largest manufacturing sector in the country by sales.

- The industry paid R32 billion in formal wages in 2021.
- The industry supports an ecosystem of ancillary industries and indirect jobs in three provinces, namely: Eastern Cape, KwaZulu-Natal and Gauteng
- 26% of manufacturing employment in the Eastern Cape;
- 41% of manufacturing employment in Nelson Mandela Bay;
- 27% in Buffalo City;
- 13% in Tshwane; and
- 9% in eThekwini.

According to the QES survey by StatsSA, the automotive industry contributed a total of R100,54 billion towards gross earnings in the formal sector in 2019. This equals 3,5% of total gross earnings in South Africa – the 9th highest share out of 62 sectors of which:

- 28% [R28,47 billion] was paid by the manufacturing of vehicles and components sector;
- 72% [R72,08 billion] by the trade, maintenance, and repair sector.

The tax burden on consumers is excessive considering that the amount of tax going to the Fiscus on a premium vehicle amounts to 42% while on an entry level vehicle to about 19%. These fiscal taxes include a CO^2 emissions tax, an ad valorem tax based on a sliding scale up to 30%, VAT of 15%, a tyre levy as well as a portion of the un-rebated import duty on vehicles. The 25% import duty on a passenger car and a light commercial vehicle [bakkie] can be rebated under the APDP, but the majority of the OEMs are not duty neutral yet and still pay a portion of the import duty.

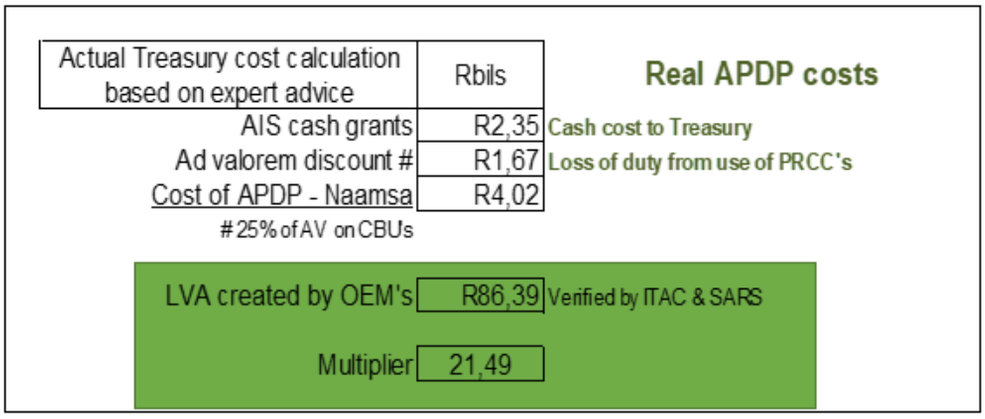
The automotive industry was liable for the following taxes in 2018 [pre-COVID-19]:

- Company tax of total motor industry - R8,4 billion;
- Company tax of automotive manufacturing sector - R4,6 billion;
- Company tax of motor trade, maintenance, and repair sector - R3,8 billion;
- VAT on auto manufacturing R15,4 billion 10,3% share of total SA tax -3rd out of 22 sectors;
- Customs duties of auto manufacturing - R13,1 billion -1st out of 22 sectors;
- Automotive industry tax - 14,5% share of total SA taxes - 2nd highest out of 22 sectors = R28,5 billion

The automotive industry offers “high value” employment as the vast majority [90%] of the jobs in the industry are “decent jobs” [at a highly skilled and skilled/semi-skilled level; 74,1% are medium-skilled and 15,4% are high-skilled positions]. This is in contrast to farming/agricultural jobs with the following skill levels: 68% unskilled, 29% skilled/semi-skilled; 2% highly skilled.

The direct value-addition impact of the automotive industry on the South African economy is multiple times the level of support it receives from government, most of which is paid in the form of duty rebates, rather than direct fiscal costs. The South African automotive industry has a multiplier of 21,5 as revealed in the following table.

Actual National Treasury cost and multiplier calculation



This calculation is a narrow view as it includes the seven OEM's & OE supply-chain only. The actual multiplier is higher if OEM and supplier locally manufactured service and exported parts are added. Considering only the OEMs, the multiplier is 21,5 times and a credit to the South African Government vision in establishing the APDP and APDP2.

The APDP and APDP2 is a Trade-Related and Investment Measure [TRIM]. The TRIM allows safe and secure FDI and allows duty rebates for the localisation of activities. "A TRIM is an investment support measure and not a subsidy by any means. Many public commentators contesting tariff rebates, view it as foregone revenue that could be applied to other more deserving purposes. However, this is not the comparison that has to be made. The situation before and after the introduction of an automotive programme are two very different economic structures and need to be viewed as such" - Alec Erwin [Ex-Trade and Industry Minister].

The automotive industry has the potential to catalyse South Africa's industrial development, hence, the ambitious targets set in the SAAM 2035. While these may not be fully achievable given the impact of COVID-19 and the weak performance of the South African economy over recent years, the SAAM and its aspirational targets should remain critical guiding frameworks to drive decision-making in the automotive policy space.

6.5 South Africa new vehicle and NEV landscape

The South African new vehicle market reflected a robust recovery in 2021, increasing by 22,2% to 464,493 units, compared to the severely COVID-19 affected 380,206 units in 2020. The strong performance underlined the resilience and determination of the South African motor industry that has had to deal with numerous challenges over the course of the year, ranging from global supply chain disruptions, insufficient model availability due to the global semi-conductor shortage, as well as several adverse events negatively impacting the domestic economy.

A close correlation exists between domestic new vehicle sales and the overall performance of the economy, and the new vehicle market's performance was aligned with the strong recovery in the country's GDP growth rate of 4,9% for 2021. Sales of passenger cars and light commercial vehicles [LCVs], which contributed 65,5% and 28,7% to the total market, respectively, increased by 23,5% and 20,0%, from 2020 to 2021. The South African truck market, comprising 5,8% of the total market, increased year-on-year by 19,0% in 2021. The following table reveals the sales of passenger cars and commercial vehicles for 2017 through to 2021.

Sales of passenger cars and commercial vehicles - 2017 to 2021

Year	Passenger Cars	Light Commercial Vehicles	Medium and Heavy Commercial Vehicles and Buses	Total New Vehicle Sales
2017	368,114	163,317	26,273	557,704
2018	365,247	159,525	27,455	552,227
2019	355,379	153,221	28,012	536,612
2020	246,541	110,912	22,754	380,207
2021	304,340	133,078	27,075	464,493

Source: **naamsa**/Lightstone Auto

In 2021, traditional and plug-in hybrid vehicle sales increased to 678 units in 2021, up from the 232 units in 2020, while electric vehicle [EV] sales increased from 92 units in 2020 to 218 units in 2021. Affordability and limited choice have been noted as the main factors inhibiting NEV sales in the country. However, South African new-vehicle buyers will have a choice of around 20 battery electric vehicles [BEVs] by 2023. The following table reveals the diversity of drivetrain sales in the South African NEV landscape from 2017 through to 2021:

	2017	2018	2019	2020	2021
Plug-in hybrid	121	89	72	77	51
Traditional hybrid	182	55	181	155	627
Electric	68	58	154	92	218
Total NEVs	371	202	407	324	896
Total new vehicle market	557,704	552,227	536,612	380,206	464,493
NEVs as % of total market	0,07%	0,04%	0,08%	0,09%	0,19%

Source: **naamsa**/Lightstone Auto

The global transition towards NEVs is inevitable and South Africa's rapid adaption is critical for the domestic automotive industry's long-term success and growth. The only way to have a successful automotive manufacturing base is to keep up with technological developments. The South African automotive industry cannot be running on one development technology track whilst the rest of the world is way ahead on the same track. Developed economies have a saturated vehicle demand and a replacement cycle that is heading towards BEVs.

Developing economies have a growing middle class which leads to a growth potential for new vehicles. Consumers are becoming smarter and technologically more educated and are demanding newer technology vehicles at a modest price. The transition towards newer automotive technologies, such as NEVs, needs to be seamless because South Africa cannot afford to operate on two parallel technology tracks, manufacturing both old and new types of vehicles because it is already struggling to attain economies of scale. South Africa needs to be on a progressive path by manufacturing new technology vehicles which has a huge growth potential, rather than being on a path which is stagnant with older generation technology whose market is declining.

Sales of NEVs could increase significantly if purchases of these vehicles are taken up by government, industry corporate fleet sales and vehicle rental companies considering that in 2021 sales to government comprised 2,6% or 12,281 units of total new vehicle sales of 464,493 units, sales to industry corporate fleet comprised 2,8% or 12,818 units and sales to the vehicle rental companies comprised 10,1%, or 46,971 units of total new vehicle sales.

The South African and the broader regional market is non-dynamic, with only limited projected growth over the next decade. The growth in NEV sales in South Africa will therefore displace ICE sales, as opposed to generating additional aggregate sales in the market. South Africa needs to be able to compete for production contracts to supply markets that require new energy vehicle technology. South African automotive manufacturers will need to be at the forefront of these new technologies to capitalise on the huge growth opportunities which exist.

6.6 Automotive exports and the relevance of the EU

Exporting remains key to generate sufficient economies of scale and achieving improved international competitiveness. During 2021, the domestic automotive industry's vehicle exports benefitted from favourable conditions abroad, as well as the introduction of new model by major domestic vehicle exporters. The following table reveals the top 10 vehicle export destinations from 2017 to 2021 for passenger cars and LCVs. In terms of number of units in 2021, the UK, Germany, France, Italy and Japan were the top export destinations. In 2021, VWSA, with its Polo model, maintained its top position for the third consecutive year.

Top 10 destinations for light vehicles [passenger cars and light commercial vehicles] exported - 2017 to 2021

Country	2017	2018	2019	2020	2021
Total [R billion]	110,9	123,2	143,4	117,0	133,2
Ranking of exporters Number 1 to 5	MBSA VW Ford BMW Toyota	MBSA VW Ford Toyota BMW	VW MBSA BMW Ford Toyota	VW MBSA BMW Ford Toyota	VW Ford Toyota BMW MBSA
UK	98,358	119,578	101,401	67,798	60,260
Germany	10,423	25,513	37,152	25,736	42,671
France	19,055	23,400	25,629	13,956	22,130
Italy	5,088	8,870	14,624	10,546	18,295
Japan	42,492	44,027	33,435	23,645	15,765
Belgium	6,902	6,338	11,379	10,048	11,752
Spain	5,770	10,833	11,217	7,345	10,876
Australia	23,336	21,594	16,284	13,041	9,676
Hungary	3,833	5,334	8,012	6,341	7,793
Austria	2,105	2,749	12,675	6,376	7,429
Other	119,743	81,767	114,457	85,898	90,794
Total [units]	337,105	350,003	386,265	270,730	297,441
Light vehicle production	574,075	581,469	603,082	422,905	471,433
% of production exported	58,7%	60,2%	64,0%	64,0%	63,1%
Number of base models produced	12	11	11	11	10
Average volume/model produced	47,840	52,861	54,826	38,446	47,143

Source: **naamsa**/Lightstone Auto, SARS

The only economically viable way to achieve positive economies of scale is for vehicle manufacturing plants to focus on longer production runs for a limited number of models, and then organise a global production and trade system that produces all their required models across several production centres linked to global demand patterns.

Significant rationalisation of the production of light vehicle models in South Africa has taken place under the MIDP, the APDP, and the APDP2, resulting in a reduction from 42 platforms in 1995 to 10 platforms in 2021. The average volume per model produced increased from 38,446 units in 2020 to 47,143 units in 2021. One model achieved production volumes more than 100,000 units, and one model achieved production volumes of 95 866 units.

The domestic industry continues to capitalise on the various trade arrangements enjoyed by South Africa that enhance exports. Europe, accounting for a substantial 229,672 vehicles, or 77,1% of the total, dominated as a region. Nearly four out of every five vehicles were destined for Europe in 2021. The EU region is currently developing legislation to ban the sales of fossil-fuel-reliant vehicles on their roads by 2035.

The UK, which has been the South African automotive industry's top vehicle export destination since 2014, has announced that the ban on new internal combustion engine [ICE] vehicle sales would be brought forward by five years, from 2035 to 2030. What is required for the domestic automotive industry's transition to NEVs is a supportive regulatory framework in the form of incentives to address the price differential between NEVs and ICE vehicles to stimulate NEV sales, additional incentives to manufacture NEVs and NEV components, as well as the roll out of public charging stations across the country.

The following table reveals that vehicle exports to major regions reflected mixed performance from 2020 to 2021, as there has been uneven recovery in the major regions. Changing composition of South African vehicle exports by major regions: 2017 to 2021

Region	2017	2018	2019	2020	2021	% change 2021/2020
Europe	190,503	233,772	285,599	197,355	229,672	+16,4%
Asia	52,827	50,277	39,879	29,440	24,170	-17,9%
Africa	21,847	23,988	23,382	16,987	21,825	+28,5%
Australasia	25,125	22,767	17,350	13,698	10,621	-22,5%
North America	43,393	13,037	13,540	9,463	7,981	-15,7%
Central America	812	1,511	5,651	3,156	3,045	-3,5%
South America	3,588	5,787	1,691	1,188	706	-40,6%
Total	**338,095**	**351,139**	**387,092**	**271,287**	**298,020**	**+9,9%**

Source: **naamsa**/Lightstone Auto

In 2021, the EU accounted for:

- 229,672 vehicle exports out of a total of 298,020 = 77,1% or nearly four out of every five vehicles exported;
- R34,3 billion automotive component exports out of a total of R69,2 billion = 49,6%; and
- R124,7 billion out of a total export value of R207,5 billion = 60,1%

The automotive industry is pivotal to NEV production to align with global and domestic targets. The European Union [EU], as a block, remained South Africa's largest trading region in 2021, with the Economic Partnership Agreements with the EU and the UK underpinning these relationships. The EU, along with the UK, accounted for R124,7 billion, or 60,1%, of total automotive exports of R207,5 billion.

Considering that 56,9% of the total automotive component export value, and 77,1% of the domestic automotive industry's vehicle export volume were destined for the EU in 2021, developments in the region have a measurable and direct impact on the South African automotive industry. The transition to eco-friendly vehicles via government regulation, the pricing of carbon in the form of a tax on ICE vehicles, government-provided consumer incentive schemes, the availability of charging infrastructure, and an even stronger environmental consciousness among society in the EU are driving developments in the domestic automotive industry to a large extent. According to the International Organisation of Motor Vehicle Manufacturers [OICA], vehicle production in the EU declined by 5,0%, from 13,80 million units in 2020 to 13,10 million units in 2021. Germany, with vehicle production of 3,31 million units, led the region's production, followed by Spain with 2,01 million units, and France with 1,35 million units.

New vehicle sales in the EU increase by a modest 0,1% from 13,63 million units in 2020 to 13,64 million units in 2021, which was still 10,0% below the pre-pandemic level of 91,76 million units in 2019. The impact of the chip shortage on vehicle output impacted negatively on the EU's sales performance. Germany, the major market in the region, reflected a year-on-year decline of 9,0% in 2021. While the supply chain disruptions hindered the sales of traditional models in 2021, over 20% of new cars sold in the EU in 2021 were 100% electric. The surge in NEV sales in Europe in 2021 was partially driven by new CO_2 emission standards. Purchase subsidies for NEVs were also increased and expanded in most major European markets. These developments are significant to the South African OEMs as Europe is the country's main new vehicle export market.

EU vehicle production and sales – 2020 to 2021

	2020	2021	% change 2021/2020
Vehicle production	13 797 533	13 101 506	-5,0%
Vehicle sales	13 629 773	13 643 798	+0,1%

Source: OICA

An Economic Partnership Agreement [EPA] between a group of countries in SADC and the EU entered into force on 10 October 2016, replacing the Trade Development and Cooperation Agreement [TDCA]. The SADC EPA group of countries does not consist of the entire SADC bloc, but rather members of the SACU, namely, Botswana, eSwatini [formerly Swaziland], Lesotho, Namibia, and South Africa, plus Mozambique, with an option for Angola to join in the future. The EPA has a strong focus on regional integration and the fostering of regional value chains in the SADC EPA group of countries. While the SADC-EU EPA is a reciprocal trade agreement, meaning both the EU and the SADC EPA group offer preferential market access to each other, the EU provides greater preferential and duty-free access, while the SADC EPA group are allowed to maintain protection of sensitive sectors.

Recently, the terms of the EU EPA have been replicated under a new and separate EPA with the UK, which entered into force on 1 January 2021. This has allowed for the continuation of preferential trade between South Africa and the UK after Brexit. The new trade agreement with the UK is called the SACUM-UK EPA, which will replace the previous legal framework for SACUM-UK trade under the SADC-EU EPA. Up to 2016, trade was governed by the trade chapter of the TDCA which became effective on 1 January 2000. The automotive part of the TDCA was only concluded on 15 December 2006. As a result, the 3% import duty on original equipment components and the 4,5% duty on aftermarket parts were reduced to duty-free on 15 December 2006, while the 10% import duty on passenger cars was reduced to 3,5% on 15 December 2006, further reduced to 1,5% on 1 January 2007, and was reduced to zero in January 2008. South Africa, in turn, granted the EU a 7% preference on passenger cars and light commercial vehicles, and an 8% preference on medium and heavy commercial vehicles and buses.

Original equipment components received no preference, but a large number of aftermarket automotive parts qualified for lower import duties. In order to qualify for zero tariffs into the EU, South African vehicles and automotive components must contain at least 60% local content with respect to the rules of origin. The definition of local content includes South African raw materials, labour, parts, transport, manufacturing costs and profit margins, as well as the value of components and sub-components originally sourced from the EU. The European Union aims to legislate banning the sale of internal combustion engine [ICE] vehicles in 2035. It is part of an ambitious effort to spur the use of electric vehicles with some countries and global brands already transforming to eVs by as early as 2025. The European Commission has proposed a 55% cut in CO^2 emissions from cars by 2030 compared to 2021 levels, which is much higher than the existing target of 37,5%. It has also mandated a 100% cut in CO^2 emissions by 2035, which would make it impossible to sell new ICE vehicles in 27 European countries. The following announcements were recently made on the NEV transition in the EU and the UK. They will accelerate faster versus the 2020 forecast, especially in the small passenger car segment, and hence an even faster transition to NEVs in South Africa is required.

Build Back Greener [UK]:

- 2030: Ban of the sale of ICE vehicles;
- 2035: All cars must be fully zero emissions capable

In Discussion:

- Introduction of a new road vehicle CO^2 emissions regulatory regime in 2024;
- Introduction of carbon border tax

EU7 Emission Regulation [EU and UK]

- Significant additional measures are required to meet EU7;
- Increased material cost - R55 000/vehicle making both the small ICE passenger car segment and LCV in EU&UK non-viable, accelerating the off-take of NEVs in the EU.

New Green Deal [EU]

- 2035: Ban of sale of ICE vehicles and switch to zero-emission vehicles;
- Carbon Border Adjustment Mechanism [CBAM]: Carbon life-cycle price on imports of certain goods from outside the EU.

The European Union's Just Transition Mechanism is integral to the EU's Green Deal, targeted at ensuring "a fair transition to a climate-neutral economy, leaving no one behind" and aims to

mobilise at least €150 billion over the period 2021-2027. The European Union's Carbon Border Adjustment Mechanism [CBAM] is a headline policy initiative of the European Green Deal. It levies a tax on greenhouse gases embedded in products imported into the EU to stop industries from shifting production to jurisdictions with weaker carbon pricing and regulation. It will function in parallel with and mirror the EU's Emission Trading Scheme [ETS]. The CBAM will gradually replace the current mechanisms used to address carbon leakage, specifically free allocations.

The first draft of the CBAM was announced in July 2021. It only covered direct emissions from electricity and 29 product categories from the cement, fertiliser, steel and aluminium industries. Since then, the EU's Committee on the Environment, Public Health and Food Safety proposed and voted on amendments to the CBAM [Committee on the Environment, Public Health and Food Safety, 2021].

The amendments include the following:

- Extending the scope to include organic chemicals, plastics, hydrogen and ammonia as well as indirect emissions [notably emissions from electricity use];
- The transitional period will be shortened to apply from 1 January 2023 to the end of 2024. During the transitional period, the burden will be administrative rather than financial. After the transitional period, exporters will have to buy digital CBAM certificates at a rate corresponding to the carbon price paid under the ETS;
- CBAM will be implemented for all sectors of the EU ETS by 2030, five years earlier than proposed by the Commission;
- Free allowances will be fully phased out by 2030;
- The revenues from the CBAM should be used to support least-developed countries decarbonisation efforts; and
- A centralised EU CBAM authority should be created, to make implementation efficient, transparent and cost effective. This would help to combat forum shopping from importers.

The proposed CBAM has an extended scope and tighter timelines, meaning that the number of products and the extent of the exposure has increased. South Africa's main vulnerable sectors are iron and steel, aluminium, plastics, organic fertilizers and hydrogen. This is because these sectors rely on coal-powered electricity or coal feedstock for production.

The South African government and exporters need to pay close attention to the developments as the legislative process for CBAM continues - particularly the vote at the plenary session on 6-9 June 2022 and negotiations by the EU Member States. Exporters should embrace and prepare by assessing CBAM's impact on business, looking at mitigation measures, and by aligning their business model to fit a low-carbon future. South Africa should also fast-track its journey towards a low-carbon economy, as other countries could follow the EU in introducing border carbon taxes.

7. GLOBAL AUTOMOTIVE ENVIRONMENT

Mobility is at the core of modern civilisation, and the way people and goods move impacts many aspects of life. The automotive industry, therefore, is one of the most significant contributors to the overall economy of the world. The industry plays a unique role in bringing together most of the major scientific and technological advancements globally, which is critical to global automotive multinational corporations' growth and performance. Changes in technology are at the core of the transition to the vehicle of the future, which is primarily linked to electrics and electronics, connectivity, safety, environment and fuel efficiency.

Mobility patterns across the world are influenced by mega trends, global events, changing work environments, and shifting industry structures, all of which have a direct correlation with vehicle utilisation preferences. The impact of the COVID-19 pandemic is still evolving and is expected to continue affecting the automotive industry for the foreseeable future. In the short term, reduced vehicle usage would be a direct outcome. Consequently, a sustained ripple effect on private vehicle sales, public transport, new mobility solutions adoption, trip patterns, urbanisation and infrastructure requirements could disrupt the entire automotive industry. The evolving dynamics are expected to significantly impact overall mobility patterns in the foreseeable future. Businesses, therefore, have to identify ways to overcome the potential challenges and create a growth matrix to fuel success, seek to capitalise on new growth avenues, create smart business models, and embrace the new-age transformations taking over the changing landscape.

Increasingly strict legislation with respect to CO^2 emissions, the impact of government subsidies, and environmental pressure are the key drivers of risk in the clusters related to internal combustion engine [ICE] technology. Electrified vehicles are growing at a frenetic pace, while ICE vehicles are either stagnant or declining. Adding to the complexity, the transition is taking place at different speeds and levels of intensity across countries. As South Africa's automotive volumes are predominantly driven by export demand, the industry is highly vulnerable to changes in demand in export markets, in particular, Europe and the UK.

There has been a rapid evolution in alternative engine technologies with low or no emissions owing to the stricter emission control regulations imposed by governments. NEVs offer an important, alternative solution to internal combustion engines in the effort to reduce emissions. The introduction of NEVs in global markets has been supported by a range of government policies and financial incentives, such as tax breaks and toll-free payments.

7.1 Global vehicle production

In 2021, COVID-19 continued to impede personal mobility needs, while supply chain disruptions slowed down the post-pandemic recovery of the global new vehicle market. The intensifying global semi-conductor shortage continued to limit vehicle production around the world. Global vehicle production increased by a modest 3,1% to reach 80,2 million vehicles in 2021, up from the 77,7 million units produced in 2020, but it was still 13,0% below the pre-COVID-19 level of 92,2 million vehicles in 2019. Vehicle production increased in all major regions in 2021, except for the EU, which reflected a year-on-year decline of 5,0%.

Globally, passenger car production increased by 2,0%, from 55,9 million units in 2020 to 57,1 million units in 2021. Light commercial vehicle production increased by 8,0%, from 17,2 million units in 2020 to 18,6 million units in 2021, heavy commercial vehicle production reflected a decline of 1,3%, from 4,4 million units in 2020 to 4,3 million units in 2021, while bus production reflected a decline of 9,6%, from 220 151 units in 2020 to 199 063 units in 2021. Seventeen countries exceeded the one million vehicle production mark in 2021, up from 15 in 2020, which is regarded as the international benchmark. China comfortably remained the world's biggest market with vehicle production of 26,1 million units in 2021, followed by the US with production of 9,2 million units, while Japan retained the number-three slot with production of 7,8 million units. In 2021, India at number four and Korea at number five surpassed Germany in the global vehicle production rankings.

South African vehicle production increased by 11,8%, from 446 215 units produced in 2020 to 499 087 units produced in 2021, exceeding the global year-on-year increase in global vehicle production of 3,1% in 2021. Subsequently the country's global vehicle production ranking improved to 2^{1s}t in 2021 and its global market share increased to 0,62%. In terms of global LCV production, South Africa was ranked 14th with a market share of 1,25%. South Africa remained the dominant market on the African continent, and accounted for 499,087 vehicles, or 53,6% of the total African production of 931,056 in 2021.

South Africa is regarded as a global second-tier player, and forms part of the group of countries producing below one million vehicles per annum. The South African automotive industry's growth strategies have been focused on becoming highly integrated into the global automotive environment on the back of increased foreign direct investment and trade. Under the SAAM 2021-2035, the objective is to produce 1% of global vehicle production, or 1,4 million vehicles, per annum by 2035, which should substantially improve the country's status and global vehicle production ranking. The following table reveals global vehicle production by country for 2021 and 2022.

Global vehicle production by country – 2020 to 2021

Country	Total units produced 2020	Total units produced 2021	Passenger cars	Commercial vehicles
1. China	25 225 242	26 082 220	21 407 962	4 674 258
2. USA	8 821 026	9 167 214	1 563 060	7 604 154
3. Japan	8 067 943	7 846 955	6 619 242	1 227 713
4. India	3 381 819	4 399 112	3 631 095	768 017
5. South Korea	3 506 774	3 462 404	3 162 727	299 677
6. Germany	3 742 570	3 308 692	3 096 165	212 527
7. Mexico	3 177 251	3 145 653	708 242	2 437 411
8. Brazil	2 014 055	2 248 253	1 707 851	540 402
9. Spain	2 268 185	2 098 133	1 662 174	435 959
10. Thailand	1 427 074	1 685 705	594 690	1 091 015
11. Russia	1 435 551	1 566 317	1 352 740	213 577
12. France	1 316 371	1 351 308	917 907	433 401
13. Turkey	1 297 878	1 276 140	782 835	493 305
14. Indonesia	690 176	1 121 967	889 756	232 211
15. Canada	1 376 127	1 115 002	288 235	826 767
16. Czech Republic	1 159 151	1 111 432	1 105 223	6 209
17. Slovakia	990 598	1 000 000	1 000 000	0
18. UK	987 044	932 488	859 575	72 913
19. Iran	880 997	894 298	838 251	56 047
20. Italy	777 057	795 856	442 432	353 424
21. South Africa	**446 215**	**499 087**	**239 267**	**259 820**
Global	**77 711 725**	**80 154 988**	**57 054 295**	**23 100 693**

Source: **naamsa**/ Lightstone Auto, OICA

7.2 Global new vehicle sales

A world of choice is available in today's new vehicle market with more than 400 different models available, while 14 major global corporations control more than 60 brands globally. Although developed economy markets continue to lead the development of the global automotive industry in terms of technology, safety and environmental standards, the future growth of the industry is likely to be strongly driven by emerging and middle-income markets. This is borne out by the fact that China alone was responsible for the major share of global vehicle consumption growth over the past decade, and that the existing profile of vehicle ownership densities in developing and developed economies points to strong emerging economy demand growth over the next 20 years.

In 2021, the global new vehicle market stabilised, increasing by 5,0%, from 78,8 million units in 2020 to 82,7 million units in 2021. Considering that the pandemic and the global semi-conductor shortage had a combined negative effect, the performance can be regarded as acceptable, although there is still a difference of 8,5 million units fewer sales than the pre-pandemic level.

Global vehicle sales by region – 2020 to 2021

Region	Total sales 2020	Total sales 2021	% change 2021/2020
Europe	16 712 898	16 874 893	+1,0%
North America	17 445 480	18 160 120	+4,1%
South America	3 369 352	3 841 032	+14,0%
Africa	924 046	1 145 007	+23,9%
Asia	40 322 544	42 663 736	+5,8%

Source: OICA

China remained the world's biggest market for new vehicles, with sales increasing by 3,8% to 26,3 million units in 2021, mainly due to the popularity of eVs, staying ahead of the US that saw sales increasing year-on-year by 3,5% to 15,4 million units, while Japan retained the number–three slot, despite sales declining year-on-year by 3,3% to 4,4 million units. The bulk of markets recovered slightly in 2021, despite the twin threats of COVID-19 and the global shortage of semi-conductors, with significant double-digit growth in major markets such as India and Australia.

Toyota, with increased year-on-year sales of 10,1%, retained its position as the leading vehicle maker in the world with sales of 10,5 million units in 2021, ahead of the Volkswagen Group, which recorded 8,9 million sales. Toyota's figures include Hino trucks and those of minicar maker Daihatsu, while the VW Group includes MAN and Scania trucks, and a Commercial Vehicles Division.

CO^2 emissions are associated with climate change and there has been a growing trend towards the reduction of CO^2 emissions. Fuel quality is not only seen as a critical component to eliminate or reduce pollutants, such as lead, but it is a prerequisite for the introduction of the latest vehicle emission control technologies, such as catalytic convertors and diesel particulate filters. Globally, vehicle manufacturers are moving towards more stringent engine requirements which reduce fuel consumption resulting in lower CO^2 emissions from new vehicles.

The global prominent levels of CO^2 emissions by vehicles are contributing to the greenhouse effect which increases global temperatures and affects the climate. Many countries are heavily investing in research and development to find alternate methods to reduce CO^2 emissions. They are developing diverse CO^2 efficient vehicles which run on alternative fuels, such as biodiesel, ethanol, hydrogen, and natural gas or they use electric and hybrid vehicle technology. Vehicle manufacturers are not pursuing a single strategy but multiple ones to ensure that the new, cleaner fuels are globally acceptable.

7.3 Global NEV landscape

NEV sales have been particularly impressive over the last three years, even as the global pandemic shrank the market for conventional cars, and as manufacturers started grappling with supply-chain bottlenecks. The net growth in global car sales in 2021 came from NEVs. In 2020, the overall car market contracted, but NEV sales bucked the trend, rising to 3,24 million units, representing 6,0% of total passenger car sales. In 2021, NEV sales more than doubled to 6,6 million, representing 11,7% of the global passenger car market, and more than tripling their market share from two years earlier. The demand continues to soar thanks to the boost from the Chinese market, Tesla and Volkswagen Group.

China accounts for more than half of all electric cars sold, but there's also strong growth in Europe and the US. China led the global growth in the NEV markets in 2021, as sales nearly tripled to 3,4 million units. In other words, more NEVs were sold in 2021 in China alone, than were sold in the entire world in 2020. The Chinese government's official target is for NEVs to reach a market share of 20% in 2025, and their performance in 2021 suggests they are well on track to do so. The government extended NEV subsidies for a further two years after the pandemic broke out, albeit with a planned reduction of 10% in 2021, and 30% in 2022.

Globally, OEMs are accelerating their NEV launch plans, partly to comply with increasingly stringent regulations in Europe and China, along with a raft of new model launches and government-sponsored incentives. BEVs use lithium-ion batteries to power their operation and release no greenhouse gas emissions and are less harmful to the environment when they are charged using electricity generated from renewable sources.

The number of eVs on world's roads by end 2021 was 16,5 million units, triple the 2018 level. China and Europe combined will represent 72% of all passenger EV sales in 2030, driven by European vehicle CO^2 regulations and China's EV credit system, fuel economy regulations and city policies restricting new internal combustion vehicle sales. OEMs will continue to focus their passenger NEV efforts on the markets with the most stringent regulations for the next 10 years, leading to low rates of NEV adoption in the rest of world. Price parity between NEVs and internal combustion vehicles is projected to be reached by the mid-2020s in most segments, but there is a wide variation between geographies. Until these tipping points are reached, policy support is still required in most markets.

A key policy in the initial phase is the offering of significant purchase and tax incentives to make NEVs economically attractive compared to ICE vehicles. To disincentivise the purchase of ICE vehicles, India introduced scrappage incentives, while Turkey, Brazil and Thailand introduced tax incentives for NEVs to lower their purchase price.

In Thailand, Mexico and Brazil, the excise duty is levied on vehicles based on CO^2 emissions and engine capacity, levying higher rates for high emitting and large vehicles. In parallel, countries extended the public charging infrastructure network, which remains important to increase visibility and reduce range anxiety. In addition, NEVs are exempt from import duty in Morocco, Egypt and Malaysia, while India allows for duty reductions on imported NEVs and parts used in NEV production. To further develop the NEV market, Poland, Thailand, Mexico and Brazil set fleet targets for the procurement of NEVs by both government agencies and private companies to reduce emissions and switch to zero emitting vehicles. Non-financial incentives are also catalysts to the adoption of NEVs. These range from free parking, preferential access to bus lanes and road toll fee waivers.

Since the backlash against high emissions vehicles, the movement towards Plug-in Hybrid-Electric Vehicles [PHEVs], as well as Battery Electric Vehicles [BEVs] has gathered more prominence and this momentum will continue. Globally, until the year 2025, PHEVs are expected to play an important role with the move towards electric vehicles. However, because of the engineering complexities of PHEV platforms and the cost thereof, from 2025 onwards, BEVs will be more attractive and are expected to take over and account for the majority of EV sales.

Key factors that will see to the progressive adoption of NEVs in the coming years:

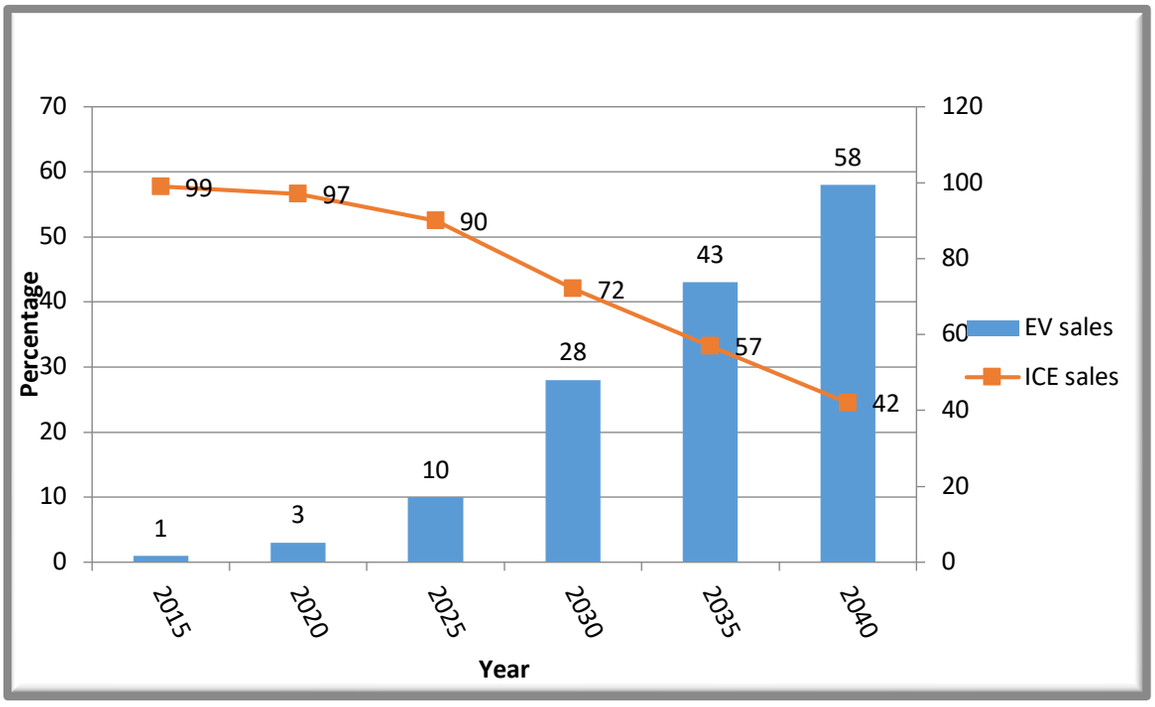
- Short-term regulatory support in key markets like the USA, Europe, and China;
- Decreasing lithium-ion battery prices;
- Increased electric vehicle commitments from global vehicle manufacturers;
- Growing consumer acceptance, sparked by competitively priced electric vehicles across all vehicle classes; and
- The growing role of car sharing, ride hailing, and autonomous driving.

Major OEMs have already announced the launch of a staggering 400 new eVs over the 2019-2023 period. Some, such as Volvo, have made ambitious commitments to phase out ICE-based vehicles. New, diverse players are also entering the market in one form or the other. They range from pioneer automotive and energy firm Tesla, information and communications technology companies, such as Google, to mining companies, such as Anglo American, battery manufacturers, and OEMs from emerging economies [primarily China and India] aiming to leverage this shift to take their business to a new dimension, to a multitude of entrepreneurs operating in niche markets.

It is estimated that over US$500 billion has been committed by OEMs on BEVs and batteries over the next five to 10 years. German OEMs are intending spending US$185 billion by 2030, Chinese OEMs US$100 billion and US OEMs US$60 billion by 2025 while major Japanese OEMs committed US$40 billion.

According to Bloomberg New Energy Outlook [BNEF], 10% of global passenger vehicle sales will comprise of electric vehicles by 2025, rising to 28% by 2030, and rapidly rising to 58% by 2040. The following figure reveals the global passenger vehicle sales forecast of ICE and eVs from 2015 to 2040.

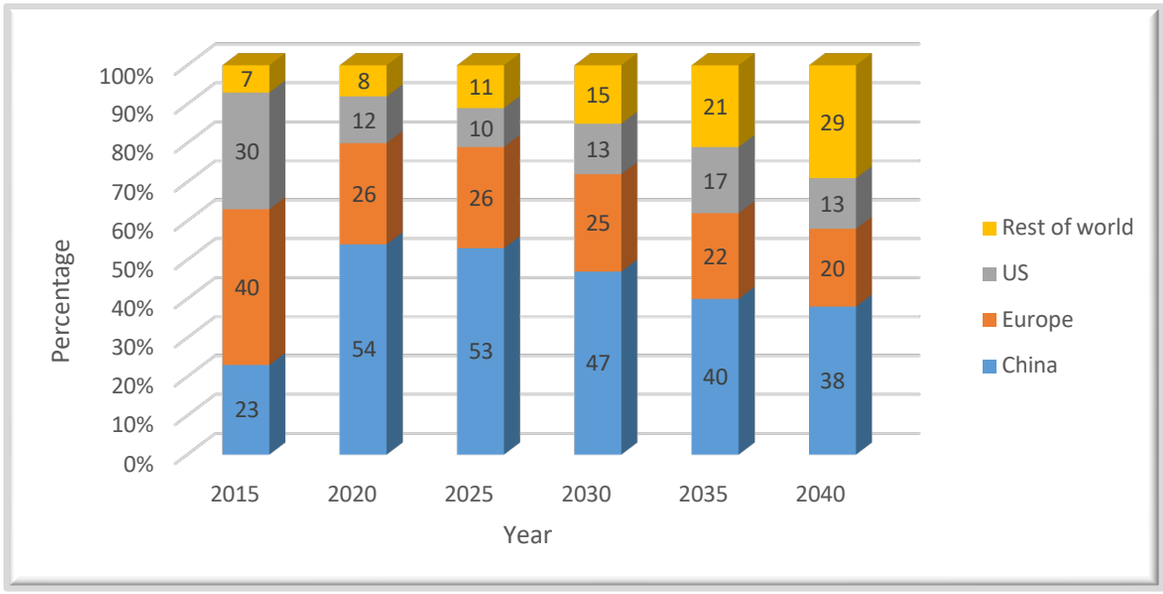
Global passenger vehicle sales forecast of ICE and NEVs from 2015 to 2040



Source: [BNEF, 2021:1]

Global passenger vehicle sales forecast of NEVs up to 2025 is relatively low, however, from 2025 to 2030 the move towards NEVs will start gaining traction. The decrease of battery prices will result in price competitive electric vehicles being sold in all major light duty vehicle segments before 2030, dawning in a period of robust growth for NEVs. It is expected that by 2030 there will be parity between the cost of an ICE vehicle and the cost of an electric vehicle, and at this point it will spark the mass adoption of eVs in most markets. The following Figure highlights the annual global electric vehicle sales forecast by market from 2015 to 2040.

Annual global electric vehicle sales forecast by market from 2015 to 2040



Source: [BNEF, 2021:2]

China and Europe will dominate the global electric vehicle market and the size of these markets, tougher CO^2 regulations, China's NEV credit system, fuel economy regulations, and government support will be the primary drivers of electric vehicle sales. Strong government support for the period 2015 to 2025 will spark demand for electric vehicle adoption in these markets. Europe transcended China as the hub for NEV growth and for the first time since 2015, NEV sales in Europe superseded NEV sales in China.

NEVs' outlook in the long run seems prosperous, as fundamental cost and technology improvements supersede the short-term impacts of the pandemic. Governments worldwide have also announced the plan to shift from ICE vehicles to BEVs using various innovative strategies. The global automotive OEMs are quickly adapting to comply with new stringent regulations being implemented in China and Europe and are launching newer compatible models whilst also taking advantage of the government incentives on offer.

In Europe, NEV sales increased by nearly 70% in 2021, to 2,3 million units, with about half these plug-in hybrids. This is significant to South African vehicle manufacturers, as Europe is the country's main new vehicle export market. The surge in NEV sales in Europe in 2021 was partially driven by new CO^2 emissions standards. Purchase subsidies for NEVs were also increased and expanded in most major European markets.

Overall, China, Europe and the US account for roughly two-thirds of the overall car market, but around 90% of electric car sales. In contrast, the market for electric cars is barely growing in Africa, Brazil, India, Indonesia, and Japan. The price premium attached to electric cars and a lack of charging infrastructure are key reasons for the sluggish uptake.

Government policies remain the key driving force for global electric car markets, but their dynamism in 2021 also reflects a very active year on the part of the automotive industry. Targets and new model launches have helped strengthen the view that the future of cars is electric. NEVs have become the road transport technology of choice for many governments and the automotive industry. In Europe, the EU Commission proposed bringing the CO^2 emission standard for new cars to zero by 2035. At the same time, several OEMs also announced electrification targets. As manufacturers sharpen their electrification strategies to compete for market share rather than considering NEVs mostly as policy compliance vehicles, more resources will be devoted to advertising, increasingly aggressive pricing, and the development of ever more attractive electric models.

Various countries have and continue to announce their intentions to ban the sales of new ICE vehicles from as early as 2025, such as Norway. The UK's announcement in late 2020, as the domestic automotive industry's top vehicle export destination since 2014, to bring forward the ban of sales of traditional petrol and diesel cars to 2030, five years earlier than previously planned, means that the South African automotive industry's electromobility discussion will have to be accelerated to ensure its future sustainability.

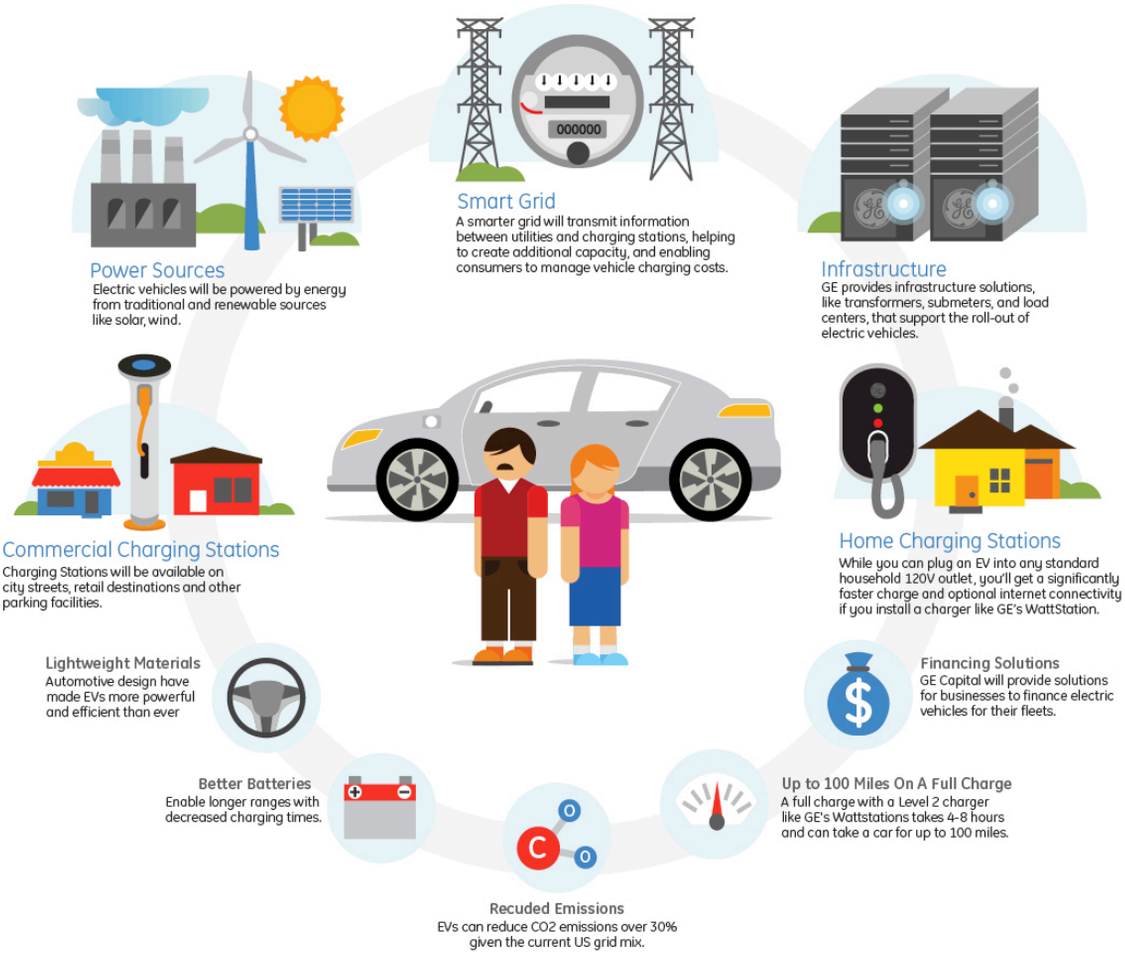
Country	Ban announced	Status and proposed commencement	Scope	Selectivity
China	2017	researching a timetable[7]	Gasoline or diesel	New car sales
Canada	2017	2040 (climate plan)[10]	Emitting	New vehicle sales
France	2017	2040 (climate plan)[13]	Gasoline or diesel	New car sales
Sri Lanka	2017	2040[21]	Gasoline or diesel	All vehicles
Slovenia	2017	2030 (emission limit of 50 g/km)[20]	Gasoline or diesel	New car sales
Netherlands	2017	2030 (coalition agreement)[17]	Gasoline or diesel	All cars
Norway	2017	2025 (tax and usage incentives)[18]	Gasoline or diesel	All cars
Ireland	2018	2030 (private members bill, not passed)[15]	Gasoline or diesel	New car sales
Sweden	2018	2030 (coalition agreement)[22]	Gasoline or diesel	New car sales
Iceland	2018	2030 (climate plan)[14]	Gasoline or diesel	New car sales
Israel	2018	2030[16]	Gasoline or diesel	New imported vehicles
Costa Rica	2019	2050[11][12]	Gasoline or diesel	New car sales
Singapore	2020	2040 (incentives on electric vehicles)[19]	Gasoline or diesel	All vehicles
United Kingdom	2020	2035 or 2032 (proposed dates)[23]	Non-electric	New car sales

Source: Bloomberg, New Energy France

The global shortage of semi-conductors is problematic for NEVs, which require around twice as many chips as equivalent conventional vehicles, mostly owing to additional power electronics components. It is possible that without these disruptions, NEV sales could have been even higher in 2021. The current Russia-Ukraine conflict is anticipated to severely impact global NEV battery-cell production as well as chips, which are already suffering a global shortage. However, according to research firms Markit, NEV sales will account for approximately 40% of the market by 2030, more than 50% by 2035, and up to 100% by 2050.

7.4 NEV Ecosystem

An NEV is part of a huge ecosystem power sources, involving smart grids, infrastructure, home charging stations, commercial charging station and regulatory environment, amongst others.



China currently has the largest fleet with 4,5 million electric cars, with Europe recording the largest annual increase last year of 3,2 million. Globally, governments spent US$14 billion on direct purchase incentives and tax deductions for electric cars in 2020, a year-on-year increase of 25%.

Although the future looks bright for NEVs, there are warning signals coming from the supply chain, with bulk material prices increasing for the entire automotive industry. In 2021, the price of steel rose by as much as 100%, aluminium around 70%, and copper more than 33%, affecting both conventional and electric cars. For electric cars, additional challenges were posed by increased prices for materials needed to manufacture batter–es - the price of lithium carbonate increased by 150% year on year, graphite by 15%, and nickel by 25%, to name just a few.

Several OEMs also faced microchip shortages in 2021 that held back output. The shortage is problematic for NEVs, which require around twice as many chips as equivalent conventional vehicles, mostly owing to additional power electronics components. It is possible that without these disruptions, NEV sales could have been even higher in 2021.

The NEV value chain proved to be robust in 2021 as it managed to deliver on higher-than-anticipated demand. For NEVs to continue their current growth trajectory, battery supply chains and NEV production capacity will have to expand at a rapid rate. Both short-term demand and longer-term ambition have skyrocketed over the last two years, but supply chains have struggled to keep pace.

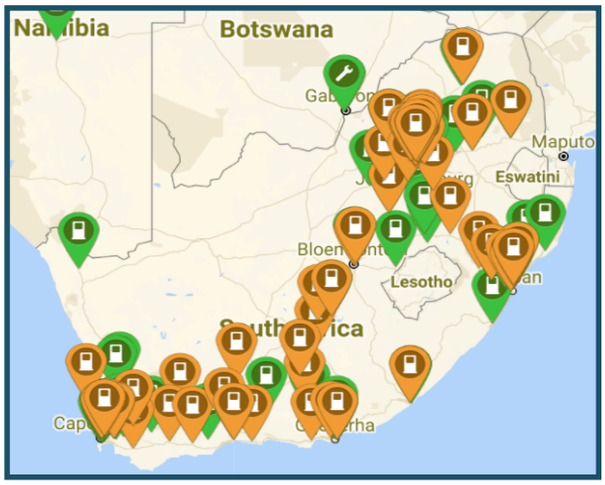
The world faces potential shortages of lithium and cobalt as early as 2025, unless sufficient investments are made to expand production. Further growth of NEVs requires not only an expansion of the extraction of key minerals, but also of the entire NEV value chain. This spans battery metal processing and refining, cathode, anode, and separator manufacturing, cell production, battery assembly and, finally, the assembly of NEVs. Each of these industries, some of which are nascent, need to expand rapidly to avoid bottlenecks that would slow down the transition to full electric mobility.

8. CHARGING INFRASTRUCTURE

The current public charging network in South Africa is still very small, and that it is going to take a long time before there is a widespread distribution of charging points. However, the larger issue is that a charging network is only as good as its power supply. More specifically, a large network of frequently used charge points needs a reliable industrial-strength power supply. Much would need to be done to ensure that the national grid has the capacity to cope with the petrol-to-electric switch, and energy producers and government need to anticipate and prepare for higher energy demands.

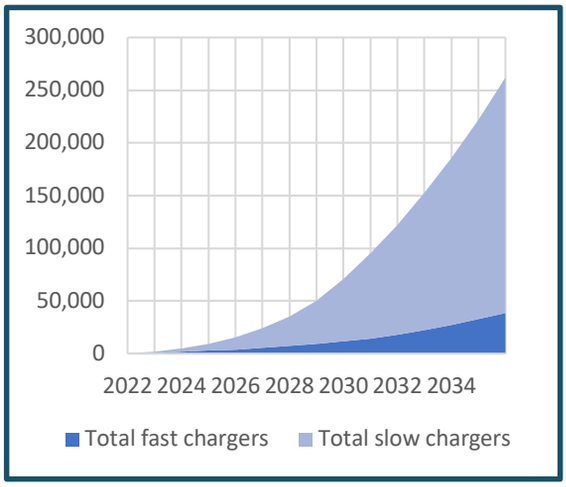
However, the availability of charging stations is not considered to be a main barrier at present in South Africa. At the end of 2020, South Africa had 305 public EV charging stations, spilt between 163 fast-charging stations [53%] and 142 slow-charging stations [47%]. Given the very low number of BEVs and PHEVs on South African roads, this translates into 5 plug-in EVs per public charging points. This is above the global standard, which is eight vehicles [BEVs and PHEVs] per charging station. South Africa therefore at present compares favourably to other countries in terms of the ratio of plug-in EVs to public charging points and is on a par with Germany. Of course, as it stands, South Africa therefore has an arguably high number of charging stations relative to the number of BEVs and PHEVs in the market. However, as shown in the following Figure, the coverage within the country is highly imperfect. The visibility and availability of such charging stations also remain much too low to support the development of the market. In addition, an aggressive increase in NEV sales would have to be matched by an ambitious rollout of charging stations in the country.

South Africa's network of public charging stations in 2021



Legend: green denotes slow chargers; orange depicts fast chargers

Number of charging stations required to reach 100% NEV market sales in SA by 2035



Note: based on one charging station for eight vehicles [BEVs and PHEVs]

Linked to range anxiety is concern about adequate charging infrastructure and the time it takes to charge vehicles. However, experience has shown that most people charge their vehicles at home. If they have home-charging and workplace charging, 96%-97% of charging is done at home or work. Awareness and familiarity are important to overcome many of these barriers.

Experience internationally suggests that less than 5% of EV charging typically happens at public charging points. This limits the need for public chargers. However, studies have found a statistically significant link between EV uptake and charging infrastructure. Some analysts suggest that public chargers, in the early stages of market development, are more important as mechanisms to curb range anxiety rather than to deliver actual charging services.

South Africa is a very small market in terms of plug-in and battery electric vehicles [BEVs] on the road and therefore, while the ratio is better or in line with many developed countries, the visibility and coverage of public chargers is less advanced. Nonetheless, despite a limited market size, this ratio, coupled with the extent of the existing charging network in South Africa, suggests that the private sector is likely to make adequate investments in public charging infrastructure. Adequate public charging infrastructure is not currently a barrier to the growth of the EV market in South Africa.

South Africa has been proactive and adopted the following foreword for South African Bureau of Standards [SABS] standards for EV charging plugs:

- SANS 62196-2: “In South Africa, the allowed configuration for AC conductive charging on domestic, industrial, commercial and public access charging stations shall be of Type 2 socket;
- SANS 62196-3: “In South Africa the allowed configuration for DC conductive charging for domestic, industrial, commercial and public access charging station shall be configuration type AA [CHAdeMO] and configuration type FF [COMBO 2]”.

A public network of both fast and slow chargers is required to complement private charging infrastructure. While most of the charging of PHEVs and BEVs would occur through private, slow chargers at home [80%], the availability of fast chargers [which can fully recharge a passenger car in less than 20-30 minutes] is critical on long-distance routes, such as highways, as well as high traffic areas, such as city centres, business districts, shopping malls and large office parks. Overall, despite the prevalence of private charging, the availability of public chargers [both slow and fast] is critical to enable the use of BEVs and to support ubiquitous market development.

While charging BEVs based on South Africa’s largely coal-based electricity grid does potentially bring some benefit in terms of greenhouse gas emissions [depending on models], BEVs are only truly low-carbon when charged from renewable energy sources. The use of renewable energy-based systems to power charging stations would furthermore contribute to allay prospective consumers’ concerns related to grid power supply.

To keep up with a potential fast growth in NEV sales, South Africa would, according to the preliminary findings of the **naamsa** DTIC NEV research study, require close to 262 000 public charging stations by 2035 based on 100% NEV sales which would be unrealistic but perhaps more applicable to 100% public charging coverage in the country. In line with global trends, 85% of such stations, or about 223 000, would be slow charging by 2035, while 15% or 38 500 stations would be fast charging. Achieving such a coverage demands an ambitious rollout programme, progressively ramping up new installations from about 1 500 in 2022, to above 6,000 in 2025, to about 25 000 in 2030 and above 40 000 in 2035.

The capital cost of such a rollout would depend heavily on whether it is associated with the installation of solar-based systems along charging stations. In 2021, in South Africa, the installation [without a connected renewable energy-based system] of a slow charging station [AC 22kW charger] and a fast-charging station [DC 50kW charger] cost R45,000 and R540,000 respectively. As detailed in the following Table, the estimated cost of the installation of required charging stations [to match an ambitious rollout of NEVs] would be in the order of R30,8 billion in 2021 Rand terms [or an average of R2,2 billion per annum]. Adding a renewable energy-based system to each charging station would materially increase the cost of this rollout to R95,5 billion in total [in 2021 Rand terms].

Capital cost for the rollout of charging stations required to reach 100% NEV market sales in South Africa by 2035, with and without renewable energy-based systems [in 2021 Rand terms].

Year	Vehicle stock BEV+PHEV]	New fast chargers required	New slow chargers required	Without renewable energy		With renewable energy	
				Cost of fast chargers	Cost of slow chargers	Cost of fast chargers	Cost of slow chargers
2022	14,316	593	917	R0.3 billion	<R0.1 billion	R1.0 billion	R0.4 billion
2023	36,490	914	1,960	R0.5 billion	R0.1 billion	R1.5 billion	R0.8 billion
2024	73,211	1,167	3,680	R0.6 billion	R0.2 billion	R1.9 billion	R1.5 billion
2025	125,469	1,145	5,002	R0.6 billion	R0.2 billion	R1.7 billion	R1.9 billion
2026	194,273	1,603	6,997	R0.9 billion	R0.3 billion	R2.2 billion	R2.4 billion
2027	280,740	1,784	9,024	R1.0 billion	R0.4 billion	R2.3 billion	R2.9 billion
2028	401,598	2,169	12,939	R1.2 billion	R0.6 billion	R2.6 billion	R3.9 billion
2029	564,588	2,460	17,914	R1.3 billion	R0.8 billion	R2.8 billion	R5.1 billion
2030	761,326	2,010	22,582	R1.1 billion	R1.0 billion	R2.1 billion	R6.0 billion
2031	976,509	3,959	22,939	R2.1 billion	R1.0 billion	R4.0 billion	R5.7 billion
2032	1,217,161	4,428	25,654	R2.4 billion	R1.2 billion	R4.1 billion	R6.0 billion
2033	1,484,871	4,926	28,538	R2.7 billion	R1.3 billion	R4.3 billion	R6.3 billion
2034	1,774,775	5,334	30,904	R2.9 billion	R1.4 billion	R4.4 billion	R6.3 billion
2035	2,095,529	5,902	34,193	R3.2 billion	R1.5 billion	R4.5 billion	R6.6 billion
TOTAL		38,392	223 244	R20.7 billion	R10 billion	R39.6billion	R 55.9 billion

- Note: An annual cost reduction of 6% is factored in for solar-based systems

In order to kick-start this roll-out plan, a **naamsa** charging infrastructure project commenced in 2022 in collaboration with the R6 billion Automotive Industry Transformation Fund [AITF]. Consideration for public charging roll-out include the following, amongst others:

1. Microgrid + green energy solutions at all sites to support energy requirements;
2. DC Charger protocol: CCS + OCPI/OCPP 1.6 and above;
3. Billing system which allows payment by credit card. Including recommended pricing for charging;

An assessment of the net revenue streams must be determined and derived on how the costs of introducing NEVs will be off-set and is the economic impact to the government's fiscal and social compact.

9. NEV TRANSITIONAL REQUIREMENTS

South African OEMs compete within the OEMs' production network with their overseas sister plants. Plant decisions need to be taken three years before start of production which means that NEV plant decisions for the next general NEVs are taken now. NEV plant decisions require-and are influenced by-the availability of:

- Low Logistics CO^2 footprint
- Green and low-cost energy
- Investment and Infrastructure support
- Competitiveness versus other international plants

Logically, South African OEMs would require at least similar support as their overseas sister plants in order to compete equally for plant decisions. The proposed support in the NEV roadmap does not fully match the support in the competing regions. Currently the competing regions offer significant support in these areas. Confirmation of NEV transition support is urgently required for positive plant decisions for start of production [SOP] beyond 2026 and OEMs require a lead time of at least 3 to 4 years to motivate to their parent companies before any potential production could start and to align with existing production cycles. Although the proposed incentives in the NEV roadmap do not match the support in the competing regions, they would provide a commitment, certainty and hence support the South African automotive industry's transition towards NEVs.

The future sustainability and growth of the domestic automotive industry under the SAAM 2021 – 2035 depends on the transition to NEVs to keep the automotive industry at the cutting-edge of new market developments, and to maintain its export capacity to key markets such as the EU and UK. Nearly four out of every five vehicles are currently exported by the South African automotive industry to the EU, with the UK the domestic automotive industry's top export market since 2014. The EU region is currently developing legislation to ban the sales of fossil-fuel-reliant vehicles on their roads by 2035.

Potentially losing up to 80% of exports to the EU, should South Africa not transform to advance its electric vehicle evolution, could result in a significant decline in South African automotive exports, vehicle and automotive component manufacturing employment, balance of trade and auto GDP contribution. However, what is required for the domestic automotive industry's transition to new energy vehicles include a supportive regulatory framework, additional incentives to address the price differential between NEVs and ICE vehicles to stimulate new energy vehicle sales, additional incentives to manufacture NEVs as well as the roll-out of public charging stations across the country.

As far as the NEV roadmap for South Africa is concerned, this is covered in SAAM 2035, as the power train of the specified vehicles is not limited to ICE. It is imperative that the domestic market grows and increasingly sells NEVs, broadly in alignment with leading global markets. However, it is similarly important that the South African automotive value chain continues to develop in alignment with the objectives of the SAAM. The automotive industry has the potential to catalyse South Africa's industrial development, hence, the ambitious targets set in the SAAM. While these may not be fully achievable given the impact of COVID-19 and the weak performance of the South African economy over recent years, the SAAM and its aspirational targets should remain critical guiding frameworks to drive decision-making in the automotive policy space.

The transition to manufacturing NEVs in South Africa must be accompanied by the local components industry acquiring a range of NEV technological capabilities that permit continued growth of local content in domestically assembled vehicles. This is presently only around 40% and, yet, as per the SAAM, it is essential that local content levels increase to 60% by 2035 to ensure the automotive industry supports the South African economy's industrial development, and associated employment growth.

Reaching such local content targets is contingent on developing the NEV supply chain, particularly around batteries and other critical components like e-axle that must be localised and produced competitively by the South African automotive industry. It should also be noted that in terms of the Rules of Origin under the SADC-EU EPA, 60% local content is required to export duty-free to the EU, the domestic automotive industry's top export region. NEV battery manufacturing, which comprises nearly half the cost of the vehicle, as part of the current 60% Rules of Origin requirement under the current free trade arrangements with the EU and the UK, is required to enter the EU and UK duty-free.

Increasing local content, while simultaneously transitioning to NEV technologies, will require a substantial increase in investment across the automotive value chain. To ensure this occurs, the existing Automotive Investment Scheme [AIS] will need to be significantly augmented. As a small vehicle producing economy with limited scale economies by global standards, limited local technological capabilities, and high comparative operating costs relative to leading global competitors, the business case for IEV investment in South Africa is likely to be highly challenging, unless substantial investment support is provided.

A recommendation in the NEV research study is therefore that the existing AIS is supplemented with a NEV Investment Scheme [NEV-IS] that provides an additional 20% investment support for all NEV related investments in vehicle manufacturing and automotive component manufacturing operations, inclusive of tooling, machinery and associated technical skills development linked to these investments.

The NEV Green Paper [DTIC, 2021] advocates for the acceleration of NEV consumption and production in South Africa in a way that aligns with the global NEV trajectory. According to the Green Paper South Africa aspires to have NEVs representing 60% of the market by 2035, of which HEVs would comprise 10%, PHEVs 20% and BEVs 30%.

However, as highlighted in the jointly funded naamsa DTIC NEV research Key Findings Report, the average price differential relative to comparative ICE models is 12% for HEVs, 43% for PHEVs and 52% for BEVs. If the South African market were forced to transition to NEV consumption without any form of incentivisation and these price differentials were forced to be borne by the consumer, the domestic vehicle market would contract substantially, massively damaging the South African fiscus and an automotive industry that sits at the heart of the country's manufacturing sector.

Given the recent poor performance of the South African domestic vehicle market due to the stagnation in middle class consumption in South Africa, and the devastating consequences of the COVID-19 pandemic, the SAAM's projected domestic market of 1,4 million units in 2035 is no longer deemed plausible and has not been used in our calculations. Rather, based on an average annual compounded growth rate of 3,5%, the estimated South African light vehicle market will only amount to 670 140 units in 2035. This would decline by 31,6% to as low as 458 523 units under a scenario of NEVs comprising 60% of the domestic market with no market incentives for NEV consumption.

These market declines would significantly impact the domestic vehicle industry and the broader South African economy, while also substantially reducing the government's fiscal intake from the industry. The South African government generated an average of R85 694 in taxes and levies from each vehicle sold based on a 2018 calculation which would translate in a loss to the fiscus of R18,1 billion in 2035 alone.

To support the transition of the South African automotive industry to an NEV dominated market, while continuing to develop the local industry in alignment with the objectives of the SAAM, are summarised in the table below. The table also outlines the underlying rationale and conditions required to optimally support the recommendations. It is only through the balancing of both demand and supply-side considerations that the future of the South African automotive industry can be secured.

Recommendations to support the South African automotive industry's NEV transiton to 2035

Recommendations	Recommended level of support	Conditions	Industry benefits	Fiscal cost
1. Introduce NEV purchasing subsidy	• R20,000 subsidy for the purchase of HEVs [to 31 December 2030]; R40,000 for PHEVs, and R80,000 for BEVs [to 31 December 2035] to drive increased NEV consumption • Subsidies to be reviewed periodically and adjusted based on NEV cost competitiveness changes over time [relative to ICE vehicles]	• HEVs only supported if vehicle can be driven only in full electric mode • Subsidies only available for EMA homologated NEVs	• Closure of price gap between NEVs and ICE vehicles in SA market • 20% of SA market comprising NEV sales in 2025, 40% in 2030 and 60% in 2035 • SA market alignment with EMA market developments	• R7.6 billion to 2025, R31.9 billion to 2030, and R94.5 billion to 2035
2. Align NEV EMA EPA tariffs	• SA based OEMs to secure long-term duty-free access to the EMA [EU and UK] market to secure existing SA vehicle production models • NEV models produced in the EMA to be available in SA at competitive pricing levels [through the reduction of BEV tariffs from 25% to 18%], as per the existing EPA	• EMA tariff reduction to be reciprocal • PHEVs with sub-1,000cc ICEs from the EMA to incur 18% CBU duty, per the balance of NEVs and ICE vehicles	• Continued access of SA OEMs to the EMA • Cost competitive EMA vehicles in the SA market	• None, will maintain the industry's status quo in respect of two-way trade flow between the EMA and SA

Recommendations	Recommended level of support	Conditions	Industry benefits	Fiscal cost
3. Provide 50% CKD rebate on NEV electrical components	• SA based OEMs to be protected from the adverse impact of 20% CKD duties on expensive NEV components, as they transition to NEV vehicle assembly	• No conditions on NEV CKD components to 31 December 2025 • NEV module assembly requirements from 2026 to 31 December 2030, then full removal of rebate	• Increased levels of PI and VALA for a transitionary period to get NEV investment into SA and support export competitiveness while the economies of scale are low	• None. Rebate worth R1.5 billion to OEMs annually, but in face of R2.9 billion in additional costs if no local sourcing of NEV components
4. Increase AIS support for NEV investment	• Increase maximum AIS from 30% [OEMs] or 35% [component manufacturers] to 50% for NEV investments	• All NEV components to qualify • Remove AIS' BBBEE and employment conditions on NEV investments	• Automotive industry investments to increase by up to 30% annually	• Additional AIS support of up to R68.4 billion to 2035
5. Maintain balance of APDP incentives	• Maintenance of existing levels of APDP support	• APDP to be reviewed in 2025, to consider policy amendment post 2026 • All recommendations included in this report to be reviewed as part of the overall APDP review	• VALA and PI continue to provide major localisation incentive for OEMs • PI continues to provide major incentive for aftermarket and export focused component manufacturers	• No change on base APDP benefits

The recommendations, as presented in the above table, should support the transition to NEVs through:

- Support South Africa's continued market development, ensuring sales do not decline because of higher NEV costs;
- Support the successful transition of the South African light vehicle market from an ICE vehicle dominated market, to a low carbon emitting market dominated by NEV consumption;
- Secure South African production access to the EMA as the key EU and UK markets transition to NEV consumption only;
- Support the competitiveness of domestic vehicle assemblers and their local supply chains in the South African NEV market by reducing the duty burden on expensive imported NEV components;
- Attract NEV investment through the South African automotive value chain, in preparation for the removal of NEV CKD duty rebates in 2030;
- Incentive NEV assembly and component production in South Africa, thereby positioning the industry for future growth and development.

South African OEMs compete against their sister plants around the world for production. Volume is allocated to plants based on their financial competitiveness and reliability as a manufacturer from an on-time delivery and quality perspective. One of the biggest challenges for South African production are the low economies of scale and the far distance from export markets. The AIS and APDP incentives assist to overcome these disadvantages from a business case perspective.

As the industry transition towards NEV production, it will be a phased in approach with manufacturers producing NEV's in combination with existing ICE's. It will not be a digital switch from one day to another that total ICE production will be replaced with NEV production. As a result, the economies of scale for NEV production will initially be even worse than current ICE production, making investment decisions and competitiveness with bigger sister plants around the world extremely challenging. In order to overcome this and get the initial NEV investment and production started in South Africa, increased levels of PI and VALA for a transitionary period would help overcome this. As the investment cost increases based on the level of electrification being produced [i.e. Hybrid → Plug-in-Hybrid, BEV] the transitionary support should be higher for these vehicles and is only applicable from each OEM's Start-of-Production [SOP] date.

Localising NEV components have the same challenges as the OEMs above, and this would support localisation decisions to get the investment into the countries. A single-handed approach should be avoided as it negatively affects domestic producers. Incentives should be for both the supply and demand side [i.e., domestic production and CBU imports]. As South Africa's most successful and largest manufacturing sector, it is critical to the domestic economy that the automotive industry achieve its potential through to 2035, as scoped within the SAAM.

9.1 NEV purchasing subsidy

Despite lower running costs, the high upfront purchasing cost of NEVs [linked to higher production costs, mainly related to battery production] has been the main inhibitor to increased NEV uptake in South Africa. This is exacerbated by the effects of the value-added tax [VAT]; the ad valorem excise duty and the import tariff; limited product availability; and awareness issues emanating from range anxiety, security of electricity supply and a limited understanding of the technology. Due to their high upfront cost, NEVs are furthermore penalised by the high interest rate associated with vehicle finance in South Africa. Overall, a package of measures would have to manage the need to reduce the high upfront cost of NEVs with the cost and socio-political acceptability of interventions.

Reducing the VAT and/or ad valorem excise duties would have a meaningful impact but would be difficult to justify socially as an NEV is regarded as a luxury item and therefore politically unjustifiable. Levelling the playing field for imports would redress an anomaly for BEVs coming from the EU, but it is not possible to guarantee that this would trigger reduced prices for customers [since local manufacturers can offset duties under the APDP2]. Providing preferential finance for NEVs would have a material impact but would require a partnership with the financial sector and could be socially regressive. All these measures run the risk of being seen as subsidising a product which, initially at least, would be purchased only by high-income earners.

In addition, interventions would need to balance market development and industrial development, as some measures, such as fleet-level targets, would help grow the market but may not be aligned with manufacturing objectives. The variety of technologies available adds another level of complexity. As such, a technology neutral approach is recommended in the short term. Besides local sales, current local manufacturing has traditionally focused on servicing the EU and United States markets with ICE vehicles, two markets that are rapidly shifting to BEVs.

NEVs are still significantly more expensive than ICE vehicles internationally. If the South African market were forced to transition to NEV consumption without any form of incentivisation and these price differentials were forced to be borne by the consumer, the domestic vehicle market would contract substantially, massively damaging the South African automotive industry. The South African vehicle market is highly price sensitive, especially across the first two quintiles [vehicles with an average selling price of R175 135 and R260 798, respectively]. These two market segments comprise almost half the South African market. NEV prices in the domestic market are far above these segments with the cheapest BEV, the Mini Cooper at R694 600 and the Toyota Cross hybrid at R461 700 as at July 2022.

Based on average annual compound growth rate of 3,5%, the South African light vehicle market will only grow to 670 140 units in 2035 with a purchasing subsidy, with this being as low as 458 523 units [a decline of 31,6%] under a scenario of NEVs comprising 60% of the domestic market, and with no market incentives for NEV consumption. These market declines would significantly impact the domestic vehicle industry and the broader South African economy, while also substantially reducing the government's fiscal intake from the industry.

The fundamental challenge to NEV market growth in South Africa is the uncompetitive pricing of NEVs relative to ICE vehicles. As highlighted in Section 1, the average international pricing gap for NEV models relative to their ICE equivalents is 12% [for HEVs], 43% [for PHEVs], and 52% [for BEVs]. While the price gap has narrowed as battery technologies advance, NEV sales in developed economies are consequently heavily subsidised.

Given the price sensitivity of the South African market, as exhibited by its price elasticity profile and the substantial levels of subsidisation required to equilibrate NEV and ICE vehicle pricing, the most appropriate incentive model to support the transition to NEV consumption in the South African automotive market appears to be the provision of a direct, fixed NEV purchase subsidy. The value of the subsidy will be determined by the type of NEV being subsidised. An incentive of this kind would optimise support for entry level NEVs, with less benefit for more expensive NEVs.

If the South African vehicle market were to transition NEV sales equal to 20% of the total market in 2025, 40% in 2030 and 60% in 2035, the profile of NEVs sold is likely to shift quite dramatically over the period. HEVs would likely dominate in the period to 2025 [10% of the 20% total], with PHEVs and BEVs ending the period in a similar market position [5% each].

However, BEVs are then projected to dominate the NEV market segment, achieving half of the 40% total in 2030 and 60% of the NEV total in 2035. The South African market's potential shift to NEVs is presented in the following Figure.

Projected light vehicle sales in the South African market to 2035, per the NEV transition

YEAR	HEV	PHEV	BEV	ICE	TOTAL MARKET
2022	12 855	4 285	4 285	407 066	428 490
2023	22 174	8 870	8 870	403 573	443 487
2024	32 131	13 770	13 770	399 338	459 009
2025	47 507	23 754	23 754	380 060	475 075
2026	49 170	29 502	34 419	378 611	491 702
2027	50 891	35 624	50 891	371 506	508 912
2028	52 672	42 138	68 474	363 439	526 724
2029	54 516	49 064	87 225	354 353	545 159
2030	56 424	56 424	112 848	338 544	564 240
2031	58 399	70 079	128 477	327 033	583 988
2032	60 443	84 620	145 063	314 302	604 427
2033	62 558	100 093	162 651	300 280	625 582
2034	64 748	116 546	181 294	284 890	647 478
2035	67 014	134 028	201 042	268 056	670 140

Based on CAGR of 3.5% to 2035.
Range of dependencies recognised for NEV transition: Charging infrastructure, RE supply, improved NEV competitiveness

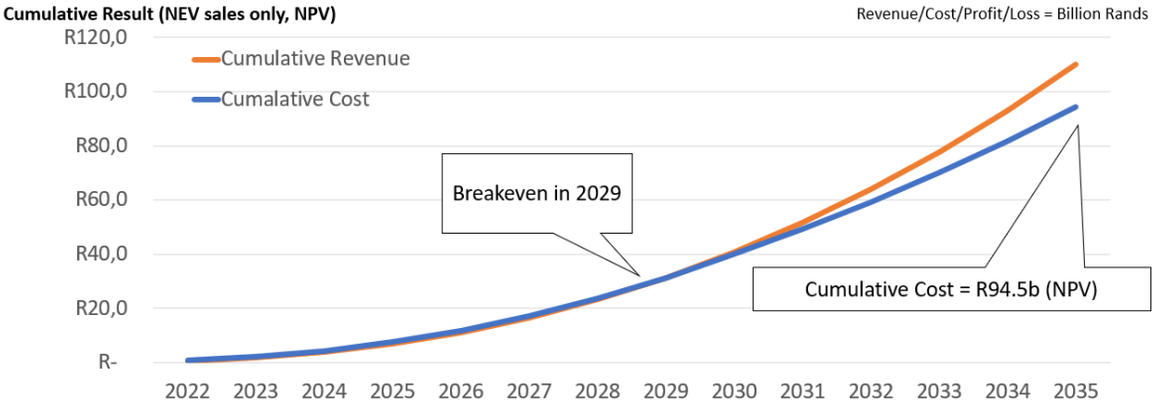
Source: **naamsa** DTIC NEV Research study

If the trend outlined in the table above realises, there will be broad alignment in respect of passenger vehicles trend relating to the EU/UK market while bakkie [LCV] sales are expected to remain hybrid-based for a longer period. It means that the country's ICE-based legacy production base will remain in place for longer than evident in the EU/UK where legislation is in progress to ban the sales of new ICE vehicles by 2035. This may only be for one or two model lifecycles but given the seven-to-ten-year average model lifecycle of a typical passenger car and bakkie new vehicle model, respectively, this means that South Africa's full light vehicle shift to BEVs may only be in 2040-2050.

The incentives will not fully equilibrate the pricing of NEVs and ICE vehicles in the domestic market. They will rather narrow the pricing gap, with the objective of securing price differentials of no more than 10% in large volume domestic market segments, which is the price premium that automotive stakeholders reported is acceptable for NEVs to remain competitive to ICE vehicles. The cost of introducing the NEV grant will be substantial if it is successfully taken up by consumers. The modelled cost will be reasonable over the initial period, at R7,6 billion for the four years from 2022 to 2025 [measured in 2021 constant Rand values].

However, these costs will then escalate significantly as PHEV and BEV consumption increases and the growth in HEV sales abates. The total cost will reach R31,9 billion by the end of 2030, and R94,5 billion by 2035. HEVs will only be receiving support for the period to the end of 2030. Beyond this period, only PHEVs and BEVs would receive NEV support, with HEVs deemed ICE variants from 2031 onwards. This is consistent with the NEV policies in the EU.

Although the costs to the fiscus up to 2035 appears to be high, **naamsa**'s calculations in the following figure reveals that the upfront transitional costs to NEVs to the fiscus based on the recommended level of support of R20,000 subsidy for the purchase of HEVs [to 31 December 2030]; R40,000 for PHEVs, and R80,000 for BEVs [to 31 December 2035] to drive increased NEV consumption would be offset by 2029 whereafter the fiscus would benefit significantly from vehicle taxes.



Cumulative Revenue	R	0.7	R	2.0	R	3.9	R	7.1	R	11.2	R	16.6	R	23.2	R	31.2	R	41.0	R	51.8	R	64.0	R	77.8	R	93.2	R	110.2
Cumalative Cost	R	0.8	R	2.2	R	4.3	R	7.7	R	11.9	R	17.2	R	23.6	R	31.2	R	40.1	R	49.2	R	59.2	R	70.1	R	81.8	R	94.5
Cumulative Profit/Loss	-R	0.1	-R	0.2	-R	0.4	-R	0.5	-R	0.6	-R	0.6	-R	0.3	R	0.1	R	0.9	R	2.6	R	4.9	R	7.8	R	11.4	R	15.8

9.2 Alignment of SADC-EU EPA NEV tariffs

In addition to stimulating domestic NEV market demand, a further key demand requirement for the South African automotive industry is ensuring continuity of EU market supply as that major market transitions to full BEV consumption. A substantial portion of South African vehicle production is destined for the EMA; and it is integral to the production rationale of several major South African-based assembly plants and their major component manufacturers.

At present, BEVs are excluded from the Southern African Development Community [SADC]-European Union [EU] Economic Partnership Agreement [EPA], also known as the SADC-EU EPA, and it is essential that this is corrected. The EPA provides South African assembled vehicles and component manufacturers with duty-free access to the EMA, and it is imperative that this market advantage is maintained over the balance of the SAAM period.

As South Africa's automotive volumes are predominantly driven by export demand, the industry is highly vulnerable to changes in demand in export markets, in particular, Europe and the UK. The EU, along with the UK, accounted for R124,7 billion, or 60,1%, of total automotive exports of R207,5 billion. Considering that 49,6% of the total automotive component export value, and 77,1% of the domestic automotive industry's vehicle export volume were destined for the EU in 2021, developments in the region have a measurable and direct impact on the South African automotive industry.

The transition to eco-friendly vehicles via government regulation, the pricing of carbon in the form of a tax on ICE vehicles, government-provided consumer incentive schemes, the availability of charging infrastructure, and an even stronger environmental consciousness among society in the EU are driving developments in the domestic automotive industry to a large extent.

An EPA between a group of countries in SADC and the EU entered into force on 10 October 2016, replacing the Trade Development and Cooperation Agreement [TDCA]. The SADC EPA group of countries does not consist of the entire SADC bloc, but rather members of the SACU, namely, Botswana, eSwatini, Lesotho, Namibia, and South Africa, plus Mozambique, with an option for Angola to join in the future. While the SADC-EU EPA is a reciprocal trade agreement, meaning both the EU and the SADC EPA group offer preferential market access to each other, the EU provides greater preferential and duty-free access, while the SADC EPA group are allowed to maintain protection of sensitive sectors.

Recently, the terms of the EU EPA have been replicated under a new and separate EPA with the UK, which entered into force on 1 January 2021. This has allowed for the continuation of preferential trade between South Africa and the UK after Brexit. The new trade agreement with the UK is called the SACUM-UK EPA, which will replace the previous legal framework for SACUM–UK trade under the SADC–EU EPA. Up to 2016, trade was governed by the trade chapter of the TDCA which became effective on 1 January 2000.

The automotive part of the TDCA was only concluded on 15 December 2006. As a result, the 3% import duty on original equipment components and the 4,5% duty on aftermarket parts were reduced to duty-free on 15 December 2006, while the 10% import duty on passenger cars was reduced to 3,5% on 15 December 2006, further reduced to 1,5% on 1 January 2007, and was reduced to zero in January 2008. South Africa, in turn, granted the EU a 7% preference on passenger cars and light commercial vehicles, and an 8% preference on medium and heavy commercial vehicles and buses.

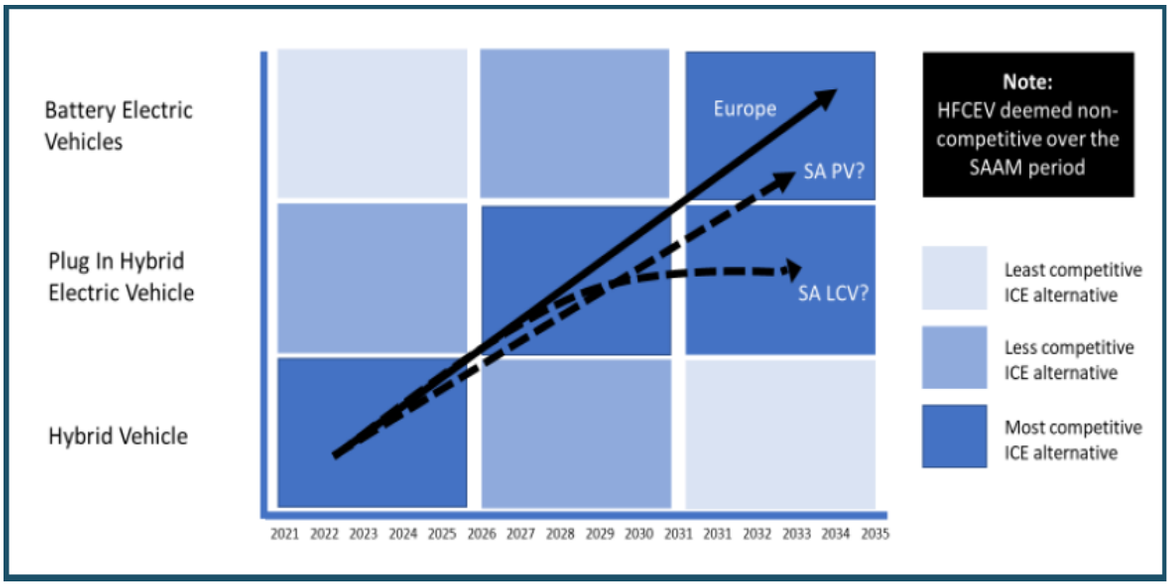
Original equipment components received no preference, but a large number of aftermarket automotive parts qualified for lower import duties. In order to qualify for zero tariffs into the EU, South African vehicles and automotive components must contain at least 60% local content with respect to the rules of origin. The definition of local content includes South African raw materials, labour, parts, transport, manufacturing costs and profit margins, as well as the value of components and sub-components originally sourced from the EU.

In exchange for the South African automotive industry securing duty-free market access to the EU as part of the EPA, the vehicle industry in the EU secures preferential access to the South African market. At present EU and UK sourced BEVs incur a full most favoured nation [MFN] tariff of 25% when supplied into the South African market, relative to an 18% EPA tariff for ICE vehicles. This 7% preference exposes emerging South African NEV market to more intensive EU competition but is an acceptable trade-off given the importance of securing duty-free access to the EU market for the South African automotive industry.

Maintaining preferential access to the EU as the automotive industry undergoes its NEV transition is critical to the South African automotive industry, as is access to competitive NEV product supply from that market. It is therefore imperative to resolve the anomaly that currently exists in the SADC-EU EPA is the NEVs are excluded from the preferential arrangement and attract an import duty of 25% into South Africa. Should this anomaly not being addressed in the NEV roadmap it will mean that South African manufactured NEVs will not receive duty-free access into the EU, irrespective of complying with the Rules of origin requirements of 60% local content.

In order to maintain the balance between supplying the domestic new vehicle market as well as export markets, it is critical that domestic and international market demand shifts are broadly aligned. This does not mean that consumption in the South African and EU/UK markets needs to be fully aligned in the timing and the profile of NEV consumption. Consistent with most developing economies, with substantial automotive industries, South Africa is starting its NEV transition slightly later. The South African NEV roadmap for light vehicles through to 2035 is presented in the following Figure. As highlighted, the EU region is projected to fully transition its market to BEV-only sales by 2035. This transition is being driven by a mix of legislative changes that will essentially ban the sale of pure ICE vehicles by 2035, combined with generous fiscal incentives at national and subnational levels to purchase NEVs. HEVs will be the most competitive alternative to ICE vehicles in the short term [to 2025], with PHEVs the most competitive alternative from around 2026 to 2030, and BEVs only becoming competitive from 2031 to 2035.

South African NEV road map to 2035, relative to the European Union



The South African NEV roadmap is not projected to be entirely dissimilar to the EU trajectory. The passenger vehicle market is expected to follow the same trend, albeit with some timing lags, given South African market price sensitivities.

9.3 Localisation of NEV components

Globally, the automotive industry benefits when the supplier base is strong and competitive. At present, automotive component suppliers not only have to face the effects of the global pandemic but are also required to drive forward the transformation of the automotive value chain towards e-mobility. Rarely has the automotive sector faced such an array of opportunities and challenges. Big changes in the decade ahead on a global scale include new powertrains, relationships with consumers, modes of ownership, manufacturing processes, and technologies.

Products related to the internal combustion engine [ICE] and exhaust systems are coming under increasing pressure, while electromobility is gaining in importance. The ICE vehicle area is confronted with a declining market volume, a high level of market consolidation and the severe negative effects of environmental legislation. This change carries enormous risks for many suppliers.

Due to the impact of the COVID-19 pandemic and faster NEV adoption, ICE vehicle sales in the passenger car segment almost certainly passed their peak in 2017 and are now in permanent decline. Automotive component suppliers that are slow in implementing the latest technological and consumer-driven trends, or to follow new regulations run the risk of failure. It is, therefore, more important than ever to maintain maximum efficiency, ensure cost-effective manufacturing and maintenance, and have the flexibility to respond to changes in the market. This can not only be achieved through major investment and innovations, but also in the little things that yield measurable results in terms of safety, quality, costs and productivity.

As the global automotive value chain undergoes its fundamental NEV transformation over the next two decades, it is essential that the South African segment of the value chain successfully transform its productive capabilities in alignment with emerging requirements. The South African automotive value chain may have a slightly delayed transition to NEVs relative to the EU, and PHEVs may occupy a larger position in the domestic market in 2035 by virtue of its strong LCV [bakkie] orientation, but the local value chain will ultimately need to transition in a similar manner to the Global Value Chain [GVC]. While the shift to HEVs and PHEVs adds additional value to the existing automotive value chain [by virtue of the additional electric components added to ICE vehicles], the advent of BEVs fundamentally changes the value package in vehicles, with major portions of the existing value chain terminating and entirely new value chain elements emerging.

The South African automotive industry will experience declining demand for a range of locally produced ICE components, including exhaust systems [including South Africa's most important component export, catalytic converters], mechanical brakes, air conditioning systems and other heat transfer products, as well as engines and their components. Conversely, a range of electrical components will increasingly be in demand, ranging from battery packs and their management systems to electric traction motors and controllers, to high voltage harnesses, charging components and regenerative braking systems.

The transition to NEV consumption globally and in domestic automotive market consequently represents both a major opportunity and an existential threat to the South African automotive value chain. If firms can make the transition, major future business opportunities await, but if they are not successful in transitioning to the new NEV technologies, the imminent decline of the domestic automotive industry, and the 115 000 direct jobs it sustains, is a likely outcome.

The benefits received under a NEV transition remain constant under the APDP2. The only major variable that changes is the amount of CKD duty payable on locally assembled NEVs for domestic market consumption, and hence the overall level of APDP benefit secured.

The NEV research report calculations reveal that domestic OEMs would lose 8,1% of their APDP benefits [excluding the AIS] under a HEV assembly model, 29,1% under a PHEV assembly model and 35.2% under a BEV assembly model. The calculations emphasise that the key issue underpinning the decline in benefits is the explosion in duty-bearing imported CKD content, as opposed to any VALA or PI benefit losses.

Domestic OEMs operate in a highly competitive domestic market. Their advantage in the domestic market is derived from a CBU import tariff ranging from 25% [when vehicles are sourced from outside of the EU], down to 18% [when sourced from the EU or UK]. Domestic OEMs are, however, subjected to CKD duties of 20% for OEM components in Chapter 98 of Schedule 1.

This results in a much lower rate of actual protection in the domestic market. the actual advantage for OEMs in the domestic market is 22% when competing with MFN-sourced CBU imports and only 15% when these vehicles are sourced from the EU or UK. The data presented is based on the profile of an average vehicle produced in South Africa in 2021. The vehicle has 42% local content, with the balance imported, hence the substantial level of CKD duty exposure.

The CKD duty rate is fully rebated when South African manufactured vehicles are exported, so the CKD duty rate is only an issue for South African manufactured vehicles destined for the domestic market. The problem that emerges when the NEV transition is factored in, ultimately to BEVs, is that electric components are expensive, and therefore constitute a much larger portion of the value of fully assembled vehicles. In the short term, at least these high-value electrical components are likely to be fully imported.

Modelling the impact of the NEV transition on the competitiveness of locally assembled vehicles for the domestic market, holding all local and imported values equal, but adding the imported electric component costs that would result in the 12% HEV, 43% PHEV and 52% BEV price differential in the selling price of the vehicle, indicates a major deterioration in the attractiveness of domestically manufactured for the South African market relative to importing vehicles, especially from the EU or UK.

This is demonstrated in that the 15%-22% advantage for an average ICE vehicle would deteriorate to 13,2% - 20,2% for HEVs, 9,9% - 16,9% for PHEVs and only 9,2% - 16,2% for BEVs. The underlying reason for this perverse effect on APDP benefits is the decline in local content as a proportion of total value that occurs as NEVs are introduced. Holding local content constant in Rand value terms, imported content would decrease from 42% for ICE vehicles to as low as 27,6% for BEVs. The narrow advantage for local OEMs in the domestic market exists even after applying VALA and PI benefits, which are significant.

The increase in CKD duties would eliminate up to R2,9 billion in APDP benefits for South Africa's seven light vehicle OEMs, or a full 35,2% of the assembly benefits presently secured from the programme. The level of impact is variable from one OEM to the next, but all OEMs would be affected, especially those with significant domestic market sales.

A domestic market advantage as low as 9,2% would clearly threaten local assembly, especially in the short term. And yet there appears to be little the domestic OEMs can do to ameliorate their duty position. The largest electric component cost is the battery pack, which is unlikely to be localised in the foreseeable future. Other electric components may represent opportunities, but any short-to-medium-term opportunity appears to be an assembly-based, as opposed to securing high-value electrical component manufacturing in South Africa.

Reducing the CKD duty exposure of local assemblers for a period is therefore a critical consideration for the South African government. Applying a 50% CKD duty rebate on NEV components for a defined period would allow the domestic OEMs to compete more effectively in the emerging domestic NEV market, while still maintaining pressure on them to localise the assembly of electric components and, when possible, even their domestic manufacture. The annual benefit to local OEMs of introducing a 50% CKD rebate on electric components, while it would not fully compensate OEMs for their higher CKD costs, it would ensure more substantial market protection.

The economics of NEV production will negatively impact the short-term competitiveness of domestic OEMs producing NEV products for the domestic market. Modelling shows market protection for locally assembled vehicles declining to as low as 9,2% for EU-sourced light vehicles, and the seven local OEMs losing R2.9 billion in annual benefits from the APDP because of the shift. The provision of the 50% rebate will not completely ameliorate these APDP incentive losses but will upwardly adjust the effective CBU rate of protection in the domestic market, and significantly reduce the incentive losses incurred to R1,45 billion.

9.4 NEV project investments

A major weakness within the existing APDP2 architecture is the potentially substantial NEV investments that need to be made by multinational OEMs in South Africa. While many aspects of NEV vehicle manufacturing are either identical or similar to ICE vehicle manufacturing, NEV model introductions are likely to require substantially larger investment levels, especially in key electric component technologies. There appear to be legitimate concerns that the local operating environment's deteriorating competitiveness over the past decade threatens the business case for these potentially larger investments in new technologies.

While the AIS may be a sufficiently generous investment support measure for brownfield ICE vehicle model replacements, it is likely to be insufficient to cover the high cost and risks associated with NEV investment through the domestic automotive value chain, particularly when competitor economies are offering multinationals increasingly generous investment support to encourage NEV investments.

The AIS is designed to grow and develop the automotive industry through investment in new and/or replacement models and automotive components that will increase plant production volumes, sustain employment and/or strengthen the automotive value chain. The AIS represents the only industry support that is of physical cost to the fiscus in the form of a non-taxable cash grant of 20% of the value of qualifying investment in productive assets by light motor vehicle manufacturers, and increased support of 25% of the value of qualifying investment in productive assets by component manufacturers and tooling companies, as approved by the DTIC.

Investments in NEV projects can earn a cash grant of 30%. This support is available to encourage investments by OEMs and component manufacturers in a manner that supports productive capacity upgrading. For an OEM to claim the AIS, a minimum annual volume of 50,000 units is required. The total investment approved since the inception of the AIS until the end of 2021, amounts to R86,8 billion, while the sum total of incentives approved since inception amounts to R23,5 billion. Since inception, 639 projects have been approved under the AIS, creating 23 279 additional jobs. The DTIC implemented a change to the AIS guidelines in 2017, applicable to all new applications approved from 1 September 2017, which requires applicants to maintain base-year employment levels throughout the entire incentive period from the application stage until claim periods.

To secure the future of NEV production in South Africa, the AIS should be increased from 30% to 50% for NEV-specific investments [making no distinction between OEMs and component firms for NEV investments]. The cost of this adjustment is significant, however, it is deemed critical to securing NEV investment, especially in respect of entirely new NEV models and their electrical components that ideally need to be localised. The 50% AIS should therefore be focused on supporting investments across all NEV types and the range NEV components included. It is further recognised that new NEV technologies and associated components may emerge over the next few years. As such, the qualifying list of components should remain open for the potential inclusion of additional NEV components.

Based on the recent investment profile of the South African automotive industry, and the need to increase investment levels by an estimated 30% annually through to 2035, it is estimated that the total vehicle manufacturing and component manufacturing investment required to successfully transition the South African automotive industry to an NEV production base in 2035 is R342 billion. Based on the additional 20% investment support required to support the transition [in addition to the present AIS], the NEV-AIS will need to disburse an additional R68,4 billion to support the industry through to 2035. The success of this strategy is also premised on the availability of performance and safety testing and certification capabilities in South Africa. It is currently not possible to certify domestically NEV lithium-ion batteries for exports to the EU, the UK or the United States.

Capital investment required to transition to NEV production 2035 in 2035 [R millions]

YEAR	ASSEMBLY	COMPONENTS	TOTAL INVESTMENT	NEV INCENTIVE*
2021	R 9,631	R 3,759	R 15,411	R 3,082
2022	R 10,208	R 3,985	R 16,215	R 3,243
2023	R 10,820	R 4,224	R 17,067	R 3,413
2024	R 11,469	R 4,477	R 17,970	R 3,594
2025	R 12,156	R 4,745	R 18,927	R 3,785
2026	R 12,885	R 5,030	R 19,941	R 3,988
2027	R 13,658	R 5,331	R 21,016	R 4,203
2028	R 14,476	R 5,651	R 22,155	R 4,431
2029	R 15,344	R 5,990	R 23,363	R 4,673
2030	R 16,264	R 6,349	R 24,643	R 4,929
2031	R 17,239	R 6,729	R 25,999	R 5,200
2032	R 18,273	R 7,133	R 27,437	R 5,487
2033	R 19,368	R 7,560	R 28,961	R 5,792
2034	R 20,529	R 8,013	R 30,576	R 6,115
2035	R 21,760	R 8,494	R 32,288	R 6,458
TOTAL	**R 224,081**	**R 87,468**	**R 341,969**	**R 68,394**

- This is in addition to the standard Automotive Incentive Scheme, which provides investment support of up to 35% for component manufacturers and 30% for vehicle assemblers.

Specific NEV localisation opportunities would include battery packs and associated management systems, electric traction motors and controllers, thermal cooling systems, electromechanical brakes [vacuum pumps], high voltage harnesses, and vehicle charge points. The balance of components supplied to vehicles would remain largely unchanged in respect of their form and function, but this will mask potentially major changes in respect of their materials used [durability and weight], their levels of digital connectivity [vehicle monitoring], and their associated homologation requirements.

Another focus is the development and investment in new energy vehicle [NEV] component technology and expansion of the fledgling electric supply chain; reinvestment and support towards reskilling and upskilling of the workforce to ensure the right skills are available for the design, engineering and manufacturing of EVs and related components and systems; the transition of South Africa towards cleaner fuel technologies available globally; and adoption of new and sustainable manufacturing processes to significantly reduce greenhouse gas emissions and improve our environmental wealth.

South Africa has many of the materials and structures in place to manufacture NEVs, but this will require new and different skills in the industry, as well as mandating that these skills be taught at tertiary education institutions. The increase in demand for NEVs creates opportunities for South Africa in several other areas as well as outlined below.

- Transformation from raw material exporter to product exporter;
- Domestic manufacture of NEV accessories [e.g., Chargers and wall boxes];
- Employee upskilling;
- Fuel retail transformation [From vehicle centric to customer centric offering opportunities to charge, rest, work, etc.];
- New businesses e.g., green tourism, recycling , etc; and
- NEV Battery life - re-purpose to supply homes with electricity to mitigate against load shedding.

9.5. Alternative proposals in addition to the jointly funded naamsa DTIC NEV research study

- It is imperative that the Rules of Origin for CBU exports to the UK/EU which currently stand at 60% be reduced via the SADC-EU EPA review to accommodate the lack of a real localisation opportunity for the battery in the foreseeable future in South Africa and the EU/UK. Failing to do so would defeat of the NEV transition in South Africa as without the NEV battery souring in South Africa or the EU/UK, the domestic automotive industry will not be able to export passenger cars and light commercial vehicles duty-free to the EU/UK;
- A purchasing subsidy is also imperative to narrow the price differential between NEVs and ICE vehicles. Without stimulating demand NEV sales will not take off in South Africa and jeopardise the whole ecosystem in respect of commercialising the required public charging infrastructure, replacing ICE vehicles and the production of NEVs and NEV components in the country. Both demand and supply issues are equally important NEV transitional requirements to sustain and grow the domestic automotive industry in the country. The industry is prepared to match the purchasing subsidy from government for the different NEV categories in order to narrow the price differential between NEVs and ICE vehicles further to stimulate an accelerated off-take of NEVs in the country;
- For the long term NEV policy in the country by linked to the timeframe of the SAAM 2035 and for a target to be set at 60% of the new vehicle market to comprise NEV sales by 2035, subject to appropriate government support levels.

10. CONCLUSION

The transport sector in most countries is dependent on fossil fuels at present. For environmental sustainability as well as to enhance industrial policy, developing a NEV market is crucial to decarbonise transport and to transform the sector through the application of emerging technologies. E-mobility can assist countries achieve sustainable development objectives and decarbonisation goals. The uptake of NEVs is, however, comparably slow to date. The high purchase price of NEVs and the availability of charging infrastructure remain major barriers to the spread of NEVs. To grow the market, however, a mix of strong and enabling policy measures and incentives addressing the cost, charging infrastructure, and information gap could help to increase the share of NEVs, as leading markets show.

Vehicle production in the South African market at present is almost exclusively ICE-based. While this is not in itself a problem in the short term given the way the APDP2 incentivises domestic production, it will become a major challenge within three to five years. As domestic and export demand for NEVs increases over time, ICE demand will decline, and the business case for ICE-dominated domestic production will be challenged. Essentially, OEMs will be required to replace their existing South African ICE platforms with NEV replacements or risk the chance of having their operations made redundant. Given that there will be a maximum of only two model replacements between now and 2035, OEMs will either introduce a NEV replacement at their next model change [to 2029], or, at the latest, the next [from 2030].

Investing in the assembly of HEVs will not necessarily result in major additional investment costs for South African OEMs, as the assembly of batteries can be easily assimilated into existing plant assembly operations. However, this does not apply to PHEV assembly, which requires more significant assembly changes and, most certainly not for BEV assembly, which requires major additional investment – potentially akin to a Greenfield operation. Beyond assembly changes, the shift to NEV technologies will also fundamentally challenge existing manufacturing operations within the domestic component value chain. This is the biggest threat facing the South African automotive industry, as well as the broader economy. On average, almost three component manufacturing jobs are created for every vehicle assembly job in South Africa, and at least one of these three jobs is likely to be threatened by the transition to NEVs.

The transition to assembling NEVs must be accompanied by the domestic components industry acquiring a range of NEV technological capabilities that permit continued growth of local content in domestically assembled vehicles. This is presently only around 40% and, yet, as per the SAAM, it is essential that local content levels increase to 60% by 2035 to ensure the automotive industry supports the South African economy's industrial development, and associated employment growth. Reaching such local content targets is contingent on developing the NEV supply chain, particularly around batteries.

Increasing local content, while simultaneously transitioning to NEV technologies, will require a substantial increase in investment across the automotive value chain. To ensure this occurs, the existing Automotive Investment Scheme [AIS] will need to be significantly augmented. As a small vehicle producing economy with limited scale economies by global standards, limited local technological capabilities, and high comparative operating costs relative to leading global markets.

The NEV challenge in South Africa is two dimensional, encompassing both demand and supply side considerations, hence the focus of the recommendations made. It is imperative that the domestic market grows and increasingly sells NEVs, broadly in alignment with leading global markets. However, it is similarly important that the South African automotive value chain continues to develop in alignment with the objectives of the SAAM. The automotive industry has the potential to catalyse South Africa's industrial development, hence the ambitious targets set in the SAAM. While these may not be fully achievable given the impact of Covid-19 and the poor performance of the South African economy over the last few years, the SAAM and its aspirational targets should remain critical guiding frameworks to drive decision making in the automotive policy space.

The transitional requirements from an ICE-based to a NEV-dominated market in South Africa within the SAAM period have the potential to:

- Support South Africa's continued market development, ensuring sales do not decline because of higher NEV costs;
- Support the successful transition of the South African light vehicle market from an ICE vehicle dominated market, to a low carbon emitting market dominated by NEV consumption;
- Secure South African production access to the EMA as the key EU and UK markets transition to NEV consumption only;
- Support the competitiveness of domestic vehicle assemblers and their local supply chains in the South African NEV market by reducing the duty burden on expensive imported NEV components;
- Attract NEV investment through the South African automotive value chain, in preparation for the removal of NEV CKD duty rebates in 2030; and
- Incentive NEV assembly and component production in South Africa, thereby positioning the industry for future growth and development.

Although the NEV transitional requirements and incentives do not match the support in the competing regions, they would provide a commitment, certainty and hence support the South African automotive industry's transition towards NEVs. Confirmation of NEV transitional support is urgently required for positive plant decisions for start of production [SOP] by 2026.

The future of the South African automotive industry can be secured with an optimal balancing of demand and supply side considerations. To maintain and further grow its automotive manufacturing ambitions, the South African automotive industry will have to adapt to the current rapid technological transition to NEVs.

An in-depth study is currently taking place globally within the truck industry, to align the NEV technologies which could be applied to include all typical truck operations and applications. South Africa will benefit from these activities, albeit various rates of development and acceptance of the solutions may be required.

The automotive industry has the potential to catalyse South Africa's industrial development, hence, the ambitious targets set in the SAAM. While these may not be fully achievable given the impact of COVID-19 and the weak performance of the South African economy over recent years, the SAAM and its aspirational targets should remain critical guiding frameworks to drive decision-making in the automotive policy space. The South African government fully realises the importance of a healthy and growing automotive industry in terms of being a large-scale employer, the largest manufacturing sector in the country's economy, and a very successful exporter.

In the near-to-medium-term, full-scale NEV adoption may not offer a realistic or practical path for South Africa. For example, Brazil is the world's largest producer of sugarcane ethanol and second largest soybean producer. Brazil has pioneered the use of energy crops as biofuel for the transport sector since the 1970's. Biofuels have been proven to emit significantly lower greenhouse gas emissions than petroleum-based fuels. In 2021, 84% of new light vehicles sold in Brazil contained flex fuel engines. In contrast, NEVs accounted for only 0.14 percent of vehicles sold and remain limited due to concerns around affordability, infrastructure and other local factors.

Even in economically advantaged nations, depending on geography or other factors, during a transition phase, more fuel-efficient ICE vehicles, hybrid vehicles and plug-in hybrid vehicles may offer a good alternative. In short, plug-in hybrid vehicles could offer the best of both worlds: a zero-emission driving mode for daily use in urban or semi-urban environments, as well as a good range for longer distances. They also do not necessitate huge charging infrastructure investments._Fuel carbon neutrality, including the use of low carbon or even carbon-neutral fuels in ICE-powered vehicles, is a key technology that merit R&D and testing merit government support. These clean[er] fuels must be user-friendly in terms of price, quality, and ready availability and coupled with more efficient ICE technologies can provide significant emissions benefits, particularly when an EV may not be an option for a customer. To reduce emissions from existing vehicles, further measures will be necessary, such as traffic management, better driver education on and incentives for eco-driving, and other creative solutions to address the needs of South Africa.

<u>Additional Considerations:</u>

Two key issues for achieving automotive carbon neutrality:

- Although EVs do not emit CO2 while in use, CO2 is emitted during the manufacture, distribution, recycling and disposal process. Carbon neutrality for motor vehicles cannot be achieved without CO2 emissions reductions throughout their life cycle, based on overall life-cycle assessment [LCA;

- A critical and related issue is that notwithstanding the widely varied energy policies and power-generation mixes in South Africa, a fair and internationally harmonized method of evaluating CO2 emissions based on LCA will need to be adopted.

No single government policy or industry commitment will achieve the ambitious goal of carbon neutrality by 2050. We must work collaboratively, at all levels of government and across all industries,

to identify the suite of approaches necessary to establish sustainable pathways to carbon neutrality across sectors that recognise and take into account the economic, geographic and cultural realities of South Africa. The automotive industry remains committed to supporting carbon neutrality as argued in this paper. We believe electrification will play a leading role in this transition but it is not the only and/or the most appropriate technology for our country for immediate implementation.

Other technologies or fuels are also suitable and South Africa should proceed towards the achievement of carbon neutrality by implementing practical and sustainable technological and policy measures tailored to our specific circumstances. Finally, essential to achieving automotive carbon neutrality are comprehensive national industrial and energy policies that effectively promote the competitiveness of the automobile industry.

SOUTH AFRICA'S NEW ENERGY VEHICLE ROADMAP

THOUGHT LEADERSHIP DISCUSSION DOCUMENT

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