



# eMobility Outlook 2024

KSA Edition



# Contents

01

Executive summary

02

KSA's transition to eMobility

03

Building a thriving EV manufacturing hub from the ground up

04

Achieving ambitious EV targets

01

EV price point challenges: Overcoming affordability barriers for wider adoption

02

Optimal temperature considerations

03

Expanding the public charging infrastructure

04

Energy generation outlook: A shift to greener energy sources

05

Looking ahead - recommended key strategies



# Executive summary

Saudi Arabia is making significant strides in its transition to eMobility as part of its broader Vision 2030 strategy, which aims to diversify the economy and achieve net-zero carbon emissions by 2060.

The Kingdom has set an ambitious goal to transition 30% of all vehicles in Riyadh to electric by 2030, as part of a larger strategy to reduce emissions in the capital city by 50%<sup>1</sup>. This transformation is being driven by ambitious targets, substantial investments in local electric vehicle (EV) manufacturing, and rising consumer confidence. According to PwC Middle East consumer survey data, more than 40% of consumers in KSA are considering purchasing an EV in the next three years.

The Kingdom is also focused on building a domestic EV manufacturing sector that is expected to greatly boost its in-country value, attract talent, technology and foreign direct investment. Key players like CEER, Foxconn and Lucid Motors are central to Saudi Arabia's EV manufacturing ambitions. These companies are contributing to the local economy and positioning Saudi Arabia as a regional hub for EV production. Moreover, the Public Investment Fund (PIF) and the Saudi Electricity Company have launched the new Electric Vehicle Infrastructure Company (EVIQ), which plans to establish 5,000 fast chargers across the Kingdom by 2030.<sup>2</sup>

Despite these advancements, challenges remain in the context of affordability of EVs, limited charging infrastructure, the impact of high temperatures on EV performance and the need for advancements in the regulatory framework. Additionally, the Kingdom must secure a stable supply of critical EV battery minerals and transition to cleaner energy sources to power the growing number of EVs.

This report explores the successful uptake of EVs in KSA and focuses on several key areas, such as investing in domestic EV manufacturing to reduce costs and create significant investment opportunities; developing an efficient and accessible charging infrastructure, including fast-charging stations, to overcome range anxiety; establishing a robust aftermarket support system for EV maintenance and repair to boost consumer confidence and exploring innovative, sustainable, and cost-effective

methods for EV battery production. Additionally, fostering public-private partnerships and government initiatives will create a conducive environment for EV infrastructure investment and development and finally, sourcing cleaner energy to power EVs will reinforce Saudi Arabia's commitment to reducing carbon emissions.



<sup>1</sup> <https://www.arabnews.com/node/2492926/business-economy>

<sup>2</sup> <https://www.thenationalnews.com/business/economy/2023/10/09/saudi-arabia-sets-up-new-ev-infrastructure-company-and-plans-5000-chargers-by-2030/>

# KSA's transition to eMobility

Currently, EVs account for just over 1% of overall car sales in Saudi Arabia. As the country begins to reduce its reliance on internal combustion engine (ICE) vehicles, the adoption of electric vehicles is seen as a critical step in lowering overall transport sector emissions.

The push towards eMobility is not only a cornerstone of the Kingdom's economic diversification efforts but also a key driver of its environmental objectives. Saudi Arabia's Public Investment Fund aims to produce half a million EVs by 2030<sup>3</sup>, with CEER, LUCID and Hyundai expected to manufacture 455,000 total EV units annually<sup>4</sup>, contributing to a significant reduction in CO<sub>2</sub> emissions.

Saudi Arabia's commitment of having 30% of vehicles on Riyadh's roads be electric by 2030 is driven by investments worth US\$39 billion in developing a robust EV ecosystem, including US\$18bn for manufacturing,

US\$9bn for battery ecosystem and US\$12bn chips and parts.<sup>5</sup> It is expected that these investments into the eMobility sector will attract US\$150mn in foreign direct investments, add US\$8bn to the Saudi GDP by 2034, and create over 30,000 jobs.<sup>6</sup>

While the current electricity mix allows for some reductions in emissions with EV adoption, these reductions can be significantly improved by increasing the use of green energy sources such as renewables, nuclear power and carbon capture and storage (CCS). By 2030, when the Kingdom's vehicle targets are achieved, emissions are projected to be nearly 13% lower than those of an all-ICE vehicle fleet. However, due to the overall increase in vehicles on the road, emissions will still rise, with EVs and greener energy sources merely helping to limit the growth of these emissions.



<sup>3</sup> <https://www.arabnews.com/node/2495936/saudi-arabia>

<sup>4</sup> PwC ME analysis

<sup>5</sup> PwC Middle East research

<sup>6</sup> PwC Middle East research

# Building a thriving EV manufacturing hub from the ground up

A key differentiator in the Kingdom is its aim to develop an EV manufacturing industry from the ground up, with PIF being the key enabler of a long-term strategy to diversify the economy and move away from fossil fuels.

Local EV manufacturers, such as CEER and Lucid Motors, are at the forefront of the EV transformation in the country, targeting an annual capacity of around 150,000 units each.

CEER, a joint venture between Saudi Arabia's Public Investment Fund (PIF) and Foxconn – the world's largest contract manufacturer of electronics<sup>7</sup> – will design, manufacture, and retail EV sedans and SUVs for consumers in KSA and around the MENA region. In March 2024, the EV maker awarded a US\$1.3 billion contract for the construction of a manufacturing site in King Abdullah Economic City.<sup>8</sup>

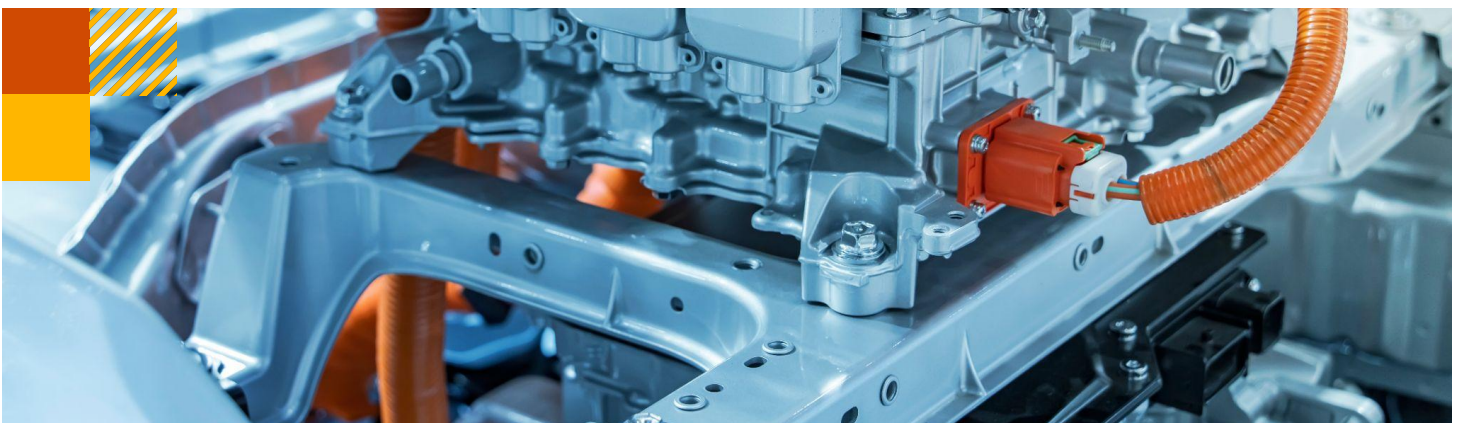
Lucid Motors, an EV startup, majority owned by PIF, has seen year-on-year sales in the Kingdom up 14-fold for the first six months of 2024 and recently secured an additional US\$1.5 billion in funding from PIF.<sup>9</sup> In September 2023, Lucid opened Saudi Arabia's first-ever auto manufacturing facility, also located in King Abdullah Economic City.

With an initial capacity of 5,000 vehicles per annum, the complete facility is expected to have a future capacity of 155,000 EVs annually.<sup>10</sup>

Similarly, PIF and Hyundai Motor Company signed a joint venture agreement to establish a new manufacturing plant in Saudi Arabia. The total investment for the manufacturing plant is estimated to exceed US\$500mn<sup>11</sup> and aims to manufacture 50,000 vehicles per year. The Saudi Arabian Ministry of Investment also signed a US\$5.6 billion<sup>12</sup> investment agreement with Chinese automotive and mobility company, Human Horizons, in a move that will see the two collaborate on the development, manufacture and sale of electric vehicles.

To meet its manufacturing goals, the Kingdom aims to produce 187,500 EV battery units annually, each with a capacity of 80 kWh, totaling 15 GWh. However, two-thirds of these batteries will need to be imported to meet the production targets. Saudi Arabia is securing US\$9 billion for EV batteries, metals, and minerals, with major investments from the EV Metals (US\$900 mn)<sup>13</sup> and Ivanhoe Electric (US\$126.4mn).<sup>14</sup>

Significant investments are also being made in Saudi Arabia's EV chips and parts sector, including US\$9 billion from Foxconn<sup>15</sup>, US\$2.2 billion from Hyundai Transys<sup>16</sup> and a US\$550mn investment from a PIF-Pirelli SpA JV to build a tyre plant that would supply tyres and parts to companies including EV makers Lucid Group Inc. and Hyundai Motors.<sup>17</sup>



<sup>7</sup><https://www.reuters.com/technology/foxconn-aims-double-jobs-investment-india-over-next-12-months-2023-09-17/>

<sup>8</sup><https://www.agbi.com/industry/2024/03/ceer-starts-work-on-1-3bn-ev-manufacturing-complex/>

<sup>9</sup><https://techcrunch.com/2024/08/05/lucid-motors-funding-saudi-arabia-q2-earnings/>

<sup>10</sup><https://ir.lucidmotors.com/news-releases/news-release-details/lucid-group-makes-history-saudi-arabia-it-opens-country-first#:~:text=Through%20the%20development%20of%20electric,Kingdom%20are%20electric%20by%202030>

<sup>11</sup><https://www.hyundai.com/worldwide/en/newsroom/detail/pif-and-hyundai-motor-company-sign-joint-venture-agreement-to-establish-new-automotive-manufacturing-plant-in-saudi-arabia%2509%2509%2509%2509-0000000334>

<sup>12</sup><https://www.wardsauto.com/audi/saudi-arabia-chinese-firm-sign-ev-investment-agreement>

<sup>13</sup><https://www.evmetalsgroup.com/newsroom/evm-plans-for-development-of-complex-in-yanbu-ksa/>

<sup>14</sup><https://www.arabnews.com/node/2230426/business-economy>

<sup>15</sup><https://www.evmetalsgroup.com/newsroom/ev-metals-group-achieves-strategic-milestones-for-construction-of-its-battery-chemicals-complex-in-saudi-arabia-in-2023/>

<sup>16</sup><https://www.agbi.com/tech/2024/06/ceer-signs-2-2bn-deal-with-hyundai-to-power-its-evs/>

<sup>17</sup><https://auto.economicstimes.indiatimes.com/news/tyres/pif-and-pirelli-jv-to-establish-tyre-plant-in-saudi-arabia-investing-usd-550m/104819023#:~:text=3%20min%20read-,PIF%20and%20Pirelli%20JV%20to%20establish%20tyre%20plant%20in%20Saudi,providing%20technical%20and%20commercial%20assistance>

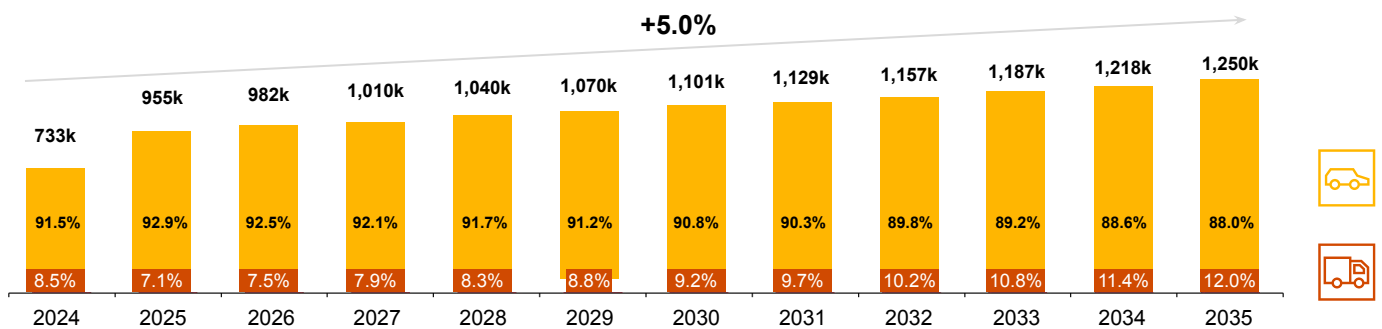


# Achieving ambitious EV targets

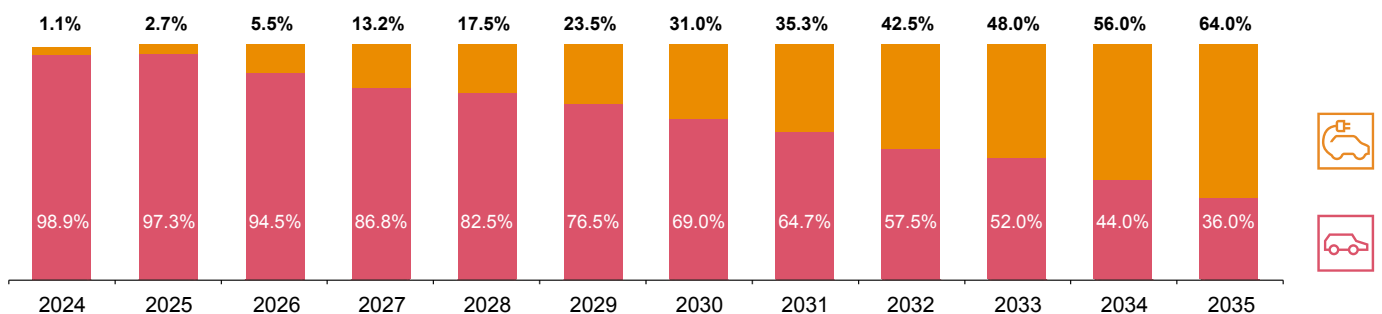
As the Kingdom moves towards achieving its goals for Vision 2030, Saudi Arabia's automotive market is rapidly transforming into a predominantly electric one. By 2030, EVs are expected to capture over 30% of new light-duty vehicle sales, with this share projected to exceed 60% by 2035.

However, accelerating the adoption of EVs and achieving these targets will depend on four crucial factors, such as overcoming affordability barriers for wider adoption, optimal temperature considerations, expanding the public charging infrastructure and assessing the need for sustainable energy generation to power EVs on Saudi roads.

## Forecast: Total new vehicle sales by category in KSA



## Forecast: Percentage share of electric vehicles of total annual sales in KSA



PC = Passenger cars; LCV = Light commercial vehicles (include vans and light pick-up trucks); EV = Electric Vehicles; ICE = Internal Combustion Engines

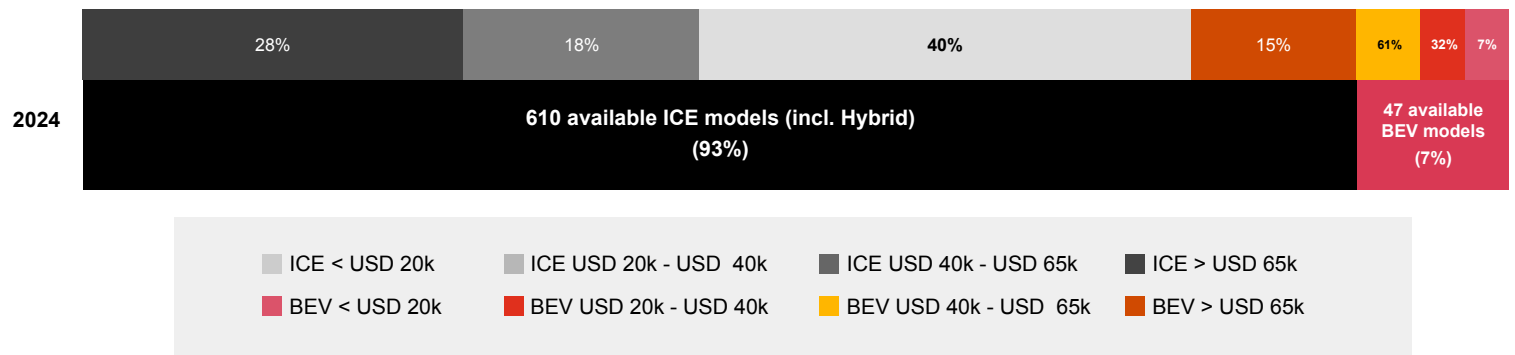


# 1. EV price point challenges: Overcoming affordability barriers for wider adoption

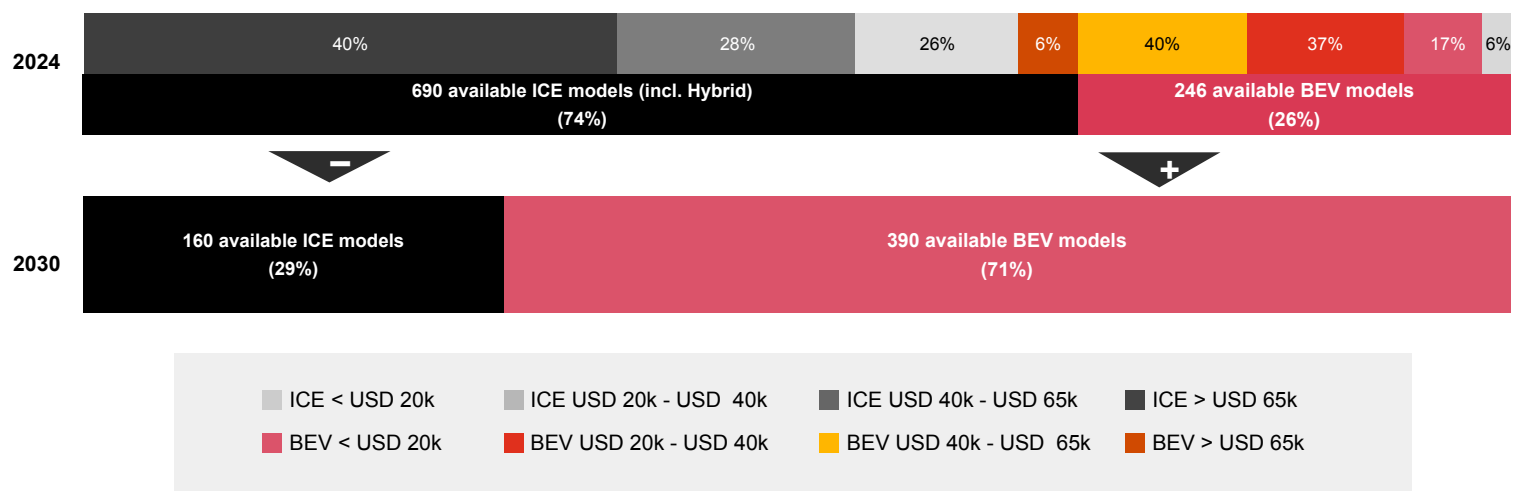
As we currently stand in 2024, only a small minority (7%) of all vehicle models in KSA are EVs, with over 60% of these priced above US\$65,000, highlighting the affordability challenge for Saudi consumers. In contrast, nearly 73% of internal combustion engine (ICE) vehicles are available for US\$65,000 or less. Additionally, more than 90% of vehicle models in the current KSA market are ICE, further underscoring the dominance of traditional vehicles. To encourage wider adoption of EVs in the region, it is crucial to introduce more electric car models at a lower price range.

This situation contrasts with Europe, which sees EVs account for 26% of all models in 2024. This is expected to rise to 71% by 2030, driven by government support for eMobility through electrification targets and stringent rules for reducing emissions in the transportation sector. EU regulators also have set ambitious targets requiring all new cars sold to have zero CO<sub>2</sub> emissions from 2035, and 55% lower emissions from 2030, compared to 2021 levels.<sup>18</sup>

## Available ICE and BEV car models in KSA



## Available ICE and BEV car models in Europe

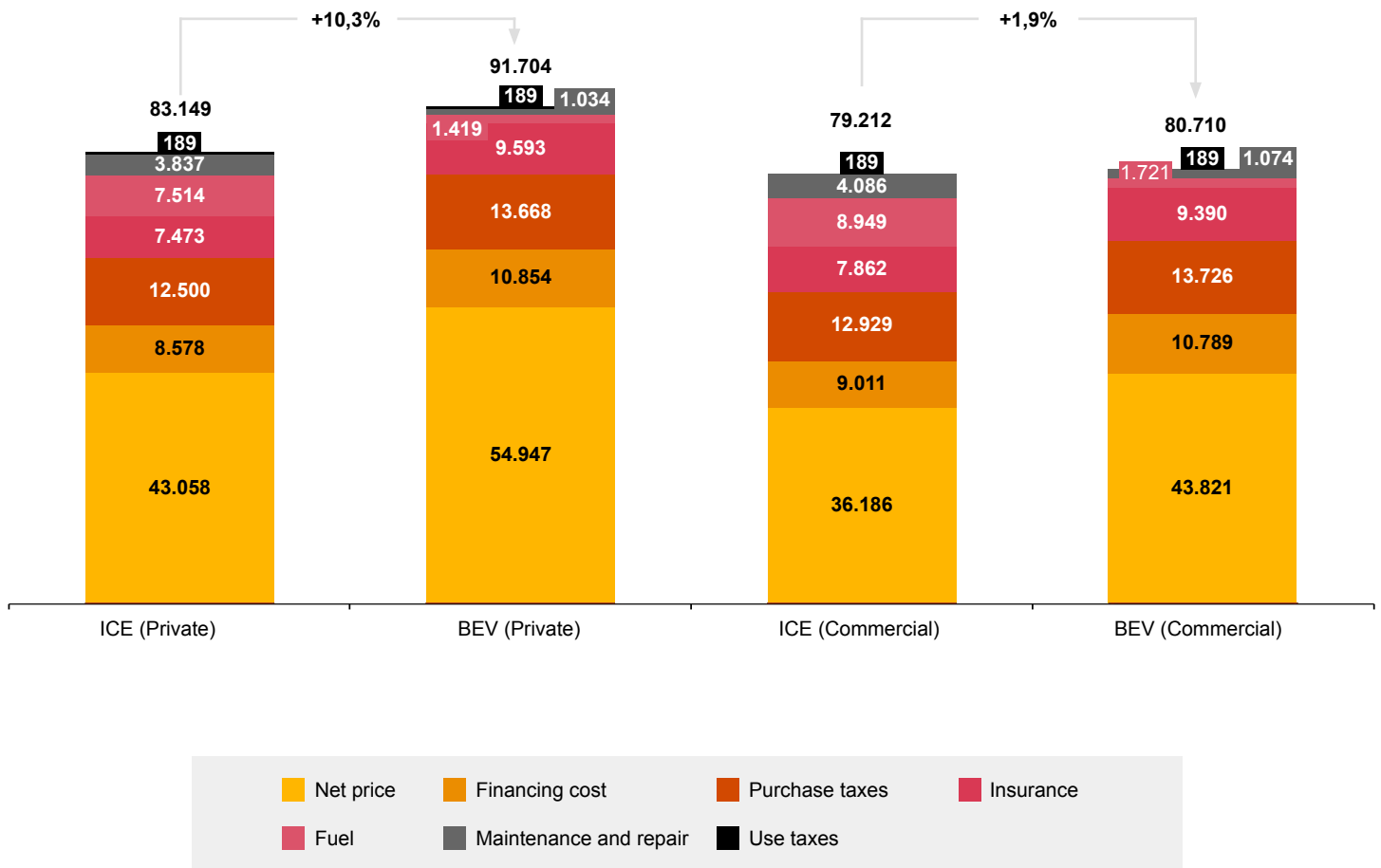


<sup>18</sup><https://www.reuters.com/business/autos-transportation/eu-countries-poised-approve-2035-phaseout-co2-emitting-cars-2023-03-28/#:~:text=The%20EU%20law%20will%20require.new%20car%20fleets%20in%20Europe>

EVs can compete with ICE vehicles, even in the face of higher prices and cheap gasoline. While the total cost of ownership (TCO) - which includes purchase, insurance, servicing and maintenance - of privately-owned EVs remains slightly higher than that of ICE vehicles due to higher initial purchase and insurance costs, the landscape is shifting, particularly for commercial buyers.

The market is also seeing substantial discounts being offered to fleet customers. These pivotal clients often receive substantial discounts, making EVs a more cost-effective option for commercial use. As the market continues to evolve, the cost dynamics for EVs in KSA are expected to become even more competitive, further encouraging adoption.

**Total Cost of Ownership Private Vs Commercial Cars over 5 year and 150,000 km in KSA (in USD)**







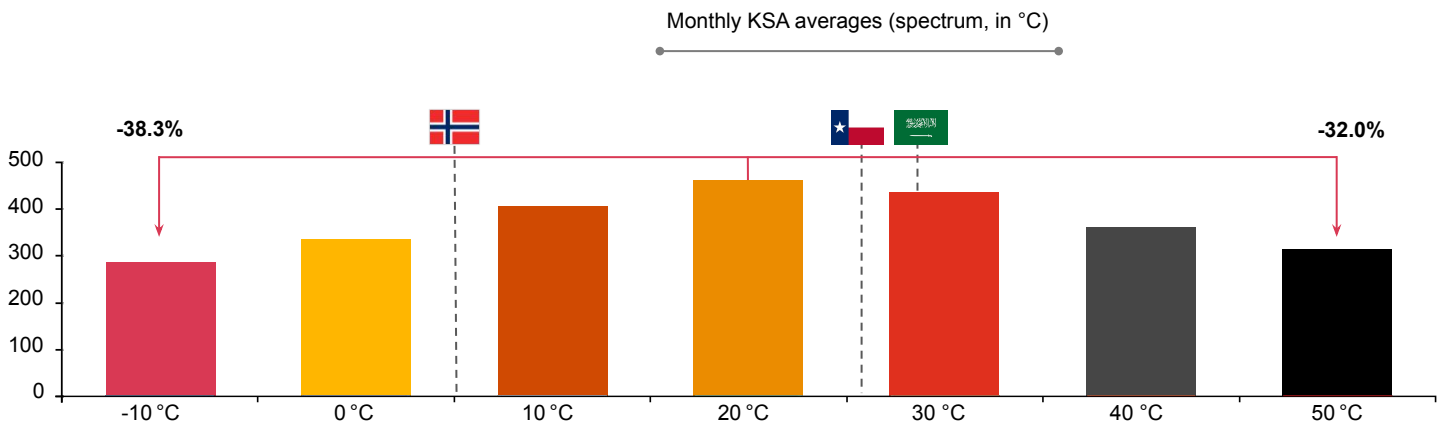
## 2. Optimal temperature considerations

EVs require an optimal operating temperature – around 20 degrees – for maximum efficiency. Fluctuations in temperature can significantly impact range and battery life of an EV; at high temperatures (typical in KSA summers), an EV will need to cool down its batteries for optimal performance, which impacts range and charging speed.

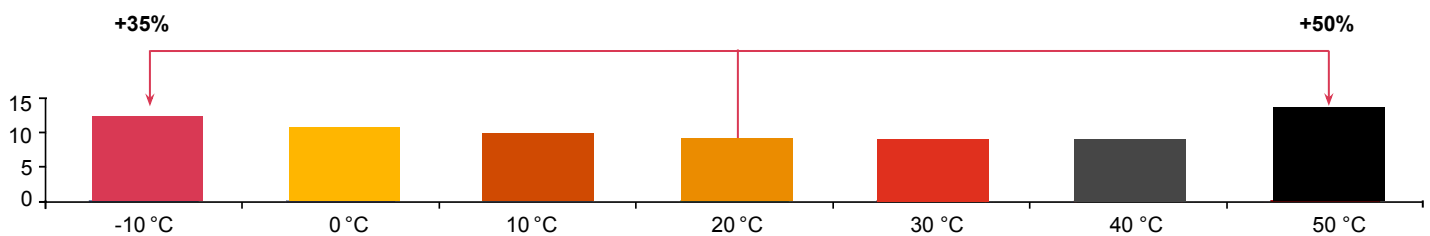
At higher temperatures, such as 40°C, an EV's battery requires more cooling to maintain optimal performance, which in turn reduces both range and charging speed. For instance, an EV that typically travels 460 kilometres on a full charge at 20°C might see its range drop to 360 kilometres at 40°C – a nearly 23% reduction – due to the additional energy needed for cooling.



### Average range (in km) at different ambient temperatures (in °C)<sup>1)</sup>



### Charging time for 100 km (in Min) at different battery temperature (in °C, at charging process start)<sup>2)</sup>



\* Example based on Tesla Model Y Battery size: 79 kWh Optimal consumption@20 °C : 0.17 kWh/km

\*\* Rated charging power: 150 kW, Consumption: 0.25 kWh/km (average); battery temperature not necessarily equal to ambient temperature due to battery thermal mgmt. system



### 3. Expanding the public charging infrastructure

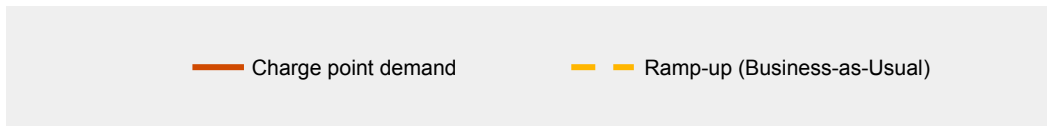
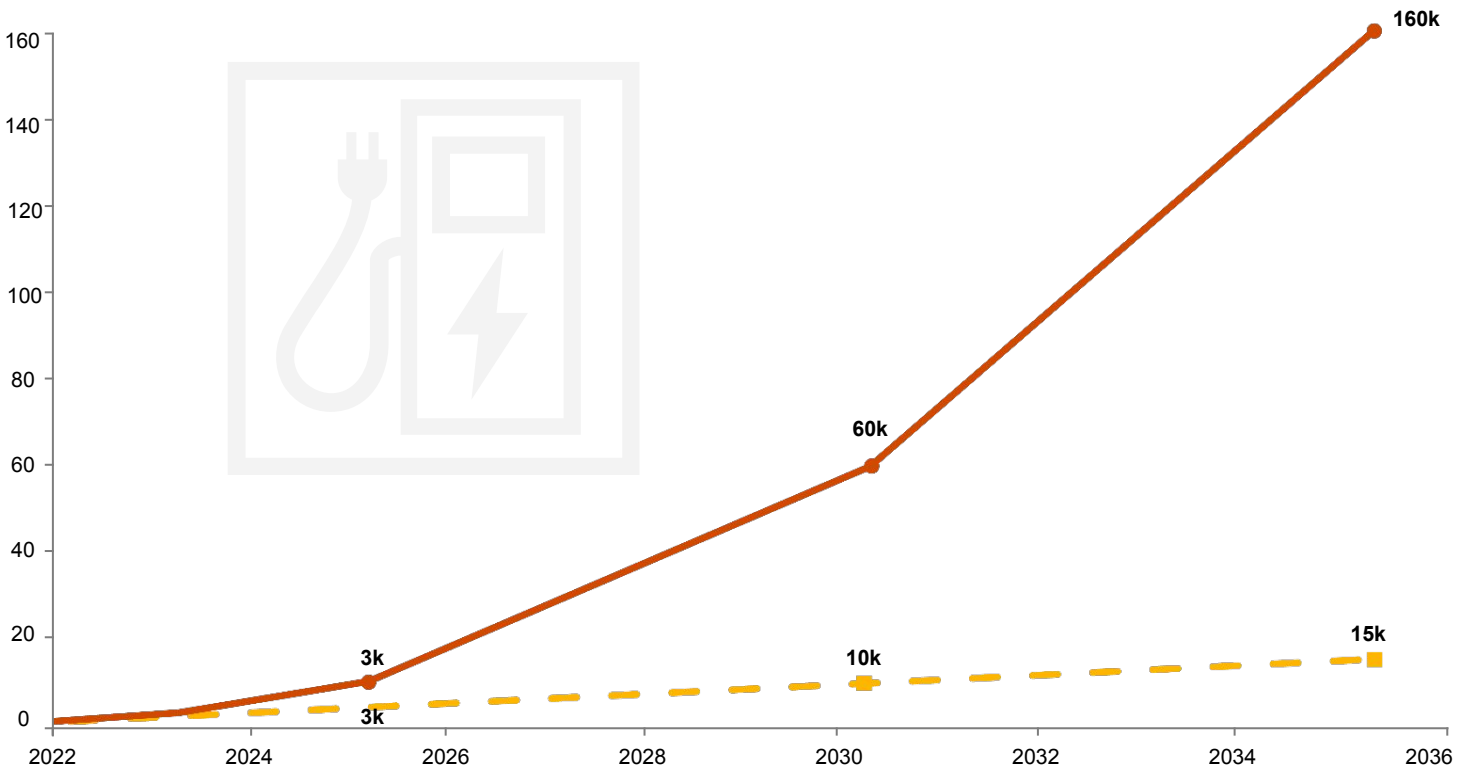
Strategic expansion of public charging infrastructure is required in KSA to sustain rising EV use by 2035.

By the end of 2023, there were only around 285 public charging points deployed in KSA. Over 65% of these points were designated slow chargers which use alternating current (AC) technology upto 22kW, in contrast with 'fast' direct current (DC) chargers, which generally have power starting at 50 kW.<sup>19</sup>

Reports also point to the gap between current roll-out speed and charging infrastructure demand in KSA, with around 160,000 charging stations required to power approximately 3.3mn EVs by 2035.<sup>20</sup>

The Electric Vehicle Infrastructure Company (EVIQ), a joint venture between PIF and the Saudi Electric Company (SEC) founded in late 2023, will play an important role as it installs more than 5,000 chargers across over 1,000 locations by 2030.<sup>21</sup>

Public Charge point Demand vs. Availability in KSA (# of charge points)



<sup>19</sup> <https://www.tapelectric.app/blog/ev-charging-dictionary/>

<sup>20</sup> PwC Middle East | eMobility Check Middle East 2024

<sup>21</sup> <https://insight.astrolabs.com/how-saudi-arabia-is-leading-the-ev-revolution-globally/>



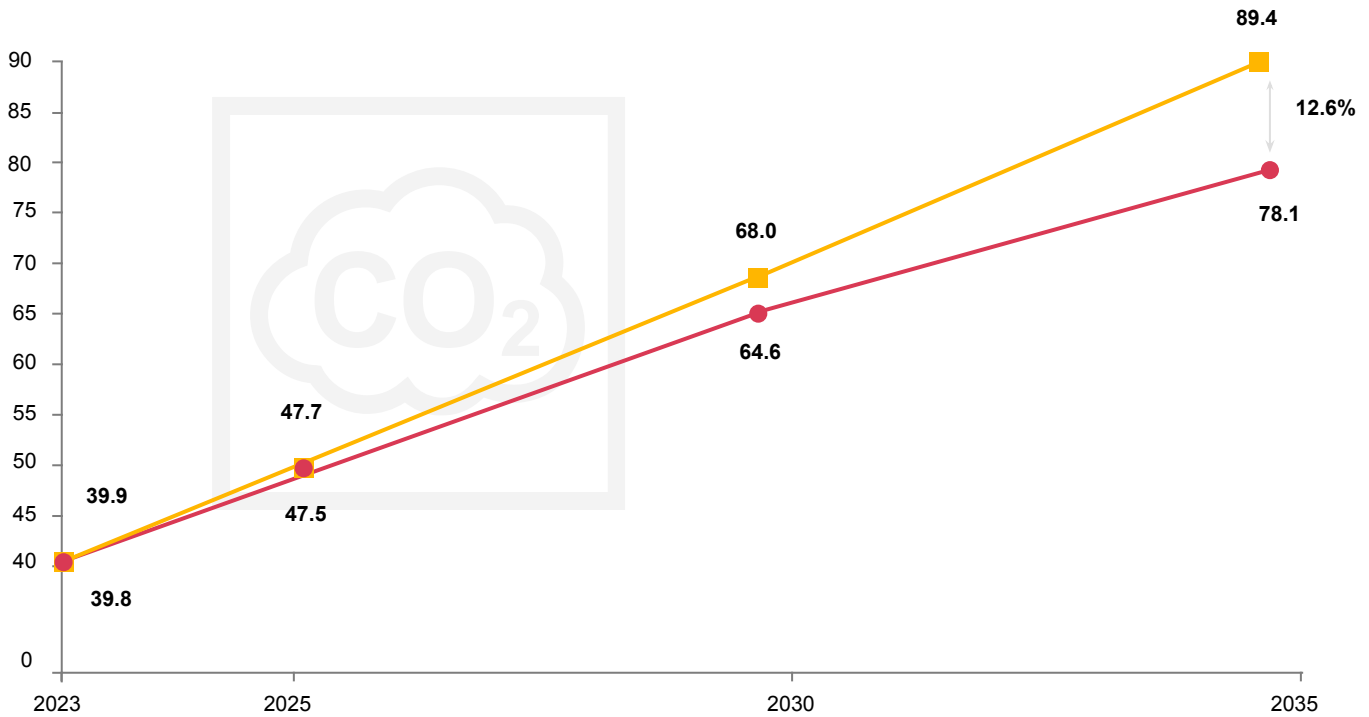
## 4. Energy generation outlook: A shift to greener energy sources

By 2035, having over 3 million EVs on the road in KSA would increase the overall electricity demand by only about 5%. With the current generation capacity from renewable energy sources, Saudi Arabia would be able to meet this demand.<sup>22</sup>

However, there has historically been a gap between electricity generation and consumption due to losses incurred during long-distance transmission. Although generation is higher at the source, a significant portion is lost through the grid before reaching end users.

Due to the expected continued increase in the number of vehicles on Saudi roads in coming years – a high proportion of which will be ICE – CO<sub>2</sub> emissions will continue to rise accordingly. EVs enable these emissions to be minimised with the current electricity mix, with further reductions made possible through a larger share of green energy sources – including renewable, nuclear, and use of carbon capture and storage (CCS).

### Forecast: Total annual CO<sub>2</sub> emissions of passenger cars & light commercial vehicles in the KSA (in Mn tons)



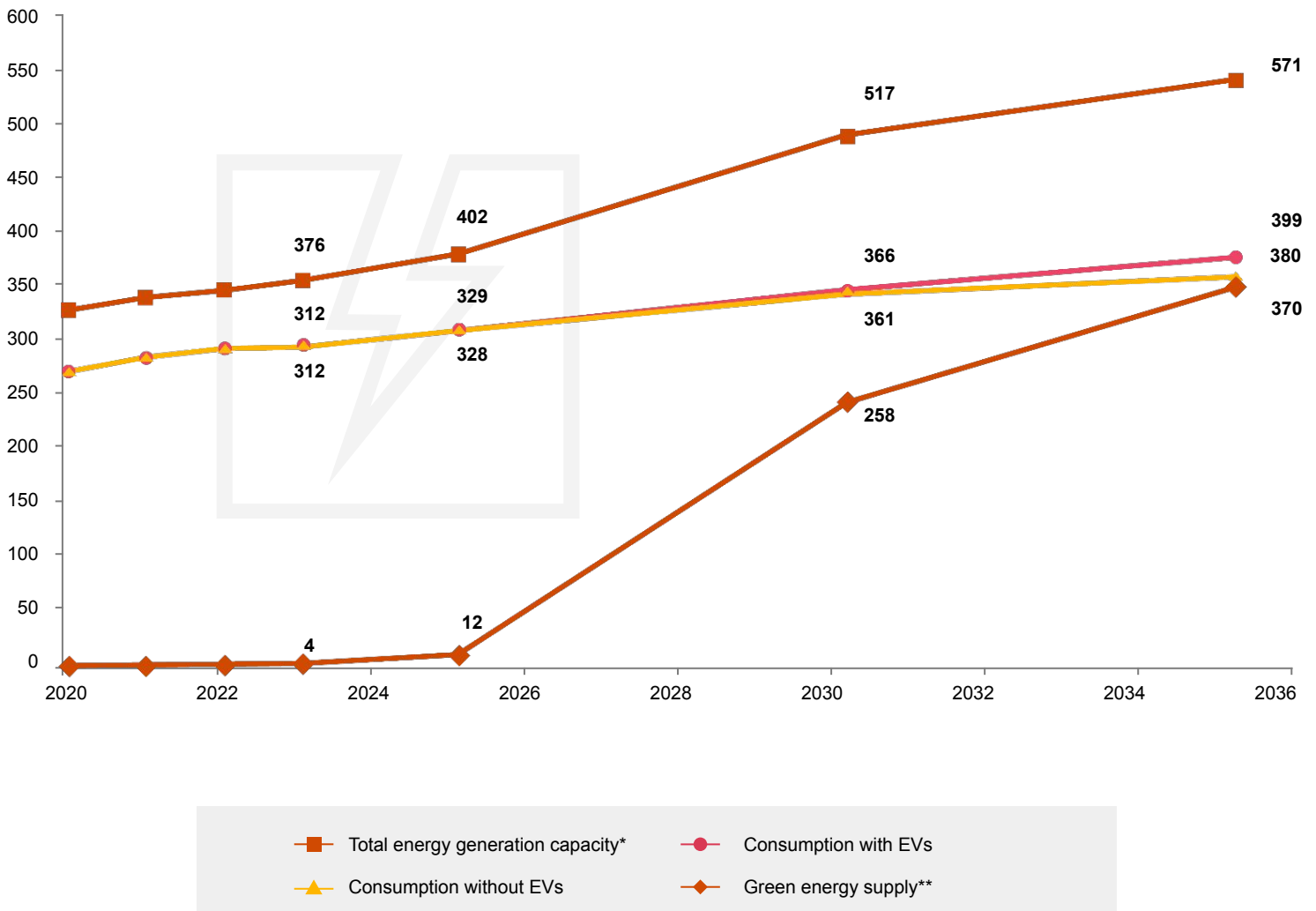
Business-as-usual

EV and greener energy\*

\*Green energy supply includes renewable and nuclear energy

If KSA achieves its EV targets for 2035, emissions will be nearly 13% lower than with a pure ICE vehicle fleet – but will still be far above current emissions. A higher number of EVs will therefore be necessary to reduce total emissions in the transport sector.

### Energy generation vs. demand – with and without EV in KSA until 2035 (in TWh)



\*Theoretical energy that can be generated within KSA by the existing power plant park in years under consideration

\*\*Green energy supply includes renewable and nuclear energy



# Looking ahead - recommended key strategies

Saudi Arabia's approach to eMobility focuses on investing in domestic EV manufacturing, expanding public charging infrastructure, and developing a robust aftermarket support system. By leveraging local resources for innovative battery production and fostering public-private partnerships, the Kingdom aims to create a sustainable EV ecosystem.

Additionally, transitioning towards cleaner energy sources will ensure the long-term viability of eMobility, aligning with Vision 2030 objectives and positioning Saudi Arabia as a leader in the global EV market.

## Key strategies that can help the Kingdom drive the uptake of EVs:

**Continue investing in domestic EV manufacturing and assembly:** Saudi Arabia's investment in domestic EV manufacturing will allow it to reduce costs and enable access to European, Indian and Middle Eastern markets. The country's focus on localising automotive production presents significant investment opportunities, with favourable incentives and infrastructure support to attract automotive manufacturers, establish local assembly plants, create jobs and boost the economy.

01

**Expanding public charging infrastructure:** Saudi government and private entities need to invest in building efficient, accessible charging infrastructure to overcome driver 'range anxiety' and encourage EV adoption.

Integrating ultra-fast charging technology in Saudi Arabia's intense climate poses challenges, but using a DC power network instead of AC can lower overall capital costs and provide a low-cost charging solution to customers. Further, having a location strategy roadmap targeting urban areas with high population, tourist locations, and commercial and industrial developments will enable faster and more targeted roll-out of charging infrastructure. Additionally, leveraging GenAI technology can help companies analyse data to identify optimal locations and predict utilisation rates.

02

**Developing a robust and efficient aftermarket support system for EVs:** Out-of-warranty EV service is rapidly growing, requiring skilled workers trained in EV-specific repairs, such as high-voltage electrical, battery management and regenerative braking. This is likely to positively impact the consumer buying sentiment. Currently, access to EV-specific repair and other services is a major concern in several countries, including KSA. Several original equipment manufacturers (OEMs) are bundling aftermarket support during the sales cycle to enhance the overall value proposition. This will further drive the second-hand market for EVs, which is currently not favourable given faster depreciation rates.

03



# Looking ahead - recommended key strategies

## **Transitioning towards cleaner energy sources:**

Integrating EVs into transport systems will have minimal short-term impact on existing electricity generation infrastructure. However, the expected rise in EV numbers in the coming decades will necessitate reinforcing local grid networks. This effort should be aligned with the charger location strategy, as forecasting EV adoption rates and charger deployment locations will enable utilities to upgrade transformers and grid capacity more accurately and efficiently.

04

## **Focused government initiatives and public-private partnerships:**

While the government has made bold moves with notable investments and emission targets, there is an opportunity to accelerate the EV adoption journey, and drive measures that can fast-track development. This includes offering incentives to attract local suppliers for auto components which are currently absent. A strong local supply chain will be critical to realise the vision and need significant policy support and private industry partnerships. Similarly, targeting areas such as charger and payment systems standardisation will reflect ground-level implementation.

Significant government initiatives and public-private partnerships will be required to create a conducive environment for investment and development of EV infrastructure. However, despite ambitious targets and committed policies, the current regulations are relatively new, fragmented and involve multiple layers and stakeholders.

05

## **Innovative and economically efficient methods for EV battery production:**

Saudi Arabia's extreme summer temperatures can adversely affect lithium-ion batteries, which are expected to remain the EV industry's primary power source for years due to the slow development of cheaper alternatives. To mitigate this, the Kingdom is exploring innovative methods to extract and process lithium from seawater desalination and oil-extraction brine, aiming to establish a domestic lithium supply chain and reduce dependence on international sources.

In 2021, Saudi Arabia became the first Middle Eastern country to secure lithium processing capacity by partnering with EV Metals Group to build a battery chemicals complex in Yanbu Industrial City. As global competition for critical minerals intensifies, Saudi Arabia must strategically balance its relationships with the US, Russia and China to strengthen its role in the lithium-ion battery supply chain.

06

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To learn more about how we are helping organisations accelerate sustainable mobility.



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