Addressing electric vehicle manufacturing challenges

A deep dive to understand innovation and efficiency driven by EV contract manufacturing

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Contents

Abstract

The emergence of advanced technologies in the automotive sector is improving the drive range and reducing the total cost of ownership for electric vehicles (EVs). This, along with increased awareness of sustainability, is fueling demand for EVs. EVs are expected to achieve a 25% share in light vehicle sales globally by 2025 and more than 90% by 2050.[1]

This rapid shift from internal combustion engine (ICE) vehicles to EVs has brought a huge opportunity for automobile manufacturers to scale up their EV production. However, this is posing challenges for automobile manufacturers, as they need to invest heavily in a short time span for EV design, development, manufacturing, selling and servicing infrastructure. There are additional challenges related to battery cost, supply chain complexities and manufacturing infrastructure. Contract manufacturing is becoming an increasingly important strategy for EV manufacturers.

Traditional automobile OEMs transitioning to EVs can leverage contract manufacturing for various benefits, including accelerated market entry, cost savings, flexibility, and access to specialized knowledge and technology. Similarly, contract manufacturing benefits early-stage OEMs to achieve scalability and bypass high capital investments. With these advantages, there are some risks and challenges, such as quality control, intellectual property protection, and lack of product differentiation. To mitigate such risks, there should be thorough due diligence and evaluation, followed by clear contractual terms and monitoring.

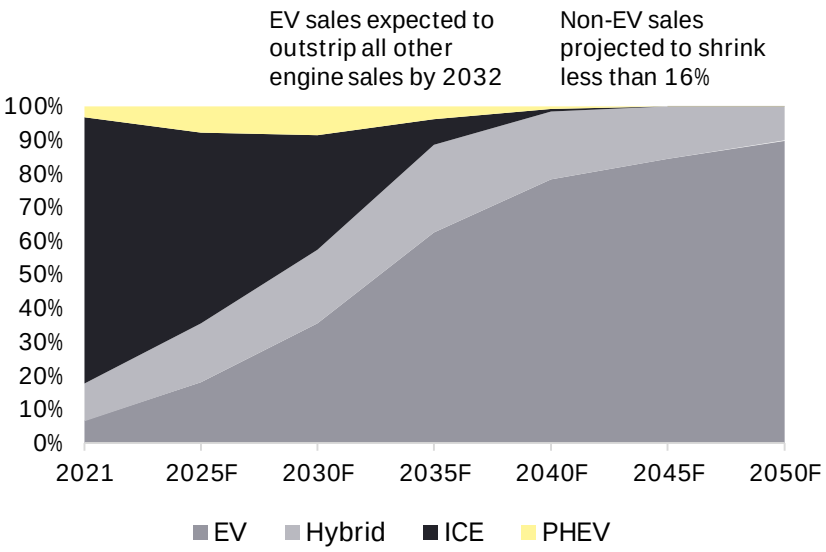
This article explores the benefits of contract manufacturing of EVs and also examines the recent trend of converting ICE plants to EV manufacturing plants and the potential levers to enhance profitability associated with EV manufacturing.

[1] EY internal research

Overview

By 2025, EVs are forecasted to achieve 25% of the total light vehicle sales globally. EVs are expected to account for 90% of the global light vehicle sales by 2050.[1] Similarly, in the US, consumer preference is shifting from plug-in hybrid electric vehicles (PHEVs) to EVs, and 100% adoption is expected to be achieved by 2045. By 2030, EV sales in the US are expected to reach 5.7m units/year.[1]

Global light vehicles sales forecast, by powertrain, 2021–2050



Source: EY internal research

We are living in an era of disruptions, where advanced technologies such as automation, digitization, and new business models have dramatically changed the way industries work. The automobile sector, which is shifting gears to completely new ways of mobility solutions such as EVs, is no exception. With an improved drive range and falling prices, the acceptance of electric vehicles has increased significantly. In addition, different governments are offering incentives or tax benefits to increase the adoption of EVs to achieve environmental sustainability goals and reduce dependence on fossil fuels.

[1] "Global Electric Vehicle Trends deck," Gaurav Batra, Anuj Chandna, Angshuman Sharma, Sparsh Gulati, July 2022 (EY internal research)

The EV manufacturing market is primarily divided into three categories:

Traditional automobile manufacturers that are developing and manufacturing their own EV products in parallel with traditional ICE vehicles. Scale of EV production is low to medium with a low level of supply chain integration.

Pure play EV manufacturing companies that were early entrants in the EV space and have a relatively matured EV manufacturing ecosystem. These companies have a medium to high level of supply chain integration.

Emerging new players are EV original equipment manufacturers (OEMs) that designed and developed their own electric skateboards.* These companies are willing to share their modular electric skateboards with other companies, which will act as a platform for EV development.

Significant investment is committed to commercializing the technologies related to EV manufacturing.

In 2020, an investment of $275b was estimated for building EV manufacturing infrastructure globally.[1] But within two years, in 2022, this projection for 2030 was increased by 20% to $345b.[1]

Points to ponder

1

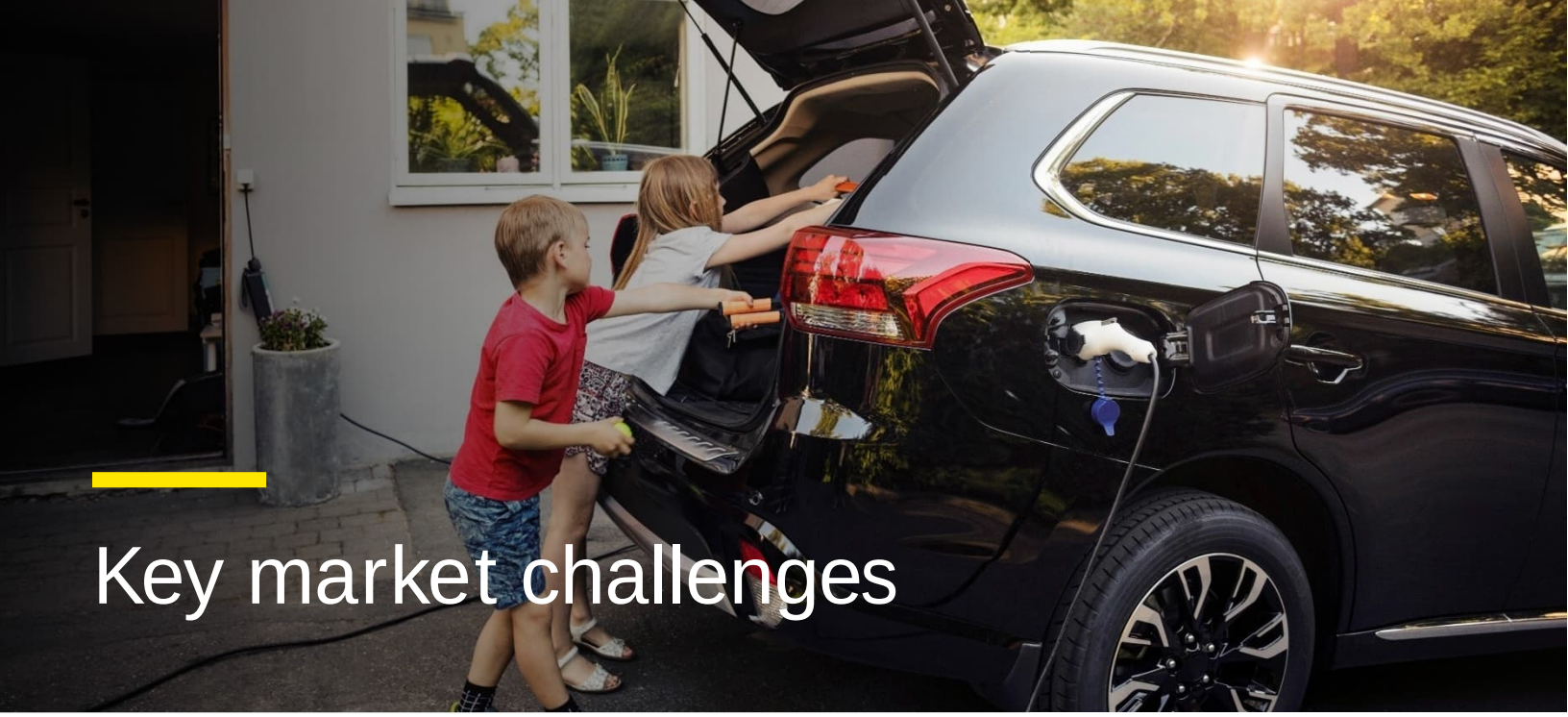
Although it sounds very exciting, this shift is challenging the traditional business models of automobile manufacturing, including design, development, manufacturing, selling and servicing.

2

Can auto manufacturers quickly adapt and scale EV production to meet rising demand for EVs? The answer becomes trickier when factors like high R&D cost, supply chain complexities, rising raw material prices and new competitors are considered.

* Skateboard chassis or platform that looks like a skateboard that carries the vehicle's battery and electric motors

[1] "Power play: Evaluating the U.S. position in the global electric vehicle transition" page 5, ICCT, June 16, 2021. https://theicct.org/sites/default/files/publications/us-position-global-ev-jun2021-1.pdf



Key market challenges

Battery technology

One of the biggest challenges for EV manufacturers is the development of advanced and reliable battery technology. This requires high R&D investment and expertise to provide a sufficient range, charging speed and durability. Developing and producing high-quality batteries at scale is a significant challenge for automobile component manufacturers.

Supply chain

The supply chain for EV manufacturing is still evolving and can be more complex than that for traditional vehicles. Manufacturers must secure reliable and cost-effective sources of raw materials, components and finished products and must manage a global supply chain that includes many different suppliers, often located in different countries.

Manufacturing processes

EVs require different manufacturing processes than traditional vehicles. For example, the assembly of electric motors and battery packs requires different tools and techniques than the assembly of combustion engines. Manufacturers must invest in new manufacturing equipment and retrain their workforce to adapt to these new processes.

Infrastructure

EVs require a different infrastructure than traditional vehicles, including charging stations and battery recycling facilities. Manufacturers must work with governments, utilities and other stakeholders to develop this infrastructure and help ensure that it is accessible and affordable for consumers.

Cost

EVs can be more expensive to manufacture than traditional vehicles due to the cost of batteries and other components. Manufacturers must find ways to reduce the cost of EV production without sacrificing quality or performance to make EVs more affordable for consumers.

A rapid increase in the raw material costs owing to the COVID-19 pandemic, the war in Ukraine, and high demand for EVs has forced many automakers to increase prices. Direct material costs for an EV is up by 144% from $3,180 in March 2020 to $8,255 per vehicle as of May 2022.[1]

[1] "Raw material costs for electric vehicles have doubled during the pandemic," Michael Wayland, *CNBC website*, www.cnbc.com/2022/06/22/electric-vehicle-raw-material-costs-doubled-during-pandemic.html, June 22, 2022.

EV contract manufacturing business models

Contract manufacturing is becoming an increasingly important strategy for EV manufacturers that are looking to reduce costs, scalability, improve efficiency and stay competitive in a rapidly changing market. As per ICCT, by 2027, a midsize electric car with a range of 300 miles would achieve cost parity with a conventional vehicle of similar specifications.[1]

Contract manufacturers

- These are companies that are primarily in contract manufacturing of various automobile components; however, they are willing to bring in complete EV manufacturing capability.
- They are exploring opportunities to start contract manufacturing of complete electric vehicles.

Shared manufacturing capacity

- These manufacturers are setting up joint ventures to provide dedicated EV contract manufacturing services.
- This would include consulting, design and manufacturing services.
- The vehicle that is produced will bear the automaker's name and branding.

Electric skateboard sharing

- These are electric vehicle OEMs that have designed and developed their own electric skateboards.
- These companies are willing to share their electric skateboards with other OEMs, which will act as a platform for vehicle development.
- This enhances opportunities for shared investment and technologies.

[1] "Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022–2035 time frame," *ICCT*, theicct.org/wp-content/uploads/2022/10/ev-cost-benefits-2035-oct22.pdf, October 18, 2022.

EV contract manufacturing benefits and advantages

Cost reduction

Contract manufacturing allows EV manufacturers to reduce their production costs by outsourcing the production of components or entire vehicles to companies with specialized expertise and economies of scale. This can help them to compete with traditional automakers that have a head start in terms of manufacturing scale and efficiency.

Time to market

Contract manufacturing allows EV manufacturers to speed up their time to market by leveraging the expertise and resources of their partners. For example, contract manufacturers can help to streamline the design and development process and accelerate the production of prototypes and final products.

Flexibility

Contract manufacturing allows EV manufacturers to be more flexible in their production strategy. They can choose to outsource the manufacturing of certain components or entire vehicles, depending on their needs and priorities. This can help them to respond quickly to changes in the market or to customer demand.

Scalability

Contract manufacturing allows EV manufacturers to scale up or down their production as needed without making large investments in manufacturing infrastructure. This can be particularly important for startups and smaller companies that are still growing and may not have the resources to invest in their own manufacturing facilities. Scalability also can significantly reduce the indirect cost of production.

Managing supply chain complexities

Contract manufacturers often have experience and expertise in managing supply chain complexities related to sourcing, procurement, assembly and product lifecycle management. Contract manufacturers can work in collaboration with OEMs and bring innovative ideas and solutions to the table. For example, they may have expertise in the latest materials or manufacturing processes that can help to improve the performance, efficiency and safety of EVs. Such a collaborative approach is expected to significantly reduce OEMs' R&D costs in the next five to seven years.

Key advantages

One of the main advantages of converting ICE plants to EV manufacturing plants is that it allows automakers to leverage existing production infrastructure and expertise rather than building new facilities from scratch. Converting an existing plant can also be less expensive and time-consuming than building a new one and can reduce the overall carbon footprint of the manufacturing process.

Many major automakers are already investing in the conversion of their existing ICE plants to EV manufacturing facilities. For example, Ford has announced plans to invest $22 billion in EV production through 2025,[1] including the conversion of several existing plants in North America to EV production. Based on ICCT data, seven US automobile plants will be all EV plants by 2025.[2]

Ten additional plants are expected to partially convert into EV plants by 2025.[2]

Emerging new players are EV original equipment manufacturers (OEMs) that have designed and developed their own electric skateboards. These companies are willing to share their modular electric skateboards with other companies, which will act as a platform for EV development.

In line with EV contract manufacturing, there is a growing trend to convert traditional internal combustion engine (ICE) production facilities into EV manufacturing plants.

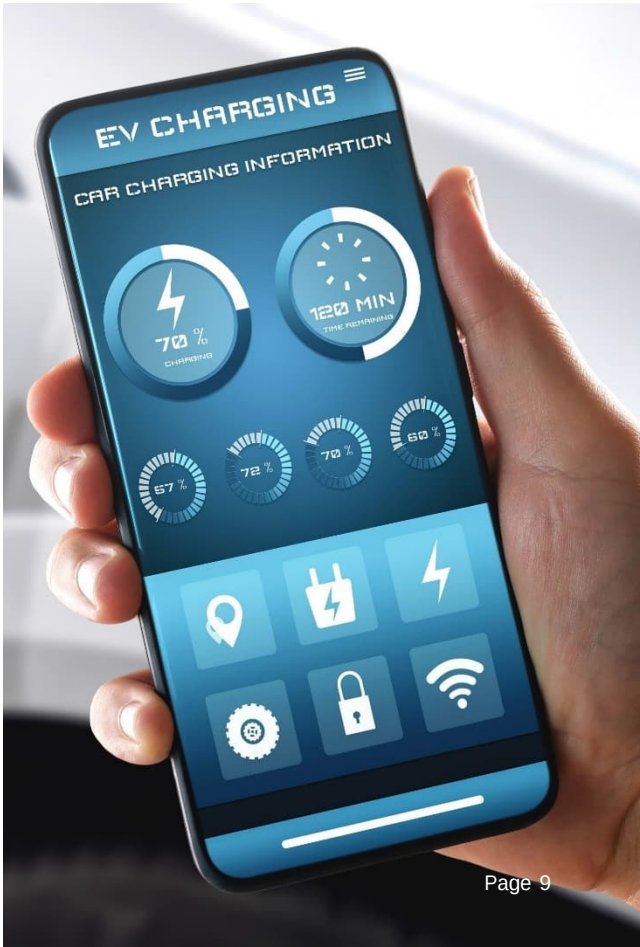
This trend reflects a strategic shift among large automobile manufacturers, where they are trying to catch up with first movers in the EV space. This is also an important step toward a shared, sustainable and efficient mode of EV manufacturing.

Points to ponder

An important point to consider is the growing number of startup EV companies that are converting existing ICE facilities to EV production plants. These companies are looking to partner with OEMs or join hands as contract manufacturers to leverage their expertise and reduce costs.

Overall, the trend of converting ICE plants to EV manufacturing plants is expected to accelerate in the coming years to develop flexible or shared contract manufacturing facilities.

This would bring opportunities to share modular skateboard platforms, reduce costs and improve efficiency in the production processes.



[1] "Ford doubles electric vehicle investment to $22 billion through 2025," Fred Lamber, *Electrek*, electrek.co/2021/02/04/ford-doubles-electric-vehicle-investment-22-billion-through-2025/, February 4, 2021.

[2] "Power-play evaluating the US position in the global electric vehicle transition," *ICCT*, Anh Bui, Peter Slowik and Nic Lutsey, theicct.org/wp-content/uploads/2021/12/us-position-global-ev-jun2021-1.pdf, June 29, 2021.

Potential levers of profitability for EV manufacturers

Modular platform

Flexibility to share modular platforms among multiple manufacturers will help improve the margins for contract manufacturers.

Value chain integration

Control over battery pack integration and assembly can save 2%–3%. This will result in an increase in the net margin by 1%–2%.[1]

Optimal usage of installed capacity

Improving capacity utilization from 75% to 85% will result in a 0.5% increase in net margin.[1]

Flexible manufacturing

Shared manufacturing facilities with modular flexibility between different EVs would reduce capex requirements up to 25%. This will result in a 1%–2% increase in net margins.[1]

Policies and subsidies

Federal policies and subsidies toward carbon neutrality would support pretax profitability of manufacturers.

Points to ponder

Contract EV manufacturing is still in the nascent stage and companies are exploring engagement opportunities with automobile companies. However, it has the potential to rapidly grow and support the ongoing transition in the automobile sector from ICE to EVs.

This includes addressing prominent issues related to EV manufacturing such as high R&D cost, scalability, profitability and sustainability. We have worked with some of the leading and upcoming EV manufacturers to optimize costs, using digital, technology and analytics.

R&D cost of OEMs would be reduced significantly in the next five to seven years.

By 2030, indirect cost is expected to reduce due to large-scale manufacturing (including contract manufacturing) and higher sales of EVs. According to ICCT, an average 70% decline in indirect cost is expected by 2025 from 2017 due to increased scalability.[2]

[1] EY internal analysis

[2] "Update on electric vehicle costs in the United States through 2030," Nic Lutsey and Michael Nicholas, ICCT, theicct.org/wp-content/uploads/2021/06/EV_cost_2020_2030_20190401.pdf, April 2, 2019.

Conclusion

To address the emerging challenges and complexities related to new ways of mobility such as EVs, the right supply chain strategy – including selection of contract manufacturing suppliers – is extremely important. To that end, it is necessary to conduct a thorough functional and technical capability assessment of the entire supply chain ecosystem of contract manufacturing.

EY Supply Chain & Operations helps automobile manufacturers and contract manufacturers address complexity and ambiguity in future operations and operating models.

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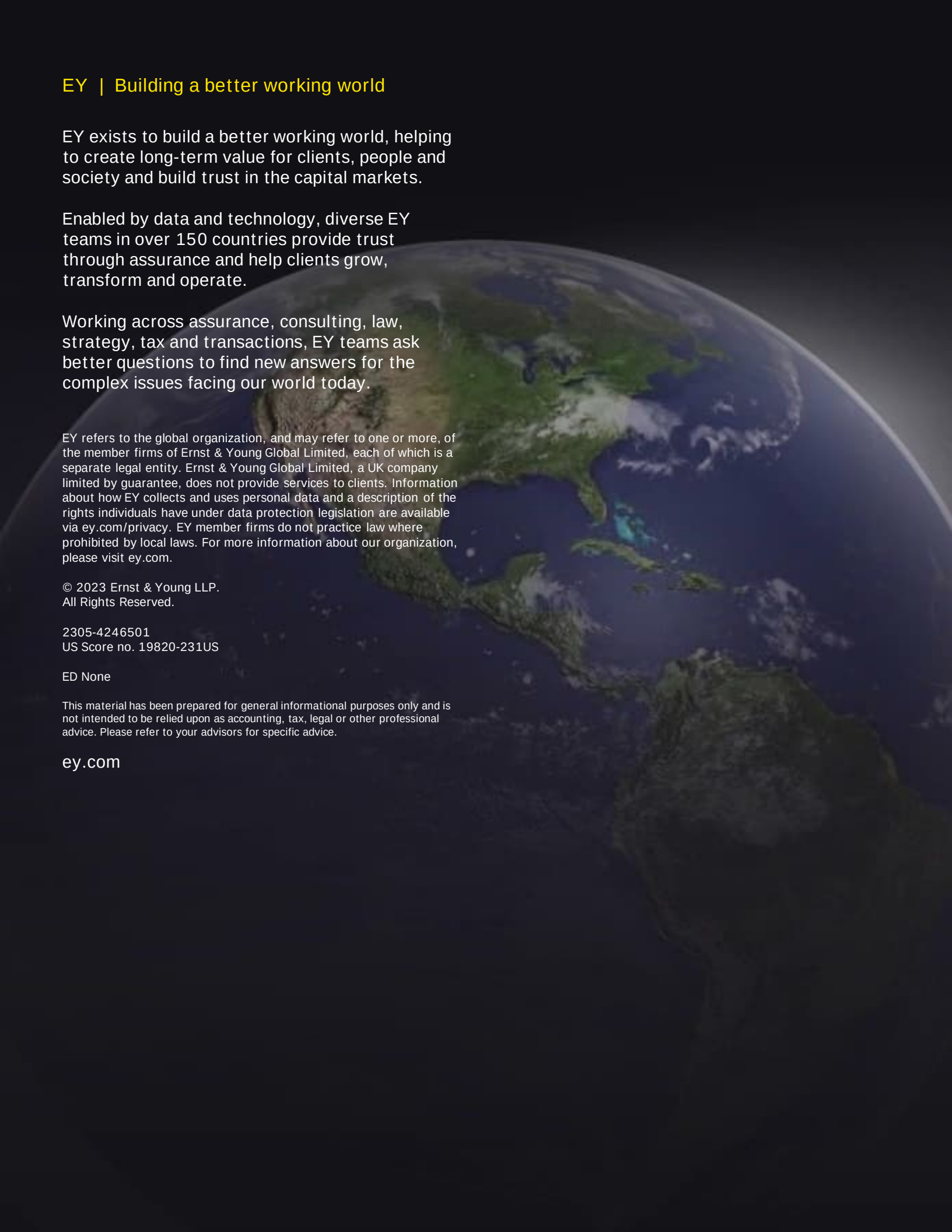

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