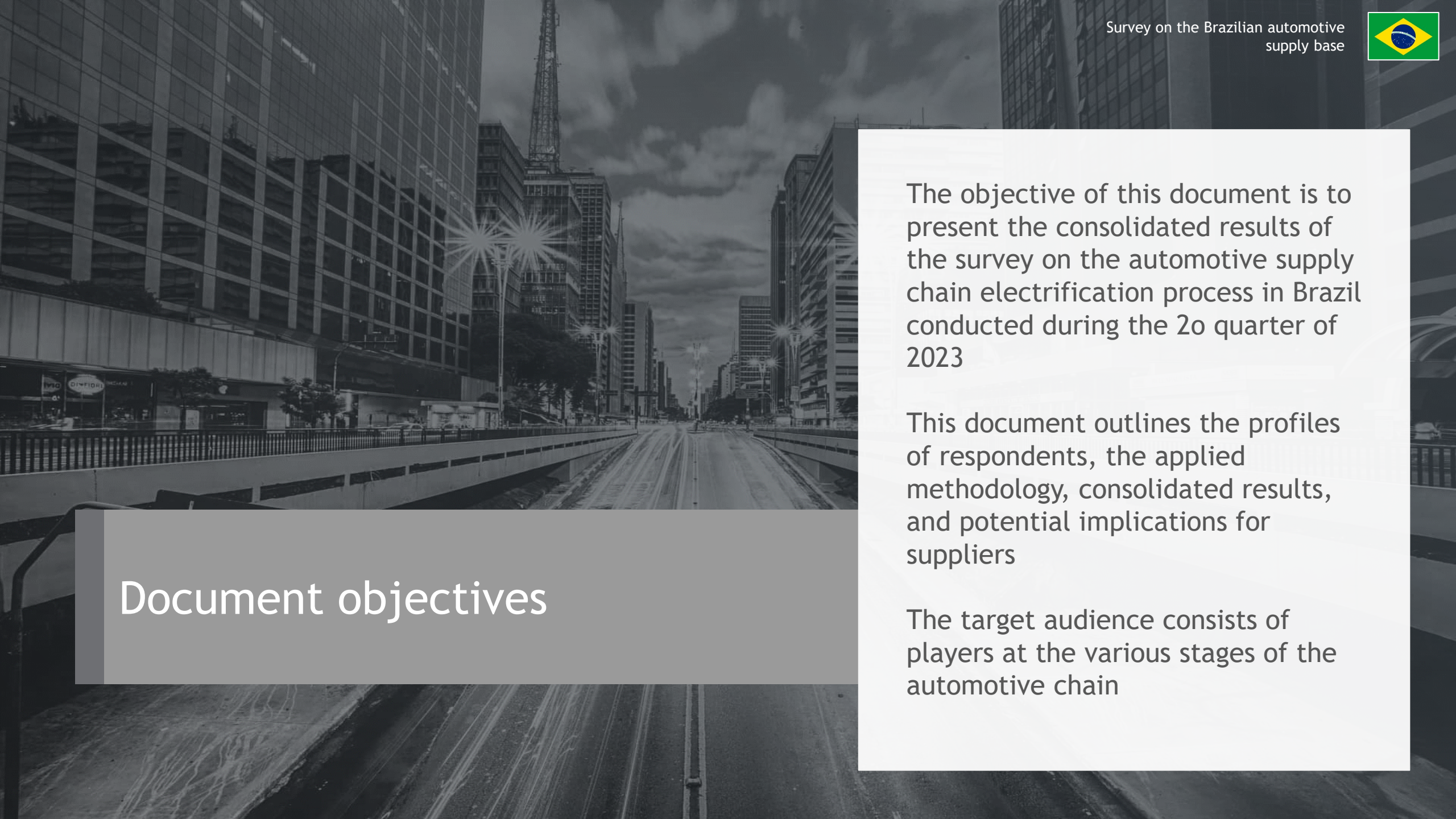
A collaboration

BCG Anfavea SINDIPEÇAS

Survey on the electrification process of Brazilian automotive supply base

SÃO PAULO, AUGUST 2023



Document objectives

The objective of this document is to present the consolidated results of the survey on the automotive supply chain electrification process in Brazil conducted during the 2o quarter of 2023

This document outlines the profiles of respondents, the applied methodology, consolidated results, and potential implications for suppliers

The target audience consists of players at the various stages of the automotive chain

Introduction

Electric vehicles will gain more prominence in the global automotive market in the next decade. Large automotive markets such as the US, Europe, and China are advancing towards electric vehicles while the value chain is getting prepared to attend this growing demand.

In Brazil, how do suppliers see the challenge of decarbonization and the electrification process? What are the prospects and implications? What are the biggest challenges and opportunities?

To answer those questions, **BCG (Boston Consulting Group), Sindipeças, and ANFAVEA partnered to establish a consolidated perspective from the Brazilian automotive supplier base.** An online survey was designed and sent to Sindipeças members. We also interviewed over 15 senior executives.

The survey demonstrates that **a large portion of automotive suppliers are confident about the hybrid vehicles advancement in the next 5-10 years** and are preparing to attend this demand. **Demand** visibility, **local industry competitiveness level** (vs the global market) and **investment capacity** were identified as **the main challenges in the process**.

A significant share of respondents said that they are **adapting their product portfolios to follow new technological trends**. The **transition to hybrid vehicles in the upcoming years can be seen as an intermediate stage** for suppliers in their electrification process (and in the development of new capabilities).

In summary, despite the more gradual electrification path in Brazil vs. more advanced markets, the moment is already favorable for **automotive suppliers to prepare and actively participate in this transition.**

Global context and Survey perspective in Brazil

BCG's perspectives and trends about the electrification process, globally and in Brazil

Respondent profiles and methodology

Consolidation of Results

Potential implications for the Brazilian automotive supply chain

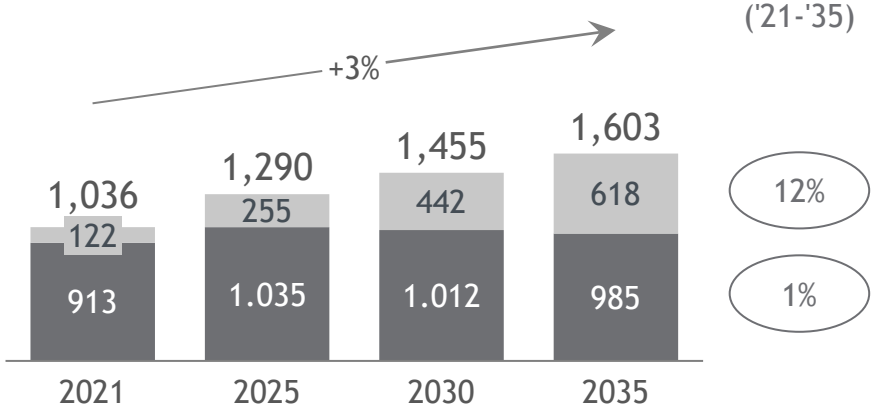
Four trends will transform the sector and mobility…

Global trends

1. Electric vehicles (BEV) will be the dominant technology
2. Connected vehicles will continue to grow and become more relevant
3. Shared mobility will continue to grow in relevance
4. Autonomous vehicles to become a reality in the next decade

…impacting the economic balance of the chain, resulting in possible risks/opportunities for suppliers

Revenue pool ($ billions)



CAGR ('21-'35)

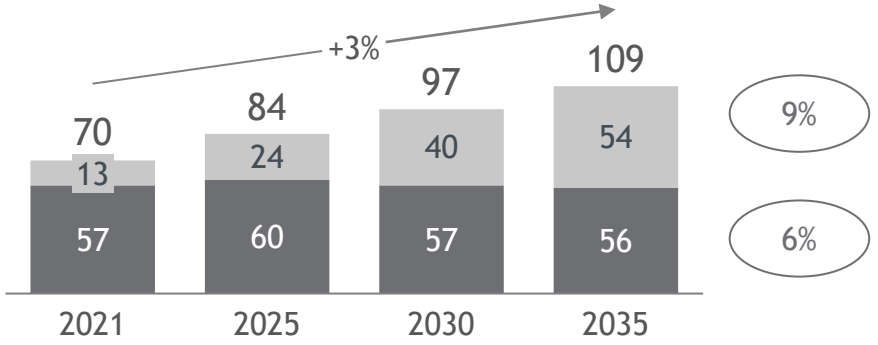
12%

1%

Key development elements

- Increase in emerging revenue propelled by BEV expansion
- The classic revenue pool stagnates as BEV sales grow in China and other regions around the world

Profit pool ($ billions)



Margin ('35)

9%

6%

- The emerging profit pools will account for almost half of the generated value (margin)
- The classic profit pools stagnate over time

In this context, automotive suppliers are globally reflecting on their corporate strategy and positioning on the chain

Consolidation of Internal Combustion Engine platforms

Price pressure for remaining SOPs

Auto OEMs speeding up the end of their ICE vehicles portfolio

Tendency of automakers to obtain ICE vehicle components from fewer suppliers

Opportunities for suppliers that seek to develop electrified vehicle components

Main BEV platforms nearly finished

EV penetration could reach approximately 40% of market share in 2023

Pool of emerging profits gaining importance (related to electrified vehicle components)

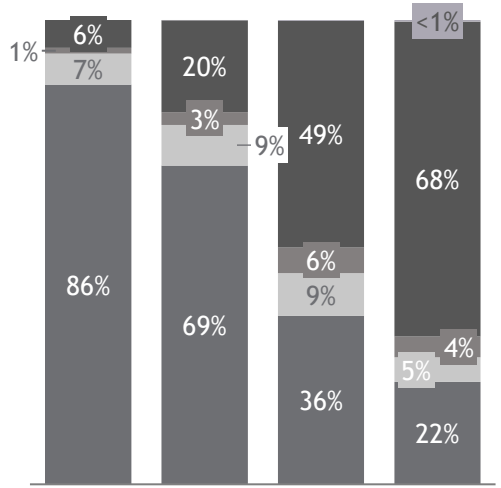
Note: BEV = battery electric; PHEV = plug-in hybrid; MHEV = mild hybrid
Source: IHS Engine Production Forecast 2015-2028; EU-Study “CO2-Emissionsreduktion bei pkw und leichten Nutzfahrzeugen nach 2020”; Press Survey

Large automotive markets (such as the US, Europe, and China) are ahead in their electrification process, accelerating the value chain transformation

Estimate

Passenger vehicles

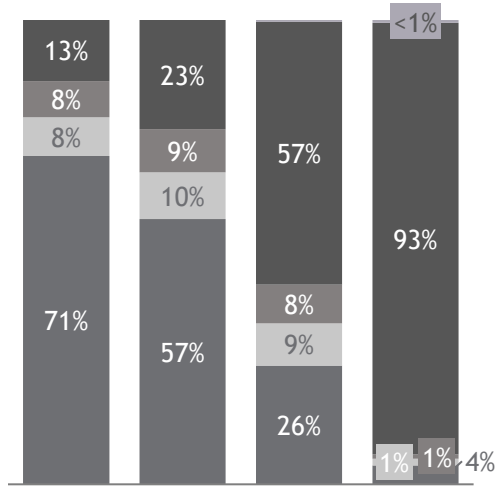
USA – volume forecast



	2025	2030	2035
FCEV+BEV+PHEV	54%	19%	6%
HEV	15%	1%	(10%)
ICE	(2%)	(12%)	(9%)

5-yr CAGR

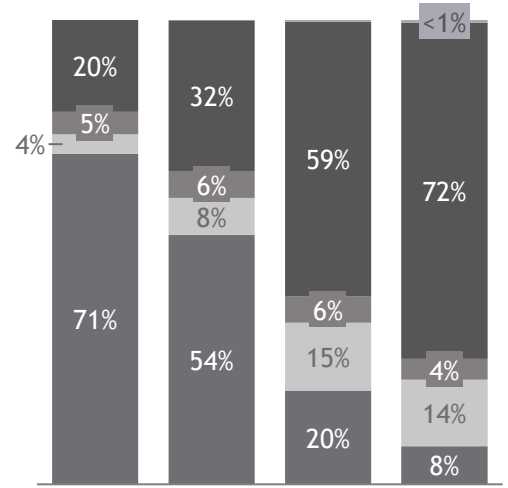
EU - volume forecast



	2025	2030	2035
FCEV+BEV+PHEV	23%	15%	8%
HEV	13%	(2%)	(31%)
ICE	(1%)	(15%)	(31%)

5-yr CAGR

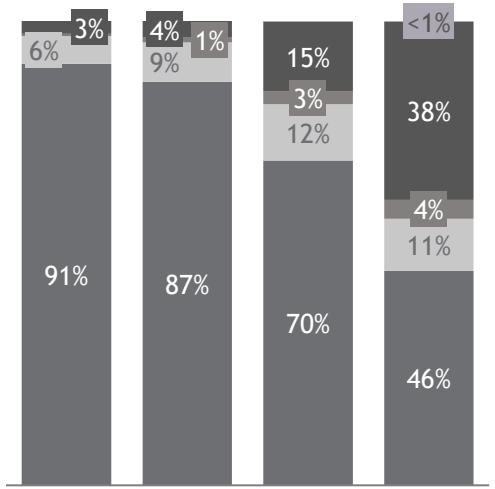
China - volume forecast



	2025	2030	2035
FCEV+BEV+PHEV	21%	14%	5%
HEV	29%	15%	1%
ICE	(5%)	(16%)	(16%)

5-yr CAGR

Other countries – volume forecast



	2025	2030	2035
FCEV+BEV+PHEV	17%	35%	22%
HEV	17%	10%	1%
ICE	2%	(2%)	(6%)

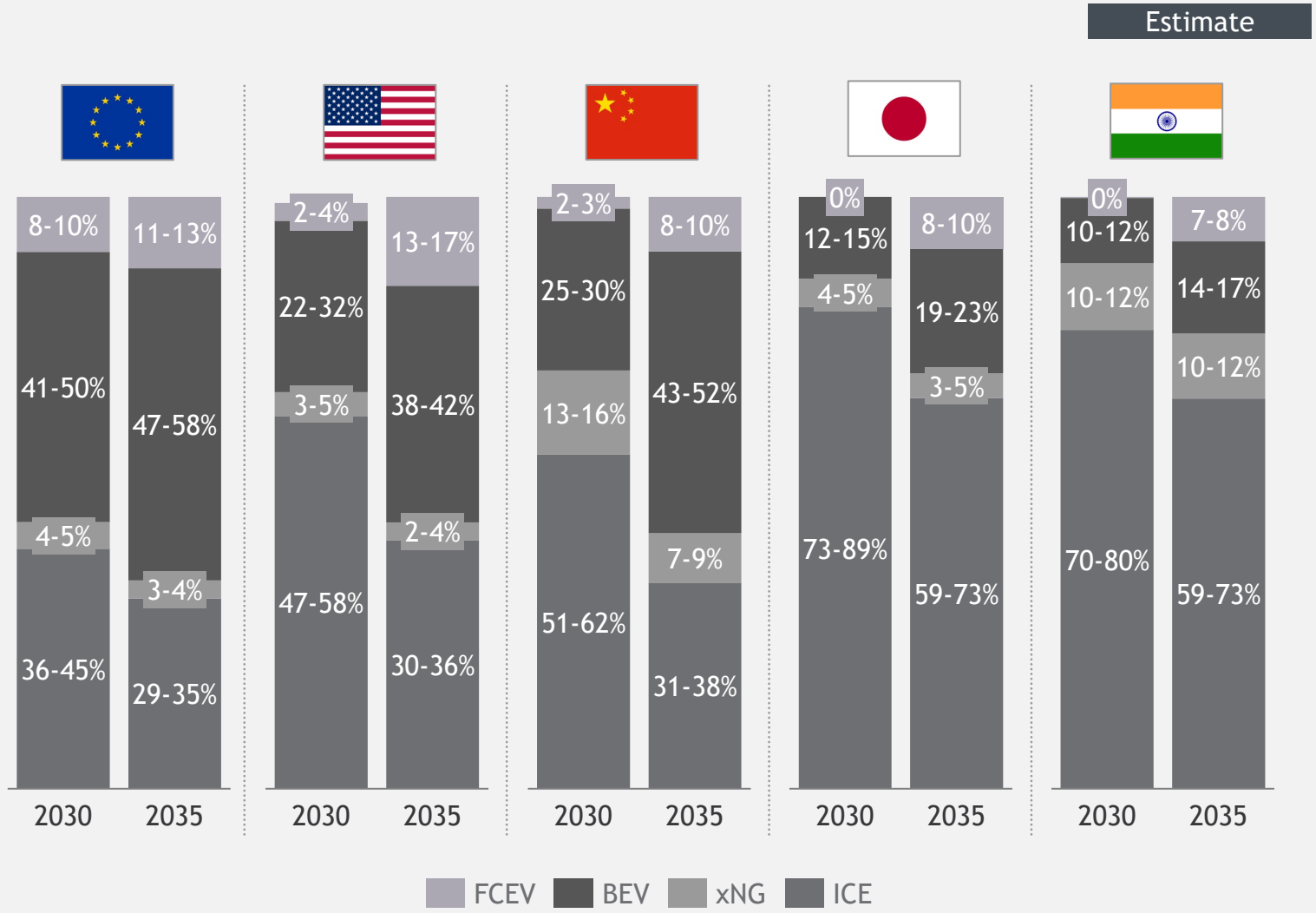
5-yr CAGR

FCEV BEV PHEV HEV ICE

Notes: The forecasts include all light vehicles with the exception of heavy vans; BEV = battery electric; FCEV = fuel cell; PHEV = plug-in hybrid; HEV = full hybrid; MHEV = mild hybrid; ICE= internal combustion (diesel + gasoline + MHEV)
Source: BCG Powertrain Model

For Heavy Vehicles, the electrification process also demonstrates evolution in large global markets

Projected ZEV adoption rates in 2030 and 2035 for Heavy Vehicles, volume



Source: BCG Analysis – 2Q 2023

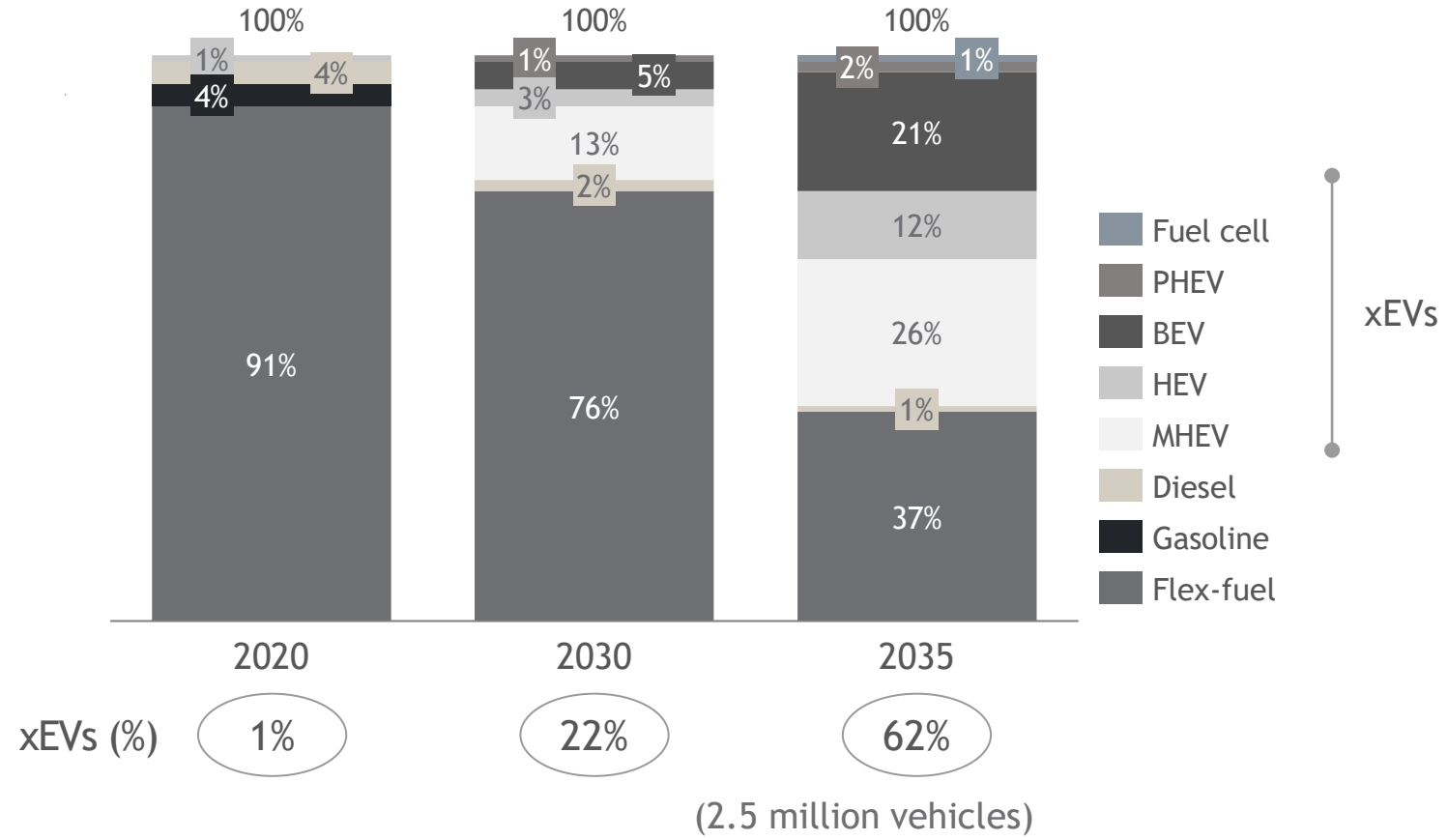
In Brazil, the transition will be more gradual, with different technologies coexisting in the next few years…

…creating a more complex environment, but also giving more time for the supply chain to prepare

Global convergence scenario

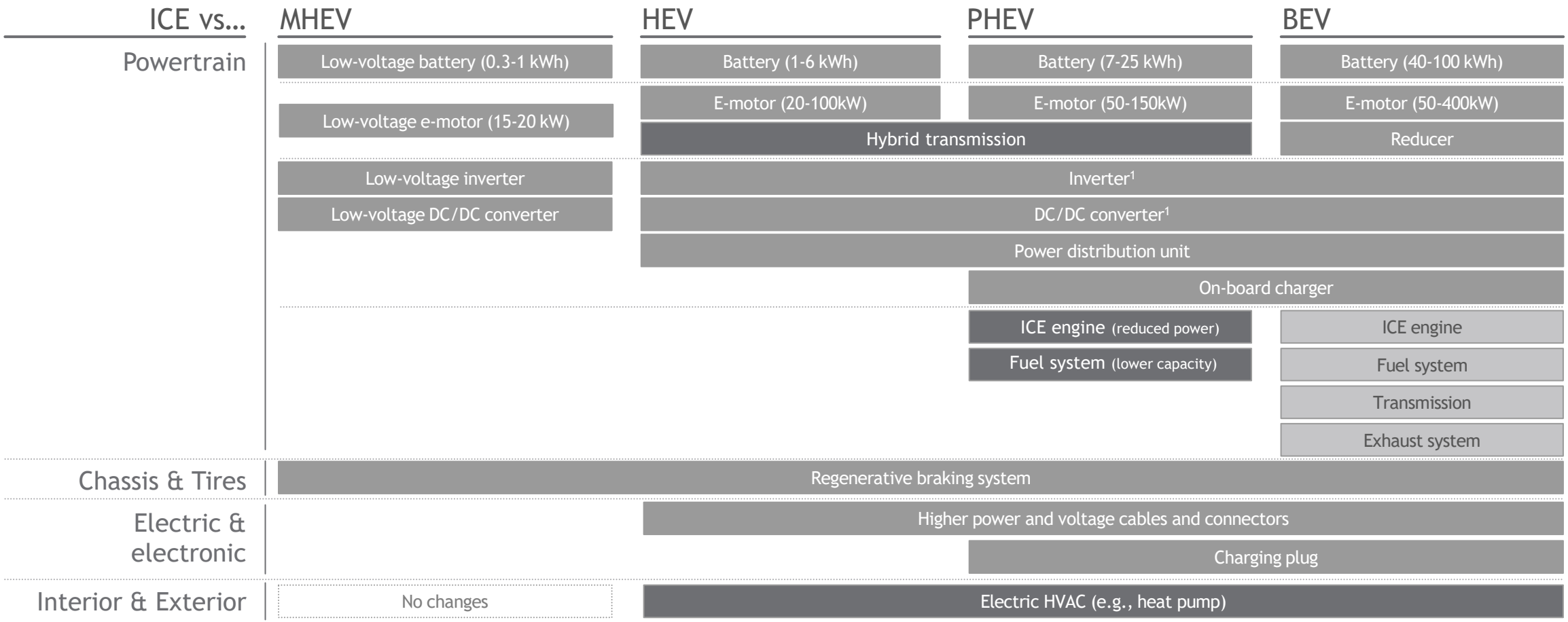
Annual sales mix, light vehicles

Estimate



Note: BEV = battery electric; PHEV = plug-in hybrid; MHEV = mild hybrid
Source: Study by BCG Q1 2023 and ANFAVEA "O caminho da descarbonização do setor automotivo no Brazil".

Hybrid platforms can represent an intermediate stage in the Brazilian electrification process



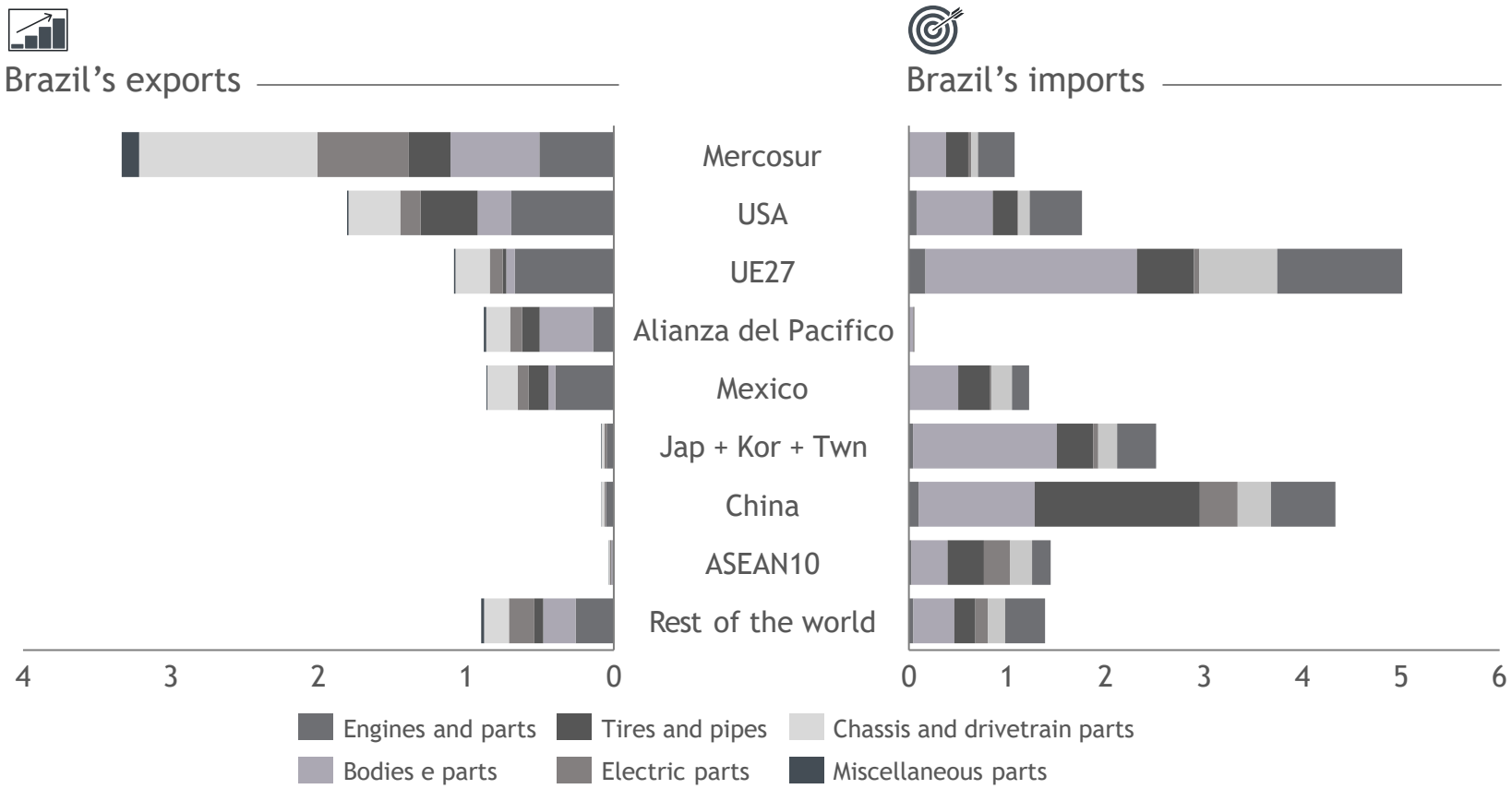
The components of hybrid vehicles (HEV) are similar to those of purely electric vehicles (BEV)

1. Parts with little specification changes were grouped together.
Source: Interviews with experts; BCG.

High voltage | New part | Adapted part | Nonexistent part

Given Brazil is moving forward with its electrification process, it is necessary to reflect on competitiveness opportunities and challenges in the context of the global auto landscape

Brazilian automotive parts trade, 2022 (US$ bn.)



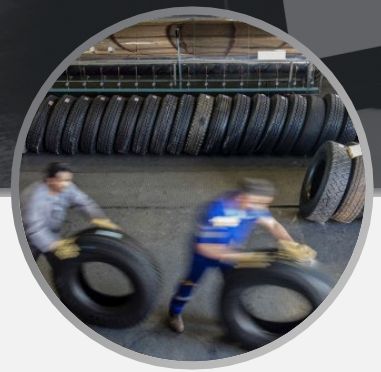
The Brazilian automotive supply network already participates in various global markets – some of which are in advanced stages of their electrification process

Note: Product categories are based on the official classification that is used in NAFTA negotiations. Categories are based on the aggregation of HS 6-digit level codes.
Source: BCG Analysis

Global and local context summary

1. Globally, **prompted by its technological trends, the automotive industry is undergoing a huge transformation**, requiring the automotive supplier network to adapt to new demand
2. Large automotive markets (such as the US, Europe, and China) are **further ahead in their electrification processes**, thus **accelerating the whole value chain transformation**
3. In Brazil, **electrification process may occur more gradually, with a transition stage involving hybrid vehicles**, giving more time for suppliers to adapt
4. Given the technological similarities, the **hybrid vehicle penetration can be seen as an intermediate step** for the supplier network in their process to develop capabilities to meet the needs of electric vehicles
5. Defining the electrification path in Brazil is fundamental for the local **supply base to take decisions and commit with investments** given global automotive supply chain competitiveness

Global context and Survey perspective in Brazil



Respondent profiles and methodology

Survey conducted by BCG in partnership with Sindipeças and ANFAVEA

Consolidation of Results

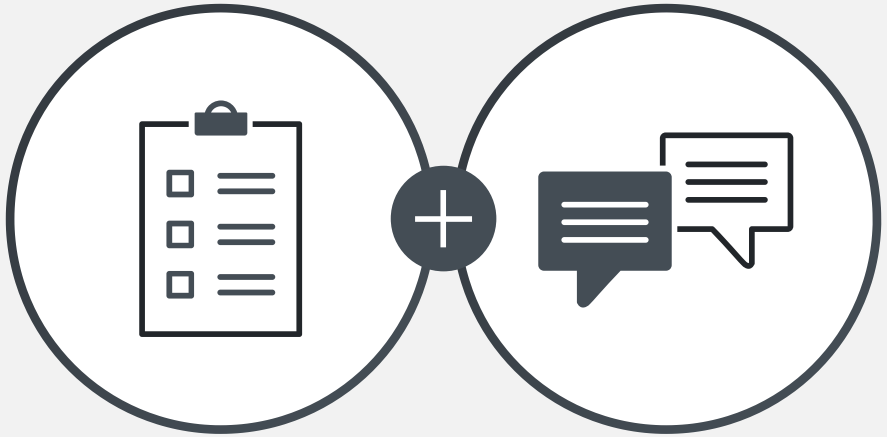
Potential implications for the Brazilian automotive supply chain

Methodology combines an online survey of suppliers along side interviews with executives from large industry players

+65

respondents in the online survey

Multiple choice questionnaire sent to the whole Brazilian automotive supplier network



+15

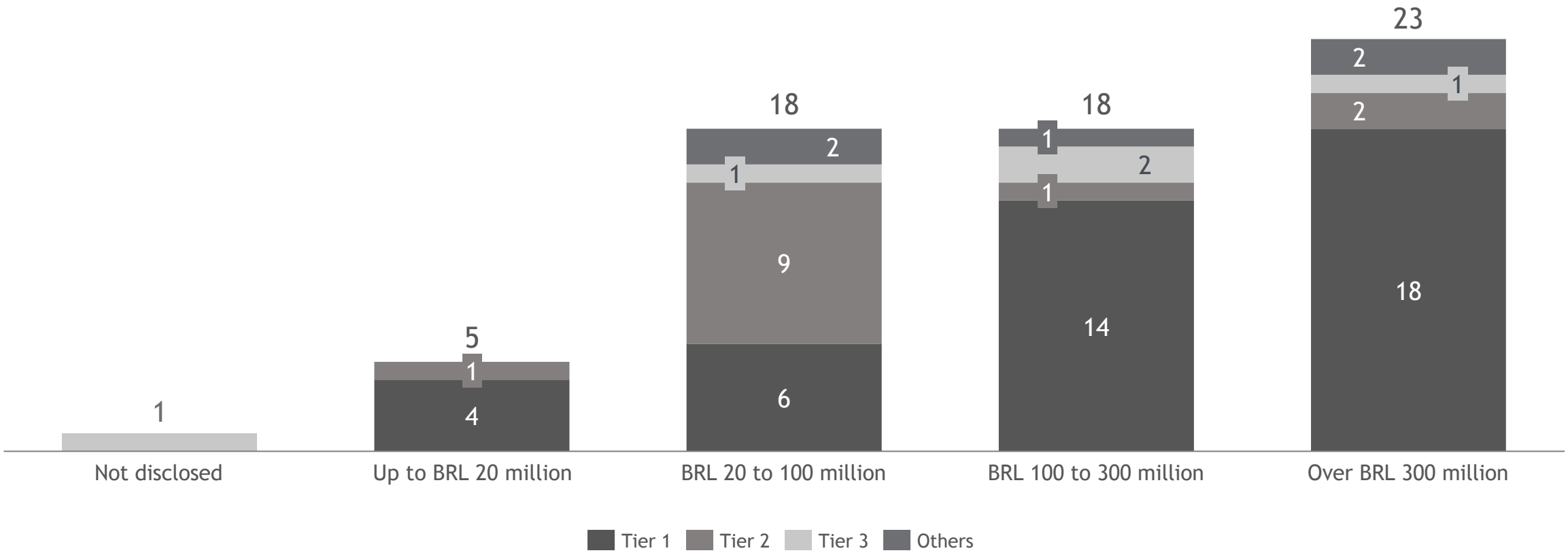
interviews with executives from large industry players

Understanding the detailed perspective of top industry leaders to support the online survey results

Note: Respondents are leaders from the survey participant companies
Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEd Sindipeças in May 2023

The online survey received responses from 65 Brazilian automotive industry companies – 23 of which have a BRL 300+ million revenue

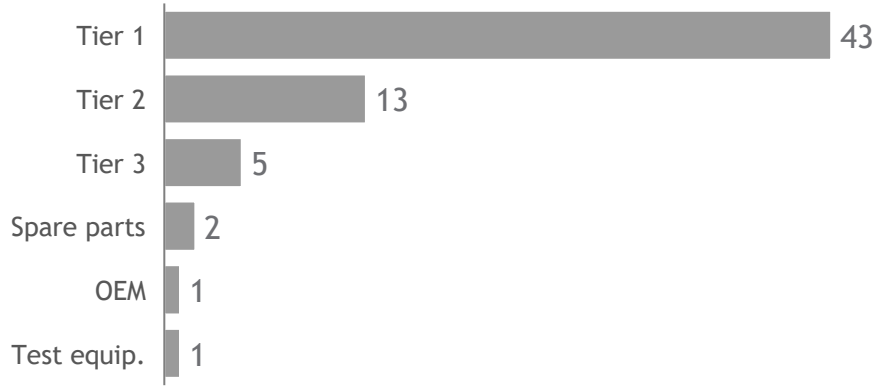
Participating companies' distribution by annual revenue in BRL millions



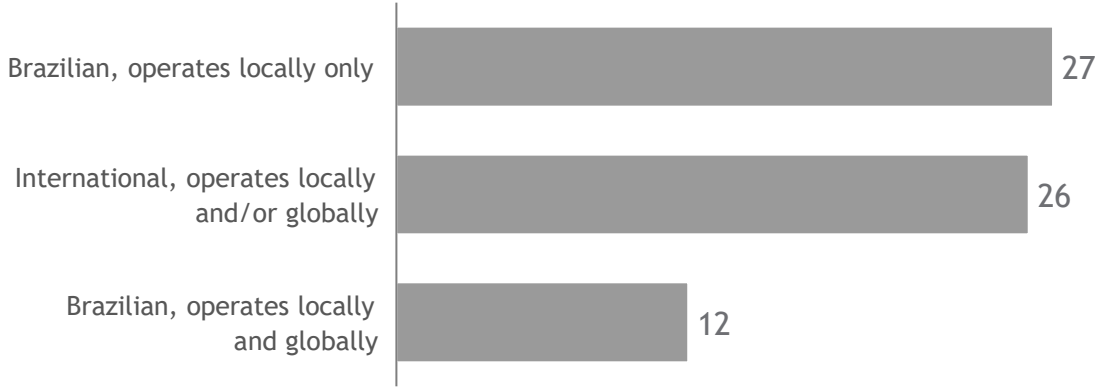
Note: Respondents are leaders from the survey participant companies
Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEd Sindipeças in May 2023

Participants have different roles in the automotive value chain…

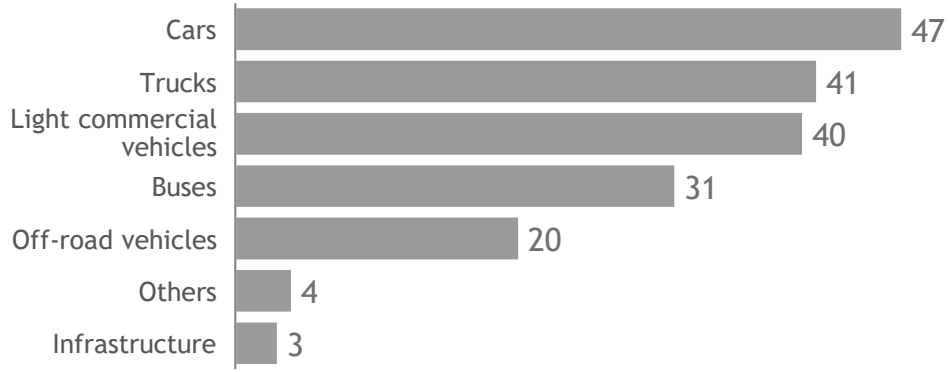
What is your company's position in the value chain?



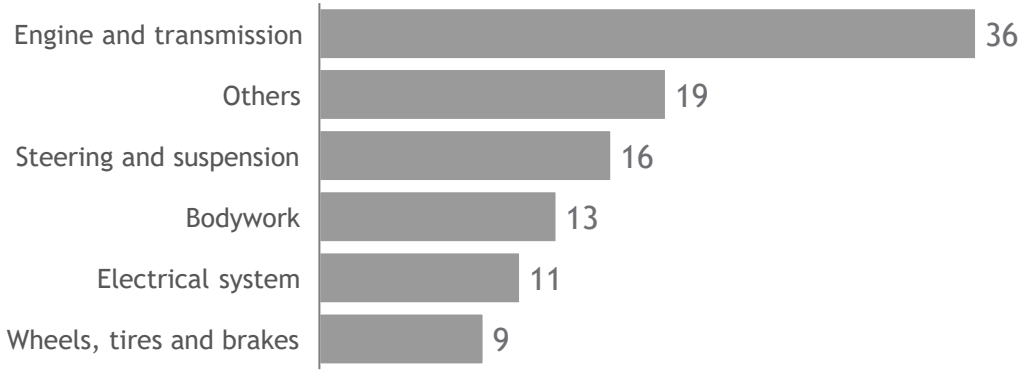
Where is the company originally from and where does it operate?



What is the main segment to which your company supplies automotive parts and components?



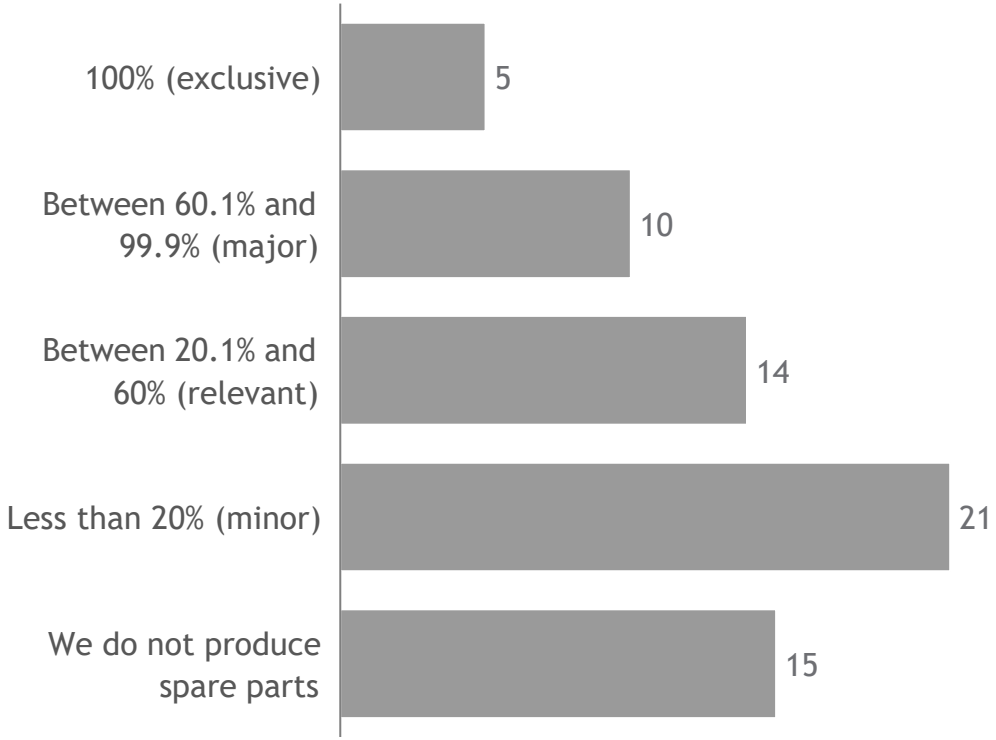
What types of components does your company supplies to the automotive industry?



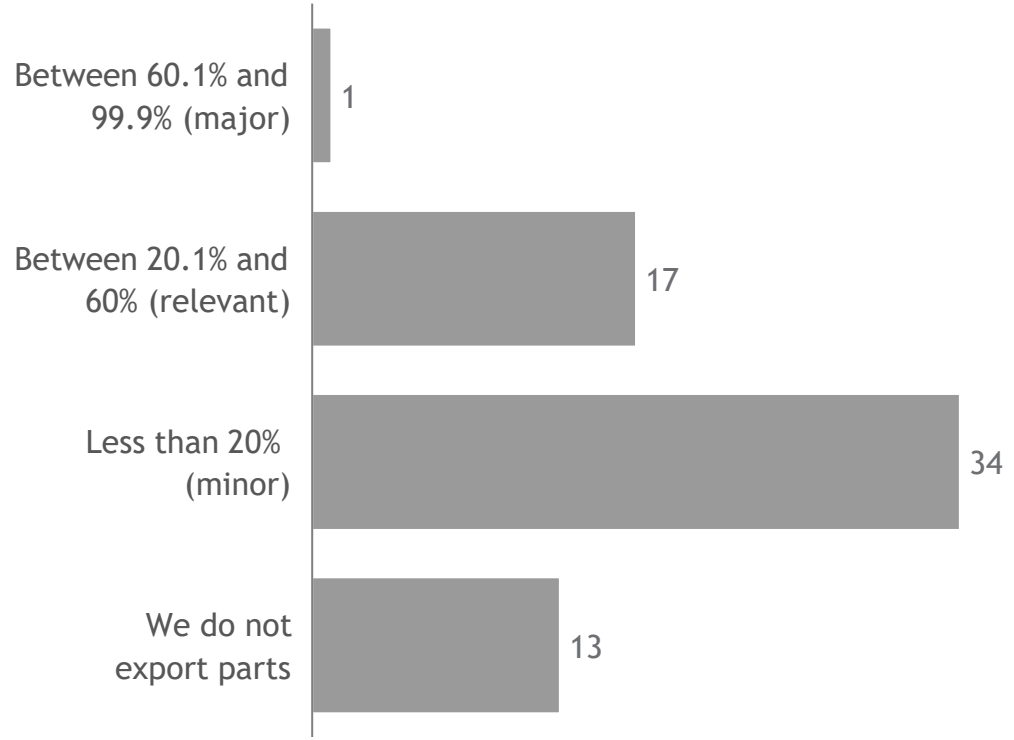
Note: Respondents could choose more than one option
Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEd Sindipeças in May 2023

…also including the after-sales and export markets

What is the percentage of your company's participation in the **automotive spare parts market?**



What is the percentage of your company's participation in the **automotive parts export market?**



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEd Sindipeças in May 2023

Global context and Survey perspective in Brazil

Respondent profiles and methodology

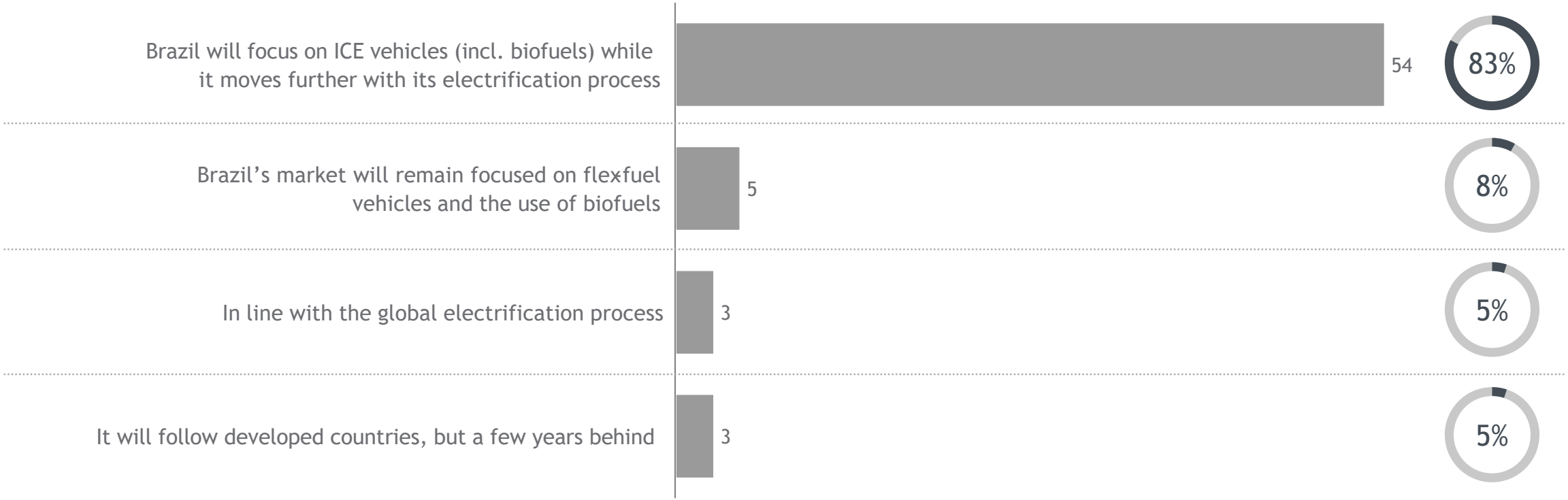
Consolidation of Results

Survey conducted by BCG in partnership with Sindipeças and ANFAVEA

Potential implications for the Brazilian automotive supply chain

Most participants believe that Brazil will focus on flex-fuel vehicles while advancing with its electrification process

In your opinion, how will Brazil evolve in the automotive electrification process (considering hybrid and all-electric vehicles), given the local specificities?



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

In the participant perspectives, biofuels and vehicle hybridization could be a viable path in the electrification process

> **HEV is a more adequate scenario for our market.** Due to infrastructure and biofuel use efficiency.

> Brazil should follow a **singular path** compared to other markets (US/China). We have a **cleaner energy mix**. The hybrid-ethanol combination should exist for a while longer

> **Ethanol-fueled HEVs** are the most viable solution for our country.

> Brazil should focus on **biofuels for medium and heavy trucks and intercity and interstate buses**, as well as exploring hybrid bio-fueled drivetrains for light vehicles outside urban areas

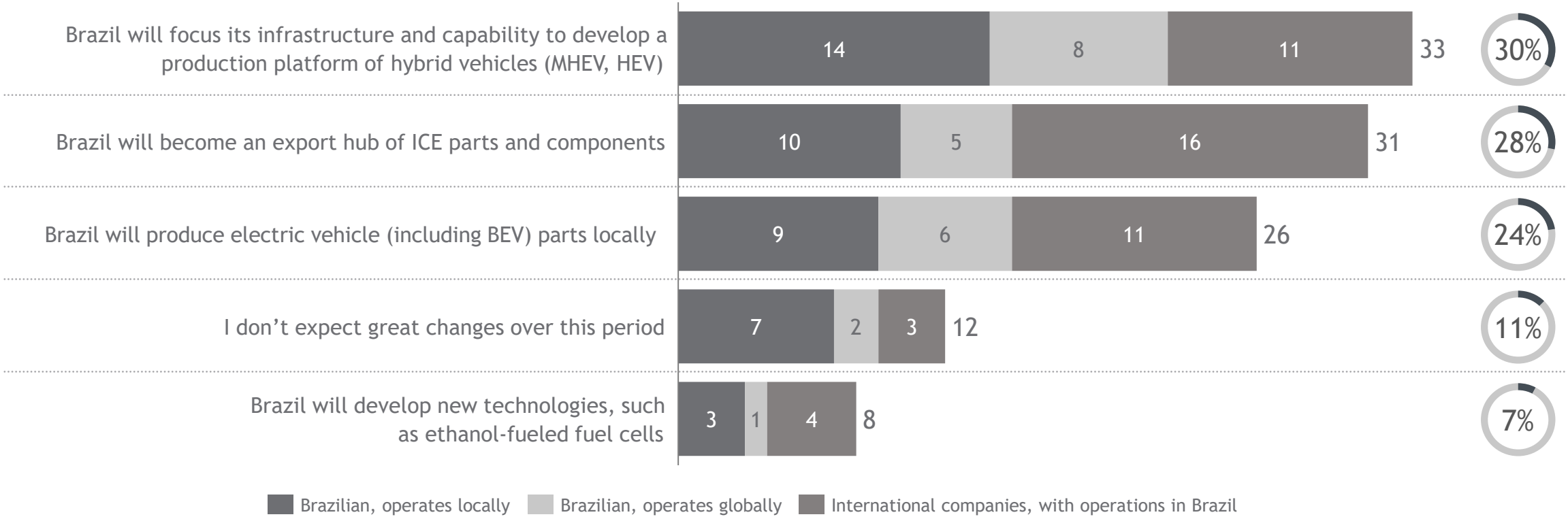
> The environmental appeal of an electric vehicle is irrelevant, considering the vast biofuel possibilities and versatility we have in Brazil.

> There should be a **platform diversity** between electric, hybrid and other fuels, such as hydrogen.

Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Developing a hybrid vehicle production platform and becoming an export hub of auto parts seen as main vectors of evolution

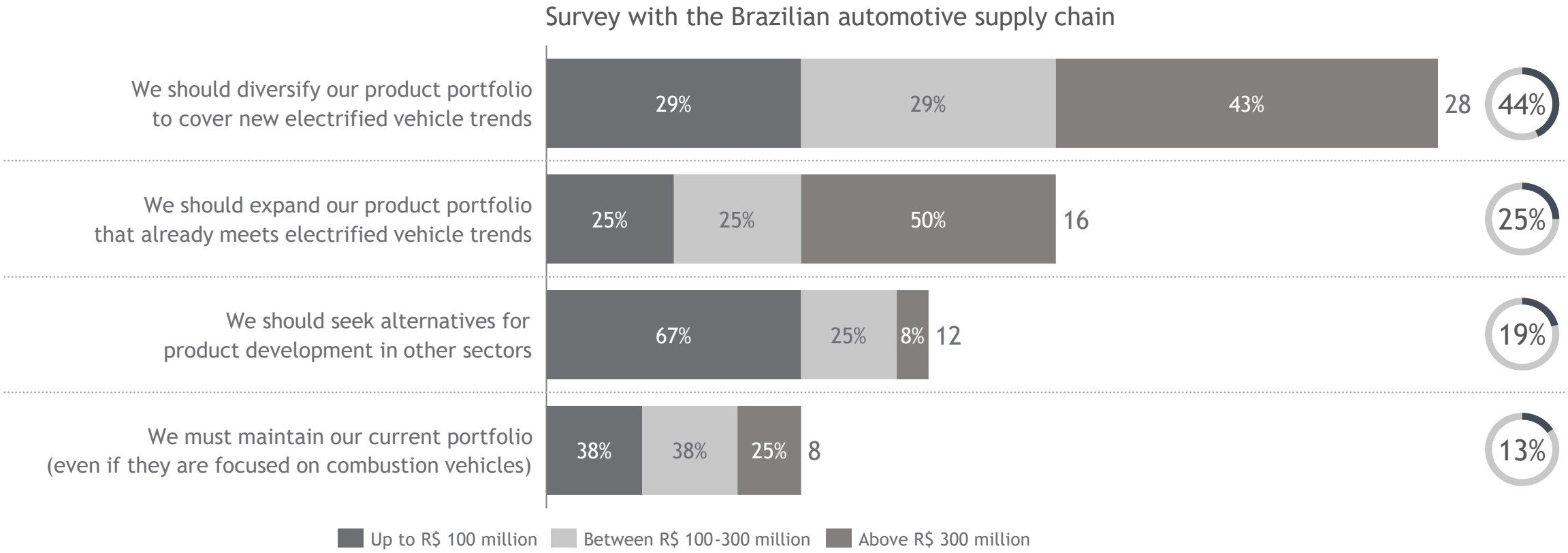
In your opinion, what do you perceive to be **the main vector of evolution for Brazil's supply network in the next 5-10 years?** Option to select more than 1 answer



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Participants say that companies in the sector must adapt their product portfolios to meet new technology trends

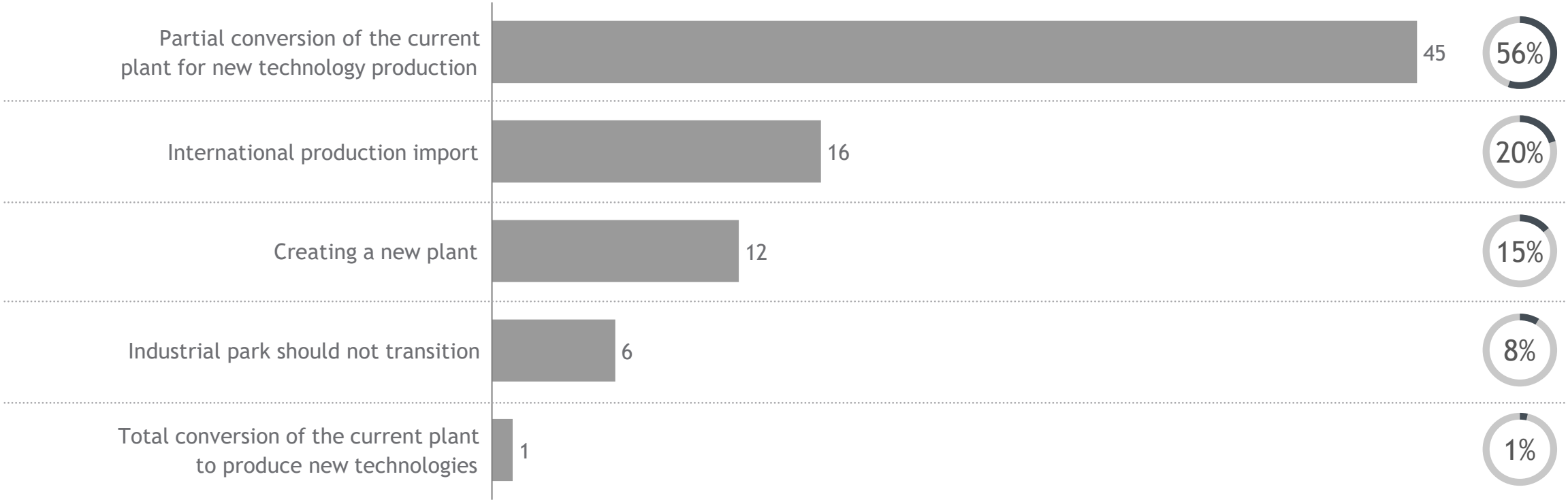
In your opinion, how should your company **adapt its product portfolio** to meet new technology trends (for parts and components) resulting from the electrification process?



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Most participants believe in a partial conversion of current plants to meet electrified demands

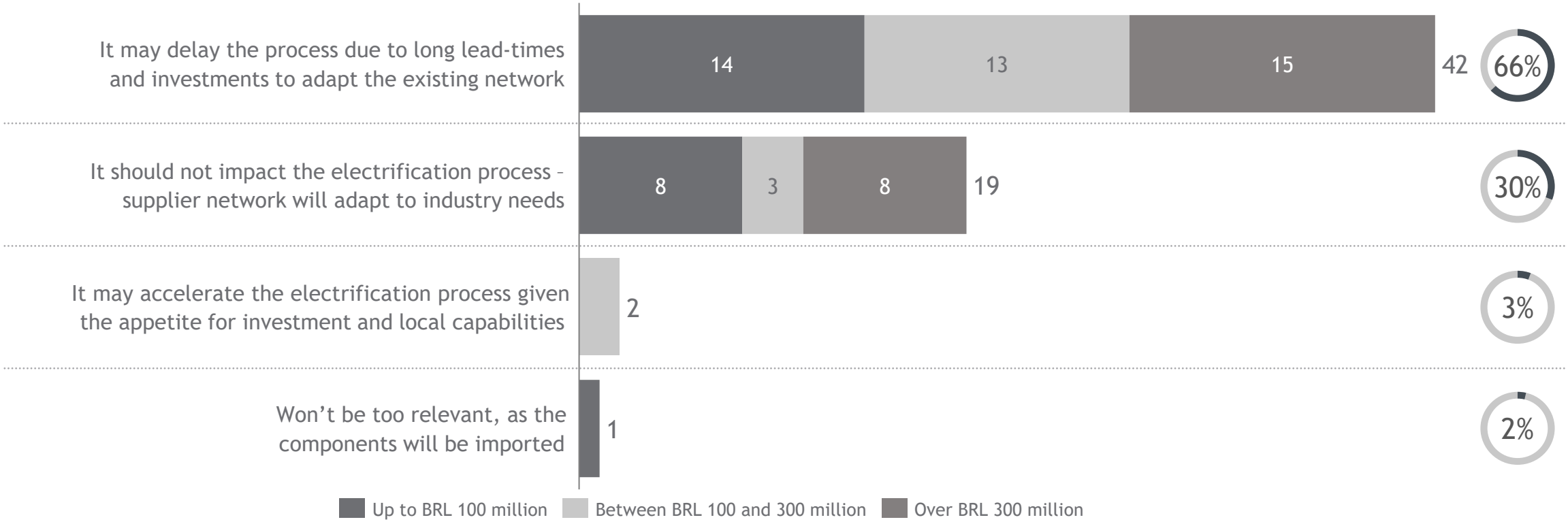
In your opinion, how should the development of parts and components for electrified vehicles occur (base data/installed capacity of automotive suppliers in Brazil)



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Participants believe the evolution of the supplier network may delay the adoption of electric vehicles

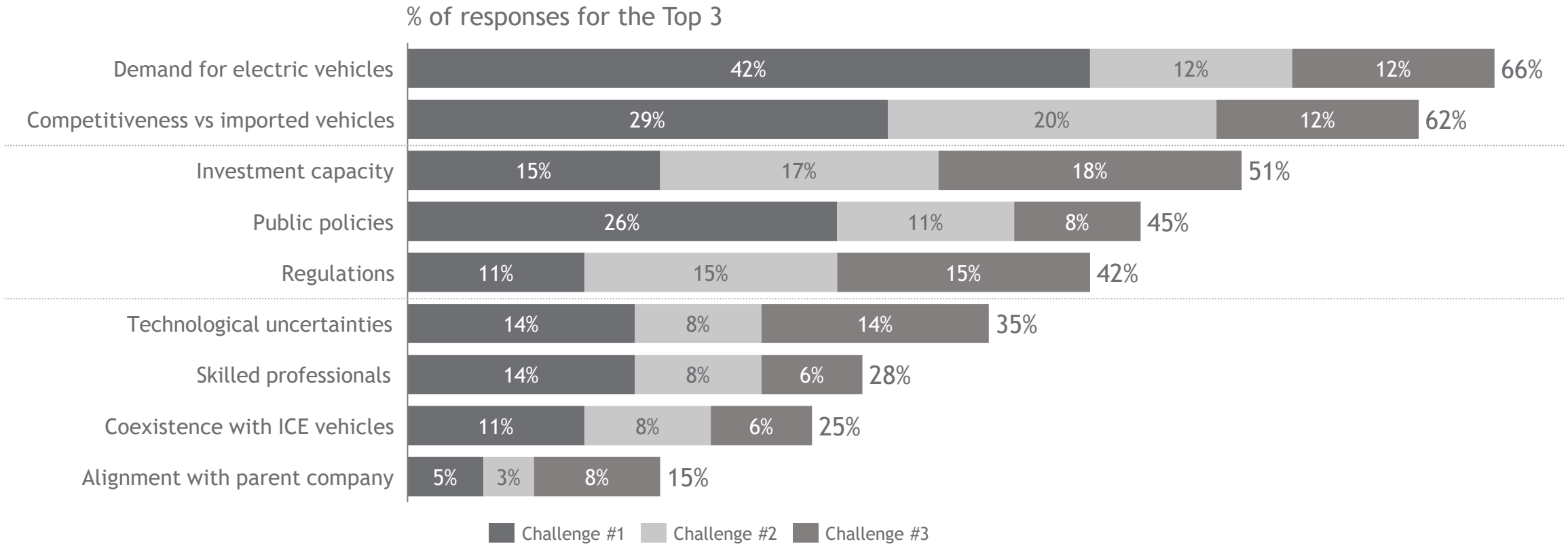
In your opinion, how will the network of parts suppliers impact the automotive electrification process in Brazil?



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Electrified vehicles demand and competitiveness vs imported vehicles are seen as main development conditions for +60% of suppliers

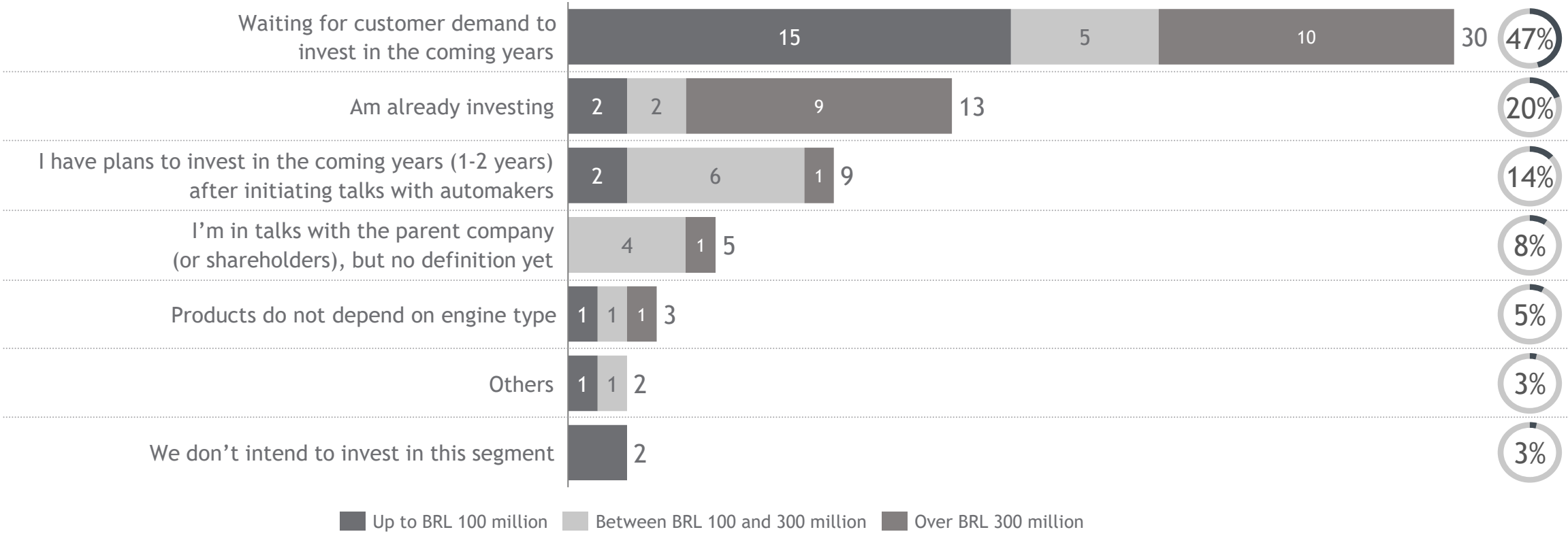
From 1 to 9, rate the **biggest challenges to the progress of the automotive supplier network electrification process** in Brazil, where 1 is the biggest and 9 is the smallest challenge



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

According to the survey participants, most companies are waiting for customer demand to start investing

What is your investment perspective for the production of electric vehicle parts and components?



Source: BCG Survey on the electrification of the automotive supply chain among Brazilian suppliers conducted in partnership with ANFAVEA and Sindipeças in May 2023

Global context and Survey perspective in Brazil

Respondent profiles and methodology

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Potential implications for the Brazilian automotive supply chain

Survey conducted by BCG in partnership with Sindipeças and ANFAVEA

Brazil is expected to have several technologies coexisting in the coming years – developing capacities to attend hybrid vehicles demand can represent a technology bridge in the electrification process

Adoption of new technologies

- **Suppliers will have more time to adapt to electrified vehicle technologies in Brazil** (compared to other regions – US/Europe/China). However, there is already a need to make strategic decisions given that **5-10 years in automotive terms is a short-term perspective**
- **Hybrid and electric vehicles have similar components** (e.g., electric engine, inverters) – the development of hybrid vehicle capabilities can be a key bridge for the **electrification process**
- **We might observe different transition pace among segments:** Buses and trucks will move in a different path, encouraged by regulation and sustainability decisions (by the public and private sectors). Local suppliers have already started producing some components for heavy vehicles
- **Given the slower electrification process in Brazil**, suppliers might explore the opportunity to have a more pro-active role as an **export hub for ICE components**, while other regions move further ahead in the production of electric vehicles

Quotes from interviews with executives

- “**Suppliers need to choose a technology to invest in - which one to choose?** How can we predict scale?
- “**ICE will still exist around the world in 50 years, due to changeover time.** If this engine isn’t being produced in Europe or the US, where will it be produced? You’re left with Brazil, India, and Mexico. **Brazil has the larger chain and more robust technology** among the 3, thus there’s potential for opportunity.
- “**Bus electrification will be quicker**, ushered in by the commitment made by major cities (São Paulo) to transition its fleet to electric vehicles.

Strategic alignment between suppliers and automakers is essential to increase demand visibility and facilitate transition

Development conditions

- **Electrified vehicle demand visibility is critical to this technological transition process** being associated with Auto OEMs local production alignment as well as the perspective of public policy guiding the decision making
- **Closer relationship between OEM and suppliers becomes more relevant** to increase the transparency and common sense across technological perspectives, facilitation of co-development opportunities and investment on different stages of the value chain (tiers 1-3)
- **Brazil can fall behind in terms of technological competitiveness** and operational efficiency (especially compared to Asian countries). Brazilian supply base may become outdated due to new technologies advancement / application in the region compared to large global markets
- **Great portion of Brazilian automotive supply base is composed by Small and Medium Size companies having investment capability as potential challenge in the electrification process**. Brazilian market volatility also observed as an obstacle to global companies, making capital availability more difficult for investment in new technologies and infrastructure

Quotes from interviews with executives

> **Supply chain will change - there will be fewer suppliers.** The way OEMs interacts with systeamist will change as well. There will be a Tier 0.5 – suppliers will gain more relevance.

> **Scarce resources for small and medium-sized companies.** Tier 2-3 suppliers also need to adapt to new technologies.

> **It's important that OEMs define their strategy** so suppliers know how to position during this transition.

> **Industries develop to meet demand, which drives investment.** In Brazil, we don't have that drive, and we also have the local ethanol situation. Electrification will arrive, but with a good delay versus other countries.

5 main *insights*

Suppliers in Brazil see different technologies coexisting in the next **few years and hybrid vehicles as the first stage in the electrification process**

Survey participants expect that the transition will happen gradually, with **portfolio and plant adaptations in line to demand evolution**

Demand visibility, competitiveness and investment capacity are the main challenges for suppliers to overcome in the electrification process

Higher collaboration between Auto OEMs and suppliers can support the technology transition process and mitigate risks

Brazil can more proactively explore **ICE technology export opportunities**, leveraging local capacity and capabilities

Although electrification process is expected to happen more gradually in Brazil, the moment is already appropriate for the local supply base to more actively participate in this transition


BCG
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CONSULTING
GROUP
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