



Emissions Mandates Will Remake Europe's Trucking Industry

OCTOBER 2023



The switch to zero-emission vehicles will benefit the sector's overall GDP and employment but will shift value among industry segments

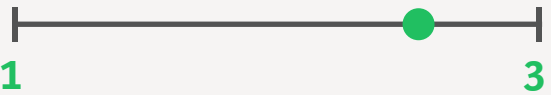


Suppliers

GDP (€BILLIONS)



JOBS (MILLIONS)



Increased battery cell production from new entrants will drive GDP and job growth

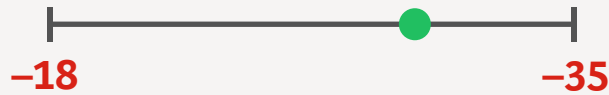


OEMs

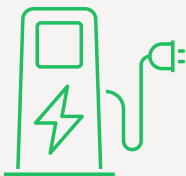
GDP (€BILLIONS)



JOBS (MILLIONS)



Phasing out internal combustion engine production will add to GDP but reduce employment

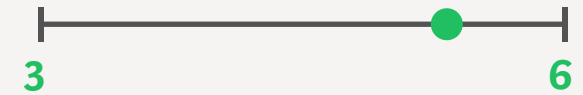


Infrastructure players

GDP (€BILLIONS)



JOBS (MILLIONS)



Building charging network infrastructure hardware will boost GDP and jobs

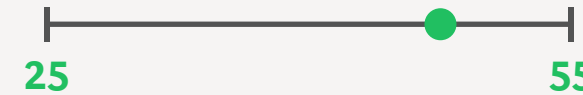


MHDT-related utilities

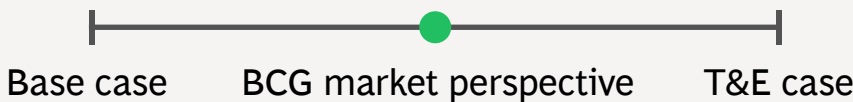
GDP (€BILLIONS)



JOBS (MILLIONS)



Shifting from foreign fossil fuels to domestic electricity will increase GDP and employment

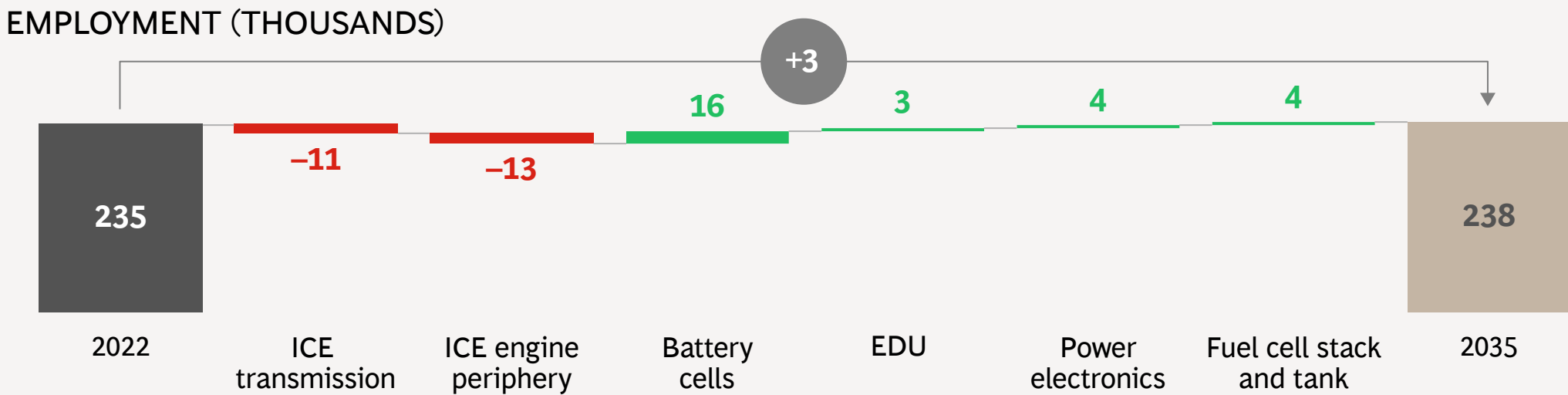
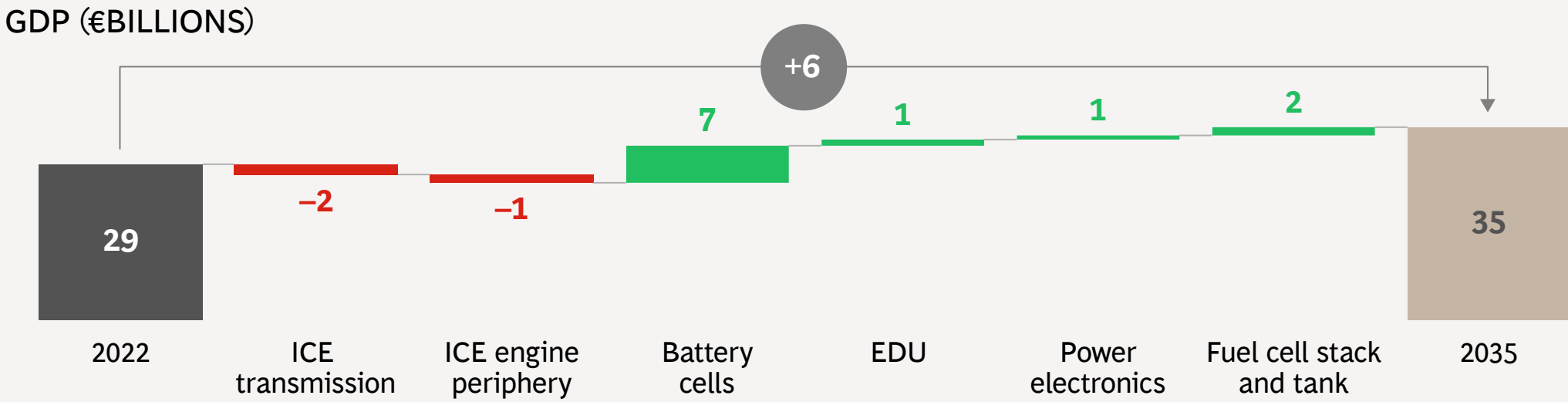


Source: BCG analysis.

Note: OEM forecast assumes that automakers will not make strategic changes to their current business model. MHDT-related utilities forecast assumes that, by 2035, the share of renewables from total electricity production will exceed 88%. MHDT = medium- and heavy-duty truck; T&E = Transport & Environment.

Suppliers will benefit in GDP and jobs, but they will need new capabilities to make battery cells and related components

T&E case: Elevated CO₂ standards (beyond those set by the EU Commission)



Source: BCG analysis.

Note: Excludes buses, coaches, and light-duty vehicles. EDU = electrical drive unit; EV = electric vehicle; ICE = internal combustion engine; T&E = Transport & Environment. Because of rounding, not all sums of component numbers listed match the totals given.

Overall impact

+€7B

GDP

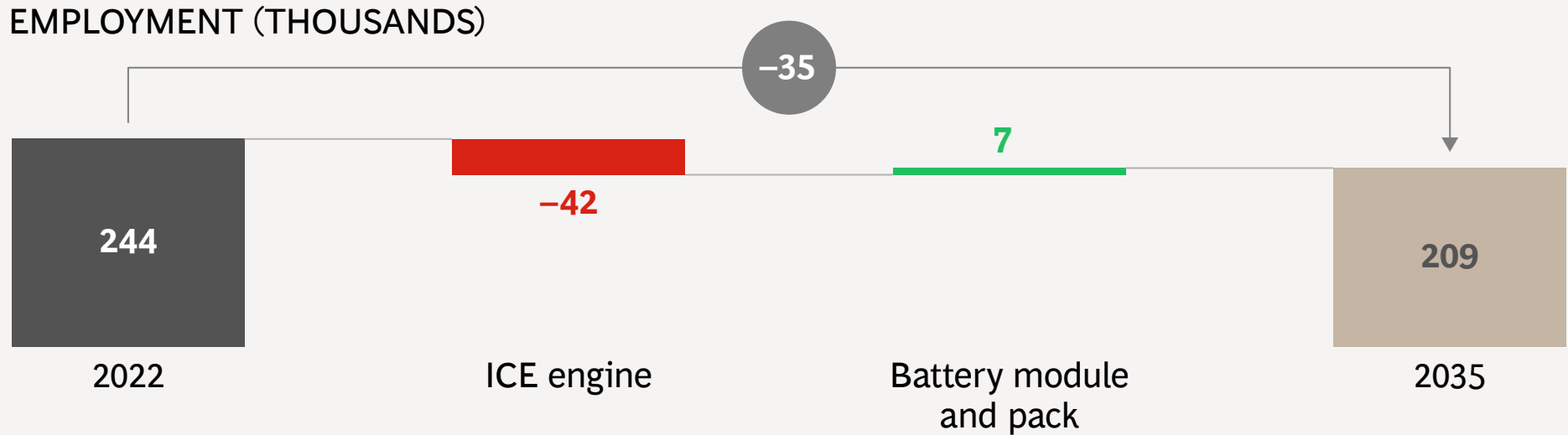
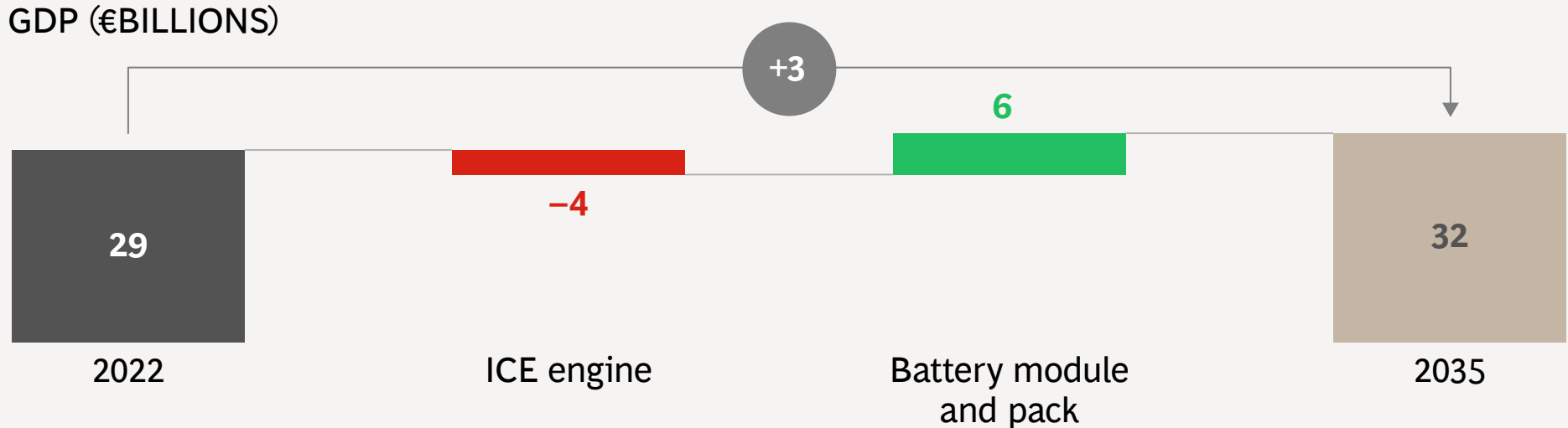
Additional GDP will come mainly from production of battery cells

+3,000

jobs

New jobs making EV components will compensate for loss of ICE-related positions

For OEMs, the phaseout of ICE-powered trucks will lead to a net loss of 35,000 jobs



Source: BCG analysis.
 Note: Assumes no strategic changes to current OEM business model. ICE – internal combustion engine.

Overall impact

+€3B

GDP

The higher value-add in the battery segment will compensate for losses from the decline in ICE engines

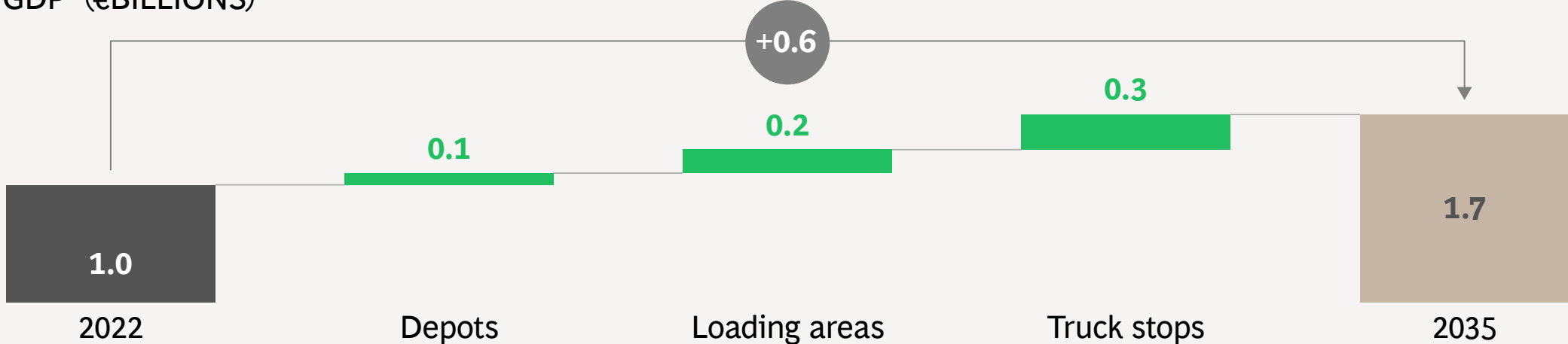
-35,000

jobs

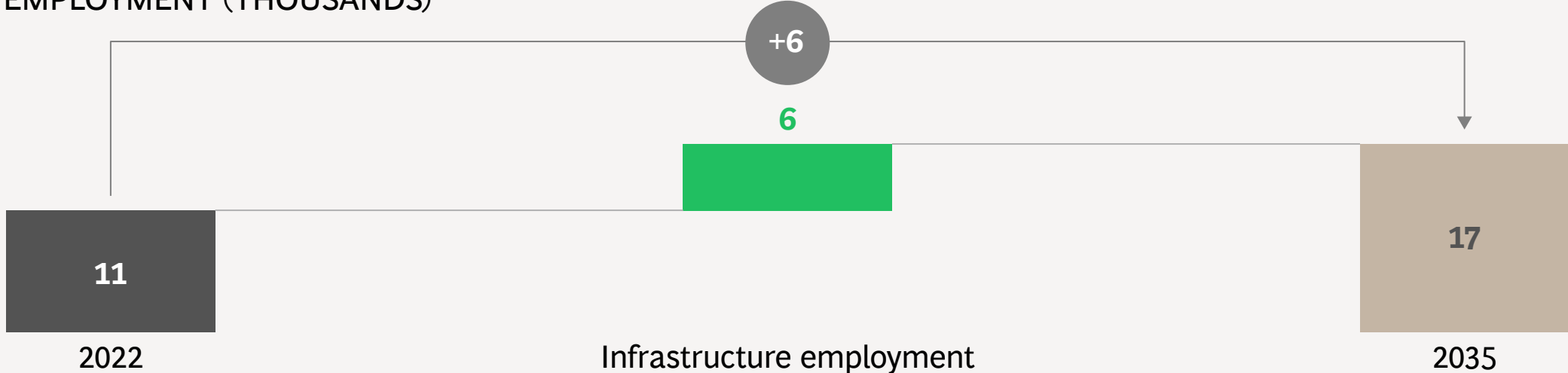
Despite yielding higher GDP value, battery module and pack assembly will be less labor intensive, resulting in job losses

ZEV infrastructure players will benefit from a rapid buildup of charging stations

GDP¹ (€BILLIONS)



EMPLOYMENT (THOUSANDS)



Source: BCG analysis.

Note: 2035 numbers based on ZEV adoption in T&E scenario. BEV = battery-electric vehicle; T&E = Transport & Environment; ZEV = zero-emission vehicle. Because of rounding, not all sums of component numbers listed match the totals given.

¹Including connected and platform services, transport solutions, and resale, reuse, and recycling.

Overall impact

+€600M

GDP

The buildout of charging infrastructure will add significantly to GDP

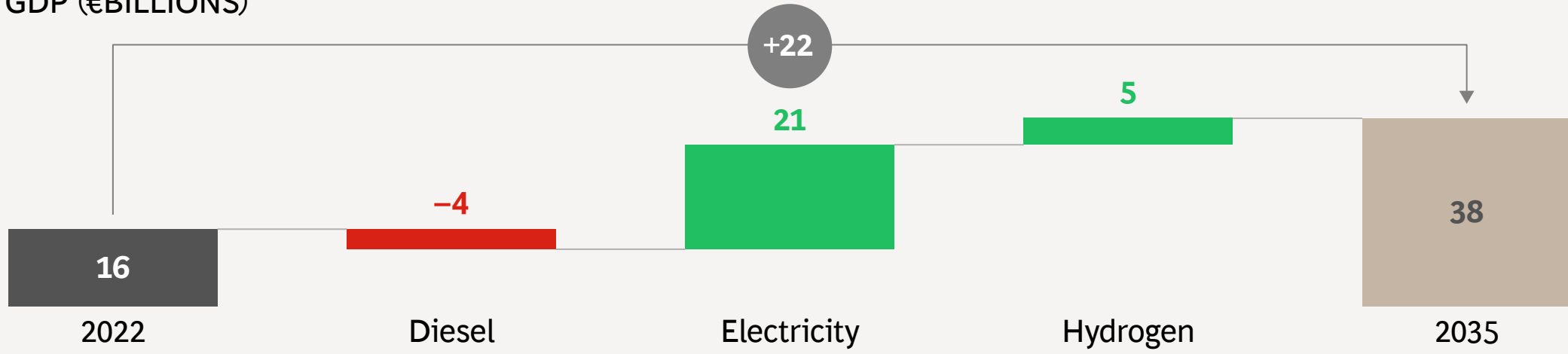
+6,000

jobs

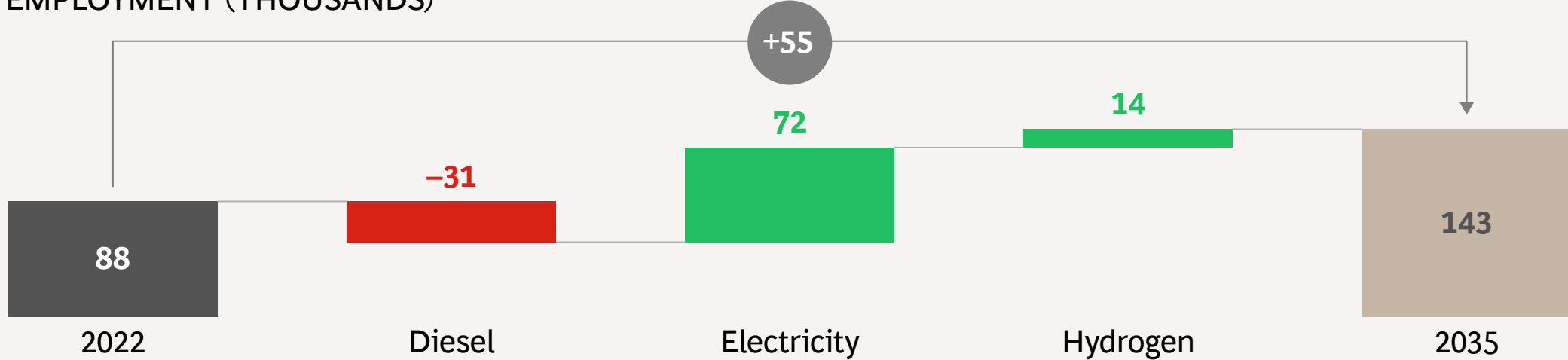
The contribution of charging infrastructure to employment will depend on BEV adoption rates

MHDT-related utilities will reap the largest gains in jobs and GDP, mainly from domestically produced electricity

GDP (€BILLIONS)



EMPLOYMENT (THOUSANDS)



Overall impact

+€22B

GDP

New demand for electricity and hydrogen will compensate for losses from phasing out diesel

+55,000



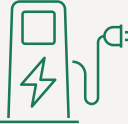

jobs

The need to provide 160 TWh of electricity per year will create jobs in the electricity sector

Source: BCG analysis.

Note: Assumes that renewables will produce 88% of total European electricity production by 2035. MHDT = medium- and heavy-duty truck; TWh = terawatt-hours.

The switch to ZEVs will have a net positive impact on European GDP and employment, but it will shift benefits along the value chain

	GDP (€BILLIONS)		EMPLOYMENT (THOUSANDS)	
	2022	2035	2022	2035
 Suppliers	29	+11% to +22% 32 to 35	235	+1% to +2% 236 to 238
 OEMs	29	+5% to +9% 31 to 32	244	-7% to -14% -226 to -209
 ZEV infrastructure	<1	+32% to +63% 1 to 2	11	+ 29% to +58% 14 to 17
 MHDT-related utilities	16	+75% to +144% 27 to 38	88	+ 29% to +63% 113 to 143
Total	29	+22% to +43% 91 to 107	577	+ 2% to +5% 589 to 607

Source: BCG analysis.

Note: Calculation of European GDP: e.g., Truck value – VAT – non-European value added. Calculation of European employment: e.g., Employees per truck components – Share of non-European production. MHDT = medium- and heavy-duty truck; VAT = value-added tax; ZEV = zero-emission vehicle.

Implications for players along the value chain that are attempting to master the shift toward ZEVs



Suppliers

The phaseout of ICE components shifts value from traditional ICE to new ZEV suppliers, with battery cells serving as the primary driver of future value; in the high-adoption scenario, battery cell capacity of up to 230 GWh will be required for 400,000 BEV trucks in 2035



Prepare for radical change in business models

Define a pathway toward the ZEV space, and start thinking about winding down ICE business



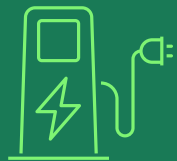
OEMs

Along with suppliers, OEMs will experience the biggest disruptions to their business model. They could lose up to 35,000 positions related to making ICE and require a substantial workforce transformation toward new capabilities, along with buildup of a new partnership ecosystem.



Prepare for capability transformation

Conduct a capability shift to produce and market ZEVs, and seek business model extensions and strategic partnerships to establish a ZEV ecosystem



ZEV infrastructure

Infrastructure providers will need to establish up to 185,000 charging points by 2035 and must overcome high implementation hurdles to ensure sufficient charging network coverage



Ensure buildup of infrastructure components

Include such key elements as a harmonized charging system and sufficient connection to the grid at core network corridors



MHDT-related utilities

Energy providers need to ramp up renewable electricity generation from less than 1 TWh in 2022 to more than 160 TWh in 2035 to fuel 1.8 million BEV trucks—a major driver of positive economic impact due to high European value-add for renewable electricity (compared to fossil fuels)



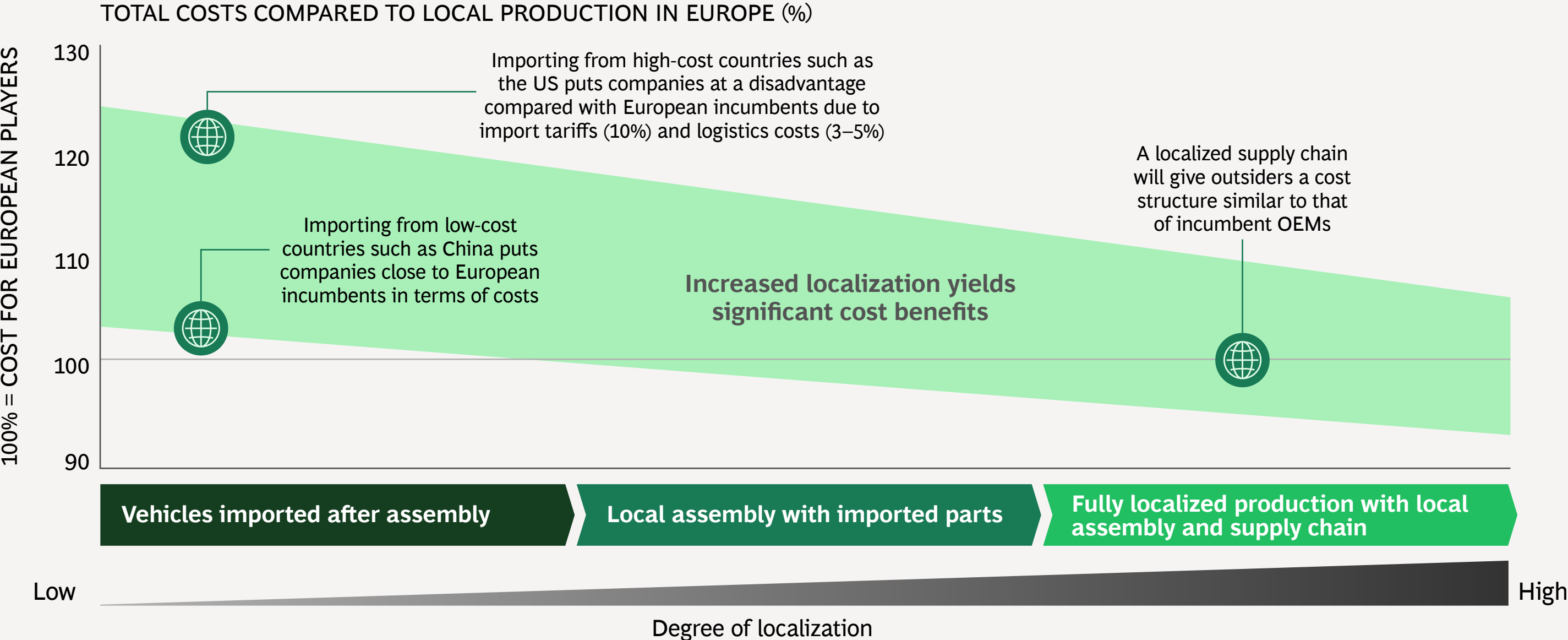
Accelerate buildup of renewable energy grid

In addition to undertaking this buildup, ensure seamless access to charging locations (e.g., truck stops, loading areas)

Source: BCG analysis.

Note: Based on T&E case. BEV = battery-electric vehicle; GWh = gigawatt-hours; ICE = internal combustion engine; MHDT = medium- and heavy-duty truck; T&E = Transport & Environment; TWh = terawatt-hours; ZEV = zero-emission vehicle.

Non-EU players could enter the market via imports, gradually moving toward localization



Source: BCG analysis.

Three scenarios assess the impact of non-European competitors entering the market



Assumption



GDP (€billions)¹



Employment (thousands)

Fully localized production

Two players move into the European market and transition to fully localized production

Negative impact²

Peak (2028)	2035
-1.6	-0.4

Negative impact²

Peak (2028)	2035
-11.3	-1.6

Local assembly with partial local sourcing

Two players move into the European market and assemble vehicles locally, using components built elsewhere

Negative impact²

Peak (2029)	2035
-1.8	-1.4

Negative impact²

Peak (2029)	2035
-12.3	-7.4

Import-based competition

Competitors import fully assembled vehicles

Negative impact²

Peak (2028)	2035
-1.2	-1.2

Negative impact²

Peak (2028)	2035
-7.6	-7.6

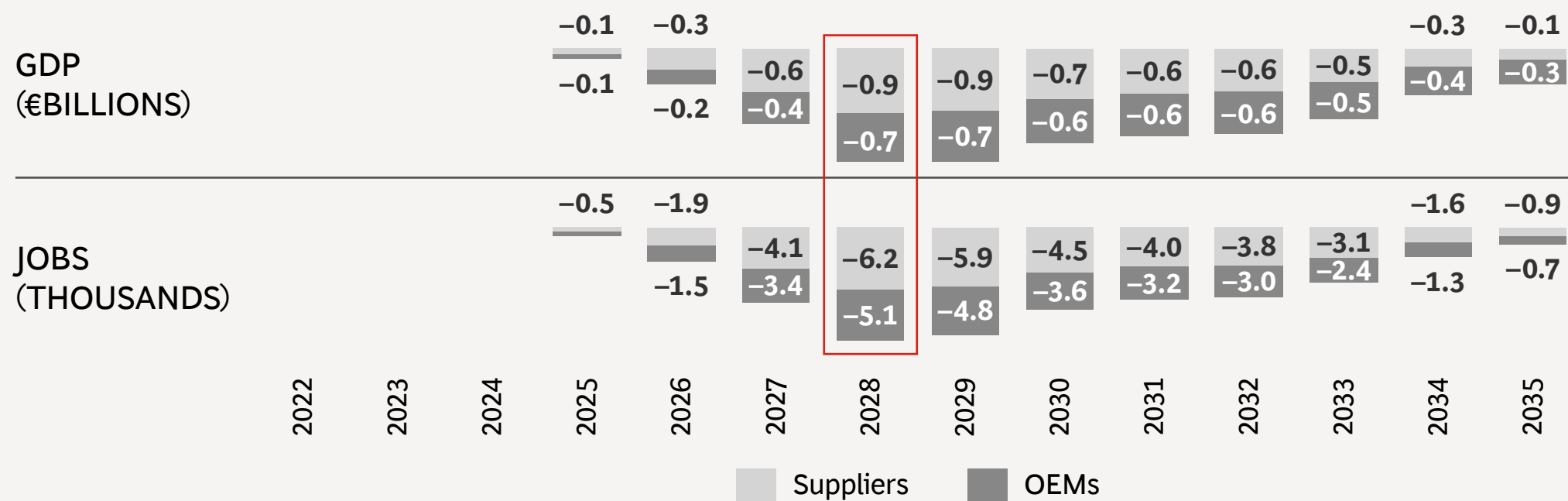
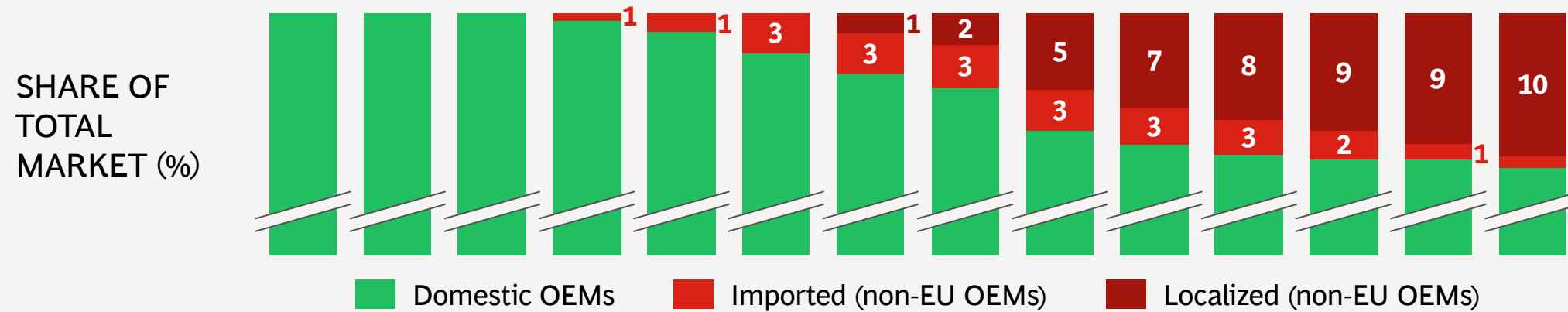
Source: BCG analysis.

¹Including only suppliers and OEMs.

²Through the year 2035; the negative impact of the import-based competition scenario will continue to increase over time.

Fully localized production will cause a medium-term dip in GDP and employment, followed by a modest recovery

Fully localized production



Overall impact

2028
-€1.6 billion

2035
-€0.4 billion

During the import peak, GDP will temporarily decrease by up to €1.6 billion

2028
-11,300 jobs

2035
-1,600 jobs

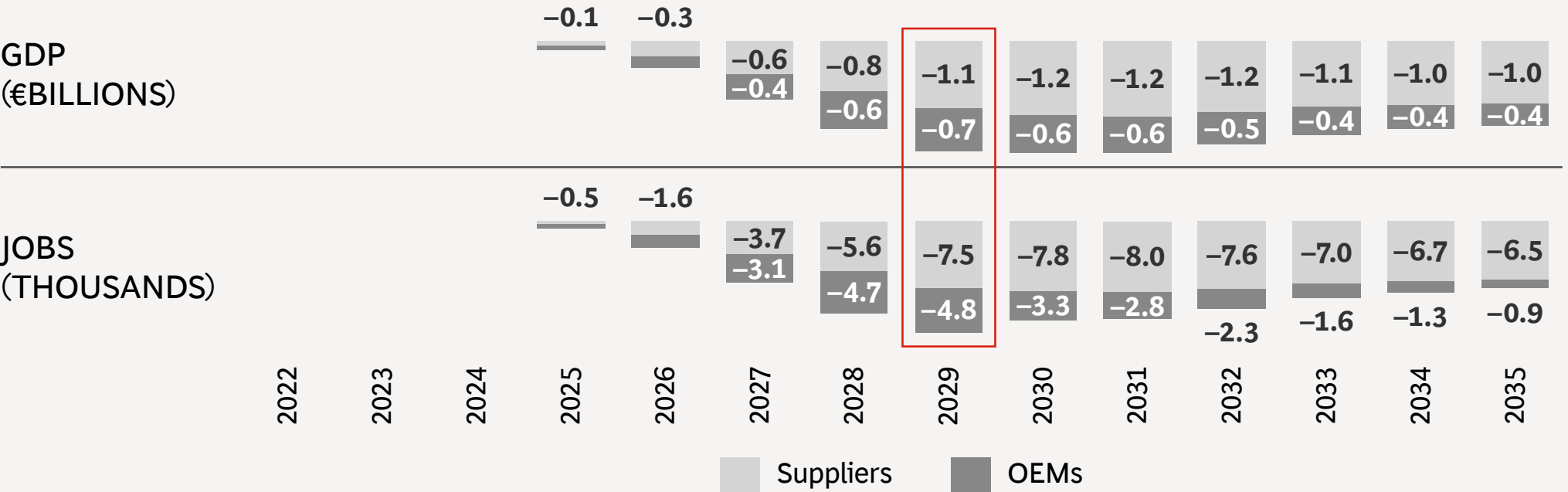
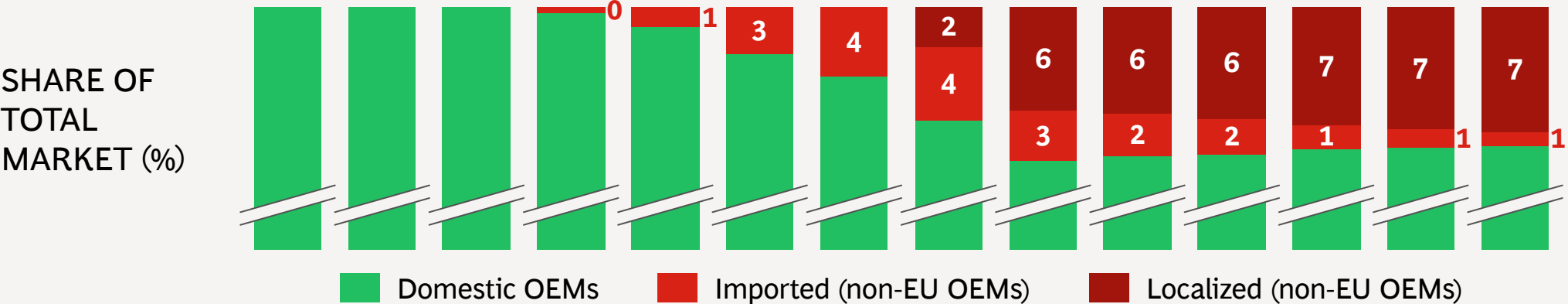
Annual employment losses during import phaseup will peak at 11,300 in 2028

Sources: IHS Automotive; BCG analysis.

Note: Analysis of the impact from non-European competitors is based on the market perspective of zero-emission vehicle adoption.

Local assembly will lead to a substantial short-term dip in GDP and employment if the supply chain is not localized

Local assembly with partial local sourcing



Overall impact

2029
-€1.8 billion

2035
-€1.4 billion

GDP will temporarily decrease until the import peak occurs in 2029

2029
-12,300 jobs

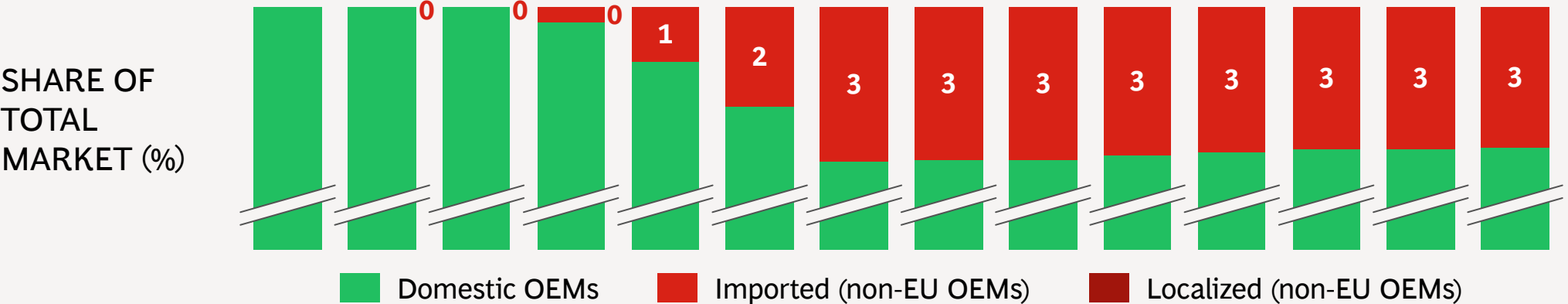
2035
-7,400 jobs

Annual employment losses during import phaseup will reach 12,300 in 2029

Sources: IHS Automotive; BCG analysis.
 Note: Analysis of the impact from non-European competitors is based on the market perspective of zero-emission vehicle adoption.

Import-based competition will lead to sustained losses of GDP and jobs for the European MHDV industry

Local assembly with partial local sourcing



Overall impact

2035
-€1.2 billion

2035
-7,600 jobs

Impact increases over time with higher zero-emission vehicle adoption

Sources: IHS Automotive; BCG analysis.

Note: Analysis of the impact from non-European competitors is based on the market perspective of zero-emission vehicle adoption.