



**EFESO**  
MANAGEMENT CONSULTANTS

# INTEGRATED COST OPTIMIZATION

Balancing cost, investment, and sustainability in automotive manufacturing

PRODUCT COSTING  
**INSIGHT**

# We will help you generate an appropriate cost and CO<sub>2</sub> target, based upon our unique costing knowledge and automotive experience

## Global organizations cite cost reductions as a priority, but they're not doing enough

The automotive industry, like many other sectors, is facing the perfect storm: major market disruptions, production challenges, evolving technology trends and new legislation. The global economy is facing significant upheaval and as the world grapples with the effects of various crises, effective cost management has become vital to survival.

Although cost and value engineering are established functions within the automotive realm, existing capabilities and practices may no longer be sufficient. As the industry changes, so must cost and value engineering, e.g., to cover new cost categories, support agile development, expand knowledge of new technologies, and provide faster cost models.

As consultants, we have helped clients both establish and further develop cost and value engineering capabilities. We have guided numerous companies throughout the implementation process, from small pilots to large-scale rollouts.

## Optimizing just one cost dimension is no longer sufficient. The effects of CO<sub>2</sub> reduction requirements exacerbate the situation!

EFESO has more than 20 years of experience in supporting clients in optimizing costs through a holistic approach, taking into account the interactions of individual cost items, such as:

- Product costs
- Machine and equipment investment costs
- Tooling investment costs
- CO<sub>2</sub> footprint and cost implications

We bring our leading technology and process expertise from working with leading automotive manufacturers on target setting and cost-improvement programs.

We have a unique track record of delivering world-class solutions, on which many of today's cost improvement programs are built.



**Oliver Briegel**  
Partner

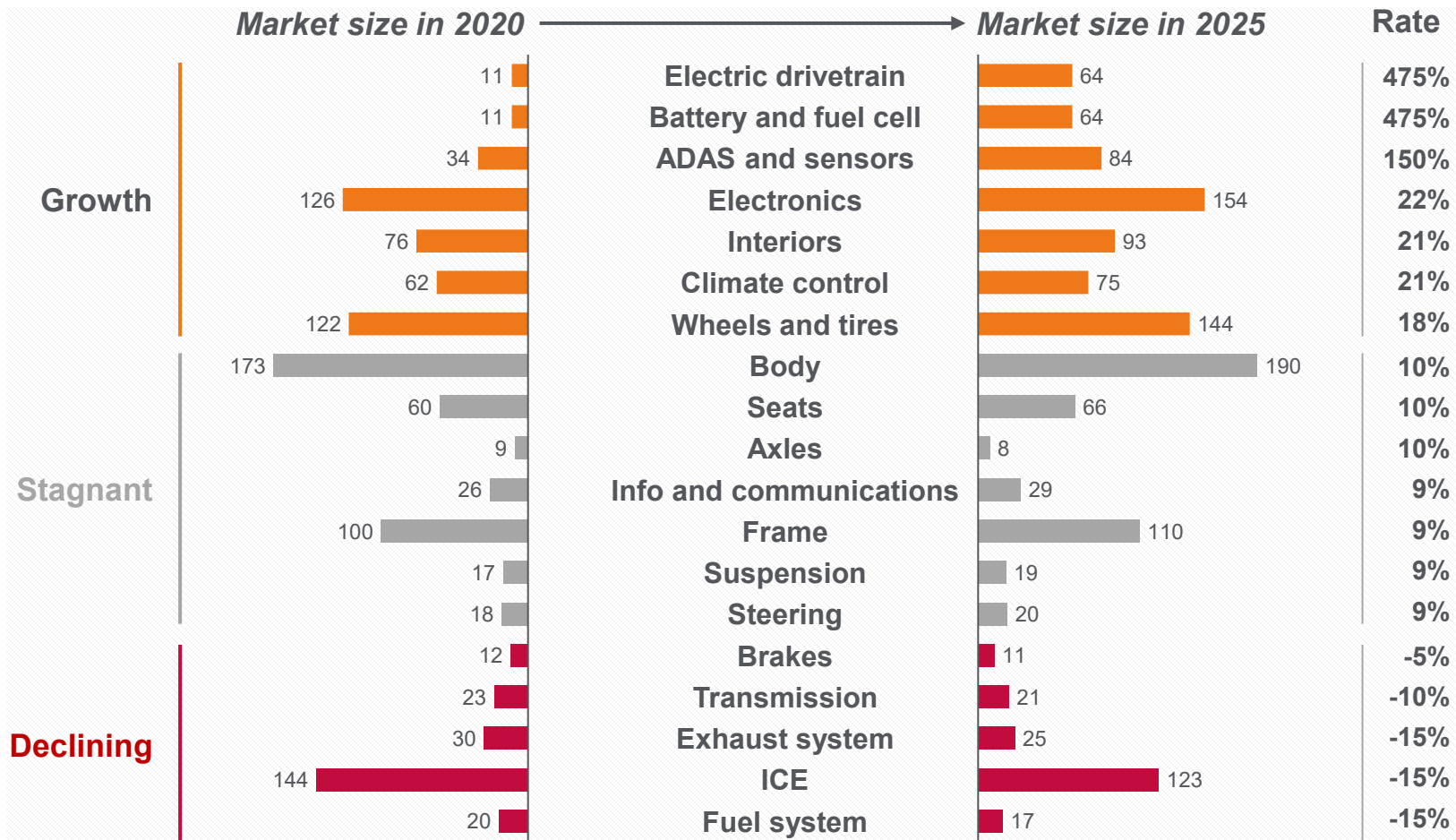


**Torsten Maß**  
Director

While the balance may be shifting from ‘old’ to ‘new’, we see continued growth for both new and legacy segments during this period of automotive industry transformation

 **Automotive component segment size in \$B (2020 vs. 2025)**

 **Implications**



- A period of transition in the automotive industry is well underway, and will lead to huge changes within the global automotive supply industry
- However, this does not mean a general decline across all sectors; the impact of the transition period, on value creation and employment, will vary greatly, depending on the product areas
- While the shift towards electric mobility is likely to bring about significant declines in the drive/chassis-related product segments, certainly in comparison to current levels of value creation and employment, there should also be good opportunities for many other product segments to shore up their positions, with significant growth in many cases
- In this period of change, we see enormous opportunities for those who are strongly positioned, and are willing to act decisively
- Positioning well to win this new business while profitably delivering the existing portfolio – this is the challenge we see right now in automotive

We are second-to-none in supporting our clients based on our unique combination of end-to-end consulting solutions with proven and consistent ability to deliver



## Data & analytics

- Process modelling skills and data access
- Holistic assessment of product, tooling and assets
- Technology skills to analyze sustainability / CO<sub>2</sub> footprint
- Innovative AI-based capabilities for costing and CO<sub>2</sub>
- Scalability of services through innovative software platform

## Integrated cost optimization



## End-to-end transformation approach

- Deep understanding of product, process and strategy
- Leading product-costing expertise
- Hands-on negotiation and implementation support
- Strong performance management skills



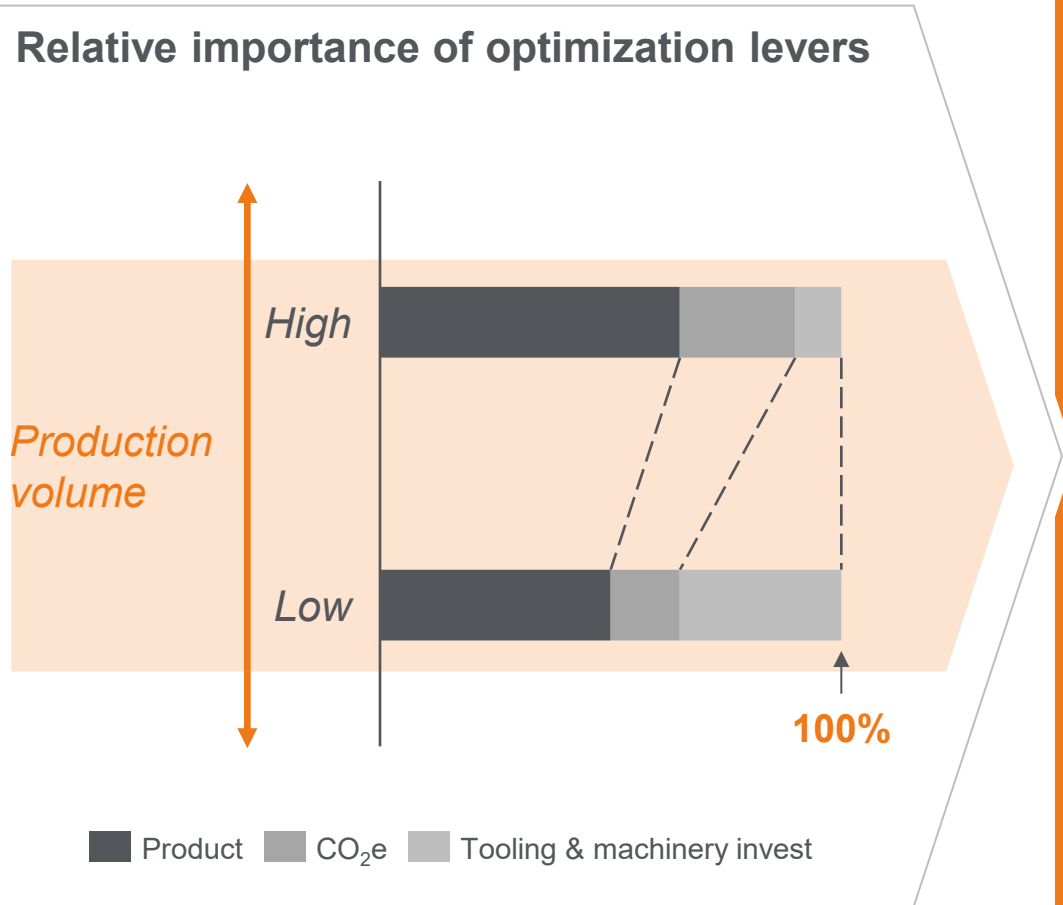
We are experienced in finding the optimum solutions in different volume scenarios for product, tooling and investment costs, with detailed evaluations of the impact of CO<sub>2</sub> taxes.



This assures healthy margins as we combine our unique capabilities in product-, tooling-, invest- and CO<sub>2</sub>e cost, fully adjusted to the respective volumes

 Our unique capability in cost-, tooling-, invest- and CO<sub>2</sub>e

**Excerpt of our current experience**

**Our promise**

We make large-scale profitability programs successful based on:

- **Comprehensiveness**, i.e., analysis of all optimization levers relevant for production volumes  
→ integrated product-, tooling-, invest- and CO<sub>2</sub>e analysis
- **Granularity**, i.e., in-depth analysis on all technologies, processes, assumptions etc. across the supply chain  
→ key to win in complex supplier negotiations

*The above capability is what makes us second to none in this field.*















































We are second-to-none in the field of parts, systems and vehicle costing, and have a long track record of successfully working with the world's leading companies

**EFESO provides cost transparency to achieve best cost solutions**

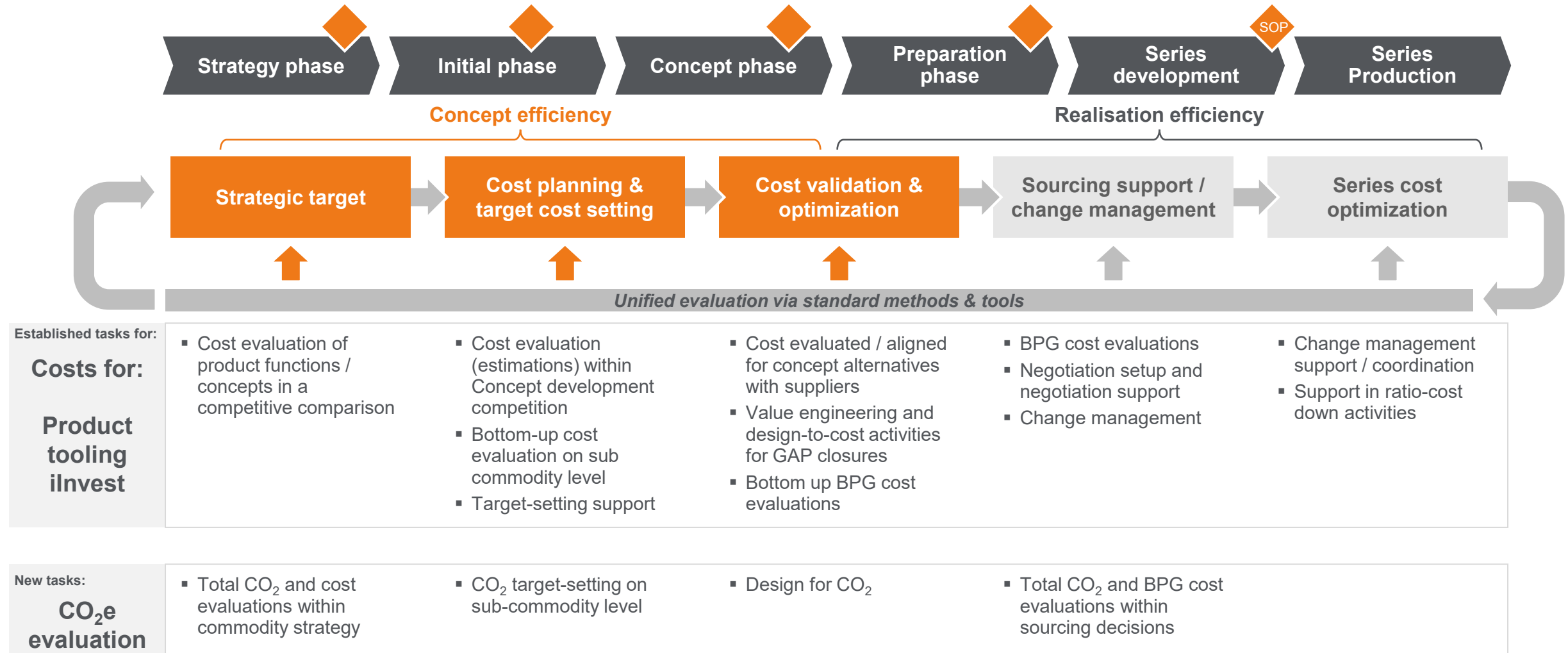
Examples

**Why EFESO?**

								
	Up	Polo	T-Rock	Tiguan	Golf	Passat	Touareg	Atlas
								
	Adam	Corsa	Astra	Mokka	Cascada	Insignia	Zafira	Vivaro
								
	Mini	Three Series	Five Series	Seven Series	X1	X3	X5	
								
	XE	XF	Evoque	Sport	Defender			
<b>Others</b>								
	Skoda Yeti	Cadillac STS	Audi R10	Bentley	Lamborghini	Ferrari	Panamera	
<b>BEV</b>								
	Ego Life	Street Scooter	Ioniq 5	EMP's	Enyaq			

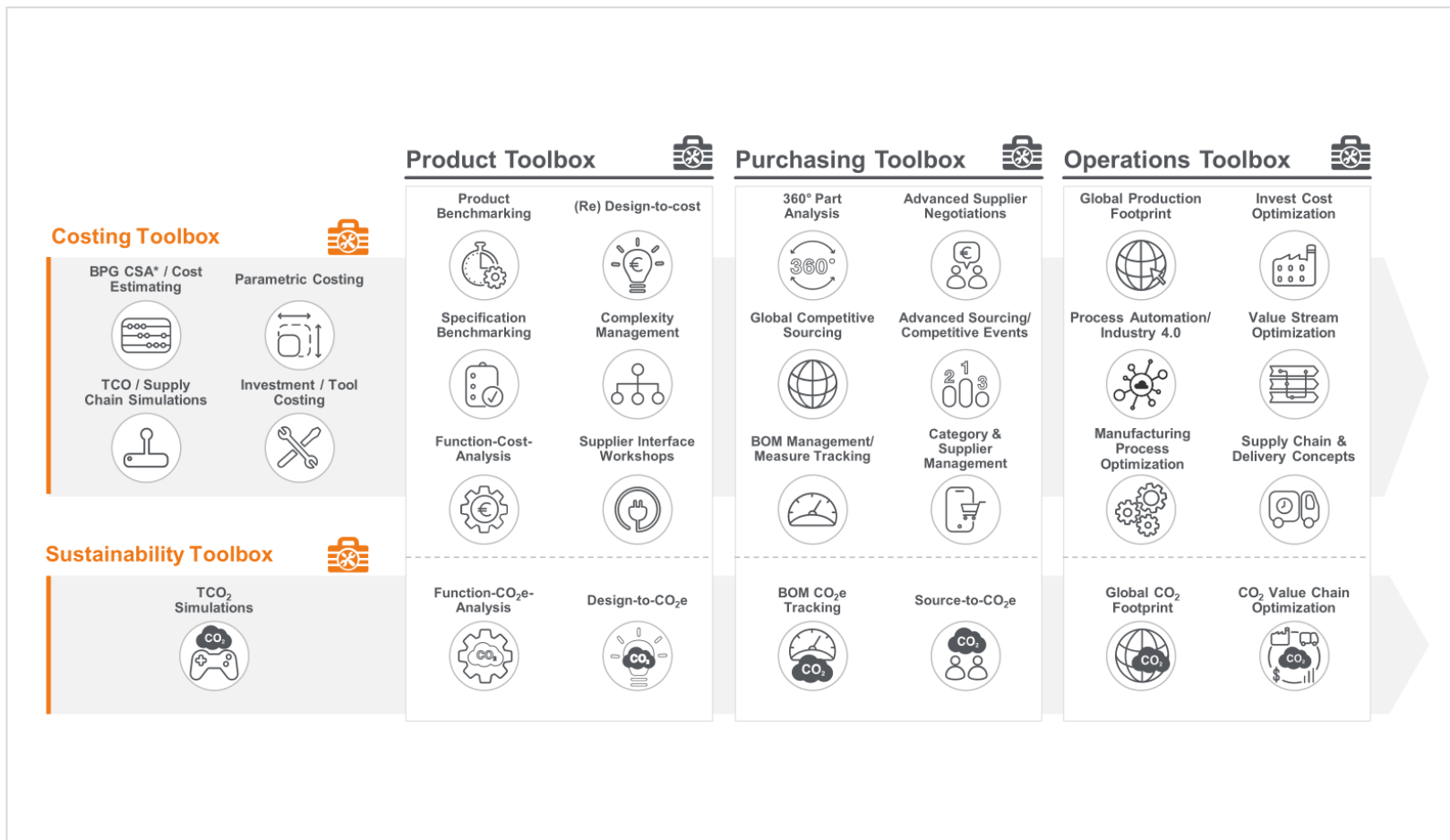
- **Integrated cost transparency** for all types of cost: product, tooling, investment, engineering, etc.
- **Single source for E2E costing services**, from concept selection, process definition, sourcing to installation and product launch
- **Robust and mature cost information** for both target setting and negotiation
- **Long track record of holistic performance improvement programs**
- **Collaborative approach** and proven strength in delivery

We analyze the product costs, investments and CO2 requirements along the product lifecycle, and then identify and deliver on value capture opportunities



# EFESO provides a 'best practice' toolset to identify value capture opportunities and supports delivery via selected proven methods and procedures

## We provides a 'tried and tested' profitability toolset



## Why EFESO


- Based on **more than 20 years of consulting experience**, we have developed specific toolboxes, combined in an **overarching approach**, to improve the profitability performance of our clients
  - These toolboxes allow a **customizable combination** of various methods in **5 general areas**:
    - › Product costing
    - › Product design
    - › Purchasing
    - › Operations & Supply Chain
    - › Sustainability / CO<sub>2</sub>
- ... to unlock savings and improvements







EFESO is the ONLY consulting firm that fully integrates all drivers of success, i.e., the cost, investment and sustainability perspectives

### Integrated optimization

- 

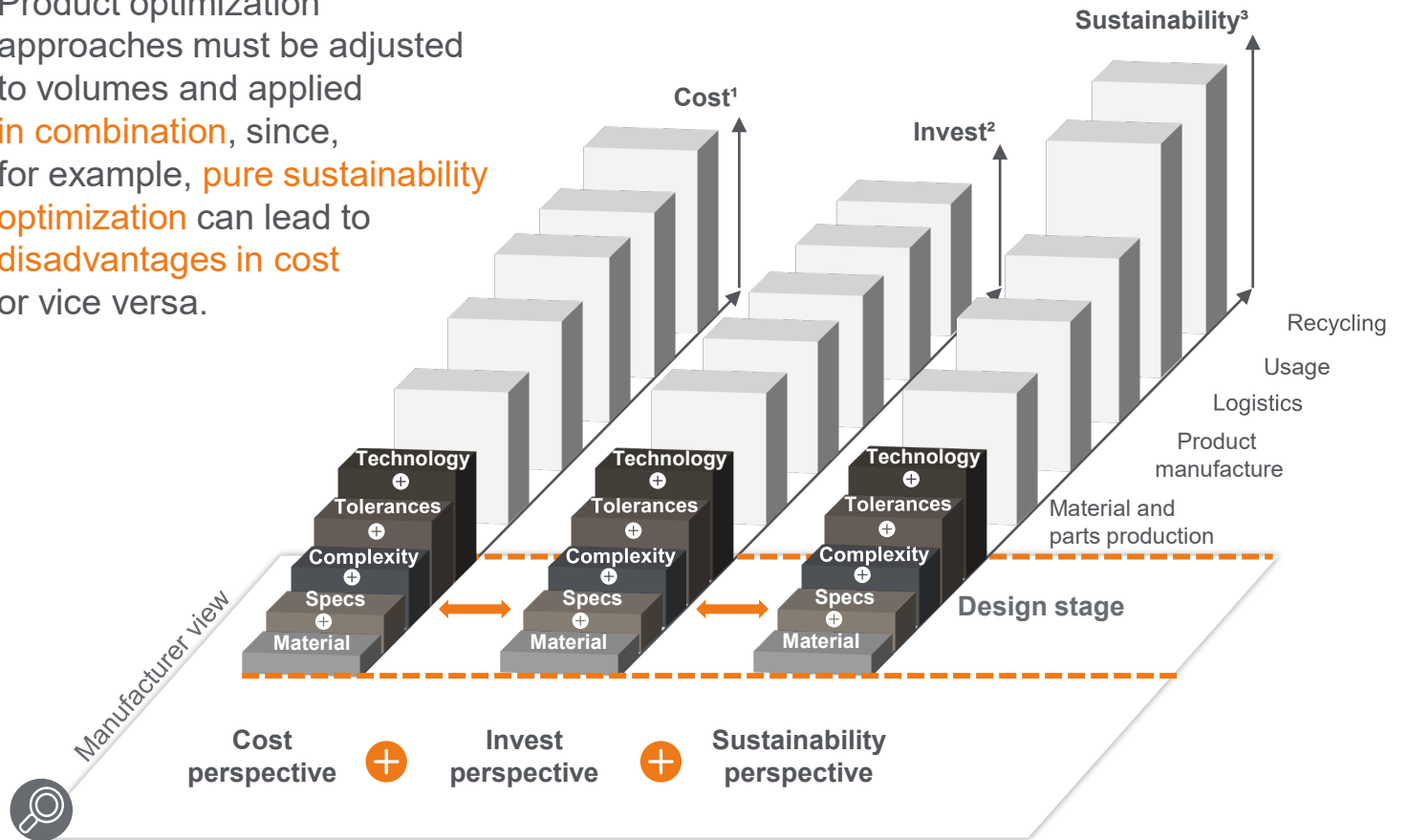
**1 Design-to-cost**  
Control and reduce product-cost during product development.  
*Develop cost-optimized products!*
- 

**2 Design-to-invest**  
Add deep cost and technology knowledge on all aspects of tooling and invest.  
*Optimize plant-/machine invest!*
- 

**3 Design-for-sustainability**  
Optimize footprint and supply chains. Rethink value to customer by considering Circularity Framework.  
*Develop sustainable products!*

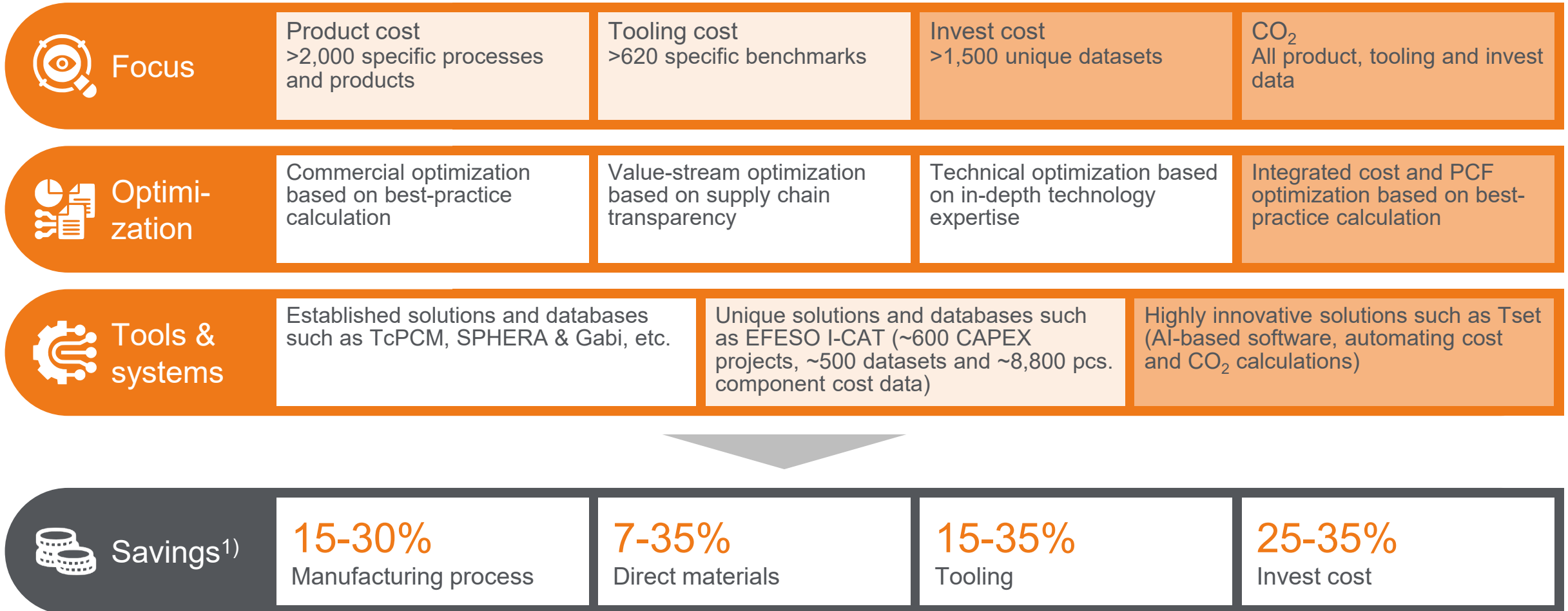
### Cumulative life-cycle view of cost, invest and sustainability

Product optimization approaches must be adjusted to volumes and applied **in combination**, since, for example, **pure sustainability optimization** can lead to **disadvantages in cost** or vice versa.




# Why? Because end-to-end success of cost-out projects requires far more than just product cost calculation capabilities – this is what we provide

## Results summary of our analysis



PCF = Product Carbon Footprint  
1) of respective cost type/category

 EFESO as market leader

 EFESO as market innovator

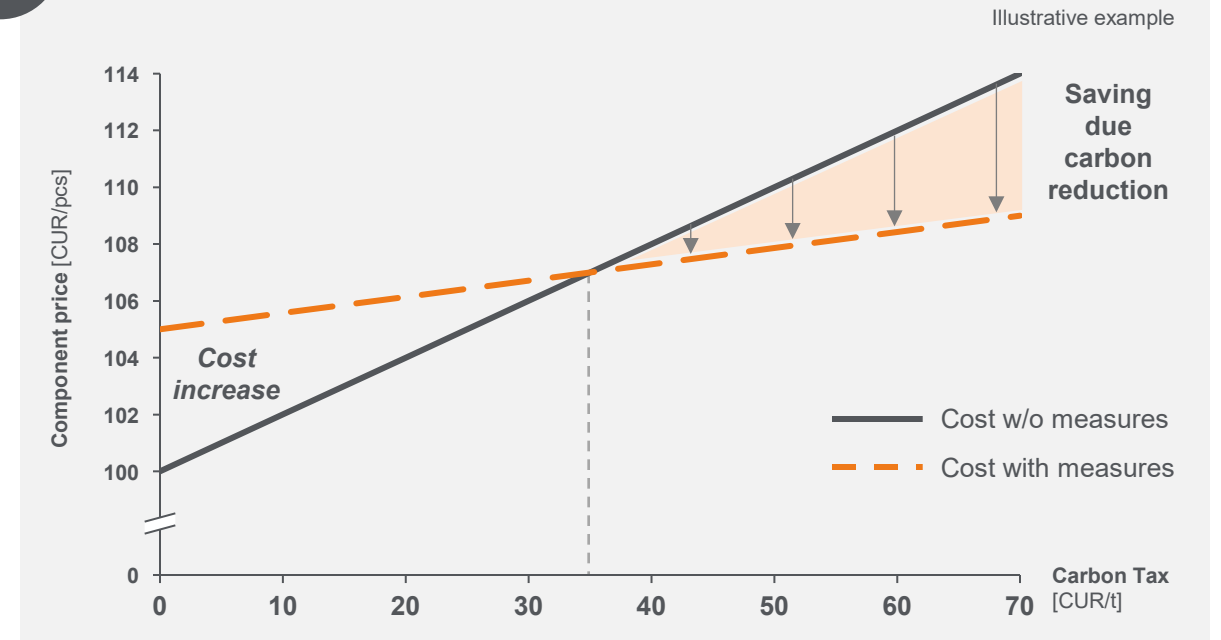
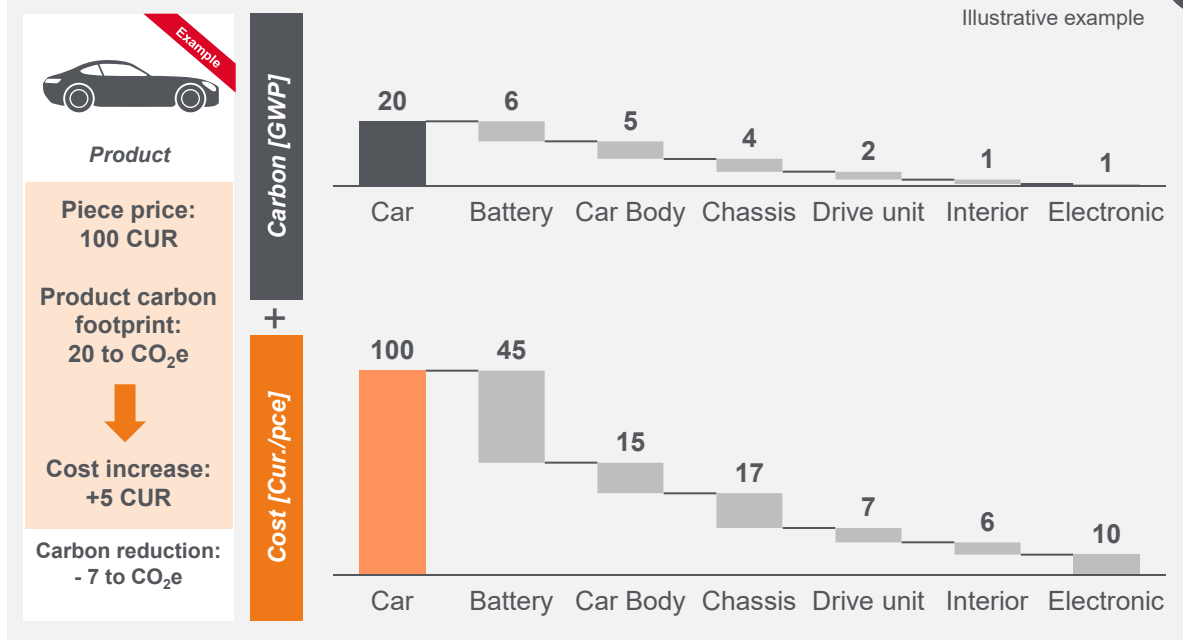
# With our integrated approach, we support to objectify decisions on CO2 reduction!



## Detailed cost & carbon structure



## Implement measures scenario



Each lever affects carbon emission and costs. The key is to find the right balance for improvements. Therefore, it is necessary to focus on a holistic analysis.



Decreasing product carbon footprint, causing add-on costs, reduces the piece price after break-even.



The transparent weighting of use and benefit in a holistic view ensures the optimum cost for products.



# Hyundai IONIQ 5 product tear down & cost calculation – vehicle highlights

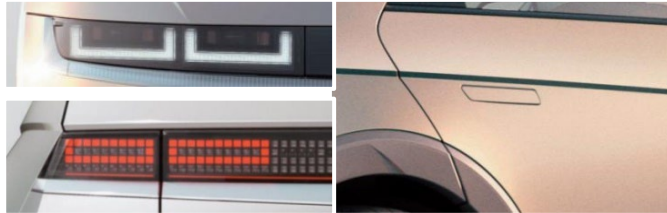


## Sustainable materials (see detail slide)



## Design elements (exterior)

Distinctive shapes, including continuous joint



## Powertrain

The IONIQ 5 is based on Hyundai Motor Group's 'Electric-Glob Modular Platform' (E-GMP). Supported by its long wheelbase, the IONIQ 5 offers unique proportions, an innovatively friendly materials, high performance paired with ultra-fast charging, a Vehicle-to-Load (V2L) function, as well as best-in-class connectivity and driver assistance features that make e-mobility even more convenient and safe



## Space

Flexibility and comfort for the occupants



Front seats with reclining function std. on top line



Power length adjustment for rear seat bench std. on top line

## Safety

Comprehensive safety including new systems



Head-up display with augmented reality std. on top line



Highway assist Level 2 (HAD 2) std. from plus line

## EV features

Advanced EV technologies



Fast charge from 10 to 80% in 18 minutes



230V connection (V2L) under the rear seat bench



# Hyundai IONIQ 5 cost calculation – assembly group overview

If you have special interests in specific assembly groups, please contact us directly!

## Assembly groups

02	Transmission
03	Motor cooling ZP7
04	Axle drive FA
05	Axle drive RA
07	Charging
08	Front axle
09	Rear axle
10	Wheels/tires
11	Steering
11-1	Steering column/steering shaft
12	Steering wheel
13	Foot ped/brake actuation
14	Brakes
14-1	Brake control
16	Motor/transmission bearings
19	Body structure
19-1	Body assembly parts
20	Paint and finish protection

## Assembly groups

21	Bumper
21-1	Crash Management System
21-2	Front end
22	Fresh air flap assy
23	Glazing
24	Side paneling
24-1	Fender
25	Wheel arch liners
25-1	Front covers
26	Wiper system
27	Water catcher/drip catcher
29	Lettering and emblems
30	Insulation and trim
30-1	Insulation/damping
31	Front flap
32	Tailgate
33	Fuel flap/charging flap
34	Roof system

## Assembly groups

35	Door
36	Locking system
37	Headlights
38	Taillights
39	Control panel assy
40	Center console
41	Cockpit trays
42	Module cross member
43	Vent
44	Applications
45	Airbags
45-1	Safety electronics
46	Seat belts/seat belt buckles
47	Front seats body
47-1	Front seats platform
48	Rear seats body
48-1	Rear seats platform
50	Air conditioning

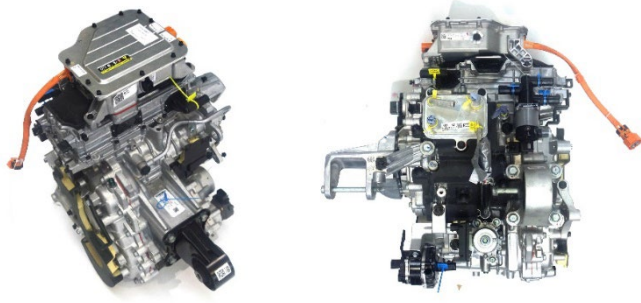
## Assembly groups

50-1	Air conditioning, refrig. circuit t. drive
51	Molded headliner/mounted parts assy
52	Interior mirror/rear view mirror assy
53	Pillar trim top/bottom
54	Floor covering
55	Hat rack/luggage compartment lid
55-1	Rear trunk
56	Frunk
57	Door panel assy
58	Interior lighting
59	Operating and display elements
60	Infotainment
62	Control units
63	Electric system
64	Power
65	Centralbox
65-1	HV battery assy
66	Driver assistance systems



# Breakdown and calculation results – detailed concept analysis and distinctive features

## Assembly group axle drive front axle



### Concept description/details

- Supplier: Mobis
- PSM (Hairpin)
- 70kW, 255 Nm
- Axis-parallel transmission
- DCU decoupling unit
- No parking lock

### Structure hierarchy

- E-machine
- Transmission
- Inverter
- Assembly



Weight **84,600g**



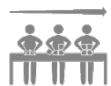
Dimensions **427 x 386 x 518mm**



Material **various**



Manufacturing process **Die casting, forging, injection molding, electronics, iron casting, assembly, etc.**



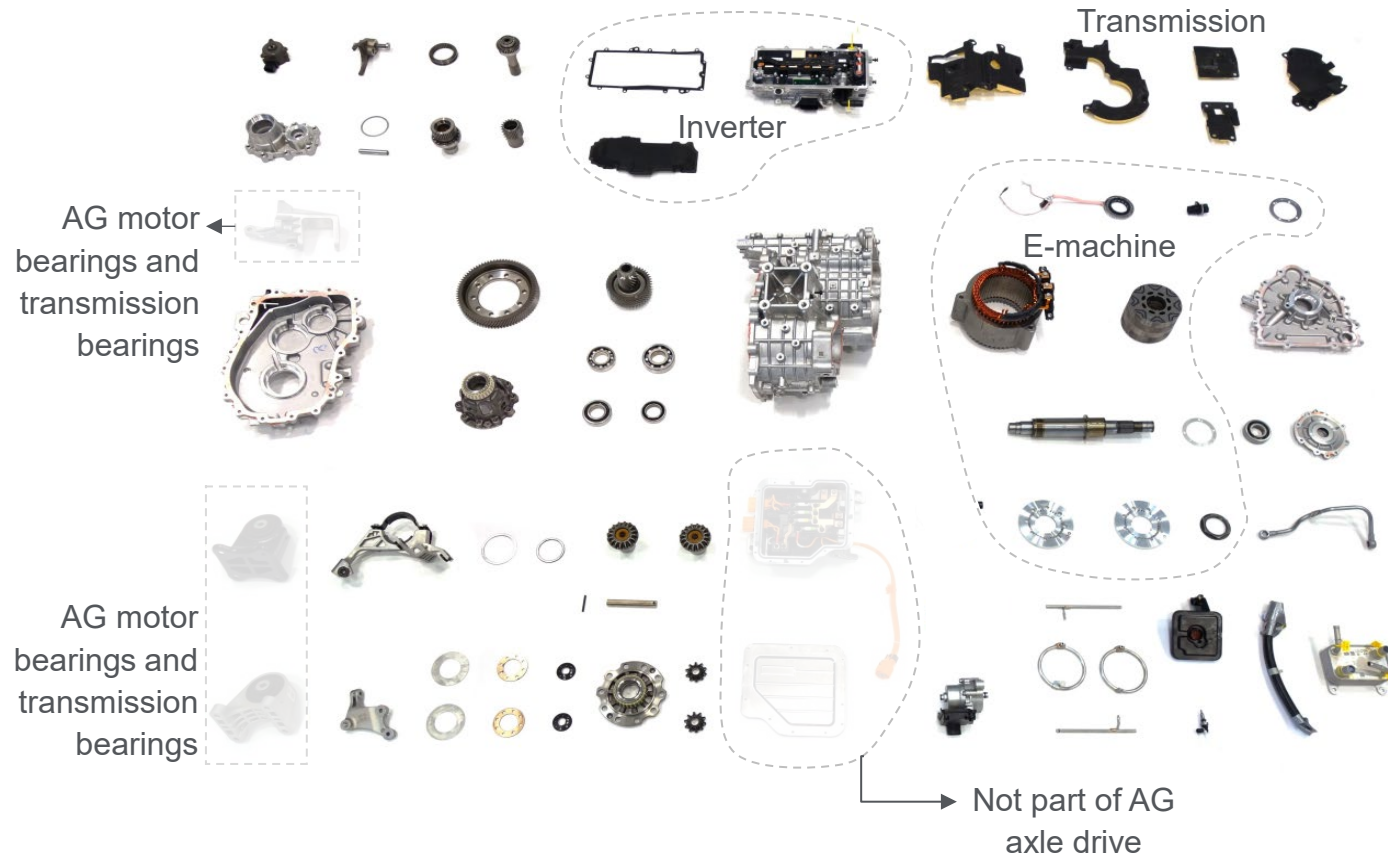
Assembly mounting **Axle drive, stator, rotor, inverter, fin, EOL**

### Distinctive features

- Modular FA/RA design (identic parts)
- Busbar box as separate assembly
- Standard design axis-parallel transmission (compact function design)
- Integrated, pluggable power electronics
- No EMC filter
- Si power module
- Some aluminum die-cast elements not blasted
- Encapsulated magnets in sheet metal package
- Ceramic bearings

# Breakdown and calculation results – image documentation (1/4)

## Assembly group axle drive front axle



Pos	Quantity	Designation
709	1	E-machine
710	1	Transmission
711	1	Inverter

## Assembly group axle drive front axle

*E-machine*



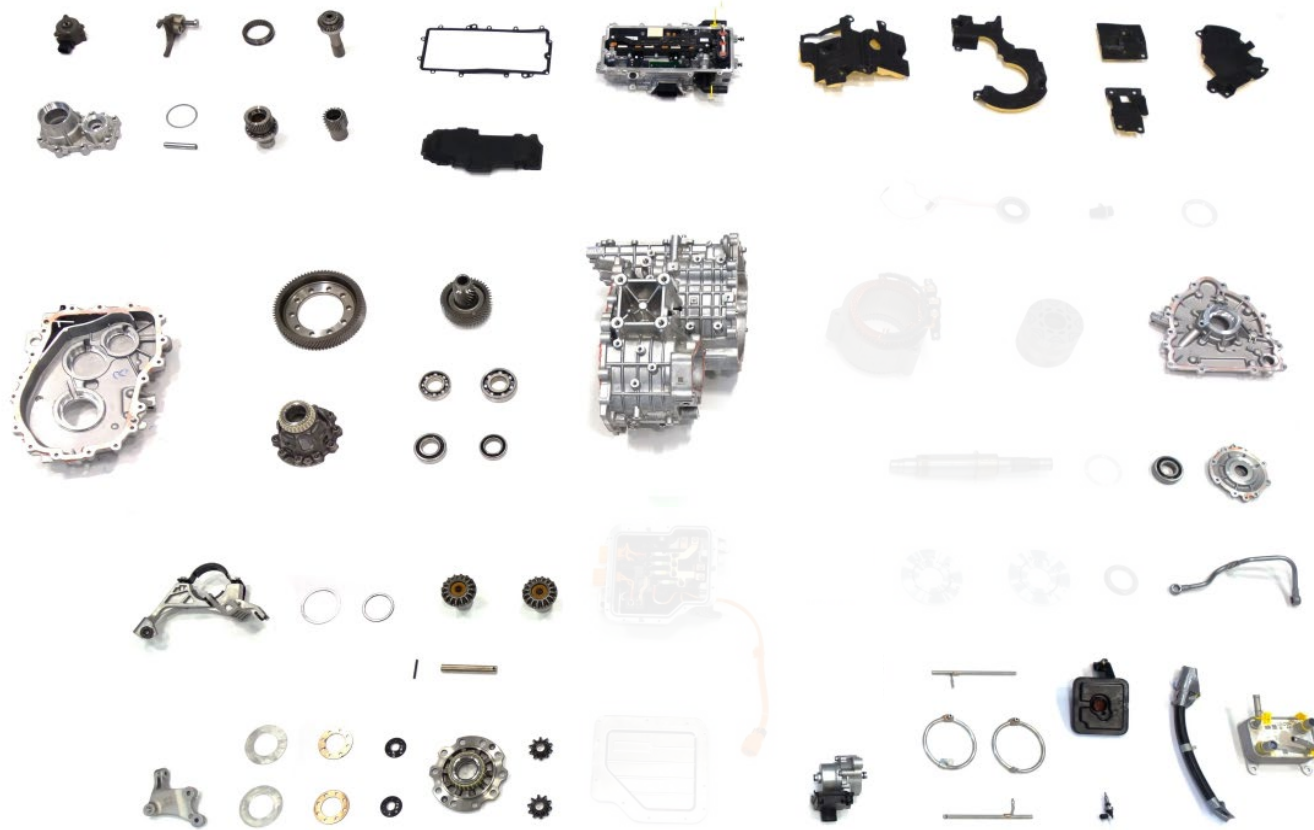
Pos	Quantity	Designation
709	1	E-machine
710	1	Transmission
711	1	Inverter



# Breakdown and calculation results – image documentation (3/4)

## Assembly group axle drive front axle

### Transmission



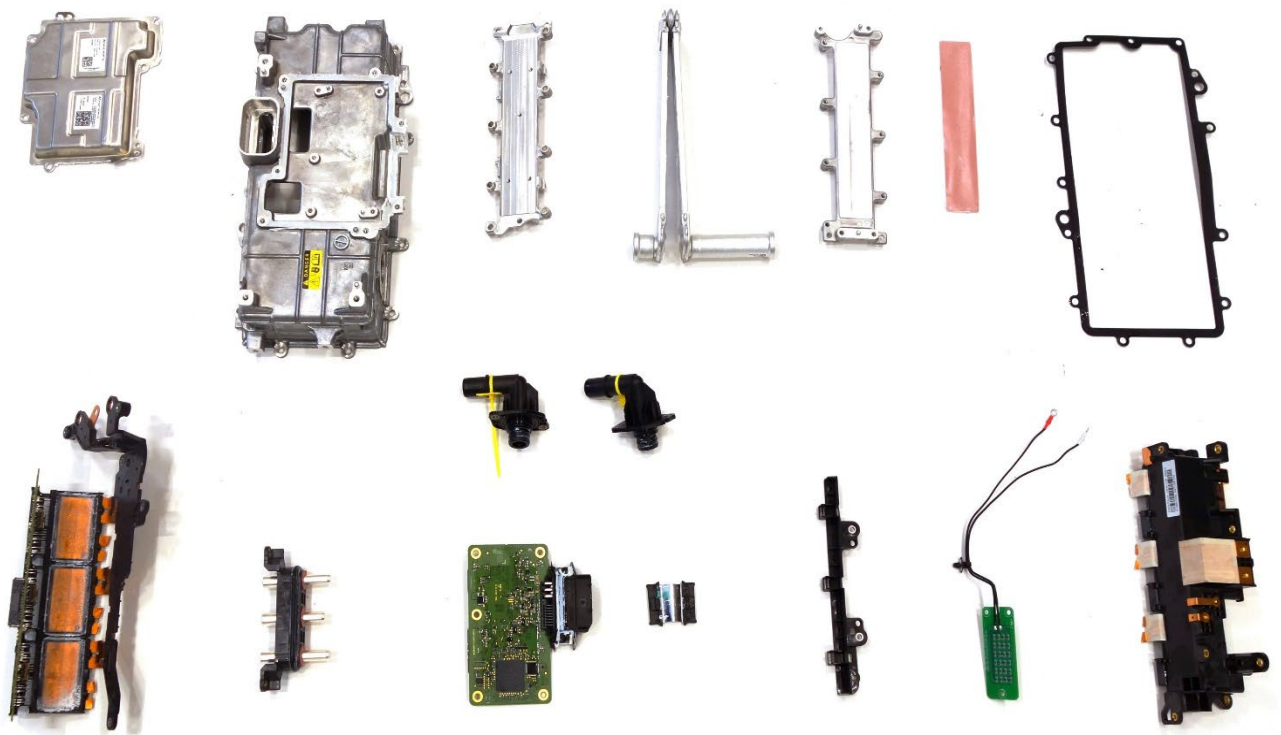
Pos	Quantity	Designation
709	1	E-machine
710	1	Transmission
711	1	Inverter

# Breakdown and calculation results – image documentation (4/4)

Example

## Assembly group axle drive front axle

### Inverter



Pos	Quantity	Designation
709	1	E-machine
710	1	Transmission
711	1	Inverter

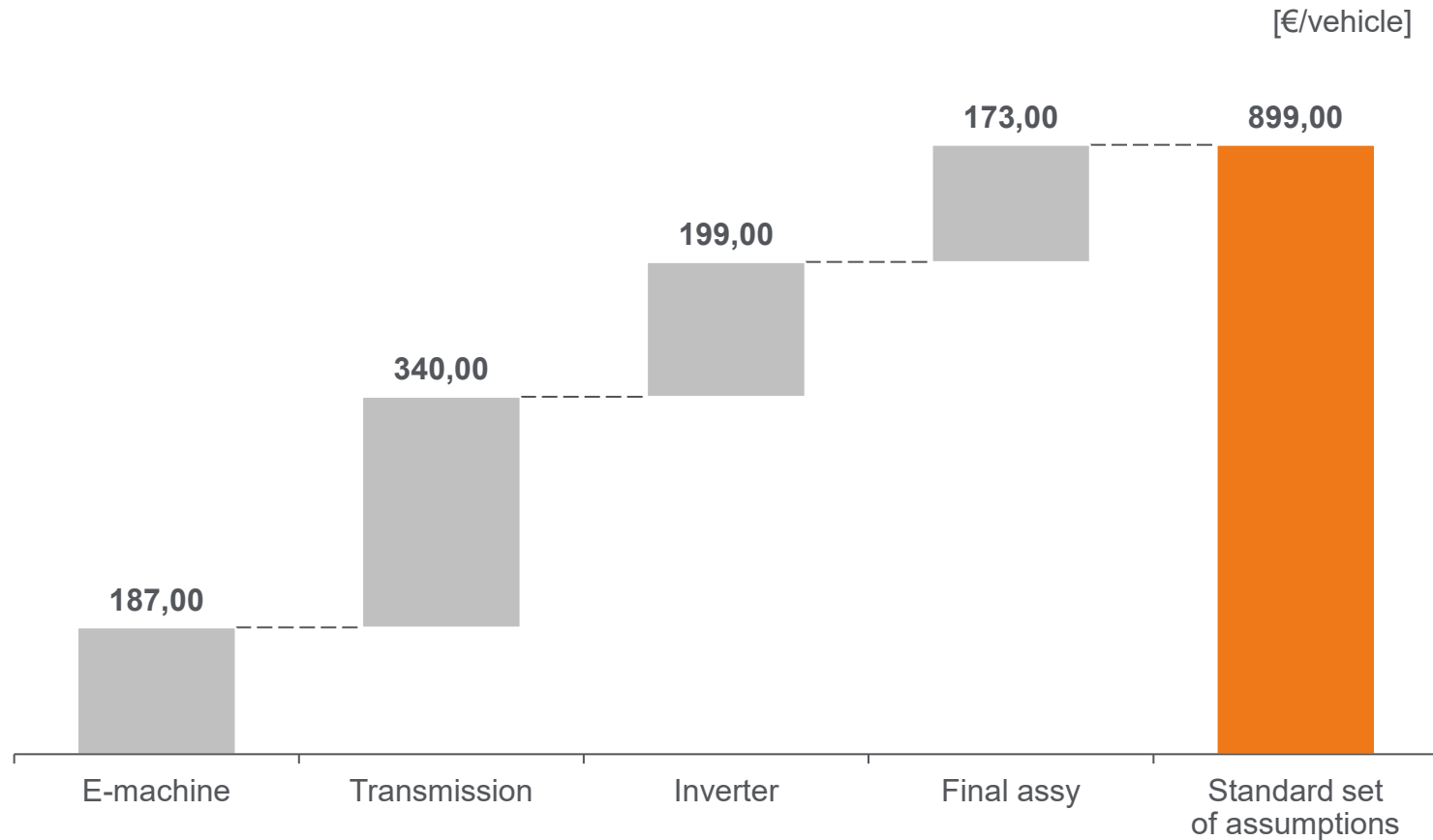


# Breakdown and calculation results – cost overview

Example

## Assembly group axle drive front axle

### Cost overview – assembly elements



### Explanation

#### Standard set of assumptions

- › Production site: Czech Republic medium
- › Annual quantity: 500,000
- › Manufacturing lots per year: 12

#### List of assembly elements

- › E-machine
- › Transmission
- › Inverter

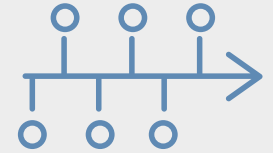


# Is my company impacted – what should I do now?

1

## Understand the baseline

- Are my product and investment costs competitive?
- Where are the main areas for improvement (capex, material costs...)?
- What is my product carbon footprint?



2

## Identify changes and optimization measures

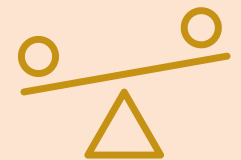
- What commercial ‘cost down’ potential do I have in the main areas (material costs, manufacturing costs, capex...)?
- Will CO<sub>2</sub> requirements have an impact on my cost structure?
- Do I need to change my sourcing footprint?
- How do I have to change my product, from a CO<sub>2</sub> perspective?



3

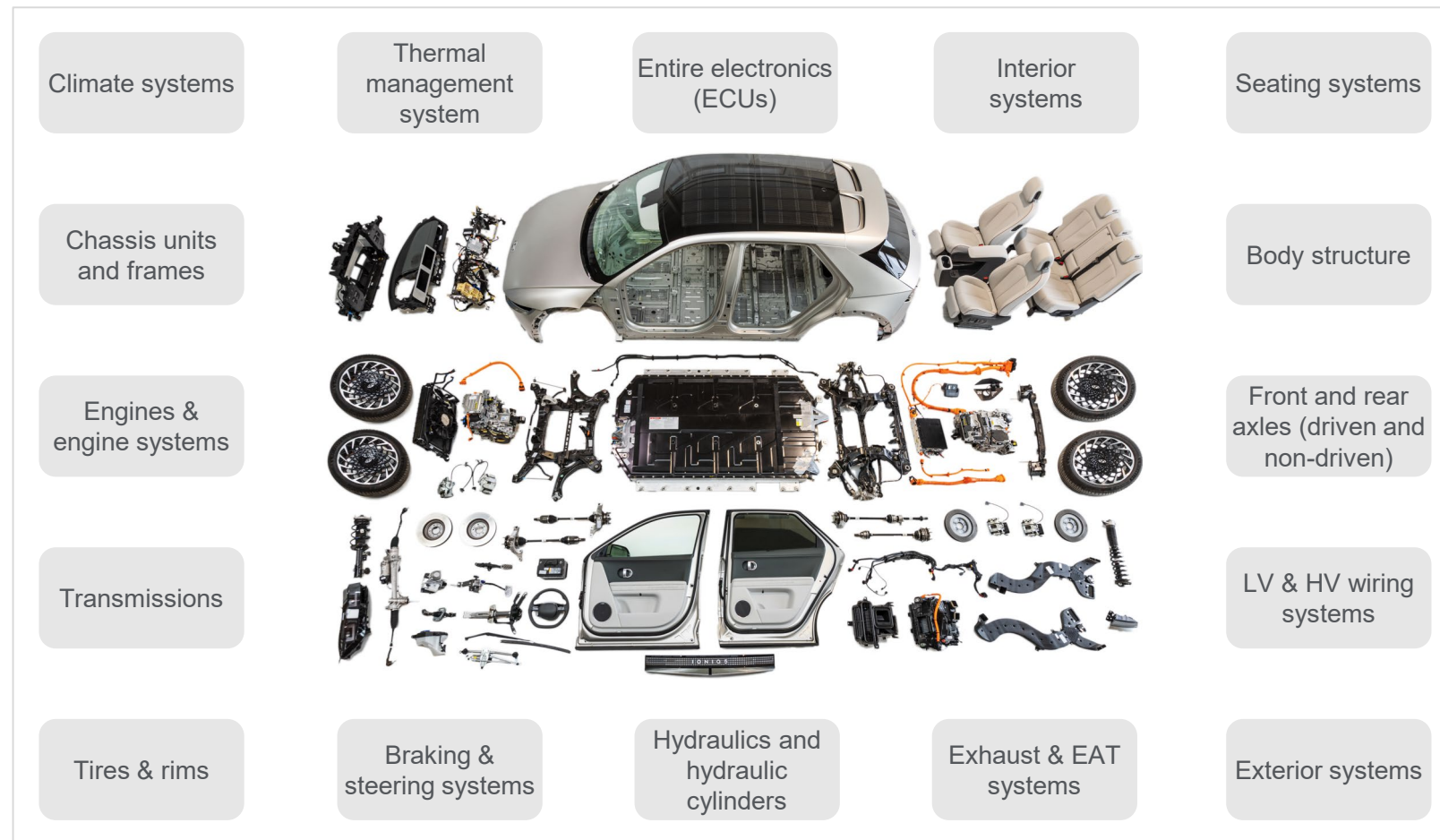
## Strategize to balance cost, carbon, and CapEx

- Impact of carbon on your business strategy?
- Balancing C<sup>3</sup> – cost, carbon, and CapEx?
- Refine sourcing and product strategy to best adapt to a given CO<sub>2</sub> regulatory landscape



We wield our leading technology and process know-how, gained from >20 years of working with leading automotive players, to reduce product, invest and tools costs

## EFESO provides holistic automotive market, technology, and costing insights



## Why EFESO

- We have worked with numerous global automotive **OEMs** and **Tier 1 suppliers** etc. delivering **sustainable approaches** with **results**. Our **unique track record of cost engineering & profitability competence** is well known in the market
- Through our vast experience in the automotive industry, we have already **broken down and analyzed all of the key technologies and supply chains** used in the Automotive Industry many times over. That's why we have **such deep knowledge about specific material and processing requirements**



**500+**  
Projects<sup>1</sup>



**100%**  
Penetration



## YOUR CONTACTS:

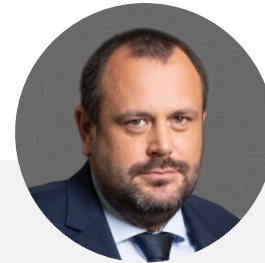


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