



# Investor Relations Presentation

November 2019



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# The Business Model

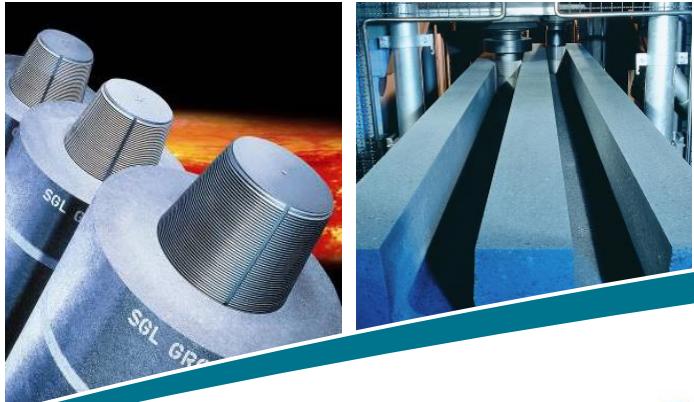
# Successful transformation of SGL Carbon.

## Carbon and graphite for Megatrends

Lighting



Steel, Aluminum



Mobility, Energy, Digitization



1878



SIEMENS  PLANIA

**SIGRI**

**SGL**  
CARBON

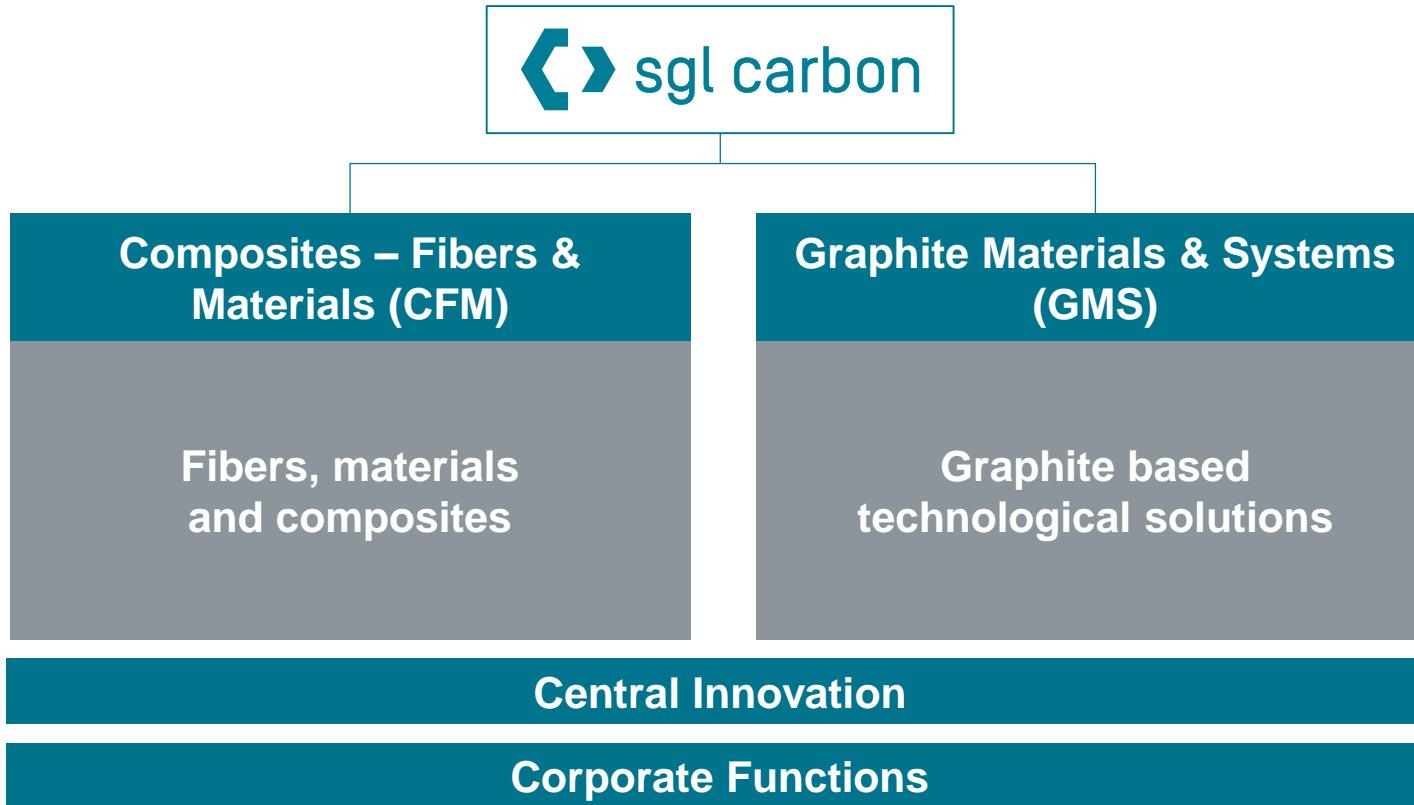
Sigri Great Lakes Carbon Group

 **SGL GROUP**  
THE CARBON COMPANY

 **sgl carbon**

# New SGL Carbon.

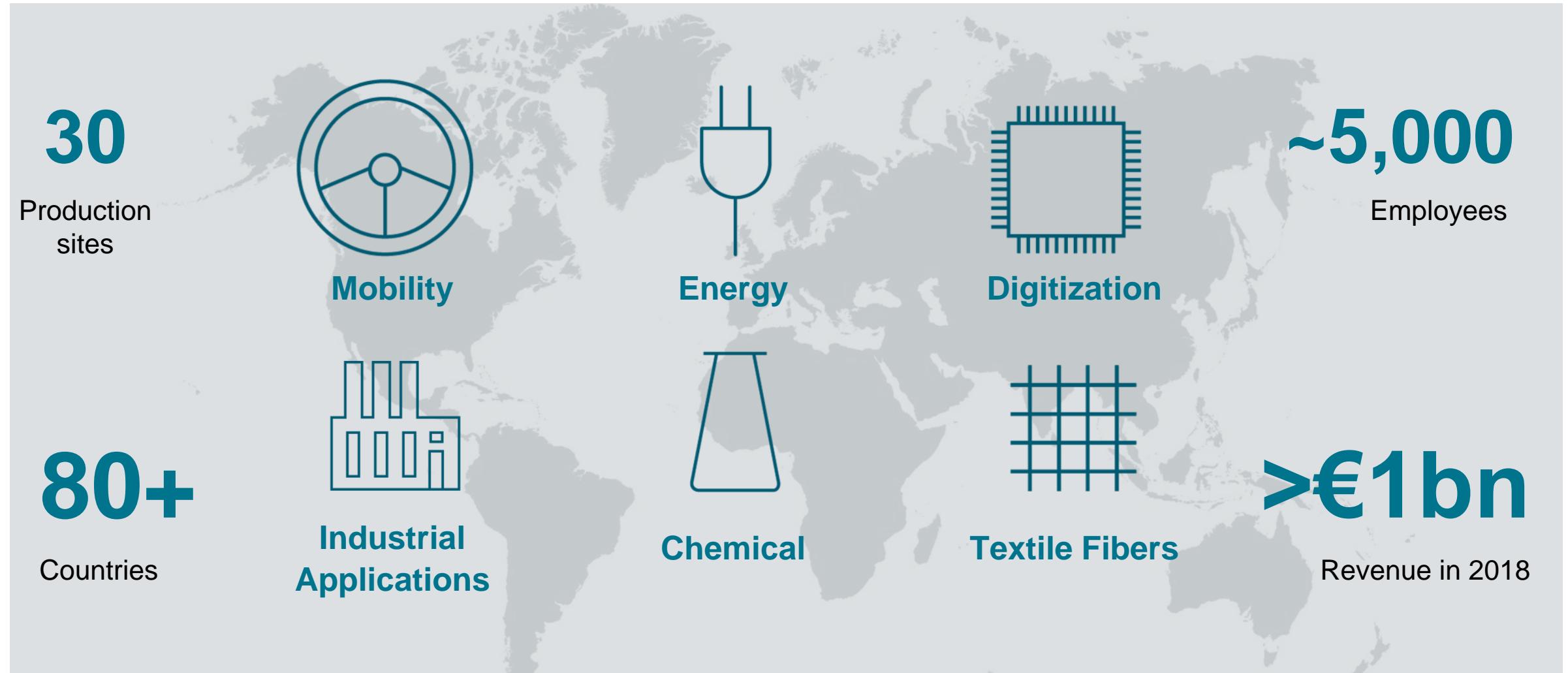
Focus on two innovative businesses



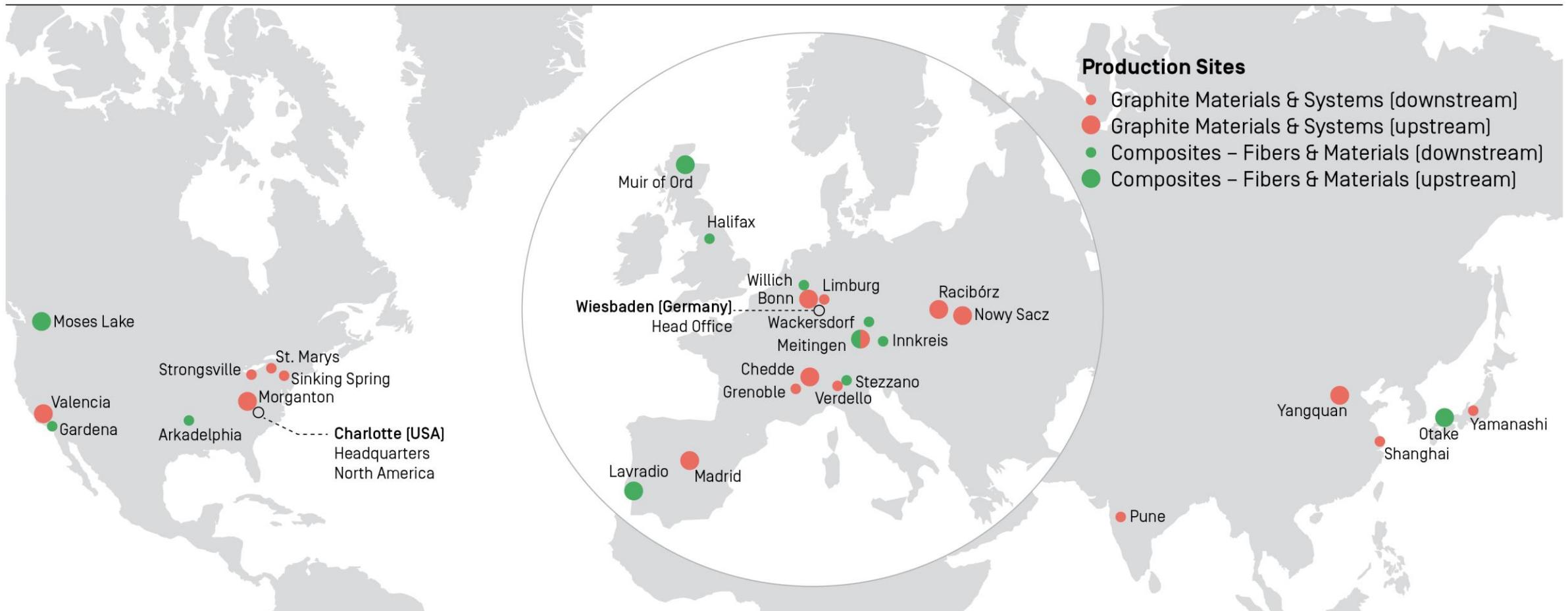
Focus on CFM and GMS improves the balance between markets and industries,  
and thus **reduces volatility in our business**

# New SGL Carbon.

Specialized on carbon- and graphite-based solutions



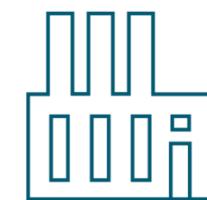
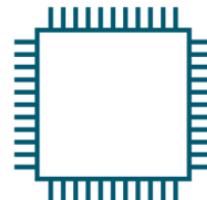
# Global presence. SGL Carbon worldwide sites



# Group market segmentation.

Stronger orientation to customer and growth markets

## Market Segment

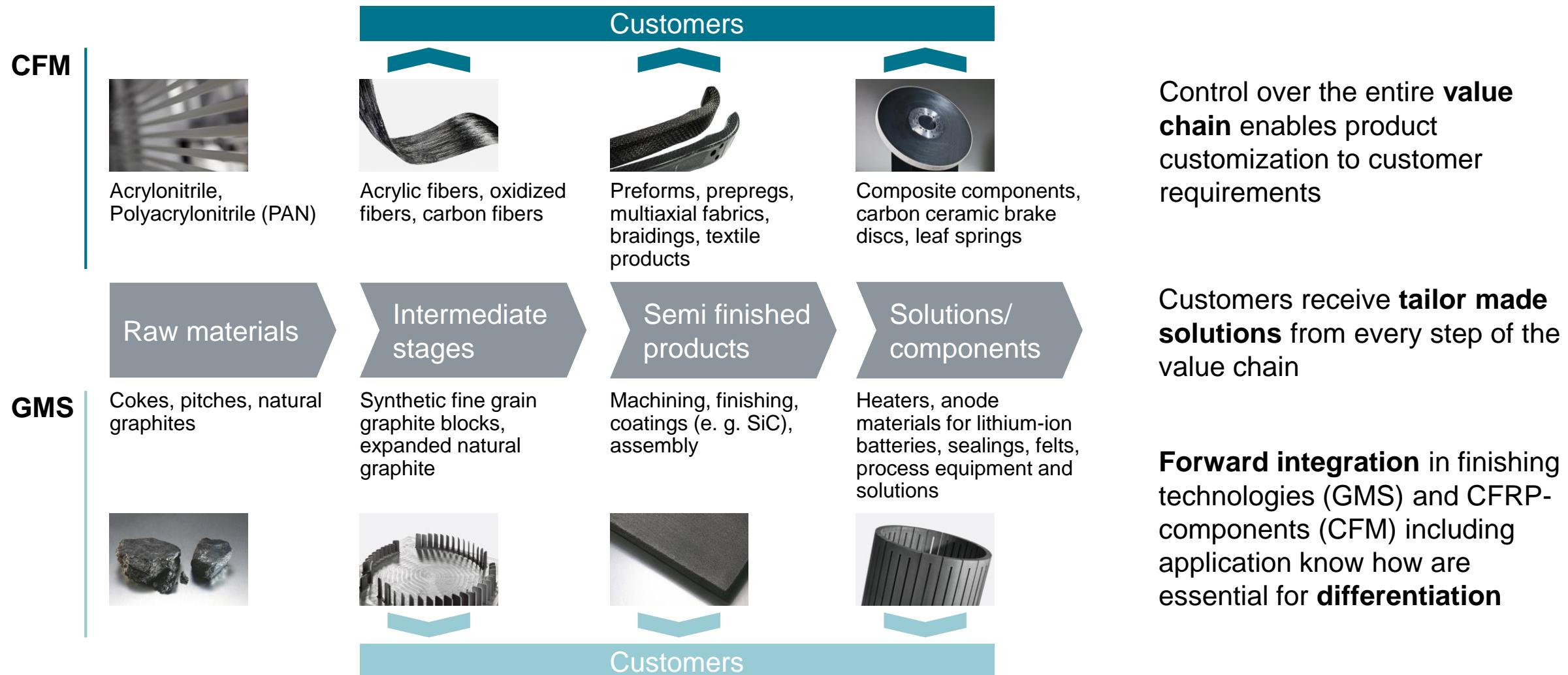


	<b>Sales<sup>1</sup> € million</b>	<b>Mobility<sup>2</sup></b>	<b>Energy<sup>3</sup></b>	<b>Digitization<sup>4</sup></b>	<b>Industrial Applications</b>	<b>Chemical</b>	<b>Textile Fibers</b>
<b>2018</b>	<b>1048</b>	<b>29%</b>	<b>16%</b>	<b>7%</b>	<b>26%</b>	<b>13%</b>	<b>9%</b>
<b>2017</b>	<b>860</b>	<b>19 %</b>	<b>22 %</b>	<b>5 %</b>	<b>29 %</b>	<b>14 %</b>	<b>11 %</b>

<sup>1</sup> Figures in 2017 do not reflect full consolidation of SGL ACF and Benteler SGL as well as disposal of SGL Kämpers

<sup>2</sup> comprises automotive, aerospace and transport markets; <sup>3</sup> comprises battery, solar, wind and other energy markets; <sup>4</sup> comprises LED and semiconductor markets

# Commanding entire value chain in carbon and graphite. Advantages in cost, quality and differentiation



# ROCE.

## Remains key management principle for managing the business

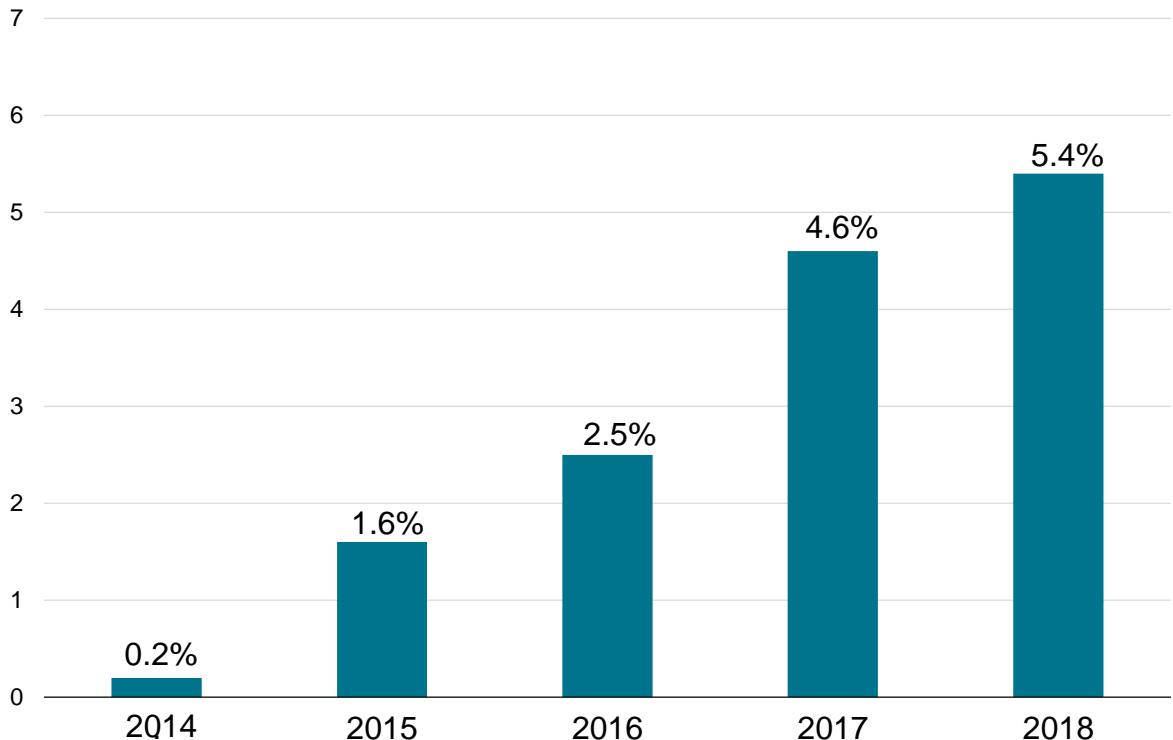
In 2014, we, the new Board of Management, introduced ROCE as new **key management principle**, replacing ROS

As a result we implemented the ROCE target in all senior management layers, aligning their **incentive system** with ours

We started reporting ROCE on Group and BU levels on a **quarterly basis**, so that our progress can be tracked



### ROCE<sup>1</sup> development



While we are not yet there, we have made substantial progress toward our targeted ROCE<sup>1</sup>

<sup>1</sup> ROCE defined as EBIT/Capital employed; historical data adjusted to reflect "new" Group structure

# Levers to further profitability improvement.

## Sales:

Focus on higher margin innovative **Megatrend markets** (digitization, energy, mobility)  
Increase in share of **higher margin downstream businesses**  
**Increase utilization** of existing capacities (CFM) and capacity extensions (GMS)  
**Commercial Excellence**: margin and KPI steered sales organization with focus on price increases, improved product mix, high margin and high growth areas

## Costs:

**Automation**  
**Digitization**  
Global **standardized** and **efficient processes**: e.g. Operations Management System  
Fully utilize **Shared Service Center** and transfer further transactional tasks

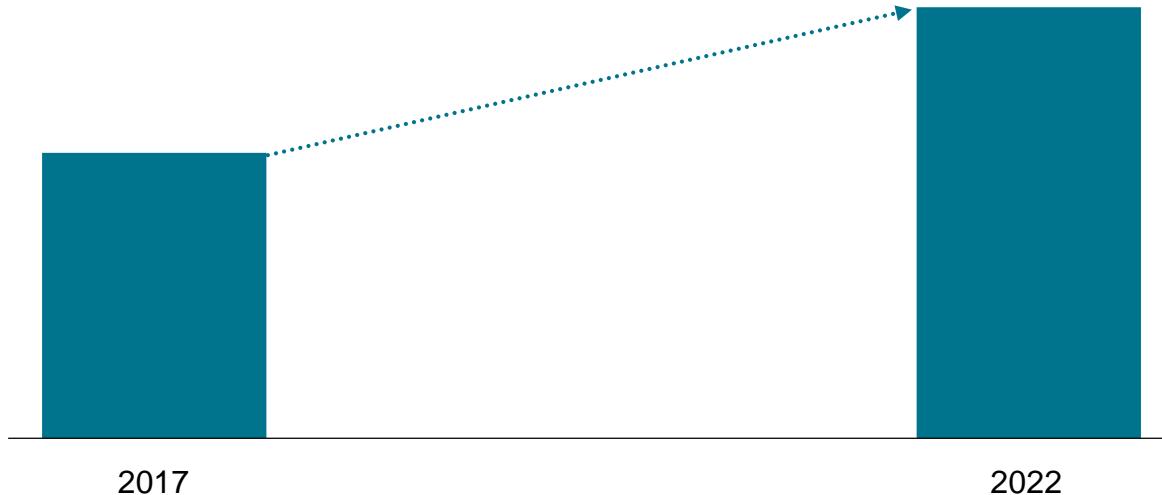
## Portfolio:

**Lightweight and Application Center** will support market penetration in automotive industry by closing the gap between materials and applications  
**Battery laboratory**: continuous build-up of own competencies to develop next generation material  
Strategic and **KPI-driven CAPEX** planning and improved execution

# SGL Carbon – our sales growth paths.

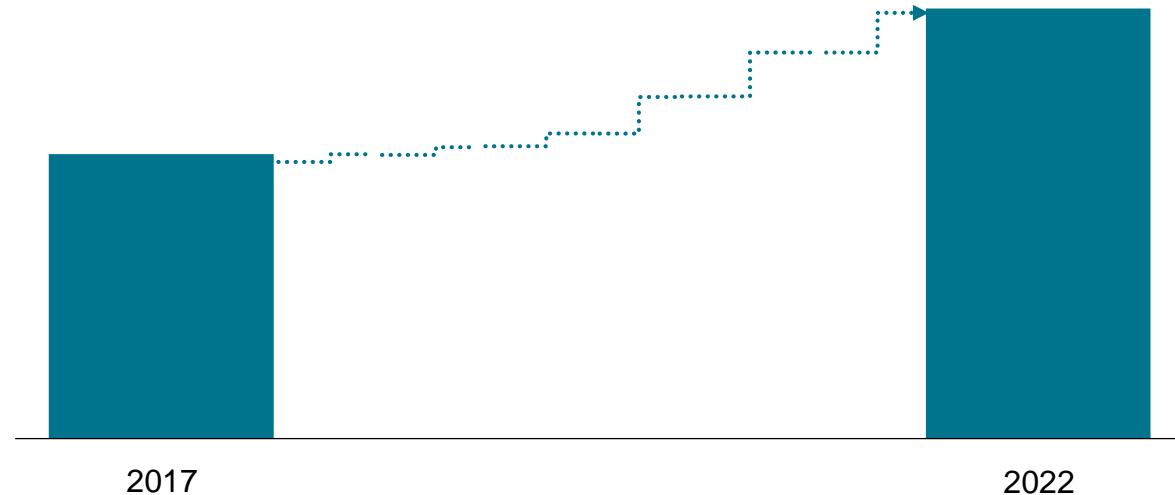
Different mid-term growth patterns expected in GMS and CFM

## GMS



- Well developed material
- Well established markets and businesses
- **“Linear“ growth expected**

## CFM



- Young material
- Breakthrough in composites today
- We have to develop our markets
- **Project-driven growth expected, back-end loaded**

Graphs for illustrative purposes; not to scale

# Business Unit Composites- Fibers & Materials (CFM)

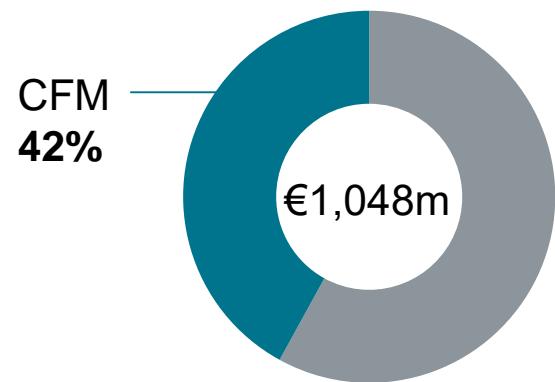
# Reporting Segment.

## Composites – Fibers & Materials (CFM)

### Activities

- Carbon Fibers
- Composite Materials
- Composite Components
- Ceramic Brake Discs  
(JV with Brembo)

### Group sales 2018



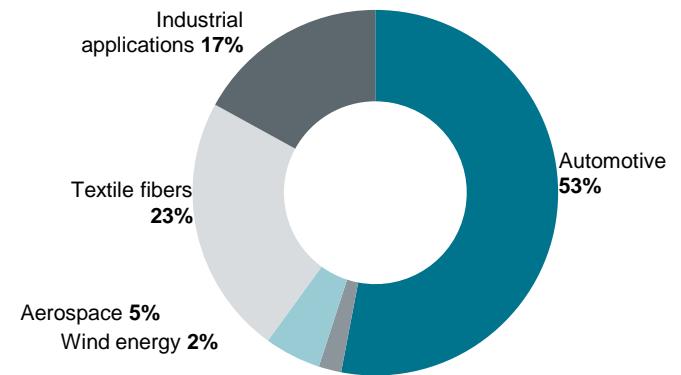
### Key industries served

- Automotive
- Aerospace
- Energy
- Industrial Applications
- Textile fibers

### Characteristics

- New applications in automotive, energy, industrial
- High earnings improvement potential
- Complete value chain in house

### CFM sales 2018



### Strategic priorities

- Strengthen capabilities to safeguard globally leading position
- Develop products and production technologies for innovative customer solutions
- Exploit synergies across the value chain

# Carbon fiber composites industry still in its infancy.

## Aluminum industry

1936	<b>Aerospace</b>	Douglas DC-3
1959	<b>Industrial Applications</b>	Introduction of aluminum cans
1961	<b>Automotive</b>	Land Rover V8 engine blocks
1994	<b>Automotive</b>	Audi Space Frame
2015	<b>Automotive</b>	Ford F-150

## Carbon fiber industry

<b>Late 1960s</b>	<b>PAN-based carbon fibers</b>	First high-performance carbon fibers
<b>1980s</b>	<b>Aerospace</b>	US military aircraft
<b>2009/13</b>	<b>Aerospace</b>	Boeing 787, Airbus A350
<b>2013/15</b>	<b>Automotive</b>	BMW i3 and 7 series

- It took the aluminum industry 40 to 50 years from selected use in aerospace to serial use in automotive
- Carbon fiber industry trails 30 years behind aluminum
- Driven by environmental legislation, serial use of carbon fibers and composites in general just begins

# CFM growth strategy is based on commanding the entire value chain



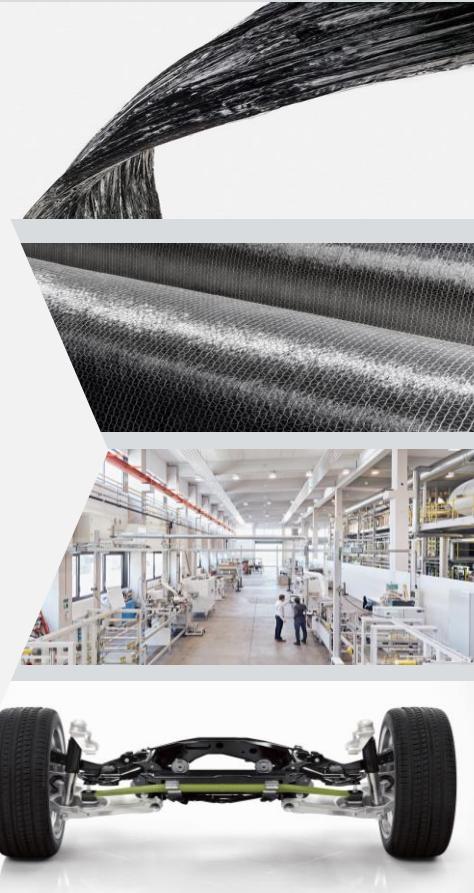
**Demonstration of technology, development and series production competence along entire value chain is key**

\* In particular, the automotive industry, but also the aerospace sector

# Our unique value chain and engineered solutions set us apart from competitors.

## Our differentiators

- Engineered solutions
- Leading composites serial production
- Unique value chain from carbon fibers to components
- Industrial carbon fiber competence



## Competitors

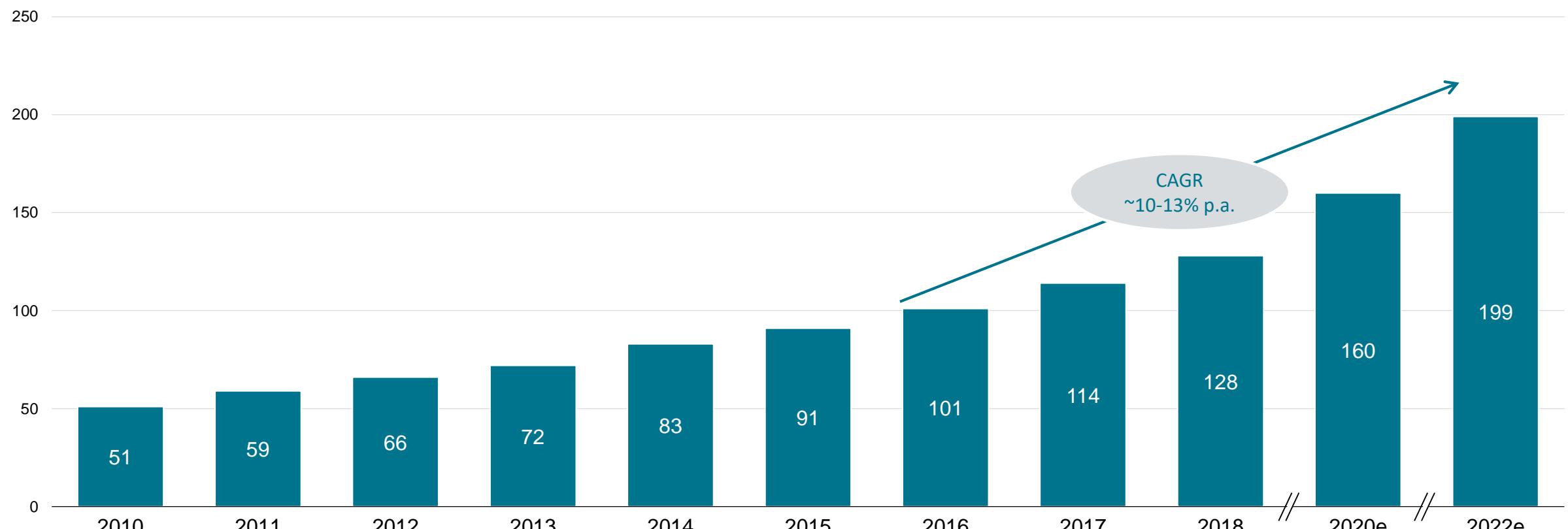
- Carbon fiber producers focused on providing materials, not components
- Focused on expensive carbon fiber not suitable for automated production processes
- Component producers not backward integrated
- Geared to expensive, time consuming and not scalable hand lay-up

# Carbon fibers and composite materials.

Strong demand growth anticipated

## Global Carbon Fiber Reinforced Plastics (CFRP) Demand

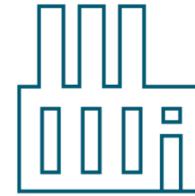
[in thousand mt p.a.]



Source: CCeV (November 2018)

# CFM expected to grow ...

## Market Segment



	Automotive	Aerospace	Wind Energy	Industrial Applications	Acrylic Fibers
<b>Sales 2017</b>	30% <sup>1</sup>	6%	12% <sup>2</sup>	23%	29%
<b>Sales 2018</b>	53%	5%	2%	17%	23%

<sup>1</sup> Automotive sales in 2017 before effect from full consolidation of joint ventures with Benteler and BMW

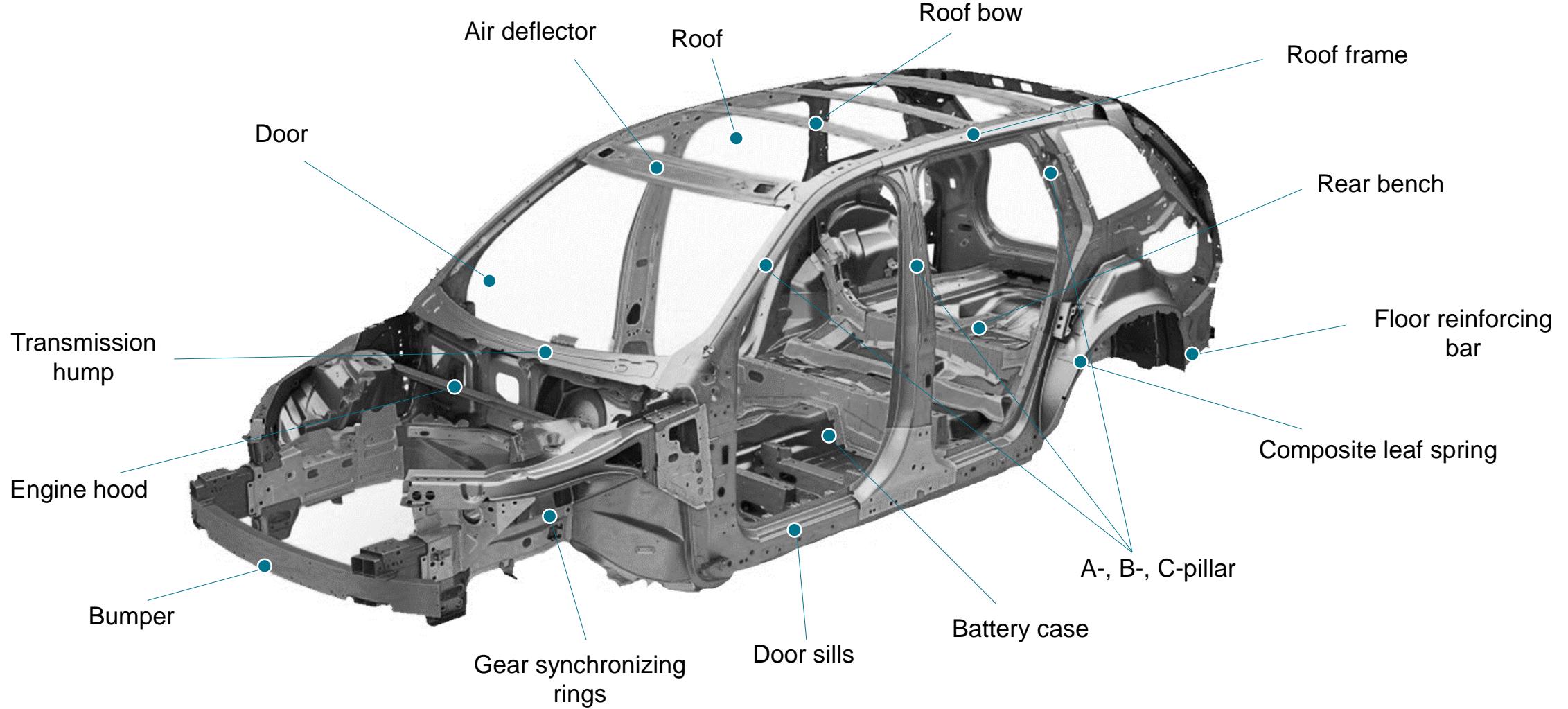
<sup>2</sup> Wind energy sales in 2017 including full consolidation of SGL Kümpers, sold end of 2017

# Automotive

SGL Carbon acts as full service and solution supplier to the automotive industry by offering engineering, prototyping and large-scale serial production for materials and components.

Together with our global customers we develop new and innovative composite automotive applications, hence transforming the existing material world into a more dynamic one and introducing flexible ways of using high-tech composite materials for diverse customer needs.

# Materials and components are suitable for various automotive parts.



Source: SGL Carbon, based on Volvo XC 90 chassis model

# SGL Carbon is already well-positioned in the automotive industry.

## Existing projects in different automotive vehicle segments

- Rear bench for performance sports cars
- Structural components for electric vehicles (EV)
- Leaf springs for light commercial vehicles and passenger car suspension systems
- Hybrid designs for large series passenger vehicles
- Friction materials for modern gear boxes



Audi MSS platform



BMW i3/i8



VW Crafter & Daimler Sprinter



BMW 7 series



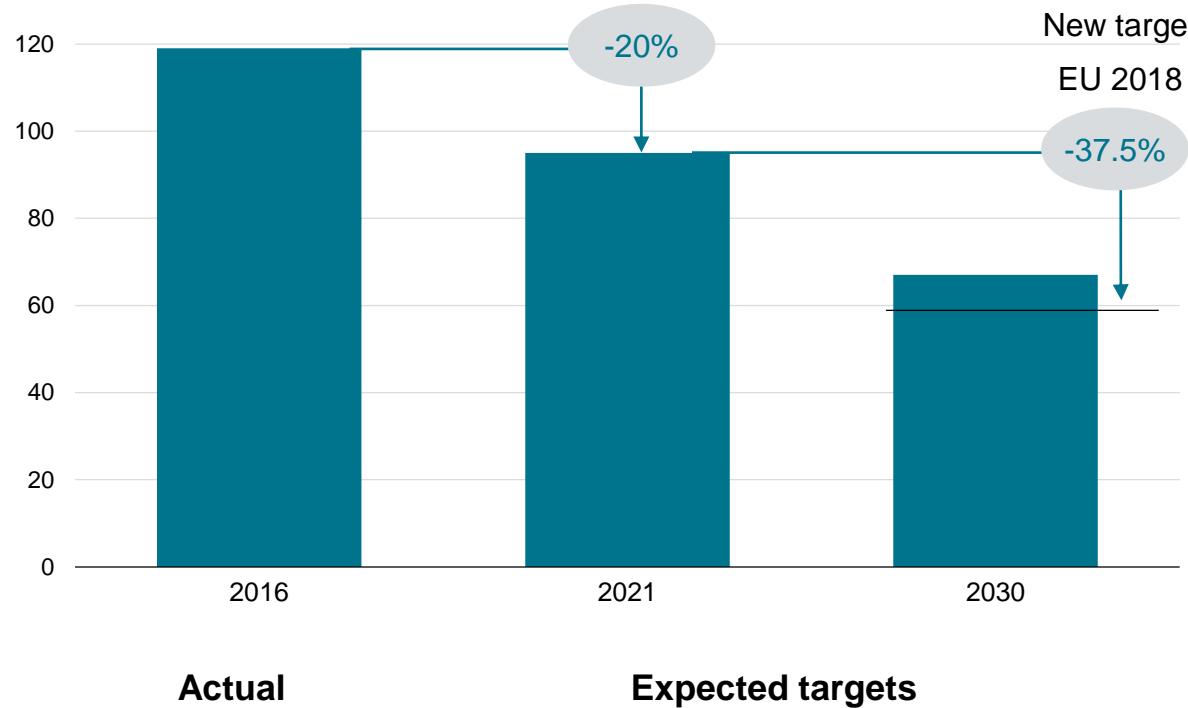
Friction materials



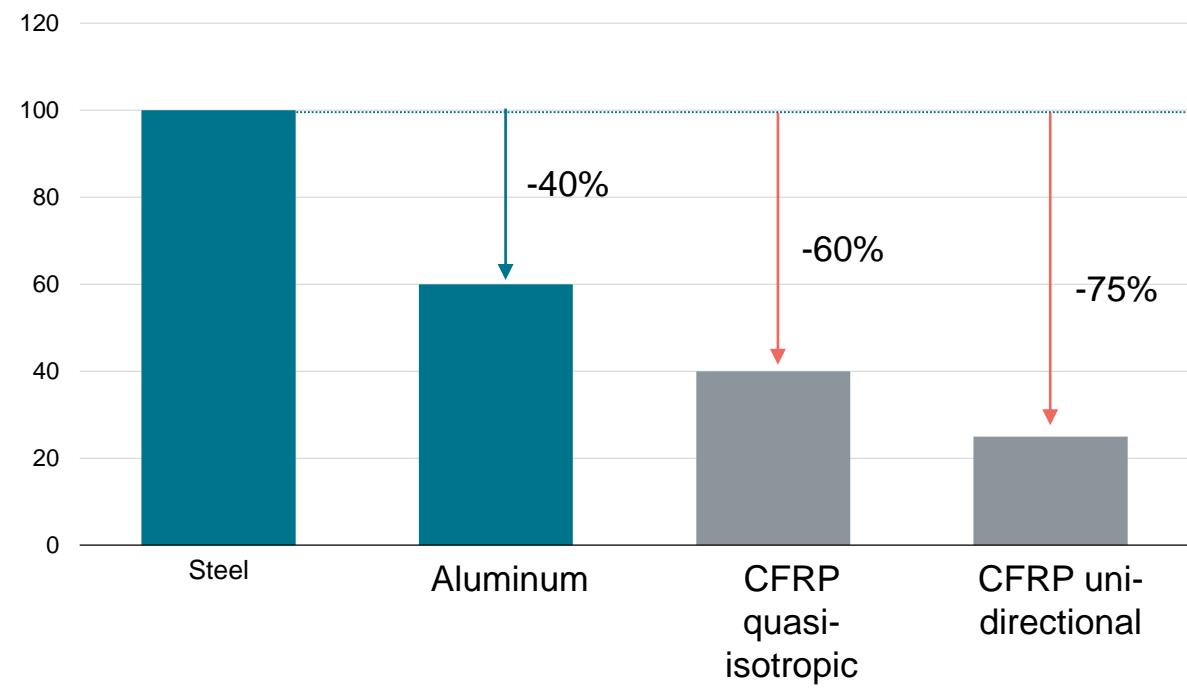
Volvo XC 90

# CO<sub>2</sub> targets drive lightweight construction in the automotive industry.

## OEM fleet target development (EU)<sup>1</sup> (in g CO<sub>2</sub>/km)



## Relative component weight<sup>2</sup> (in %)

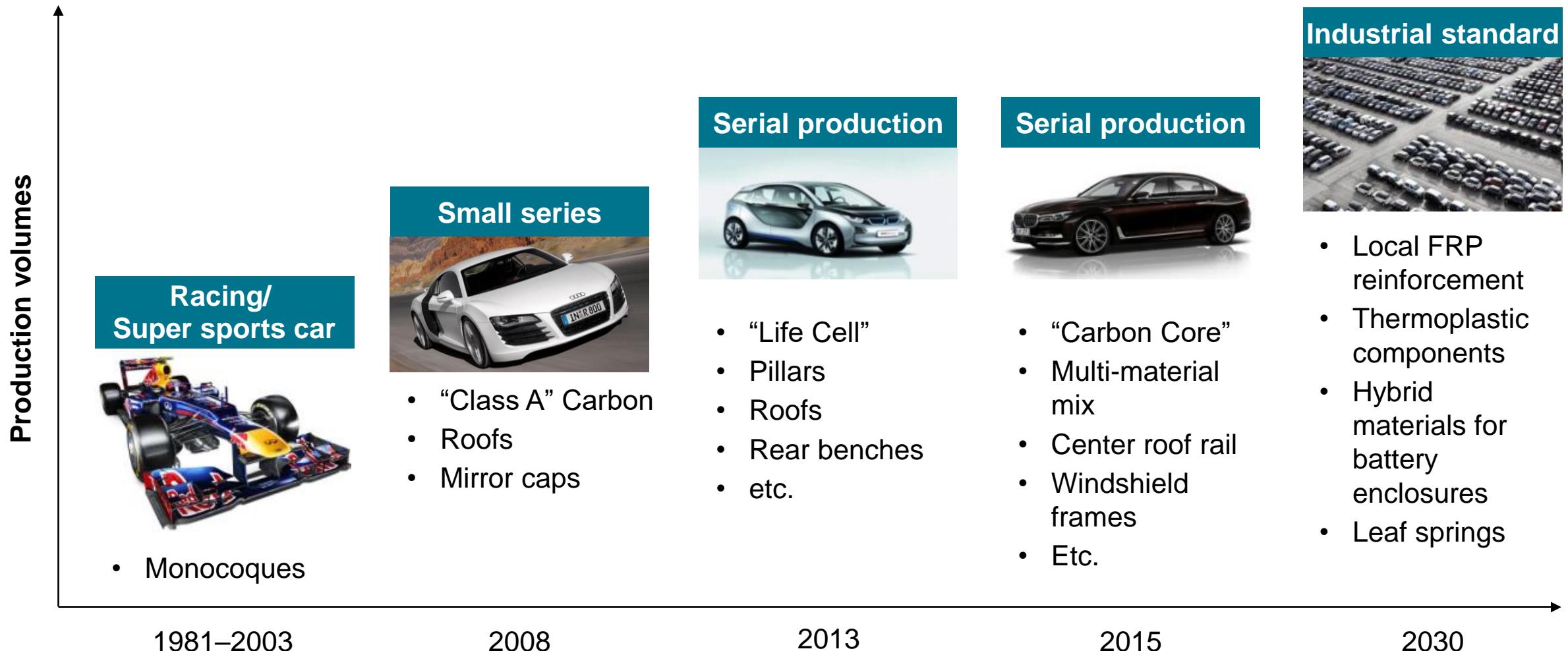


<sup>1</sup>status as of 17/12/2018

<sup>2</sup>with same functionality

Source: ICCT, SGL estimates

# Automotive: By 2030 most cars expected to have fiber-reinforced polymer (FRP) parts.



Source: RedBull F1, Daimler AG, Audi AG, BMW Group

# Automotive growth is expected to be driven by ...

## Local reinforcements

- A- and B-pillar reinforcements
- Roof rail

## Leaf springs for passenger cars

- Pick-up trucks, SUVs, Vans
- New BEV vehicle concepts

## Thermoplastic components

- Structural parts
- Easy to integrate into OEM assembly plants

## Battery cases for BEVs

- Hybrid material solutions

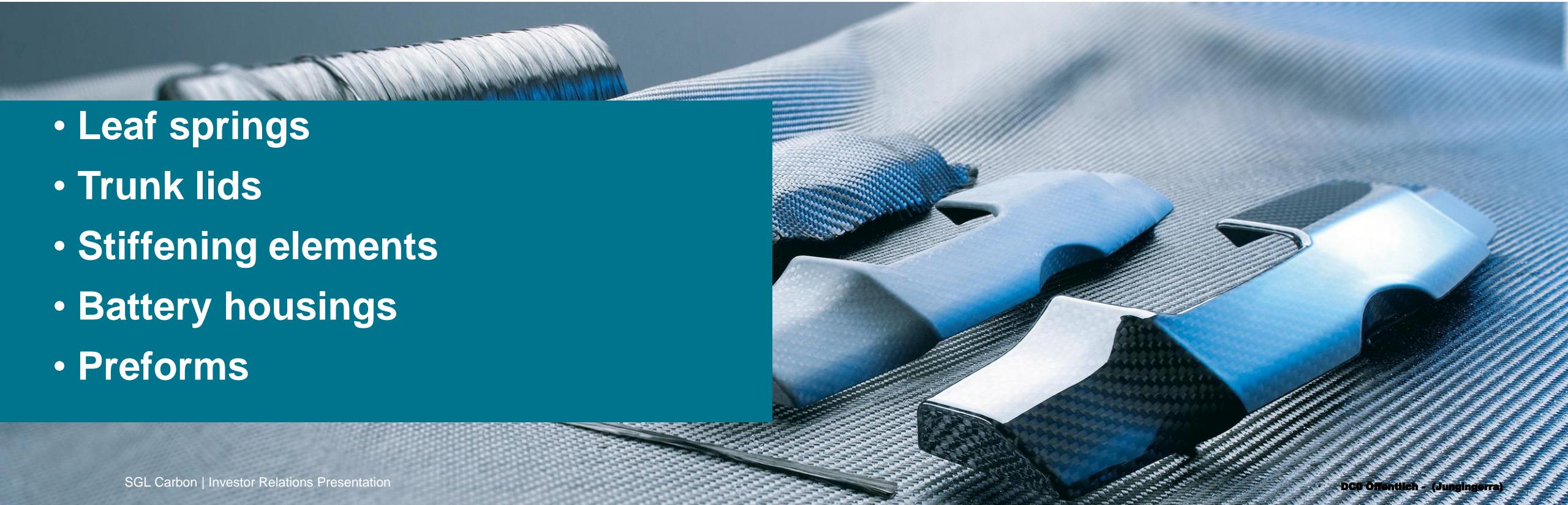
# Automotive: Current CFM project pipeline.

Since the beginning of 2018 nominated for 13 new serial products



\*Start of production; \*\*Status: March 27, 2019

- Leaf springs
- Trunk lids
- Stiffening elements
- Battery housings
- Preforms





## Aerospace

Materials and components must be reliable and safe under extreme conditions. Fuel consumption must be reduced through lightweight design. These demands can be met with our carbon fiber reinforced composites. We offer the right solutions for primary and secondary structures, sub-systems or internal fittings.

# The high production volume of narrow body commercial aircrafts requires serial production competency.

## Airbus monthly production volume forecast



## Boeing monthly production volume forecast



	2016	2020
A350 (wide body)	4	10
A320 (narrow body)	46	60+

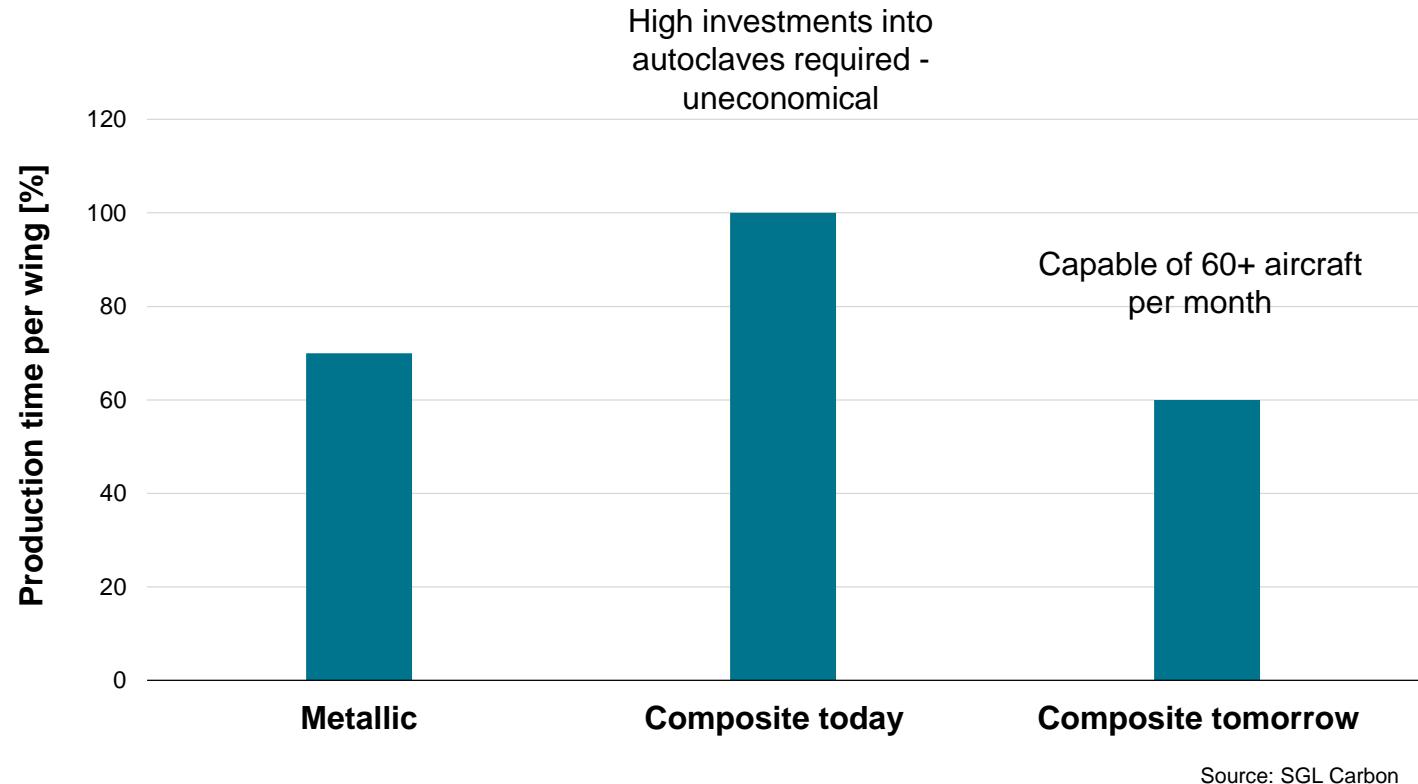
	2016	2020
B787 (wide body)	11	12
B737 (narrow body)	42	58

Remark: "Narrow body" typically describes single aisle aircrafts, "wide body" aircrafts with double aisles.  
Source: Airbus, Boeing

# Aerospace: Composites market will continue to grow.

## Focus on operating cost efficiency

- Airline industry extremely competitive, constant battle over **cost reduction**
- Composites address this key customer requirement as lightweight construction reduces **fuel consumption**
- Strong commercial aircraft **CFRP market growth (CAGR > 8%)<sup>1</sup>** driven by aircraft programs (e.g. A350, B787, B777X)
- Additionally, other commercial aircraft aerospace markets are accelerating – launcher, UAV, etc.
- Clear incentive to use composites, as customers are willing to pay for **reduced weight**



<sup>1</sup>Source: CompositesWorld, JEC, MarketsandMarkets.com, internal analysis

# Composite materials and components for commercial aircraft parts.



Source: SGL Carbon

# Aerospace growth expected to be driven by ...

## Non-crimp fabrics for primary structures

- Automated textile preforming processes based on lay-up technologies
- Liquid resin infusion and out-of-autoclave curing

## High-performance insulation

- Spare parts business for aero-engines, e.g. thrust reverser heat shield
- Fuselage insulation components

## TowPreg materials in combination with fiber placement processes

- Fast curing pre-impregnated carbon fiber tow materials
- Automated material deposition by fiber placement processes

## Next generation aircraft brakes

- 3D carbon fiber based preforms
- Dedicated carbon fiber for dry friction applications

# Energy

Energy companies must ensure a reliable, flexible supply of energy to consumers. At the same time, cost pressures are increasing, and so are greater demands on efficiency. Genuinely high-performance materials are needed – in different sectors of the energy industry.



# Wind energy is the key driver for the energy segment.

## Key benefits of composites in the wind energy industry:

- Corrosion resistance
- Strength-to-weight ratio

Global cumulative installed wind power capacity in gigawatt<sup>1</sup>



## Efficiency requirement for rotor blade design leads to potential for composites:

- The growing demand of efficient wind energy plants has led to new developments in wind turbine designs
- Plants with a large number of wind turbines with short rotor blades are being upgraded with a smaller number of wind turbines with longer rotor blades
- The requirement of longer rotor blades has resulted in a huge potential for composite use in rotor blade construction

<sup>1</sup>Source: Globaldata

# Energy growth expected to be driven by ...

## Supply of carbon fiber to growing pultrusion market

- Technology change from prepreg/textile to pultruded profiles
- Pultrusion provides better mechanical properties

## Increasing carbon fiber need for on- and offshore wind turbines

- Increased blade length possible
- Reduced leveled cost of energy by using longer blades

## Political driven need to reduce CO<sub>2</sub> emission

- Countermeasure against global warning

# Industrial Applications

SGL Group is the only company to master all types of production processes, manufacturing everything from carbon fibers to composites. Our unique expertise allows us to tap the full potential of new materials. We offer solutions that fully meet our customers' expectations in many different industrial sectors.

# Industrial Applications growth expected to be driven by ...

## Industrial grade carbon fiber for civil engineering

- Carbon fiber materials to be used e.g. for infrastructure repairs
- Usage for concrete reinforcement in renovation and new buildings

## Fiber intermediates for compounding applications

- Chopped carbon fibers within applications for consumer electronics
- Milled carbon fibers as anti-static coatings

## Tailor-made pre-impregnated materials for component manufacturing

- Material basis for professional sports gear

## Small series components for engineering solutions

- Lightweight applications within machining/tooling parts
- Customized parts for highly stressed applications

# Levers to further profitability improvement.

## CFM by value chain



- Develop advanced carbon fibers; e.g. aerospace, energy
- Sales growth will lead to increased capacity utilization of carbon fiber lines
- Conversion of low profitability textile fiber lines to precursor lines and increase efficiency of precursor production
- Leverage own precursor production and improve properties
- Develop higher margin acrylic fiber products

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- Develop new materials and enhance production know-how, leveraging expertise of Lightweight and Application Center
- Broaden competencies in materials for energy and civil engineering market

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- Leverage series manufacturing capabilities (former Benteler SGL)
- Expand manufacturing footprint to USA and China
- Develop further products/technical capabilities

\* including Textile Fibers

# Levers to further profitability improvement.

## CFM by market segments

### Overall:

Leverage Lightweight and Application Center: Gain know-how, provide tailor made products and win customer projects

### Automotive:

- Full integration of SGL ACF and Benteler SGL post acquiring of remaining JV interests
- Increase presence in regions outside Europe
- Important projects won: significant German OEM project (SOP 2021)
- Numerous projects with OEMs and tier 1 (for leafspring, battery cases, components)

### Aerospace:

- Expand product portfolio based on own precursor and sell products across entire value chain
- Extension of contract with Elbe Flugzeugwerke (Airbus) for A350 floor panels
- Product development with large aircraft manufacturers for adoption of SGL (50k) fiber in structural components (SOP beyond 2022)
- Planned increase in vertical integration with aerospace supplier for secondary structural parts (SOP beyond 2022)

### Energy:

- Temporary sales decline by divestment of Kämpfers joint venture
- Significant order with additional wind energy customer won for deliveries from 2019 onwards

### Industrial Applications:

- Increase market penetration through leveraging sales agent network
- Increase presence in regions outside Europe
- Develop materials for civil engineering market

### Textile Fibers:

- Improve profitability by operational improvements & development of higher margin products (pigmented fibers and flame resistant fibers)

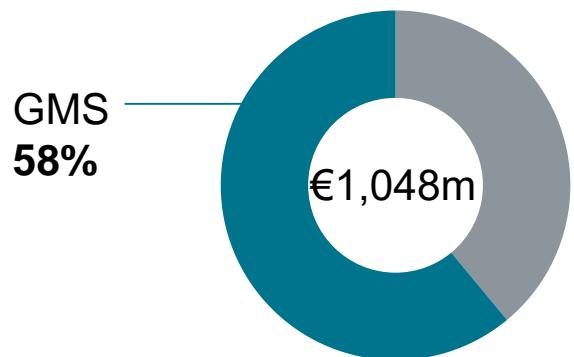
# Business Unit Graphite Materials & Systems (GMS)

# Reporting Segment. Graphite Materials & Systems (GMS)

## Activities

- Anode materials
- Isostatic graphite
- Fiber materials
- Extruded graphite
- Die molded
- Expanded graphite
- Process technology

## Group sales 2018



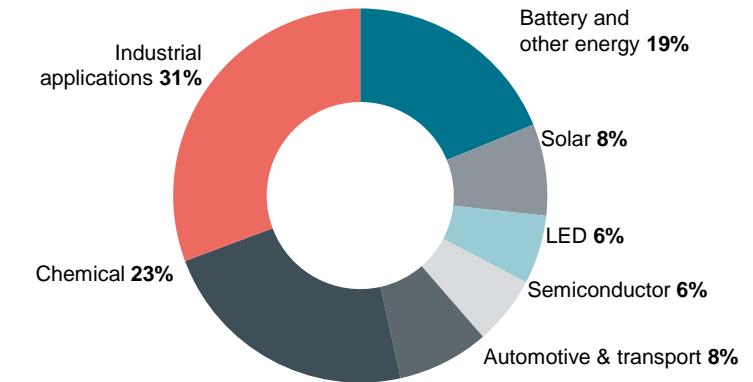
## Key industries served

- Lithium-Ion Battery
- Solar
- Semiconductor
- LED
- Chemical
- Automotive & transport
- Industrial applications<sup>1</sup>

## Characteristics

- Higher value-added products enabling customer innovations
- Specialized, partially tailor-made, products for differentiated customers
- Innovation driven business
- Engineered products & solutions for customers from > 35 industries – some with high growth potential

## GMS sales 2018



## Strategic priorities

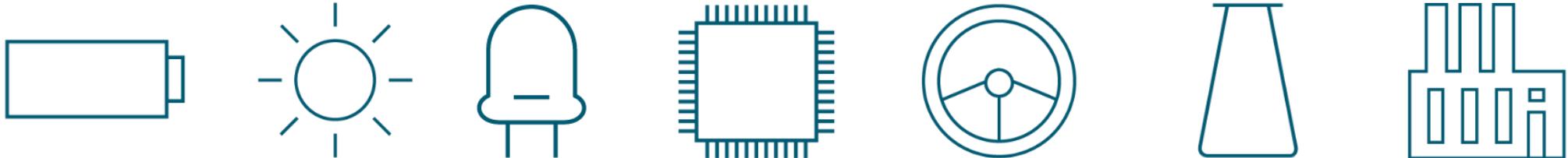
- Focus on forward integration and innovation
- Combine material know-how and engineering competence
- Advanced material, equipment, and process solutions in cooperation with customers
- Global competence and presence
- Improve cost competitiveness
- Target new market segments

<sup>1</sup> e.g. electric discharge machining (EDM), oil and gas, glass, high temperature applications, metallurgy

# GMS – the hidden champion.

Active in very attractive market segments

## Market Segment



Sales	Battery & other Energy	Solar	LED	Semi-conductor	Automotive & Transport	Chemical	Industrial Applications
2018	19%	8%	6%	6%	8%	23%	31%
2017	19%	10%	4%	5%	7%	24%	31%



GMS positioned in high growth markets

# Market segment Battery & other Energy

# Our products for energy storage.

## Fields of application and product examples

### Lithium-ion batteries

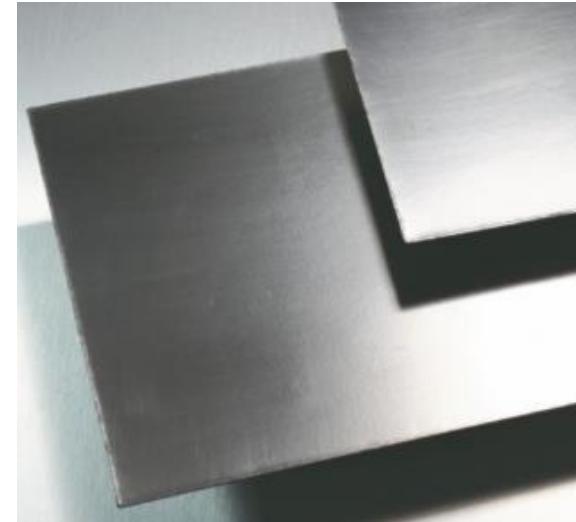


Specialty graphite for lithium-ion battery anodes

### Flow and advanced batteries



Porous electrodes made from SIGRACELL® battery felt



SIGRACELL® bipolar plates made of expanded graphite compounds

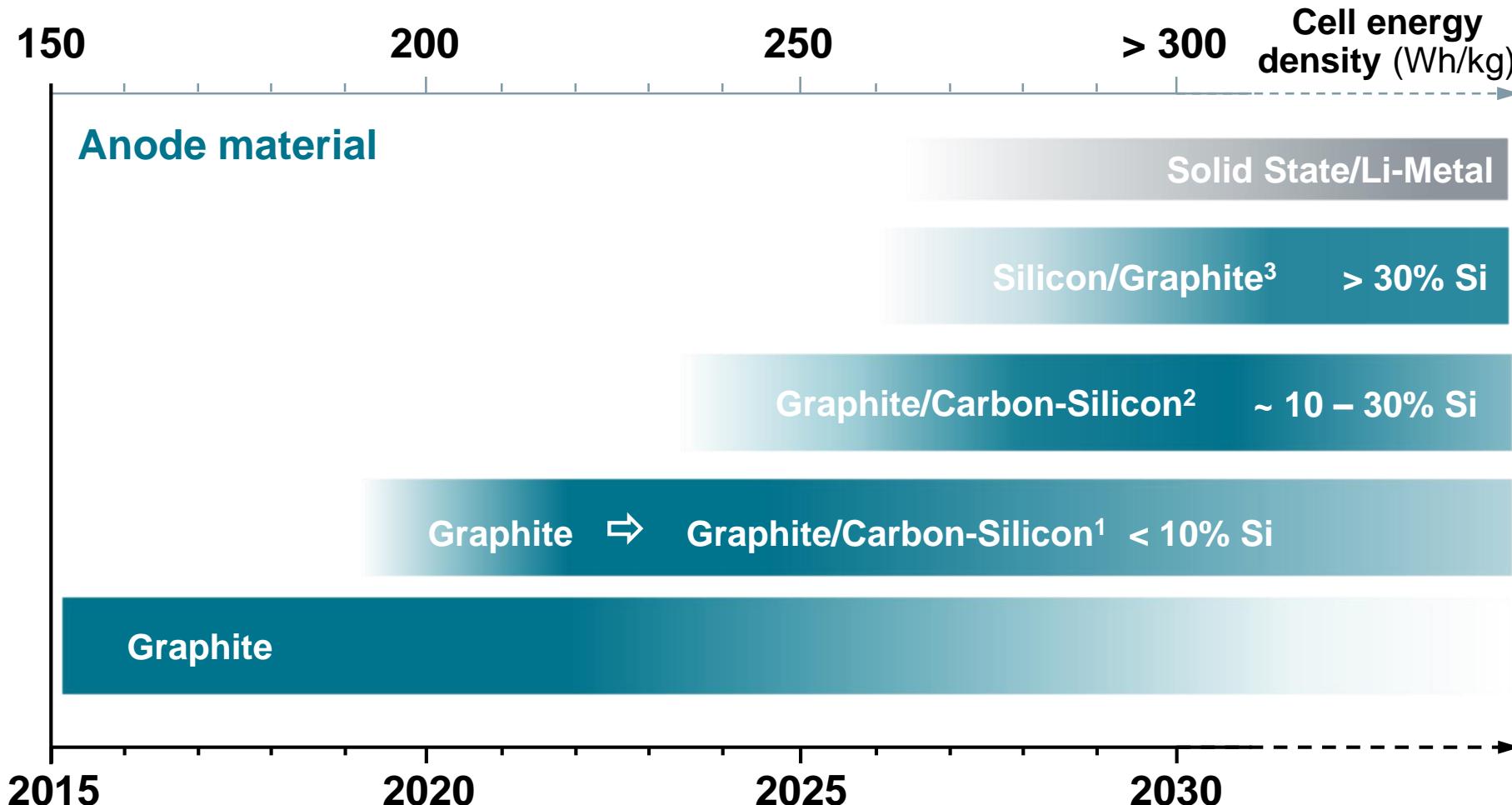


SIGRACELL® graphite foils

# Graphite is essential for lithium-ion batteries (LiB).



# Graphite based anodes expected to remain dominant at least until 2030.

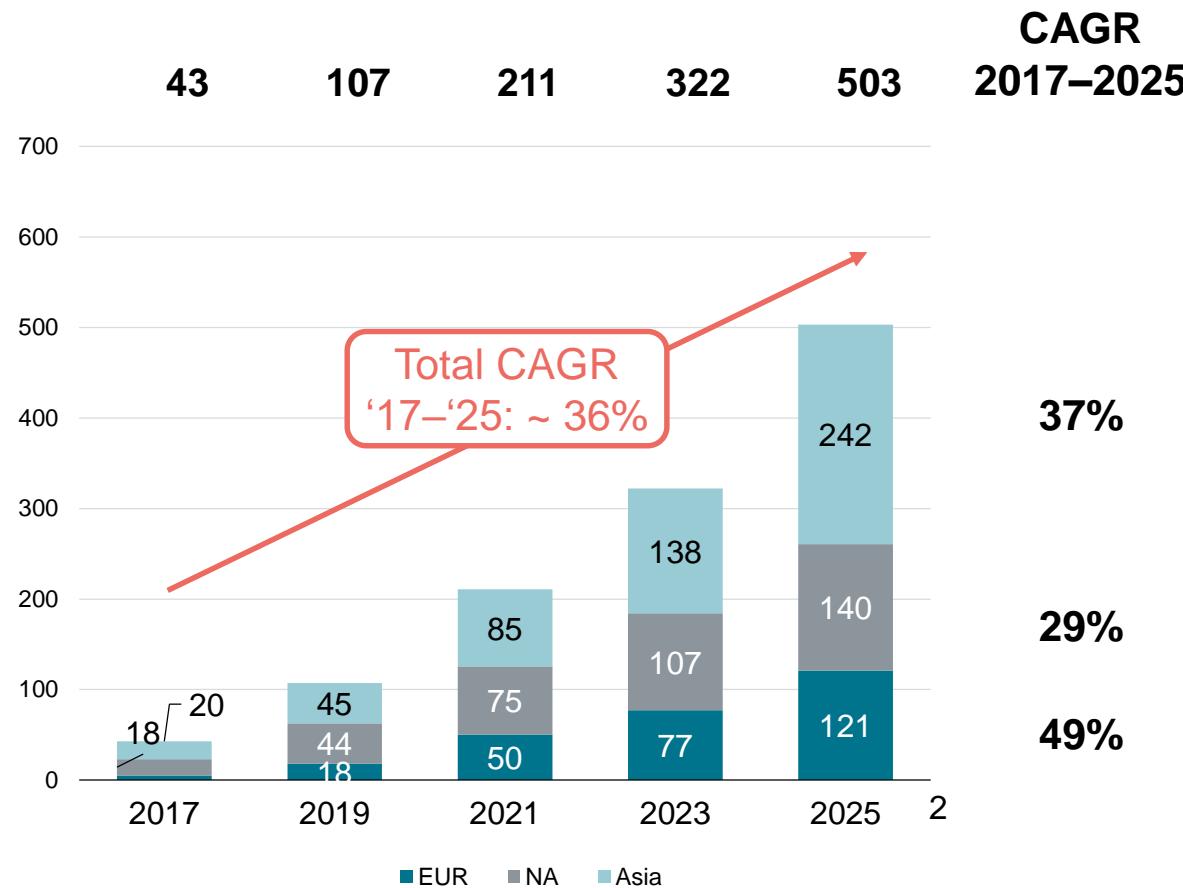


Source: Roadmap Nationale Plattform Elektromobilität and GMS assumptions

<sup>1</sup>SiO<sub>x</sub> or carbon-silicon blended with major share of graphite; <sup>2</sup>carbon-silicon: graphite blend ~ 1:1 <sup>3</sup>Si-dominant carbon silicon anode with graphite as additive

# SGL opportunity supported by the regional shift of EV and cell production.

## EV LiB demand by region (in GWh)<sup>1</sup>



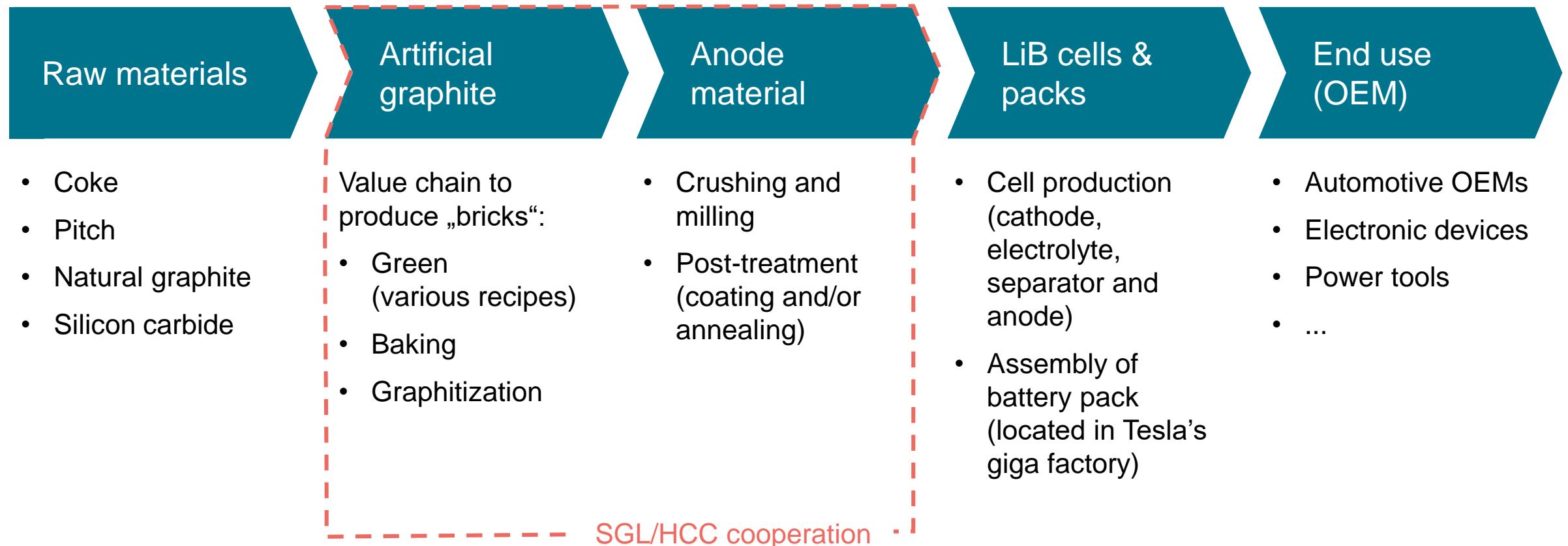
## Market Details

- LiB-cell mass production will be established in Europe and America
- Center of cell production will continue to be in Asia
- Announced cell production capacity for Europe: ~100 GWh
- Opportunity for SGL to participate in European supply chain for European cell manufacturing sites
- Comparable situation and opportunity for SGL in North America

<sup>1</sup> IHS Markit (BEV, PHEV, Full-Hybrid, only LIB) + own research <sup>2</sup> IHS Markit Data max forecast until 2023: CAGR 2023–2025: 25% (own estimate)

# SGL supplies artificial graphite as key component into LiB supply chain.

## Value chain



# Market segment Semiconductors

# Our solutions and products for the semiconductor industry.

## Fields of application and product examples

Polysilicon production



Silicon single crystal growth



Silicon epitaxy



Compound semiconductor epitaxy (in MOCVDs<sup>2</sup>)



SIGRAFINE® electrodes for Siemens reactors

SIGRAFINE® meander heater for CZ<sup>1</sup> units

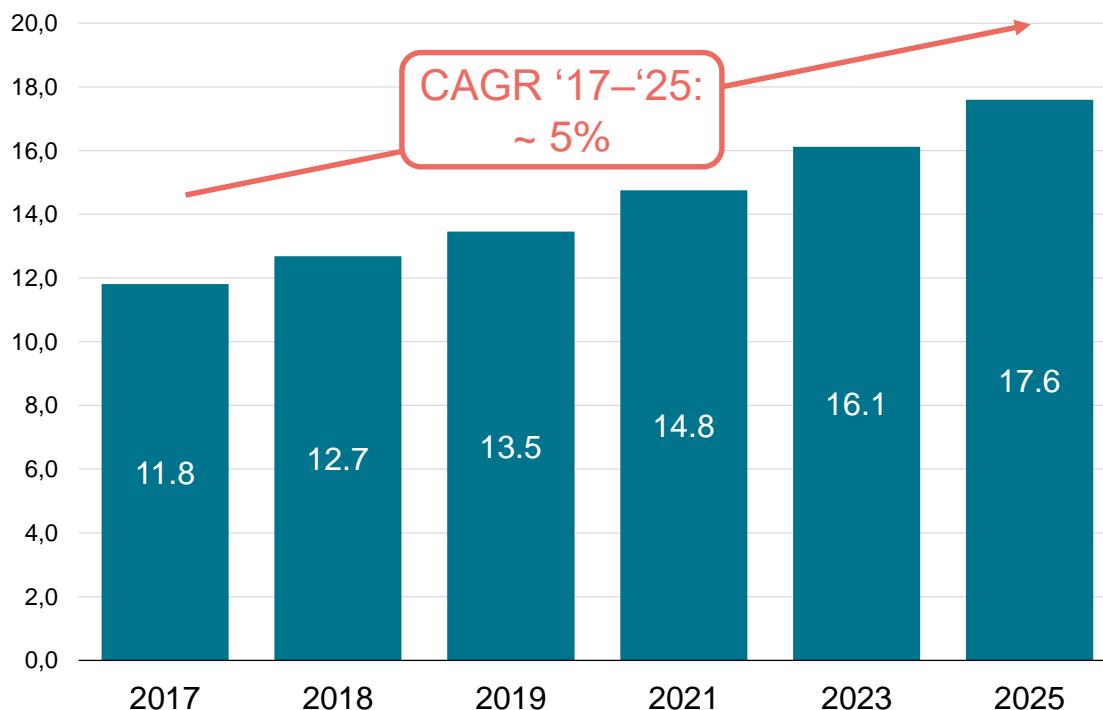
SIGRAFINE® SiC coated susceptors for silicon epitaxy reactors

SIGRAFINE® SiC coated wafer carrier for compound semi<sup>3</sup> wafer production

<sup>1</sup>Czochralski process; <sup>2</sup>MOCVD: Metal Organic Chemical Vapor Deposition reactor in which; <sup>3</sup> compound semiconductors are built by a thermo-chemical reaction of two or more semiconductor elements in gas-form

# Semiconductor industry in super cycle supports base growth for years to come.

## Semiconductor – Silicon wafer shipments (in 1000 x MSI<sup>1</sup>/a)

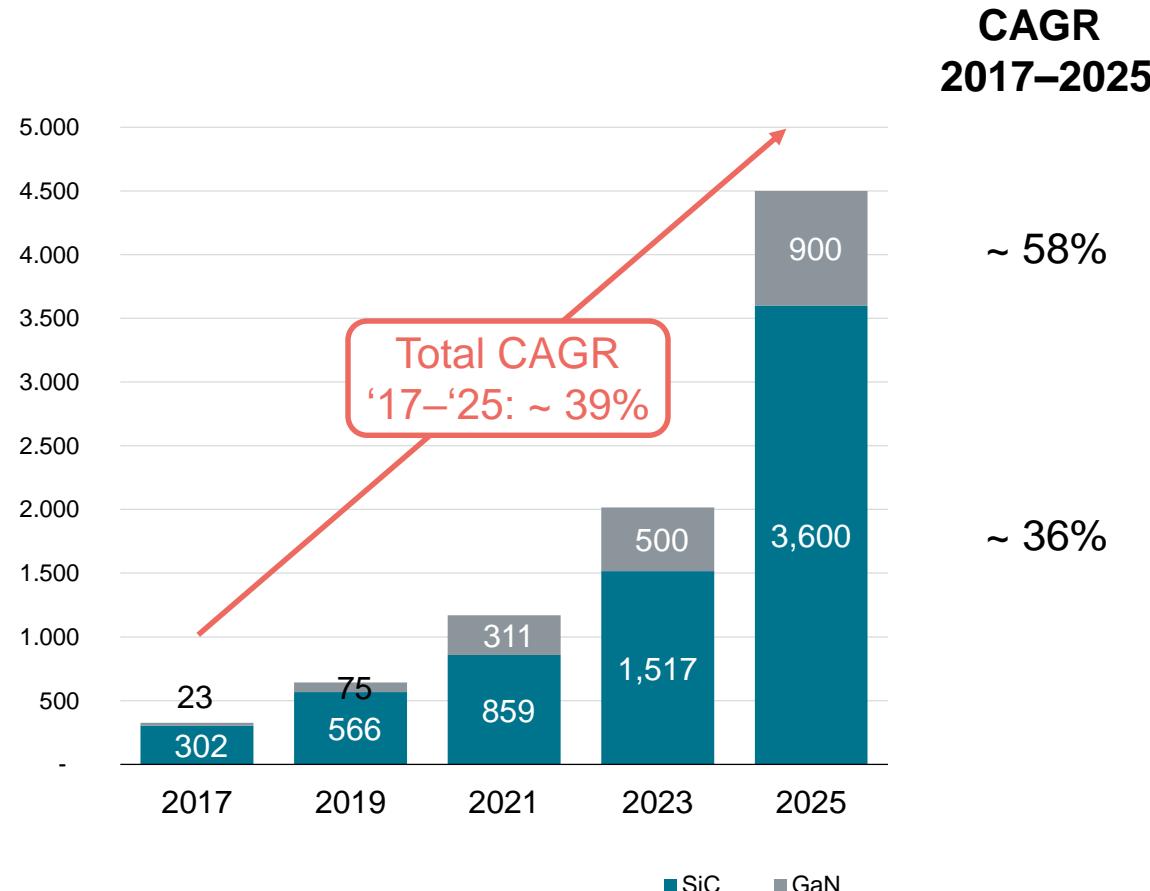


## Market details

- Silicon wafer shipments are proportional to graphite demand
- Semi is in a super-cycle with main drivers being AI<sup>2</sup>, IoT<sup>3</sup>, 5G, automotive and China 2025
- Memory for mobile and computing drive 300mm silicon wafer demand
- Power electronics and MEMS<sup>4</sup> for automotive and mobile drive demand for ≤ 200mm Si wafers
- Wafer supply expected to remain short until 2020
  - Wafer prices continue to rise
  - Key players cautiously expand wafer capacity
- Increasing performance requirements

# Our expected double digit growth is fueled by high power applications, based on SiC<sup>1</sup> and GaN<sup>2</sup> semiconductors.

## SiC and GaN power device market (in \$m)



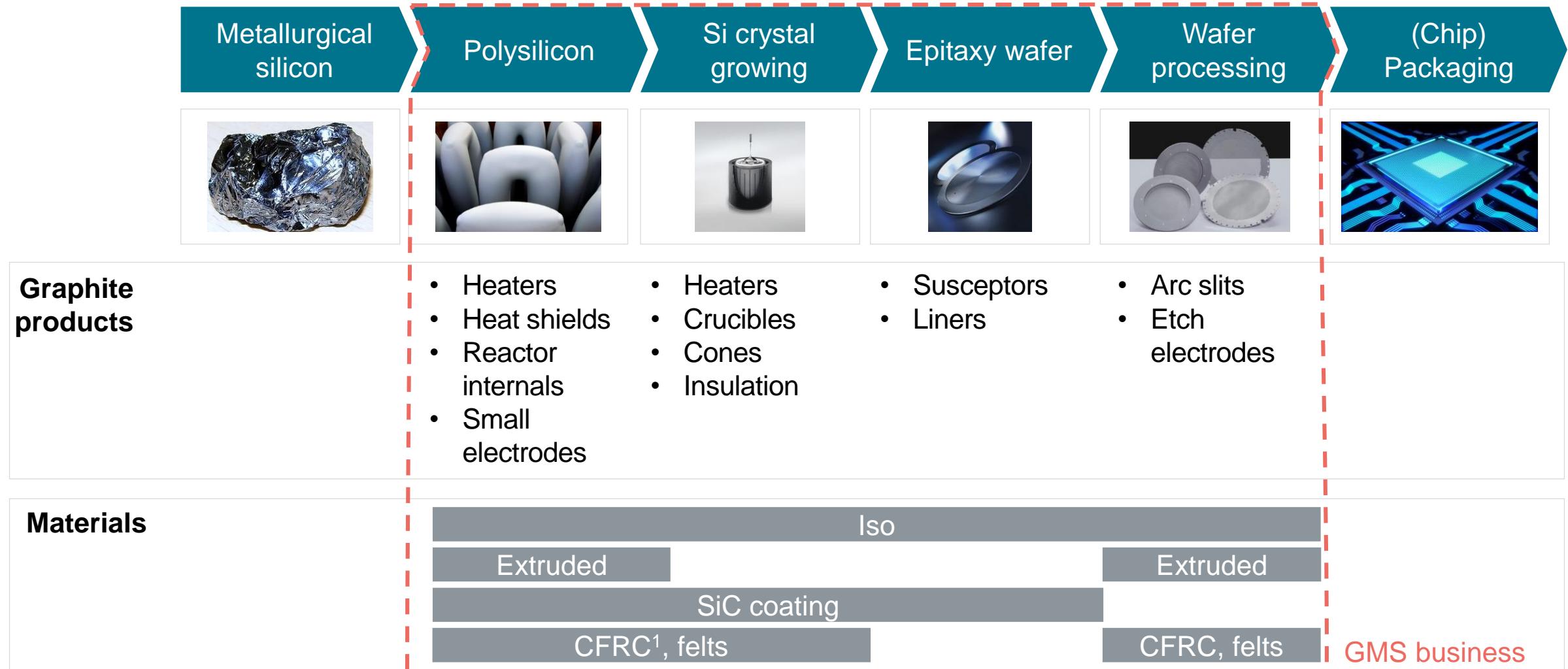
## Market Details

- Wide Band Gap semiconductors offer new options where silicon reaches its limits
- Especially in power electronics, SiC and to some extent GaN are expected to establish themselves
  - PV inverters and power supply (as existing markets)
  - Electric vehicles, supposed to reach 40–50% of the SiC device market
  - Rail and industrial motor drives
- GMS is well positioned to meet high customer demands

<sup>1</sup>Silicon Carbide; <sup>2</sup>Gallium Nitride

Source: Yole Development. IHS Market

# Graphite solutions are mainly required along the entire silicon-based semiconductor value chain.



<sup>1</sup>Carbon fiber reinforced carbon

# Market segment LED

# Our solutions for the LED industry.

## Fields of application and product examples

Crystal growth



SIGRAFINE® meander heater  
for crystal growth furnaces

Crystal growth



SIGRATHERM® rigid felt  
insulation cylinder

LED (MOCVD)

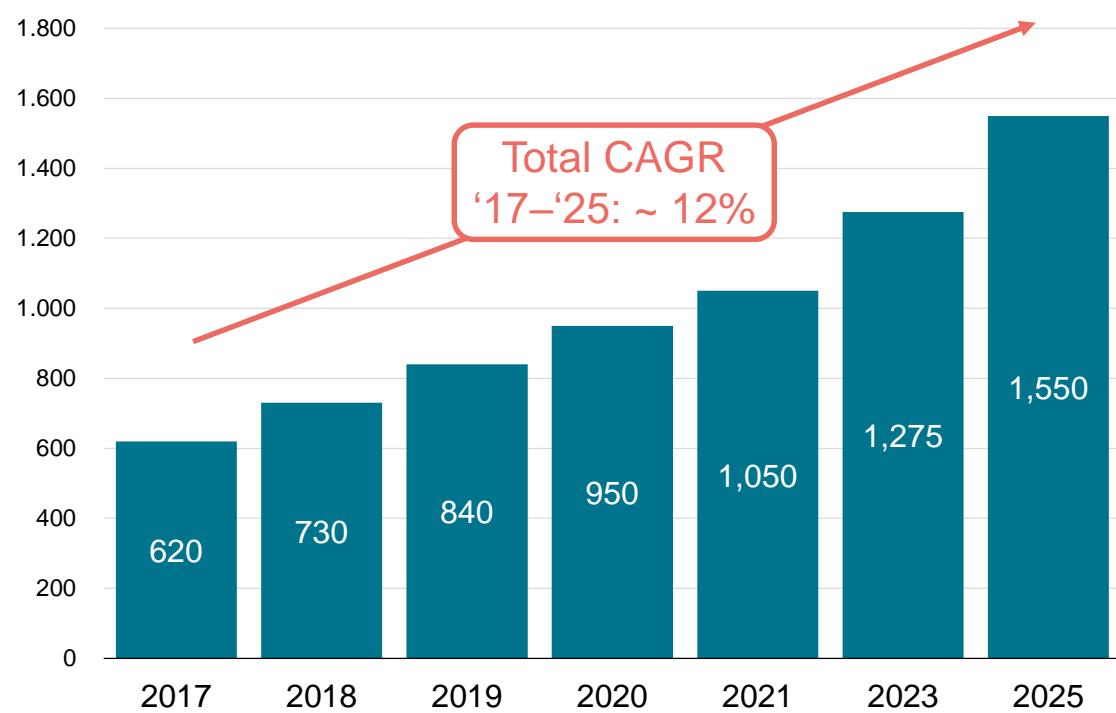


SIGRAFINE® SiC coated wafer carrier  
for LED wafer production in MOCVD  
reactors

# LED market expected to more than double by 2025.

Driven by general lighting, specialty LEDs and micro LEDs in the long-term

## Demand for packed LEDs (in bn units/a)



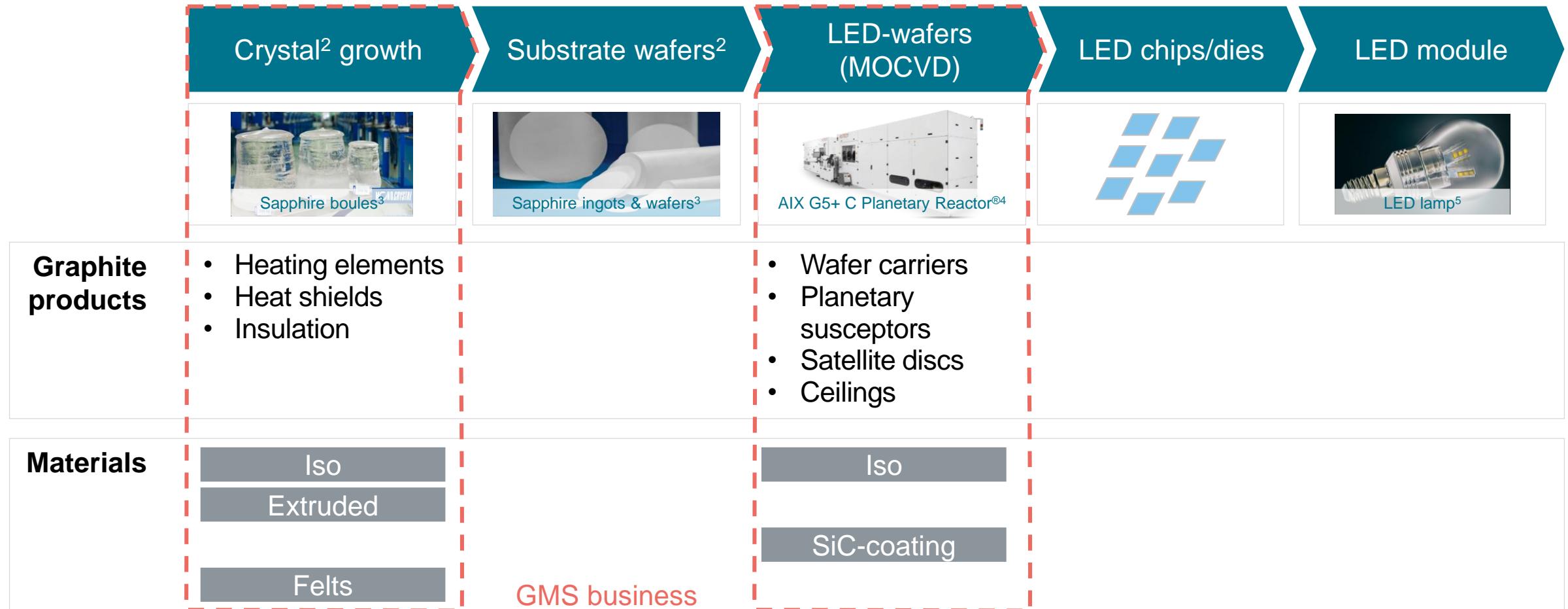
## Market details

- General lighting remains the LED volume driver
- LED markets are diversifying
  - LED technologies open up numerous applications
  - Specialty LEDs (e.g. IR, UV, horticultural) are booming
- China plays a key role in both supply and demand, driven by government subsidies

Sources: Strategies Unlimited; Yole Development; Merrill Lynch; GMS estimates

# LED production requires graphite solutions mainly upstream, in sapphire crystal growth and especially in the MOCVD<sup>1</sup> process.

## Graphite products in the LED value chain



<sup>1</sup>MOCVD: Metal Organic Chemical Vapor Deposition; key equipment for the production of LED wafers; <sup>2</sup>> 90% of LEDs are based on sapphire substrates; <sup>3</sup>images with courtesy of Monocrystal; <sup>4</sup>image with courtesy of AIXTRON SE; <sup>5</sup>ID 52110090 © Yana Bardichevska | Dreamstime.com

# Market segment Solar

# Our products and solutions for the photovoltaic industry.

## Fields of application and product examples

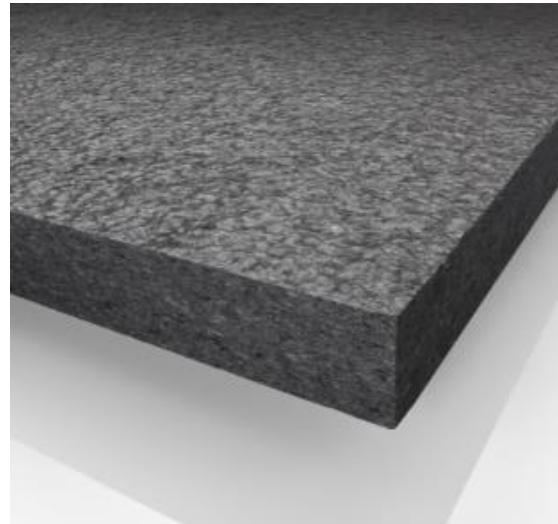
Polysilicon production



Silicon mono crystal pulling



Production of multi-crystalline silicon



Anti-reflection coating



SIGRAFINE® electrodes for  
Siemens reactors

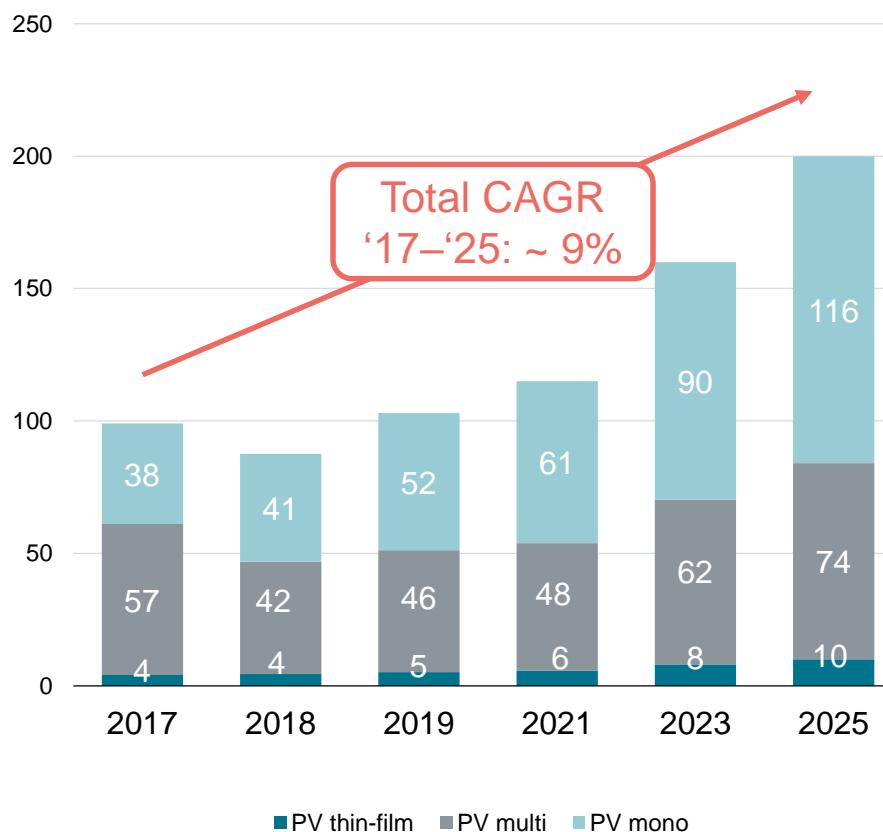
Support crucible made from  
SIGRABOND® CFRC

SIGRATHERM® MFA  
graphite rigid felt sheet

SIGRABOND® CFRC carrier  
frame for solar wafers

# 2018 likely to see dip in PV demand but long-term growth path intact. Mono PV technology is set to dominate the growth

## Global PV installations (in GW/a)



CAGR  
2017–2025

~ 15%  
~ 3%  
~ 12%

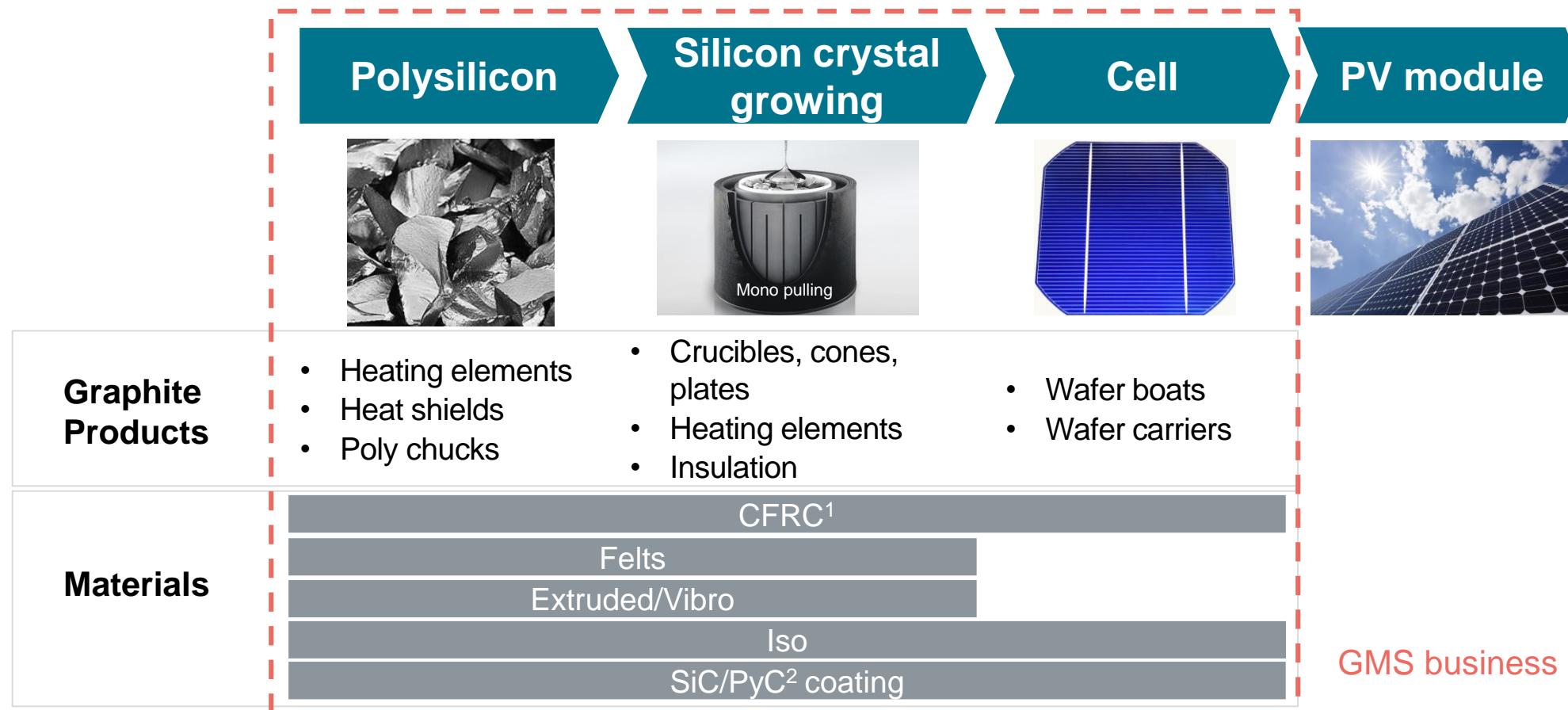
## Market details:

- China subsidy cut in May 2018 leading to a temporary market decline
- Replacement demand for graphite unaffected
- History proved PV demand to be highly price elastic, thus growth expected to continue
- Switch from multi to mono technology impacts the full PV value chain and is beneficial for graphite consumption

Source: GMS estimate based on Solar Power Europe (Global Market Outlook 2018-2022), ITRPV\_9<sup>th</sup> Edition, IHS Markit, Berreuter Research, Bloomberg

# Graphite is required along the entire photovoltaic value chain.

## Graphite products in the photovoltaic value chain



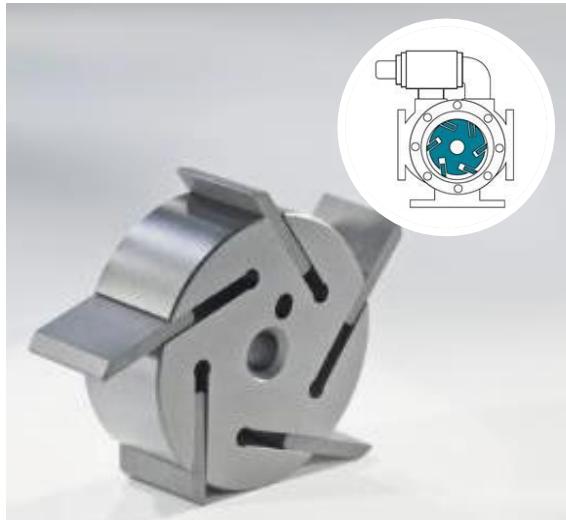
<sup>1</sup>Carbon fiber reinforced carbon; <sup>2</sup>Pyrolytic carbon-coating

# Market segment Automotive & Transport

# Our solutions for the automotive industry.

## Fields of application and product examples

### Vacuum pumps



### Fuel and water pumps



### Sealings and gaskets



### Exhaust gas recirculation



SIGRAFINE® PTS rotor with vanes for brake assist pumps

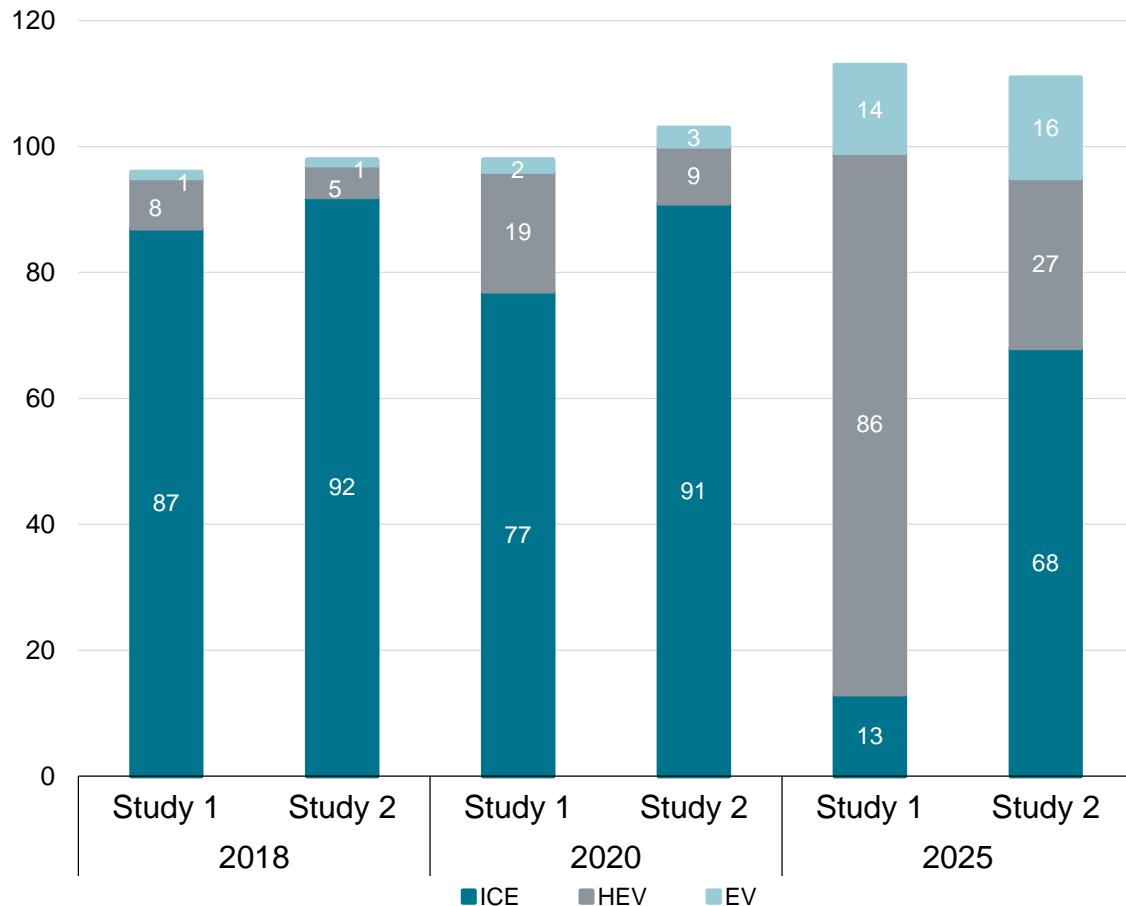
SIGRAFINE® PTS bearings made from carbon graphite

SIGRAFLEX® expanded graphite foil for cylinder head and recirculation gaskets

SIGRAFINE® graphite bearings for exhaust gas recirculation valves

# Automotive industry is forecasted to grow. GMS offers solutions for both EV and internal combustion engine (ICE) powertrains

## Automotive global sales (in million units/a)



## Market details

- Environmental legislation/CO<sub>2</sub> reduction targets
- Strong growth of e-mobility
- Market shifts towards Asia

## Significance for SGL

- ICE: CO<sub>2</sub> reduction enabled by SGL products
- EV: Significant opportunities for SGL solutions in electric water pumps for cooling and in brake assistant pumps

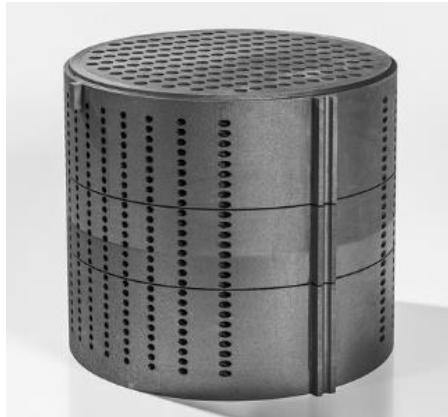
Sources: Diverse sources and own calculations (2017/2018)

# Market segment Chemicals

# Our solutions for the chemical industry.

## Selected product examples

### Heat exchanger



### Columns



### Pumps



### HCl synthesis



### Sealing materials



DIABON® graphite block heat exchanger

POLYFLURON® PTFE lined column

DIABON® centrifugal pump group in graphite for hot corrosive fluids

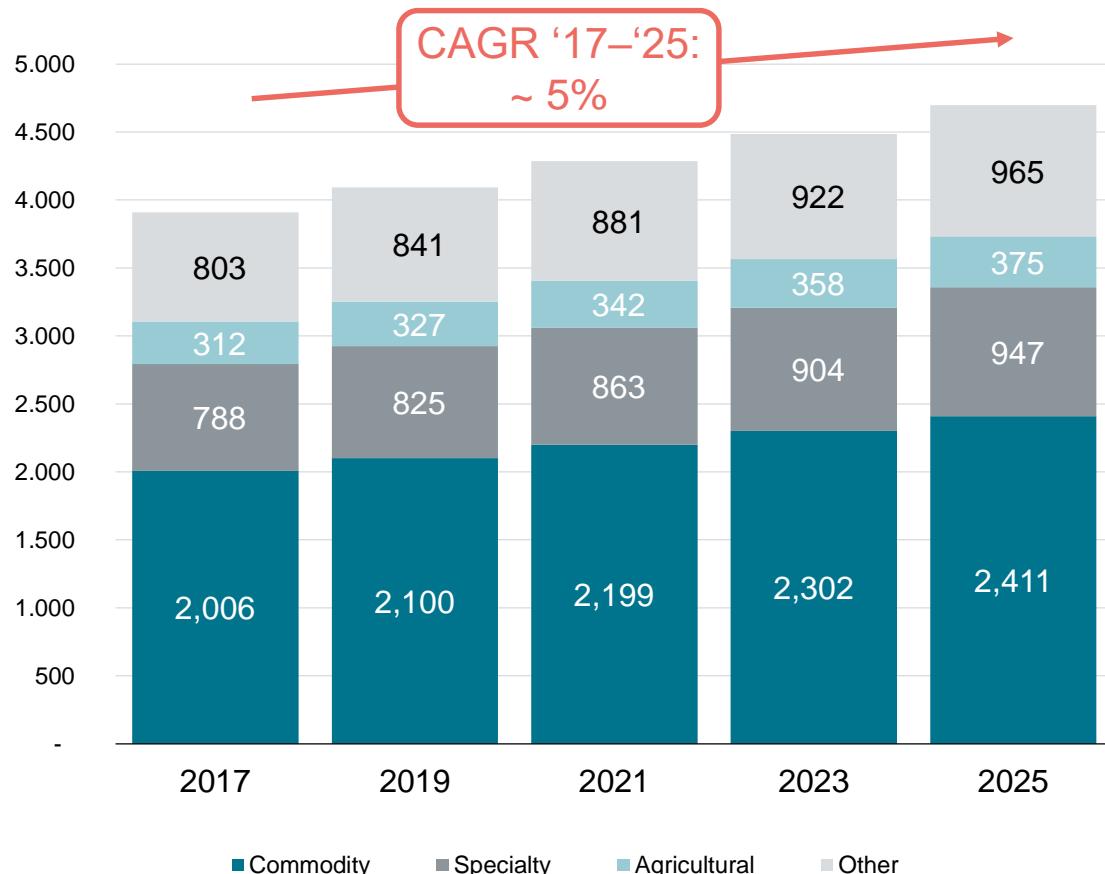
Bottom burner section of HCl synthesis unit

SIGRAFLEX® graphite sheet for gaskets

# Global chemicals market grows with global GDP.

## With high dependence on China

### Global chemicals demand (in €bn)

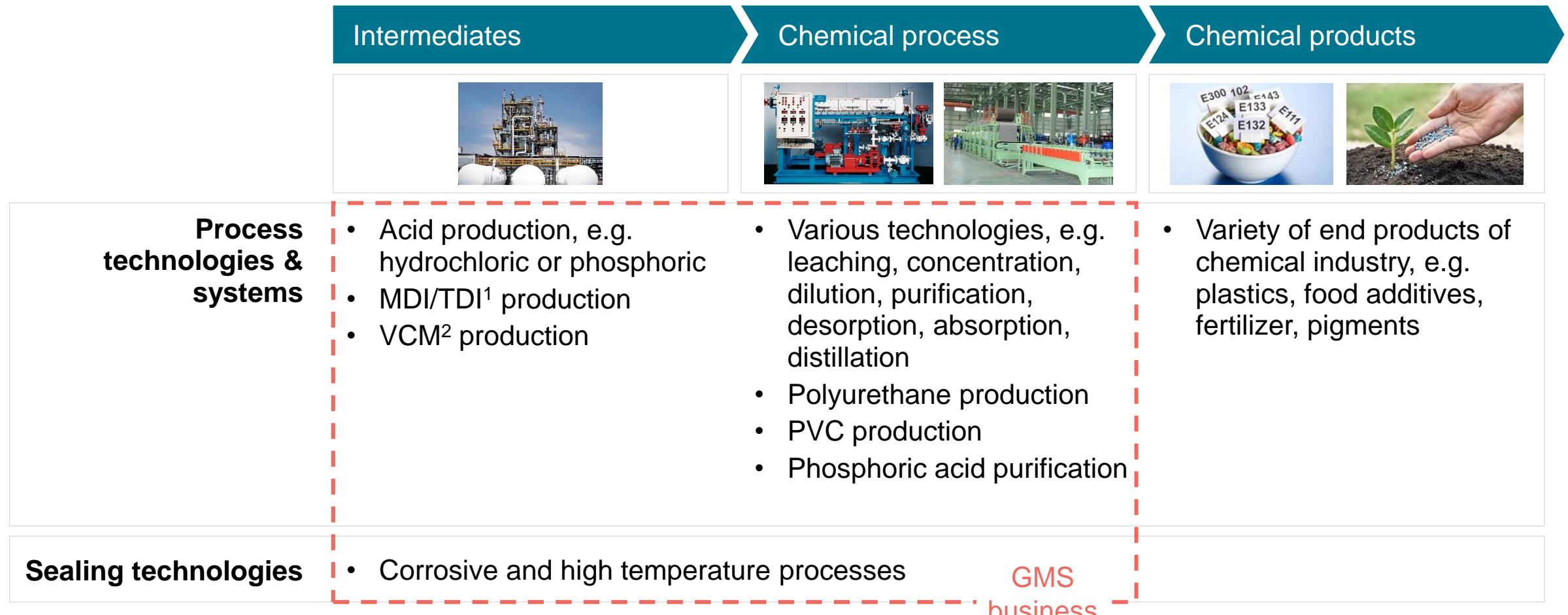


### Market details

- New entrants, mainly from China, with the effect of overcapacities and price pressure
- Volatility in exchange rates, raw material prices and margins
- Consolidation ongoing especially in the area of commodities
- High dependence on Chinese growth

# SGL solutions enable many technologies and applications along various chemical value chains.

## Chemicals – General description of typical corrosive chemical processes



<sup>1</sup> Methylene diphenyl diisocyanate/toluylene diisocyanate; <sup>2</sup> Vinyl chloride monomer

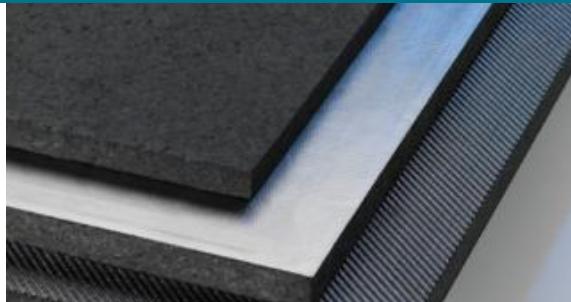
# Market segment Industrial Applications

# Market segment Industrial Applications.

## Our solutions for high temperature furnaces



Heating elements  
and systems



Thermal insulation



Heat shields and  
insulation protection



Charging systems  
and elements

## Our solutions for electrical discharge machining in toolmaking



Standard ready-to-run  
electrode



Detail electrode for precise  
geometries



Rib electrode



Electrode for turbine blade  
production

# Market segment Industrial Applications.

## Our solutions for the metal industry



Continuous casting



Pressure sintering



Powder metal industry



Gas injection and distribution systems

## Our solutions for the glass and refractory industries



Container glass



Float glass

# Mid term innovation. New markets for our graphite based solutions are continuously developing

## Glass bending

- Graphite needed as molds for bending of glass
- Today's applications: smart phones
- Tomorrow: automotive displays

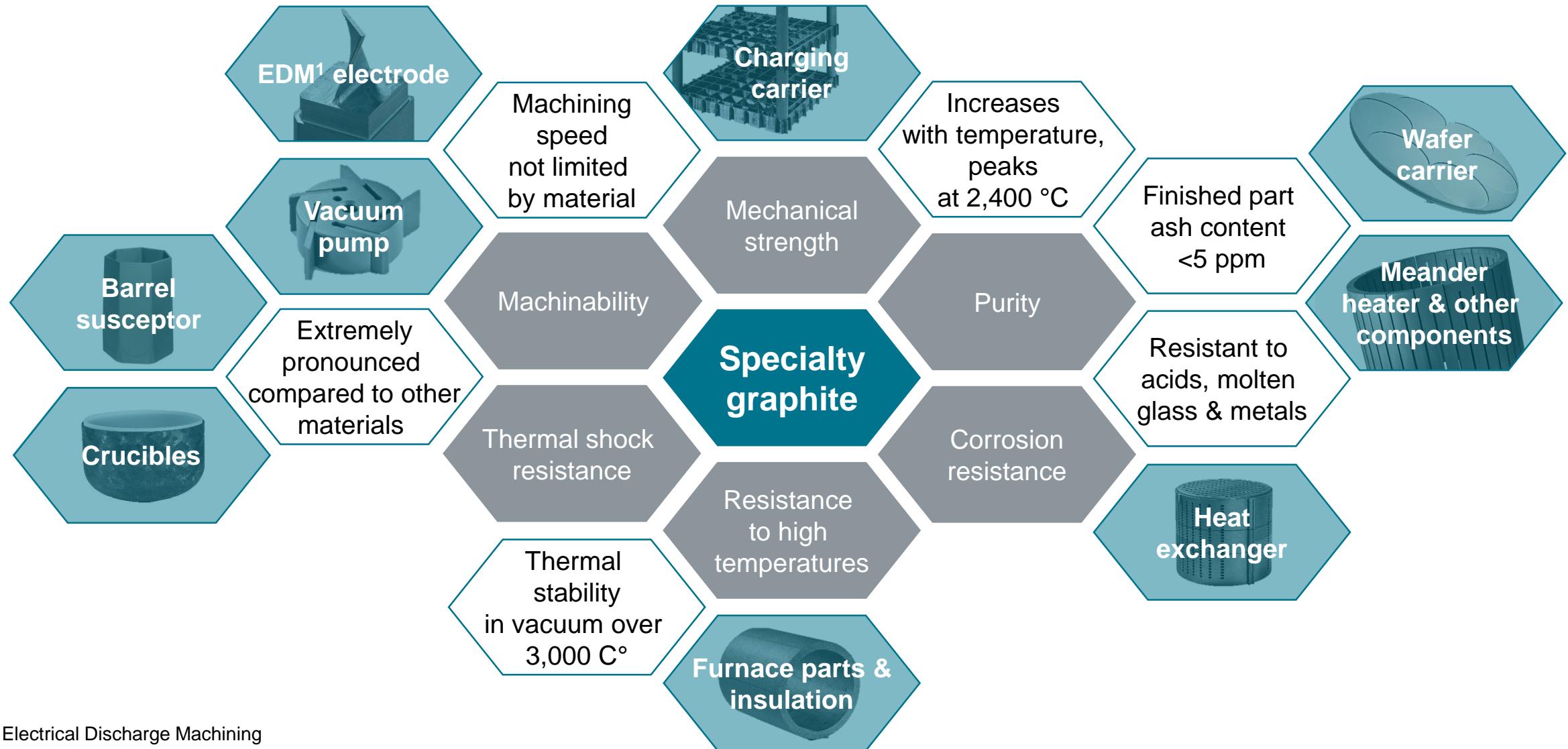


## Optical fiber

- Ever increasing data quantities require more fibers
- Products: heating elements, insulation & CFRC support high temperature customer processes

# The importance of the value chain

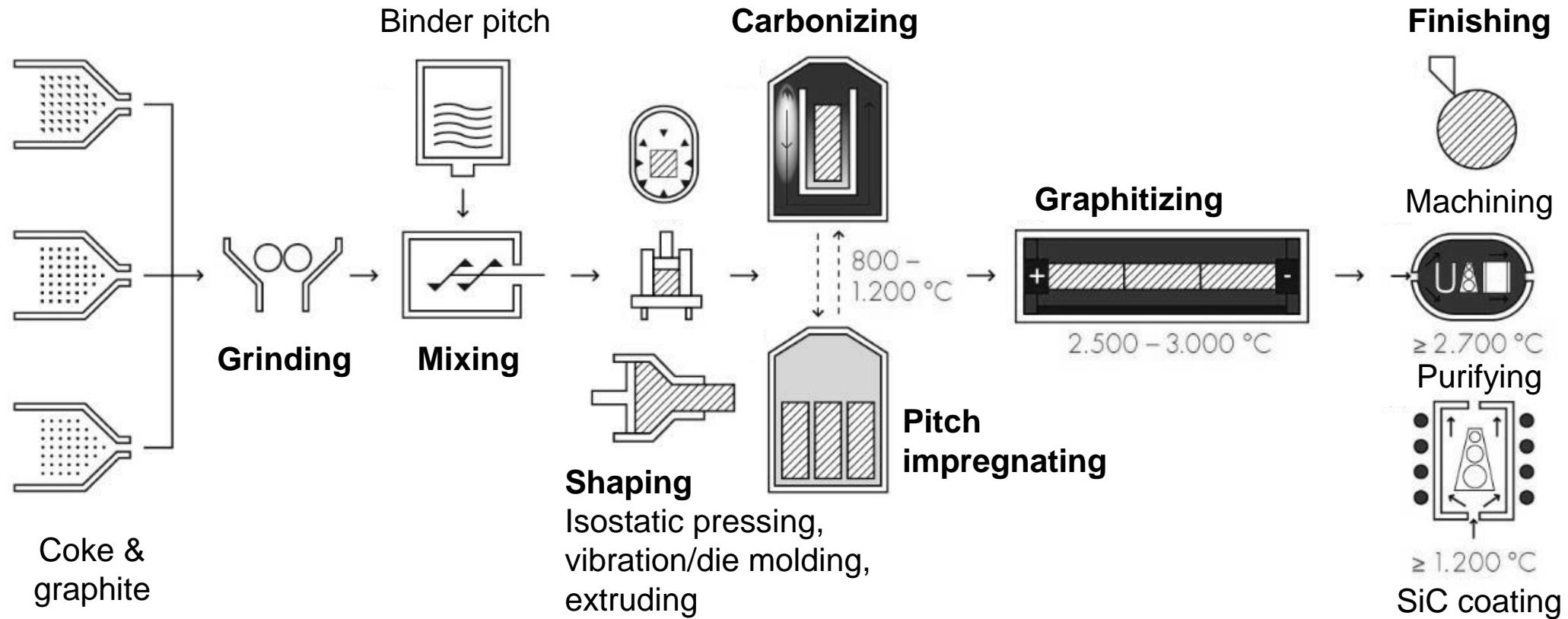
# Specialty graphites come into play where other materials fail.



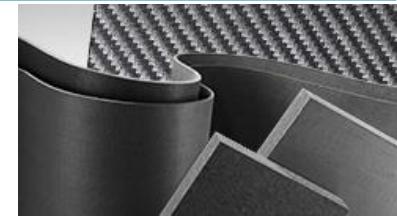
<sup>1</sup> Electrical Discharge Machining

# Fine grain graphite manufacturing is complex and know-how intensive with long production times.

## Manufacturing process of fine grain graphite

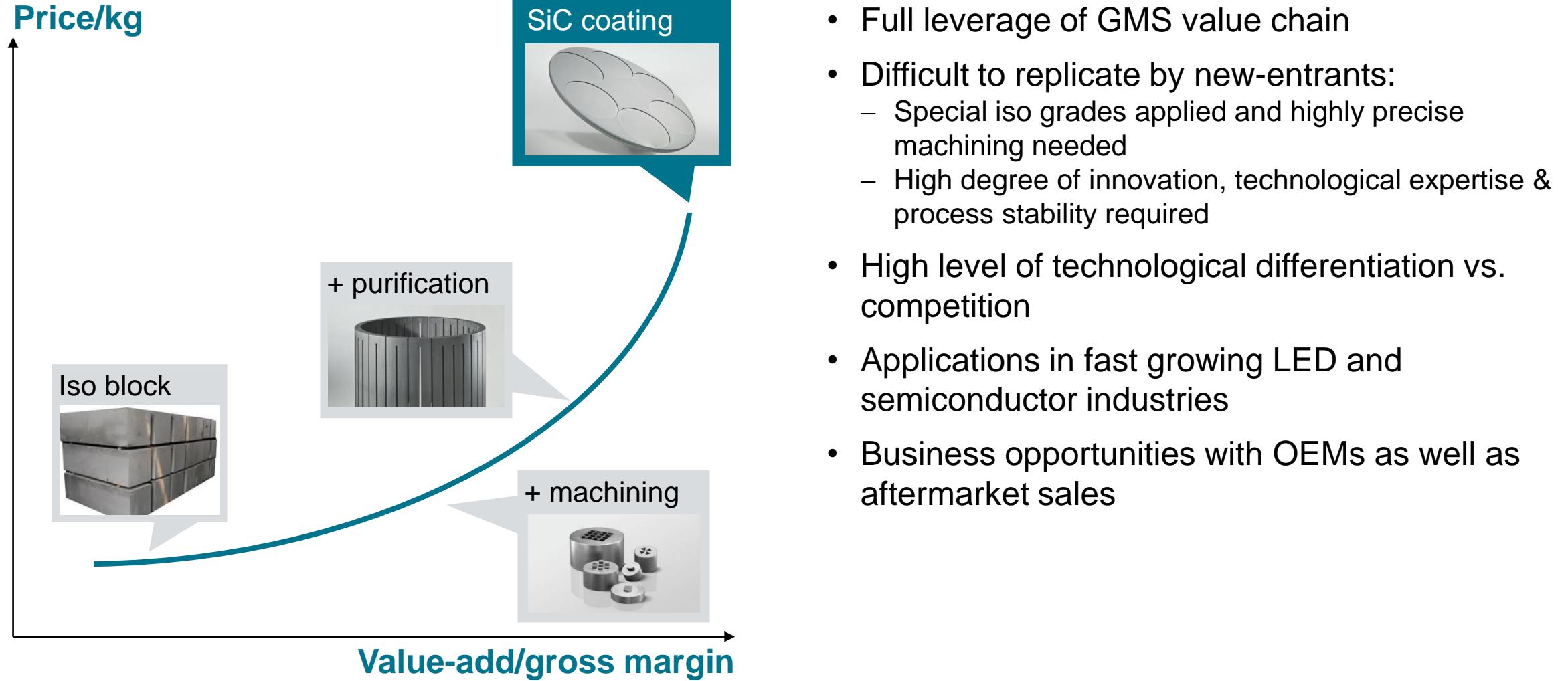


# GMS can offer tailored solutions for customer applications due to broadest portfolio and capabilities in the industry.

Fine grain graphite	<ul style="list-style-type: none"><li>• Isostatic</li><li>• Extruded</li></ul> <ul style="list-style-type: none"><li>• Vibro molded</li><li>• Die molded</li></ul>	
Expanded natural graphite	<ul style="list-style-type: none"><li>• Foils &amp; Sheets</li><li>• Yarns</li></ul> <ul style="list-style-type: none"><li>• Panels</li><li>• Additives</li></ul>	
Carbon fiber-reinforced carbon and felts	<ul style="list-style-type: none"><li>• CFRC<sup>1</sup></li><li>• Rigid felt</li></ul> <ul style="list-style-type: none"><li>• Soft felt</li></ul>	
Value-add process capabilities	<ul style="list-style-type: none"><li>• Base machining</li><li>• Advanced machining</li><li>• Purification</li><li>• SiC Coating</li></ul> <ul style="list-style-type: none"><li>• Process &amp; product modeling</li><li>• System design</li><li>• System assembly</li></ul>	

<sup>1</sup>CFRC: carbon fiber reinforced carbon

# SiC coating is an example for high-value-add applications, offering premium sales prices and margins in the respective markets.



# Graphite materials enable innovation.

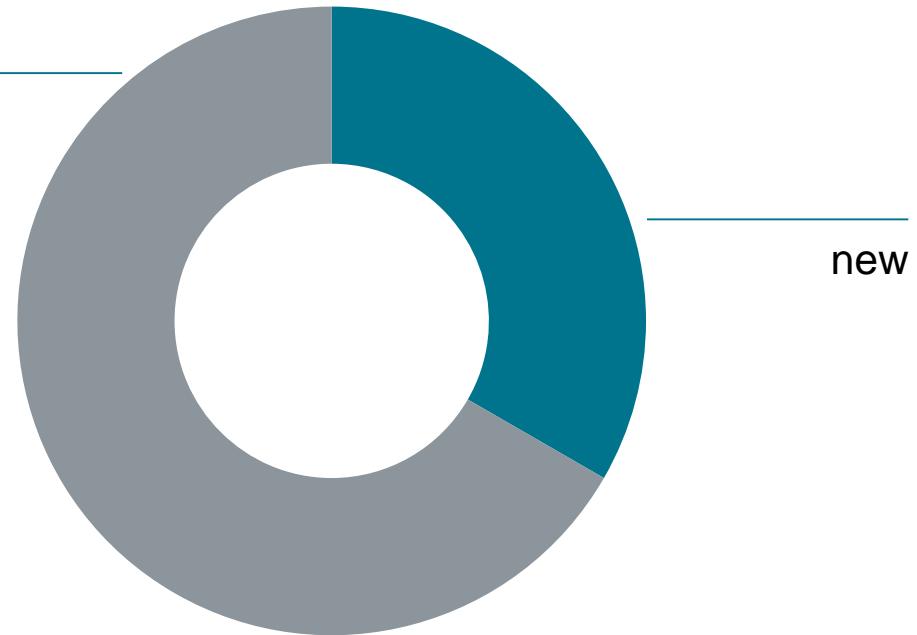
## Examples:

- Advanced graphite anode materials for lithium-ion batteries
- Graphite foils and felts for stationary energy storage
- Additives for advanced lead acid batteries
- Advanced silicon carbide coated carriers for LED and semiconductors
- CFRC charging racks carriers for high-temperature applications
- Extra large reactors for polysilicon production
- CFRC column internals for chemical processes
- Special graphite grades for glass bending
- Graphite felts for fuel cell applications

**Target approx. 1/3 of sales based on new products introduced over the last 4 years**

established

new



# Graphite Materials & Systems.

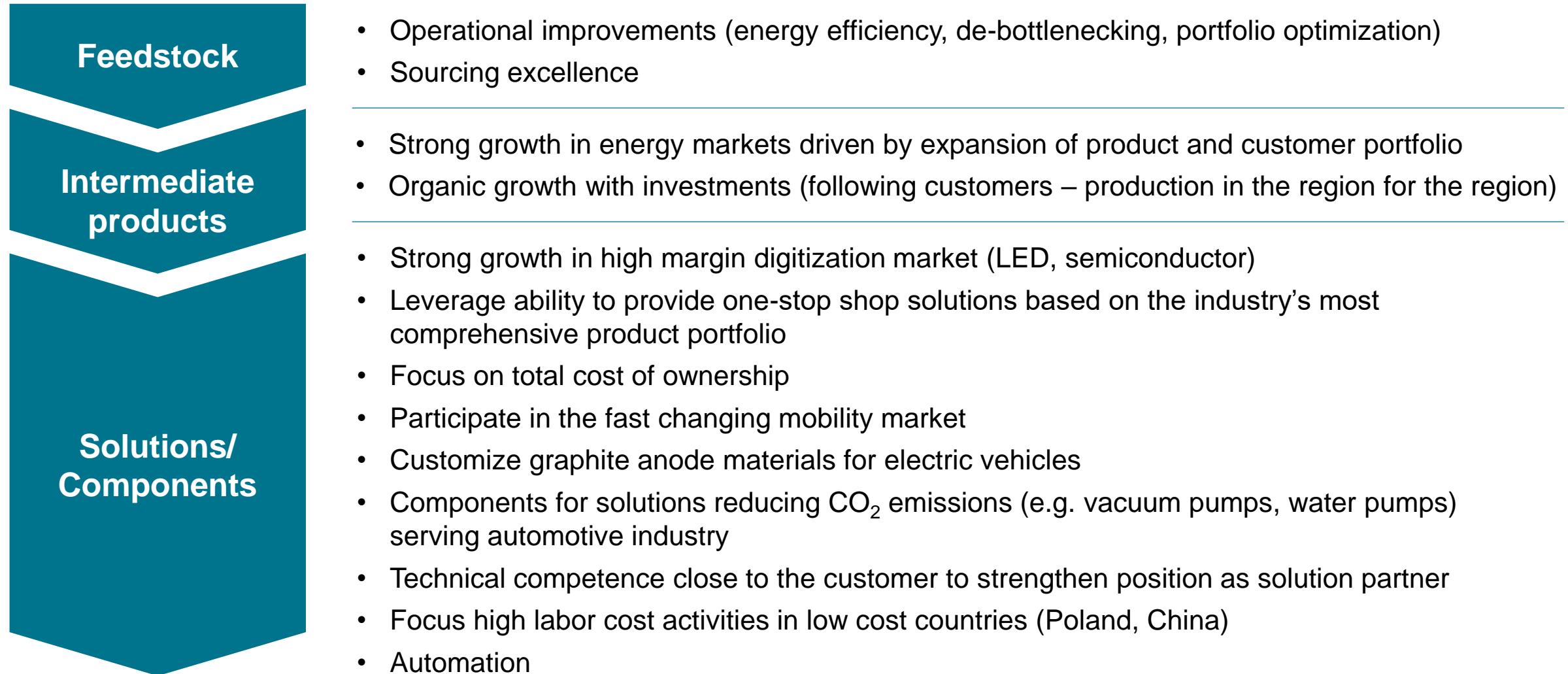
## Leading market shares in major end markets

### Global markets shares 2017

Chemicals	30%
Batteries & other energy	20%
LED	20%
Solar	15%
Semiconductor	15%
Automotive & transportation	15%
Industrial applications	10%-50%

Source: SGL Group's own estimates

# GMS already achieves sales growth and EBIT margin targets but expected to grow further. GMS by value chain



# Levers to further profitability improvement.

## GMS by market segments

### Overall:

- Efficiency gains in operations improve profitability

### Battery & other energy:

- Expand capacities to grow with new customers
- Investment into battery laboratory: develop next generation material
- “Economies of scale” and operational improvements compensate potential pressure on prices

### Semiconductor & LED:

- Strongly growing and attractive market
- Utilize capacity in St. Marys and further expansion in other regions (China)
- Invest into technology & know-how

### Automotive:

- Major customer projects won (e.g.: Bosch: parts for diagnosis tank leakage module pumps, Pierburg: parts for brake assistant pump)
- Focus high labor cost activities in low cost countries (Poland)

### Solar

- Grow with market while improving profitability

# Innovation

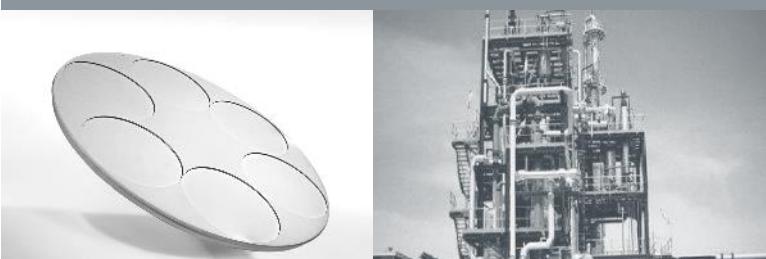
# SGL Innovation.

## Focused on future growth markets

### SGL Innovation

#### GMS

#### Application & Technology



- Graphite anode materials for lithium-ion batteries
- Isostatic and extruded graphite
- Coated graphite for semiconductors
- Carbon and graphite felts
- Thermal management solutions
- Sealing materials
- Equipment for chemical industry
- Die molded materials for automotive

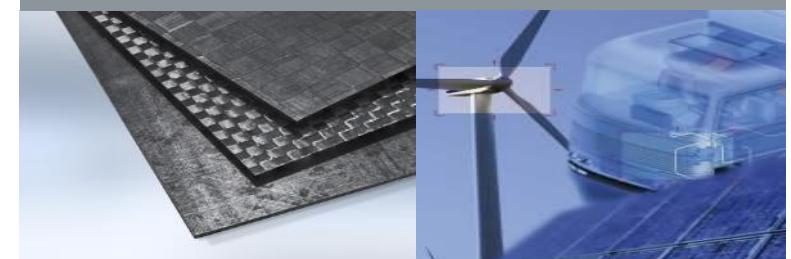
#### Central Innovation



- Strategic scouting
- Advanced & future carbon fibers
- Future composites
- Future coatings
- 3D printed materials
- Next generation materials for lithium-ion batteries
- C/SiC<sup>1</sup> ceramics
- Gas diffusion layers for fuel cells

#### CFM

#### Technology



- Textile and carbon fibers
- Textile materials
- Pre-impregnated materials
- Thermoplastic materials
- Wet friction materials
- Lightweight solutions & prototypes

<sup>1</sup>C/SiC: Carbon fiber reinforced Silicon Carbide

# SGL Central Innovation – Future Growth Areas.

From research and development to profitable business

## Startups:

Develop business with  
profitable growth



**Development:** Products &  
technology in cooperation with  
customers and partners



## Future growth areas:

Defined by analysis of markets  
and Megatrends in technology

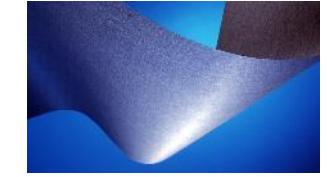


**Startup GDL<sup>1</sup>  
for fuel cell**



**C/SiC  
ceramics**

C/SiC<sup>2</sup> ceramics



GDL for fuel cell

**3D printing**



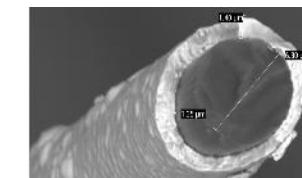
**Nano Si/C for  
next generation  
lithium-ion batteries**

Nano Si/C<sup>3</sup> for LIB



3D printing

**Future carbon  
fibers & textiles**



**Future  
composites**

Future coatings



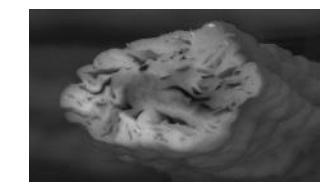
Fut. composites

**Future  
coatings**



**Scouting: Medtec,  
water treatment, etc.**

Water treatment

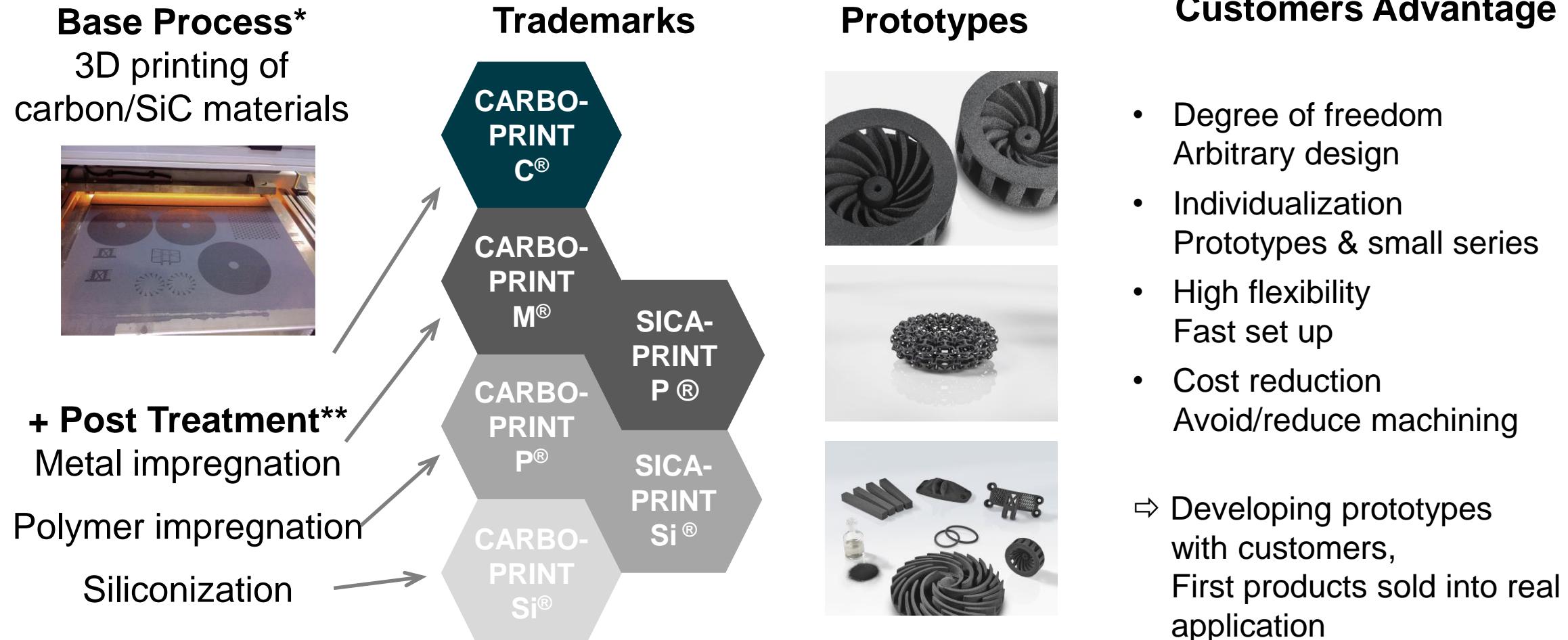


Future C-fibers

<sup>1</sup>GDL: Gas diffusion layer; <sup>2</sup>C/SiC: Carbon/Silicon carbide; <sup>3</sup>Si/C: Silicon/Carbon

# SGL Central Innovation – Future Growth Areas.

## SGL Carbon – A Pioneer in 3D Printing of Carbon Materials

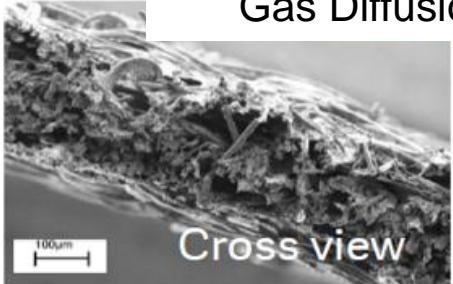


\* Developed in cooperation with ExOne, Crosslicenced; \*\* SGL Group patents pending

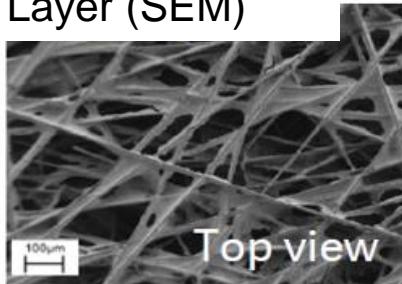
# SGL Innovation – Start Ups.

## Fuel Cell Materials – Profitable Growth in Mobility & Energy

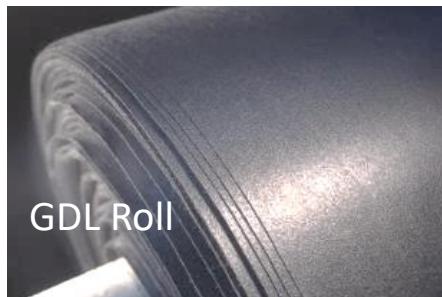
Microstructure of a  
Gas Diffusion Layer (SEM)



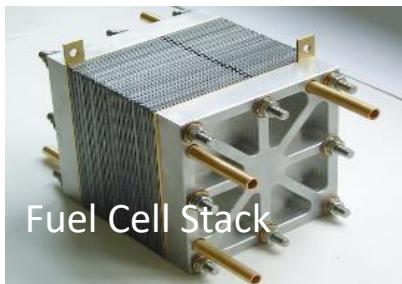
Cross view



Top view



GDL Roll



Fuel Cell Stack



Fuel Cell Car

- Gas Diffusion Layers are a non substitutable component in all major fuel cell types. The typical GDL raw material is carbon fiber paper.
- SGL Group has 20 years experience in development, production and sales of GDL material.
- SGL is a quality leader for GDL materials.
- Fuel cell market has grown with high double digit annual growth rates during last years .
- SGL Group delivers more than 50 customers in all continents.
- In 2017 we signed a long term supply contract with Hyundai Motor Corporation, one of the leading fuel cell car OEMs.

# Summary

# The new SGL Carbon.

## In a nutshell:

- Material competence based on **carbon<sup>1</sup>** and **high temperature processes**
- Commands **entire** carbon fiber and graphite **value chain**
- **High tech** carbon fiber & graphite based **engineered solutions**
- **Diversified customer base** – servicing more than 35 industries
- **Sales growth** fueled by the **megatrends energy, mobility and digitization**
- Targeting **earnings growth more than proportionate** to sales growth

<sup>1</sup> Carbon refers to the chemical element – graphite and carbon fiber are forms of carbon

**Thank you for your attention !**

# Backup

# Outlook for fiscal year 2019

# Reporting segment outlook 2019.

## CFM – guidance revised downwards significantly

- Slight **increase in sales** expected mainly driven by market segment **Wind Energy**
- **FY2019 guidance** for recurring **EBIT** now negative mid to high single digit million € amount due to
  - Continued weakness becoming apparent for Q4/2019 in the market segments **Textile Fibers** and **Industrial Applications**
  - Despite the strong growth in the market segment **Wind Energy**, a substantial year-over-year earnings decline is also expected in this market segment due to the deteriorated product mix.

# Reporting segment outlook 2019.

## GMS – guidance revised upwards slightly again

- **Sales** expected to increase slightly on prior year level which was boosted by initial adoption of IFRS 15
  - Mainly driven by market segments **Semiconductors** and **Automotive & Transport**
- Due to strong 9M/2019, we now expect **FY 2019 EBIT** to slightly increase
  - Prior year level was also boosted by initial adoption of IFRS 15
  - Lower shipments planned for Q4/19 as well as measures to reduce inventory, which decreases fixed cost absorption but improves cash flow
- **ROS<sub>EBIT</sub>** target of 12% should again be exceeded in this business unit and thus **stability of GMS' business model** proven in a weaker overall economic environment

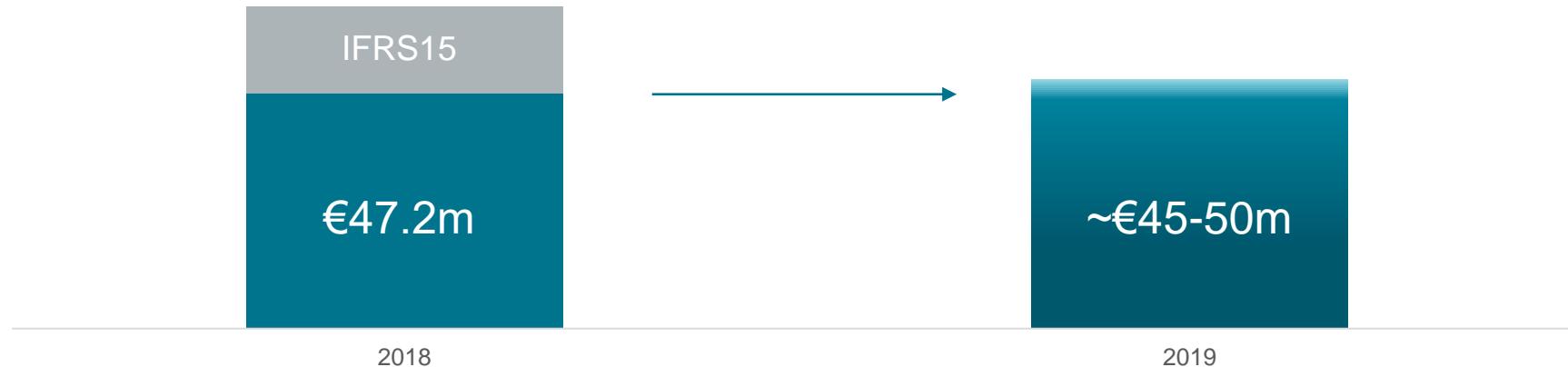
# Reporting segment outlook 2019.

## Corporate – guidance revised upwards slightly again

- **Recurring EBIT** anticipated **substantially better than** prior year level mainly due to
  - Lower net expenses in Central Innovation resulting from much stronger business development in fuel cell components
  - Lower expenses for management incentive plans following results decline in CFM and thus also at Group level
- Significant improvement in recurring EBIT expected despite prior year benefiting from a €3.9 million **one-time impact** from a land sale in Q1/2018

# Group outlook 2019. Guidance for recurring EBIT revised downwards

- Full year **Group sales** expected to increase mid single-digit mainly driven by volume increases
  - Despite weakening of overall economic environment
  - Prior year boosted by high effects from initial adoption of IFRS 15
- **Group recurring EBIT** expected at €45-€50m compared to prior year level which was boosted by positive IFRS 15 effects
  - Adjusted for effects from initial adoption of IFRS 15, Group EBIT in 2019 is approx. on the same level as in 2018



# Group outlook 2019. Adverse impact on net profit guidance due to lower outlook for CFM and impairment losses

- **Net result – continued operations** now expected at approx. negative €100m (2018: €41m)
  - Prior year included a high positive one-time effect of €28m from the full consolidation of SGL ACF
  - Current year includes approx. €75m impairment losses at CFM and approx. €7m DTA write-offs
  - In addition, we expect substantially higher interest cost in net financial results mainly from the corporate bond issue in April 2019
- **Capex** 2019 to increase compared to prior year to approx. €100m
- Substantial improvement in negative **free cash flow** from continued operations to a low double-digit m€ amount expected mainly due to working capital improvement and despite higher capex and higher interest costs – i.e. **free cash flow positive** on normalized capex levels
- **Net debt** at end 2019 to increase by a mid double-digit m€ amount
- **Net debt and free cash flow** target attainment could be slightly affected by earnings decline in CFM

# Sneak preview on 2020.

- **Sales revenues to be slightly lower than 2019 level**
  - 2019 sales expected between €1.05 and €1.1bn
- **Recurring EBIT to be 10-15% lower than in 2019**
  - 2019 recurring EBIT expected between €45 and €50m
- Further details in January 2020 at the latest

# Latest financials 9M/2019

# Composites – Fibers & Materials.

in € million	9M/2019	9M/2018
Sales revenue	328.6	323.9
EBITDA <sup>1</sup>	24.1	45.8
EBIT <sup>1</sup>	-1.8	20.9
EBIT <sup>1</sup> -Margin (in %)	-0.5	6.5
ROCE <sub>EBIT<sup>1</sup></sub> (in %)	-0.3	4.6

- **Sales revenue** in 9M/2019 slightly above prior year level (currency adjusted 1%)
  - Strong growth in market segment **Wind Energy** (albeit from a very low base) offset by market segments **Industrial Applications** and **Textile Fibers** (weakening global economy and structural reasons) as well as **Aerospace** (project billings skewed to H2/2019)
  - Remaining market segment **Automotive** approximately on prior year level
- **EBIT<sup>1</sup>** in Q3/2019 significantly declined compared to the first two quarters due to the deterioration in **Textile Fibers, Wind Energy and Industrial Applications**
- Overall **EBIT<sup>1</sup>** in 9M/2019 substantially below prior year level
  - Mainly due to earnings decline in market segments **Textile Fibers** (weak economic conditions and structural effects), **Wind Energy** (lower earnings despite higher sales due to unfavorable product mix), **Automotive** (temporary unfavorable product mix), **Aerospace** (different billing patterns)

# Graphite Materials & Systems.

in € million	9M/2019	9M/2018
Sales revenue	471.3	436.8
EBITDA <sup>1</sup>	91.2	76.5
EBIT <sup>1</sup>	70.9	59.5
EBIT <sup>1</sup> -Margin (in %)	15.0	13.6
ROCE <sub>EBIT<sup>1</sup></sub> (in %)	16.9	16.0

- **Sales revenue in 9M/2019 up 8% (currency adjusted by 6%)**
  - Substantial double-digit growth in market segments **Semiconductors, Automotive & Transport** and **LED**
  - Slight increase also in **Industrial Applications** and **Chemicals**
  - **Battery & other Energy** close to prior year level as expected
  - Sales to market segment **Solar** again limited to below prior year level as supply to **LED** and **Semiconductor** industries again prioritized
- **EBIT<sup>1</sup> in 9M/2019 increased by 19% and thus more than proportionately to sales to a record level**
  - Due to improvements in most market segments
  - **Automotive & Transport** was able to improve earnings significantly in Q3 vs. the first half 2019 (reduced start-up costs), thus stabilizing earnings over the reporting period
  - Earnings in the market segment **Battery & other Energy** were also maintained close to the prior year level
  - **Solar** below prior year level due to shift of business to more profitable Semiconductor customers

# Corporate.

in € million	9M/2019	9M/2018
Sales revenue	32.5	25.6
- of which <i>Central Innovation</i>	9.4	3.6
EBITDA <sup>1</sup>	-8.1	-16.6
EBIT <sup>1</sup>	-14.9	-21.2
- of which <i>Central Innovation</i>	-4.0	-6.1

- Higher **sales revenue** resulting primarily from stronger demand in the market segment **Energy** relating to parts for fuel cell customers supplied by our central research and development department (Central Innovation)
  - Accordingly, sales revenue at Central Innovation more than doubled in the reporting period to €9.4 million
- **EBIT<sup>1</sup>** improved significantly compared to the prior year level – despite a €3.9 million one-time gain from a land sale in the prior year period
  - Lower expenses for management incentive plans mainly as a result of the weak performance in CFM and thus in the Group
  - Central Innovation net expenses of €4.0 million below prior year level of €6.1 million due to higher earnings contribution from business with parts for fuel cells

<sup>1</sup> before non-recurring items of €1.8 million in 9M/2018

# Group.

in € million	9M/2019	9M/2018
Sales revenue	832.4	786.3
<b>EBITDA before non-recurring items</b>	<b>107.2</b>	<b>105.7</b>
<b>EBIT before non-recurring items</b>	<b>54.2</b>	<b>59.2</b>
<i>ROCE<sub>EBIT</sub> (in %)</i>	4.7	6.1
Non-recurring items	-81.0	20.5
EBIT	-26.8	79.7
Net financing result	-32.6	-21.3
Results from continuing operations before income taxes	-59.4	58.4
Income tax expense and non controlling interests	-14.7	-6.4
Result from discontinued operations, net of income taxes	-0.1	-4.0
<b>Consolidated net result attributable to shareholders of parent company</b>	<b>-74.5</b>	<b>47.7</b>

- **Recurring EBIT** declined by 8% to €54.2 million due to gain from a land sale in prior year period (impact of €3.9 million in Q1/2018). Excluding this effect in the prior year period, EBIT would have been nearly stable as higher earnings contribution from GMS and lower expenses in Corporate almost entirely compensated for lower CFM contribution
- **Net financing result** deteriorated mainly due to the one-time expense of €6.3 million for the repurchase of the convertible bond 2015/2020 as well as due to higher interest expenses from new convertible bond issued in September 2018 and the new corporate bond issued in April 2019 as well as from the first time adoption of IFRS 16.
- Lower **net result** due mainly to impairment losses and lower financial result in the current year and non-recurrence of positive non-recurring items of approximately €28 million from the full consolidation of former JV with BMW (SGL ACF) in the prior year period

# Free cash flow.

<b>in € million (continuing operations)</b>	<b>9M/2019</b>	<b>9M/2018</b>
Cash flow from operating activities	29.9	7.6
• Capital expenditures in property, plant, equipment and intangible assets	-50.7	-38.7
• Cash flow from other investing activities <sup>1</sup>	11.2	-8.8
Cash flow from investing activities	-39.5	-47.5
Free cash flow	-9.6	-39.9
Free cash flow from discontinued operations	-9.8	58.6

- **Cash flow from operating activities** improved significantly to €29.9 million from €7.6 million due to
  - The lower increase in working capital
  - A higher positive non-cash effect from IFRS15 in the prior year result
- **Free cash flow** also improved significantly to close to break even level due to
  - Improvement in operating cash flow
  - Lower cash outflow from investing activities despite significantly higher capex as prior year period included payment for German part of SGL ACF (Wackersdorf site)
- **Free cash flow from discontinued operations** included
  - Cash outflow relating to final settlement payments to the buyer of HITCO Aerostructures in the reporting period
  - Prior year benefited from cash inflow from the final outstanding payments for the sale of former PP activities

<sup>1</sup>dividends received, payments for capital contributions in investments accounted for At-Equity and other financial assets, payments for acquiring remaining stakes in our joint ventures, proceeds from sale of intangible assets and property, plant and equipment

# Balance sheet.

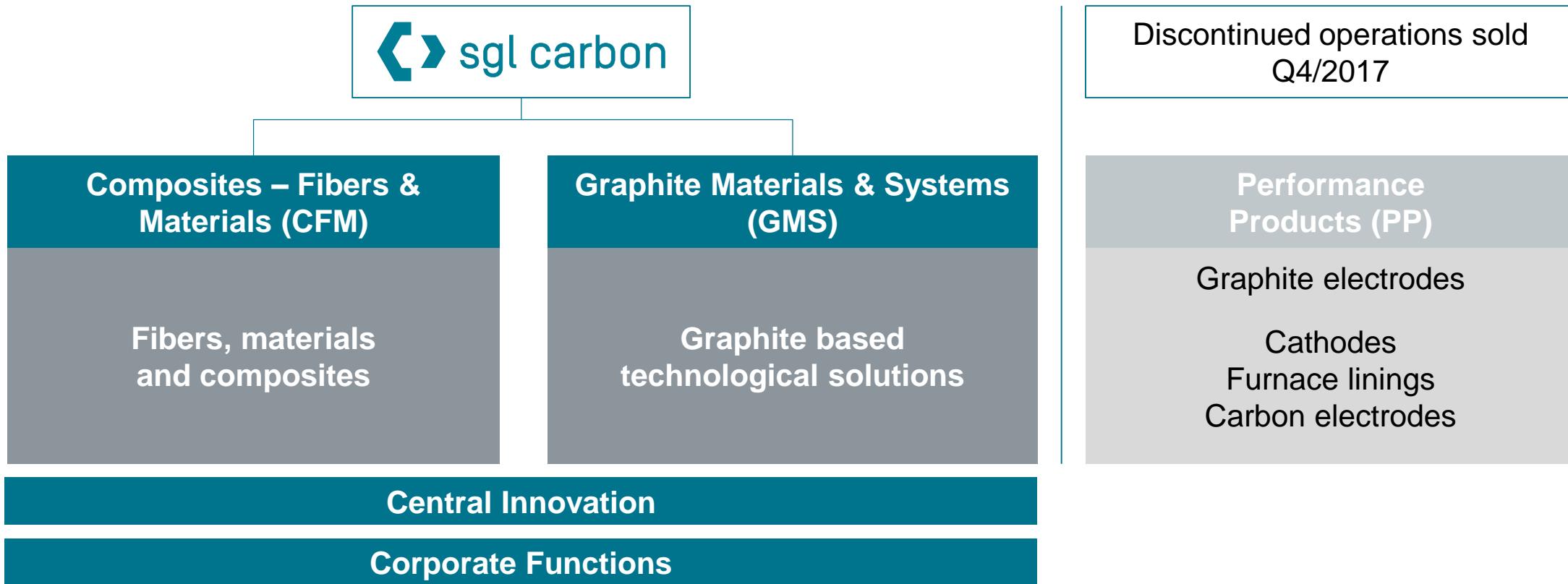
in € million	30.09.2019	31.12.2018
Equity ratio (in %)	26.6	33.5
Total liquidity	146.7	181.6
Net financial debt	279.5	242.2
Gearing (net debt/equity)	0.68	0.46
Leverage ratio (net debt/EBITDA)	2.2	1.9

- **Equity ratio** deteriorated mainly due to the lower net result impacted by the impairment and decreased equity from adoption of lower interest rates on pension liabilities. Positive effects from FX were not sufficient to compensate for these adverse effects
- Higher **net financial debt** primarily reflects final settlement payments to the buyer of HITCO Aerostructures, the small negative free cash flow, and incurred costs for the corporate bond issue

# Appendix

# The transformation of SGL Group.

We have implemented the announced strategy



- ✓ Disposal of the PP business to **concentrate** our resources on the **growth areas CFM and GMS**
- ✓ Focus on CFM and GMS improves the balance between markets and industries, and thus **reduces volatility in our business**

# Regional Sales Distribution.

## Sales by destination

Sales	Germany	Europe outside Germany	North America	Asia	Rest of World
2018	34 %	18 %	16 %	28 %	4 %
2017	26 %	22 %	19 %	28 %	6 %

## Sales by origin

Sales	Germany	Europe outside Germany	North America	Asia
2018	39 %	31 %	23 %	7 %
2017	41 %	32 %	21 %	6 %

# Shares in issue and shareholder structure.

## Basic shares

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Security Identification Number	723530
ISIN Number	DE0007235301
Cusip Number	784 188 203
Number of Shares (as at October 31, 2019)	122,341,478
Free float	~ 46%

## Reported shareholdings according to §§ 21 f. WpHG and other notifications

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SKion GmbH	28.5%
BMW AG	18.4%
Volkswagen AG	7.4%

# Debt market instruments.

## Convertible notes 2018/2023

ISIN-Number:	DE000A2G8VX7
Coupon	3.0%
Principal Amount	€ 159.3 million
Initial Conversion Price	€ 13.0220
Conversion Right	12.234 million shares
Issue Date	20 September 2018
Date of Maturity	20 September 2023

## Corporate bond 2019/2024

ISIN-Number:	XS1945271952
Coupon	4.625%
Principal Amount	€ 250 million
Issue Date	10 April 2019
Date of Maturity	30 September 2024

## Convertible notes 2015/2020

ISIN-Number: DE000A168YY5

Repaid fully ahead of maturity in July 2019 following a tender offer.

# Financial calendar/contact details.

## Financial calendar 2020

March 12, 2020	Annual Report 2019
April 22, 2020	Annual General Meeting
May 14, 2020	Report on the first quarter 2020
August 13, 2020	Report on the first half year 2020
November 12, 2020	Report on the nine months 2020

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