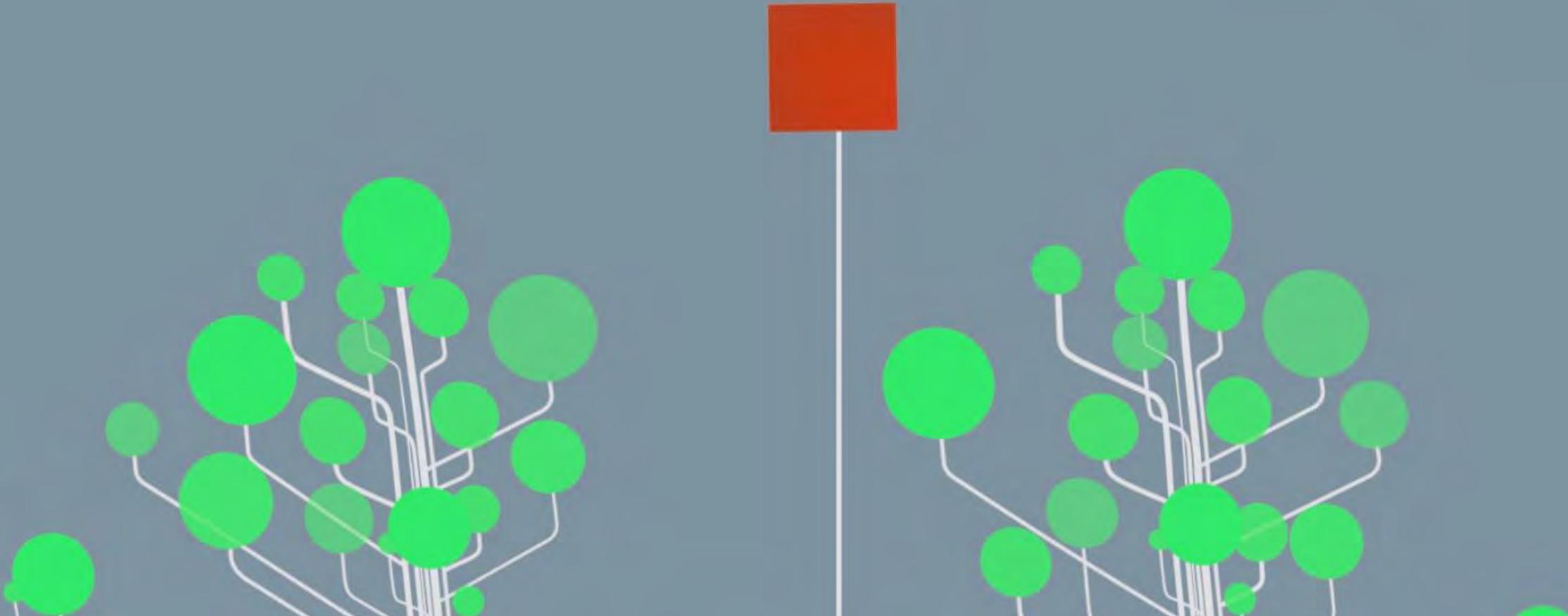




# CAPITAL MARKETS DAY

NOVEMBER 29, 2018



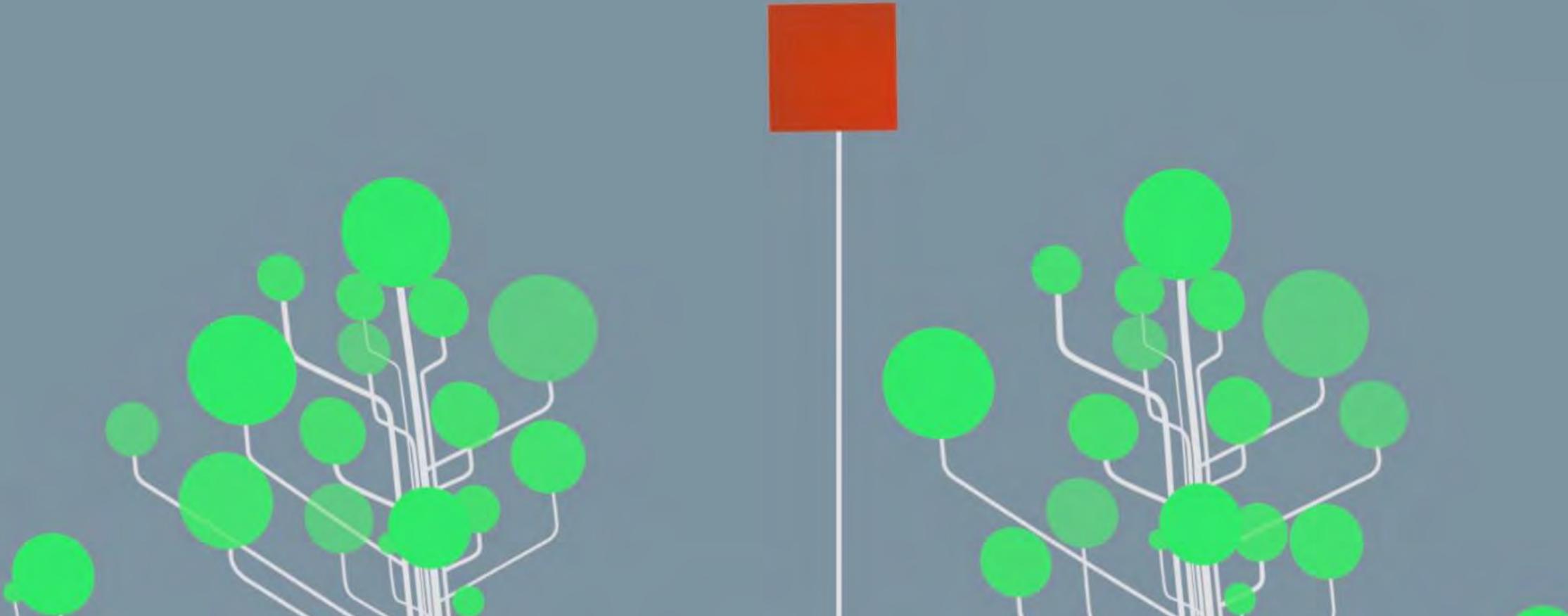
# AGENDA

<b>9:00 – 9:25</b>	<b>Mersen: Creating value for our stakeholders</b>	<i>Luc Themelin</i>
<b>9:25 – 10:10</b>	<b>Mersen's contribution to Solar Energy</b>	<i>Philippe Chemin Laurent Marcenac</i>
<b>10:10 – 10:40</b>	<b>Batteries for Energy Storage Systems</b>	<i>Philippe Roussel</i>
<i>Break</i>		
<b>11:10 – 12:00</b>	<b>Energy Efficiency at Mersen</b>	<i>Christophe Bommier</i>
<b>12:00 – 12:15</b>	<b>Mersen's Financial Business model</b>	<i>Thomas Baumgartner</i>
<i>Lunch</i>		



# MERSEN: CREATING VALUE FOR OUR STAKEHOLDERS

CAPITAL MARKETS DAY – NOVEMBER 29, 2018  
LUC THEMELIN, CHIEF EXECUTIVE OFFICER

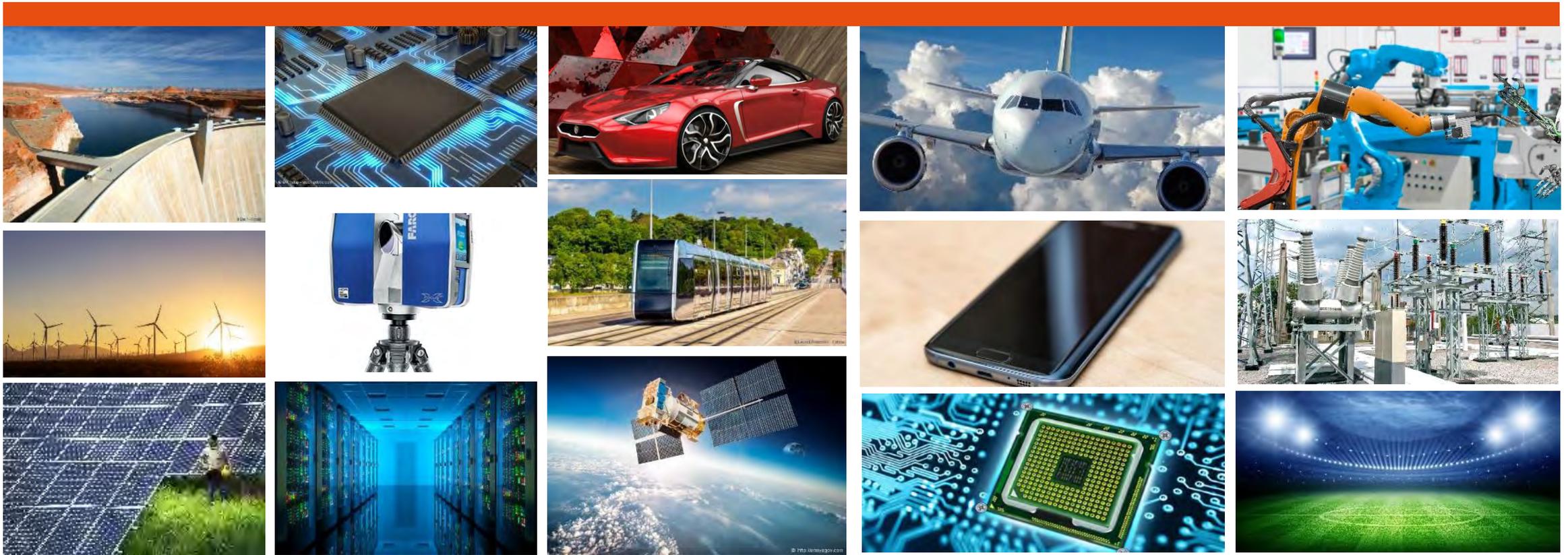


# MERSEN: OUR MISSION, TECHNOLOGICAL PROGRESS

WE ARE DEVELOPING  
THE **BEST TECHNOLOGIES**  
FOR THE INDUSTRIES OF THE FUTURE



WE PROVIDE INDUSTRIAL COMPANIES  
WORLDWIDE WITH **INNOVATIVE SOLUTIONS**  
ENHANCING THE PERFORMANCE OF THEIR  
**PRODUCTS AND SERVICES**



# CREATING THE VALUE THAT DRIVES OUR STAKEHOLDERS



**OUR  
EMPLOYEES**

**OUR  
CUSTOMERS**

**OUR  
SHAREHOLDERS**

**OUR PARTNERS**

# THE GROUP'S FOUNDATION: HUMAN CAPITAL

OUR  
EMPLOYEES

## DEVELOP A SENSE OF BELONGING

Strengthen the Company's attractiveness  
Anchor our values  
Promote collaboration

**6,500** employees  
**50+** sites in **35** countries

## WORK TO KEEP EVERYONE SAFE

Training, prevention and Golden Rules  
Health and safety weeks  
Safety audits

Keep the rate of accidents (TF1\*)  
very low  
**1.4 in 2017**

## DEVELOP SKILLS

Management Academy  
OpenExpert Program  
Mentoring, Development Center

**100% of managers trained**  
within two years

\* TF1: number of lost-time occupational accidents per million hours worked

# PRESTIGIOUS AND EXACTING CUSTOMERS...

OUR CUSTOMERS

as a % of sales in 2017



> 65% customized products

Replacement market  
65% of sales

Largest client  
~3% of sales

Longstanding ties



ALSTOM



BOMBARDIER

AIRBUS



THALES

SIEMENS



ABB



SEMIKRON  
innovation+service

WACKER



Vestas

SIEMENS

LONGi 隆基

HSC

# ...WHO BENEFIT FROM OUR EXPERTISE FOR GREATER PERFORMANCE AND EFFICIENCY

OUR  
CUSTOMERS

## ELECTRICAL POWER

**NO. 2 WORLDWIDE**  
Industrial fuses



**ELECTRICAL PROTECTION  
& CONTROL**

**NO. 2 WORLDWIDE**  
Components  
for power electronics



**SOLUTIONS FOR  
POWER MANAGEMENT**

## ADVANCED MATERIALS

**NO. 1-2  
WORLDWIDE**  
Graphite  
anticorrosion  
equipment



**ANTICORROSION  
EQUIPMENT**

**NO. 1-2  
WORLDWIDE**  
High-temperature  
applications



**GRAPHITE  
SPECIALTIES**

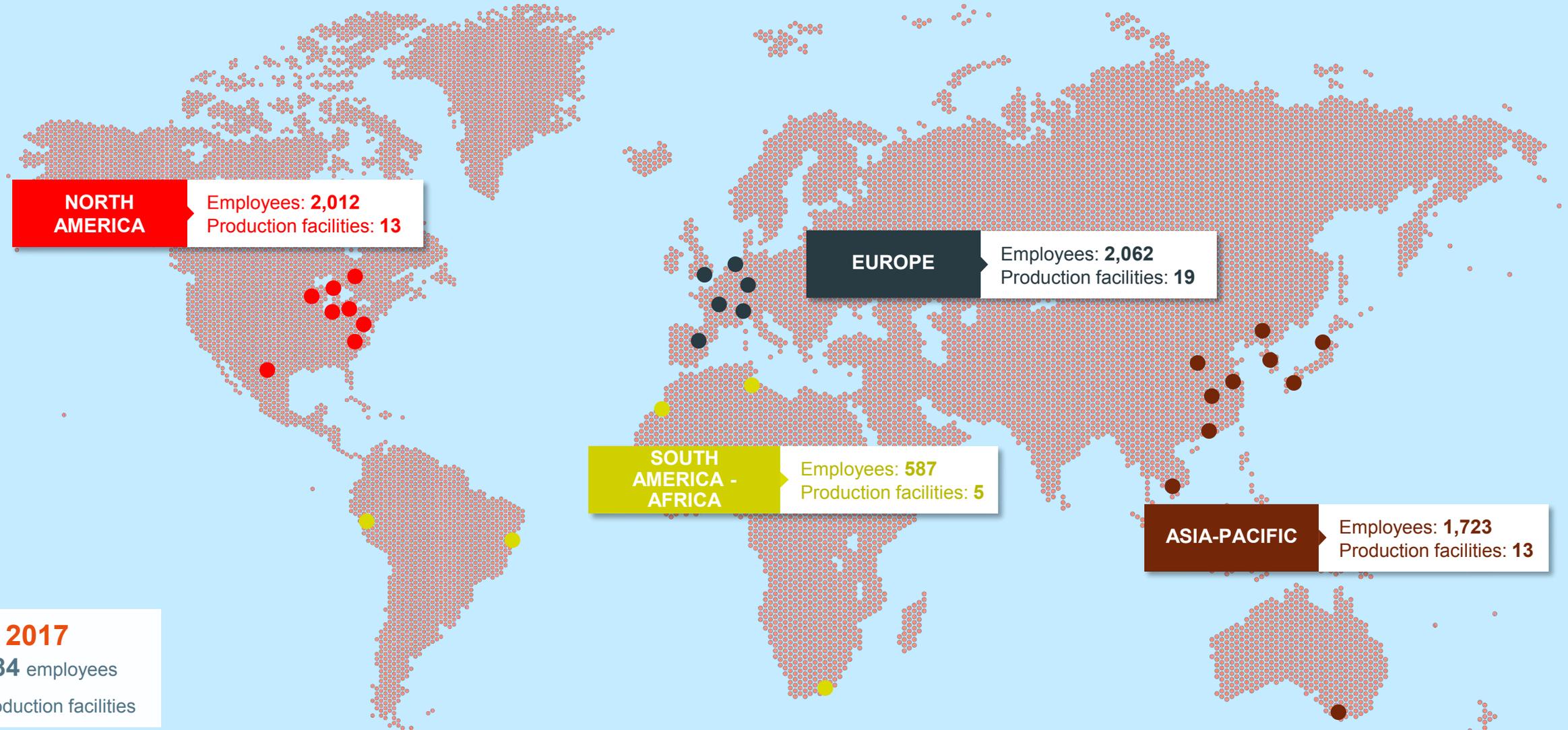
**NO. 1-2  
WORLDWIDE**  
Brushes for industrial  
motors



**POWER TRANSFER  
TECHNOLOGIES**

**8%** of sales reinvested in R&D and innovations to help us better serve our customers

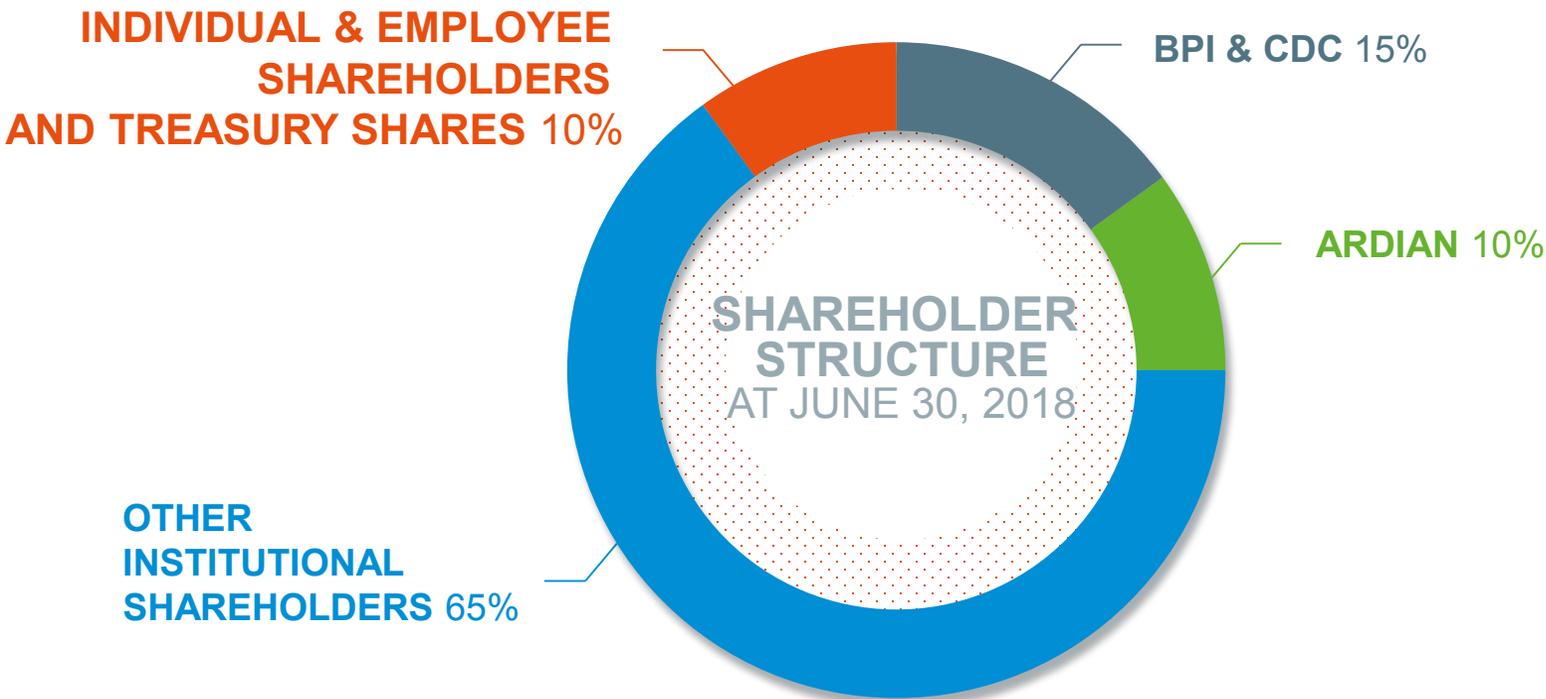
# ...AS WELL AS FROM OUR GLOBAL OPERATIONS



**2017**  
6,384 employees  
50 production facilities

# LONG-TERM RELATIONSHIPS WITH OUR SHAREHOLDERS THAT ARE BASED ON TRUST

OUR SHAREHOLDERS



DIVIDEND POLICY:  
PAYOUT RATIO OF

**30%-40%**

RIGOROUS FINANCIAL  
MANAGEMENT:

**AVERAGE FCF\*/SALES.  
OVER FIVE YEARS ~5%**

\* Free Cash-flow before restructuring and after financial interests

# PARTNERS THAT ARE CRITICAL TO OUR DEVELOPMENT

OUR  
PARTNERS

## FINANCIAL PARTNERS

Long-term relationships  
Diversified sources of financing

Net debt/EBITDA ratio: **1.5\***

Debt maturity: **4.7 years\***

## SUPPLIERS

Inclusion of environmental/ethics criteria  
Focus on quality and reliability

**400 strategic suppliers**  
“under control”

Priority given to local suppliers

## REGIONS

Extensive delegation  
of responsibilities across each entity  
Respect for cultural differences

**90%** of plant managers  
are locals

\* At June 2018 – Maturity on authorized lines

# BALANCED GOVERNANCE



**Compliance with the AFEP-MEDEF corporate governance code**



**Separation of control and management functions**  
(Chairman of the Board, Chief Executive Officer)



**3 Specialized Board Committees**  
(Audit and Accounts, Strategy, Governance & Remuneration)



**An 11-member Board**  
2 representatives from Ardian  
2 representatives from BPI  
6 independent members  
1 employee director



**Compliance: Chief Compliance Officer**  
  
Reports to the Chief Executive Officer

**Signatory of the UN Global Compact since 2009**



**WE SUPPORT**

# INSIDE MERSEN: A REDUCED ENVIRONMENTAL FOOTPRINT

## ...FROM PRODUCT DESIGN TO RECYCLING



### ECO-FRIENDLY PRODUCTS

No Mersen product is harmful to the environment



### CLEAN PROCESSES

Graphite manufacturing: a “best available technology” process

Fuse manufacturing: component assembly



### PROACTIVE WASTE MANAGEMENT

Percentage of waste recycled:  
**42%** in 2017

**+5 points** vs. 2016



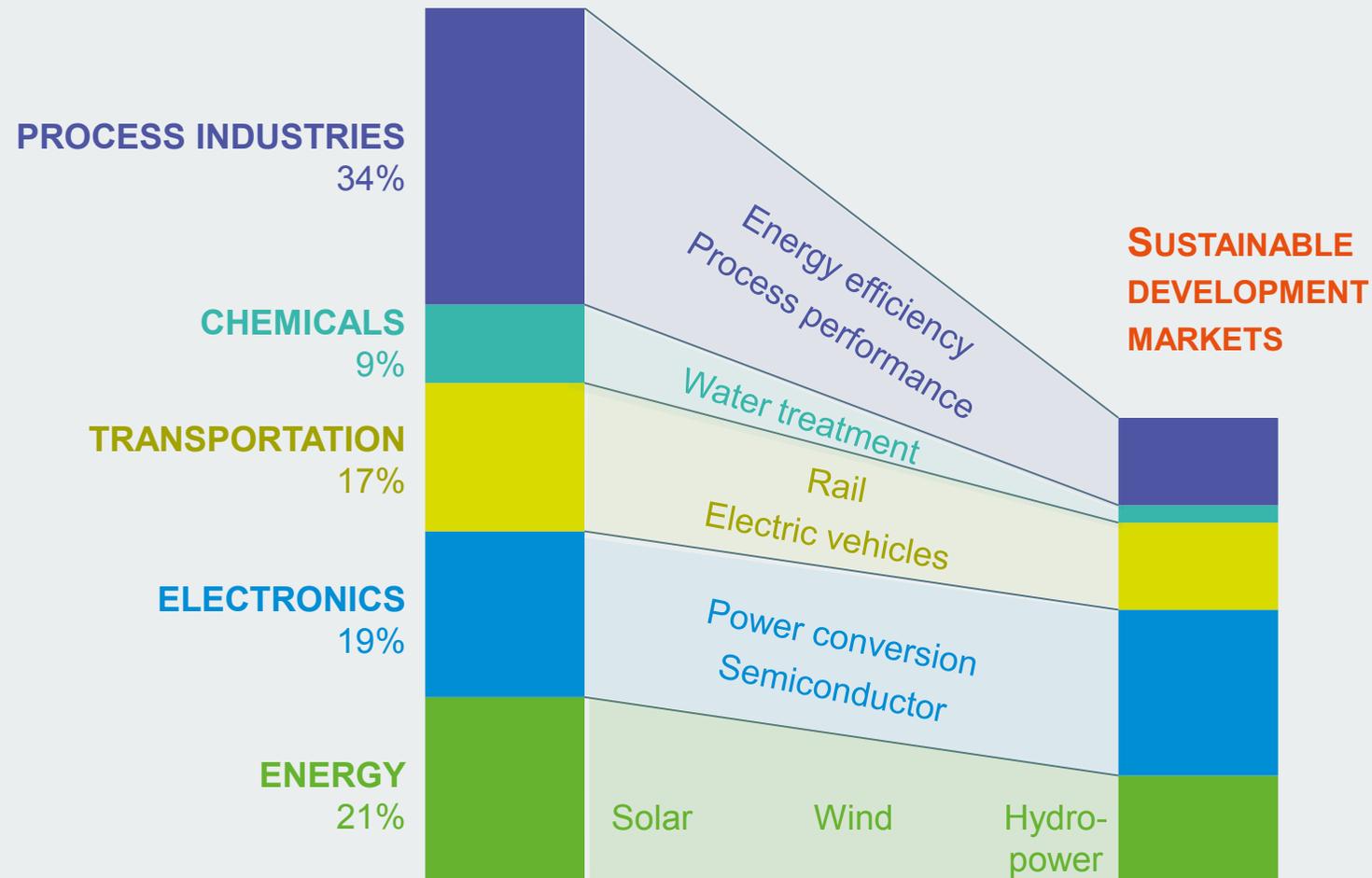
### ONGOING RECYCLING

**100%** of graphite powder recycled during the process

Fuse and electrical component recycling (external service provider)

\* At constant scope of consolidation

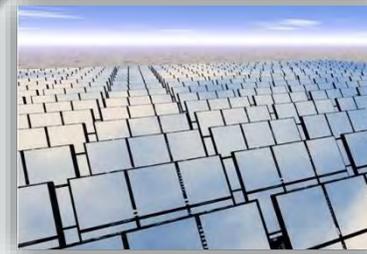
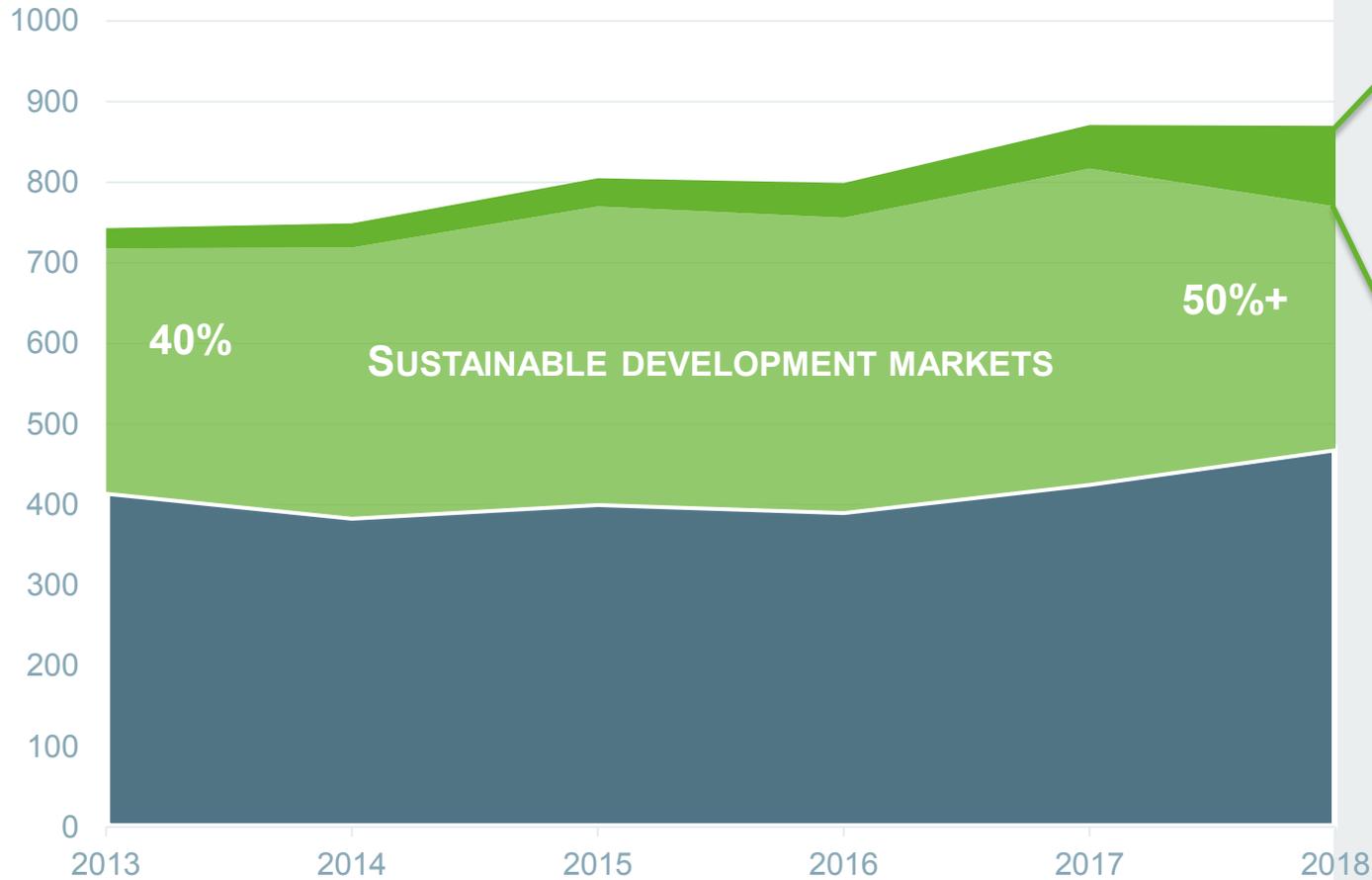
# MERSEN INSIDE: MORE THAN HALF OF MERSEN SOLUTIONS ARE FOR SUSTAINABLE DEVELOPMENT MARKETS



Breakdown of 2017 sales

# MARKETS WITH MAJOR GROWTH POTENTIAL IN THE MEDIUM TERM

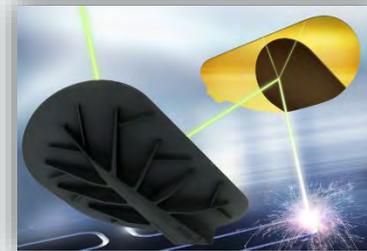
Sales in €m



SOLAR PHOTOVOLTAICS



ENERGY STORAGE



SiC LASER MIRRORS



SiC SEMICONDUCTEURS

**CAGR 2018-2023**  
**[+10-15%]\***

\* In the initial version circulated at the Capital Markets Day, the CAGR was wrongly mentioned to reach 15-20%



# MERSEN'S CONTRIBUTION TO SOLAR PHOTOVOLTAIC ENERGY

CAPITAL MARKETS DAY  
NOVEMBER 29, 2018





## **PHILIPPE CHEMIN**

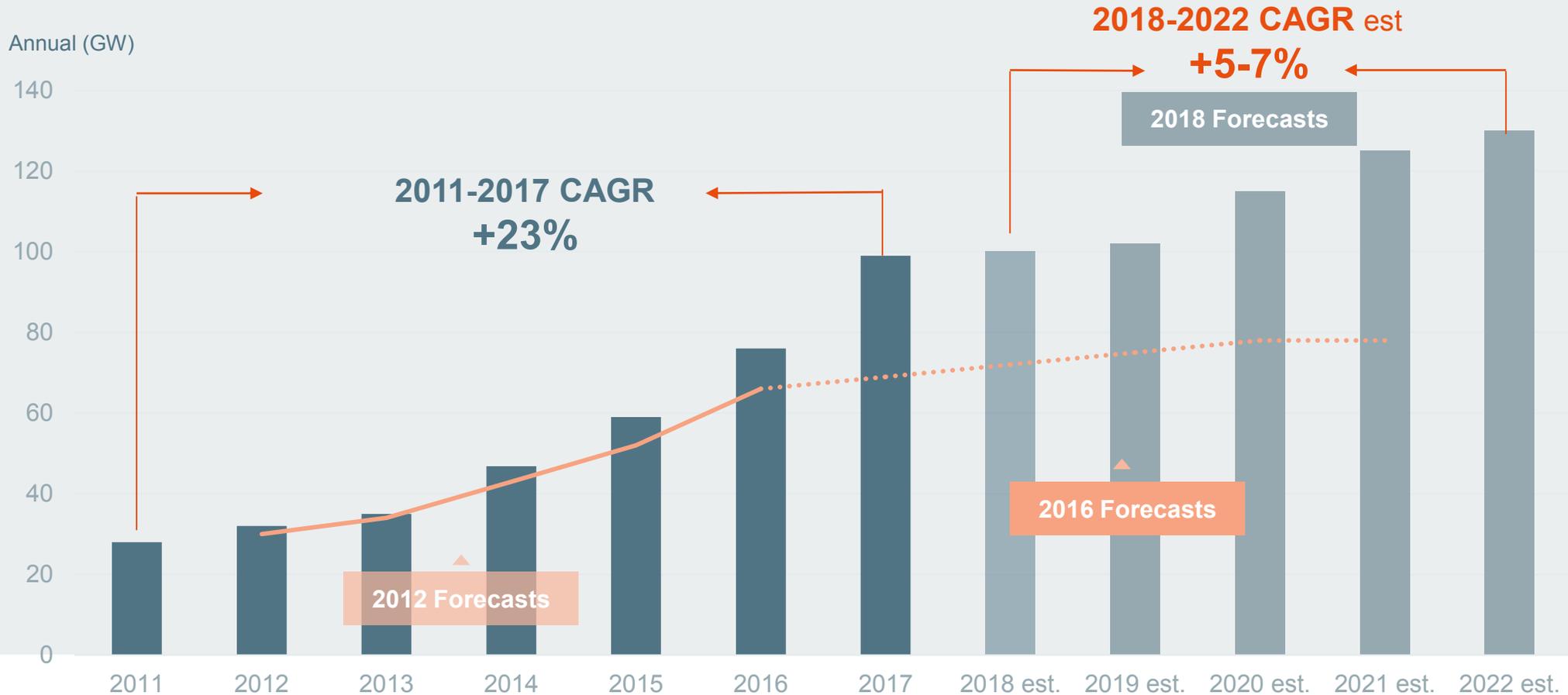
VP SALES & MARKETING, GRAPHITE SPECIALTIES  
BUSINESS UNIT

**MERSEN IN THE UPSTREAM PHASE OF THE  
SOLAR PHOTOVOLTAICS VALUE CHAIN**

# SOLAR: AN ENERGY SOURCE SEEING STRONG GROWTH

NUMBER OF PANEL INSTALLATIONS GROWING SHARPLY EACH YEAR

CONSISTENTLY OUTPACING FORECASTS



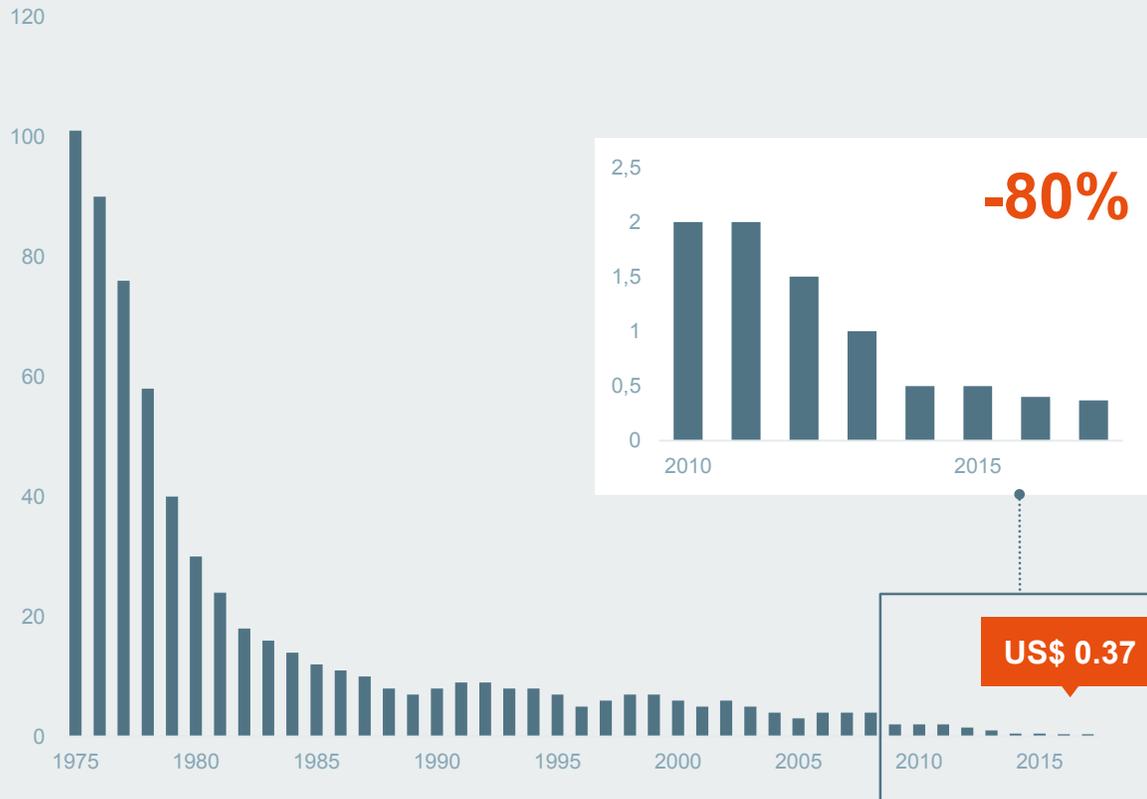
Source: IHS Markit, Exawatt, Mersen estimates

# SOLAR: A COMPETITIVE COST

## DECREASE IN COST OF SOLAR CELLS

US\$ 101.00

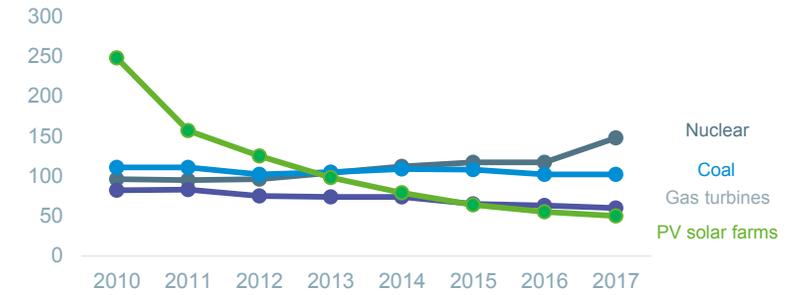
Price of solar cells in US\$ per watt



Source: Bloomberg New Energy Finance and pv.energytrend.com

## THE LOWEST\* ENERGY PRODUCTION COST

US\$/MWh



**-20%**

vs. natural gas

**3x**

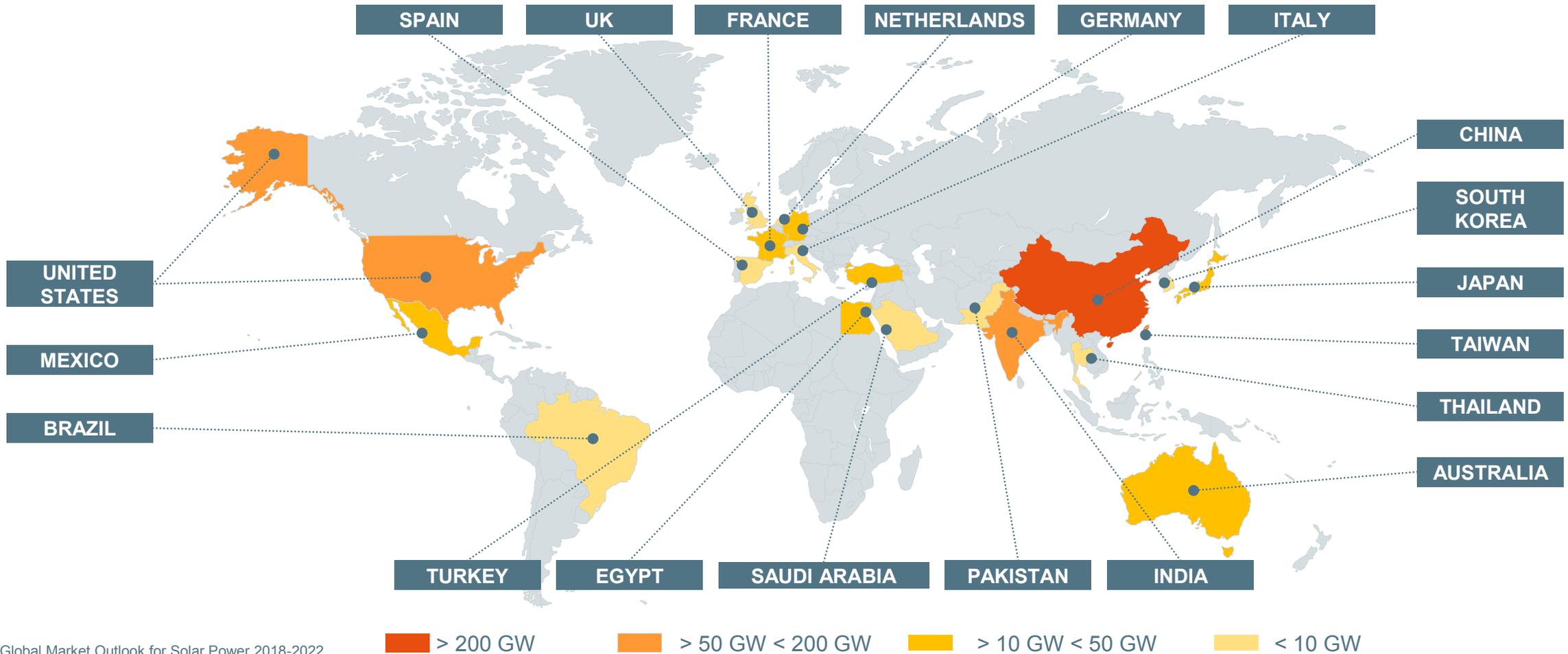
**LESS EXPENSIVE**

vs. nuclear power

\* On average - Source: Lazard's 2017 Levelized Cost of Energy Analysis

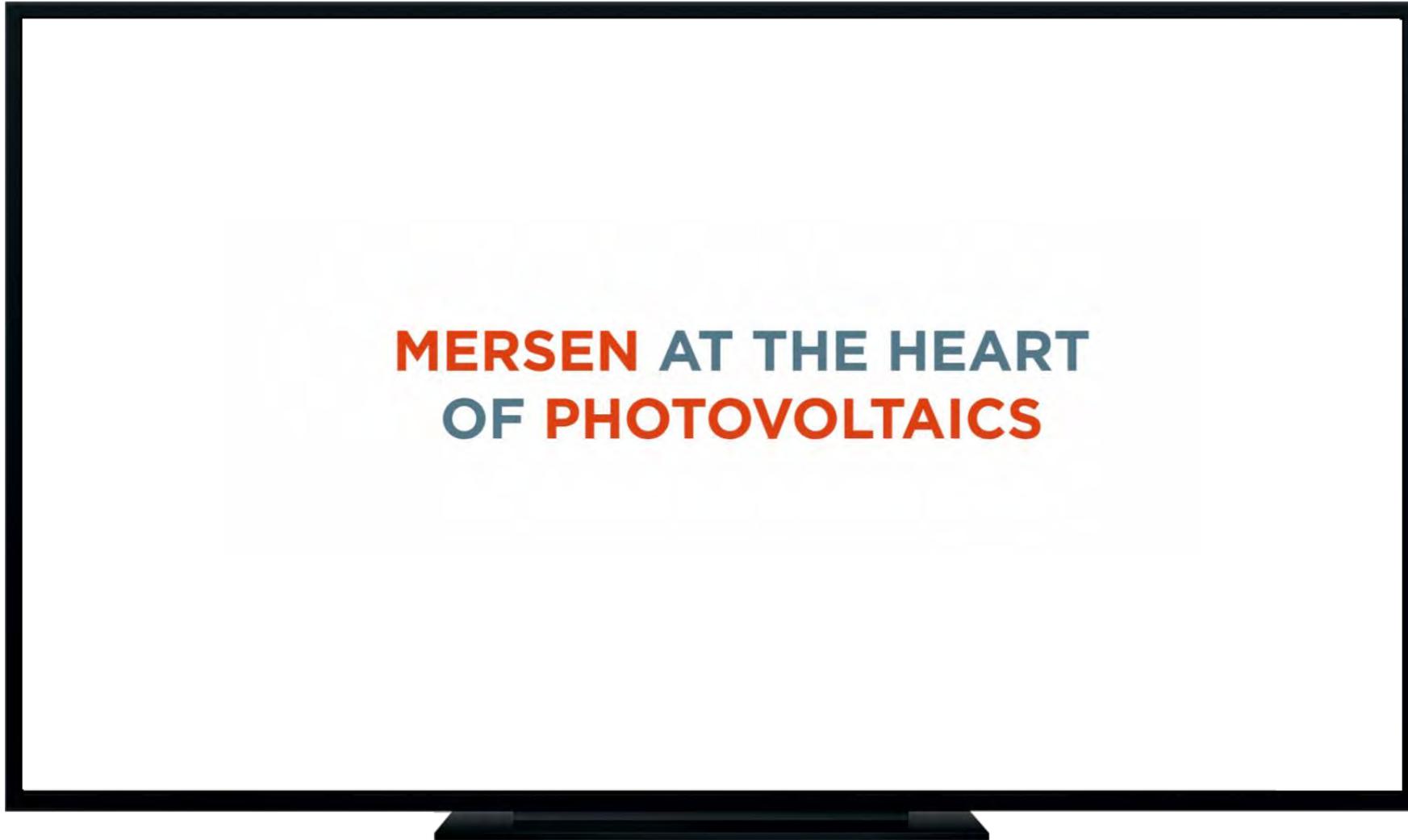
# SOLAR: A STRONG POTENTIAL THANKS TO ITS EASY INSTALLATION

## MAIN COUNTRIES WITH UPCOMING SOLAR PANEL INSTALLATION PROGRAMS



Source: Global Market Outlook for Solar Power 2018-2022

# MERSEN AT THE HEART OF SOLAR PHOTOVOLTAICS



# MERSEN, THE WORLD'S NO. 1 SUPPLIER FOR THE POLYSILICON INDUSTRY



## A ROBUST GLOBAL NETWORK

Longstanding supplier  
for all leading global companies



Machining capacities  
in all major industrialized nations



## SOLUTIONS THAT ENHANCE OUR CUSTOMERS' PERFORMANCE

Joint development programs to help  
polysilicon makers stay competitive  
despite a significant drop in the price  
of polysilicon

Unique expertise in the design and  
manufacture of large components,  
to improve capacities and productivity  
at our customers' sites



## WIDE-RANGING EXPERTISE

Synthesis units,  
graphite parts

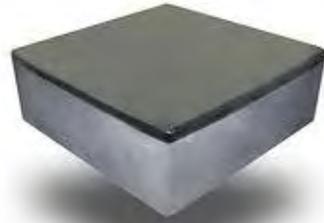
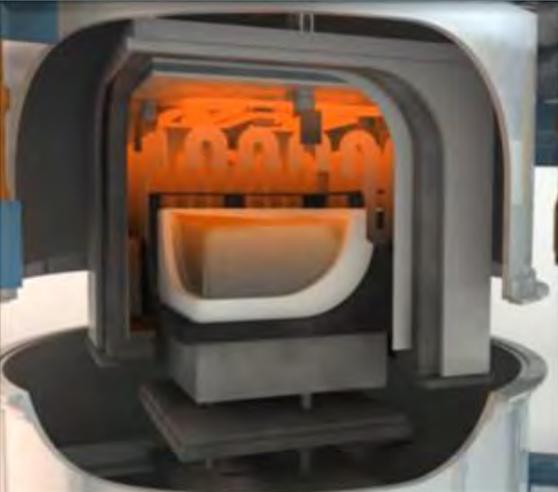
2 centers of expertise  
(Bay City, Michigan, United States –  
Gennevilliers, France) with coating  
capabilities

Design of customized grades

# INGOT MANUFACTURING: 2 MAJOR EXISTING TECHNOLOGIES



## DSS MULTICRYSTALLINE



Larger block

Silicon consumption: **4-5 g/watt**

Cell efficiency: **18%-19%**

Historically lower production cost

## CZ MONOCRYSTALLINE



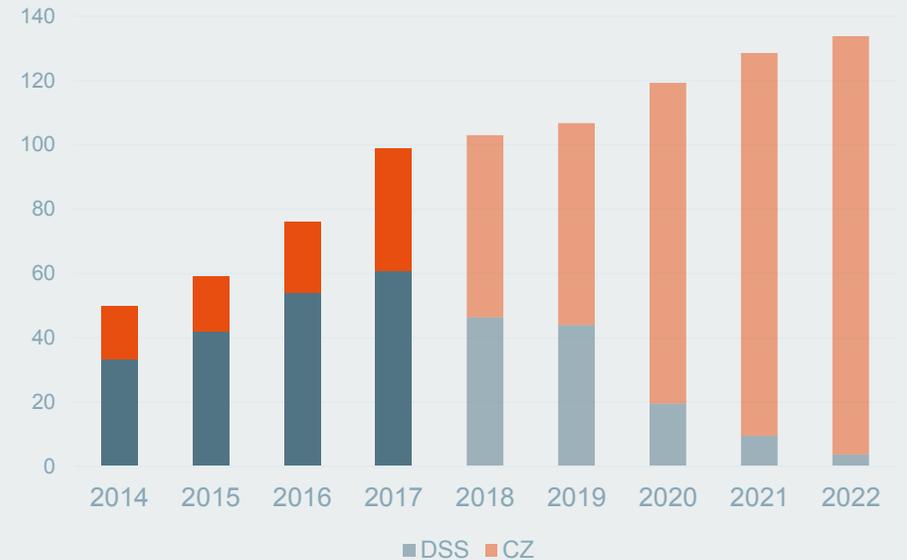
Uses less energy: **-20%**

Less loss of silicon: **(3.2 g/watt)**

Cell efficiency: **22%-23%**

## DSS and CZ production

GW/year



Sources: Exawatt - Sept. 2018; PV-Tech - Sept. 2018

# MERSEN HAS THE ADVANTAGE THANKS TO THE EMERGENCE OF CZ TECHNOLOGY VS. DSS...



**DSS  
MULTICRYSTALLINE**

Required graphite/GW:

**30 tons**

Less sophisticated graphite

More competitive market



**CZ  
MONOCRYSTALLINE**

Required graphite/GW:

**120 tons**

Large parts → customized grades, extremely fine-grained graphite, high-level of expertise required

Relationships with the leading players





# ...AND THANKS TO ITS STRONG PRESENCE IN ASIA

MERSEN'S FOOTPRINT IN ASIA

TO SERVE THIS MARKET

**85%**  
of cell producers are  
**CHINESE** companies

Others: primarily Japan, Taiwan and South Korea



# A NEW, MORE COMPREHENSIVE RANGE OF CZ INGOT PRODUCTION SOLUTIONS TO COME THANKS TO THE MERSEN GALAXY JV



**ENHANCED OFFER**

Flexible felt insulation solutions



Furnace internal parts in graphite (150 total), including:  
Graphite resistance

**COMPLEMENTARY OFFER**

Crucible support in C/C composite



# MERSEN GALAXY JV: FOR A COMPREHENSIVE CZ OFFER

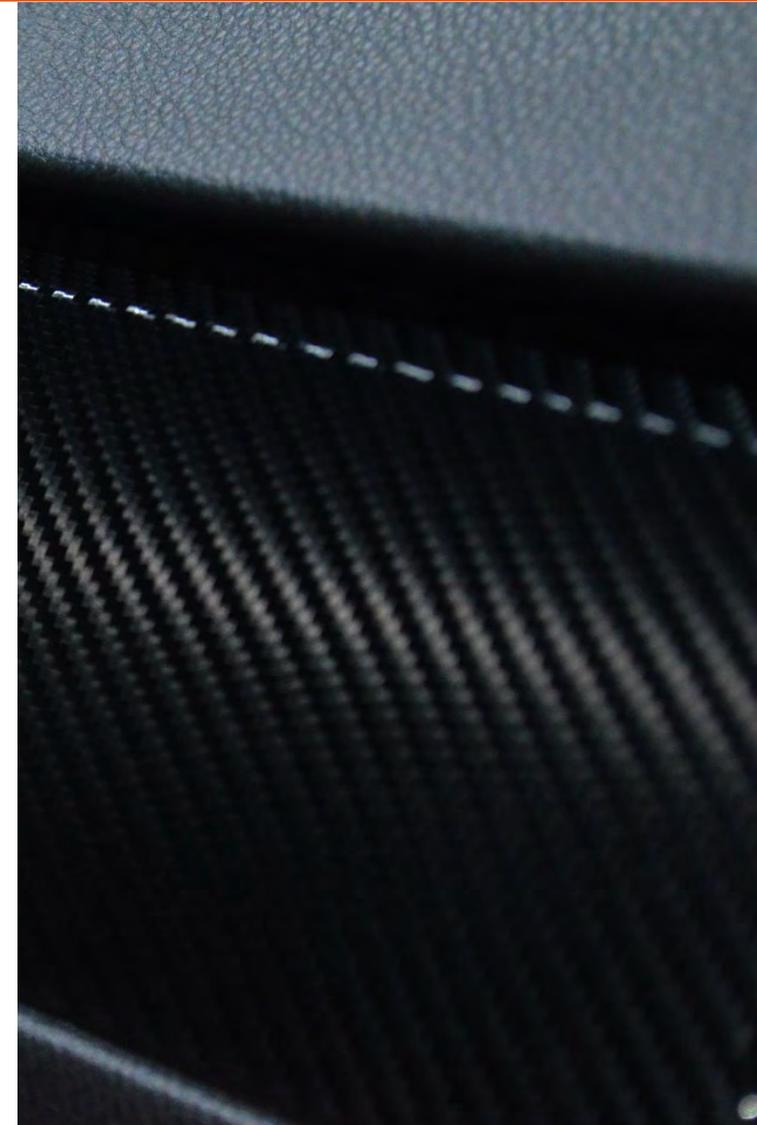
## JV (60% OWNED BY MERSEN)

- COVERS THE MANUFACTURING AND SALE OF **CARBON/CARBON** COMPOSITES AND FLEXIBLE FELT **INSULATION** SOLUTIONS FOR THE **CZ PV** MARKET IN CHINA
- MERSEN'S **LONG-STANDING** PARTNER IN ISOSTATIC GRAPHITE (YANTAI JV)

MERSEN'S CONTRIBUTION: **CNY60M (2018)**

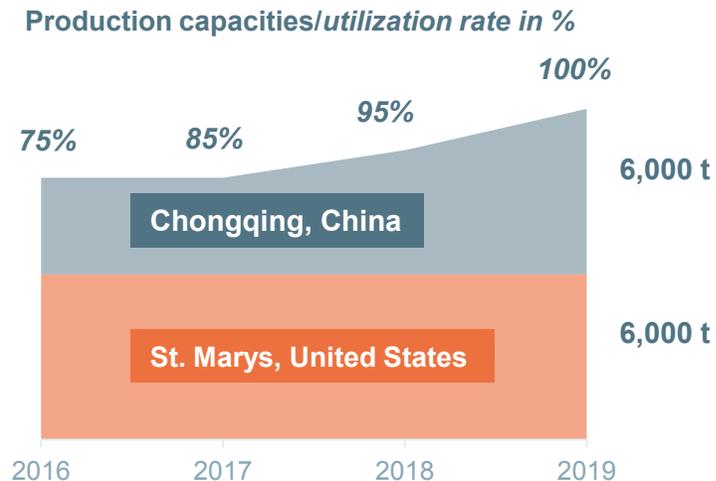
## FIVE-YEAR SALES TARGET

- C/C COMPOSITE: **€5M-€10M.**
- FLEXIBLE FELT INSULATION SOLUTIONS: **€5M-€10M**



# PRODUCTION CAPACITIES MEETING MARKET DEMAND

## ■ ADJUSTING GRAPHITE PRODUCTION CAPACITIES IN LINE WITH CURRENT DEMAND



- 2018: Resuming of furnace production in Chongqing  
**2018 Average: 10,500 t**
- Nominal capacities available for 2019: **12,000 t**  
**+15%** vs 2018 to meet market demand

## ■ A MORE MATURE AND STABLE MARKET THAT REDUCES THE IMPACT OF “BUBBLES”

- A replacement market that is now **spread over time**: consumable parts are sold over the useful life of products
- An immature market in 2011: each new furnace was sold with approximately three years’ worth of consumables



## LAURENT MARCENAC

VP GLOBAL SALES, ELECTRICAL POWER SEGMENT

**MERSEN IN THE DOWNSTREAM PHASE OF  
THE SOLAR PHOTOVOLTAICS VALUE  
CHAIN**



# MERSEN: THE CAPABILITY TO BE ACTIVE IN SEVERAL MARKETS

AVERAGE SOLAR FARM SALES  
**€1m-€2m/gw**

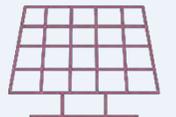
ENERGY STORAGE



INVERTERS

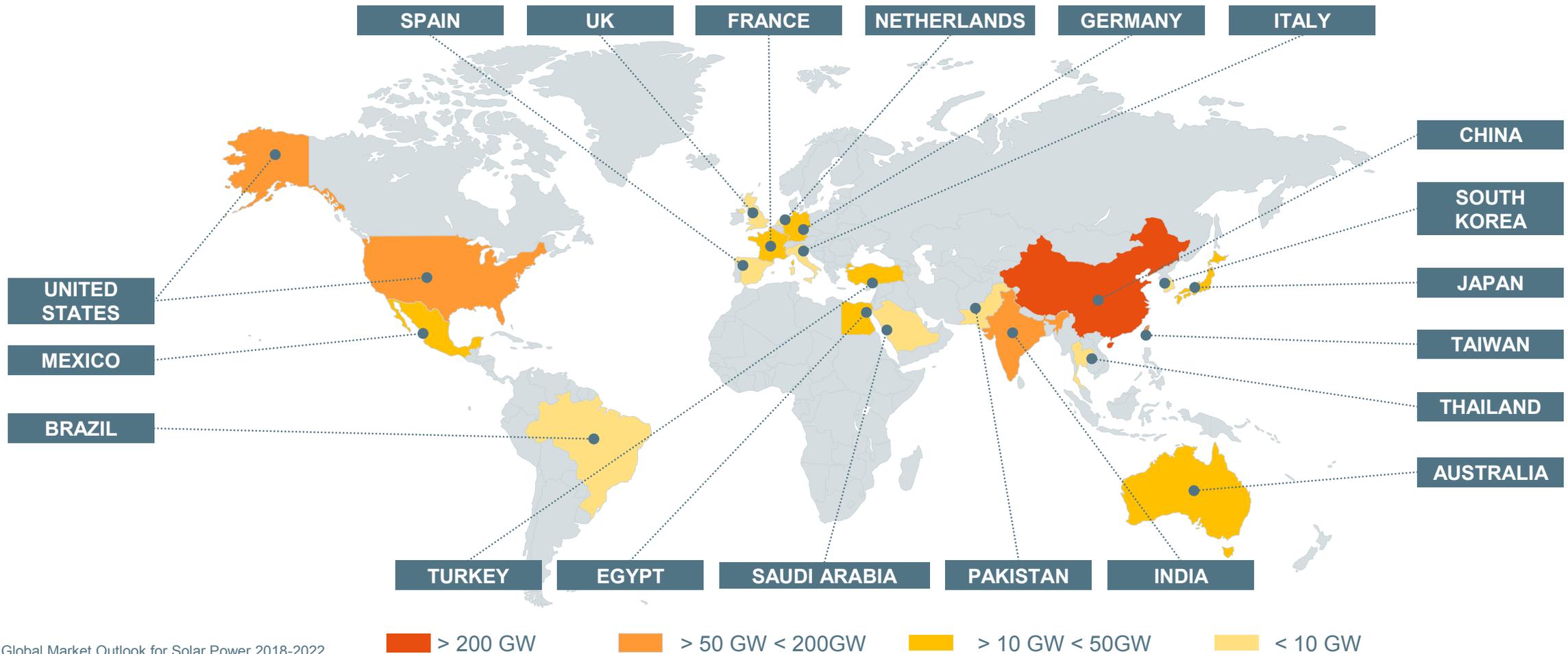


SOLAR PANEL PROTECTION



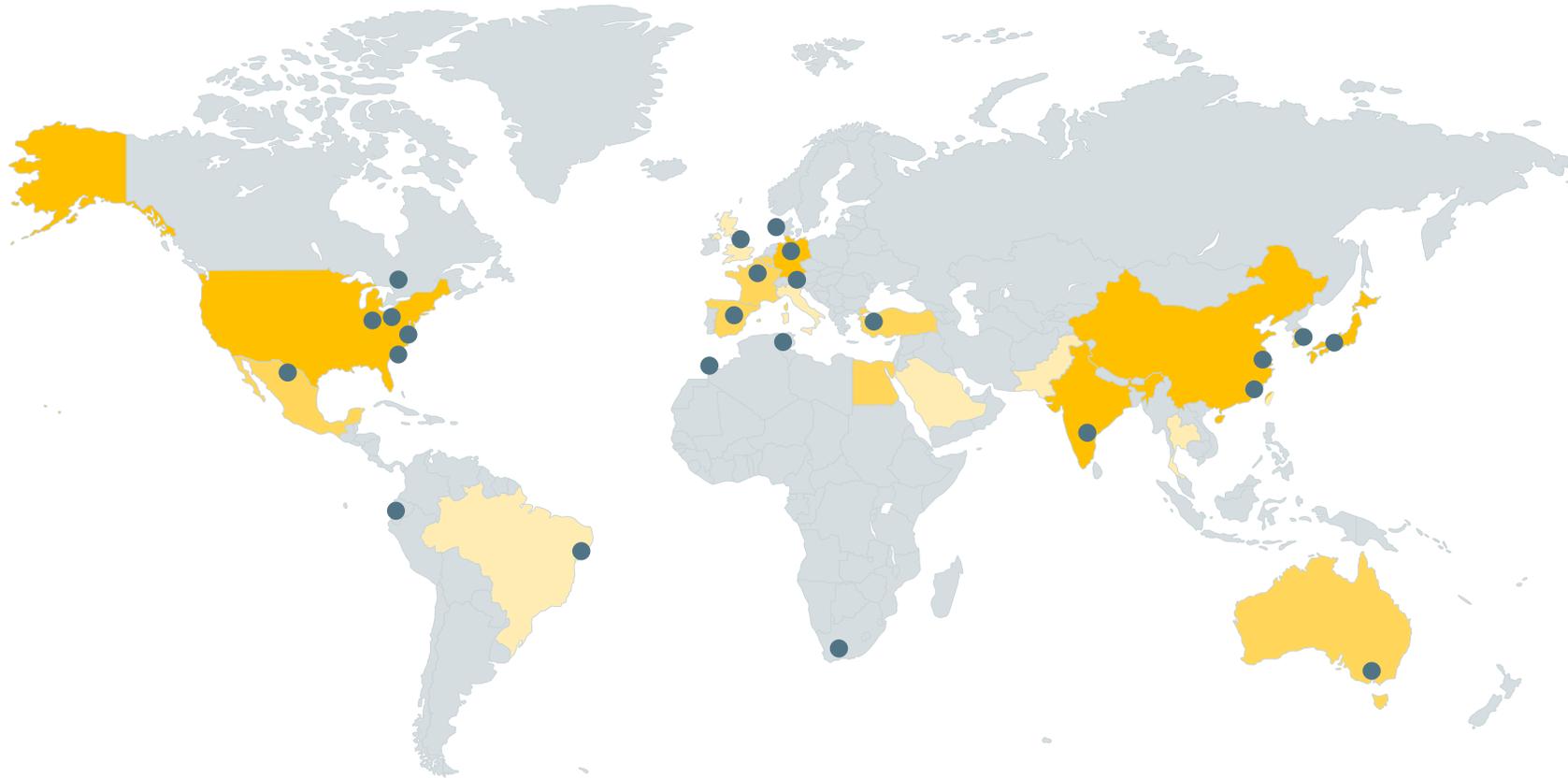
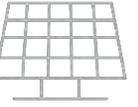
# SOLAR: A STRONG POTENTIAL THANKS TO ITS EASY INSTALLATION

## MAIN COUNTRIES WITH UPCOMING SOLAR PANEL INSTALLATION PROGRAMS



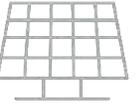
Source: Global Market Outlook for Solar Power 2018-2022

# ELECTRICAL PROTECTION OF SOLAR PANELS: A LOCAL MARKET THAT IS WELL SUITED TO MERSEN'S GLOBAL OPERATIONS



Key Mersen EP segment operations

# MERSEN'S STRENGTHS IN SOLAR PANEL PROTECTION



## A COMPREHENSIVE RANGE

Recognized expertise in **high voltage** (1500V DC)

HelioProtection® range for **Overcurrent** protection

Strengthening of **Surge protection** range, by the acquisition of the remaining stake in Cirprotec in 2018



## GLOBAL OPERATIONS

Allow Mersen to **efficiently serve** the panel builder market

Ensure **competitiveness and adaptability**



## UNIQUE TESTING CAPACITIES

**3 test sites:** St Bonnet (France), Terrassa (Spain), Newburyport (United States)

Recognized expertise in **high voltage direct current transmission**

Enable Mersen to meet market **demand for innovation** and quickly adapt its range accordingly

# POWER CONVERSION: A SEGMENTED MARKET



**HIGH VOLTAGE**

A market associated with **solar farms**

Significant **technical constraints**



**MEDIUM VOLTAGE**

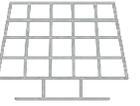
A market associated with **rooftop solar panels**

**Less powerful converters** increasingly associated with energy storage systems

**CAGR 2018-2022\***  
**4-6%**

\* Sources: Yole, Mersen and other

# MERSEN'S STRENGTHS IN POWER CONVERSION



## A UNIQUE INTEGRATED OFFER

Busbars/High-speed fuses for semiconductor protection/Cooling devices/Capacitors

Optimized **co-design** of capacitors and busbars



## LONG-STANDING RELATIONSHIPS WITH MAJOR WESTERN OEMs

A sales structure dedicated to **key accounts**, including:

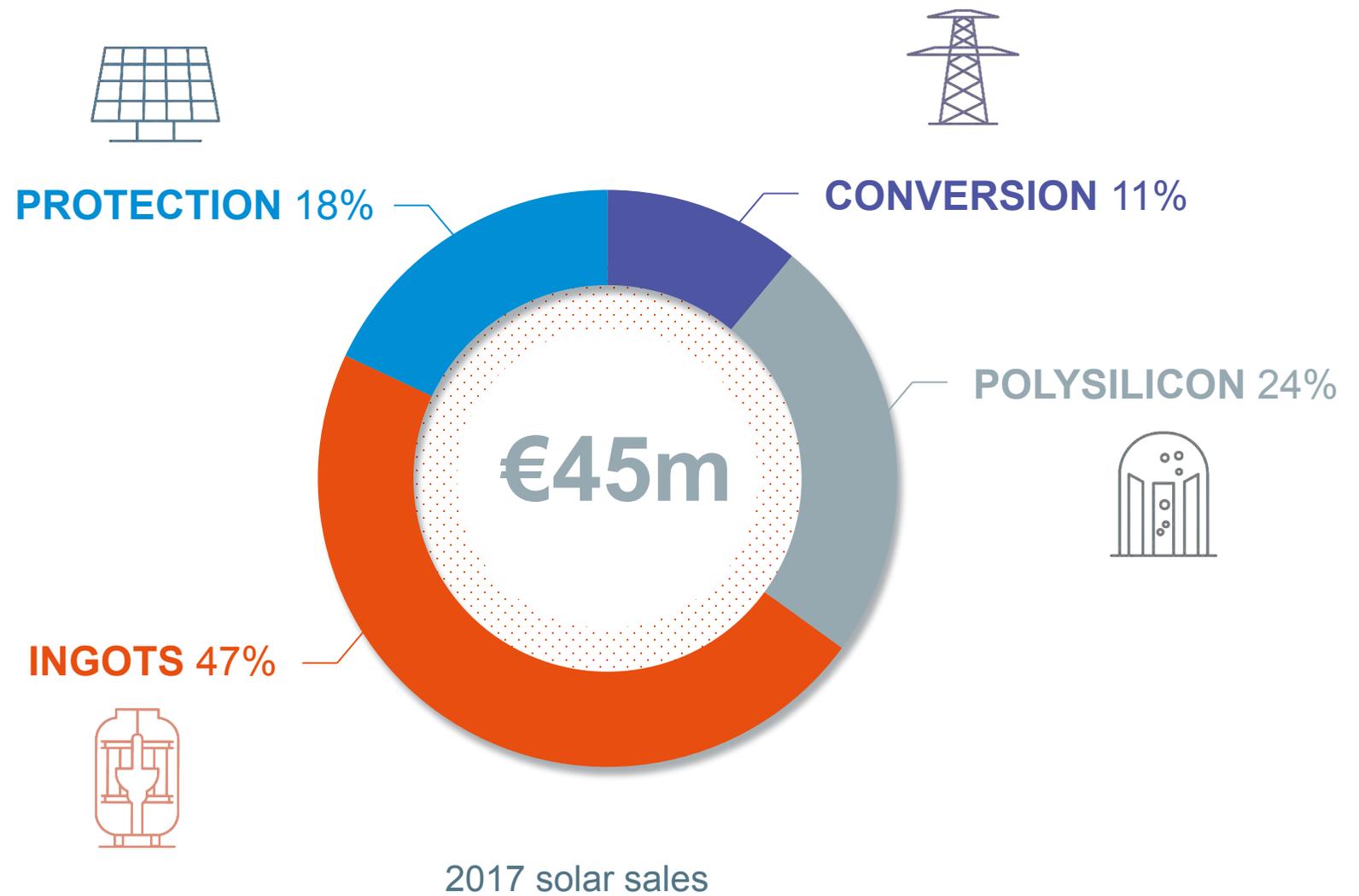
GE, Siemens,  
Schneider, ABB  
TMEIC



## A SOLID GLOBAL OPERATIONS BASE

Allows Mersen to keep up with the design and production centers **relocation** of our customers towards Asia, especially India

# BREAKDOWN OF MERSEN SOLAR SALES



# MERSEN SOLAR SALES OUTLOOK



# SOLAR MARKET STRATEGY



Increase the pace of growth by **developing the Mersen Galaxy JV**



Examine opportunities to **expand graphite production capacity** in the medium term



**Bring the production** of the electrical protection and capacitors offers to Asia

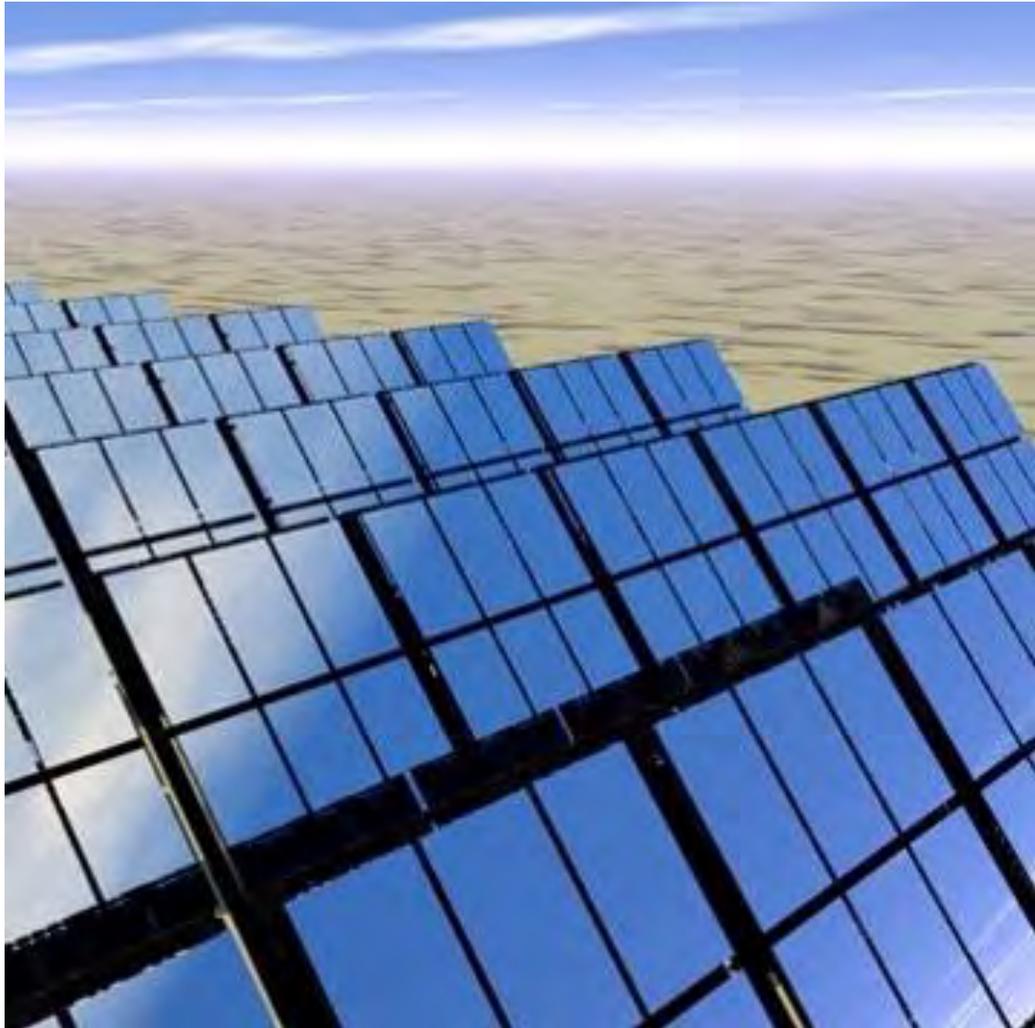


Cultivate relations with **China's major market players in energy conversion** (Huawei, Sungrow, ...)



# ENERGY STORAGE, A BOOSTER FOR SOLAR!





**QUESTIONS ?**



# BATTERIES FOR ENERGY STORAGE SYSTEMS

CAPITAL MARKETS DAY – NOVEMBER 29, 2018

DR. PHILIPPE ROUSSEL, VP GLOBAL STRATEGIC  
MARKETING, SPM



# BATTERY ENERGY STORAGE IS EVERYWHERE

*STATIONARY (EES) OR MOBILE (EVs/HEVs)*



# WHAT ARE THE FACTORS THAT WILL DRIVE GROWTH IN THIS MARKET?

## STATIONARY BATTERIES

### RENEWABLE ENERGIES

Improvement in the **management and regulation** of these diverse and intermittent energy sources (solar, wind)

Improvement in the balance between production/consumption to **avoid** using conventional thermal power, which has very high CO<sub>2</sub> emissions

They are an essential part of the **Smart Grid** concept: local production for local consumption **reduces the need to transport power**

Improvement in power quality for **greater equipment efficiency**

## MOBILE BATTERIES

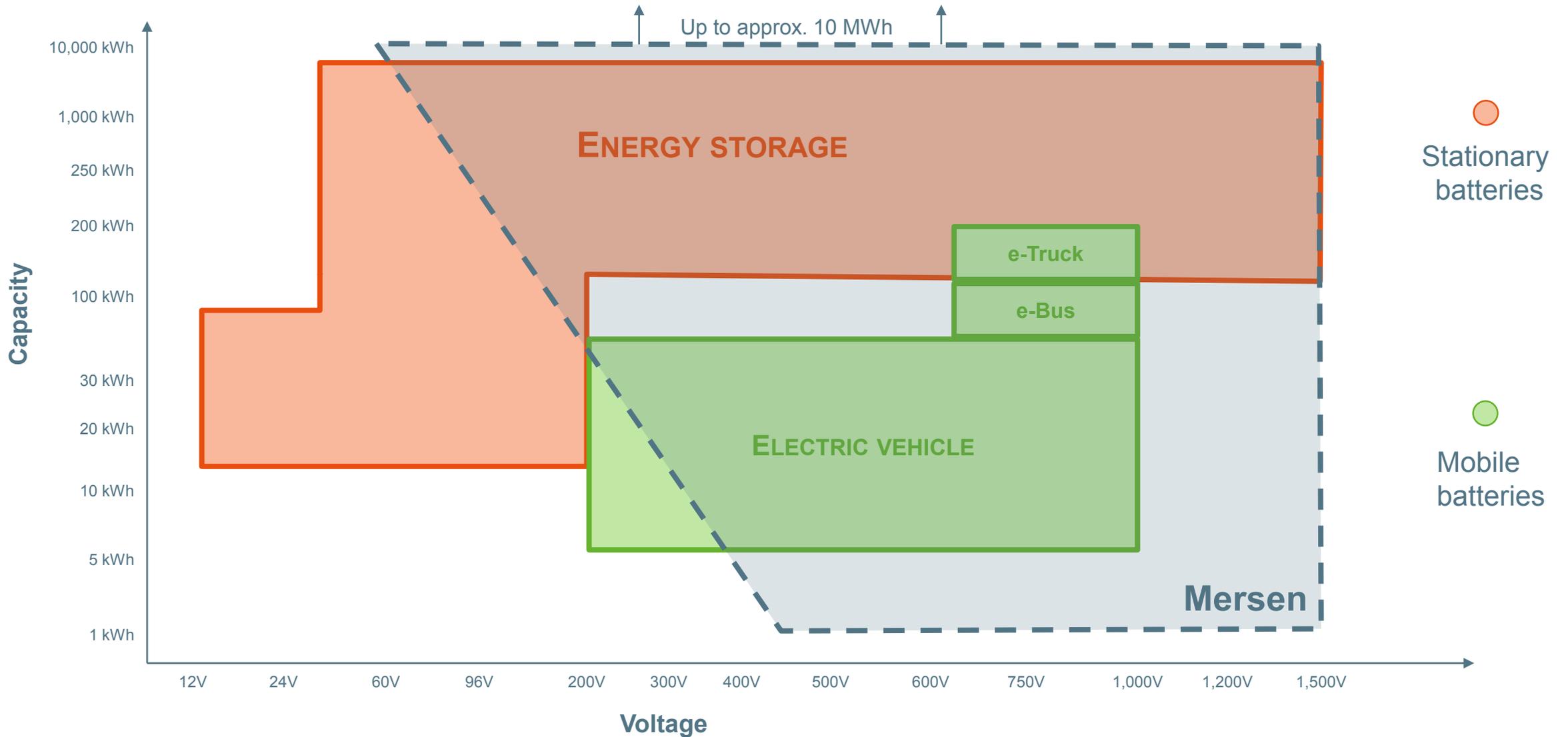
### GREEN MOBILITY

Emergence of electric vehicles and electric and hybrid buses and trucks

Mobile batteries that can be **recycled** (Li-ion) into stationary batteries

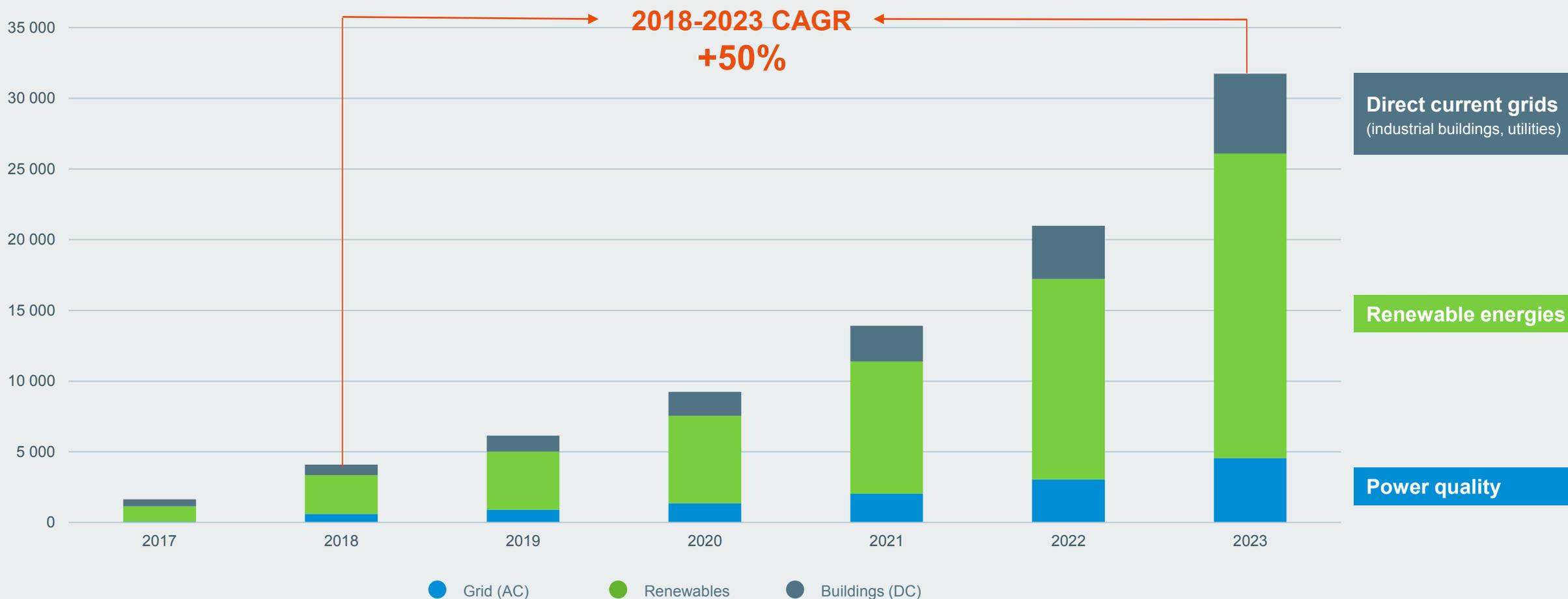
Mobile batteries for EVs that can also **serve as stationary batteries** for personal use

# UNDERSTANDING BATTERY ENERGY STORAGE



# A STATIONARY BATTERY MARKET DRIVEN BY RENEWABLE ENERGIES IN THE MEDIUM TERM AND DC GRIDS IN THE LONG TERM

## ANNUAL INSTALLED CAPACITY OF STATIONARY BATTERIES IN MWh



Source: Yole Développement, 2017 – residential segment excluded (< 20 kWh)

# MERSEN SOLUTIONS FOR STATIONARY STORAGE BATTERIES

Mersen solutions

Protection Connection



Protection



Protection



Li-ion battery cell

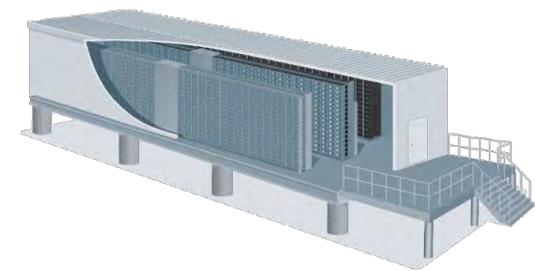
Battery module

Battery rack

Battery pack

Battery container

Power conversion



DC



AC

# MERSEN HAS THE ADVANTAGE ON THIS MARKET THANKS TO ITS GLOBAL FOOTPRINT



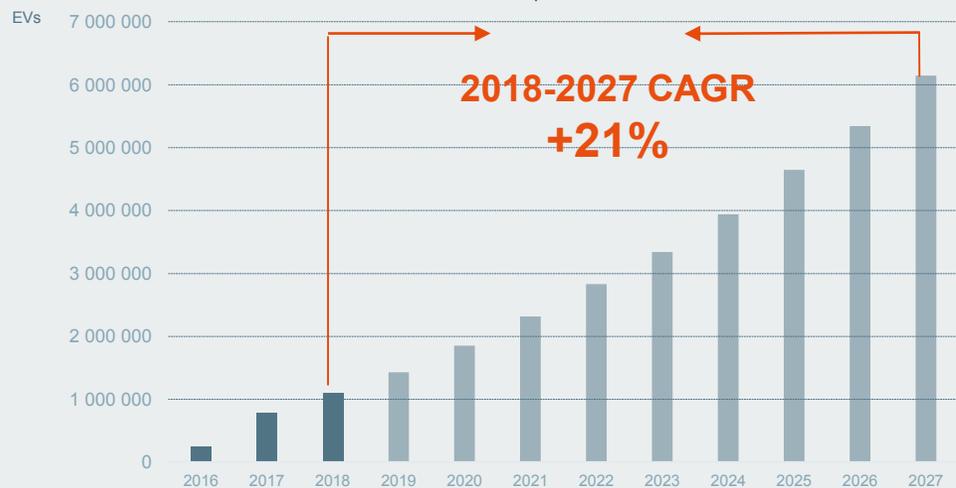
Non-exhaustive list

# ELECTRIC VEHICLES: A MARKET FOR ENERGY STORAGE

Photo Exagon Motors



## PASSENGER VEHICLES



## BUSES, TRUCKS AND OTHER COMMERCIAL VEHICLES



Source: IDTechEx, Yole, Mersen

# MERSEN SOLUTIONS FOR EV LI-ION BATTERIES



Cooling plate



Monitoring busbar



**m-fuse**  
Module fuse

**Battery module**

€100-€1000  
per vehicle



Fuses

**χp series**



Hybrids

**χs series**



**Battery pack**



SPD



Fuse

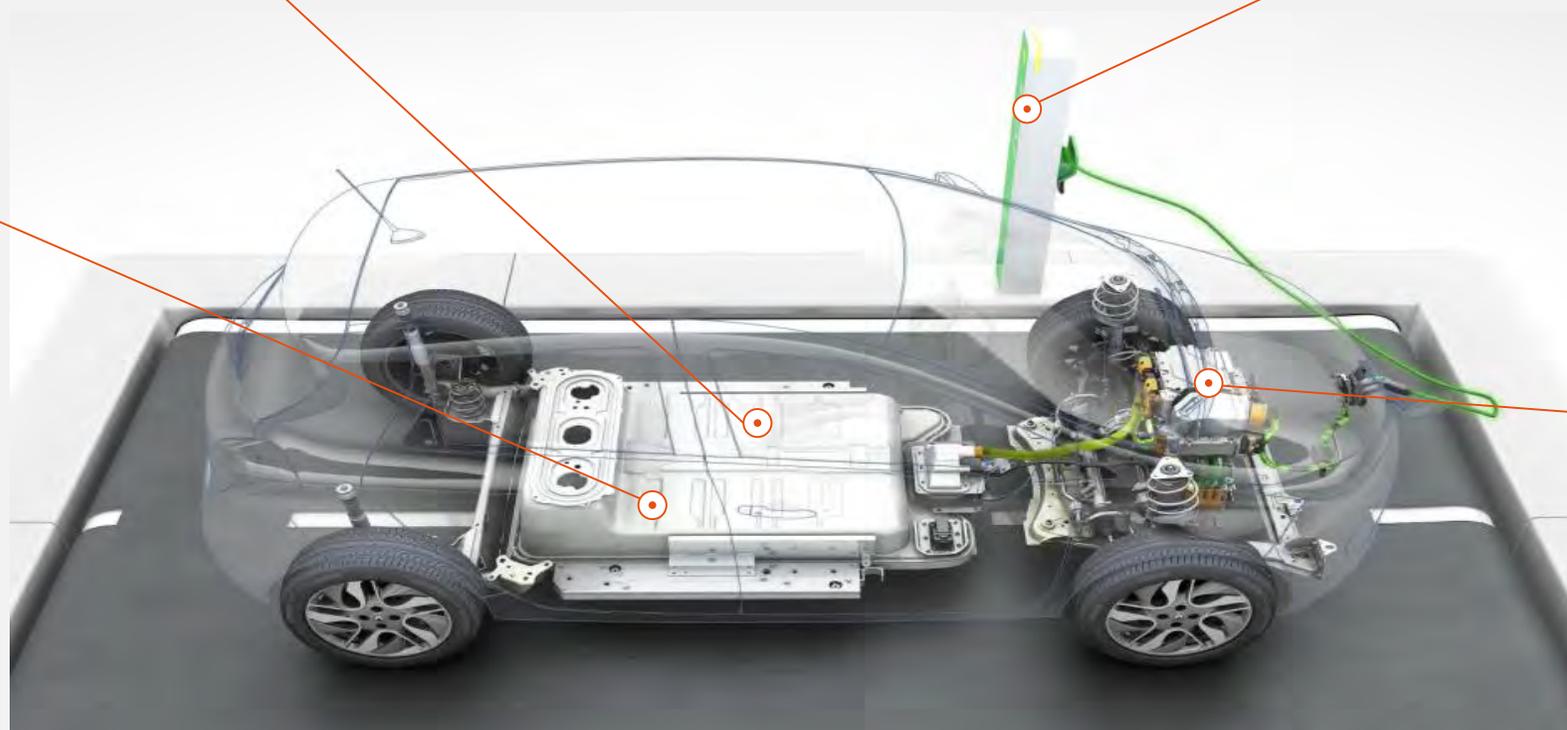


Cooling



Busbar

**Charging station**




Cooling



Busbar

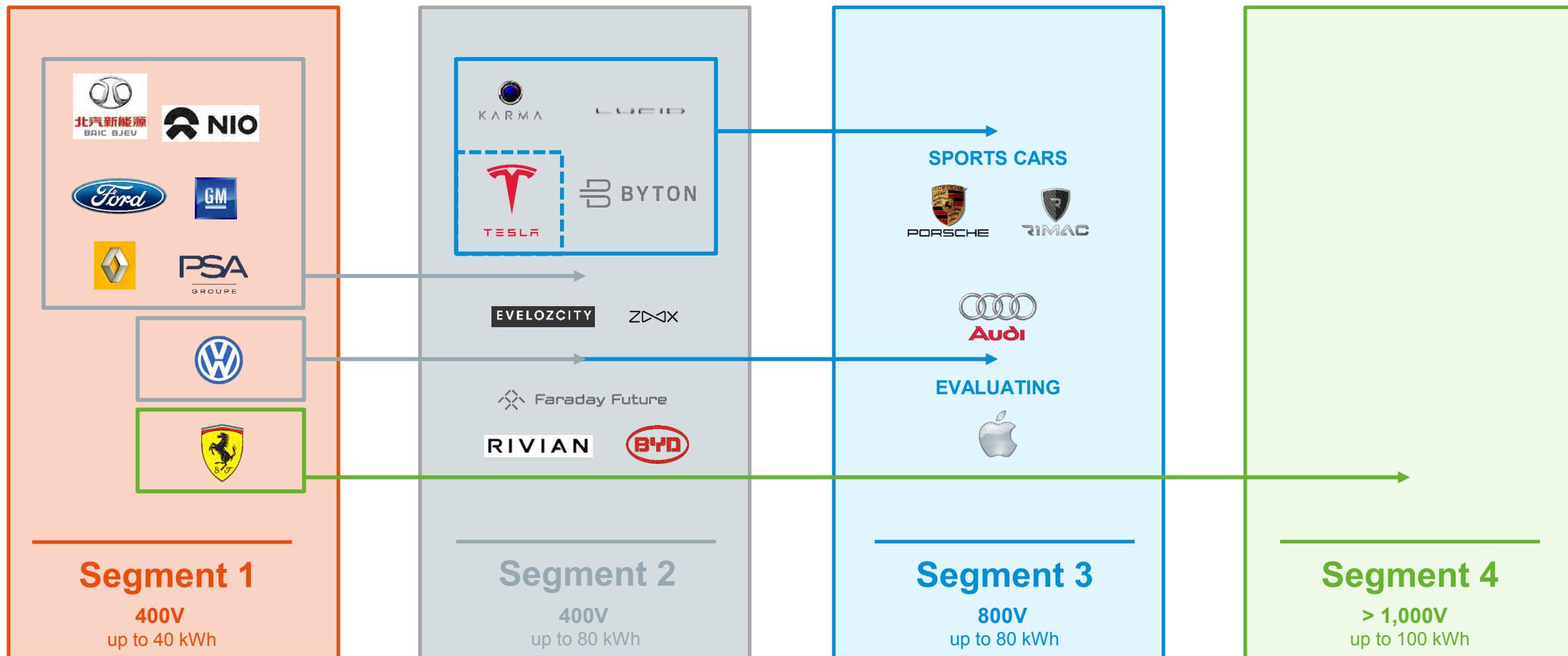


Capacitor

**Inverter**

Illustration courtesy of Renault™

# AN EVOLVING MARKET



# OUR OFFER IS CHANGING



## HYBRID PROTECTION

**End to technical development partnership with the VW Group** following changes in specifications

—  
**Developments to be continued with four leading international manufacturers**

—  
 Product changes planned for the VW Group

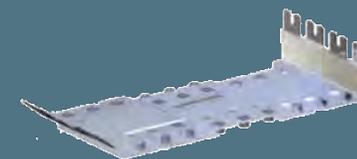


## FUSES

**Strong demand for battery protection solutions and auxiliary circuits** from 150V and up

—  
**Expansion of our range for 500V and similar**

—  
**New innovative design at 800V**



## BUSBARS

**Clear increase in demand for battery connection solutions** (including monitoring functions)

—  
**Development of a dual offer: [busbars + capacitors]** for power converters

# KEY SUCCESS FACTORS FOR MERSEN ON BATTERY FOR ENERGY STORAGE SYSTEMS



## POWERFUL PRODUCTION BASE

**Global production footprint**  
Asia | Europe | United States

**Skills centers**  
regional presence

**On-going** compliance process  
with automotive standard  
IATF 16949



## WIDE-RANGING EXPERTISE

**Specialist in electrical protection** for several decades

**Recognized expertise**  
in battery connection and monitoring  
(smart busbars)

**Solid reputation**  
in power converter cooling

**Teams dedicated**  
for EVs and EES



## INNOVATION

Introduction of disruptive  
**new technologies**  
for hybrid systems

Integration of  
semiconductor-based **protection**  
**functions**

## RECOGNIZED EXPERTISE

# ANDROS SPORT 01 100% ELECTRIC



Powered by  
**EXAGON**

Battery cell connection components and protection  
fuses from **Mersen**

Our solutions are tested under  
**extreme driving and  
temperature conditions**



# ENERGY STORAGE MARKET STRATEGY



Continue discussions with carmakers **about hybrid fuses**



**Cultivate relations with electric platform customers** (besides EV: rail, naval, aerospace, etc.)



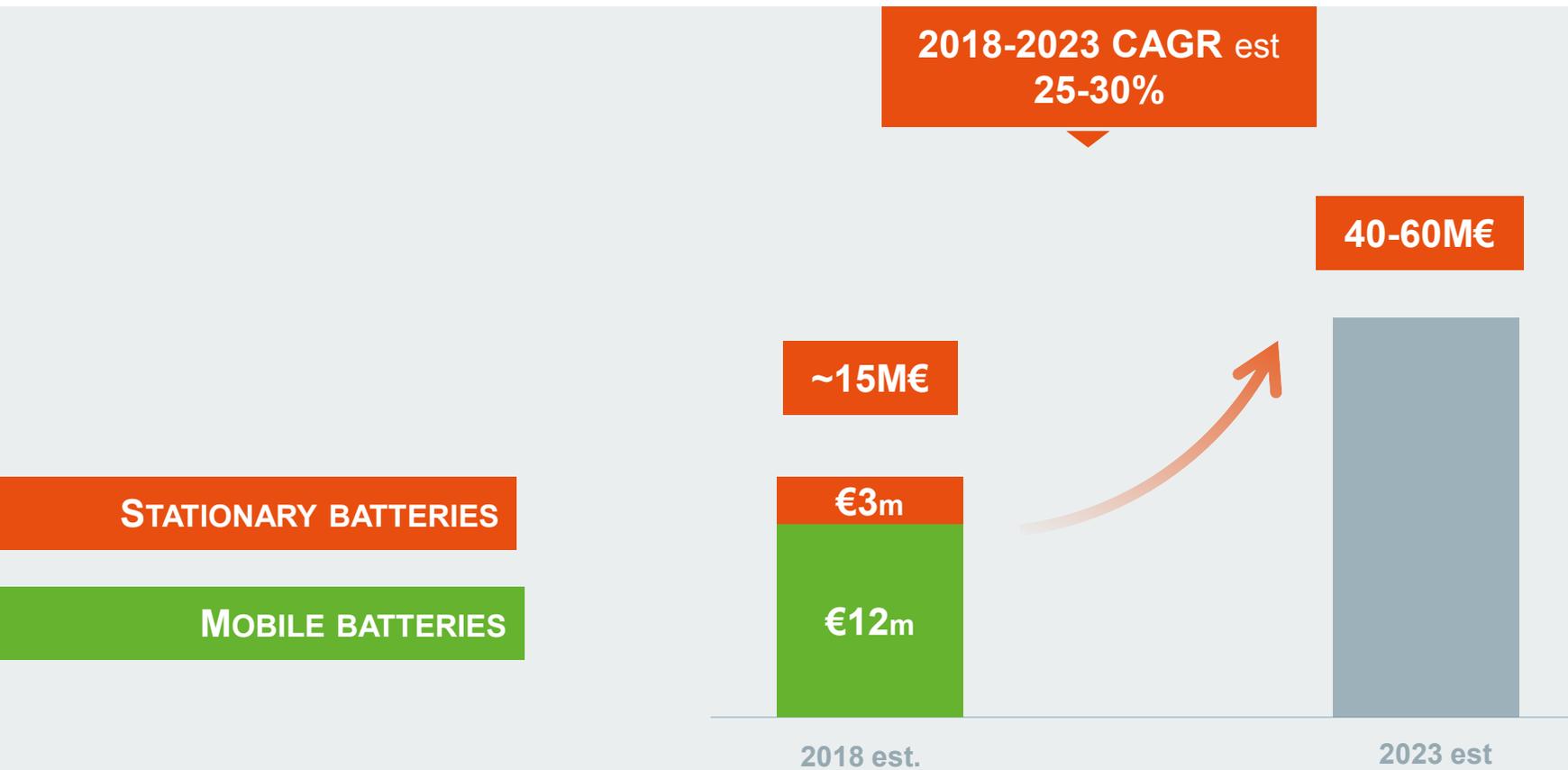
Examine opportunities in **high-power charging stations**



Harness market growth in **stationary batteries** by capitalizing on our flexibility



# GROWTH POTENTIAL FOR MERSEN IN ENERGY STORAGE



# BEYOND LI-ION BATTERIES...

## REDOX FLOW BATTERIES



Storage for renewable energies

## NA-ION BATTERIES



Storage for transportation

## CHALLENGES FOR MERSEN (ADVANCED MATERIAL SEGMENT)

**Development**  
of a range of flexible felt  
solutions

**Investment** to be anticipated in the  
medium term if the market grows



QUESTIONS ?



# ENERGY EFFICIENCY

## AT THE HEART OF OUR PROCESSES

CAPITAL MARKETS DAY – NOVEMBER 29, 2018

CHRISTOPHE BOMMIER, CTO



# CUSTOMERS THAT BENEFIT FROM OUR EXPERTISE FOR GREATER PERFORMANCE AND EFFICIENCY

## ELECTRICAL POWER

**NO. 2 WORLDWIDE**  
Industrial fuses



**ELECTRICAL PROTECTION  
& CONTROL**

**NO. 2 WORLDWIDE**  
Components  
for power electronics



**SOLUTIONS FOR  
POWER MANAGEMENT**

## ADVANCED MATERIALS

**NO. 1-2  
WORLDWIDE**  
Graphite  
anticorrosion  
equipment



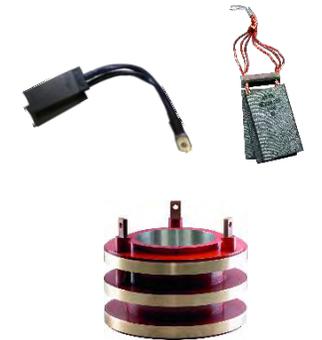
**ANTICORROSION  
EQUIPMENT**

**NO. 1-2  
WORLDWIDE**  
High-temperature  
applications



**GRAPHITE  
SPECIALTIES**

**NO. 1-2  
WORLDWIDE**  
Brushes for industrial  
motors



**POWER TRANSFER  
TECHNOLOGIES**

# INSIDE MERSEN: A REDUCED ENVIRONMENTAL FOOTPRINT

## ...FROM PRODUCT DESIGN TO RECYCLING



### CLEAN PROCESSES

Graphite manufacturing:  
a “best available technology” process

Fuse manufacturing: component  
assembly



### ECO-FRIENDLY PRODUCTS

No Mersen product is harmful to the  
environment



### PROACTIVE WASTE MANAGEMENT

Percentage of waste recycled:  
**42%** in 2017  
**+5 points\*** vs. 2016



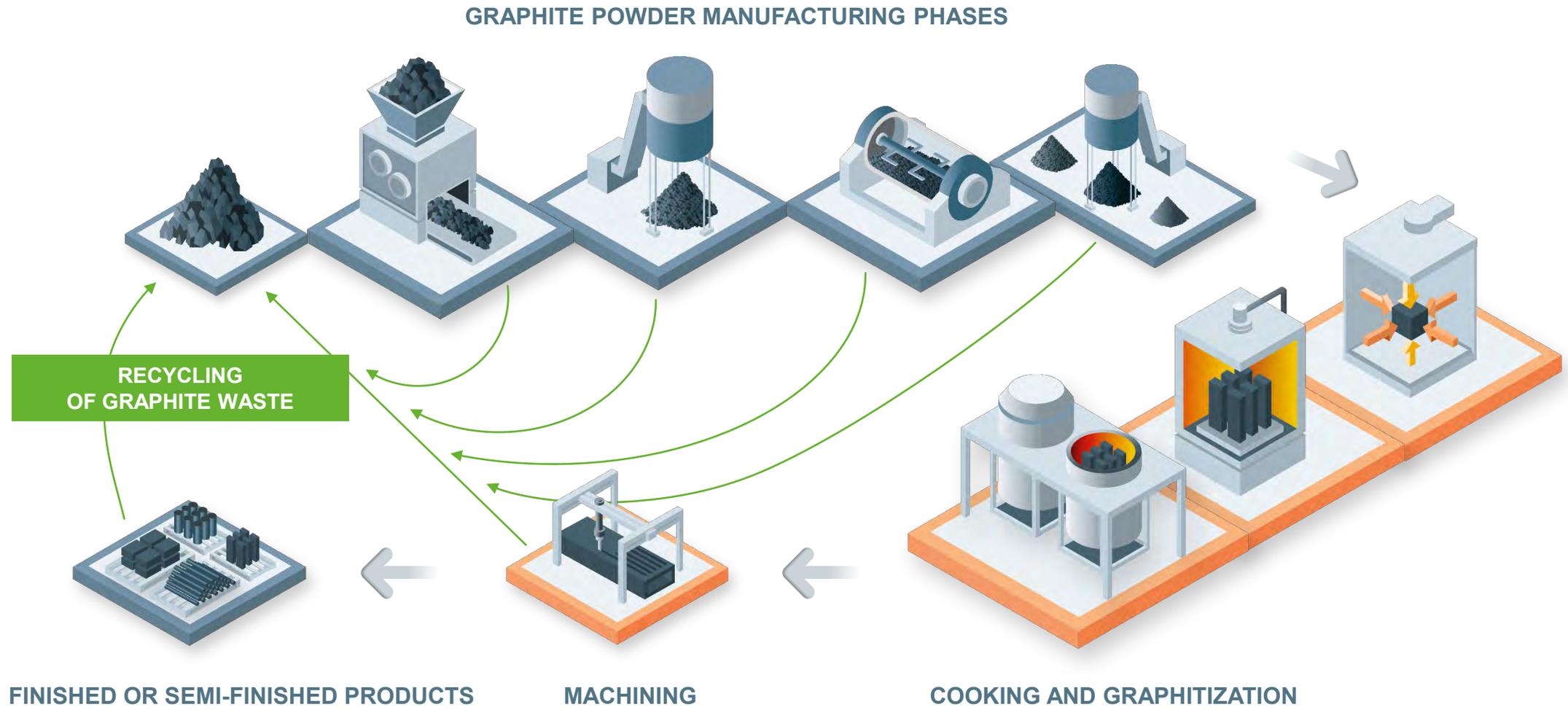
### ONGOING RECYCLING

**100%** of graphite powder recycled  
during the process

Fuse and electrical component  
recycling (external service provider)

\* At constant scope of consolidation

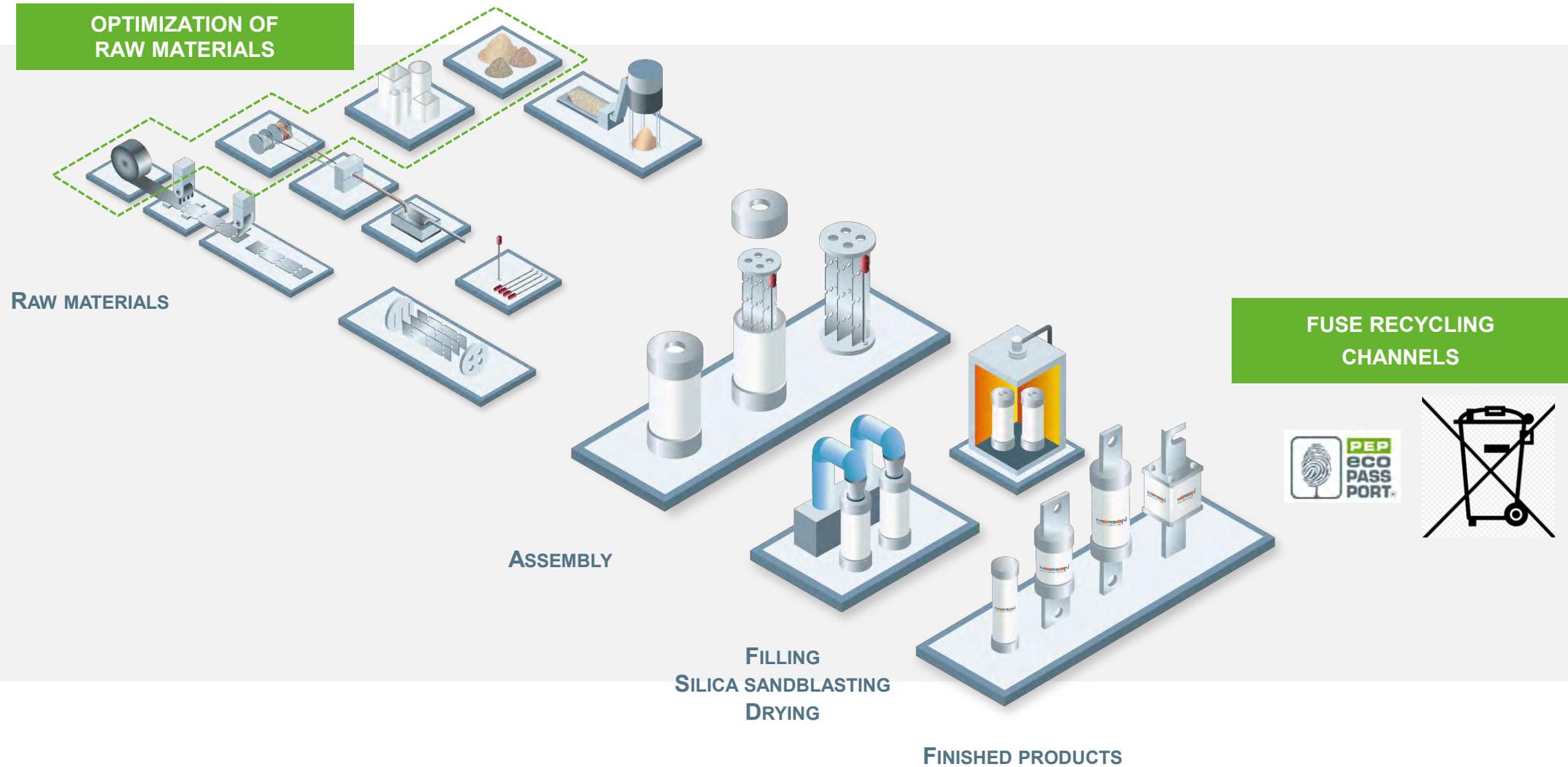
# GRAPHITE MANUFACTURING: A PROCESS THAT CLOSELY MATCHES TODAY'S "BEST AVAILABLE TECHNOLOGIES"



# HOW TO OPTIMIZE ENERGY CONSUMPTION IN OUR PROCESSES: THE EXAMPLE OF HOLYTOWN



# MANUFACTURING OF FUSES: THE IMPORTANCE OF RAW MATERIALS



# HOW TO OPTIMIZE THE USE OF RAW MATERIALS: THE EXAMPLE OF MODULOSTAR

## CONTEXT

Stand out from the competition on the fuse holder market

Propose a solution that consumes less raw materials and is easier to use

## CHALLENGES

Make it easier to access and change fuses

Reduce the use of raw materials by modifying the design

Maintain the same functionalities and obtain certifications for the new product

## STAKES

Reduction in the quantity of plastic materials

Reduction in copper

20% reduction in total production costs



BEFORE/AFTER DESIGN



**QUESTIONS ?**



## ENERGY EFFICIENCY

### AT THE HEART OF OUR STRATEGY

CAPITAL MARKETS DAY – NOVEMBER 29, 2018

CHRISTOPHE BOMMIER, CTO

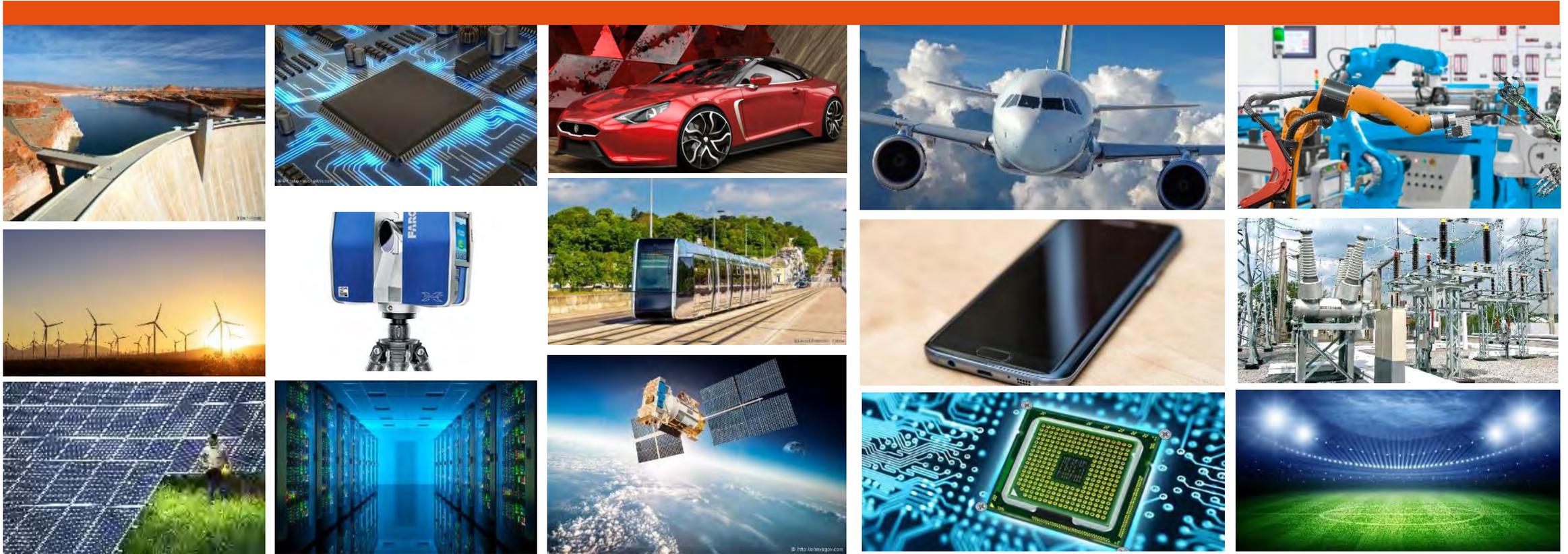


# MERSEN: OUR MISSION, TECHNOLOGICAL PROGRESS

WE ARE DEVELOPING  
THE **BEST TECHNOLOGIES**  
FOR THE INDUSTRIES OF THE FUTURE



WE PROVIDE INDUSTRIAL COMPANIES  
WORLDWIDE WITH **INNOVATIVE SOLUTIONS**  
ENHANCING THE PERFORMANCE OF THEIR  
**PRODUCTS AND SERVICES**



# CUSTOMERS THAT BENEFIT FROM OUR EXPERTISE FOR GREATER PERFORMANCE AND EFFICIENCY



Example:

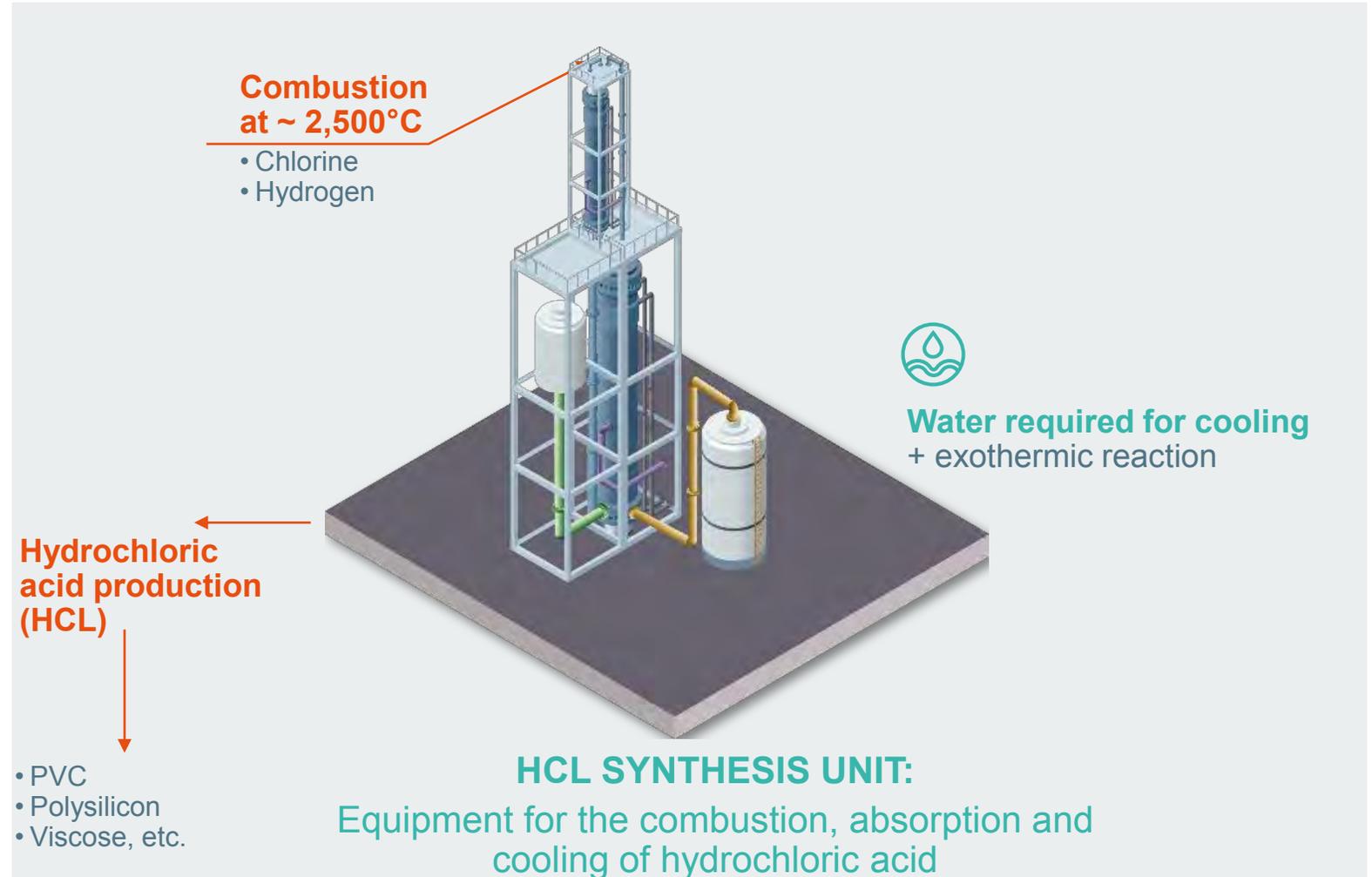
## THE CHEMICALS MARKET

# THE CORROSIVE CHEMICALS MARKET

HCL SYNTHESIS UNITS ARE NEEDED IN DEVELOPMENT ACROSS A VAST NUMBER OF MARKETS

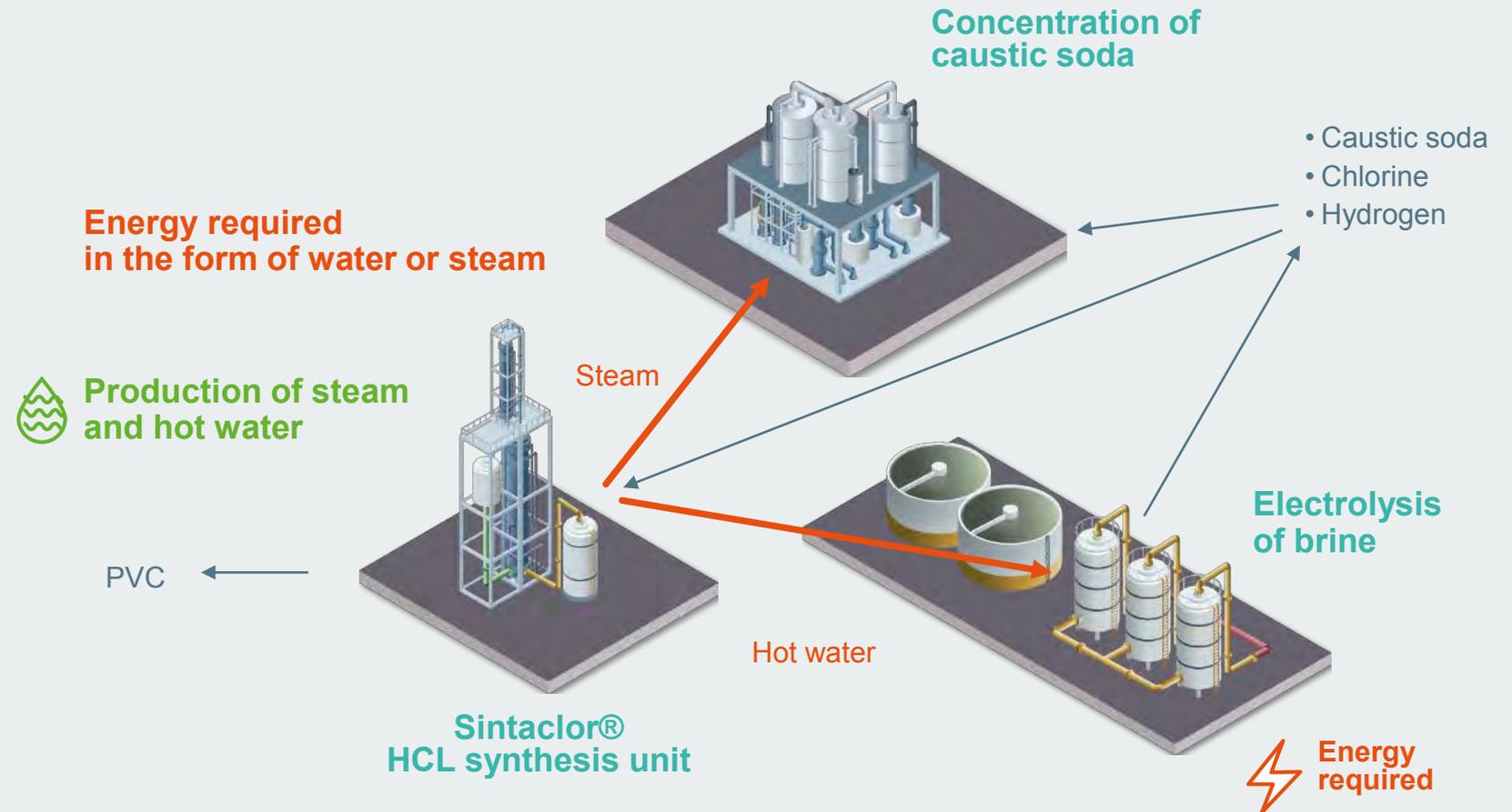


# MERSEN SUPPLIES HCL SYNTHESIS UNITS



# BENEFITS FOR OUR CUSTOMERS

Cooling water from synthesis units IS REUSED FOR HEAT RECOVERY



# SOLUTION TO THE WATER CHALLENGE IN INDIA

## CUSTOMERS



**ADITYA BIRLA GROUP**



## CONTEXT

**Viscose and aluminum markets** are seeing strong growth

Difficult **climate conditions**

**Need for a solution with low water consumption**

## SOLUTION

**Adaptation and optimization** of an existing product

**Limited water consumption (-65%)**

**Production in India**

## STAKES

**Long-term customer relationships**

**Sales of several million euros**

# MERSEN STRENGTHS



## PRODUCT EXPERTISE

**Special grade of graphite  
for high temperatures  
( $>2,000^{\circ}\text{C}$ )**



## SYSTEM EXPERTISE

**System that recovers energy**  
produced in the form of steam for  
customer needs

**System for recycling water**

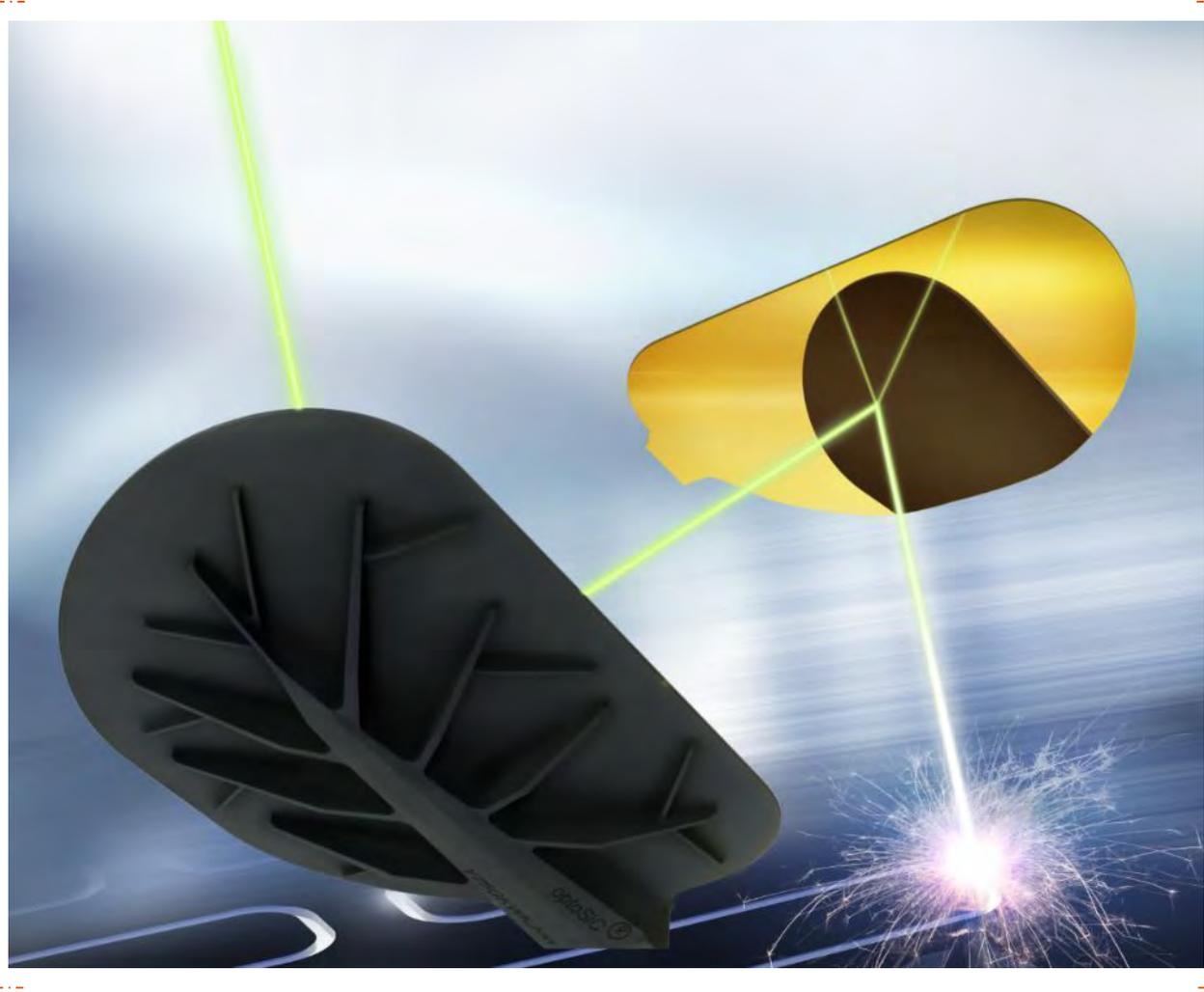


## GLOBAL NETWORK

**Local manufacturing**

Synthesis units for  
production facilities are  
**manufactured locally**  
*(lower transport costs)*

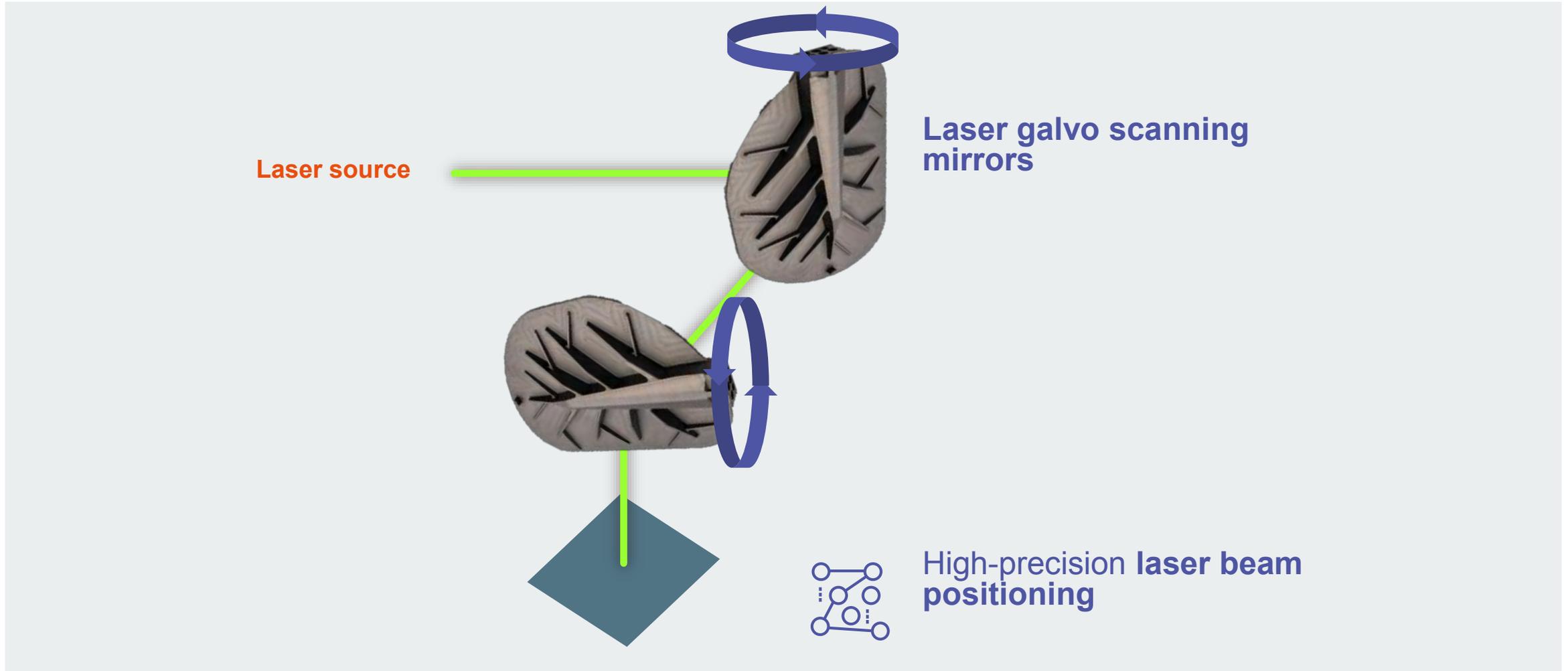
# CUSTOMERS THAT BENEFIT FROM OUR EXPERTISE FOR GREATER PERFORMANCE AND EFFICIENCY



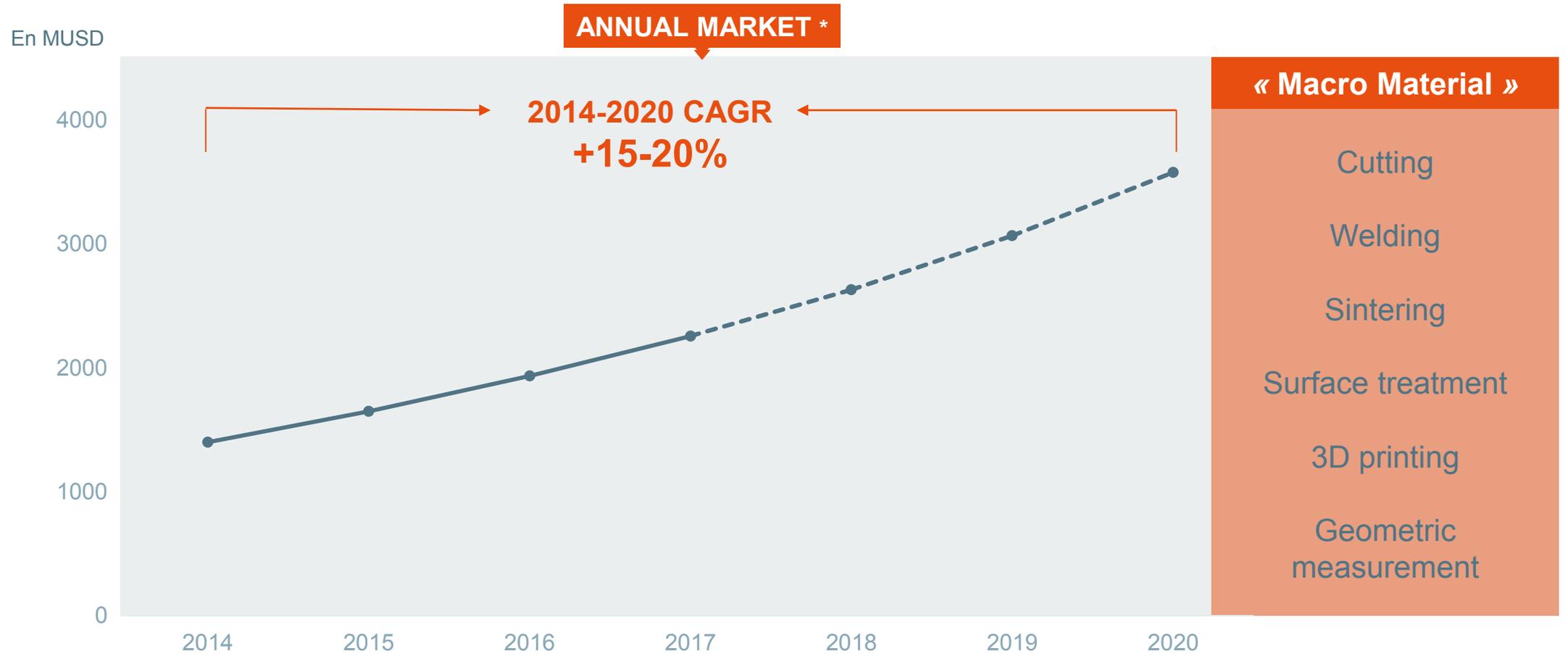
Example:

## INDUSTRIAL APPLICATIONS FOR LASERS

# UNDERSTANDING LASER SCANNERS



# A GROWING MARKET



\* Source: "Industrial Laser Solutions" - Macro Material - March 2016 – and Mersen estimates for price erosion

# SIGNIFICANT MARKET OPPORTUNITIES MEAN LIMITED EXPOSURE TO CYCLICAL CHANGE

**END-CUSTOMERS**

TOYOTA Volkswagen TESLA

adidas intel

BOEING AIRBUS

MICHELIN

LONGI SAMSUNG

**LASER MACHINE MANUFACTURERS**

FARO stratasys

XYZ PRINTING Mazak OPTONICS CORP.

GE Additive manz

HAN'S LASER COHERENT

TRUMPF NGK

NOVARTIS

**GALVANOMETER MANUFACTURERS**

RAYLASE SCANLAB

RIEGL AEROTECH

Marc Newson.

FARO

CAMBRIDGE TECHNOLOGY

**MERSEN CUSTOMERS**

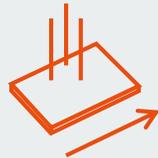
Non-exhaustive list

# GROWTH DRIVERS



## Technical advancements in laser sources

Wavelengths, pulse lengths, lower energy requirements, etc.



## Increase in the size of mirrors

Broader spectral range, large surface processing



## Higher quality mirrors

High angle acceleration

Thermal stability

# GREATER

PRODUCTIVITY AND ENERGY  
EFFICIENCY

# LOWER

ELECTRICITY CONSUMPTION

# SiC IS THE IDEAL MATERIAL

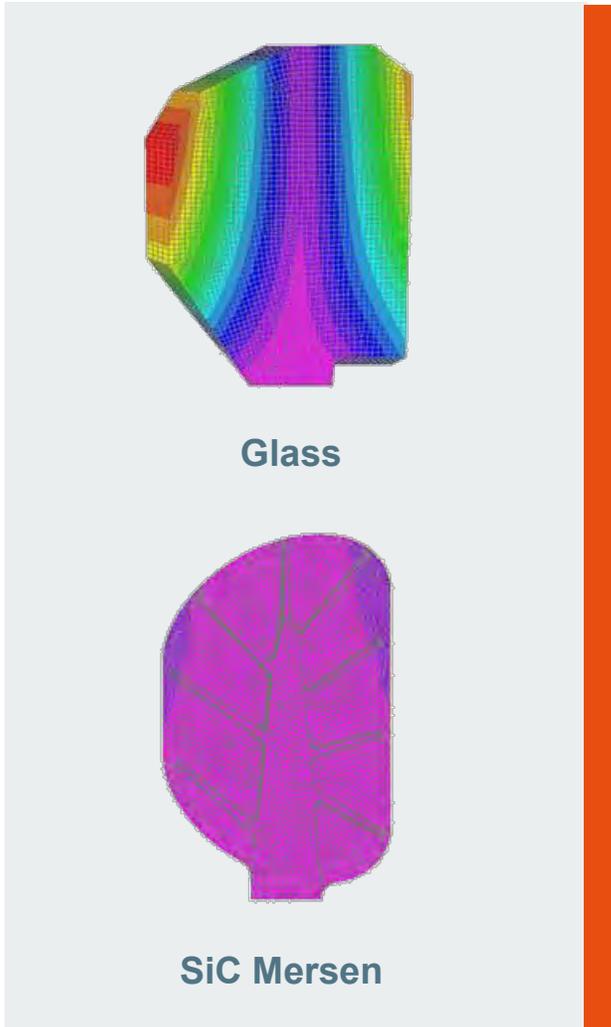
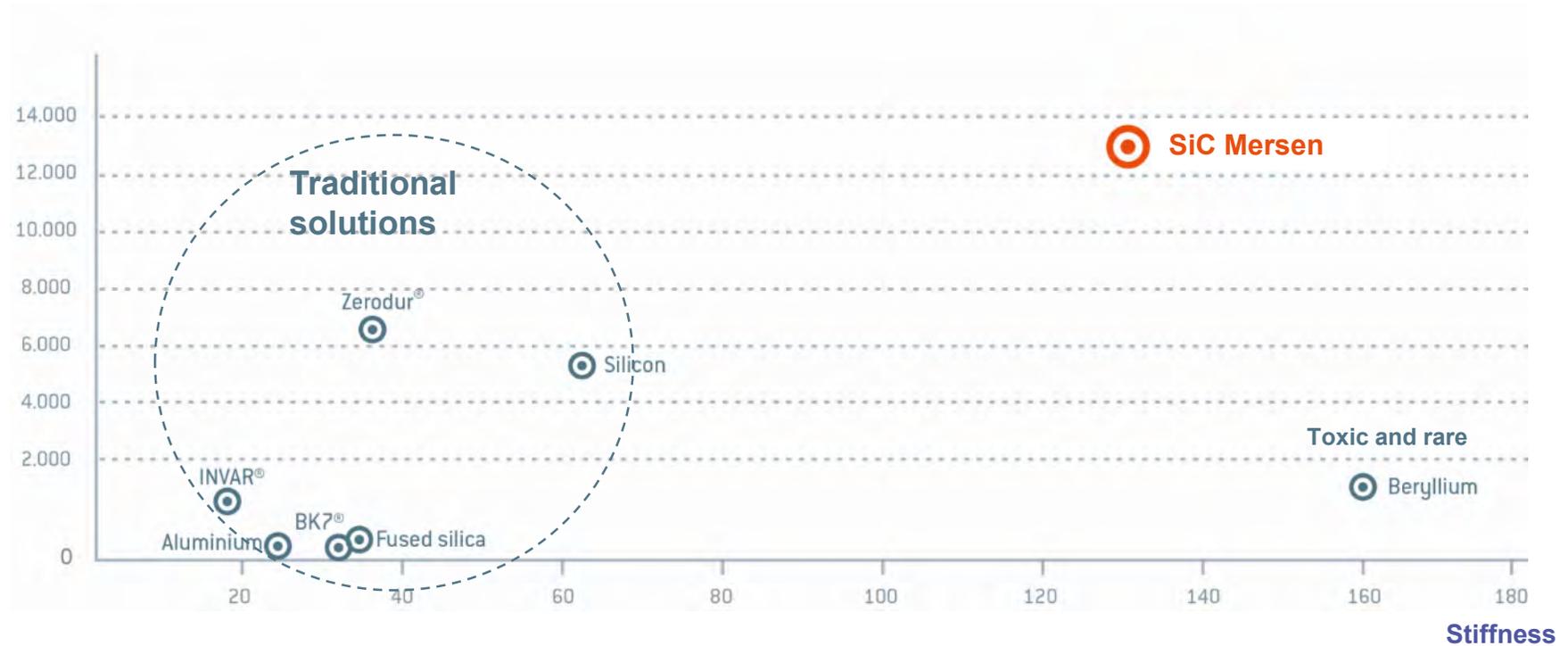
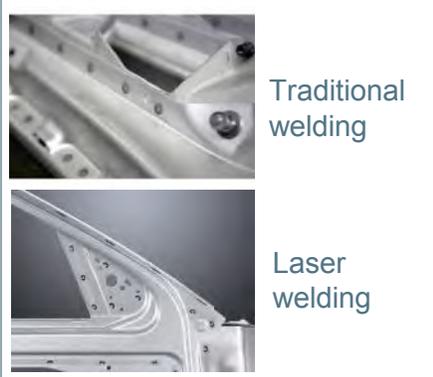


Figure of merit:  
quality of materials for mirror applications



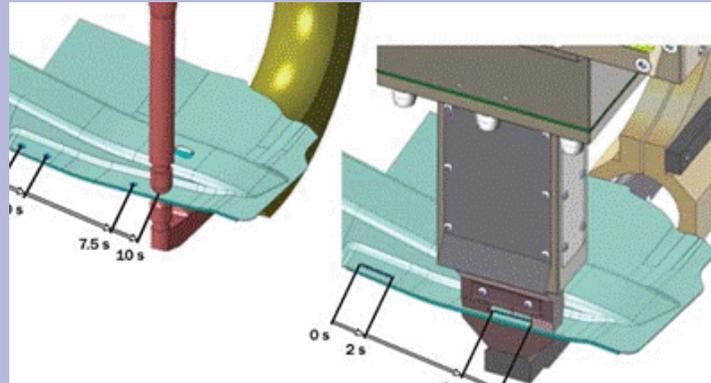
# AUTOMOTIVE INDUSTRY EXAMPLE

## WEIGHT SAVINGS



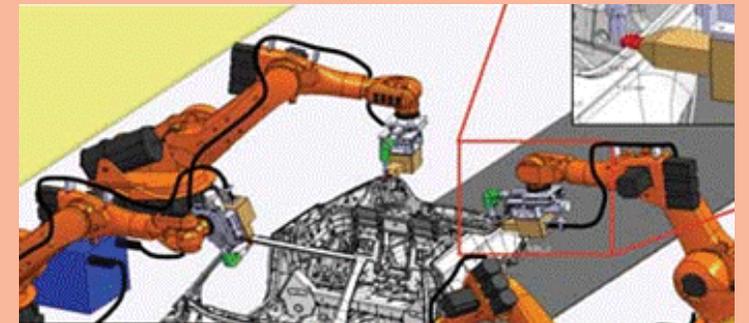
**40 kg less metal**  
per car

## TIME SAVINGS



**Time savings**  
of **50%**

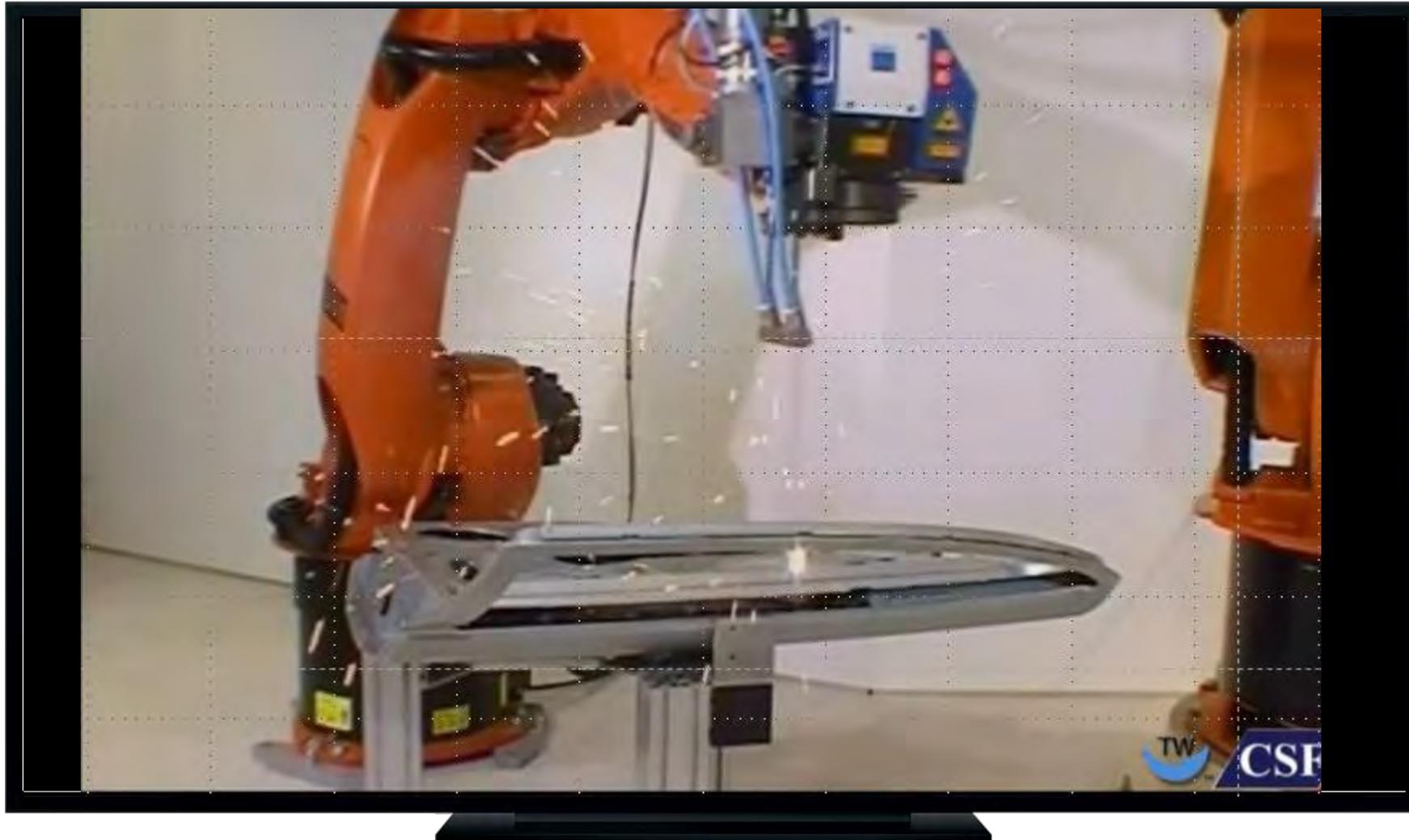
## SPACE SAVINGS - LOWER CAPEX



**Half**  
the manufacturing space

**Half**  
the number of robots

# AUTOMOTIVE MARKET EXAMPLE



# MERSEN STRENGTHS IN SiC MIRRORS FOR LASER PROCESSES



## UNIQUE EXPERTISE

Recognized expertise in **silicon carbide**, a material with the ideal properties for this application

Clear technical understanding of end applications (**optical systems expertise**)



## TAILORED MANUFACTURING

Integrated **mirror polishing** process



## GLOBAL NETWORK

Strong partnerships with OEMs

# GROWTH SALES POTENTIAL FOR MERSEN IN LASERS



# SiC MIRRORS FOR LASERS STRATEGY



**Develop SiC optical polishing expertise**  
(10mm to 30mm)

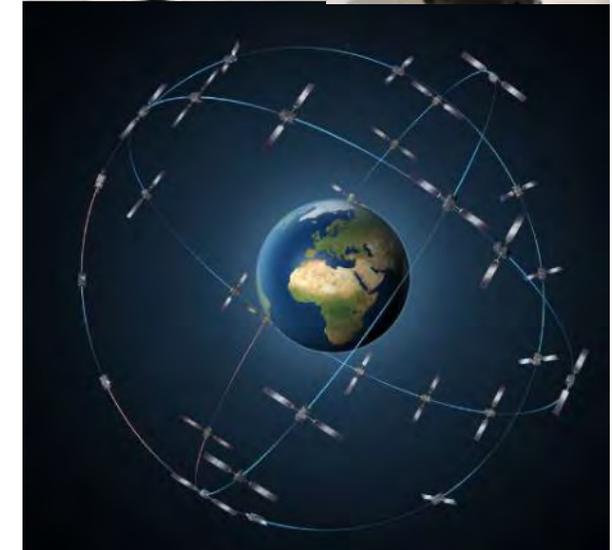


**Increase production capacities in line with current demand**

(capex: €3m to €5m in 2 years)



**Next steps:** laser com satellite constellation projects that could impact the size of the market over time (*1 constellation = 1,000 to 2,000 satellites with 2 to 3 mirrors per satellite*)



# CUSTOMERS THAT BENEFIT FROM OUR EXPERTISE FOR GREATER PERFORMANCE AND EFFICIENCY



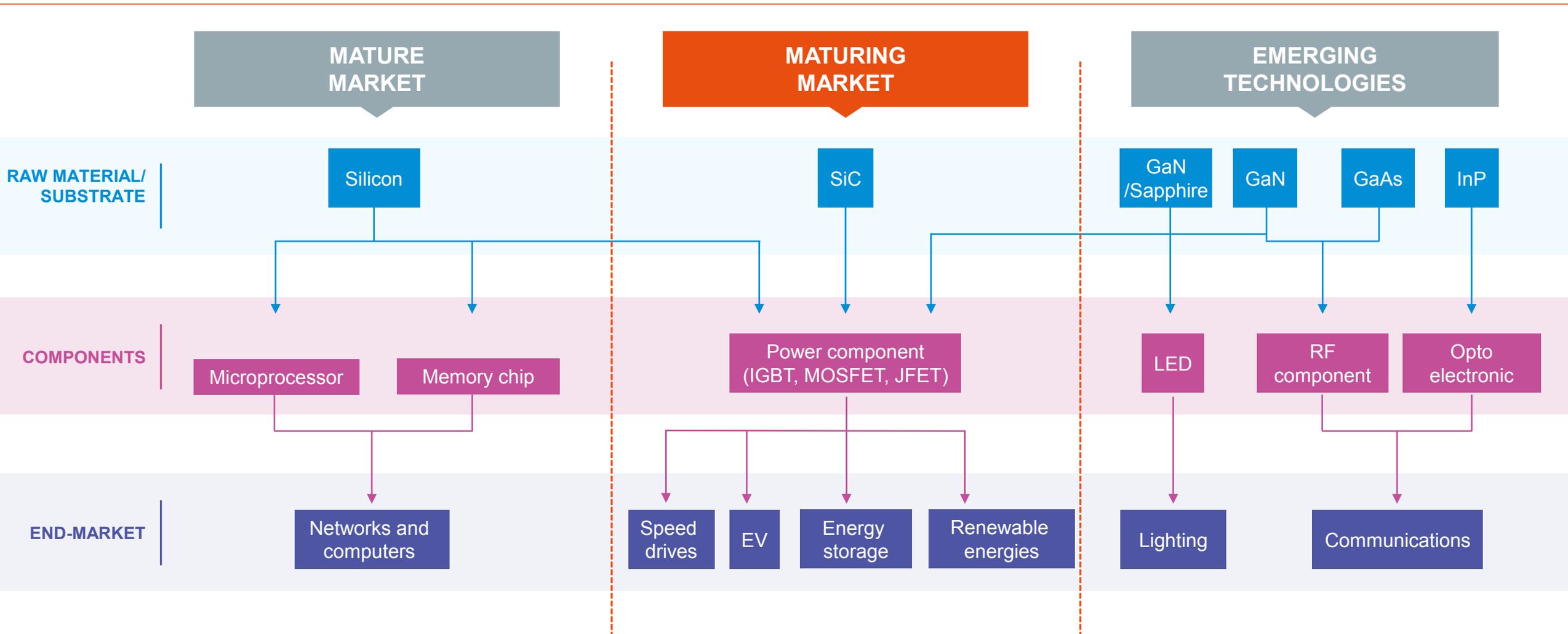
Example:

**SiC**  
**SEMICONDUCTORS**

# WHAT MAKES SiC SEMICONDUCTORS SO SUCCESSFUL?

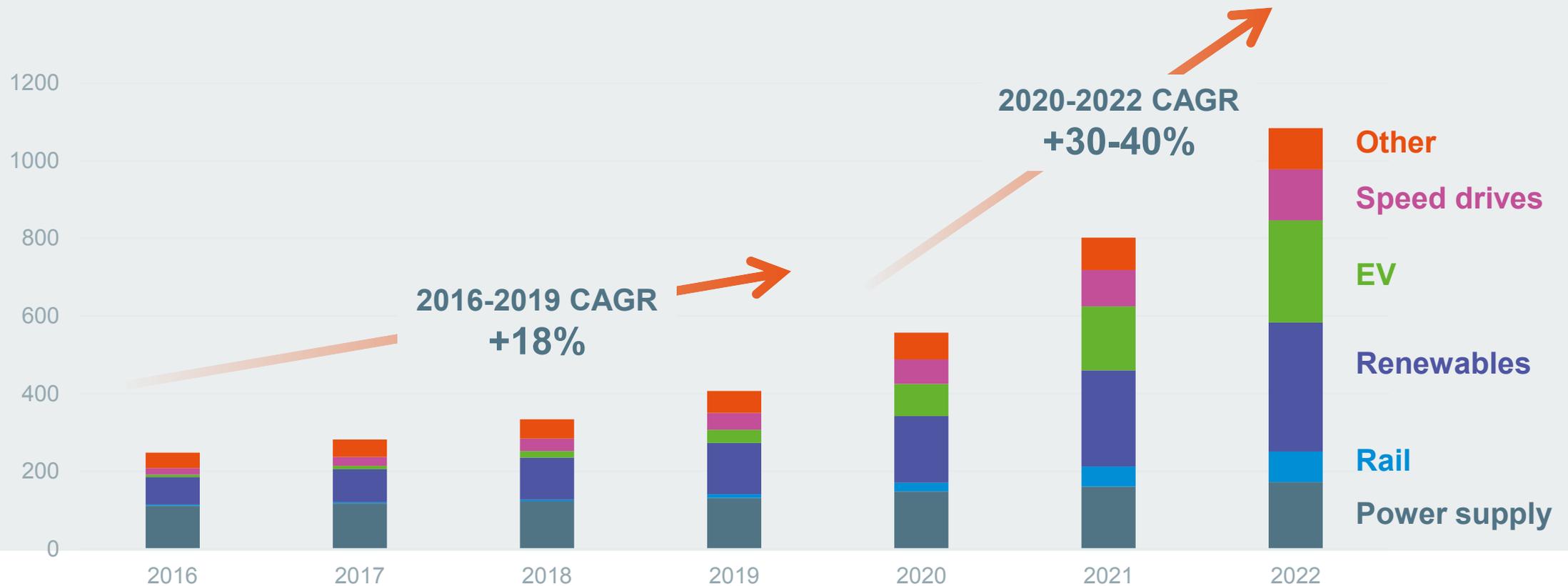
The silicon carbide  
semiconductor  
revolution

# DEVELOPMENTS IN THE SEMICONDUCTORS MARKET



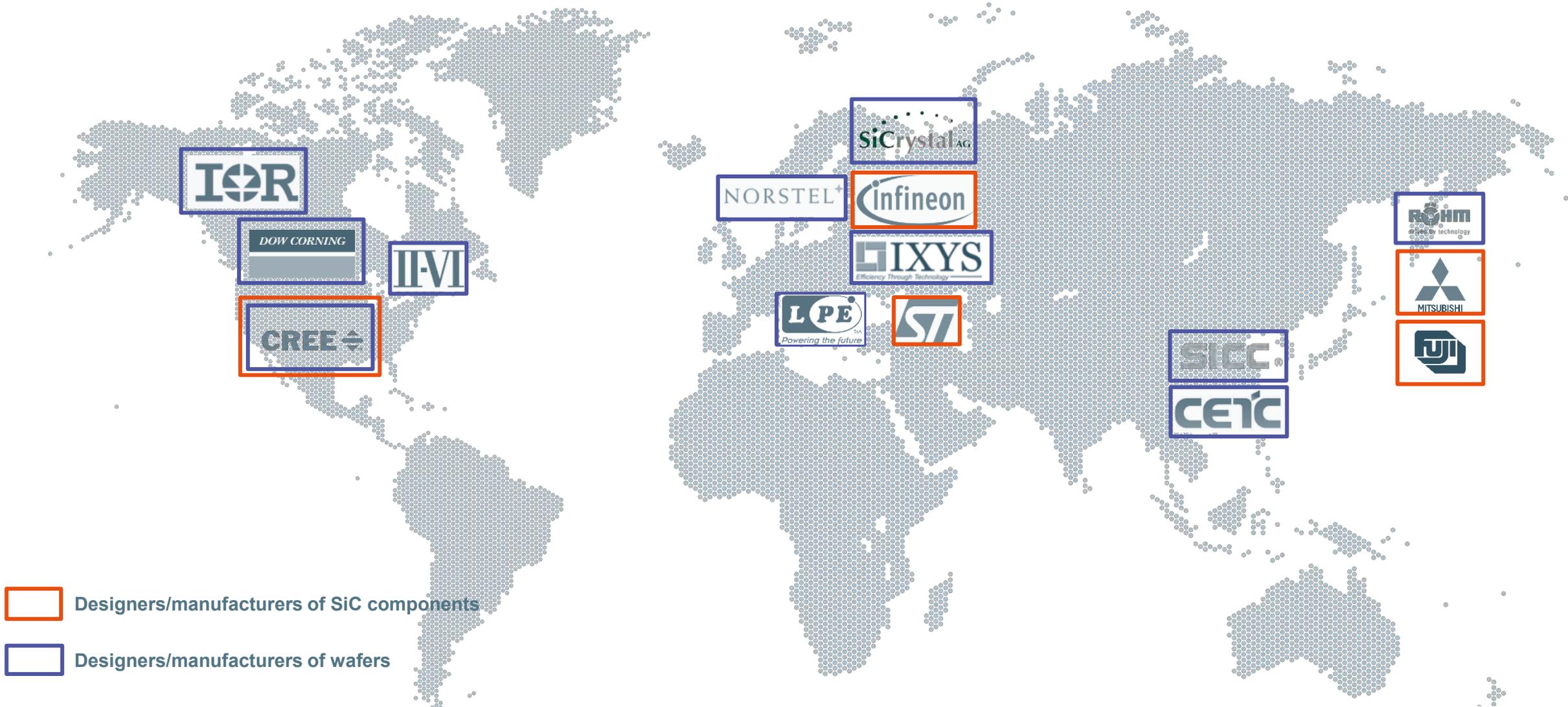
# THE GROWTH OF THE SiC SEMICONDUCTORS MARKET IS SET TO ACCELERATE AFTER 2020-2022 IN LINE WITH THE GROWTH OF THE EV MARKET

SiC COMPONENTS MARKET IN USD MILLIONS



Source: Yole Development, Power SiC 2017 – Materials, Devices and Applications

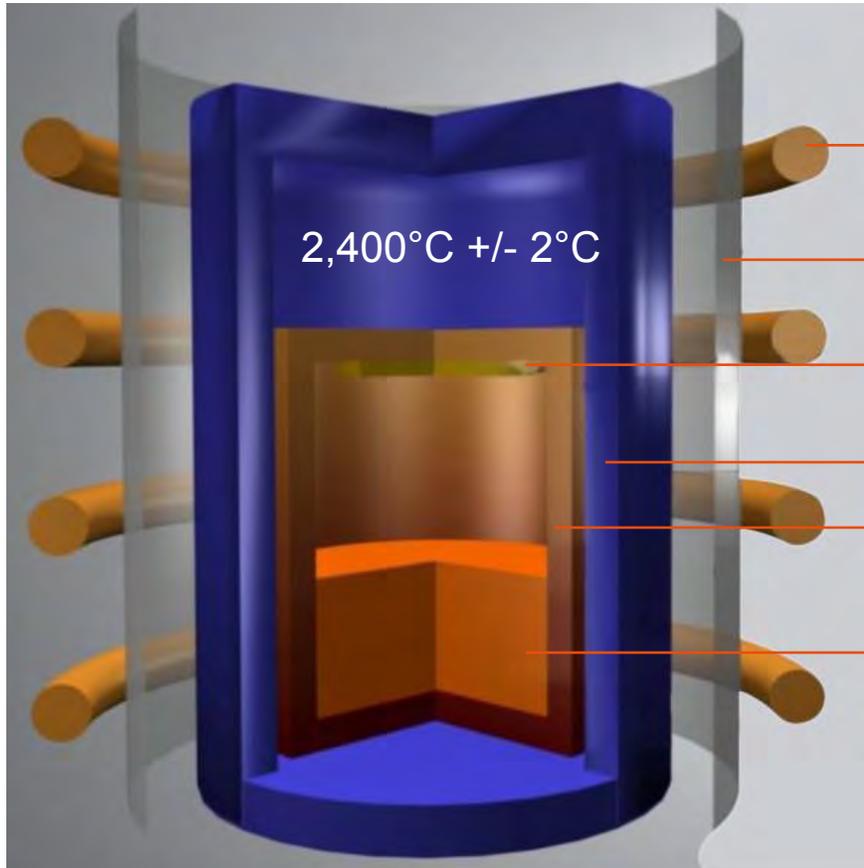
# A GLOBAL MARKET FOR WAFERS AND COMPONENTS



 Designers/manufacturers of SiC components

 Designers/manufacturers of wafers

# MERSEN SOLUTIONS



- Induction coil
- Quartz tubing
- SiC
- **INSULATION**
- **GRAPHITE CRUCIBLE**
- Reservoir of SiC powder

**GRAPHITE**  
COMPONENTS  
Crucible

—  
RIGID FELT  
**INSULATION**  
(Patent pending)



SiC ingot

# MERSEN STRENGTHS ON THE SiC SEMICONDUCTORS MARKET



## UNIQUE EXPERTISE

**Ability to meet technical challenges**

**Graphite: very high grade**

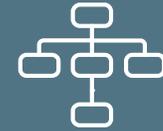
Felt: guaranteed thermal homogeneity of 2,400°C



## CUSTOMER RELATIONS

**Long-standing relationships with designers**  
*(wafers + components)*  
that place us at the forefront of design (“Designed in”)

**Ability to accompany new players**  
*(particularly in China)*

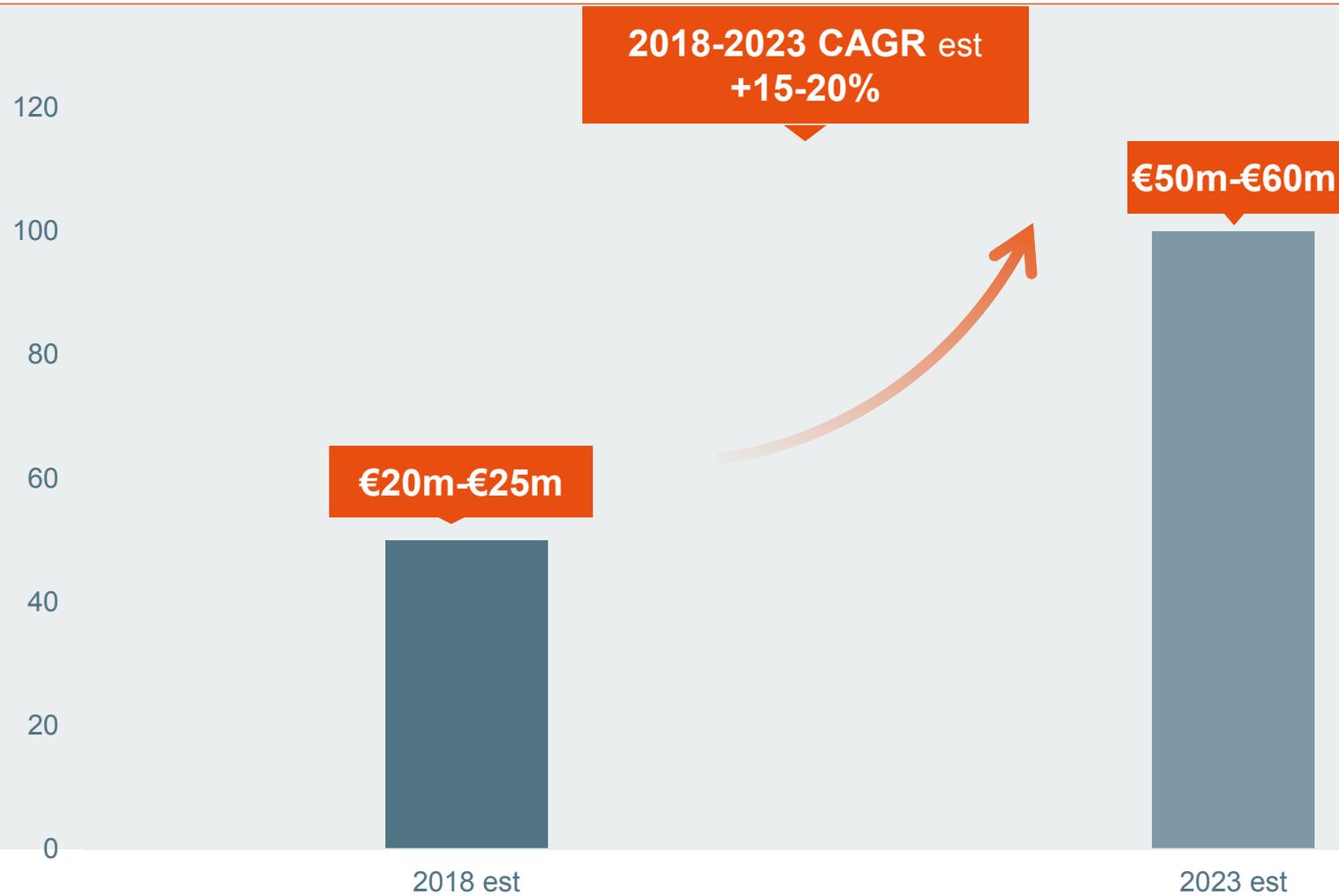


## STRONG ORGANIZATION

**Global organization**

*Asia, Europe and the United States*

# GROWTH POTENTIAL FOR MERSEN IN SiC SEMICONDUCTORS



# MERSEN STRATEGY FOR THE SiC SEMICONDUCTORS MARKET



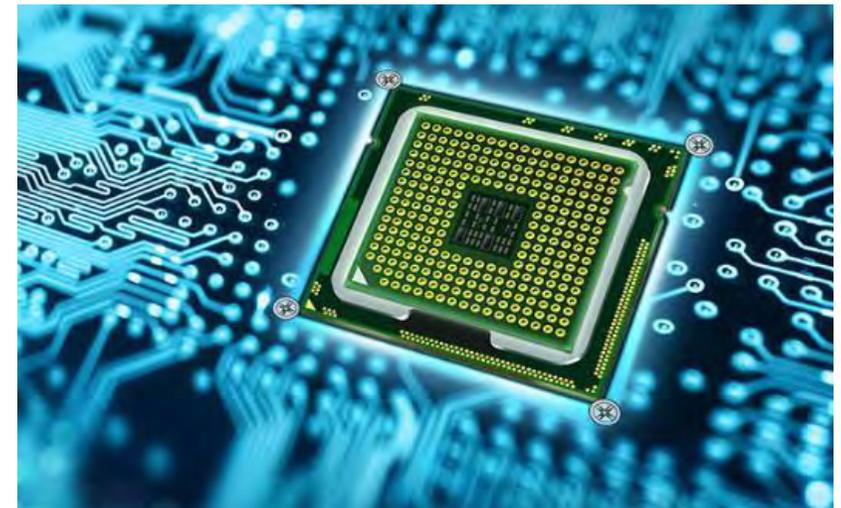
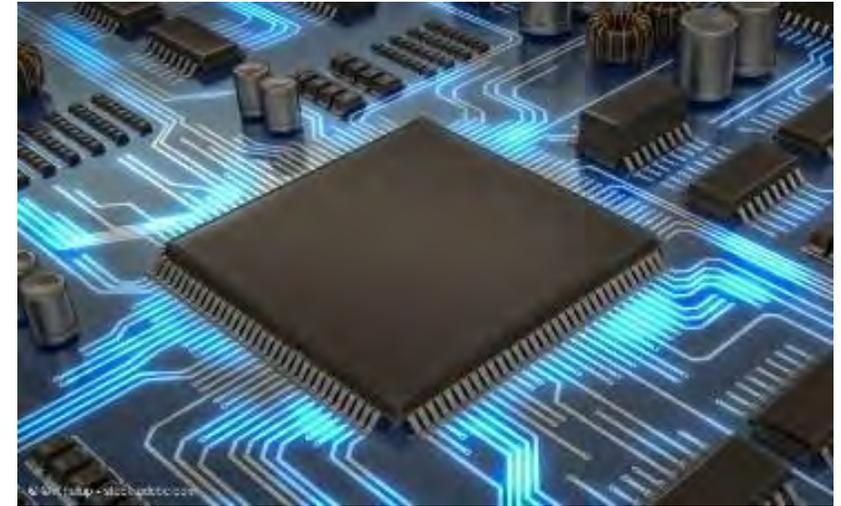
**Accelerate our positioning on the SiC semiconductors market which is less cyclical than other semiconductor markets**



**Keep pace with the accelerated growth of the market** by increasing investment in rigid felt (€25m-€30m for the next 3 years) in preparation for the market after 2020



**Capitalize on SiC properties to create high-performance protection solutions** through our partnership with Caly Technologies



# CONCLUSION



**A BROAD VARIETY OF  
HIGH-POTENTIAL OPPORTUNITIES**

**FOR MERSEN**

**MATERIALS EXPERTISE**

*INSULATION*

*GRAPHITE*

**ELECTRICAL EXPERTISE**

**SiC SEMICONDUCTORS NEED TO BE  
PROTECTED**

*COMPONENTS FOR POWER  
CONVERSION*



**QUESTIONS ?**



# MERSEN: OUR MISSION...

## TECHNOLOGICAL PROGRESS

CAPITAL MARKETS DAY – NOVEMBER 29, 2018

THOMAS BAUMGARTNER, CFO



# A SERIES OF MEASURES TO IMPROVE THE GROUP'S COMPETITIVENESS

## ADAPTATION MEASURES

### TRANSFORM PLAN

Simplification of the Group's industrial organization and processes and adaptation of its chemicals business in line with market needs

### REORGANIZATION

of the 2 business segments to strengthen synergies, efficiency and innovation

### LAUNCH

of the **Operational Excellence** plan to enhance competitiveness

### LAUNCH

of **Mersen Excellence Journey**

20  
14

20  
15

20  
16

20  
17

20  
18



## DISPOSAL OF CYCLICAL BUSINESSES

Discontinuation of carbon steel equipment (China) following the sale of 2 plants in France in 2012 linked to chemicals

Discontinuation of brazing technology business

Sale of 2 plants in France (high-power switches)

-€55m\*

## ACQUISITIONS IN GROWTH MARKETS

Cirprotec

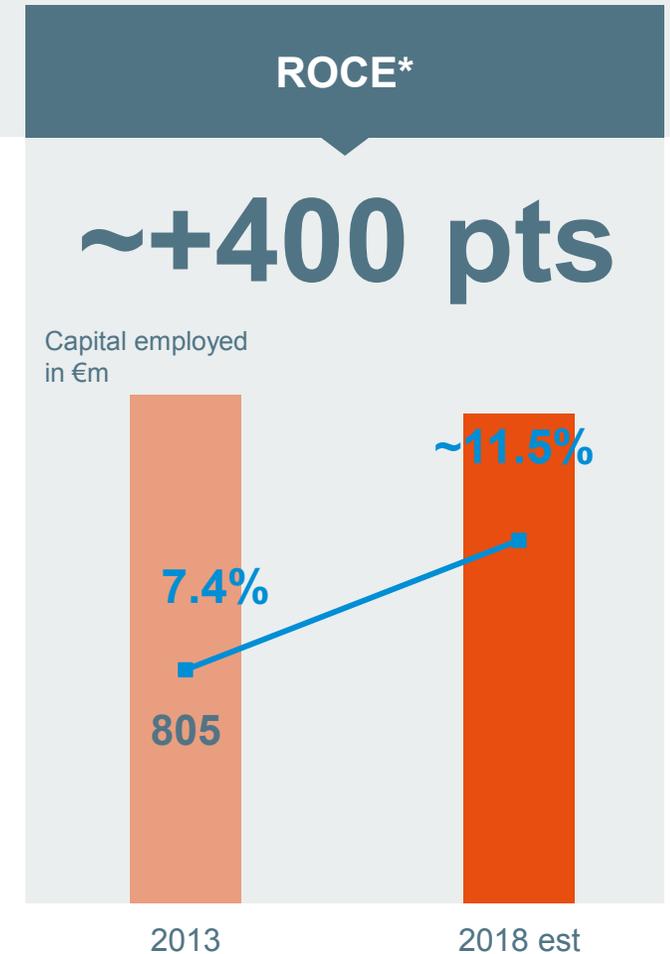
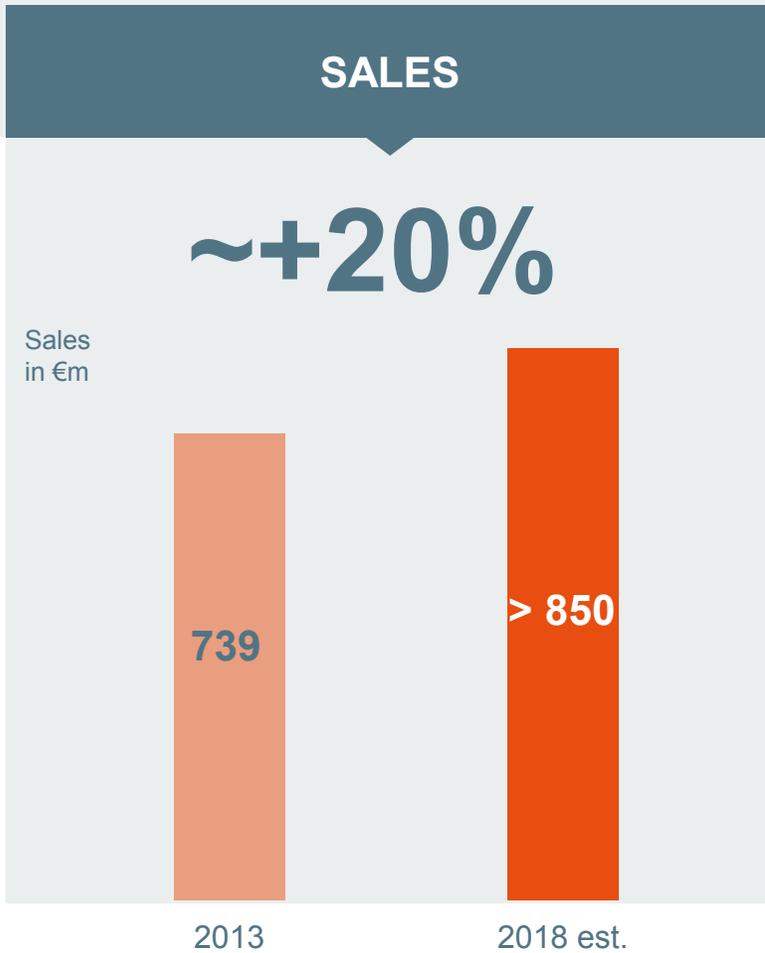
ASP

FTCap, Idealec

+€45m

\* Including Kapp and Lump

# CONCLUSIVE RESULTS



\* Operating income before non-recurring items/average weighted capital employed

# THAT ARE REFLECTED IN MERSEN'S GUIDANCE FOR 2018

ORGANIC GROWTH\*  
IN SALES VERSUS 2017

# 2018

OPERATING MARGIN BEFORE  
NON-RECURRING ITEMS

Announced  
in March 2018

Adjusted  
in July 2018

Press release  
in October 2018

Between 3% and 6%

**BETWEEN  
7% AND 9%**

**AROUND 9%**

+2% linked  
to acquisitions

At constant exchange rates

Between 9.6% and  
10.1%  
of sales  
(vs. 9.2% in 2017)

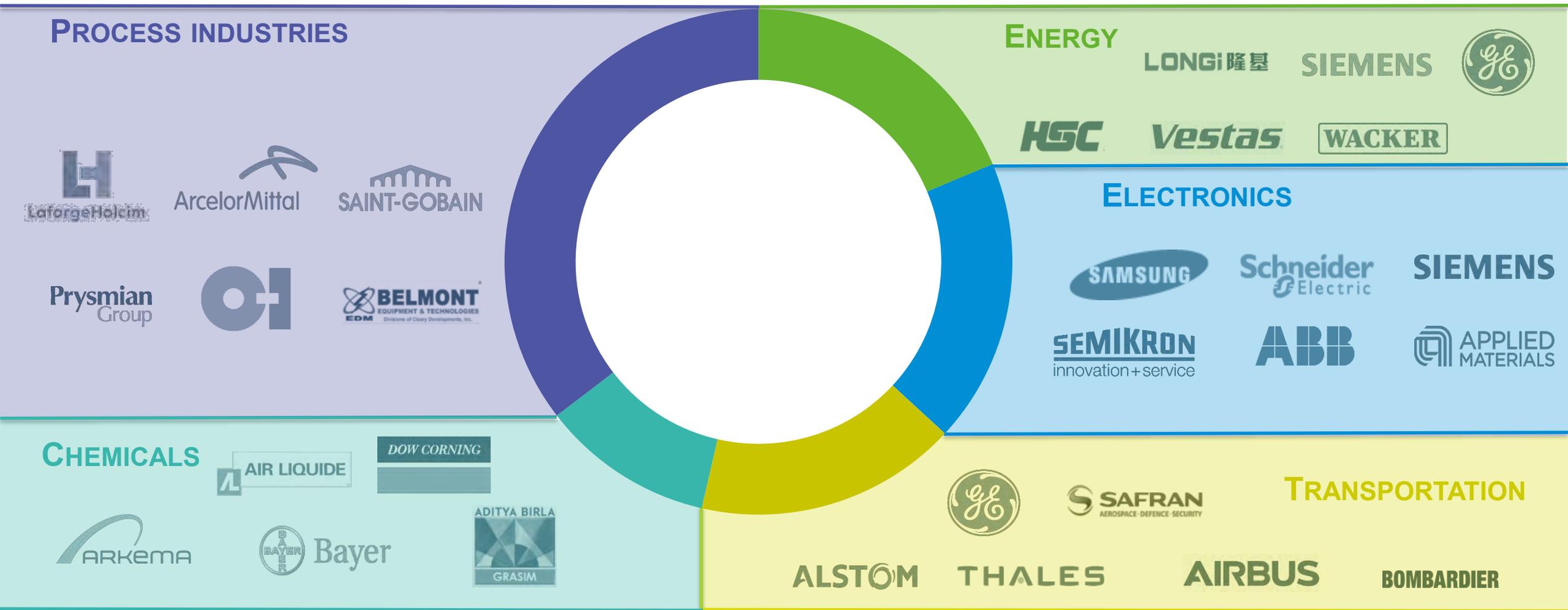
**BETWEEN 10.1%  
AND 10.4% OF  
SALES**

**AROUND 10.4%**

Including the impact  
of acquisitions

\* At constant exchange rates and scope of consolidation

# MERSEN'S STRENGTHS FOR THE FUTURE: DIVERSIFIED CUSTOMER PORTFOLIO AND MARKETS



# LEADERSHIP POSITIONS THAT ARE A SOURCE OF PROFITABILITY

## MERSEN'S STRENGTHS



**Leadership position:**  
#1 or #2 worldwide  
in niche markets

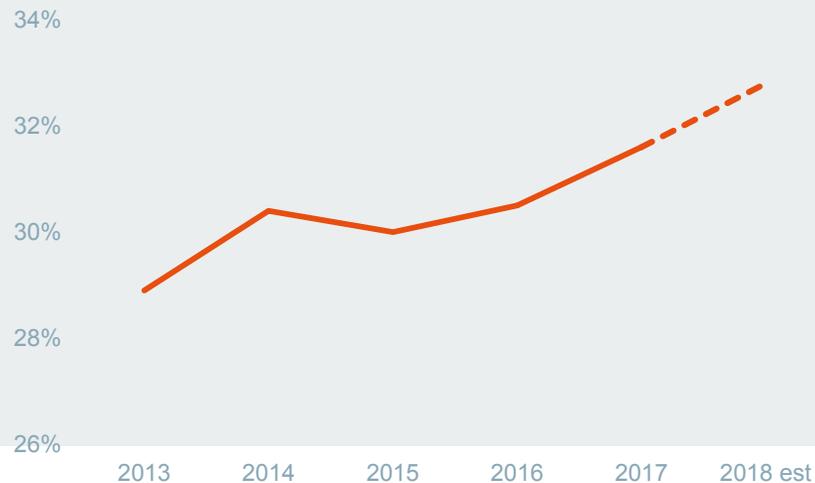


**> 65%**  
of products are  
built for purpose



**Expertise:**  
high barriers  
to entry

## GROSS MARGIN



## PRICE EFFECT

**2011-2016**

**-0.6%** on average/year

Solid performance despite  
two back-to-back crises  
(solar, chemicals)

**2017**

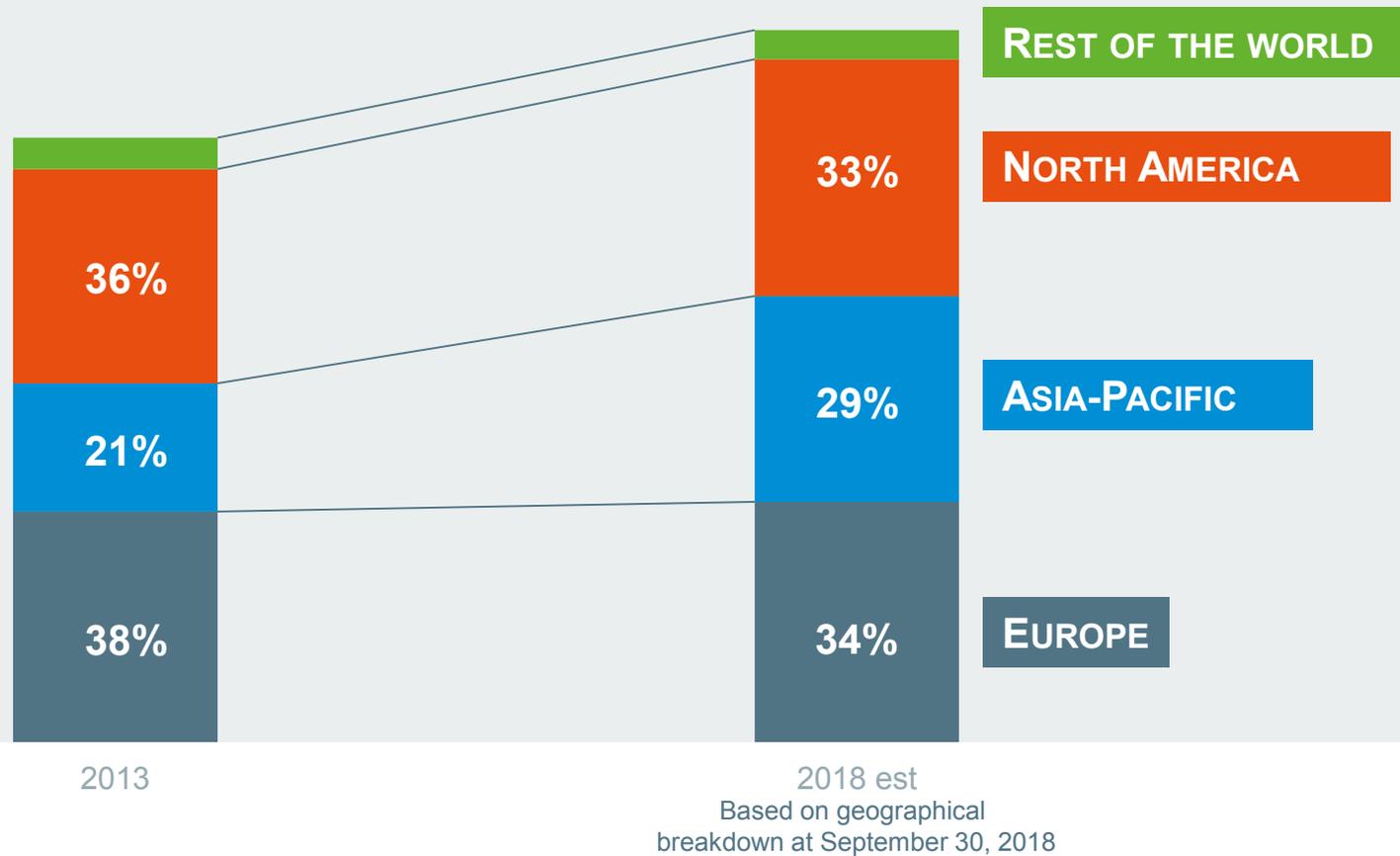
**Stable**

**2018**

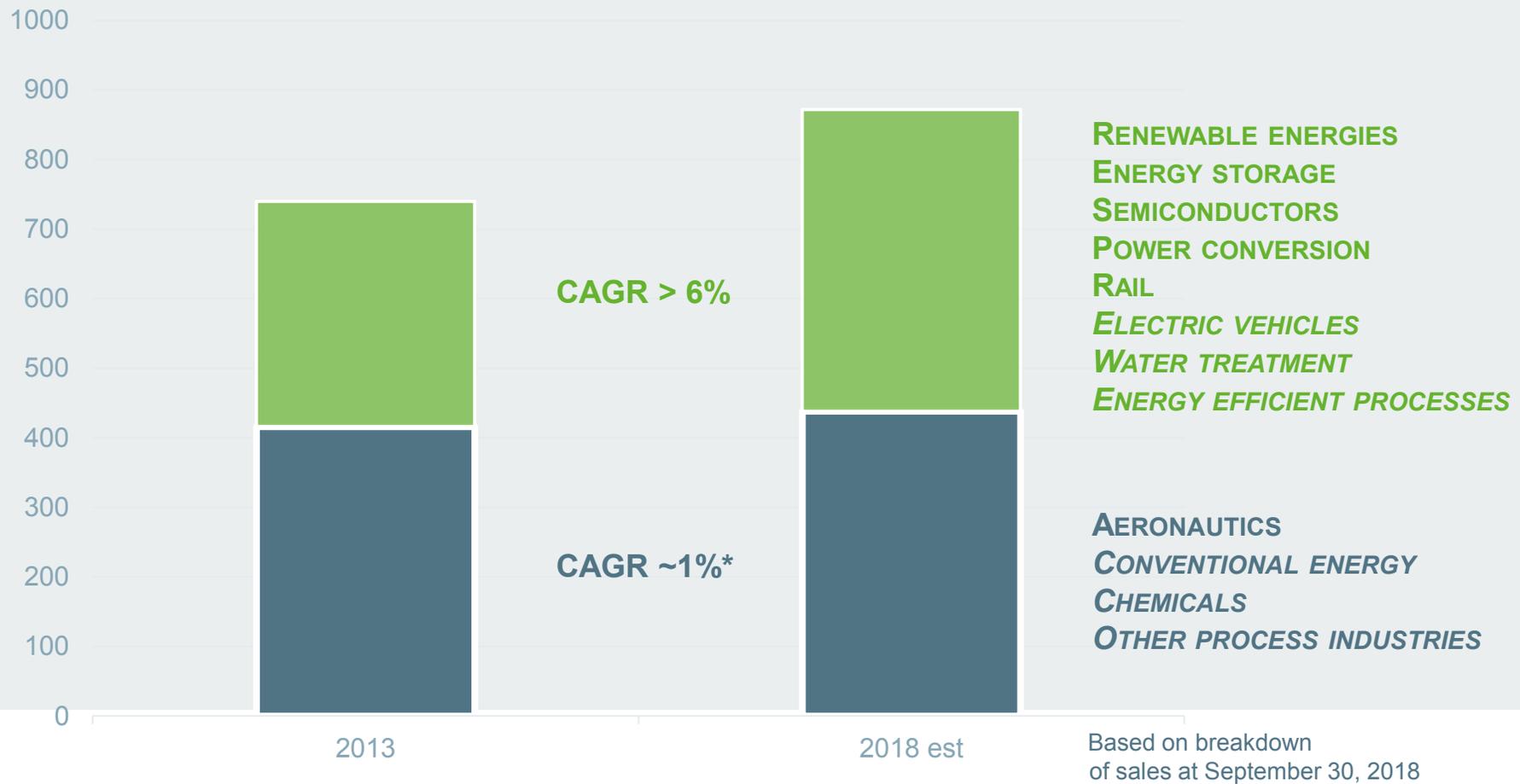
**+1.6%\*** \* 9 months

Ability to raise prices

# A BALANCED GEOGRAPHIC FOOTPRINT FOR MORE OPPORTUNITIES AND GREATER DIVERSIFICATION

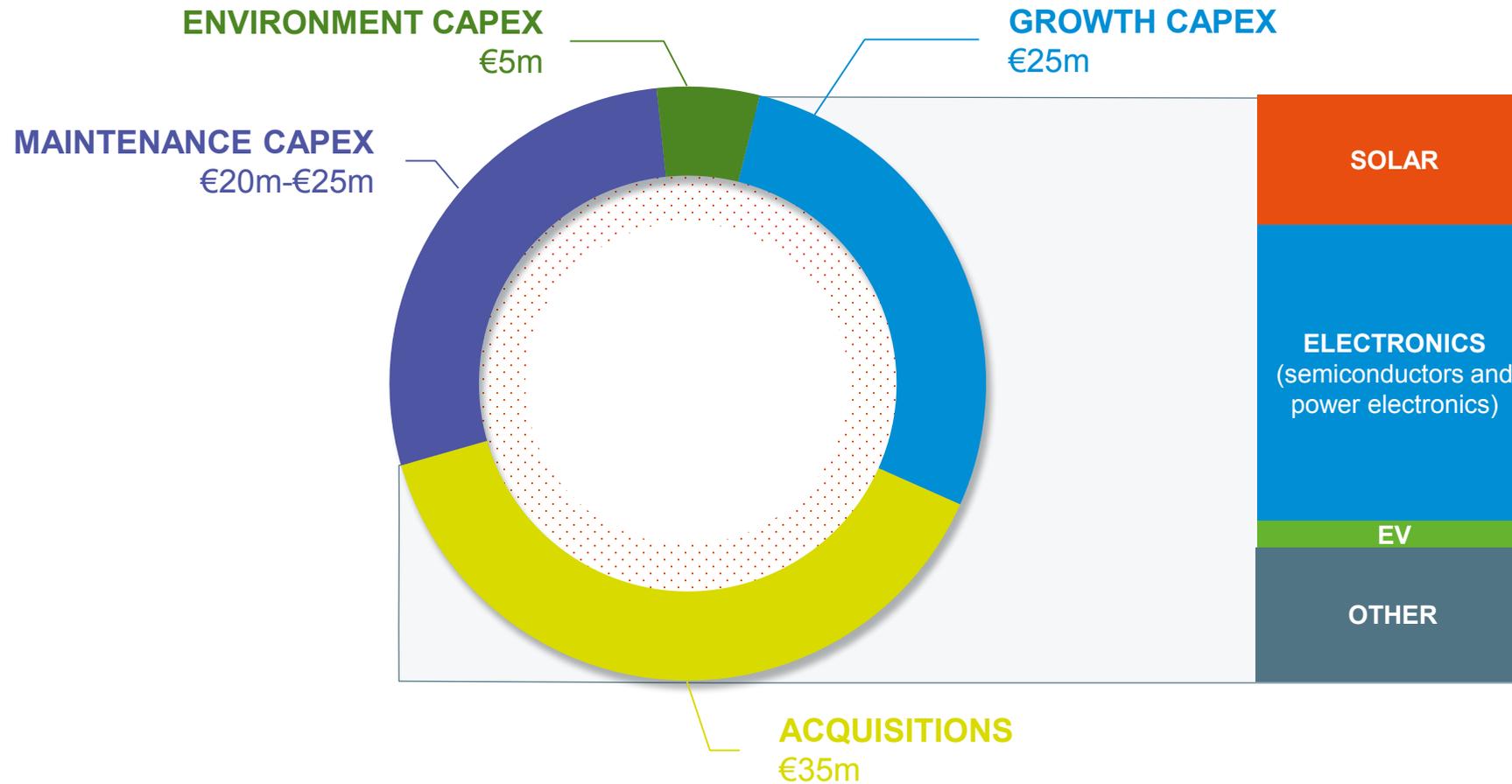


# MARKETS WITH MAJOR GROWTH POTENTIAL IN THE MEDIUM TERM

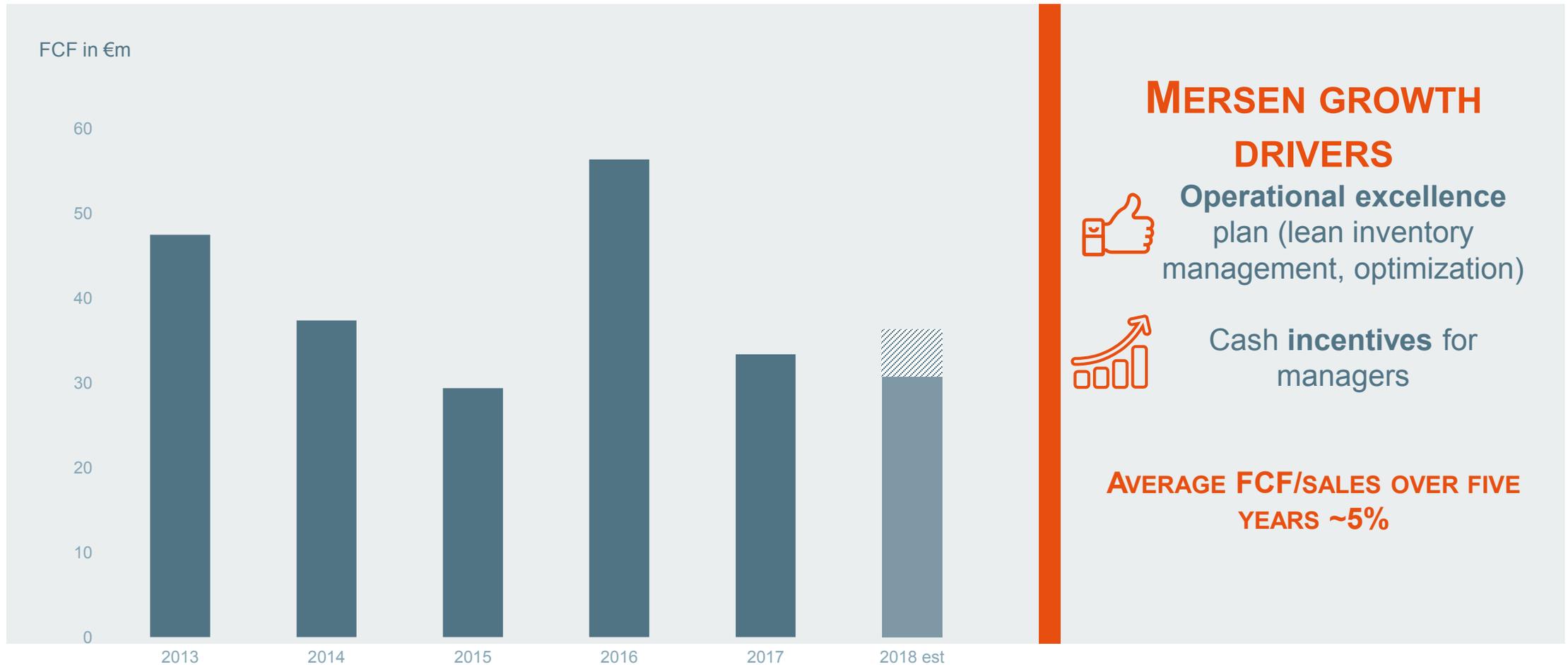


\*including -5% of CAGR for chemicals over the period

# UNDERPINNED BY STRATEGIC INVESTMENT IN 2018 TO DRIVE FUTURE GROWTH



# A GROUP THAT REMAINS FOCUSED ON CASH GENERATION



## MERSEN GROWTH DRIVERS



**Operational excellence**  
plan (lean inventory  
management, optimization)



**Cash incentives** for  
managers

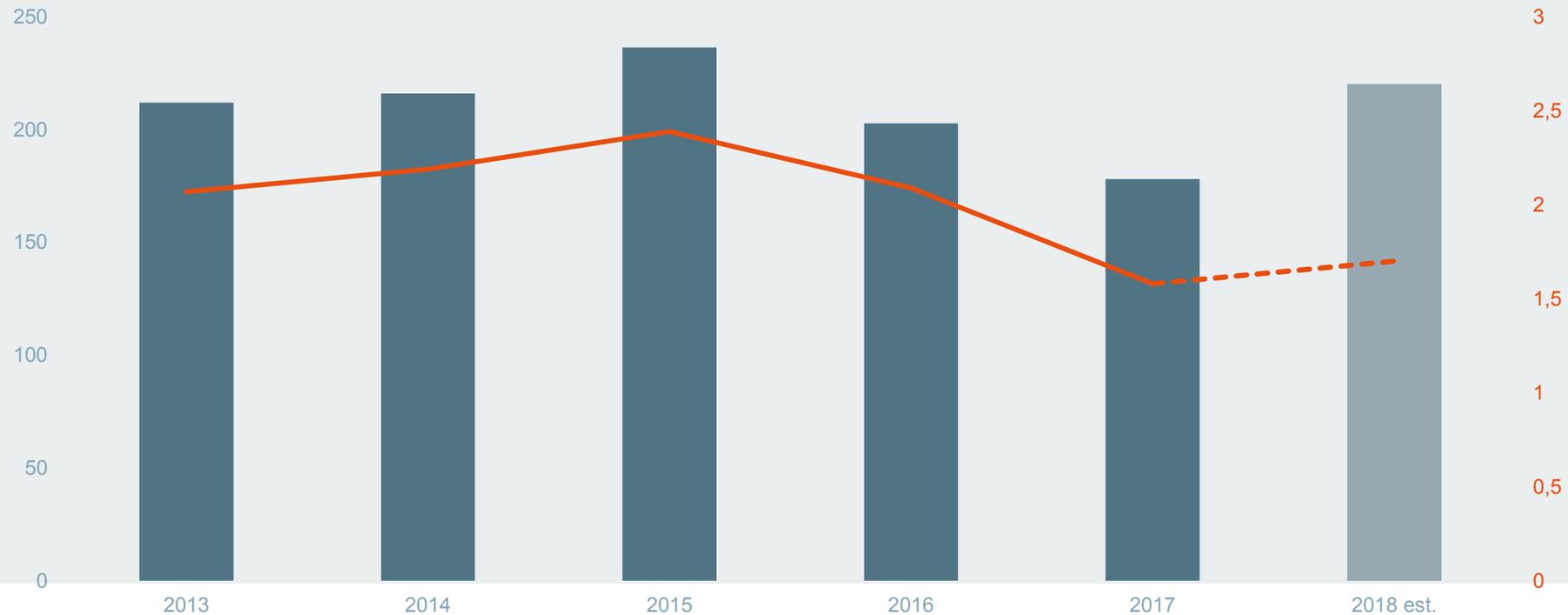
**AVERAGE FCF/SALES OVER FIVE  
YEARS ~5%**

FCF: Free cash flow before restructuring and after financial interest  
excluding acquisitions and non-capital expenditure

# A ROBUST FINANCIAL STRUCTURE AND SIGNIFICANT INVESTMENT AND ACQUISITIONS IN 2018

Net debt in €m

Leverage



**MATERIAL IMPACTS  
IN 2018 (estimated)**

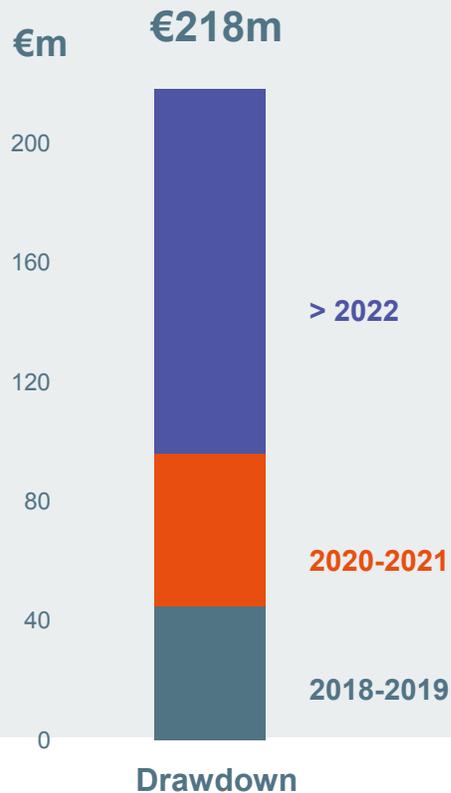
■ **Acquisitions: €35m**

■ **Capex: €55m**

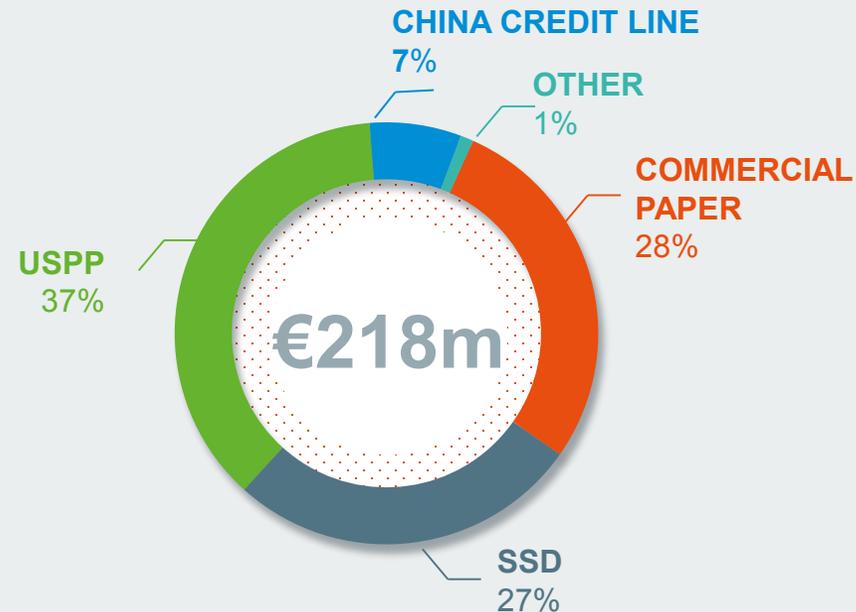
■ **Competitiveness plan: €15m**

# A SOLID BALANCE SHEET WITH DIVERSIFIED FINANCING

## MATURITY PROFILE OF 4.7 YEARS\*



## SOURCES OF FINANCING (including commercial paper)



## UNDRAWN CONFIRMED CREDIT LINES

€148m

*(taking into account the back-up line available in the commercial paper program)*

**Fixed rates**

For 50% of the total  
100% of confirmed credit  
lines in US\$

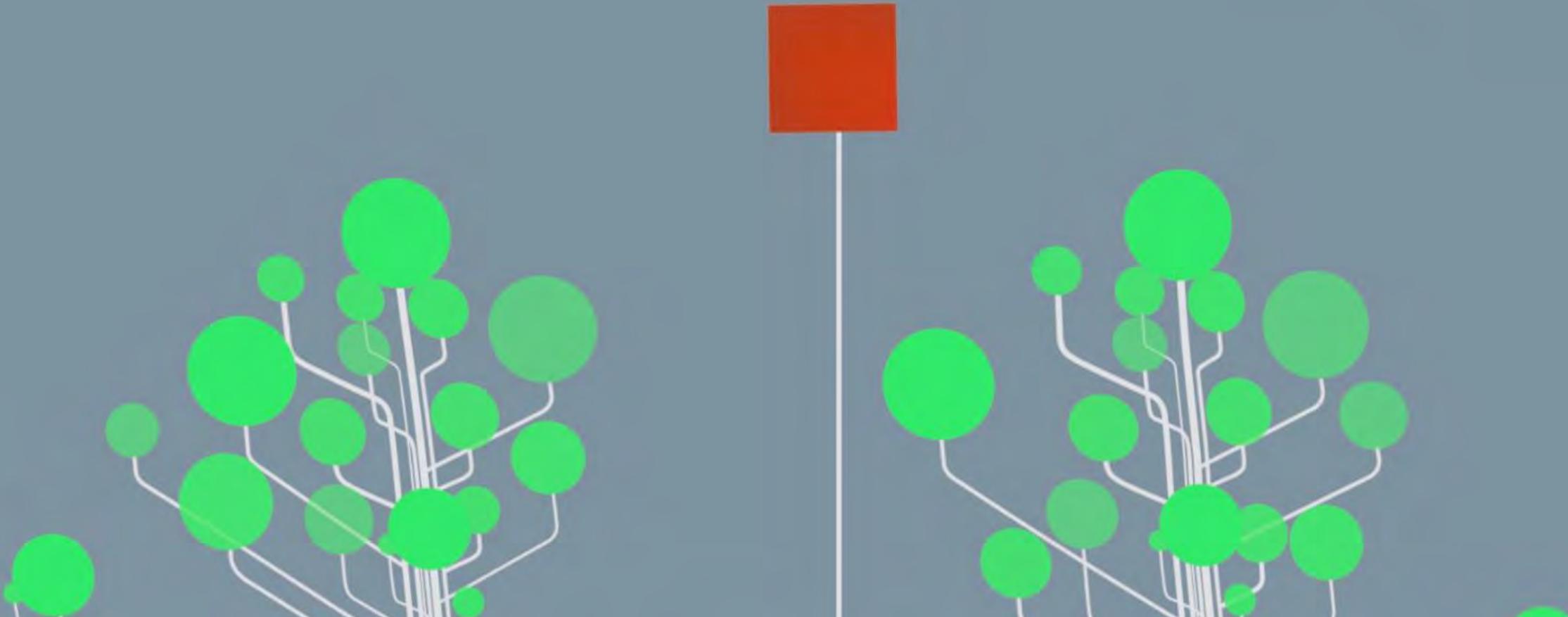
Figures at June, 30 2018

\* For credit lines drawn down



# MERSEN: OUR MISSION... TECHNOLOGICAL PROGRESS

CAPITAL MARKETS DAY – NOVEMBER 29, 2018



# CONCLUSION



## **Mersen is committed to sustainable development**

*Inside Mersen, a continuous improvement process*

*Mersen Inside, growth markets*



## **Mersen has increased its competitiveness and consolidated its growth drivers**

*Expanding markets*

*A customer, global and competitive positioning that delivers high margins*

*A solid balance sheet and strong cash flow generation*



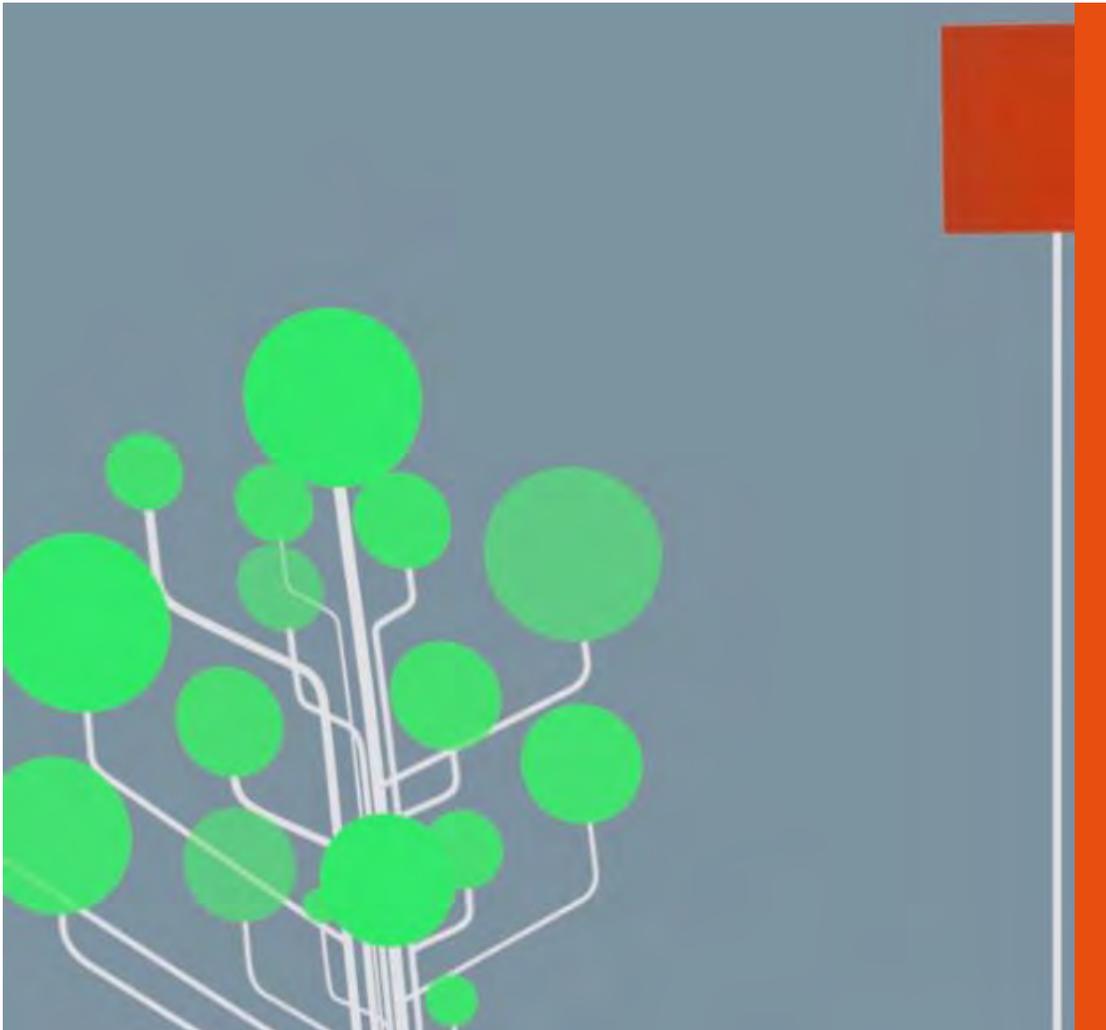
## **Mersen is committed to operational excellence at every level**

*Mersen Excellence Journey*



## **Mersen's expertise makes it a key partner for all of tomorrow's industries**





**QUESTIONS ?**