DRIVING ENERGY EFFICIENCY WITH ELECTRONICS

INVESTOR DAY

SEPTEMBER 19, 2012

AGENDA

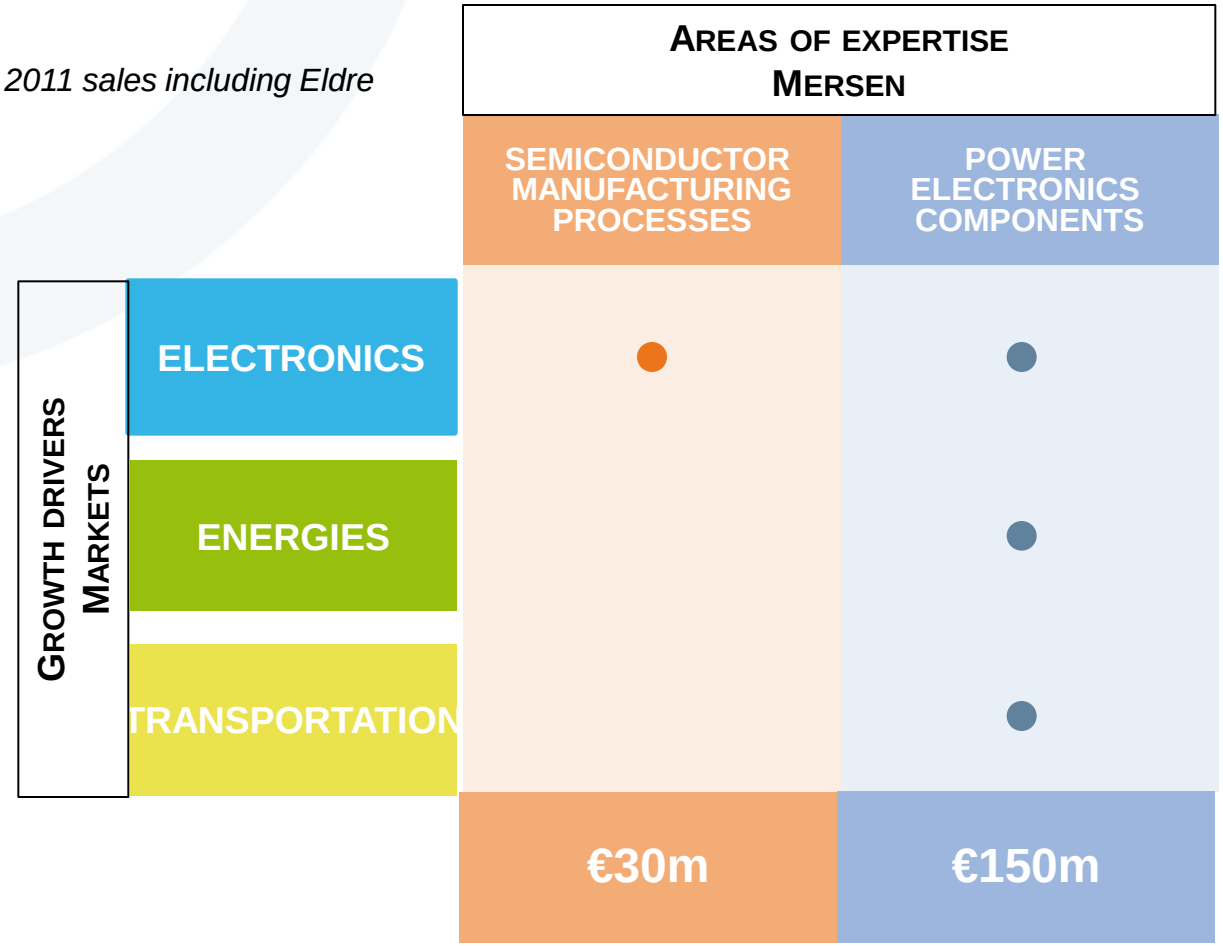
Introduction	Luc Themelin
Semiconductor fab equipment	Christophe Bommier
Driving energy efficiency with Power electronics	Marc Vinet
Conclusion	Luc Themelin
Interim results	Thomas Baumgartner

ELECTRONICS, IN THE HEART OF MERSEN'S STRATEGY

- **TWO GROWTH DRIVERS**
  - Solar, Electronics
- **TWO SEGMENTS OF EXPERTISE**
  - Materials, Electrical
- **A GLOBAL POSITIONING**
  - A diversified portfolio of high-quality customers worldwide

ELECTRONICS, A MAJOR MARKET FOR THE GROUP

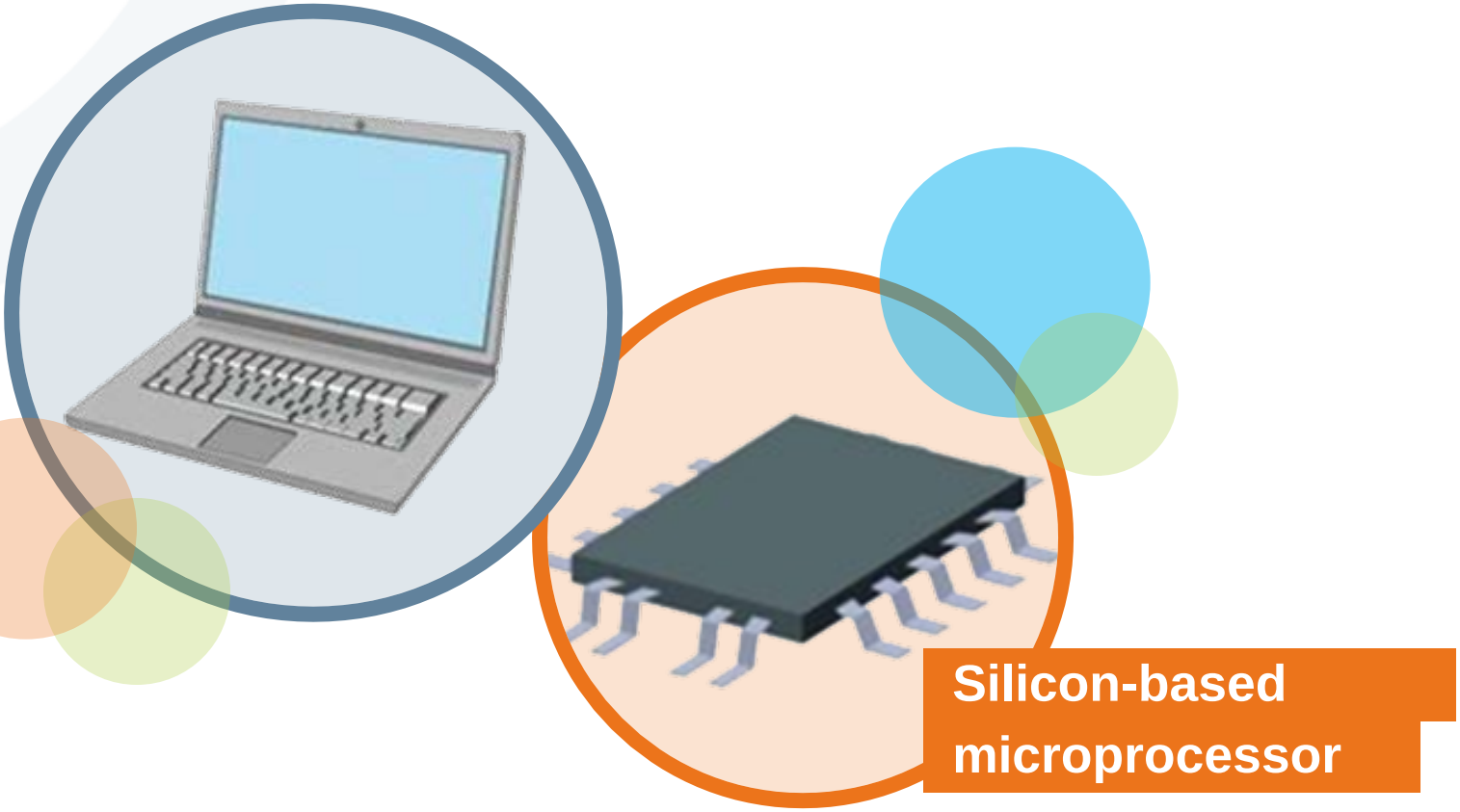
2011 sales including Eldre



SEMICONDUCTOR

fab equipment

BEFORE, GROWTH IN THE ELECTRONICS MARKET WAS DRIVEN BY THE INCREASING USE OF COMPUTERS



Silicon-based microprocessor

TODAY, IT IS BEING LED BY THREE MAIN FACTORS

MOBILE COMMUNICATIONS

- Flat screens
- Smartphones, Tablets
- Wireless connectivity

DATA NETWORKS

- Data storage
- Computing power
- Cloud computing
- Optical fiber

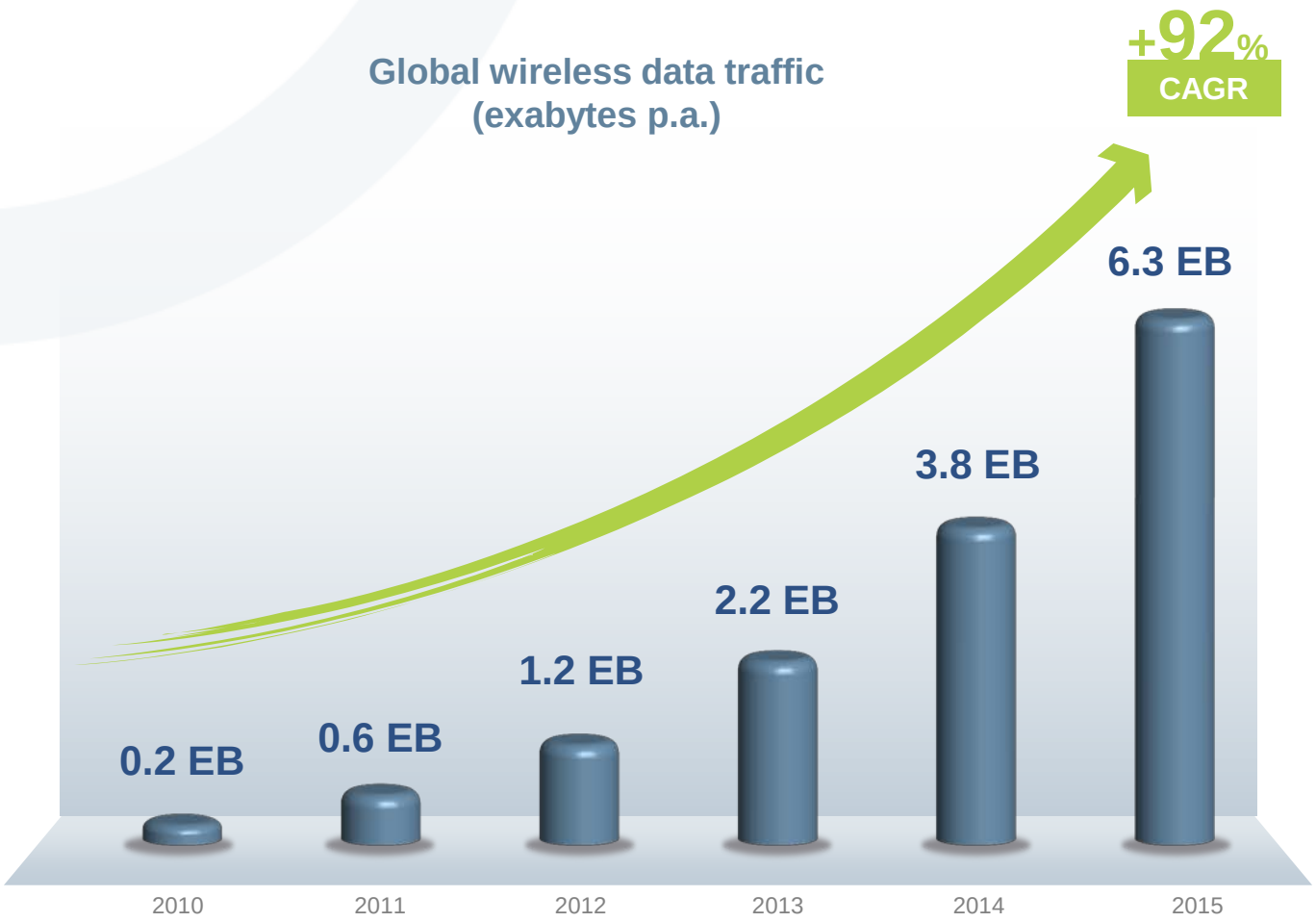
ENERGY EFFICIENCY

- Low-energy lighting
- Electricity grids
- Speed drives

…TO BE JOINED IN THE FUTURE BY A FOURTH

HYBRID AND/OR ELECTRIC VEHICLES

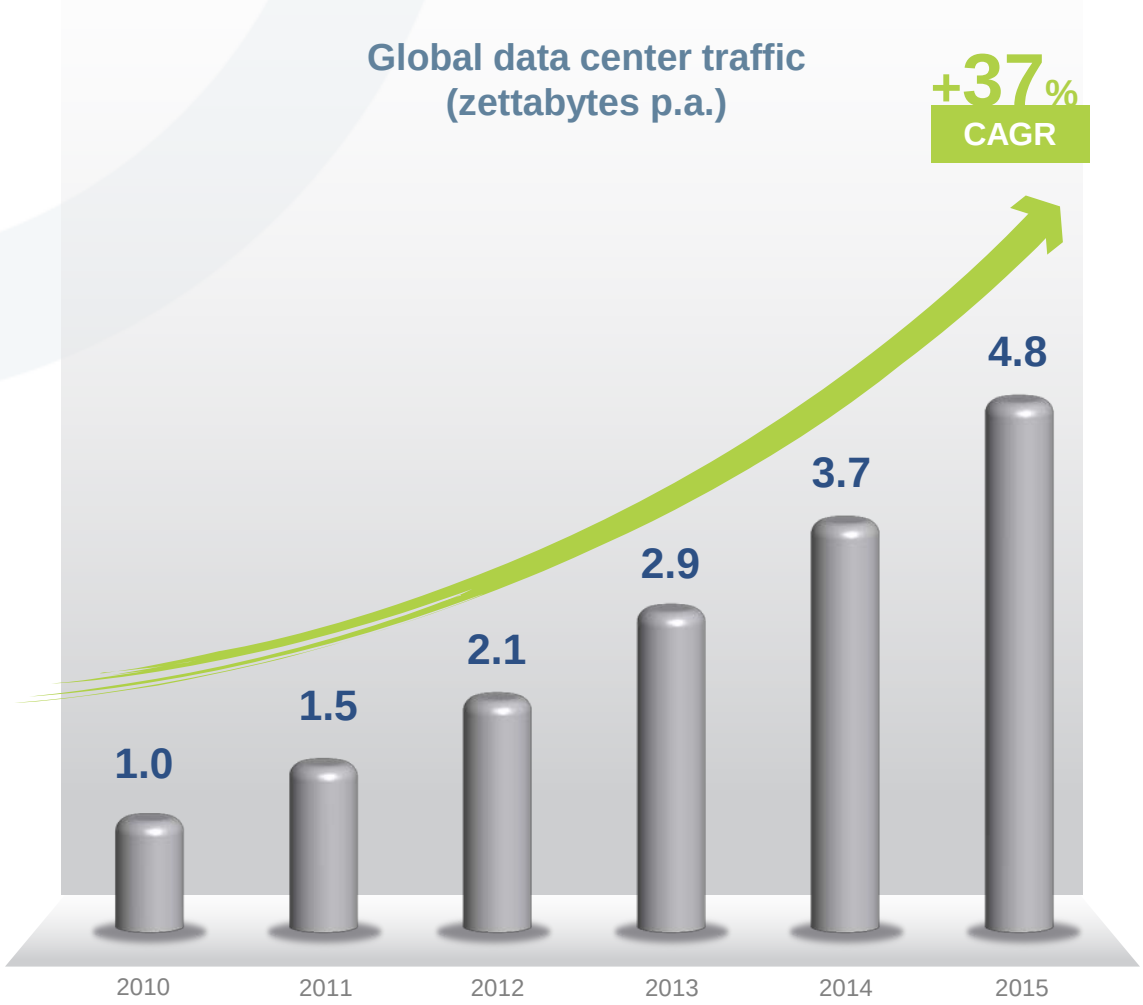
THE WIRELESS
COMMUNICATION MARKET IS JUST BEGINNING TO EXPAND



3G, 4G networks

EB: exabytes =10^{18}
Source: Cisco VNI Mobile, 2011

DATA STORAGE CAPACITY IS RISING SHARPLY



Zettabytes = 10^{21}
Source: Cisco and Mersen estimates

Reduction in data storage costs

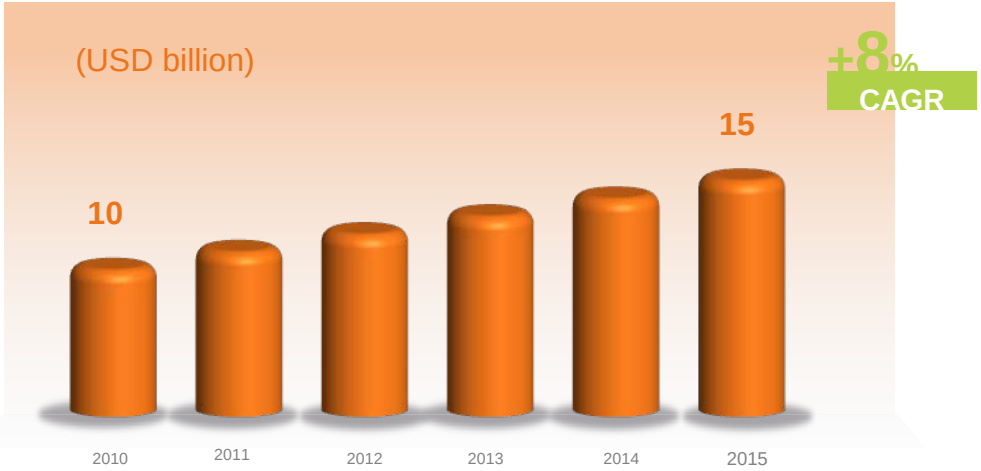
High-speed data transfers

ENERGY EFFICIENCY IS BECOMING A DRIVING FORCE IN EVERY MARKET

Source: Strategies Unlimited and Piper Jeffray Research

A mass market

LED lighting goes mainstream

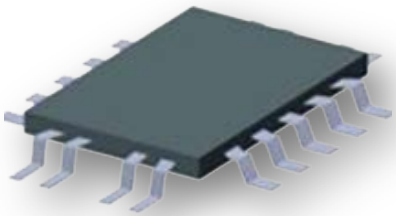


Source: Yole

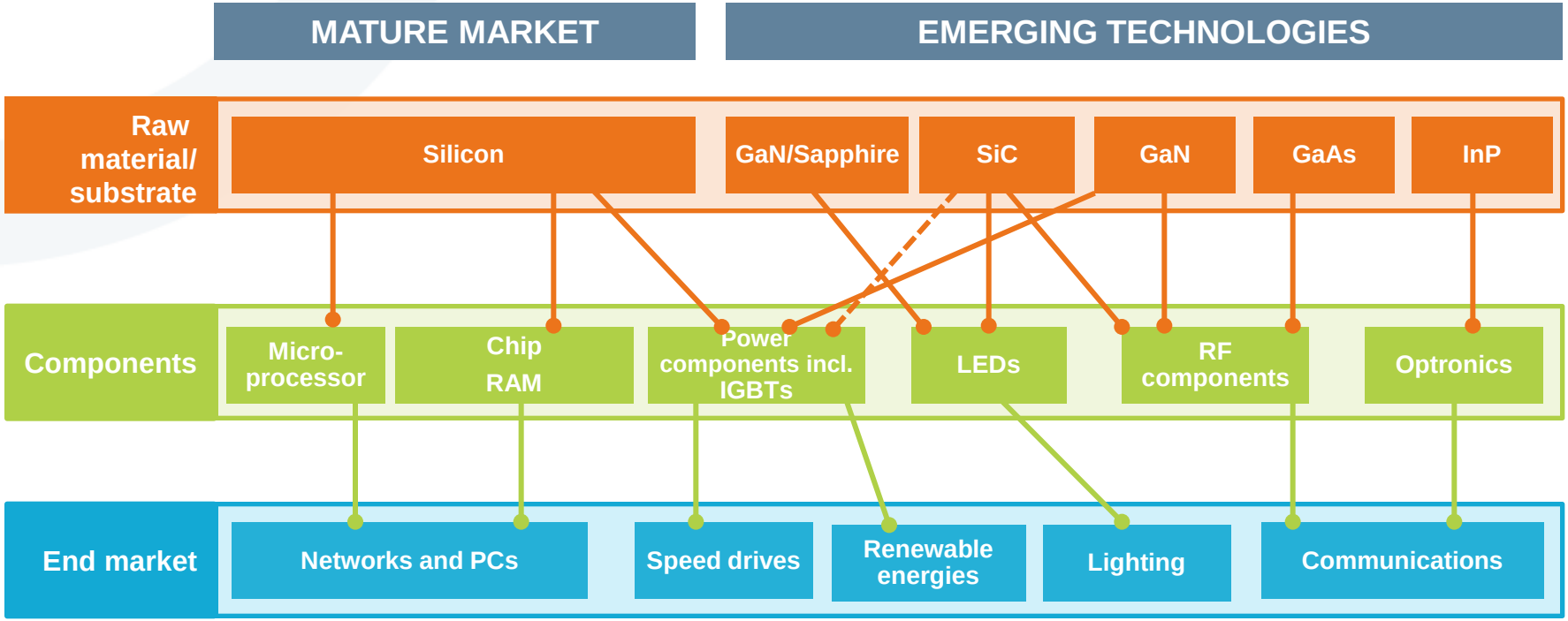
A highly technical market

AC speed controllers

MERSEN'S ROLE IN SEMICONDUCTOR FABRICATION



CONTINUOUSLY IMPROVED TECHNOLOGIES, FROM SILICON TO NEW MATERIALS



…DEMAND FOR INCREASINGLY SOPHISTICATED GRAPHITE PRODUCTS

MAJOR UPGRADES IN PRODUCTION PROCESSES

INCREASINGLY PURE

→ 0.01 PPB

PRODUCTION PROCESS REQUIREMENTS

INCREASINGLY BIG

→ 450MM

INCREASINGLY HOT AND CORROSIVE

→ 2,500° C

IMPROVE THE COST-EFFECTIVENESS OF OUR CUSTOMERS' NEW COMPONENTS AND ENSURE NEW DEVELOPMENTS

PROCESSES TO MEET INCREASINGLY EXACTING PURITY STANDARDS

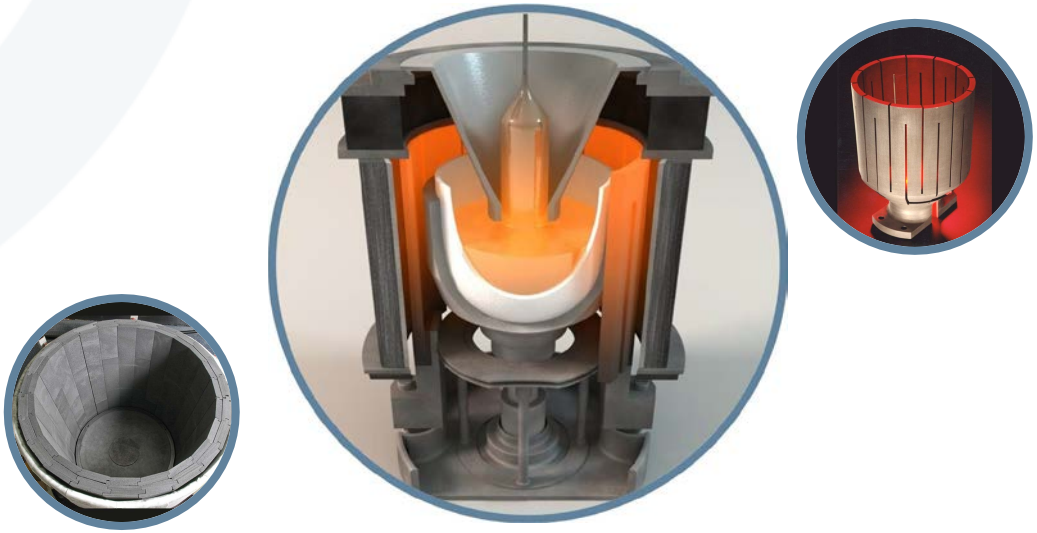
Development of purification and ultra-pure deposit processes

Supply **increasingly pure** products:

- *Impurities < 1ppm*

Ultra-pure material solutions for ingot pulling in Si, Sapphire, SiC, and other

PROCESSES TO PRODUCE BIGGER AND BIGGER WAFERS



Align the offering with the need for large blocks for ingot pulling (450mm wafers)

Supply **outsized** products:

- *E.g. 1,500 mm Ø isostatic graphite blocks*

Equipment for large Si, Sapphire, SiC and other crystal pulling furnaces

INCREASINGLY HOT AND CORROSIVE PROCESSES

High temperature epitaxy:
A very corrosive process

Development of new protective coatings against increasingly hot and corrosive environments

Tantalum carbide (TaC) coatings:

- *The equipment can resist the process for several hundreds of hours (versus several hours with an SiC coating)*

Graphite parts coated with new ultra-pure materials (including TaC) for SiC or GaN epitaxial processes

CURRENT CHALLENGES

Business challenges

- **Support the development of the MOCVD market in Asia** (LED market growth)

Technical challenges

- **Contribute to performance improvements in high-temperature epitaxy processes**
  - Support advances (size/yield) in the ingot growth processes (silicon, SiC, sapphire, etc.)
  - Make power components more competitive (especially for electric vehicles)

Capex around USD15m over 2 years (US and China)

CAPABILITIES TO SERVE MARKET NEEDS

An **extensive range** for the **major OEMs**

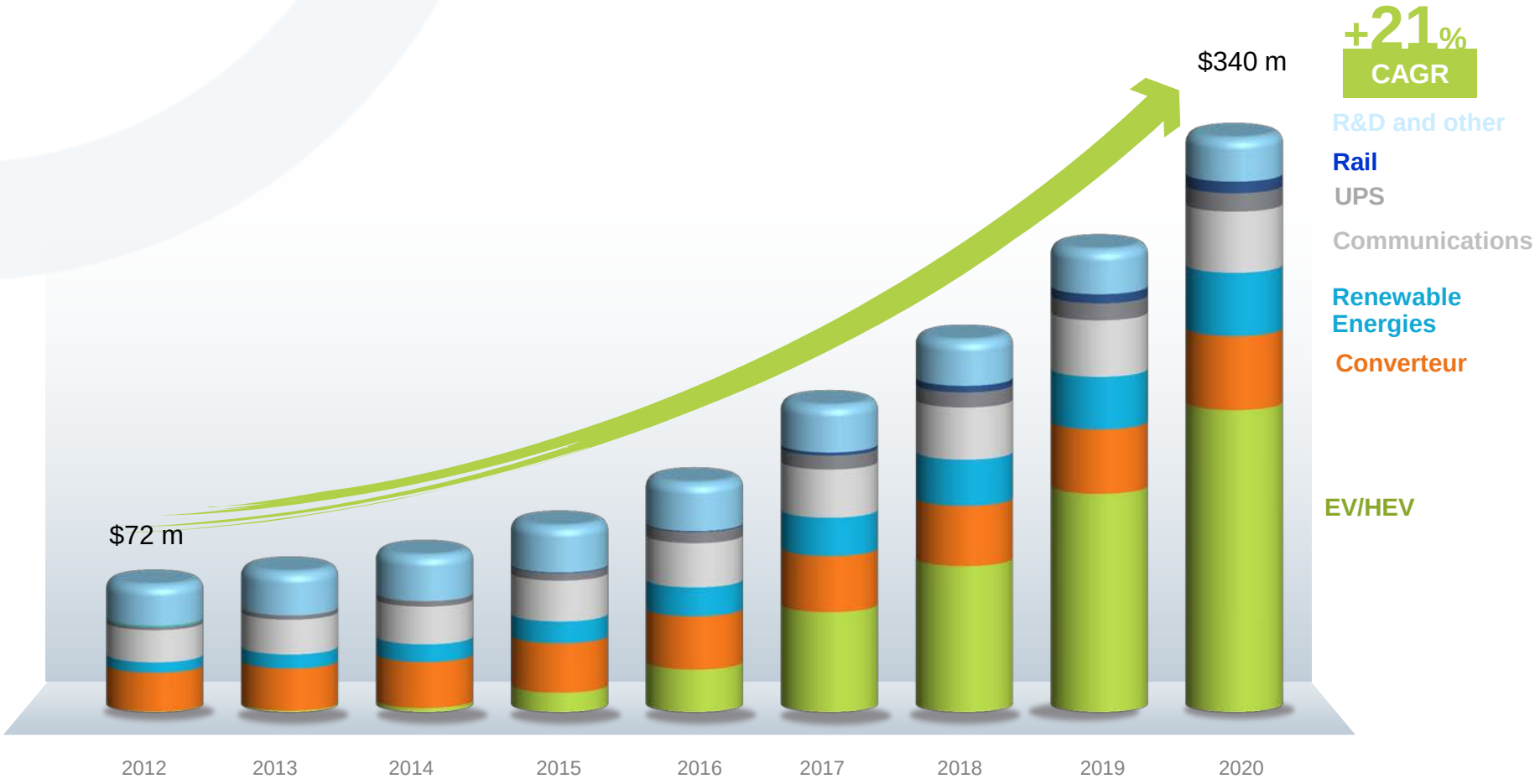
- Customized offerings
- Expertise in materials: graphite + insulator + coatings
- High-precision machining

Global sales coverage serving major **OEMs: Applied Materials, GT**, etc.

Manufacturing facilities specialized in semiconductors serving **local markets**: US, Europe, Asia

GOING FORWARD

DEVELOPMENT OF POWER COMPONENTS ON SiC SUBSTRATES



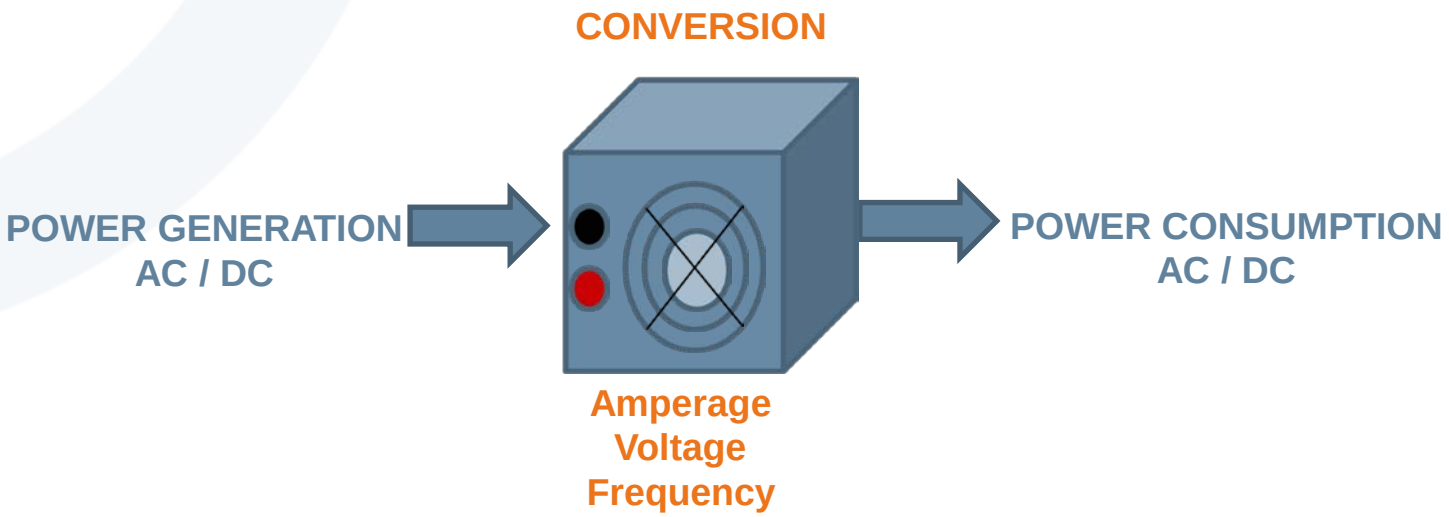
Source: Yole 2012

Driving Energy Efficiency

with power electronics

MERSEN

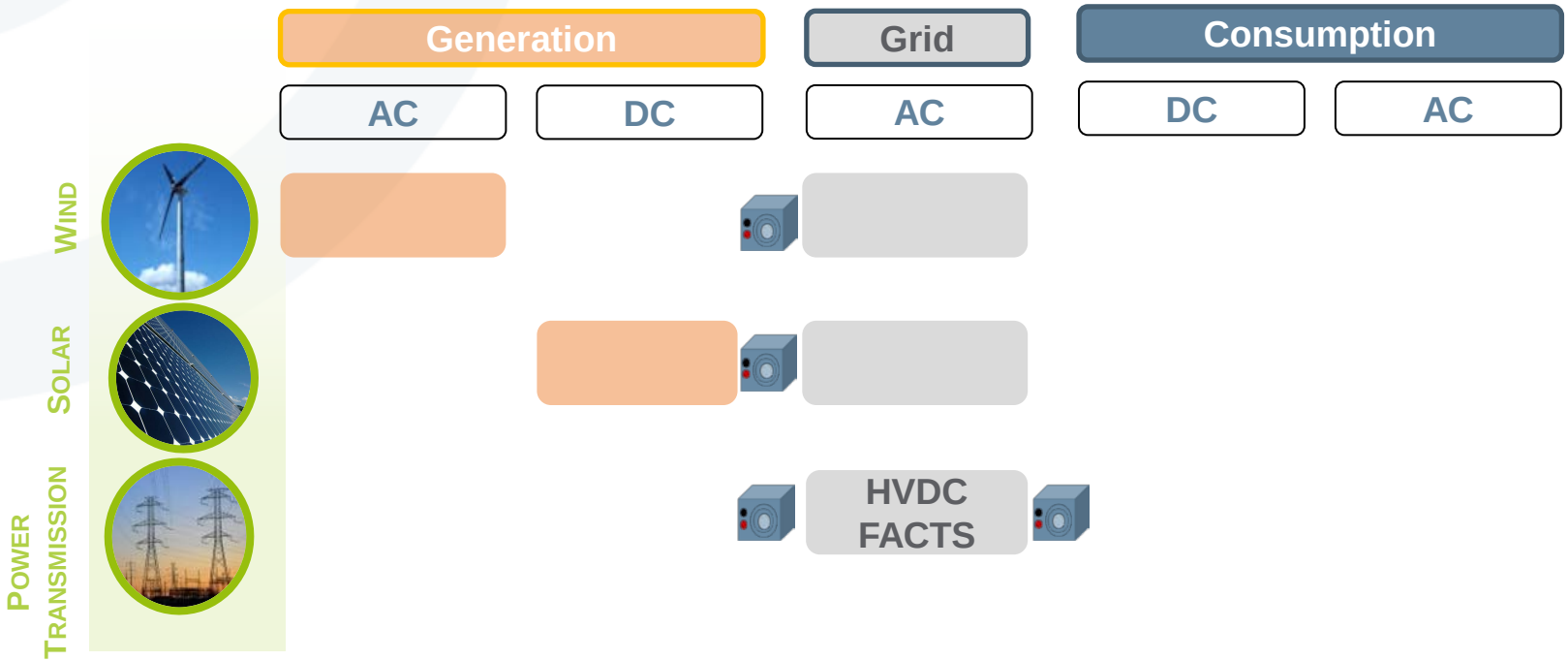
POWER ELECTRONICS REFERS TO THE "CONVERTING OF ELECTRICAL POWER"



- BASIC FUNCTION: to convert electric energy as efficiently as possible
- CONVERSION: in a form that the most divergent applications and users require

Mersen focus: high-end applications (power)
not on consumer electronics & low power suppliers

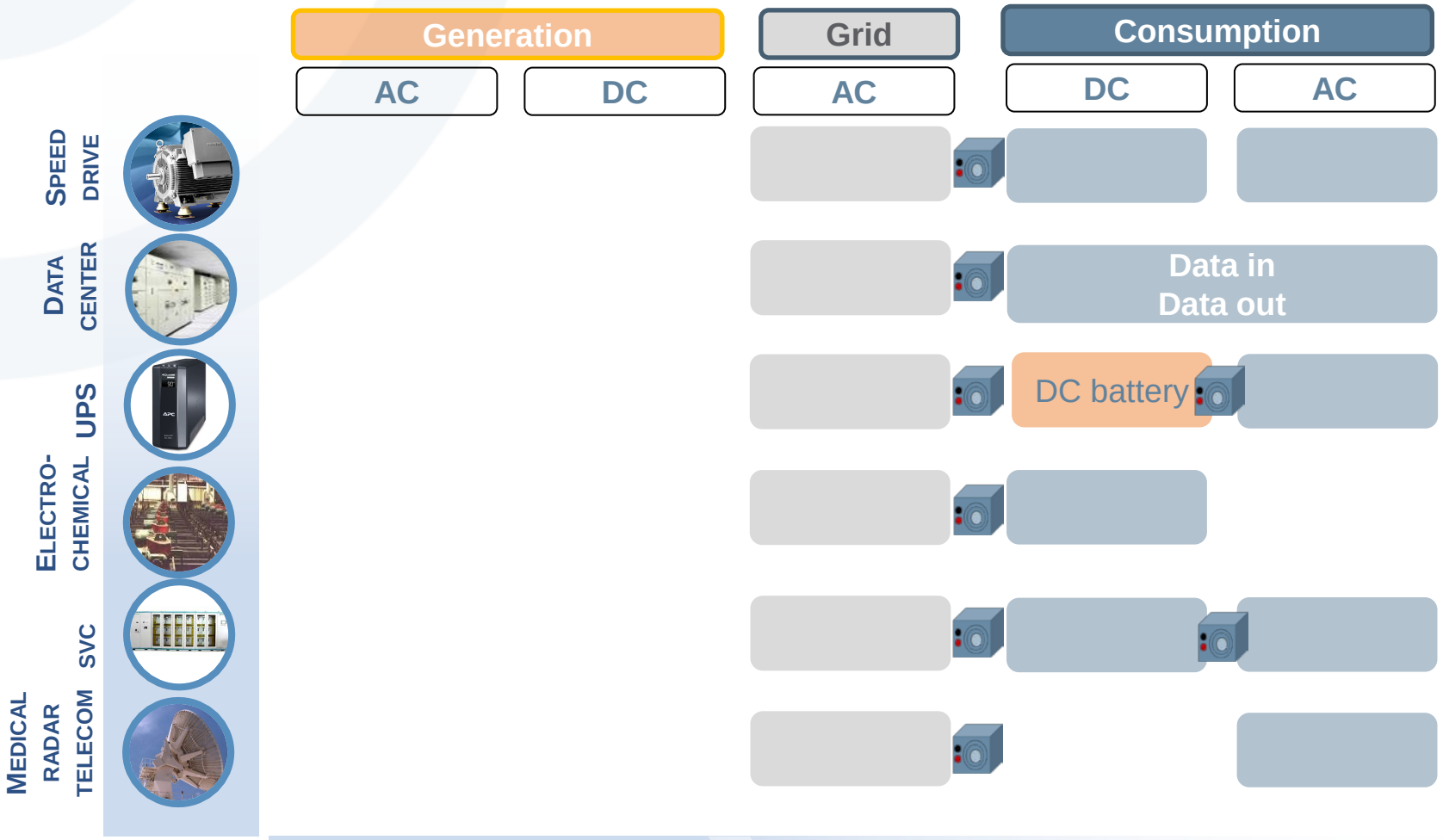
Where power needs to be converted? Energy market



Market drivers

- Alternative energy
- Urbanization
- Grid efficiency

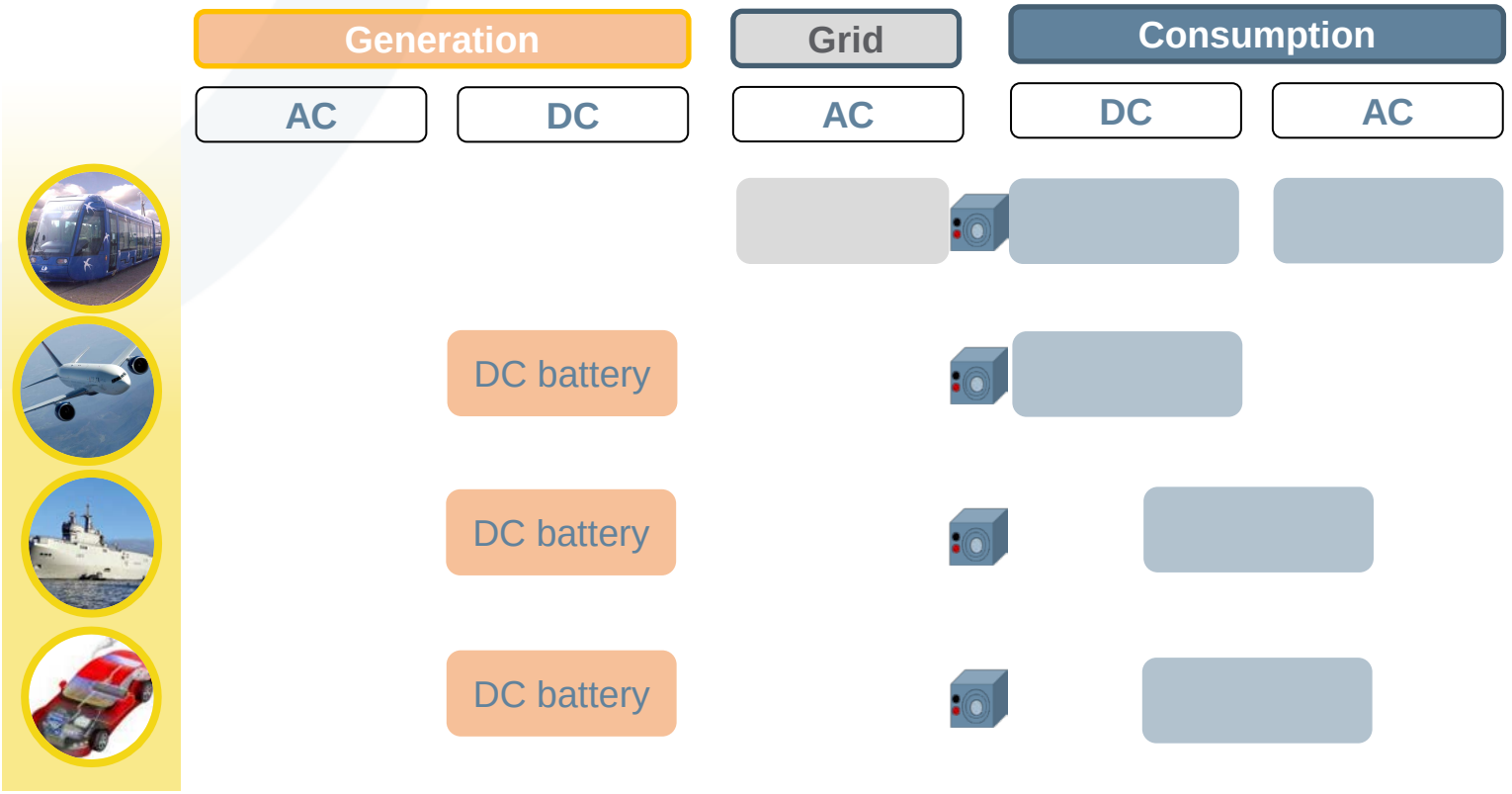
WHERE POWER NEEDS TO BE CONVERTED? INDUSTRIES/COMMERCIAL/IT



Market drivers

- REDUCE TOTAL COST OF OWNERSHIP
- ENERGY EFFICIENCY
- DATA STORAGE, CLOUD COMPUTING

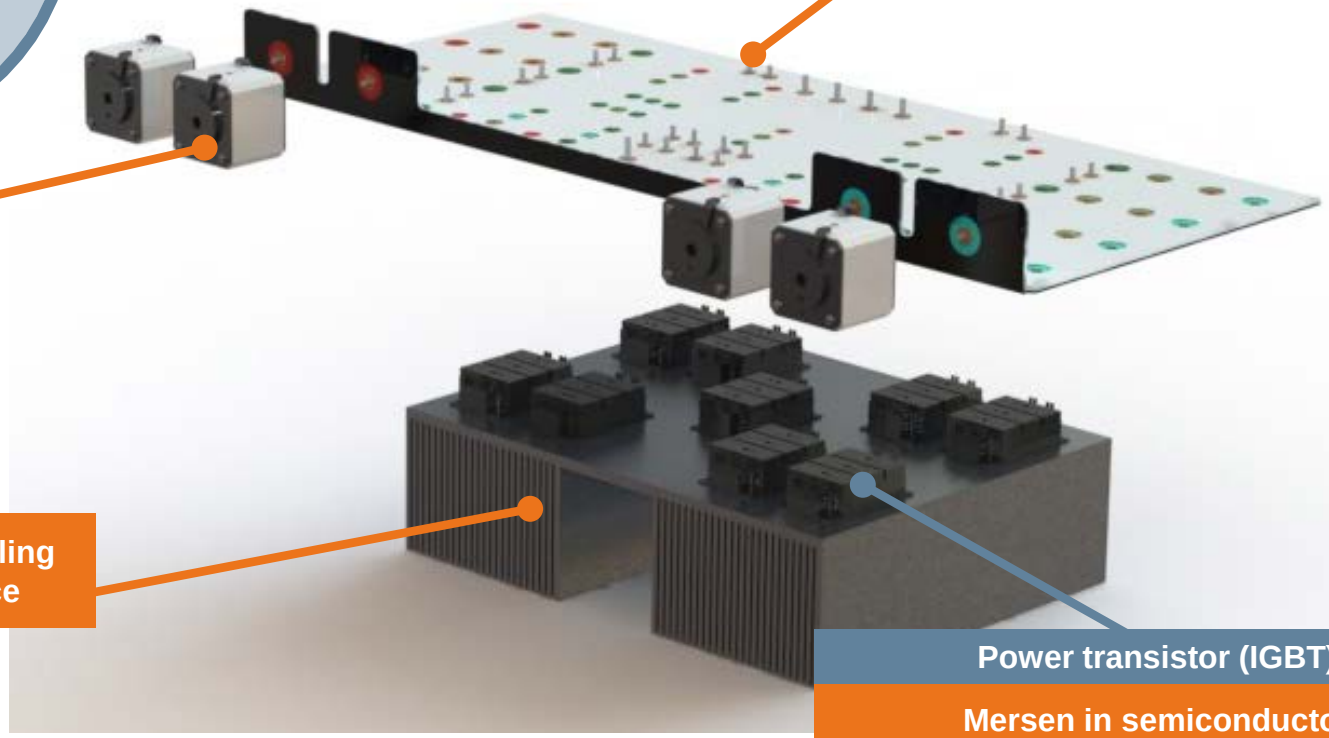
WHERE POWER NEEDS TO BE CONVERTED? TRANSPORTATION



Market drivers

- URBANIZATION & TRAFFIC CONGESTION
- REDUCE WEIGHT
- MOBILITY NEEDS
- LESS CO_2

MERSEN, IN THE HEART OF THE INVERTER



Laminated busbar
(low inductance / high current density)

Semi-conductor
Fuse

Air Cooling
Device

Power transistor (IGBT)

Mersen in semiconductor
manufacturing process

GROWTH SUSTAINED BY TECHNOLOGY GAINS & DRIVERS

- **Higher efficiencies** by systems energy savings (thermal management)
- **Higher power density** at systems levels (new material developments)
- **Customized packaging** of systems (integration of more components and functions)
- **Systems embedding:** modular integration, higher reliability

Requires power components manufacturer and system integrators to provide new innovative solutions

MERSEN: A UNIQUE POSITIONING

LARGE OEMS REQUIRE THE EXPERTISE OF HIGH PERFORMANCE POWER ELECTRONICS SUPPLIERS TO KEEP UP WITH THE MARKET

Fuji Electric
Rockwell Automation
EMERSON
EATON
Schneider Electric
SIEMENS
ABB
TMEIC
We drive industry

ALSTOM
MITSUBISHI ELECTRIC
Changes for the Better
SIEMENS
CNR 中国北车 永济新时速电机电器有限责任公司 YONGJI XINSHISU ELECTRIC EQUIPMENT CO.,LTD.
BOMBARDIER
THALES
Continental

Vestas
SMA
SIEMENS
Satcon
GOLDWIND

MITSUBISHI ELECTRIC
Changes for the Better
SEMIKRON
innovation + service
infineon
ABB
TOSHIBA
Leading Innovation

EFFICIENT DESIGN CAPABILITIES

2 High Power test Labs

Europe
- High power and low power
- IEC testing

USA
- High power and low power
- Surge testing
- UL approved for third party testing

Simulation means
- Thermal, Electrical
- On-line access

Worldwide Power Electronics specification and qualification capabilities
- Local technology-dedicated design center
- Power electronics specification team

AN INTERNATIONAL PRESENCE ALIGNED WITH THE MARKET

Start-off industrial operations for busbar & cooling

Toronto
Rochester
Newburyport
Juarez

St Bonnet
La Mure
Angers

Shanghai
Bangalore
Tokyo

MERSEN BUNDLE OFFER, A KEY DIFFERENTIATOR IN THE MARKET

SUPERIOR ABILITY TO TARGET THE MARKET

At the right place :

- International presence
- Relationship with OEM
- Search for “hidden champions”

At the right time

With the right solution:

- Power Electronics Specification team
- Dedicated local design offices

Leveraging the Eldre Acquisition Market

New staged entry point

In development process at existing customers

New customers

Where Mersen's cooling devices & fuses not applicable or in tough competition

New field of technological development

T (°C) – V
Battery management failure modes

New geographical development

Asia

Leveraging the Eldre Acquisition Facts

A **fair acquisition price** resulting from Mersen capability and culture to provide a strategic future to family-owned businesses

A smooth integration with:

- Progressive change from a family driven culture to a multinational culture
- Local management reinforced and supported
- Reinforcement of a Power Electronics Specification Team with Eldre key skills
- Balanced industrial & marketing plan in China

A **relutive contribution** in H1 2012 despite economic slowdown

An exciting pipeline of **new opportunities** and qualified projects with a potential for 2014 & beyond of accelerated growth

SUSTAINED STRATEGIC FOCUS

Reinforce leading position and remain in front position with current OEM customers

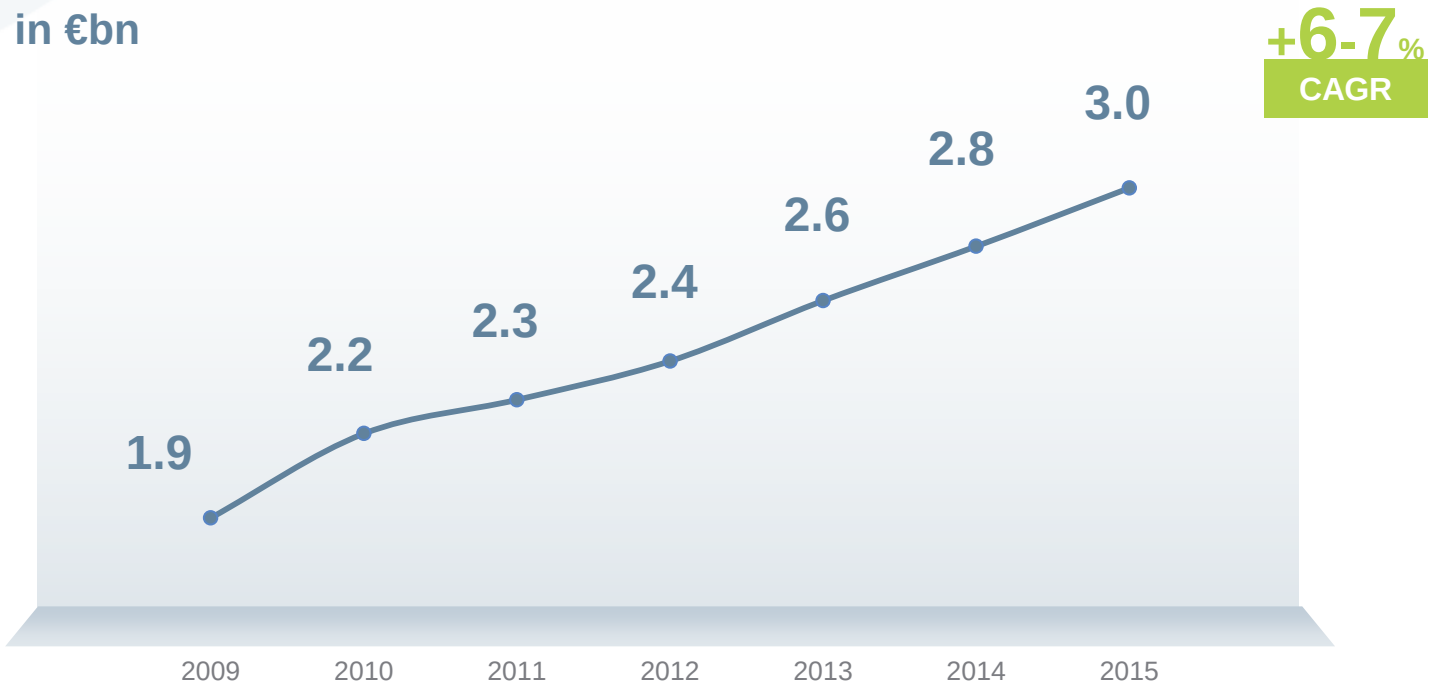
Capitalize synergies on Eldre's acquisition

Broaden our bundle offer beyond semiconductor fuses, cooling and busbars

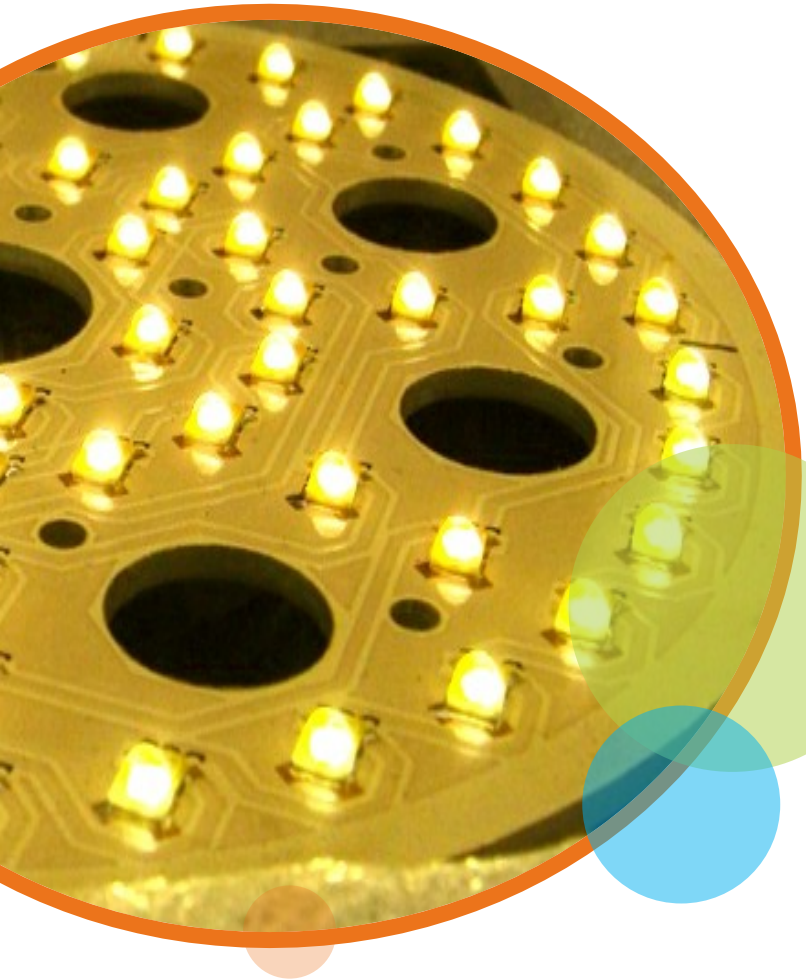
Maintain business leadership to support OEM customers' global footprint, including China

MERSEN'S OBJECTIVE: OUTPERFORM THIS SIGNIFICANT, GROWING MARKET

Key Components for power inverters
(fuses, cooling devices and laminated busbars)



** Source: Mersen and Yole (2011) – Excluding EV/HEV projections*



CONCLUSION

ELECTRONICS TO SERVE AN INCREASINGLY POWER-HUNGRY WORLD

- Bringing electricity to off-grid communities
- Global economic growth
- Development of transportation "CO_2 free"

Major growth in worldwide power consumption

The shift to new energy sources

From fossil fuels to renewable energies
(smaller carbon footprint)

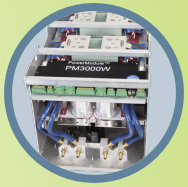
- Power conversion and transmission
- Grid quality

Energy efficiency

- Efficiency of electric motors (70% of all power consumption) → **speed drives**
- More efficient lighting → **LEDs**
- New power transistors → **SiC** IGBTs

Strong, secure growth in power electronics and substrates

MEDIUM AND LONG-TERM VISION



Power electronics

Semiconductor fab equipment

MERSEN'S VISION

OUTPERFORM
on average these 2 markets
over the next 5 years
with faster growth expected after 2015

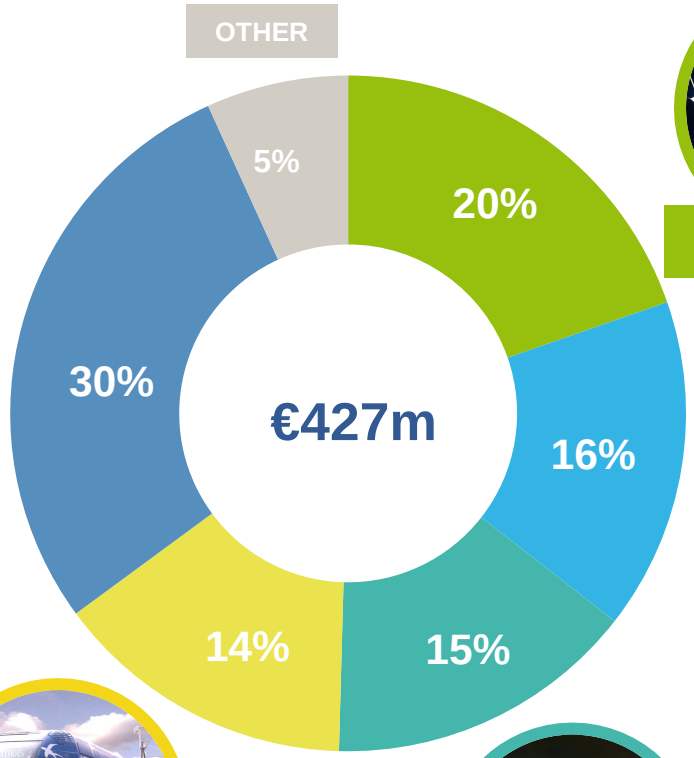
MERSEN

Interim Results

RESULTS THAT DEMONSTRATE THE MODEL'S ROBUSTNESS

- **REVENUE VARIES BY:**
  - End market
  - Geography
- **A RESILIENT MODEL IN A DIFFICULT ENVIRONMENT**
  - H1 2012 operating margin: **10.4%**
- **RESOURCES TO SUPPORT GROWTH**
  - Strong cash flow from operations: **€40 million**
  - Longer debt maturities, now close to **5 years**
- **OUTLOOK**
  - A second half largely dependent on the economy
  - Further out, demand driven by the solar energy, electronics and chemicals industries

VARYING SITUATIONS, DEPENDING ON THE MARKET



ENERGY

-21%

Steep decline in solar. Windpower market held up well

PROCESS INDUSTRIES

+9%

Slowdown in Europe
Growth in US and China

ELECTRONICS

+8%

Loss of market momentum.
Positive impact of Eldre integration

TRANSPOR-TATION

+8%

Growth in air transportation.
Slowdown in rail transportation

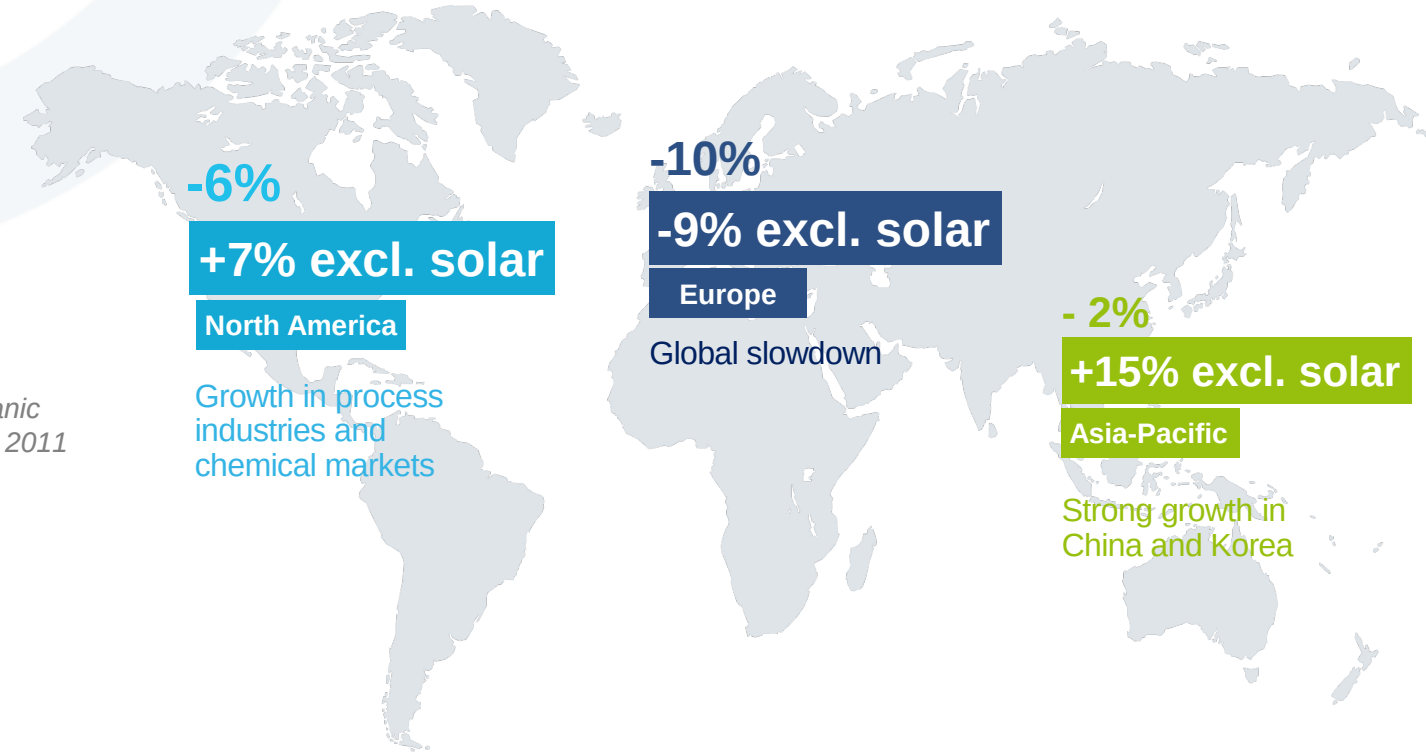
CHEMICALS

+22%

Investments

H1 2012 trends
Based on historical values

EXCLUDING SOLAR, SIGNIFICANT GROWTH IN ASIA AND NORTH AMERICA



H1 2012 organic growth vs H1 2011

Solar: this year's demand-driven slowdown coming to an end

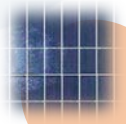
- No recurring new equipment sales
- Manufacturers have been accumulating excess cell inventories since Q3 2011
- The major polysilicon producers (Wacker, Hemlock) are still investing

Steep drop in Mersen's sales in H1

- New solar panels are still being installed (15GW est. in H1 2012)
- Chinese manufacturers have stepped up their cell production since Q2

Recovery in graphite demand expected in Q4

SOLAR: MERSEN IS WELL PLACED TO PROFIT FROM UNDERLYING CHANGES IN THE MARKET



On-going
solar panel installations

15 GW* installed in H1 (up 50% vs. 2011)

34 GW* est. in 2012 (vs. 27GW in 2011)

Increase in the number of installer countries

New growth drivers: China, USA, Japan, India, Australia, the Sunbelt

Sharp **drop** in photovoltaic cell and polysilicon prices in the past two years

Making solar power increasingly profitable (grid parity attained in many countries)

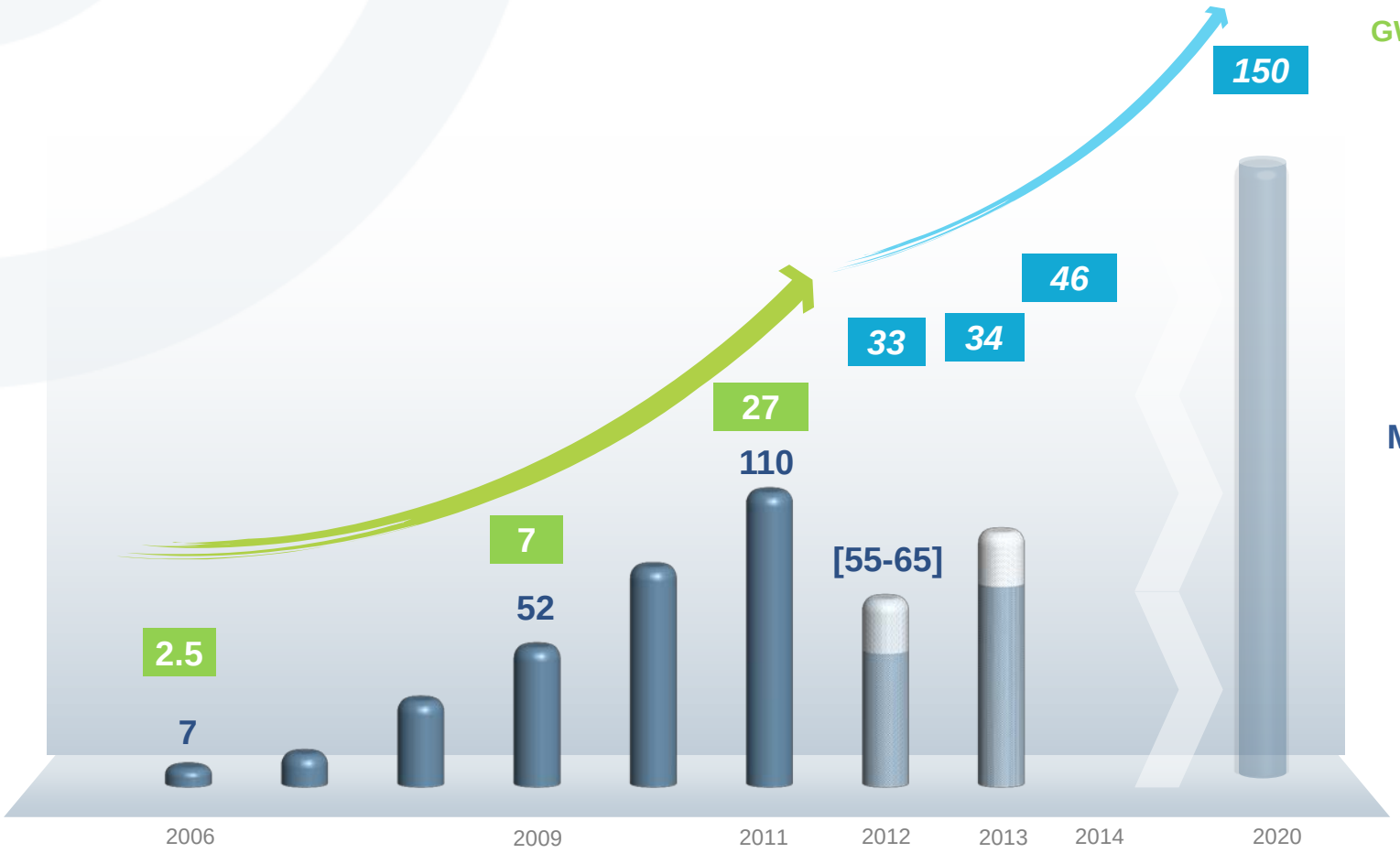
Moderate impact on graphite prices

Since mid-2011, the majority of photovoltaic cells are made in **China****

Mersen has a solid **manufacturing base** in China and has been supplying local cell manufacturers for many years

* Source: Photon July 2012
** Q-cells, Sovello and others have discontinued photovoltaic cell production

SOLAR: A ROBUST OUTLOOK



2011 Excess inventory High sales of new equipment

2012 Cell inventories drawn down

2013 Upturn in production output. No new equipment sales

Sources : Photon 2012

A SIGNIFICANT ORDER BACKLOG IN THE CHEMICALS MARKET

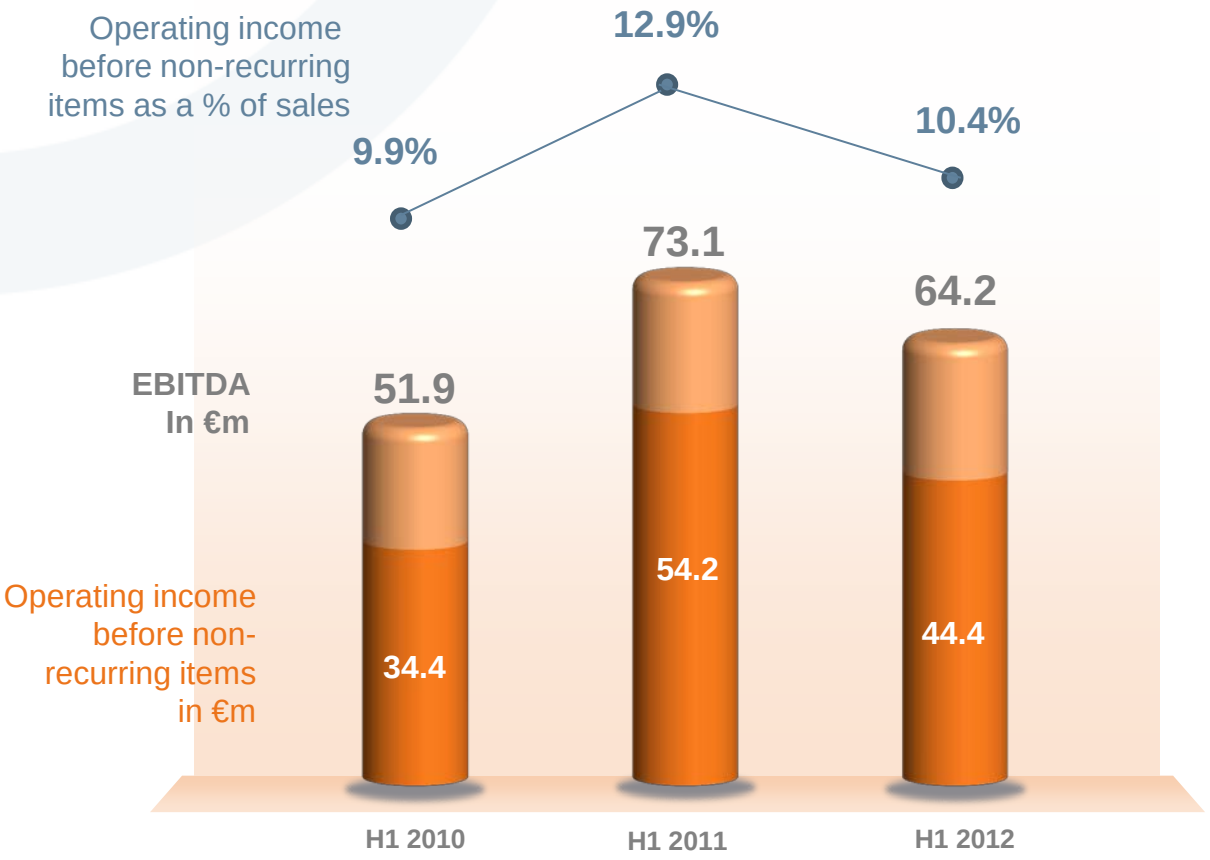
- **Energy, mining processes**
  - Rare earths
  - Oil industries
  - Shale gas

- Increasing demand for **fertilizers** (Morocco)

- **Considerable investment in specialty chemicals processes**
  - SABIC contract

ORDER BACKLOG **+25% SINCE DEC. 2011**
+60% SINCE JUNE 2011

OPERATING INCOME PERFORMANCE CONFIRMING THE GROUP'S RESILIENCE



S1 2012

- Lower volumes
- Unfavorable **product mix**
- €8m **cost saving plan**
- Limited **price and materials cost effect**

STRONG CASH FLOW GENERATION*

H1 2012

- On-going **cash-initiative program**
- **No change** in late payments in China since December 2011
- **Built up of inventories** ahead of expected recovery in solar orders

* Before capital expenditure

A Sound Financial Position

Net debt at June 30, 2012: €255m

	Ratios at June 30, 2012	*Maximum ratios set in Debt covenants*
Net debt/EBITDA*	1.98	*3.35*
Net debt/Equity*	46%	*130%*

* Ratio calculated by the method specified in the covenants clauses for the November 2011 USD 100 million US private placement notes and the July 2012 syndicated credit facility.

DEBT MATURITIES EXTENDED ON ATTRACTIVE TERMS

Sept. 11 **CNY500m >** Syndicated facility in China extended by one year to 2014

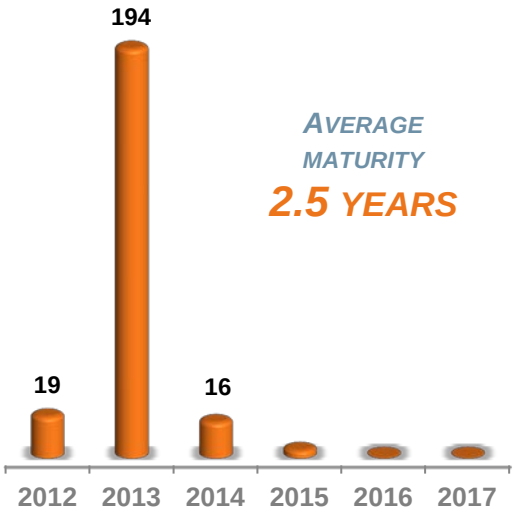
Nov. 11 **USD100m >** US private placement notes (4.7% fixed rate - average maturity 9 years)

July 12 **EUR215m >** Bank lines of credit (initial average spread close to 115 bps[1] - average maturity 4.8 years)

[1] Adjustable up or down based on the Group's net debt/EBITDA ratio

REPAYMENT PROFILE, COMMITTED LINES OF CREDIT (€M)

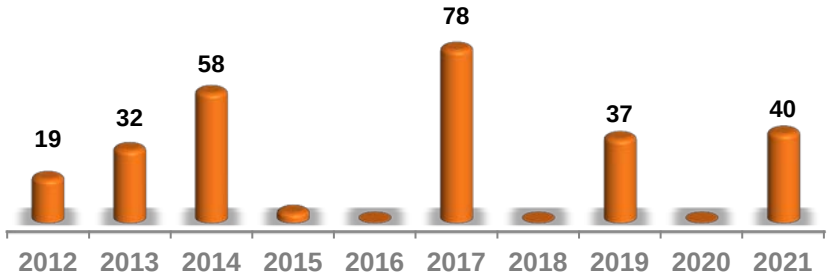
JUNE 30, 2011[2]



AVERAGE MATURITY
2.5 YEARS

JUNE 30, 2012 AFTER REFINANCING[3]

AVERAGE MATURITY
4.7 YEARS



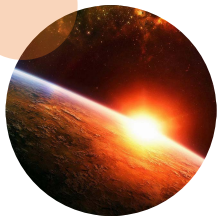
THE AVAILABLE DRAWING FACILITIES (€150M) SUFFICIENT TO COVER SHORT-TERM REPAYMENT OBLIGATIONS

[2] Based on amounts drawn down at June 30, 2011, at June 30, 2012 exchange rates
[3] Based on amounts drawn down at June 30, 2012

OUTLOOK

2ND HALF

- Macro-economic environment will remain **difficult**
- Recovery in **solar** order flow in Q4
- Unfavorable **product mix**
- **Positive impact** of adaptation plans



BEYOND

- Momentum in **solar** and **electronics** markets
- Significant backlog in **chemicals** market