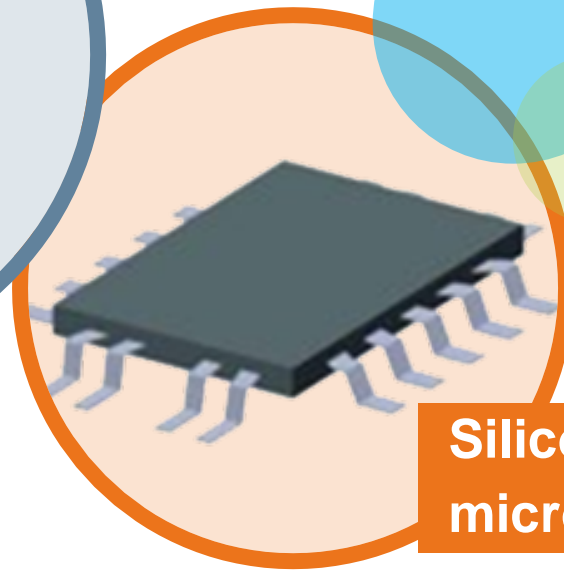




SEMICONDUCTOR

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

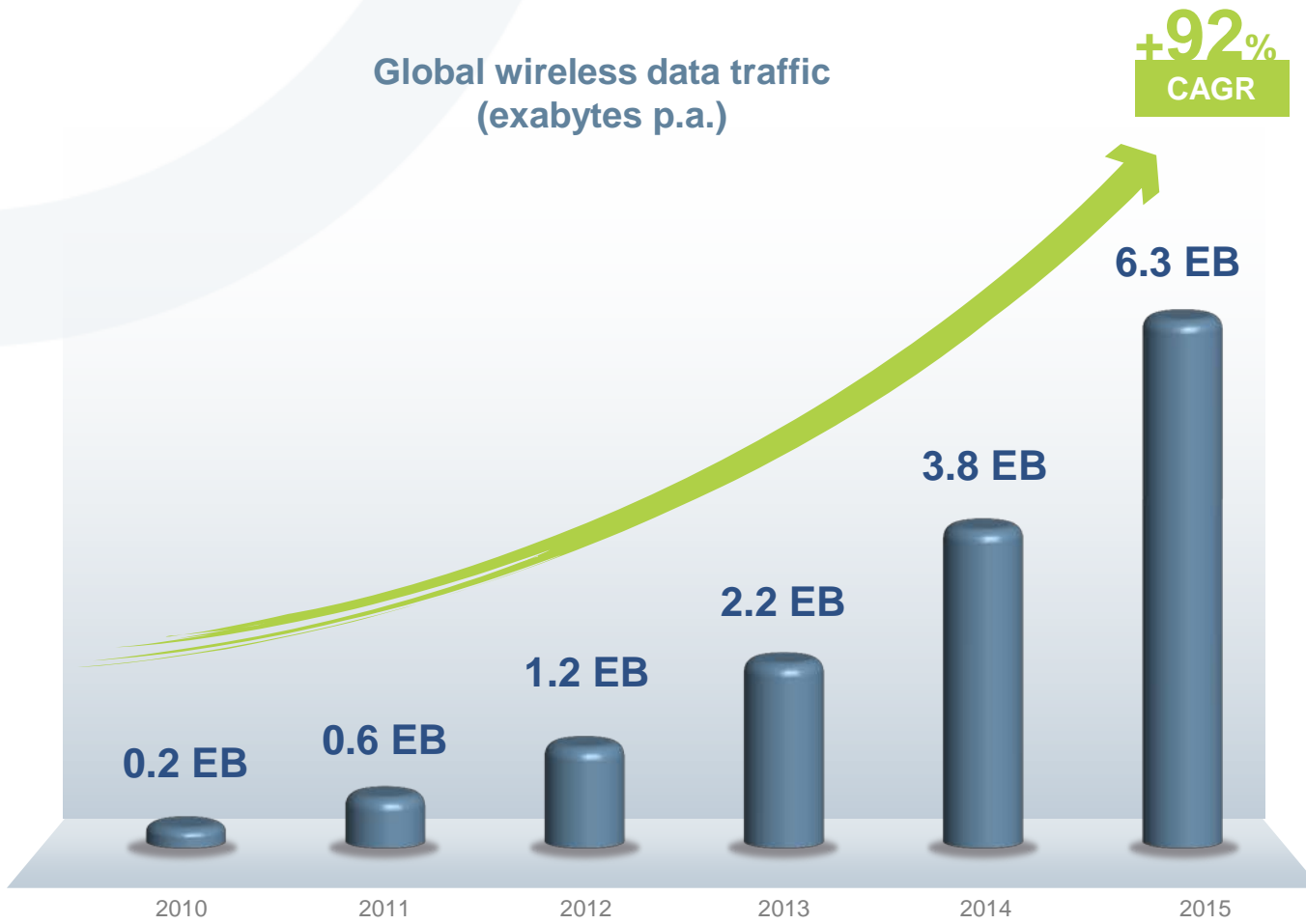
- › Low-energy lighting
- › Electricity grids
- › Speed drives

...TO BE JOINED IN THE FUTURE BY A FOURTH

HYBRID AND/OR ELECTRIC VEHICLES

THE WIRELESS COMMUNICATION MARKET IS JUST BEGINNING TO EXPAND

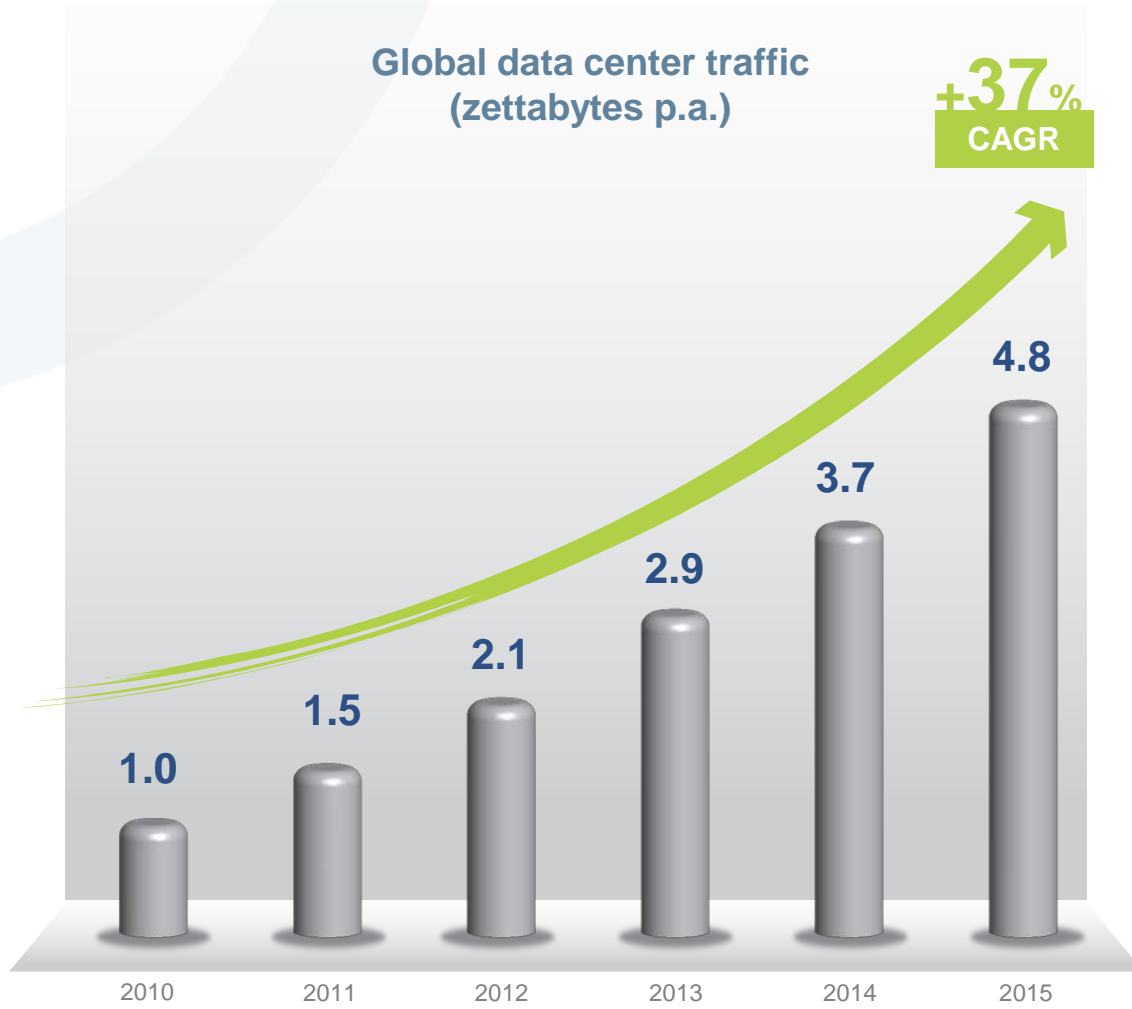
Global wireless data traffic
(exabytes p.a.)



EB: exabytes = 10^{18}

Source: Cisco VNI Mobile, 2011

DATA STORAGE CAPACITY IS RISING SHARPLY



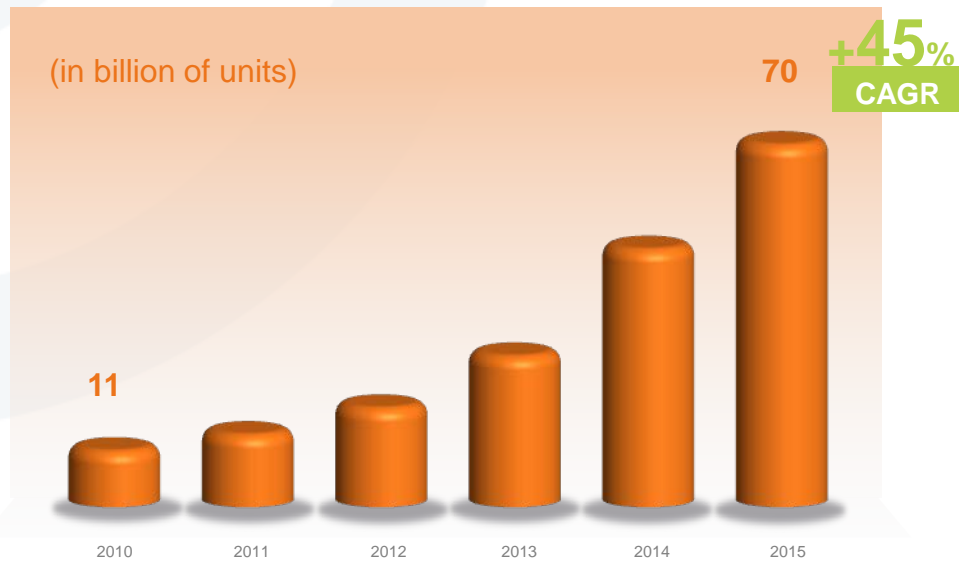
Zettabytes = 10^{21}
Source: Cisco and Mersen estimates

Reduction in data storage costs

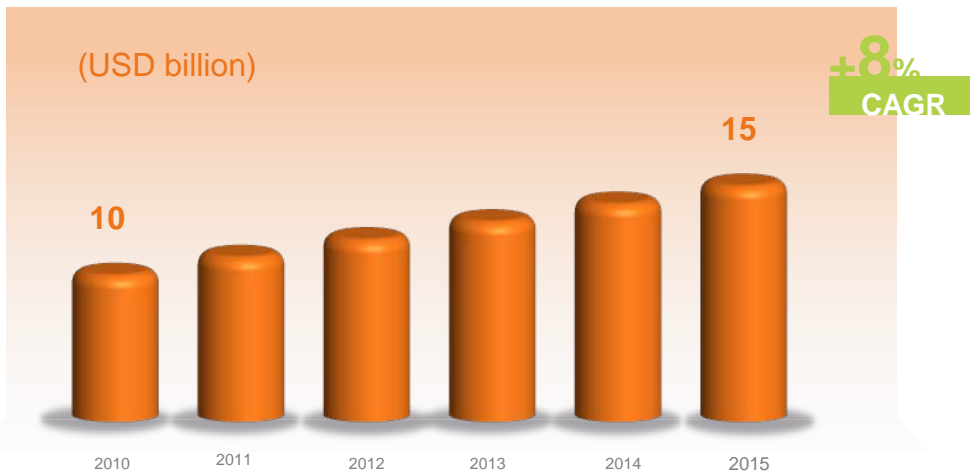


High-speed data transfers

ENERGY EFFICIENCY IS BECOMING A DRIVING FORCE IN EVERY MARKET



Source: Strategies Unlimited and Piper Jeffray Research



Source: Yole

A mass market

LED lighting goes mainstream

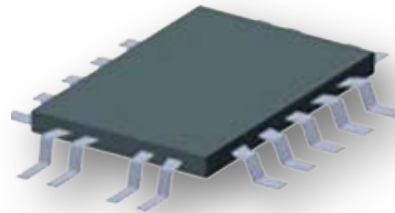


A highly technical market

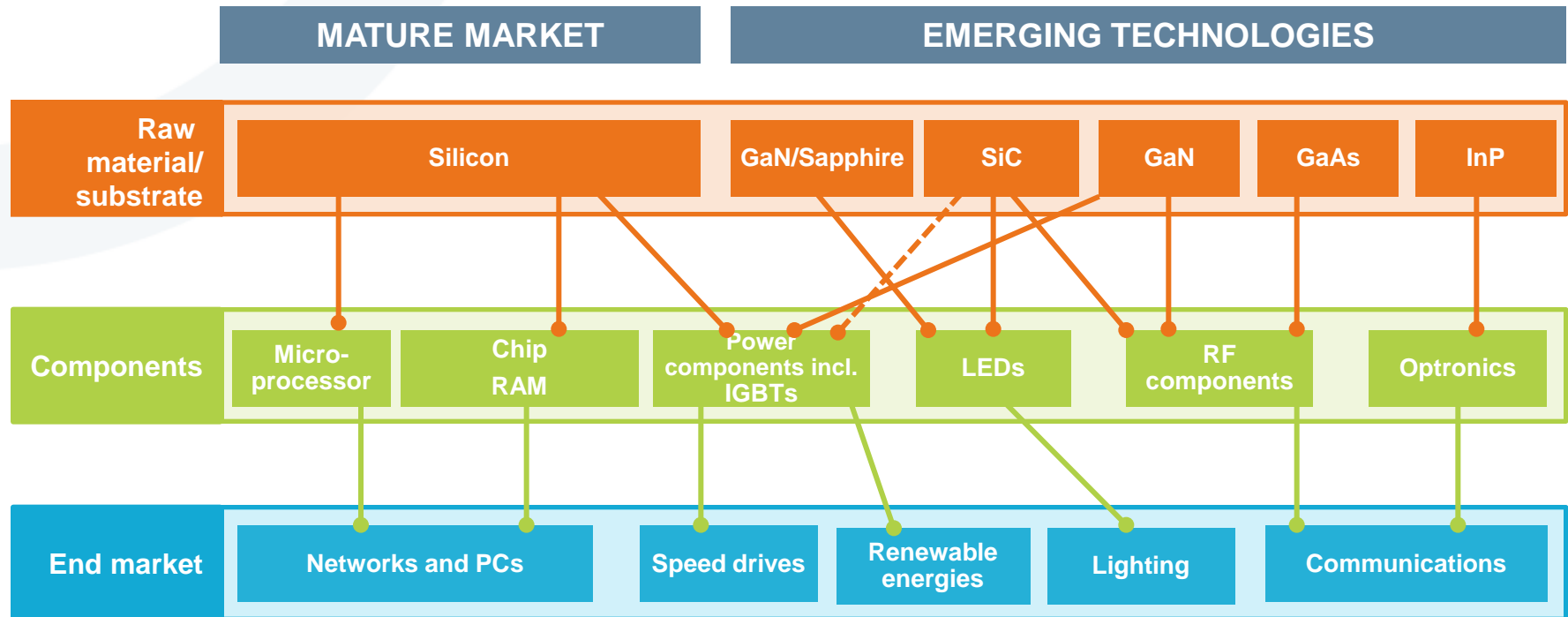
AC speed controllers



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

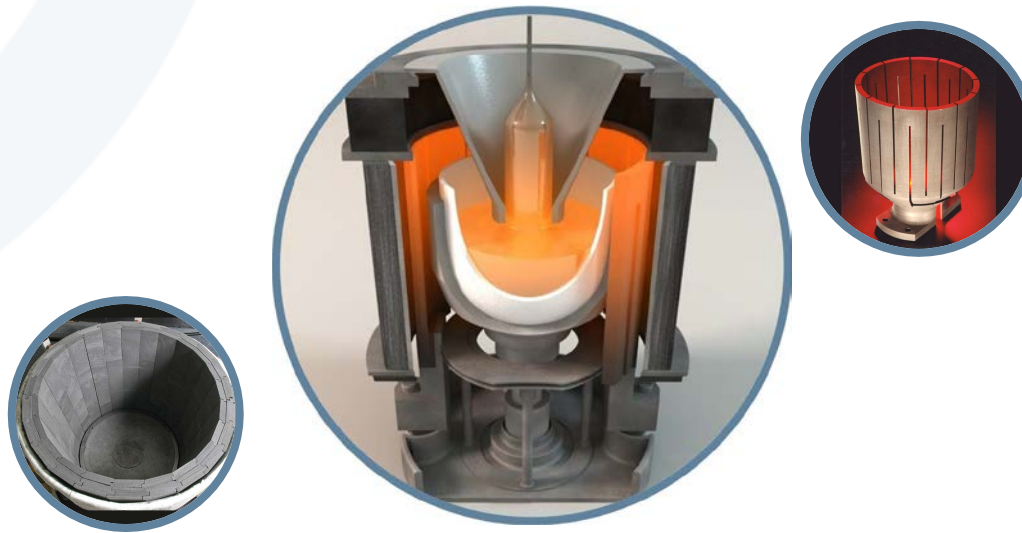


Development of purification and ultra-pure deposit processes

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



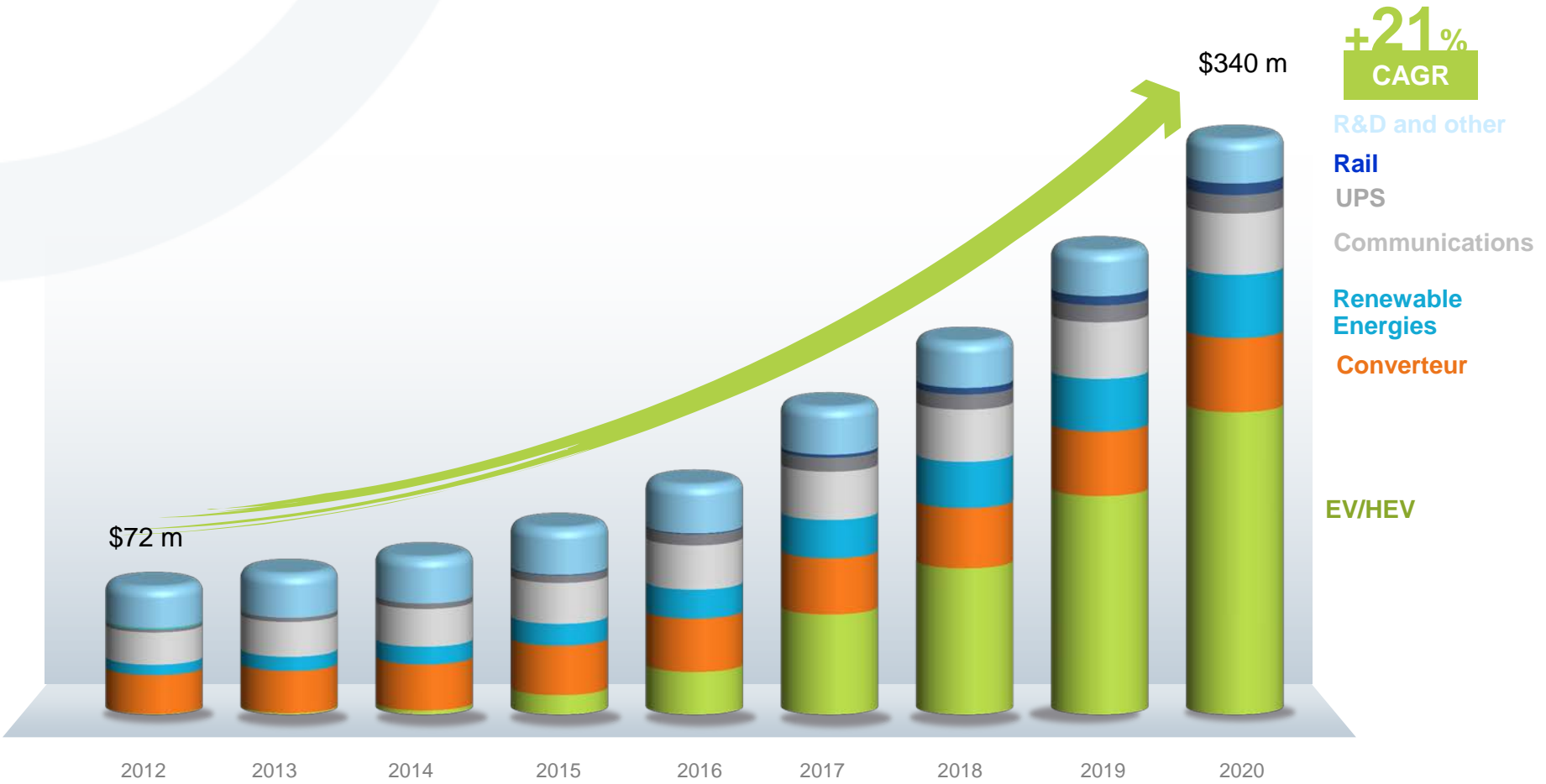
Global sales coverage serving major **OEMs**:
Applied Materials, GT, etc.



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

GOING FORWARD

DEVELOPMENT OF POWER COMPONENTS ON SiC SUBSTRATES



Source: Yole 2012