

MAPS:

VAT vacuum valves play a key role in the global digital transformation.

The world is being profoundly changed by the rapid development of digital technologies. The Internet of Things, cloud computing, wireless communications everywhere, and rapid progress in artificial intelligence promise to improve the quality of life for people all over the world. The following pages show how VAT's advanced vacuum valves contribute to this unprecedented development.

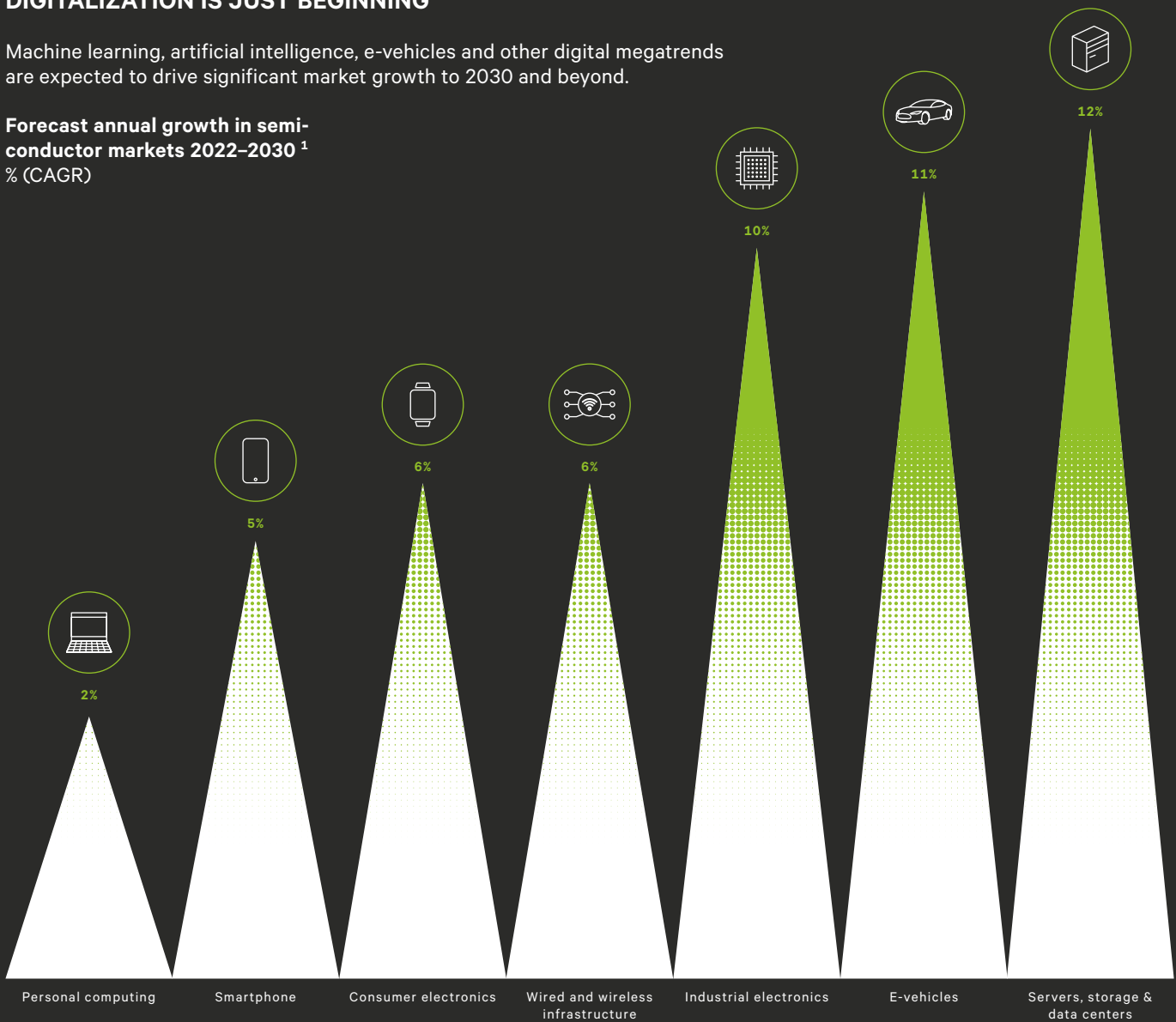
AT THE EPICENTER OF LONG-TERM GROWTH

Megatrends such as digitalization, renewable energy and life sciences will drive demand for semiconductors and other vacuum-based manufacturing for years to come.

DIGITALIZATION IS JUST BEGINNING

Machine learning, artificial intelligence, e-vehicles and other digital megatrends are expected to drive significant market growth to 2030 and beyond.

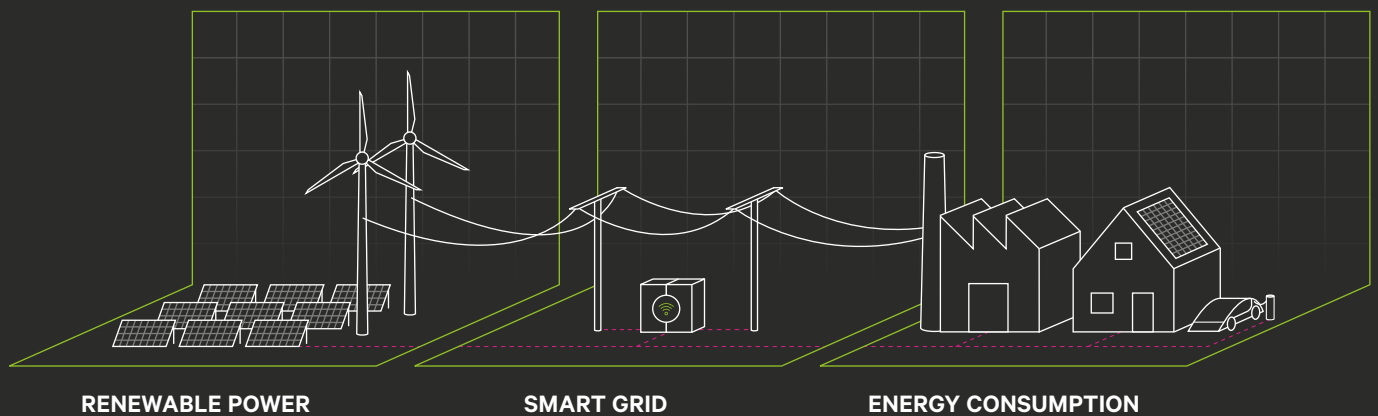
Forecast annual growth in semiconductor markets 2022–2030¹
% (CAGR)



Source: 1 Gartner Q3 2022 forecast, years 2027–2030 extrapolated by VAT using historic average CAGR; 2 Allied Market Research Renewable Energy Market, Sept. 2021; 3 Market Research Future Life Science and Analytical Instruments Sept. 2022

Generating, transmitting and using renewable power requires advanced semiconductors — and the vacuum valves needed to manufacture them.

VACUUM-BASED PROCESSES ARE FOUND ACROSS THE ENTIRE RENEWABLE ENERGY VALUE CHAIN



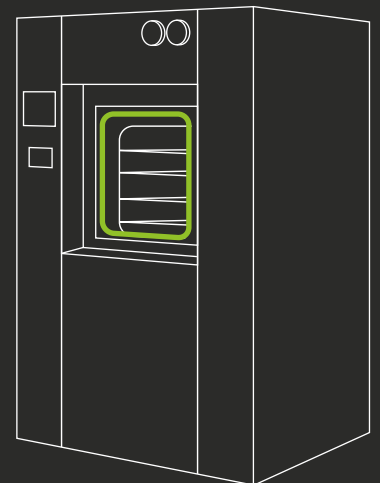
Forecast annual semiconductor market growth from renewable energy 2021–2027
% (CAGR)²

+8%

Biotech moving to nano-scale technologies

High-vacuum technology is key to analytical, medical and other precision equipment. This market is expected to grow more than 7% per year (CAGR) from 2021–2027.³

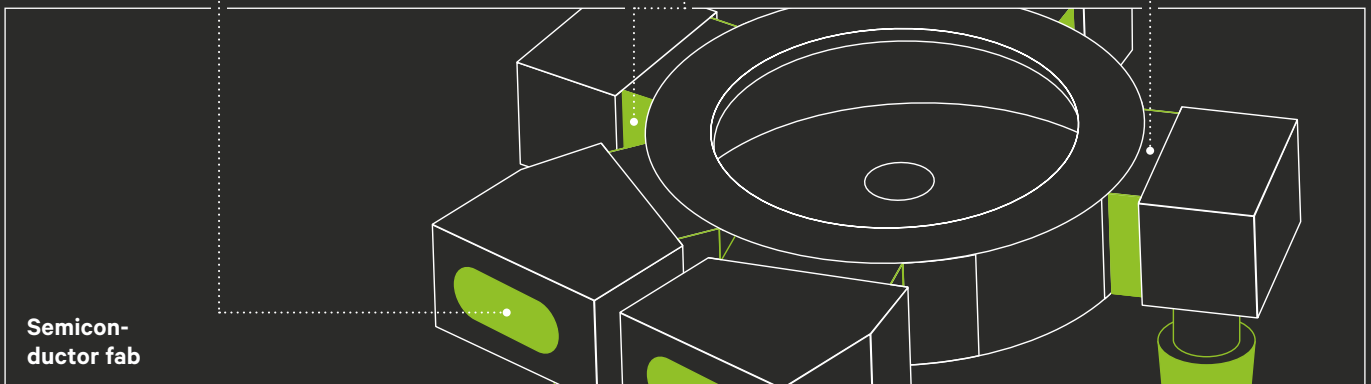
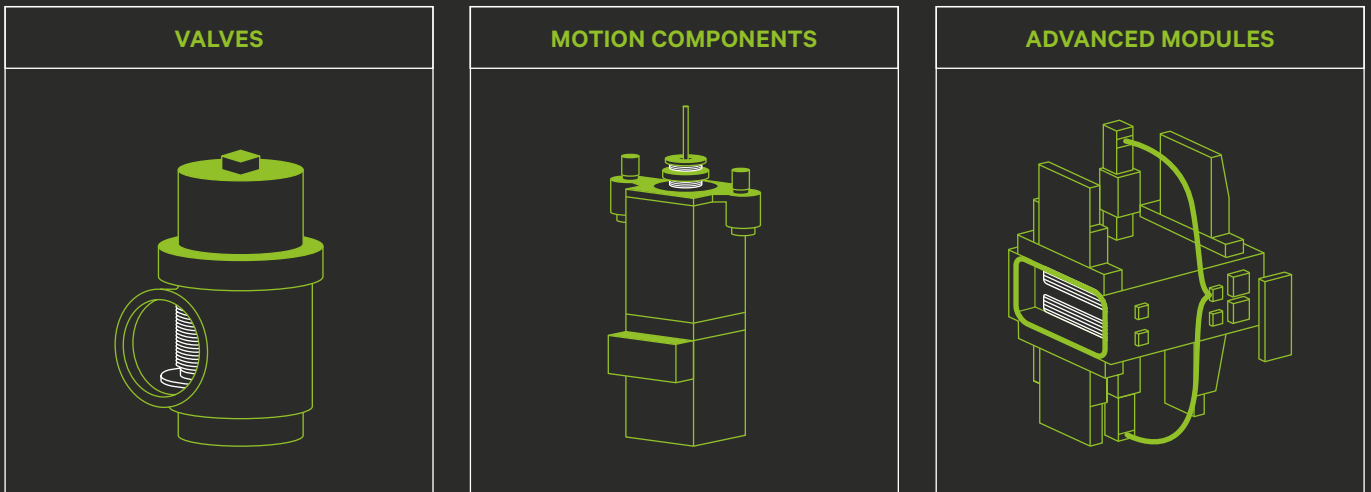
Medical sterilizers with vacuum-based electron-beam chambers



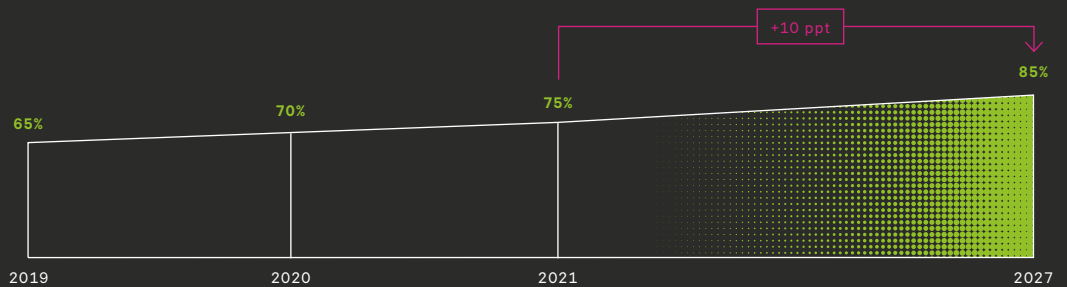
VAT VALVES ARE ESSENTIAL TO THE SEMICONDUCTOR INDUSTRY

VAT is the world's leading supplier of vacuum valves to the semiconductor industry, creating the high-purity vacuum chambers needed to manufacture integrated circuits at a molecular scale. As semiconductors become more powerful and more complex, the need for VAT's high-performance valves increases, driving growth and profitability.

Our product lines



Market share growth
Greater semiconductor complexity will drive demand for high-end valve solutions and boost VAT's market share.



Moving into adjacent markets will drive significant new growth beyond our core valves market.

**EXAMPLE:
MOTION COMPONENTS**

- Focus on dry etch and deposition processes
- Outgrow market by $\approx 2x$
- VAT as one-stop-shop for high-precision plug-and-play motion components

**Forecast annual motion components sales growth 2022-2027
(CAGR)**

+27%

**EXAMPLE:
ADVANCED MODULES**

- Targeting leading edge semiconductor platforms
- Option to add further adjacent components
- Smallest footprint for greater performance in smaller area

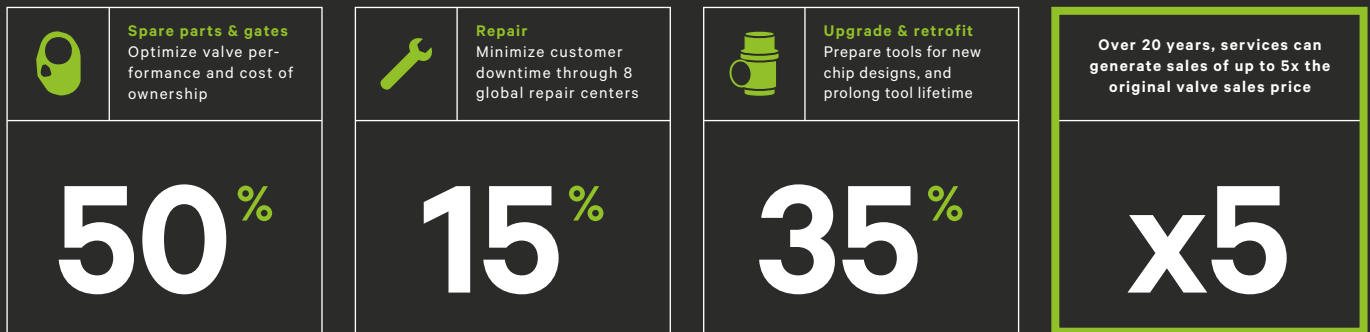
**Forecast annual advanced modules sales growth 2022-2027
(CAGR)**

+13%

GLOBAL SERVICE TO BUILD MARKET STRENGTH

VAT's Global Service network builds trust, strengthens customer relationships, increases market share and lifts profitability. And as VAT's installed base of valves continues to grow – in 2022 at about 1.5 million – the service business provides a steady flow of revenues through the business cycle.

Approximate share of segment sales by service type

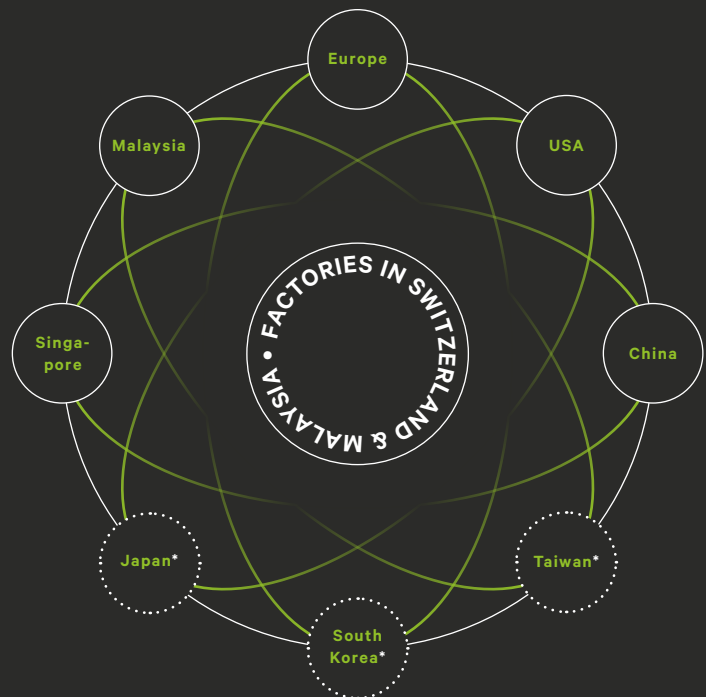


Global Service net sales growth target (CAGR) 2023–2027

+13%

- VAT already has the **largest repair network** in the industry with **8 service centers**
- **3 upgraded service centers** opening in 2022 in Japan, Korea, and Taiwan
- **2x to 3x** capacity increase and higher-grade cleanrooms in each of these 3 facilities

VAT Service Center Network * 3 upgraded service centers



ADVANCED INDUSTRIALS TAP NEW OPPORTUNITIES

Our Advanced Industrials business opens doors to new markets where vacuum-based manufacturing is becoming more important.

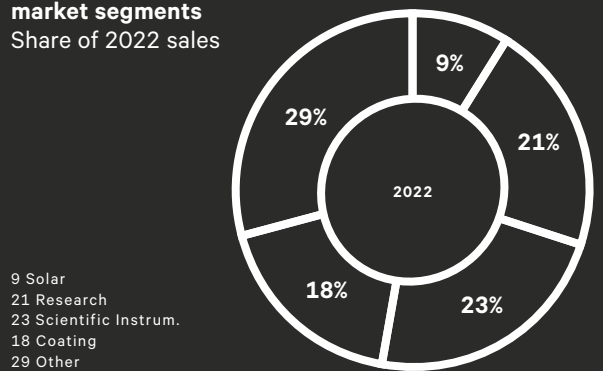
E-beam opportunities
Electron-beam technology requires high-purity vacuum valves and adjacent products

Example: Valves used in electron microscopes

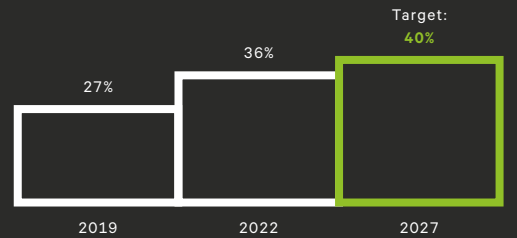
Industrial applications for e-beam technologies are expanding rapidly, and include:

- 3D printing
- Precision welding
- Nano-scale lithography
- Medical device sterilizing
- Food processing
- Water treatment

Advanced Industrials market segments
Share of 2022 sales



Market share development ¹
2019–2027



Advanced Industrials net sales growth target
(CAGR) 2023–2027

+11%

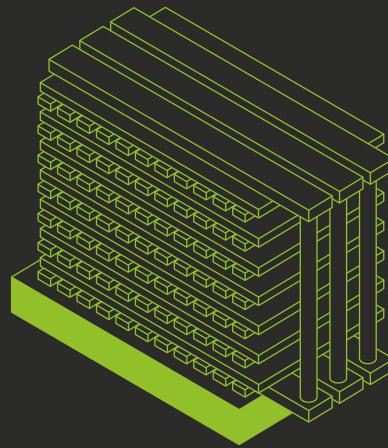
VAT'S TECHNOLOGY ADVANTAGE

VAT's ability to innovate quickly, in collaborative partnerships with customers, allows the company to stay ahead of the technology curve, build market leadership and generate sustainable profitable growth over the long-term.

TECHNOLOGY DRIVERS

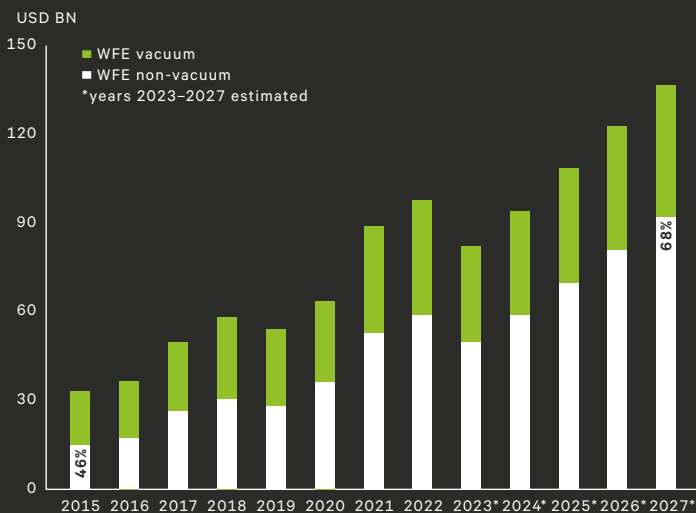
- More transistors per chip
 - More layers per chip
 - More process steps
 - More steps under vacuum
 - Purer vacuum
 - New materials
 - Lower power consumption
-
- More flexible tools
 - Plug & Play
 - Faster time-to-market
 - More precise process control
 - More customization
 - Wireless connectivity
 - Predictive maintenance

Expected trend in logic node sizes
Technology progression is a key growth driver as 90% of specification wins are at the leading-edge ¹



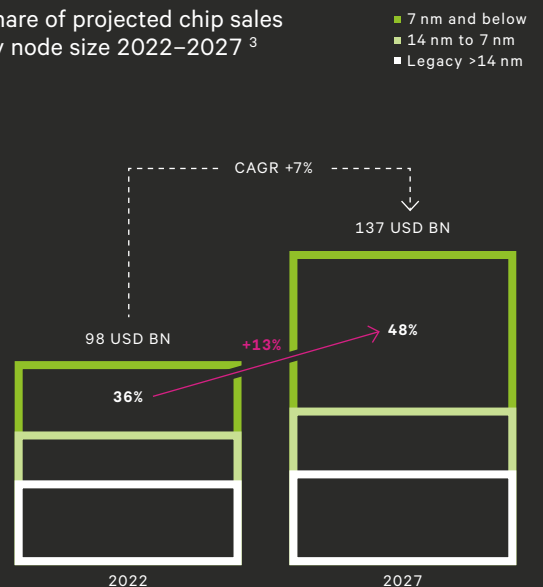
NEW CHIP DESIGNS NEED MORE VACUUM STEPS

WFE spend on vacuum vs. non-vacuum equipment, USD bn ²



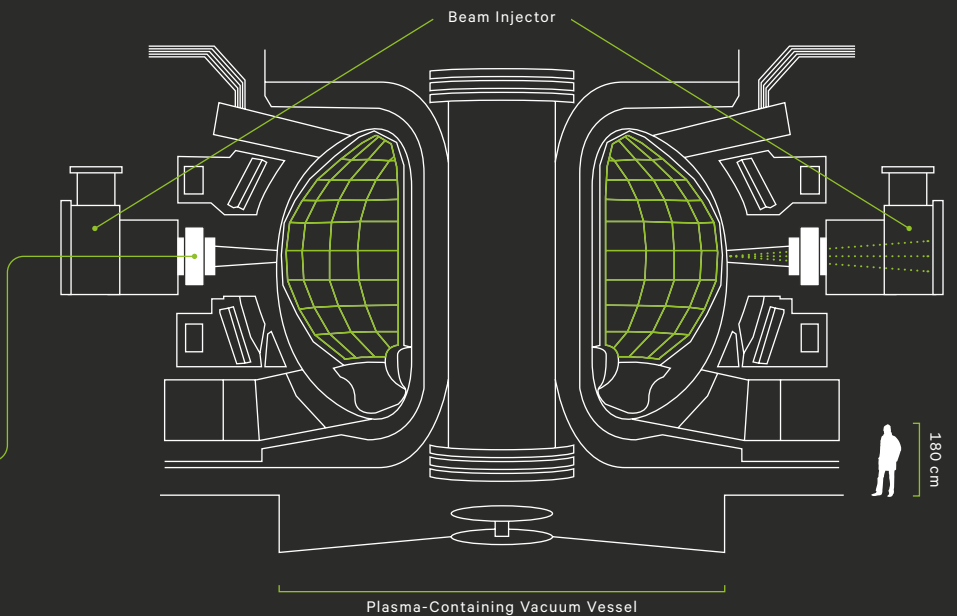
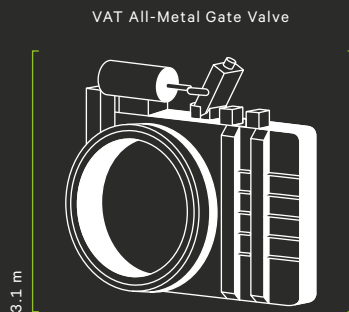
Smaller nodes require most advanced valves

Share of projected chip sales by node size 2022-2027 ³



VAT'S ROLE IN FUSION ENERGY

At the ITER experimental fusion reactor in France, a beam of high-energy particles is shot into a plasma to create the conditions for nuclear fusion. Both the plasma and the particle beam are contained in extreme vacuum conditions.



VAT has developed one of the world's largest all-metal gate valves to separate the chambers so they can be vented independently. The 7,000 kg valve can withstand up to 27 tons of pressure.

Developing products for extreme applications provides VAT with technology insights that can be applied in the design of valves for wider commercial applications.

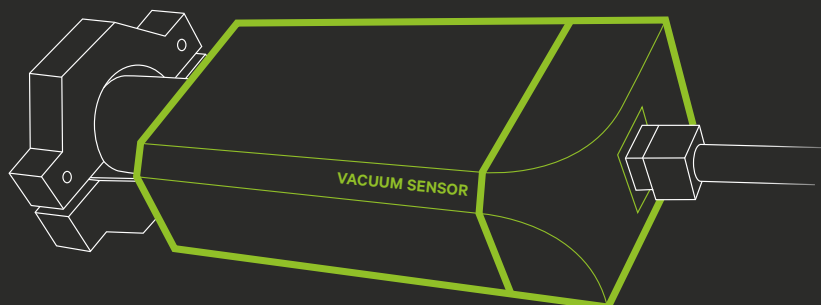
ALLOCATING CAPITAL TO INNOVATION SECURES GROWTH

Total R&D investment
2016–2022

> 200m

INNOVATING FOR TOMORROW'S INDUSTRY CHALLENGE

Example: Microelectromechanical Systems (MEMS)



Current vacuum pressure sensor technology will soon reach its technical limits. MEMS technology allows new types of pressure measurement for coming chip generations.

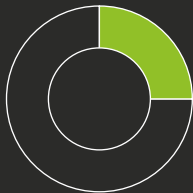
Real-time pressure measurements during chip manufacture to:

- Improve precision and control of wafer polishing
- Reduce number of wafer defects
- Identify component wear and tear

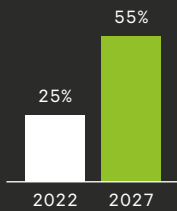
THE VALUE OF A GLOBAL FOOTPRINT

With manufacturing, technology, application and supply hubs close to all its major customers, VAT can move quickly and cost-effectively to meet their rapidly changing needs.

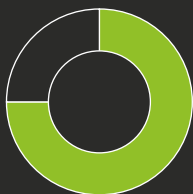
BUILDING AN INCREASINGLY FAST AND FLEXIBLE GLOBAL VALUE CHAIN



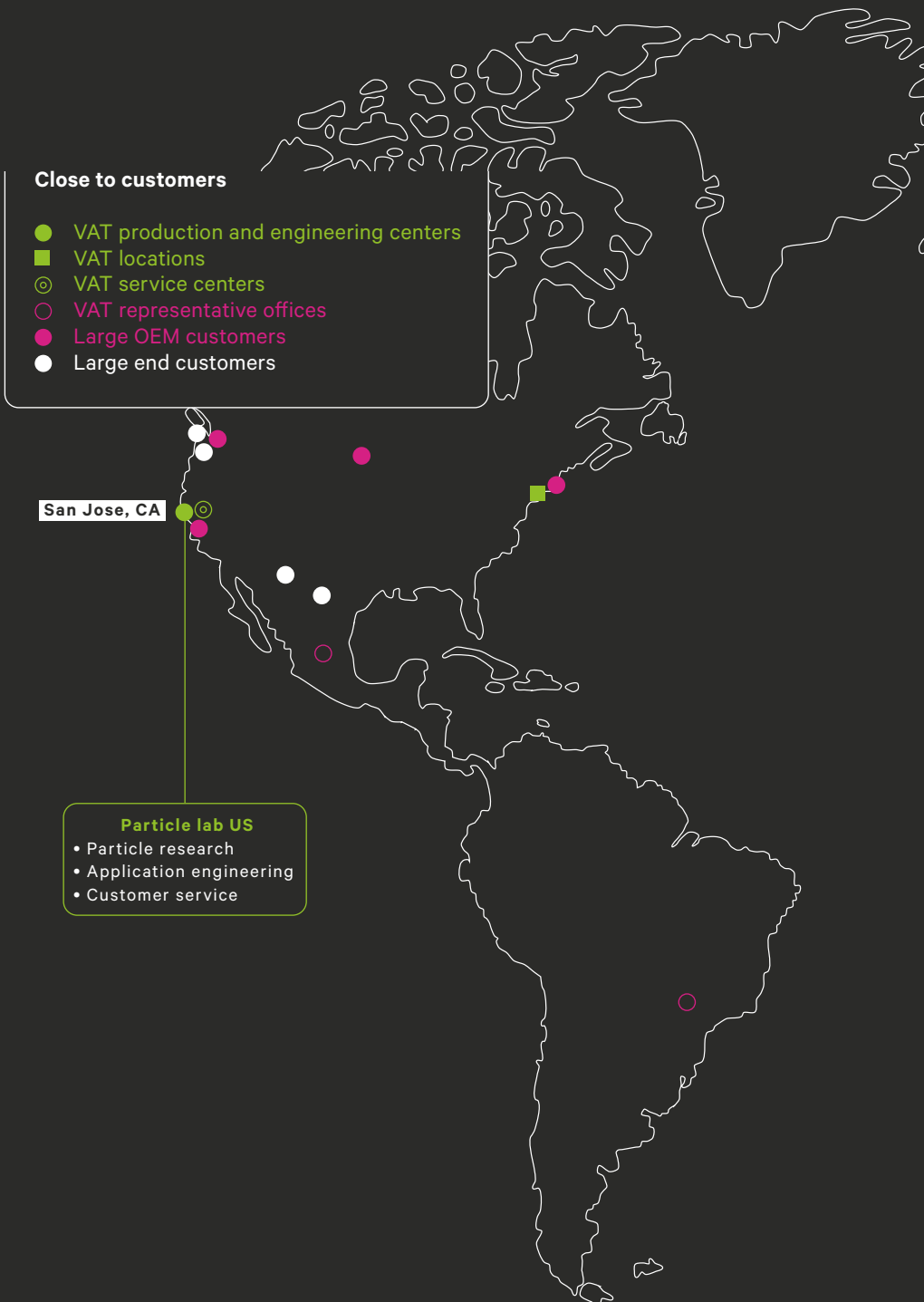
25% flexible factory workforce group-wide



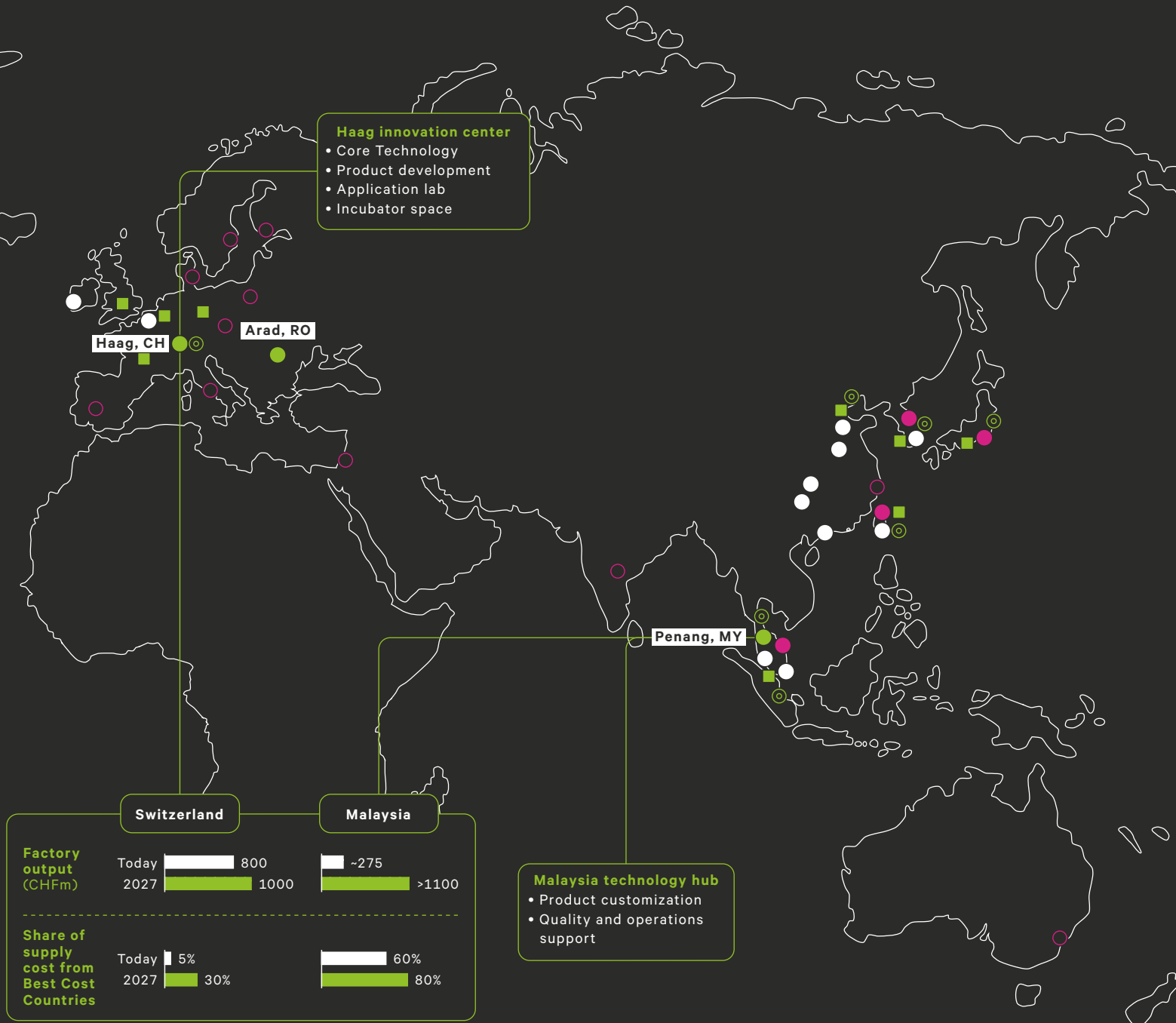
Best cost country sourcing is expected to more than double by 2027



75% of our components are outsourced and around 2/3 of our costs are variable

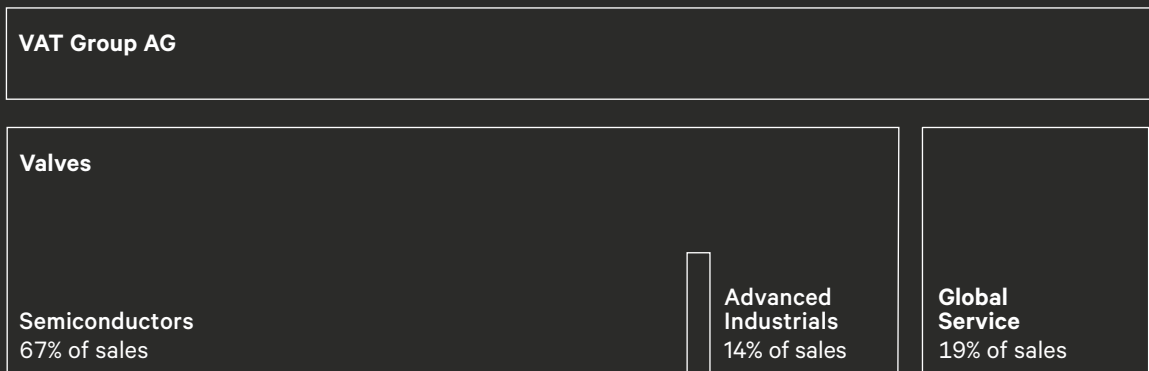


Our global footprint gives us cost and supply flexibility so we can stay ahead of the curve as markets change.



ORGANIZATION

VAT Group is organized and managed in two segments: Valves and Global Service. The Valves segment comprises the two business units Semiconductors, and General Vacuum.



As of Jan. 1, 2023, the Display & Solar business unit was dissolved, with the display business integrated into the Semiconductor business and the Solar business moved to the Advanced Industrials business unit. The moves are intended to take advantage of synergies and scale economies related to technology, business drivers and customer needs.

The VAT Group is led by the Group Executive Committee (GEC) consisting of the CEO, CFO, COO and EVP for the Semiconductor Solutions Group. The GEC is supported by the Group Management Board and Group Functions.

