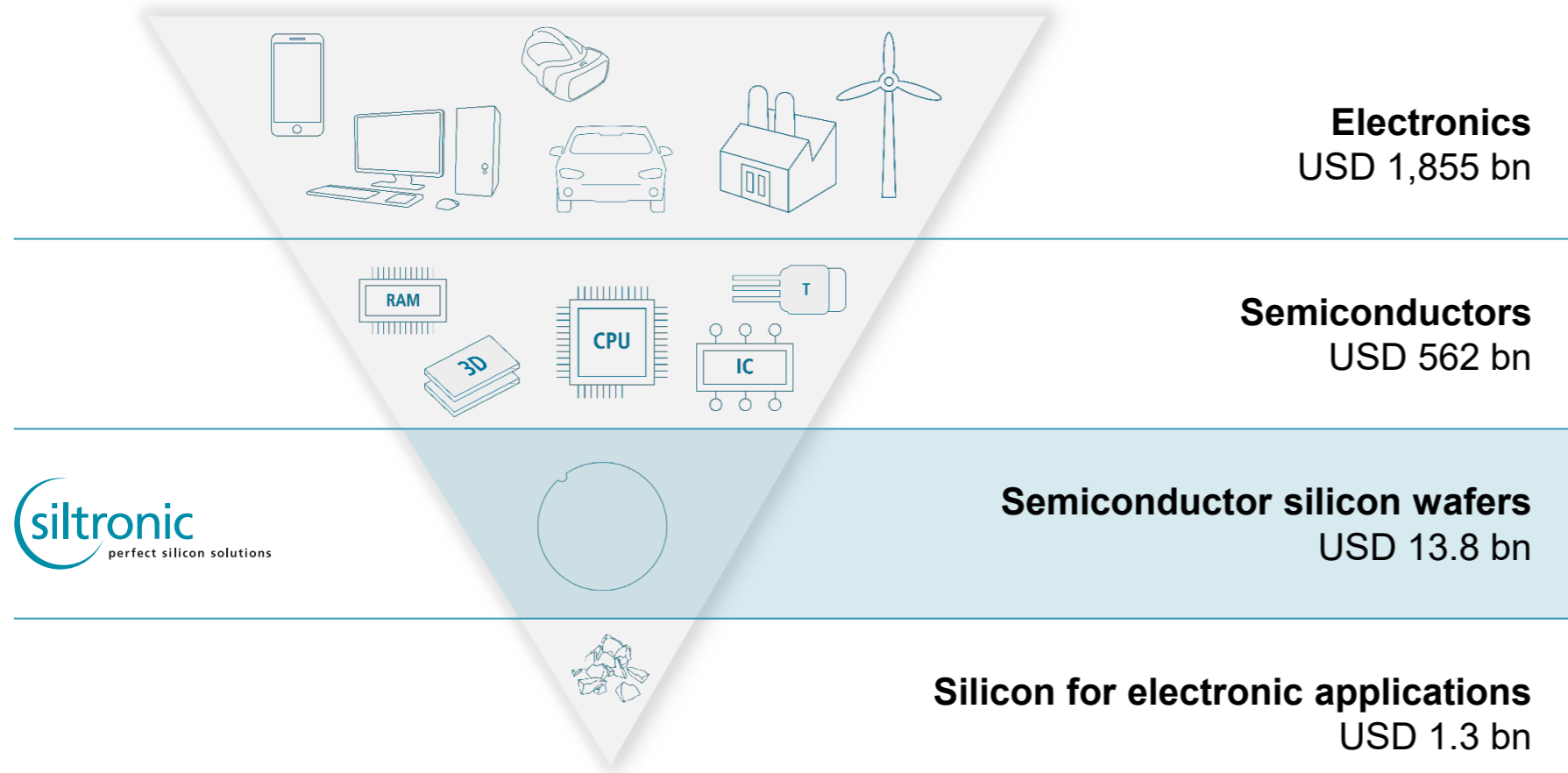


THE WAFER MARKET MECHANICS AND TRENDS

Dr. Rupert Krautbauer
Senior VP Marketing & Sales
November 30, 2023

THE ELECTRONIC WORLD IS A SILICON WORLD

SILICON IS FUELING THE ELECTRONIC WORLD



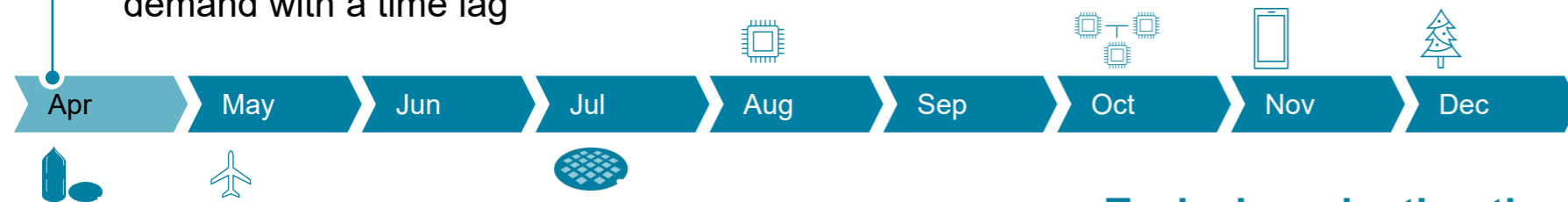
Sources: 2022 TechInsights, WSTS (Silicon based), SEMI SMG, Gartner, Siltronic Marketing



IT TAKES MORE THAN 6 MONTHS FROM A SILTRONIC INGOT TO A MOBILE PHONE

Supply chain determined by semiconductor production complexity

- Wafers are custom-made for each specification starting with the ingot
- Changes in end markets impact wafer demand with a time lag



Typical production time

| | | |
|--|-------------------------|------------|
| | Crystal | 1 week |
| | Wafer | 1 week |
| | Wafer shipment | days |
| | Device | 2–4 months |
| | Back end/packaging | weeks |
| | Distributors | weeks |
| | End use device assembly | days |



6 months+

from ingot production until your mobile is put under the christmas tree



Inventory

along the supply chain extends the time lag

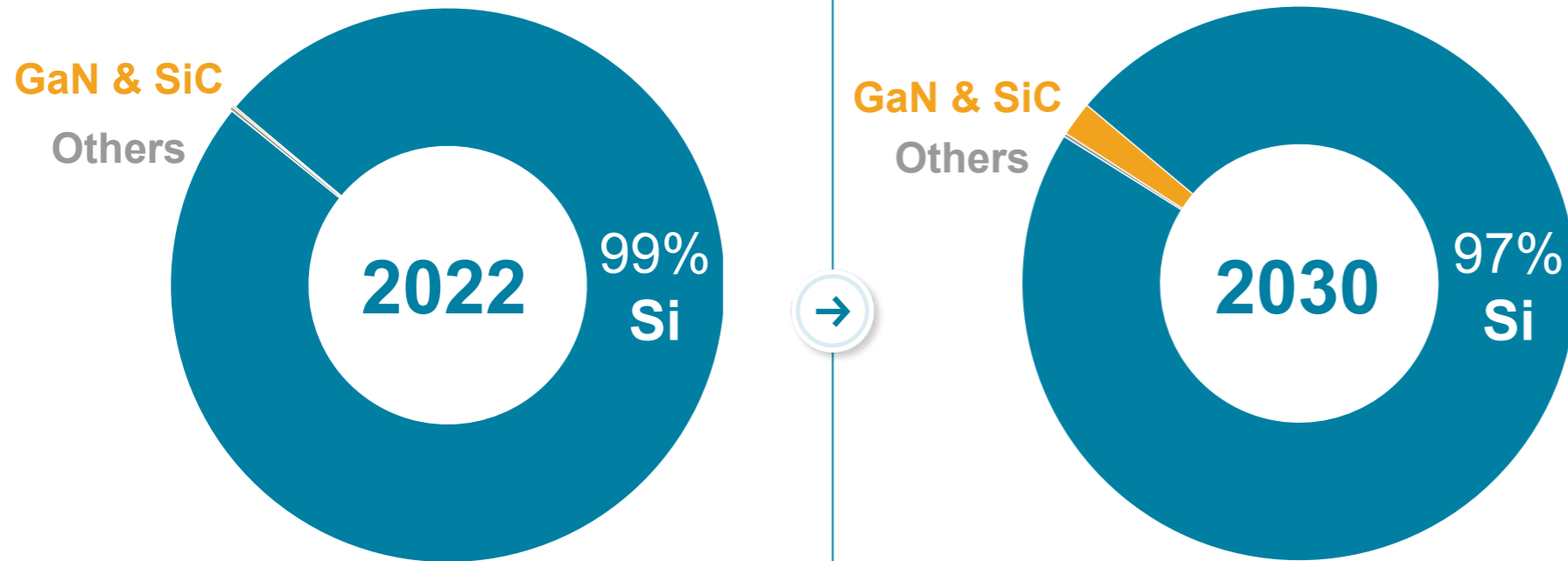


Diversified

supply chain length varies with device type

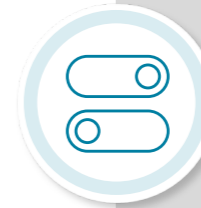
WAFER BUSINESS IS A SILICON WORLD – SILTRONIC'S KEY COMPETENCE

Wafer area in %



SiC

materials grow fast but from a very small base



GaN

R&D of Siltronic for more than 10 years



Silicon

will remain the key material for almost all volume applications

Source: Siltronic estimate

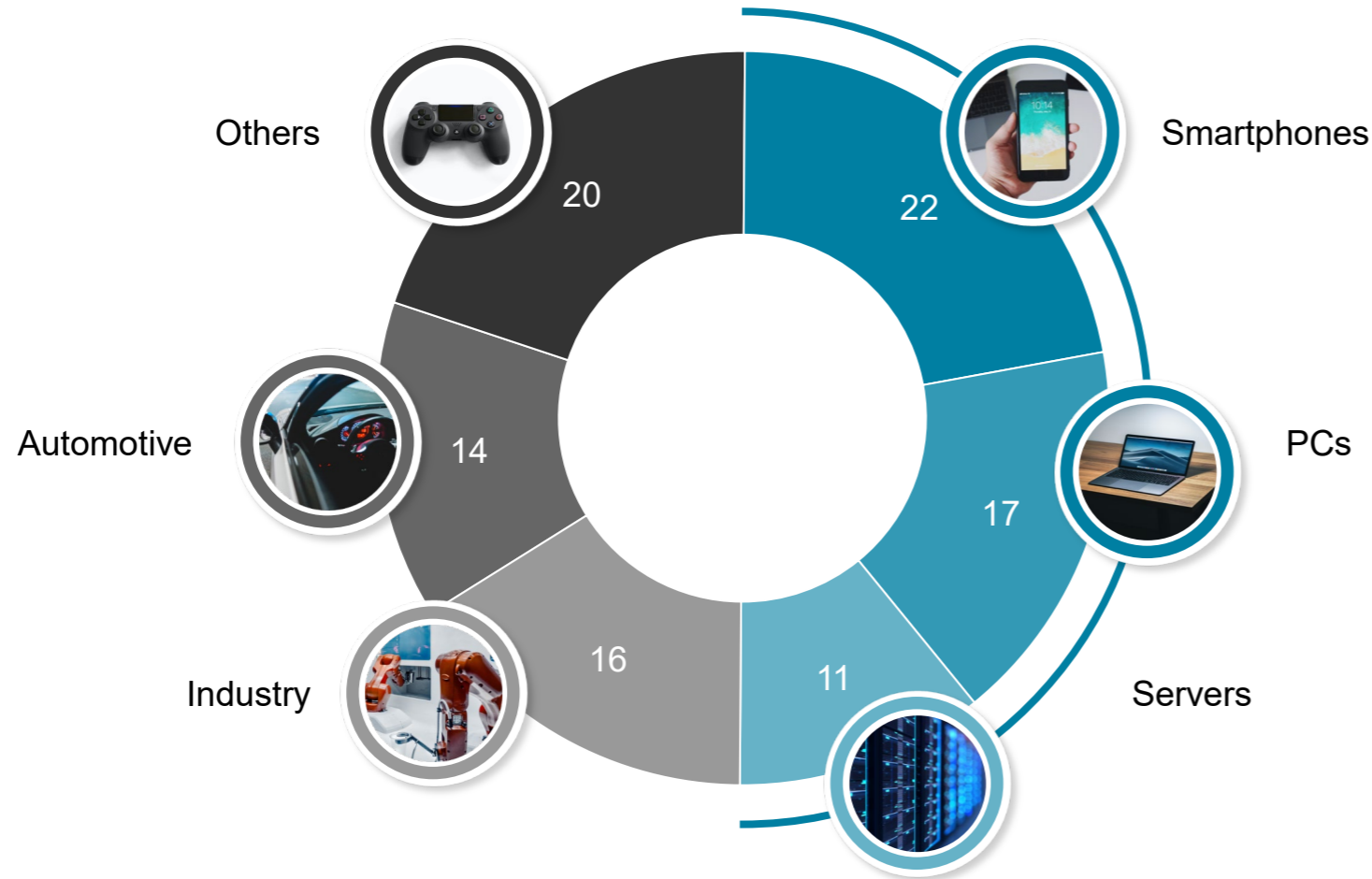
GaN = Gallium Nitride
GaAs = Gallium Arsenide
SiC = Silicon Carbide

A person wearing a white cleanroom suit and mask is working in a cleanroom environment. They are holding a large, dark, reflective silicon wafer. The background shows industrial equipment and other wafers. The image is overlaid with a large, semi-transparent teal shape on the left side.

DRIVERS FOR THE SILICON WAFER MARKET

OUR WAFERS ARE USED IN MULTIPLE END MARKETS

Consumption of wafers by end use 2022 in %



Siltronic

is partnering with leading device makers in all segments



All markets

need Logic, Memory and Power at different ratios



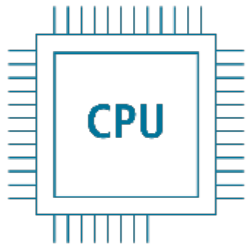
50%

of all silicon is used in smartphones and computing applications

AI SERVERS CONTAIN DIFFERENT CHIPS – SILTRONIC IN ALL KEY COMPONENTS

Logic processor

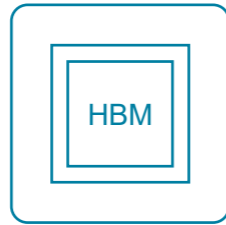
Leading Edge 300 mm epi



Processor and GPUs execute compute function

High end Memory

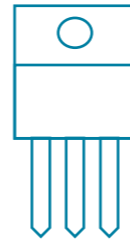
Leading Edge 300 mm pol



DRAM and special memory chips for intermediate data storage

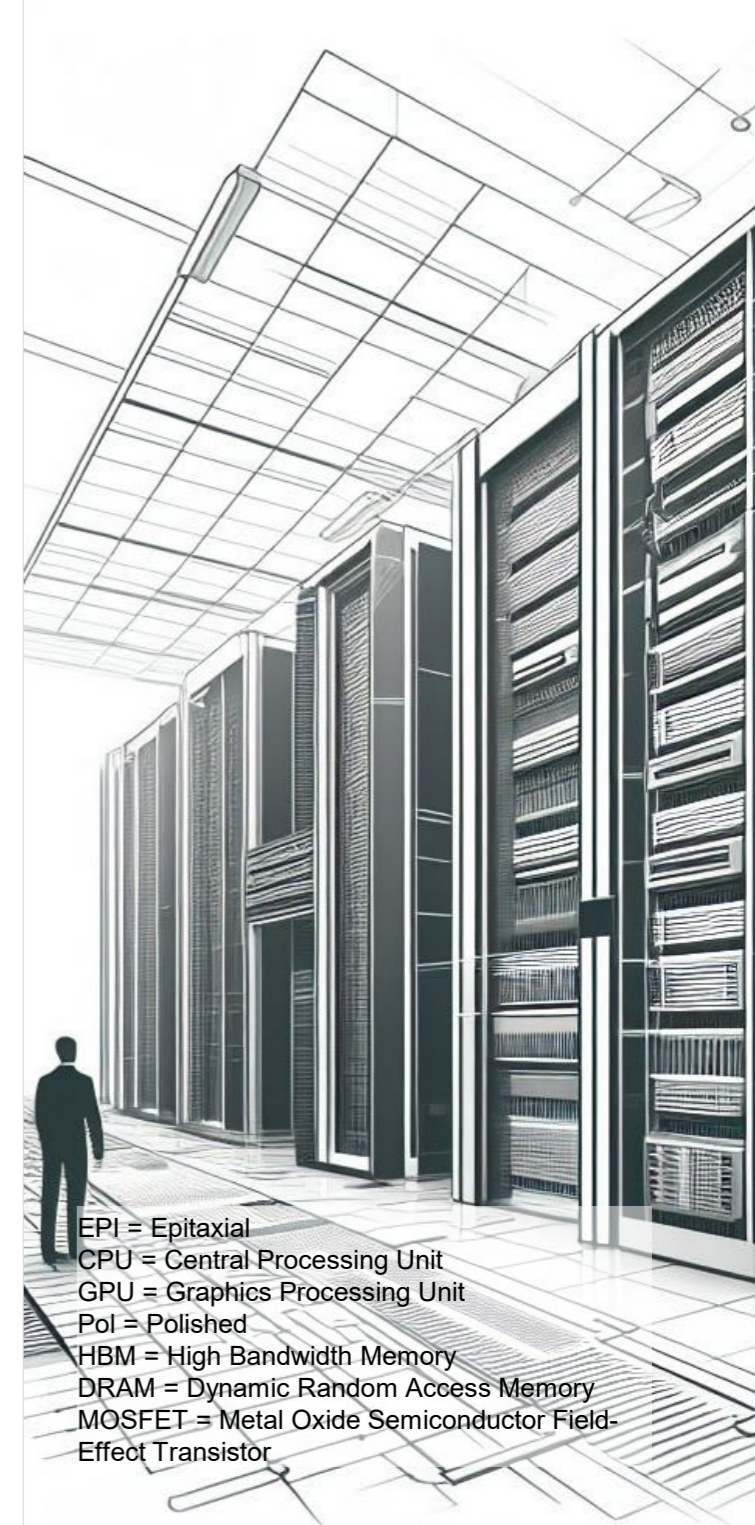
Power management

Highly doped 200 mm wafers



MOSFETs convert grid voltage to operating voltage, smart power optimizes resources

Source: Pictures Generated by DALL•E 3



EPI = Epitaxial
CPU = Central Processing Unit
GPU = Graphics Processing Unit
Pol = Polished
HBM = High Bandwidth Memory
DRAM = Dynamic Random Access Memory
MOSFET = Metal Oxide Semiconductor Field-Effect Transistor

SEMICONDUCTORS OMNIPRESENT IN CARS – SILTRONIC MEETS ALL AUTOMOTIVE STANDARDS

Examples of key components

Logic

- Microcontrollers
- ADAS
- Infotainment

Communication

- Traffic alerts
- On-board ethernet
- Over-air updates
- Car-to-car and car-to-infrastructure

Sensors

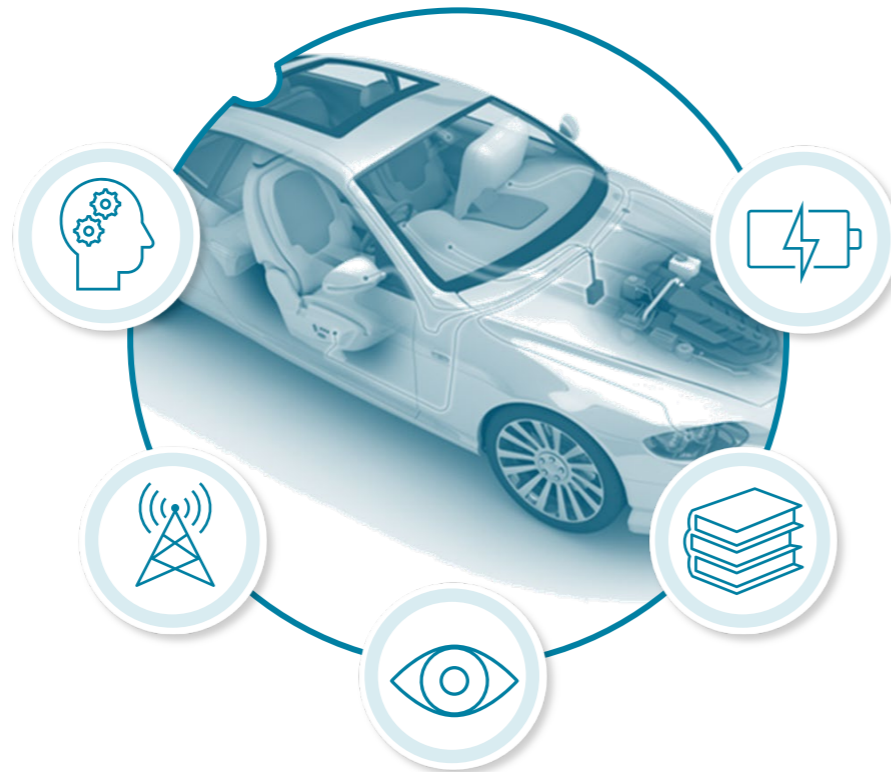
- ADAS
- Tire pressure
- Parking assistant
- Rear monitor

Power

- Starter and utilities
- e.g. power seat, windows
- Electric drive/charger

Memory

- Infotainment
- ADAS
- Maps for navigation
- Maintenance
- Accident recording



EV Inverter

Power conversion based on 200 mm FZ + 300 mm low Oi wafers



ADAS

Logic on 300 mm epi, sensors on ≤ 200 mm



Infotainment

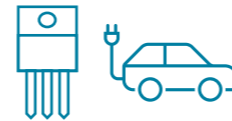
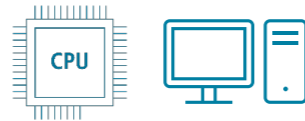
similar to tablets, containing 300 mm polished and epi

HIGH END APPLICATIONS REQUIRE SPECIALIZED WAFERS WITH LARGER GROWTH RATES

Application

Leading Edge Logic

Power for EV & renewables



Wafer type

300 mm
leading edge epi

200 mm FZ,
300 mm low Oi

CAGR 2022–2028

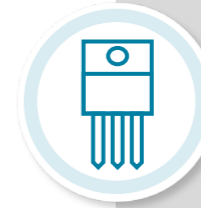
15%

11%



Leading edge

requirements change fast for high volume applications



Power

management requires specialized silicon wafers



Siltronic

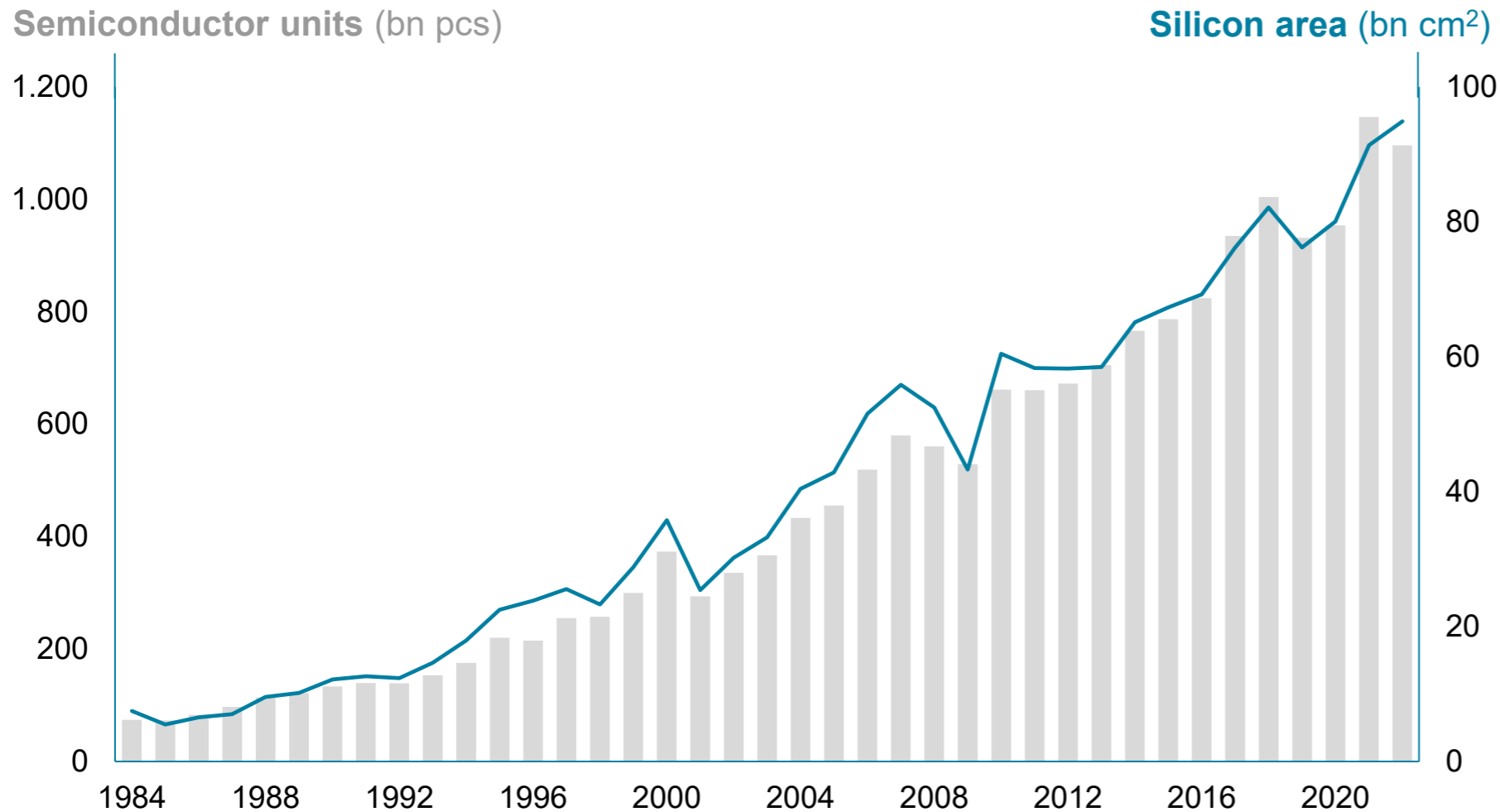
as a major supplier

Source: Siltronic estimate

Low Oi = Low Oxygen interstitial

THE 300 MM MARKET

SILICON MARKET GROWS IN PARALLEL WITH SEMICONDUCTOR UNITS



Source: Worldwide Semiconductor Trade Statistics up to Dec 2022, SEMI SMG up to Dec 2022; (1) McKinsey



Semis

are approaching USD 1 trillion by 2030⁽¹⁾



Chip size

has been stable at 0.1 cm² over decades across all devices

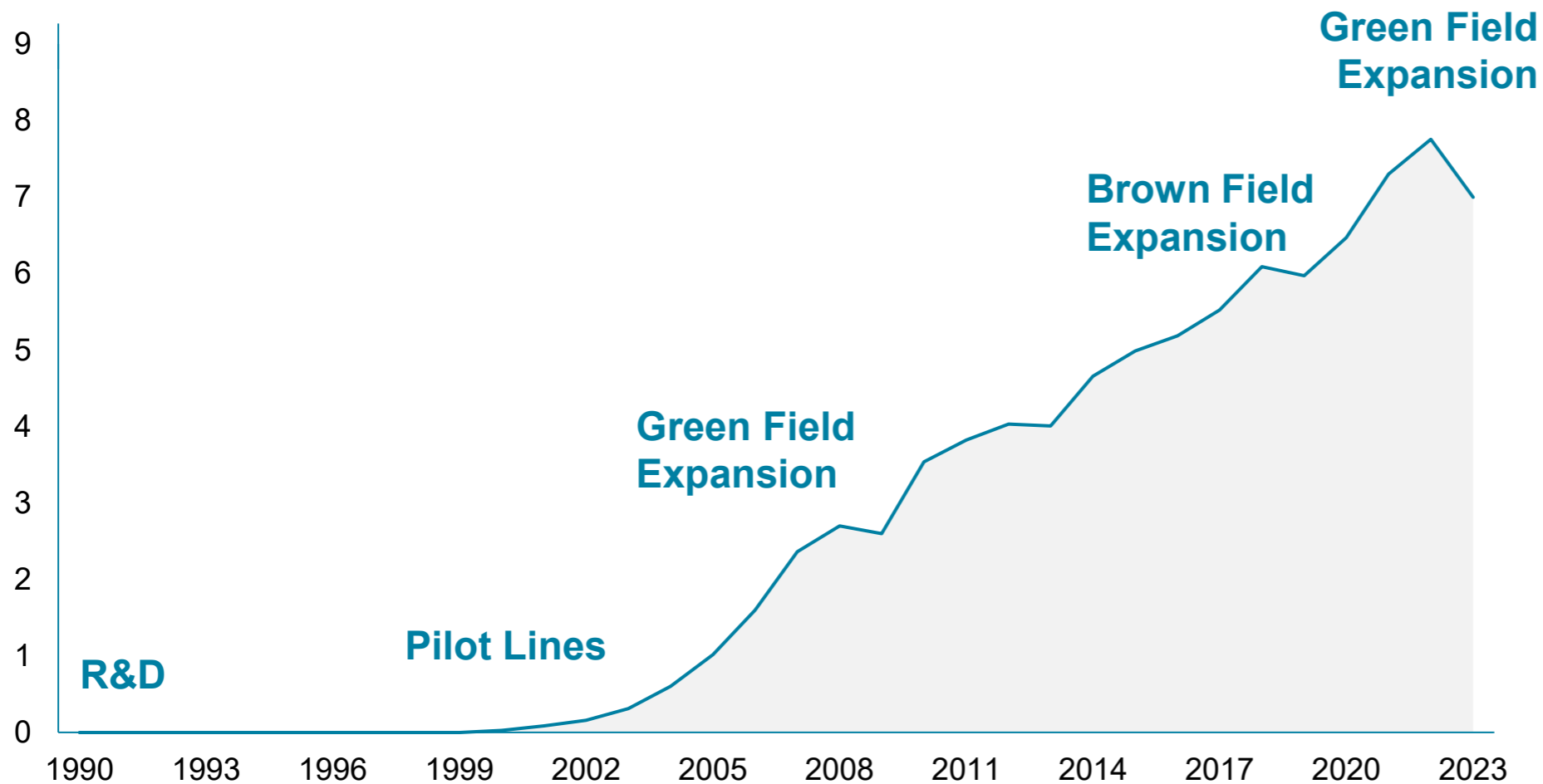


Growth

in semiconductors translates directly into 300 mm wafer demand

300 mm WAFERS HAVE GROWN FROM R&D TO THE DRIVING FORCE OF THE INDUSTRY

million wafer/month



Source: SEMI SMG



1990

Siltronic ships first 300 mm wafers



2004

Siltronic starts production of 300 mm fab in Freiberg



2023

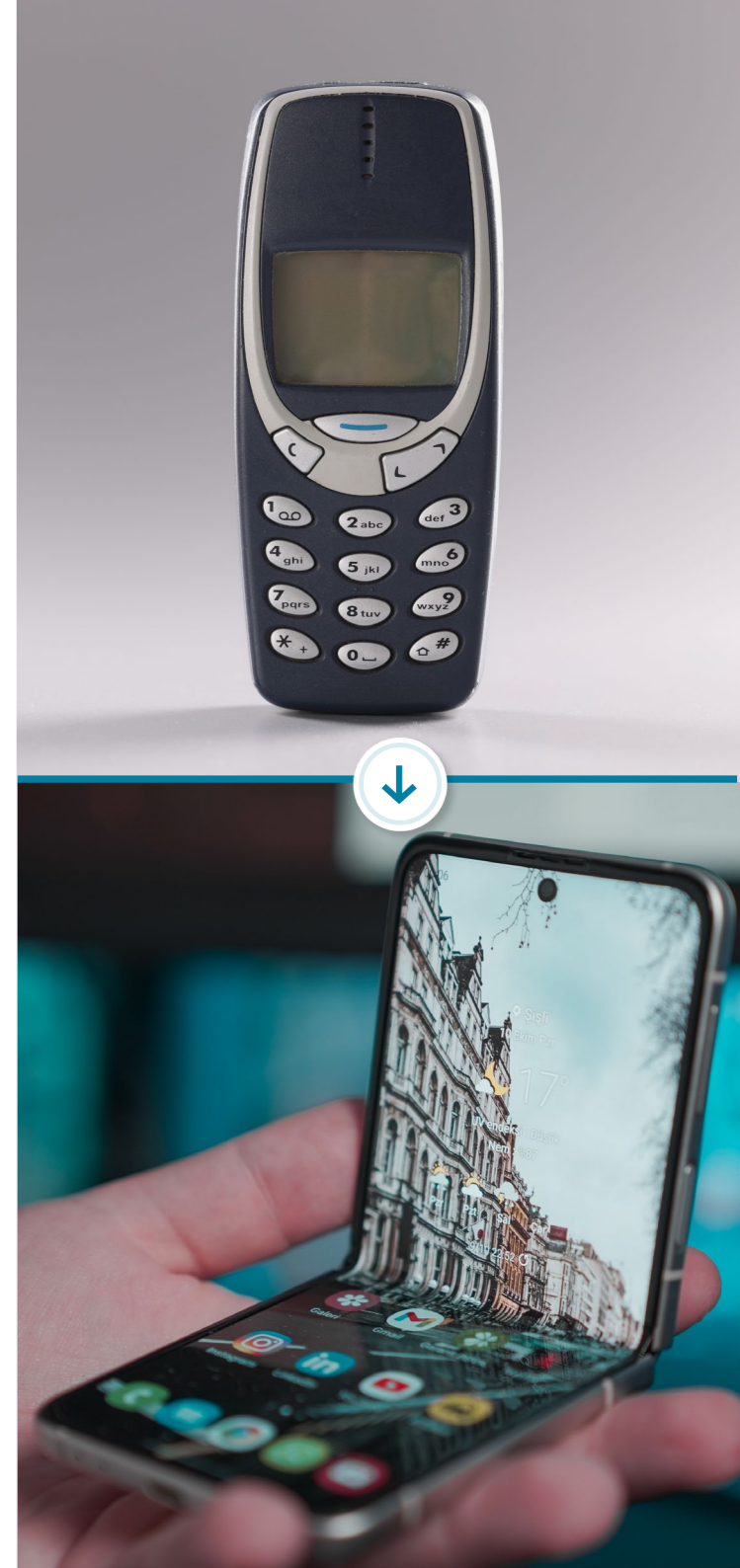
First wafers out at FabNext in Singapore

WAFER INDUSTRY THEN AND NOW: FEWER PLAYERS SERVE A BIGGER MARKET

| | 2000 | 2022 |
|---|------------------|----------------|
| Number of main wafer suppliers consolidated | | |
| 300 mm wafer market grew 300x | | |
| Size of HVM fab ⁽¹⁾ shell remained similar | 2,000% of market | 5–8% of market |

→ New greenfield fabs do not disrupt supply & demand balance

Market size: 25 kw/m in 2000 vs. 7,800 kw/m in 2022 | (1) HVM fab = High Volume Manufacturing.

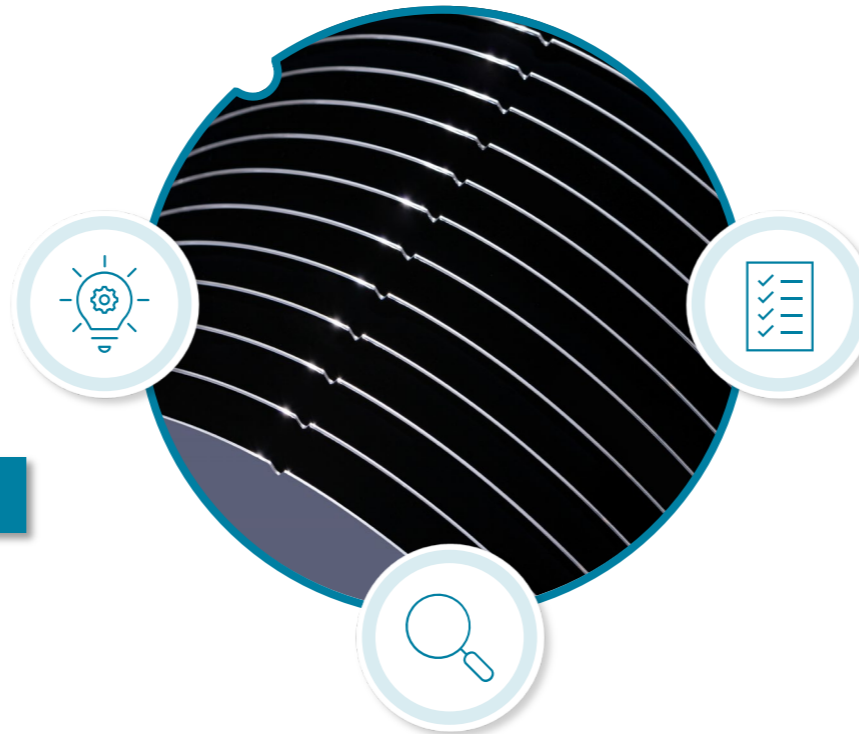


HOW OUR CUSTOMERS BUY WAFERS

Wafers are made to specification

- Various specifications with different bottleneck processes
- Just-in-time production
- Pricing and planning by specification

 serves 4,000 customer specifications



Capability is key

- High entry barriers
- Wafer specifications are optimized for each application
- Qualifications by specification

 leading technology since >50 years





Wafer sourcing

- Typically, at least 3 suppliers – ideally interchangeable
- Competition for shares among qualified suppliers
- Contract terms vary from quarterly to multi-year (2/3 LTAs)





 partner for #1 Logic, Memory and Power customers

HIGHER RESILIENCE THROUGH LTAs



Customer

-  Secures supply – most important for growth products and in up-markets
-  “The most expensive wafer is the one you cannot get”
-  Known prices/conditions
-  Commitment – security or prepayment



-  Customer commitment (volume and price) in soft markets
-  Safeguarding investment, prepayments
-  Limited upside potential in up-markets
-  Margin risk when cost increases exceed reductions/efficiency gains

Long Term Agreements (LTA)

-  Industry demand not elastic, but LTAs soften swings across supply chain
-  LTAs are managed as a portfolio, each is a tactical decision



Quantity

fixed or ramping for growth products



Pricing

predetermined for quantity



Terms

duration depending on customer (~1–8 years)

KEY TAKEAWAYS

Strong partnerships with top semi customers including #1 players for Memory, Logic and Power



Wide product portfolio covers all volume trends with focus on **Leading Edge and Power**



Industry growth on **300 mm supported by FabNext** and our R&D focus to **stay ahead of the curve**



Market maturity for 300 mm and **high LTA share** increase **resilience and predictability**



QUESTIONS?



DR. RUPERT KRAUTBAUER

Senior VP Marketing & Sales

Siltronic Munich
Siltronic AG
Einsteinstraße 172
D-81677 Munich

www.siltronic.com



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