At the crossroad: Strategic considerations for Chip Manufacturing

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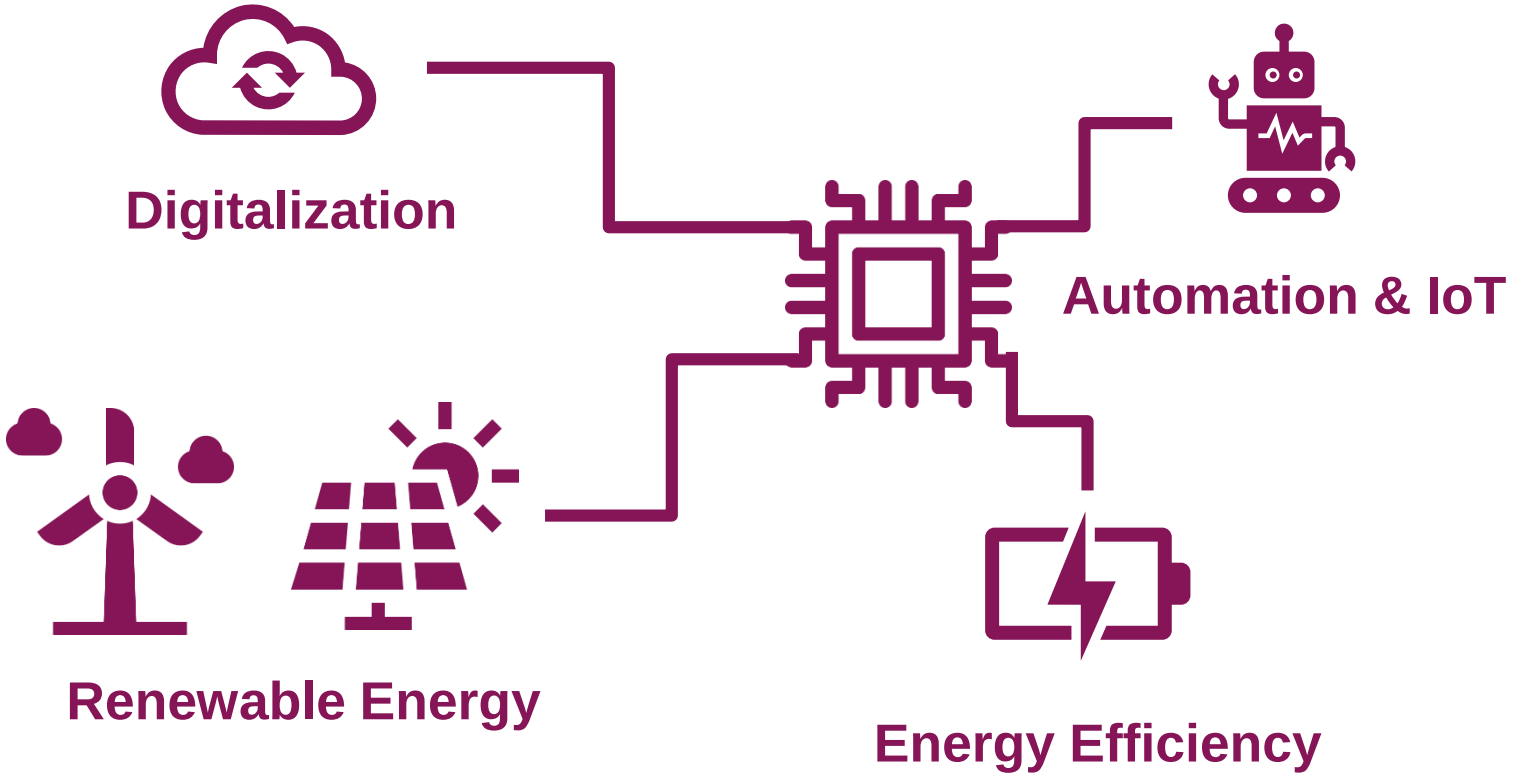
Everybody is talking about chips

Microelectronics: basis for ALL global megatrends



The New York Times

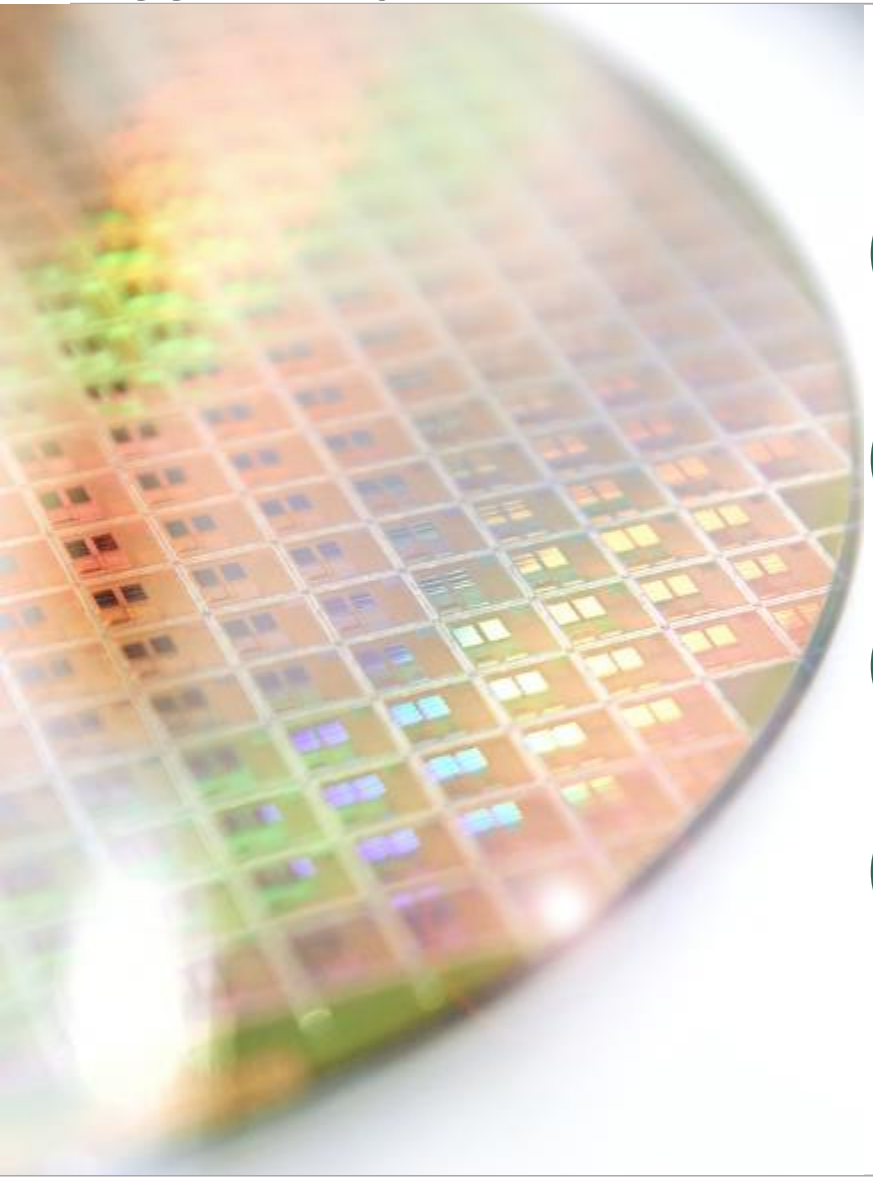
Ford's sales fell 27 percent in the third quarter because of chip shortages.

Intel and AMD suffer from chip shortage in server industry

Chip Shortage Hits Solar Sector With Enphase Citing Constraints

22 JUN 2021 DIGITAL SECURITY INDUSTRY AFFECTED BY GLOBAL CHIP SHORTAGE

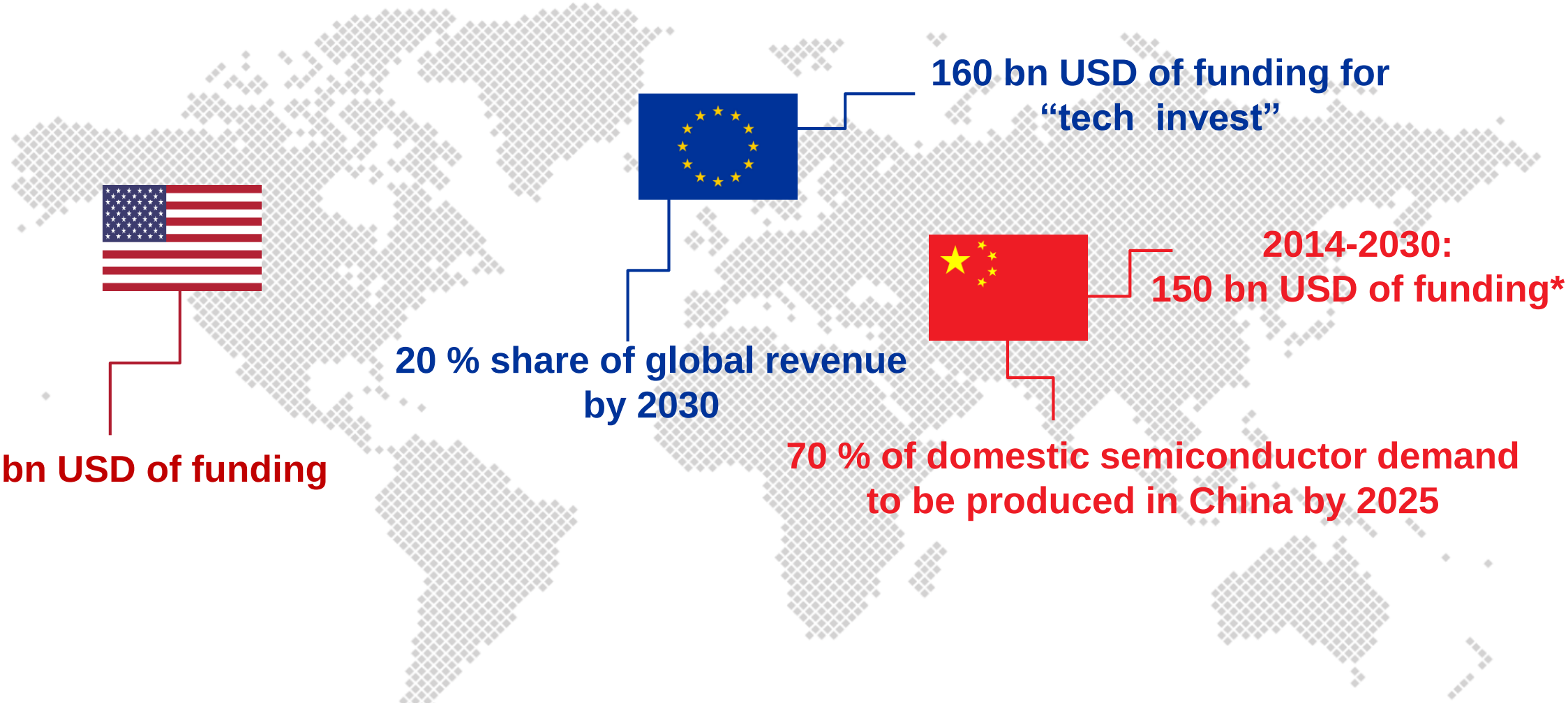
The current imbalance in demand vs. supply in semiconductors was triggered by several structural and cyclical events



Key drivers

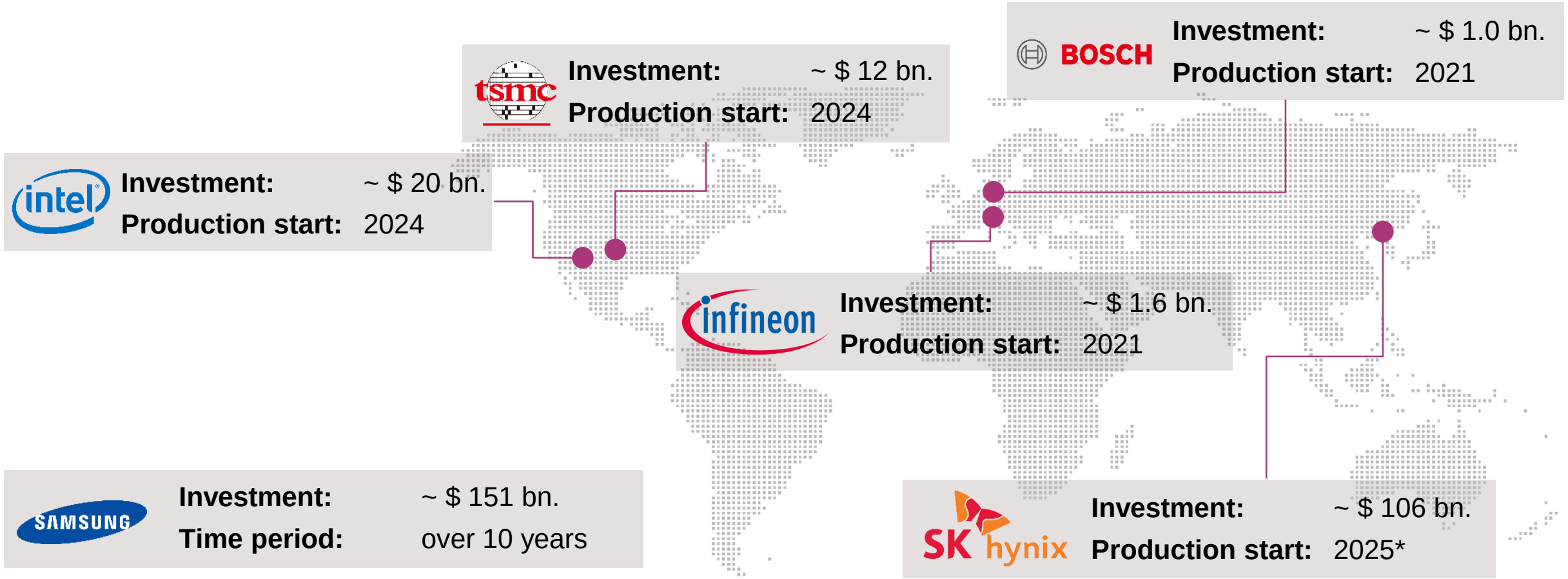
- Significant **change in demand structure** across applications
- **Underinvestment at silicon foundries for mature nodes** and **increased lead times** for capacity increases
- **Extraordinary cyclical demand** as rebound of COVID-19
- **Event-driven disruptions** in global supply chains

Companies want chips – States want chip manufacturers…



Source: European Commission (2021), Tech Monitor (2021), Congressional Research Service (2021), The White House (2021)
*: between 2014 and 2030, Source: Semiconductor Industry Association (2021)

…new fabs are on the way…



tsmc
Investment: ~ $ 12 bn.
Production start: 2024

BOSCH
Investment: ~ $ 1.0 bn.
Production start: 2021

intel
Investment: ~ $ 20 bn.
Production start: 2024

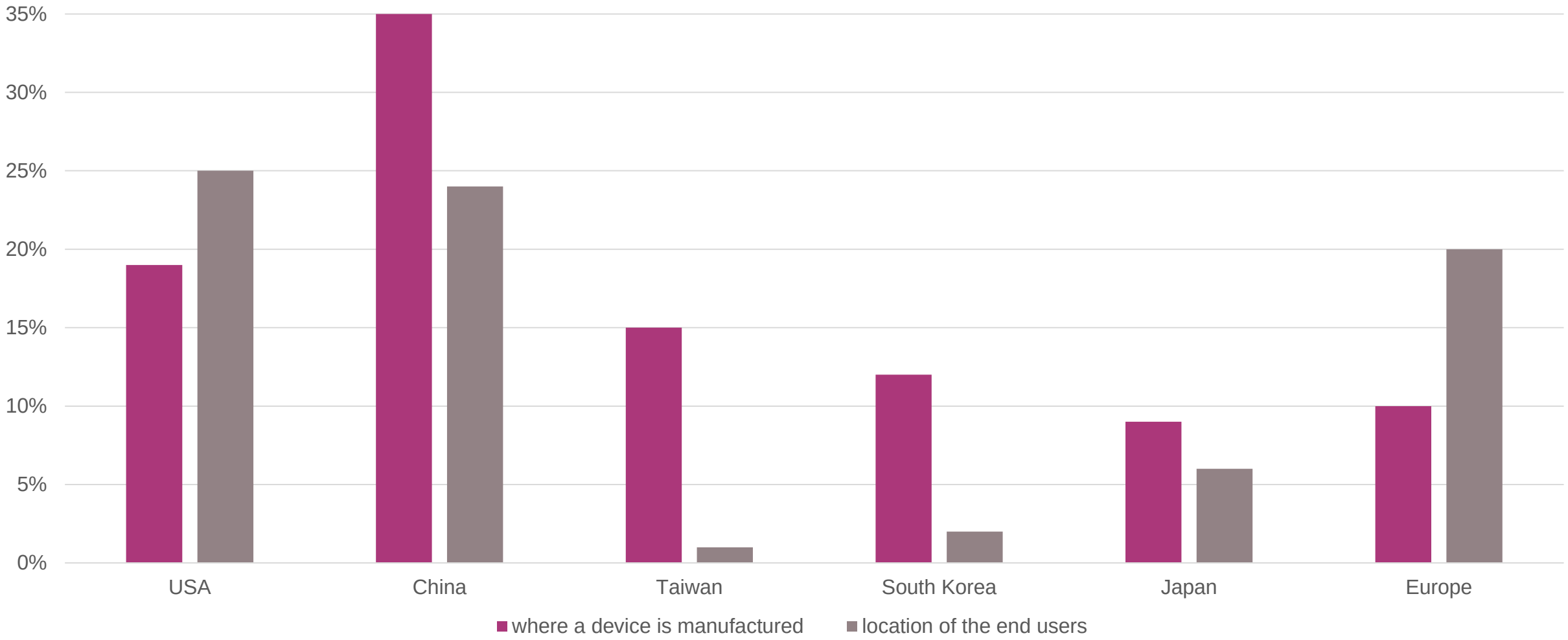
Infineon
Investment: ~ $ 1.6 bn.
Production start: 2021

SAMSUNG
Investment: ~ $ 151 bn.
Time period: over 10 years

SK hynix
Investment: ~ $ 106 bn.
Production start: 2025*

*: first part of the whole complex to go online in 2025.

The European manufacturing gap between place of production & place of consumption



Source: Boston Consulting (2021)

Ursula von der Leyen, President of the EU Commission
2021 State of the Union Address

„ The aim is to jointly create a state-of-the-art European chip ecosystem, including production. That ensures our security of supply and will develop new markets for ground-breaking European tech…

…so let's be bold again, this time with semiconductors.”

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Commitment: 1.6 bn Euro investment in European manufacturing

New fully automated chip factory

Start of construction:	first half of 2019
Start of production:	Sept 2021
Building space:	~ 60.000 m^2 (gross)
Employees:	~ 400 highly skilled jobs

Complemented with massive investment in R&D

Global player in the semiconductor industry

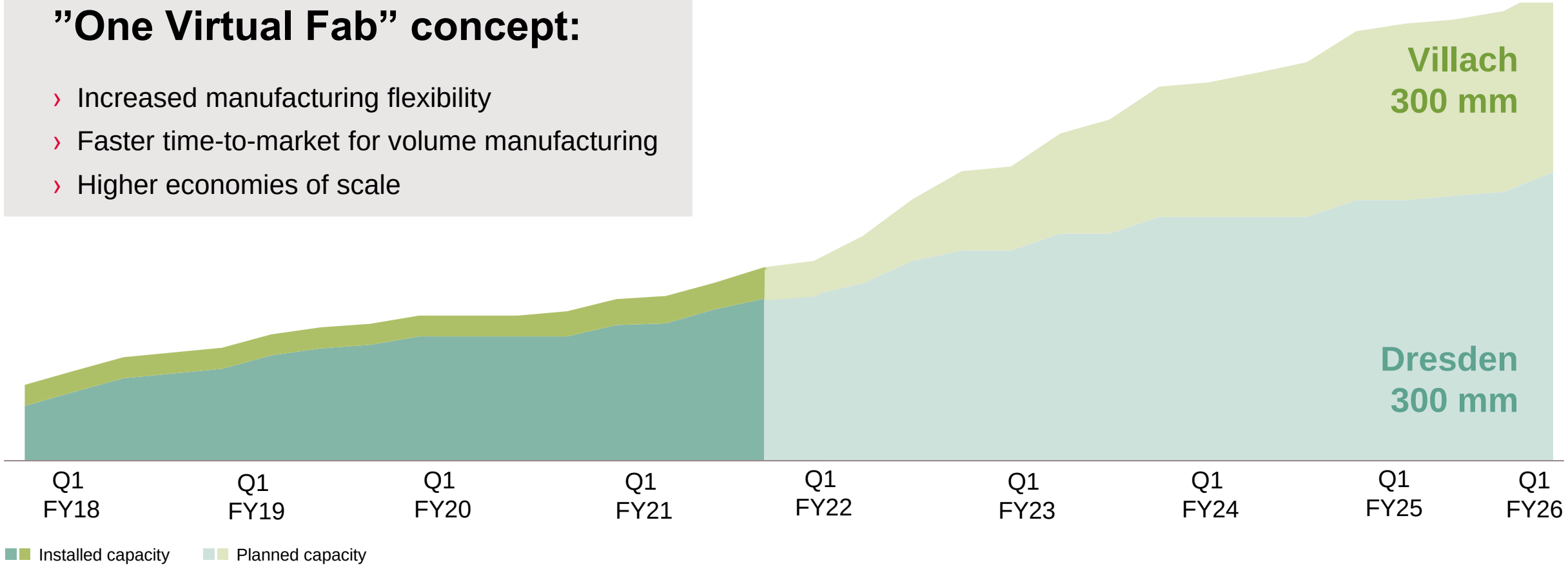
Top 10
Semiconductor companies worldwide

- #1 In power semiconductors
- #1 In the automotive sector
- #1 In Security ICs

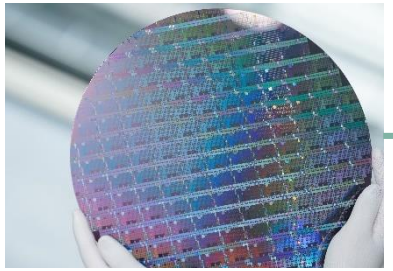
Thinking big: One Virtual fab for the next level

Benefits from our **”One Virtual Fab” concept:**

- Increased manufacturing flexibility
- Faster time-to-market for volume manufacturing
- Higher economies of scale



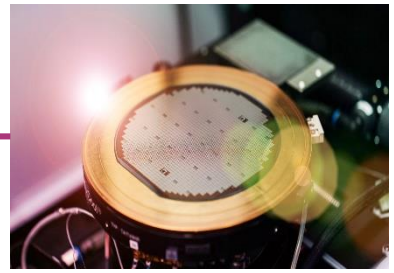
Power Electronics @ Infineon – our way to the top



“big” nodes

on very thin wafers

vast power experience



applied to new materials

two physical sites

one virtual fab

Strategic differentiation through in-house manufacturing

In-house manufacturing

- We manufacture power and sensor technologies in-house where we can gain a strategic advantage from our leading-edge manufacturing technologies and our outstanding process expertise
- This results is differentiation potential in terms of cost and/or performance
- **The current chip shortage highlights the strategic value of in-house manufacturing**

Outsourcing

- We work with outsourcing partners where we see no or little differentiation to optimize capital efficiency (CMOS and derivate technologies and standard packages)
- We cooperate with subcontractors and foundries in order to ensure adequate capacity growth and flexibility

Sustainable manufacturing @ Infineon

per cm² of produced wafer, Infineon consumes…

-53 %
energy

-31 %
water

-66 %
waste

…compared to the global average

CO_2 burden[2]
of 2.18 million tons
CO_2 equivalents

Ratio around 1:33

CO_2 savings[3]
of 72.45 million tons
CO_2 equivalents

Net ecological benefit of more than 70 million tons CO_2

Infineon – sustainability goals

Infineon is one of the world's most sustainable companies

for the 12th year in a row

Infineon will be carbon-neutral in 2030

By 2025, emissions are to be reduced by 70% (2019)

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Market Leadership based on proven technology

Major industry players		Process node (nm)								
		✓ Currently producing in commercial volumes						✓ Under development/planned		
Country	Company	90	65	45/40	32/28	22/20	16/14	10/7	5	3
	tsmc	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SAMSUNG	✓	✓	✓	✓	✓	✓	✓	✓	✓
	intel	✓	✓	✓	✓	✓	✓	✓*	✓	✓
	GLOBAL FOUNDRIES	✓	✓	✓	✓	✓	✓	✓		
	SMIC	✓	✓	✓	✓	✓	✓	✓		
	SK hynix	✓	✓	✓	✓	✓	✓	✓		
	KIOXIA	✓	✓	✓	✓	✓	✓			
	UMC	✓	✓	✓	✓	✓				
	stm	✓	✓	✓	✓	✓				
	Infineon	✓	✓	✓	✓					

*: Intel is in commercial production at 10 nm but has encountered challenges with high volume production at 7 nm.

Source: Eurasia Group (2020)

Focus on core strengths

Renewable Energy

Energy Efficiency

Automation & IoT

Main enabler = power electronics

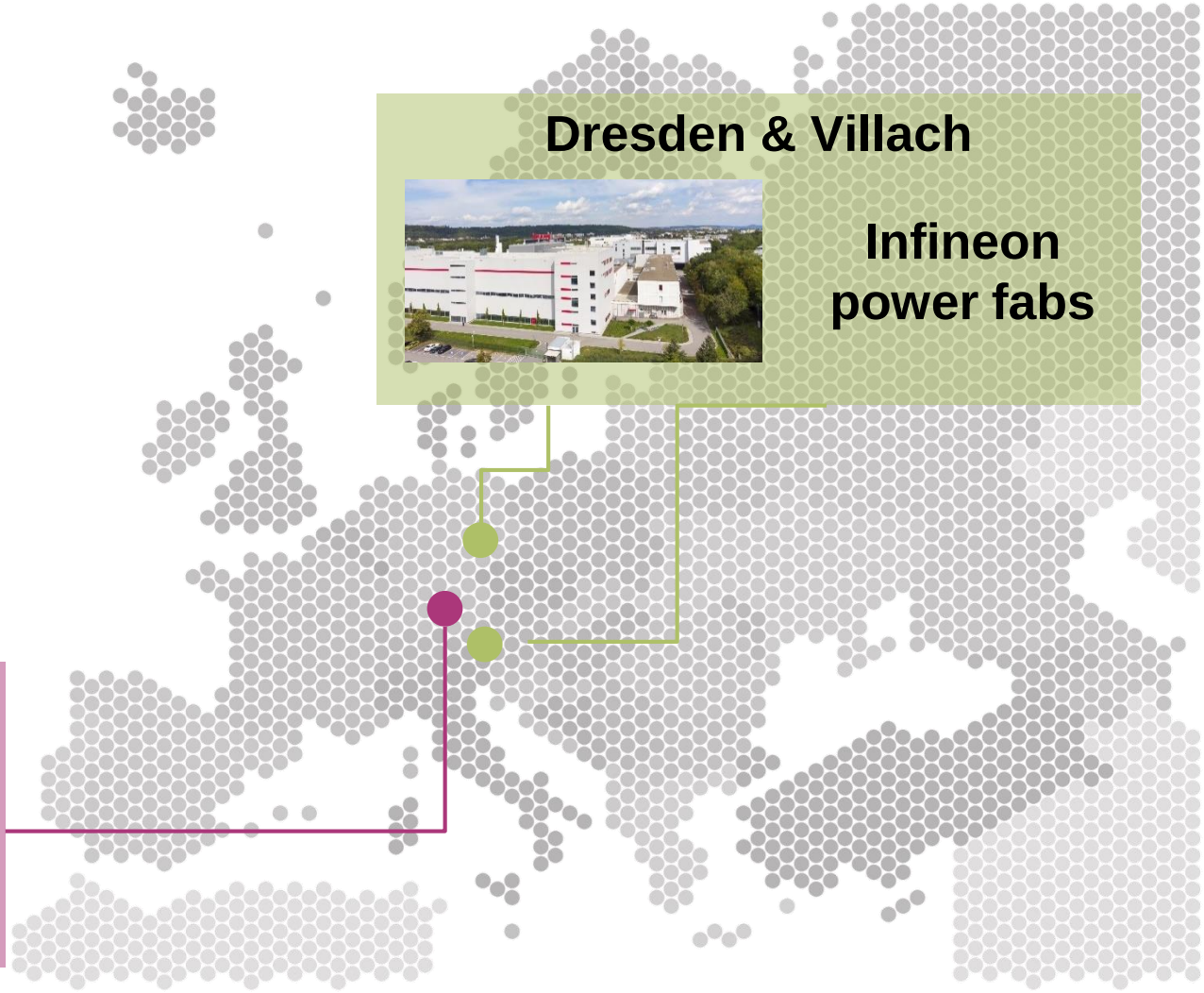
Main enabler = sensor systems

Focus on core strengths and further develop…

Europe 5 years ahead in sensor systems

Europe 3 years ahead in power electronics

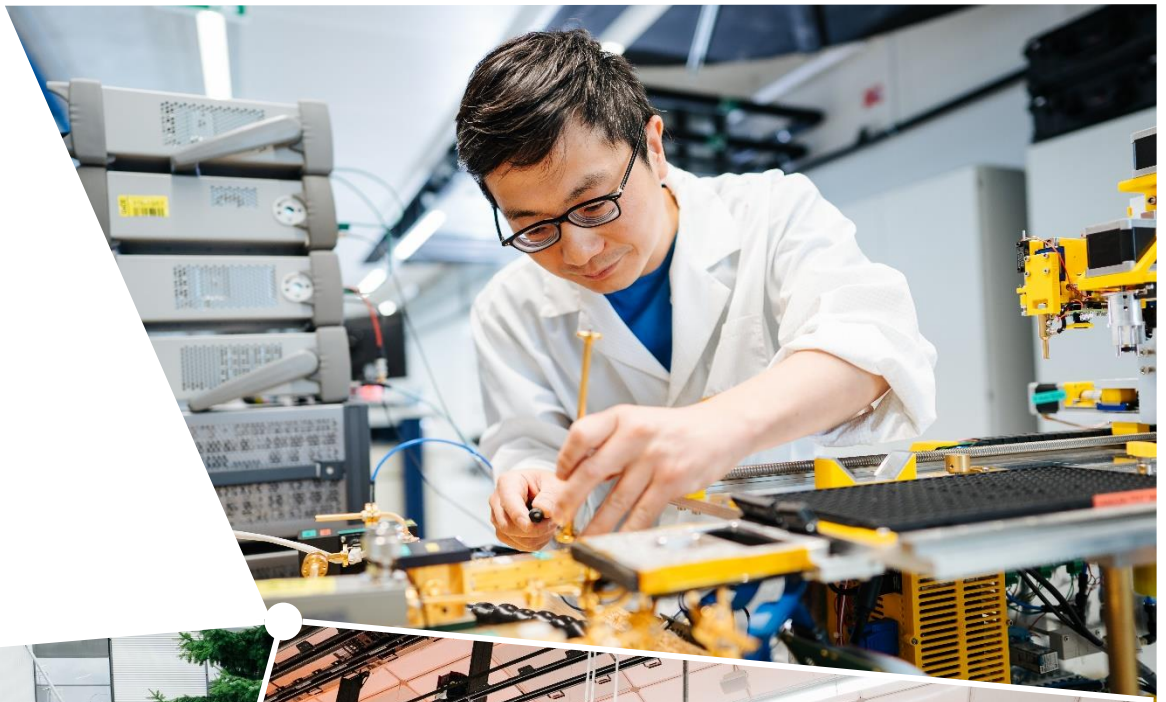
Europe 10-15 years behind in CPUs & GPUs



Source: McKinsey (2020)

Technology and new fabs are important:
But skills are key for success

It’s all about people!



A technologically sovereign Europe can not imitate others but has to consistently build on its own strengths!

Therefore: **Right Goals**
Right Instruments
Time as competitive Factor
Getting things done!

Part of your life. Part of tomorrow.