Megatrends, wafer demand and capacity plans to support future growth

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ASML Small Talk 2022

Megatrends, wafer demand and capacity plans to support future growth

Key messages

Global trends continue to fuel semiconductor growth

- While the current macro environment creates near-term uncertainties, we see longer-term wafer demand and capacity showing healthy growth
- Expanding application space and industry innovation are expected to continue to fuel growth across semiconductor markets
- This translates to semi end market annual growth rate of **around 9%** and a doubling of semiconductor revenue (2020-2030)

This drives an increase in demand for wafers into the next decade

- Strong growth rates across markets, continued innovation, more foundry competition and technological sovereignty drive an increased demand at advanced and mature nodes, which requires wafer capacity additions of **over 780 thousand wafer starts per month per year**, or a **CAGR of 6.5%** (2020-2030)

To meet that demand, ASML and its partners are adding capacity

- We plan to adjust our capacity to meet future demand, preparing for cyclicality while sharing risks and rewards fairly with all stakeholders
- We plan to increase our capacity to **90** Low-NA EUV and **600** DUV systems (2025-2026), while also ramping High-NA EUV capacity to **20** systems (2027-2028)

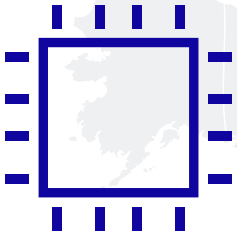
Megatrends

Wafer demand

Changes from Investor Day 2021

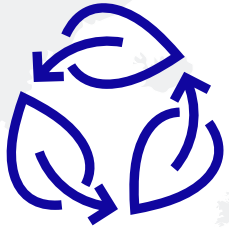
Capacity expansion

The world is changing fast



Connected world

- Smarter cities, factories, homes, cars
- Connecting billions of ‘things’
- Unprecedented data volumes
- Privacy in a connected world
- Cybersecurity
- …



Climate change and resource scarcity

- Rising energy use
- Exploding energy costs
- Accelerating climate change
- More waste and pollution
- Fragile food chains
- Material shortages
- …

Social and economic shifts

- Rising population
- Higher medical costs
- Faster urbanization
- Need for tech talent
- Deglobalization
- Technological sovereignty
- …

The world is changing fast and technology can help unlock the potential

Connected world

- Cloud infrastructure
- Artificial intelligence
- Hyperconnectivity
- Edge computing

Climate change and resource scarcity

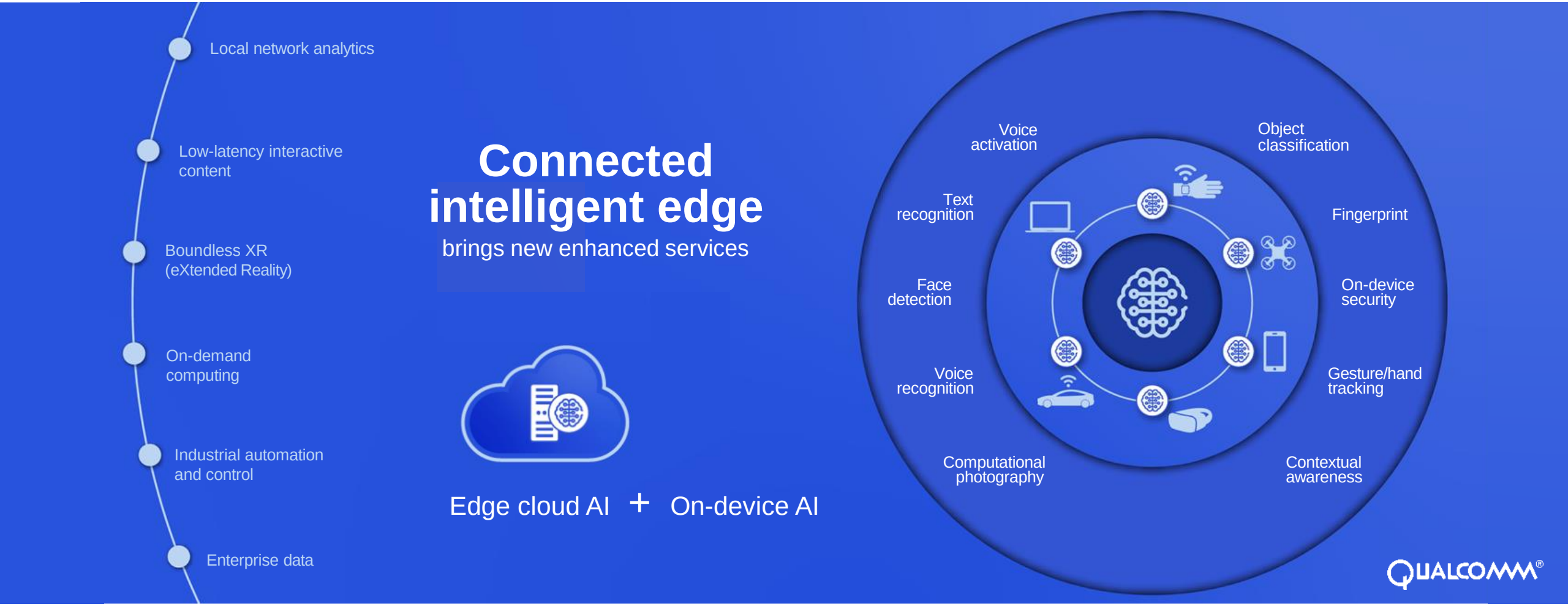
- Energy transition
- Electrification, smart mobility
- Agricultural innovation
- Smarter use of limited resources

Social and economic shifts

- Working, learning remotely
- Healthcare, medical tech
- Technological sovereignty
- Automation

The connected intelligent edge delivers new and enhanced services

Artificial intelligence of things



Source: Qualcomm, What's the role of artificial intelligence in the future of 5G and beyond?, September 21, 2021

Energy transition will be one of the market drivers over the coming decades

Semiconductors are crucial in generation, storage, distribution, consumption of electrical energy

Generation

Accelerated migration to different energy mix due to environmental, scarcity and geopolitical factors[1]

Green energy generators have **high-power semiconductor** content[2]:

- Wind: ~3,000 €/MW
- Solar: ~4,000 €/MW

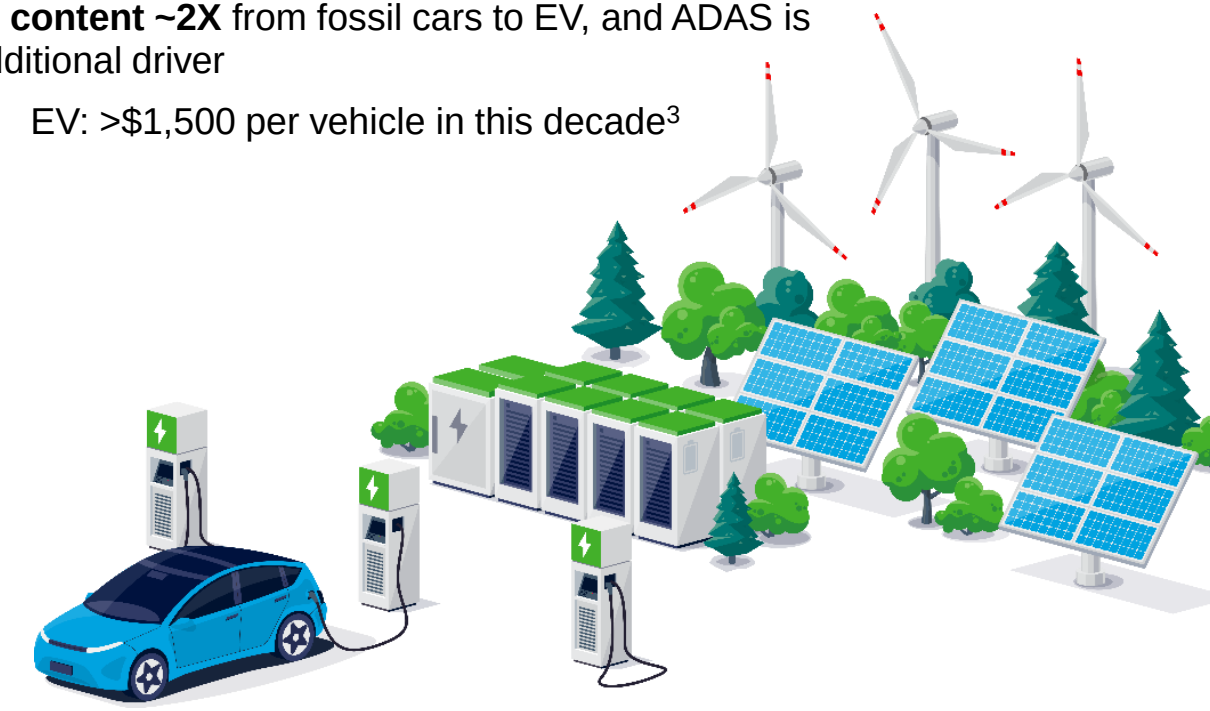
Consumption

Accelerated conversion from fossil to electrical in mobility

- ~70% of car sales in 2030 will be xEV (up from ~15% in 2021)[3]

Semi content ~2X from fossil cars to EV, and ADAS is an additional driver

- EV: >$1,500 per vehicle in this decade[3]



Sources

1: Shell-2021 The energy transition scenarios
2: Infineon-August 2022: Third quarter FY2022- quarterly update
3: Infineon-October 2022: Automotive Division Call
xEV: all types of electric vehicles, including mild hybrid electric vehicles

More integrated systems require both advanced and mature nodes

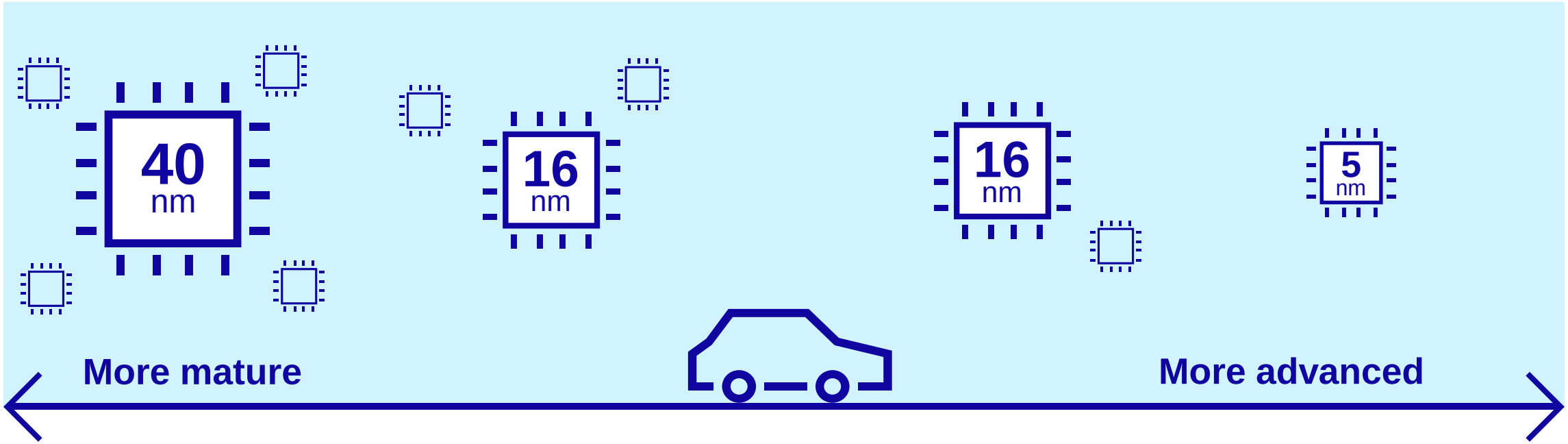
An automotive integrated system has a spectrum of scalable, flexible computing solutions

Actuators
Smart control

Domain/zone control
Compute intensive real-time actions

Comms gateway
Low latency communications

Central core
System's main computer



High **control** capacity
Signal-oriented operations
Hard real-time requirements

High **processing** capacity
Service-oriented operations
Soft real-time requirements

Source: Based on Lars Reger, NXP, "Changing the world with rolling robots – requirements for collaboration, innovation and supply", IMEC Future summit, May 2022

Countries push for ‘technological sovereignty’, fueling capex spend

CHIPS Act, FABS Act

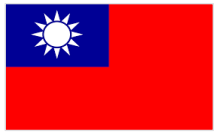
- $52bn
- Investment tax credits

European CHIPS Act

- $46bn

Integrated Circuit Industry Investment Fund (“Big Fund”)

- $20.7bn Phase 1
- $30.5bn Phase 2
- Tax breaks



Invest Taiwan Initiative

- Tax credits
- Help securing land, water and electricity

K-Semiconductor Belt

- Tax credits
- Aim to attract $450bn in private investment by 2030

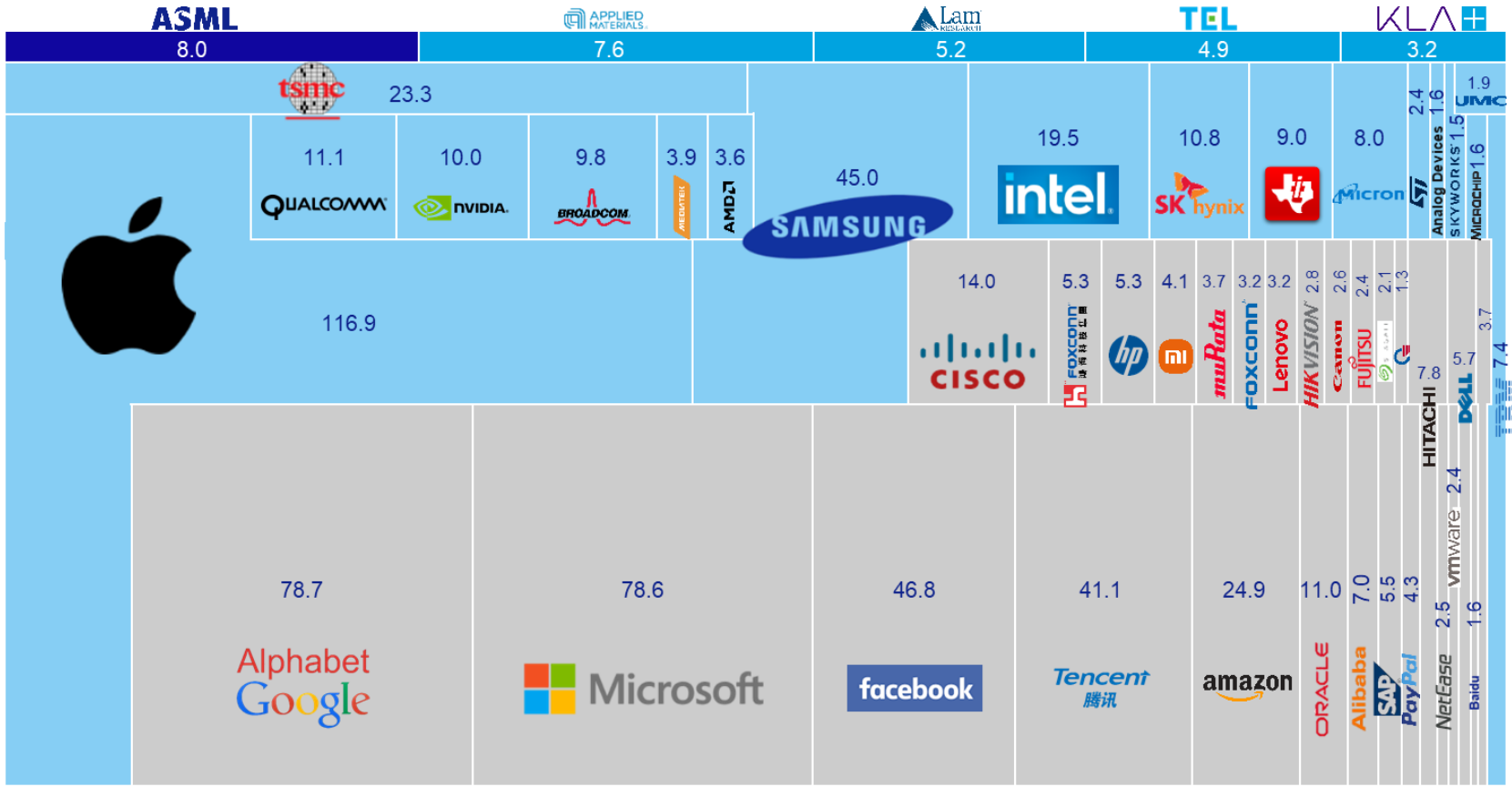
Specified ICT Utilization

- $4.42bn
- Subsidies for setup costs

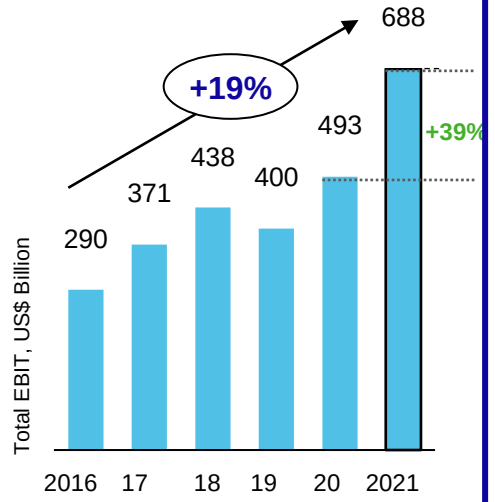
Source: “The resilience myth: Fatal flaws in the push to secure chip supply chains,” Nikkei Asia, July 26, 2022

ASML ecosystem has considerable means to drive innovation

50 top technology companies in our ecosystem generated $688 billion of EBIT in 2021



In our ecosystem, EBIT has grown at 19% CAGR from 2016 to 2021

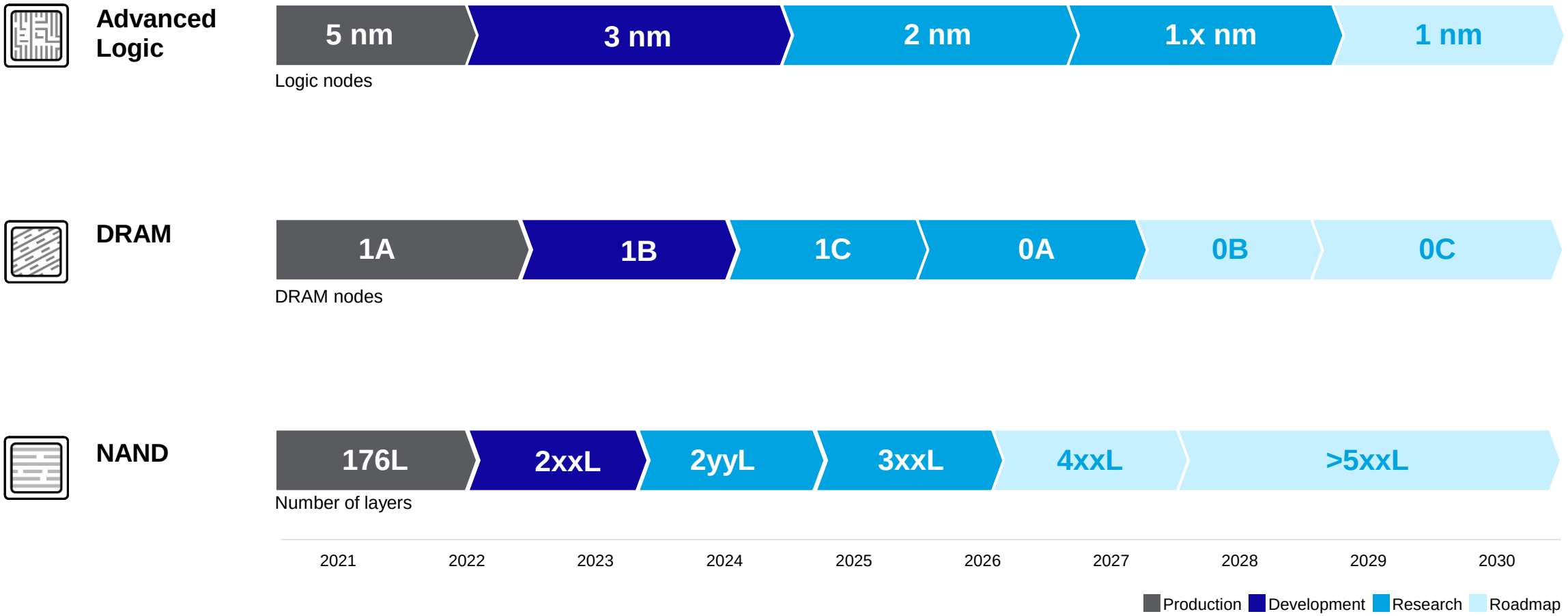


Source: Bloomberg, companies' annual reports, and ASML analysis. Note: EBIT = Earnings before Interest & Taxes; 50 top companies are top IT companies from the GICS 45 classification, according to EBIT rankings, plus Amazon, which is categorized as a retail company by the GICS (Global Industry Classification Standard). This chart uses the total EBIT of a company.

And it’s not stopping: the industry has years of device innovation ahead

The industry is enabling technologies in innovative and affordable ways

Today’s status

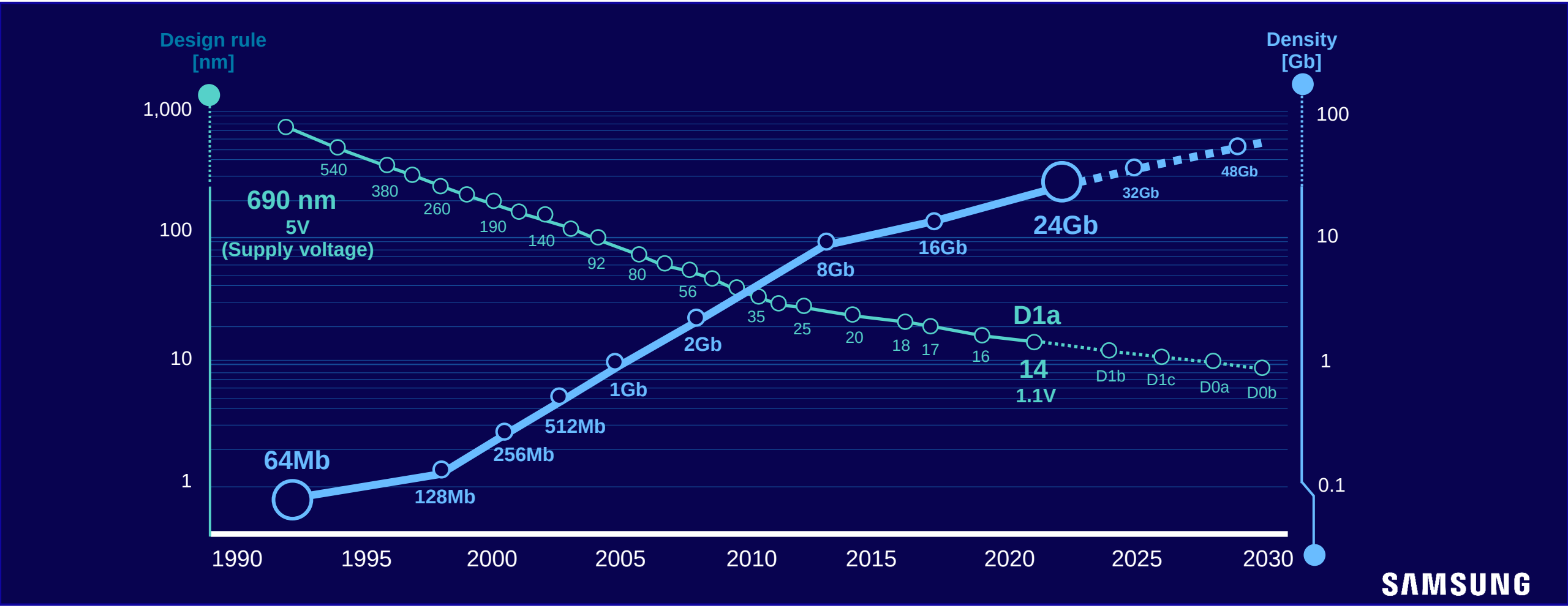


The innovation pipeline is filled to the brim

Source: IMEC, Future Summits, May 2022

30 years of DRAM: continuous improvements in design rule and bit density

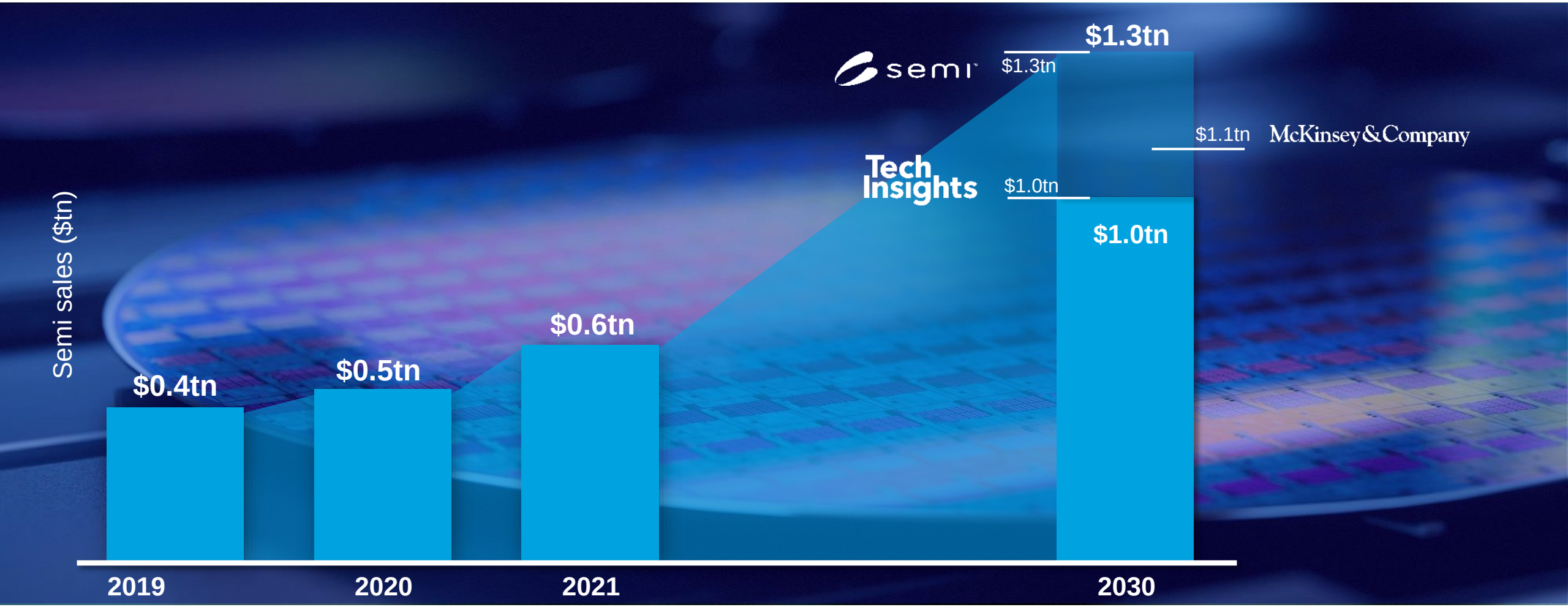
This carries on in the coming decade



Source: Kinam Kim, Samsung, The smallest engine transforming humanity, the past, present and future, IEDM, December 2021

The semiconductor market is expected to double in 10 years

Analysts' views on 2030 market are ranging from $1.0tn to $1.3tn

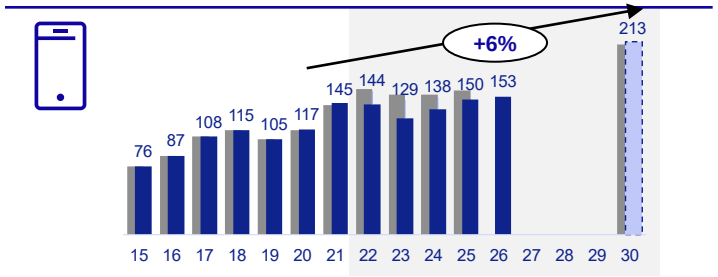


Sources: TechInsights, McKinsey, SEMI.org

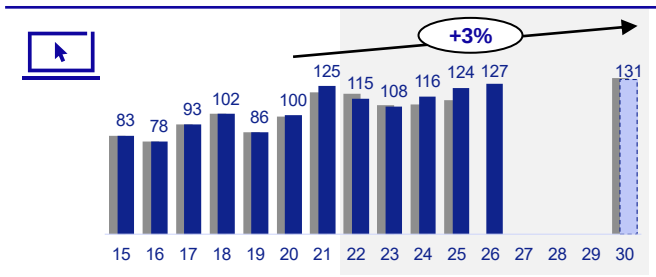
Semi end markets expected to grow 9% through 2030

All markets contributing; Datacenter, Automotive and Industrial expected to outperform

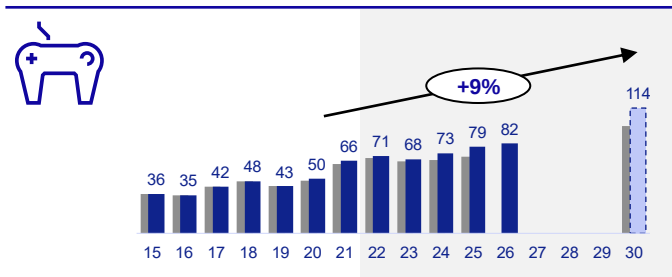
Smartphone ($bn)



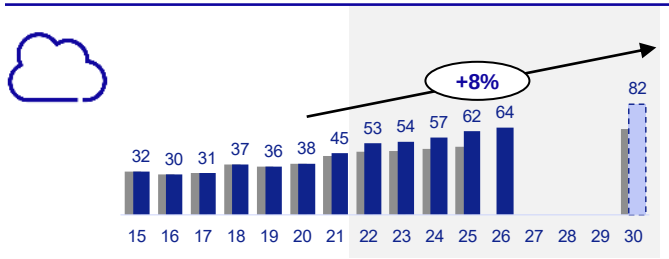
Personal Computing ($bn)



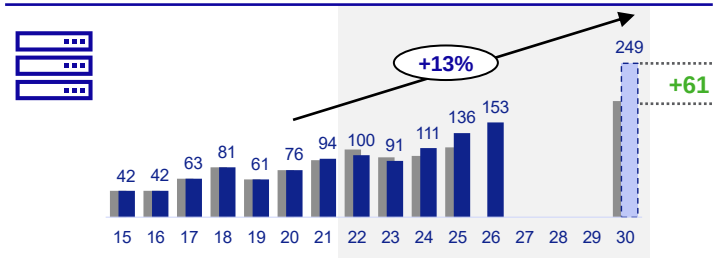
Consumer Electronics ($bn)



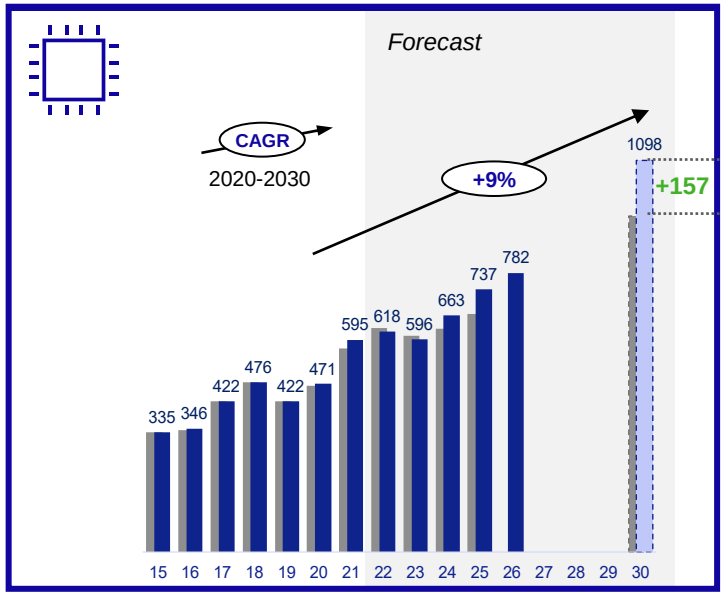
Wired & wireless Infrastructure ($bn)



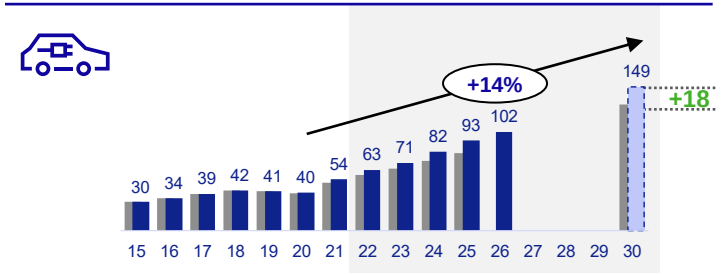
Servers, Datacenters & Storage ($bn)



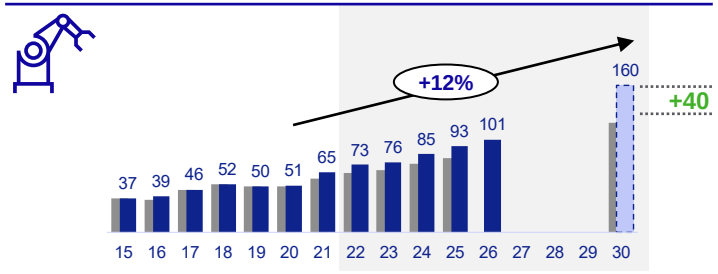
Total Semiconductor ($bn)



Automotive ($bn)



Industrial Electronics ($bn)



Source: Historical data: Gartner. Outlook: Gartner 3Q22 Forecast (Sep22, 2022) for years '22-'26; Outlook 2030: ASML estimate; segment revenue extrapolated using '20-'26 Compound Annual Growth Rate (CAGR). Some deviations from this methodology due to expected growth profile differences across the decade

CMD 2021 CMD 2022
CMD 2022 - extrapolation

Megatrends

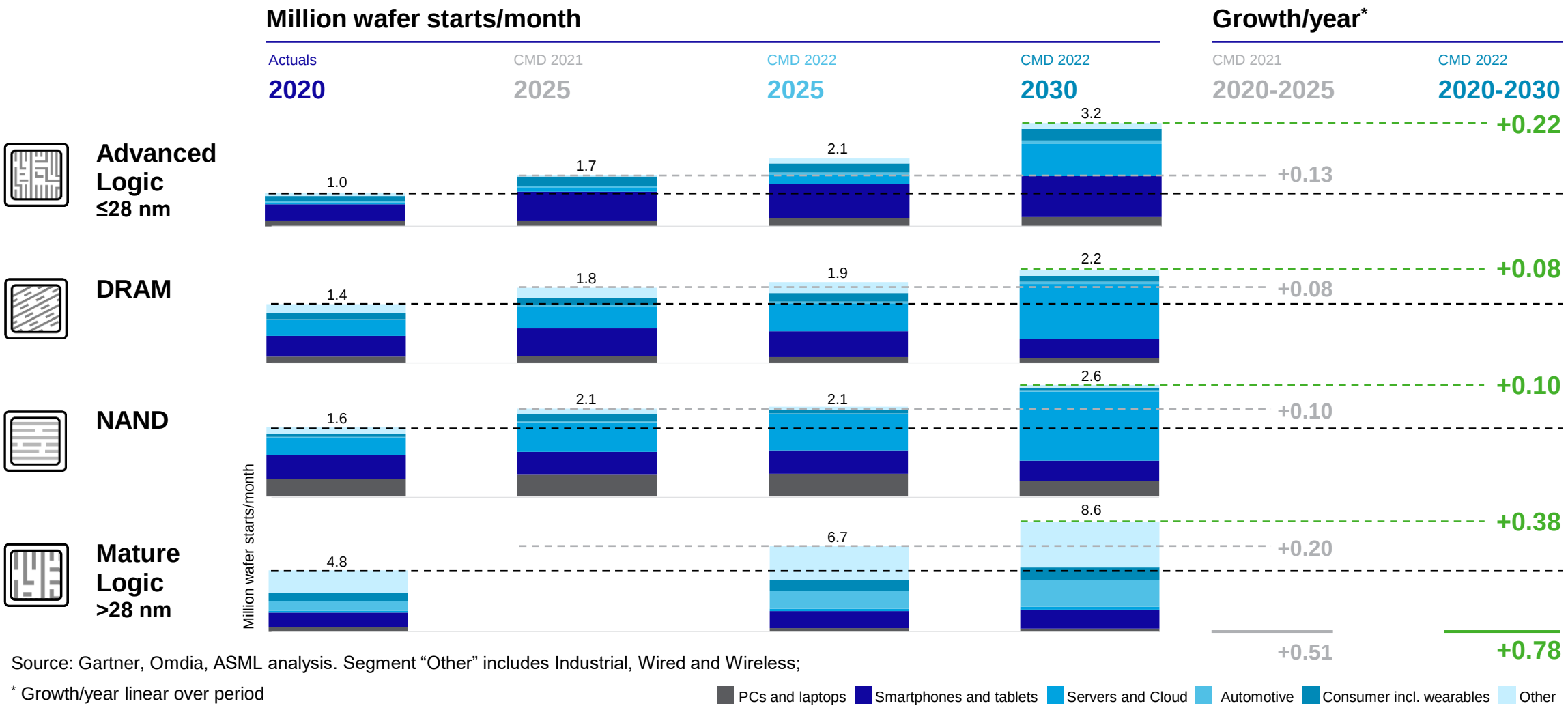
Wafer demand

Changes from Investor Day 2021

Capacity expansion

Translating to expected growth of wafer demand in all segments

Higher growth for advanced Logic and mature markets compared to CMD 2021



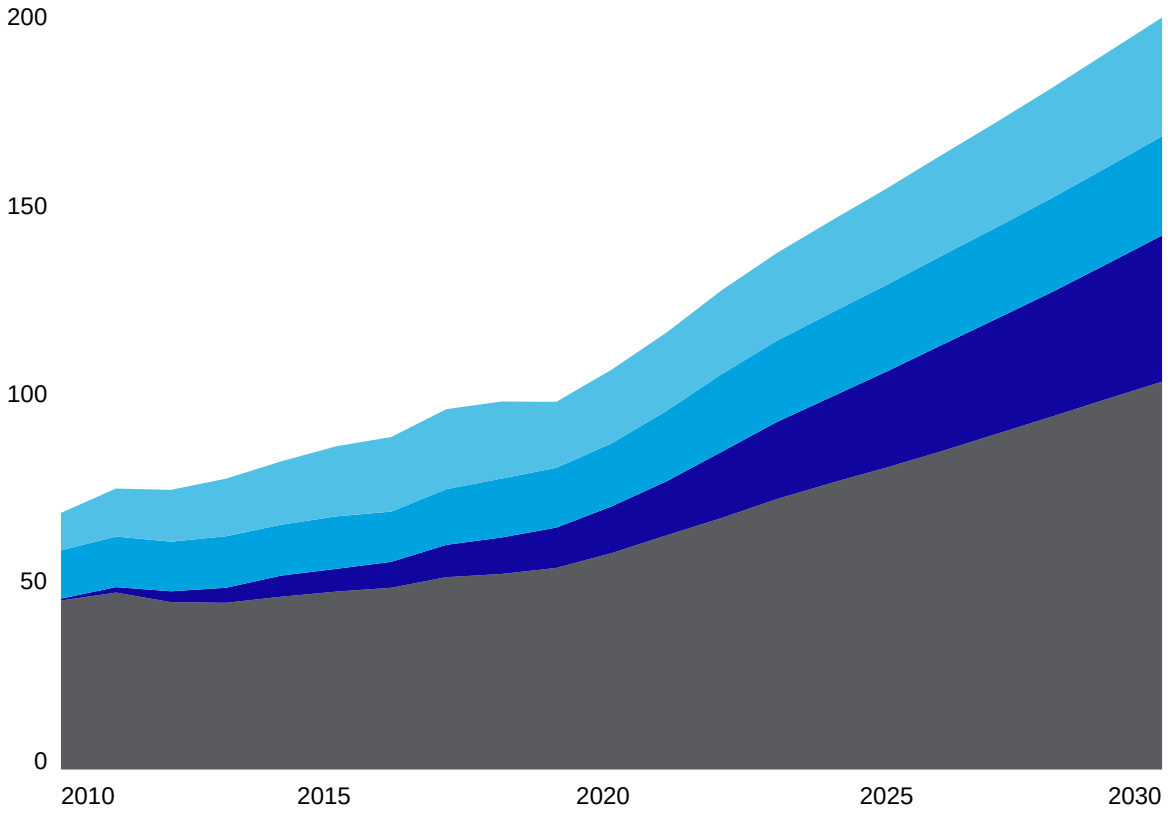
Source: Gartner, Omdia, ASML analysis. Segment "Other" includes Industrial, Wired and Wireless;

* Growth/year linear over period

Advanced and mature nodes drive investments in wafer capacity

~780k wafers/month per year 2020-2030, CAGR ~6.5%

Wafers (million wafer/yr) 300mm equivalent



Source: ASML analysis, Advanced Logic ≤28 nm, Mature >28 nm

Cost-effective innovations

- Growing wafer demand and capacity across all market segments drives increased litho demand
- Advanced Logic driven by growing application space and energy-efficient transistor growth.
- Mature markets driven primarily by strong automotive and industrial demand, mainly in 300 mm but 200 mm also growing

	kwspm/y CMD 2021 2020-2025	kwspm/y Growth 2020-2030	Percentage CAGR 2020-2030
NAND	+100	+100	4.9%
DRAM	+80	+80	4.7%
Advanced Logic	+125	+220	12.0%
Mature	+200	+380	6.0%
Total	**+505**	**+780**	**6.5%**

Mature Logic DRAM NAND

Megatrends

Wafer demand

Changes from Investor Day 2021

Capacity expansion

We see a range of demand drivers for wafer capacity growth

Demand bucket	Demand driver	kwspm/yr Additional wafer capacity required	Variables
CMD 2021 2020-2025		505	
 **Market driven growth**	• Advanced market growth across segments driven primarily by server and AR/VR. • Mature markets growth driven primarily by industrial and automotive (incl. electrification)	45 180	• End market segments growth rates • Geopolitical instabilities
 **Technology driven growth**	• Larger die sizes are required to improve both energy efficiency and performance while also compensating for slowing shrink	50	• Innovation by needs of industry, society and government • Transistor and bit demand growth due to market or technology
CMD 2022 2020-2030		**780**	

Advanced market growing faster

Faster node migration and more backfill, stronger outlook on growing servers and emerging markets

More products moving from mature to advanced Nodes

Especially in smartphone and consumer

Sense more and Fusion	
Type	Sensors (CIS&MEMS)
# of IC	10 ~ 25
Technology	0.35µm ~ N28

More Bands & Higher Speed	
Type	RF Module IC
# of IC	15 ~ 40
Technology	N65 ~ N6

True Sound and Image	
Type	Audio & Display
# of IC	2 ~ 4
Technology	N90 ~ N22

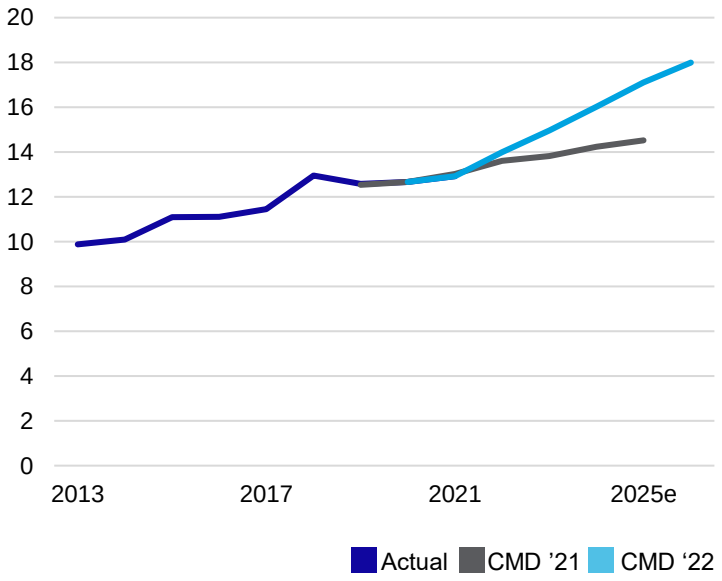
Discrete → Smart PMIC	
Type	PMIC
# of IC	10 ~ 30
Technology	0.25µm ~ N40

TSMC June 2022 symposium: to add 50% on mature (including 28 nm)/ specialized capacity by 2025

Sources: TSMC symposium 2022

More positive outlook on the server market

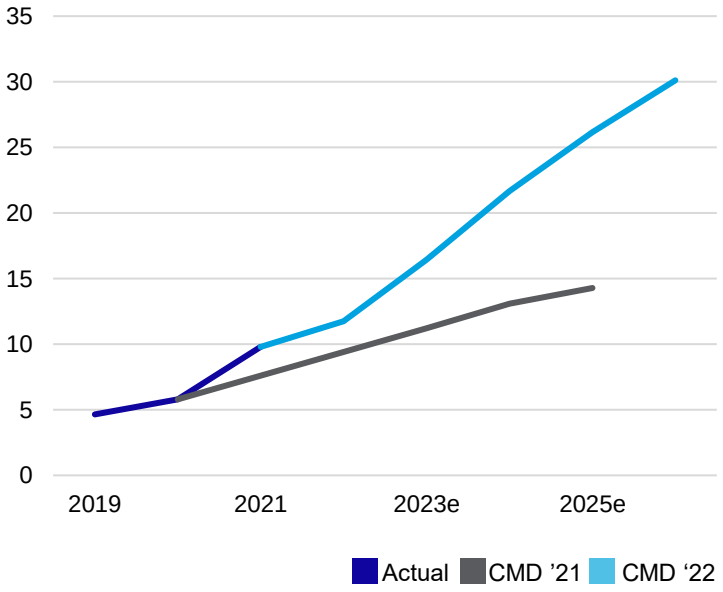
Server (units in millions)



Sources: Gartner Server forecasts 2Q21 and 3Q22

Emerging applications accelerating uptake

AR/VR headsets (units in millions)

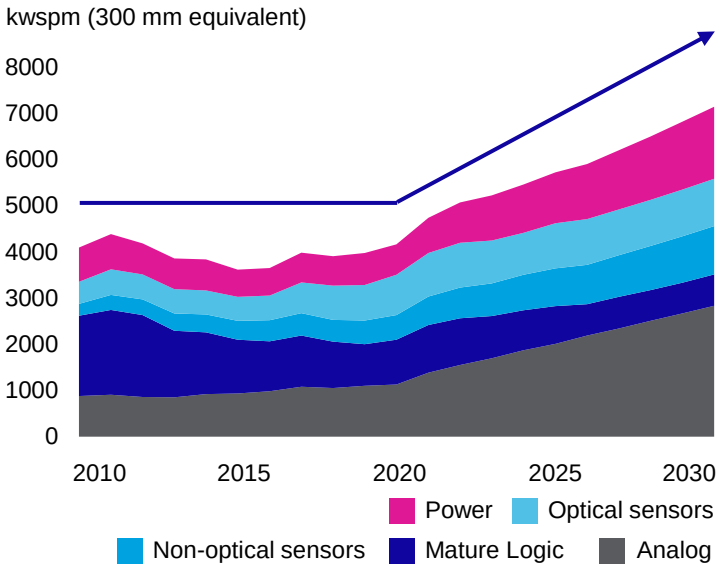


Sources: Gartner Semiconductor forecasts 2Q21 and 3Q22

Mature market is growing faster, driven by smart grids and automotive

Mature grows in all segments

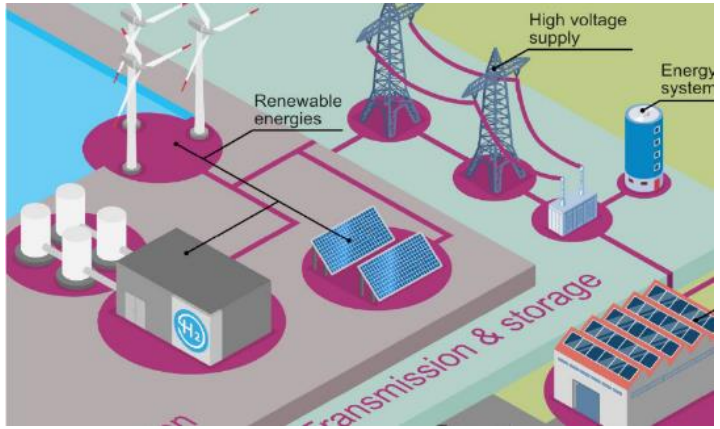
After being stable for years, we now see proliferation of mature applications, and growing wafer demand



Source: ASML analysis using external sources

New applications emerging

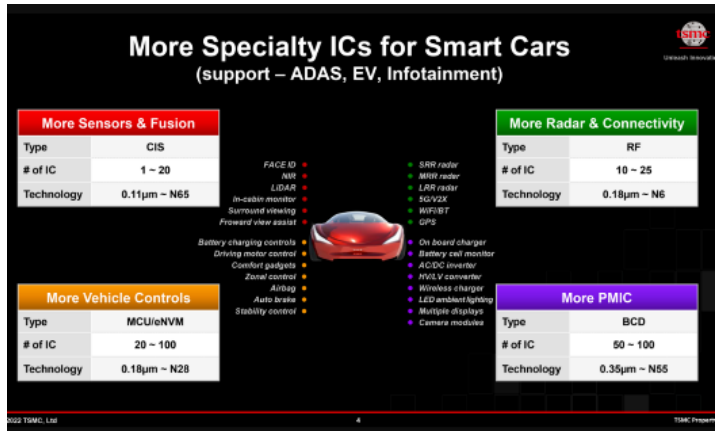
With reducing cost, new applications and markets are emerging. Smart grids being one example, where the variable nature of renewable energy requires smart grids to balance this.



Source: Infineon Aug'22: quarterly update-third quarter FY2022

Customers support our view

Customers such as TSMC confirm mature applications are growing, in segments such as smartphone (driven by sensors, camera, etc) and automotive (driven by electrification).



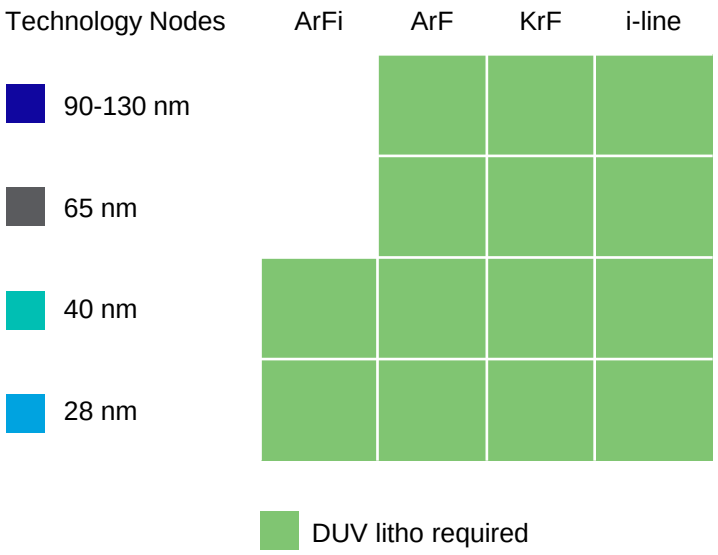
Source: TSMC, Anandtech June16, 2022

Significant increase in mask sets or products for ≥ 28 nm Logic nodes

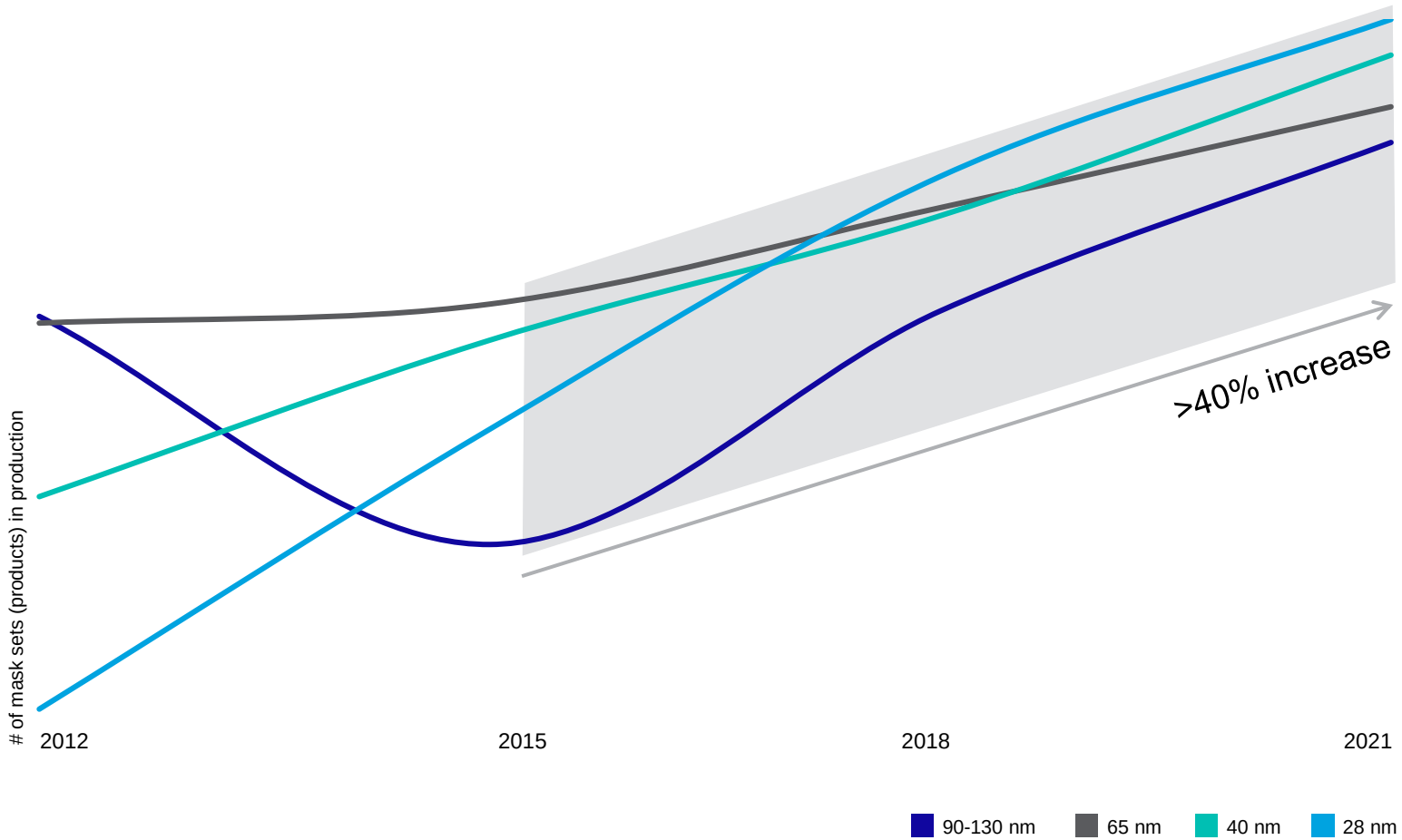
DUV growth drivers

Over 40% increase in products in past few years, meaning more applications

Technology nodes require DUV



Products ≥ 28 nm technology in production (300 mm)



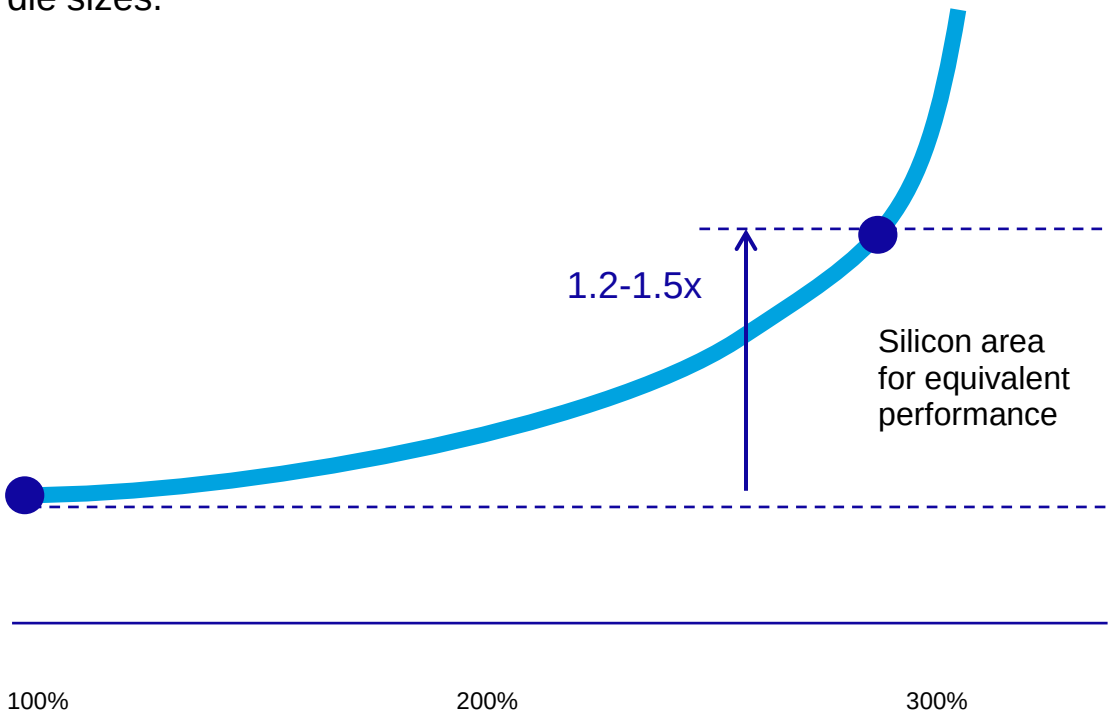
Source: ASML analysis and external analysts

Drive for energy efficiency requires more silicon in advanced segment

Larger die sizes are required to improve both energy efficiency and performance

Energy efficiency requires more silicon

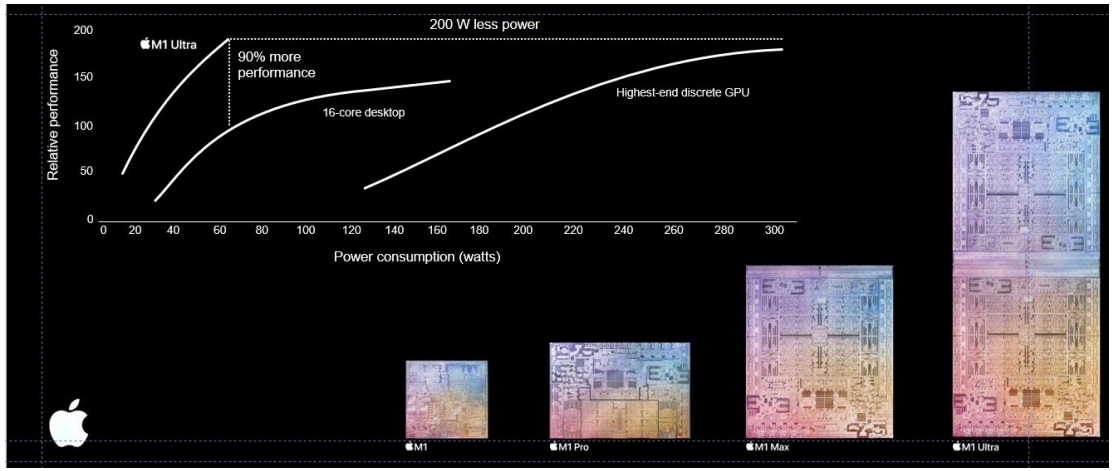
Running chips at lower voltage increases energy efficiency and lowers performance, which can be compensated by larger die sizes.



Source: ASML analysis using external sources

Customers are balancing performance and power

After an era of transistor density optimization, customers are increasingly optimizing system scaling and energy efficiency.



Source: Apple.com, March 2022

We see a range of demand drivers for wafer capacity growth

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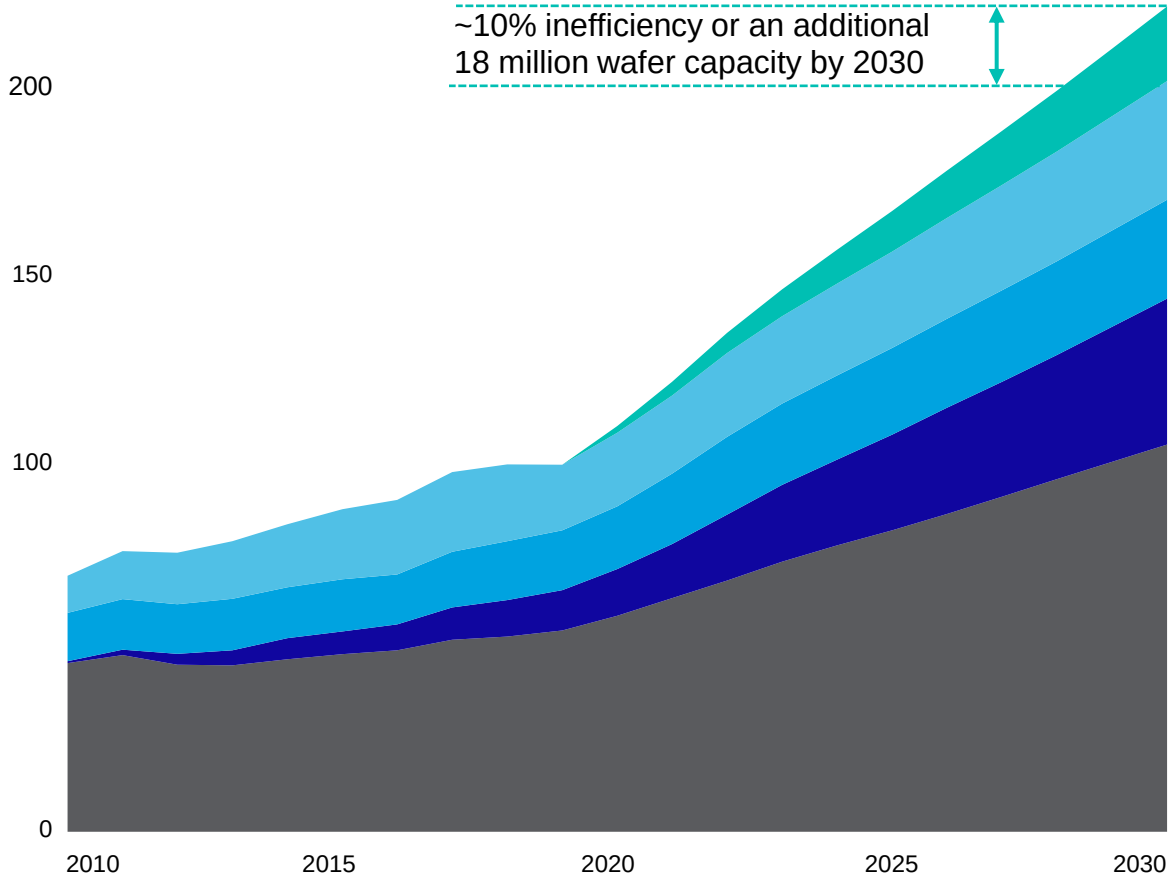
Technology driven growth	• Larger die sizes are required to improve both energy efficiency and performance while also compensating for slowing shrink	50	• Innovation by needs of industry, society and government • Transistor and bit demand growth due to market or technology
CMD 2022 2020-2030		**780**	
Geopolitical and competitive driven growth	• Technological sovereignty • Foundry competition	150	• Geopolitical driven self-sufficiency • Foundry competition uncertainty
CMD 2022 2020-2030		**~780-930**	

Technological sovereignty and foundry competition create additional capacity

Resulting in ~10% inefficiency of the total wafer installed capacity by 2030

Capacity (million wafer/year) 300 mm equivalent



Source: ASML analysis, advanced Logic ≤28 nm, mature >28 nm

Cost-effective innovations

- Tech sovereignty leading to less efficient use of the installed capacity as countries/regions aim to (re)gain fab footprint.
- Fab base becomes more spread in ownership and geography and load balancing will become more difficult
- Intensified foundry competition could lead to period with overcapacity as players try to capture market share

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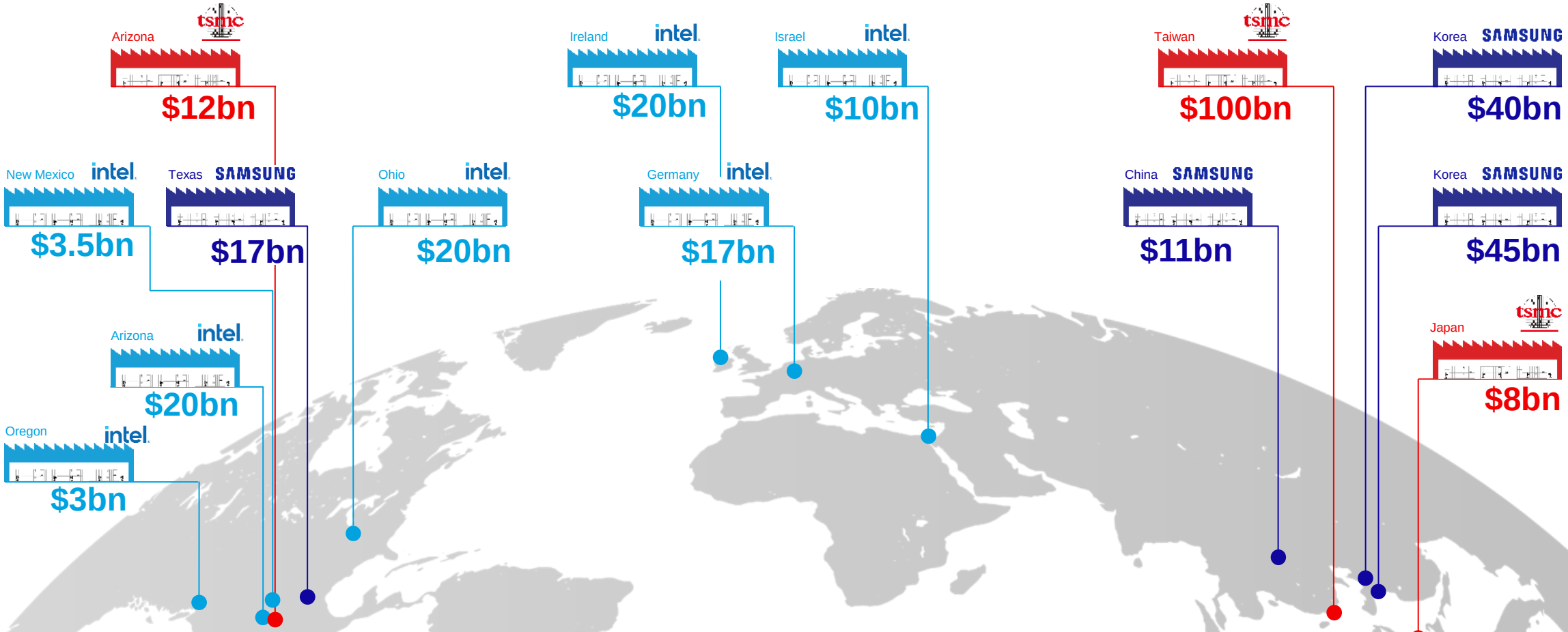
NAND	+100	+100	4.9%
DRAM	+80	+80	4.7%
Advanced Logic	+125	+220	12.0%
Mature	+200	+380	6.0%
Total	**+505**	**+780**	**6.5%**
+ Technological Sovereignty & Competition		+150	
Total capacity	**+505**	**+930**	**7.4%**

Mature Logic DRAM NAND

Customers are investing to support these demand drivers

Top three semiconductor manufacturers announced plans to invest >$300 billion in global capacity



Megatrends

Wafer demand

Changes from Investor Day 2021

Capacity expansion

With strong long-term growth, we adjust our capacity to meet demand

Flexible growth in a volatile environment to ensure reliable performance

Strong long-term growth

over the next 10+ years

Our industry and the ASML ecosystem expect to double in size before 2030

Adjust capacity

to meet demand

Invest timely and sustainably in additional capacity to plan to meet demand

Prepare for cyclicality

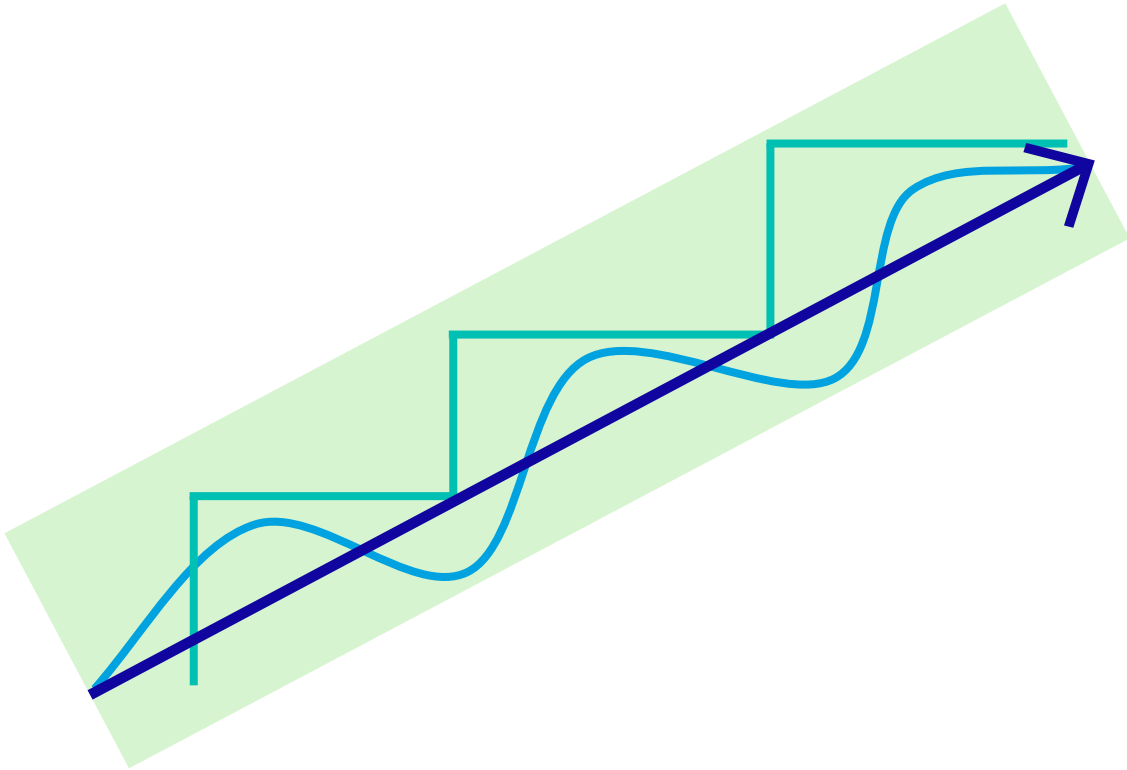
with the aim of serving *all* customer needs *throughout* swings

Embed flexibility to grow fast and adjust in down-cycle

Balance the interests

of all stakeholders

Share risks and rewards fairly between customers, suppliers, employees, shareholders and society



Capacity expansion plans and productivity roadmap to support semiconductor industry growth

DUV capacity growth to
600 systems/year
in 2025-2026

Number of units	Productivity	Litho wafer capacity*
~2.5x	~1.2x	~3x

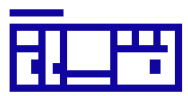
compared to 2020

Low-NA EUV capacity growth to
90 systems/year
in 2025-2026

Number of units	Productivity	Litho wafer capacity*
~3x	~1.7x	~5x

compared to 2020

High-NA EUV capacity growth to
20 systems/year
starting in 2027-2028 and growing over time



Number of units
≥ 20

*Litho wafer capacity=units x productivity; numbers provided are capacity plans, not shipment plans

Revised capacity expansion plans require the building of new production facilities

- Expansion to increase ASML production space by >65,000m^2
- Phased capex approach with incremental ~€0.5bn per year over 5 years, translating to ~€0.2bn per year on average in depreciation costs
- Total supply chain expected to invest ~€2bn over next years

Megatrends, wafer demand and capacity plans to support future growth

Key Messages

Global trends continue to fuel semiconductor growth

- While the current macro environment creates near-term uncertainties, we see longer-term wafer demand and capacity showing healthy growth
- Expanding application space and industry innovation are expected to continue to fuel growth across semiconductor markets
- This translates to semi end market annual growth rate of **around 9%** and a doubling of semiconductor revenue (2020-2030)

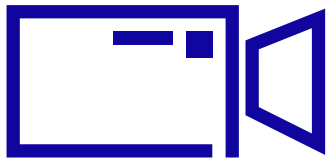
This drives an increase in demand for wafers into the next decade

- Strong growth rates across markets, continued innovation, more foundry competition and technological sovereignty drive an increased demand at advanced and mature nodes, which requires wafer capacity additions of **over 780 thousand wafer starts per month per year**, or a **CAGR of 6.5%** (2020-2030)

To meet that demand, ASML and its partners are adding capacity

- We plan to adjust our capacity to meet future demand, preparing for cyclicality while sharing risks and rewards fairly with all stakeholders
- We plan to increase our capacity to **90** Low-NA EUV and **600** DUV systems (2025-2026), while also ramping High-NA EUV capacity to **20** systems (2027-2028)

Placeholder video Zeiss (5 min)



Forward Looking Statements

This document and related discussions contain statements that are forward-looking within the meaning of the U.S. Private Securities Litigation Reform Act of 1995, including statements with respect to expected trends, including trends in end markets and the technology industry and business environment trends, expected lithography and semiconductor industry growth and growth rates and revenue, capital intensity outlook, expected growth in semiconductor end markets, expected growth in wafer demand and capacity and additional wafer capacity requirements, expected investments in wafer capacity and plans to increase capacity, expected growth in lithography spend, opportunity for growth in service and upgrades and expected growth in Installed Base Management sales, expected increase in capacity and plan for ASML and its suppliers to increase capacity and output to meet demand, expected production of systems, updated model for 2025 and 2030, outlook and expected, modelled or potential financial results, including revenue projections and annual revenue opportunity gross margin, R&D costs, SG&A costs, capital expenditure, cash conversion cycle and annualized effective tax rate for 2025 and 2030 and assumptions underlying such expected, modelled or potential amounts, and other assumptions underlying our business and financial models, expected trends in semiconductor end markets and long term growth opportunities, demand and demand drivers, expected growth in the semiconductor industry including demand growth and expected capital spend in the coming years, the impact of technology sovereignty and foundry competition, statements with respect to dividends and share buybacks and dividend policy, including expectation of growing dividends and buybacks and statements with respect to ASML's new buyback plan, energy generation and consumption trends and the drive toward energy efficiency, increasing technological sovereignty across the world, including specific goals of countries across the world, increasing competition in the foundry business and other non-historical statements. You can generally identify these statements by the use of words like "may", "will", "could", "should", "project", "believe", "anticipate", "expect", "plan", "estimate", "forecast", "potential", "intend", "continue", "target", "future", "progress", "goal" and variations of these words or comparable words. These statements are not historical facts, but rather are based on current expectations, estimates, assumptions and projections about our business and our future financial results and readers should not place undue reliance on them. Forward-looking statements do not guarantee future performance and involve a number of substantial known and unknown risks and uncertainties. These risks and uncertainties include, without limitation, economic conditions, product demand and semiconductor equipment industry capacity, worldwide demand and manufacturing capacity utilization for semiconductors, the impact of general economic conditions on consumer confidence and demand and capacity for our customers' products, performance of our systems, the impact of the COVID-19 outbreak and measures taken to contain it on us, our suppliers, the global economy and financial markets, the impact of the Russian military actions in the Ukraine and measures taken in response on the global economy and global financial markets and other factors that may impact ASML's financial results, including customer demand and ASML's ability to obtain parts and components for its products and otherwise meet demand, the success of technology advances and the pace of new product development and customer acceptance of and demand for new products, risks relating to execution of technology roadmaps, demand and production capacity and our and our supplier's ability to increase capacity to meet demand, the impact of inflation and any recession, investments in capacity and lithography spend, our ability to meet the goals and expectations in our business and financial models and whether the assumptions underlying our models prove to be reasonable and accurate, the number and timing of systems ordered, shipped and recognized in revenue, and the risk of order cancellation or push out, supply chain capacity and constraints and logistics and constraints on our ability to produce systems to meet demand, our ability to increase capacity including our infrastructure and workforce, our ability to control costs and maintain and improve gross margin and competitive position, trends in the semiconductor industry, our ability to enforce patents and protect intellectual property rights and the outcome of intellectual property disputes and litigation, availability of raw materials, critical manufacturing equipment and qualified employees, trade environment, geopolitical risks and impact on our business, import/export and national security regulations and orders and their impact on us including the impact of new U.S. export regulations, changes in exchange and tax rates, available liquidity and liquidity requirements, our ability to refinance our indebtedness, available cash and distributable reserves for, and other factors impacting, dividend payments and share repurchases, results of our share repurchase program and other risks indicated in the risk factors included in ASML's Annual Report on Form 20-F for the year ended December 31, 2021 and other filings with and submissions to the US Securities and Exchange Commission. These forward-looking statements are made only as of the date of this document. We undertake no obligation to update any forward-looking statements after the date of this report or to conform such statements to actual results or revised expectations, except as required by law.

ASML Small Talk 2022

ASML

Investor Day Veldhoven