

axcelis

INVESTOR EVENT

July 2024



FORWARD LOOKING STATEMENT CAUTION

Statements in this presentation other than historical facts, such as statements pertaining to: (i) future industry demand for semiconductors and WFE; (ii) future development of regulatory landscape; (iii) our market position for the future; (iv) our forecast of financial measures for the following quarter and full year; (v) our long-term financial targets and underlying assumptions; (vi) our future investment plan on R&D, technology and infrastructure; and (vii) future shareholder returns, are forward-looking statements and subject to the Safe Harbor provisions created by the Private Securities Litigation Reform Act of 1995.

These forward-looking statements are based on current information and expectations and involve a number of risks and uncertainties. Actual results may differ materially from those projected in such statements due to various factors, including but not limited to: economic, political and social conditions in the countries in which we, our customers and our suppliers operate; disruption to our manufacturing facilities or other operations, or the operations of our customers, due to natural catastrophic events, health epidemics or terrorism; ongoing changes in the technology industry, and the semiconductor industry in particular, including future growth rates, pricing trends in end-markets, or changes in customer capital spending patterns; our ability to timely develop new technologies and products that successfully anticipate or address changes in the semiconductor industry; our ability to maintain our technology advantage and protect our proprietary rights; our ability to compete with new products introduced by our competitors; our ability or the ability of our customers to obtain U.S. export control licenses for the sale of certain products or provision of certain services to customers in China.

For other factors that may cause actual results to differ materially from those projected and anticipated in forward-looking statements in this material, please refer to Axcelis' most recent Annual Report on Form 10-K, and other subsequent filings with the Securities and Exchange Commission. Axcelis assumes no obligation to, and does not currently intend to, update these forward-looking statements

PRESENTERS



Russell Low, PhD

President & CEO

Overview, Strategy



Greg Redinbo, PhD

EVP, Marketing & Applications

Products and R&D



James Coogan

EVP & CFO

Financials



Doug Lawson

EVP, Marketing & Strategy

Moderator

Axcelis Well Positioned Across Multiple Market Inflections

Russell Low, PhD

President & CEO



INVESTMENT CASE SUMMARY



**Foundational
Technology for
Semiconductor
Manufacturing**



**Well Positioned for
Market Inflections
& Secular Growth
Opportunities**



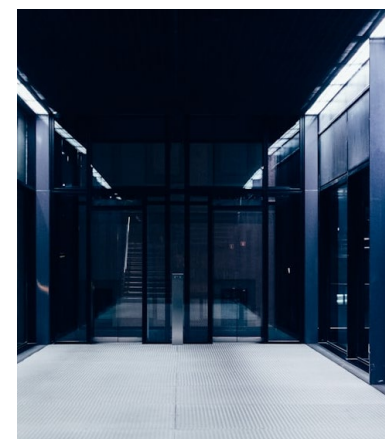
**Long-Term Margin
Expansion &
Earnings Growth**



**Strong Balance
Sheet with
Balanced Capital
Allocation**



Our highly proprietary ion implantation tools provide a critical step in semiconductor production, enabling multiple emerging technologies.



FOUNDED
1978

MARKET CAP ⁽¹⁾
~\$4.6B

EMPLOYEES
1,620

2023 OP MARGIN
23.5%



2023 REVENUE
\$1.13B

2023 EPS
\$7.43

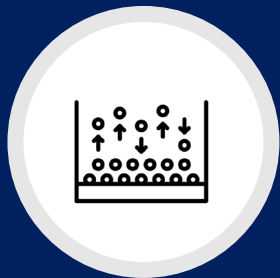
⁽¹⁾ Market Cap as of June 30, 2024

WHERE WE FIT IN THE INDUSTRY

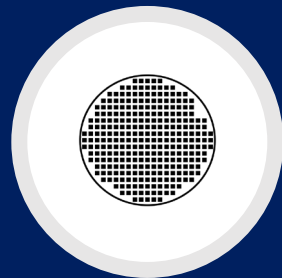
Fundamental Steps in Semiconductor Production

FRONT END

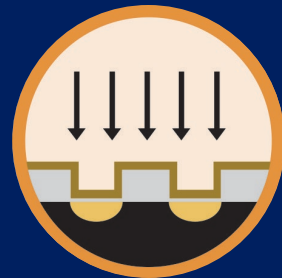
BACK END



DEPOSITION



LITHOGRAPHY



**ION
IMPLANTATION**



ETCH



METROLOGY
& INSPECTION



ADVANCED
PACKAGING

Ion implantation is a critical enabling and enhancing step to meet device functionality and performance

WHAT IS AN ION IMPLANTER?

WHAT

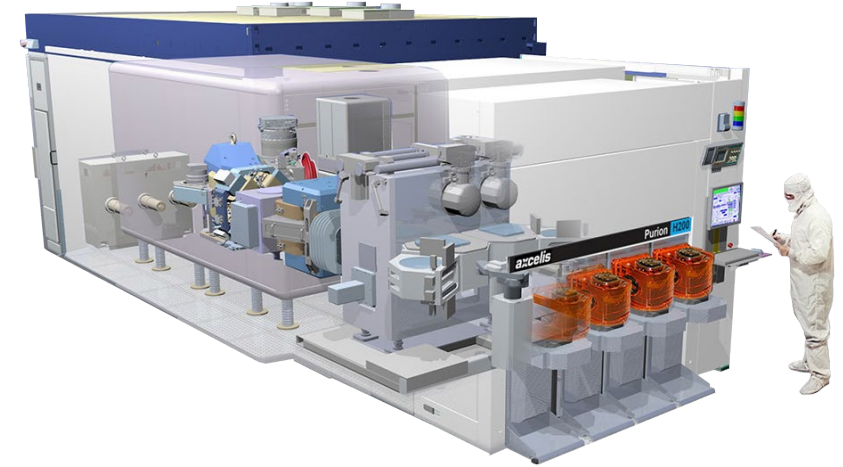
Ion implantation is the process of delivering materials into semiconductors to locally change its properties

WHY

To modify the electrical or physical characteristics of a material to determine device performance

HOW

Precisely delivering ions of high purity at the right dose, energy and angle



WHAT IS PURION?

A common ion implant platform consisting of modern toolsets that enable cutting edge device design and production while meeting the growing needs for today's most sophisticated devices

From mature process nodes implant to advanced logic material modification, Purion optimizes our customers need for:

+ PURITY

+ PRODUCTIVITY

+ PRECISION

+ COST OF OWNERSHIP

OUR PRODUCTS ARE USED IN A GROWING VARIETY OF APPLICATIONS



IOT

Smart devices from refrigerators to doorbells use mature node chips



AUTOMOTIVE

Power semiconductors are used in EVs, PHEVs, Hybrids and ICE vehicles



MOBILE

Chips powering mobile computing including Image sensors, memory and communication devices



ADVANCED COMPUTING

Chips are used in the datacenter, memory, cooling station, and power supplies



CLEAN ENERGY

Power semiconductors turn wind and solar energy into usable electricity



GROWTH

Multiple initiatives will accelerate Purion across all markets



Power Devices: Continued Focus On The Growing Market Opportunity

New customers and growing footprint with existing customers as they ramp to high volume manufacturing



Geographic Expansion

China: Emphasis on mature process technology for a large, diverse group of customers

Japan: Focus on power devices, image sensors and NAND



Purion Footprint Growth at Our Existing Customer Base

Adding Purion product types including Advanced Logic Capabilities

Targeted joint developments around improved device performance and higher productivity



New Implant Applications

Collaborating with customers and industry peers to develop novel uses for ion implant

POWER MARKET DRIVERS



**GREENHOUSE
GAS EMISSIONS**



**ENERGY
GENERATION
& EFFICIENCY**



AI – ENERGY USE

7.3 TWh

Estimated annual energy consumption for the 100,000 NVIDIA units shipped in 2023.

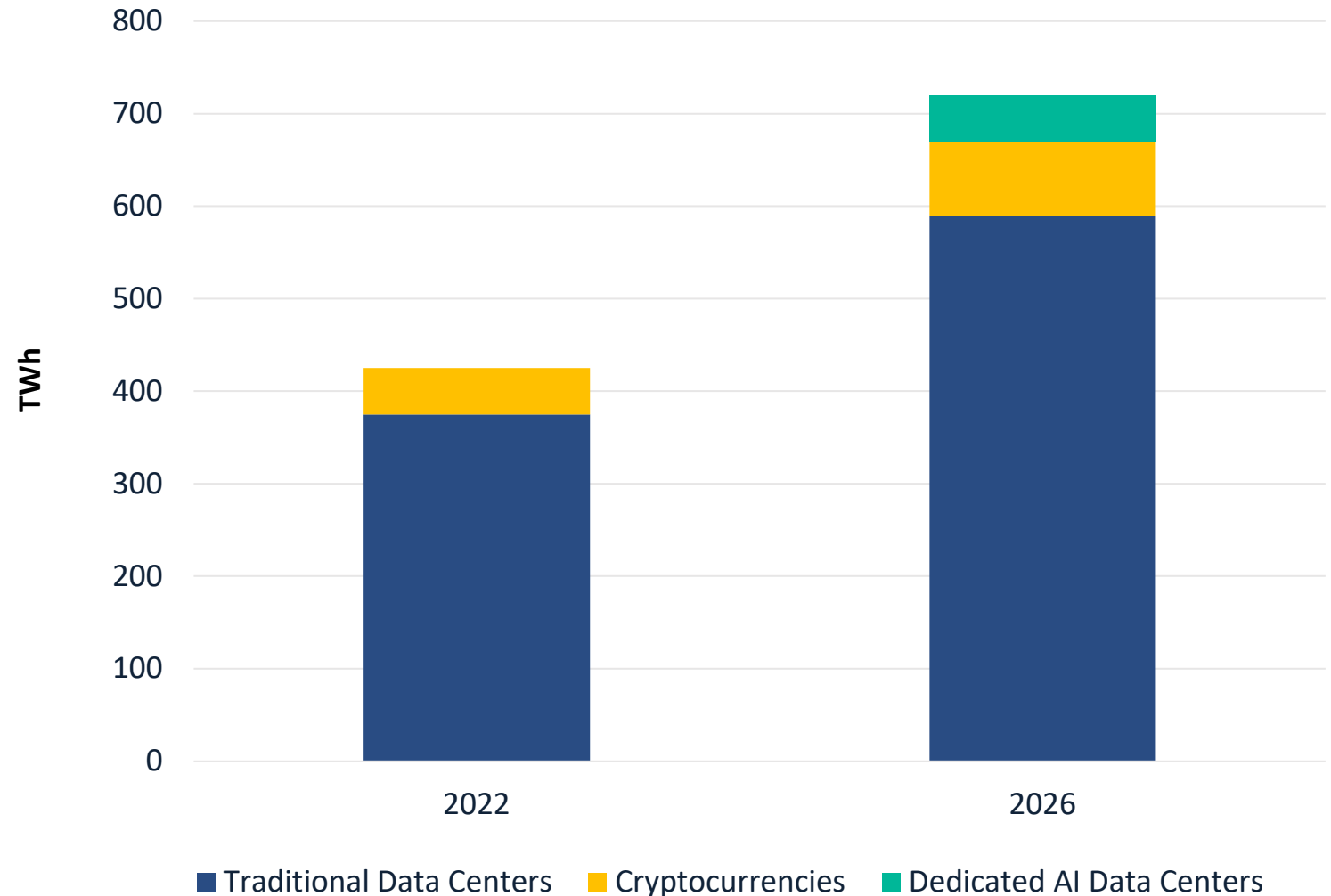
10X

Estimated increase in energy consumption from AI by 2026

The US Department of Energy (DOE) is supporting the local production of semiconductors and is funding the development of **more efficient semiconductors** over the next two decades. More efficient semiconductors reduce cooling requirements, thus supporting the decarbonization of the sector.

Chinese regulators will require all data centers acquired by public organizations to improve their energy efficiency and be entirely powered by renewable energy by 2032, starting with a 5% share mandate for renewables in 2023.

Estimated Electricity Demand



Data center electricity demand excludes consumption from data network centers.

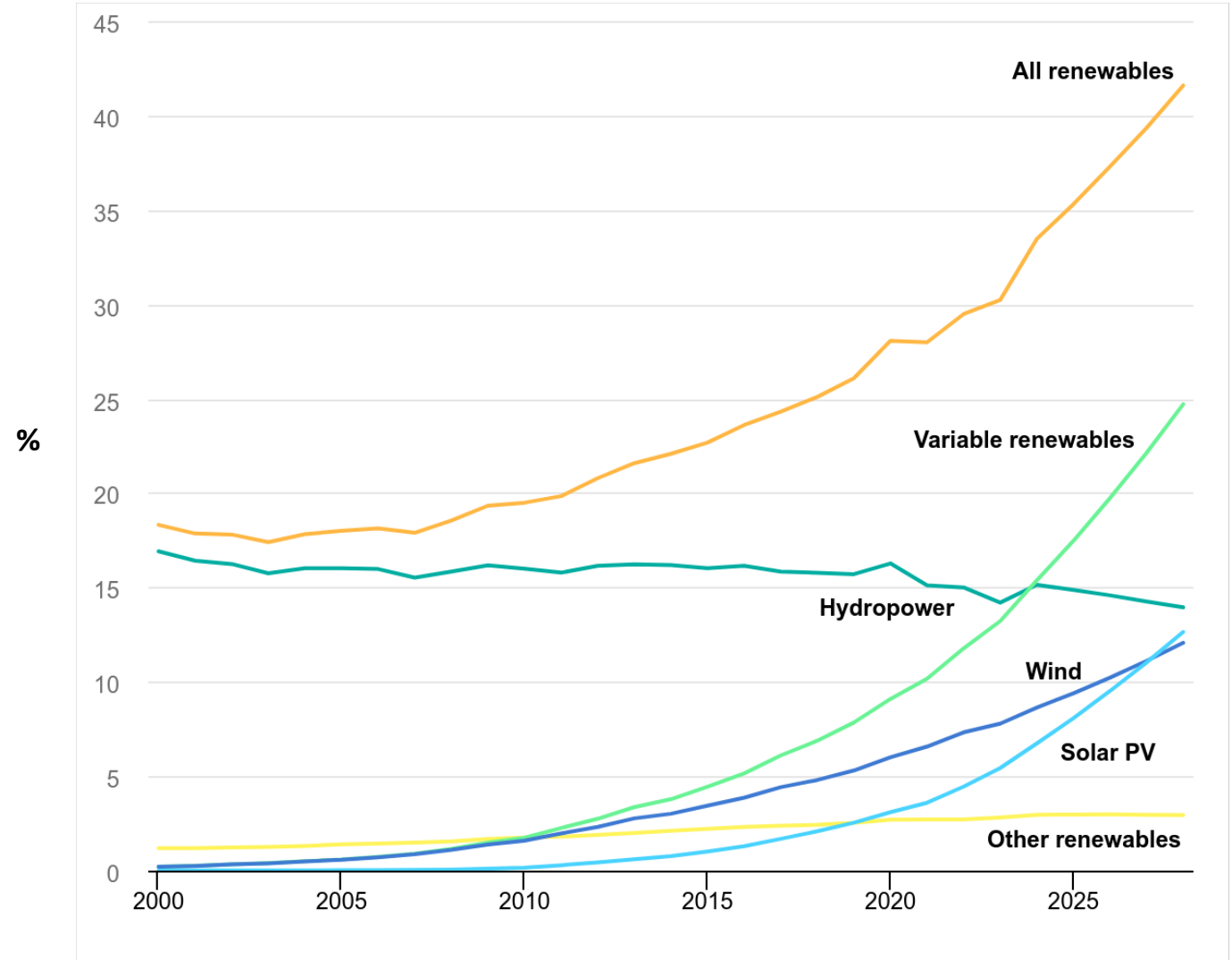
CLEAN ENERGY

Approximately 3,700 GW of new renewable capacity will come online globally over the 2023-2028 period

Over the coming five years, several global renewable energy milestones are expected to be achieved:

- In 2024, **wind and solar PV** together generate more electricity than hydropower.
- In 2025, **renewables** surpass coal to become the largest source of electricity generation.
- Wind and solar PV each **surpass nuclear** electricity generation in 2025 and 2026 respectively.
- In 2028, **renewable** energy sources account for over 42% of global electricity generation.

Transformation of the Global Power Mix (2000-2028)

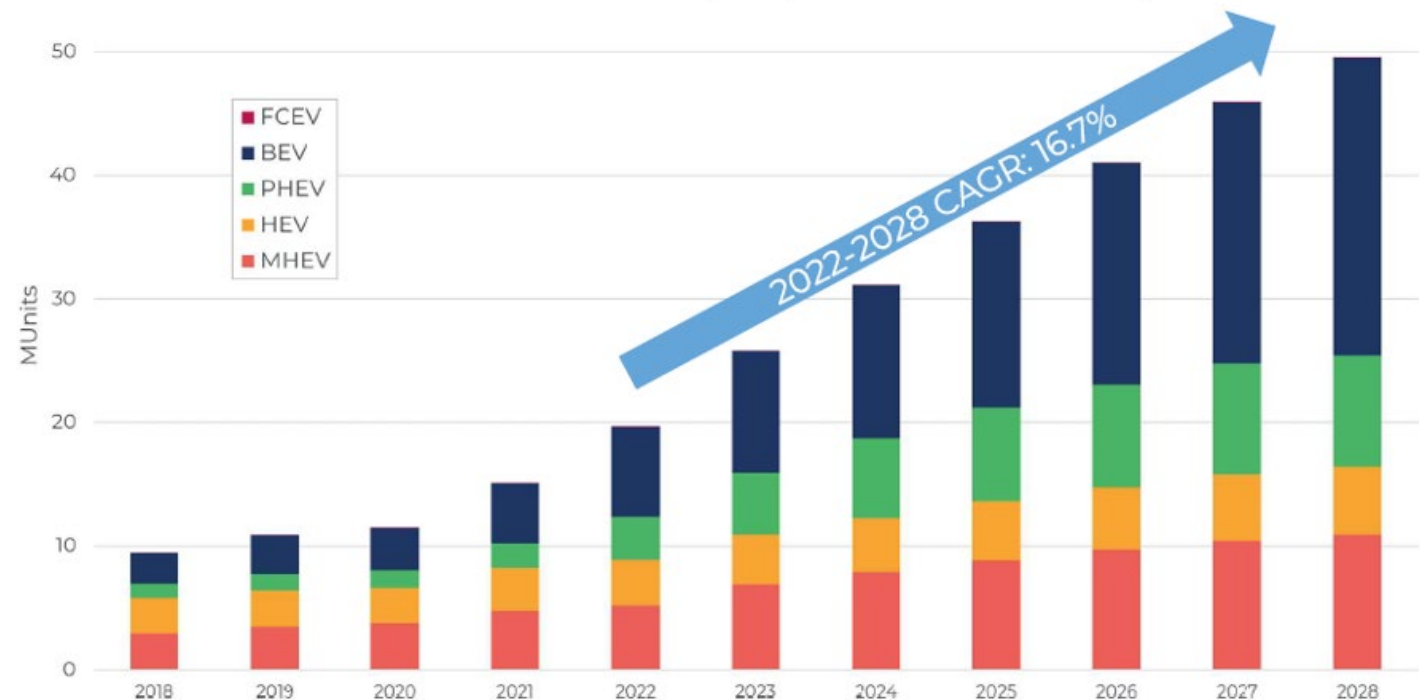


AUTOMOTIVE ELECTRIFICATION

Globally passenger car electrification continues to grow with BEV, PHEV, and HEV

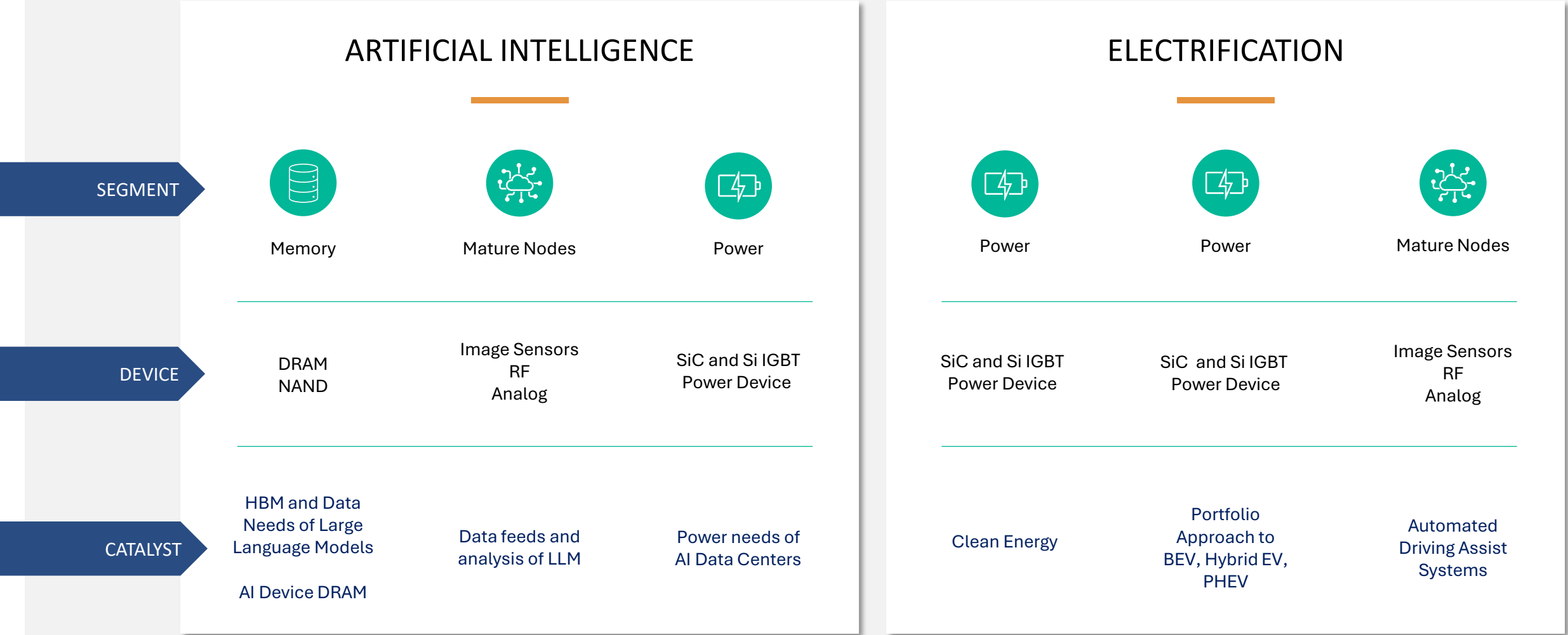
- Battery electric vehicles is the biggest market in units and value.
- Electric car sales exceeded 10 million in 2022 and accounted for close to 15% of the global car market.
- China continues to dominate the market, representing around 60% of all electric cars sold globally.

xEV Market in Unit, Split By Vehicle Electrification Type



FCEV: Fuel Cell Electric Vehicle
BEV: Battery Electric Vehicle
HEV: Hybrid Electric Vehicle
MHEV: Mild Hybrid Electric Vehicle
PHEV: Plug-in Hybrid Electric Vehicle

MARKET OPPORTUNITIES DRIVING NEAR-TERM GROWTH



MULTIPLE INPUTS TO LONG-TERM GROWTH

~\$1.6B
2027 Revenue
Target



Power

All battery powered devices require Si and SiC semiconductors. SiC is used to create high performance power devices serving technologies such as EVs, PHEVs, Charging, Solar, Wind and Energy Storage



Memory

Storage and processing devices, DRAM and NAND, serving PC, Mobile and Datacenters driven by AI and technology refresh cycles



Mature Nodes

AI driven demand, IOT, Image Sensors, and general automotive to drive greater connectivity of devices utilizing mature node technology



Geographic Expansion

Increased exposure in new strategic markets



Advanced Logic

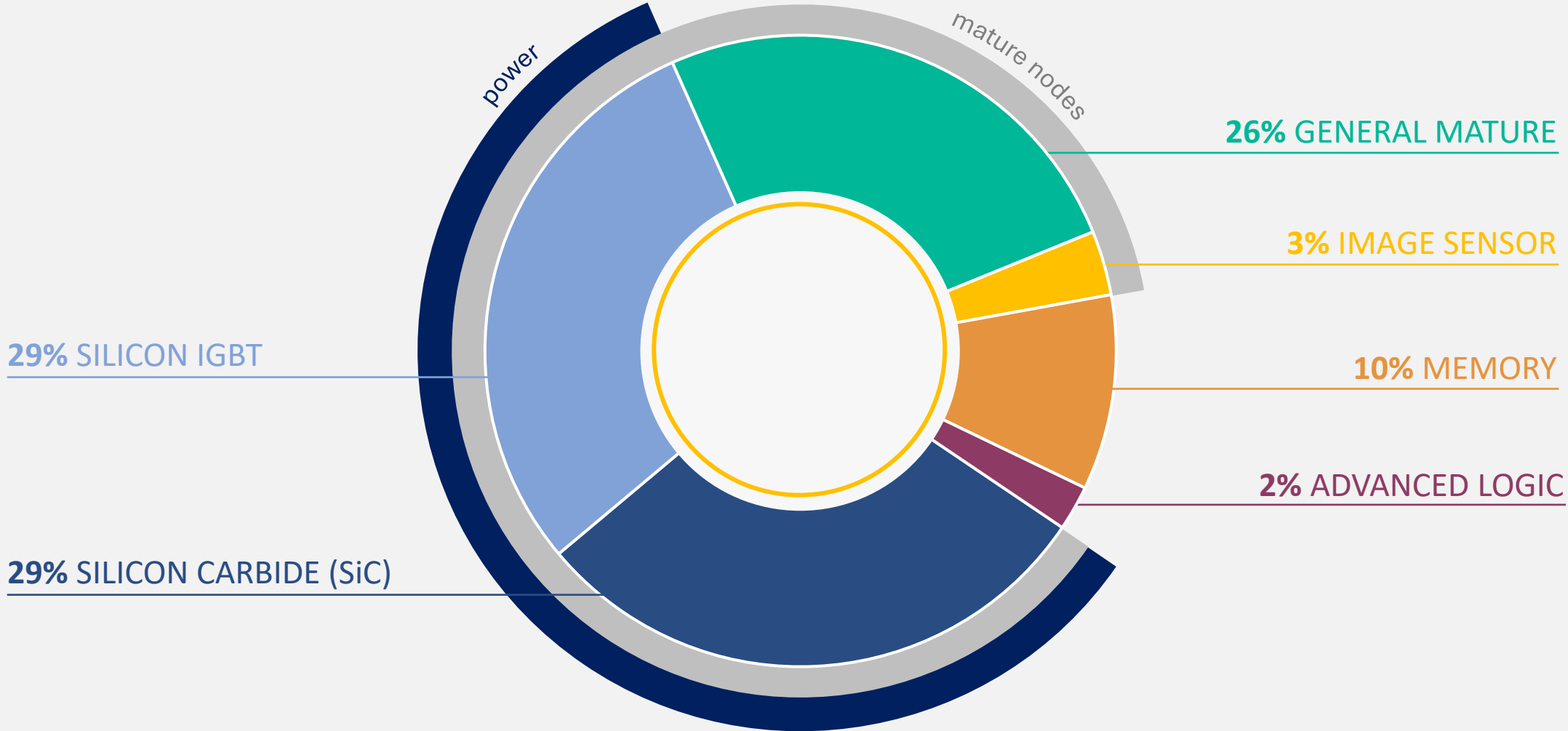
Strategic investments and evaluation units in Advanced Logic to drive longer-term growth

Market Drivers and Positioning for Future Growth

Greg Redinbo, PhD
EVP, Marketing & Applications



REVENUE BY SEGMENT – 2023 SYSTEMS REVENUE OF \$884M



ION IMPLANT TAM HAS MORE THAN DOUBLED AND CONTINUES TO GROW

70%

Approximate make up of implant TAM from Mature Process Technology market segments

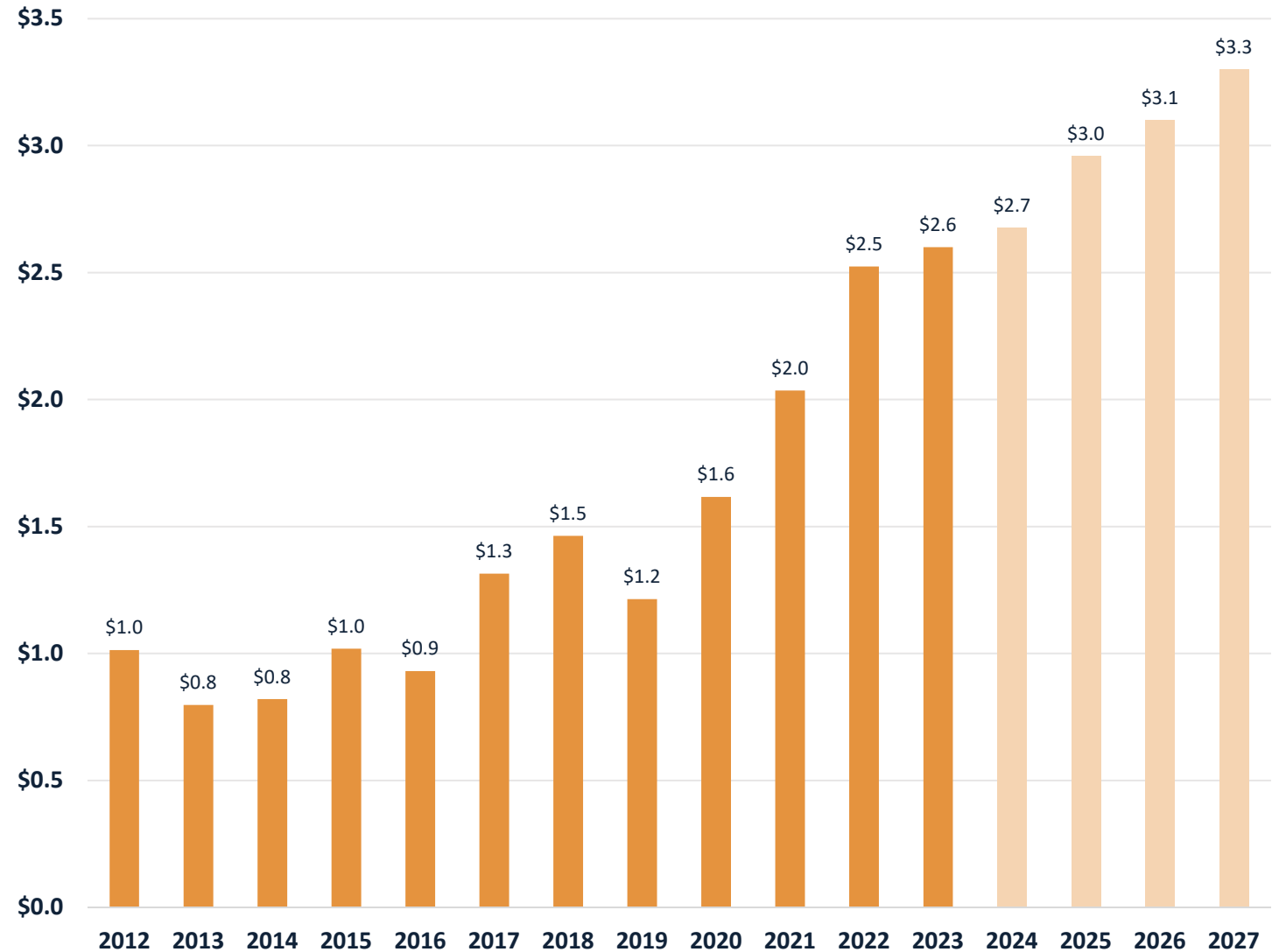
Strong TAM growth driven by:

- Increased wafer starts across all segments
- Rapid growth of implant intensive mature nodes, power and image sensor devices

Axcelis Opportunity:

- High value Purion product extensions required by specialty markets
- Purion Power and Image Sensor Series

ION IMPLANT ANNUAL TAM ESTIMATES (\$B)



ION IMPLANT TAM SEGMENT BREAKDOWN

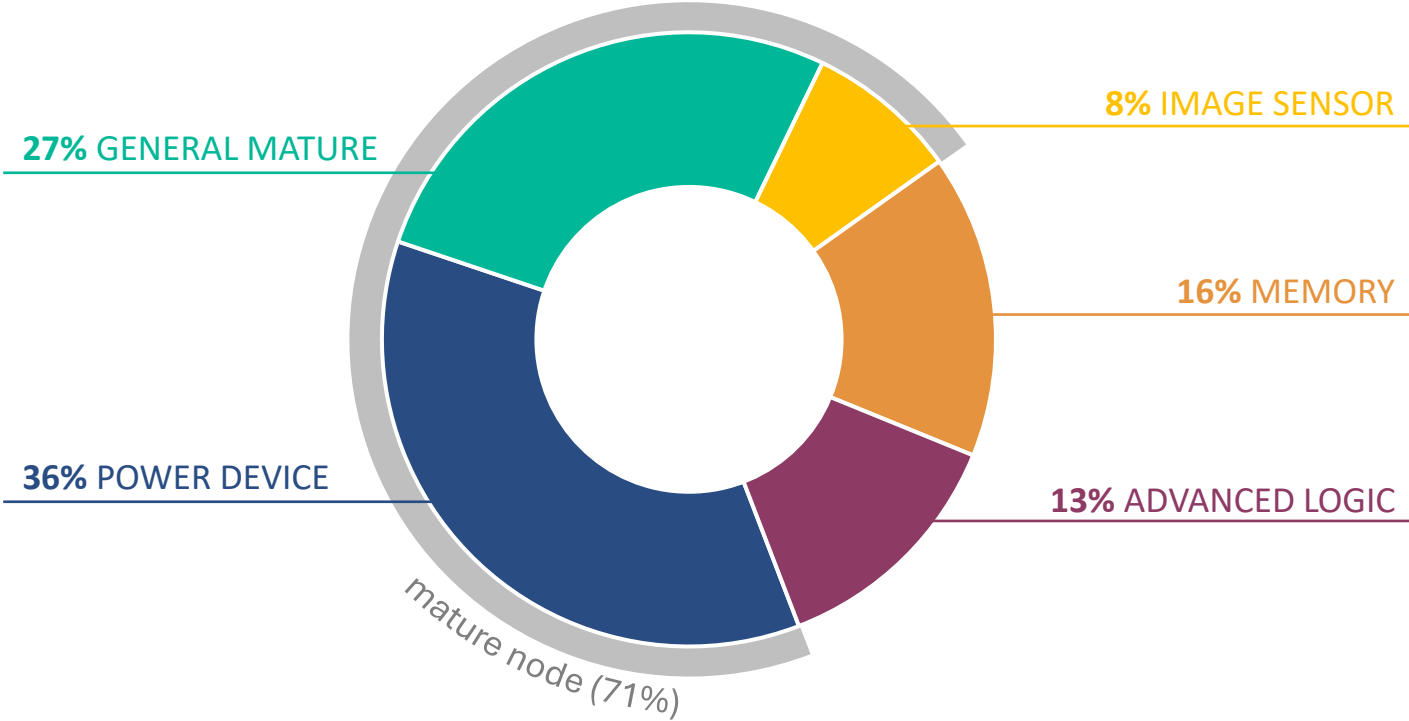
Mature Process Technology Segment is Driving Ion Implant TAM Growth

The mature process technology segment accounts for approximately 70% of the ion implant TAM

- **Mature process technology** is growing based on increases in wafer starts, high implant capital intensity, and higher value implanters for specialty devices
- **Memory** expected to be driven by new wafer start activity to support bit growth demand
- **Advanced logic** has increased based on accelerating wafer start growth

Implant TAM for SiC devices is expected to grow within the power device segment, driven by end market growth, device performance enhancements, and fab optimization efforts

APPROXIMATE ION IMPLANT TAM SEGMENT BREAKDOWN*

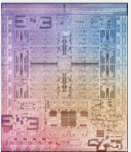


* Axcelis Internal Estimates for 2024 - 2027 (Annual numbers will vary based on customer activity and projects)

ENABLING OUR CUSTOMERS' PRODUCTS

ADVANCED LOGIC

"DOES THE MATH"

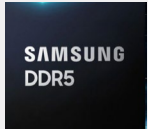


Microprocessor
Billions of Transistors



MEMORY

"SAVES THE DATA"



DRAM
Billions of Transistors



POWER DEVICES

"MANAGES THE POWER"



SiC MOSFET
1 Transistor



IMAGE SENSOR (CIS)

"TAKES THE PICTURE"







MATURE LOGIC

"CONTROLS, COLLECTS AND CONVERTS"



GROWTH ROADMAP ALIGNED WITH MARKET SEGMENT OPPORTUNITIES

MARKET SEGMENT	DEVICES PRODUCED	CAPITAL INTENSITY	EST. PERCENT OF IMPLANT CAPEX*	LEADING CHIPMAKERS
MEMORY Per 100K WSPM	NAND	~30 - 40 Total Implanters	 16%	Samsung SK Hynix Micron Kioxia
	DRAM	~45 - 55 Total Implanters		
MATURE PROCESS TECHNOLOGY ex Power ≥ 28NM	Image Sensors MEMS Comms Analog uController	<ul style="list-style-type: none"> • 300mm/200mm/150mm • Power Devices and HE in Image Sensor • Purion H, M and XE 	 35%	TSMC GlobalFoundries Sony TI Infineon ST
POWER DEVICE Per 100K WSPM	Power	~50 - 70 Total Implanters	 36%	UNT BYD Wolfspeed OnSemi Rohm
ADVANCED LOGIC (FinFET/GAA) Per 100K WSPM	CPU SOC Graphics Comms	~30 - 40 Total Implanters	 13%	Intel TSMC Samsung

* Source – IC Knowledge and company estimated forecast 2024 – 2026. Opportunity varies by process, customer and node. HE = high energy, HC = high current, MC = medium current.

POWER BREAKDOWN

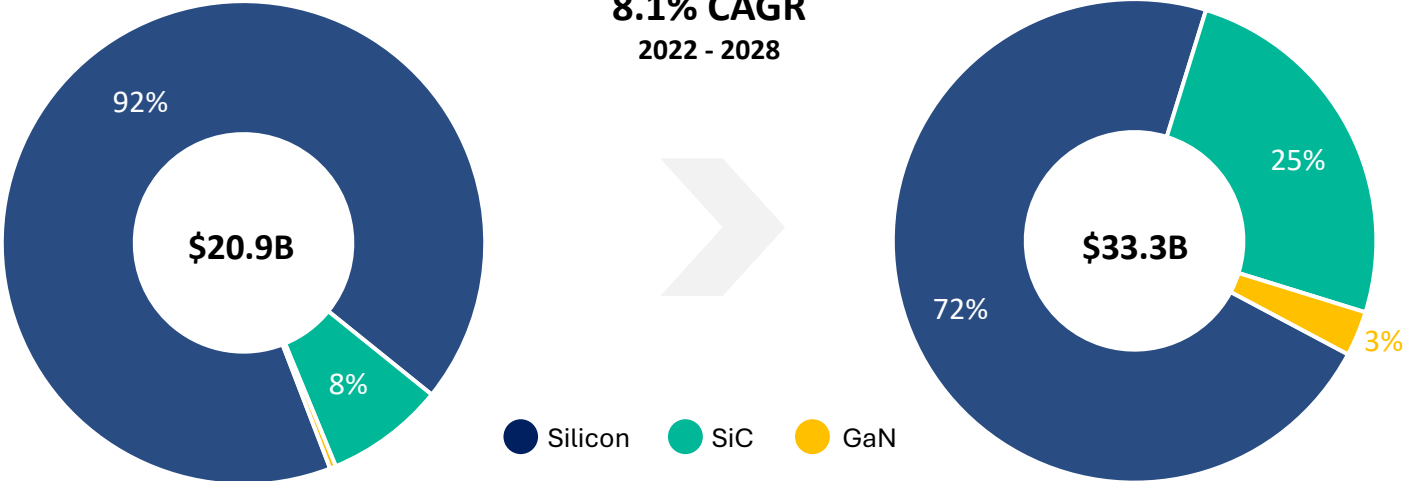
25% CAGR IN SiC POWER DEVICE GROWTH 2023 to 2029

The SiC device market is expected to reach more than \$10B by 2029, at a CAGR (23-29) of 25%.

Automotive and mobility will account for more than 80% of the total SiC market

Battery Electric Vehicle will remain the main market driver for SiC

SIGNIFICANT GROWTH IN POWER



POWER END MARKET OVERVIEW CAGR 2022 - 2028

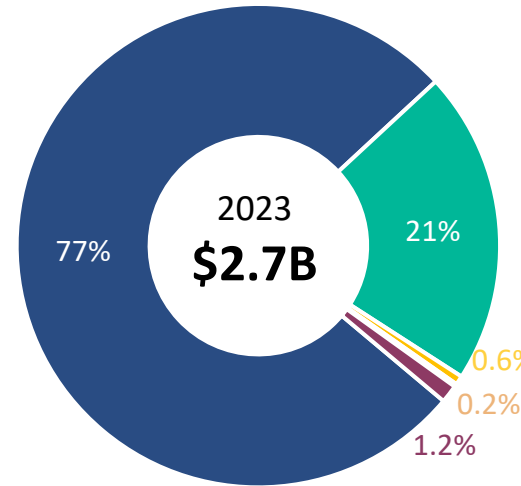
Automotive & Mobility	12.9%
Industrial	7.1%
Medical	4.7%
Telecom & Infrastructure	4.2%
Mobile & Consumer	0.3%
TOTAL	8.1%

Source: Yole Intelligence / Note: Silicon includes Si IGBT, Si MOSFET, Si Thyristors, Si Bipolar devices.

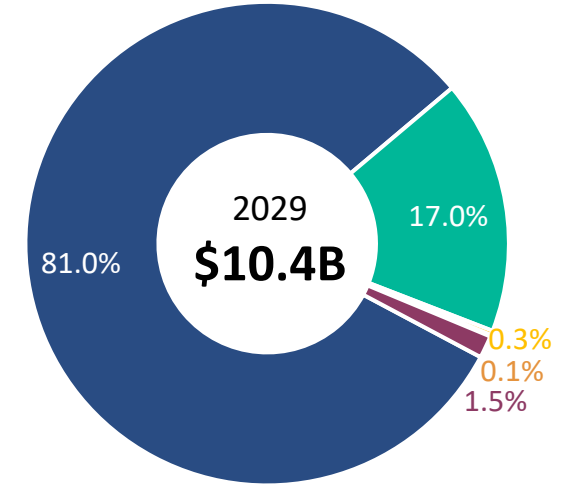
SILICON CARBIDE MARKET FORECAST

The SiC Device process requires significant investment in epitaxy equipment, ion implanters, metrology and inspection tools.

SiC WFE excluding PVT	CAGR '23-'29
Thinning and CMP	0.1%
Deposition	-0.2%
Epitaxy/HTCVD	6.4%
Thermal Processing	4.7%
Etch and clean	6.1%
Ion Implantation	9.7%
Patterning	-0.3%
Metrology and inspection	11.1%
Wafer Bonding	9.9%
Total SiC Equipment	6.5%



25% CAGR
2023 - 2029



INDUSTRIAL

- UPS
- Motor Drives
- Industrial Power Supply
- LIDAR
- DC Charging Station
- Wind
- Photovoltaics

AUTOMOTIVE & MOBILITY

- EV/HV
- LIDAR in Autonomous Vehicles
- E-Bikes
- E-Motorcycles
- Train

TELECOM & INFRASTRUCTURE

- Data Centers
- Servers
- Base Stations

MOBILE & CONSUMER

- Home Appliances
- Mobile Fast Charging
- Wireless Charging
- Audio and Image

OTHERS

- Defense
- Aerospace
- Medical

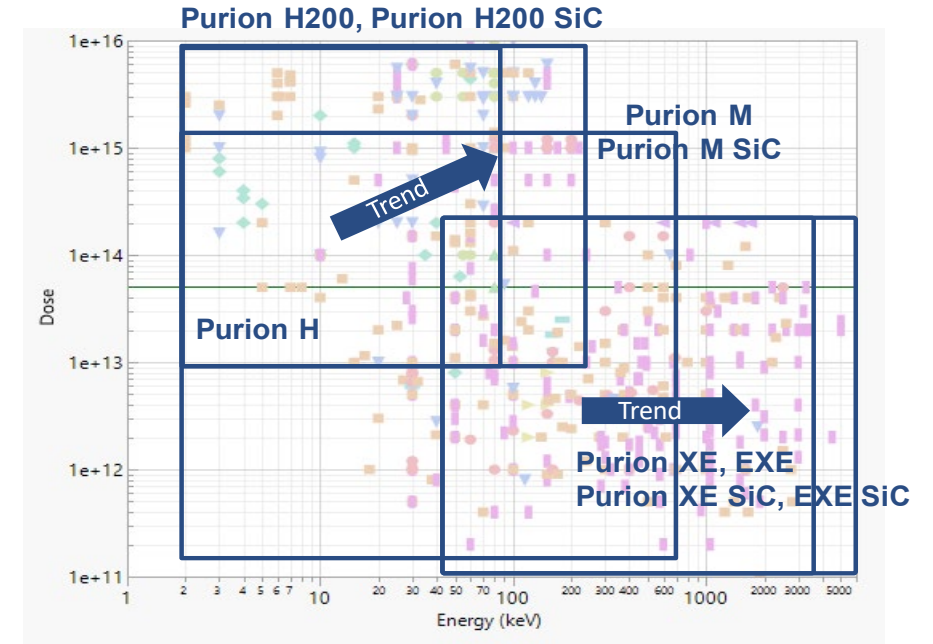
AXCELIS IS THE POWER LEADER

First Mover Advantage - Axcelis has been a leader in SiC implant since 2014, creating a significant incumbency advantage

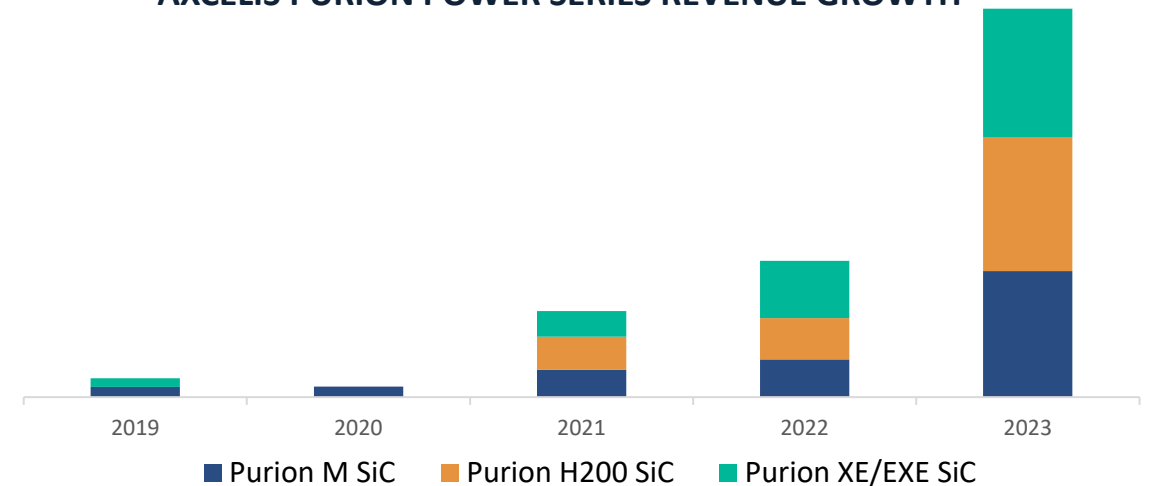
Purion Power Series:

- A portfolio of HE, MC, HC and the tools serving the full range of our customers' needs
- Production-proven
- Flexible
- Extendible - meeting needs of trench and superjunction MOSFETS
- Upgradeable to meet the transition from 150mm to 200mm

POWER DEVICE RECIPE REQUIREMENTS



AXCELIS PURION POWER SERIES REVENUE GROWTH



JAPAN



Full Product Offering in country servicing available market segments

> \$450M
APPROXIMATE MARKET SIZE

< 10%
CURRENT MARKET PENETRATION

LOCAL

In country resources serving the market

PARTNERSHIP

Working with leading device manufacturers to evaluate technology and products

PRODUCT STRENGTH

Winning applications over local competition in the Power market given the strength of our Purion Power Series

Segments Targeted:



POWER DEVICE



IMAGE SENSOR



MEMORY



ADVANCED LOGIC

ADVANCED LOGIC

Grows with direct correlation to wafer starts and technology shrinks associated with advanced device manufacturing.

> \$400M

APPROXIMATE MARKET SIZE

< 5%

CURRENT MARKET PENETRATION

PRODUCT

Purion Dragon is a leading-edge tool focused on meeting the needs of Advanced Logic customers

INVESTMENT

Developing extensions, product upgrades, and refinements for the unique requirements of advanced logic devices

CONTRIBUTION

Timing for more meaningful contribution is 3-5 years



CURRENT EFFORTS

LEARNER

Development System with
Leading European
Advanced Logic Research
Institute

EARNER

Evaluation System with
Customer Advanced R&D
Center

PRODUCTION





High Current systems with
high volume advanced logic
production lines

PURION – THE CORE OF OUR GROWTH STRATEGY

Purion products targeted at high value applications and market segments

		TARGETED MARKET SEGMENTS			
Ion Implantation TAM	COMMON PURION PLATFORM	Base Purion Product	Power	Image Sensors	Advanced Memory / Logic
High Current 50% of TAM		H	H80 H200 H200 SiC	H	Dragon
High Energy 25% of TAM		XE	EXE XE SiC EXE SiC	EXE VXE XE _{max}	XE
Medium Current 25% of TAM		M	M M SiC	M	M

NEW PRODUCT DEVELOPMENT DRIVING SALES GROWTH

	CUSTOMER CHALLENGE	CURRENT SOLUTION	NEXT-GEN SOLUTIONS	HIGH VALUE OPPORTUNITY
 POWER DEVICE – Si	Si IGBT Backside H+ Implant	None	Purion VXE Platform	Systems Sales
 POWER DEVICE – SiC	Evolving device designs and requirements, while advancing technology position	Purion Power Series	Purion Power Extensions	Systems Sales Upgrades
 ADVANCED LOGIC	Targeted applications for Advanced Logic Devices	Purion H	Purion Dragon	Systems Sales
 POWER AND ADVANCED LOGIC	Cost of Ownership	Chained Implants	MUSIC	System Extension Upgrades



POWER DEVICE SOLUTIONS | SI IGBT BACKSIDE IMPLANT

CUSTOMER CHALLENGE

Reducing power loss during in Si IGBT power device applications

AXCELIS SOLUTION

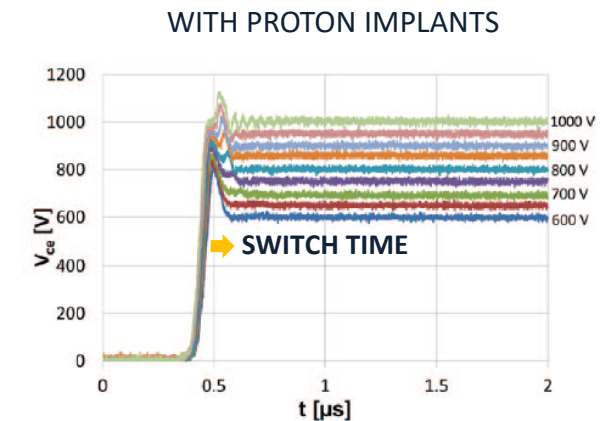
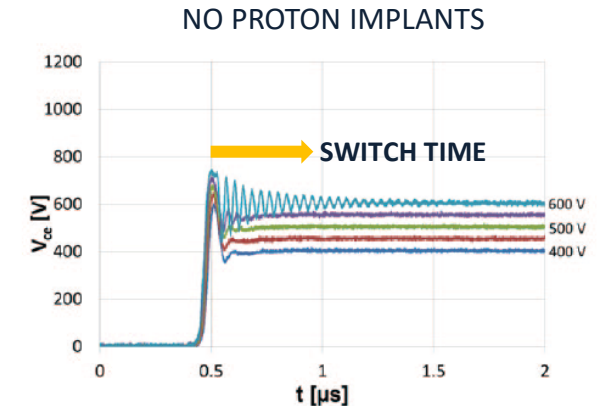
Optimized Purion VXE Proton Implanter

- Production-proven Purion VXE platform (> 300 Purion High Energy installed)
- LINAC (linear accelerator) based high energy tool for higher reliability, throughput
- Optimized cooling capability for thin wafer applications

HIGH VALUE OPPORTUNITY

System sales in Si IGBT application with Served Addressable Market of > \$50M

PROTON IMPLANTS REDUCE SWITCHING TIMES FOR HIGH VOLTAGE OPERATION





POWER DEVICE SOLUTIONS | PURION POWER SERIES EXTENSIONS

CUSTOMER CHALLENGE

Evolving power device designs and rapid transition to new production requirements

AXCELIS SOLUTION

Purion Power Series Product Extensions - Enabling Improved Device Capability

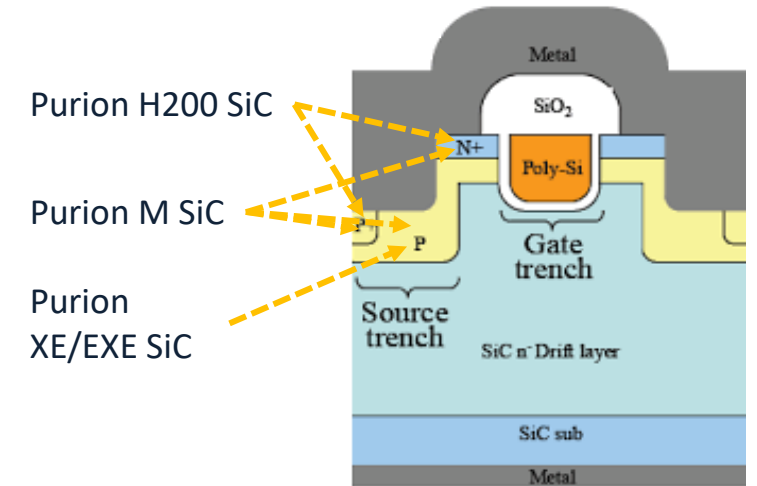
High Energy Purion EXE SiC - trench MOSFET and Superjunction devices

- Throughput increases across the platform
- New wafer heating technology
- Updated ion source technology
- Optimized cooling
- Upgrades from 150mm to 200mm wafer capability

HIGH VALUE OPPORTUNITY

Capture device transition, production fanout and upgrade from initial 150mm pilot to 200mm HVM

SiC TRENCH MOSFET POWER DEVICE





ADVANCED LOGIC | TARGETED APPLICATIONS

CUSTOMER CHALLENGE

Advanced Logic devices require more materials modification and new applications in "middle of line" MOL process

AXCELIS SOLUTION

Purion Dragon Scanned Spot Beam Technology

Design: Orthogonal optics enable high productivity while retaining simultaneous angle and dose control

- Productivity: > 20% demonstrated productivity advantage in low energy, high aspect ratio, critical implants
- Angle Control: Advanced vertical and horizontal angle control necessary for high aspect ratio and 3D structure implants
- Flexibility: Independent uniformity and angle control for optimizing device performance

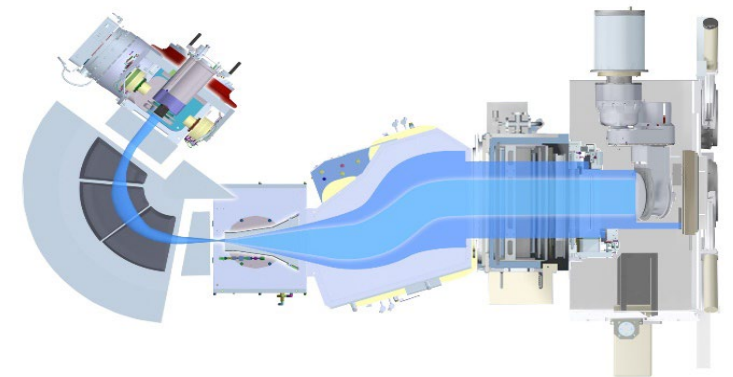
HIGH VALUE OPPORTUNITY

Incremental high current system sales for targeted applications

IMPLANT STEPS

	7nm	5nm	3nm	2nm (est.)
FEOL	24	24	26	26
MOL	4	7	7	> 10
BEOL	1	2	2	> 4

PURION DRAGON





POWER AND ADVANCED LOGIC | DEVICE PERFORMANCE AND COO

CUSTOMER CHALLENGE

Customers need to create a “box” profile with uniform dopant concentration vs depth with multiple “chained” implants at lowest cost

AXCELIS SOLUTION

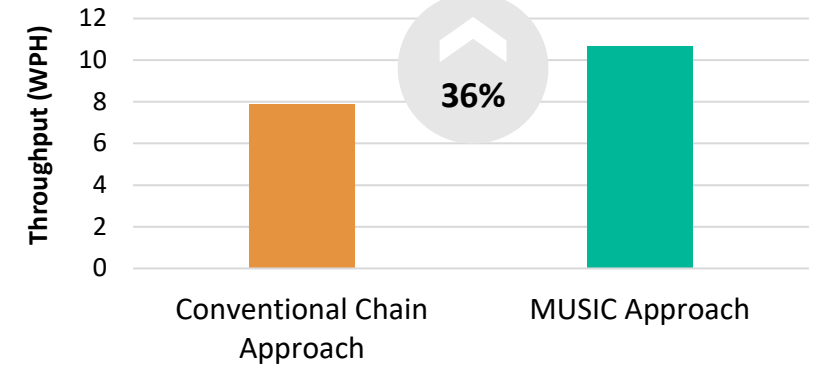
MUSIC (Multiple Steps Implant Chain)

- Unique process capability to implant multiple energy recipes in a single recipe step
- Significant throughput gain vs conventional chained implant
- Purion architectural entitlement
- IP protected

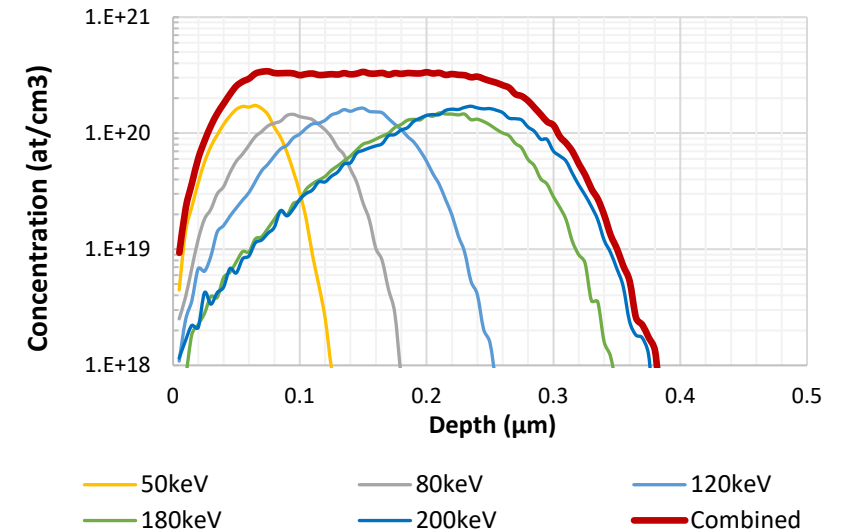
HIGH VALUE OPPORTUNITY

Capture new applications in power and advanced logic





THROUGHPUT: CONVENTIONAL VS MUSIC



TARGET BOX PROFILE FORMED BY CHAINED IMPLANTS



NEW PRODUCT DEVELOPMENT DRIVING SALES GROWTH

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 POWER AND ADVANCED LOGIC	Cost of Ownership	Chained Implants	MUSIC	System Extension Upgrades

Continued Financial Strength Underpinning Long Term Value Creation

James Coogan
EVP & CFO



HISTORICAL FINANCIAL SUMMARY

REVENUE GROWTH DRIVERS:

Broad success in Silicon Carbide and Silicon IGBT

Strong demand backdrop for memory

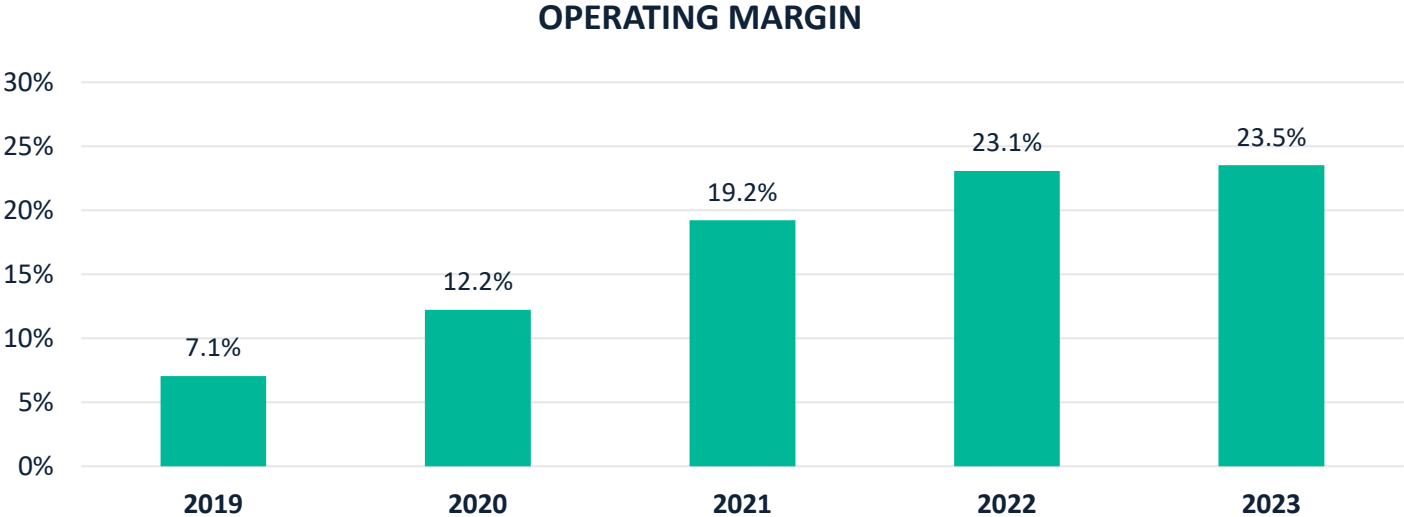
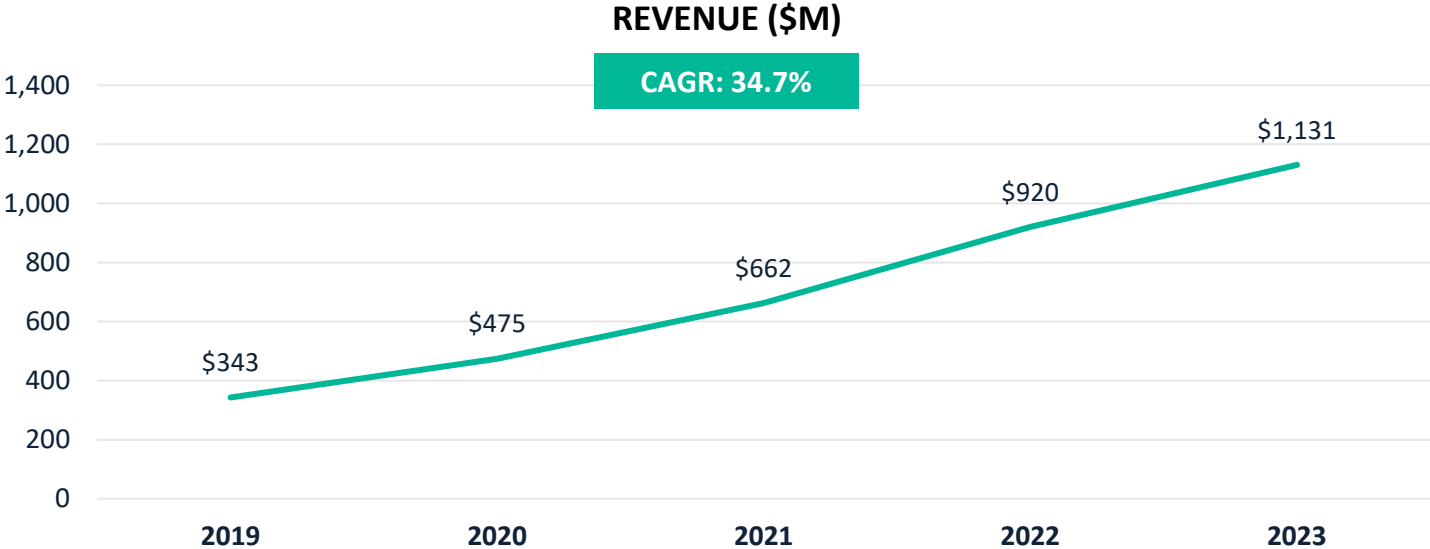
Continued support in mature nodes driven by expanding global chip demand for connected devices

MARGIN EXPANSION:

Improved mix shift to higher margin products driven by enhanced proprietary design and benefits

Leverage on higher sales

Cost control initiatives designed to enhance margin performance



HISTORICAL FINANCIAL SUMMARY

EPS COMMENTARY:

Improved mix shift to higher margin products driven by enhanced proprietary design and benefits

Leverage on higher sales

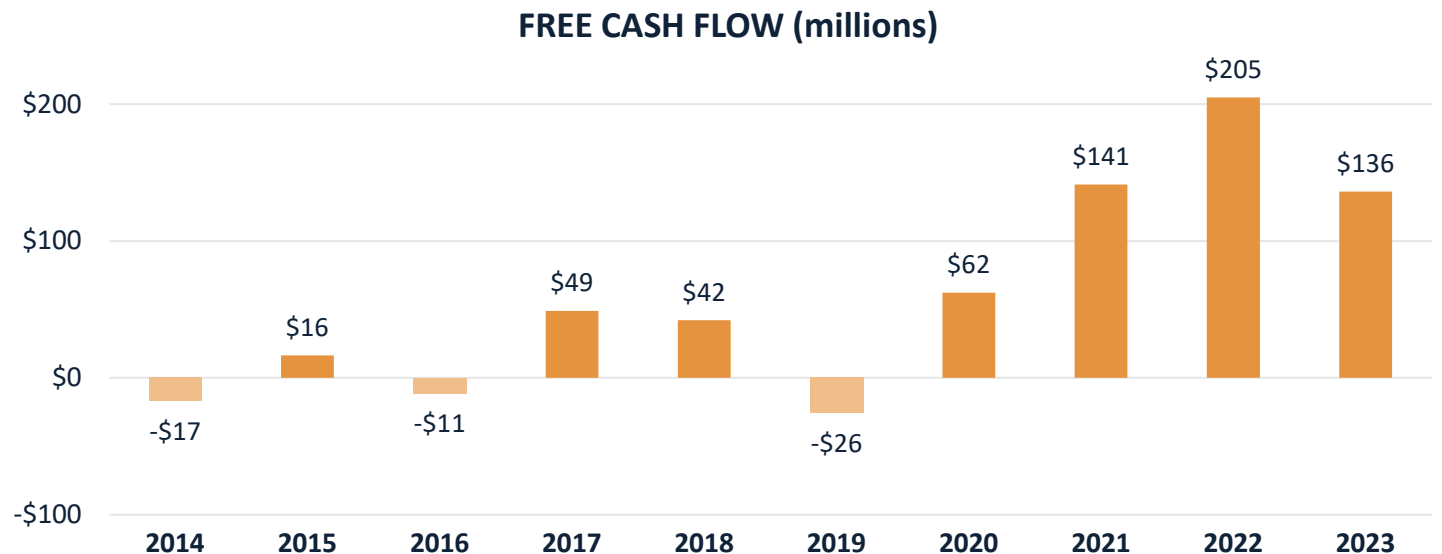
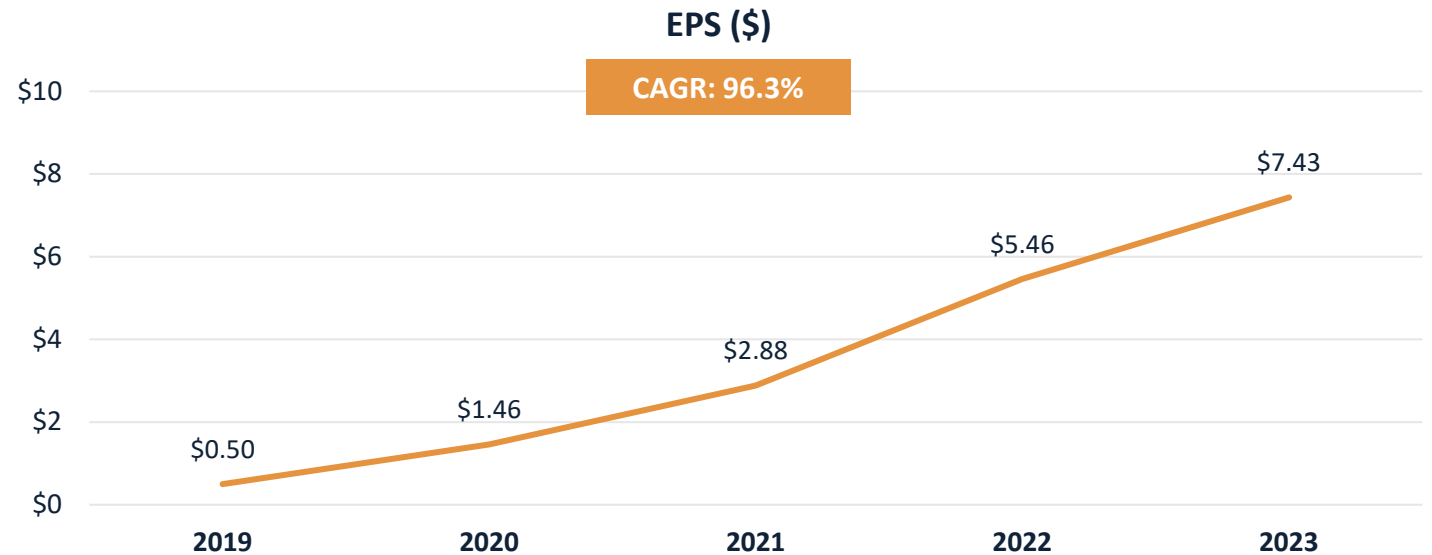
Cost control initiatives designed to enhance margin performance

Reduction in Diluted Shares of 3.8M

CASH FLOW COMMENTARY:

Improved cash flow performance driven by profitability

Investments in technology and capacity to support long term growth expectations



LONG-TERM FINANCIAL MODEL

10% + Diluted EPS CAGR
2023 to 2027

Other Key Assumptions

- Tax Rate of 15%
- Diluted Shares Outstanding of 32M
 - With potential for upside to share buyback assumption, guided by rate of return profile
- Target FCF* Conversion of EBITDA** of >75%

	2023 BASELINE		2027 TARGET MODEL
Revenue (\$M)	\$1.1B	➤	~ \$1.6B
Gross Margin	43.5%	➤	> 45%
Operating Margin	23.5%	➤	> 27%
Tax Rate	11.6%	➤	~ 15%
Diluted EPS	\$7.43	➤	> \$11.50

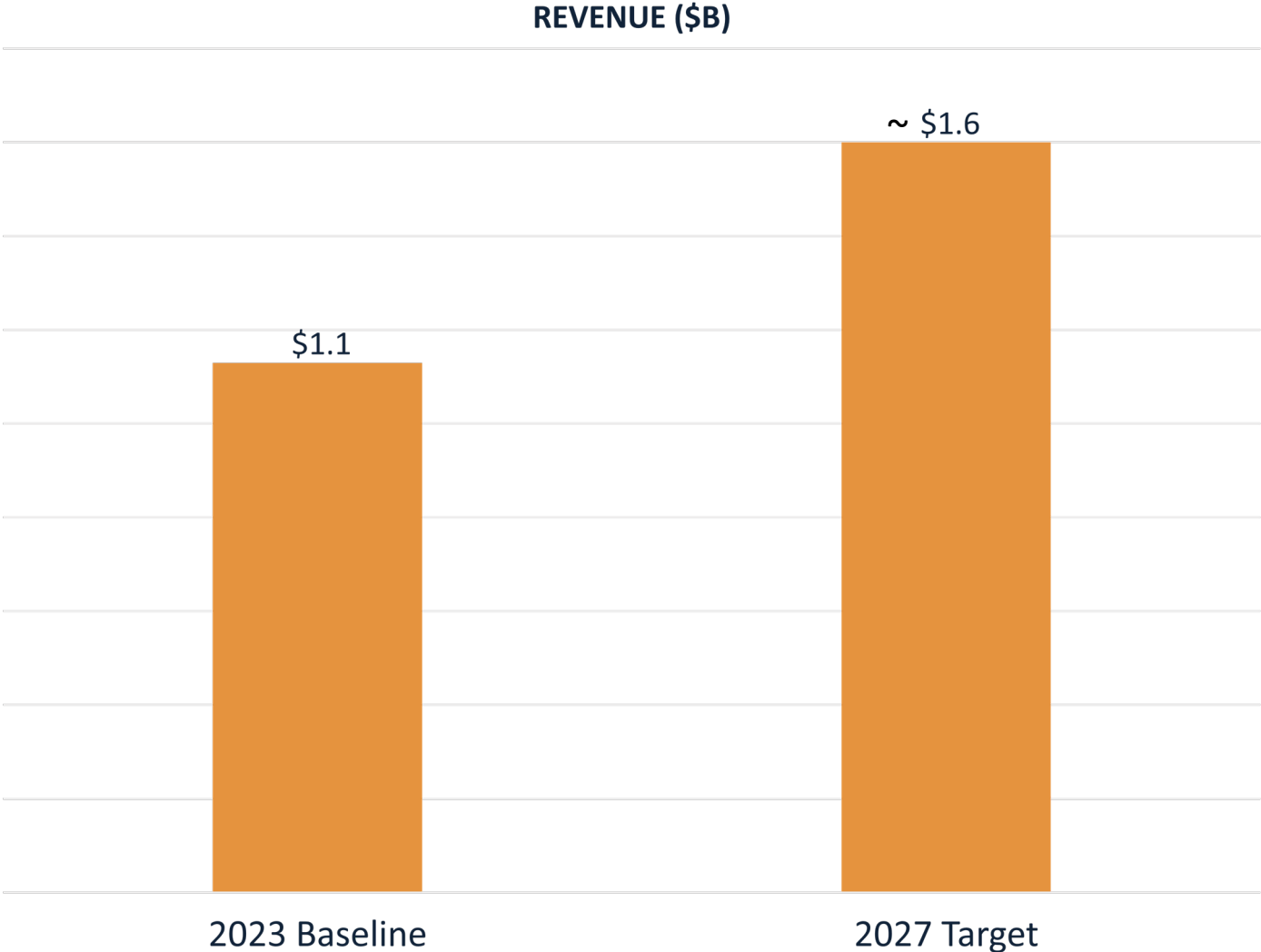
* Free Cash Flow: Net cash provided by operating activities less Expenditures for property, plant and equipment and capitalized software

**EBITDA: Earnings before Interest, Taxes, Depreciation & Amortization

GROWTH IN REVENUE

CRITICAL REVENUE ASSUMPTION

- Continued growth in mature markets including Power – SiC and Si IGBT
- Recovery in memory spending
- Share gain in Advanced Logic
- Image Sensor recovery
- Increased contribution of Customer Success & Innovation (CS&I)



CS&I: A GROWING PART OF OUR REVENUE MIX

What is CS&I?

Represents revenue derived from the sale of Consumables, Spares, Services and Upgrades

Examples of what we provide to current customers

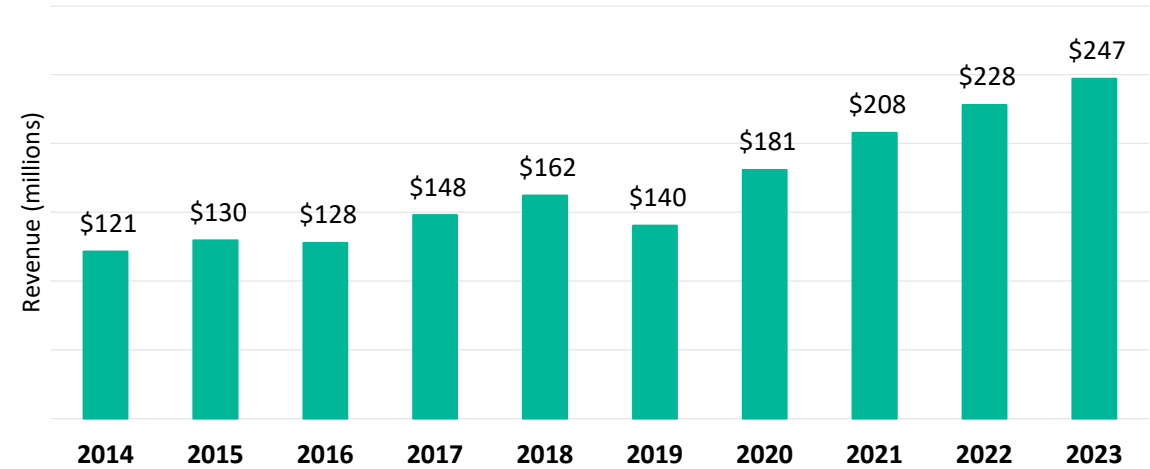
- Consumables: Graphite Liners
- Service: Preventative Maintenance
- Spares: Robots, Sources, RF Generators
- Upgrades: Software Updates, Wafer Size Change Kits

A typical implanter's life is measured in decades (10-20 years) and provides us an annual revenue stream based on the utilization of our customers and device design changes they implement.

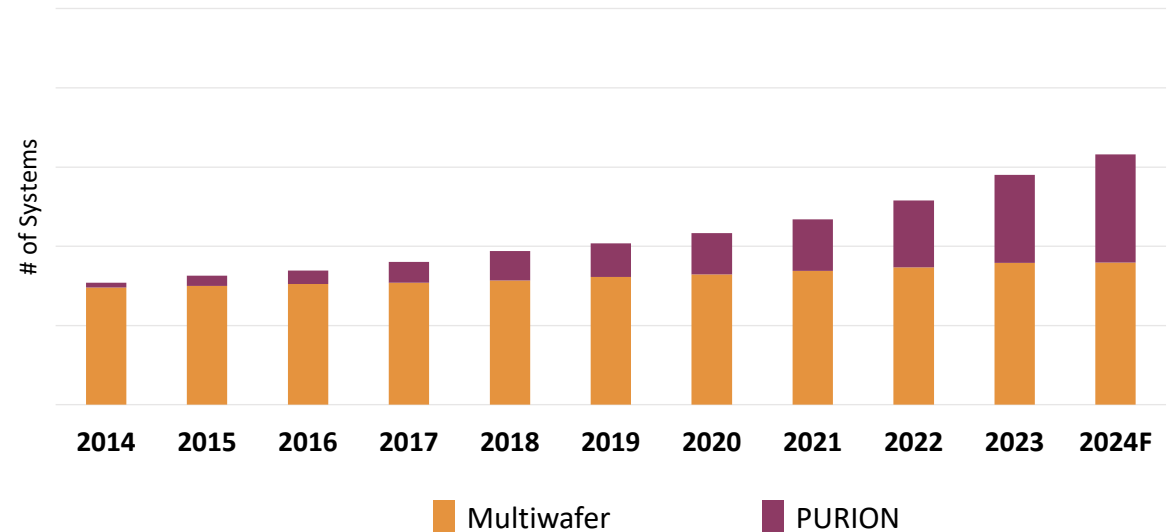
More than > 3,200 tools in our installed base:

- Purion
- Multiwafer Implanters
- Other Legacy Systems

AXCELIS CS&I REVENUE - ALL INSTALLED TOOLS



AXCELIS ION IMPLANT INSTALLED BASE



OPERATING MARGIN EXPANSION

>350 bps Expansion in Operating Margins

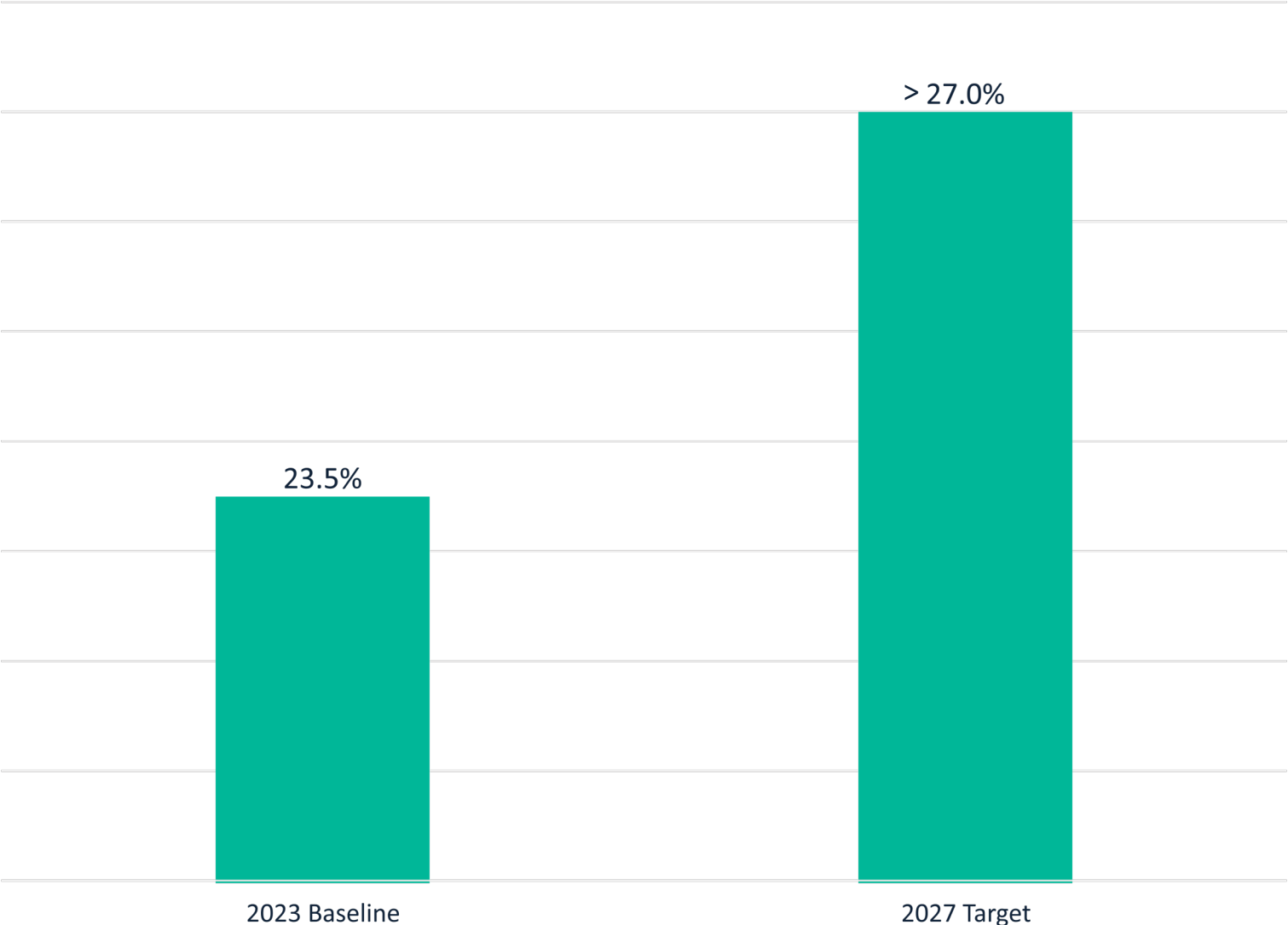
Revenue Mix

- Systems mix between HE, HC and MC
- Growth in CS&I

Incremental operating leverage more than offsetting anticipated investments

Cost controls

OPERATING MARGIN



CONTINUOUS INVESTMENT IN ION IMPLANT R&D

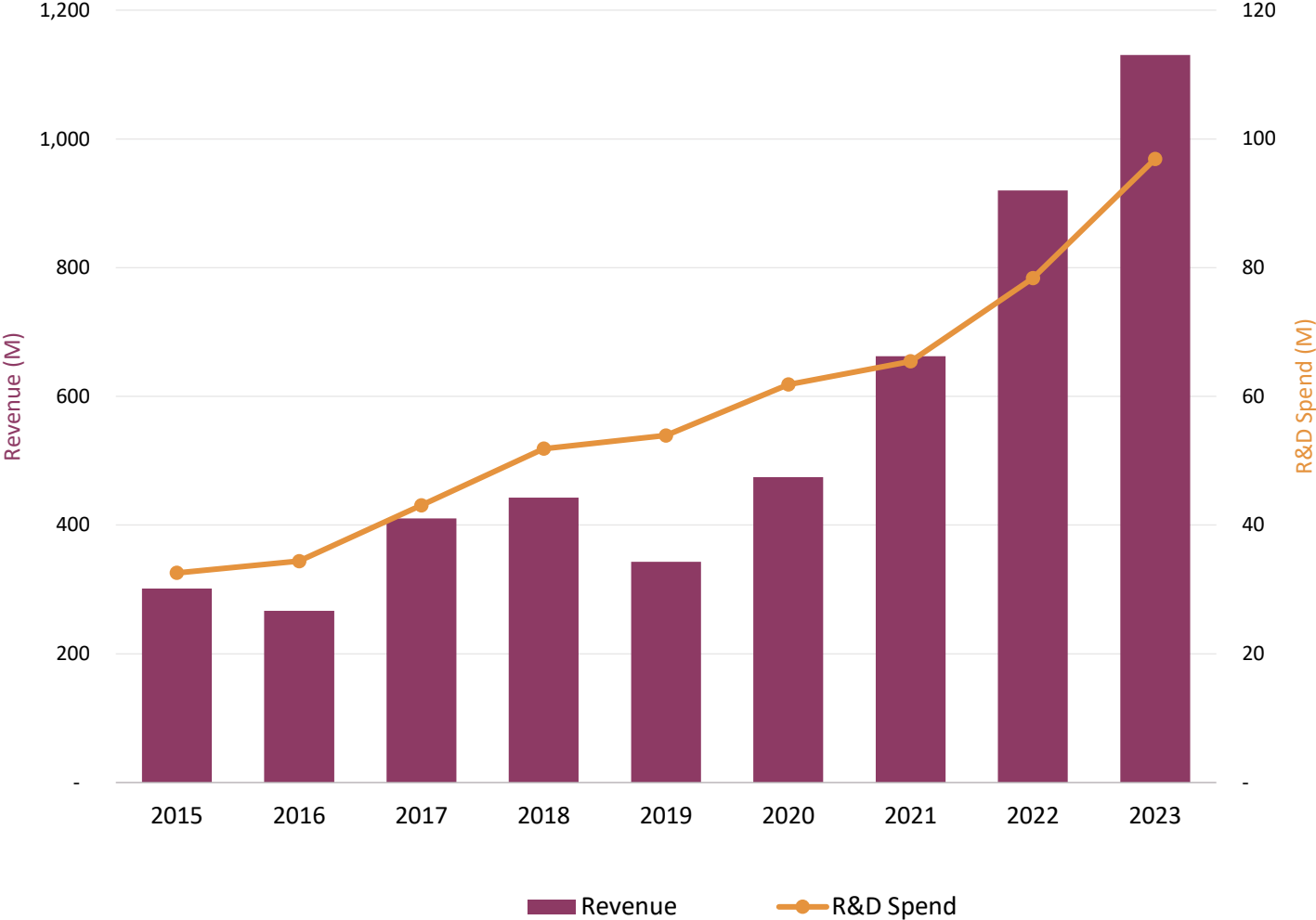
> \$100M Expected R&D Spending Annually On New Technologies, Products and Capabilities

Axcelis has heavily focused R&D spending on Purion product development

Many new products and extensions have been released and shipped to numerous first time and existing customers

We will continue to invest R&D dollars on new Purion product extensions, CIP, field upgrades and new technologies

R&D INVESTMENT



CAPITAL ALLOCATION PHILOSOPHY

We will direct capital to the strategy with the **highest risk-adjusted rate of return**

Organic Growth

Capacity Expansion/Automation
Increasing Investment in Product Development

M&A

Capability Enhancing
Technology / SAM Expansion

Share Repurchase Program

Opportunistic
At least to offset dilution from equity compensation

BALANCED APPROACH

INVESTMENT CASE SUMMARY



**Foundational
Technology for
Semiconductor
Manufacturing**



**Well Positioned for
Market Inflections
& Secular Growth
Opportunities**



**Long-Term Margin
Expansion &
Earnings Growth**



**Strong Balance
Sheet with
Balanced Capital
Allocation**



Q&A
