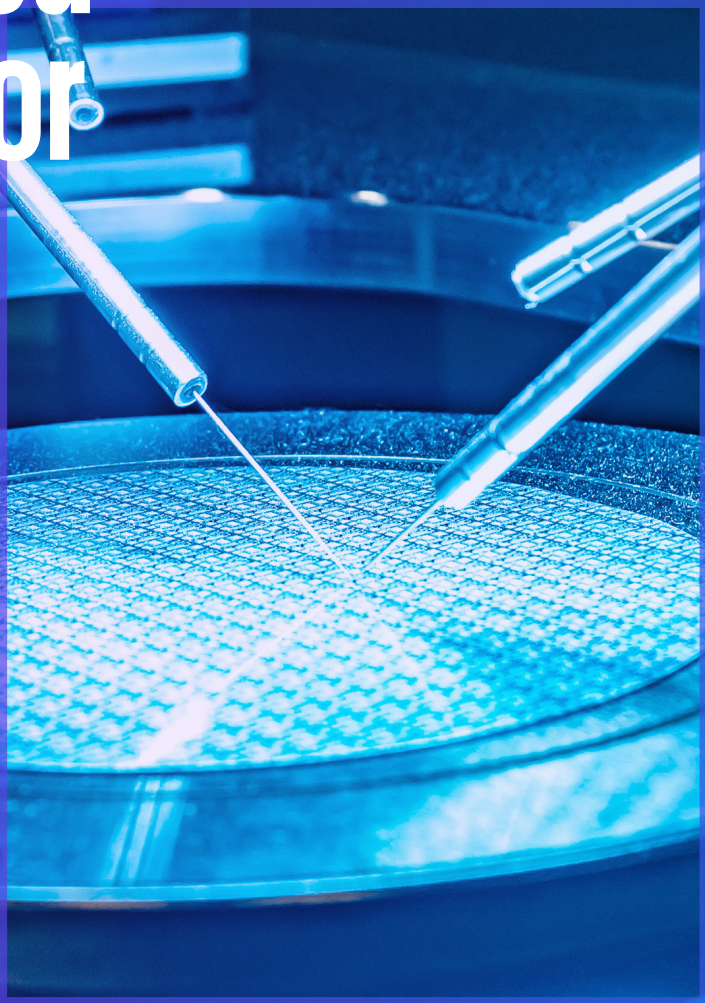
KPMG

Managing for growth during an unprecedented semiconductor cycle



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Foreword

The semiconductor industry is cyclical. And while the long-term outlook remains positive, the industry has once again swung from a dynamic of constrained supply to softer demand.

In past industry cycles, the standard practice has been to hit the brakes—stop hiring, postpone capital investment, and cut overhead. This time, the state of the global industry is different, so the approach needs to be different.

First, during this cycle, we face a shortage of critical semiconductor talent. A shortage of experienced workers means that decreasing headcount now, without careful consideration for medium-to-long-term dynamics, could jeopardize the ability of companies to take full advantage of the next upcycle.

Second, unlike past cycles, the current one provides a unique opportunity for semiconductor companies to obtain one-time government funding and support. The U.S. government made billions of dollars available through the Creating Helpful Incentives to Produce Semiconductors for America (CHIPS) and Science Act and other programs positioned to reward companies for, among other things, expanding their production facilities in the U.S. Therefore, limiting or delaying capital investment could restrict a company's ability to meet future demand and squander a one-time opportunity to take advantage of the available funds.

Third, the more stringent ESG (Environmental, Social, and Governance) requirements and the connected government funding were not present during previous cycles. By January 2024, EU Corporate Sustainability Reporting Directive (CSRD) requires impacted companies to document their environmental impact and progress toward net-zero emissions by 2050.[1] The US Security and Exchange Commission (SEC) also proposed a rule requiring registrants to disclose some climate-related information like greenhouse gas emissions and potential risks to their business.[2] Adherence to the new ESG guidelines is mandatory for many businesses.

In this paper, we provide recommendations for companies to navigate the unique challenges of the current economic environment while preserving viability for the inevitable upturn in the market. We focus on three areas:

Managing headcount costs without jeopardizing future talent availability: Companies need to acknowledge the current and long-term shortage of skilled semiconductor labor. Reducing skilled labor in the current environment could mean not being able to take full advantage of future market growth.

Taking advantage of government initiatives and not delaying strategic expansion plans: Companies need to continue investing in greater manufacturing capacity despite the current softer demand to take advantage of the U.S. government incentives.

Continuing ESG investments to prepare for new environmental regulations and laws: Companies cannot falter on their commitment to ESG and can take advantage of government funding and tax incentive programs to maintain momentum.

Irene Signorino
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KPMG US

[1] "The EU's CSRD impacts global technology companies; it's time to get ready," TechRadar, February 26, 2023

[2] "SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors," US Securities and Exchange Commission, March 21, 2022

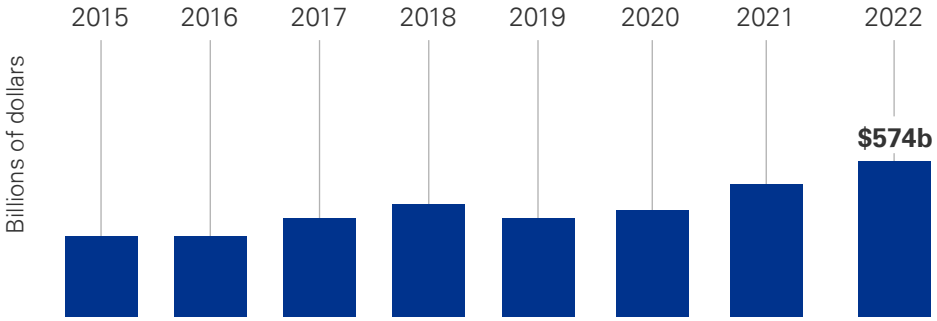
A recovery is in the cards

Over the last few years, the semiconductor industry experienced an unprecedented and turbulent cycle of challenges and growth. COVID-19 supply chain issues and geopolitical concerns impacted the chip industry. Still, the sector increased its revenue to a record $574 billion in 2022.[3] The second half of 2022 marked the start of a downturn that continues in the first half of 2023. Changes in consumer demand, high inflation, and a looming recession will make 2023 particularly challenging.

As leading semiconductor companies grapple with these factors, earnings have suffered. Responses included various cost-cutting approaches, like reprioritizing their most profitable business centers, halting merit increases and bonuses, reducing employee benefits such as 401(k) matching, bringing down executive pay, and trimming staff.[4]

Even with these challenges, we see significant opportunities in the near term. For example, the automotive semiconductor industry's rapidly growing demand for chips and sensors will likely represent a $250 billion market by 2040.[5] In addition, the increased adoption of wireless communications, cloud-based solutions, Internet of Things (IoT) devices, and artificial intelligence will drive more demand for semiconductors. Most respondents in the 18th annual KPMG Global Semiconductor Industry survey[6] projected a positive outlook. Among the key takeaways (see Exhibit 2):

Exhibit 1: Global semiconductor sales surpassed $570 billion in 2022



Source: WSTS, World Semiconductor Trade Statistics

- Eighty-one percent expect their company's revenue to increase in the coming year, and half expect more than 10 percent growth. While these are lower than last year's survey (95 percent and 68 percent, respectively), it is still encouraging, given the current economic environment and perceptions regarding industry inventory levels.
- Leaders are slightly less bullish on industry revenue growth for 2023. Sixty-four percent forecast the industry's revenue will increase in the coming year, with 19 percent predicting more than 10 percent growth. These are also significantly lower than last year's survey (97 percent and 49 percent, respectively).

[3] "Global Semiconductor Sales Increase 3.3% in 2022 Despite Second-Half Slowdown," semiconductors.org, February 3, 2023

[4] "Despite Billions in Federal Subsidies, Chipmakers Are Laying Off Thousands of Workers," Observer, December 22, 2022

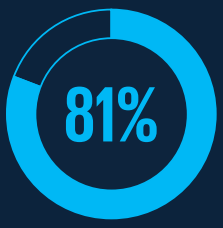
[5] "Growth in automotive semiconductors outpace expectations," KPMG LLP, 2022

[6] "Global semiconductor industry outlook for 2023," KPMG LLP, February 2023

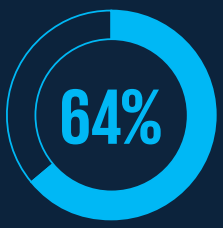
Exhibit 2: In the fourth quarter of 2022, KPMG LLP and the Global Semiconductor Alliance (GSA) surveyed 151 semiconductor executives about the financial, strategic, and operational trends, issues, and agenda items across the industry and ecosystem.

The research shows that despite headwinds, global semiconductor executives maintain an overall positive outlook. for the industry in 2023 and beyond.[7]

Leaders remain optimistic about revenue growth, though slower rates expected

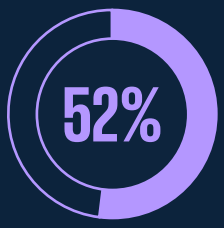


Expect their company's revenue to increase in 2023

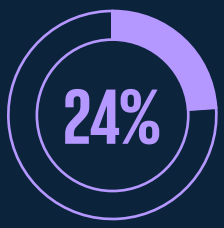


Expect industry revenue to increase in 2023

End of the semiconductor shortage is in sight



Think the chip supply shortage will ease by mid-2023



Believe there is already an inventory excess and the chip supply shortage is over

Automotive takes the pole position as the most important revenue growth driver

How important are each of the following applications in driving your company's revenue stream over the next fiscal year? (Average rating on a scale of 1-5)

- 3.9 Automotive
- 3.6 Wireless communications
- 3.5 Cloud computing/ data centers
- 3.5 Internet of Things
- 3.4 Artificial intelligence
- 3.2 Consumer electronics
- 3.2 Industrial equipment
- 2.8 Wireline communications
- 2.7 Personal computing
- 2.4 Metaverse

Talent repeats as the biggest industry issue and strategic priority

A global talent shortage is the **#1** issue in the semiconductor ecosystem

[7] "Global semiconductor industry outlook for 2023," KPMG LLP, 2023

Managing headcount costs without jeopardizing future growth

Global executives recognize that employee talent remains one of the top strategic priorities in the short and long term.[8] A recent study estimated a shortage of 23,000 chip designers by 2030 in the US, and the STEM pipeline of new specialists is not on track to fill the void.[9] Compounding the issue, some automotive companies, technology giants, and consumer electronics makers are now designing and managing some critical silicon parts in house, thus increasing the demand and options for designers, engineers, and industry experts. Greater competition for talented staff will make it difficult for companies to quickly hire or rehire the needed experts when the industry recovers.

What semiconductor companies can do today

To avoid laying off valuable staff, semiconductor companies should consider and evaluate short-, medium-, and long-term cost-saving measures:

In the short term:

- Consider more aggressive reduction or optimization of non-headcount costs such as non-essential marketing activities, third-party spending, and travel. Specifically, in our experience, vendor consolidation and optimization are often a source of significant savings.
- When considering headcount cost reduction, help ensure you first have a long-term detailed staffing model to support the company's strategic roadmap, a clear view of skills needed today and tomorrow, and an effective talent pipeline development and management process. Talent can be retained, and headcount costs can still be controlled in the short-term by addressing short-term and long-term incentive mix, prioritizing training and development programs in lieu of immediate incentives to foster both their skills and the company future needs, and by prioritizing investments in workforce diversity and other initiatives that can increase the sense of belonging and retention of critical talent.

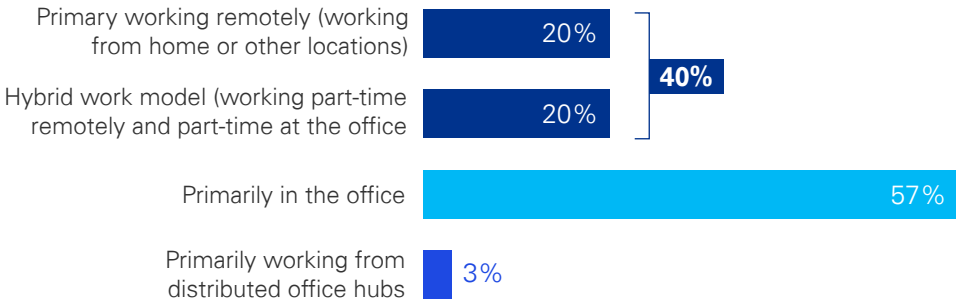
[8] "Global semiconductor industry outlook for 2023," KPMG LLP, February 2023

[9] "New report identifies challenges to continued U.S. leadership in semiconductor design innovation," Semiconductor Industry Association, November 30, 2022

In the medium to long term:

- Labor costs can be reshaped by leveraging value-added activities analysis and implementing digital tools such as advanced analytics, robotics process automation (RPA), and artificial intelligence (AI).
- Labor costs can also be controlled by relocating specific functions to lower cost and/or remote locations. The flexibility of working from home is a valuable perk to many employees and can be used both as a retention strategy and as an indirect way to control real estate spending. The semiconductor industry has operated in a global environment for many years and the concern around maintaining company culture and a connected workforce is less pressing than other industries.[10]

Exhibit 3: Even before the pandemic, 40 percent of semiconductor employees had remote or hybrid arrangements



Source: Hybrid work environment survey, GSA, August 2021

In the long term:

- Companies can take a broader and more strategic approach to finding and developing potential future employees even before that talent joins the labor force.
- Career learning and development plans are an integral part of the employee experience and should be factored into the greater retention conversation.
- Strategic collaboration with educational institutions and industry associations can help identify new talent early. Examples are semiconductor-specific training and certifications programs at state universities like ASU,[11] Intel's Broadening Participation in Science and Engineering Higher Education program,[12] and SIA partnership with FIRST to enhance STEM education.[13]

Companies have many different levers to affect headcount costs while developing and retaining talent. The important thing is to take a long-term strategic view and have a detailed understating of current and future talent needs.

[10] Lasting pandemic effects on semiconductor supply chains and workforces (kpmg.us)

[11] "Building a Semiconductor Workforce," ASU News, February 6, 2023

[12] "Higher Education Technology, Solutions, and Resources," Intel

[13] "SIA, FIRST Announce Partnership to Strengthen U.S. STEM Workforce," Semiconductor Industry Association, May 4, 2022

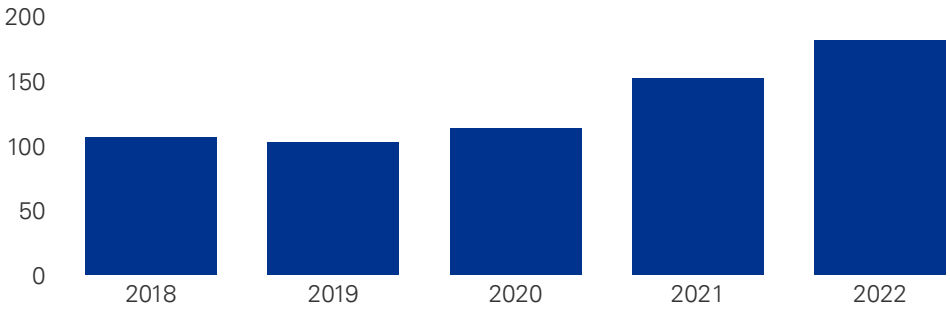
Avoid delaying strategic expansion plans to take advantage of one-time government initiatives

Capital expenditures among semiconductor manufacturers steadily increased due to strong demand, with CapEx growing 35 percent in 2021 to a record $153.1 billion. However, in late 2022, the demand slowdown triggered several announcements from companies either delaying or canceling their plans.[14]

Several governments responded with prioritized support for the semiconductor segment essential for our quality of life and national security.

In 2022, the US Congress committed $52.7 billion to the semiconductor vertical through the Creating Helpful Incentives to Produce Semiconductors for America (CHIPS) and Science Act.[15] The legislation addresses two major domestic concerns. First, semiconductor manufacturing has steadily moved overseas during the past few decades. Today, the United States fabricates only 12 percent of global chip capacity.[16] Second, many sophisticated US military weapons depend on semiconductors sourced from other countries, leaving the US potentially vulnerable to "geostrategic rivals."

Exhibit 4: Semiconductor CapEx (billions $)



Source: "Semiconductor capex takes a nose dive in 2023," Bits & Chips, November 25, 2022

[14] "Semiconductor capex takes a nose dive in 2023," Bits & Chips, November 25, 2022

[15] "About CHIPS for America," NIST

[16] "Pass-the-CHIPS-Act-of-2022-Fact-Sheet," Semiconductor Industry Association, July 2022

Exhibit 5: CHIPS act funds and expands previously enacted semiconductor provisions in the 2021 National Defense Authorization Act

The act incentivizes domestic manufacturing, research and development, and workforce development across the semiconductor space.

CHIPS Act

Imperative to the U.S. because:

Federal funding remains flat as global competitors invest heavily in semiconductor research

Decline in U.S. share of commercial semiconductor manufacturing from 37 percent in 1990 to 12 percent

Significant incentives offered by global competitors make production in U.S. 25–50% percent costlier

Gaps and vulnerabilities in the supply chain pose risks to the U.S. economy and national security

Semiconductors enable key technologies driving economy and national security via AI, 5G/6G, quantum computing, cloud services

Foreign entity concern

Funding and the 48D Tax Credit will not be provided to "foreign entity of concern" which broadly includes the sanctioned entities, and entities related to the governments of China, North Korea, Russia or Iran

$39B — **Expanding manufacturing capabilities**

Allocated to develop facilities to fabricate, produce, test, assemble, package or research semiconductors over next 5 years. Includes $2 billion for legacy chips used in automobiles and defense systems.

$14B — **R&D and workforce development**

Allocated for semiconductor R&D and workforce development, including funding to establish National Semiconductor Technology Center ("NSTC")

25% — **Federal tax credit**

For qualifying property placed in manufacturing facility of semiconductors or semiconductor manufacturing equipment

Clawback

Entire funding amount will be recovered from the entities, if

- They knowingly engage in joint research with restricted companies
- Expand semiconductor manufacturing capabilities below the 28nm level in China or other foreign countries of concern

Implementing regulations

Grants authority to the Department of Commerce and the Department of the Treasury to define regulations and other guidance related to implementation of the CHIPS Act or other foreign countries of concern

Additionally: Infrastructure Investment and Jobs Act (IIJA) - $1.2 trillion, Inflation Reduction Act (IRA) - $369 billion

Source: "Pass-the-CHIPS-Act-of-2022-Fact-Sheet," Semiconductor Industry Association, July 2022

Similar programs to the CHIPS and Science Act are in place in South Korea, Taiwan, and Europe:

- South Korea's semiconductor companies benefit from up to a 35 percent tax deduction and a 25 percent tax credit. An additional 10 percent tax break applies for capital investments semiconductor companies make to strengthen the domestic supply chain.[17]
- Taiwan passed similar rules[18] allowing local firms to take 25 percent of their research and development cost as a tax credit.
- The European Chips Act will add 47 billion euros into the industry through public and private donations. The funds will encourage innovative technologies, strengthen the European supply chain, build international partnerships, and more.[19]

Additionally, the U.S. government has made money available through the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) to support investment in green technologies, new infrastructure, and new job creation.

Waiting to apply or to deploy the grants might not be an option for several reasons, including:

- **Finite funds coupled with strong demand:** While the available budget is considerable, it is also finite. We expect demand for funds will be very high among industry giants establishing or expanding their capacity in the US and among many mid-size companies that want to expand their footprint. Businesses waiting to finalize their plans and apply for grants could miss out, especially smaller companies that typically move more slowly.
- **Claw-back clauses:** Securing a grant and delaying plans or missing deadlines could trigger claw-back clauses. The government can recoup funds they deem "misused" and help ensure grants improve workforce development and community investments.
- **Long lead times to add new capacity:** Semiconductor fabs can take years to be ready for production. Businesses not investing during the current downturn risk falling behind when the market rebounds.

What semiconductor companies can do today

- **Consider asset divestiture or other restructuring:** If assets remain unneeded by your organization in long-term planning, then consider raising cash by selling real assets. This additional cash can allow teams to deleverage the business, invest in new product areas, and meet other key goals. KPMG analysis shows that business unit sales can contribute to long-term success—the same outcomes of reallocating human resources and redeploying capital could be achieved from specific asset sales.
- **Manage depreciation:** Cost segregation and other strategies can help accelerate depreciation costs and improve company EBITDA margins and cash flow metrics.
- **Review existing capital projects for potential leakage or cost recovery:** It may be possible to recover cost leakages in your existing construction or other capital spending contracts, either as a one-off review or as part of a regular third-party audit program.
- **Consider alliances/partnership structures to reduce risk to your business:** Some projects may meet your increased hurdle rates, but still represent a high risk in an uncertain economic environment. Partnership, alliance, or joint venture structures can help distribute costs and risks of economical projects that align to your growth strategy. Private Equity has recently shown increased interest in the space and can be a great option for many mid-sized companies.

Additional suggestions can be found in KPMG latest paper "*CapEx decisions in a downturn*."

While it is understandable companies must manage CapEx carefully, now it is not the time to take the foot off the pedal.

[17] "South Korea plans tax breaks on domestic chip and tech investments," Reuters, January 22, 2023

[18] "Taiwan Passes Its Chips Act With Tax Credits for Chipmakers," Bloomberg, January 8, 2023

[19] "Europe approves its $47 billion answer to Biden's CHIPS act," cnbc.com, April 19, 2023

Continuing ESG investments to prepare for new environmental regulations and laws

Companies are facing more stringent ESG requirements. By January 2024, EU Corporate Sustainability Reporting Directive (CSRD) requires impacted companies to document their environmental impact and progress toward net-zero emissions by 2050.[20] The US Security and Exchange Commission (SEC) also proposed a rule requiring registrants to disclose some climate-related information like greenhouse gas emissions and potential risks to their business.[21]

Not only adherence to the new ESG guidelines is mandatory for many businesses, but according to KPMG research, 79 percent of technology CEOs admit to feeling pressure from employees and customers to institute green initiatives, and 74 percent feel it is their responsibility to help ensure their ESG policies reflect customer values.[22] This is reflected in the action of many semiconductor leaders publicly committing to green power initiatives. For example, several leading semiconductor companies committed to the RE100 initiative[23] for businesses targeting 100 percent renewable electricity.

On the plus side, the US government has created additional funding programs to support companies committed to improve their environmental footprint and to develop green technologies. For example, the Inflation Reduction Act incentives reduce renewable energy costs for organizations like Green Power Partners. Taking advantage of Inflation Reduction Act incentives, such as tax credits, is key to lowering GHG emission footprints and accelerating the clean energy transition.[24]

Government funding availability during this economic slowdown creates an unprecedented opportunity to continue investing in transformational ESG initiatives.

[20] "The EU's CSRD impacts global technology companies; it's time to get ready," TechRadar, February 26, 2023

[21] "SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors," US Securities and Exchange Commission, March 21, 2022

[22] "The ESG imperative for technology companies," KPMG LLP, May 4, 2020

[23] RE100.org

[24] "Inflation Reduction Act Summary," Energy.gov

[25] "The computer chip industry has a dirty climate secret," The Guardian, September 18, 2021

What semiconductor companies can do today

Understand that ESG has a material impact on shareholder value creation. A company's ESG programs undergo public and stakeholder scrutiny, which can impact risk management strategies, access and cost of capital, and adherence to regulations. However, ESG initiatives can add value throughout the business. Improving on social topics such as diversity, equity, and inclusion (DEI) can lead to more effective talent attraction and retention and generate positive employee engagement. Also, decarbonization efforts like renewable energy sourcing or switching to LED lighting can bring positive financial returns.

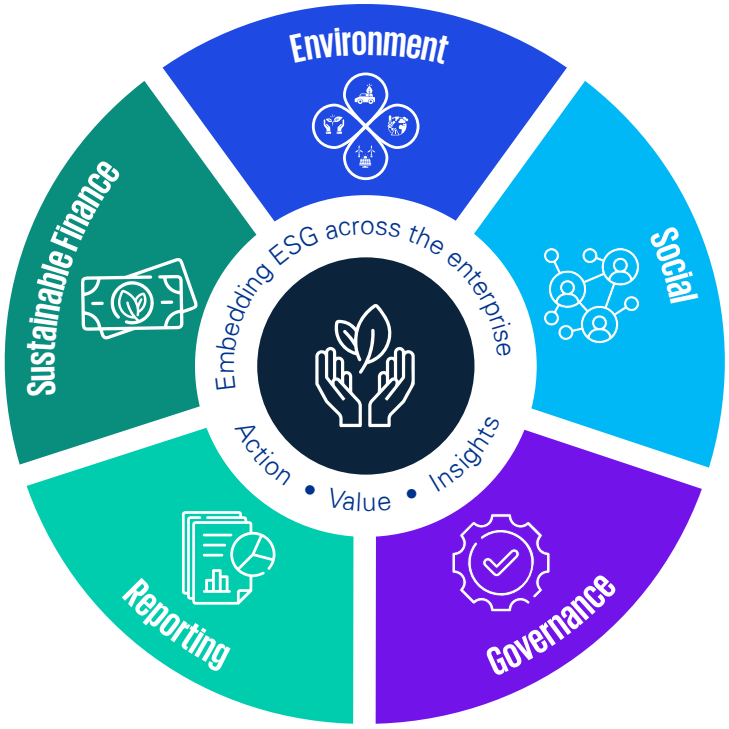
Adhere to the Sustainability Accounting Standards Board's (SASB) recommendations. While SASB is a voluntary framework, understanding the metrics for these topics could help companies prepare for disclosures likely required by CSRD in the EU and the SEC in the US. In the semiconductor industry, SASB standards cross multiple topics:

- Environment: GHG emissions, energy management, water and wastewater management, waste and hazardous materials management
- Human capital: Employee health and safety, employee engagement, diversity, and inclusion
- Business model and innovation: Product design and lifecycle management, material sourcing and efficiency
- Leadership and governance: Ethical competitive behavior

Use this economic cycle to get ahead and prepare for more stringent ESG regulations such as SEC and CSRD that will require significant effort for reporting and disclosure:

- Perform a materiality assessment to identify key ESG topics for reporting and action. The process is the first step for companies needing to comply with CSRD.
- Establish GHG emissions baseline and set emissions reduction targets.
- Evaluate renewable energy sources, including on-site solar, virtual power purchase agreements (VPPAs), or community solar.
- Perform energy audits across facilities to identify "quick win" opportunities to reduce energy consumption.
- Conduct a climate risk assessment across the value chain to identify factors that may contribute to climate change and to protect corporate assets. Climate risk assessment also involves understanding how events like wildfires or floods could affect a company's supply chain, facilities, and offices.
- Employ circular economy strategies to reduce waste and maximize recycling.
- Verify materials sourcing throughout the supply chain to ensure compliance with ESG.

Embedding ESG across the enterprise can turn ESG aspirations into action.



How KPMG can help you

KPMG helps clients develop and implement strategies to optimally navigate market slowdowns and properly prepare for future growth:

KPMG's Dedicated Semiconductor Practice is focused on addressing the specific issues and challenges facing the industry, with a long track record of successfully assisting companies with semiconductor-specific issues and problems.

KPMG ESG Services helps teams to drive sustainable innovation across their business. KPMG can help guide or implement business activities like decarbonization, reporting, sustainable finance, and DEI.

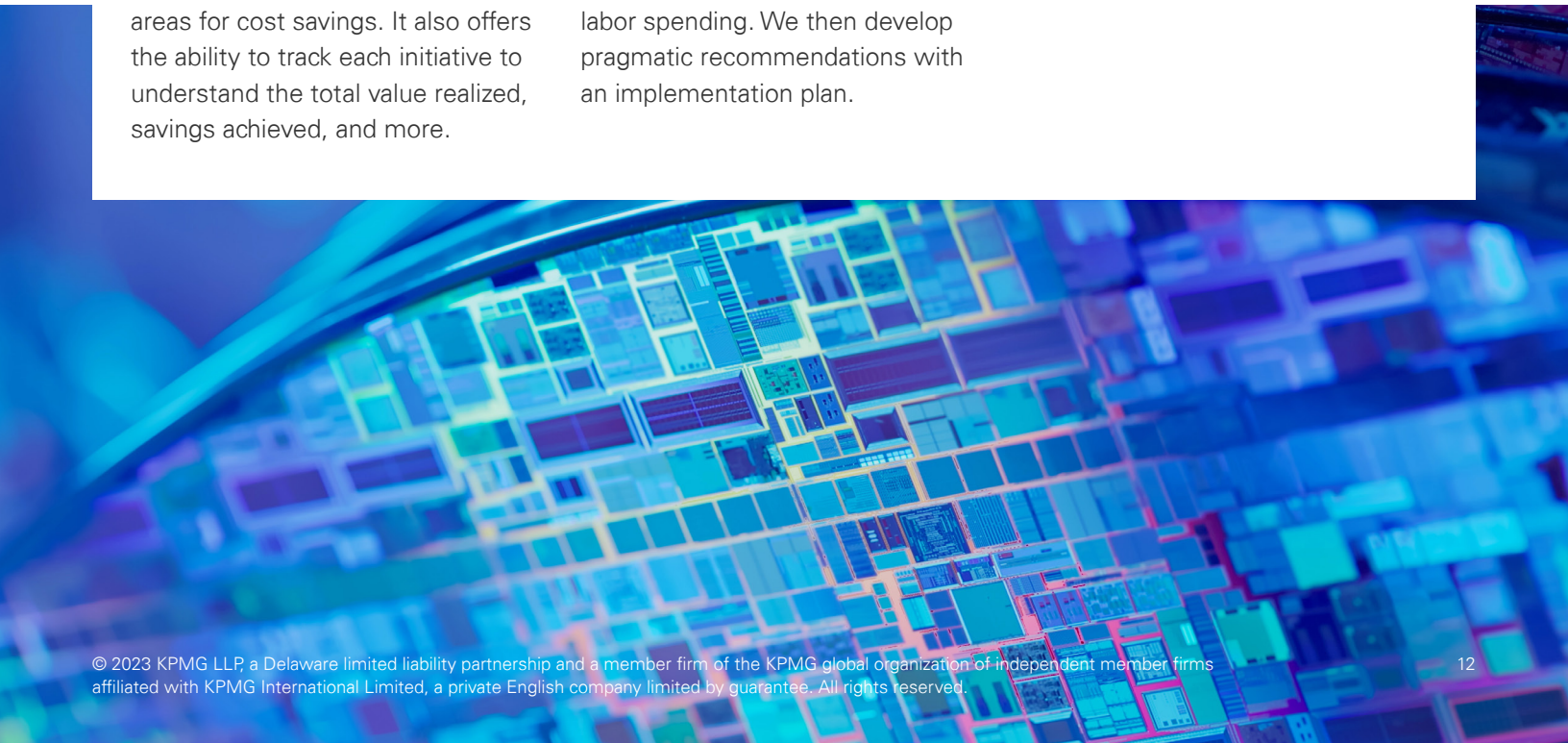
KPMG's Valuation Tracking Tool helps companies define labor and non-labor costs across different business units and identify potential areas for cost savings. It also offers the ability to track each initiative to understand the total value realized, savings achieved, and more.

KPMG's Organizational Design Analyzer evaluates global staffing to help assess a company's staffing cost and organizational effectiveness. The process explores various labor integration scenarios and identifies potential improvement areas like duplicate management, inefficient functional alignment, or overstaffing for specific functions.

KPMG's People Strategy Services helps identify ways to quickly reach strategic, operational, organizational, and financial objectives. Our methodology involves functional analyses, site visits, and interviews to identify the most effective balance of headcount, contractors, and non-labor spending. We then develop pragmatic recommendations with an implementation plan.

KPMG's Active Portfolio Management Framework can help companies review their portfolio to maximize their investments and income through strategic portfolio investing and divesting.

KPMG Elevate Framework assists clients with insights and improves earnings before interest, taxes, depreciation, and amortization (EBITDA). We help organizations rapidly assess transaction-level data, quantify resulting opportunities, and implement short-term activities that generate immediate value. We also find ways to fund long-term, transformative, and sustainable business changes.



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Irene is a managing director and the semiconductor strategy lead for the Technology, Media, and Telecommunication sector at KPMG US. She has 25 years of experience working with semiconductor, electronic materials, and advisory companies in a wide variety of functions, including strategic operations and business management. Irene has led projects to support the cost-effective expansion of a critical fab, led teams in the creation of new product lines, and led multiple multi-billion dollar transformational integration and separation products.

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Marcus is a managing director and the ESG Strategy lead for the Technology, Media, and Telecommunications sector at KPMG US. Marcus has 15+ years of experience leading teams in successfully delivering large-scale/complex business transformations, strategy (development and execution), and M&A (strategy, diligence, and execution) engagements.

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Greg is a director in the Technology, Media, and Telecommunications practice. He started his career in the semiconductor industry in 2001 and has been a leader in KPMG's semiconductor team since 2016, advising clients on strategic operational improvements and transformational shifts. Greg also works with clients carving out or integrating businesses with operational diligence as well as transaction execution success.

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Related thought leadership:

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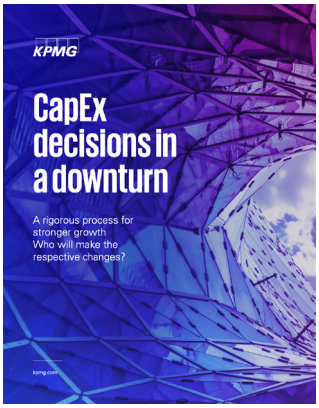
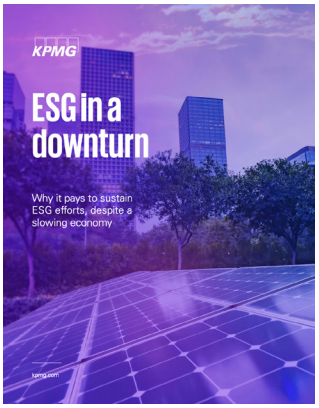


CapEx decisions in a downturn



ESG in a downturn

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