Q2 2023 Earnings Call

Company Participants

- C.C. Wei, Chief Executive Officer
- Jeff Su, Director of Investor Relations
- Mark Liu, Chairman
- Wendell Huang, Vice President, Finance and Chief Financial Officer

Other Participants

- Brett Simpson
- Bruce Lu
- Charles Shi
- Charlie Chan
- Gokul Hariharan
- Laura Chen
- Mehdi Hosseini
- Randy Abrams
- Rolf Bulk
- Sunny Lin

Presentation

Jeff Su {BIO 19785914 <GO>}

(Foreign Language) Good afternoon, everyone, and welcome to TSMC's Second Quarter 2023 Earnings Conference Call. This is Jeff Su, TSMC's Director of Investor Relations, and your host for today. TSMC is hosting our earnings conference call via live audio webcast through the company's website at www.tsmc.com, where you can also download the earnings release materials. If you are joining us through the conference call, your dial-in lines are in listen-only mode.

The format for today's event will be as follows. First, TSMC's Vice President and CFO, Mr.Wendell Huang, will summarize our operations in the second quarter 2023, followed by our guidance for the third quarter 2023. Afterwards Mr.Huang; TSMC's CEO, Dr.C.C. Wei; and TSMC's Chairman, Dr.Mark Liu, will jointly provide the company's key messages. Then we will open the line for a question-and-answer session.

As usual, I would like to remind everybody that today's discussions may contain forward-looking statements that are subject to significant risks and uncertainties, which could

cause actual results to differ materially from those contained in the forward-looking statements. Please refer to the safe harbor notice that appears in our press release.

And now, I would like to turn the call over to TSMC's CFO, Mr.Wendell Huang, for the summary of operations and the current quarter guidance.

Wendell Huang {BIO 18242139 <GO>}

Thank you, Jeff. Good afternoon, everyone, and thank you for joining us today. My presentation will start with financial highlights for the second quarter of 2023. After that, I will provide the guidance for the third quarter.

Second quarter revenue decreased 5.5% sequentially in NT or 6.2% in U.S. dollars, as our second quarter business was impacted by the overall global economic conditions, which dampened the end-market demand and led to customers' ongoing inventory adjustment.

Gross margin decreased 2.2 percentage points sequentially to 54.1%, mainly reflecting lower capacity utilization and higher electricity cost, partially offset by more stringent cost control and a more favorable foreign exchange rate. Despite the industry's cyclical downturn, we continue to invest in R&D to support our N3 and N2 development. Thus, operating margin was 42% down 3.5 percentage points sequentially. Overall, our first quarter EPS was TWD7.01 and ROE was 23.2%.

Now, let's move on to revenue by technology. 5-nanometer process technology contributed 30% of our wafer revenue in the second quarter, while 7-nanometer accounted for 23%. Advanced Technologies, defined as 7-nanometer and below, accounted for 53% of wafer revenue.

Moving on to revenue contribution by platform. HPC decreased 5% quarter-over-quarter to account for 44% of our second quarter revenue. Smartphone decreased 9% to account for 33%. IoT decreased 11% to account for 8, automotive increased 3% to account for 8%, and DCE increased 25% to account for 3%.

Moving on to the balance sheet, we ended the second quarter with cash and marketable securities of TWD1.5 trillion, or $48 billion. On the liability side, current liabilities decreased by TWD62 billion, mainly due to the net decrease of TWD87 billion in income tax payable, as we pay TWD120 billion for 2022 income tax, offset by TWD33 billion accrued tax payables for the second quarter.

Long-term interest-bearing debt increased by TWD53 billion, mainly as we raised TWD41 billion in corporate bonds. On financial ratios, accounts receivable turnover days decreased 2 days to 32 days, while days of inventory increased 3 days to 99 days, primarily due to N3 ramp during the quarter.

Regarding cash flow and CapEx. During the second quarter, we generated about TWD167 billion in cash from operations, spent TWD251 billion in CapEx, distributed TWD71 billion

for third quarter 2022 cash dividend, and raised TWD41 billion from corporate bond issuances.

Overall, our cash balance decreased by TWD109 billion to TWD1.3 trillion at the end of the quarter. Free cash flow was negative TWD83 billion during the quarter, as operating cash flow was more than offset by capital expenditures, partly due to the income tax payment of TWD120 billion. In U.S. dollar terms, our second quarter capital expenditures totaled $8.17 billion.

I have finished my financial summary. Now let's turn to our current quarter guidance. Based on the current business outlook, we expect our third quarter revenue to be between $16.7 billion and $17.5 billion, which represents a 9.1% sequential increase at the midpoint. Based on the exchange rate assumption of $1 to TWD30.8, gross margin is expected to be between 51.5% and 53.5%. Operating margin to be between 38% and 40%. This concludes my financial presentation.

Now, let me turn to our key messages. I will start by making some comments on our second quarter '23 and third quarter '23 profitability. Compared to first quarter, our second quarter gross margin decreased by 220 basis points sequentially to 54.1%, primarily due to a lower capacity utilization.

Compared to our second quarter guidance, our actual gross margin slightly exceeded the high-end of the range provided three months ago, mainly due to more stringent cost control efforts and a slightly more favorable foreign exchange rate. We have just guided our third quarter gross margin to decline by 1.6 percentage point to 52.5% at the midpoint, primarily as a higher level of capacity utilization rate is offset by 2 to 3 percentage points margin dilution from the initial ramp up of our 3 nanometer technology.

Looking ahead to the fourth quarter, we expect a continuous steep ramp up of our 3 nanometer to dilute our fourth quarter gross margin by about 3 to 4 percentage points. In 2023, our gross margin faces challenges from lower capacity utilization due to semiconductor cyclicality, the ramp up of N3, overseas fab expansion, and inflationary costs, including higher utility costs in Taiwan.

To manage our profitability in 2023, we will work diligently on internal cost improvement efforts, while continuing to sell our value. While we face near-term challenges, we continue to forecast a long-term gross margin of 53% and higher is achievable.

Next, let me talk about our 2023 capital budget and depreciation. Every year, our CapEx is spent in anticipation of the growth that will follow in future years. Given the near-term uncertainties, we continue to manage our business prudently and tighten up our capital spending where appropriate.

We now expect our 2023 capital budget to be towards the lower end of our range of between $32 billion and $36 billion. Our depreciation expense is now expected to increase by mid-20% year-over-year in 2023, mainly as we ramp our 3-nanometer technologies.

Despite near-term inventory cycle, our commitment to support customers' structural growth remains unchanged, and our disciplined CapEx and capacity planning remains based on the long-term market demand profile. We will continue to work closely with our customers to plan our long-term capacity and invest in leading-edge, specialty and advanced packaging technologies to support their growth, while delivering profitable growth to our shareholders.

Now, let me make a few comments on our cash dividend distribution policy. The objectives of TSMC's capital management are to fund the capital -- the company's growth organically, generate good profitability, preserve financial flexibility, and distribute a sustainable and steadily increasing cash dividend to shareholders.

As a result of our rigorous capital management, in May, TSMC Board of Directors approved the distribution of TWD3.00 per share cash dividend for the first quarter of 2023, up from TWD2.75 previously. This will become the new minimum quarterly dividend level going forward. First quarter '23 cash dividend will be distributed in October 2023. For 2023, TSMC shareholders will receive a total of TWD11.25 per share dividend, and at least TWD12 per share cash dividend for 2024.

Going forward, as our capital intensity begins to decline in the next several years, the focus of our cash dividend policy is expected to shift from a sustainable to a steadily increasing cash dividend per share in the next few years.

Now, let me turn the microphone over to C.C.

C.C. Wei

Thank you, Wendell. Good afternoon, everyone. First, let me start with our near-term demand and inventory. We concluded our second quarter with revenue of $15.7 billion, in line with our guidance in U.S. dollar terms.

Our business in the second quarter was impacted by the overall global economic conditions, which dampened the end-market demand and customers' ongoing inventory adjustment. Moving into third quarter 2023, while we have recently observed an increase in AI-related demand, it is not enough to offset the overall cyclicality of our business. We expect our business in the third quarter to be supported by the strong ramp of our 3-nanometer technologies, partially offset by customers' continued inventory adjustment.

In the last quarterly conference, we said we expect fabless semiconductor inventory to rebalance to a healthier level exceeding the third quarter. This statement continued to hold true. However, due to persistent weaker overall macroeconomic conditions, slower than expected demand recovery in China, and overall softer end market demand conditions, customers are more cautious and intend to further control their inventory into 4Q '23.

Thus, while we maintain our forecast for the 2023 semiconductor market excluding memory to decline mid-single-digit year-over-year. We now expect the foundry industry to

decline mid-teens, and our full-year 2023 revenue to decline around 10% in U.S. dollar term. With such inventory control, we also forecast the fabless semiconductor inventory to exit 4Q '23 at a healthier and lower level as compared to our expectation three months ago.

Next, let me talk about HPC and TSMC's long-term growth outlook. As we have said before, the massive structural increase in demand for computation underpinned by the industry megatrend of 5G and HPC continues to drive great need for performance and energy-efficient computing, which require use of leading-edge technologies.

These megatrends are expected to fuel TSMC's long-term growth. Even with a more challenging 2023, our revenue remains well on track to grow between 15% and 20% CAGR over the next several years in U.S. dollar terms, which is a target we communicated back in January 2022 Investor Conference. The recent increase in AI-related demand is directionally positive for TSMC.

Generative AI requires higher computing power and interconnected bandwidth, which drive increasing semiconductor content. Whether using CPUs, GPUs, or AI-accelerated and related ASIC for AI and machine learning, the commonality is that, it requires use of leading-edge technology and a strong foundry design ecosystem, these are all TSMC's strengths.

Today, server AI processor demand, which we define as a CPUs, GPUs and AI accelerators that are performing, training and inference functions, accounts for approximately 6% of TSMC's total revenue. We forecast that is to grow at a close to 50% CAGR in the next five years, and increase to low teens percent of our revenue.

The accessible need for energy-efficient computation is starting from data centers, and we expect it will proliferate to edge and end devices of time, which will drive further long-term opportunities. We have already embedded a certain assumption for AI demand into our long-term CapEx and growth forecast.

Our HPC platform is expected to be the main engine and the largest incremental contributor to TSMC's long-term growth in the next several years. While the quantification of the total addressable opportunity is still ongoing, generative AI and large-language model only reinforce the already strong conviction we have in the structurally megatrend to drive TSMC's long-term growth, and we will closely monitor the development for further potential upside.

Now let me talk about our N3 and N3E status. Our 3-nanometer technology is the most advanced semiconductor technology in both PPA and the transistor technology. N3E is already in volume production with good yield. We are seeing robust demand for N3E and expect a strong ramp-up of N3E in the second half of this year, supported by both HPC and Smartphone applications.

N3E is expected to continue to contribute a single-digit percentage of our total wafer revenue in 2023. N3E further extend our N3 family with enhanced performance, power

and yield, and provide complete platform support for both HPC and Smartphone applications.

N3E has passed the qualification and achieved performance and yield target, and we'll start volume production in the fourth quarter of this year. With our continuous enhancement of 3-nanometer process technologies, we expect strong multiyear demand from our customers and are confident that our 3-nanometer family will be another large and long-lasting node for TSMC.

Finally, I'll talk about our N2 status. Our N2 technology development is progressing well and on track for volume production in 2025. Our N2 will adopt nanosheet transistor structure to provide our customers with the best performance, cost, and technology maturity. Our nanosheet technology has demonstrated excellent power efficiency, and our N2 will deliver full node performance and power benefits to address the increasing need for energy-efficient computing.

As part of N2 technology platform, we also develop N2 with backside power rail solution, which is best suited for HPC applications. Backside power rail will provide 10% to 12% additional speed gain, and 10% to 15% larger density boost on top of the baseline technology. We are targeting backside power rail to be available in the second half of 2025 to customers with production in 2026.

We are observing a high level of customer interest and engagement at N2 from both HPC and smartphone applications. Our 2-nanometer technology will be the most advanced semiconductor technology in the industry in both density and the energy efficiency, when it is introduced. N2 will further extend our technology leadership way into the future.

This conclude my prepared remarks, and now let me turn the microphone over to Mark.

Mark Liu {BIO 4255945 <GO>}

Thank you, C.C. And good afternoon, everyone. Today, I want to talk about TSMC's global manufacturing footprint status update. TSMC's mission is to be the trusted technology and capacity provider of the global logic IC industry for years to come. Our strategy is to expand our global manufacturing footprint to increase customer trust and to expand our future growth potential, and to reach for more global talents.

Our overseas decisions are based on our customers' needs and the necessary level of government support. That is to maximize the value of our shareholders and to fulfill our fiduciary duty.

In Arizona, we are building a first fab to provide U.S. most advanced semiconductor technology in mass production to support the needs for U.S. semiconductor infrastructure. Our fab in Arizona started construction in April 2021, with an aggressive schedule. We are now entering a critical phase of handling and installing the most advanced and the dedicated equipments.

However, we are encountering certain challenges, as there is an insufficient amount of skilled workers, with those specialized expertise required for equipment installation in a semiconductor grade facility. While we are working on to improve the situation, including sending experienced technicians from Taiwan to train the local skilled workers for a short period of time. We expect the production schedule of N4 process technology to be pushed out to 2025.

In Japan, we are building a specialty technology factory, which will utilize 12, 16, and 22, 28 process technologies. Volume production is on track for late 2024. In Europe, we are engaging with customers and partners to evaluate building a specialty fab in Germany, focusing on automotive-specific technologies based on the demand from our customers and the level of government support. In China, we are expanding 28-nanometer in Nanjing, as we planned, to support our customer in China and we continue to follow all rules and regulations fully. At the same time, we continue to invest in Taiwan and to expand our capacity to support our customers' growth.

From a cost perspective, the initial cost of overseas fabs are higher than TSMC's fabs in Taiwan, due to, one, the smaller fab scale, two, higher costs throughout the supply chain, and three, the early stage of semiconductor ecosystem on those overseas sites, as compared to a matured ecosystem in Taiwan. In our recent meetings with senior government officials in the U.S., Japan, and Europe, we discussed our plans to expand our global manufacturing footprint to them.

We also emphasized one of our major responsibilities is to manage and minimize the cost gap to maximize return for our shareholders. Those discussions went very well. All sides understand the critical and integral role TSMC plays in the semiconductor industry, and we appreciate all the government's ongoing support in working with TSMC to help narrow down the cost gap. We will continue to work closely with all the governments to secure the further support.

Our pricing will also remain strategic to reflect our value, which includes the value of geographic flexibility. At the same time, we will leverage our fundamental competitive advantage of manufacturing technology leadership, large volume and economies of scale to continuously drive our costs down.

By taking such actions, TSMC will have the ability to absorb the higher costs of overseas fab, while remaining the most efficient and cost-effective manufacturer, no matter where we operate. Thus, even as we expand our capacity overseas, TSMC's long-term gross margin of 53% and higher and sustainable ROE of greater than 25% is achievable, and we will continue to maximize the value for our shareholders.

This concludes our key messages. Thank you for your attention.

Jeff Su {BIO 19785914 <GO>}

Thank you, Chairman. This concludes our prepared statements. Before we start the Q&A session, I would like to remind everybody to please limit your questions to two at a time to allow all the participants an opportunity to ask their questions. Should you wish to raise

your question in Chinese, I will translate it to English before our management answers your question. (Operator Instructions)

Now let's begin the Q&A session. Operator, can we please proceed with the first caller on the line?

Questions And Answers

Operator

(Question And Answer)

The first one to ask questions, Gokul Hariharan from JPMorgan. Go ahead, please.

Q - Gokul Hariharan {BIO 6332238 <GO>}

Yeah. Thank you. Good afternoon, and thanks for a lot of clarity on the AI-related exposures. My first question is on the AI front. A lot of TSMC's customers have been talking about capacity shortage and having to kind of queue up for capacity for AI accelerators, including GPUs and ASICs.

Could TSMC talk a little bit about what TSMC is doing on the capacity side, especially on the advanced packaging, but also on other areas? And when do you expect to get back to some degree of demand and supply balance for these AI accelerators? Is it going to be only sometime next year, or you think it could happen quicker based on what you see on demand from your customers and the capacity plan?

A - Jeff Su {BIO 19785914 <GO>}

Okay, Gokul, Thank you. Let me try to -- please allow me to summarize your first question. So, first question from Gokul is that, he notes that, whereas customers are seeing strong demand from AI related, but they're facing capacity tightness or shortage. So, his question is, what are we doing in terms of the capacity side, maybe both in terms of the advanced packaging, as well as the logic? And then when do we see the demand supply imbalance returning to a better, healthier balance level? Is it sometime next year? Is that correct roughly, Gokul?

Q - Gokul Hariharan {BIO 6332238 <GO>}

Yeah, thanks. Thank you.

A - C.C. Wei

Okay, Gokul, this is C.C. Wei. Let me answer your question. For the AI right now, we see a very strong demand, yes. For the front-end part, we don't have any problem to support. But for the back-end, the advanced packaging side, especially for the CoWoS, we do have some very tight capacity to -- very hard to fulfill 100% of what customer needed. So, we are working with customer for the short term to help them to fulfill the demand, but we are increasing our capacity as quickly as possible. And we expect that this tightness will

be released in next year, probably towards the end of next year. But in between, we're still working closely with our customer to support their goals.

Q - Gokul Hariharan {BIO 6332238 <GO>}

Okay. C.C. maybe one follow-up. Could you let us know what kind of capacity expansion is it like, like how much capacity are you expanding on the CoWoS side like any kind of quantities, you know, what kind of capacity you are adding?

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Gokul, just an additional to the first question, how much capacity are we going to increase in terms of CoWoS?

A - C.C. Wei

Well, let me give you a -- I will not give you the exact number, but let me give you a roughly, probably 2x of the capacity will be added. Okay, Gokul?

A - Jeff Su {BIO 19785914 <GO>}

Gokul? Okay. Gokul, are you there? If not, operator, maybe we move on to the next participant. Gokul, are you there? Okay. I think there was a disconnected. All right, let's move on to the next caller, participant please.

Operator

Next one to ask question, Bruce Lu from Goldman Sachs. Go ahead please.

Q - Bruce Lu {BIO 20933876 <GO>}

Okay. Thank you for taking my question. I still want to know about like the, the TSMC intended 15% to 20 % revenue CAGR, when we cut this year's revenue to minus 10%, right? That also, if we use that 15% revenue CAGR to 2026, that implies about like 25% plus revenue CAGR from the coming two years, which means that the overall semi growth is going to increase like a lot for the next two to three years.

And you just mentioned that the AI only accounts for 6% with low-teens potentially. That is not big enough to get back to the trend. So, what is the underlying growth you have for the global semi in the coming years? And what are the key assumptions for the growth for each segment?

A - Jeff Su {BIO 19785914 <GO>}

Okay, Bruce, let me try to summarize your first question. So, Bruce's first question is on our long-term growth CAGR, which we have said is to be between 15% to 20% from '21 to '26 CAGR period. So, Bruce's question, this year, C.C., just said, we will decline around 10%.

Under his calculation, I think he's saying, well, this implies you should grow 25% in the next several years, which, of course, this is a CAGR, but nonetheless. And so Bruce's question

is that, therefore, if that's the type of growth, then shouldn't that imply a much higher growth level for the overall semiconductor-excluding memory industry? I think that is your question, Bruce. Am I correct?

Q - Bruce Lu {BIO 20933876 <GO>}

Yes. What are the key assumptions for this growth, so?

A - C.C. Wei

Okay. Let me handle this question. Your rationale is correct. However, some of the factor may not be totally included. For one thing in your model that the customer's gross margin is 60% or plus, I don't think that would represent the average customer's gross margin. It may be some specific ones.

However, the other one is the market share. The market share factor, you assume the constant, that is one thing that could be different than in your formula. So, but the semiconductor growth, right now we are forecasting 4% to 5%, it may increase, but definitely as you said, it won't increase to 10%. But those longer term semiconductor excluding memory growth is still yet to be evaluated. Did I answer your question?

Q - Bruce Lu {BIO 20933876 <GO>}

Yes. So, the reason I give that is, I'm assuming that you have like dominant market share in the advanced node, and also that the growth is mostly coming from the advanced node, which your customer's growth rate is supposed to be higher. So, I still think that the gap is wide enough that's what I'm wondering, whether I missed anything, which might be big enough to move the needle that might -- investment that the management might, can give us some color.

A - C.C. Wei

I don't -- this is a factor. As far as the market share value, you might not totally include it all the factors. That's my perspective. But I cannot dig into the numerical comparison at this point here.

Q - Bruce Lu {BIO 20933876 <GO>}

Right. Okay.

A - C.C. Wei

What I mean, the market share is not just the advanced leading-edge technologies, but also the share of the outsourcing.

A - Jeff Su {BIO 19785914 <GO>}

So maybe, Bruce, if I summarize again, TSMC's growth is driven by both the underlying structural megatrends, but also by our technology leadership and differentiation. So, our CAGR is a combination of those two factors.

Q - Bruce Lu {BIO 20933876 <GO>}
I see. Okay, thank you.

A - Jeff Su {BIO 19785914 <GO>}
Do you have a -- I'm sorry go ahead.

Q - Bruce Lu {BIO 20933876 <GO>}
Yes. My next question is regarding to the guidance changes. The previous guidance for the full-year was low-to-mid-single digit. Now it's about like 10% decline. So, the gap is like 5% of the total revenue, which is like quite sizeable in terms of the revenue. Well, with TWD3 billion, TWD4 billion highly concentrated in the second half or fourth quarter. Can you give us, like, what are the changes in terms of this shortfall? Where are the weaknesses come from?

A - Jeff Su {BIO 19785914 <GO>}
Okay. So, Bruce's second question is looking at our 2023 full-year guidance. He noticed last time, we had said low-to-mid-single-digit decline. This time, we have guided to around 10%. So, his question is, the delta of this seems to be a lot of it also in the fourth quarter. So, what -- is there any particular segment or market that is driving this? And what are the factors behind this? Is that correct, Bruce?

Q - Bruce Lu {BIO 20933876 <GO>}
Yes, thank you.

A - Jeff Su {BIO 19785914 <GO>}
Okay.

A - C.C. Wei
Okay, Bruce, let me answer the question. Yes, we did see something different. First, the macro is weaker than what we thought. Three months ago, we probably more optimistic, but now it's not. Also, that is, you know, for example, China economy's recovery is actually also weaker than what we thought. And so the yen market demand actually did not grow as we expected. So, put all together, even we have a very good AI's process as a demand, it's still not enough to offset all those kind of a macro impact. So, now we expect that the whole year will become minus 10%, that's what we thought.

Q - Bruce Lu {BIO 20933876 <GO>}
And in terms of by particular segment or is there a particular market?

A - C.C. Wei
It's almost, well, thank you. You are asking me the question. It's almost an impact--

Q - Bruce Lu {BIO 20933876 <GO>}

Yes, I understand my question. Thank you again.

A - C.C. Wei

Yeah, it's overall all market segment is being impacted, because of its combination of the macroeconomics.

Q - Bruce Lu {BIO 20933876 <GO>}

So, can we conclude that other than AI, almost every application see some weakness in the second half?

A - C.C. Wei

You got it.

Q - Bruce Lu {BIO 20933876 <GO>}

Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Bruce. Operator, can we move on to the next participant, please?

Operator

Next one to ask question is Gokul Hariharan from JPMorgan.

A - Jeff Su {BIO 19785914 <GO>}

Gokul, you're back. Okay.

Q - Gokul Hariharan {BIO 6332238 <GO>}

Yeah, sorry about that. So, next question, just wanted to ask about TSMC management's view on the current inventory cycle. It looks like this cycle is taking it much longer to get through the down cycle compared to 2019 and 2015. When do you think we kind of bottom out? And do you feel that the recovery in next year is going to be a strong recovery, or are you think it's going to be a more gradual recovery? What are the kind of plans that you're putting in place, as you think about next year's recovery once the inventory situation normalizes? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Gokul's second question is about the inventory correction cycle. He notes this cycle seems to be taking much longer to get through as compared to 2019 and 2015. So, his second question is, when do we think this cycle can bottom out? What will 2024 next year look like? Do we expect a strong recovery and what factors are we looking at? Is that correct, Gokul?

Q - Gokul Hariharan {BIO 6332238 <GO>}

Yes, thanks. Thanks a lot.

A - C.C. Wei

Okay, Gokul, this is a good question. Let me answer it in a short one sentence. It's all about the macro. I mean, I just say in the macroeconomics is not so -- it's become weaker than we thought. In fact, high inflation and interest rate impact end demand in all market segment in every region in the world.

As we said, under such situation, our customers are more cautious in their inventory control in the second half of this year. So, while we expect the fabless semiconductor industry, their inventory to be cleaner and healthier exiting this year, but when much closer to the seasonal level. But our expectation for them, they will continue to manage their inventory. And 2024, it still depends on the macro situation. Gokul?

Q - Gokul Hariharan {BIO 6332238 <GO>}

Okay. So, C.C. so that -- it sounds like you're still expecting at least early part of next year to still be a little bit challenging, similar to what it is looking like right now. Is that fair to say?

A - C.C. Wei

What if you are --

Q - Gokul Hariharan {BIO 6332238 <GO>}

At least first half of this year.

A - C.C. Wei

Gokul, we will give you our comment, next time in 2024.

Q - Gokul Hariharan {BIO 6332238 <GO>}

Got it. Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Thank you, Gokul. Operator, can we move on to the next participant, please?

Operator

Next one, we have Charlie Chan from Morgan Stanley.

Q - Charlie Chan {BIO 16164784 <GO>}

Hi gentlemen, good afternoon. Thanks for taking my question. So, my first question is about the overseas fab cost, it seems to get higher. So, would the TSMC consider to further adjust your pricing to absorb those increased costs? And also, you mentioned that

you're doubling or more than doubling your tech packaging, given the AI rush order. Would that give you a chance to reprice the back-end foundry service? Because I remember there was kind of below company's gross margin average. Would that be a chance to bring that back to the corporate average? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay, Charlie. Charlie's first question is, I guess, regarding pricing, two parts or two angles. First, on the overseas fab, given that the costs are higher, would TSMC consider to further adjust our wafer price? And also along similar lines related to advanced packaging given we are, you know, C.C., said, doubling roughly the capacity, would we consider to also charge more or higher given that the returns of the back-end are lower?

A - Mark Liu {BIO 4255945 <GO>}

Let me answer the first question first. Yes, the overseas fab will cost higher, at least for the near future, where their supply ecosystem is not mature yet. And the labor cost is from our experience actually is a little bit higher than we expected. But to answer your question, yes, as we try to get the maximum government subsidy and we also really look at the how the price value for the overseas geographical flexibilities. These are all considered.

The aim is two; one, to increase our customer trust, make them continue to work with us going forward under the geopolitical concerns. Secondly is to maximize the shareholders' value. To answer your question of price, it's a strategically yes.

A - C.C. Wei

All right.

A - Mark Liu {BIO 4255945 <GO>}

C.C., can you answer the second question? Yes.

A - C.C. Wei

Okay. I think the second question is about the pricing or the under CoWoS. As I answered the question, we are increasing the capacity in as soon as possible manner, of course, that including actual cost. So, in fact, we are working with our customer, and the most important thing for them right now is supply assurance, is a supply to meet their demand. So, we are working with them. We do everything possible to increase the capacity. And of course, at the same time, we share our value. And then --

Q - Charlie Chan {BIO 16164784 <GO>}

Thanks. Okay. May I ask the second question? It's a different topic. Is that okay?

A - Jeff Su {BIO 19785914 <GO>}

Sure. You get two questions, so sure.

Q - Charlie Chan {BIO 16164784 <GO>}

Thank you. Thanks, Jeff. Yeah. So, another question is about the AI semi demand, right? Since you are providing, your revenue contribution, growth assumption, that is super helpful. But I'm wondering how TSMC can judge the AI demand? Because right now, it's ARM's reach right now. Customers are very aggressive at booking capacity.

So, I'm wondering how company can judge, whether those AI semi-demand is for real? And also, in terms of breakdown, I'm wondering, whether company sees that ASIC, the custom chip is outgrowing GPU? I think the more important one should be the first part of question, especially investors are concerned, whether AI is cannibalizing the CPU server demand. So, those are kind of questions in our mind. Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Let me summarize your second question, Charlie. Charlie's on AI demand. He wants to know how do we judge the demand properly, because customers are very aggressive, but how, in his words, how do we know that this demand is real? And then also, how do we see the demand specifically for ASICs, as it relates to AI?

A - C.C. Wei

Okay. You want to answer?

A - Mark Liu {BIO 4255945 <GO>}

Let me try first, and you probably follow up on this. This is a very deep question. Of course, we have a model, basically. The short-term frenzy about the AI demand definitely cannot extrapolate for the long-term, and neither can we predict the near future, meaning next year, how the sudden demand will continue or will flatten out. However, our model is based on the data center structure. We assume a certain percentage of the data center processor are AI processors. And based on that, we calculate the AI processor demand. And this model is yet to be fitted to the practical data later on.

But in general, I think, our trend of a big portion of data center processor will be AI processor is a sure thing. And will it cannibalize the data center processors? In the short term, when the CapEx of the cloud service provider are fixed, yes, it will. It is. But as for the long term, when their data service, when the cloud service having the generative AI service revenue, I think, they will increase the CapEx, that should be consistent with the long-term AI processor demand. And I mean, the CapEx will increase, because of a generative AI services.

Anything more for you?

Q - Charlie Chan {BIO 16164784 <GO>}

Yes.

A - Jeff Su {BIO 19785914 <GO>}

Yeah, Charlie, I think part of Charlie's question is also how do we see ASIC related in AI development?

A - C.C. Wei

Well, actually, the customer also have high demand on the ASIC parts for the AI application. And as Mark pointed out, a short-term sudden increase, you cannot extrapolate it to be long-term. But again, let me emphasize that. Those kind of application in the AI, be it CPUs, GPU or AI accelerator or ASIC, they all need leading edge technologies. And they all have one symptom, they are using the very large die size, which is a TSMC's strength.

Q - Charlie Chan {BIO 16164784 <GO>}

Got it. Thank you. Thank you very much.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Charlie. Thank you. Operator, can we move on to the next participant, please?

Operator

Next one to ask questions, Randy Abrams, Credit Suisse.

Q - Randy Abrams {BIO 3738795 <GO>}

Okay. Yes. Thank you. I wanted to shift to the profitability, maybe more for Wendell -- looking at the fourth quarter, you mentioned the 3 to 4 points dilution from N3. I think that is 2 to 3 points in the third quarter. Is that what you're suggesting the directional change could be a little bit down margin profile? Or do you have positive offsets that could keep it more stable?

And then a follow-up on the margin, where you discussed it's a tough year for margins on these factors like the energy, ramp-up N3. But could you discuss 2024, do you think we're going into a period of a bit more challenging profitability, where you see factors that we could comfortably get back to the 53% and above next year?

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Randy. So, Randy's first question is on gross margin. Fourth quarter, with the N3 dilution of 3% to 4%, does that mean directionally fourth quarter margin is sequentially down? Are there any positive offsets?

And then for looking to 2024 for the full year, if Wendell can give some comments about 2024 gross margin, will it also be challenging, or do we still feel confident in a 53% and higher gross margin?

A - Wendell Huang {BIO 18242139 <GO>}

Okay, Randy. Starting from the second half of this year, as we said, we face certain cost challenges, including the ramp-up of N3, which will dilute about 2 to 3 percentage point in third quarter, and 3 to 4 in the fourth quarter, plus the higher electricity cost. But we're not giving our guidance on the fourth quarter at this moment, we're just spelling out some of the challenges that we're seeing.

And of course, we are going to continue to drive down our cost and sell our value to ensure that we will have a good return on the node. That's for this year. For next year, we're seeing -- we're not talking about the whole gross margin, but we'll still see that N3 will dilute about 3 to 4 percentage point of next year's gross margin. And although the yield rate will be better next year. At the same time, the percentage of revenue contributed by N3 will be bigger. So, net-net, we also see some dilution from the N3 next year. But the margin -- the guidance will be given out next year.

Q - Randy Abrams {BIO 3738795 <GO>}

Okay. A quick follow-up to the first question. I think the last few nodes was 2 to 3-point dilution in the first year or two of ramp. The factor for it larger is it the higher capital intensity or something different with 3 versus 5 and 7, where it looks like a little bit more dilution?

A - Wendell Huang {BIO 18242139 <GO>}

Yeah, the increasing process complexity does add on to the challenges of a newer node. However, the other important factor is that, our corporate averages has become higher than before. We used to have 50% gross margin. We're now talking about 53% and higher gross margin.

Q - Randy Abrams {BIO 3738795 <GO>}

Okay. And the second question, I wanted to ask how you're thinking about CapEx, just netting a few things, the geographic expansion, the 3 and then the start of 2-nanometer, the first ramp up or tool move in, versus the mixed outlook you're looking at for macro for a ballpark CapEx into next year.

And if I could maybe within it ask, if the Arizona fab delays, does that push out, where you mentioned the low end of guidance, push out some of this year, have to give some lift to next year?

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Randy's second question is on CAPEX. He wants to know, basically focusing on 2024 CapEx, to some of the delays in the Arizona fab push out CapEx from this year to next year. As we expand overseas, as we invest in N2, but at the same time as the macro remains uncertain, how does this impact 2024 CapEx?

A - C.C. Wei

Yeah, Randy, the push of fabs does push out some part of the CapEx, but that doesn't affect a big part. For 2024, it's too early to talk about the overall CapEx. However, our CapEx, as we said before, every year we spend the CapEx to capture the future growth

opportunities. In the past few years, our CapEx has risen very fast to capture the megatrend. And going forward the next few years, when we start to harvest those investment, we believe their CapEx will begin to level off in terms of dollar amount. And that will lead to start to lower the capital intensity in the next several years.

Q - Randy Abrams {BIO 3738795 <GO>}

Okay.

A - Jeff Su {BIO 19785914 <GO>}

Sorry, Randy. Sorry, do you --?

Q - Randy Abrams {BIO 3738795 <GO>}

Yes, my quick follow up. I think you mentioned in the past you could use your 5-nanometer to support the ramp-up 3. Given the AI and some of that pickup, do you still see that potential that could help optimize CapEx or do you need to keep it for existing node? And that's my final one, thank you.

A - Jeff Su {BIO 19785914 <GO>}

Yeah, so Randy's just also asking then how does tool commonality play a role in our future CapEx?

A - C.C. Wei

Yeah, we always build the tool commonality between nodes to provide a greater flexibility. We mentioned last time the strong multi-year demand from N3, we are able to support that using some of the tools from N5. We're not going to comment on the CapEx beyond this year. However, as I just mentioned, every year the CapEx spent to capture the future growth opportunities.

Q - Randy Abrams {BIO 3738795 <GO>}

Okay. Thank you, Wendell.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Randy. Operator, can we move on to the next participant?

Operator

Next one to ask questions, Laura Chen from Citi.

Q - Laura Chen {BIO 22650168 <GO>}

Yeah. Thank you very much for taking my question. Good afternoon, gentlemen. Very appreciate C.C. and Mark sharing on TSMC's view on the longer term outlook in AI. So, I'm just wondering how does TSMC evaluate your back-end capacity expansion to sync up with the front-end wafer site? Since there is no problem in the front-end. And foundry space, were you kind of concerned about potential overcapacity in the back-end side

beyond next year? Or actually, we may see more upside at the foundry wafer size, so our, say, like, advanced node iteration rate may go higher into next year? Thank you. That's my first question.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Laura's first question is looking at our expansion of advanced packaging or back-end versus the front-end wafer. As we are expanding the back-end, but not the front-end, does that imply that first that our front-end wafer, particularly leading node, we expect the utilization to increase next year? And then conversely, or is there a risk that we are over-expanding or overcapacity risk for the packaging side?

A - C.C. Wei

Okay. Laura, let me answer the question. AI today is a very hot topic. A lot of my customers right now increase their demand and that will increase their front-end's demand, of course. TSMC almost have the major share or the largest share, let me say that, in the front-end wafer.

According to that front-end's loading or we really work closely with our customer and to decide what is the back-end that they need. And so, on that perspective, we are planning our CoWoS' capacity, although probably still not enough, but we are working very hard to increase it. Overcapacity, not today is a concern. Today's concern is not enough capacity to support all the very strong demand.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, C.C.

Q - Laura Chen {BIO 22650168 <GO>}

Thank you. That's very clear. Thank you very much, C.C. And my second question is also about the gross margin outlook. I'll -- if I'm wrong, please correct me. I recall that the previous cycle, like 7-nanometer or 5-nanometer, the capacity usually will be 3x in the third year of the new technology ramping. So, I'm still -- I'm wondering, is still the case for N3? In particularly you are seeing that a significant capacity intensity increase may lead to some margin pressure, particularly in the first few years. So, I'm just wondering how does TSMC balance your technology leadership and also the margin saturation. Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Laura, you said 3x -- sorry, are you referring to the revenue contribution? Sorry, you said N7?

Q - Laura Chen {BIO 22650168 <GO>}

As well as capacity -- a capacity, yes.

A - Jeff Su {BIO 19785914 <GO>}

Okay, so. All right, let me try to summarize your question. I think Laura is asking N7, N5, we substantially expand the capacity, so what is the case for N3, and then also in terms of the

profitability of N3 or gross margin, to be more specific, as it compares to N5 and N7 previously. Is that roughly correct, Laura?

Q - Laura Chen {BIO 22650168 <GO>}
Yes, thank you, Jeff.

A - Jeff Su {BIO 19785914 <GO>}
Okay.

A - Wendell Huang {BIO 18242139 <GO>}
Okay, Laura. Let me answer this question. As I just mentioned, the N3, due to the increasing process complexity, is becoming more challenging than the previous nodes. But we -- but at the same time, we will continue to sell our value and drive down the cost at the same time. But we still believe that N3 will be a long-lasting or a large node for TSMC. With all the efforts, and we still believe that the whole company's gross margin will be 53% and higher.

A - Jeff Su {BIO 19785914 <GO>}
Okay. Laura, does that answer your question?

Q - Laura Chen {BIO 22650168 <GO>}
Okay. Thank you, really appreciate.

A - Jeff Su {BIO 19785914 <GO>}
Yes.

Q - Laura Chen {BIO 22650168 <GO>}
Yes. Thank you.

A - Jeff Su {BIO 19785914 <GO>}
Okay. Thank you, Laura. Operator, let's move on to the next participant, please.

Operator:} Yes. Right now, we have Rolf Bulk from New Street Research. Go ahead, please.

Q - Rolf Bulk {BIO 21142097 <GO>}
Thank you for taking my question. Despite your RFs [ph] in the legacy nodes, 16-nanometer and 28-nanometer in particular, are down around 15% to 20% Q-on-Q. And my question is, were there any particular end markets that caused this decline? And how do you think about the recovery of those legacy nodes? Should we still expect a recovery in the fourth quarter of this year, or is that more 2024 even? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Rolf's first question is looking on the mature nodes such as 2016 and 2018 nodes, that he notes -- that those all saw sequential declines in the second quarter. So, his question is, what is driving this -- what end markets are driving these decline, and what is the expectation for this in the second half?

A - Mark Liu {BIO 4255945 <GO>}

Well, let me answer that question. The mature nodes wafer actually all the product actually try to be companionship for the smartphone or for the PC market or for the HPC. So, while the total unit of smartphone become weaker and PC become weaker. So, is the leading edge technology node being also demand dropping and so the mature node, that's together. Did I answer your question?

Q - Rolf Bulk {BIO 21142097 <GO>}

Yes, thank you. That's very clear. My second question, if you focus on CoWoS and advanced packaging in general, and also the weakness that you see in the remainder of your business, would you maybe comment on the percentage of your CapEx spending that will go towards leading nodes, specialty nodes and packaging this year compared to last year?

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Rolf's second question is, for 2023 CapEx, which our CFO has said towards the lower end of the $32 billion to $36 billion range, can we give a breakdown between leading edge specialty technologies, and then the packaging, testing, mask making, and others.

A - Wendell Huang {BIO 18242139 <GO>}

Leading edge technology accounts for between 70% to 80% of our total CapEx in a year. Mature specialty technology between 10% to 20%. And the remaining are split between advanced packaging and EBO and some others.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Rolf.

Q - Rolf Bulk {BIO 21142097 <GO>}

Perfect. Thank you. All right. Operator, let's move on to the next participant, please.

Operator

Next one we have Sunny Lin from UBS.

Q - Sunny Lin {BIO 22583442 <GO>}

Thank you very much. Good afternoon. Thank you for taking my questions. So, my number one question is on 3-nanometer ramp-up. As we are going through several quarters of mass production. I think you must have pretty good visibility for customer engagement for the coming few years. So, I wonder now, how should we think about the overall ramp of 3-nanometer if we compare with 5-nanometer and 7-nanometer?

If we look at 5, it reached toward 18% of revenue in the second year of mass production and then about 24% of revenue in the third year. Whereas for 3-nanometer, I think the concerns by smartphone customers have been on cost. And the question will be, if HPC is significant enough to still drive a meaningful pickup of 3-nanometer. And so, we would greatly appreciate if you could provide us any kind of thoughts. Thank you very much.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Sunny's first question is on the ramp-up 3-nanometer. Her question really, I believe, is coming from a percentage of revenue contribution. She wants to know how is the ramp of 3-nanometer? And then, can it contribute to the revenue like N5, N7 in the past?

A - C.C. Wei

Yeah. As I just said, we believe N3 will be a long-lasting and large node for TSMC. Now, in terms of percentage, I think, it's sometimes less important, because our overall corporate revenue is much, much bigger these days than before. So, I think, you should also take that into consideration. But dollar amount-wise, it's a much bigger node, yeah.

A - Jeff Su {BIO 19785914 <GO>}

And C.C. you also said it's multi-year strong structural demand. Yeah, sorry. Okay?

Q - Sunny Lin {BIO 22583442 <GO>}

Got it. Well, so I have a quick follow-up on 3-nanometer profitability. And so Wendell has provided pretty good insight about the dilution for 2024. But historically, a new node would take about seven to eight quarters to get to corporate average after mass production. I understand now corporate average gross margin is also higher, but any expectations that N3 will become in line with corporate average gross margin?

A - Jeff Su {BIO 19785914 <GO>}

Yeah. So, Sunny's question is looking at the 3-nanometer. Her question is really, you know, that with 3-nanometer and process complexity. Sunny, you're asking really, can it reach the corporate average over time?

Q - Sunny Lin {BIO 22583442 <GO>}

Or is there a timeline that you are expecting?

A - Jeff Su {BIO 19785914 <GO>}

Or and timeline to reach?

A - C.C. Wei

Yeah, Sunny, as I just mentioned, it's becoming more challenging for the leading nodes because of the process complexity increases a lot. It applies to N3, so it will be challenging for N3. And we actually mentioned that at the beginning of last year already, it will be challenging that for N3 to reach the corporate average in seven to eight quarters time frame like before. Yeah. However, part of it is really because of the higher corporate margin that we currently have.

Q - Sunny Lin {BIO 22583442 <GO>}

Got it. Thank you. My second question is on 2-nanometer. So, if we look at your target for 2-nanometer improvement over 3-nanometer in terms of speed and power, the upgrade seems to be actually less than 3-nanometer over 5-nanometer. So, I wonder, what's actually the implication of GAA transition to cost versus performance? Is the target somewhat conservative, or there is other technological challenges that we need to consider?

A - Jeff Su {BIO 19785914 <GO>}

Okay. Sunny's second, well, it's really her third, but the question is on N2. She notes that the performance and the improvement seem to be less than 3-nanometer versus 5-nanometer, so could we talk more about that?

A - Mark Liu {BIO 4255945 <GO>}

Yeah, let me answer the question. Sunny, you have a very good observation. Yes, you are right. As I compare node to node, from 5-nanometer to 3-nanometer, the improvement, it become less from 3-nanometer to 2-nanometer. But let me point it out, usually, we are talking about the performance, the speed, and also the density, so that the geometry shrinkage.

Now, we focus on the power consumption reduction, which is still a 4-node as a performance, because as time goes by, more and more customer, really, they are increasing toward greater power efficiency. This is very important for the data center, very important for the server. And that's what we are working on. So, did I answer your question, Sunny?

Q - Sunny Lin {BIO 22583442 <GO>}

Got it. Thank you for the color. And good to know that you are on track to deliver second generation of 2-nanometer in 2026. Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Thank you, Sunny. Operator, let's move on to the next participant, please.

Operator

Next one to ask questions, Brett Simpson from Arete.

Q - Brett Simpson {BIO 3279126 <GO>}

Yeah, thanks very much. The first question is for C.C. I was interested in getting a read on the customer reception you're getting for the new variants for N3. I think you talked about N3P, N3X. Are customers still was focused on N3E, or are you seeing a preference for them to migrate to the new variants, such as N3P, N3X, rather than the N3E?

And this is a follow-on, for AI, when do we actually start to see N3 adoption for N3? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Brett's first question is, looking at our 3-nanometer families and the continuous enhancements that we always have. He is asking, what is the customer reception of N3P and N3X? How does this compare or cannibalize N3? And when do we expect AI-related to adopt 3-nanometer family solutions?

A - C.C. Wei

Let me answer the last one first. AI application already adopting that our N3 technology node. We continue to improve our technology, as we always do. So, we have N3E, N3P, N3X, X is the actual performance that's for the very high speed, very high, let me say, performance computing for some of the CPU's application. But N3Es are widely accepted by all my customer, and they design starting from N3E, and we help them, okay, for some of them, go to the N3P. So, all together, every version, every variation, there's a lot of our customer engagement right now.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, C.C.

Q - Brett Simpson {BIO 3279126 <GO>}

Okay. And maybe just my second question for Mark. Mark, you were talking about the building up the ecosystem in some of the overseas markets like the U.S., and you were talking about skills shortage. But can you talk about what you think the like-for-like wafer cost difference is to operate in the U.S. versus Taiwan? I think your, TSMC founder have talked previously about a 50% premium to operate in the U.S. Can you just clarify if it's likely to be that high? And then, when would you expect the cash support from the U.S. CHIPS Act to be made available to TSMC? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Brett's second question is for Chairman. He wants to know basically the cost gap. How big is the cost gap of fab in the U.S. versus in Taiwan? The founder has said 50% or more. Is it that high? And then, concurrently with the CHIPS Act, when or how and when do we expect to receive the incentives to support?

A - Mark Liu {BIO 4255945 <GO>}

Yes, Simpson. I think the founder is right. I mean, at this point, if we're using the current supply chain and labor cost, indeed, yes, that's a difference. However, we try to work with the U.S. administration. First of all, on the subsidy, cash subsidy and tax, investment tax credit, that is to cover the gap in the first five years, approximately. When the tool is depreciated, then the ecosystem becomes prominent. That is, what is the material cost, chemical cost, and the labor cost.

And we are working with our supplier to setup some of the more efficient supply sites and to be lower. And the U.S. administration is decided to also to subsidize the supply, supply our suppliers. So, that is still in the work. How much it can further decrease, I don't know. But I think either way, we will, we will strengthen our pricing, pricing values and be able to keep the corporate profitability as we forecast it now.

A - Jeff Su {BIO 19785914 <GO>}

Thank you, Chairman.

Q - Brett Simpson {BIO 3279126 <GO>}

Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you, Brett. In the interest of time, operator, we'll take questions from the last two participants in the queue, please.

Operator

Yes. Next one to ask question, Mehdi Hosseini from SIG.

Q - Mehdi Hosseini {BIO 4362002 <GO>}

Yes. Thanks for taking my question. I'm going to go back to the gross margin. And I think you highlighted the fact that for '23, you're still tracking to 53% gross margin on a USD basis. That would imply that Q4 could be flat to up. And I just want to better understand how this tracking, I'm not asking for a guide on Q4. But if 2023 gross margin is going to be 53% plus, that would imply Q4 flat to up, is that correct?

A - Jeff Su {BIO 19785914 <GO>}

All right, Mehdi, I think we'll let Wendell answer this question. But Mehdi is asking basically, you know, are we saying that 2023 will be 53% and higher?

A - Wendell Huang {BIO 18242139 <GO>}

Mehdi, we're not giving our guidance beyond this quarter. So, we're not saying what Jeff just said. What we're saying is, only some of the negative factors will affect the second half of the year. As to 53% and higher, that's a long-term gross margin target for TSMC.

A - Jeff Su {BIO 19785914 <GO>}

Yeah, we did not provide a guidance for 2023 specifically, Mehdi, as Wendell just said. 53% and higher is our long-term target, which we believe is achievable. Do you have a second question?

Q - Mehdi Hosseini {BIO 4362002 <GO>}

Okay, thank you both. Yes, your updated guide suggests the revenues in the second half would be up 10% to 12% versus the first half. Obviously, that step up is lower than prior expectation. What I want to better understand is, how should we think about continued inventory correction among your customer, versus new product ramp by some of the other customers? Is there any way you can differentiate these two trends?

A - Jeff Su {BIO 19785914 <GO>}

Okay. Mehdi is asking, with our full-year guidance, it implies a more mild second-half seasonality. So, he wants to know how much strength of the new customer product launches is offset by continued inventory correction, sort of, if we can provide more color on that.

A - Mark Liu {BIO 4255945 <GO>}

Oh, that's a tough question to answer. Mehdi, your observation is right. Our second-half seasonality is more mild than previous years. But of course, we have N3 ramped up for the new product launch. But what is the impact, how to separate them, now I cannot share too much of the detail of that.

A - Jeff Su {BIO 19785914 <GO>}

Okay, Mehdi.

Q - Mehdi Hosseini {BIO 4362002 <GO>}

Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Thank you. Operator, then let's move on to the last participant, please.

Operator

Yes, the last one on queue is Charles Shi from Needham.

Q - Charles Shi {BIO 22238518 <GO>}

Thanks. Hey, thanks for squeezing me in. I have two questions. The first question is, I want to ask about AI, especially around TSMC's monetization of the AI trend. We did hear some commentary that for certain AI applications, TSMC is selling chips for a few hundred bucks, but the TSMC customers can actually sell for tens of thousands of dollars to their end customers.

So, I mean, some investors I spoke with really feel it pains them to see TSMC created an advanced technology does they probably deserve no greater value than this. So, the question really is, how does TSMC to think about maybe better monetization going forward for the capability to produce all these AI chips? And really, I want to tie back to one thing management mentioned in the prepared remarks, the AI growth 50% CAGR, how much of that is volume? And how much of that could be the pricing CAGR in terms of what TSMC's expected to grow over the next few years in AI? Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Charles' question first is on AI. Again, basically, he's asking about the monetization or capturing value, let's say. He notes that TSMC, we may be selling chips for a few hundred dollars, but our customers are able to sell it for tens of thousands or even more. So, is TSMC giving away too much of the value? Can we better sell our value or monetize to capture greater value with the AI trend?

A - C.C. Wei

Well, Charles, I used to make a joke on my customer, say that I selling him a few hundred dollars of a chip and then he sold it back to me with a $200,000. But let me say that, we are happy to see customer doing very well. And if customer do well, TSMC does well. And of course, we work with them and we sell our value to them.

And fundamentally, we want to say that, we are able to address and capture a major portion of the market in terms of a semiconductor component in AI. Did I answer your question?

Q - Charles Shi {BIO 22238518 <GO>}

Yes. What about the part about 50% CAGR, how much of that is volume and should we expect some pricing element in that long-term growth?

A - C.C. Wei

I'm sorry.

A - Jeff Su {BIO 19785914 <GO>}

Yeah. So, the second part is about close to 50% CAGR for AI -- server with AI processor. How much of that is volume? How much of that is price?

A - C.C. Wei

We cannot separate it out, but let me share with you again, we talked to the customers because we have a major share of that all the leading edge technology node. So, we know that we can make our judgment and so we forecast of 50% CAGR. How much of that is, are in the front-end, back-end, or others, I'm not able to share with you about it. But let me assure you that TSMC going to capture a major portion of the market in terms of semiconductor component.

A - Jeff Su {BIO 19785914 <GO>}

Okay, Charles.

Q - Charles Shi {BIO 22238518 <GO>}

Thank you. Can I ask you a second question?

A - Jeff Su {BIO 19785914 <GO>}

Last question.

Q - Charles Shi {BIO 22238518 <GO>}

Yeah, no problem. Last one. May I ask about the CapEx. I think I heard a comment, maybe from Wendell, about on dollar amount, CapEx sort of probably going to level off from here. And I think the management used to point us, analysts, to look at the 2010 to 2013 period, with the high capacity. CapEx actually went up TWD3 billion, TWD4 billion per year to TWD10 billion. And actually after that, TSMC's CapEx did level off around the TWD10 billion level for roughly five years, until 2019.

By telling us their CapEx is probably going to level off, are you telling us or are you alluding to maybe there will be some steady-state CapEx numbers going forward, maybe starting from '24, '25 around TWD30 billion-ish level? That's just a clarification on that comment on leveling off. Thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. So, Charles' second question is on our CapEx. He wants to know capital spending starting to level off, I think, Wendell said in the next several years, so not any specific. But what does that mean? Is it going to stay around the TWD30 billion some level, or what does that mean by spending leveling off?

A - Wendell Huang {BIO 18242139 <GO>}

Yeah, Charles, as I mentioned, in the past few years, our CapEx increased dramatically from TWD10 billion to TWD36 billion last year. As we start to harvest those investments, the increase in CapEx will be slower than before. That's what I mean by leveling off.

A - Jeff Su {BIO 19785914 <GO>}

Okay. All right, Charles.

Q - Charles Shi {BIO 22238518 <GO>}

Got it. Perfect.

A - Jeff Su {BIO 19785914 <GO>}

Yeah, okay. Thank you.

Q - Charles Shi {BIO 22238518 <GO>}

Yeah, thank you.

A - Jeff Su {BIO 19785914 <GO>}

Okay. Operator, this concludes our Q&A session. Before we conclude today's conference, please be advised that the replay of the call will be accessible within 30 minutes from now. The transcript will become available 24 hours from now, both of which you can be find and available through TSMC's website at www.tsmc.com.

So, thank you for joining us today. We hope everyone continues to stay well. Have a good rest of the summer, and we hope you will join us again next quarter. Goodbye, and have a good day.