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PRESENTATION

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

(foreign language) Good afternoon, everyone, and welcome to TSMC's First Quarter 2024 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 shortly. (Operator Instructions)

The format for today's event will be as follows: first, TSMC's Senior Vice President and CFO, Mr. Wendell Huang, will summarize our operations in the first quarter 2024, followed by our guidance for the second quarter 2024. Afterwards, Mr. Huang and TSMC's CEO, Dr. C. C. Wei, will jointly provide the company's key messages. Then we will open the lines for the 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 on 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 - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Thank you, Jeff. Good afternoon, everyone. Thank you for joining us today. My presentation will start with the financial highlights for the first quarter 2024. After that, I will provide the guidance for the second quarter 2024.

First quarter revenue decreased 5.3% sequentially in NT dollars or 3.8% in U.S. dollars as our business was impacted by smartphone seasonality, partially offset by continued HPC-related demand. Gross margin increased 0.1 percentage point sequentially to 53.1%, mainly reflecting product mix changes due to smartphone seasonality, partially offset by a less favorable foreign exchange rate.

Total operating expenses accounted for 11.1% of net revenue, which is lower than the 12% implied in our first quarter guidance, mainly due to tighter expense controls. Thus, operating margin increased 0.4 percentage points sequentially to 42%. Overall, our first quarter EPS was TWD 8.7 and ROE was 25.4%.

Now let's move on to revenue by technology. 3-nanometer process technology contributed 9% of wafer revenue in the first quarter, whilst 5-nanometer and 7-nanometer accounted for 37% and 19%, respectively. Advanced technologies, defined as 7-nanometer and below, accounted for 65% of wafer revenue.

Moving on to revenue contribution by platform. HPC increased 3% quarter-over-quarter to account for 46% of our first quarter revenue. Smartphone decreased 16% to account for 38%. IoT increased 5% to account for 6%. Automotive remained flat and accounted for 6%, and DCE increased 33% to account for 2%.

Moving on to the balance sheet. We ended the first quarter with cash and marketable securities of TWD 1.9 trillion or USD 60 billion. On the liability side, current liabilities increased by TWD 113 billion, mainly due to the increase of TWD 140 billion in accrued liabilities and others, partially offset by the decrease of TWD 44 billion in accounts payable. The increase in accrued liabilities and others was mainly due to the reclassification of the temporary receipt from customers from long-term liabilities.

Our financial ratios, accounts receivable turnover days remained at 31 days, while days of inventory increased 5 days to 90 days, primarily due to ramp of 3-nanometer technologies.

Regarding cash flow and CapEx. During the first quarter, we generated about TWD 436 billion in cash from operations, spent TWD 181 billion in CapEx and distributed TWD 78 billion for second quarter 2023 cash dividend. In addition, we raised TWD 23 billion in cash from bond issuances.

Overall, our cash balance increased TWD 233 billion to TWD 1.7 trillion at the end of the quarter. In U.S. dollar terms, our first quarter capital expenditures totaled \$5.77 billion.

I have finished my financial summary. Now let's turn to our current quarter guidance. We expect our business to be supported by strong demand for our industry-leading 3-nanometer and 5-nanometer technologies, partially offset by continued smartphone seasonality.

Based on the current business outlook, we expect our second quarter revenue to be between USD 19.6 billion and USD 20.4 billion, which represents a 6% sequential increase and 27.6% year-over-year increase at the midpoint. Based on the exchange rate assumption of USD 1 to TWD 32.3, gross margin is expected to be between 51% and 53%, operating margin between 40% and 42%.

Also, in the second quarter, we will need to accrue the tax on the undistributed retained earnings. As a result, our second quarter tax rate will be slightly above 19%. The tax rate will then fall back to 13% to 14% level in the third and fourth quarter, and the full year tax rate will be between 15% to 16% compared to 14.5% in 2023. This concludes my financial presentation.

Now let me turn to our key messages. I will start by making some comments on the impact from the April 3 earthquake. On April 3, an earthquake of 7.2 magnitude struck Taiwan, and the maximum magnitude of our fabs was 5. Safety systems and protocols at our fabs were initiated immediately, and all TSMC personnel are safe.

Based on TSMC's deep experience and capabilities in earthquake response and damage prevention as well as regular disasters drills, the overall tool recovery in our fabs reached more than 70% within the first 10 hours and were fully recovered by the end of the third day. There were no power outages, no structural damage to our fabs, and there's no damage to our critical tools, including all of our EUV lithography tools.

That being said, a certain number of wafers in process were impacted and had to be scrapped, but we expect most of the lost production to be recovered in the second quarter and, thus, minimum impact to our second quarter revenue. We expect the total impact from the earthquake to reduce our second quarter gross margin by about 50 basis points, mainly due to the losses associated with wafer scraps and material loss.

Next, let me talk about our first quarter '24 and second quarter '24 profitability. Compared to fourth quarter 2023, our first quarter gross margin slightly increased by 10 basis points sequentially to 53.1%, primarily driven by product mix changes due to smartphone seasonality. We have just guided our second quarter gross margin to decline by 1.1 percentage points to 52% at the midpoint, primarily due to the impact from the earthquake on April 3, as just discussed, and higher electricity cost in Taiwan.

After last year's 17% electricity price increase from April 1, TSMC's electricity price in Taiwan has increased by another 25% starting April 1 this year. This is expected to take out 70 to 80 basis points from our second quarter gross margin. Looking ahead to the second half of the year, we expect the impact from higher electricity cost to continue and dilute our gross margin by 60 to 70 basis points. We also expect the higher electricity cost to indirectly lead to higher materials, chemical and gases and other variable costs.

In addition, we expect our overall business in the second quarter of the year to be stronger than the first half. And the revenue contribution from 3-nanometer technologies is expected to increase as well, which will dilute our gross margin by 3 to 4 percentage points in second half of '24 as compared to 2 to 3 percentage points in first half of '24.

Finally, as we have said before, we have a strategy to convert some 5-nanometer tools to support 3-nanometer capacity given the strong multiyear demand. We expect this conversion to dilute our gross margin by about 1 to 2 percentage points in the second half of 2024.

To manage our profitability in second half 2024, we will work diligently on internal cost improvement efforts while continuing to sell our value. Longer term, excluding the impact of foreign exchange rate and considering our global manufacturing footprint expansion plans, we continue to forecast a long-term gross margin of 53% and higher is achievable.

(technical difficulty)

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

In light of the fact that we had these technical issues, I think we'll start with Wendell Huang, our CFO, to give our guidance, and then we will go into our prepared remarks. Thank you.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Thank you, Jeff. Sorry, everyone.

Let me repeat the guidance for second quarter again. For the second quarter of 2024, we expect our business to be supported by strong demand for our industry-leading 3-nanometer and 5-nanometer technologies, partially offset by continued smartphone seasonality.

Based on the current business outlook, we expect our second quarter revenue to be between USD 19.6 billion and USD 20.4 billion, which represents a 6% sequential increase or a 27.6% year-over-year increase at the midpoint. Based on the exchange rate assumption of USD 1 to TWD 32.3, gross margin is expected to be between 51% and 53%, operating margin between 40% and 42%.

Also, in the second quarter, we will need to accrue the tax on the undistributed retained earnings. As a result, our second quarter tax rate will be slightly above 19%. The tax rate will then fall back to 13% to 14% level in the third and fourth quarter, and the full year tax rate will be between 15% to 16% compared to 14.5% in 2023.

Now that concludes the financial presentation. Let me now repeat our key messages. I will start by making some comments on the impact from the April 3 earthquake. On April 3, an earthquake of 7.2 magnitude struck Taiwan, and the maximum magnitude at our fabs was 5. Safety systems and protocols at our fabs were initiated immediately, and all TSMC personnel are safe.

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That being said, a certain number of wafers in process were impacted and had to be scrapped, but we expect most of the lost production to be recovered in the second quarter and, thus, minimal impact to our second quarter revenue. We expect the total impact from the earthquake to reduce our second quarter gross margin by about 50 basis points, mainly due to the losses associated with wafer scraps and material loss.

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After last year's 17% electricity price increase from April 1, TSMC's electricity price in Taiwan was -- has increased by another 25% starting April 1 this year. This is expected to take out 70 to 80 basis points from our second quarter gross margin. Looking ahead to the second half of the year, we expect the impact from higher electricity costs continue and dilute our gross margin by 60 to 70 basis points. We also expect the higher electricity cost to indirectly lead to higher materials, chemicals and gases and other variable costs.

In addition, we expect our overall business in the second half of the year to be stronger than the first half. And revenue contribution from 3-nanometer technologies is expected to increase as well, which will dilute our gross margin by 3 to 4 percentage points in second half '24 as compared to 2 to 3 percentage points in first half of '24.

Finally, as we have said before, we have a strategy to convert some 5-nanometer tools to support 3-nanometer capacity given the strong multiyear demand. We expect this conversion to dilute our gross margin by about 1 to 2 percentage points in the second half of 2024.

To manage our profitability in second half of '24, we will work diligently on internal cost improvement efforts while continuing to sell our value. Longer term, excluding the impact of foreign exchange rate and considering our global manufacturing footprint expansion plans, we continue to forecast a long-term gross margin of 53% and higher is achievable.

Finally, let me talk about our 2024 capital budget. Every year, our CapEx is spent in anticipation of the growth that will follow in future years. Our CapEx and capacity planning is always based on long-term market demand profile. We reiterate our 2024 capital budget is expected to be between USD 28 billion and USD 32 billion as we continue to invest to support customers' growth.

Out of the USD 28 billion to USD 32 billion CapEx for 2024, between 70% and 80% of the capital budget will be allocated for advanced process technologies, about 10% to 20% will be spent for specialty technologies and about 10% will be spent for advanced packaging, testing, mask making and others.

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

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Thank you, Wendell. Good afternoon, everyone. Before I start, I would like to take a moment and make a few remarks.

On April 3, [Taiwan] (corrected by company after the call) experienced a major-scale earthquake of 7.2 magnitude. Our deepest sympathies and heart go out to all those who are affected by this tragedy. I also want to recognize and deeply thank all of our employees and our suppliers for their dedication and hard effort during this time.

Although it was largest earthquake in Taiwan in the last 25 years, we worked together tirelessly and were able to resume full operation at all our fab within 3 days with minimal disruptions, demonstrating the resilience of our operation in Taiwan.

Lastly, I would also like to extend our great appreciation to our customers with their understanding and support as we work to recover the lost production during the second quarter.

Now let me start my prepared remarks with our near-term demand outlook. We concluded our first quarter with revenue of USD 18.9 billion, slightly above our guidance in U.S. dollar terms. Our business in the first quarter was impacted by smartphone seasonality, partially offset by continued HPC-related demand.

Moving into second quarter 2024, we expect our business to be supported by strong demand for our industry-leading 3-nanometer and 5-nanometer technologies, partially offset by continued smartphone seasonality.

Looking at the full year 2024, macroeconomic and geopolitical uncertainty persists, potentially further weighing on consumer sentiment and end-market demand. We thus expect the overall semiconductor market, excluding memory, to experience a more mild and gradual recovery in 2024.

We lowered our forecast for the 2024 overall semiconductor market, excluding memory, to increase by approximately 10% year-over-year, while foundry industry growth is now forecast to be mid- to high-teens percent, both are coming off the steep inventory correction and low base of 2023. Having said that, we continue to expect 2024 to be a healthy growth year for TSMC.

Supported by our technology leadership and broad customer base, we expect that our business to grow quarter-over-quarter throughout 2024 and reaffirm our full year revenue to increase by low to mid-20% in U.S. dollar terms.

Next, I will talk about the strong AI-related demand outlook. The continued surge in AI-related demand supports our already strong conviction that structural demand for energy-efficient computing is accelerating in an intelligent and connected world. TSMC is a key enabler of AI applications.

AI technology is evolving to use ever increasingly complex AI models, which needs to be supported by more powerful semiconductor hardware. No matter which approach is taken, it requires use of the most advanced semiconductor process technologies. Thus, the value of our technology position is increasing as customers rely on TSMC to provide the most advanced process and packaging technology at scale with a dependable and predictable cadence of technology offering.

In summary, our technology leadership enables TSMC to win business and enables our customer to win business in their end market. Almost all the AI innovators are working with TSMC to address the insatiable AI-related demand for energy-efficient computing power. We forecast the revenue contribution from server AI processors to more than double this year and account for low-teens percent of our total revenue in 2024.

For the next 5 years, we forecast it to grow at 50% CAGR and increase to higher than 20% of our revenue by 2028. Server AI processors are narrowly defined as GPUs, AI accelerators and CPUs performing training and inference functions and do not include the networking edge or on-device AI. We expect server AI processors to be the strongest driver of our HPC platform growth and the largest contributor in terms of our overall incremental revenue growth in the next several years.

Now let me talk about our global manufacturing footprint update. TSMC's mission is to be the trusted technology and capacity provider of the global IC -- logic IC industry for years to come. Given the strong HPC and AI-related demand, it is strategically important for TSMC to expand our global manufacturing footprint to continue to support our U.S. customers' growth, increase customers' trust and expand our future growth potential.

In Arizona, we have received the strong commitment and support from our U.S. customers and plan to build 3 fabs, which help to create greater economies of scale. Each of our fab in Arizona will have a clean-room area that is approximately double the size of a typical logic fab. We have made significant progress in our first fab, which has already entered engineering wafer production in April with the N4 process technology. We are well on track for volume production in first half 2025.

Our second fab has been upgraded to utilize 2-nanometer technologies to support the strong AI-related demand in addition to the previously announced 3-nanometer. We recently completed the topping off, in which the last steel construction beam was raised into place, and volume production is scheduled to begin in 2028.

We also recently announced plans to build a third fab in Arizona using 2-nanometer or more advanced technologies, with production beginning by the end of the decade. We are confident that once we begin volume production, we will be able to deliver the same level of manufacturing quality and reliability in each of our fab in Arizona as from our fabs in Taiwan.

In Japan, we held an opening ceremony in February in Kumamoto for our first specialty technology fab. This fab will utilize the 12/16 and the 22/28-nanometer process technologies and is on track for volume production in the fourth quarter of this year.

Together with our JV partners, we also announced a plan to build a second specialty fab in Japan with 40, 12/16 and the 6/7-nanometer process technologies to support strategic customers for consumer, automotive, industrial and HPC-related applications. Construction is scheduled to begin in second half '24 with production target by the end 2027.

In Europe, we plan to build a specialty technology fab in Dresden, Germany, focusing on automotive and industrial applications with our JV partners. Fab construction is scheduled to begin in fourth quarter this year. Our overseas decisions are based on our customers' need and the necessary level of government support. This is to maximize the value for our shareholders.

In today's fragmented globalization environment, cost will be higher for everyone, including TSMC, our customers, our competitors and the entire semiconductor industry. We plan to manage and minimize the overseas cost gap by, first, pricing strategically to reflect the value of geographic flexibility; second, working closely with government to secure their support; and third, leveraging our fundamental advantage of manufacturing technology leadership and our large-scale manufacturing base, which no other manufacturer in this industry can match.

Thus, even after factoring in the higher cost of overseas fab, we are confident to deliver a long-term gross margin of 53% and higher and sustainable ROE of greater than 25% that we have committed to our shareholders. At the same time, TSMC will be the most efficient and cost-effective manufacturer in the region that we operate. We are continuing to provide our customers with the most advanced technology at scale to support their growth.

Finally, I will talk about our N2 status. Our N2 technology leads our industry in addressing the insatiable need for energy-efficient computing, and almost all AI innovators are working with TSMC. We are observing a high level of customer interest and engagement at N2 and expect the number of the new tape-outs from 2-nanometer technology in its first 2 years to be higher than both 3-nanometer and 5-nanometer in their first 2 years.

Our 2-nanometer technology will adopt the nanosheet transistors structure and be the most advanced semiconductor industry technology in both density and energy efficiency. N2 technology development is progressing well with device performance and yield on track or ahead of plan. N2 is on track for volume production in 2025 with a ramp profile similar to N3. With our strategy of continuous enhancement, N2 and its derivative will further extend our technology leadership position and enable TSMC to capture the AI-related growth opportunities well into future.

This concludes our key messages, and thank you for your attention.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, C. C. This concludes our prepared remarks. (Operator Instructions) Should you wish to raise your question in Chinese, I will translate it to English before our management answers your question. (Operator Instructions) So now let's begin the Q&A session. Operator, can we please proceed with the first caller on the line? Thank you.

QUESTIONS AND ANSWERS

Operator

The first one to ask questions is Gokul Hariharan, JPMorgan.

Gokul Hariharan - *JPMorgan Chase & Co, Research Division - MD, Co-Head of Asia TMT Research, Head of Taiwan Equity Research & Senior Tech Analyst*

My first questions are on demand. So C. C., you kind of reduced the expectation for the overall semiconductor industry growth. Could you talk a little bit about where is the area where you have seen that slower pickup in demand? I think you talked about smartphone a couple of times in the call. Is it primarily the smartphone area where you've seen a slower pickup in terms of demand?

And previously, a couple of quarters back, you talked about cannibalization or decline in regular data center demand due to the crowding out of AI and being a drag for TSMC. Do you see that the regular compute, regular data center networking kind of demand is coming back? Or is it still remaining muted and most of the demand uptick is still focused on AI?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Gokul, thank you. So Gokul's first question is a little bit 2 parts. So he notes that we have lowered our overall semiconductor ex memory growth forecast for this year to approximately 10% and foundry now to mid to high teens. So Gokul wants to understand, in what segments or applications or areas are we seeing a slower pickup in demand? And then also, in terms of specifically AI versus traditional servers, how are you seeing that demand shape out? And what is the impact to TSMC? Is that generally correct, Gokul?

Gokul Hariharan - *JPMorgan Chase & Co, Research Division - MD, Co-Head of Asia TMT Research, Head of Taiwan Equity Research & Senior Tech Analyst*

Yes. And I think maybe since you called out smartphone, just maybe mention how you see the smartphone demand compared to maybe 3 months back as well.

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Well, Gokul, this is C. C. Wei. Let me answer your questions and some of your comment also. Yes, smartphone end-market demand is seeing gradual recovery and not a steep recovery, of course. PC has been bottomed out and the recovery is slower. However, AI-related data center demand is very, very strong. And the traditional server demand is slow, lukewarm. IoT and consumer remain sluggish. Automotive inventory continue to correct, okay?

What does that mean to TSMC? The budget for a hyperscale player, their wallet share shifted from traditional server to AI server is favorable for TSMC. And we are able to capture most of the semiconductor content in an AI server's area as we define the GPU, ASIC, networking processor, et cetera. Well, we have a lower presence in those CPU-only, CPU-centric traditional server. So we expect our growth will be very healthy. Do I answer your question, Gokul?

Gokul Hariharan - *JPMorgan Chase & Co, Research Division - MD, Co-Head of Asia TMT Research, Head of Taiwan Equity Research & Senior Tech Analyst*

Okay. So yes, I just wanted to ask, is it smartphone the main change compared to, let's say, back in January when you had more than 10% growth for semi? Or is it across the board you're seeing a slower recovery?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So Gokul is asking sort of versus 3 months ago, where have we seen the major shift in the overall end market? Is there a particular area that we have seen?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes, Gokul, 3 months ago, we project that one of the platforms, the automotive platform was -- will increase this year, but now we're expecting it to decrease. So I think that is the one area that we saw was different.

Gokul Hariharan - JPMorgan Chase & Co, Research Division - MD, Co-Head of Asia TMT Research, Head of Taiwan Equity Research & Senior Tech Analyst

Okay. My second question, just wanted to understand gross margin trends. We talked about 3 to 4 percentage point gross margin dilution from N3 ramp in second half of the year. Should we think that the N3-related gross margin drag is more severe than usual for what we have seen for leading-edge nodes in the past? Or is it largely similar to what we have seen in N5 or N7?

And when we go to N2, do you think that this will kind of be the similar pattern? Or do you think that the gross margin dilution will be lower when we go to like future process nodes given that N3 seems to be, at least compared to previous cycle, seems to be dragging a little bit more compared to like N5 or N7 in the past few years?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, Gokul. So let me summarize your second question, basically, is on gross margin. Gokul notes that N3, as Wendell said, will dilute our margin by 3 to 4 points, percentage points in the second half. So his question is, it seems that N3, the gross margin dilution or drag is more severe than past nodes such as N5 and N7. Is that the case? And also, of course, with N2 upcoming, will we face a similar pattern? Or what is the margin profile for N2? Which I think Wendell can address, yes.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes, Gokul, it is true that N3 is taking longer time to reach the corporate margin than the other nodes like N5 or N7. N5 or N7 before, it was like 8 to 10 quarters to reach the corporate. But for N3, we think it will take about 10 to 12 quarters. And this is probably because N3 process complexity has increased, and also our corporate average gross margin also increased during the period.

But another reason is that we set the pricing of N3 very early, several years ahead of production. However, we experienced a lot of cost inflation pressures in the following years. So as a result, N3 will take a longer time than N5 and N7 to reach the corporate average gross margin. For N2, based on what we can see so far is that we are doing a better job in cost and selling our value, and we expect N2 to have a better margin profile than N3.

Operator

The next one to ask a question, Brett Simpson, Arete.

Brett Simpson - Arete Research Services LLP - Senior Analyst

I had a question on the AI returns at TSMC. So I think it's clear that AI is producing a large profit pool at your customers. And the HBM is also driving super-normal returns for memory players. So my question is, does TSMC believe they're getting their fair share of the returns in the AI value chain today? And is there scope for TSMC to raise pricing for AI chips in the future?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, Brett. So Brett's first question is looking at the AI-related demand. He notes that AI customers are earning very good returns, HBM and other components as well. So his question is that whether TSMC, do we feel we are earning or capturing our fair value or right value of the returns? And I think on pricing, how would we price for AI basically, I think. Brett, sorry, that's your question, right?

Brett Simpson - Arete Research Services LLP - Senior Analyst

That's it.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, let me answer the questions. We always say that we want to sell our value, but it is a continuous process for TSMC. And let me tell you that we are working on it. We are happy that our customers are doing well. And if customers do well, TSMC does well. So let me summarize it. We are working on it, and we hopefully that we can sell our value.

Brett Simpson - Arete Research Services LLP - Senior Analyst

Right. For my follow-up question, I wanted -- yes, that's great, Jeff. And my follow-up question was on the lagging edge nodes at TSMC. And looking at Q1 sales for 12-nanometer and above, your overall revenues for these nodes collectively was off 20% year-on-year, and it's only 35% of your overall sales. Can you maybe share with us whether you see a recovery at all this year at these nodes? And we're seeing a lot of government support in building out new fabs in the U.S. and China around lagging edge nodes. So are you concerned at all about structural overcapacity for the older nodes to the cycle?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, Brett. So Brett's second question is more on the mature nodes. He notes that the demand for our mature nodes, 12-nanometer and older, are down year-over-year. So he wonders sort of what is the outlook for the recovery of mature nodes in the second half of the year. I think that's the first part of his question.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay. Brett, let me answer this question. First, the mature node demand remains sluggish because as we just announced it, the whole semiconductor industry is gradually recovering, but not fast enough. So we expect to gradually improve in the second half of 2024.

As you mentioned that you -- do we have a concern on the overcapacity because of some of the companies, they continue to build a lot of mature node capacity. For us, actually, our strategy at a mature node is work closely with our strategic customers to develop specialty technology solution to meet their requirement. And we create differentiated and long-lasting value to customers. So we are less exposed to this possible overcapacity environment. And we believe that our utilization and profitability on mature node can be well protected.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Does that answer your second question, Brett?

Brett Simpson - Arete Research Services LLP - Senior Analyst

That's clear.

Operator

Next one, we have Randy Abrams, UBS.

Randy Abrams - UBS Investment Bank, Research Division - Analyst

I wanted to ask a question, following up on C. C.'s comment about a ramp profile similar to 3-nanometer for 2-nanometer. Could you clarify for the timing of the meaningful revenue ramp for that node? Is the expectation that would be starting early 2026 and ramping up steep through 2026? Or any potential to pull that in?

And then just a second question on that is you noted that tape-outs are higher. Would there be potential with higher tape-outs in 3 and 5 for either steeper or it ramps to be larger than the prior nodes once underway or looking out a couple of years?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Randy's first question is around 2-nanometer. So his first question is to C. C. with that we said that the N2 ramp profile will be similar to N3. We also said, of course, the production begins in 2025. So his question partly is, when do we expect to see the revenue contribution, meaningful revenue contribution from N2? And then also that with N2, the tape-outs being higher, what is the multiyear opportunity or contribution from N2 maybe in terms of the revenue as compared to N3 or other nodes?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Randy, the N2's ramp profile we say is very similar to N3 because of, look at the cycle time, we start the N2 production in the second half of 2025, actually in the last quarter of 2025. And because of the cycle time and all the kind of back-end process, and so we expect the meaningful revenue will start from the end of the first quarter or beginning of the second quarter of 2026. That's what we mean that is the profile is very similar to N3.

Now your second question is there have been a lot of engagement and the tape-out will be higher, and do we see a very steep kind of production? Well, we do expect that, but let me say again, N2 is a very complicated work or a very complex technology node. So my customer, they also take a little bit longer time to prepare for the tape-out. So that's why they all engage with TSMC in the early stage. And -- but for their product ramp-up, they will have their own product road map and their own business consideration. However, we still say that N2 will be a very, very big node for TSMC.

Randy, does that answer your question?

Randy Abrams - UBS Investment Bank, Research Division - Analyst

Okay. Great. No, that's helpful color. Yes. Yes, it does. No, helpful color. My second question is just relating to the upward expectations you gave for the AI accelerators. Curious how that ties to how you're looking at the CapEx, if you say that we're entering either higher growth or investment

cycle, where capital intensity could need to rise up above that mid-30s range that you set or at least in absolute dollars from the \$30 billion this year, we should start growing or thinking about CapEx at least growing with revenue.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Randy's second question is basically, I think, with such strong AI-related demand, what does this mean for our CapEx and capacity planning? And also, what does this mean for our capital intensity outlook?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes. Randy, for TSMC, a higher level of capital expenditure is always correlated with higher growth opportunity in the following years. We work with our customers closely, and our CapEx and capacity planning are always based on the long-term structural market demand profile that is underpinned by the multiyear megatrends. We always review our CapEx plan on an ongoing basis. And as a key enabler of AI, we will work with our customers closely to plan the appropriate level of capacity to support their needs.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

And then in terms of the capital intensity and CapEx dollar outlook.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes. The capital intensity, in the past few years, it was high as we invested heavily to meet the strong customer demand. Now the increase -- the rate of increase for the CapEx is leveling off. So this year and the next several years, we are expecting that the capital intensity is somewhere at the mid-30s level. But as I just said, if there are opportunities in the future years, then we will invest accordingly.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Does that answer your second question, Randy?

Randy Abrams - UBS Investment Bank, Research Division - Analyst

If I could ask a quick follow-up. Yes, it does. Sorry, I'll ask a quick follow-up. Is this -- would this be viewed as a bit of a digestion year since you ramped a lot of the 3-nanometer spending in the past couple of years? So then as you kick off to -- like I mean, should we look at it at a lower -- or should we see this as kind of a normal in that trend?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So I think Randy's question is with -- Randy, you're still asking about CapEx. So is that correct?

Randy Abrams - UBS Investment Bank, Research Division - Analyst

Yes. Sorry, still on CapEx. If it's a CapEx digestion year, since you've ramped a lot of 3 spending already in the 2-nanometer still, a lot of that is still in front of us.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes, Randy, I wouldn't call it a digestion year. I mean every year, we invest based on the forward-looking business opportunities, and we constantly review that. So this is what we're seeing in the future, and that's why we're -- the funds that we're investing in. So no, I wouldn't call it a digestion year. Okay?

Randy Abrams - UBS Investment Bank, Research Division - Analyst

Okay. Good.

Operator

And next one to ask questions, Charlie Chan from Morgan Stanley.

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

So my first question is about selling the value. I think another caller also addressed this topic, but I want to go a little bit deeper. Because given all the efforts you made, right, and also ongoing cost challenge made at the coming U.S. fab, electricity cost hike, I'm not sure if you can give investors kind of a range about a potential price adjustment or kind of the value you're going to sell to your customers.

Based on our back testing, I think based on your revenue and shipments in 2022 and 2023, we calculate your price hike could be around 10% in 2022 and the price hike of 5% in 2023. So C. C., I'm not sure whether you are planning to hike price in this kind of a range or magnitude for 2025, so we can be comfortable you can achieve the 53% gross margin in 2025.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Charlie's first question is about TSMC's pricing strategy. He notes that TSMC, of course, makes a lot of efforts to deliver technology leadership and manufacturing excellence to our customers, but we also face a lot of cost challenges, whether from electricity price hikes or the higher cost of overseas fabs. So his question is, number one, I guess, what is our intention about pricing strategy to sell our value; and then, number two, he would like to know what percentage range, if any?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay, Charlie, this is C. C. Wei. First, I would like to emphasize again this kind of a pricing strategy is very confidential and totally between TSMC and the customer. However, let me expand a little bit, we do encounter some kind of higher cost in the overseas or even recently, the inflation and the electricity. We expect our customers to share some of the higher cost with us, and we already started our discussion with our customers.

And as I said, for the overseas fab, we want to share our value, which also includes the flexibility of geographic location or something like that. If my customer requests to be in some certain area, then definitely, TSMC and the customer had to share the incremental cost.

Charlie, did I answer your question?

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

Yes, I think that answers my question. I think passing through some cost or all the cost to -- incremental cost to customers should be fair, especially you are creating lots of value to your customers.

And my second question is about AI. I know the -- your CoWoS capacity has been very tight, very strategic. But I'm wondering how you're going to judge the demand and allocate the capacity to all the different type of AI semi customers. Because we're hearing your major customer is demanding for 2x capacity next year.

So I'm wondering how you're going to allocate, so I mean, will you still reserve a certain percentage for some smaller or strategic customers no matter if it's ASIC or smaller GPU vendors? So what is the kind of benchmark you're going to allocate those capacity to customers? And are you okay with that if your major customers' demand cannot be fulfilled by you? Are you okay to give out or do some market share to some of your industry competitors?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Charlie's second question is around, I guess, basically, our advanced packaging and more specifically, CoWoS. And he, of course, notes that the CoWoS capacity, the demand is very strong today and also into 2025. So the capacity is very tight.

So his question is, how does TSMC decide on how to allocate the capacity to customers, where we have large customers, but will we reserve capacity to support smaller customers as well? And then lastly, would we be okay if customers want to use somebody else, so to speak? So several parts to this question.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Charlie, let me say it again, the demand is very, very strong, and we have done our best where we put all the effort to increase the capacity. It's probably more than double this year as compared with last year. However, it's still not enough to meet the customers' demand, and we leverage our OSAT partners to complement of TSMC's capacity to fulfill our customers' need.

Still not enough, of course. But in my mind, my first priority is to make our customer to be successful, no matter which one. And of course, the long-term partners will have a better cooperation with TSMC in terms of technology and process complexity, so much easier to be ramped up.

However, no matter what, let me say again, the demand is very high, extremely high. And we do our best to increase the capacity to alleviate the shortage. We also leverage the OSAT partners. We want to make sure that all our customers get supported, probably not enough this year; but for next year, we try, we try very hard.

And you mentioned about giving up some market share, that's not my consideration. My consideration is to help our customers to be successful in their market.

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

I see. So since your major customers said there's no room for other type of AI computing chips, but it seems like TSMC is happy to see some similar customers, right? So is that the right interpretation about your comments?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Yes. C. C. said all customers, yes. Thank you, Charlie.

Operator

Next one to ask questions, Bruce Lu from Goldman Sachs.

Bruce Lu - Goldman Sachs Group, Inc., Research Division - VP

I think, again, the question is coming back to AI still. I think currently, most of the AI accelerators are mostly in 5-nanometers, which is N minus 1 comparing to a smartphone for now. So when do we expect them to catch up or surplus in terms of technology node? Do we see them to be the technology driver in 2-nanometers or above?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Bruce's first question is about, again, looking at AI accelerators. He notes that in his view, they're currently at 5-nanometer now. His question is, do we expect them to catch up? How do we see AI accelerators and also maybe HPC as a whole being the driver or adopter of TSMC's most leading-edge or advanced technology node? Is that correct, Bruce?

Bruce Lu - Goldman Sachs Group, Inc., Research Division - VP

Yes, that's correct.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay. Bruce, let me answer the questions. Yes, your observation is right. Today, all the AI accelerators, most of them are in the 5- or 4-nanometer technology. But my customers are working with TSMC for the next node. Even for the next, next node, they have to move fast because, as I said, the power consumption has to be considered in the AI data center. So the energy-efficient is fairly important. So our 3-nanometer is much better than the 5-nanometer. And again, it will be improved in the 2-nanometer. So all I can say is all my customers are working on this kind of a trend from 4-nanometer to 3 to 2. Bruce?

Bruce Lu - Goldman Sachs Group, Inc., Research Division - VP

But if that is the case, do we see -- yes, if that is the case, do we see a bigger revenue in the first 2 years of the 2-nanometers? Because in the past, it's only smartphone. But in 2-nanometer, it would be both smartphone and HPC customers.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So Bruce is asking then, well, then with such strong AI-related demand, should we see more revenue from 2-nanometer in its first 2 years compared to past nodes?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes, Bruce, as we said, we believe that it will be -- our advanced technologies will be long-lasting nodes and larger nodes, N2, then N3 or N5. So the dollar value will certainly be larger.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

I think, Bruce, we're locating at these opportunities in a multiyear period. So as Wendell and C. C. just said, certainly, with the demand that we're seeing, we do expect N2 revenue contribution to be even larger than N3, just like 3 has a larger contribution or larger node than 5, et cetera, et cetera.

Bruce Lu - Goldman Sachs Group, Inc., Research Division - VP

I see. So my second question is for dividends. We do see very strong free cash flow in the first quarter. And the capital intensity, as Wendell mentioned, is stabilizing. And we even started to pay a huge amount of retained earnings tax. So do we -- can we turn more aggressive in terms of dividends? The current dividend level is much, much lower than 70% of free cash flow in the back-of-envelope calculation. So can we expect to see more dividends in the coming quarters?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, Bruce. So Bruce's second question is on the cash dividend policy. He notes that in the first quarter, we're generating very, very strong free cash flow. As we have said, the capital intensity is beginning to stabilize and also that we are paying a very high retained earnings tax. So his question, I think, is, what is the outlook? Can we pay more dividends in the coming quarters? Or what should investors expect?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Yes. Bruce, the -- our dividend policy is, in principle, to pay 70% of our free cash flow in a year as cash dividends. So I would not just look at quarterly cash, free cash flow to make a judgment. But indeed, as we said before, now that we're harvesting the heavy investment that we did in the past few years, we expect our dividend policy to switch to steadily increasing from the sustainable in the past few years.

Operator

Next one, we have Laura Chen from Citi.

Laura Chen - Citigroup Inc., Research Division - Research Analyst

My question is about the edge AI. We know that C. C. mentioned that the smartphone and the PC recovery is still probably prolonged, yet we are also seeing that the AI PC or AI smartphone is getting quite topical. So I'm just wondering, what's TSMC's view on this kind of edge AI device take off maybe later or 2025? And what's the implication to TSMC? That's my first question.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Thank you, Laura. So Laura's first question is on AI, but more specifically edge or what we call on-device AI. She notes that there's AI being added to smartphones and also AI for PCs. It's quite topical. So she wants to know how do we see this trend, more importantly, what is the implication to TSMC. Is that correct, Laura?

Laura Chen - Citigroup Inc., Research Division - Research Analyst

Yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay, Laura. Let me answer the question. The edge AI or the on-device AI, the first order of magnitude is the die size. We saw without the AI -- with the AI for neural processor inside. The die size will be increased, okay? That's the first we observed. And it's happening.

And then for the future, I would think that replacement cycle for smartphone or for those kind of a PC will be accelerated a little bit in the future, at least. It's not happening yet, but we do expect that it will happen soon. And all in all, I would say that on-device AI will be very positive for TSMC because we capture the larger share of the market.

Did I answer the question, Laura?

Laura Chen - Citigroup Inc., Research Division - Research Analyst

Yes. And so in that case -- yes, very helpful. So in that case, can we expect that our demand -- and see, because now it's still mostly on the smartphone or mobile. So can we expect that N3's revenue contribution in second half or next year will be bigger, say, like a 20% plus in the second half of this year?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So well, Laura's follow-on to the first question is then should we expect that N3 demand in the second half or into 2025. Sorry, I didn't catch the exact percentage, but a large percentage or significantly larger than it is today. Is that correct, Laura?

Laura Chen - Citigroup Inc., Research Division - Research Analyst

Yes.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Okay. Certainly, as I said, we expect to happen at a larger die size. As I said, we already observed that. And for the replacement cycle to be accelerated, it will happen, but I cannot give you a definite number because of -- it's too early to predict in 2025. But it's an upward trend, no doubt about it, and we expect we have a good business.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO

Just to follow up on C. C.'s comments. Last time, we also said that this year, N3 revenue will be more than triple than the revenue in 2023.

Laura Chen - Citigroup Inc., Research Division - Research Analyst

Okay. That's very clear. My second question is about, again, advanced packaging. We know that TSMC is working on the 3DIC for many years. So I'm just wondering that what's the current progress? Will we expect to see more meaningful take-off with our N2 ramp-up for like a high-computing PC? And between different kind of technology, like hybrid bonding or TSV, what's TSMC's major consideration?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Laura's, I guess, second question, although -- yes, fine. Second question is about our advanced packaging solutions and 3DIC solutions. She is wondering, what is the outlook or take-up for the demand for the next several years? And she also would like us to comment on the consideration of TSV versus hybrid bonding and such.

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Wow, you asked a very technical question about the TSV and the hybrid bonding. It's all together. The 3DIC's packaging technology is very complicated, and our customers start to adopt it. Not a big volume yet, but we expect it to start to grow from this year.

How big it will be? It's hard to say, but I think it is a trend. Whether it is a micro-bumping or it's a hybrid connection, that it depends on the customer's product requirement.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Laura?

Laura Chen - Citigroup Inc., Research Division - Research Analyst

So starting from this year, we'll see -- yes, yes, just very quickly. So starting from later this year, we will see that 3DIC products from our customers, that's the current progress?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

So Laura is asking, will we start to see 3DIC products from our customers when?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Now. I'm sorry, I just said that the customers start to adopt it from now, and you would expect that product in the market soon. All right?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Thank you, Laura. Okay. In the interest of time, maybe we'll take questions from the last 2 participants on the call. Thank you. Operator?

Operator

Next one, we have Rolf Bulk from New Street Research.

Rolf Bulk - New Street Research LLP - Research Analyst

Earlier on the call, you mentioned the possibility of converting so much your N5 capacity to N3. But what I was wondering, considering the strong demand for AI chips and a recovery in smartphones, is there a scenario in which you would consider similar conversions from some of your older nodes such as N7 given that utilization and revenues there are still well below peak levels?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Rolf's first question is about our tool commonality and conversion. He notes that we have already said we are converting some of the capacity -- using some of the N5 tools to support the strong multiyear demand for N3 for AI-related and such. His question is that given our 7-nanometer is still underutilized, will we also consider converting 7-nanometer tools to support more leading-edge stronger demand?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, let me answer this question. We can convert one technology node capacity to the next one is because of our there's physical advantage, meaning, let me give you one example, our 3-nanometer and 5-nanometer are adjacent to each other, the fabs, and they are all connected. So it's much easier for TSMC to convert from 5 to 3. And that doesn't mean that every node can do the same. That's one.

And your question about the N7 converted to N5, presumably. No, because we expect the N7 in the next couple of years, it will pick up, the demand will pick up again. And it will repeat -- probably repeat the same kind of experience we have in 28-nanometer. So today, no, we don't have any solid plan to convert the N7 into N5.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Rolf, does that answer your first question?

Rolf Bulk - New Street Research LLP - Research Analyst

Yes. An unrelated follow-up?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Sure.

Rolf Bulk - New Street Research LLP - Research Analyst

Yes, it does. And unrelated follow-up, it's a follow-up to Laura's question, actually. On SoIC, given that the technology is now being adopted more broadly, do you see beginning of interest of your smartphone customer base to also adopt the technology? Could you comment on the likely timeline of adoption of SoIC in smartphones?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. So Rolf's second question is basically going back to SoIC adoption. His question really is pretty straightforward. Do we see a timeline or can we give a timeline for adoption of SoIC by smartphone applications?

C. C. Wei - Taiwan Semiconductor Manufacturing Company Limited - CEO

Well, let me answer the question. Just HPC product is the first one. HPC customer is the first one to adopt, that is a 3DIC or SoIC's advanced packaging technology. And the other area, let's wait, wait and see. I cannot make any comment. We are working on it. Okay?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Rolf?

Rolf Bulk - New Street Research LLP - Research Analyst

Yes.

Operator

The last one to ask question, Mehdi Hosseini from SIG.

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Two from my end. You had a very nice upside to revenue expectation for the first half of '24, but has kept the year-end unchanged. Is that a reflection of that slow recovery that you were highlighting? Or would you prefer to wait to have more visibility before updating 2024 target?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Mehdi's first question is about our revenue outlook and guidance. His question is saying we have a nice upside to our revenue in the first half of this year, but we have kept the full year guidance in to grow low to mid-20s. So is that because we are more cautious on the second half? Or is it because we will see how things go? But I'm not sure if you mean by upside to the first half, Mehdi. You're saying, of course, our first quarter, as C. C. said, was slightly ahead of our guidance in U.S. dollar term, but very minutely. But -- yes?

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO*

Yes. Mehdi, our guidance for the quarterly profile did not change. We always said that quarter-over-quarter, there will be growth. And also, the full year guidance will stay the same. So I don't think there is a so-called upside, as you just said.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

To the first half, yes.

Wendell Huang - *Taiwan Semiconductor Manufacturing Company Limited - Senior VP of Finance & CFO*

Yes.

Mehdi Hosseini - *Susquehanna Financial Group, LLLP, Research Division - Senior Analyst*

Okay. And regarding the investment in U.S., especially for 2-nanometer, does that include advanced packaging? Or would advanced packaging be mostly concentrated in Taiwan region?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of IR*

Okay. So Mehdi's second question is that, of course, that we have announced to build 3 fabs in the U.S., including 2-nanometer, given the strong AI-related demand. So his question is then what about the advanced packaging side, will we also build advanced packaging in Arizona? Or yes, what is our plan?

C. C. Wei - *Taiwan Semiconductor Manufacturing Company Limited - CEO*

Well, let me answer this question. It is always customer's decision for where the back-end service are done for their product. So in Arizona, we are happy to see that Amkor's recent announcement to build an advanced packaging facility that's very close to our AZ fab. Actually, we are working with Amkor and try to support all our customers in AZ and for their demand, for their need.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay, Mehdi, does that address your second question?

Mehdi Hosseini - Susquehanna Financial Group, LLLP, Research Division - Senior Analyst

Yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of IR

Okay. Great. All right. Everyone, this concludes our question-and-answer session. Again, we do apologize for the technical difficulties. If you have anything unclear or need to follow up, please contact TSMC's IR, and we'll be more than happy to help.

Before we conclude today's conference, please be advised that the replay of the conference will be accessible within 30 minutes from now, and the transcript will become available 24 hours from now, both of which are going to be available through TSMC's website at www.tsmc.com.

So thank you again for joining us today. We hope everyone continues to stay safe and healthy, and we hope to see you again next quarter. Goodbye, and have a good day.

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