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2330.TW - Q4 2020 Taiwan Semiconductor Manufacturing Co Ltd
Earnings Call

EVENT DATE/TIME: JANUARY 14, 2021 / 6:00AM GMT

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PRESENTATION

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

(foreign language) Good afternoon, everyone, and welcome to TSMC's Fourth Quarter 2020 Earnings Conference Call. This is Jeff Su, TSMC's Director of Investor Relations and your host for today.

To prevent the spread of COVID-19, 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. (Operator Instructions)

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 fourth quarter 2020, followed by our guidance for the first quarter 2021. Afterwards, Mr. Huang and TSMC's CEO, Dr. C.C. Wei, will jointly provide the company's key messages. Then TSMC's Chairman, Dr. Mark Liu, will host the Q&A session where all 3 executives will entertain your questions.

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 - *Taiwan Semiconductor Manufacturing Company Limited - VP & CFO*

Thank you, Jeff. Happy New Year, everyone. Thank you for joining us today. My presentation will start with financial highlights for the fourth quarter and a recap of full year 2020. After that, I will provide the guidance for the first quarter of 2021.

Fourth quarter revenue increased 1.4% sequentially in NT terms or 4.4% in U.S. dollar terms as we saw strong demand for our 5-nanometer technology driven by 5G smartphone launches and HPC-related applications. Gross margin increased 0.6 percentage point sequentially to 54%, mainly thanks to cost improvement, partially offset by the margin dilution from 5-nanometer ramp and an unfavorable exchange rate. Our utilization rate in the fourth quarter was at an extremely high level partially due to more production output, of which some of the wafers will be shipped in the first quarter. Total operating expenses slightly decreased by TWD 2.6 billion. Therefore, operating margins increased by 1.4 percentage points sequentially to 43.5%. Overall, our fourth quarter EPS was TWD 5.51, and ROE was 31.4%.

Now let's move on to the revenue by technology. 5-nanometer process technology contributed 20% of wafer revenue in the fourth quarter, while 7-nanometer and 16-nanometer contributed 29% and 13%, respectively. Advanced technologies, which are defined as 16-nanometer and below, accounted for 62% of wafer revenue.

On a full year basis, 5-nanometer revenue contribution came in at 8% of 2020 wafer revenue, 7-nanometer was 33%, and 16-nanometer was 17%. Advanced technologies accounted for 58% of total wafer revenue, up from 50% in 2019.

Now moving on to the revenue contribution by platform. Smartphone increased 13% quarter-over-quarter to account for 51% of our fourth quarter revenue. HPC decreased 14% to account for 31%. IoT decreased 13% to account for 7%. Automotive increased 27% to account for 3%. Digital consumer electronics increased 29% to account for 4%.

On a full year basis, smartphone, HPC and IoT saw strong growth of 23%, 39% and 28%, respectively. DCE also increased 2%, while auto decreased 7% in 2020. Overall, smartphone accounted for 48% of our 2020 revenue, HPC accounted for 33%, and IoT accounted for 8%.

Moving on to the balance sheet. We ended the fourth quarter with cash and marketable securities of TWD 791 billion. On the liability side, current liabilities increased by TWD 29 billion mainly due to the increase of TWD 57 billion in accounts payable and the increase of TWD 38 billion in accrued liabilities and others, offset by the decrease of TWD 69 billion in short-term loan. Long-term interest-bearing debt increased by TWD 28 billion mainly as we raised TWD 30.5 billion of corporate bonds during the quarter.

On financial ratios, accounts receivable turnover days decreased 1 day to 39 days. Days of inventory increased 15 days to 73 days primarily due to the ramp of leading nodes.

Now let me make a few comments on cash flow and CapEx. During the fourth quarter, we generated about TWD 259 billion in cash from operations, spent TWD 89 billion in CapEx and distribution TWD 65 billion for first quarter '20 cash dividend. Short-term loans decreased by TWD 67 billion, while bonds payable increased by TWD 30.5 billion due to the bond issuances. Overall, our cash balance increased TWD 56 billion to TWD 660 billion at the end of the quarter. In U.S. dollar terms, our fourth quarter capital expenditures totaled \$3.2 billion.

Now let's look at the recap of our performance in 2020. We saw a strong growth in 2020 as our technology leadership position enabled us to capture the industry megatrends of 5G and HPC. Our revenue increased 31.4% in U.S. dollar terms and 25.2% in NT dollar terms to reach TWD 1.34 trillion. Gross margin increased 7.1 percentage points to 53.1% primarily due to a high level of capacity utilization and cost improvement. Operating margin increased 7.5 percentage points to 42.3%. Overall, full year EPS increased 50% to TWD 19.97.

On cash flow, we spent TWD 507 billion in CapEx, while we generated TWD 823 billion in operating cash flow and TWD 315 billion in free cash flow. We also paid TWD 259 billion in cash dividends in 2020.

I have finished my financial summary. Now let's turn to our first quarter guidance. Based on the current business outlook, we expect our first quarter revenue to be between USD 12.7 billion and USD 13 billion, which represents a 1.3% sequential increase at the midpoint. Based on the exchange

rate assumption of USD 1 to TWD 27.95, gross margin is expected to be between 50.5% and 52.5%, operating margin between 39.5% and 41.5%. The sequential decline in first quarter gross margin is mainly due to a slightly lower utilization rate in the first quarter, albeit it is still staying at the high level, as well as an unfavorable foreign exchange rate.

Now I would like to talk about the tax rate. We expect our [2021] (corrected by company after the call) tax rate to be in the range of 10% to 11%, and this will be equally applied to all 4 quarters of the year.

This concludes my financial presentation.

Now I would like to start with the key messages for the quarter. I will start by making some comments on our capital budget in 2020 and 2021. Every year, our CapEx is invested in anticipation of the growth that will follow in the next few years. Our capital investment decisions are based on 4 disciplines: technology leadership; flexible and responsive manufacturing; retaining customers' trust; and earning the proper return.

In 2020, we spent USD 17.2 billion to capture the strong demand for our advanced technologies and support our customers' capacity needs. In order to meet the increasing demand for our advanced and specialty technologies and further support our customers' capacity needs, our 2021 capital budget is expected to be between USD 25 billion and USD 28 billion. Out of the \$25 billion to \$28 billion CapEx for 2021, about 80% of the capital budget will be allocated for advanced process technologies, including 3-nanometer, 5-nanometer and 7-nanometer; about 10% will be spent for advanced packaging and mask making; and about 10% will be spent for specialty technologies.

Next, let me talk about our capital intensity outlook. As we have said previously, our long-term capital intensity is in the mid-30s percentage range. However, when we enter a period of higher growth, our CapEx needs to be spent ahead of the revenue growth that will follow, so our capital intensity will be higher. For example, during 2010 to 2014, our CapEx spending increased threefold as compared to the previous few years, and our capital intensity ranged between 38% to 50%. Because of the increased investment, we were able to capture the growth opportunities and deliver about 15% growth CAGR from 2010 to 2015.

Today, as we enter another period of higher growth, we believe a higher level of capacity -- of capital intensity is appropriate to capture the future growth opportunities. We now expect a higher growth CAGR in the next few years driven by the industry megatrends of 5G and HPC-related applications, which C.C. will discuss in more detail.

We also expect this higher level of capital investment to continue to drive our technology leadership, enable flexible and responsive manufacturing and earn customers' trust. While our leading node capital cost continues to increase due to increasing process complexities, it is expected to be compensated by continuing to sell our value, which includes the value of our technology, service, quality and capacity support, and diligently working on cost improvement. With this level of CapEx spending in 2021, we reiterate that TSMC remains committed to a sustainable cash dividends on both an annual and quarterly basis.

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

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

Thank you, Wendell. Hi, everyone. This is C.C. Wei. Good afternoon. We hope everybody is staying safe and healthy during this time.

Now let me start with our near-term demand and inventory. We concluded our fourth quarter with revenue of TWD 361.5 billion or USD 12.7 billion, which was in line with our guidance, mainly due to strong demand for our 5-nanometer technology driven by 5G smartphone launches and HPC-related applications.

Concluding 2020, the semiconductor industry, excluding memory growth, was about 10%, while foundry industry increased about 20% year-over-year. TSMC's revenue grew 31.4% year-over-year in U.S. dollar term.

Moving into first quarter 2021. Our business continues to be strong, supported by HPC-related demand, recovery in the automotive segment and a milder smartphone seasonality than in recent years.

On the inventory front, our fabless customers' overall inventory was digested throughout the fourth quarter. We now expect it to approach the historical season exiting 2020, better than our forecast 3 months ago. We observed that the supply chain are changing their approaches to inventory management amidst the lingering macro uncertainties. Looking ahead, we expect the supply chain and our customer to prepare a higher level of inventory compared to the historical season level for a longer period of time given the industry's continued need to ensure supply security.

Next, let me talk about the automotive supply tightness. The automotive market has been soft since 2018. Entering 2020, COVID-19 further impacted the automotive market. The auto supply chain was affected throughout the year, and our customers continued to decrease their demand in the third quarter. We only began to see sudden recovery in the fourth quarter. However, the automotive supply chain is long and complex, while many of our technology nodes have been tight throughout 2020 due to strong demand from our other customers.

Therefore, in the near term, as demand from the automotive supply chain is rebounding, the shortage in automotive supply has become more obvious. In TSMC, this is our top priority, and we are working closely with our automotive customers to resolve the capacity support issues.

Now I will talk about our 2021 outlook. For the full year of 2021, we forecast the overall semiconductor market, excluding memory, to grow about 8%, while foundry industry growth is forecast to be about 10%. For TSMC, we are confident we can outperform the foundry revenue growth and grow by mid-teens percentage in 2021 in U.S. dollar term. Our 2021 business will be supported by strong demand for our industry-leading advanced and specialty technologies, where we see stronger interest from all 4 growth platforms, which are smartphone, HPC, automotive and IoT.

Next, let me talk about TSMC's long-term growth outlook. We are entering a period of higher growth as a multiyear megatrend of 5G and HPC-related applications are expected to fuel strong demand for our advanced technologies in the next several years. We expect global smartphone units to grow 10% year-over-year in 2021. We forecast the penetration rate for 5G smartphone of the total smartphone market to rise from 18% in 2020 to more than 35% in 2021. We expect the silicon content of a 5G smartphone to continue to increase as compared to a 4G smartphone.

We continue to expect faster penetration of 5G smartphone as compared to 4G over the next several years as 5G smartphone benefit from the significant performance, bandwidth and latency improvement of 5G networks to drive more AI applications and more cloud services. We believe 5G is a multiyear megatrend that will enable a world where digital computation is increasingly ubiquitous, which will fuel the growth of all 4 of our growth platforms in the next several years.

As we enter the 5G era, a smarter and more intelligent world will require massive increases in computation power and greater need for energy-efficient computing and, therefore, require leading-edge technologies. Thus, HPC is an increasingly important driver of TSMC's long-term growth and the largest contributor in terms of our incremental revenue growth.

With our technology leadership, we are well positioned to capture the growth from the favorable industry megatrend. We now expect our long-term revenue growth to be 10% to 15% CAGR from 2020 to 2025 in U.S. dollar terms.

Now I will talk about our N3 status. N3 will be another full node stride from our N5 with up to 70% logic density gain, up to 15% performance gain and up to 30% power reduction as compared with 5-nanometer. Our N3 technology will use FinFET transistor structure to deliver the best technology maturity, performance and cost for our customers. Our N3 technology development is on track with good progress. We are seeing a much higher level of customer engagement for both HPC and smartphone application at N3 as compared with N5 and N7 at a similar stage. Risk production is scheduled in 2021, and volume production is targeted in the second half of 2022.

Our 3-nanometer technology will be the most advanced foundry technology in both PPA and transistor technology when it is introduced. Thus, we are confident our 3-nanometer will be another large and long-lasting node for TSMC.

Finally, I will talk about TSMC 3DFabric. TSMC has developed an industry-leading and comprehensive wafer-level 3D IC technology road map to enhance system-level performance. Our differentiated chipllets and heterogeneous integration technology drive better, power-efficient and

smaller-form-factor benefit for our customer while shortening their time to market. This technology is including chip-stacking solution such as SoIC as well as advanced packaging solutions such as InFO and CoWoS. We observed chiplets are becoming an industry trend. We are working with several customers on 3DFabric to enable chiplet architecture.

SoIC small volume production is targeted 2022. SoIC is expected to be first adopted by HPC applications, where our bandwidth performance, power efficiency and form factor are aggressively pursued. We expect revenue from our back-end services, which are including both advanced packaging and testing, to grow at the rate higher than corporate average in the next few years.

This is concluding our key message. Thank you for your attention.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Thank you, C.C. This concludes our prepared statements. (Operator Instructions) Should you wish to raise your question in Chinese, I will translate into English before our management answers your question. (Operator Instructions)

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

QUESTIONS AND ANSWERS

Operator

The first one to ask question, Gokul Hariharan from JPMorgan.

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

So let me ask a question first on 3-nanometer. Dr. Wei, how should we think about the size of 3-nanometer? What we have seen is over the last 2 years, 28-nanometer was a very big node. 7-nanometer came out to be roughly 70% bigger if you think about peak revenue compared to 28-nanometer when you had new applications coming in.

How is -- given the big CapEx plan that you're also outlining, should we think that 3-nanometer, once it ramps up fully, would be substantially bigger than 7-nanometer in terms of peak revenues? Just wondering how we should kind of think about the size of this process node.

And could you also talk a little bit about the opportunities in HPC? Right now, you are already engaged with multiple HPC customers. But could you talk a little bit about CPU, x86 CPU, obviously, which is something on everybody's mind? Could you talk a little bit about how TSMC would be exposed to this market as well as we go into the 3-nanometer era?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Gokul, sorry, this is Jeff. Let me please summarize your questions, 2 questions. We'll take them in the -- one by one.

Gokul's first question is with regards to 3-nanometer and about the size of our 3-nanometer. He notes that in the past, we have had very big nodes such as 28-nanometer and then 7-nanometer. So Gokul wants to know in terms of the peak revenue contribution, do we expect or should N3 be substantially bigger than N7? That's his first question. Correct?

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

Yes, especially considering the step-up in CapEx as well.

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

Well, Gokul, let me answer your question by saying that we do expect the 3-nanometer will be widely used in HPC-related applications in addition to the smartphones. So with this kind of engagement with our customer, we do expect our revenue will be bigger, certainly. There's no doubt about it. So what is the next question?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

And then, Gokul, I think the second part of your question is looking at what are our opportunities in high-performance computing. Gokul notes that we have multiple customers engaged, but in particular, he is asking about the progress or the status of CPU opportunity and what do we see as the drivers of HPC.

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

Gokul, we don't specifically name one of our HPC applications such as CPU to say that what is the growth rate. But let me tell you that CPU, networking and AI accelerator will be the main growth area in the HPC applications. Did that answer your question?

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

Could you be a little bit more specific on x86? And then you already had good success in 7-nanometer penetrating the x86 market. Should we think the x86 market share continues to move up a lot as we get into 3-nanometers?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Gokul, I guess the -- your question is really on the x86 and looking at 7-nanometer has done well. As we get into 3-nanometer, will our exposure to x86 continue to increase.

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

Again, we don't specifically comment on very specific area. We work with our customers continuously and to supply the very good technology to support their business.

Operator

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

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. Yes. I got 2 questions to ask. First, on the -- you talked about the automotive, and I assume also your mature nodes are very tight. You traditionally haven't added that much capacity on mature nodes and 8-inch. Could you discuss within that, because you have some mix of that, how you're seeing a strategy to add capacity for those nodes? And could you also look at auto has been only about 3% of revenue. Should we expect a meaningful pickup in this vertical, both the mature applications and also from new areas like EV and ADAS?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Randy, let me summarize your question. You're asking first on the automotive side. He notes our comments that automotive supply is tight. Do we expect a pickup in the automotive vertical? And then also in looking at the mature nodes, will auto benefit our mature nodes and then ADAS? And other trends in automotive, how do we see?

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

Well, let me say that now we see the automotive industry need a lot of semiconductor components, and that's including the leading-edge technology for the ADAS system and also some of the mature technology for a lot of applications like a sensor, like a power management IC. We do see, right now, it's a little bit shortage on the automotive the mature technology supply. And we are working with customer to mitigate the shortage impact.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

And then Randy is also asking second part on our mature nodes, given the tightness, will we consider to add capacity for the mature nodes.

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

We always work with our customer to plan our technologies, capacity, all those kind of thing. For mature node, we used to convert some of the large capacity into specialties. Right now, the trend stays the same.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. Great. And my second question is, sorry, 2 parts. I just want to ask on gross margin and inventory. The gross margins you've improved 4 points year-over-year. Part of that is utilization, but depreciation also was up 45% NT dollar [against the] 6 points. So could you discuss if you've had a breakthrough on the cost reduction side and if now -- I think last quarter, you said about 50%. But given what you've seen on cost reduction and coming off 54%, if you could have better confidence on margin could continue to do better.

And then I just want to ask a quick on inventory, which is up 15 days, historically, you draw down within the fourth quarter, but maybe the trend-wide inventory was rising into early in the year.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Randy, let me summarize your questions, 2 parts. First is on the gross margin, he notes that our gross margin improved throughout the year. And Randy wants to know if there is a breakthrough on the cost side, and therefore, the long-term outlook for our gross margin is still 50% or not.

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

Right. Randy, this is Wendell. You just mentioned that our depreciation increased 45% year-over-year. I think the number should be 15% year-over-year.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. I was looking at Q4-to-Q4, I think of just the fourth quarter over fourth quarter.

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

Right. Right. Now in terms of gross margin in the long term, we believe 50% gross margin is reasonable and achievable. There are 6 factors affecting our profitabilities: the ramp of leading-edge technology, price, cost, mix, utilization and foreign exchange rate. Take foreign exchange rate for example. In 2020, the average dollar against NT rate was TWD 29.43. It is now trading between TWD 27.90 to TWD 28. That is already a 5% appreciation of NT. So every 1% of appreciation of NT will affect our gross margin by 40 basis points.

The other thing is the -- in the fourth quarter of last year, as we mentioned, the utilization rate was very high, extremely high. And that's the abnormal level of high utilization rate cannot sustain. Therefore, in this quarter, we believe the utilization rate will come down a little bit, albeit it is still at a very high level. Now every point of utilization rate change will impact the gross margin by 40 basis point.

A third example will be the ramp in our leading-edge technologies. We mentioned last time that we expect N5 ramp in 2021 to affect our margins by 2 to 3 percentage point, and we still think that will be the case.

So if you take all of those into considerations, we believe 50% gross margin is reasonable and achievable in the long term.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

And then Randy had also asked about our days of inventory increasing in fourth quarter.

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

Right. Right. And that's partially because some -- as we have a very high utilization in the fourth quarter, but some of the wafers will be shipped in the first quarter as opposed to shipped in the fourth quarter.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Thank you. Thank you, Randy.

Operator

Next one, we have Sebastian Hou from CLSA.

Sebastian Hou - *CLSA Limited, Research Division - Research Analyst*

First question is I want to follow up on the gross margin side. So if I look back in the past 2 quarters, the -- your gross margin actual result turned out to be either at the high end or the -- to the upside to your original guidance, while revenue is much on the high end of the guidance, while the Taiwan dollars continued to appreciate in the second half of last year, so which means that the margin turns out to be better than what you originally guided for 2 quarters consecutively. So my question is whether or not the 1Q outlook margin is too conservative again. And second to that is whether our structural profitability will need to revise up just as our 5-year revenue growth CAGR has just been revised up officially.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

All right. Sebastian, let me summarize your first question, your observation that in the past 2 quarters, our gross margin has come in at the high end or slightly above the high end of our guidance, revenue at the high end, and the currency appreciation is there. So Sebastian's question is, first, is the first quarter gross margin guidance too conservative. And what about the outlook for our longer-term structural profitability, does it need to be revised up?

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

Okay. Sebastian, if we compare fourth quarter to first quarter, 54% in fourth quarter, and the midterm of our guidance for first quarter is 51.5%. The 2.5 percentage point difference actually mainly comes from the utilization as well as the unfavorable foreign exchange rates. So at this moment, we are still sticking to this guidance, although, obviously, we will work hard to continue to improve the gross margins.

As for the long-term gross margin, as I just reported earlier that we are maintaining the 50% gross margin to be reasonable, achievable based on the elements, the 6 factors that I just talked about. Each of those factors will affect our growth -- profitability in the long term.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Sebastian, do you have a second question?

Sebastian Hou - *CLSA Limited, Research Division - Research Analyst*

Yes, I do. My second question is on your CapEx outlook. Apparently that at least there's a significant upside surprise to me and, I think, also to the consensus estimate. So the last time, in the comment, you raised CapEx from \$10 billion to \$12 billion level to the like a \$15 billion to \$17 billion level, then that resulted in the 30% revenue growth in 2020. And then -- so my question is that I think that CapEx we invest for the future growth, so whether or not this -- another step-up of the CapEx to like -- to \$25 billion to \$30 billion. This year's will represent a reacceleration of the growth in 2022 or '23.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Sebastian's question is looking at our CapEx guidance for this year, \$25 billion to \$28 billion. It is above his expectations. So he's looking at the last time we have the increase in acceleration to CapEx from \$10 billion to \$12 billion to \$15 billion to \$17 billion resulted in us growing 30% this year -- 31% this year. So what is the outlook for our growth in 2022 or the future years?

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

Okay. Sebastian, it's too early to talk about -- specifically about 2022. But as C.C. mentioned, in the next 5 years, our target CAGR is between 10% to 15%. So that's already higher than the original target of 5% to 10% CAGR that we used to have before the last conference call. And that's also because of the higher capital investment that we are ready to make to capture the higher growth opportunities underpinned by the multiyear megatrends in the industry.

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

Well, let me add something. This is C.C. Wei. This 10% to 15% CAGR is based on a very high number of 2020. So we still forecast 10% to 15% CAGR. That will tell you that how much of CapEx that we need to invest.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Thank you. Thank you, Sebastian.

Operator

Next one, we have Bruce Lu from Goldman Sachs.

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

I think the big difference this time is that you raised the long-term revenue CAGR from 5% to 10% to 10% to 15%. Can you tell us that in terms of this kind of incremental changes, how much of the growth is coming from HPC? And what are the drivers for that?

And in terms of the smartphone growth, I mean the 5G penetration is already like 30-something percent in 2021. Moving forward, how much growth for you is coming from the dollar content growth or the shipment growth? Or can you provide more color on the growth?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Bruce, so your question is really about our long-term growth outlook with our growth target CAGR of 10% to 15%. Your question basically is by the different platforms such as HPC, what is the growth contribution; and in looking at smartphone, how much is dollar content, how much is unit contribution.

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

Well, let me answer the question by, actually, the growth rate from the HPC application is higher than the corporate average. And smartphone is very close to the corporate. And also, automotive is higher than the corporate average; IoT, close to that corporate average. Did that answer your question?

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

Yes. Okay. My next question is I want to ask about the structural profitability. I understand that -- all these 6 factors for the profitability, but that's based on the assumption that structural profitability remain unchanged. So do we consider to move up the structural profitability because of the current supply -- structural growth for the company or the structural tightness for -- especially with legacy technology nodes?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Bruce, your second question is on the structural profitability. Given the higher growth outlook and also the tightness in supply at legacy nodes or legacy technologies, would we consider to move up the structural profitability target?

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Bruce, as I just mentioned, we are maintaining the financial objective, i.e., the structural profitability goal of 50% gross margin. And of those 6 factors, every one of them can affect the profitability. For example -- I just used an example in foreign exchange rate, utilization and also the ramp of leading-edge nodes.

And for example, the leading-edge technologies, the complexities increases, the CapEx per K, it's more expensive than before. So we are working very hard with the customer to sell our value, the service value, the technology value and also the capacity value and firm up the wafer price. At the same time, we also work very closely with our suppliers to continue to improve our cost so that altogether, we can maintain and earn a proper return in the leading nodes compared to those of the previous few nodes. As a result, we are maintaining our structured profitability goal as 50% of gross margin. Okay?

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

So -- understand. Let me clarify that whatever you gain in terms of your cost-saving, you will still return it to your customer and maintain your 50% profitability target.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

It's -- there are 6 factors. So all -- you add all of them together. It's...

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

Understand.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Yes. Yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Thank you, Bruce.

Operator

The next one to ask question, Charlie Chan, Morgan Stanley.

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

So first question is also about the CapEx. So in the past, for you to spend a huge CapEx on leading edge is usually for the smartphone application given that the key user is Apple. So this time, you almost doubled your CapEx level. Does it mean to say there is a significant upside of the Intel CPU outsourcing? This is the first question.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay, Charlie. So your question is on our CapEx. Basically, Charlie notes that in the past, our large CapEx on leading edge historically has been for smartphone platform. This year, of course, our CapEx number is much higher. So therefore, he is wondering whether it's intended for a particular customer on the CPU side.

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

Well, Charlie, let me answer the question. In fact, we don't comment on specific customer or specific area. Our CapEx guidance is based on the current long-term demand profile underpinned by the industry's megatrend.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay, Charlie?

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

Yes. And there's...

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Do you have a second question?

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

Yes, I do. So just some feedback to C.C. I think we all understand the megatrend 5G and HPC. So the last question was just to understand whether there is additional kind of growth driver, for example, IDM outsourcing on top of the organic growth.

But my next question, I think it should be more related to your strategy because I think your existing customer, Intel, 2 days ago, they also commented about don't rule out the possibility of a licensed foundry process. And actually, 20 years ago, back in 2000, I think you also licensed the largest semi process to National Semi. So I'm not sure if TSMC, after 20 years, do you still kind of consider this kind of option, meaning license your foundry process to your IDM customer or even consider some option like a joint venture for the fab operation with your IDM customer.

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

Well, again, we don't comment on a specific topic or a specific customer. But let me tell you that we are working with our customer continuously and to expand the TSMC's business and to support our customers' demand.

Charlie Chan - Morgan Stanley, Research Division - Technology Analyst

Okay. Okay. Got you. So I will be back to the queue. I have some follow-up.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Thanks, Charlie.

Operator

Next to ask question, Brett Simpson from Arete Research.

Brett William Simpson - Arete Research Services LLP - Senior Analyst

A question maybe first for Wendell. So on the revenue guide, I guess you're starting the year with a far better than seasonal Q1. But I just wondered, how do you see the year playing out? Should we expect in the second half a typical seasonality this year?

And then in terms of the CapEx guide for this year, obviously, there's a big step-up. And spending this year is normally a reflection of how you think about long -- future capacity growth beyond 2021. So can we assume from the big increase in CapEx this year that your implied revenue growth in 2022 will be higher than 2021?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Brett has 2 questions. One, on the revenue guidance of -- we guided for mid-teens for the full year growth for 2021. So he wants to know how does it play out throughout the year. Is there -- second half, will we see the typical seasonality, first half, second half split? That's his first question.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Yes. From what we can see now, second half is still higher than the first half.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

And then the second part is also CapEx and growth. Looking at the increase in our CapEx investment in 2021, noting that we typically spend CapEx in advance of the growth that will follow, Brett wants to know then should we expect a big year or a large growth year in 2020 -- 2022, sorry.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Brett, it's -- as I said, it's a bit too early to discuss 2022 in details. But C.C. just mentioned, over the next 5 years, we're looking at a higher range of CAGR.

And also, the CapEx spend this year means future opportunity and growth not just for the next year but also the years after that. So we're looking at multiple years of growth opportunities.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay?

Brett William Simpson - Arete Research Services LLP - Senior Analyst

And maybe just one for C.C. Wei on N3. You mentioned N3 would have the best PPA. And we're seeing a lot of transistor innovation at Intel and Samsung in the next couple of years, but you're planning to stick with FinFET at 3-nanometer. And I'm just wondering how you see the transistor density at 3-nanometer. I think at N5, you've talked about 175 million transistors per mil square is the potential of N5. How should we think about N3 in that regard? And relative to some of the transistor innovation we're seeing at Intel and Samsung, are you happy with the FinFET roadmap?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Brett, so your second question is regards to our N3 and our decision to continue to use FinFET transistor structure at 3-nanometer. You note that at 5-nanometer, we can deliver about 175 million transistors per millimeter square. So you want to know how this falls out at N3 or maybe in terms of our 3-nanometer in comparison to Samsung or others, how does it compare.

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

Well, as I said in my statement that N3 still provide 70% of the logic density gain in addition to all the performance gain and the power reductions. Whether that's at 5-nanometer, you got 175 million transistor per millimeter square, that will depends on what the number in N3. I think that will depend on customers' design. We continue to say that we offer the FinFET because of the technology maturity, the performance and the cost are the best combination for TSMC to serve our customer.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Thank you, Brett.

Operator

Next one, we have Roland Shu from Citigroup.

Roland Shu - *Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research*

Congrats for the very good results. My first question is also for the CapEx spending, and there are 2 parts of my question. So with this sharply increased CapEx spending, are you considering to sign long-term contracts with customers, especially to those customers who are new to adopt your most leading-edge technology, to ensure a proper return of your investment?

And second part of the first question is this means that you have spent ahead in CapEx in EUV because of the lower productivity for EUV when you first ramp EUV. So I would like to know how much CapEx downside you expect after you have improved EUV productivity to the optimized level.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Roland, we'll take your questions one by one. Both of them relate to CapEx. First one is that with the higher level of CapEx that we have in 2021, Roland wants to know that would we consider signing long-term contracts with customers, especially with customers that are new to TSMC, to ensure that we are making a proper return.

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

Roland, signing a contract to guarantee the loading in the future is not our common practice. We always work with our customer and continuous work with customers to serve their demand. And we also put our CapEx or expanding our capacity according to our current long-term demand forecast. All right? And did that answer your question?

Roland Shu - *Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research*

Okay. Yes. Yes. I take it does.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay, Roland. And then your second question is also related to CapEx. Roland, let me summarize. I think you are saying that in our CapEx guidance, your assumption that the lower productivity of EUV is -- means leading to a higher CapEx level for TSMC. So your question is that if the productivity -- as the productivity of EUV improves, then we'll -- how much reduction in CapEx could we see. Is that your question? Am I summarizing that correctly?

Roland Shu - *Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research*

Yes, exactly. Yes, exactly.

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

Well, let me answer that. We continue to improve the EUV's productivity because we are working closely with suppliers. And so far, we -- the improvement is obvious but still not up to our expectation yet. As for the CapEx will be decreased because of improved productivity, this is in our CapEx plan already.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay?

Roland Shu - Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research

Okay. Yes. So it means going forward, I mean even you have like higher EUV productivity, the CapEx spending or CapEx -- capital intensity probably would be still high next year or in the near future.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Roland, his question is that even with EUV productivity and factoring it into our CapEx, that our capital intensity could remain high even into next year.

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

Well, whether the CapEx remained high or the CapEx intensity remained high is because of technology complexity. It's actually that N5 is much more complicated than N7, N3 is much more complicated than N5. So most of that CapEx intensity coming from this technology advancement. Of course, EUV is a part of it, but it is not the only one reason.

Roland Shu - Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research

Okay. Fair enough.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Thank you, Roland.

Roland Shu - Citigroup Inc., Research Division - Director & Head of Regional Semiconductor Research

Okay. Then my second question -- yes?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Roland, I think that's 2 questions already, sorry. Because we still have several people in the queue, I would kindly ask you to get back into the queue, so we can allow everyone a chance.

Operator

The next one, we have Sunny Lin from UBS.

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

My first question is that I want to follow up on 3-nanometer. I think just I want to get a bit of color on your current visibility for the customer adoption into second half of next year, how does it compare with the historical ramp of 5-nanometer and 7-nanometer and also the cost per transistor for 3-nanometer versus 5.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Sunny, so your first question is on 3-nanometer. You want to know the visibility into customer adoption of 3-nanometer into second half 2022 and how does it compare to 5-nanometer or prior nodes; and also, the cost per transistor at 3-nanometer, is it still declining.

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

Let me answer that. The cost per transistor actually continue to decrease. But for your question about engagement with the customer, we see a lot of customers, especially from the HPC field, they are increased -- been engaged with their activity with TSMC.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Sunny, do you have a second question?

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

Right. So just a very quick follow-up to my first question. I wonder if C.C. will be able to provide any color regarding the ramp for 3-nanometer for second half of next year.

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

Okay. So early adoption from our customer is both in smartphone and HPC-related applications. That's all I can say.

Sunny Lin - UBS Investment Bank, Research Division - Director & Associate Analyst

Got it. And then my second question is for your 2021 gross margin. So with CapEx going up significantly, how should we think about your depreciation growth for this year and also the impact on gross margin?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Sunny's second question is on the 2021 overall gross margin. With a higher level of CapEx spending, she wants to know what will be the year-on-year increase in depreciation and what's the impact to the overall 2021 gross margin.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Sunny, the depreciation in 2021 is expected to be between mid- to high-20s percent higher than 2020. And the impact of -- to gross margins, it's too early to talk about the remaining quarters of the 2021. But as a general feeling, if you look at the capacity utilization that I just mentioned, foreign exchange rate unfavorable and also the N5 ramp, negative impact on our profitability, those are the factors that may affect our whole year 2021 gross margin. But as I've said, it's too early to talk about details on the remaining quarters.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay?

Sunny Lin - *UBS Investment Bank, Research Division - Director & Associate Analyst*

Got it. Very helpful.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Sure. Thank you, Sunny.

Operator

Right now, we're having Laura Chen from KGI.

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

Congratulations for the good results and outlook. I also have the question about the CapEx and the gross margin trend. I think given your strong position in the most advanced technology node and an extremely high CapEx in recent years, I believe there must be some strong conviction on the order outlook with your major clients.

So can you share with us your view that for the N3, first year contribution will be similar to N5, that will have probably more than 10% revenue for the first year on mass production? Can we expect that to happen?

And also, on the gross margin side, given there might be some swing factor of your major IDM clients for outsourcing opportunity, how would you manage the utilization rate which may impact your gross margin substantially? That's my first question.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Laura, I think that's 2 questions. But your first question is on the -- yes, on the N3, sort of noting our strong position in the advanced nodes and also the higher CapEx as an indication of the strong conviction on major clients. Laura wants to know what -- will the revenue contribution of 3-nanometer in its first year be similar to -- or how does it compare to 5-nanometer in the first year.

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

Okay. Laura, it's really too early to talk about that at this moment. But as C.C. said, we believe N3, when it's out, is going to be another large and lasting node for TSMC.

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

Okay. Got it. And also...

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

And then -- sorry, go ahead.

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

Yes. On the -- probably the swing factor of the utilization rate that may impact the gross margin potentially on the -- and particularly for advanced node, how should we look at the trend, how -- your management in that.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Laura's second question is looking at our gross margin and then also looking at opportunities, for example, in a particular IDM, if there are swings in utilization, how would we manage that and how would that impact the gross margin. Is that correct, Laura?

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

Yes.

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

We don't -- Laura, we don't comment on specific customers or business outlook. The -- what we can say is we continue to work with our customers closely and to ensure that we provide this proper capacity to them. And we also maintain a good utilization out of it.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

And as Wendell -- yes.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Laura, let me add some colors. I think our business has been driven traditionally -- in the past few years by smartphones. Starting from this year on, HPC also jumped on the wagons, and therefore, we're looking -- forward looking, we see the traditional seasonality is -- can be moderated with multiple big customers in multiple market segments. So that's our confidence.

The other confidence is our CapEx includes 3-nanometer, also 5-nanometer. Our 5-nanometer is also very strong, stronger than we expected 3 months ago. So those 2 combined to give us the confidence to increase our CapEx.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay, Laura?

Laura Chen - *KGI Securities Co. Ltd., Research Division - Research Analyst*

That's very helpful. Yes, that's very helpful.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Great. Thank you, Laura.

Operator

Next one, we have Robert Sanders from Deutsche Bank.

Robert Duncan Cobban Sanders - Deutsche Bank AG, Research Division - Director

Yes, I just got one question, actually. Just could you please then comment more on the wafer shortage situation and how severe it is at present? Which node are you seeing the shortage most acute? Is it 65-, 90-nanometer, 0.11, 0.13, whatever it is? And how far out are you essentially booked out at some of these nodes? And do you think there's wafer upside to what you're pricing at these nodes?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Robert, your question is on the tightness or shortage in the wafer. He is asking, is it at particular node such as 65-nanometer, 90-nanometer, 0.13, how short it is and how long it will last.

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

Robert, most of the shortage actually is in the mature node. It's not in the 3-, not in the 5- or 7-nanometer per se, but in all the mature node, especially in 0.13 micron, in 40-nanometer, in 55-nanometer, in those area.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay?

Robert Duncan Cobban Sanders - Deutsche Bank AG, Research Division - Director

Can I just have one follow-up, which is just you haven't traditionally built capacity there, but they could become part of dependencies for the industry if they are continuing to be short? So would you actually consider building greenfield to help the industry or you think that other foundries will handle that?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

So Robert, your follow-up question is then given the shortage or tightness on some of these mature nodes, will we consider to expand, build new capacity at these mature nodes to alleviate any potential bottleneck risk.

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

Well, actually, we are working with customer closely and moving some of their mature node to more advanced node, where we have a better capacity to support them. In addition to that, we also try to manage this shortage condition, try to mitigate the impact from this shortage.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay? Thank you.

Operator

Next one, we have Rick Hsu from Daiwa Securities.

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Yes, this is Rick. My first question is I guess you guys mentioned that now your customers are happy living with a higher inventory than the historical pattern because of the macro uncertainties such as COVID-19, so I wonder if your customer would still be happy living with a high inventory than the normal historical patterns if COVID-19 is contained. So this is my first question.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Thank you, Rick. So your question is our -- the higher level of inventory that we're seeing partly is attributable to COVID-19. What if COVID-19 is no longer -- everyone has vaccine, then it's no longer an issue. Will this continue?

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Yes, that's right.

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

Yes, first, let's say that we really hope that the vaccine will work and -- but even if it's working, it takes time. And then also our customers still -- today, they still have a different approach for the inventory management, as we said, because of the securing of the supply is more important than anything you are seeing in today's situation. So we don't think it's really to revert back to the historical level of the inventory.

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Okay. That's helpful. My second question is also regarding your CapEx because the number this year is really high. So about 80% of your high CapEx this year is going to be spent for leading edge, so I wonder how much of that portion is actually for preparation of a capacity build for 2022 and beyond, not for this year. So can you share your idea with us?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Rick, your question is on our CapEx. 80% -- about 80% is for the advanced nodes. He wants to know how much of this spending for the advanced nodes is in preparation for capacity for 2000 -- sorry, 2022.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Rick, we invest this year -- actually, for future year primarily. So it's not only for 2022, it may also be for the years following that. So that's -- I think that's something that I'd like to share with you.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay?

Rick Hsu - Daiwa Securities Co. Ltd., Research Division - Head of Regional Technology & Head of Taiwan Research

Okay. That's helpful. Yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Yes, no problem. Thank you, Rick.

Operator

Next one, we have Andrew Lu from Sinolink Securities.

Andrew Lu - Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst

Can you hear me?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Yes, we can hear you.

Andrew Lu - Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst

Okay. My first question is, if your customer has his own design rule, knows what's the different metal and poly pitch spec for TSMC's one, can this customer use the in-house manufacturing and TSMC foundry based on the same design? Or it needs to redesign the chip based on TSMC 5-nanometer, 3-nanometer design rule?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Andrew, let me try to summarize your question. Your question is about customers' design rules. If the customer has their own design rules but with different metal and different poly pitch from TSMC's, could this customer use TSMC foundry or use their in-house manufacturing? Or do they need to use TSMC's design rules, basically?

Andrew Lu - Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst

That's correct.

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

Andrew, we always work closely with our customer to support their design into TSMC's process technologies, so we can manufacture it inside TSMC.

Andrew Lu - *Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst*

So customer doesn't need to change its own design?

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

Okay. I cannot answer this question because of -- it is 2 parties' cooperation. And as I said, we work closely with them to support their design.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay?

Andrew Lu - *Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst*

Understood.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Yes.

Andrew Lu - *Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst*

My second question is, since our 3-nanometer, 4-nanometer nodes will be ramping up next year, what about second half this year, will we have something like a 5-nanometer plus or revision, 5-nanometer process node for second half this year.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Andrew's second question is, looking at second half of this year, noting that next year we'll have, for example, N3 and N4, then second half of this year, do we have any new node or continuous improvement, enhancement?

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

Andrew, we always continue to improve the technologies. Last year, we introduced our 5-nanometer to the market. This year, we continue to improve it. And next year, we will improve further. So we never stop.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay?

Andrew Lu - *Sinolink Securities Co., Ltd., Research Division - Semiconductor Analyst*

So something like the 5-nanometer plus?

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

If that's your naming, yes.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Thank you, Andrew.

Operator

Next one, we have Mehdi Hosseini from SIG.

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

Yes. First question has to do with the revenue mix forecast for Q1 by technology and platform. It will be great if you could provide some color, and I have a follow-up.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Mehdi wants to know for the first quarter, revenue by technology and revenue by platform.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Okay. Mehdi, in the first quarter, HPC, automotive and IoT will increase sequentially, while smartphone will experience a milder seasonal decline compared to its recent seasonalities.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

And we do not provide a breakdown guidance of revenue by technology, Mehdi, okay? So do you have a second question?

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

Yes. Just a quick follow-up on CapEx. Does your \$25 billion to \$28 billion CapEx guide include investment for infrastructure in U.S.?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

So Mehdi's question is does our CapEx guidance this year include any investment for the U.S. fab infrastructure.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Yes, it does. The U.S. fab starts construction this year.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay?

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

Can you elaborate that how much of the CapEx is for the U.S.?

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

Not at this point. Right.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay? Thank you, Mehdi.

Operator

Next one, Krish Sankar from Cowen and Company.

Krish Sankar - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Yes. I also had 2 on CapEx. Number one, pretty nice step-up in CapEx this year from last year. Is it fair to assume your investment in EUV is also up this year relative to last year? And then I had a follow-up.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Krish's first question is that with our increase in CapEx guidance -- that we guided for in 2021 versus 2020 being an increase, does that also mean an increase in the CapEx we spend on EUV.

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

No, we do not disclose that details.

Krish Sankar - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Got it. And then as a follow-up, C.C., you mentioned that how capital intensity is going to be high all the way to 3-nanometer. But you also said long-term capital intensity should be in the mid-30s, so I'm just trying to square that by what do you mean by long term? Because it looks like if 3-nanometer is still going to be high for the next few years, capital intensity might be higher than mid-30s. So at what point should we expect it to get to mid-30s?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Krish's second question is in terms of capital intensity. With the capital intensity or CapEx per K at 3-nanometer being higher, and then we're having a long-term capital intensity returning to mid-30s, he wants to know when will we return to mid-30s capital intensity level. Is that correct, Krish?

Krish Sankar - *Cowen and Company, LLC, Research Division - MD & Senior Research Analyst*

Yes.

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

Yes. Yes. We mean long-term meaning 3 to 5 years. I think 2010 to 2014 can be an example. During that period of time, the capital intensity rose from 38% to 50%, maintaining at high 40s for a couple of years and came down afterwards. Something like that should be a reference. Okay?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

All right. Thanks, Krish.

Operator

Next one, Gokul Hariharan, JPMorgan.

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

Yes. One question on CapEx and depreciation. Do we -- are we having to spend CapEx a little bit ahead of what we used to spend in the past -- in the EUV era? Is that a function of having to spend maybe 6 to 9 months ahead compared to, let's say, in the immersion era? That's one.

And how should we think about depreciation with this jump in CapEx? Wendell, can you give us a little bit of guidance in terms of how we should think about depreciation for this year and going ahead as well given the higher level of CapEx?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. Gokul, let me summarize. Your first question is in terms of the CapEx. He wants to know that are we -- with CapEx, are we having to spend CapEx earlier now and is this because of EUV that we need to spend more CapEx earlier.

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

Well, let me answer the question. The answer is yes because of, yes, a long lead time for the EUV tools. The tools are very complicated, and the supply chain for the EUV takes a long time to prepare for it. And as a result, TSMC also has to plan in advance. That's longer than the normal tools that we used to have.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. And then Gokul's second question is looking at with the higher CapEx, the depreciation outlook.

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

Right. For this year, Gokul, we expect the depreciation to increase by mid-20% to high 20% for 2021 over 2020.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay, Gokul?

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

Okay.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Yes.

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

And maybe to just add -- yes. So even with that, we are comfortable with the 50% structural gross margin.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

So even with the higher growth and depreciation, Gokul is asking are we still comfortable with a 50% gross margin.

Wendell Huang - Taiwan Semiconductor Manufacturing Company Limited - VP & CFO

Yes. 50% gross margin as a long-term target, we think it's reasonable and achievable.

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. Operator, in the interest of time, I think we'll take the last 2 callers.

Operator

Okay. The next caller is Randy Abrams, Crédit Suisse.

Randy Abrams - Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department

Okay. Yes, my first follow-up on U.S. and China, your overseas sites. For the U.S. site, you bought 1,100 acres. Do you have plans to build out a mega fab or potential to build out multi-phase of 20K wafers? And then for the China business post-Huawei, where it's down to single digits, how's your outlook for the China and also expansion of the China from 20K?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Okay. So Randy, your first question is regards to capacity and fab expansion overseas. So Randy is asking in the U.S., in Arizona, we target 20K, do we -- will we continue to build it out into a mega fab type of site. And he also wants to know in China, and I guess you're referring to Nanjing, do we have plans to further expand the capacity in Nanjing. Is that your question, correct, Randy?

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Yes, that's the question, just the outlook to rebound China just post-HiSilicon, where it's down to mid-single-digit contribution.

Mark Liu - *Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board*

Yes, this is Mark. Let me take your question. Yes, we recently acquired a big piece of land in Phoenix, 1,100 acres. Definitely, that was the long-term plan to have a mega-scale production sites. But currently, our plan is only work on the Phase 1 production and targetting 2024 with 20,000 wafer per month. And we'll -- going forward, we'll see according to the market condition and the cost economics and provided by the government support to mend the cost differences to decide the next steps.

On China, yes, we do have plan to continue to expand in China. But of course, the business in China at leading edge will -- does have a reset. But we do expect the demand in China will continue, and we will gradually, accordingly increase our capacity in Nanjing.

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay. Okay. Great. And my second question is if you could give -- I think you gave first quarter, but the full year growth for each of the platforms. And also for the backend, where you're doubling CapEx, what's leading that investment between the InFO, CoWoS, SoC in growth outlook for backend?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Randy is asking about 2021 growth, first, growth outlook by platform and then growth outlook by the backend; and then between the backend, InFO, CoWoS, by segment.

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

Okay. Randy, for 2021 by platform, we think HPC and automotive growth will be higher than the corporate average growth. Smartphone and IoT will be similar to the corporate average growth in U.S. dollar terms. In terms of our backend business, we expect it to grow slightly higher than the corporate in 2021. We do not disclose details within the back-end business.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay?

Randy Abrams - *Crédit Suisse AG, Research Division - MD and Head of Taiwan Research in the Equity Research Department*

Okay.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

All right. Thanks, Randy.

Operator

The next one, we have Sebastian Hou from CLSA.

Sebastian Hou - CLSA Limited, Research Division - Research Analyst

Yes. Two follow-up. The first one is to follow on Mark's comments that, yes, I think Mark previously said that the company has noted 5-nanometer demand also stronger than you thought 3 months ago. So I would be curious about if you can give us more details about which applications are you seeing a stronger-than-expected demand.

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board

High-performance computing.

Sebastian Hou - CLSA Limited, Research Division - Research Analyst

So for high-performance computing, is it the typical, those consumer electronics or is more typical HPC or blockchain related?

Jeff Su - Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations

Sorry, I didn't hear the -- we didn't hear the last part, Sebastian.

Sebastian Hou - CLSA Limited, Research Division - Research Analyst

Yes, I'm sorry. I was saying that for the HPC part, is it more related to your existing customers or more related to the blockchain-related products?

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board

Let me add a little bit color on this. High-performance computing, as Wendell just said, will be the major growth driver of our business. And this field is currently under exciting changes. As the high-performance computing's architectures, as you know, from different customers, everybody is striving to get the best performance with different architectures. So many, many -- many more players are getting into this field. So we see a stronger innovation is coming our way on N3 as well as on N5, yes.

Sebastian Hou - CLSA Limited, Research Division - Research Analyst

Okay. Okay. That's good.

Mark Liu - Taiwan Semiconductor Manufacturing Company Limited - Chairman of the Board

Cryptocurrency -- it's not on cryptocurrency, Sebastian. We don't count on that, but we support that, yes.

Sebastian Hou - CLSA Limited, Research Division - Research Analyst

Okay. Yes, that's fair. And the second follow-up is a follow-up to Wendell's comments on that I think in this year is, based on the guidance, that we will see the CapEx intensity to go up to 50%. So if we calculate -- based on the revenue guidance, if we do some calculations, which means the free cash flow for this year could be -- the growth will likely to be -- will be pretty small or even flat, depends on how things go, but definitely not as strong as past few years. So my question is that is the company still sticking to the dividend policy that is 70% of free cash flow?

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay. So Sebastian, your question is then in looking at the CapEx, looking at our revenue guidance, the capital intensity this year being about around 50%, then the free cash flow growth may slow this year. So what is the outlook for the dividend? Do we still use 70% of free cash flow as the cash dividend formula?

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

Right. Sebastian, our dividend policy has 2 parts, 70% of free cash flow but not to be lower than the previous period. So we remain committed to a sustainable and steadily increasing cash dividend. During the periods of higher investments, the focus will be more on sustainable. And as we harvest the growth, the focus will be on steadily increasing.

Sebastian Hou - *CLSA Limited, Research Division - Research Analyst*

Okay. So given that you're paying the -- the investor is getting the dividend in this quarter, which is the earnings you made like 3 quarters earlier, so if we do the calculation simulation, which means that in the next 24 months, the investor will probably still getting the TWD 2.50 per quarter. Is that a fair calculation assumption?

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

At least. At least.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

Okay?

Sebastian Hou - *CLSA Limited, Research Division - Research Analyst*

Okay.

Jeff Su - *Taiwan Semiconductor Manufacturing Company Limited - Director of Investor Relations*

All right. Thanks, Sebastian. Okay. Thank you, everyone. This concludes our Q&A session.

Before we conclude today's conference, please be advised that the replay of the conference will be accessible within 4 hours from now. The transcript will become available 24 hours from now, both of which will be available through TSMC's website at www.tsmc.com.

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

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