PUBLIC

U.S. Department of Commerce

Request for Public Comment on the Risks in the Semiconductor Supply Chain

Docket No. 210915-0189

This is a public version of ASML's submission. A business confidential version is being submitted simultaneously. In this submission, business confidential portions have been redacted.

I. Introduction

ASML, a world leader in semiconductor lithography technology and systems, is a multinational company headquartered in the Netherlands, but with a significant presence across the United States, with facilities in Arizona, California, Connecticut, Idaho, New York, Oregon, Texas, and Virginia. Components, modules and software for ASML's lithography systems are developed and produced by suppliers all over the world, with major suppliers in the United States, Germany and Japan.

ASML has been a longtime investor in the semiconductor industry in the United States. Our U.S. operations total approximately 6,000 full-time employees with expansion plans at all major sites that service our U.S. customers. **In 2020, ASML invested nearly $1 billion in U.S. semiconductor R&D, and spent another nearly $1 billion on U.S. suppliers, strengthening the U.S. semiconductor ecosystem, expertise, and workforce.** Further, several large ASML customers – including Intel, Micron, Texas Instruments, GlobalFoundries, and IBM – are headquartered in the United States. Additionally, ASML international customers – TSMC and Samsung – have announced their intent to expand their manufacturing plants in the United States.

II. Background: Role of Lithography in the Semiconductor Ecosystem

A. ASML's Role in Semiconductor Product Supply Chain

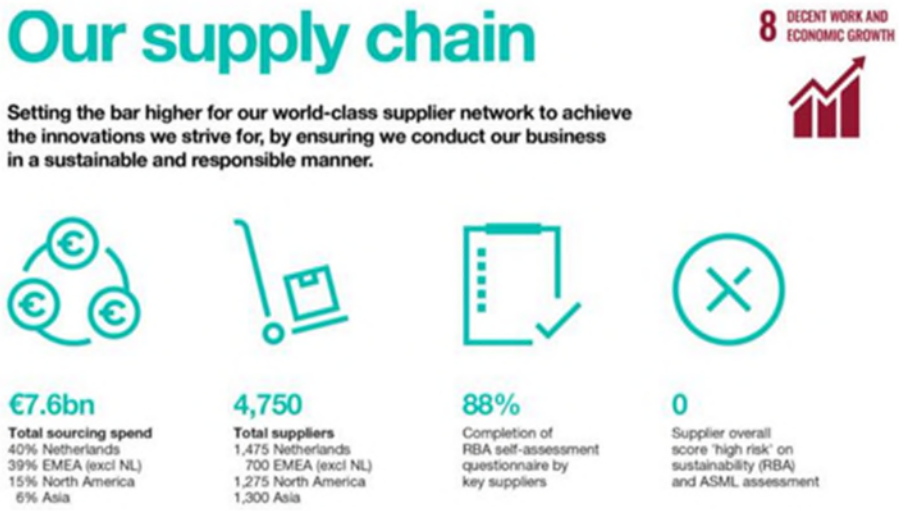
ASML's lithography systems use light to print the circuitry patterns on silicon wafers, a critical step in the chip manufacturing process. The patterns are ultimately linked together to create a single integrated circuit (a "chip") that can offer computing or memory functions. Lithography systems can be found in the factories of every major chipmaking company in the world.

ASML's systems are just one piece of a process involving numerous suppliers, software applications, materials, metrology and other semiconductor manufacturing equipment (SME). Every step and every machine in the process is important to the manufacturing process. Lithography systems use light to create a pattern in a photosensitive material (photoresist) on a wafer. This pattern forms the template against which the pattern is transferred onto the wafer surface by the etching or deposition of various materials. Chemical transfer processes then reveal the pattern features eventually creating a 3D circuit. This cycle of lithography patterning, pattern transfer and new pattern creation is repeated layer after layer, until the circuit design is finished.

This interdependency of semiconductor manufacturing equipment is a reason why the semiconductor industry supply chain is unique. Over decades, companies across different technical sectors and countries have worked together to purposefully create a global semiconductor ecosystem.

III. ASML's Supply Chain

With a model based on innovation and system integration, ASML relies heavily on suppliers. The thousands of components that comprise an EUV system are made up of more than 100,000 individual parts, which must be manufactured with precision and delivered from around the world. For example, mirrors manufactured in Germany take months to make, because the system requires the layers to be polished to an atom's thickness.



ASML's supply chain is an end-to-end function covering the entire ASML value chain by balancing demand & supply, securing product readiness, preparing suppliers for volume, supporting the global logistics infrastructure, and guaranteeing material quality & availability while enabling a reverse supply chain for re-use.

Despite the incredibly complex manufacturing process and the number of suppliers necessary to build a lithography system, ASML has managed, with the help of its partners in the supply chain, to keep its production going during the past challenging COVID-19 period. ASML has experienced supply chain-related delays and has relied on its buffer stock of suppliers and materials to meet customer demand. We will continue to work closely with our suppliers to respond to the challenges of the current worldwide material and component shortages and to secure our shipment plans for next year.

IV. Primary Disruptions and Bottlenecks

A. Semiconductor consumption

ASML designs and integrates the components, modules and software that comprise its products. ASML manufactures some of these components, but most are purchased, manufactured and assembled components, which contain semiconductor devices, from its supply chain of several thousand "build-to-print" and original equipment manufacturers and distributors worldwide. ASML is experiencing the same supply chain issues as every other company, that is, smaller inventories and longer lead times for part and systems deliveries.

B. [REDACTED]

1. The role of Semiconductor lithography technology

Semiconductor lithography technology, together with related technologies like etch and deposition, enable chipmakers to increase the number of transistors placed within a certain area

of a chip. This means the same number of transistors used in a previous generation of chip can be placed in a smaller area, freeing-up space for example for additional cores on a chip or a larger battery in a mobile phone. But semiconductor lithography technology does not enable special performance or capabilities for integrated circuits (ICs); indeed, chip performance depends far more directly on other elements, including chip design, heterogeneous device integration, and advanced packaging.

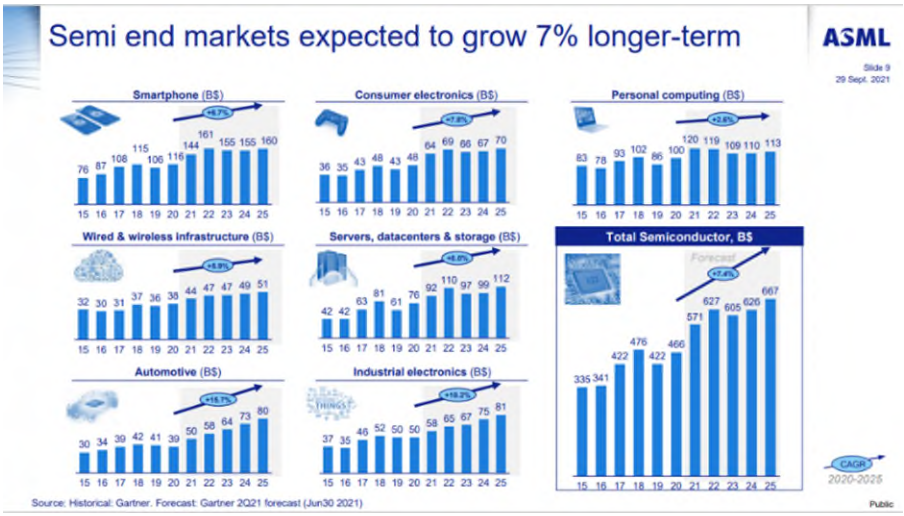
Further, semiconductor manufacturing's general contribution to the full stack of technology and advanced electronics has become more generic over time and its strategic significance has diminished as it has become more standardized, disaggregated and internationally dispersed.

2. A large portion of production of mature technology, the highest demand semi-conductor chips, is in Asia

Today, semiconductor manufacturing is driven much more by economics rather than differentiated by applications or technology levels. Large volume, high-yield and low cost are the principal drivers for semiconductor manufacturing equipment.

[REDACTED]

According to Gartner, the highest demand growth for semiconductors are advanced manufacturing and automotive chips. Indeed, in the third quarter of 2020, automotive sales recovered faster than predicated, and since then, automakers have faced a chip shortage.[1] [2]



[REDACTED]

[1] *See D. Howley, What the Chip Shortage Means for the U.S. Economy, Yahoo Finance, Apr. 22, 2021, referring to Goldman Sachs Note.*

[2] *See* B. Vigliarolo, *Gartner: 2020 Woes Were No Obstacle for Semiconductor Market Growth*, TechRepublic, Apr. 12, 2021; *see also*, Press-Release, Gartner, *Gartner Says Worldwide Semiconductor Revenue Grew 10.4% in 2020* (Apr. 12, 2021).

Finally, the capital investments made to move computing and storage to the cloud and digitize operations are likely to only increase over time, fueling further demand for semiconductors, particularly those at the top end of the spectrum.

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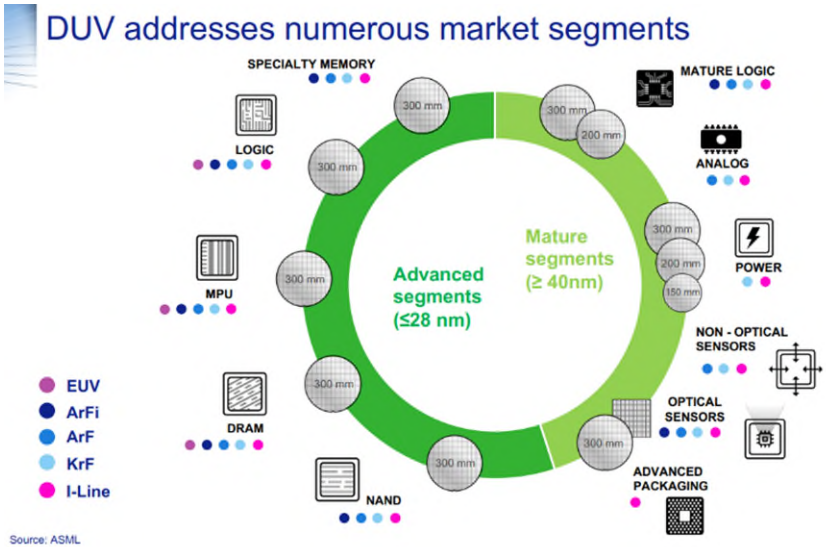


V. Steps ASML is Taking to Increase Manufacturing Capacity

ASML has taken steps to help semiconductor manufacturers alleviate the semiconductor shortage by implementing productivity upgrades on installed lithography systems, shortening production cycle time and increasing manufacturing capacity.

We expect to increase unit output, but are reliant on manufacturing capacity additions in our supply chain.

The actions in our supply chain to increase output have different time horizons to materialize, but we expect to see an impact of these actions starting this year and extending into next year.

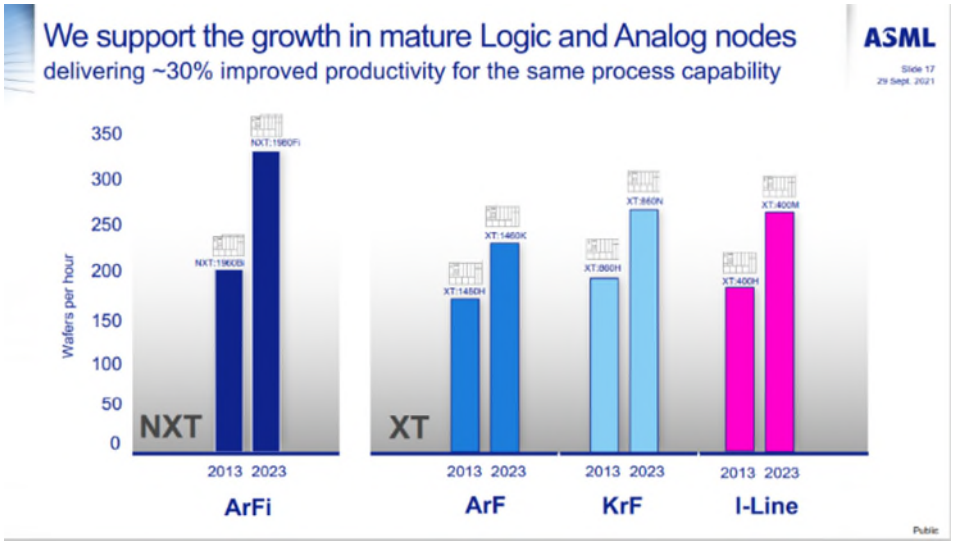
We are actively working with our supply chain partners to increase our capacity next year, and the final output and mix will depend on our supply chain progress, although we currently believe we should be able to reach our 2021 shipment plan output.

A. Increasing efficiency of existing install space per square foot of cleanroom space

To address the semiconductor shortage, semiconductor manufacturers globally need to increase their wafer output per square foot of cleanroom space available. Increasing sales of semiconductor lithography equipment can help achieve that goal. [REDACTED]

[REDACTED]

EUV systems play an important role in affordable manufacturing. ASML is planning to increase our EUV lithography system output, which will help chipmakers meet increasing demand for chips.



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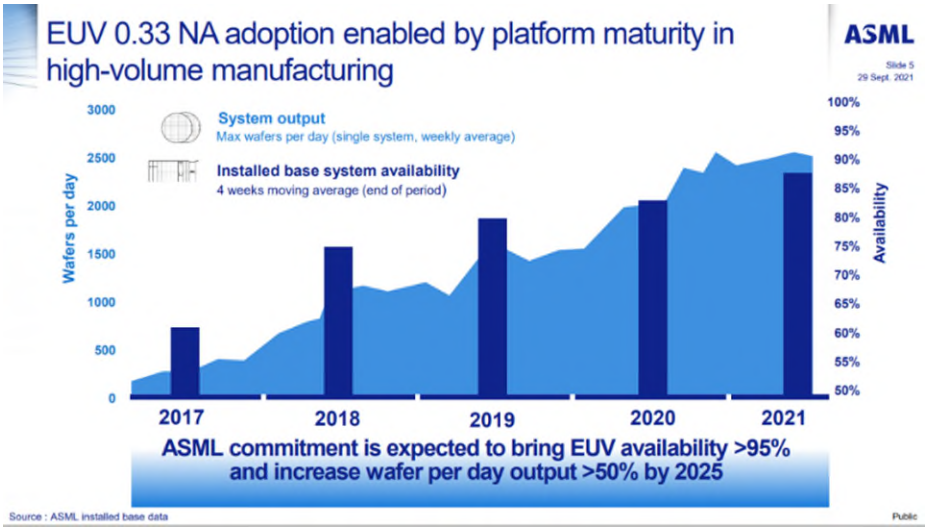
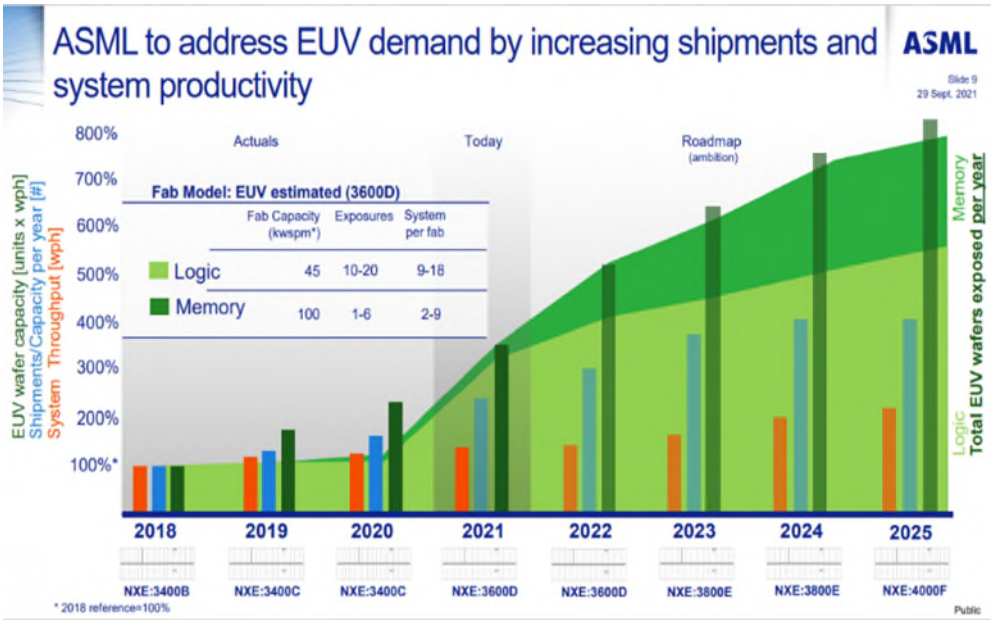


We recommend that the Department of Commerce consider U.S. and global construction lead times for cleanroom space as they seek to address the semiconductor shortage**.**

B. In order to face the increased demand, ASML Is Piloting a Program of Installing and Qualifying Machines at Customer's Locations.

In order to support the strong demand in DUV lithography, the workhorse of the industry, ASML is shortening the production cycle time for its DUV products. Through this program, ASML is allowing some assembly, qualification and calibration to occur **on the customer site**, while balancing manufacturing risks to ensure that ASML is delivering a high quality machine.

[REDACTED]



VI. Conclusion

ASML is taking bold action to increase production of semiconductor lithography machines to address demand from customers across the globe.

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Thank you for providing this opportunity to comment.

Sincerely,

Maryam Khan Cope
Head of Government Affairs
ASML US LLC