November 8, 2021

Subject: GlobalFoundries Response to Notice of Request for Public Comments on Risks in the Semiconductor Supply Chain [Docket No. BIS-2021-0036]

Background on GlobalFoundries

GlobalFoundries is one of the world's leading semiconductor foundries. We manufacture complex, feature-rich integrated circuits that enable billions of electronic devices that are pervasive throughout nearly every sector of the global economy. As the only scaled pure-play foundry with a global footprint that is not based in China and Taiwan, we help customers mitigate geopolitical risk and provide greater supply chain certainty. We provide differentiated foundry solutions in our core markets of Smart Mobile Devices, Home and Industrial IoT, Communications Infrastructure & Datacenter, Automotive and Personal Computing.

Since our founding in 2009, we have invested over $23 billion in our company to build a global manufacturing footprint with multiple state-of-the-art facilities across three continents. We focus on feature-rich devices that include digital, analog, mixed-signal, radio frequency, ultra-low power and embedded memory solutions that connect, secure and process data, and efficiently power the digital world around us.

We currently operate five manufacturing sites in the following locations: Dresden, Germany; Singapore; Malta, New York; Burlington, Vermont; and East Fishkill, New York. We are one of the most advanced accredited foundry providers to the U.S. Department of Defense and can extend this high-assurance model to serve commercial customers and to enhance supply chain security and resilience at a time when they are becoming more critical to national and economic security. Since foundry production is concentrated in China and Taiwan, we believe our global manufacturing footprint is a key differentiator.

Semiconductor Megatrends: The Pervasive Semiconductor Market

Historically, processor-centric compute was the foundation of the semiconductor industry, and technological innovation in end products was driven by an evolution to smaller feature sizes and greater processing capability per unit produced. This was appropriate when narrow application requirements were centered on raw processing power and led to a cyclical industry predominantly focused on highly digital, compute-oriented verticals.

Today, with ever-increasing demand for mobile applications, technology megatrends including internet of things ("IoT"), 5G, cloud, artificial intelligence and next-generation automotive are reshaping the global economy and driving a new golden age for semiconductors—a market that is expected to grow to more than $1 trillion by the end of this decade, from close to $0.5 trillion in 2021. These trends are driving robust feature sets such as wireless connectivity, low power and thermal efficiency. In addition, virtually all electronic systems require a combination of compute capability and features such as digital, analog, mixed-signal, RF and embedded memory to enable

breakthrough functionality across wide-ranging end markets and applications. The ICs that serve these applications comprise what we at GF call the “pervasive semiconductor market” – the market at nodes above 10nm process technology.

The pervasive semiconductor market represented 73% of the total semiconductor foundry market, as well as 33% of the total semiconductor foundry capital expenditure in 2020. This segment is driving breakthrough innovation across broad applications such as longer battery life for mobile devices, always-on access to connected devices, high data throughput for work from home, streaming, gaming and augmented reality / virtual reality (“AR/VR”), powerful sensing for safe and comfortable autonomous driving and embedded memory for secure cryptographic credentials. Unlike processor-centric compute devices, pervasive semiconductor performance is driven more by circuit design, specialty materials and specialized manufacturing processes. Innovation in pervasive ICs is measured in terms of precision, accuracy, bandwidth, efficiency and sensitivity.

The Acceleration of Demand: COVID-19 and the Chip Shortage

While technology megatrends have been driving increased semiconductor demand, the COVID-19 pandemic accelerated demand trends already underway, including remote work, learning, and medicine, driving sustainable demand for electronic devices such as networking and infrastructure to maintain a distributed environment. As a result, demand has outstripped supply across most of the semiconductor industry. Meanwhile, other industries, such as the automotive sector, which were initially hard-hit by the pandemic, began to halt new purchases and depleted existing inventories of semiconductor chips.

As some parts of the world have started to re-open, these impacted sectors have seen significant increases in new demand, which, when coupled with underlying megatrends not related to the COVID-19 pandemic, such as the electrification of vehicles, have resulted in a significant imbalance between demand and supply. Although the supply-demand imbalance is expected to improve over the medium-term, the semiconductor industry will require a significant increase in investment to keep up with demand, with total industry revenue expected to double over the next eight to ten years.

In particular, due to the megatrends described above, the world suddenly faced an explosion of demand in the pervasive semiconductor market. Thus, while R&D and investments over the last few decades focused on single-digit nanometer chips and the endless pursuit of Moore’s Law, feature-rich chips in the pervasive market have quietly become the driver of technological and economic growth. Thus, it is the pervasive market segment – not the leading edge – where the chip shortage and ongoing supply chain risk and uncertainty is most acute.

The trends are having a severe impact on the automotive sector. Initially at the start of the COVID-19 pandemic, the automotive industry, understandably, forecasted lower sales. This meant automotive part suppliers would be buying fewer chips and demand would be lower. The semiconductor industry shifted surplus automotive manufacturing

capacity to other business lines experiencing an increase in demand, such as the chips used in smartphones, laptops, tablets and other mostly mobile devices that were seeing an increase in sales as more people were working and learning from home and needed to be connected to their workplace or schools. These other non-automotive, non-industrial, mobile centric “sockets” also tend to be higher in volume, as there are more phones than cars and more laptops than industrial or healthcare devices, and shorter in life in contrast to automotive/industrial sockets which run for years. Thus, it was a less risky, and more economically rational decision for fabless design companies to allocate towards these higher volume, shorter cycle products. It is important to note that foundries, like GF, rarely have visibility into these customer allocation decisions. After automotive sales declined in 2020, automotive manufacturing fell to the back of the line. Automotive sales then snapped back much stronger than expected, representing a 50% increase in demand year-over-year.

Historically, the automotive companies were disconnected from the foundries that produced the chips that are incorporated into vehicles. The car makers were focused on first and second-tier suppliers – chips were much further down the supply chain. By necessity, that dynamic has started to change. The automotive industry is now rethinking its strategic sourcing relationships, and GF is closely engaged with nearly all the leading manufacturers to reimagine the supply chain for chips. Automotive companies are coming closer to us as sole-source partners with longer term agreements.

In addition, today there is growing demand for a different mix of semiconductors in cars. As the market moves toward electric vehicles, computing has become the heart of the vehicle, and that computing requires semiconductors. Electronic features managing the battery, running the electric motors, brakes, lights and other systems, as well as features such as entertainment and heated seats, require specialized and differentiated chips. These are exactly the type of relevant chips that GF makes – not the bleeding-edge, attention-grabbing chips that TSMC, Intel and Samsung disproportionately focus on.

Fixing It

While leading-edge single-digit nanometer chips are important, the industry needs to re-balance and re-focus on the larger, pervasive market, which is also the portion of the market that is associated with the chip shortage.

More of that pervasive market capacity needs to be built in the United States to meet U.S. demand. Further, the investment in new U.S. fabs must make economic sense for the foundry companies that serve the pervasive market. This realignment is already starting to happen, and these trends need to continue. For example, prices in the pervasive sector have started to rise, and foundry customers are beginning to co-invest with the foundries in creating additional capacity. Governments, which historically have targeted their subsidy programs at the leading-edge, need to re-focus a significant portion of their programs to accelerate the creation of additional capacity in the pervasive sector.

Creating a level financial playing field is important to incentivizing U.S. production, ensuring access to supply, and shoring up supply chain resiliency. Long term supply chain security requires sustained demand. The United States must be bold in promoting and protecting domestic manufacturing, which has plummeted from 37% in 1990 to 12% today in terms of output.

Strong, sustained demand can be achieved through government policies that make the United States the preferred country in which to operate, preserve U.S. technological advantages, and integrate assured supply into critical infrastructure.

The United States can become the preferred country in which to operate through strategic government investments that bolster domestic chip production in the pervasive sector, such as through Creating Helpful Incentives for Producing Semiconductors for America (CHIPS) Act funding, and investment tax credits for semiconductor manufacturing. By enacting the CHIPS Act, Congress recognized the critical role the U.S. semiconductor industry plays in America's future. Now, the Administration and Congress must fully fund the semiconductor manufacturing and research provisions authorized by the CHIPS Act to strengthen America's global leadership in chip technology for years to come. The Senate took a significant step toward this goal by passing the U.S. Innovation and Competition Act (USICA). The House should follow suit and send legislation to the President's desk to be signed into law.

The United States can preserve its technological leadership and bolster domestic semiconductor manufacturing through export control policy that considers and assesses anticipated effects on the industrial base, including with respect to supply chain security.

The U.S. government can strengthen the semiconductor supply chain by establishing and driving the adoption of security requirements for domestic critical infrastructure. Trusted supply chain and operational security standards established by the U.S. government should incorporate best practices that reduce the likelihood of unauthorized access, tampering, defects, and vulnerabilities resulting from nefarious actors, potential adversaries, or natural disasters. These standards should assess and address risks and increase security across products and processes in the supply chain through proven methods. These standards should immediately adopt available and proven techniques, leveraging robust parameters required under the ITAR and EAR and under Department of Defense Trusted accreditation, including classified flows. Before incorporating and implementing security requirements for critical infrastructure, the government should coordinate revisions to standards with industry to ensure techniques demonstrably add security protections.

GF Capacity Expansion

GF is ready to do its part, put shovels in the ground and add jobs to increase capacity and put an end to the supply-demand imbalance. GF is investing to increase capacity for our customers globally, including through previously announced capacity expansions in the United States and Singapore.

The economics of building a new fab in the United States, which would directly and indirectly create thousands of jobs, develop a robust domestic semiconductor ecosystem, and enhance strategic, economic, and national security, depends on U.S. government actions, including those discussed above.

Conclusion

GF stands ready to build out additional capacity at its existing U.S. fabs in the near term. In the longer term, public private partnerships and U.S. government actions are key to supporting the establishment of a new GF fab in the United States. Our success in these endeavors depends on a level playing field and we urge the U.S. government to promote and protect the U.S. semiconductor industry. Through this support, and with American innovation and hard work, the United States can regain semiconductor manufacturing leadership by 2030.