Section 57 of the Competition Act (Cap. 50B)

Grounds of Decision issued by the Competition and Consumer Commission of Singapore in relation to the proposed acquisition by GlobalWafers Co., Ltd. of Siltronic AG pursuant to section 57 of the Competition Act

Date: 11 May 2021

Case number: CCCS 400/140/2021/001

Confidential information in the original version of this Decision has been redacted from the published version on the public register. Redacted confidential information in the text of the published version of the Decision is denoted by [✂].

TABLE OF CONTENTS

I. INTRODUCTION

1. On 26 February 2021, GlobalWafers Co., Ltd. ("**GWC**") filed a notification pursuant to section 57 of the Competition Act (Cap. 50B) (the "**Act**") for a decision by the Competition and Consumer Commission of Singapore ("**CCCS**") as to whether the proposed acquisition by GWC of all or a substantial majority of at least 50% of the issued share capital and voting rights in Siltronic AG ("**Siltronic**") (collectively, the "**Parties**") by way of a voluntary public takeover bid under German law (and potentially additional share purchases) (the "**Proposed Transaction**") will infringe the section 54 prohibition, if carried into effect.

2. In reviewing the Proposed Transaction, CCCS contacted 20 competitors[1] and 26 customers who purchase silicon wafers[2] (collectively referred to as "**third parties**"). CCCS also sought information from [✂], as part of its review of the Proposed Transaction. Of the third parties contacted, 18 replied[3], of which 17 provided substantive responses[4]. While a majority of the third parties who responded indicated that they were neutral or have no competition concerns about the Proposed Transaction, four (4)[5] indicated that they had competition concerns about the Proposed Transaction.

3. One area of concern raised was that there might be insufficient capacity, particularly in the supply of 300mm polished and 300mm epitaxial wafers, to cater to the increasing demand for semiconductor devices in the next few years, and the Proposed Transaction may exacerbate the situation, and may lead to higher prices post-transaction as the major global suppliers of silicon wafers are not able to expand capacity in a short period of time.

4. At the end of the consultation process and after evaluating all the information including the Parties' submissions and the concerns raised by third parties, CCCS, on balance, concludes that the Proposed Transaction, if carried into effect, will not infringe section 54 of the Act.

II. THE PARTIES

(a) The Acquirer

[1] Competitors: [✂]
[2] Customers: [✂]
[3] [✂]
[4] All except [✂].
[5] [✂]

GWC

5. GWC is a Taiwanese company registered in Hsinchu City, Taiwan. The largest shareholder of GWC, and its ultimate parent is Sino-American Silicon Products Inc ("**SAS**", including all other subsidiaries "**SAS Group**").[6] Founded in 1981, the SAS Group is a global manufacturer and supplier of wafers, and its main products include semiconductor wafers (which is GWC's business), solar wafers, cells and modules.[7]

6. GWC manufactures and supplies a broad range of wafers to the semiconductor industry.[8] In Singapore, GWC is primarily active as a supplier of silicon wafers for the semiconductor industry. GWC does not have any manufacturing activities but has a sales office in Singapore.[9]

7. The total (group) worldwide revenue of GWC was NT$58.094 billion (approximately S$2.75 billion) in the financial year ended 31 December 2019. The total (group) Singapore revenue of GWC for the same financial year was [✂].[10]

(b) The Target

Siltronic

8. Siltronic is a German company registered in Munich, Germany. The largest shareholder of Siltronic, and the former ultimate parent is Wacker Chemie AG ("**Wacker Chemie**").[11] Founded in 1914, Wacker Chemie is one of the leading suppliers of polysilicon, the primary input material for the production of silicon wafers.[12]

9. Siltronic develops and manufactures silicon wafers.[13] In Singapore, Siltronic is primarily active as a manufacturer and supplier of silicon wafers for the semiconductor industry.[14] Siltronic has a manufacturing facility and a sales office in Singapore.[15]

---

[6] Paragraph 7.1 of Form M1.
[7] Paragraph 10.5 of Form M1.
[8] Paragraph 10.7 of Form M1.
[9] Paragraph 10.12 of Form M1.
[10] Paragraph 13.1 of Form M1.
[11] Paragraph 7.3 of Form M1.
[12] Paragraph 36.3 of Form M1.
[13] Paragraph 10.9 of Form M1.
[14] Paragraph 10.13 of Form M1.
[15] Paragraph 10.13 of Form M1.

10. The total (group) worldwide revenue of Siltronic was €1.270 billion (approximately S$2.051 billion) in the financial year ended 31 December 2019. The total (group) Singapore revenue of Siltronic for the same financial year was [✂].[16]

III. THE PROPOSED TRANSACTION

Nature of the Proposed Transaction

11. The Proposed Transaction will involve the acquisition by GlobalWafers GmbH, a wholly-owned indirect subsidiary of GWC incorporated under the laws of Germany (the "**Acquirer**"), of all or a substantial majority of at least 50% of the issued share capital and voting rights in Siltronic by way of a voluntary public cash takeover offer ("**Takeover Offer**") under German law (and potentially additional share purchases).[17]

12. GWC, the Acquirer and Wacker Chemie have entered into an Irrevocable Undertaking Agreement ("**IUA**") on 9 December 2020. Pursuant to the IUA, Wacker Chemie is obliged to accept the Takeover Offer in respect all of the shares Wacker Chemie holds in Siltronic (amounting to 30.83% of Siltronic's shares). Wacker Chemie is also obliged not to challenge or withdraw its acceptance of the Takeover Offer unless the terms of the Takeover Offer are amended.[18] The completion of the Takeover Offer is subject to a minimum acceptance threshold of currently 50% of Siltronic's issued and outstanding ordinary share capital and as at 3 March 2021, GWC has achieved an acceptance level of 70.2732% of Siltronic's shares.[19]

13. In addition, the Parties have entered into a Business Combination Agreement ("**BCA**") on 9 December 2020. The BCA outlines the principal terms and conditions of the Proposed Transaction as well as the mutual intentions and understandings of the Parties with regard thereto, the future organisational and corporate governance structure as well as the business strategy to be pursued by the combination of the Parties' businesses.[20]

Merger under section 54 of the Act

[16] Paragraph 13.2 of Form M1.
[17] Paragraphs 1.1 and 11.1 of Form M1.
[18] Paragraph 11.3 of Form M1; paragraph 2.1 of Annex 5 of Form M1.
[19] Paragraph 2.1 of GWC's 8 March 2021 response to CCCS's 1 March 2021 Request For Information ("**RFI**").
[20] Paragraph 11.4 of Form M1; preamble part D of Annex 6 of Form M1.

14. Based on GWC's submissions, CCCS is of the view that the Proposed Transaction constitutes a merger under section 54(2)(b) of the Act as GWC (through GlobalWafers GmbH) will acquire all or a substantial majority of at least 50% of the issued share capital and voting rights in Siltronic, and will have sole control over Siltronic. CCCS also notes that as at 3 March 2021, GWC has achieved an acceptance level of 70.2732% of Siltronic's shares to be acquired.[21]

IV. COMPETITION ISSUES

15. GWC submitted that the Parties overlap in the supply of silicon wafers in Singapore.[22] Silicon wafers form the basis of almost all semiconductor devices, such as processors or memory chips and while the key stages of the semiconductor value chain include chip design, fabrication and assembly,[23] GWC submitted that the Parties' activities are only limited to the supply of primarily silicon wafers as input materials for semiconductor device fabricators at the fabrication stage, and the Parties are not active in the semiconductor device design or assembly stages.[24]

16. GWC also submitted that there are no goods or services in respect of which GWC and Siltronic are potential competitors in Singapore.[25] While the Parties also supply ingots[26] worldwide, both GWC and Siltronic [✂] turnover in the supply of ingots to Singapore in 2018, 2019 and 2020 (Q1 to Q3) was [✂].[27]

17. GWC also submitted that the Proposed Transaction will not give rise to or strengthen any vertical relationship as the Parties are not active in any upstream, downstream or related markets of silicon wafer manufacturing.[28] While Siltronic's former parent and the largest shareholder, Wacker Chemie is amongst the leading supplier of polysilicon, the primary input material for the production of silicon wafers, the structural link will be severed through the Proposed Transaction.[29]

---

[21] Paragraph 2.1 of GWC's 8 March 2021 response to CCCS's 1 March 2021 RFI.
[22] Paragraph 15.1 of Form M1.
[23] Paragraph 18.1 of Form M1.
[24] Paragraphs 18.2 and 18.3 of Form M1.
[25] Paragraph 17.1 of Form M1.
[26] The first step in silicon wafer manufacturing is growing an ingot. Ingots that have the required diameter are further processed into silicon wafers (the final end-product). Footnote 4 of Annex 1 of GWC's 26 February 2021 response to CCCS's 4 February 2021 RFI.
[27] For completeness, GWC submitted that Siltronic had [✂] sales of scrap ingots in Singapore between 2018 and 2020 (Q1 to Q3) while GWC [✂]. Paragraphs 5.1 and 5.2 of Annex 1 of GWC's 26 February 2021 response to CCCS's 4 February 2021 RFI.
[28] Paragraphs 36.1 and 36.2 of Form M1.
[29] Paragraph 36.3 of Form M1.

18. Given the above, CCCS has focused its assessment on whether the Proposed Transaction will lead to non-coordinated and/or coordinated effects that would substantially lessen competition in relation to the supply of silicon wafers.

V. COUNTERFACTUAL

19. GWC submitted that, in the absence of the Proposed Transaction, the Parties will continue to operate separately and independently, and will compete with a multitude of competitors.[30] However, there will be a loss in opportunity for the Parties to rationalise and achieve the efficiencies that are likely to arise from the Proposed Transaction.[31]

20. In the absence of third party feedback or evidence suggesting otherwise, CCCS considers the appropriate counterfactual to be the prevailing conditions of competition prior to the Proposed Transaction. Absent the Proposed Transaction, the Parties will continue their business operations independently and compete in the supply of silicon wafers in Singapore.

VI. RELEVANT MARKETS

(a) Product Market

Segmentation by different types of silicon wafers

21. In general, third party feedback indicates that there is a low degree of demand-side substitutability between the different types of silicon wafers. CCCS understands that the type of wafer purchased by customers is pre-defined by the technical specifications, the type of end-application/device as well as the process flow.[32] Moreover, each wafer type has its own unique electrical characteristics, and can only be used for particular application(s).[33] The wafer type procured is also influenced by the needs and requirements of the downstream end-customer who uses the customers' products.[34] A fresh and separate qualification process to ensure that new potential suppliers meet the customers' internal quality standards

[30] Paragraph 23.1 of Form M1.
[31] Paragraph 23.1 of Form M1.
[32] Paragraph 9 of Notes of Call with [✂] dated 18 March 2021; [✂]'s 17 March 2021 response to Question 9 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 9 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 11 March 2021 response to Question 11 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 11 of Notes of Call with [✂] on 10 March 2021; Paragraph 11 of Notes of Call with [✂] on 11 March 2021.
[33] [✂]'s 10 March 2021 response to Question 11 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 11 March 2021 response to Question 11 of CCCS's 3 March 2021 Invitation to Comment.
[34] Paragraph 9 of Notes of Call with [✂] dated 12 March 2021.

is also required for each type of wafer before it can be purchased and used, and the qualification process takes time.[35]

22. From the supply-side, CCCS notes that most suppliers currently supply the traditional silicon wafers (such as polished and epitaxial wafers) while a limited number of suppliers (including GWC but excluding Siltronic) also supply other types of wafers, e.g., annealed, diffused, Silicon-on-insulator ("**SOI**") and Silicon Carbide ("**SiC**") wafers.[36] However, CCCS has received feedback from a competitor indicating that while it is possible to modify an existing wafer fabrication plant to commence production of a different type (and size) of silicon wafer, it is significantly difficult to do so due to the cost and time involved for such modifications.[37] The production tools are different[38] and additional machineries and wafer fabrication plants may also be needed to produce different types of wafers.[39] Third party feedback also indicates that it would depend on whether the silicon wafer manufacturers have the know-how[40], and the complexity varies for different wafer types[41]. Third party feedback further indicates that it would be difficult for manufacturers who do not currently produce a specific wafer type to do so as they would need to develop the capabilities from scratch[42] and meet customers' specifications[43]. In addition, depending on the type of end-application, the time to market is long as customers would likely need at least 12 months to 36 months to qualify a new wafer type.[44]

23. Notwithstanding the above, CCCS notes that specifically for polished and epitaxial wafers, switching between supplying polished and epitaxial wafers is theoretically possible. Third party feedback corroborates GWC's submissions that manufacturing epitaxial wafers only requires an additional processing step from

---

[35] Paragraph 11 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 11 March 2021 response to Questions 11 and 15 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 25 of CCCS's 3 March 2021 Invitation to Comment.
[36] Paragraph 2.1 of GWC's 15 March 2021 response to CCCS's 10 March 2021 RFI.
[37] [✂]'s 17 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment.
[38] [✂]'s 10 March 2021 response to Question 9 of CCCS's 3 March 2021 Invitation to Comment.
[39] [✂]'s 17 March 2021 response to Question 9 of CCCS's 3 March 2021 Invitation to Comment.
[40] [✂]'s 10 March 2021 response to Question 19 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 12 of [✂]'s 10 March 2021 Response to CCCS's 3 March 2021 Invitation to Comment; [✂]'s 11 March 2021 response to Question 12 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 12 of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 Invitation to Comment.
[41] Paragraph 12 of Notes of Call with [✂] dated 12 March 2021.
[42] Paragraph 12 of Notes of Call with [✂] dated 12 March 2021.
[43] [✂]'s 29 March 2021 response to Question 12 of CCCS's 3 March 2021 Invitation to Comment.
[44] [✂]'s 11 March 2021 response to Questions 12 and 25 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 25 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Questions 20 and 25 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 25 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 17 March 2021 response to Question 25 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 10 of Notes of Call with [✂] dated 11 March 2021; Paragraph 32 of [✂]'s 10 March 2021 response to CCCS's 3 March 2021 Invitation to Comment.

polished wafers, and in general, suppliers who supply polished wafers are able to supply epitaxial wafers as long as these suppliers have epitaxial reactors.[45] In this regard, CCCS notes that most major global suppliers besides the Parties have the capabilities to carry out the epitaxial silicon deposition in-house without outsourcing the process to third parties, if capacity is available. In the same vein, as long as capacity is available, suppliers of epitaxial wafers should be able to supply polished wafers since polished wafers are used as the base wafer for epitaxial wafers and suppliers would already have the necessary equipment to make the production switch.[46] That said, CCCS understands from a customer that in terms of mass production, it takes less time for suppliers to produce epitaxial wafers that meet customers' criteria as compared to polished wafers. To produce an epitaxial wafer, suppliers can simply apply the epitaxial deposition on a lower quality polished wafer. On the other hand, to supply polished wafers as a final product to customers, every step of the production process would need to be perfect in order to produce polished wafers that meet customers' requirements.[47] Therefore, this suggests that suppliers would still need to develop the technical capabilities required in order to switch from producing epitaxial wafers to polished wafers. Furthermore, third party feedback indicates that suppliers tend to not switch between the production of polished and epitaxial wafers, and vice versa, as there is a different demand segment for each wafer type.[48] Third party feedback received also suggests that suppliers would produce both polished and epitaxial wafers since generally, logic devices require epitaxial wafers and memory devices require polished wafers.[49]

24. Considering the above third party feedback on demand-side and supply-side substitution, CCCS is of the view that the product market definition may possibly be narrower than that submitted by GWC, i.e., all wafer types may not constitute a single product market. In this regard, CCCS had considered narrower markets based on the wafer types that the Parties overlap in, which are non-polished wafers, polished wafers and epitaxial wafers.

25. CCCS had focused its subsequent assessment on polished wafers and epitaxial wafers only, as CCCS considers that the effect of the Proposed Transaction on the supply of non-polished wafers would be insignificant. CCCS also did not receive any third party feedback to suggest concerns regarding the supply of non-polished

[45] Paragraph 18.7 of Form M1; Paragraph 12 of Notes of Call with [✂] dated 11 March 2021; Paragraph 12 of Notes of Call with [✂] dated 18 March 2021.
[46] Paragraph 12 of Notes of Call with [✂] dated 18 March 2021; Paragraph 12 of Notes of Call with [✂] on 11 March 2021.
[47] Paragraph 18 of Notes of Call with [✂] dated 18 March 2021.
[48] Paragraph 12 of Notes of Call with [✂] dated 18 March 2021.
[49] Paragraph 5(a) of [✂]'s 31 March 2021 response to CCCS's 27 March 2021 Invitation to Comment.

wafers, and CCCS also notes that none of the customers who provided feedback had purchased non-polished wafers.

Segmentation by different sizes of silicon wafers

26. For the supply of polished and epitaxial wafers, CCCS notes that the Parties overlap in the following wafer sizes: certain ranges of the small diameter wafer size (i.e., [✂]), 200mm and 300mm.

27. In relation to the small diameter wafer segment (i.e., 50mm to 150mm), CCCS notes GWC's submissions that it is not meaningful to split further the small diameter wafer segment as these wafers only account for a *de minimis* fraction of the overall market.[50] Moreover, Siltronic [✂].[51] CCCS also notes that the Parties' overlap in the small diameter wafer segment is [✂]. Accordingly, CCCS considers that the Proposed Transaction is unlikely to raise competition concerns with respect to the small diameter wafer segment and had therefore focused its assessment on whether the product market for polished and epitaxial wafers respectively, needs to be segmented further by the larger sizes i.e., between 200mm and 300mm.

28. From the demand-side, third party feedback indicates that customers generally do not view 200mm and 300mm silicon wafers as substitutes as customers are unable to switch between 200mm and 300mm once they have decided on a particular design for a specific technology or application which will utilise a particular wafer size.[52] As different equipment are required to manufacture products with a different silicon wafer size, customers indicated that it would be too expensive to make a switch between sizes after they had invested in a dedicated factory with manufacturing equipment for a particular size, e.g., 200mm or 300mm.[53] Different design processes are involved for different sizes, and suppliers would also have to undergo a fresh qualification process if there is a change in size.[54]

[50] Paragraph 1.5 of GWC's 15 March 2021 response to CCCS's 10 March 2021 RFI.
[51] Siltronic [✂].
Paragraphs 1.5 of GWC's 15 March 2021 response to CCCS's 10 March 2021 RFI.
[52] Paragraph 11 of Notes of Call with [✂] dated 9 March 2021; Paragraph 11 of [✂]'s 10 March 2021 Response to CCCS's 3 March 2021 Invitation to Comment.
[53] Paragraph 11 of Notes of Call with [✂] dated 9 March 2021; Paragraph 11 of [✂]'s 11 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 11 of Notes of Call with [✂] dated 10 March 2021; Paragraph 11 of Notes of Call with [✂] dated 12 March 2021; Paragraph 11 of Notes of Call with [✂] dated 11 March 2021.
[54] Paragraph 2 of Notes of Call with [✂] dated 9 March 2021; Paragraph 11 of Notes of Call with [✂] on 11 March 2021.

29. From the supply-side, CCCS has received feedback from third parties that suppliers may not find it easy to switch from producing 200mm to 300mm silicon wafers. In particular, third party feedback suggests that new entrants will typically establish their reputation and quality standards in 200mm silicon wafers first which relies on more mature technologies, before working their way up the value chain to produce 300mm silicon wafers, as it is generally more difficult to achieve uniformity on the wafer as the size of wafer increases.[55] Additionally, it is not viable for suppliers to switch from the production of 200mm to 300mm silicon wafers, and vice versa in their fabrication plants as the equipment would need to be retooled.[56] The lead time for such a switch from 200mm to 300mm silicon wafers, and vice versa, is estimated to be 18 to 24 months.[57] Large capital investment is also required for suppliers to establish manufacturing capabilities for a different wafer size.[58] Further, CCCS understands from a competitor that the ease of switching between sizes depends on whether the suppliers have the manufacturing techniques to produce that particular wafer size.[59]

30. Considering the above third party feedback on demand-side and supply-side substitution, CCCS is of the view that the product market definition may possibly be narrower than that submitted by GWC i.e., 200mm and 300mm may not constitute a single product market.

CCCS's conclusion on product market

31. In this case, considering the third party feedback received on demand-side and supply-side substitutability, CCCS is of the view that not all types and sizes of silicon wafers would constitute a single product market. As per paragraph 3.20 of the *CCCS Guidelines on Market Definition*, CCCS has defined the product markets on the basis of demand-side substitutability, and considered supply-side constraints when assessing potential entry. In this regard, for the purpose of its assessment, CCCS has considered each of the four (4) different types and sizes of silicon wafers which the Parties mainly overlap in, as a distinct product market, as follows:

[55] Paragraph 12 of Notes of Call with [✂] dated 9 March 2021.
[56] Paragraph 12 of Notes of Call with [✂] on 11 March 2021; Paragraph 10b of [✂]'s 10 March 2021 response to CCCS's 3 March 2021 RFI; Paragraph 10b of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 RFI.
[57] Paragraph 12 of Notes of Call with [✂] on 11 March 2021.
[58] Paragraph 12 of Notes of Call with [✂] dated 9 March 2021; [✂]'s 10 March 2021 response to Question 12 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 12 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 12 of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 Invitation to Comment.
[59] Paragraph 9 of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 Invitation to Comment.

(a) supply of 200mm polished wafers;
(b) supply of 200mm epitaxial wafers;
(c) supply of 300mm polished wafers; and
(d) supply of 300mm epitaxial wafers.

(b) Geographic Market

32. Customers that have a global presence typically adopt a global procurement strategy on a consolidated basis for multiple locations globally.[60] Similarly, feedback from competitors indicated that they supply silicon wafers globally and do not face significant geographical constraints, such as shipping costs and tariffs.[61] On a related note, CCCS observes that while GWC has a sales office in Singapore, it does not have any manufacturing activities in Singapore.[62]

33. In light of the above, CCCS is of the view that the relevant geographic market is the global supply of silicon wafers to customers worldwide.

(c) Overall Assessment on Relevant Market

34. Given the considerations set out above, CCCS is of the view that the relevant markets for the purpose of assessing the Proposed Transaction are:

(a) The global supply of 200mm polished wafers to customers worldwide;
(b) The global supply of 200mm epitaxial wafers to customers worldwide;
(c) The global supply of 300mm polished wafers to customers worldwide; and
(d) The global supply of 300mm epitaxial wafers to customers worldwide.

(collectively, the "**Relevant Markets**")

VII. MARKET STRUCTURE

(a) Market Shares and Market Concentration

[60] Paragraph 14 of Notes of Call with [✂] dated 9 March 2021; Paragraph 14 of [✂]'s 10 March response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 14 of [✂]'s 10 March 2021 Response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 14 of Notes of Call with [✂] on 12 March 2021; Paragraph 14 of Notes of Call with [✂] on 11 March 2021; Paragraph 14 of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 14 of Notes of Call with [✂] on 10 March 2021; Paragraph 14 of [✂]'s 29 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 14 of Notes of Call with [✂] on 11 March 2021.
[61] Paragraph 12 of [✂]'s 10 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 12 of [✂]'s 17 March 2021 Response to CCCS's 3 March 2021 Invitation to Comment.
[62] Paragraph 10.12 of Form M1.

35. CCCS notes that the combined market shares of the Parties in each Relevant Market which is between [20%-40%] falls within CCCS's indicative threshold range of 20% to 40% as set out in the *CCCS Guidelines on the Substantive Assessment of Mergers 2016*. CCCS estimates the post-merger combined market share of the three largest firms (CR3) in each Relevant Market to be approximately [80%-90%] in 2020 which is over CCCS's indicative threshold of 70%.[63]

36. Notwithstanding the above, CCCS has received third party feedback indicating that Shin-Etsu Handotai Co., Ltd. ("**Shin-Etsu**") and SUMCO Corporation ("**SUMCO**") will remain as significant suppliers of 200mm polished wafers, 200mm epitaxial wafers, 300mm polished wafers and 300mm epitaxial wafers.[64]

37. Considering the above, the Parties' combined market shares in the Relevant Markets may not, in or of themselves, necessarily result in competition concerns.

(b) Barriers to Entry and Expansion

38. CCCS is of the view that the barriers to entry to the Relevant Markets are high. While the initial set-up and capital costs for entry are not insurmountable as demonstrated by the recent new entrants (for example, the Chinese suppliers), these entrants have generally not been able to develop adequate technical expertise and know-how to meet the requirements of customers, particularly for the supply of 300mm polished and 300mm epitaxial wafers. The extent of time required, in particular for credible new entry, can be significant. In this regard, CCCS is of the view that there is uncertainty as to the extent to which the new entrants can be a sufficient competitive constraint on the major global suppliers for the supply of 300mm polished and 300mm epitaxial wafers, within the next two (2) years. For the supply of 200mm polished and 200mm epitaxial wafers, CCCS is of the view that the gap in technical expertise between the new entrants and major global suppliers is likely to be smaller than the gap in technical expertise in relation to the supply of 300mm polished and 300mm epitaxial wafers. However, in view of the mixed feedback received from third parties, it is also unclear to what extent the new entrants can be a sufficient competitive constraint on the major global suppliers for the supply of 200mm polished and 200mm epitaxial wafers.

---

[63] Paragraph 5.15 of the *CCCS Guidelines on the Substantive Assessment of Mergers 2016*.

[64] Paragraph 5 of [✂]'s 11 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 5 of [✂]'s 17 March 2021 response to CCCS's 3 March 2021 Invitation to Comment; Paragraph 6 of [✂]'s 30 March 2021 response to CCCS's 26 March 2021 Invitation to Comment; Paragraph 15 of Notes of Call with [✂] on 10 March 2021; Paragraph 15 of Notes of Call with [✂] dated 18 March 2021; Paragraph 14 of [✂]'s 30 March 2021 response to CCCS's 26 March 2021 Invitation to Comment; Paragraph 14 of [✂]'s 31 March 2021 response to CCCS's 26 March 2021 Invitation to Comment.

39. For barriers to expansion, CCCS is of the view that barriers to expansion for the supply of silicon wafers, including for the Relevant Markets, range between moderate to high. The time required for existing suppliers to invest and expand their production capacity via brownfield expansion is shorter than the time taken for greenfield expansion. However, time is still required for suppliers to obtain the necessary customer qualifications. Significant capital expenditure is also required for suppliers to expand their production capacity. That said, the recent instances of existing competitors investing in capacity expansion do suggest that competitors would do so, if there is sufficient return on investment to justify investing in brownfield or greenfield expansion. Customers may also enter into long term agreements with suppliers to expand their production capacity further, to meet increased demand.

(c) Countervailing Buyer Power

40. While CCCS notes that the largest customer of the Parties account for a significant proportion of each Party's revenue in the market for the global supply of silicon wafers, CCCS is mindful that for GWC, the remaining top four (4) customers each account for only [✂]% or less of GWC's worldwide revenue. For Siltronic, while the second and third largest customer each account for between [✂]% and [✂]% of Siltronic's worldwide revenue, the fourth and fifth largest customer each account for only [✂]% of Siltronic's worldwide revenue. Considering the above, CCCS is of the view that it is not clear that the large customers of the Parties would be able to exercise buyer power.

41. CCCS further notes that even if a customer accounts for a large proportion of the Parties' revenue, it is not sufficient to conclude on this alone that buyer power is strong. While CCCS has received third party feedback that some customers are able to exert influence on prices[65] through the use of long term agreements[66], and they may potentially have buyer power because they purchase significant volumes of silicon wafers from different suppliers and can shift their demand around to impact a supplier's revenue[67], CCCS notes that customers' ability to exercise buyer power depends on the prevailing market conditions. During periods of heightened demand when qualified suppliers face capacity constraints, customers

[65] [✂]'s 11 March 2021 response to Question 19 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 19 of Notes of Call with [✂] dated 9 March 2021; Paragraph 19 of Notes of Call with [✂] dated 11 March 2021; [✂]'s 10 March 2021 response to Question 19 of CCCS's 3 March 2021 Invitation to Comment.
[66] Paragraph 19 of Notes of Call with [✂] dated 12 March 2021.
[67] Paragraph 19 of Notes of Call with [✂] dated 18 March 2021; Paragraph 19 of Notes of Call with [✂] dated 11 March 2021.

would not be able to shift its demand to other suppliers, and would not be able to exert downward pricing pressure.[68] Conversely, customers are more likely to be able to negotiate with suppliers during times of excess capacity.[69] Furthermore, CCCS understands from third parties that it is difficult to switch to a new supplier due to reasons such as product sensitivities[70], time required for qualification[71] and end-customer approval required[72].

42. In relation to self-supply, third party feedback indicates that customers generally do not self-supply.[73]

43. Given the above assessment, CCCS is of the view that it is not clear that the large customers of the Parties would be able to exercise buyer power. CCCS notes that even if the large customers of the Parties may possess a certain degree of countervailing buyer power, the extent to which they can exercise buyer power ultimately depends on prevailing market conditions. Given the current tight supply of silicon wafers, it is unclear whether there is adequate countervailing buyer power in the Relevant Markets to constrain the Parties following the Proposed Transaction.

VIII. COMPETITION ASSESSMENT

(a) Non-Coordinated Effects

Parties' product offerings and business focus

44. Third party feedback corroborates GWC's submissions that the Parties' product offerings are differentiated. In particular, GWC offers a broader range of silicon wafer products which are not offered by Siltronic.[74]

45. Third party feedback also corroborates GWC's submission that GWC and Siltronic have a different business focus.[75] Further, third party feedback indicates

[68] Paragraph 19 of Notes of Call with [✂] dated 9 March 2021; Paragraph 20 of Notes of Call with [✂] dated 11 March 2021.
[69] Paragraph 19 of Notes of Call with [✂] dated 9 March 2021.
[70] Paragraph 19 of Notes of Call with [✂] dated 12 March 2021.
[71] Paragraph 5 of Notes of Call with [✂] dated 8 March 2021.
[72] [✂]'s 11 March 2021 response to Question 20 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 20 of CCCS's 3 March 2021 Invitation to Comment.
[73] [✂]'s 11 March 2021 response to Question 27 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 27 of Notes of Call with [✂] dated 11 March 2021.
[74] Paragraph 9 of Notes of Call with [✂] dated 8 March 2021; [✂]'s 12 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 17 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 17 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment.
[75] [✂]'s 10 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment.

that when it comes to the supply of 300mm epitaxial wafers for advanced applications, Siltronic competes more closely with Shin-Etsu and SUMCO.[76]

Difficulties in switching suppliers

46. Third party feedback suggests that customers generally multi-source and would qualify multiple suppliers for each silicon wafer product. In terms of ease of switching, CCCS understands from most third parties that customers are generally able to switch relatively easily among qualified suppliers.[77]

47. However, third party feedback indicated that the difficulties in switching between qualified suppliers depend on the prevailing market condition.[78] Switching between qualified suppliers would not be possible if there is no excess capacity available in the market to absorb the increase in demand.[79] On this note, CCCS has received feedback from several third parties indicating that they expect there to be a global capacity shortage in the supply of silicon wafers (particularly in the supply of 300mm polished and 300mm epitaxial wafers) in the near term as demand outstrips supply.[80] Notwithstanding that several third parties have raised concerns regarding the difficulties faced in switching between qualified suppliers post-transaction due to insufficient capacity, CCCS notes that this difficulty will arise with or without the Proposed Transaction. CCCS understands that the wider semiconductor market as well as the silicon wafer market is cyclical in nature, and had over the years, undergone periods of tight supply (and consequently higher prices) and oversupply (and consequently lower prices) depending on the demand for semiconductor devices.[81] In the absence of the Proposed Transaction, suppliers in general face capacity constraints and would not be able to expand capacity within a short period of time to meet the increased demand.

48. Considering the above, CCCS is of the view that the supply shortage, and therefore, any potential increase in prices post-transaction is due to the prevailing

[76] Paragraph 17 of Notes of Call with [✂] dated 11 March 2021.
[77] Paragraph 20 of Notes of Call with [✂] dated 9 March 2021; [✂]'s 10 March 2021 response to Question 20 of CCCS's 3 March 2021 Invitation to Comment.
[78] Paragraph 20 of Notes of Call with [✂] dated 12 March 2021.
[79] [✂]'s 17 March 2021 response to Questions 20 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 13 of [✂]'s email response dated 29 March 2021; Paragraph 10 of Notes of Call with [✂] dated 12 March 2021.
[80] [✂]'s 17 March 2021 response to Questions 23 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 21 of Notes of Call with [✂] dated 11 March 2021.
[81] In *CCS 400/003/17 – Proposed Acquisition by SK Holdings Co. Ltd. Of LG Siltron Inc*, CCCS received feedback indicating that the wider semiconductor market is cyclical, although the specific duration of each cycle is generally less predictable. For a period of around ten (10) years (i.e. from 2007 to 2017), the silicon wafer market has generally been in a situation of oversupply, with the last period of tight supply and demand (other than periodic wafer shortages) occurring prior to 2007. Feedback from third parties also indicated that the silicon wafer market has been in a situation of tight supply from around 2016/2017 onwards.

market conditions, and is unlikely to be directly attributable to the loss of competition between the Parties due to the Proposed Transaction.

Closeness of rivalry between the Parties and alternative suppliers

49. CCCS understands from third parties that most of them generally do not view GWC and Siltronic as each other's closest competitor in the global supply of silicon wafers, as well as in each of the Relevant Markets.[82] Feedback received from several third parties indicate that they consider the top five (5) global suppliers for silicon wafers (i.e., SUMCO, Shin-Etsu, GWC, Siltronic and SK Siltron Co., Ltd. ("**SK Siltron**")) to compete on equal footing in the Relevant Markets.[83]

50. In general, feedback from most third parties (except [✂[84]]) indicate that they consider silicon wafers supplied by the Parties, as well as the silicon wafers supplied by other suppliers to be substitutable, as long as the suppliers are qualified.[85] Several third parties also noted that the Parties do not have a competitive advantage over the supply of any type and size of silicon wafer.[86]

Barriers to entry and expansion

51. As discussed in paragraphs 38 and 39 above, CCCS is of the view that the barriers to entry to the Relevant Markets are high as the extent of time required for credible new entry, can be significant. The barriers to expansion also range between moderate to high given that significant capital expenditure and time is required for the addition of new capacity to the market via greenfield capacity. Accordingly, it would take time for existing suppliers to invest in capacity expansion in the Relevant Markets (particularly in the supply of 300mm polished and 300mm

[82] [✂]'s 10 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 17 March 2021 response to Question 17 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 17 of Notes of Call with [✂] dated 18 March 2021.
[83] Paragraph 15 of Notes of Call with [✂] dated 9 March 2021; Paragraph 17 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 17 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment.
[84] [✂]'s 11 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment.
[85] Paragraph 10 of Notes of Call with [✂] dated 9 March 2021; [✂]'s 10 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 10 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 12 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 10 of Notes of Call with [✂] dated 11 March 2021; Paragraph 10 of Notes of Call with [✂] dated 11 March 2021; [✂]'s 29 March 2021 response to Question 10 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 10 of Notes of Call with [✂] dated 18 March 2021; [✂]'s 31 March 2021 response to Question 11 of CCCS's 26 March 2021 Invitation to Comment; [✂]'s 30 March 2021 response to Question 11 of CCCS's 26 March 2021 Invitation to Comment.
[86] Paragraph 10 of Notes of Call with [✂] dated 18 March 2021; Paragraph 10 of Notes of Call with [✂] dated 9 March 2021.

epitaxial wafers) to meet the increased demand. On this note, CCCS observes that the major global suppliers have increased their production capacity in the past to meet growing demand for 300mm silicon wafers, and this does suggest that existing competitors would continue to do so, if there is sufficient return on investment to justify investing in brownfield and/or greenfield expansion, albeit that there will be a time lag before there is sufficient capacity to meet demand.

52. As noted at paragraph 47, CCCS further notes that there will likely be a shortage of capacity in the supply of silicon wafers in general, in the near term, to cater to the increasing demand for semiconductor devices, with or without the Proposed Transaction. Given that silicon wafer suppliers who face capacity constraints would generally require significant time and capital expenditure to invest and expand their capacity further, it is likely that the supply shortage would exert an upward pressure on prices, and prices of silicon wafers may increase independent of the Proposed Transaction. That said, CCCS is of the view that notwithstanding that there are high barriers to entry and moderate to high barriers to expansion, it is likely that any potential increase in prices post-transaction is due to the prevailing market conditions, and not directly attributable to the loss of competition between the Parties due to the Proposed Transaction.

Countervailing buyer power

53. As noted in paragraph 43 above, CCCS is of the view that it is not clear that the large customers of the Parties would be able to exercise buyer power. CCCS notes that even if the large customers of the Parties may possess a certain degree of countervailing buyer power, it is unclear whether there is adequate countervailing buyer power in the Relevant Markets to constrain the Parties post-transaction given the current tight supply of silicon wafers, which is driven by growing demand for semiconductor devices.

CCCS's conclusion on non-coordinated effects

54. On balance, CCCS is of the view that it is unlikely that the Proposed Transaction, if carried into effect, will give rise to non-coordinated effects that would lead to SLC concerns in the Relevant Markets. Notwithstanding concerns raised that there might be insufficient capacity in the supply of silicon wafers (particularly in the supply of 300mm polished and 300mm epitaxial wafers) to cater to the increasing demand for semiconductor devices in the next few years, feedback from third parties indicate that the Parties are generally, not each other's closest competitors, and there are three other large global suppliers i.e., Shin-Etsu, SUMCO and SK

Siltron that are likely to be important sources of competitive constraints on the Parties post-transaction. The Parties' product offerings are differentiated, and the Parties have different business focus. Furthermore, customers multi-source and qualify multiple suppliers, and silicon wafers supplied by qualified suppliers are generally substitutable. If there is a global capacity shortage in the supply of silicon wafers in the near term, it is not directly attributable to the Proposed Transaction. It is unlikely that any potential increase in prices post-transaction is directly attributable to the loss of competition between the Parties due to the Proposed Transaction as the Parties will continue to face competitive constraints in the Relevant Markets from at least the three other large global suppliers post-transaction.

(b) Coordinated Effects

55. Having considered GWC's submissions and third party feedback, CCCS concludes that the Proposed Transaction is unlikely to give rise to coordinated effects in the Relevant Markets for the following reasons:

a. It is unlikely that the Proposed Transaction would increase the ability of suppliers to coordinate their actions.[87] In particular, it is unlikely that the merged entity will have the incentive to coordinate with Shin-Etsu and SUMCO, two of the other largest global suppliers of silicon wafers.[88] CCCS further notes that it would be difficult for suppliers to align their behaviour given the number of silicon wafer suppliers present globally that customers have been and are able to purchase from for different types and sizes of silicon wafers.

b. The global silicon wafer market is not sufficiently transparent as silicon wafers are customised according to each customer's needs,[89] and actual prices are only known to the supplier and customer.[90] Customers engage in separate negotiations with each supplier[91], and typically employ different sourcing strategies e.g. long term agreements (which are the most common) and spot purchases depending on market conditions, to procure silicon

[87] Paragraph 35 of Notes of Call with [✂] dated 9 March 2021; [✂]'s 10 March 2021 response to Question 35 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 10 March 2021 response to Question 35 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 17 March 2021 response to Question 35 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 35 of Notes of Call with [✂] dated 11 March 2021; Paragraph 35 of Notes of Call with [✂] dated 18 March 2021.
[88] Paragraph 35 of Notes of Call with [✂] dated 11 March 2021.
[89] Paragraph 35 of Notes of Call with [✂] dated 11 March 2021.
[90] [✂]'s 12 March 2021 response to Question 35 of CCCS's 3 March 2021 Invitation to Comment.
[91] Paragraph 19 of Notes of Call with [✂] dated 18 March 2021.

wafers.[92] The differing frequency of negotiation between suppliers and their customers (e.g. ad-hoc, quarterly, annually etc) [93] and the unique product mix for each customer (e.g. product specification and parameters, differing volumes and types and sizes of silicon wafers etc.) serve to limit the extent of price transparency for suppliers to coordinate.

c. Demand and supply in the market for silicon wafers is volatile. In particular, prices of silicon wafers are dependent on the overall demand and supply in the market at any given time[94], and suppliers would not have any incentive to align their behaviour as they would have to respond to market changes.[95] In fact, CCCS understands that it is fairly common for customers and suppliers to re-negotiate the terms of the long-term agreement if there is a change in the prices or volume required.[96]

(c) Vertical Effects

56. CCCS agrees with GWC's submission that the Proposed Transaction does not give rise to any vertical relationship that would likely cause vertical effects.

Conclusion on Competition Assessment

57. Considering CCCS's conclusions in relation to the lack of non-coordinated and coordinated effects from the Proposed Transaction, CCCS is of the view that the Proposed Transaction, if implemented, will not result in an SLC in the Relevant Markets.

IX. EFFICIENCIES

58. Given that the Proposed Transaction does not raise SLC concerns in any of the Relevant Markets, CCCS is of the view that it is not necessary to make an assessment on the claimed efficiencies by GWC.

---

[92] Paragraph 19 of Notes of Call with [✂] dated 9 March 2021; [✂]'s 10 March 2021 response to Question 19 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 19 of Notes of Call with [✂] dated 12 March 2021; [✂]'s 31 March 2021 response to Question 4 of CCCS's 26 March 2021 Invitation to Comment; [✂]'s 30 March 2021 response to Question 4 of CCCS's 26 March 2021 Invitation to Comment.

[93] Paragraph 4 of Notes of Call with [✂] dated 8 March 2021; [✂]'s 11 March 2021 response to Questions 19 and 33 of CCCS's 3 March 2021 Invitation to Comment; [✂]'s 17 March 2021 response to Question 19 of CCCS's 3 March 2021 Invitation to Comment.

[94] [✂]'s 12 March 2021 response to Question 35 of CCCS's 3 March 2021 Invitation to Comment; Paragraph 13 of [✂]'s email response dated 29 March 2021.

[95] Paragraph 35 of Notes of Call with [✂] dated 18 March 2021.

[96] Paragraph 19 of Notes of Call with [✂] dated 11 March 2021.

X. ANCILLARY RESTRICTIONS

59. GWC has submitted that the non-compete and non-solicitation restrictions on the part of Wacker Chemie contained in the IUA constitute ancillary restrictions to the Proposed Transaction, and may, *prima facie*, be perceived to infringe the section 34 prohibition as it restricts the ability of Wacker Chemie and its affiliates from[97]:

    a. [✂]; and

    b. [✂].

60. Clause [✂] of the IUA (non-compete restriction) provides that for a period of [✂], Wacker Chemie shall not [✂]:

    a. [✂]; and

    b. [✂].

    Clause [✂] of the IUA applies only to the territorial area [✂].[98]

61. Clause [✂] of the IUA (non-solicitation restriction) provides that [✂], Wacker Chemie [✂].[99]

62. CCCS is of the view that the non-compete restriction is directly related and necessary to the Proposed Transaction as it serves to prevent Wacker Chemie [✂]. The non-compete restriction is also not overly restrictive of competition as the geographical and product scope of the restriction is limited to [✂]. In this case, the [✂] period of the non-compete restriction also coincides with [✂]. CCCS is therefore of the view that a [✂] duration is proportionate.

63. In relation to the non-solicitation restriction, CCCS is likewise of the view that it is directly related to the Proposed Transaction as it serves to [✂]. CCCS is of the view that the non-solicitation restriction is not overly restrictive of competition and the [✂] duration for the non-solicitation restriction is reasonable and properly limited as it allows GWC to protect the value of the business, without which GWC would not have entered into the Proposed Transaction.

---

[97] Paragraph 43.5 of Form M1.
[98] Paragraph 43.1 of Form M1.
[99] Paragraph 43.1 of Form M1.

64. CCCS concludes that the non-compete obligation and the non-solicitation restriction constitute ancillary restraints which benefit from the Ancillary Restriction Exclusion under the Act, insofar as they relate to Singapore.

XI. CONCLUSION

65. For the reasons above and based on the information available, CCCS has assessed that the Proposed Transaction, if carried into effect, will not lead to an SLC and consequently, will not infringe the section 54 prohibition.

66. In accordance with section 57(7) of the Act, the decision will be valid for a period of one (1) year from the date of this decision.

Sia Aik Kor
Chief Executive
Competition and Consumer Commission of Singapore