

# Annual Report: Compound Semiconductor Cluster in South Wales

[csconnected.com](https://csconnected.com)

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Welsh Economy  
Research Unit  
Yr Uned Ymchwil  
i Economi Cymru



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## Table of Contents

<b>Key elements of the 2022 Compound Semiconductor (CS) cluster report</b>	<b>2</b>
<b>1. Introduction</b>	<b>3</b>
<b>2. Economic Context</b>	<b>6</b>
2.1. Introduction	7
2.2. International economy context for CS cluster activity	7
2.3. UK economic conditions	10
2.4. Recent CS cluster performance	10
<b>3. CS Cluster – Economic contribution to Wales in 2022</b>	<b>15</b>
3.1. Introduction	16
3.2. Impact headlines: Direct effects	17
3.3. Impact headlines: Indirect effects	18
<b>4. Conclusions</b>	<b>21</b>
4.1. The overall picture	22
4.2. Key developmental indicators	22
4.3. Moving ahead to 2023–24	23

## About CSconnected

CSconnected is the collective brand for a growing number of advanced semiconductor related activities in Wales, home to a unique community of academic institutions, prototyping facilities and global, high-volume manufacturing capabilities that collaborate across a range of research and innovation programs. CSconnected is uniquely positioned to develop a global advantage in a sovereign, key enabling technology which will allow Wales and the UK to increase trade globally in critical sectors such as 5G communications, autonomous and electric vehicles, advanced medical devices, and consumer electronics of the future.

In 2020, CSconnected received government funding provided through UK Research and Innovation's flagship Strength in Places Fund (SIPF). The 55-month CSconnected SIPF project has a total value of £43million, supported by £25million of UKRI funds. It builds on Wales's regional strengths and integrates research excellence with a unique regional supply chain in compound semiconductor manufacturing.

More information at [www.csconnected.com](http://www.csconnected.com).

# Key elements of the 2022 CS cluster report

This is the third in a series of annual reports considering the economic effects connected to the development of the compound semiconductor (CS) cluster in Wales. The report considers the regional context of CS cluster development and how its contribution compares with other parts of the Welsh economy. The work forms part of the research and evaluation function surrounding the UKRI Strength in Places Fund investment into CSconnected.

The report provides an update on the regional economic context surrounding CS cluster development in 2022.

## Highlights

**9%**

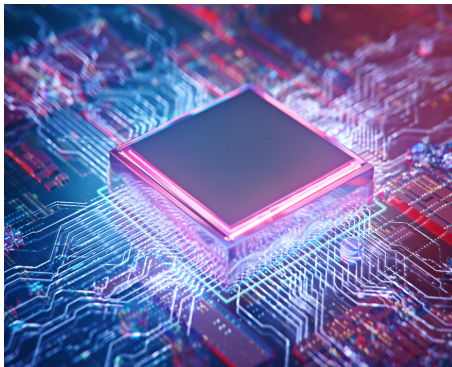
Employment in the Cluster in 2022 marks an 9% increase on 2021 (direct and indirect jobs)

**2%**

The cluster contributes between 2% and 3% of Welsh manufacturing exports, close to £500m

**9%**

GVA in the Cluster in 2022 marks an 9% increase on 2021 (direct and indirect GVA)



## CS Cluster – Economic contribution to Wales in 2022

### In 2022 the CS Cluster

supported an estimate of

**2,615 jobs**

of which

**1,737 jobs**

are directly supported by the cluster

### In 2022 the CS Cluster

contributed an estimate of

**£303m GVA**

of which

**£212m GVA**

is directly supported by the cluster

# 1. INTRODUCTION

Photo: Chris Meadows, Director of CSconnected, speaking at Semicon Europa – November 2022



This report is an annual update which considers the economic activity supported in Wales by the cluster of firms and institutions that form part of CSconnected activity funded by the Strength in Places Fund managed by UK Research and Innovation (UKRI). The consortium consists of partners including: Cardiff University (lead), Swansea University, Rockley Photonics, IQE, KLA, Nexperia (previously Newport Wafer Fab), Microchip, MicroLink Devices UK Ltd, the Compound Semiconductor Centre, the Compound Semiconductor Applications (CSA) Catapult, the Cardiff Capital Region (CCR) City Deal and Welsh Government.

An important element of the CSconnected activity is to explore the changing economic contribution of the cluster over time, and particularly the way in which the activities of the firms and institutions supported by the UKRI funding contribute in terms of meeting place-based needs in the Welsh economy.

This report estimates the economic activity supported by the CS cluster in 2022. The report also provides contextual information through which to better understand the economic contribution of the cluster, particularly the worsening economic conditions in the UK during 2022.

Various data have been used to develop this report. During each year of the UKRI funded research it has been possible to send out a survey to cluster members. This survey is used to collect information in respect of the output, employment, wages and salaries, expenditure and exports of the members. This is particularly important as this information allows the team to compare economic activity supported within the cluster to other activity in Wales, not least in terms of trying to identify the productivity characteristics of the CS firms. However, we also make use of published company accounts data from the Bureau van Dijk FAME database and with this providing additional insights into the spending and performance of the cluster firms. Finally we make extensive use of published statistics from organisations such as the Office for National Statistics. This is largely in terms of regional economic data in respect of industry employment and gross value added.

This report presents estimates of the Welsh economic activity supported by the CS cluster. It is important to stress that this is an estimate for 2022 as the companies involved in the cluster have different financial reporting year ends. In addition, the analytical process requires assumptions to be made about the gross value added directly and indirectly supported by CS cluster operations. Part of the analysis which follows comprises an economic modelling exercise to examine how the CS cluster supports activity in other parts of the Welsh economy. While this is a modelled assessment, part of our research work during 2023 is investigating the actual supply chain linkages that cluster members have with other firms in the Wales and South West economy. We hope to publish the findings of this work later this year.

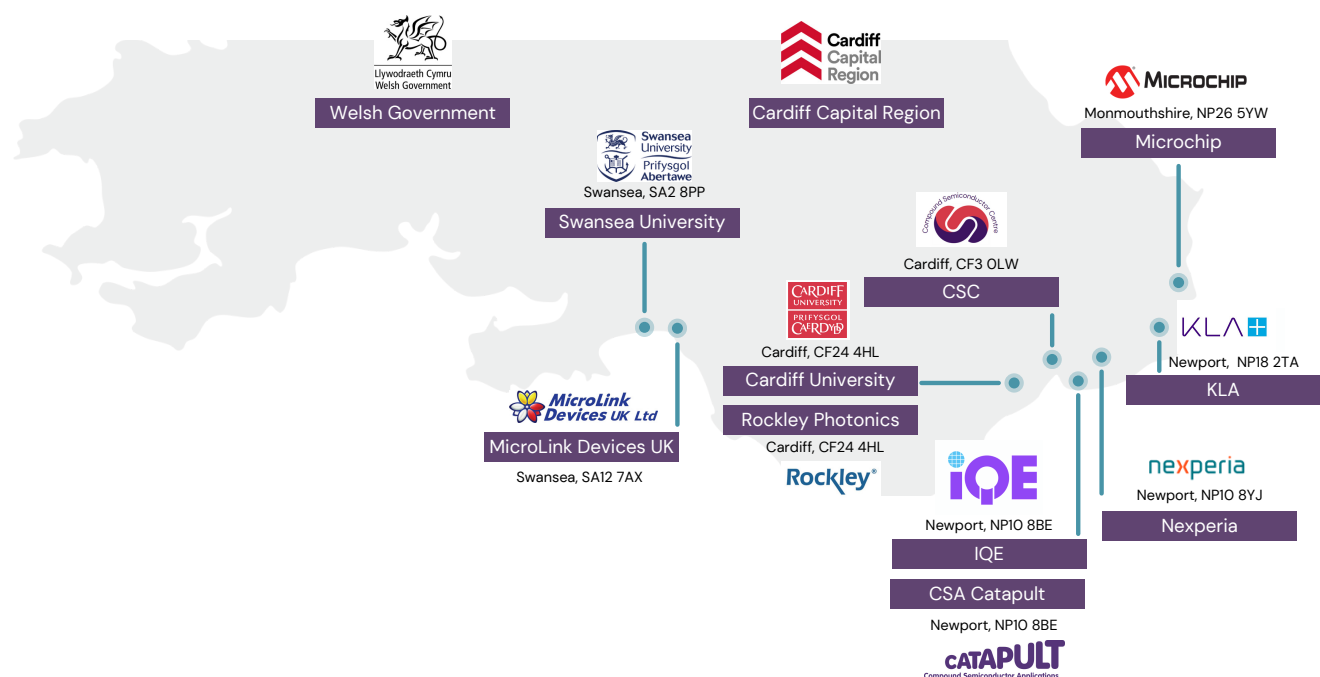
The annual review of economic activity supported by the cluster also serves to inform a series of KPIs for the UKRI funded Strength in Places CSconnected project; these include:

- KPI 1 Direct employment in core cluster firms and new inward investors
- KPI 2 Exports of cluster firms
- KPI 4 Total gross value added supported by cluster activity directly and indirectly.

Furthermore, elements of this report are also useful to inform the future evaluation framework of the UK-wide Strength in Places Fund (SIPF) activity. In this respect the report touches on material that will be useful in answering specific Evaluation Questions for the whole of the programme. Specifically:

- EQ2: Did the SIPF increase the quantity and quality of regional commercial R&I in key industries? To what extent was long-term capacity for such R&I increased? To what extent did this leverage existing local strengths?
- EQ5: Did SIPF improve the job prospects, in terms of the number, variety and profile of jobs available within the targeted regions? If not, why not?
- EQ6: Did SIPF increase the skills base and/or alter the profile of skills in targeted regions? If not, why not?
- EQ7: Did SIPF funded-activities contribute to improved economic performance, particularly within targeted industries and regions?
- EQ8: Did SIPF contribute to closing gaps in economic performance across UK regions? If not, why not?
- EQ15: To what extent does the SIPF represent value for money given the overall impact on knowledge, economy and society relative to the size of the investment?

The next section provides an update on the economic context surrounding cluster development in 2022, with the third section providing an estimate of the direct and indirect economic activity in Wales supported by cluster activity. The final section provides some conclusions on the expected development of CS cluster activity in Wales in 2023 and outlines the activity being carried out by the research and evaluation team during this year.



*CSconnected SIPF Cluster map*

A photograph of two men in business suits. The man on the left is holding a small electronic component, likely a microchip, and showing it to the man on the right. Both are looking down at the component with interest. The background is blurred, suggesting an indoor setting like a conference or exhibition. The entire image has a semi-transparent purple overlay.

## **2. REGIONAL ECONOMIC CONTEXT**

Photo: Sir Andrew McKenzie, Chair of UKRI, and Tracy Wotherspoon, Microchip, at the CSconnected cluster showcase – December 2022. Credit: Matthew Horwood

## 2.1. Introduction

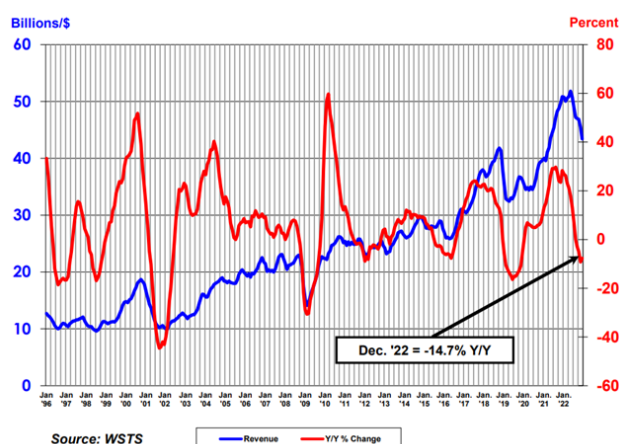
This section of the report focuses on the economic context surrounding the operations of the CS cluster firms in Wales. The second part of this section examines the economic information appertaining to the broad economic sectors in which CS cluster activity occurs i.e. standard industrial classifications (SIC) 26 and 27, manufacture of computer, optical and electronic products, and manufacture of electrical equipment. A key objective here is to frame the economic contribution of the CS cluster in the context of recent economic conditions and events.

## 2.2. International economic context for CS cluster activity

The year 2022 saw tougher operating conditions for manufacturers across the UK. Few parts of the economy have been exempted from pressures which according to the IMF World Economic Outlook (October 2022) have embraced: the impacts of the Russian invasion of Ukraine leading to an energy crisis in Europe; inflationary pressures causing a tightening of global monetary and financial conditions with higher real interest rates that are expected to work through the economy. This weighing down of demand (including demand for devices using semiconductors) coupled with the effects of the Zero-Covid policy in China has hit global supply chains and hampered trade activity. The combination of factors led the IMF to conclude that global GDP growth would have slowed to 3.2% in 2022.

The global semiconductor industry has not been immune to these global pressures. According to data from the Semiconductor Industry Association (SIA), semiconductor industry sales totalled US\$573.5 billion in 2022, the highest-ever annual total, increasing by 3.2% compared to 2021. However, the growth slowed down during the second half of the year. Estimated fourth-quarter sales of US\$130.2 billion were 7.7% lower than in 2022Q3 and more worryingly 14.7% less than in 2021Q4. According to SIA the slowdowns in the second half of 2022 were down to “short-term fluctuations in sales due to market cyclicalities and macroeconomic conditions”[1]. The variation of worldwide semiconductor revenues based on World Semiconductor Trade Statistics (WSTS) organizations is depicted in Figure 2.1.

Figure 2.1. Long term trend in Semiconductor sales



[1] See [Global Semiconductor Sales Increase 3.3% in 2022 Despite Second-Half Slowdown – Semiconductor Industry Association](#). SIA, 2023.



On a regional basis, sales into the Americas market experienced the largest increase (16.0%) in 2022. Meanwhile, China saw a sharp decrease in sales, decreasing by 6.3% to \$180.3 billion in 2022. Sales for December 2022 decreased compared to November 2022 across all regions: Europe (-0.7%), Japan (-0.8%), Asia Pacific/All Other (-3.5%), China (-5.7%), and the Americas (-6.5%). Figure 2.2 shows the variation in sales in each market in December 2022.

**Figure 2.2 Recent variations in semiconductor sales (December 2022)**

Month-to-Month Sales (Billions \$)			
Market	Last Month	Current Month	% Change
Americas	12.12	11.34	-6.5
Europe	4.47	4.44	-0.7
Japan	3.99	3.96	-0.8
China	13.39	12.63	-5.7
Asia Pacific/All Other	11.44	11.04	-3.5
Total	45.41	43.40	-4.4
Year-to-Year Sales (Billions \$)			
Market	Last Month	Current Month	% Change
Americas	12.14	11.34	-6.6
Europe	4.3	4.44	3.3
Japan	3.94	3.96	0.5
China	17.16	12.63	-26.4
Asia Pacific/All Other	13.32	11.04	-17.1
Total	50.85	43.40	-14.7

Source: SIA

A continued shortage of semiconductors to some sectors characterised 2022. However, there was an emerging oversupply of semiconductors to consumer electronics with a major cause of this being reduced consumer demand for electronics against a backdrop of rising interest rates, a falling stock market, and growing recessionary pressure. [2]

The Philadelphia Semiconductor Sector Index (SOX) provides some further context for the global progress and confidence of the semiconductor industry. This is a capitalization-weighted index composed of 30 semiconductor companies (i.e. those having main business activities that embrace the design, distribution, manufacture, and sale of semiconductors). The index is designed to track the performance of listed semiconductor businesses. The index is only formed of businesses listed on the main US stock exchanges. Figure 2.3 reveals the trend in the index from July 2019 to March 2023. This reveals that while performance was strong for much of 2021, that 2022 saw falling confidence in the main companies and this reflected in stock prices.

[2] [Despite Short-Term Cyclical Downturn, Global Semiconductor Market's Long-Term Outlook is Strong – Semiconductor Industry Association \(semiconductors.org\)](#)

Figure 2.3 PHLX Semiconductor Sector Index



Source: NASDAQ *Overview for SOX* ([nasdaqomx.com](https://nasdaqomx.com))

The pattern in the Figure reveals a slowdown in semiconductor sales during the second half of 2022, but with some recovery during the opening quarter of this year. Industry commentators have argued that the 2022 downturn was temporary resulting from cost inflation, geopolitical factors, and remaining impacts of Covid-19. This led to reduced consumer spending and then uncertainty demand for semiconductors. However, this is viewed as a short term adjustment phase and with stronger long term growth in the industry expected (see for commentary Casanova, 2023)[3]. As for the compound semiconductors specifically, Polaris Market research has estimated that the global compound semiconductor market was worth around £40 billion in 2022 and is expected to grow at a compound annual growth rate of 6.4% between 2023 and 2032.

[2] Despite Short-Term Cyclical Downturn, Global Semiconductor Market's Long-Term Outlook is Strong – Semiconductor Industry Association ([semiconductors.org](https://semiconductors.org))

[3] See footnote 2.

## 2.3. UK economic conditions

While much of the output from the CSconnected cluster of businesses is produced for export markets, economic conditions in the UK are still important in terms of the strength of labour markets and more general conditions for business investment. The UK economy news in the last quarter of 2022 revealed that:

- the economy shrank in the quarter to 2022 Q3, and with growing concerns over trends in industry output.
- UK business investment fell in 2022 Q3 by 2.5%, and in December 2022 the Bank of England reported that surveys of investment intentions had worsened in recent months.
- UK unemployment was relatively stable in the three-month period to October 2022.

In this UK context continued investment into cluster activities particularly by firms such as KLA (progressing construction to build a new research-and-development (R&D) and manufacturing centre for the SPTS division in Newport), is very welcome. The new facility will include a state-of-the-art innovation centre, offices, cleanrooms, storage and support facilities and could support up to 750 jobs. This represents one of the most significant inward investment decisions in Wales for some time.



*KLA breaks ground on new R&D and manufacturing facility in Newport, Wales in Oct 2022  
(Credit: KLA)*

## 2.4. Recent CS cluster performance

### CS cluster and Welsh output

Much of the activity in the CS cluster sits within the broad computer and electronics products sector, and the machinery sector. Figure 2.3 reveals recent trends in the index of output in these sectors. There is every indication here that the index of output in both of these sectors outperformed manufacturing as a whole in 2022.

For example, the index of computer and electronics products grew by an estimated 11% between 2021–2022[4], and with the index of machinery output growing by 14%. Importantly in both of these sectors output levels are above those in 2019 prior to the Covid Pandemic. For manufacturing output as a whole, output levels are around 7% lower than they were in 2019, whereas in computers and electronics products output is 6% higher.

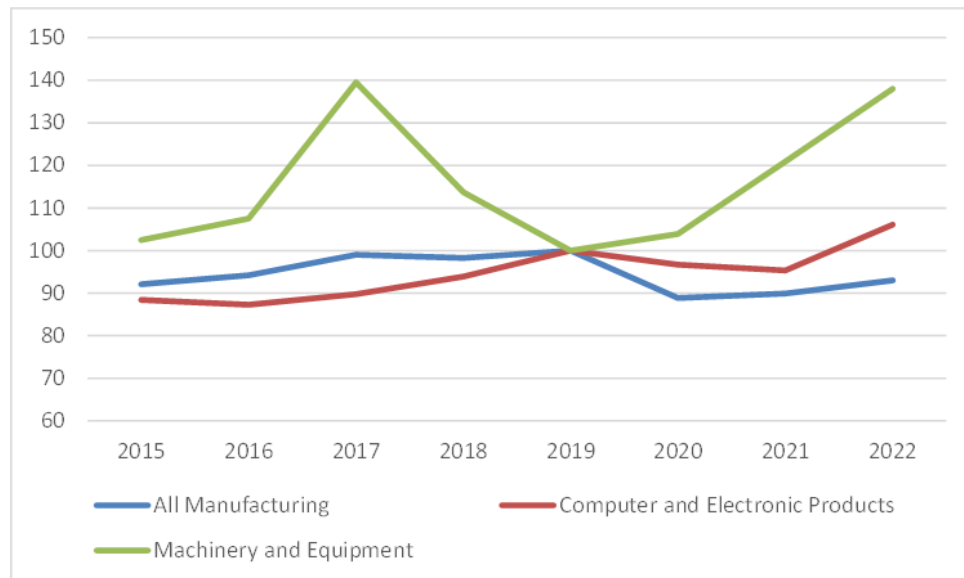
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[4] Note 2022 figures only up until 2022Q3 here and we note the potential for a sharp output fall in some manufacturing sectors in the final quarter of last year.

The positive performances put in by the manufacturing elements of the CS cluster have contributed to this strong showing and with previous annual reports showing relatively buoyant growth in CS cluster employment.

Our survey of the CS cluster suggests that between 2021 and 2022 there has been an 8.4% increase in employment (i.e. from 1,602 to an estimated 1,737 employees in 2022). This growth would seem to tally with the upward trend in overall sector output evidenced in Figure 2.4.

**Figure 2.4 Index of manufacturing output Wales 2015–2022Q3**



Source: Statswales

## Employment contribution

The majority of the compound semiconductor manufacturing activity in South Wales is within standard industrial classifications (SIC 2007) 26 and 27. SIC 26 and 27 together make-up the Electrical engineering and equipment sector in Wales (defined as SIC 26 – Manufacture of computer, electronic and optical products, and SIC 27 – Manufacture of electrical equipment).

The most recent figures available for employment in these two sectors are from the ONS Business Register and Employment Survey and reveal that the number of employees grew from an estimated 10,200 in 2017 to an estimated 11,450 in 2021. During the Covid-19 pandemic a downturn in economic activity led to some reduction in employees from 13,000 in 2019 to 11,360 in 2020.

Much of the CS cluster employment is in just a few elements of SIC 26 and SIC 27 (i.e. SIC 261 manufacturer of electronic components and SIC 279 manufacture of other electric equipment). Here estimated employees in 2021 were 2,850 people and with the CS cluster taking an increasing share of this total through time as it has grown.

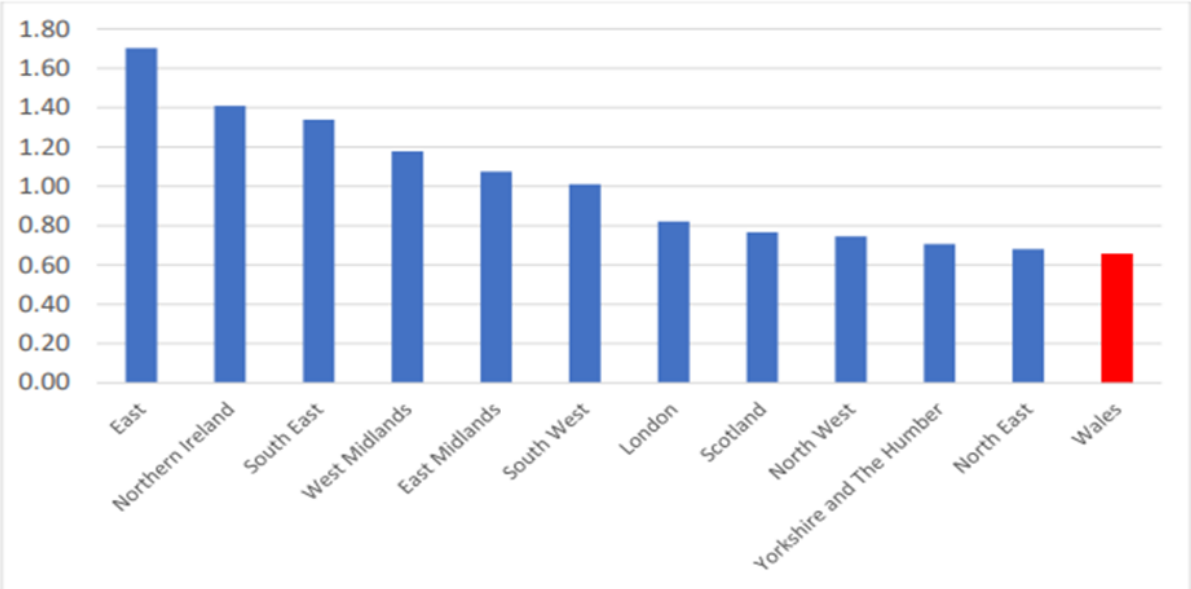


The CS cluster in 2022 accounts for around 1,737 employees, with 84% of these employment opportunities connected to the manufacturing elements of the cluster. Our time series of analyses of the CS cluster suggest that sector activity is accounting for a growing share of the manufacturing employment in SIC 26 and SIC 27 in Wales. Currently we estimate the cluster accounts for 13% of the total employment in these sectors. Our forecast is for this percentage to grow, not least because of new KLA investment into the sector during 2022–23 boosting employment.

**CS cluster and Welsh productivity**

Part of the justification for the UKRI Strength in Places support for the CSconnected project was the prospect of improving productivity levels in the local economy. The poor productivity tale of the Welsh economy has been a longstanding problem. A recent report from the Productivity Institute[5] revealed that R&D and innovation levels in the private sector in the region have been very low compared to that in other regions. The report revealed that worsening local productivity conditions are connected to limited new private sector capital investment and limited R&D and innovation activity. The report stated: “In the private sector Wales has failed to attract research and development activity at the same scale as in other devolved nations and regions of the UK.” Figure 2.5 reveals part of the problem with Wales featuring low R&D employment as a percentage of total employment. This points very much to the type of activity being undertaken in Welsh manufacturing and is a context for the UKRI Strength in Place Fund interventions in Wales.

**Figure 2.5 R&D employment as a percentage of total employment in private sector**



Source: Henley, 2021 *The Productivity Institute*

[5] Henley (2021) Wales’ Productivity Challenge: Exploring the issues, [The Productivity Institute PIP007-Wales-Productivity-Challenge-FINAL-011221.pdf](#)

The CS cluster manufacturing firms feature relatively high levels of R&D employment. The proportion of staff in the manufacturing parts of the cluster involved in R&D activity range from around 10% to 100% in some cases. This hints at the high value of activity undertaken in the firms and the skills being used. Prior annual reports in this series have pointed to the relatively high level of earnings in the cluster. Our analysis for 2022 suggests that within four of the firms average salaries were in excess of £65,000 and with a range from £48,000 to £86,000. The level of R&D and the payments to employees hint at high productivity activity.

There are problems in estimating even basic productivity numbers for the CS cluster. Some information is available from the Office for National Statistics on levels of gross value added in Wales for sectors SIC 26 (Computer, electronic and optical products) and SIC 27 (electrical equipment). However, these sectors cover very different types of manufacturing activity, with SIC 26 including basic electronic components as well as complex semiconductor manufacture and epitaxy. Figure 2.6 shows estimates of GVA in current prices for these two sectors for 2021 together with estimated employment levels from the ONS Business Register and Employment Survey.

**Figure 2.6 Estimated GVA per Employee in SIC 26 & SIC 27 2021**

Sector	Gross value added 2021 estimated	Employees 2021	Estimated GVA per employee
SIC 26 Computer, electronic and optical products	£825m	7,685	£107,352
SIC 27 Electrical equipment	£344m	3,770	£91,247
All Welsh manufacturing	£10,691m	136,000	£78,610

*Source: Estimated for 2021 from ONS Regional Accounts GVA at Current Prices by Industry and BRES (from Nomisweb).*

The figures for GVA per employee are averages for these broad sectors. Our analysis of the CS cluster for 2022 reveals that estimated GVA directly supported is £212m or around £122,000 per employee (we note this includes elements of non-manufacturing activity, which works to bring down the average for the CS cluster because GVA per employment in sectors such as education, research and related services is lower than that in the manufacturing elements of the cluster). We still stress that this may be conservative. It is particularly difficult to estimate some of the non-wage components of value added for the cluster.

## **CS cluster and Welsh trade**

The value of exports from Wales increased in the year to 2022 Q3. The value of Welsh exports increased by 36.6% to £19.5 billion over the year to September 2022 (compared with an increase of 27.2% in Scotland, 15.3% in England, and 11.0% in Northern Ireland). In comparison with the pre-pandemic year ending September 2019, the value of goods exported from Wales was up £1.7 billion (or 9.5%) with this value recovering to above pre-pandemic levels. Exports from the cluster members are important in supporting these figures. It is estimated that in 2022 exports from the CS cluster were close to £500m, meaning that the cluster is estimated to contribute between 2% and 3% of Welsh manufacturing exports.



# **3. CS CLUSTER: ECONOMIC CONTRIBUTION TO WALES IN 2022**

Photo: The CSconnected career event to outline the roles and the skills required in the compound semiconductor sector – April 2023



### 3.1. Introduction

This section of the report updates the analyses undertaken for 2019–2021 seeking to provide a current estimate of the economic activity of Wales supported by the CS cluster. As in each of the annual reports we stress that the gross value-added supported numbers are estimates. While data was available from some of the industrial partners in respect of employment and output, direct GVA associated with this employment and output is estimated using a variety of sources including the ONS Annual Business Survey, ONS Regional gross value added (balanced) by industry [6] and the Business Register and Employment Survey (accessed through NOMIS). The derived estimates take into account that GVA per employee in the consortium will vary by industry, for example with developed GVA per employee estimates varying between SIC 26 and 27 (SIC 26 Manufacture of computer, electronic and optical products, and SIC 27 – Manufacture of electrical equipment), and varying again in the case of any activity supported in the higher education sector.

Finally, this section also provides an estimate of how far the activity of the consortium members supports other activity in the Welsh economy through their supply-chains. This analysis was assisted by information provided by consortium members in respect of their purchasing patterns, in particular information in respect of what firms are able to purchase in Wales. Clearly, the most important aspect of local purchasing is labour inputs, with the consortium activity providing wages and salaries that are spent in the local economy, and which themselves support economic activity indirectly.

To estimate the indirect (or multiplier) consequences of the compound semiconductor cluster activity it is necessary to have a picture of the local economy that specifies how various industry sectors ‘fit together’ in terms of their trading relationships. This then allows the effects of activity in one sector to be traced through the entire local economy. The most comprehensive picture available of the Welsh economy is an Input–Output table. Further description of the Welsh Input–Output project, its strengths and limitations, can be found in (Jones et al., 2010).[7]

The approach adopted here involves estimating direct employment, output and gross value added connected with current cluster operations. The indirect (supply chain) and induced (household spending) effects connected with this activity are estimated through the use of employment and GVA multipliers derived from the Welsh Input–Output tables. Multipliers used were adjusted to take account of features of the specific firms in the cluster and with analysis also incorporating information from the firms showing their local purchasing linkages (and the direction of their sales).

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[6] See [Regional gross value added \(balanced\) by industry: all ITL regions](#) – Office for National Statistics

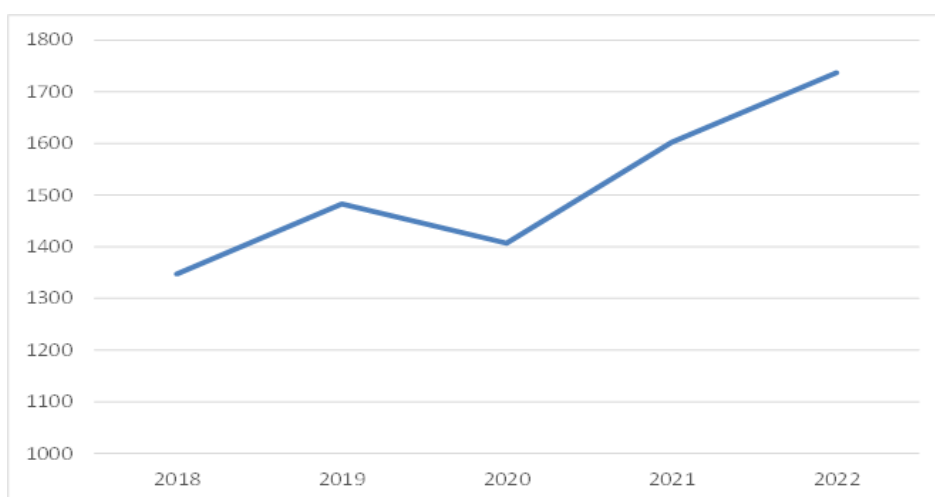
[7] [https://www.cardiff.ac.uk/\\_data/assets/pdf\\_file/0010/698869/input-output-tables-2007-final-30-6.pdf](https://www.cardiff.ac.uk/_data/assets/pdf_file/0010/698869/input-output-tables-2007-final-30-6.pdf)

## 3.2. Impact headlines: Direct effects

**In 2022 the compound semiconductor cluster employed an estimated 1,737 employees.**

Importantly, the vast majority of employment provided by the cluster is full-time as opposed to part-time. The employment in 2022 marks an 8.2% increase on 2021. Figure 3.1 shows the trend in employment in the CS cluster over the last five years. There is a strong expectation that employment will grow into 2023 in line with new investment in the private and university sector. For example, the new Centre for Integrative Semiconductor Materials (CISM) is expected to open at Swansea University in 2023. This £30m facility will connect semiconductor and advanced materials platforms and processes to deliver new technologies and products. It will also lead to the provision of new services for the CS cluster firms. New investment by KLA mentioned earlier in this report is also expected to strengthen employment growth in the cluster in 2023.

**Figure 3.1 Employee Estimates in the CS Cluster in Wales**



*The new Centre for Integrative Semiconductor Materials (CISM) at Swansea University. Copyright: Swansea University*



*The new compound semiconductor fab facility at ICS, Cardiff University dedicated end-to-end processing of wafers. Copyright: Cardiff University*

[8] See [Regional gross value added \(balanced\) by industry: all ITL regions](#) – Office for National Statistics

The estimated gross value-added per employee within the compound semiconductor cluster firms and organisations in 2022 is estimated at around £122,000. **The GVA directly supported by the cluster of firms and institutions is estimated in the year to 2022 at £212m.**

It is useful to contextualise these numbers in terms of the GVA generated by all Welsh manufacturing. The latest available data for 2020[8] reveals that Welsh manufacturing generated some £10.69bn of GVA and the Computer, electronic, optical and electrical engineering parts of Welsh manufacturing generated £1.13bn of GVA. Although these figures are somewhat dated they suggest that **the compound semiconductor cluster GVA directly supports around 2% of total Welsh manufacturing GVA and around 18.8% of GVA in the more tightly defined electronic and engineering sector.**

## 3.2. Impact headlines: Indirect effects

The CSconnected project aims to increase the embeddedness of the compound semiconductor firms in the regional economy. Part of the rationale for the CSconnected project is that the CS cluster firms have transformative potential and be able to embed themselves within the economy particularly through supply chain linkages. It is through links with local businesses that new knowledge can be transferred, and with emerging evidence in the CS cluster of suppliers in Wales working to upgrade their abilities to work with high technology elements of the CS cluster, not least through investments in clean room facilities.

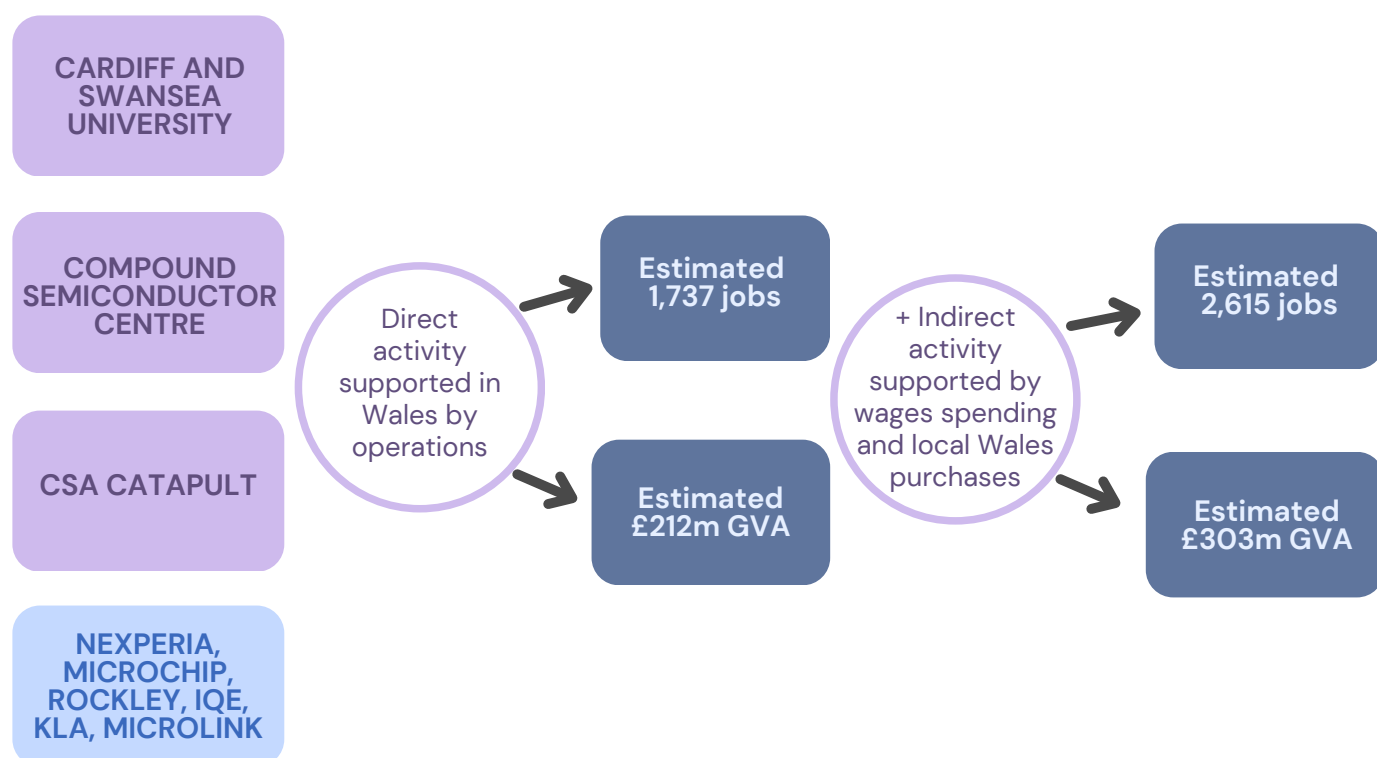
During 2023 the team will be undertaking research to explore the supply chain links being developed between CS cluster firms and suppliers. For this annual review we examine how the spending of the CS cluster supports activity indirectly in Wales, but following from the above it is important to recognise that this is only one means of understanding how the CS cluster supports local economic activity, and perhaps more importantly, productivity gains in the local supply chain.

In what follows we take 'local economy' to mean Wales. Again it is important to reflect here that the manufacturing firms in the cluster also support suppliers in the South West and in the wider UK economy through their purchases. However, much of the indirect impact of the cluster occurs in Wales. This is in part due to the considerable part of industry purchases in terms of wages and salaries being subsequently spent in Wales, supporting activity throughout the local economy.

As the above analysis suggests, CS cluster members directly support around £212m of GVA and 1,737 employees. Using the Welsh Input-Output framework it is estimated that the cluster, through its purchasing of regional goods and services, and its payment of wage incomes, supports a further £91m of GVA in the Welsh economy. Then each £1m of GVA directly generated in the CS cluster supports an additional £0.42m of GVA elsewhere in the Welsh economy. Overall, this results in the cluster supporting directly and indirectly an estimated £303m of Welsh GVA. This is round 9% higher than the estimate for 2021 (£277m).

Similarly, while the cluster directly supports around 1,737 jobs, it supports an estimated further 878 jobs through its purchasing and payment of wages and salaries i.e. every employment in the cluster is connected to an estimated 0.51 of an employment elsewhere in the Welsh economy. In total, therefore, the cluster in 2022 could be associated with as many as 2,615 jobs in Wales.

**Figure 3.2 Economic activity supported by the Compound Semiconductor Cluster (2022)**



*Note: Activities of the main manufacturing firms and other CSconnected members are combined for commercial confidentiality reasons. While direct employment and turnover information was provided by cluster firms, the estimates of GVA/employee were informed by Regional Accounts Current Price estimates of Industry GVA for Wales (SIC 26, 27) and overall Welsh employment estimates in these same industries. Indirect and household effects were estimated using multipliers developed from the Welsh Input–Output tables for SIC 26 and SIC 27, but with some adjustment to multiplier values to allow for some purchases and sales between firms. It is noted that the firms mentioned in this Figure do not share all the characteristics of the wider sector – particularly in the case of SIC 26. Multiplier estimates are therefore indicative. For the cluster firms, multiplier effects through supply chains in Wales are currently quite limited because of low local purchasing. However the multiplier effects through wage spending higher because of the relatively high wages and salaries paid in firms in the cluster.*





## **4. CONCLUSIONS**

## 4.1. The overall picture

While the UK and Welsh economy in 2022 was marked by falling levels of business confidence, there is evidence from this report that activity in the CS cluster has been maintained at a high level. Indeed, the employment directly supported by the cluster has seen some growth. This growth reflected some increases in employment in the private sector manufacturing firms in the cluster.

The year has not been without problems for the cluster. The UK Government during 2022 required Nexperia at Newport to sell the majority of its holdings in the Newport semiconductor manufacturing facility. The future ownership of the facility and its strategic plans are still unclear, particularly in respect of how far plans will embrace an open access fab. However, countering this uncertainty has been renewed inward investment by KLA, together with the ongoing development of University infrastructure to support the cluster. There also appears to be growing recognition at a UK level of the economic needs of the semiconductor sector as a whole in the UK and the its exposure to supply risks in semiconductors and related components. There have also been calls for the UK Government to develop a risk and resilience strategy for the semiconductor industry which will be set alongside a new Semiconductor Strategy being developed.[9] Longer term, there also seems to be continued growth in semiconductor markets linked to the evolution of the Internet of Things, laser, optical and sensor applications, and photonics applications.[10]

## 4.2. Key developmental indicators

In conclusion, the survey returns provided by cluster members in 2022 reveal the maintenance of sector activity in terms of employment and gross value added contribution. This report also confirms the findings of prior reviews in terms of:

- The high quality of existing jobs (as reflected in average salaries) and new job creation in the sector. The sector continues to be reliant on well qualified people and as a result there are continued concerns about the strength of the supply side in Wales to provide the talent needed for the largest firms.
- The relatively high proportion of private sector employment in the cluster associated with R&D activity.
- The presence of activity that strengthens Wales' productivity performance. The survey returns described continued investment in human and physical assets through the year. Productivity (albeit simply measured here) is shown to be relatively high when compared to other parts of Welsh manufacturing.
- Continued growth of the sector will help the Welsh economy as it seeks to close the gap on its more prosperous neighbours.

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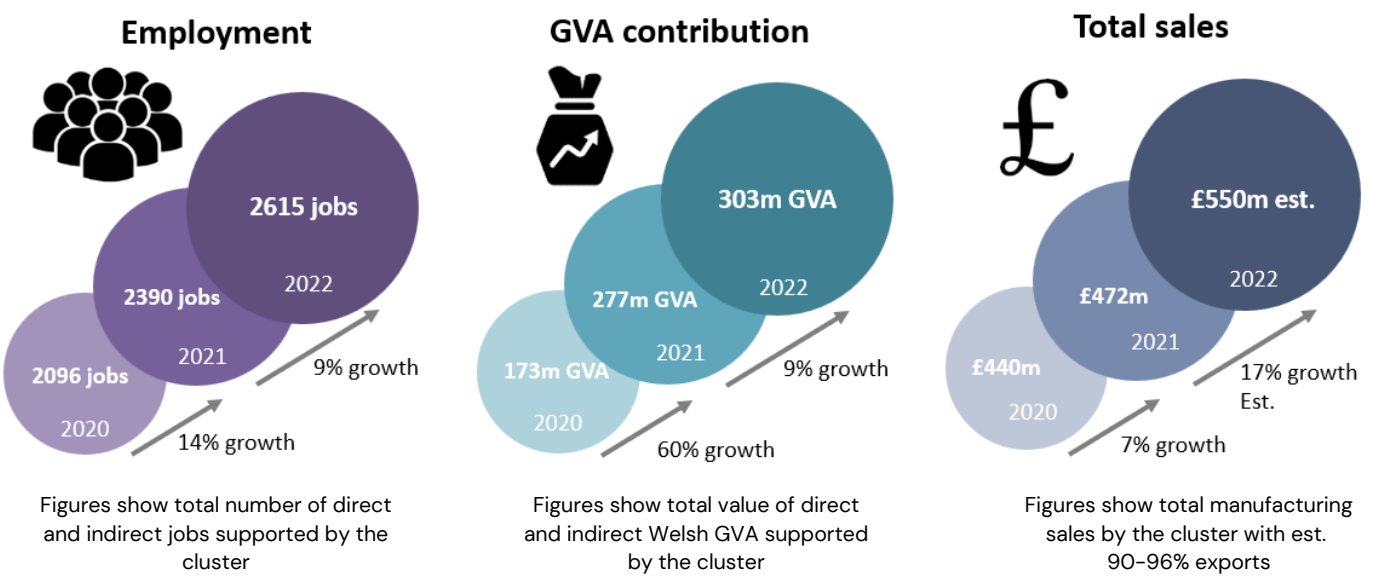
[9] <https://committees.parliament.uk/publications/31752/documents/178214/default/>

[10] See for example, Huggins, R. et al., (2023) Competition, open innovation, and growth challenges in the semiconductor industry: the case of Europe's clusters, Science and Public Policy. <https://doi.org/10.1093/scipol/scad005>

### 4.3. Moving ahead to 2023–24

Over the next year the team at Cardiff University are focusing in large measure on two further case studies related to supply chain development around the CS cluster and the improvement of the skills supply side to serve the cluster of CS firms. We are also continuing the process of collecting information on firms within the cluster. Further information on the work of the research and evaluation team can be had by contacting the Welsh Economy Research Unit ([mundaymc@cf.ac.uk](mailto:mundaymc@cf.ac.uk)).

#### Economic Outputs of CS Cluster from 2020 to 2022





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