Hidden powerhouse: South Wales, at the heart of the global compound semiconductor industry

Howard Rupprecht, managing director of CSconnected, highlights the global role of the South Wales-based compound semiconductor cluster.

South Wales is home to the world's first compound semiconductor cluster, a complete ecosystem spanning epitaxy, wafer and device fabrication, packaging, equipment manufacturing, and end-use applications. Few places globally can match this breadth, which enables the region to serve the entire value chain from prototyping to high-volume manufacturing.

Including gallium nitride (GaN), indium phosphide (InP) and gallium arsenide (GaAs), compound semiconductors are the enabling materials behind today's most advanced technologies—powering 5G networks, photonics, power electronics, and emerging quantum systems.

While global attention often gravitates towards Asia or Silicon Valley, South Wales has quietly established itself as a hidden powerhouse. The cluster not only delivers critical technologies into global supply chains but also drives regional transformation through high-value careers, skills development, and long-term economic growth.

The rise of the South Wales compound semiconductor cluster

South Wales's transition from traditional industries (such as steel) into advanced technologies was anchored by academic excellence at Cardiff University and Swansea University. In 2015, this talent base formed the world's first compound semiconductor cluster under the CSconnected brand umbrella.

Key players include IQE, KLA, Vishay, and Microchip. This has also given way for scale-ups such as MicroLink Devices, Kubos Semiconductors, and Ffotoneg.

Support from the UKRI Strength in Places Fund (SIPF) and Cardiff Capital Region (CCR) has helped to develop strategic infrastructure, skills pipelines, and investment in local supply chains. These efforts reinforce the cluster's success not just as a co-location, but as a purpose-aligned ecosystem uniting academia, government and industry, collaborating on innovation, productivity and global leadership.

Strategic global importance of the cluster

The global contribution of the cluster extends across the value chain, from next-generation chip materials to device manufacturing and integration.

In a geopolitical climate dominated by supply chain fragility and strategic recalibration, the resilience of the South Wales cluster stands out. The region now exports over 90% of its output, totalling around £466m in 2024. These exports support the UK trade and industrial strategy, reinforcing domestic supply chain independence.

This integrated ecosystem is built on firms ranging from global leaders to innovative scale-ups. Among them, IQE stands out as a flagship: a Cardiff-headquartered company whose epitaxial wafer technologies underpin devices used worldwide

IQE — pioneering epitaxial wafer foundry services

As the world's leading independent supplier of advanced compound semiconductor wafers, IQE epitomizes the South Wales cluster's global importance. The company has a global footprint but is headquartered in Cardiff. IQE provides epiwafer foundry services to many of the world's largest semiconductor manufacturers. These epitaxial layers are the enabling building blocks for devices powering 5G infrastructure, smartphones, data centers, photonics, and high-performance computing.

From a technical perspective, IQE's expertise spans multiple material platforms including GaAs, InP, and GaN. Each plays a distinct role in meeting market demand:

- GaAs for high-efficiency power amplifiers in smartphones and wireless networks;
- InP for high-speed optical devices that underpin cloud computing and AI data flows;
- GaN for high-power, high-frequency devices essential to both radio frequency applications and next-generation power electronics.

Strategically, IQE's roadmap demonstrates how South Wales is aligning with global megatrends. For example, the extension of GaN-on-silicon technology from well-established radio frequency applications into power semiconductors positions IQE to support the rapid growth of electric vehicles (EVs). Today, many EV power electronics rely on silicon carbide (SiC); IQE's work on GaN-on-Si offers the potential for devices with higher efficiency, lower cost, and easier scaling.

This dual lens — technical innovation, coupled with market alignment — highlights the South Wales cluster's global relevance. IQE's ability to adapt material science breakthroughs into commercial wafer platforms mirrors the region's wider strength: combining academic excellence with industrial scale to anticipate and serve the needs of tomorrow's technologies.

Cleanroom at IQE's Newport facility. (Photo courtesy of IQE.)

Economic and social impact on South Wales

As the representing body of the cluster, CSconnected's mission is to support the growth of the Welsh compound semiconductor industry. The cluster supported 1806 direct jobs across core firms and 2748 jobs across the Welsh economy in 2024; a 28% increase in direct employment since 2021.

In addition, cluster jobs are highly skilled and well paid; reflecting the value of this high-productivity sector. This is a high-value, knowledge-intensive industry creating so-called 'sticky jobs' – roles that are deeply rooted in place, due to the enormous capital investment and long lead-times involved in setting up a semiconductor fab. For instance, Vishay (formerly Newport Wafer Fab) has been operational in the region since 1982 and is still thriving more than four decades later. These aren't throwaway gigs, they're resilient, future-focused careers.

Globally, the semiconductor industry is facing a talent shortage of 250,000 to 300,000 people by 2030. And this is where Wales thrives. There are two excellent universities across Cardiff and Swansea, producing high-level graduates every year in relevant fields like material science and physics.

CSconnected is also building out the vocational and apprenticeship pipeline for skilled technical roles. And critically, offering a lifestyle that's hard to beat; affordable living, beautiful landscapes, and a growing tech ecosystem with multiple employers clustered together, reducing risk and offering long-term career pathways.

While the US is pouring money into fabs, it may struggle to find talent due to tightening immigration and a lack of domestic graduates. Wales has a unique offer: a place where people want to live, work, and build careers. This strength in attracting and retaining talent doesn't just support the industry itself, it underpins a broader economic ripple effect.

With this level of impact already achieved, the opportunity now is to scale it further. It is clear that the cluster's contribution to regional prosperity is substantial: cumulative gross value-added (GVA) reached £255m in 2024. This wealth is typically reinvested into regeneration, high-value career creation, and economic diversification, which is particularly transformational in communities previously dependent on declining industries.

To build on this success, the UK must treat the compound semiconductor industry as a strategic priority. Sustained investment and commitment will help to fuel the skills development and infrastructure needed to maintain momentum. A prime example is the £250m investment by Vishay Intertechnology into Newport Wafer Fab, the UK's largest semiconductor facility, which is set to bring skilled job opportunities across a broad range of skills (including manufacturing and engineering) to South Wales. Vishay's investment is expected to directly support over 500 high-value, high-skilled jobs in the region and indirectly support hundreds more in the wider supply chain.

This kind of long-term industrial commitment is being matched by growing government ambition. Recently, the UK Government has pledged to grow its annual R&D spending by £2.26bn annually by 2030, with funding into the compound semiconductor industry

anticipated. There has also been a commitment of an £86bn boost to science and technology, which should give regions the power to carry out important and innovative research.

While this is an encouraging step, to unlock the potential of this investment it must flow across the entire lifecycle of semiconductors including manufacture and the accompanying supply chain. One example of this kind of targeted support is the Supply Chain Development Programme, launched by CSconnected and supported by Cardiff Capital Region — see **https://businessnewswales.com/building-a-thriving-ecosystem-within-south-wales-semiconductor-supply-chain-initiative**. The initiative is already helping to strengthen critical links in South Wales' semiconductor ecosystem by funding collaborative projects that enhance manufacturing capabilities and supply chain resilience.

Innovation and R&D leadership

Capabilities in the region go beyond manufacturing. The region hosts world-class R&D infrastructure: Cardiff University's Institute for Compound Semiconductors, Swansea University's Centre for Integrative Semiconductor Materials, the Compound Semiconductor Applications Catapult (CSA Catapult), and the translational facilities across the cluster.

CSA Catapult alone has engaged in over 156 projects between 2019 and May 2024. It has supported 1325 FTE jobs created and 3393 jobs safeguarded, with R&D revenue reaching nearly £4.5m in 2023–2024 (see csa.catapult.org.uk).

These success stories underscore an ecosystem where academic innovation is rapidly commercialized. Collaborative R&D accelerates technology readiness, creates high-quality jobs, and offers firms direct access to world-leading facilities and expertise.

Looking ahead

South Wales has emerged as a global leader in compound semiconductors — not through scale, but through a purpose-built, innovation-driven cluster. Anchored by companies like IQE, world-class research institutions, and infrastructure powered by SIPF and CCR, the region delivers technologies vital to connectivity, clean energy, and advanced computing.

With high-value jobs, £255m GVA, £466m in exports, and rising employment, the cluster is an economic anchor. Continued investment, collaboration and regional supply chain integration will be essential to sustain this trajectory. As global demand for compound semiconductors accelerates, South Wales stands not only as a region transformed — it stands as the hidden powerhouse shaping tomorrow's technologies. ■

***Author**: Howard Rupprecht, managing director, CSconnected*

Howard Rupprecht was appointed managing director of CSconnected in March 2024. With over 35 years of experience in the global electronics and semiconductor sectors, he combines deep technical expertise with strategic insight into investment, supply chain development, and stakeholder engagement.

Rupprecht's career began in electronics manufacturing at Lucas Electronics, before moving into international sales, marketing and business development for advanced production equipment in Silicon Valley. He later held senior leadership roles at VTT Technical Research Centre of Finland, where he specialized in technology commercialization and ran the Micronova R&D fab, Northern Europe's largest semiconductor research facility.

Returning to the UK, Rupprecht joined Rockley Photonics to build semiconductor supply chain capabilities and now supports cluster growth at CSconnected — helping to attract investment, promoting local, regional and national economic impact, and raising awareness of the semiconductor industry's importance.

The CSconnected compound semiconductor cluster

CSconnected is a £43m project focused on expanding the South Wales compound semiconductor industry. As the world's first compound semiconductor cluster, CSconnected brings together a unique community of academic institutions, prototyping facilities, and global high-volume manufacturing capabilities. This collaboration fosters cutting-edge research, innovation and global leadership, positioning Wales and the UK to compete globally in critical sectors such as 5G communications, autonomous and electric vehicles, advanced medical devices, sustainable technology and next-generation consumer electronics.

Through strategic collaborations and continuous investment in research and development, CSconnected is committed to maintaining Wales's position at the forefront of the global semiconductor industry, driving economic growth and technological innovation.

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