

1. What is the current and future anticipated demand for common products built with semiconductor materials (e.g. computer chips) both in the UK and globally?

Semiconductor materials and devices underpin our present way of life. The market demand for semiconductors and related technologies (including equipment) is going to be huge in the UK and globally. This will grow exponentially with more online trading; virtual meetings; increase streaming; gaming; Virtual and Augmented Reality; IoT; Smart Everything; EV; Autonomous Vehicles; Net Zero Energy related technologies; 5G / 6G Health / Well-being sensors and data handling; AI and Power Electronics.

You only have to look at how our world has changed in the past 2 years to see that the future will be increasingly dependent on more and more semiconductor technologies. The future is electrical (semiconductors), both from the energy and information perspectives.

All major world powers (China, US, EU, Japan, Korea) are investing hundreds of £Billions in semiconductor capability.

The UK needs to follow suit.

2. What is the UK's semiconductor supply chain and is this secure? If not, how can this be improved? What specific strengths does the UK have to contribute to regional or global semiconductor supply chains? How competitive is the UK within the global context of the semiconductor industry?

The UK has excellent Universities; some excellent 100mm to 200mm Fabs; world class companies in power devices, Compound Semiconductors and Semiconductor Equipment.

The UK does not have a vertically integrated sovereign supply chain in most semiconductor application areas.

It is essential that we develop these supply chains as well as capitalising on our areas of strength.

One area where there is potential to relatively easily develop the full supply chain is in Power Electronics and Automotive. This requires some visionary government intervention and also integration between all the players. In addition, a recognition by some automotive companies that they will need to develop and action vertical supply-chain integration strategies.

This is especially true if we are to cement our semiconductor supply to our British automotive companies such as Jaguar Land Rover.

There are also strengths in limited parts of the supply chain such as wafer epitaxy and semiconductor related equipment.

3. Are there opportunities for strengthening different parts of the current UK semiconductor industry? What are the potential weaknesses and strengths of the UK semiconductor industry to meet future requirements of electronic device manufacturing?

There are huge opportunities – highlighted by investments from other nations. Everyone recognises the market opportunity, which is both immediate and will be long term. The UK needs to be in the game or it will be left behind as a 2nd tier technology power with alarming vulnerability. An inability to source semiconductor components will adversely impact on the growth of the economy.

Strengths include power semiconductor devices which are used for net zero technologies. The largest semiconductor plant in the UK is based in Newport and manufactures around these power chips at high volumes. This plant could easily be scaled up at a fraction of the cost of building a new facility from a green field foundation. However as has been mentioned, this needs to be strengthened including full vertical supply chain integration for our automotive manufacturers to be able to take advantage.

4. In which industries does the UK not have an end-to-end semiconductor supply chain? Are there any opportunities for these supply chain gaps to be filled within the UK?

Make no mistake, the UK is totally reliant on overseas nations for the vast majority of our semiconductor components. An extremely small proportion of global semiconductor chips are manufactured within the UK.

No end-to-end supply chain for:

LEDs

Microelectronic processors

Opportunities in all, as market demand, economic payback, national security argument is there – but needs vision and government leadership.

Let's not forget that there is a £multi-billion Intel 300mm wafer fab in Ireland which has approximately 4,500 employees working at its Leixlip campus as of 2020, and as it has been a major contributor to the performance of the Irish economy.

The UK should be looking for similar opportunities.

5. How can the Government strengthen semiconductor research and innovation? Are there any current areas of weakness in the present Government strategy to semiconductor innovation? Is there effective communication between the various stakeholders within the UK's semiconductor ecosystem?

Government has to be much more ambitious and visionary in its thinking. To invest a few tens of millions of pounds is just a drop in the ocean.

Consider the cost of *not* investing in this key-enabling technology!

It needs serious investment.

There are opportunities though – for instance, Tata is looking to develop capabilities in microelectronics.

Also, TSMC may be looking for a manufacturing base outside Taiwan.

We have strength in Compound Semi, Power and equipment, as well as expertise.

There are existing Fab facilities, which could be repurposed at a much lower capital cost than building a completely new Fab.

6. Does the UK have the required skills, talent and diversity to be able to boost its current semiconductor industry and to respond to future disruption?

The academic and skills infrastructure is here in the UK.

However, there needs to be much greater investment in building the talent pipeline, in order to meet the demand for new employees from this growing industry. Many companies are planning imminent expansions requiring thousands of jobs to be created over the next few years.

We need to engage with more people from more diverse backgrounds.

Jobs are multidisciplinary.

The messages need to be clear – these jobs are not only for Electrical Engineering students!

7. What are the potential national security concerns or vulnerabilities in our semiconductor industry? How should the UK collaborate with the United States and European Union? What are the ramifications on other industries and the wider economy within the UK?

The concerns are very real, in that the UK will not have significant chip production capability and will therefore be vulnerable to chip shortages in key industries (the automotive industry has highlighted this recently). Semiconductor components are crucial to military hardware (aircraft, tanks, radar, comms, cyber security) – indeed the MoD have traditionally been heavily involved in semiconductor R&D but without the possibility to scale.

Make no mistake, there are hundreds of semiconductor components in the equipment needed for our current way of life; transport (cars, trains, buses etc.), medical equipment (life support, drug delivery etc.), energy infrastructure (renewables including wind, solar, tidal), consumer (computers, washing machines etc.). Semiconductors can be viewed as the complex “nuts and bolts” underpinning our civilisation.

In future, this will be the case in many other application sectors.

Will the EU chip manufacturers supply the German car industry in the first instance, before it prioritises UK car manufacturers? Of course it will!

The UK should be looking at this as a huge opportunity, to get on board an industry that is only ever going to expand.

8. Is the Government currently providing the clarity and direction required to enable growth and security in the semiconductor industry? Are the right governmental organisations involved with ensuring effective development of our current semiconductor industry to thrive in the future?

No, unfortunately not at all. The government does not seem to understand the importance nor appreciate the semiconductor industry – despite efforts and parliamentary enquiries.

The government needs to be much more visionary and ambitious - providing the incentives for integration.

Too many of our companies are adopting a “head in the sand” approach to semiconductor integration. Moreover many of our companies cannot get access to semiconductors due to the current shortage and are thus, suffering economically.

They have to switch on.

Government needs much closer ties with the industry – as is the case in other countries.

The UK has the lowest investment levels within the semiconductor industry compared to our G7 counterparts. This needs to change if we are to avoid becoming a vassal state.