

# An Overview of the Compound Semiconductor (CSC) Project and wider Cluster opportunities

February 2019



# Overview

- CCR City Deal & commitment to Compound Semiconductors (CSCs)
- About IQE plc
- About CSCs
- The CCR City Deal CSC Project – key features and outcomes
- The CSC Cluster
- Economic Impact Assessment

# City Deal & Compound Semiconductors

- In January 2016, George Osborne (then, Chancellor of the Exchequer) announced a new £50m UK national Catapult Centre to develop next generation CSC technologies
- IQE referenced as lead industrial partner
- City Deal Heads of Terms signed in 2017 & included an ambition to transform the UK's capability and help position CCR as the European leader in CSC applications
- CCR commitment to interventions that supported development of internationally-competitive CSC cluster

# About CSCs

- Silicon wafers have been the mainstay of the semiconductor industry over last 50 years
- Have driven over 45% of all GDP in last 50 years through ICT impact
- To date, silicon known as best semi-conductor - but severely limited
- Next generation 'advanced CSCs' are the future
- Silicon chip market exceeds \$350bn – but scaling reached limits
- Market for CSCs is c£25bn – but fastest growing segment in the industry



# About CSCs

- Compound semis are much more efficient than silicon
- Compound semis are already the “silent enabler” to a wide range of technologies which underpin modern society & fundamental to global communications
- Wafers produce 10bn wireless chips & 2bn photonic chips a year powering smartphone revolution & global broadband infrastructure
- Three mega trends that rely on CSCs:
  - Energy efficient technologies
  - Defence
  - Cyber and security

# The Market Opportunity of CSCs

## Healthcare, Robotics & Autonomous systems

Healthcare, medical diagnostics & treatment  
Robotics  
Self drive vehicles  
Machine awareness  
Advanced Sensor Technology

## Communications & Big data

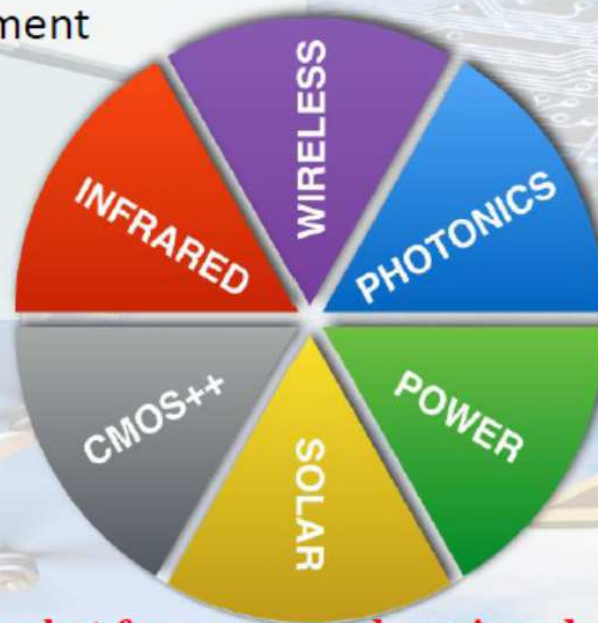
Mobile and infrastructure  
Data storage  
Internet of Things  
Wearables & TeleHealthcare  
Sensing and biophotonics

## Defense and Aerospace

Satellite power  
Communications  
AVs  
Infra Red Imaging  
Food Security

## Energy efficiency

Clean energy (CPV solar)  
Solid State Lighting (LED)  
Power switching  
Base Stations  
Factories of the Future



**‘The global market for compound semiconductor components utilised for electronic and photonic applications will be > \$104bn by 2020. Demand is forecast to grow to >\$128bn by 2025: CAGR= 12.6 %’ (Source: Global Markets for Compound Semiconductors, BCC Research 2013 ).**

# About IQE



- IQE Plc (HQ in St Mellons) specialist producer of CSCs
- 11 global outlets across US and Asia with >500 staff
- Founded in 1988. Global leader in the sector, with c55% market share
- No.1/2 supplier to all major customers across the world
- Virtually every smartphone, tablet and games console produced today contains IQE's wafers
- >95% of sales are exports
- Main market segments: wireless, photonics, infrared, solar & power across Health, Robotics, AI systems, Defence & Aerospace
- AIM listed, with a market cap of over £300m

# A strong and growing sector

- IQE plc as specialist producer of CSCs in the region
- Focused and growing supply chain presence in the region and Wales
- Over £270m of tactical and strategic investments in CSC R&D
  - Institute of CSC – early stage R&D – IQE partnership with WG and Cardiff University
  - CSC Centre of Excellence – prototyping – IQE and Cardiff University
  - Applications based Catapult Centre – led by Innovate UK
  - Has included investment from sources such as WG, WEFO, UK Research Partnership, EPSRC, Ser Cymru, HEFCW, Cardiff University and Innovate UK



# Bridging the 'Valley of Death'

## The Entities



Institute for Compound Semiconductors  
£75m



Compound Semiconductor Centre (CSC)  
£42m



## Technology Readiness Level



**CATAPULT**

£50m

**Cardiff Region CITY DEAL**



Horizon 2020  
European Union Funding  
for Research & Innovation

# Cardiff Capital Region City Deal ... Distributed wealth creation

The image displays a collection of logos for various organizations and government bodies, arranged in a grid-like fashion. The logos include:

- axiom** MANUFACTURING SERVICES
- Blaenau Gwent** County Borough Council
- Ford**
- SONY**
- GE Aviation**
- CAERPHILLY** COUNTY BOROUGH COUNCIL
- Cardiff University** PRIFYSGOL CAERDYDD
- GE Healthcare**
- PhotonStar**
- MERTHYR TYDFIL** County Borough Council
- Cyngor Bwrdeistref Sirol MERTHYR TUDFUL**
- monmouthshire** sir fynwy
- Microsemi**
- IRBUS**
- NEWPORT** CITY COUNCIL
- CYNGOR DINAS CASNEWYDD**
- RENISHAW**
- RHONDDA CYNON TAF** TRIFADAEITH GADNEN | DYFODOL SICR
- TVR** TORFAEN COUNTY BOROUGH
- BWRDEISTREF SIROL TORFAEN**
- GENERAL DYNAMICS**
- HM Government**
- ASTON MARTIN**
- VALE of GLAMORGAN**
- BRO MORGANNWG**
- Llywodraeth Cymru** Welsh Government

# CCR City Deal CSC Project (1)

- Aim to anchor company IQE in the region, grow the supply network & economic devices
- IQE engaged in new product development programme with one of the largest global OEM organisations in consumer electronics
- OEM invested at least \$1billion on venture.
- OEM profile & scale of reach means this was single biggest opportunity for a Welsh company to dominate market
- Driven by IQE's product – OEM will be at cutting edge of product innovation – drive adoption industry wide

# CCR City Deal CSC Project (2)

100 reactor tools needed to fulfil contract & wider demand

Significant commercial imperatives

Overseas options cheaper – but better alignment with wider developments in C

City Deal to invest £37.9m in acquiring & developing 375,000 sq. ft. P&T Building  
in Newport from Welsh Government

Head Lease to IQE - 11 year lease period with a flexible Option to Purchase

Catapult co-located in cluster

Over 5 years - £9.89 of private investment: £1 of CCR investment

CSC Foundry Limited established as Special Purpose Vehicle to deliver project

Procurement, State Aid and COMAH Planning - compliant

# The Cluster Opportunity – CS Connected

- Brand for the growing number of independent but related CSC activities in region
- Growing and connecting supply chain and more
- £40m+ bid to the UK Government ‘Strength in Places Fund’ – awaiting stage 1 notification
- Embedding the ‘eco-system’
- IQE has led this to date, with City Deal, Cardiff University, Wales Government and industrial partners

# Economic Impact – potential

- CSC represents strength in advanced manufacturing
- Foundry:
  - 2,395 jobs could be created, induced and safeguarded in Wales
  - High-value jobs with the average salary of IQE employees in 2016 being £42,345 – significantly higher than Wales average
- Cluster: driving productivity and growth, encouraging innovation & stimulating new business formation
  - Inclusive of Foundry figures, potential to increase job figures to 4-5,000 and new start ups/ SMEs
  - Work for CCR to do around governance, infrastructure, risk capital & branding – Strength in Places Fund critical to this
- World's first Compound Semiconductor Cluster